WAITAHA HYDRO SCHEME

Application for Concessions and Assessment of Effects

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EXECUTIVE SUMMARY

Westpower Limited is applying for concessions from the Minister of Conservation for the construction, operation and maintenance of a run-of–river hydro scheme on the Waitaha River. The proposal is to develop a hydro-electric power scheme based on a renewable resource for the benefit of the West Coast community served by Westpower. The Waitaha Hydro Scheme is located on conservation land administered and managed by the Department of Conservation. The land is classified as Stewardship Land. Concessions in the form of lease, license and easement are required to occupy and have access to the site. The application and proposed concession provide for both the temporary and permanent structures, works and activities associated with the construction and operation of the Waitaha Hydro Scheme.

THE APPLICANT

Westpower Limited (**Westpower**) is a 100% West Coast community owned company with its head office in Greymouth. Since 1999, when it was required by legislation to divest itself of a set of generation assets within the West Coast, Westpower has principally been an electricity distribution company, responsible for transporting electricity from the national grid to consumers.

In the mid 2000's the Government allowed distribution companies to re-enter the generation market. At this time Westpower and Harihari Hydro Ltd formed a joint venture company Amethyst Hydro Ltd and built a run-of-river hydro-electric power scheme on the Amethyst River north of Harihari. The Amethyst Hydro Scheme was commissioned in June 2013. The intake for the Amethyst Hydro Scheme is located in the Amethyst Ravine, with a penstock conveying water via a 1.1 km tunnel. From the tunnel to the powerhouse the penstock is mostly underground. An access road was constructed between the tunnel portal and the powerhouse. This scheme (except for the powerhouse) is predominantly on conservation land. Through the successful development of the Amethyst Hydro Scheme, Westpower has demonstrated the skills and experience required to develop a hydro generation scheme on conservation land.

The Waitaha Hydro Scheme (**Scheme**) on the Waitaha River is to be developed in response to a need for improving the reliability and security of supply within the West Coast, and more specifically within the Westpower distribution area. The focus is on developing renewable power generation to meet the needs of present and future generations. Westpower also has a responsibility to look for investments that will provide sustainable returns for Westpower consumers (the shareholders and also the community). The benefits of these returns remain on the West Coast and within the Westpower distribution area.

THE SCHEME

The Waitaha River is located 38 km south of Hokitika and extends from the Main Divide of the Southern Alps to the Tasman Sea on the West Coast. The Waitaha Catchment falls 2640 m over a length of 40 km with a total catchment area of 223 km^2.

The Scheme is located within and on the true right bank of the Waitaha River between the lower end of Kiwi Flat and Macgregor Creek within the Waitaha Valley, and within the northern half of the Westland District. It is predominantly on Stewardship Land managed by the Department of Conservation (**DOC**). Sections of the access road, at or on the north bank of Macgregor Creek are located on land that is privately owned or crown land administered by Land Information New Zealand (**LINZ**).

The Scheme will produce approximately 110-120 GWh per year with a maximum or peak output of about 16 – 20 MW. This is equivalent to providing electricity to approximately 12,000 households.

Currently the annual peak demand in the Westpower distribution area is 50 MW with up to 25 MW being generated on the West Coast by a number of small power stations including the new Amethyst Hydro Scheme (7.6 MW). Future demand is expected to increase over time. The Scheme once developed would significantly

increase the percentage of power generated and owned by the local community, and would make the Westpower area almost self-sufficient in power generation.

Technical and engineering feasibility studies have identified the Waitaha Valley as a good site for a run-of-river hydro scheme because of the ability to generate power economically and efficiently from a Scheme that has a small physical and environmental footprint.

This is a run-of-river scheme with no instream storage. It includes a low weir and diversion structure at the upstream end of Morgan Gorge. There will be no formation of a lake and no submergence of native vegetation, land or terrestrial habitat as a consequence of the weir. A tunnel approximately 1.5 km long will convey water from the intake to a powerhouse located below Morgan Gorge. The diverted water is returned to the Waitaha River via a tailrace.

An access road is required to the powerhouse site from the end of the existing public Waitaha Road. This is for the construction of the tunnel, powerhouse and associated structures which are all located on the true right of the river. Upon commissioning of the Scheme, this road will be retained for routine maintenance and inspection of the Scheme infrastructure. The transmission route within conservation land will follow this access road route.

It is proposed that the maximum volume of water to be diverted will be 23 cumecs (23 m^3/s) but the water take will vary depending on the flows in the river and the minimum residual flow. Westpower is proposing a minimum residual flow of 3.5 cumecs (or 3.5 m^3/s) immediately below the intake. The residual flow was established at a level which makes the most efficient and effective use of the hydro resource whilst ensuring that the life supporting capacity of the river is maintained. Side streams that enter the Waitaha River below the intake will increase the residual flow below the weir before full flow is restored to the river at the outlet of the tailrace, below the powerhouse. The abstraction reach would include approximately 2.6 km of the Waitaha River, including the Morgan Gorge.

A summary of the key features of the Scheme is provided in Table 1.

DEVELOPMENT ENVELOPE

Westpower is applying for a development envelope (**envelope**) within which the project (or construction) and operational footprint will be located. The project and operational footprints represent the maximum footprints required for the Scheme and these will not change within the envelope. The envelope represents the outer physical boundaries within which the Scheme will be located as well as providing some flexibility for final design, layout, construction methods and equipment while adhering to best practice standards for construction and the conditions required. This approach enables the most efficient and effective development of the Scheme with an ability to respond to technical, site and environmental matters as they arise. This is an approach Westpower has some experience with through the successful development of the Amethyst Hydro Scheme.

Any final design changes will fit within this maximum envelope and will not be out of character or scale with, or raise higher levels of potential effect than, the matters outlined in this application. The expert consultants engaged on this Scheme took this approach into account in assessing the effects of the Scheme and the preparation of their reports. The potential effects on natural values will not change as a result of the final design, layout, construction method or equipment used. A suite of draft conditions is suggested to ensure that this is the case. There is the potential for final construction designs to have less effect than those assessed, and Westpower seeks the ability to be able to achieve the best outcome possible for the Scheme within this location.

THE APPLICATION PROCESS

The technical reports commissioned for the Scheme and the Assessment of Environmental Effects have been prepared for both the concession and resource consent processes. This application focuses on the process and requirements for concessions from DOC, including the relevant legislation and planning documents.

Westpower decided to apply for concessions prior to the relevant consents because it is considered that the permission of the landowner of the conservation estate is critical to the success of the Scheme. If concessions are granted, Westpower can proceed to apply for resource consents from the West Coast Regional Council (**WCRC**) and the Westland District Council (**WDC**).

THE EXISTING ENVIRONMENT

Westpower has commissioned a range of ecological assessments to understand the ecological values within the area in which the Scheme is proposed and to provide a baseline for subsequent surveys in preparation of the AEE. This work commenced in 2005. Additional survey work was undertaken following a preliminary review of the original studies by DOC in 2012 and as suggested by DOC. These studies were further refined with the selection of the intake and powerhouse sites.

Prior to commissioning these reports there was a paucity of information. A wealth of new information about this area has been recorded and documented during these investigations. There have been significant key findings as a result of this work, for example the discovery of a significant long tailed bat population in the Kiwi Flat area and that the native koaro is the only fish found in the Waitaha River upstream of Morgan Gorge.

ASSESSMENT OF EFFECTS

The potential effects on the environmental associated with the Scheme fall into two general phases: construction and operational. Construction is expected to take 3 - 4 years at a minimum and has a higher level of effect than the operational phase. Table 12 in Section 7 of the application provides a summary of construction and operational effects.

Construction effects relate to the intense phase of activity involved with establishing the Scheme and associated infrastructure. This is the phase at which the majority of conditions are targeted to avoid or mitigate effects. This includes suggested conditions for a range of pre-construction activities, planning and monitoring to ensure the development of the Scheme is undertaken to achieve the optimal outcomes for both the Scheme and the environment.

Operational effects are in essence the residual effects of the Scheme post construction and relate to the visual presence of the intake structures at the entrance to Morgan Gorge, the presence of the powerhouse and associated structures, an access road across Macgregor Creek to the powerhouse, transmission line, and reduced flow in the abstraction reach between the intake and the discharge from the tailrace. There will be from time to time traffic movements for maintenance and monitoring of the Scheme, including the use of helicopters on an intermittent basis.

A range of ecological studies have been undertaken to understand the natural values of the area and to plan for the avoidance, remedy or mitigation of potential effects. These studies include aquatic ecology: fish; invertebrates and plants; whio/blue duck; and terrestrial fauna: birds; bats; lizard habitat; invertebrates; predators; and vegetation. Landscape and recreation assessments were also undertaken to assess the values of the Waitaha Catchment including in the context of local, regional, national and international significance. Each of the reports considers and assesses as relevant the potential effects from both construction and operation of the Scheme and makes recommendations in regard to mitigation and monitoring.

The assessments of effects of the Scheme on the existing values within the Waitaha Catchment have been closely considered. This has included consideration of options and alternatives (e.g. intake location) and a number of potential effects have been addressed through the planning, location and design process.

Consideration of the advice from experts and discussions with interested parties has resulted in a Scheme that has a small footprint that largely avoids or addresses potential and actual effects.

The potential effects on the environment and recommended measures to avoid, remedy or mitigate are identified in Section 7 of this document and the relevant technical reports in Appendices 6 – 21. For the potential effects identified a suite of suggested conditions has been developed in Section 9, based on the recommendations of the expert reports to ensure adverse effects are avoided, remedied or mitigated.

It cannot be said that there will be no effects arising from the Scheme as there will remain some moderate to higher levels of effect in regard to certain landscape and recreational matters. Of the other matters assessed the potential effects are generally able to be avoided or mitigated to a minor or less than minor degree. A specific monitoring programme, with associated response triggers, is proposed to assure that the blue duck population is not adversely effected.

The higher levels of effect are due to the actual physical effect of the introduction of structures into the environment and the abstraction reach controlled flow regime, at the local scale, and to wider perceptual effects for some users of the river. Having said that, the respective expert assessments conclude that:

- with respect to Natural Character, Landscape and Visual Amenity the Scheme will meet the emphasis of the Conservation Act, will sit well within its landscape and respond to its setting, and overall is considered appropriate with respect to natural character, landscape and visual amenity; and
- with respect to Recreation and Tourism while a hydro-development and backcountry-remote zone recreation management category are not compatible, the "Outcomes" of the CMS for the 'Hokitika Place' will still be achieved with the Scheme in place. At the wider regional scale, which is more appropriate for kayaking opportunities due to the mobility of kayakers and their national and international origins, the Report concludes that, "... *the effect of the Scheme on West Coast recreation and tourism generally will be very slight due to the high number of alternatives available for all activities affected by the Scheme and the relatively low level of use of the Kiwi Flat area ....* ".

While not a primary consideration in the approval of the concession, economic effects have also been considered to provide background and context as to why Westpower is investigating renewable energy generation on behalf of the West Coast community (the consumers/shareholders). There is also a range of positive effects/benefits which have been recognised through the development of the Scheme proposal and expert reports which are relevant when considering the Scheme on an holistic basis.

AVOIDANCE, REMEDY AND MITIGATION

Westpower has commissioned a range of technical and environmental assessments to ensure that the potential effects of the scheme are identified and where possible, avoided or otherwise remedied or mitigated. Each expert report contains recommendations to reduce adverse effects through measures such as design and suggested conditions for construction, operation and monitoring.

The iterative process that has been undertaken as part of the development of the Scheme has enabled the avoidance of many potential adverse effects. This includes, for example, the avoidance of activities on Kiwi Flat by the selection of an intake at the bottom of Kiwi Flat rather than at the top of the flat, and the access road alignment to avoid the Stable Tributary.

Design, construction and operational methods will be developed and employed to incorporate best practice techniques which will be outlined in proposed management plans. These plans will set out the objectives of the plans, how the construction works will be staged, the timing and duration of the various stages, methods of construction and methods for avoiding, remedying or mitigating effects.

The expert recommendations for mitigation and monitoring form an integral component of the application and the suggested draft concession conditions. The suggested conditions (Section 9) seek to ensure that the

assessed levels of effect, which are based on mitigation having been undertaken, of the Scheme are achieved, or where possible reduced. Post construction monitoring is proposed to ensure that and appropriate action, where required is undertaken.

STATUTORY PROVISIONS

In assessing the concession application the Minister must consider a number of matters as set out in *Part 3B* of the Conservation Act 1987 (**Act**), including:

- the effects of the proposed activity, and the possible avoidance and mitigation measures available and proposed;
- whether the concession is consistent with the West Coast Conservation Management Strategy 2010 - 2020 (**CMS**);
- the values of the natural and historic resources the Stewardship Land status seeks to protect;
- whether the granting of the concession application, with or without conditions, would be contrary to the purpose of a Stewardship Area; and
- whether the granting of the concession application, with or without conditions, would be contrary to the provisions of the Act.

Taking into account the potential effects, and the proposed measures to avoid remedy or mitigate those effects, it is considered that the granting of this Concession application with the suggested conditions will:

- be consistent with the CMS and will not compromise the desired conservation "Outcomes" for the 'Hokitika Place' and the West Coast Conservancy; and
- not be contrary to either the purpose for which the land is held as a Stewardship Area or the provisions of the Act.

CONSULTATION

As detailed in Section 12, since March 2012, Westpower has consulted with a wide range of individuals and groups. Westpower intends to continue consultation after the lodgement of this application.

Westpower has provided opportunities for consultation early on and prior to submitting the application to identify the concerns that individuals or groups may have and to consider these in the planning and development stages of the Scheme.

Westpower selected the Scheme option that was determined to have a lesser environmental effect and incorporated features into the Scheme that addressed the concerns of some of the interested parties.

CONCLUSION

The application is complete and contains sufficient information to enable consideration of the effects of development and operation of the Scheme.

The application is for the development of a Utility, being a hydro-electric power scheme, on conservation land and it is not reasonable, based on an assessment of alternatives, to locate the Scheme outside conservation land or elsewhere on the river.

It cannot be said that there will be no effects from the Scheme, however it is considered that the granting of this application, with appropriate conditions as suggested, would not undermine the protection of the natural and historic resources of the Stewardship Area in that the natural and historic resources will be maintained as far as is practicable, given the nature of such a scheme, in its current state.

The Scheme is consistent with the West Coast Conservation Management Strategy 2010-2020 and will not compromise the desired conservation "Outcomes" for the 'Hokitika Place' and the West Coast Conservancy.

It is considered that the granting of the concession would not be contrary to the purpose for which the land is held, as a Stewardship Land, or the provisions of the Act.

Accordingly it is considered that the application is not inconsistent with the provisions of the Act or the West Coast Conservation Management Strategy 2010 - 2020, is not inappropriate in the circumstances having regard to Section 17U of the Act, and can be granted by the Minister.

Table 1: Summary of Scheme - Key Features.

Feature	Description
Headworks	
Intake and weir	Elevation 238 m asl Intake water diversion channel Low level weir No storage of water
Subsurface Structures	
Sediment Settling basin(s)	Sited underground Flushing tunnel outlet approximately 400 m down Morgan Gorge
Tunnel	Approximately 1.5 km long Maximum dimensions 8 m wide x 7 m high Varying supports and rock conditions
Penstock	Maximum 2.7 m diameter Approximately 1.7 km long Bifurcated and buried between tunnel exit portal and powerhouse Or alternatively a pressure tunnel
Powerhouse Site	
Powerhouse	Elevation 130 m asl Approximately 15 m x 30 m Maximum height above ground 10 m 5 m underground Shape and size determined by generating equipment housed within
Turbines	2 turbines
Switchyard	Area approximately 20 m x 20 m
Main Access Road	Located between the end of Waitaha Road and the powerhouse and lower tunnel portal exit Total length approximately 7 km long Approximately 2.0 km on conservation land
Transmission Route	66 kV Follows road access route within conservation land
Maximum Peak Output	16 – 20 MW
Annual output	115 – 120 GWh
Maximum water take	23 m^3/s (cumecs)
Minimum Residual flow	3.5 m^3/s (cumecs) immediately below intake
Gross Head	Approximately 100 m

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1. INTRODUCTION

1.1 PROPOSAL OVERVIEW

Westpower is a 100% community owned company and is proposing to build a run-of-river hydro-electric power scheme on the Waitaha River. As detailed in Section 2, the Scheme has been developed in response to a need for improving the reliability and security of supply within the West Coast and more specifically within the Westpower distribution area. The focus of the Scheme is on developing renewable and sustainable power generation to meet the needs of present and future generations of the West Coast community. In achieving this outcome Westpower has a responsibility to ensure that any investment will provide returns for Westpower consumers (also referred to as the shareholders), benefit the community and will last into the future. Community ownership of the Scheme ensures that all benefits remain on the West Coast and within the Westpower distribution area.

Westpower is applying for concessions for access and to construct, operate and maintain a run-of-river hydro–electric power scheme on the Waitaha River, which is located within conservation land managed and administered by DOC. The Waitaha River is located approximately 15 km south of Ross.

The Scheme will produce approximately 110-120 GWh per year with a peak output of about 16–20 MW. This is equivalent to providing electricity to approximately 12,000 households.

Currently the annual peak demand in the Westpower distribution area (refer Figure 1) is 50 MW with up to 25 MW being generated on the West Coast by a number of small power stations including the recently constructed Amethyst Hydro Scheme (7.6 MW). Once operational, and in terms of current annual peak demand this Scheme will make the Westpower area almost self-sufficient in local power generation (from 50% to 90%) in terms of peak demand, thereby reducing the need for, and reliance on, electricity generated and imported from outside the region. The Scheme would also significantly increase the percentage of power generated and owned by the local community (from 14% to 54%). This in turn gives the community greater management and control of the electricity assets on which it relies to meet its current and future needs.

The Scheme is a run-of-river design with no instream storage (i.e. does not require the impoundment of water above the intake). It includes a low weir and diversion structure at the entrance to Morgan Gorge. There will be no lake formed as a result of this development, no submergence of native vegetation, or loss of use of the area up-river of the intake site. A tunnel approximately 1.5 km long will convey water from the intake to a powerhouse located below Morgan Gorge. The diverted water is returned via a tailrace to the Waitaha River some 2.6 km downstream of the intake site.

The Scheme will take and divert a maximum of 23 cumecs, although this water take and diversion will vary depending on the flows in the river and the residual flow proposed to remain in the river. It is proposed the diversion of water will be managed to ensure that a residual flow of 3.5 cumecs will remain in the river immediately below the site of the intake. Side streams that enter the Waitaha River below the intake will augment the residual flow below the intake site before full flow is restored through the discharge of the water back to the river via the tailrace below the powerhouse. The section of Waitaha River between the intake site and the tailrace outlet, described as the “abstraction reach”, is approximately 2.6 km and includes the Morgan Gorge.

An access road is required to the powerhouse site from the end of the existing public Waitaha Road. This is for the construction of the tunnel, powerhouse and associated structures which are all located on the true right of the river. Upon commissioning of the Scheme this road will be retained for routine maintenance and inspection of the Scheme infrastructure. The transmission route will follow this access road route within conservation land.

1.2 THE DEVELOPMENT ENVELOPE

In applying for this concession, Westpower is seeking concessions within a development envelope (**envelope**) within which the Scheme will be constructed.

The envelope represents the outer physical boundaries within which the Scheme will be located as well as providing for flexibility with final design, lay out, construction methods and equipment while at the same time adhering to best practice standards for construction, mitigating potential effects on the environment and fulfilling the conditions of the concession and any resource consents issued by other authorities. The maximum construction and operational footprints of the Scheme have been defined and these will not change. Maps outlining the Scheme areas are found in Appendix 1.

The envelope has been refined to the point of application through a process of option selection, Scheme design/location, and expert assessment in order to avoid, remedy or mitigate potential effects. Westpower has engaged a wide range of independent experts who have comprehensively assessed the potential effects arising from the Scheme and have been integral in the approach to developing the Scheme envelope. Westpower has taken an "environment first" rather than "engineering first" approach. The avoidance of adverse environmental effects, where possible, has been the primary objective and where this is not practical then mitigation is proposed. This approach has led directly to the options chosen in terms of Scheme design and location and the avoidance of a number of potential adverse effects of the Scheme.

This envelope approach has provided the ability to take into account a range of site factors such as topography, geology, waterways and vegetation. There has also been the ability to fine tune the Scheme and ensure efficiency of design and the ability to avoid or mitigate localised effects through the construction process. The access road to the powerhouse site provides an example of how this approach is used.

A road corridor of 10 m has been proposed to accommodate the proposed road cross section (including water tables) within the generally flat to rolling topography. An additional 10 m has been included to allow for the transmission line, to provide sufficient clearance from the road edge and allow for vegetation clearance required for power poles and overhead power lines. A maximum total cleared corridor of 20 m width has therefore been allowed for in the application but vegetation will only be cleared as required. The final alignment of the road however is still to be confirmed and for this reason, as well as to accommodate the identified cleared footprint, a wider band is indicated (refer Appendix 1: Map 6). As well as providing a safe and efficient access route, the final road alignment will seek to follow a route that avoids any key vegetation, large trees and potential bat roosts and to maintain at minimum a 10 m buffer between the road and both the Waitaha River and the ecologically sensitive Stable Tributary as described in Section 4.9. The ability to locate the road corridor within this envelope means that these site specific issues can be provided for and also ensures that potential effects are avoided or mitigated.

A conservative approach has been adopted in regard to the envelope as the assessments are based on a maximum construction and operational footprint as well as maximum construction and operational requirements. The expert consultants engaged on this Scheme took this approach into account in assessing the effects of the Scheme and the preparation of their reports. The potential effects on natural values will not change as a result of the final design, layout, construction method or equipment used.

Any final design changes will fit within this maximum envelope and will not be out of character or scale with, or raise higher levels of potential effect than, the matters outlined in this application. There is the potential for final construction designs to have less effect than those assessed, and Westpower seeks the ability to be able to achieve the best outcome possible for the Scheme within this location. This approach will ensure the most efficient and effective development of the Scheme and the ability to attend to specific site features to fit into the environment within which the Scheme is to be located. This approach ensures that the environmental

values of the site are not compromised and that necessary flexibility for the engineering requirements of the Scheme is allowed for.

The use of a development envelope was an integral component of the recently completed Amethyst Hydro Scheme. The development of that Scheme was very successful and provides an example of how construction can be managed in a very constrained site within a very small footprint using the flexibility provided by an envelope to ensure the best site specific outcomes. The same principles used in the construction of the Amethyst Hydro Scheme will be applied to the construction of the Waitaha Hydro Scheme.

1.3 DOCUMENT STRUCTURE

Westpower has decided to apply for the relevant concessions first. Applying for resource consents from the WDC and the WCRC under the Resource Management Act 1991 (**RMA**) will be dependent on the outcome of this process.

This application has been developed to provide a comprehensive overview of the Scheme including a level of detail and assessment of effects appropriate to the concessions sought. It will be noted that the expert reports have been prepared to take into account both the Conservation Act/concession and RMA processes to ensure an integrated assessment and consideration of values and potential effects. The actual applications (concession vs resource consents) themselves are separate and will focus on the issues relevant to each process. This application for concessions focuses on the use of conservation land for the purposes of the Scheme.

The concession application is divided into thirteen sections as set out in Table 2. The sections are set out to enable both the provision of a complete application (Sections 17(S) and (T)), and provide for matters to be considered by the Minister (Section 17(U)). A decision on the application is made pursuant to Section 17T of the Act.

Table 2: Document Structure.

Application		Conservation Act 1987	
Section	**Description**	**Section 17S**	**Section 17U**
1	**Introduction** An introduction to the application and provides an overview of the proposal and the development approach being used.	(1)(a)	(1)(a), (c), (d) & (e)
2	**The Applicant** Information about Westpower and the drivers for this proposal.	(1)(f)	(1)(a), (d) & (e)
3	**Land Description** Includes the following details: • the land over which the concessions are being sought; • where activities will be undertaken; • activities that require concession; • types of concession; • term sought; and • a brief summary of the resource consent matters.	(1)(b), (d) & (e) (2)	(1)(a), (d) & (e) (5), (6)
4	**Existing Environment** Describes the existing environment including the physical, landscape, ecological, recreational, heritage and cultural aspects.	(1)(b)	1(d), (e)
5	**Scheme Overview: Operational Infrastructure** An overview of the operational aspects of the Scheme, the facilities and infrastructure required.	(1)(a)	(1)(a), (d) & (e)
6	**Description of Construction** A general overview of the construction period, key stages and methods associated with development of the Scheme.	(1)(a)	(1)(a), (c), (d) & (e)
7	**Assessment of Environmental Effects** An overview of the Assessment of Effects for each of the specialist areas considered. The Assessment of Effects is supported by comprehensive expert reports in Appendices 6 to 21.	(1)(c)	(1)(b), (d) & (e)
8	**Avoidance, Mitigation and Monitoring** A review of avoidance and mitigation methods for managing any adverse effects.	(1)(c)	(1)(b), (d) & (e)
9	**Suggested conditions** A suite of suggested conditions to avoid or mitigate potential effects of the Scheme.	(1)(c)	(1)(b), (d) & (e)
10	**Statutory Provisions** A review of statutory planning regime as it applies to the land for which concession is sought.	(1)(b)	1(d), (e) (3), (4)
11	**Alternative Locations and Options** An overview of the alternatives considered in reaching the final location and general design of the Scheme.	(1)(c)	1(d), (e) (4)
12	**Consultation** An overview of the consultation undertaken prior to, and during, the preparation of this application.		1(d), (e)
13	**Conclusion** A conclusion for the application and matters to be considered in granting the application.	Decision under Section 17T(2) & (3)	

2. THE APPLICANT

2.1 WESTPOWER

Westpower is a 100% West Coast community owned company with its head office in Greymouth. The West Coast Electric Power Trust was formed as a consequence of the passing of the Energy Companies Act 1992. The Trustees, who are elected by the community every two years, hold the shares of Westpower on behalf of the consumers (also referred to as shareholders) of Westpower.

In 1999, Westpower was required, by the Electricity Industry Reform Act 1998, to sell its electricity generation assets. The assets at that time included the: Kumara – Dillmans – Duffers Scheme; Arnold; Kaniere Forks; Mackay Creek; Wahapo; Fox Glacier and the Turnbull power schemes. This effectively meant that the local community retained no ability to be self-sufficient in terms of local electricity generation and the management of these resources to meet current and future needs. After the reforms, the Westpower Board of Directors led the company through a period of consolidation, focusing primarily on operating and maintaining its distribution network.

The Westpower distribution network (Figure 1) covers 18,017 square kilometres from Lyell in the north to Paringa in South Westland, consists of over 2,000 km of power lines, and supplies more than 13,000 consumers.

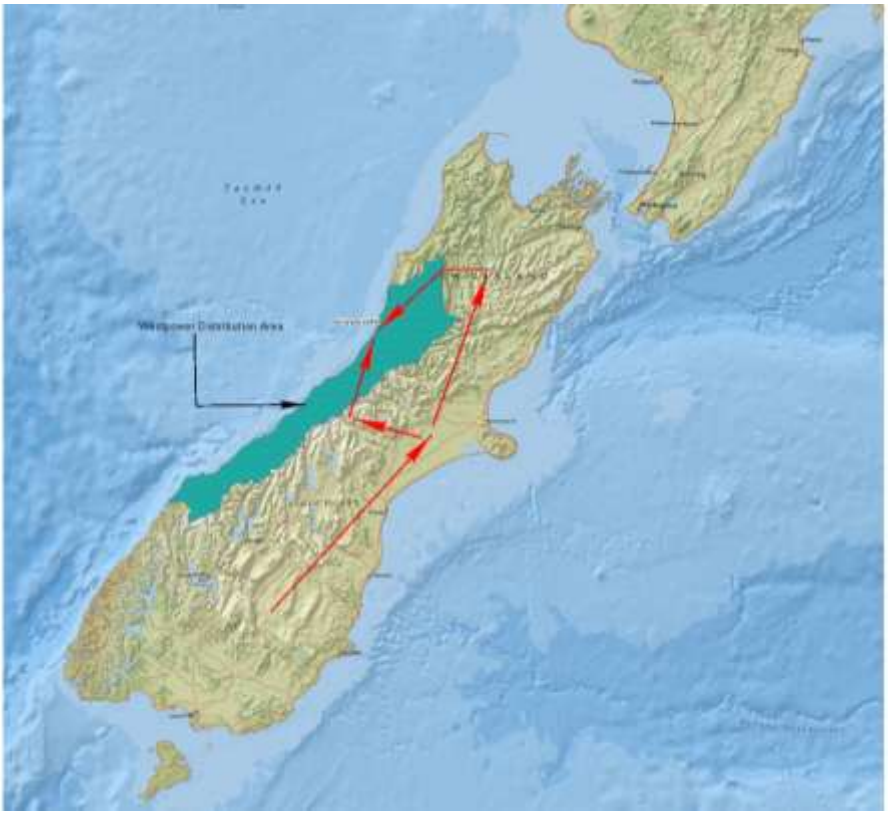

Figure 1: Westpower distribution area with main transmission routes (indicated by red arrows) into the West Coast.

Westpower owns electrical contracting and consultancy businesses that form the ElectroNet group of companies. Since the mid 2000's, when the Government allowed distribution companies to re-enter the generation market, Westpower has moved back into generation with the construction and the commissioning

of the Amethyst Hydro Scheme in June 2013. Westpower is not an electricity retailer. The company structure is outlined below.

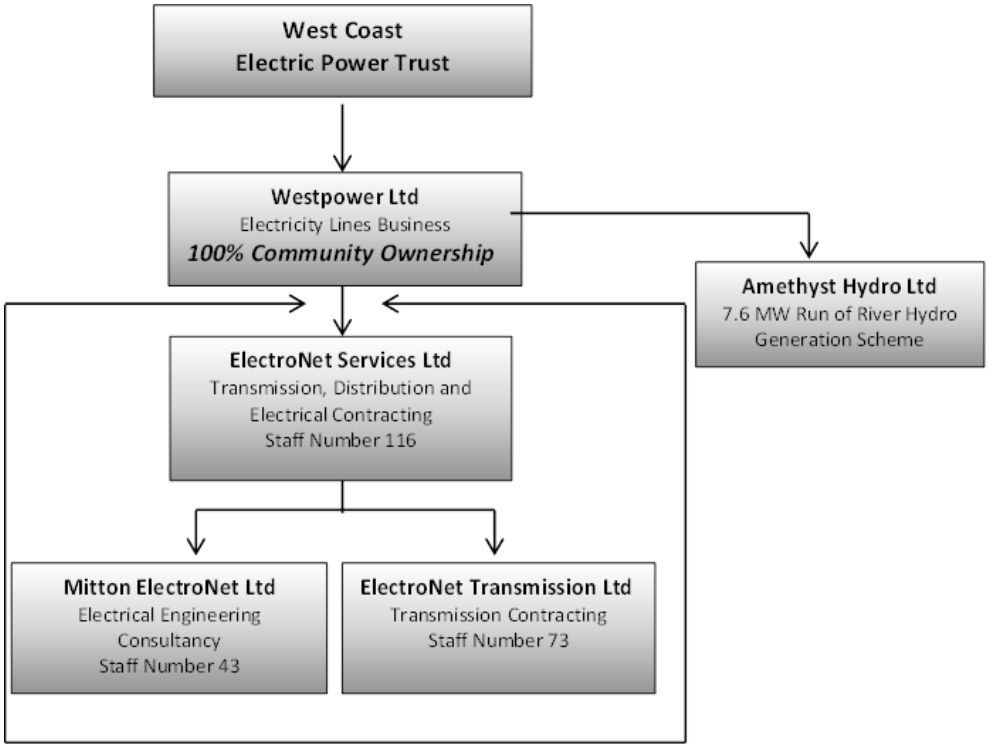

Figure 2: Westpower Company Structure.

Amethyst Hydro Ltd is a joint venture company (an 88% owned subsidiary of Westpower and 12% owned by Harihari Hydro Ltd) which owns and operates the Amethyst Hydro Scheme. Following nine years of planning, design and construction, the Scheme commenced generation in mid June 2013. The support of the local community has been instrumental in ensuring the construction of this important piece of community-owned West Coast electricity infrastructure.

ElectroNet Services Ltd was formed as a subsidiary company of Westpower when it restructured its electricity distribution activities after the Government reforms in 1997. This restructure included transferring all Westpower staff into ElectroNet Services Ltd to provide electrical contracting services to Westpower. ElectroNet Services Ltd has grown significantly in recent years as the result of a planned approach to growing the organisation. The company now provides transmission, distribution and electrical contracting services.

Mitton ElectroNet Ltd is a Christchurch based consultancy company, providing electrical engineering services to many New Zealand and overseas electricity generation, transmission and distribution companies. Mitton ElectroNet Ltd was formed in 2007 following ElectroNet's acquisition of Mitton Consulting, a Christchurch based electrical engineering consultancy. The company offers a comprehensive and professional service that delivers integrated client solutions. Mitton Electronet Ltd provided the civil engineering services and project management for the construction of the Amethyst Hydro Scheme and is involved in the development of this Scheme.

ElectroNet Transmission Ltd is a Nelson and Greymouth based company, providing electricity transmission, maintenance and build services throughout the West Coast and Nelson/Marlborough regions.

Westpower plays an important role in advocating on behalf of West Coast consumers and in recent years has had a major role in lobbying for the upgrading of transmission capacity into the region. Transpower is

responsible for transmitting electricity into all regions of New Zealand via high voltage power lines (the national grid). Westpower and Transpower have been able to work successfully together, to ensure that there is a secure electricity supply into West Coast Grid Exit Points which are located at Reefton, Dobson, Greymouth, Atarau, Otira, Kumara and Hokitika.

2.2 DRIVERS FOR THE WAITAHA HYDRO SCHEME

Westpower is principally an electricity distribution (or network) company and is responsible for transporting electricity from the national grid to consumers (homes and businesses), however Government reforms in the mid 2000's, enabled Westpower to investigate and progress the Amethyst Hydro Scheme.

The recently commissioned Amethyst Hydro Scheme provides an excellent example of how Westpower approaches hydro-electric power scheme development in an environmentally sensitive manner. The Amethyst Hydro Scheme was constructed near Harihari on land administered by DOC. It demonstrates the low environmental impact that can be achieved through a collaborative approach with DOC to ensure that environmental values are carefully maintained.

The Amethyst Hydro Scheme has a very small footprint and illustrates how significant advantages can accrue to the local community through small scale run-of-river hydro development. Westpower is committed to quality developments and sound environmental practices and expects to apply the same key success factors to the Waitaha Hydro Scheme.

The Waitaha Hydro Scheme is consistent with the following Westpower goals.

A. Improve the reliability and security of supply within the West Coast and more specifically within the Westpower distribution area.

As for any other company, Westpower's directors and senior management are obliged to explore opportunities to grow the business and provide returns to its consumer-shareholders. However an important difference in this case is that the consumer-shareholders are also the local community, therefore any benefits to the company are in effect benefits to the community. For Westpower those returns are not necessarily just in terms of financial dividends, but also in terms of providing sustainable, secure and reliable renewable electricity generation and delivery to its consumers. Developments such as hydro-electric power schemes provide the opportunity for long term sustainable benefits which meet both the financial and non-financial requirements of the community. All returns remain on the West Coast and within the Westpower distribution area.

With the Waitaha Hydro Scheme operational, there would be sufficient generation capacity to run all of South Westland and Hokitika. The local generation Westpower is developing is able to assist during transmission outages. This is particularly important in the event of the short term loss of all transmission into the region. Local generation schemes such as the Amethyst and the Waitaha Hydro Schemes are designed to be able to run when a local-transmission outage is experienced.

Together the Waitaha and Amethyst Schemes are big enough to provide a stable source that other smaller power stations on the Coast can synchronise to. Under normal operating conditions, the electric power used within a power station is provided from the station's own generators. If all of the plant's main generators are shut down, station service power is provided by drawing power from the national grid through the plant's transmission line. However, during a major outage on the lines coming into the Westpower area, this power supply would not be available. In the absence of power from the national grid, the Waitaha and Amethyst Hydro Schemes can provide sufficient power to enable these smaller stations e.g. the Arnold to restart and minimise the disruption of supply to the community.

This is a definite advantage in improving security of supply within the Coast. There is a major benefit for all consumers in having local generation assisting supply should either a local transmission outage or national grid outage occur.

B. Look for investments that will provide returns for Westpower consumers (the shareholders) that will last into the future.

As a 100% community owned company, any profits made by Westpower are reinvested in the community in a number of ways, including the discounting of line charges from time to time. This is a very direct way of sharing profits, and at the end of 2013, $2,000,000 was returned to consumer-shareholders via a discount to line charges.

Westland is currently vulnerable to variable demand, which currently exceeds local generation, along with high electricity transmission charges. The Scheme would make the Westpower area almost self-sufficient in power generation. The Scheme would also significantly increase the percentage of power generated and owned by the local community rather than an increased reliance on generation companies with a national focus.

The current electricity supply relies on the importation of electricity over long distance transmission lines. Transmission losses approaching up to 20% occur as a result of power being imported from outside the West Coast (refer Figure 1). This results in costs to the wider community in terms of energy loss as well as to the local West Coast community in terms of financial costs.

The longer term and perhaps less obvious direct benefits from investing in local power generation come from improving economic confidence and the resulting development and infrastructure that may result from this. The Scheme would enhance security of supply in the West Coast region, in turn providing potential investors and developers with the confidence to invest in the West Coast region, assured that their energy demands can be met in both the medium and long term.

The long term benefits of reduced transmission losses and security of supply underpin these economic benefits. These economic benefits are discussed in more detail in the Assessment of Economic Effects (**Economics Report**) prepared by Brown & Copeland, 2014 in Appendix 21.

C. Investigate the opportunities for developing renewable power generation to meet the needs of present and future generations.

Prior to the electricity reforms in the 1990s, Westpower was involved in hydro-electric power schemes on the West Coast. There is the opportunity to be involved again which Westpower sees as a positive way in which to best serve the West Coast community.

The West Coast has plentiful natural water resources and the potential for small community owned hydro schemes needs to be explored. This does not mean that every West Coast river will be suitable for a hydro scheme, and over the past decade, Westpower has undertaken investigations into the feasibility of hydro schemes within the Westpower area. The process by which Westpower selected the Waitaha River is outlined in Section 11.

There are currently nine hydro power stations (ranging in size from 430 kW to 7,600 kW) within the Westpower distribution area. However, to meet energy demands, the region remains reliant on energy coming from Canterbury via Lake Coleridge and Otira and from Nelson via Inangahua (2 lines). Locally generated electricity will reduce the reliance on importing electricity. Moreover, as a community owned company, any profits that are made from the Scheme are ultimately directed back to the consumers in the area.

As outlined in the Economics Report there is uncertainty surrounding the future plans of the Tiwai Aluminium Smelter (which consumed 13% of New Zealand's total electricity demand in 2012). Also the demand for new electricity generation capacity may be restricted by restructuring of the wholesale electricity market by a

future government. Notwithstanding these future uncertainties, there will be a role for new renewable energy sources like the Scheme in meeting electricity demand, even if demand growth is slow. New renewable sources of supply will be required to replace retired thermal capacity. Also the Scheme will enable an increase in West Coast electricity supply self-sufficiency (Brown & Copeland, 2014).

Apart from the Amethyst Hydro Scheme, all other power generation schemes within the Westpower distribution area are owned by Trustpower or NZ Energy[1], both of which are private companies. Westpower differs from these companies in that it has a focus on providing and managing generation and supply for the benefit of the local community.

Westpower's focus is on its own area with a particular interest in ensuring security of supply for consumers. With a relatively short construction period, and small footprint, this Scheme may start a lot sooner than larger projects and will remain community owned and managed.

This proposal is consistent with the New Zealand Energy Strategy target for renewable electricity generation. The target is - *"that 90% of electricity should be derived from renewable energy sources by 2025".* While the total annual power generation on the West Coast is very small when compared to national generation, increasing self-sufficiency on the West Coast will contribute in replacing non-renewable energy (e.g. thermal generation) elsewhere. New Zealand suffers from a geographical imbalance between electricity production and consumption in that electricity is required to be transmitted across large distances from the point of generation to the point of use. This can, and does from the experience of transmission into the West Coast, result in loss of energy over distance. Producing power close to where it is used conserves energy that is otherwise lost via transmission and is more efficient and effective.

While in the short term the increase in demand for electricity has slowed and the forecasts are less optimistic than had previously been the case; this Scheme is a very long term investment which will span several generations. On the basis of moderate future growth in the economy and population, the Ministry of Business, Innovation & Employment is forecasting future growth in demand averaging between 0.9% and 1.3% per annum over the period 2012 to 2040. The Ministry's assumed average growth in gross domestic product over the 28 year period is less than the 2.2% averaged over the period 1990 to 2004. Also much of the growth to occur is assumed to take place in the less energy intensive service sector of the economy, whilst energy efficiency improvements are assumed to continue. These factors explain the expected slower growth in electricity demand in the future (Brown & Copeland, 2014).

Currently the annual peak demand in the Westpower distribution area (Figure 1) is 50 MW with up to 25 MW being generated on the West Coast by a number of small power stations including the recently constructed Amethyst Hydro Scheme (7.6 MW). Once operational, and in terms of current annual peak demand this Scheme will make the Westpower area almost self-sufficient thereby reducing the need for, and reliance on, electricity generated and imported from outside the region. The Scheme would also significantly increase the percentage of power generated and owned by the local community. This in turn gives the community greater management and control of the electricity assets on which it relies to meet its current and future needs

The driver for long term security of supply and meeting the energy demands of the Westpower area is not incompatible with the drive to conserve energy or to improve energy efficiency. Increasing local generation to meet local needs is an effective and efficient use of local renewable resources.

[1] refer Appendix 22: Table 1 for a summary of power schemes and their ownership within the Westpower distribution area.

3. LAND DESCRIPTION

Westpower is proposing to build the Scheme within and on the true right bank of the Waitaha River which is located approximately 15 km south of Ross and 38 km south of Hokitika, Westland.

The Scheme is situated about 11 km upriver from where State Highway 6 crosses the Waitaha River. An access road is required from the end of the Waitaha Road (on the north side of the Waitaha River) to the powerhouse site and tunnel portal. The first section of the access road crosses over privately owned farmland and land managed by LINZ before crossing Macgregor Creek, part of which is managed by either LINZ or DOC (depending on the final road alignment) and then enters conservation land after which the road continues up the true right of and parallel to the Waitaha River.

The location of the Scheme, the various key components and the envelope are shown on Maps 1-7 in Appendix 1. Appendix 2 provides a series of photographs showing the Waitaha River and surrounds and the location of components of the Scheme.

3.1 LEGAL DESCRIPTIONS

The Scheme components comprised in this application occur in the Waitaha Forest conservation unit, which is classified as Stewardship Land and is administered by DOC. The Scheme is located on land legally described as Reserve 1672 and Section 1, Survey Office Plan 12094 (Conservation Act 1987) and includes components within the bed of the Waitaha River and part of Macgregor Creek.

Table 3: Conservation land subject to this Application

Landowner/Manager	Legal Description	Key Topographical References
Department of Conservation	Stewardship Land within Reserve 1672 and Section 1 Survey Office Plan 12094 and includes part of the bed of the Waitaha River and part of the bed of Macgregor Creek.	Powerhouse Site: c. NZTM E1415320; N5223700. Tunnel Portal at PH site : c. NZTM E1415324; N5223550, Intake Site: c. NZTM E1415825; N5222160 Contractors Facility: c. NZTM E1416125;N5222050

This land lies within the wider Wilberg Ecological District which encompasses the Waitaha, Wanganui, and Poerua catchments and the majority of the Perth catchment.

The general area of the proposed activities is predominantly within parts of the bed of the Waitaha River, on the true right bank of the Waitaha River between and including part of Macgregor Creek and the lower end of Kiwi Flat.

As shown in Table 4, some activities e.g. road access and sections of the transmission route are required over privately owned land and crown land administered by LINZ. The use of these areas of land will be dealt separately with the relevant landowners or agencies and does not affect this application. The information contained in this application focuses on the works required, and associated potential effects, on the conservation land.

Table 4: Adjacent Landowners.

Landowner/Manager	Legal description
Crown Land	Pt Rural Section 4149 Part Bed of Macgregor Creek and Waitaha River
Macleans	Lot 2 DP 376096 being adjacent to Macgregor Creek

3.2 LAND AREAS

The project footprint (also referred to as the construction footprint) encompasses both construction and operation activities and includes temporary and permanent installations, infrastructure and access ways. It represents the maximum area which may be required for the development, operation and maintenance of the Scheme. The project footprint (Table 5) allows for all works including vegetation clearance and any areas that are non-vegetated e.g. for works in the beds of a waterway.

The operational footprint is the permanent footprint once construction is completed, temporary structures have been removed, areas of land are rehabilitated and the Scheme is operational.

An exception to this, in terms of the development is the use and maintenance of sub-surface structures. In this case the project footprint has allowed for a 10 m wide tunnel corridor over the 1,500 m length of the tunnel. The final tunnel alignment will be based on the results of investigative drilling. It also allows for construction of other subsurface structures such as sediment settling basins, access and flushing tunnels. Therefore, as shown below the project footprint for subsurface structures will be the same as the operational footprint.

Table 5: The Project and Operational Footprints.

	Project Footprint Hectare (ha)	Operational Footprint Hectare (ha)
Surface Area:		
Area 1: Headworks	0.73	0.235
Area 2: Powerhouse Site	2.0	1.3
Access Road	2.6	2.4
Total Surface Area	**5.33**	**3.935**
Total Subsurface Area	**2.6**	**2.6**

Note:

1. *The surface figures include:*
   a) the areas estimated for vegetation clearance as provided in the report on Terrestrial Flora Description and Assessment (TACCRA 2013 Appendix 15) and
   b) allows for the non – vegetated areas within the footprint, for example, work within the bed of the river.
2. *The Powerhouse site includes stop-banks and flood protection.*
3. *The Access Road provides a corridor for both the road and transmission line.*
4. *The Operational Footprint is within the Project Footprint.*

Once construction of the Scheme components and infrastructure are completed (including the tunnel, access roads, tunnel portals, intake structures, penstock, stopbank, flood protection, powerhouse, and switchyard) a final survey map will be prepared by suitably qualified land surveyors and in a format able to be registered. Westpower will provide this final survey map to DOC so that the concession can be modified to reflect the

actual surveyed operational footprint. A draft condition to cover this is included in Section 9: Suggested Draft Conditions. This area will be within the envelope (see Section 1.2) and is less than the project footprint.

Maps outlining the Scheme areas are found in Appendix 1.

Map 1 provides an overview of the general area in which the Waitaha River is located.

Map 2 shows the conservation land boundaries in relation to the Scheme.

Map 3 provides an overview of the Project Area and identifies the location of existing features such as DOC tracks, Kiwi Flat Hut and the Waitaha River Hot Springs. It identifies the key reaches of the Waitaha River, within the Project Area from upstream to downstream which are defined below.

Upstream Reach	Upstream of the upper boundary of Kiwi Flat and the lower entrance of the Waitaha Gorge.
Kiwi Flat Reach	Between the lower entrance to the Waitaha Gorge and the upper entrance to Morgan Gorge.
Morgan Gorge	Steep turbulent confined section of Waitaha River below Kiwi Flat. Bottom of Morgan Gorge defined as confluence of Glamour Glen.
Douglas Creek Reach	Bottom of Morgan Gorge to the confluence of Douglas Creek. This section is characterised by the “boulder garden" .
Downstream Reach	Below the Douglas Creek confluence.

The terminology for the reaches here may be different to those referred to in some of the expert reports, particularly in discussing the potential effects in relation to the Waitaha River. Where this is the case, the reports must be read in the context of the description of the reaches provided in those reports.

Map 4 shows the general location of the two key surface areas associated with the Scheme. These are Area 1 (Infrastructure locations above Morgan Gorge) and Area 2 (Infrastructure Locations below Morgan Gorge). Subsurface structures are indicated by dashed lines. The length of the abstraction reach is drawn on this map. It is approximately 2.6 km long and extends from the intake at the entrance to Morgan Gorge to the tailrace slightly downstream of the powerhouse.

Three unnamed waterways are referred to in the application as “Alpha Creek”, “Granite Creek” and the spring fed “Stable Tributary”. These were named during the course of the Scheme investigations to assist with identification and location in relation to the Scheme and accompanying assessment of effects. These waterways are marked on plans and maps within the application as such, but otherwise appear as unnamed creeks on topographical maps. Granite Creek is the first stream on the right bank upstream of Macgregor Creek and Alpha Creek is the second stream on the right bank upstream of Macgregor Creek (adjacent to the proposed outfall from the tailrace to the Waitaha River below the proposed powerhouse) as shown on Appendix 1: Maps 3 and 4. The Stable Tributary is located between these two creeks.

Maps 5 and 6 illustrate the key areas within which the Scheme infrastructure, both temporary and permanent, will be located and provide more detail of the key surface aspects of the Scheme. The green dashed lines represent the outer physical boundaries of the envelope within which the Scheme will be located. As described previously (Section 1.2) the envelope provides for some flexibility with final design, lay out, construction methods and equipment and particularly of those components related to the Scheme which will be dependent on final design and/or pre- construction surveys such as for the access road alignment.

Map 7 shows the indicative road route corridor and provides initial longitudinal contour sections.

3.3. ACTIVITIES FOR WHICH CONCESSIONS ARE SOUGHT

Table 6 provides a summary of the activities occurring on the land administered by DOC and requiring a concession. More detailed description of these activities is found in Sections 5 and 6.

Table 6: Summary of Activities requiring Concessions.

Description of the Area	Activity Requiring Concession
Headworks	Construction, Use and Maintenance (including all associated activities and works within and outside the bed of the Waitaha River) of: • an intake weir, abutments and associated structures and works; • a diversion channel, intake portal and gates; • an upper tunnel portal; • a short access road from the upper tunnel portal to the river bed, including rock armouring at intake site (permanent); • take, diversion and discharge of water (including water containing sediment); • an access road to contractors' facilities (temporary); • a contractors facility for construction activities including associated site infrastructure and helipad (temporary); Also including: • occupation of space associated with these works and developments; • clearance of vegetation and earthworks associated with above; • helicopter flights associated with the above; • relocation and upgrading of existing foot access track.
Sub-surface Structures	Construction, Use and Maintenance (including all associated activities and works within and outside the bed of the Waitaha River) of: • the upper and lower tunnel portals; • subsurface tunnels and sediment basins; • flushing tunnel and outlet; Also including: • occupation of space associated with tunnel; • conveying water; • diversion of groundwater within the tunnel; • storage of rock/spoil during construction; • earthworks; and • access between intake site/infrastructure and powerhouse site/infrastructure.
Powerhouse Site	Construction, Use and Maintenance (including all associated activities and works within and outside the bed of the Waitaha River) of: • a stopbank and flood protection around the power house site and infrastructure; • sediment ponds and discharge to watercourses; • a powerhouse, switchyard and tailrace including associated infrastructure and surrounds; and • stormwater and wastewater/effluent facilities; Also including: • occupation of space associated with developments; and • clearance of vegetation and earthworks associated with above.
Access Road and Transmission Line	Construction, Use and Maintenance (including all associated activities and works within and outside the bed of the Waitaha River) of: • a main access road including: water tables and roadside drainage; waterway crossings and transmission corridor (permanent); • minor protection works, as required around waterway crossings; • protection works in, and alignment of, Alpha Creek;

	Also including; • conveying water; • occupation of space associated with development; and • clearance of vegetation and earthworks associated with above.

Through consultation with DOC, the appropriate forms of concession will be determined by DOC. The following table outlines the permanent and temporary structures to assist in this process (refer to Section 10: Statutory Provisions 17U(5),(6) and (7).

Table 7: Concession Types.

	Scheme Component	Indicative Concession Type
Headworks		
Permanent structures	Weir, diversion, intake channel, intake portal and upper tunnel portal.	*Lease*
	Short intake access road between tunnel portal and intake and associated protection works.	*Easement*
Temporary structures	Contractors' facilities including helicopter landing pad. Section of road from intake access road to contractors facilities.	*Licence*
Subsurface structures	Tunnels and sediment settling basins.	*Lease*
Powerhouse site		
Permanent Structures	Tunnel portal, penstock, powerhouse and surrounds, switchyard, tailrace, stop-bank and flood protection works.	*Lease*
Temporary structures	Staging/storage areas and treatment pond.	*Licence*
Access road and transmission line		
Permanent structures	Access road from tunnel to power house across Macgregor Creek, including associated drainage and protection works Overhead power lines	*Easement*

3.4 TERM AND EXPIRY DATE

This application is for a term of 49 years. Westpower submits that the size of the overall capital investment and life of the Scheme requires a concession of long term duration to provide for adequate security of the asset for the community. It is appropriate in this instance to provide for this level of security for the community in terms of investment in the infrastructure and planning for the long term needs of the community.

3.5 TERRITORIAL AND REGIONAL AUTHORITIES

The Scheme is located within the Westland District and comes under the jurisdiction of the WDC and the WCRC in terms of administration of the RMA and the relevant regional and district statutory plans and policies. Westpower will require a number of resource consents from both the WDC and the WCRC. It is proposed that such consents will be applied for if the concessions are granted. To enable an overview of the types of matters that may be attended to through the resource consent process, a general summary of the relevant resource consent matters administered by both these authorities is outlined in Table 8.

Resource consent requirements will be more comprehensively identified through an assessment of compliance with provisions of the relevant statutory plans. These matters will be attended to prior to developing and lodging applications with the District and Regional Councils. The following is for information purposes in regard to resource management matters that may be relevant to the Scheme and is not intended as an exhaustive list of resource consents required.

Table 8: General Overview of Resource Management Matters – Consent Types.

West Coast Regional Council	
Land Use	• earthworks and vegetation clearance within riparian margins; • earthworks on land outside riparian margins (under certain circumstances); • earthworks and vegetation clearance on land exceeding 12^0 in slope; • works and structures within the beds of the Waitaha River and other watercourses; • structures in the bed of a waterway for the damming and diversion of water; • disturbance of, deposition in and on, and reclamation of the beds of the Waitaha River and other watercourses; and • activities within the Waitaha River.
Take, Use Diversion and Damming of Water	• slope dewatering; • temporary diversion of water during construction in waterways; • permanent damming/diversion of water; • diversion of natural runoff - both contaminated and uncontaminated; • take, diversion and use of groundwater; and • diversion, damming, take and use of water, and discharge of water and trace contaminants to water for hydro-electric power generation purposes.
Discharge to Water	• discharge of water to water (under certain circumstances); • discharges of water to water after use for hydro-electric generation purposes; and • discharge of water containing contaminants to water.
Discharge to Land	• discharge of stormwater to land from impervious surfaces (under certain circumstances); • discharge of water containing contaminants to land (under certain circumstances); and • discharge of effluent to land from toilet facilities. (under certain circumstances).
Discharges to Air	• discharge of dust to air from construction and related activities (under certain circumstances).

Westland District Council	
Land Use	• construction, use and maintenance of a hydro-electric power scheme and associated infrastructure and activities including; • clearance of more than 2000 m^2 of indigenous vegetation; • modification of riparian margins of waterways greater than 3 m in width; and • use of the construction noise standard.

4. EXISTING ENVIRONMENT

This section provides an overview of the Waitaha River and surrounds within which the Scheme is to be developed. The descriptions of aspects of the environment have been drawn from the specific environmental investigations and their resultant reports undertaken as part of the consideration of options and development of this application. The full reports are contained in Appendices 6 to 21.

4.1 GENERAL LOCATION AND CONTEXT

The Waitaha River is located 38 km south of Hokitika and extends from the Main Divide of the Southern Alps to the Tasman Sea on the West Coast. The Waitaha Catchment falls 2,640 m over a length of 40 km with a total catchment area of 223 km^2.

The Alpine Fault runs through the catchment at approximately the confluence of the Waitaha River and Macgregor Creek (the downriver boundary of the application area) and is downriver from the powerhouse site.

The Scheme is located within and on the right bank of the Waitaha River between the lower end of Kiwi Flat and Macgregor Creek within the Waitaha Valley and within the northern half of the Westland District. It is predominantly on Stewardship Land managed by DOC. The first section of the access road required for the Scheme runs from the end of the existing formed legal road (Waitaha Road) that services the developed farmland in the valley below Macgregor Creek and is located on both private developed farmland and crown land.

The Scheme when operational will occupy a small footprint, at maximum 3.94 ha (of which 3.69 ha includes at maximum permanent vegetation clearance) within the Upper Waitaha Catchment of 12,761 ha. The Scheme is comprised of two separate and discrete surface installations: the intake site and the powerhouse site. These are linked by a subsurface tunnel. The intake is at an elevation of approximately 238 m asl and the powerhouse site at 130 m asl.

The public roads closest to the Scheme area are the Waitaha Road on the north and Allen Road on the south side of the Waitaha River. The end of these two roads are approximately 5 and 3 km (in a direct line) respectively from the powerhouse site.

At the end of Waitaha Road there is a parking area from which there is foot access to Kiwi Flat via a marked DOC track. This track is located on the true right of the Waitaha River and there is a swingbridge that crosses the river at the entrance to Morgan Gorge. From Kiwi Flat there are several tracks leading further up the valley or adjacent ridges and which are part of a greater network of back country tracks.

Foot access onto conservation land from Allen Road requires crossing private land and permission from the landowner. Access may also be via helicopter which may be used to transport kayakers to the Upper Waitaha/Kiwi Flat and for ferrying some hunters and trampers in and/or out of the area.

The lower part of the Waitaha Catchment is a mix of uses and land types including large areas of well-developed farm land, which is particularly the case on the true right bank of the Waitaha River up to Macgregor Creek. This creek basically comprises the downriver boundary of this application.

The site of the Scheme is essentially in the transition area between the highly developed farmland below Macgregor Creek and the more natural landscape as progress is made up the Waitaha River. Low lying areas downstream from the proposed powerhouse site on the alluvial flat area between the true right of the Waitaha River and the true left of Macgregor Creek have been subject to intermittent grazing by cattle. Above the powerhouse site, development is mostly restricted to recreational structures managed by DOC.

4.2 GEOLOGY

Appendix 8: Waitaha Hydroelectric Scheme: Geological Feasibility Report

The geology of the project area is described in the report prepared by M. Yetton, Geotech Consulting: Waitaha Hydroelectric Scheme: Geological Feasibility Report, 2013 (**Geology Report)**.

The Waitaha Catchment includes the Broomfield and Smythe Ranges with numerous peaks above 1200 m and some areas of permanent snow. In general, the catchment above the Alpine Fault is very steep with the river confined for most of its length in deep gorges. Bush and scrub cover account for only 40% of the catchment area and this is generally below 1200 m. The river has a high bedload.

The Scheme is located east of the Alpine Fault entirely within schist and schist derived sediments. The schist is a well foliated quartzo-feldspathic biotite schist of the garnet and oligoclase zones that in outcrop is typically a strong to very strong rock. The outcrops tend to be the hardest and most resistant material. Because faulting is widespread in the area, there will be many weaker areas of schist that are not exposed and remain hidden under thick vegetation cover or alluvial cover sediments.

The Scheme location avoids the weakest mylonite material that is located immediately adjacent to the Alpine Fault. The tunnel will be built mainly in strong to very strong foliated high grade schist rock that is broadly similar to the rock recently tunnelled 10 km southwest of this area as part of the Amethyst hydroelectric Scheme. Relatively dense post glacial aggradation gravels are present as a terrace cap at the downstream (powerhouse) end of the tunnel. The proposed intake site at the upstream end of Morgan Gorge has the best bedrock quality observed so far in the local Waitaha area where the schist is strong and contains relatively few obvious foliations (parallel partings).

4.3 CATCHMENT AND HYDROLOGY

Appendix 6: The Hydrology of the Waitaha Catchment
Appendix 7: Sediment Investigations relating to a HEP Scheme on the Waitaha River

- NIWA Letter 11.12.13 re Bed/Channel Stability
- NIWA Letter 25.02.14 re Suspended Sediment

The report Hydrology of the Waitaha Catchment prepared by M Doyle, 2013 (**Hydrology Report**) provides a description of the catchment and the hydrology of the Waitaha Catchment. NIWA have provided information on the sediment and stability characteristics of the Waitaha River in the report Sediment Investigations relating to a HEP scheme on the Waitaha River, 2013 (**Sediment Report**) and associated correspondence.

The upper Waitaha Catchment receives considerable rainfall, ranging from about 5.5 m annually at the Kiwi Flat intake area, to around 12 - 14 m annually at the divide. Just on the other side of the divide from the Waitaha is the Cropp Valley, where extensive hydrological monitoring has been carried out for 33 years. This location holds a number of New Zealand rainfall records, including the greatest 12 month rainfall (18,442 mm), the greatest 30 day rainfall (3,800 mm), the greatest 24 hour rainfall (758 mm), and the greatest hourly rainfall (134 mm). The average annual total is among the highest yearly rainfalls in the world and this is predicted to increase with climate change.

The catchment rises to around 2,200 msl at its head. There are 19 small glaciers in the upper reaches of the Waitaha, and at the end of summer, snow exists only on these glaciers and as snow patches, typically above 1,900 msl. Around 8.6% of the catchment is under permanent ice cover (as measured at the flow recorder at the top of Kiwi Flat).

The sometimes intense rain and the effect of snow and ice together exert considerable influence on the nature of flow conditions in the Waitaha River. The river flows high in spring and early summer and is discoloured with snowmelt. Flows recede as the temperature cools over autumn into winter, when flows drop to very low levels and the river runs clear during dry periods.

The seasonal effect can be seen when looking at the monthly median flows at the top of Morgan Gorge. The median might be described as the 'normal flow', as half of the time the flows are below this level, and half above. The monthly median flow reaches a peak of 31.8 cumecs in December as rising temperatures melt the seasonal snowpack (along with some ice), and the river is continuously discoloured, either showing the milky colour of snowmelt, or the darker colour of flood flows. By March the median flow has dropped to 20.8 cumecs, as much of the available snow is gone, but the river still has a milky appearance. Flows continue to drop with reduced temperatures and reach a low point in July, when the median flow is 10.3 cumecs. At this time, with no snow or ice melt occurring, the river runs clear if no recent rain has fallen.

In December the lowest flows on average reach 17.8 cumecs, in March they are 16.0 cumecs, while in July they are 8.2 cumecs.

The average flow for the Waitaha at the bottom of Kiwi Flat is 34.6 cumecs, and the median flow is 19.7 cumecs.

Floods occur throughout the year every 8.6 days on average and it is typically around 2 days from flood onset before river levels drop back to the point where the grey/brown flood discoloration reverts to the usual milky colour, although this depends on the nature of the heavy rainfall.

The Waitaha River is typical of many West Coast rivers, fast flowing and carrying high sediment loads[2]. During large floods, when the bulk of sediment transport occurs, flows are constricted through Morgan Gorge causing water levels to back up along Kiwi Flat as far as Whirling Water. The reduced velocities in this backwater reach induce deposition of sediment (sandy gravelly material and suspended sand and silt). The bed levels upstream of the gorge are therefore likely to fluctuate considerably during and following large floods. During flood recessions, lesser events, and baseflows the deposited bed material is reworked down the Waitaha channel to Morgan Gorge.

In contrast, in the section between Kiwi Flat and the proposed outfall site the Waitaha River falls through Morgan Gorge (a slot bedrock and large boulder gorge) then flows along a relatively steep 'rock garden' boulder-bed reach. The boulders in the latter reach are lag deposits of low mobility, even during floods. The bulk of the Waitaha bedload here is finer material (cobbles, gravel and sand) that is generally supplied at rates less than the river's capacity to transport such material during floods, and generally overpasses the boulder-lined channel bed and the channel is relatively stable (NIWA Letter 11.12.13 re Bed/Channel Stability).

[2] Initial estimates of the mean annual suspended sediment concentration (SCC) load of the Waitaha River at Kiwi Flat range from 0.17 to 1.15 Mt/yr, depending on the source of the data used for the rating function. A working best estimate is proposed at 0.47 Mt/yr (5240 t/km^2/yr)^2. By comparison with the specific yields from nearby rivers (Hokitika, 5918 t/km2/yr; Whataroa, 10136 t/km2/yr; Haast, 4072 t/km2/yr; Taipo 3637 t/km2/yr – data from Hicks et al. 2011), the Kiwi Flat estimate based on the 2013 turbidity rating (5240 t/km2/yr) is closest to the average of these rivers. It is suggested using this figure as a working estimate but accepting that this may be in error by a factor of 2-3 until the turbidity records can be calibrated to SSC. Initial advice, M. Hicks, 2014, NIWA Letter 25.02.14.

4.4 LANDSCAPE

Appendix 9: Natural Character, Landscape and Visual Amenity Assessment

Boffa Miskell describes the Waitaha Catchment in the Natural Character, Landscape and Visual Amenity Assessment Report, 2014 (**Landscape Report**).

THE REGION

The West Coast Region is characterised by dynamic tectonic activity, high rainfall and associated high energy fluvial processes, which has resulted in a diverse landscape of large mountains, numerous lakes, large rivers and coastal plains. Nearly two-thirds of the region is mountainous and over three quarters consists of indigenous forest cover much of which is contained within the conservation estate. The West Coast is synonymous with the 'wilder' side of New Zealand and known nationally and internationally for its drama and scenic beauty. The Waitaha Catchment forms a small part of this overall mountainous landscape.

Large coastal floodplains extend out from the numerous foothills and gorges and are the principal locations for transportation, fertile grazing, lowland forest, saltwater lagoons and small settlements.

THE WESTLAND DISTRICT

The Scheme is located approximately 1 km east of the Alpine Fault, within the Waitaha Valley and within the northern half of the Westland District. This part of the West Coast, including the Waitaha Valley, typifies the imprint of past and present alluvial and glacial activity. This valley occupies a broad catchment extending inland to the Southern Alps.

The headwaters of the major rivers in this area, including the Waitaha, Wanganui, Poerua and Whataroa originate in the steep and precipitous Southern Alps draining the landscape westwards from one of the highest rainfall areas in the country. All of these river catchments contain numerous physical characteristics that are in some way unique to each area, however collectively share common elements, such as indigenous vegetation cover, hot springs, gorges, waterfalls and wild rivers.

A number of the more noted features, river gorges and hot springs, of the West Coast have been identified within the Geopreservation Society's "Inventory and Maps of Important Geological Sites and Landforms in the West Coast". Of relevance to this application, the Inventory notes the Waitaha River Springs below Morgan Gorge as a geo-preservation site of regional importance, but does not include any of the gorges along the Waitaha River.

WAITAHA CATCHMENT

The Waitaha Catchment is relatively small in comparison to other river catchments on the West Coast, being 223 km² whereas the Wanganui and Hokitika are 521 km² and 1,066 km² respectively. However, the drop in elevation from 2,640 m in the Upper Waitaha Catchment to sea-level is significantly steeper along the Waitaha River's 40 km length.

The Waitaha Catchment is defined by the Smyth Range to the south, the Bloomfield Range to the west and the Lange Range to the north-west. Numerous peaks above 2,100 m are within the catchment, many covered in permanent snow and ice. Small glaciers are located within these upper tributaries, including Ivory Glacier and its associated cirque; Ivory Lake. At Morgan Gorge the river changes its course from an east-west direction to a south- north alignment in its lower reaches.

The topography within the Waitaha Catchment is steep and often precipitous where areas of exposed rock, gravel and cliffs characterise the landscape over 1,300 m. At lower altitudes, the land is covered by a sequence of predominantly indigenous vegetation, ranging from alpine grasses and scrub at the highest elevation to hardwood and podocarp/ hardwood forests at lower altitudes. Areas of exotic grasses and other small shrubs

are evident along parts of the Waitaha River above Morgan Gorge. Below Morgan Gorge, the valley landscape becomes more open, containing landscape modifications such as roads, agriculture and settlements.

The largest tributary of the Waitaha River is the Kakapotahi River (or Little Waitaha River) which drains from the northern faces of the Hitchin Range parallel to the main stem of the Waitaha River. This tributary flows through reasonably steep terrain, and enters Happy Valley, an area of flat, open land within the Kakapotahi lower catchment before the tributary is then is constricted again before it connects with the Waitaha River downstream close to SH6. Other steep tributaries within the Upper Waitaha Catchment include County Stream, Moonbeam Torrent and Whirling Water and in the Lower Waitaha Catchment there are Douglas and Macgregor Creeks.

THE UPPER WAITAHA CATCHMENT

The Upper Waitaha Catchment is defined and contained by steep and precipitous mountain peaks and ridges, extending downriver to just beyond Morgan Gorge, where the topography becomes less steep and the river valley becomes more open. The Upper Waitaha Catchment is dynamic and maintains a visually coherent remote character, where natural elements, patterns and processes have sculpted the area to retain several identifiable features, such as glaciers, cirques, tarns and gorges that are not uncommon in West Coast upper river catchments. The relatively hard basement rock and rapid tectonic uplift creates steep catchments, where loose scree, rocks, boulders and slips are common. Much of this loose material is transported by the numerous tributaries that feed into the Waitaha River further downstream.

The Waitaha River itself maintains numerous characteristics, from narrow, steep channels in its alpine upper reaches, to the whirling tortuous rapids travelling through the three gorges of Windhover, Waitaha and Morgan, to broad open braids within its lower valley. Both the Windhover and Waitaha Gorges have steep vegetated sides and rocky river beds.

Kiwi Flat has been the collection point for the aggradation of alluvial and glacial sediment and has formed a small open area of approximately 2 km long and 500 m wide at its widest point. During periods of high rain fall, Kiwi Flat floods due to the constriction at Morgan Gorge.

Morgan Gorge is the lowest elevated gorge within the Waitaha Catchment and acts as a division between the upper and lower catchments. The upper slopes above the rocky gorge are clad with dense indigenous vegetation, while the rock is exposed in the frequently submerged lower parts. Large rocky boulders and almost vertical, river sculpted walls, are a result of the turbulent, energy rich waters. The gorge is particularly narrow which means that some parts are not visible, even from the air.

Hot water springs can be associated with faults close to the Alpine Fault and can be found at the lower end of Morgan Gorge. These hot springs are accessed via a steep section of rock, generally by abseiling with the aid of a fixed rope, and are located on a rocky ledge immediately above the Waitaha River. During periods of high flow the springs are submerged.

The single channel section below Morgan Gorge is dominated by large boulders with a section known as the “boulder garden”. Downstream of Morgan Gorge, the Upper Waitaha Catchment begins to slowly open, where the enclosing mountain spurs appear lower and less steep and the river widens. Glimpses of the Lower Waitaha Catchment are evident, north of the powerhouse site. Numerous accumulations of river gravel areas are also apparent.

LOWER WAITAHA CATCHMENT

The Lower Waitaha Catchment has very different landscape characteristics from the Upper Waitaha Catchment and is framed by the forested peaks of Urquhart Knob, Mt. Allen, and the Rangitoto and Bonar Ranges. It is predominantly open, flat pastoral land with some indigenous vegetation cover, and subject to a range of rural activities, including quarrying. The small settlement of Waitaha, is located mid-way in the lower

valley and accessed via Waitaha Road. The river takes on a braided character below Douglas Creek and flows north-west towards its mouth.

4.5 VEGETATION

Appendix 15: Waitaha Hydro Scheme: Terrestrial Flora Description and Assessment of Effects

Terrestrial Flora Description and Assessment of Effects (**Vegetation Report**) prepared by TACCRA, 2013 provides a comprehensive overview of the key vegetation types present within the Waitaha Catchment.

Indigenous forest and shrubland vegetation within the Waitaha Catchment is similar to and contiguous with other catchments in the Wilberg Ecological Area and in Westland. Vegetation ranges from alpine grasses and scrub at the highest elevation to hardwood/podocarp and hardwood forests at lower altitudes. Exotic plant species occur, in particular on open riverbed/floodplain surfaces however their incidence is relatively low. There were no plant species that are classified as threatened identified within the area surveyed or within the project footprint.

ABOVE MORGAN GORGE

Podocarp/hardwood forest dominates above the high terraces in the lower valley extending close to Kiwi Flat and above Morgan Gorge. The canopy height increases to 16 – 22 m with progression upslope. The principal forest canopy includes Kamahi with Tawheowheo (Westland Quintinia), southern rata, broadleaf with species of tree ferns present in lower densities. Rimu, totara, miro, southern rata and kaikawaka are present as canopy emergents surface.

Hardwood dominated forest (with low or no podocarp trees) with an average canopy height of 6 – 8 m, occurs on the faces, gully sides, foot slopes and in other localised areas. Vegetation cover is principally comprised of shrub and small stature trees. Dominant canopy species include kamahi, kapuka, putaputaweta, horopito, and rohutu and Olearia species. The understory includes coprosma species, pate (seven finger), wineberry, Westland Quintinia, weeping mapou, occasional miro and totara seedlings. Tree ferns are present throughout, with soft tree ferns more prevalent than the rough tree ferns.

The greater area of the recent alluvial and slightly raised terraces of Kiwi Flat are vegetated with a wide range of shrubs, monocots and ground cover species including tree broom, toetoe and coprosma, olearia species, hebes, kapuka, ferns, flaxes and a range of grasses. Variations in species found occur along riparian margins and areas of ponding.

BELOW MORGAN GORGE

Patchy scrub and grassy clearings on low river terraces and flood channels occur below Morgan Gorge, The cover is typically between 0.5 and 0.8 m high. Very occasional regeneration of forest trees in seedling stage is present e.g. southern rata and kamahi. Shrub cover, where present, consists of scattered individual stems or as small clumps. Common species are coprosma species, kaikomako, tree broom, horoeka (lancewood), porokaiwhiri (pigeon wood), weeping mapou, hutu, inaka (turpentine scrub), haumakoroa and the tree ferns. Monocots and other ground cover species include abundant toetoe and scattered bush and mountain flaxes, various fern and filmy fern species, akatea (white climbing rata) and piripiri (bidibid) occur in areas where a closed hardwood shrub cover is not established. Various grasses and mosses are intermingled along with other broadleaved herbaceous plants both native and exotic.

Further downstream of the area described above and upstream of Macgregor Creek, younger podocarp/hardwood forest is present on the low river terraces throughout and the footslopes. Large podocarp trees are rare or absent from the forest cover in these areas. Canopy height is typically 8 – 14 m with cover mainly comprised of kamahi and tree ferns. Other canopy hardwoods of less frequent occurrence are

tawheowheo, putaputaweta, kapuka and kaikomako. Occasional miro and rimu are emergent above the hardwood component. Kareao (supplejack) occurs in the canopy in places (and in lower tiers). The shrub tier includes regeneration of canopy species and tree ferns along with pseudopanax and coprosma species, hutu, porokaiwhiri, mahoe (whiteywood) and horopito (pepperwood).

For a complete species list refer to Appendix B of the Vegetation Report.

4.6 TERRESTRIAL FAUNA - BIRDS AND BATS

Appendix 16: Assessment of the Potential Effects of the Proposed Waitaha Hydro Scheme of Vertebrate Fauna (Birds and Bats)

Wildlife Surveys Ltd provide a description of terrestrial fauna within the Waitaha Catchment based on survey work undertaken in 2006/2007 and 2012 in the report: Assessment of the Potential Effects of the Proposed Waitaha Hydro Scheme of Vertebrate Fauna (Birds and Bats), Buckingham, 2014 (**Birds and Bats Report**).

BATS

Faunal surveys undertaken in the Waitaha project area as part of the Scheme investigations recorded the presence of long-tailed bats (*Chalinolobus tuberculatus*). Prior to this, there was no formal record of long tailed bats within this area. They have been found in the Waitaha Valley area from Doughboy Hill in the lower valley to Kiwi Flat with a core population based at Kiwi Flat. The long tailed bat is classified as 'Nationally Threatened' and the population in this location is considered regionally significant.

Bat activity data within the survey area indicated two preferred areas for foraging (above Morgan Gorge and downriver of Macgregor Creek). While roosting habitat is available for bats in Kiwi Flat there is no roosting habitat for bats in the lower part of the valley (below the confluence of Macgregor Creek) where moderate activity of bats was recorded. It is possible that long-tailed bats fly between Kiwi Flat and the lower valley for foraging.

No short-tailed bats were detected. Introduced mammalian predators are assumed to be the most likely reason for the disappearance of short-tailed bats and the shrinkage of long-tailed bat populations in remote forest locations in the South Island.

BIRDS

The Waitaha Valley is home to small numbers of many of the endangered species on the DOC Classification. None of these species are identified as unique to this area and all are well represented elsewhere, regionally or nationally.

During the most recent avifaunal surveys in 2012, up to 38 bird species have been identified from the project area of which twenty six were native species. Of these, five Threatened and five At Risk bird species were recorded in the survey area (refer Table 3 of the Birds and Bats Report). Threatened bird species include blue duck (Nationally Vulnerable), grey duck (Nationally Critical), New Zealand falcon (Nationally Vulnerable), South Island kaka (Nationally Vulnerable) and kea (Nationally Endangered). At Risk species included black shag (Naturally Uncommon), South Island pied oystercatcher (Declining), long-tailed cuckoo (Naturally Uncommon), South Island fernbird (Declining) and New Zealand pipit (Declining).

Species such as kaka, kakariki, weka, kereru, rifleman and robin have been recorded in low numbers on both the 2006/2007 and 2012 surveys with more or less the same patchy distribution patterns. The indigenous passerines: tomtits, grey warblers, bellbirds and silvereyes were common throughout.

Western weka had a localised distribution, being most conspicuous near the scrub edges surrounding Robinson Slip and also present at Kiwi Flat. No sign of kiwi was found during either survey. No fernbirds were

detected, even in habitats that seemed ideal for fernbirds. Moreporks were not recorded in 2012 and their scarcity was noted during 2006/2007 surveys.

In addition to avifauna, a survey for Powelliphanta was undertaken as Powelliphanta shells were found at Kiwi Flat in 2007 and 2011. It is considered most likely that these were washed downstream in a flood, rather than representing snails living in the vicinity. No living populations of *Powelliphanta* have been found in the area. The only known *Powelliphanta* snail species present in the general area is restricted to alpine habitats, very likely including the headwater catchments of the Waitaha River.

4.7 LIZARDS

Appendix 17: An Assessment of the Potential Impact of the Proposed Westpower Hydroelectric Development on the Lizard Fauna of the Lower Waitaha River, Westland

Whitaker Consultants Limited provide a description of lizard fauna that may be found in the Waitaha project area in the report: An Assessment of the Potential Impact of the Proposed Westpower Hydroelectric Development on the Lizard Fauna of the Lower Waitaha River, Westland, 2013 (**Lizard Report**).

There are no known records of lizards from within the Waitaha Catchment and information on the lizard fauna in the surrounding district is scanty. While no lizards were found during the field survey, the limited data available on the occurrence of lizards in central Westland, together with knowledge of the overall range and habitat preferences of the lizard species that occur on the West Coast, means it is possible to predict what might be present in the project area.

Two gecko species (*Mokopirirakau granulatus s.s.*, *Naultinus tuberculatus*) are expected to occur within the project area as these taxa are widespread in forest and shrub land habitats in northern and central Westland.

One skink species may occur in open habitats on forest margins and riparian areas within the project area as there are a few isolated and scattered records of small skinks (*Oligosoma polychroma s.l.*) in such habitats in the general region.

4.8 TERRESTRIAL INVERTEBRATES

Appendix 18: Potential Effects of the Waitaha Hydro Scheme on Terrestrial Invertebrates

Entecol Ltd describes the invertebrate fauna of the Waitaha in the report: Potential Effects of the Waitaha Hydro Scheme on Terrestrial Invertebrates, Toft, 2014 (**Invertebrate Report**).

In general, the invertebrate fauna surveyed is typical of wet, western South Island locations, and strongly related to the vegetation types present. No invertebrates of known conservation concern were detected. The native invertebrate communities around the project area appear to have a relatively high degree of natural integrity, with invasive species e.g. European wasps, *Vespula vulgaris* absent or in low abundance. This would be typical of South Westland, with extensive areas of wet native forest.

Over 4,200 invertebrate specimens were collected during the surveys, and 218 taxa identified. Of particular note was the discovery of three undescribed species of stiletto flies (Therevidae) in the genus Anabarhynchus although this is not unexpected (and probably reflects the lack of targeted collecting of therevids on the southern West Coast and New Zealand generally).

A total of 88 lepidopteron taxa were identified from the Waitaha survey. The moth fauna collected was typical of the West Coast region with most larval feeding guilds represented and none thought to have a restricted distribution. A fern-feeding geometrid moth, *Paradetis porphyrias*, was of interest because it is taxonomically isolated and not often collected, although thought to be widespread in high-rainfall forested areas. A North

Island understory leafroller, *Epalxiphora axenana* (Tortricidae) was an interesting find from the Macgregor Creek area. It is thought to have been transported to the South Island, probably on leafy horticultural stock and garden shrubs. It was discovered in the Taramakau Valley in the mid-1980s, and later confirmed in Golden Bay, and West Coast localities from Karamea to Westport. The Waitaha Valley record is the most southerly to date.

No tree wetas (Hemideina sp.) were detected during the survey although the Waitaha is within the known range of the Wellington tree weta (*H. crassidens*) The West Coast bush weta (*H. broughi*) is not thought to occur as far south as the Waitaha.

4.9 AQUATIC ECOLOGY

Appendix 10: Proposed Waitaha Hydro Scheme: Assessment of Environmental Effects: Benthic Ecology of the Waitaha Catchment

Appendix 11: Proposed Waitaha Hydro Scheme: Assessment of Environmental Effects: Fish of the Waitaha Catchment

EOS Ecology have undertaken survey work in the Waitaha River since 2005 and describe the aquatic invertebrates, periphyton and fish found within the Waitaha River in their two reports: Assessment of Environmental Effects: Benthic Ecology of the Waitaha Catchment, McMurtrie & Suren, 2014 (**Benthic Report**) and Assessment of Environmental Effects: Fish of the Waitaha Catchment, Drinan & McMurtrie, 2014 (**Fish Report)** and collectively known as the **Aquatic Reports**.

The Waitaha River is similar to many West Coast rivers, subject to frequent flooding, and high sediment loads where the nutrient content is low. The tributaries in contrast are slower moving and more productive than the mainstem of the river.

WATER QUALITY

When compared with river water quality data from the whole of New Zealand, the water chemistry of the Waitaha Catchment is comparable for pH and conductivity (with these values close to the national median values) while most nutrient levels are below the national values. The low-nutrient water of the Waitaha Catchment is typical to many other West Coast rivers where catchment modification is scarce.

ALGAE

Periphyton communities are similar throughout the mainstem river and most tributary waterways, although stable tributary stream sites support distinct communities. All 52 taxa recorded during surveys (refer Appendix IV of the Benthic Report) are common and widespread in South Island rivers and the communities are typical for the catchment type in terms of their diversity and species composition. Periphyton biomass is low in all areas throughout the Waitaha River and stable tributaries, but is slightly elevated in other tributaries. The low biomass is attributed to the low-nutrient waters and flood-prone nature of the Waitaha River. Slightly higher biomass at the most downstream site in the lower Waitaha River most likely reflects diffuse nutrient inputs from developed agricultural areas. All sites were dominated by diatom assemblages rather than filamentous algae, also reflecting the instability and flood prone nature of most of the waterways.

The Waitaha River does not appear to be suitable for extensive Didymo growth, with frequent floods and high suspended sediment loads keeping biomass to a minimum. However Didymo has been found in the lower Kakapotahi River.

BRYOPHYTES

Aquatic bryophytes (mosses, liverworts and hornworts) were found in abundance in a small stable spring-fed tributary (the Stable Tributary) below Morgan Gorge on the true right downstream from Alpha Creek. This stream represents a biodiversity 'hotspot' for bryophytes in the Waitaha Catchment with these plants providing a valuable habitat and food resources for the aquatic invertebrate community. While bryophytes

were found in other sites within the mainstem and other tributary sites these were at very low levels and in restricted areas, most likely reflecting the high sediment loads and levels of abrasion that occurs.

AQUATIC INVERTEBRATES

The aquatic invertebrate fauna of the Waitaha Catchment is composed of a diverse assemblage of 104 insect taxa (refer Appendix V of the Benthic Report) dominated by mayflies, chironomid midges, caddisflies, and stoneflies. Invertebrate density and diversity are significantly higher in stable tributary sites than the mainstem river or other tributaries. These stable streams are locally important for maintaining biodiversity values and ecosystem functioning. In contrast, invertebrate density in the mainstem of the Waitaha River is low, with a similar assemblage of taxa throughout different areas of the river. This species-poor community is dominated by only a few taxa (e.g., *Deleatidium* and midges) that are capable of persisting through frequent flood events and times of moving substrates.

The invertebrate fauna and the biotic metrics such as abundance, the Macroinvertebrate Community Index (**MCI**) and the number of Ephemeroptera, Plecoptera and Trichoptera (**EPT**) of the Waitaha Catchment appears typical to that of other fast-flowing West Coast rivers flowing through unmodified catchments in high rainfall areas, where water quality is high and nutrient levels and algal biomass are low. While no species of particular conservation interest or rarity were collected, there were several new records for the distribution of taxa in the area. The stable tributaries however, support invertebrate communities that are distinct from those found in the mainstem or other tributaries, and can therefore be regarded as locally unique.

FISH

Eight fish species are found in the Waitaha River, in decreasing order of abundance these were koaro, brown trout, longfin eel, torrentfish, lamprey, redfin bully, common bully and shortfin eel. Freshwater crayfish were also recorded from a single tributary. Of these, koaro, redfin bully, torrentfish, longfin eel and lamprey are listed as declining[3] in the latest assessment of their conservation status. Freshwater crayfish/kōura are also listed as being in gradual decline[4].

Notwithstanding the survey findings, none of these species are unique to the Waitaha Catchment and all of these species are quite common in other West Coast catchments.

Of particular interest, koaro is the only fish species recorded above Morgan Gorge. This suggests that Morgan Gorge represents a natural barrier to fish passage.

There are clear differences in fish communities between the mainstem and tributaries. Apart from Kiwi Flat, where koaro are the only species recorded, fish species richness and total fish densities are considerably higher in tributaries. Below Morgan Gorge, fish species richness was highest in the Douglas Creek Reach with seven species (including freshwater crayfish/koura). This is mainly attributed to the Stable Tributary that supported three species (koura, lamprey and redfin bully) that were recorded nowhere else in the Douglas Creek Reach or upstream.

Fish densities in the mainstem of the Waitaha River were particularly low, with an average of 2.3 individuals per 100 m^2 in the Douglas Creek Reach, and <0.1 individuals per 100 m^2 in the Kiwi Flat Reach. Torrentfish

[3] The conservation status of fish in New Zealand is provided in Allibone et al. (2010). For fish, one or more of the following criteria were used to assign the threat status (Threatened, At Risk and Not threatened): total number of mature individuals; ongoing or predicted population trend (due to existing threats); total number of populations; number of mature individuals in the largest population; or area of occupancy of the total population (Townsend et al., 2008). 'Declining' taxa do not qualify as 'Threatened' because they are buffered by a large total population size and/or a slower decline rate. However, if the declining trends continue, these taxa may be listed as 'Threatened' in the future. Further information is available in Townsend et al. (2008).

[4] For crayfish/kōura, similar status and trend criteria are used to evaluate their threat status (Hitchmough et al., 2007). The trend criterion for 'Gradual Decline' (listed as Chronically Threatened) is a predicted decline of 5–30% in the total population in the next 10 years due to existing threats, and the decline is predicted to continue beyond 10 years (Molloy et al., 2002).

were the only species to have higher densities in the mainstem than in tributary waterways, although these densities were still low.

The greatest species richness (seven species) and density of fish (46 individuals per 100 m^2) were recorded in the Stable Tributary, on the true right of the Waitaha River downstream of Alpha Creek and downstream of the abstraction reach. This tributary is a 'hotspot' for fish diversity and density within the Waitaha Catchment, including a large number of lamprey ammocoetes. With the exception of the Stable Tributary, the higher fish densities in the tributaries of the Douglas Creek and Kiwi Flat reaches were due to koaro, as this was (apart from longfin eel) the only fish species recorded from tributaries upstream of the Stable Tributary.

4.10 BLUE DUCK/WHIO

Appendix 13: Assessment of Environmental Effects of the Proposed Waitaha Hydro Scheme on Whio/Blue Duck (*Hymenolaimus Malacorhynchos*)

A blue duck/whio (*Hymenolaimus malacorhynchos*) (**blue duck**) population is present on waterways within the Waitaha Catchment. The blue duck is a New Zealand endemic species and genus and is a nationally vulnerable species, due to a significant decline in abundance and distribution. The species occurs on mainland rivers and cannot be secured on offshore islands. Observations of blue duck in the Kiwi Flat area are not uncommon.

The primary features of the blue duck population in the Scheme area[5] are described in the Assessment of Environmental Effects of the Proposed Waitaha Hydro Scheme on Whio/Blue Duck (*Hymenolaimus Malacorhynchos* prepared by Sustainability Solutions Ltd, Overmars, 2014 (**Blue Duck Report**). These features are summarised below.

A total of 31 blue ducks was recorded in the Waitaha Catchment in April 2007. There were six pairs above the Waitaha Gorge, and three pairs at Kiwi Flat; a pair at the Douglas Creek confluence in May 2007 may have been additional. The number of pairs in the catchment represent c.1.0% of the national total of c.1000 breeding pairs.

At Kiwi Flat, there is a comparatively high blue duck pair density, probably arising from more reliable resource availability through spatial and temporal variation around the confluences of two significant tributaries, higher invertebrate densities (including rock garden and riffle feeding habitats), and the absence of trout.

In the abstraction reach, the population is low (0–3 birds, based on five surveys and other observations), which is attributable to locally less favourable habitat. There was an inconsistent presence of pairs and single birds around the Douglas Creek confluence. The total population in the Scheme area in 2006–2012 was *c.*8–12 adults (including three pairs and 3–4 females), centred on Kiwi Flat.

At Kiwi Flat, there was a level of population stability between 2006–2012 (*c.*7–11 adults). Other features are male-biased sex ratio; predominantly young adult females (indicating preferential loss of breeding females); and low breeding success and low recruitment. These characteristics are attributable to stoat predation as a primary threat.

There is evidence two pairs, and possibly three, attempted to breed at Kiwi Flat in 2007–2008, but all were unsuccessful, probably because of a stoat irruption in central Westland podocarp forests from February 2007 onwards. None of these nest sites were definitively located, but there is evidence that all three were in gorges or on steep torrents. The evidence points to a blue duck behavioural breeding adaptation for gorge nesting

[5] In this report, 'Scheme area' in relation to blue ducks and their habitat is taken as the Waitaha River, its tributaries and riparian margins, and (where appropriate) the habitat of predators, from (and inclusive of) Kiwi Flat to below the Douglas Creek confluence.

sites, whilst obtaining their energetic and nutrient requirements at rock gardens with high macro-invertebrate densities; and to a capability to bring ducklings from those distant nesting sites onto Kiwi Flat for brood raising (possibly including against the current through the upper part of Morgan Gorge).

In total, six juveniles were observed in six breeding seasons for which there is data. Three of these juveniles were confirmed to have been recruited into the population, and this may have occurred for the others. Juvenile survival and recruitment in the 2010–2011 and 2011–2012 breeding seasons may have benefited from a TBfree New Zealand aerial 1080 possum control operation in winter 2010. In only one breeding season (2007–2008) was there strong evidence of the absence of juveniles.

Mortality and recruitment data for the April 2007–December 2009 period indicate mortality (50%) substantially exceeded recruitment (20%). Less complete data also points to periods of low mortality (2006–2007, 2009–2011) and some consistency in recruitment over the full 2006–2011 period. The data (although not complete) overall indicates that, despite a period of significant loss, there appears to have been some balance between mortality (five marked birds) and recruitment (five juveniles) over the 2006–2011 period.

Demographic analysis shows that Kiwi Flat population has insufficient local productivity to compensate for the high adult mortality, and to ensure long term population stability. Yet the Kiwi Flat breeding population has been reasonably stable over the six year study period (7–11 total adults). The conclusion is that the population is receiving immigrants from elsewhere, probably juveniles, and it could not persist in the absence of this immigration.

Periodically high stoat predation associated particularly with rimu masting and then rodent and stoat irruptions is a feature of blue duck habitat in the Scheme area.

The Scheme area blue duck population and other populations in the central Southern Alps valleys have features of a metapopulation, particularly from linkage through juvenile dispersal. The likely source of immigration into the Scheme area is the high density population at Amethyst Ravine.

Small blue duck populations such as in the Scheme area are highly vulnerable to the risk of local extinction from the primary threat (i.e. stoat predation). They are also vulnerable to a number of additional interacting processes that come into play as wildlife populations become smaller. These include environmental fluctuation and change, genetic effects, instability of the breeding structure, and catastrophic events.

On its own, the blue duck population in the Scheme area appears to be at some risk from adverse natural environmental factors, particularly predation. The risk is likely mitigated by its connectivity and interactions with adjoining populations (in particular, that at Amethyst Ravine), and possibly by future TBfree 1080 possum control operations.

4.11 TURF PLANT COMMUNITIES

Appendix 15: Email 11.09.13 re Turf Communities

In habitats, such as Morgan Gorge, with such extreme abrasion during flooding that leads to smooth rock walls, there are only a few specialist turf species that will grow here in more protected sites, i.e. where there are back eddies that do not get the full force of the water in flood. These are not considered to be rare species. The flooding within Morgan Gorge is likely to reach up to the tops of the rock walls where mossy areas on top will have mixture of colonising species like *Stereocaulon* and forest species where there is an accumulation of litter. It is considered there would not be any threatened species of bryophytes and lichens that would be found with the Scheme habitat particularly within Morgan Gorge.

4.12 CULTURAL VALUES

Most of the West Coast region lies within the rohe of the iwi Ngāi Tahu, and specifically the rohe of the hapū Ngāti Waewae and Ngāti Makaawhio. The Papatipu Rūnanga, or the administrative bodies, within the West Coast are Te Rūnanga o Ngāti Waewae and Te Rūnanga o Makaawhio.

The exclusive rohe of Te Rūnanga o Ngāti Waewae is centered on Arahura and Hokitika and extends from Kahurangi Point to the north bank of the Hokitika River and inland to the Main Divide.

The exclusive rohe of Te Rūnanga o Makaawhio is centered at Makaawhio and extends from the south bank of the Poerua River to Piopiotahi (Milford Sound) and inland to the Main Divide.

Both hapū have a shared interest in the area situated between the north bank of the Poerua River and the south bank of the Hokitika River which includes the Waitaha Valley (CMS, pages 329-330).

Based on the discussions and consultation to date, Westpower is not aware of any specific or significant cultural or archaeological sites of Maori origin or activities undertaken historically or traditionally within the project area by Te Rūnanga o Ngāti Waewae and/or Te Rūnanga o Makaawhio.

Early in the consultation process (March 2012), Westpower discussed with representatives of both Te Rūnanga o Ngāti Waewae and Te Rūnanga o Makaawhio, the need to undertake a joint Cultural Impact Assessment to assess the potential effects on cultural matters associated with the project area. Westpower has been advised by a representative of both Iwi that, a Cultural Impact Assessment is unlikely to be required. This is because there are no known sites or values of cultural significance within the Scheme area, and the potential effects of the Scheme on Taonga species present within the area have been considered in the various ecological reports and mitigation measures have been proposed.

While it is understood that a Cultural Impact Assessment is unlikely to be required, Te Rūnanga o Ngāti Waewae and Te Rūnanga o Makaawhio have been provided with a complete copy of this application.

4.13 HISTORIC AND ARCHAEOLOGICAL VALUES

There are no sites recorded, reported nor has any anecdotal information been provided about archaeological sites within the project area or footprint and upstream of Macgregor Creek. No historic sites of significance have been identified or registered by the DOC, the WDC or the Historic Places Trust. There is nothing listed on the Archaeological Register (pers comms L. Wright 23.11.12). There are no buildings present in the area other than the Kiwi Flat Hut.

4.14 RECREATION AND TOURISM

Appendix 19: Westpower Waitaha Hydro Investigations: Recreation and Tourism Assessment of Effects

Westpower Waitaha Hydro Investigations: Recreation and Tourism Assessment of Effects prepared by Rob Greenaway and Associates, 2014 (**Recreation Report**) describes the recreation opportunity settings that can be found within the Waitaha Valley. These are summarised below.

- The upper Waitaha Gorge above County Stream. This is a grade 6 extreme kayaking experience limited to highly skilled kayakers, and was first run in February 2013. Windhover Gorge was portaged in this expedition. The Windhover Gorge was paddled for the first time in December 2013.
- The main stem of the Waitaha River from the confluence with County Stream (immediately below Windhover Gorge) to the bottom of the Waitaha Gorge. This provides a grade 5 whitewater resource currently used by advanced-level adventure kayakers and was first run in the late 1990s.
- Morgan Gorge. This is a grade 6 kayaking experience limited to highly skilled kayakers, and was first run in 2010. Most kayakers will portage all, or much of, Morgan Gorge.
- The river section from the bottom of Morgan Gorge to Douglas Creek. This set of rapids presents whitewater of variable grades, suitable for a range of abilities and is accessible by foot.
- Kiwi Flat provides a destination for trampers and hunters (who may stay at Kiwi Flat Hut or stop-over on longer tramps).
- The Scamper Torrent 'weekend' tramping route. For some people this trip includes the Mt Durward – Headlong Spur circuit. The track facilitates access above the bush line onto the tussock tops.
- The headwaters and wider catchment area. This includes the upper Waitaha River basin (Windhover Gorge and above to Ivory Lake) and the spurs leading to and from the Waitaha Valley onto the open tops. This setting offers the opportunity for remote and challenging multi-day trans-alpine traverses.
- Three huts are sited within the Waitaha River Valley: Kiwi Flat Hut, Moonbeam Hut and Top Waitaha Hut. Another three huts are sited within the wider Waitaha Catchment: Scamper Torrent Hut, County Stream Hut and Ivory Lake Hut.

In addition, recreational users may visit the hot springs situated within the river at the lower end of Morgan Gorge or these may be a destination in themselves.

Trout fishing occurs in the lower stretches of the river or tributaries such as Ellis Creek with the main recreational fishing setting close to the State Highway Bridge – some 11 km below Macgregor Creek. The river is rarely jet boated and then only in the lower reaches.

The level of use of the area is low for all of the recreational activities undertaken in the catchment, which includes; whitewater kayaking, tramping, mountaineering and hunting. Total use can be measured in the hundreds of visitors and, to some users, this low level of activity is an important appeal of the setting. Recreationists are drawn from a wide area, with international kayakers (according to some sources) comprising more than 25% of the Waitaha kayaker population. Based on the log book information from the Kiwi Flat hut most trampers and hunters (70% of entries) are drawn from outside the region. Based on existing information and investigation, usage can be summarised as:

- approximately 50 kayakers paddling the Waitaha Gorge section (and mostly portaging Morgan Gorge) annually;

- fewer than 10 individuals might kayak the upper Waitaha Gorge (above Moonbeam Hut) and/or Morgan Gorge in any one year, although these sections might not be run at all for long periods, and there is a very limited pool of suitably skilled kayakers;
- approximately 50 hunters (red deer, tahr and chamois) use the Waitaha Valley area annually;
- fewer than 150 trampers and day visitors access Kiwi Flat annually.

The Waitaha River is identified as one of 14 grade 5 whitewater rivers on the West Coast which require helicopter access, and one of 24 grade 5 rivers in the region (of all access types). Although the River has grade 6 sections, the overall rating applies to the ability to portage those. The Waitaha is the 5th-equal most kayaked grade 5 river on the West Coast out of 24.

Helicopter companies servicing the Waitaha Valley, and the West Coast generally, have reported a significant recent decline in the positioning of recreationists in the backcountry over the past two years, with very little helicopter-based activity currently occurring. Various reasons for this radical decline have been suggested, with the recession and increased international competition for kayaking destinations commonly mooted.

Despite these low use levels the catchment is an important recreation setting due to its accessible but 'remote' natural setting, and the characteristics of the white water resource. The kayaking resource is likely to be of sufficient interest to off-shore paddlers, and to be of international significance to highly advanced kayakers, as part of the West Coast kayaking complex.

4.15 OTHER EXISTING ACTIVITIES WITHIN THE WAITAHA CATCHMENT

There are a number of existing concessions and or consents within the Waitaha Catchment for a range of activities.

These include irregular helicopter landings for the delivery of kayakers and other recreational users and commercial hunting guiding into the Upper Waitaha Catchment. As noted previously kayaking activities have been declining over recent times. The Waitaha Valley is used rarely for guided hunting (once in the past five years and only in the alpine area).

There is a suction dredge gold mining permit over the section of river extending between the top of Kiwi Flat and Macgregor Creek and a concession approved for access to carry out this activity. To date there has been no mining in the area under this permit and concession.

Lower down the valley, there is an active schist stone extraction operation in Macgregor Creek and approvals in place for other schist stone extraction in the bed of the Waitaha River up to the confluence of Douglas Creek.

Below Macgregor Creek there are grazing concessions and a number of land use consents have been granted for a variety of works in and adjacent to the bed of the Waitaha River e.g. for flood protection and gravel extraction as well as for land development.

One guiding company occasionally uses tributaries of the Waitaha near the coast (Ellis Creek particularly). Rafting is not known in the project area.

Dairy farming is the predominant land based activity in the lower Waitaha Catchment, beginning immediately below Macgregor Creek.

5. SCHEME OVERVIEW: OPERATIONAL INFRASTRUCTURE

5.1 GENERAL OVERVIEW

This section provides a general overview of the operational infrastructure of the Scheme. Westpower has undertaken a comprehensive process of considering Scheme location, design and layout through obtaining expert advice in a number of technical areas. Along with engineering disciplines, a range of environmental disciplines have been involved to ensure that the values of the location within which the Scheme will sit have been factored into the Scheme, and its component parts, from the outset. This approach has ensured that potential effects have been able to be recognised and the Scheme refined to avoid or mitigate potential effects as far as is possible.

The overview is based on preliminary concept designs and the envelope within which works will occur (detailed in Section 1.2). A conservative approach has been used with regards to both the envelope and in the description of activities, and accordingly the expert assessments of effects. This approach seeks to ensure that the maximum level of effect has been considered in the design, layout and assessments and appropriate means to avoid or mitigate effects developed. Any final design changes will fit within the envelope and not be out of character or scale with, or raise higher levels of potential effect than, the matters outlined in this application. There is the potential for final construction designs to have lesser effects than those assessed, and Westpower seeks the ability to be able to achieve the best outcome possible for the Scheme and the location. This approach will ensure the most efficient and effective development of the Scheme and the ability to attend to specific site features to fit into the environment within which the Scheme is to be located. The draft conditions suggested in Section 9 are reflective of this approach.

Westpower have adopted this approach following completion of the Amethyst Hydro Scheme. That Scheme is of similar layout, although it differs in scale, and is also within conservation land. It has been successfully developed taking into account the site specific values and requirements and utilising the methodology outlined above. Westpower seeks to use the experience and successful methods adopted through that hydro-electric power scheme project to ensure the best quality outcome possible for this Scheme and location.

The Scheme is a run-of-river design and has been chosen to avoid the need to develop large scale dam structures, impoundment and water storage lakes. Rather the Scheme makes use of natural features and topography to develop a discrete intake node. The Scheme is to divert up to a maximum of 23 cumecs from the Waitaha River, with a weir and side intake located at the upstream end of Morgan Gorge. This is a natural constriction of the river where the river discharges from the wide gravel bed across Kiwi Flat into a narrow rock walled slot gorge. Water will pass from the intake into sediment settling basins from which captured sediment and water will be discharged back into Morgan Gorge at times of high flow via a sediment flushing tunnel, with the outlet being approximately halfway down the gorge from the swingbridge. A residual flow of 3.5 cumecs is proposed immediately below the intake weir.

An upper tunnel portal and short access road down to the intake site is proposed to be developed for construction and operational maintenance purposes. This option has been chosen to avoid the need for a formed overland heavy vehicle access between the powerhouse site and the intake site and resultant effects on the environment.

From the sediment settling basins the diverted flow is conveyed via a tunnel approximately 1.5 km long to a powerhouse located on a low river flat immediately upstream of Alpha Creek. This Scheme layout will develop about 100 m of head and generate an annual output of 110 -120 GWh with a peak output of 16 – 20 MW of power.

The water flows through the tunnel via a penstock or alternatively directly via the tunnel (if built as a pressure tunnel) depending on the final tunnel design (refer Cross Sections: Tunnels and Settling Basins, Appendix 4). Water is discharged back into the Waitaha River via a tailrace from the powerhouse. The abstraction reach (intake weir to tailrace) is approximately 2.6 km long.

Associated with the powerhouse is a switchyard, stop bank and flood protection works. An access road from the end of the existing public Waitaha Road to the powerhouse site must be constructed for the Scheme to be built, and for future maintenance. This road may be up to approximately 7.0 km long, although approximately only 2.0 km of this will be on conservation land, including a section across Macgregor Creek (subject to final alignment and survey). The first sections of the road cross private land and crown land managed by LINZ. This access road will cross several waterways and require some associated protection works, particularly around Alpha Creek.

Overhead lines for electricity and communication will be installed up to the powerhouse site to provide services to the tunnel area for construction and for the transmission of power once the Scheme is operational. The transmission route will follow the road route within conservation land.

The key areas of construction involve earthworks, vegetation clearance and works/structures within the bed and margins of the river. Works will also be required for crossing of small watercourses. Once construction is completed and rehabilitation undertaken, the scale of activity is greatly reduced to routine operations, maintenance and monitoring. The noise from the powerhouse during generation will be masked by the sound of the adjacent river.

Accordingly there will be an intense period of activity, over a period of about 3 - 4 years as the Scheme is established, followed by a low level of activity during routine operation and maintenance.

Once operational, the Scheme will be controlled remotely from the ElectroNet Offices in Greymouth using communication links including real time information, camera and video footage. This includes continuous monitoring of matters such as equipment and flows, managing the intake flows and flushing of sediment.

During the first year of operation, following commissioning there may be one or two weekly site visits to check on structures and for regular maintenance, after which these are expected to drop back to one visit per week.

The majority of vehicles will be light utility vehicles or small trucks. Access to the headworks will be dependent on the final tunnel design (penstock or pressurised) and may be either through the tunnel and/or by foot or helicopter dependent on requirements and work needed.

Consideration is being given to leaving an excavator parked within the upper tunnel entrance for ongoing maintenance purposes. There will be unplanned and planned maintenance required, and from time to time the need for major maintenance that may require the use of helicopters e.g. parts replacement, however any such activities will be on a much smaller scale in terms of both works and the time required than the initial construction activities. Planned maintenance at the intake would preferably be done in the summer (January - March) in low flow periods. The requirement for ongoing maintenance is an integral component of this application.

In addition to routine site visits, there will be various environmental monitoring, weed and pest management activities to be carried out. These are important aspects of the Scheme and are to be undertaken in recognition of the values of the area and the applicants wish to have a Scheme which avoids or minimises effects on the environment within which it is located. The frequency and timing of these activities will be dependent on the final conditions of concessions and any later resource consents, and the relevant management plans developed by Westpower and approved by DOC. This work will be undertaken by the relevant consultants or contractors to ensure the contents of these management plans meet the relevant requirements.

Public safety in and around the operational area and structures will be managed under a Safety Plan developed in conjunction with DOC.

There will be no lighting along the road corridor. There will be lighting at the powerhouse and intake sites, but this will be minimal and operated on sensors (for the powerhouse site) or intermittent manual/remote use (for intake site). Lighting will be required at the intake site for monitoring, however this will only be turned on when required. Consideration will be given to using lighting that produces light at one wave length, but emits no UV and is designed to reduce light scatter.

The transformers and lines will be owned by Westpower and will be managed and maintained as per their other Westpower assets.

The operational footprint is less than 4 ha, of which more than half (2.6 ha) is made up of the road between the powerhouse and Macgregor Creek. The remaining footprint is spread over two distinct and discrete areas, the intake and the powerhouse sites and therefore the footprint at any one area is further reduced given this separation. The Scheme has been designed to minimise the footprint and have the smallest possible effect on the environment within which it is located.

A number of photo simulations accompany the Landscape Report (Boffa Miskell, 2014, Appendix 9). This report has considered the values of the location and assessed potential effects of the Scheme with the aim of Westpower being able to construct a Scheme which is appropriate to the landscape within which it is located. These simulations indicate how the Scheme will sit within the landscape, at both the intake and powerhouse sites, from a variety of viewpoints once operational.

It is important to note that should use of the Scheme cease all surface components are able to be removed.

The Scheme is described under five key sections: headworks; subsurface structures; powerhouse site; access road and transmission route. A description of the operating flow regime is provided. More details about construction are provided in Section 6.

5.2 THE HEADWORKS

The headworks include all those works associated with the intake and weir at the top of the Morgan Gorge including tunnel portal entrance and a short access road to the intake.

The headworks are located upstream of, but in close proximity to, the entrance to Morgan Gorge. Morgan Gorge is a very steep sided slot gorge which appears in places to be as narrow as 6 – 7 m, is 20 m deep close to the top end, and deeper further downstream. Preliminary concept designs for the headworks are described more fully in the report Waitaha Hydro Scheme: Morgan Gorge intake: Preliminary Headworks Concept prepared by I. McCahon, 2013, (**Headworks Report**) and included as Appendix 3.

Upstream of Morgan Gorge, the river flows over a wide gravel bed within Kiwi Flat (Figure 3). About 0.5 km upstream of the gorge, the Whirling Water tributary enters at a rock bluff on the true left, and the active river channel is restricted to about 100 m width. Within a short distance downstream of this point, the river bed gradient increases and falls an estimated 10 m into the gorge entrance.

At the gorge entrance, the river channel extends through a platform of rock on each side, about 2 – 3m above normal water levels for about 20 m upstream of the gorge proper. There is clear evidence in vegetation lines, fine sediment deposits and debris, that in large floods, the river ponds upstream of the gorge and this backwater effect extends up to about the Whirling Water confluence. The flood depth at the gorge entrance is

estimated to be 8 – 9 m [6] above the normal water level. The bed levels in the section of river upstream of the gorge are likely to be controlled by the combination of the backwater effects of the flood levels and sediment load.

Figure 3: Aerial Photo of Kiwi Flat with Whirling Water, entrance to Morgan Gorge and indicative location of contractors facilities.

Any intake must allow for this substantial flood rise (Figure 4). The Hydrology Report (Doyle, 2013) in Appendix 6 provides flood statistics for Kiwi Flat and has been an integral component of the design of the Scheme taking into account the hydrological conditions at this location.

[6] This estimate was based on a normal water level upstream of the Morgan Gorge, and the river drops steeply to the mouth of the Gorge (at location of the swing bridge) from this point. Subsequent to the McCahon estimate above, a large flood occurred which allowed an accurate survey of flood levels in February 2014. Directly under the swingbridge the flood level reached a height of 17.3 m above normal water level. This flood level is approximately 2.9 m below the swing bridge.

Figure 4: Looking upstream from the entrance of Morgan Gorge to Whirling Water during flood flows (*flood levels estimated to be 400 - 500 cumecs).*

The proposed intake works include:

- a low weir across the river;
- an intake channel on the right bank which takes the river flow to the intake gate and incorporates a channel and gate to sluice sediment past the intake;
- an intake gate housed at the start of a roofed culvert to convey the flow into the intake tunnel portal; and
- a second intake gate mounted in a shaft constructed in the natural rock face, to allow water intake during high flood periods when the lower gate will be subject to high sediment load.

In addition, there will be a short access road from the high level tunnel portal entrance (also referred to as the main tunnel portal or high portal) to the intake site and a temporary access road to contractors' facilities (required on a temporary basis for construction) which is also detailed in this section.

The preliminary concept is illustrated in the Headworks Report (McCahon, 2013) in the attached drawings A-1 to A-5, Appendix 3. Figure 5 below provides an outline of the headworks structures. The final design will take into account site specific and environmental factors.

The permanent and visible headwork structures consist of the weir, intake diversion, channel and intake portal; the tunnel portal and access road between this and the intake area.

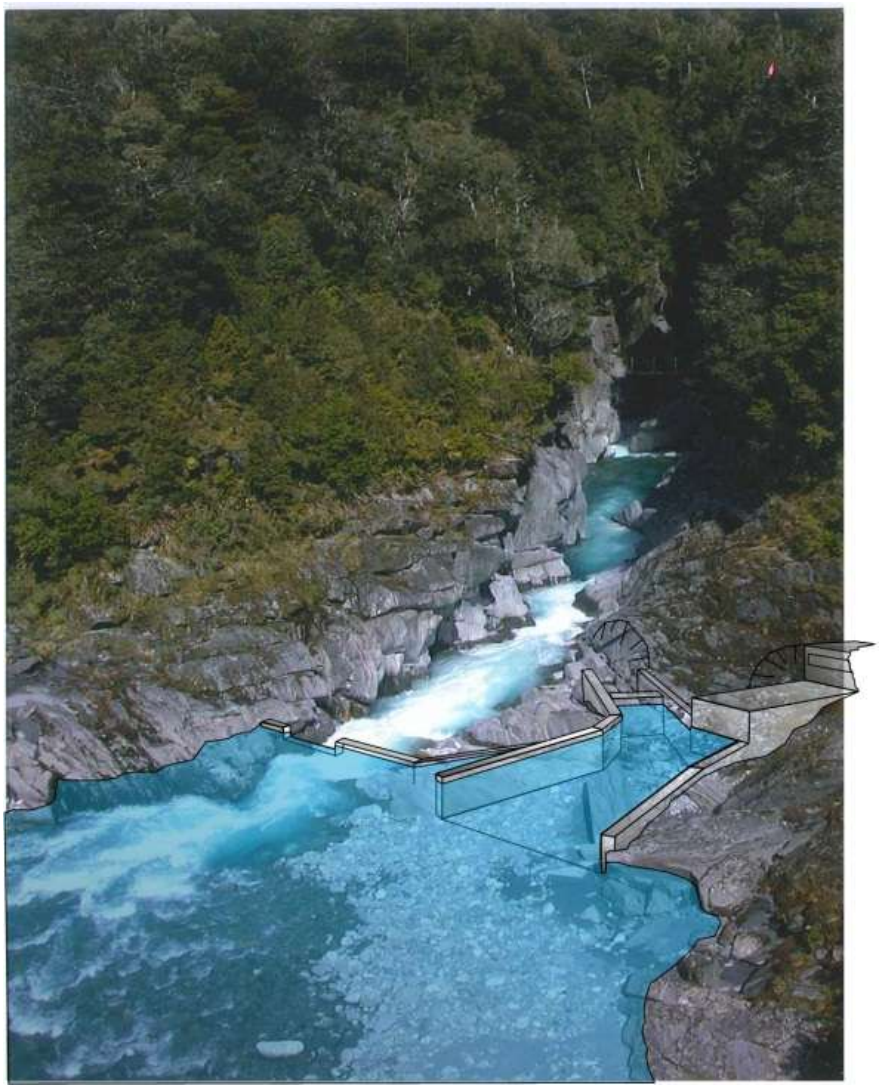

Figure 5: Outline of weir and intake structures at Morgan Gorge.

The concrete surfaces of the visible structures will weather rapidly and become less obtrusive. As revegetation occurs the portal and access road will become less visible. Photo simulations of the headworks are presented in the Photograph Simulations Supplement accompanying the Landscape Report (Boffa Miskell, 2014), in Appendix 9. A number of mitigation measures are also proposed to ensure that the headworks sit appropriately within the landscape.

5.2.1 WEIR

The weir is shown in cross section in Figure No: A-3 (Appendix 3). It is a simple reinforced concrete wall with a crest level of RL 238, which is generally 1 – 2 m above the rock level on the right abutment (looking downstream). A reinforced concrete structure of about 1 m width is envisaged, secured with rock anchors. The section across the river channel is likely to be 4 – 5 m high (above the river bed), but at the chosen location, the channel is only about 4 m wide.

It is envisaged that this channel section will have a depressed crest at RL 237.35 m. This will pass the residual flow, proposed to be 3.5 cumecs with the upstream water level at RL 238 m. This arrangement has been incorporated to concentrate the residual flow into a chute in order to retain the opportunity for kayakers to kayak this section of the river. Other arrangements are also possible, including having one crest level

throughout, or an irregular crest level or weir partially constructed from large boulders bolted and concreted into place to provide a more natural appearance.

Taking into account expert advice obtained in planning the layout of the Scheme' the final design of the weir will incorporate features to protect the koaro population within Kiwi Flat by enabling their passage in and out of Kiwi Flat while at the same time ensuring that the weir provides a barrier to trout entering Kiwi Flat. It will incorporate features to enable blue duck duckling access. The weir can also be designed to incorporate features to allow kayakers entry into Morgan Gorge. Finally, and as above, there is some scope to construct the weir to incorporate a more natural appearance provided this does not facilitate trout access. Such final design aspects to achieve these ends, while preserving engineering integrity and economic feasibility, will be made in consultation with the relevant experts.

At baseflows, the backwater formed by a weir at the location and height proposed (upstream from the throat of Morgan Gorge, crest height at R.L. 238 m) would initially extend some 250 - 300 m upstream. This would likely fill quickly with sediment, possibly during the first flood, due to the relatively small storage volume (Hicks 2013) with the riverbed regrading down to the weir. The weir and intake design does not create a lake upriver from the intake with the river reaching equilibrium and returning to natural base flow patterns in a short period following construction.

5.2.2 INTAKE CHANNEL, INTAKE AND INTAKE PORTAL

The intake channel will be located on, and cut into, the rock platform on the right bank. This channel is designed to fulfil three functions. Firstly to act as a diversion during construction of the weir across the river channel, secondly to divert the river flow in an appropriate flow alignment to the Scheme intake and finally to provide a sluicing channel in front of the intake to prevent most of the larger bedload entering the intake.

The floor will be cut into the rock and concreted to provide better hydraulic conditions for sluicing sediment and the channel confined with side walls about 4.5 m high. The channel is sized at 4 m width at the gate to keep flow velocities high enough to entrain bed material and move it past the intake. A gate at the downstream end of the channel can be shut so water is directed into the intake. The intake has been sized as a 5m wide passage out of the side of the intake channel. This opening will be controlled with a radial gate housed within the structure at the upstream end. Through the assessment of landscape values, and consideration of methods to avoid or mitigate effects, design options were considered and the structure has been kept deliberately low to reduce its visibility and potential effects on the landscape. It will be covered with a roof and removable hatch to allow for the infrequent need for maintenance access. The top of the structure will be subject to about 7 m head of water during large floods and thus the structure will need to be substantial to withstand the imposed loading.

A second auxiliary intake is to be located in a short shaft constructed within a slot cut into the rock face at the intake tunnel portal. This is located above the primary intake (refer Appendix 3, Figure A-5: Diagram Intake) This shaft will also be fitted with an access hatch at the top, and will house a second intake gate. The gate will normally be kept closed, and will only open during periods of flood, when the sediment load at the lower intake level is likely to be too high to be handled effectively. By shutting the lower gate during floods and opening the upper gate, it should be possible to minimize bedload entrainment into the intake and subsurface settling ponds.

The intake structure is envisaged as integral with the intake tunnel portal. Because of the flood risk for workers in the tunnel during construction, the intake structure, higher level intake shaft and portal must be built before the tunnel is broken out.

5.2.3 MAIN TUNNEL PORTAL ENTRANCE

As discussed in the last section there is a need to construct the intake before breaking out the settling basin tunnel for both programming and risk reasons, therefore a separate section of the main tunnel (also referred

to as the "access tunnel") to a high level portal is needed. This section of tunnel will provide access above flood levels for construction of the intake structures and potentially for operational maintenance purposes.

While the final design and location within the development envelope are yet to be confirmed the portal entrance could be at a maximum 5 m x 5 m in size but likely to be less (3.5 m x 3.5 m). The location will be selected to provide the best exit conditions but will be within the area of works identified in Aerial Map (Appendix 1, Map 5). Where possible the site will be selected to avoid any larger trees and minimise effects on the landscape. There will be a formed area at the portal large enough to allow vehicles to turn about 90 degrees from the road into the tunnel, about 8 – 10 m in diameter. In places the construction footprint could be up to 15 m wide, however this additional area will be rehabilitated following construction.

5.2.4 INTAKE ACCESS ROAD

A short access road is needed between the main tunnel portal entrance and the intake structure for construction of the weir and intake structures and future maintenance. Consideration is being given to leaving an excavator parked within the upper tunnel entrance for ongoing maintenance purposes. This will depend on the final size of the tunnel and operation management plans but is an option to be considered given the choice to avoid potential effects by not creating road access from the powerhouse to the intake site. The unsealed intake access road will most likely be 5 m wide including 1 m for the water table. It will be formed from the portal in a direction up the valley on a suitable grade to suit the topography but no steeper than 1 in 6. It will be on steep terrain so in places the construction footprint could be up to 15 m wide. Rehabilitation will occur following construction to achieve the required operational width. The toe of the access road is likely to require rock armouring, where it is within the bed of the river at the intake site, to ensure access is available when required. The indicative alignment is shown on Figure A-1, Appendix 3.

5.3 SUBSURFACE STRUCTURES

In contrast to the Amethyst Hydro Scheme, this Scheme has more infrastructure located underground including the sediment settling basins, a cross tunnel channel, flushing and access tunnels. These works are more fully described in the Headworks Report (Macahon, 2013) in Appendix 3. The location of the sediment settling basins underground avoids significant disturbance above ground, keeping the project footprint to a minimum.

5.3.1 SEDIMENT SETTLING BASINS AND FLUSHING TUNNEL

The water taken from the river will carry suspended sediment, and at times a large bedload. The settling basins will be designed to remove as much of the coarser sediment as possible to prevent undue wear on the turbine and penstock. The current concept is for a traditional settling basin design to allow the flushing of sediment back to the river. From the portal, the flow is taken by a 5 m wide channel for about 25 m into the hillside. At this point the tunnel and channel splits before widening and deepening to provide two 10 m wide x 60 m long settling basins (refer Appendix 4, Cross Section: Settling Basins).

The two basins are adopted as this allows flushing of one basin while still generating off the other, and reduces the width of the underground excavation.

At the downstream end there will be a weir to take the generation flow from the top of the basin and into a cross channel which leads to the upper end of the main tunnel and into the penstock or pressure tunnel. The channel floor will be a concrete slab spanning over four channels, forming a continuation of the settling basin floor leading to four flushing gates. When open these discharge into the flushing tunnel to return sediment to the river.

The outlet to this flushing tunnel is about half way down the gorge and not visible from the intake site. The river bed has probably dropped about 15 m from the top of the gorge to this point and this should mean the

tunnel invert is about 10 m above the river bed. The outlet should be above even extreme flood levels. Additional investigation, survey and modeling are needed before the location of the outlet can be confirmed.

Flushing would normally be carried out during floods or on their recession when the river is already turbid and at relatively high levels. This will assist to ensure that sediment laden water does not adversely affect water quality and that sediment from the flushing tunnel is mixed and distributed as per natural flood and fresh processes in the river. It is not envisaged that there will be any significant impact on river turbidity or that the discharged sediment will build any appreciable fan at the outlet.

5.3.2 MAIN TUNNEL

The main tunnel (straight section which houses the penstock) would be at a maximum 8 m wide x 7 m high (refer Appendix 4, Cross Section: Tunnel and Pressure Tunnel). The final tunnel size and alignment will be finalised once investigative drilling is carried out. A corridor 50 m wide is proposed to allow for this final alignment. The tunnel grade will be relatively flat at about 1 in 10 as compared to the Amethyst at 1 in 4.

While the final tunnel design has not been confirmed, the maximum size allows for a service road to run alongside the penstock, and various services and control systems that will be carried through the tunnel. This is a larger version of Amethyst which has a penstock on one side and room to walk or take a quad bike through. The tunnel itself is expected to be rock bolted and shotcreted through much of its length.

Also under consideration and as an alternative tunnel design is a smaller pressure tunnel where the tunnel also acts as the penstock which conveys the water to the powerhouse. This would be about the same size as Amethyst at 3.5 m wide x 3.8 m high. The rock walls would be concrete lined and the lower 200 - 300 m would probably need to be steel lined (refer Appendix 4 Cross Sections: Tunnel and Pressure Tunnel).

The first option has the advantage of good and reasonably quick access to the intake in all weather conditions but is less economic because of the larger tunnel. The construction methodology would be the same for both, drill and blast, although the equipment used for removing the excavated material may change. The final decision will be based on engineering and economic feasibility. All associated subsurface structures such as sediment settling basins, flushing tunnel and external structures are required for both options. There is no difference in effects between the two options. The tunnel portal exit structure (at the powerhouse site) would be similar to that at the Amethyst for both these options as would the upper tunnel portal entrance. Construction methods and rehabilitation following construction will assist in reducing the visual effects.

Figure 6: The Amethyst Portal – the penstock is buried on leaving the tunnel. *(Note regeneration of vegetation above portal within 3 years).*

5.3.3 PENSTOCK

The water for generation will be directed into either a penstock intake (or as discussed previously a pressure tunnel) from the cross tunnel channel (refer Appendix 3, Figure A-1*)*. The channel will curve around to meet the top end of the main tunnel, where the penstock intake will be located. This is envisaged as a simple wall across the full section of the tunnel, fitted with a gate and penstock entry. This wall seals the settling basin from the main tunnel to prevent water spilling into the main tunnel.

The penstock will be located on the right hand side, when viewed downslope, of the main tunnel to allow support directly to the tunnel wall at a bend in the tunnel likely to be needed towards the downstream end. The diameter of the single penstock is to be confirmed but will be approximately 2.2 - 2.7 m. The penstock would be supported on concrete pedestals within the tunnel. At the powerhouse end the penstock will bifurcate into two smaller sized penstocks located side by side to feed the two turbines inside the powerhouse. It is expected the penstock will be buried between the tunnel portal and the powerhouse. The pressure tunnel option will also require the penstock to bifurcate at the powerhouse.

5.4 POWERHOUSE SITE

The tunnel portal exit, penstock, powerhouse, switchyard, and tailrace will all be established within the existing mostly grassed flood plain between cliffs and Alpha Creek located below Morgan Gorge, as shown on Appendix 1, Map 6. This area is approximately 1.7 ha (70 m at widest point, 345 m at longest point). This area can be considered a construction or staging area, which, through the course of development of the Scheme becomes part of the operational footprint and includes the structures outlined below.

5.4.1 POWERHOUSE

The overall footprint for the powerhouse will be about 30 m x 15 m and up to a maximum height of 10 m above ground. The powerhouse will be a concrete building which will house two turbines, generating equipment and the control room. Permanent staff toilet facilities will be provided.

The final configuration is dependent on the turbines and generation equipment selected as well as how these will be accessed for maintenance. The Amethyst powerhouse, for example, has a removable roof to enable future maintenance or replacement of generating equipment. There may be approximately 5 m of the building below ground level to accommodate the two turbines.

The photo simulations presented in the Photograph Simulation Supplement (Appendix 9) are based on the Amethyst powerhouse. While the powerhouse design may change, the general bulk and location will not and the photo simulations therefore provide an idea of the size of the building and how its sits within the environment at this location.

More precise positioning will be worked out at the detailed design phase after field topographical survey and geotechnical investigations have been completed. The powerhouse will be sited to minimise the risk of damage from a landslide or toppling of the cliff behind it.

5.4.2 SWITCHYARD

The switchyard contains all of the base transmission equipment and will sit beside the powerhouse building. The overall footprint for the switchyard will be about 20 m x 20 m, and there will be a 66 kV transmission line leaving the switchyard to take power away. The switchyard will be an open area that is securely fenced off. The maximum height of the tower (poles) in the switchyard is 12 m. The control room is located within the powerhouse.

While the final configuration of the powerhouse and switchyard may alter slightly the overall footprint of these two components is likely to remain unchanged. The switchyard will be located on the downstream side of the powerhouse.

5.4.3 TAILRACE

The tailrace will extend from the powerhouse to discharge to the river in the area where Alpha Creek, when flowing, discharges (noting this is largely ephemeral). It will be about 5 m wide at the base, 3 m deep with approximately 2 to 1 batters and a 20 m top width. It will be slightly wider near the powerhouse to match the draft tube spacing.

The tailrace will be designed to accommodate the maximum discharge from the powerhouse to the Waitaha River and constructed in such a way as to avoid scouring of the natural watercourse. Based on expert advice it will also take into consideration concerns about entrapment and predation of fish, particularly of koaro, within the tailrace as discussed in the Fish Report (Drinan & McMurtrie 2014, Appendix 11).

5.4.4 FLOOD PROTECTION

5.4.4.1 STOP-BANK AT POWERHOUSE SITE

The powerhouse site will require protection from the river in flood events. The extent and specific siting is to be determined but it is most likely to consist of an armour-rocked stop bank of up to 1 m high with a 4 metre top width extending from the toe of the terrace at the southern end of the alluvial flat along the river bank to the tailrace. It may merge with the powerhouse platform. Rock protection material will be sourced where practical from the powerhouse, tailrace sites and tunnel excavations or brought in from off-site. The effect of the stop bank on flows in the main channel and bank stability are considered minor (Appendix 7, NIWA Letter 22.5.14).

5.4.4.2 FLOOD PROTECTION AT ALPHA CREEK

Alpha Creek is located on the downstream side of the powerhouse. Below the cliffs it appears as a dry creek bed for most of the time. In flood the water has flowed both north and south as it leaves the cliff base. During stormwater flows, rock debris is carried down the slope and distributed through the vegetation and channels across the fan, dependent on current orientation. At present it is flowing south during storm events.

Flood protection at Alpha Creek is needed to protect both the access road and the tailrace from being inundated with gravel in a major flood event. This will require the realignment of the creek through the construction of a flood channel and stop bank(s). It will contain the creek at the access road crossing point – otherwise a long section of road will be at risk in a flood as there is no defined channel. This could also potentially disrupt the ability to manage discharge of the water from the tailrace back to the river. An indicative cross section of the proposed flood control works is provided in Appendix 4.

Works will occur within the existing extent of debris and flood flow paths. It is expected that once constructed and over time there will be a reasonable degree of revegetation. The scale of vegetation clearance involved in this activity is within the range of naturally occurring disturbances such as slips or stream channel changes.

5.5 MAIN ACCESS ROAD

The access road from the end of the Waitaha Road, on the north side of the Waitaha River, to the powerhouse site is required before tunnelling can begin.

The first section of the access road crosses over privately owned farmland and land managed by LINZ before crossing Macgregor Creek, part of which is managed by either LINZ or DOC (depending on the final road alignment) and then enters conservation land after which the road continues up the true right of and parallel to the Waitaha River. The road, subject to final survey, may be up to 7.0 km long with up to approximately 2.0 km being on conservation land (approximately 1.7 km excluding the section across Macgregor Creek) and included in this application. The section of road over the farm land will be a private access and not open to the general public for use.

The access road will be established within an envelope as shown on the Map 6 (within green dashed lines) Appendix 1. The finished road will be no greater than 10 m wide (including water tables). As with other aspects of the Scheme, this envelope is to provide some flexibility of location to ensure that site specific features and topography can be provided for.

Along with providing a safe and efficient road route, the detailed design phase will concentrate on minimising the impact of the route on flora and fauna within the corridor, and will seek to follow a route that avoids key vegetation and the Stable Tributary, which as described in Section 4.9, is an ecologically sensitive waterway. The values of this waterway have been taken into account and have been the subject of consideration of options by Westpower to avoid potential adverse effects as far as is possible. An initial option to cross this

waterway was discounted, Westpower seeking to avoid potential effects and protect the values of the waterway. To this end the decision has been made through the investigation and planning phase of the Scheme to avoid crossing the Stable Tributary waterway.

The indicative road layout plan with longitudinal sections is provided at Appendix 1, Map 7.

An unsealed two lane road cross section has been proposed through conservation land (refer Appendix 4, Cross Sections: Single and Two Lane Road). A short length of road either side of each significant waterway crossing will likely be sealed to limit potholing of the surface and to provide for a high friction surface for vehicles to brake should they encounter an oncoming vehicle.

A number of waterway crossings will be required. Generally culverts will be placed as required to collect road runoff and move flows from the uphill side of the road to the downhill side. Specific waterway crossings are required for Allen Creek (on private land), Macgregor Creek, Granite Creek, and Alpha Creek. In addition, if any crossing of other smaller waterways is required then this will be managed to minimise effects on the waterway. As discussed above, the possible crossing of the Stable Tributary has been avoided given the high aquatic values of that waterway.

The crossing of Macgregor Creek will likely use an unsealed ford, as this will accommodate washout of the crossing with relatively simple repair methods. A ford is proposed for crossing Alpha Creek while a bridge is proposed for Granite Creek. This bridge may require a pier for support depending on the final road alignment and engineering requirements. Some protection works may also be required for crossings.

There will be no road access from the lower Waitaha Valley into Kiwi Flat.

5.6 TRANSMISSION

Power and telephone services will be required at the lower tunnel exit portal site during construction. These will be maintained following completion of the works programme to supply power and communications /telephone connection to the tunnel, headworks and powerhouse.

Transmission lines and other utilities will be carried overhead on poles along the access road corridor when crossing conservation land and on up through the tunnel to the intake site. The short section of transmission line between the powerhouse and the tunnel may be underground.

The transmission line used to carry the 11 kV required for construction will then be used to convey power (66 kV) generated by the Scheme from the switchyard to the distribution connection point at the State Highway. The transmission route is included in the road corridor and will follow the access road to Macgregor Creek. Beyond this point the transmission route to the main highway is subject to further investigation with a number of factors to be taken into consideration including land ownership, environmental effects, cost and impact on power users during construction. Any other utilities including communications/telephone, coming into and out of the Scheme will be carried on the same set of poles.

ElectroNet, on behalf of Westpower, will undertake installation of the transmisson line from the switchyard to the distribution connection point by the State Highway and between the powerhouse and the lower portal of the tunnel.

5.7 FLOW REGIME

There is no storage in this type of run-of-river Scheme so the generation output will follow the flow in the river.

A residual flow of 3.5 cumecs immediately below the intake has been proposed. Westpower, in determining a residual flow, sought to ensure that the Waitaha River would maintain the aquatic habitat values. Accordingly the residual flow was the subject of specific consideration and advice in regard to aquatic ecology. 3.5 cumecs was adopted as the residual flow rate at which it is considered that aquatic values and life supporting capacity of the river will be retained.

Water takes have been modelled up to a maximum 23 cumecs. The expert advice and assessment of effects have been based on this rate of take. It is Westpower's intention to apply for a 23 cumec take, with the associated 3.5 cumec minimum residual flow in future resource consent applications. Accordingly for the purposes of this application, a maximum of 23 cumecs is also used.

There will be a water level monitor in the tunnel at the start of the penstock. When the level rises the Scheme control system will open the guide vanes to take more water and the generation output from the Scheme will increase. If the water level drops the opposite will happen.

When the Scheme reaches the maximum take, the intake gate will close sufficiently so that excess water remains in the river. There may also be some may spill from the sediment settling basin through the flushing channel.

When the flow gets below the minimum required for one turbine to operate then the Scheme will be shut down until there is sufficient water. This is likely to be in the range of 2-3 cumecs above the residual flow.

Planned starting and stopping of the Scheme can be managed using ramping procedures to prevent a sudden increase in flow in the main stem of the river or in the case of starting, increased discharge from the tailrace.

Procedures will be put in place to manage situations which may result in the Scheme shutting down without notice e.g. automatic emergency shutdowns. The effects of stops and starts on river flows will be dependent on the volume of water in the river and the volume being diverted. The effects on stops and starts will be closely monitored during commissioning and the initial operational period. The information gained from this monitoring will be used to determine the appropriate safety procedures and level of response to manage these situations and to ensure public safety. Monitoring will also be undertaken concurrently to assess the effects of changes in river flow (particularly down ramping) on fish stranding.

6. DESCRIPTION OF CONSTRUCTION

This section provides a general outline of the stages, programme, management, methods and activities that are specific to the construction period. As discussed in the previous section, setting out an overview of the project, Westpower seeks some flexibility in approach to ensure that final works are able to take into account site specific conditions, including environmental matters, to enable the most efficient and effective development of the Scheme within its location. As with the discussion in that section, this approach is based on comprehensive investigation of technical and environmental matters along with experience of successfully developing a hydro scheme on conservation land at the Amethyst site.

6.1 PRE CONSTRUCTION ACTIVITIES

There will be a series of pre-construction activities required before the final location, design and plans for the Scheme are confirmed. These include:

- investigative drilling for tunnel construction (which will occur under separate concession);
- surveying for final road alignments – main access road and intake access road. This includes consideration of works in the vicinity of the Stable Tributary to avoid or mitigate potential effects and design of the intake access road to take into account landscape matters;
- surveying of vegetation to avoid, where possible, any trees of significant size and or bat roosting potential;
- weir and intake design considerations including providing access for koaro (while providing a barrier to trout), kayakers, blue duck ducklings and from a landscape perspective.

6.2 CONSTRUCTION PROGRAMME AND METHODS

6.2.1 PROJECT MANAGEMENT

Project management, how the project proceeds and the final construction methods will be determined by the contractors engaged on the various aspects of the project in conjunction with Westpower. Having said that, all such activities will be within the scope of, and not out of character or scale with the parameters set out in this application and the technical reports.

All of the DOC concessions, and later resource consents, requirements and conditions will be incorporated within the contract documents. Westpower will work with the contractors to develop a work methodology that will meet these conditions. When completed this will become part of the Construction Management Plan which then becomes the basis of how the work is performed. To assist with consideration of the project and how it will be managed, this application includes a suggested set of draft conditions in Section 9. These conditions are based on expert advice in regard to engineering, design and environmental matters along with conditions which Westpower have experience with, and known to have worked, to produce successful outcomes for both Westpower and DOC in developing the Amethyst Hydro Scheme on conservation land. Expert technical advice has been obtained early in project planning and utilised to account for local conditions and environmental values.

A number of additional management plans, plus the various contract plans and work instructions, are considered part of the overall Construction Management Plan. These additional plans include: the Wastewater, Groundwater, Erosion and Sediment Management Plan; Construction Noise Management Plan; Landscape Management Plan; Rehabilitation Management Plan, Pest and Weed Management Plan; Safety Plan, and Environmental Monitoring Plan. These plans will be developed by the contractor(s) and Westpower in consultation with, and to be approved by DOC. These plans provide the specific methodology for managing

aspects and stages of the construction process. As with previous experience of successfully developing such projects it is expected that many of the recommended mitigations for the effects of construction will be addressed via the management plan method e.g. sediment control.

The appointment of a Liaison Officer is anticipated by Westpower, as for the Amethyst Hydro Scheme, and is considered an effective way for managing the relationship between Westpower and DOC for this development in this area. This position requires a range of professional skills necessary for liaising effectively and autonomously with Westpower, DOC, territorial authorities and other external consultants. The Liaison Officer will be appointed by the commencement date for this concession.

6.2.2 CONSTRUCTION SEQUENCE AND TIMING

Overall construction is expected to take 3 – 4 years at a minimum, although activities will not be occurring at all sites for this entire length of time. For example, no major works at the intake and powerhouse sites can be undertaken until the access road to the powerhouse site is developed. Construction of the Scheme can be considered in 4 key stages as outlined in Table 9 below. There will be some overlap between stages 2, 3 and 4 with stages 3 and 4 occurring concurrently.

Table 9: Construction Stages and Timing.

Stage	Description	Estimated Time
1.	The construction of the access road from Waitaha Rd to the tunnel portal and powerhouse site.	**6 months**
2.	Construction of the tunnel and subsurface structures, the short access road down to the intake site.	**24 months**
3.	Construction of the intake channel and weir.	**12 -18 months**
4.	Construction of the powerhouse, switchyard and 66 kV transmission line and installation of the penstock.	**12 months**

Construction timing and the length of time to complete construction will be dependent on a range of factors including:

- the availability of contractors;
- the supply and delivery of the machinery;
- intake and weir construction occurs during the most favorable period of flow in the river in terms of low flow and low probability of floods;
- final size of tunnel;
- rock conditions encountered during tunnelling.

6.3 DESCRIPTION OF KEY CONSTRUCTION ACTIVITIES

These activities are considered either as an activity specific to a particular stage of construction e.g. as outlined in Table 9 or as a general activity common across all construction stages and areas.

6.3.1 STAGE 1: THE CONSTRUCTION OF THE ACCESS ROAD FROM WAITAHA ROAD TO THE POWERHOUSE SITE AND TUNNEL PORTAL

6.3.1.1 GENERAL

The access road from the end of the Waitaha Road (on the north side of the Waitaha River) to the powerhouse site is required before tunnelling can begin. Road construction begins on private farmland and land managed by LINZ with the upgrade of existing farm roads leading to Macgregor Creek. The next section involves crossing Macgregor Creek (which is managed by either LINZ and/or DOC subject to final survey and alignment across this section) and then continuing through conservation land up the true right of the Waitaha River. This access road from the end of Waitaha Road to the powerhouse site is subject to final survey but may be up to 7 km long, of which approximately 1.7 km is within the vegetated area on the conservation land south of Macgregor Creek.

As well as providing a safe and efficient access route, the final road alignment will seek to follow a route that avoids any key vegetation and the Stable Tributary. Westpower, in determining the route, seeks to avoid potential effects of work within the margins of that waterway to ensure instream values are maintained.

There are a number of other waterways and likely smaller watercourses that will be crossed by the road. The access road will be constructed on alluvial gravels using culverts, fords or bridges (whichever is most appropriate) to cross these waterways. Roadside water tables and run off/sediment controls will be constructed in accordance with best practice to assist with maintaining water quality. Soil and vegetation cleared during road formation cut and fill will be removed from the site and disposed of on private land. Runoff from the road will be collected in roadside channels and directed to the nearest natural watercourse. Sediment management measures will be employed to avoid sediment run-off, in particular into the Stable Tributary to ensure that the identified values in that waterway are protected. Flood protection works as described in Section 6.3.4 will be undertaken during road construction.

It is expected that the areas of cut bush on the edge of the corridor will regenerate quickly. The maximum width of the finished road (if two lanes) will be at maximum 10 m wide including an allowance for water tables. From a visual perspective the road will look like other metalled roads, either public or private, which commonly occur throughout the Westland District.

The construction phase of the road will see the use of earthmoving machinery plus large truck and trailer units to carry bridge and culvert precast elements, large cranes for bridge construction and articulated dump trucks for removing soil and cleared vegetation. The construction processes will be similar to the construction methods used on any local road in the area and which have been successfully applied during the construction of the Amethyst Hydro Scheme to achieve good environmental outcomes.

Installation of power poles and power supply from the nearest existing power supply to the tunnel entrance/powerhouse site will also occur during this stage.

6.3.1.2 ROAD CORRIDOR

A road corridor of 10 m has been proposed to accommodate the proposed road cross section (including water tables) within the generally flat to rolling topography. An additional 10 m has been included to allow for the transmission line, to provide sufficient clearance from the road edge and allow for vegetation clearance required for power poles and overhead power lines. A total cleared corridor of 20 m width has therefore been allowed for in the application but vegetation will only be cleared as required. Maintenance of areas where

vegetation has been cleared will be required over time to maintain and protect the line and the transmission route. Where possible the cut and fill from the road construction activity will be balanced, but excess material will be carted off site to the spoil disposal site on private land.

There is presently limited topographical information available for the road design to be based upon. For this reason, as well as to accommodate the identified cleared footprint, it is probable that the required road and transmission line footprint will move around within the envelope (refer Appendix 1: Map 6) particularly along some sections, as the design alignment is refined with more detailed information. The ability to locate the corridor within the envelope means that site specific issues can be provided for (i.e. topography, the Stable Tributary, large trees and potential bat roosts) and it is intended that the final alignment will be arrived at through further surveys of the road.

6.3.1.3 PRELIMINARY DESIGN CRITERIA

Preliminary design criteria have been established for the access road for the concept design phase. These road design criteria allow for the heavy vehicle use required during construction then on-going light vehicle use with occasional heavy vehicle use required for maintenance.

Initial roading design provides for a two lane road through conservation land which will provide improved efficiency for travel and safety between oncoming vehicles, particularly during the construction phase. A two lane layout means that vehicles are not so dependent on visibility around curves for oncoming vehicles, which also means that there will be less pressure to clear vegetation for visibility and the road is not required to be as straight as it would otherwise need to be for safety reasons should a single lane be used. The decision to build either a single lane with passing bays or a two lane road will be dependent on final survey and taking into account topographic and site specific issues. A typical cross section for both a single and two lane road is provided in Appendix 4.

Broadly speaking the longitudinal grades will be kept to less than 6.5%, with a maximum longitudinal gradient of 12.5%. One of the key reasons for this relates to road safety of the truck and trailer units and the articulated dump trucks descending and climbing the road. Horizontal curves will be sized to provide passage of the vehicles with the largest turning circles.

The intention is to generally maintain an unsealed road surface. This allows maintenance of the road surface to be kept simple by grading, topping up any gravel lost by flooding or vehicle damage, without the need for the resealing of an otherwise chip sealed surface. A short length of road either side of each significant waterway crossing will likely be sealed to limit potholing of the surface and to provide for a high friction surface for vehicles to brake should they encounter an oncoming vehicle.

The roadside water tables will be generally sized to provide sufficient capacity to carry runoff to the regularly spaced standardised circular concrete culverts that will cross the road to allow storm water to make its way to the nearest watercourse. All roadside drainage will include measures to ensure that any sediment laden road runoff is kept out of the Stable Tributary. This may be a combination of informal drainage channels to direct runoff away from the Stable Tributary and sediment management practices. This waterway will be monitored during the construction phase for pH and sediment (i.e. parameters such as total suspended solids, turbidity and water clarity). Final monitoring requirements will depend on final alignment of the road and proximity of the road and construction activities to the waterway.

Other general measures to prevent contamination of waterways, such a refuelling practices and siting of contractor facilities, will be part of the Construction Management Plan and are included in the suggested conditions in Section 9.

Post construction, the road will be maintained to the minimum width practicable to enable access for operational and maintenance purposes. Areas no longer required will be rehabilitated.

6.3.1.4 WATERWAY CROSSINGS

Several large waterway crossings will require specific design because of their scale and the debris and/or bedload that the watercourse is likely to carry. The crossing of Macgregor Creek will likely use an unsealed ford, as this will accommodate washout of the crossing with relatively simple repair methods. A ford is also proposed for crossing Alpha Creek for similar reasons.

A bridge is proposed for Granite Creek. If this bridge requires a pier, as recommended in the Aquatic Ecology Reports (McMurtrie & Suren 2014, Drinan & McMurtrie, 2014, Appendices 10 and 11) the pier where technically feasible, will be located out of the wetted channel. Some machinery will be tracked through Granite Creek during construction of the road and the bridge, or alternatively a temporary ford may be created using pipes to provide dry access while the construction of the bridge and road proceeds. Once the bridge is completed direct crossing of the creek bed will cease and any ford will be removed.

As previously discussed, Westpower has considered the expert advice and values of the Stable Tributary and a decision has been made not to cross this waterway to ensure protection of the biodiversity values associated with it. The road will be located on the true right of the Stable Tributary at a sufficient distance (minimum 10 m but preferably wider) to allow for a protected vegetated riparian zone of trees, shrubs and groundcover that will shelter the water way from the road and help to intercept run off from the road. As above, the final alignment around the Stable Tributary will be determined through closer investigation/survey prior to construction.

Care will be taken to protect all small waterways alongside the access route from contamination during construction.

6.3.2 STAGE 2: CONSTRUCTION OF THE TUNNEL, SUBSURFACE STRUCTURES, SHORT ACCESS ROAD TO THE INTAKE SITE AND THE TEMPORARY ROAD TO THE CONTRACTORS FACILITIES.

6.3.2.1 GENERAL

Westpower has proven experience with the construction of the tunnel at the Amethyst. The experience gained during the Amethyst project will be applied to the management and construction of the tunnel for this Scheme.

The proposed tunnel is 1.5 km long and will have on average a grade of 1 in 10. The final tunnel alignment will be dependent on investigative drilling, for which a concession is being applied for separately, and final surveying.

The tunnel excavation will commence from the powerhouse site area. This area will be considered a construction area and will be used: for the temporary storage of rock removed from the underground excavations; to store equipment, machinery and will include some contractor facilities. The area to be developed as the tailrace will be initially be developed as a settling pond for sediment laden water from tunnelling and converted to the tailrace at the completion of works. Once spoil from the tunnel has accumulated to a certain volume, typically less than 100 m^3, it will be transferred by truck to the proposed disposal area to the north of Macgregor Creek. A small portion of spoil may be used where suitable within the existing earthworks for flood protection.

The tunnel design must allow for the following:

- driving the tunnel;
- for transporting supplies and materials for the construction of the headworks (dependent on final sizing of the tunnel and penstock); and

- ongoing access to intake for operation and maintenance (dependent on final sizing of the tunnel and penstock).

An indicative construction sequence is outlined in the Headworks Report (McCahon, 2013) in Appendix 3. The following is a possible order of construction (note this list also includes Stage 3 and 4 activities):

- form main tunnel to end of penstock;
- continue with access tunnel and high level portal. As well as providing access to the intake, this also provides through tunnel ventilation and a second tunnel egress;
- excavate cross drive and access drive to flushing tunnel, construct access road to intake;
- commence construction of intake structure and channel in the river bed;
- excavate settling basins, using the cross drive as access. The grade in the cross drive is kept to an acceptable level to allow plant access;
- concrete work to one settling basin;
- construct flushing tunnel;
- complete intake structure to safeguard portal from flooding;
- break out hydraulic tunnel to the portal and completed intake structure;
- complete concrete work in settling basins;
- construct penstock intake;
- complete intake works and weir; and
- lay the penstock.

6.3.2.2 TUNNEL PORTALS

Safe tunnel portals are required to secure and protect the tunnel and workers from the potential for vegetation slides and rock falls and to provide ongoing protection of the infrastructure. The first part of the work will be to stabilise the face above the tunnel portal. It is anticipated that a temporary steel-catch fence will be constructed above each portal, and other stabilisation treatments may be required on the slopes above the portals. Alternatives to shotcreting will be considered for sensitive locations. A reinforced concrete portal structure will be constructed at both ends of the main tunnel. The actual size of these structures will vary depending on matters including the final location, topographical survey and the risk of landslides.

The portals will have a similar internal profile to the final tunnel design. The exterior may be partially backfilled and planted to blend in with the hillside. The steel-catch fences would be removed following completion of the tunnel excavation and final restoration of the site will be undertaken at both ends of the main tunnel.

(a) The tunnel portal exit structure (at the powerhouse site) will be constructed following excavation of overburden from the tunnel portal and prior to commencement of tunnelling. There is a 60 -70 m high near-vertical terrace edge approximately 50 m from the proposed river level powerhouse. The tunnel may start at the base of this slope, however subsurface investigations are required before the final confirmation of this position. This portal would be at maximum up to 8 m wide x 7 m high.

It is proposed that the pre-cast concrete portal will act as a shield prior to commencing the tunnel and during excavations. Poor quality rock as result of weathering and proximity to the Alpine Fault could be expected in the first 100 - 300 m from the portal.

The concrete portal structure could ultimately be covered over to better protect it from subsequent falls from the terrace edge, and also allow planting to minimise visual impacts. Consideration will also be given to forming a bund over the buried tunnel section closer to the powerhouse to reduce the risk of falling debris from the terrace edge reaching the actual powerhouse. This bund could also be planted.

(b) The tunnel portal entrance above Morgan Gorge is as yet unspecified in location or size. At maximum it could be about 5 m x 5 m in size, but likely to be less. The dimensions are less than as for the portal described in (a) above as this does not require room for the penstock. The location will be selected to provide the best exit conditions. The type of portal structure depends on whether there is a suitable rock bluff to exit from or whether it will be a steep slope with some colluvium cover in which case it may look similar to the downstream Amethyst tunnel portal. If possible the site will be selected to avoid any larger trees. There will need to be a formed area at the portal large enough to allow vehicles to turn about 90 degrees from the road into the tunnel, so about 8 – 10 m in diameter. In places, the construction footprint could be up to 15 m wide. From here the short access road to the contractors' facilities and to the intake will be constructed.

6.3.2.3 TUNNEL EXCAVATION AND CONSTRUCTION

The tunnel and subsurface structures will be primarily constructed using drill and blast techniques – this will be the same for both penstock or pressure tunnel although the equipment used for removing the excavated material may change to suit the tunnel dimensions. Where there are areas of weak rock then this may be excavated using a milling head on an excavator.

Drill and blast tunnelling is a cyclic operation, comprising the excavation of the face and support of the exposed section of tunnel excavated in "rounds". Each cycle or round comprises: the drilling of the blast pattern; loading the holes and firing; venting; and installing rock support (rock bolts or steel sets) and shotcreting and mucking out (spoil removal). Blasting could occur at any time over the 24-hour working period, depending on when the cycle is ready for blasting. Noise related to the blasting is discussed in Section 6.4.

It is expected that at least 50% of the tunnel will require rock bolting and shotcreting during excavation, and that a significant proportion of the excavation will be concrete lined (both walls and floor). The final tunnel design will also depend on the preferred configuration i.e. either a large diameter pipe with an adjacent access track, or a concrete lined pressure tunnel. There will be relatively large underground excavations required for the sediment settling basins.

When the tunnel excavations reach the sediment settling basin location, there are a number of options (McCahon, 2013). One option is to excavate through to the intake portal to allow weir construction to commence, followed by tunnel widening for the settling basin chamber and driving of the flushing tunnel adit (outlet). This would allow an early start for the intake but with some delays while tunnelling was finished. An alternative would be to complete the settling basin chamber (i.e. all tunnel excavation and support work) before commencing intake construction. The final programme of work will be determined by the project engineers and contractors taking into account the expert technical and environmental reports and recommendations.

The break out from the flushing tunnel and intake portal is expected to result in some rock falling outside of the portal into Morgan Gorge. This will be applied for as part of the Resource Consent application. The volume of debris is not considered an issue for this river as like other West Coast rivers it carries a high sediment load during flood conditions.

6.3.2.4 DISCHARGE TO AIR

A high speed ventilation fan will be required at the exit portal to vent the tunnel during construction. Blasting gases would be removed by ducting and discharged outside the exit portal. These will quickly disperse and would not pose a risk to workers on site or visitors in the vicinity of the construction works. The use of modern ammonium nitrate based emulsion explosives has removed most of the noxious gases from this operation. Small quantities of dust may result from the blasting if the rock is dry but this will also dissipate quickly at the portal. Experience during the Amethyst tunnelling works confirms that such discharges are very minor in nature and scale and therefore no specific management measures are required.

6.3.2.5 DISCHARGE TO WATER FROM TUNNEL DRAINAGE

Subterranean water encountered during the tunnelling will be diverted to a temporary sediment pond to enable any sediment (from blasting and construction traffic) to settle out before the water is discharged into the river. The settling pond will be a rock lined surface depression of approximately 20 x 30 m and likely to be located within the tailrace footprint. The settling pond will eventually be redeveloped to form part of the tailrace.

The area around Glamour Glen has several faults converging along which hot water may be running, but it also possible that hot water could be encountered in the fault zones on the true right of the river down at tunnel level (Yetton, 2013, Appendix 8)). This water will be captured by the sediment pond prior to discharge to the river to avoid the discharge of heated water directly to the river. Tunnelling works will not affect the supply of water to the hot pools located on the left bank of the river.

In addition to the settling pond, all practical control measures will be taken around the tunnel portal to ensure the reduction of any significant sediment (or hydrocarbon) spills reaching adjacent watercourses. If there are substantial clean water flows from the rock then this could be diverted separately back to the river, although to avoid a potential for multiple discharge channels to the river the current proposal is that all water will be directed through the settling pond.

Once the works are complete the settling basin should no longer be needed, as the tunnel discharge will be running clean and it is proposed (depending on volumes) this be directed either into the tailrace or directly into the river.

The specific details for managing sediment and discharge to water will be finalised as part of a Wastewater, Groundwater, Erosion and Sediment Management Plan prepared in conjunction with the contractors, Westpower and DOC, and as approved by DOC.

6.3.2.6 INTAKE ACCESS ROAD

The intake access road will be about 5 m wide (including 1 m for water table) and unsealed. It will be formed from the tunnel portal entrance (or upper portal) in a direction up the valley on a suitable grade to suit the topography but no steeper than 1 in 6. At a suitable place to minimise earthworks, there will be a hairpin bend and the road will reverse direction to angle down to the river bed at the intake. A platform will be built at the top of wall on the intake channel at RL 238 between the channel and the bank to provide a space to turn. There will be approximately a 12 m vertical height difference between the upper entrance portal and the platform. The toe of the access is likely to require rock armouring to avoid damage from flood events. If at a grade of 1 in 8, then the road length is about 60 m in total, but it could well be longer to better suit the topography (alignment is shown schematically in Map 5: Appendix 1).

Any vegetation clearance associated with these works will be contained within defined areas to avoid large trees and using natural contours where practicable in the alignment of the road to avoid excessive cuts and areas of fill. Post construction this short intake access road will be maintained to the minimum width practicable to enable access for operational and maintenance purposes.

6.3.2.7 TEMPORARY ACCESS ROAD TO CONTRACTORS FACILITIES

Access to a proposed contractors' facilities area on an alluvial terrace upstream of the tunnel portal entrance requires formation of approximately 130 m of road. This road is required to be of a standard suitable for machinery to be used for the headworks construction. The final dimensions and location of this road are to be confirmed but its approximate location is shown in Appendix 1, Map 5. The dimensions will be similar to those given above for the intake section of the access road, with an additional width allowance for cut/fill disturbance.

This section of road and the contractors' facilities will not be required post-construction of the headworks infrastructure. Rehabilitation of vegetation in these areas will be undertaken. The methods for rehabilitating the site will be incorporated into the Rehabilitation Management Plan developed in consultation with, and as approved, by DOC.

The area may be rehabilitated via supplementary planting or left to regenerate naturally. It is expected that natural regeneration of indigenous cover would occur relatively quickly if scarification/ripping of compacted surfaces is undertaken to provide a loose gravel substrate. Weed monitoring and control will also be undertaken as part of the restoration of the area.

6.3.3 STAGE 3: CONSTRUCTION OF INTAKE CHANNEL AND WEIR

There is likely to be overlap between Stages 2 and 3 but the likely sequence of events following establishment of the main tunnel portal and intake access road to the contractors' facilities and intake area is:

- construction of water intake channel;
- construction of intake portal structures;
- construction of weir;
- break-through to intake tunnel.

6.3.3.1 GENERAL

The intake is a key component of the Scheme and is to be built at a challenging location due to variable flows and frequent floods in the river. Initial consideration was given to construction of the intake once the tunnel was completed, and to use the tunnel for access and delivery of materials, equipment and personnel to and from the headworks construction site. However, the use of helicopters for access in addition to tunnel access provides greater flexibility for construction and a longer window for the "in river" work as compared to waiting until after the main tunnel and upper entrance tunnel portal is completed. Another benefit of this approach in terms of potential disturbance in the area is that this may shorten the overall construction time. The degree to which the two access methods are used will depend on the final plans for the tunnel and degree of access for machinery. A helicopter landing pad would be located within the contractors' facilities area, although some equipment or materials e.g. concrete may be delivered directly to where it will be used. This will avoid double handling and save time.

The site layout and general arrangement drawings for the intake are included in Appendix 3.

Construction of the intake and weir will be timed to take advantage of low river flows with the intake channel built first to act as a diversion during construction of the weir. Construction activities will include blasting of rock, trimming of vegetation and concrete work.

Precision drill and blast techniques will be used to excavate the rock. Blasting will consist of a number of small blasts to excavate and profile the diversion channel. These blasts will create small fragments of rock that can be washed out and removed by the river when it is in flood. The amount of rock to be excavated in total, is minor compared to the initial estimate of 5240t/km^2/yr [(7)] assessed mean annual suspended sediment load in the river.

The intake and weir will consist of reinforced concrete, steel and some timber. Some concrete will be precast units but the majority will be formed using boxing and tied reinforcing with the concrete flown in using a skip. Particular care will be taken with site management and the timing of the work to ensure that temporary site

[7] NIWA Letter 25.02.14 re Suspended Sediment

works such as boxing and bracing are not vulnerable to being washed away by the river. Site management will also ensure that no wet concrete gets into the waterway and any cleaning of concreting tools or formwork is done in a contained area away from the waterway. Westpower has sound experience in attending to these matters following the construction of the Amethyst Hydro Scheme which required all such works to occur within a very confined space focused around that waterway.

6.3.3.2 INTAKE CHANNEL

As outlined in the Headworks Report (McCahon, 2013, Appendix 3), the rock platform on the right bank provides an excellent location for this channel. Blasting will be required to cut the channel into the rock by generally about 3 m and the upstream corner of the gorge will have to be trimmed with a 6 m high cut to provide a suitable alignment.

The floor of the channel will be concreted to provide better hydraulic conditions for sluicing sediment and the channel confined with side walls about 4.5 m high (that is 1.5 m above existing rock level).

The alignment has been sketched to keep the channel sufficiently back from the river channel to allow the rock between to remain with low risk of being inadvertently damaged during excavation and thus allow the channel construction to continue with some security from flooding. A gravel bank is assumed to be built across the upstream end to keep small to moderate floods away from the site. The curved alignment assists in setting up a secondary flow which helps pull sediment away from the intake when the sluicing gate is operated. The channel is sized at 4 m width at the gate to keep flow velocities high enough to entrain bed material and move it past the intake.

The concept is for the intake channel to be completed prior to the weir construction. When the weir is to be built, the temporary stopbank would be removed and the river diverted into the channel. On completion of the weir, the gate can be shut and the intake becomes operable.

The intake structure is envisaged as integral with the tunnel portal. Because of the flood risk, the intake structure, higher level intake shaft and portal must be built before the tunnel is broken out.

6.3.3.3 WEIR

The section of weir across the channel can only be constructed with the river diverted. It is likely to be impractical to determine the depth of the active channel or bed material until after dewatering, given the very turbulent flow at this location. Construction will require the diversion of the river through the completed intake channel to allow a coffer dam to be built across the river channel both upstream and downstream of the weir.

This will be an unavoidably high risk part of the construction as it is very exposed to flooding. It must be well planned and resourced to minimise the time in the river and exposure to flooding and damage. Weir construction would need to be carried out as quickly as possible, so the coffer dam would only exist for a limited period.

6.3.4 STAGE 4: CONSTRUCTION OF THE POWERHOUSE, SWITCHYARD, 66 KV TRANSMISSION LINE AND THE INSTALLATION OF THE PENSTOCK.

The main activities for this Stage may occur concurrently. The final siting of a powerhouse and associated switchyard within the powerhouse site may be subject to change although dimensions are expected to be similar and will not be greater than dimensions previously described in Section 5 (powerhouse of 30 m x 15 m and an associated switchyard area of 20 m x 20 m). It will require permanent clearance of the site it occupies, although at present this mainly consists of a mixture of grasses, small shrubs and seedlings. An area surrounding the powerhouse and switchyard, about twice the area occupied by the powerhouse and

switchyard, will be hard-filled (gravelled and possibly surfaced e.g. sealed with associated stormwater drainage) and there will be some landscape planting to assist with integration into the environment.

6.3.4.1 THE POWERHOUSE

The construction methodology will be dependent on the foundation material and the water table level. A large pad of stable engineered fill will be required as a base for the building and to lift the site out of the potential flooding zone. This will involve site excavation and preparation for both the powerhouse and switchyard, excavation of the tailrace, laying the concrete base and installing structural elements such as pipework in the machine bay area. Once the concrete foundations are completed then the superstructure can be built. Part of the building will be below finished ground level dependent on the final turbine equipment chosen.

The order in which building occurs, and the installation of equipment will depend on the final selection of generating equipment. The penstock section at the powerhouse site needs to be laid as part of the concrete foundations of the powerhouse. Sections of the tailrace may also have been excavated in the earlier formation of the settling pond required for sediment management during tunnel excavation.

Stormwater from the buildings and yard will be directed to the tailrace or the adjacent drains, with sediment control measures being put in place on any stormwater drainage as required.

The powerhouse will be a concrete structure and it is proposed in the Landscape Report (Boffa Miskell, 2014) that utilising a neutral colour palette for the walls and the roof will reduce the visual effects of the powerhouse. Additional screening using plant species indigenous to the areas will also assist in the integration of these structures into the surroundings. A planting plan has been proposed, which will form part of a Landscape Management Plan which will be prepared by a suitably qualified expert (member of NZ Institute of Landscape Architects) and in consultation with, and approval from DOC.

6.3.4.2 SWITCHYARD

Within the station confines there will also be external management facilities for the control of the generated electricity. This will principally involve a 66 kV and an 11 kV transformer with the associated isolation and control switchgear needed for efficient operation. The transformers will be bunded in case of possible oil spill, with the level of bunding in accordance with advice received in regard to aquatic ecology. The switchyard will be fenced for security and safety reasons.

6.3.4.3 TAILRACE

The tailrace will be an open canal from a point below the powerhouse to the river bed, a distance of approximately 120 m. Water exiting the turbine will be directed into a plunge pool, then to the tailrace canal where a measuring weir will record flows for compliance with resource consents. It will be about 5 m wide at the base, 3 m deep with approximately 2 to 1 batters and a 20 m top width. It will be slightly wider near the powerhouse to match the draft tube spacing.

The tailrace will be designed and constructed in such a way as to avoid scouring and erosion of the Waitaha River and banks. The design will also take into consideration concerns about entrapment and predation of fish, particularly koaro, within the tailrace as identified by Drinan & McMurtrie 2014 (Appendix 11).

6.3.4.4 STOPBANK

The powerhouse site will require protection from the river in large flood events. The extent and specific siting is to be determined but it is most likely to consist of an armour-rocked stop bank up to 1 m high, above existing natural bank level, with a 4 m top width extending from the toe of the terrace at the southern end of the alluvial flat along the riverbank, becoming continuous with the hard fill zone surrounding the powerhouse and switchyard, and extend a distance of approximately 195 m to its northern end.

Rock protection material used for the stopbank will be sourced where suitable and if available, when required from the tunnel and powerhouse site excavations or brought in from off-site. The southern section of the

stopbank will be built prior to tunnel construction commencing to assist with protection of the works and construction area required around the portal area.

The indicative location of the stopbank is shown on Appendix 1, Map 6, as well as represented in the photo simulations (Appendix 9: Photo Simulations Supplement).

6.3.4.5 FLOOD PROTECTION AT ALPHA CREEK

In addition to the flood protection (stopbank) required along the river edge of the terrace on which the powerhouse and switchyard are to be located, there is a risk to the access road and tailrace from Alpha Creek during high flows. Alpha Creek, below the cliffs appears as a dry creek bed for most (possibly nearly all) of the time and in flood it can, and has, flowed both north and south as it leaves the cliff base. At present it is flowing south but could shift. At times of flooding it is apparent, from viewing the flood channels, that rock and debris is carried downslope and spread over a wide area.

Flood protection at Alpha Creek is required and will involve the construction of a flood channel and stop bank(s) to prevent large flood flows, and the associated gravel that comes with them, from getting into the tailrace and putting the powerhouse and access road at risk. This work will contain the creek at the access road crossing point, proposed to be a ford taking into account the flooding flow nature of the creek and maintenance issues, otherwise a long section of road will be at risk in a flood as there is no defined channel to this creek (Figure 7).

Figure 7: Exit of Alpha Creek at the northern end of the powerhouse site.

The work required cannot be determined until the road alignment and design is confirmed. Disturbance will be kept to a minimum but at a maximum it could involve the clearance of a 20 - 25 m wide strip of vegetation from where the creek bed exits the cliffs (Figure 8) - a distance of approximately 150 m (Figure 9). A stop bank could be formed on at least the powerhouse side although it would be more effective to have one on both sides to ensure flooding and debris is contained and not diverted outside its usual range. These works would merge into the tailrace at the river. The potential area of works is indicated on Appendix 1, Map 6. A cross section of Alpha Creek is provided in Appendix 4.

It is expected that once constructed, and over time, there will be a reasonable degree of revegetation (up to 50% but this will depend on floods and the amount of gravel). The scale of vegetation clearance involved in this activity is within that of naturally occurring disturbances such as slips or stream channel changes and the area is naturally vulnerable to vegetation removal through flood and debris flow events.

Natural regeneration of the range of species present prior to any clearance would be expected to occur relatively quickly on any of the areas discussed above (other than the powerhouse/switchyard site where a specific planting plan is proposed) and not permanently occupied. A good example of this is at the site of the former Amethyst Power Scheme pipeline and access route. This area which exhibits similar landform and vegetation types had become overgrown by indigenous vegetation within approximately 10 years from the cessation of the Scheme.

Figure 8: Alpha Creek looking upstream at a confined point where the creek bed exits cliffs *(works to occur from the channel at the base of the cliffs down to the tailrace).*

Figure 9: Alpha Creek looking downstream and area where channel would be constructed *(taken approximately halfway along proposed works area).*

Supplementary planting can enhance the speed of re-vegetation if required and where suitable substrate exists. The deposition of soil material obtained from other Scheme component construction (if available) can increase the speed and success of plant establishment in particular, prior to any supplementary planting.

6.3.4.6 TRANSMISSION ROUTE

Power and telephone services are required at the staging area, during and following construction, to supply lighting, power and phone connections to the tunnel and/or headworks. Automation and other control and communication system cables will be required between the intake, powerhouse, and tailrace. These lines will be carried overhead on the same power poles to be used for transmission.

Appendix 5 provides examples of the styles of concrete power poles that will most likely be used along the transmission route for the Waitaha Hydro Scheme. From the switchyard a variety of poles (photos A, B and C) may be used depending on the terrain, direction and proximity to the powerhouse. A double pole arrangement (photo D) is used where a longer span is needed e.g. in crossing Macgregor Creek although this may not be required. There will be no pylons used for transmission. While the concrete power poles are the standard for such lines, Westpower is conscious of landscape and visual aspects of the Scheme and hardwood poles may be used in preference and as an alternative, and these can also be coloured to reduce visual dominance.

The height of the poles generally range from 12 – 15 m high (above ground) while the height of the poles used (if required for Macgregor Creek) in the river channel are at maximum 21 m (above the bed of the channel) with 12 m below ground. The spacing between the poles along the road corridor will range from 150 – 180 m. Clearance of vegetation will be required along the transmission route within conservation land and this will be undertaken as part of the clearance for the road corridor unless for practical reasons a pole or poles need to be located away from the road corridor. Where located away from the corridor the line will remain within the envelope and entail only enough clearance as needed to locate the pole and provide security to the lines. This application also covers the requirement for future clearance and trimming of vegetation to maintain the integrity of the line.

6.4 GENERAL CONSTRUCTION ACTIVITIES

6.4.1 VEGETATION CLEARANCE

Vegetation clearance is required for all aspects of construction, to varying degrees, with the largest permanent clearance required for the access road and minimal clearance or cut back at the intake site. Following construction, and through rehabilitation and regeneration, the final cleared areas are reduced to the minimum needed for operational requirements. A comprehensive assessment of vegetation clearance for both the project (construction) footprint, and the operational footprint has been undertaken as part of the Vegetation Report (TACCRA, 2013) in Appendix 15.

The table below provides a summary of the indicative areas of vegetation clearance taken from this report. It is important to note that areas given as construction, permanent and riparian (construction) are not additive. The permanent and riparian areas are sub-areas for the purposes of describing the amount of vegetation clearance associated with a given Scheme component.

Table 10: Areas of Vegetation Potentially Affected by Scheme Components and in Total

Scheme Component(s)	Construction (ha)	Permanent (ha)	Riparian (Construction, ha)
Area 1: Headworks and Associated Infrastructure Item(s)			
Weir.	0.0050	0.0010	0.0
Intake Channel.	0.0325	0.0163	0.0
Intake Structure and Intake Portal.	0.0478	0.0278	0.0294
Tunnel Portal Entrance.	0.0187	0.0187	0.0
Tunnel Portal Entrance Apron, Intake Access Road and River Protection at Road Toe.	0.1370	0.0790	0.0410
Road to Contractors' Facilities Area.	0.1040	0.0	0.0300
Contractors' Facilities Area.	0.2200	0.0	0.0
Flushing Tunnel Outlet.	0.0100	0.0100	0.0100
Area 1 Sub-totals	***0.5750***	***0.1528***	***0.1104***
Area 1 Sub-totals Rounded Up	***0.58***	***0.16***	***0.12***
Area 2: Infrastructure Item(s)			
Tunnel Portal Exit and Construction Apron.	0.2480	0.1800	0.0
Access Road and Transmission Line Parallel.	2.5470	2.4198	0.0450
Waterway Training and Flood Protection at Alpha Creek.	0.3375	0.1688	0.1750
Powerhouse, Switchyard and Hard-fill Area.	0.3150	0.3150	0.0
Powerhouse to Tunnel Portal Exit Access Road and Penstock.	0.1275	0.1275	0.0
Tailrace.	0.2000	0.2000	0.0250
Stopbank as River Protection for Powerhouse, Switchyard, Tailrace, Penstock and Access Road.	0.1755	0.1169	0.1755
Area 2 Sub-totals	***3.9505***	***3.5280***	***0.4205***
Area 2 Sub-totals Rounded Up	***3.96***	***3.53***	***0.43***
Scheme Totals	**4.5255**	**3.6808**	**0.5309**
Scheme Totals Rounded Up	**4.53**	**3.69**	**0.54**

Note: Areas given as rounded sub-totals and totals in the above table are rounded up to two decimal places in every case so as to avoid dropping any area as could occur if using conventional rounding of figures less than five. Riparian (construction) and permanent areas are a subset of the total construction footprint.

In summary, there will be a localised loss of forest/vegetation cover on conservation land during construction of the Scheme. This will be approximately 4.53 ha which will reduce, through rehabilitation and regeneration, to 3.69 ha during the operational phase. The majority of this clearance is made up of the access road and the powerhouse site.

Scheme development planning and proposed construction methods are aimed at minimising disturbance to riparian margins (with as far as practicable, works crossing through margins rather than along margins, the exception being stopbank works), and surveys for vegetation clearance in regard to alignments in relation to large trees.

To ensure clearance is minimised during construction, the boundaries of all areas to be disturbed will be marked out prior to work commencing, and will be approved by DOC. The vegetation clearance and felling of any trees is to be done in a manner so that damage to surrounding vegetation is minimised and disposed of according to methods approved by DOC. As with previous aspects of this application Westpower has sound and successful experience in undertaking these activities through the Amethyst Hydro Scheme development.

All areas not required for the ongoing maintenance or operation of the Scheme will be rehabilitated. A Rehabilitation Management Plan will be developed, in consultation with and approved by DOC. This will be

developed prior to work commencing and will include (but not be limited to) defined rehabilitation goals, timelines and methods that will employed to rehabilitate the site to the point where the effects of all activities are minor.

6.4.2 SPOIL DISPOSAL

The volume of spoil from underground works is estimated to be approximately 100,000 m^3. This includes the main tunnel, the access tunnel, flushing tunnel and settling basins. Spoil from the tunnel will be utilised within the development earthworks where possible, or temporarily stockpiled before being transferred off conservation land.

There will also be vegetation from the formation of the access road to be disposed of. It is estimated the preferred access route will generate an excess of cut to waste material in the order of 16,000 m^3. This will also be disposed of onto private land outside conservation land. The spoil will be used for development of pasture for farming purposes which will involve re-contouring existing poor quality farm paddocks and sowing with grass.

While spoil will be disposed of onto private land (in agreement with the landowner and in accordance with any resource consent requirements) there will be a requirement for temporary stockpiling locations in both Kiwi Flat and at the powerhouse site. This will be kept to a minimum (and no more than 100 m^3) by regular removal to the designated disposal site.

6.4.3 CONTRACTORS FACILITIES/STORAGE/STAGING AREAS

During the construction phase, areas will be required for the temporary location of offices, ablutions, workshop, storage, magazines, compressors, temporary storage of spoil and settling ponds.

There will be two key contractors' facilities which are described below.

1. The main site administration buildings, storage areas and most likely the concrete batching plant will be located on the north bank of the Waitaha on private land (subject to agreement with the landowner). This location reduces the need for all vehicles to cross Macgregor Creek in order to get to the site office. This will be sited away from the adjacent Macgregor Creek.

2. A temporary contractors' area, including self-contained ablution facilities, will be located on a high terrace on the true right of the Waitaha River above Morgan Gorge, and immediately upstream of the proposed intake site, as outlined in Appendix 1, Map 5. The terrace is approximately 4 ha in area and the proposed facilities area will be at maximum 2000 m^2. This site has been chosen due to both its proximity to the works and as it enables the facility and associated activities to be set back from the margin of the river. A vegetation buffer is able to be retained to minimise views of the facility from the surrounding area. This area will be developed following the main tunnel entrance portal break-through and ahead of the main intake works. This area will not be required post-construction. Refer to Section 6.3.2.7 for discussion about rehabilitation.

While the access road to the lower tunnel portal at the powerhouse site is being built, the access road corridor will provide for parking and storage areas as the road is progressively formed rather than the creation of further separate areas.

The site for the powerhouse and lower tunnel portal exit is considered a construction area and will require vegetation clearance, although this site is covered mainly by range of grasses and small shrubs with the exception of taller vegetation regenerating on slip material at the base of the cliff. The lower site will be used initially for the construction of the tunnel and then the powerhouse. The degree to which this will be used for storage of materials, refuelling and short term stockpiling of tunnel spoil will be determined by the contractors. A suite of suggested conditions, to avoid or mitigate potential effects, are provided in regard to

these matters to provide for these activities should they occur. There may be some temporary site buildings including temporary self-contained toilet facilities.

The final location of these areas will be determined by the requirements of the contractors engaged on the project but will be located within the envelope and managed in compliance with project requirements, the concession, and any later consent conditions, as well as for safety purposes. These areas will be well controlled, and maintained in an orderly manner with a particular emphasis of keeping activities as far away from the active bed of the Waitaha River as is possible. All rubbish will be contained and removed on a regular basis from the site.

6.4.4 NOISE

All of the construction activities associated with the development of the Scheme will generate noise in one form or another and Westpower is experienced in managing construction noise on conservation land. Noise generation from helicopter movements and noisy construction activities, such as blasting and possibly piling will occur intermittently during the construction period. To assist with identification and management of noise producing activities, Westpower commissioned Marshall Day Acoustics to undertake an assessment of effects. The report, Waitaha Hydro Scheme: Assessment of Noise Effects, 2014 (**Noise Report**) can be referred to in Appendix 20.

Noise during access road, transmission route and powerhouse construction will be limited to normal working hours and will consist of that produced by heavy machinery. The Waitaha Road is already subject to heavy traffic, milk tankers and other farm associated traffic plus trucks that are involved in the schist stone recovery activity within Macgregor Creek.

Tunnel excavation will create noise in the early stages. During the initial stages of tunnelling it is common practice to confine work to a single extended day shift to limit the blasting to daylight hours and that is what is proposed in this case, after which it becomes a 24 hour operation.

Drill and blast tunnelling is a cyclic operation, comprising the excavation of the face and support of the exposed section of tunnel excavated in “rounds”. Each cycle or round comprises: the drilling of the blast pattern; loading the holes with explosives and firing; venting; mucking out (spoil removal) and installing rock support (rock bolts or steel sets). A typical round will comprise approximately 40 blast holes and these are loaded with cartridge explosive, each with a bottom initiated delay detonator, with typically half a second between each delay firing, starting at the inner holes. Normally cycle times would be in the order of a round per shift, depending on the amount of rock support required. Hence blast frequency for the tunnel is expected to be between 7 and 9 hours apart, but not at any set times. Blasting could occur at any time over the 24-hour working period, depending on when the cycle is ready for blasting.

During the initial stages of tunnel development, blasting will be audible at the bush edge (1 km away) but is unlikely to be audible at the nearest residence some 6.12 km away.

At the intake, noise will be intermittent over the period of construction. It will not be heard below Morgan Gorge and will not be heard at the closest residences some 8 km away. Depending on the particular construction activity at the time of their visit, noise from these activities may be heard by recreational visitors to the area and who are in close proximity to the headworks. The constant background noise of the river assists to mitigate construction noise.

Piling may be required on a limited basis (if at all) for any bridge installation along the access road or if a transmission pole is required in the bed of Macgregor Creek, and possibly for powerhouse construction.

Helicopters involved in the construction, and possibly maintenance, of the Scheme will generally be limited to the lower part of Kiwi Flat and downriver.

Helicopters will be used in the construction of the headworks to transport personnel, equipment and materials from the powerhouse site or contractors' facilities site on the northern side of Macgregor Creek to the weir and intake construction site and contractors' facilities over a period of up to 18 months. This period allows for days on which the river levels are too high for construction activities and or when conditions are unsuitable for flying. On most days when conditions are suitable for flying there could be typically be eight movements (i.e. two return trips at the start and end of the day).

During certain activities such as concrete pouring, there may be intense helicopter activity for a number of days, although these will not all be consecutive days. This would involve helicopter movements between the powerhouse site and the headworks. For example, at the Amethyst there were up to 15 days where there was intense helicopter activity and on the busiest days there were approximately 100 trips using 2 helicopters. They started at about 8 am and finished about 5 pm with one hour breaks every 2 hours or so. The return trip time was about 5-6 minutes so the actual flying time for each helicopter was about 5 hours.

The proposed flight path for the periods of intense helicopter movements is in the order of 4 km away from the nearest dwelling.

Construction traffic on Waitaha Road, and within the project footprint and helicopter movements, will be appropriately managed to ensure noise effects are acceptable through the implementation of a Construction Noise Management Plan. To manage and mitigate potential effects of helicopters flights, these flights will be undertaken in accordance with nationally accepted standards as recommended through expert advice commissioned by Westpower in regard to these matters.

Whilst construction involves an intense period of work and activities, this is for a limited time. Once construction is complete, noise effects from the operation of the Scheme on residents of nearby dwellings, recreational users and wildlife will be no more than minor. Noise from the powerhouse will be masked by the sound of the adjacent river.

6.4.5 TRAFFIC

6.4.5.1 VEHICULAR MOVEMENTS

The construction of the Scheme will generate some additional traffic on Waitaha Road. The number of vehicle movements per day will vary, depending on the construction activity occurring at the time. During the busiest periods of construction e.g. setting up the main site office and contractor facilities, delivery of heavy machinery, materials and equipment, there may be up to 40 light vehicle movements (equivalent to 20 light vehicles to and from the construction site) and 40 heavy vehicle movements (equivalent to 20 heavy vehicles to and from the site) per day on Waitaha Road. Vehicle movements will generally occur during daytime hours only. However, a small number of light vehicle movements will occur at night during the tunnelling stage of construction as this, by necessity, is a 24 hour per day activity.

Whilst residents on Waitaha Road will experience an increase in traffic, at peak times it is estimated to be on average only one movement every seven minutes during the day and this is still very low in traffic terms. Traffic levels during the hours of darkness will be light. Traffic noise levels will still be within acceptable guidelines for vehicle traffic on roads.

However, the majority of traffic movements will be between the contractors' facilities situated on private farmland and the construction works which is well away from Waitaha Road. Matters relating to traffic within the project footprint will be managed via the Construction Management Plan. Some minor traffic controls may be appropriate on public roads during particular times of construction and if required will be done in conjunction with Transit NZ and the Westland District Council.

6.4.5.2 HELICOPTER MOVEMENTS

During construction of the weir intake, Hughes 500 helicopters are likely to be used to transport personnel, equipment and materials between the powerhouse site, or contractors' facilities site on the northern side of Macgregor Creek and the headworks construction site.

The use of helicopters to construct parts of the weir intake, which were successfully employed in the development of the Amethyst Hydro Scheme, can assist to reduce the need for large and heavy land based equipment. It is anticipated that there could be on average 8 movements per day (when conditions are suitable for flying and for work to be carried out) between these sites over a period of 12-18 months. Helicopter movements would occur only during daytime hours and do not occur during dawn or dusk for safety reasons.

While it is anticipated that intake construction may take less time, an extended 12-18 month period has been allowed to take account of days on which the river levels are too high for construction activities and/or conditions are unsuitable for flying. As outlined in the previous section there will be periods of intense helicopter activity during construction e.g. when concrete is being delivered to the site. Flights taking concrete into the site will be undertaken in such a manner that there could not be an accidental dump into the active river channel.

Once the Scheme is commissioned the need for access will be limited to service vehicles and will typically be one movement per week. Dependent on maintenance and monitoring requirements and the most effective, timely and efficient methods for undertaking these, there may be the occasional periods of helicopters use to keep work and the level of activity to a minimum.

6.4.6 REFUELLING

To enable good management all refuelling will be conducted at specified sites, for example, the site office area, and potentially at specified and controlled areas along the access road corridor during road formation, the lower tunnel portal during tunnel construction; and at the upper contractors' facilities during weir construction. There will be no storage and refuelling within the beds, or on the bank of, any waterway.

Fuel will be stored within bunded areas, and contingency plans detailing methods used in case of accidental spill will be required from all contractors operating machinery on site. Storage tanks and refuelling will not take place within the bed, or 10 m of waterways including the Stable Tributary.

6.4.7 PESTS AND WEEDS

Westpower recognises the need to consider and provide for potential pest and weed management matters. All machinery used on site as part of this development will be required to be weed free upon arriving. Care will be taken to ensure that all gravel, fill or other material brought onto the site comes from a weed free source.

A localised active weed and pest control management programme will be implemented to manage and suppress weeds and pests within the project and operational footprints. This will become part of the on-going site maintenance programme.

All contractors and personnel involved in the Scheme will comply with the Didymo prevention and cleaning protocols before and after contact (including people, equipment, clothing, footwear and other items) with any waterway.

Measures will be taken to prevent dogs being brought into the area by personnel associated with the construction and operation/maintenance of the Scheme. All contractors, employees or site visitors associated with the Scheme must comply with a no dog policy, although dogs may be required for monitoring purposes e.g. for blue duck. Any other appropriate measures e.g. signage for the general public will be agreed to in conjunction with DOC.

6.4.8 ACCESS

In recognition of the potential construction effects, and to provide enhanced foot access ability, it is proposed that an alternative foot access track for recreational users to access Kiwi Flat be provided. This will bypass the key construction area at the powerhouse site. Potentially this will be of a higher standard and improved grade than the existing foot access track on the true right of the river. The final route and design of the track will be subject to agreement and approval of DOC and take into consideration feedback from recreational users. This may be maintained as a permanent track.

7. ASSESSMENT OF ENVIRONMENTAL EFFECTS

7.1 INTRODUCTION

This section of the application is to provide for the requirements of the Act in terms of provision of information on (*Section 17S Contents of Application)*, and having regard to *(Section 17U Matters to be Considered by Minister)*, potential effects arising from the proposed activity and any measures that can reasonably and practicably be undertaken to avoid, remedy or mitigate those effects. The identification of environmental effects, and potential for their avoidance or mitigation, have been primary considerations in the environmental assessments and development of the Scheme. The assessment of the natural, historic and recreation values within the Scheme area has been very comprehensive to ensure an integrated approach to Scheme development and mitigation of effects.

Westpower is aware that cultural values are an important consideration for any application for concession. To this end Westpower has undertaken consultation with Te Rūnanga o Ngāti Waewae and Te Rūnanga o Makaawhio to determine whether there are any immediate issues or concerns requiring consideration through the development of the application. No significant cultural matters have been raised through that consultation process and Westpower have been advised that a Cultural Impact Assessment would not be required for the application and for it to proceed to lodgement.

Westpower has selected a Scheme on the Waitaha River in part as a result of seeking to avoid effects on known values at other locations. Further comprehensive consideration of effects was given to finalising infrastructure location on the river, particularly the location of the intake site at the entrance to Morgan Gorge over a site at the bottom of the Waitaha Gorge. This choice of location avoided a range of potential effects on both the river and Kiwi Flat (refer Section 11: Assessment of Alternatives and Options).

In developing the Scheme and this concession application many of the potential adverse effects identified are addressed through the design and location of key structures and infrastructure, whilst a range of suggested conditions caters for mitigation measures identified in various expert assessments. In considering potential adverse effects and the potential to avoid or mitigate them, Westpower is also mindful of the need to ensure that any measures are achievable and enable the viable, efficient and effective development and operation of the Scheme to utilise the renewable hydro resource.

A comprehensive series of technical studies by independent experts has been commissioned to provide baseline information and to assess the values of, and potential effects of the project on, the natural, historic resources and recreational opportunities of the Waitaha River and Catchment. The potential effects arising from both the construction and operation of the Scheme are based on a conservative approach of considering the maximum potential effects which might arise from the Scheme. The studies have recommended a range of measures to avoid, remedy or mitigate potential effects which have been provided for through the proposal location, design and layout of the Scheme and its components, or through the suggested suite of draft conditions contained in Section 9 of this application.

This section of the application provides a summary of the assessment of, and potential effects on, the environmental values within the area affected by the Scheme and the proposed approaches for avoiding, mitigating or remedying any effects. These reports are contained in Appendices 6 - 21 and should be read in full.

For completeness the assessments have considered conservation legislation, policies and strategies as well as the RMA and relevant regional and district planning documents to ensure a comprehensive and integrated assessment. This application however, is for concessions under the Conservation Act 1987 and therefore in discussion of Statutory Provisions (Section 10) refers only to the relevant conservation related matters.

The areas covered within this section on the assessment of effects are listed below.

1. River Dynamics and Natural Hazards
2. Natural Character, Visual and Landscape Values.
3. Vegetation
4. Bats and Birds
5. Lizards
6. Invertebrates
7. Periphyton and invertebrates
8. Fish
9. Blue Duck
10. Turf Communities
11. Cultural Values
12. Historic and Archaeological Values
13. Recreational and Tourism Values
14. Noise Levels
15. Potential Benefits and Positive Effects

Table 12 located at the end of this section provides a summary of the level of effects once recommended mitigation has been undertaken. Avoidance or mitigation of effects has been provided for either through the proposed location, design and layout of the Scheme (Sections 5 and 6) or through the suggested suite of draft conditions contained in this application (Section 9).

7.2 RIVER DYNAMICS AND NATURAL HAZARDS

Section 4:	Existing Environment
Section 9:	Suggested Draft Conditions
Appendix 6:	The Hydrology of the Waitaha Catchment
Appendix 7:	Sediment Investigations relating to a HEP Scheme on the Waitaha River • NIWA Letter 11.12.13 re Bed/Channel Stability • NIWA Letter 25.02.14 re Suspended Sediment • NIWA Letter 22.05.14 re Bank Stability at Powerhouse
Appendix 8:	Waitaha Hydroelectric Scheme: Geological Feasibility Report

This section provides an overview of the physical process within the river and the geological setting within which the Scheme is to be developed. The potential direct physical effects of the larger Scheme structures, weir/intake and powerhouse stopbank, on the dynamic processes occurring in the river are considered as are the potential natural hazards which may affect the Scheme. Where directly related these potential effects are discussed together. The effects of a minimum residual flow are considered in relation to specific environmental values and are covered in the relevant sections and technical reports i.e. the Aquatic Ecology, Blue Duck, Landscape and Recreation Reports.

NIWA was commissioned to investigate potential effects of the weir on natural patterns and processes related to floods, freshes, bed/channel stability and sediment movement, and fine sediment losses. The Sediment Report (NIWA, 2013) and subsequent correspondence from NIWA provided advice on stability and erosion as well as preliminary advice on the levels (concentration) of suspended sediment. There is an on-going investigation including monitoring turbidity in the Waitaha River at Kiwi Flat in order to better understand the dynamics of the Waitaha River's fine sediment load and which will be used for finalising the design of the subsurface sediment settling basins. NIWA also provided advice as to the potential effects of construction of the stopbank at the powerhouse site, including effects on the opposite bank.

The **Geology Report** (Yetton, 2013) provides an initial consideration of geotechnical issues associated with the proposed tunnelling works, access road and assessment of hazards associated with the Alpine Fault. In part the hazards assessment was for Westpower's own purposes in identifying, understanding and assessing risk associated with the Alpine Fault for its own decision making purposes, but also to assess the potential seismic risk to the environment and river users from development of the Scheme.

POTENTIAL EFFECTS

Potentials effects of the Scheme that have been considered are the:

A. natural river processes and features;
B. Waitaha River channel stability;
C. formation of backwater due to presence of weir;
D. aggradation of Kiwi Flat upstream of the weir and intake structure;
E. loss of sediment into waterways during construction;
F. fine sediment build-up in the abstraction reach from sediment discharges from the flushing tunnel during operation of the Scheme;
G. erosion due to powerhouse stopbank; and
H. seismic risk to the environment and river users.

ASSESSMENT OF EFFECTS

A. Natural River Process and Features and B. Channel Stability

The Waitaha River channel at Kiwi Flat naturally exhibits considerable instability due to frequent large floods, high fluxes of bed-material, and transient deposition and re-working of sediment. This is evident from abandoned branches (typically perched above the existing channel), terraces and banks of deposited sand and gravel, armoured segments of bed and bank, and places where the channel margins are eroding (e.g. the true left bank immediately north of the Kiwi Flat hut). The NIWA assessment advises that the Scheme will not alter this suite of natural processes and fluvial features, nor their frequencies of occurrence or physical characteristics.

Between Kiwi Flat and the proposed outfall site (approx. 1 km upstream of Douglas Creek) the Waitaha River falls through Morgan Gorge (a slot bedrock and large boulder gorge) then flows along a relatively steep 'rock garden' boulder-bed reach. The boulders in the latter reach are lag deposits of low mobility, even during floods. The bulk of the Waitaha bedload here is finer material (cobbles, gravel and sand) that is generally supplied at rates less than the river's capacity to transport such material during floods, thus it generally overpasses the boulder-lined channel bed and the channel is relatively stable. Since the proposed project will have no significant effect on the discharge of water and bedload from Kiwi Flat during floods, it should also not affect channel processes, characteristics, and stability in the reach between the Scheme's take and return points (NIWA Letter 11.12.13).

C. Formation of a Backwater and D. Aggradation of Kiwi Flat, due to the presence of the Weir and Intake

The main effects of the weir on these aspects are described in the Sediment Report and included below.

- At baseflows, the backwater formed by a weir at the location and height proposed (upstream from the throat of Morgan Gorge, crest height at R.L. 238 m) would initially extend some 250 - 300 m upstream. This would likely fill quickly with sediment, possibly during the first flood, due to the relatively small storage volume.
- During flood flows the constricted discharge through Morgan Gorge causes water levels to back-up along Kiwi Flat about as far as the Whirling Water confluence. The reduced velocities in this backwater

reach induce deposition of sandy-gravelly bed-material on delta lobes and suspended sand and silt along marginal banks. During flood recessions, lesser events, and baseflows the deposited bed material is reworked down the Waitaha channel to Morgan Gorge.

- Hydraulic modelling has demonstrated that the hydraulic effects of a weir during floods (and consequent effects on transient in-flood sedimentation) are sensitive to the weir's location and height. The effects of the proposed weir at the proposed location (upstream of the gorge throat) are unlikely to be significant because during high flows the throat of Morgan Gorge remains the controlling influence on water levels. However, shifting the weir into the gorge throat would cause a significant increase in flood levels and cause the sedimentation effects to translate up Kiwi Flat.
- A permanent bed-material deposit would extend from 200 - 500 m upstream from the weir, lapping onto either the first or second boulder riffle upstream. Weir induced deposition is expected to be limited to this extent – not the whole length of Kiwi Flat as might be expected for a simple alluvial reach – because (i) bed material transport through the lower part of Kiwi Flat responds to the complex hydraulic behaviour and shifting controls during floods and recessions, and (ii) the generally armoured state of the channel indicates that overall the river has more capacity than needed to transport its bed material supply.

E. Sediment Losses during Construction

There may be some sediment losses during construction, however given that the river has a high sediment load and that it will remain dominated by frequent freshes, the effects are considered minor. During construction the full flow of the river will continue down the gorge. Coffer dams will be used to enable building of the intake diversion which will then be used to divert water away from the bed of the river while the weir is being built. Blasting and river diversion works will inevitably lead to some rock entering the waterway. There is not likely to be much fine material getting into the water as the work site is predominantly rock that will need to be excavated by blasting.

There is the potential for sediment losses as a result of the construction activities downstream of Morgan Gorge at the powerhouse site and access road and flood protection works. Potential sediment loss as a result of constructing the access road is well covered in the Aquatic Ecology Reports (Appendices 10 and 11), and Section 7.8. One key avoidance measure has been to locate the access road at a sufficient riparian buffer margin distance from the Stable Tributary, and deciding that there will be no crossings of this waterway given its identified value as a biodiversity 'hotspot'.

F. Fine Sediment Build Up

Glaciers cover 6.61% of the Waitaha Catchment upstream from Morgan Gorge, and these are the primary sources of fine sediment carried by late summer baseflows in the river.

In the Sediment Report, NIWA raises one potential environmental effect with regards to the extent to which fine sediment might build-up in the Waitaha channel between the flushing tunnel exit within Morgan Gorge and the return point at the tailrace. There is the potential for some temporary sedimentation at the exit of the flushing tunnel, with the only difference when compared to the natural sediment movement situation being the period of time in this state. Flushing of the sediment basins is not likely to occur at low flows but rather freshes and floods. Whilst not the usual situation, there may be instances where fine sediment is discharged into Morgan Gorge when there is not a flood or fresh in the river. Such a discharge could lead to fine sediment accumulation in pools and along bank margins, which in turn might impact fish and duck habitat and aesthetics. However, given the very rough, turbulent, boulder-bed nature of the span of channel that would experience reduced flows with the Scheme, and the usually high frequency of freshes and floods down the

Waitaha River that would flush away accumulating fine sediment deposits, the Scheme is unlikely to induce fine sedimentation to occur at a level dramatically different than occurs naturally.

G. Erosion due to Powerhouse Stopbank

The flat on which the powerhouse is proposed shows signs of flood debris in extreme high flows. However infrequent such floods may be, the powerhouse site requires some form of flood protection. Westpower has sought the advice of NIWA on the potential effects of construction of the stopbank on the flood carrying capacity and potential for erosion of the opposite bank. NIWA has assessed this matter and concludes that even with a flow of 1400 cumecs (m^3/s) [8], which is something like a 100-year return period event, the stopbank will induce only a slight reduction in the Waitaha channel conveyance and consequently cause only slight increases in water level and shear stress against the left bank. Such an event just has the competence to mobilise the boulders lining the left bank, and so some bank erosion is possible during an event of this size. However, retreat of only 1 -3 m would be all that would be required to recover the hydraulic conditions without the stopbank. Therefore the effect of the stopbank on bank erosion would be considered minor.

H. Seismic Risk to the Environment and River Users

The Geology Report considers a range of geological hazards which may affect the Scheme i.e. flooding, landslides at various scales and earthquakes. Some of these potential hazards are localised and intended for Westpower to consider through the design process and some are wider ranging and are for the purposes of Westpower decision making and risk assessment.

An important geological feature of the area is the Alpine Fault and related faults. The Scheme location avoids the Alpine Fault zone with its network of active fault traces. The closest identified Alpine Fault trace is approximately 250 m downstream from the proposed powerhouse. There are other faults in addition to the Alpine Fault that are previously mapped in the area or apparent in the field. It is possible these other faults are also active structures.

The report concludes that there are significant risks to the Scheme from natural hazards in the area, in particular the future possibility of an Alpine Fault earthquake during the lifetime of the Scheme. However the main impact of future fault rupture and/or large earthquakes in the Scheme area is on the future maintenance and operation of the Scheme itself, and not on the environment. Because there is no proposed significant new water storage structure the construction of the various Scheme components will not create additional seismic hazards or seismic risks for either the local environment or river users.

MITIGATION

In considering the potential effects in regard to these matters, a range of suggested mitigation measures are recommended to manage potential effects of sediment from construction works, and the operation of the Scheme, entering waterways. These recommendations are outlined below.

1. During the construction of the intake, road, powerhouse, and tunnel, sediment losses will be controlled via a Wastewater, Groundwater, Erosion and Sediment Management Plan. The overall objective is to minimise sediment and contaminants from entering waterways during construction. Measures will be implemented to manage any effects or monitor effects to enable appropriate action if required. This will include a sediment settling pond at the powerhouse site and appropriate sediment control methods to protect the Stable Tributary.

[8] The modelled discharge of 1400 cumecs (m^3/s) was the peak flow during the December 2013 flood estimated at the powerhouse site by M. Doyle, based on the discharge record at the top end of Kiwi Flat (with due allowance for tributary inputs, tributary lags, and peak attenuation).

2. The retention of a sufficient riparian buffer along the Stable Tributary and the implementation of drainage and sediment controls to mitigate the effects of sediment runoff from the road, particularly during construction. Once operational there will be little traffic on this road.

3. Flushing of the sediment settling basins during operations is intended to occur during freshes and floods and unlikely to occur at low flows. However, as a precautionary measure, the NIWA report recommends the establishment of a fine sediment monitoring programme in the reach between Morgan Gorge and the tailrace discharge point. The monitoring will be by visual inspection of the channel margins downstream from Morgan Gorge, for example, weekly during periods when for example more than 2 weeks passes without a fresh in the river and will be used to determine need for increasing flow to assist with dispersion of sediment until the next flood. It is proposed that a facility to bypass all baseflows at the Scheme intake is included in the design so that a flushing flow could be released should monitoring show a build-up of fine sediment sufficient to degrade the physical habitat.

SUGGESTED CONDITIONS

Westpower has considered the suggested mitigation measures contained in the reports and advice received and has adopted these in the form of suggested conditions with the aim of avoiding or mitigating potential effects of the Scheme.

More particularly, and in relation to monitoring of fine sediment and retention of a riparian buffer along the Stable Tributary, are the following conditions as set out in Section 9 of this application.

CONDITIONS	*1.1-1.2, 4.3, 5.16, 6.3, 7.1-7.4, 8.1-8.7, 8.14-8.17, 8.20, 18.1-18.4, 18.9, 18.10, 19.1-19.2*

CONCLUSION

In summary the reports conclude that the Scheme will not alter the existing suite of natural processes and fluvial features that occur with the Waitaha River, nor the frequencies of their occurrence or physical characteristics. Since the proposed project will have no significant effect on the discharge of water and bedload from Kiwi Flat during floods, it should also not affect channel processes, characteristics, and stability in the reach between the Scheme's take and return point at the tailrace.

Sediment losses during construction and operation will be managed via a Wastewater, Groundwater, Erosion and Sediment Management Plan which will incorporate measures to minimise sediment losses to the Waitaha River and protect the Stable Tributary.

The Scheme is unlikely to induce fine sedimentation to occur at a level dramatically different than occurs naturally but monitoring will be undertaken.

Stopbank protection works required at the powerhouse site will have no more than minor effect on flood capacity of the river at this location, or erosion of the opposite bank in regard to the modelled flood flow.

As the Scheme does not involve storage of significant amounts of water the proposed construction of the various Scheme components will not create additional seismic hazards or seismic risks to either the local environment or river users.

7.3 NATURAL CHARACTER, LANDSCAPE AND VISUAL AMENITY EFFECTS

Section 4: Existing Environment
Section 9: Suggested Draft Conditions
Appendix 9: Natural Character, Landscape and Visual Amenity Assessment

- Graphic Supplement
- Photograph Simulations Supplement
- Landscape External Peer Review

The Landscape Report (Boffa Miskell, 2014) assesses the effects of the Scheme on natural character, landscape and visual amenity values of the Waitaha Valley. The report is accompanied by two graphic supplements to illustrate matters raised and considered in the report. This report incorporates changes made in response to a peer review undertaken by Gavin Lister, Director at Isthmus.

The report adopts a structured approach to assessing the potential effects on the natural character, landscape and visual amenity values. The location of the Upper Waitaha Catchment is illustrated in the Graphic Supplement attached to the Landscape Report (Figure 6, pg. 6) with Macgregor Creek (on the true right) and Douglas Creek (on the true left) separating the Upper and Lower Waitaha Catchments. The findings of this Report are summarised below.

NATURAL VALUES

The report considers the values of the Waitaha Catchment and Scheme location on the broad scale and context down to the very local and immediate scale.

The rugged West Coast mountains, foothills and coastal plains form the wider landscape context for the landscape contained within the Waitaha Catchment. The Scheme is not being proposed in a National Park or World Heritage Area, such as Fiordland and South Westland, nor in a designated Wilderness Area. The area is classified as Stewardship Land by DOC where limited or no active pest control is undertaken. The West Coast is synonymous with the 'wilder' side of New Zealand and known nationally and internationally for its drama and scenic beauty. The Waitaha Catchment forms a small part of this overall mountainous landscape. Furthermore, in the broader context of the West Coast Region, where approximately 84% of the land is managed by DOC, there are numerous other river catchments holding similar features such as gorges, hot springs and glaciers and therefore the catchment is not considered unique. The project area occupies a short section (less than 3 km, including abstraction reach) of the overall length of the 40 km long Waitaha River. The rugged West Coast mountains, foothills and coastal plains form the wider landscape context for the landscape contained within the Waitaha Catchment.

For the purposes of assessment of values and effects the Waitaha Catchment has been divided into 'Upper' and 'Lower' segments dependent on landscape, natural character and visual amenity values. The Scheme is located at the lower end of the Upper Catchment, essentially on the margin with the Lower Catchment.

The report describes the whole Upper Waitaha Catchment as containing very high, near pristine levels of natural character, due to the general lack of human-induced modification, but notes however that the area is not rated at the highest end of the naturalness spectrum. This is due to a number of modifications, including pests, evidence of tracks, huts and a swingbridge and its popularity for hunting and kayaking. There is also a gold mining permit over the section of river between the top of Kiwi Flat and Macgregor Creek. There are several landuse consents and concessions for a variety of works in the bed of the Waitaha River and schist extraction operations in Macgregor Creek.

The Upper Waitaha Catchment is not listed in the Westland District Plan 2002 (**WDP**) or West Coast Regional Policy Statement 2000 (**RPS**) as either an outstanding natural landscape or outstanding natural feature. The author of the report is of the opinion that, given the landscape qualities and values found within this part of the catchment and the high level of naturalness, in the absence of such a district or regional wide study it is

likely that the Upper Waitaha Catchment would be considered an outstanding natural landscape at both a district and regional scale. Morgan Gorge itself is considered to be an outstanding natural feature within this landscape, due to its exceptional biophysical and perceptual values. The report also notes the hot springs (Waitaha River Springs) at the bottom of the Morgan Gorge and their recognition by the Geopreservation Society.

POTENTIAL EFFECTS

The actual and potential effects of the Scheme are considered with regards to the natural character, landscape and visual amenity values of the Upper Waitaha Catchment. The potential effects identified in the report are the:

- natural Character effects on river flow through the abstraction reach, specifically within Morgan Gorge from reduced river flows;
- broad scale landscape effects on the whole Upper Waitaha Catchment as an Outstanding Natural Landscape and on Morgan Gorge as an Outstanding Natural Feature;
- local scale landscape effects on the Scheme Areas within the Upper Waitaha Catchment as an Outstanding Natural Landscape; and
- visual amenity effects at intake and powerhouse sites from tracks, including the access road.

ASSESSMENT OF EFFECTS

The Scheme as a whole will modify the landscape and introduce structures that currently are not present in the area. There will be a physical 'presence' of the Scheme at the intake area and at the downstream powerhouse site which will affect the remote-like characteristics of the area. The natural elements, patterns and processes of the river within the abstraction reach will be modified during periods of low flow. However, it is considered that despite the Upper Waitaha Catchment being an outstanding natural landscape and Morgan Gorge being an outstanding natural feature, the Scheme is an appropriate development (with respect to natural character, landscape and visual amenity), as the underlying values which comprise/define the outstanding natural landscape and outstanding natural feature are protected.

In terms of the effects of the Scheme on the natural character, landscape and visual amenity values, the report provides the following conclusions.

1. At a broad Upper Waitaha Catchment scale, the effects on natural character, landscape and visual amenity would be low or moderate to low. This is principally due to the small and defined footprint of the Scheme, which avoids damming the river, avoids the formation of a lake and avoids creating large cuts for access roads from the lower valley into the upper valley. Remoteness values would be affected, however as noted the Scheme is not occurring within a National Park or one of New Zealand's highest rated conservation areas. The Scheme is also in close proximity to the boundary with the Lower Waitaha Catchment, and away from the truly wild and more remote areas further upstream beyond Waitaha Gorge.

2. The effects of the Scheme on Morgan Gorge, whilst smaller in scale than the Upper Waitaha Catchment, will not affect the overall biophysical, associational and sensory values of the gorge to a significant degree and therefore not reduce its 'outstandingness' as an outstanding feature. Essentially, the weir will appear close to the entrance of the gorge, along with the intake structure. The river will maintain its course through the gorge despite reduced flows. The associated cliffs and natural eroding of the broader Morgan Gorge by fluvial processes will continue.

3. For more local effects and despite the Scheme's small footprint, it is considered that there would be high natural character effects at both the intake and powerhouse sites. This is predominantly due to the introduction of two nodes of intensified industrialised-style modification occurring within an area containing very little modification and holding high natural character values.

4. In terms of river flow, there would be a moderate level of effect on the perceptual aspects of natural character effects through the abstraction reach. This level of effects was concluded based on the managed water flow through the abstraction reach. Natural freshes and floods would continue to occur and there would be no lake. The river would essentially continue to operate as it does naturally, albeit with reduced river flows during drier periods. Sediment would continue to be transported by the river. Abiotic and biotic natural character effects would be minor for the abstraction reach.
5. For landscape there would be a high level of effects, again at the local scale. At a broader scale, this would drop to low. There would be no effect to the landscape values associated with the Waitaha River Springs within the gorge.
6. For Visual Amenity the Photo Simulations (Appendix 9) demonstrate that the Scheme would have high visual effects from a number of close viewpoints, notably Photo Simulation IN1 and IN2 for the intake area and Photo Simulation PH1, PH2, PH4 and PH6 for the powerhouse site, reducing to moderate to low levels of visual effects for more distant viewpoints, including Photo Simulation IN3 and IN4 for the intake area and Photo Simulation PH3 and PH5 for the powerhouse site.
7. Under the WDP, it is considered that the Scheme is consistent with the protection of the necessary values of the Upper Waitaha Catchment under Policy (C) of Policy 4.8. The landscape values associated with Morgan Gorge would however be affected, but not to a significant degree, insofar that it would remove the 'outstandingness' of the natural feature.

Based on the above, the overall judgement confirms there will be effects to the natural character, landscape and visual amenity aspects of the Upper Waitaha Catchment, at a variety of scales that will be more than minor. The nature of the Scheme has avoided potentially larger or more significant effects, such as damming the river, creating a lake or placing the structures elsewhere in the Upper Catchment and the design of the elements of the Scheme has assisted in reducing the physical and visual impact. The Scheme will have an industrial appearance, however will be in keeping with a tradition on the West Coast of such small scales works juxtaposed against a wild landscape.

Of the two areas of the Scheme, the intake is the most sensitive, located at the entrance to Morgan Gorge within a backcountry-remote setting and more separated from the modified lower valley. Here careful design will avoid more significant effects with further refinements to the design continuing to mitigate larger construction and permanent effects.

The mitigation measures proposed, and the iterative design process, has enabled the Scheme to sit well within its landscape and to respond to its setting and to acknowledge the outstanding landscape, natural character and visual amenity values the Upper Waitaha Catchment holds by avoiding potentially major effects. Overall, it is considered that the Scheme is appropriate with respect to natural character, landscape and visual amenity despite the fact that at more local levels the natural character, landscape and visual amenity effects are assessed as being moderate to high (or more than minor under the RMA). At a broader scale the effects are low (or minor under the RMA). Conditions are recommended, including development of a Landscape Management Plan, to avoid effects being to a degree or scale which are inappropriate to the landscape, features and setting within which the Scheme is located.

MITIGATION

As part of the assessment of effects, and due to the outstanding landscape values and very high levels of natural character and visual amenity inherent within the vicinity of the Scheme, the report recommends a range of measures which will assist in integrating the development into its surrounding landscape.

The intake structures have been designed to minimise their visual and physical presence in the landscape. The intake structure especially has been designed to sit within the riverine landscape. There will be limited

vegetation clearance in the area, which reduces the effect of amplifying prominence that can be associated with vegetation clearance. There will be no dam and no formation of a lake. The intake structure is of a low profile design. Recolonisation of vegetation will occur naturally after construction, which will assist in softening the structure to some degree.

The powerhouse, switchyard and tailrace occupy a discrete footprint downstream of Morgan Gorge. The structures have been designed to minimise their footprint. The visual effects of the powerhouse will be mitigated by utilising a neutral colour palette for the walls and roof. Additional screening in terms of indigenous vegetation will also greatly assist to reduce the visual prominence of the structure as well as the switchyard. Any visual cuts on facing slopes will be revegetated using indigenous species, especially near the tunnel portal area. The alignment of the access road and transmission line will avoid, where appropriate, any large individual or stands of mature trees located between Macgregor Creek and the powerhouse area.

All worksites will be actively rehabilitated and backfilled and seeded with indigenous species, where appropriate. The contractors' facilities at the intake will be located within an area of semi-mature vegetation. Natural rehabilitation will also assist. Spoil from the tunnel excavations will be placed at a nominated site outside conservation land.

Mitigation of Effects through Scheme Design

As part of the assessment of effects, and due to the high levels of natural character, landscape and visual amenity values present within the project area, numerous measures have been recommended which will assist in integrating the development into its surrounding landscape. Many of these measures have been incorporated in the planning stages of the Scheme, where the project design has aimed at minimising where possible effects to natural character, landscape and visual amenity values. Key elements of the design include:

- A decision not to build a vehicular access road into Kiwi Flat;
- using underground tunnels for transporting water from the intake to the powerhouse and locating the penstock within the tunnel;
- low level weir design
- selecting an option of tunnel and intake (known as Option B) where overall effects were considered by experts to be significantly less than Option A.

Landscape Management

To achieve an acceptable outcome, a number of Landscape Objectives have been developed. These will form part of a Landscape Management Plan which will be developed and prepared in consultation with a Landscape Architect. The overall objective of this Plan is:

- To use construction methods and materials where feasible that will minimise effects on the environment, including reducing visual prominence and enable recolonisation of vegetation.

Intake Area

Specific Objectives for the Intake Area will be included in the Landscape Management Plan, and include:

- avoiding significant cuts and battered slopes for access roads including avoiding their proximity to river bank features; and keeping works in the bed of the river to the minimum required to construct and maintain the road;
- ensuring that the intake structures intersect with the existing topographic features and that appropriate cliff stabilisation measures are sensitively implemented; and
- ensuring that active and passive rehabilitation measures are effective, notably for the construction sites.

The intake structures have been designed to minimise their visual and physical presence in the landscape at the entrance to Morgan Gorge. While much of the specific details of the design will occur in the final design stages, the intake structure especially has been designed to sit within the riverine 'sculpted rock' of the Upper Catchment landscape. The intake and weir structures have been designed iteratively to achieve a low profile design.

Consideration will be given, where practicable, to implement measures that reduce the visual impact and help blend in with the environment. For example, there may be opportunities to modify the box like intake structure by rounding of corners, faceting and texturing of surfaces, alignment of exposed faces to match the profile of rock on each side.

Natural processes such as flooding, deposition of rock flour and silt from the river, drift wood, and establishment of moss and lichen will continue and it is likely that within a short time the structures surfaces will take on a weathered appearance.

In addition, the final design of the weir will incorporate features to protect the koaro populations within Kiwi Flat and enable their passage in and out while providing a barrier to trout. Blue duck duckling access will be incorporated into the weir design. The weir can also be designed to incorporate features to retain the opportunity for kayakers' entry into Morgan Gorge. Such design aspects will be made in consultation with relevant experts including a landscape architect. The final design of the intake must retain engineering integrity and economic feasibility.

It is also proposed to minimise disturbance around the intake interface with the river rock. And where stabilization is required above the intake structure consideration will be given to stabilisation treatments that are appropriate to this sensitive location.

Any vegetation clearance associated with the intake structure will be associated with the access road and contractors' facilities and will be contained to defined areas. Natural contours will be used in the alignment of the road to avoid excessive cuts and areas of fill. Rehabilitation of vegetation of these areas will be undertaken through consultation with the DOC and active and natural (or passive) recolonisation can be expected to occur relatively quickly after construction, which will assist in softening the works to some degree, notably any cut faces.

Powerhouse/Switchyard Area

The powerhouse, switchyard, tailrace and access road would occupy a discrete footprint downstream of Morgan Gorge. The structures have been designed to minimise their footprint.

The visual effects of the powerhouse would be mitigated by utilising a neutral colour palette for the walls and roof. Additional screening in terms of vegetation would also assist in reducing the visual prominence of the structure as well as the switchyard, as illustrated in Photo Simulations PH1- 6 (Appendix 9). Species indigenous to the area would be most appropriate, which could include *Coprosma* and *Olearia species, Griselinea littoralis*, tree ferns and some southern rata. Ensuring that the plantings blend in with the surroundings is paramount for the integration of these structures. A list of recommended species is provided in the body of the report (Table 2, page 70).

Specific Objectives for the Powerhouse Area that will be included in the Landscape Management Plan are:

- to ensure that the footprint of the powerhouse is clearly defined and that works do not extend outside of these parameters;
- that the design of the powerhouse and adjacent penstock and portal avoids imposing structures with as much as practical kept underground;
- to minimise the removal of indigenous vegetation; and
- to ensure that a Landscape Planting Plan is developed.

SUGGESTED CONDITIONS

Westpower has considered the suggested mitigation measures contained in the Landscape Report and has adopted these in the form of suggested conditions with the aim of avoiding or mitigating potential effects of the Scheme.

More particularly, and in relation to natural character, landscape and visual amenity matters, are the following conditions as set out in Section 9 of this application.

CONDITIONS	*1.1-1.2, 5.1, 5.2, 5.13-5.16, 7.1-7.4, 8.10, 8.12, 8.17, 10.1-10.4, 11.1-11.6*

CONCLUSION

Based on the above, the overall judgement confirms there will be effects to the natural character, landscape and visual amenity aspects of the Upper Waitaha Catchment, at a variety of scales that will be more than minor. The nature of the Scheme has avoided potentially larger or more significant effects, such as damming the river, creating a lake or placing the structures elsewhere in the Upper Catchment and the design of the elements of the Scheme has assisted to reduce their physical and visual impact. The Scheme will have an industrial appearance, however it will be in keeping with a tradition on the West Coast of such small scales works juxtaposed against a wild landscape.

Of the two areas of the Scheme, the intake is the most sensitive, located at the entrance to Morgan Gorge within a backcountry-remote setting and more separated from the modified lower valley. Here careful design will avoid more significant effects with further refinements to the design continuing to mitigate larger construction and permanent effects.

The mitigation measures proposed, and the iterative design process, has enabled the Scheme to sit well within its landscape and to respond to its setting and to acknowledge the outstanding landscape, natural character and visual amenity values the Upper Waitaha Catchment holds by avoiding potentially major effects. Overall, it is considered that the Scheme is appropriate with respect to natural character, landscape and visual amenity despite the fact that at more local levels the natural character, landscape and visual amenity effects are assessed as being moderate to high (or more than minor under the RMA). At a broader scale the effects are low (or minor under the RMA). Conditions are recommended, including development of a Landscape Management Plan to avoid effects being to a degree or scale which are inappropriate to the landscape, features and setting within which the scheme is located.

7.4 VEGETATION EFFECTS

Section 4: Existing Environment
Section 9: Suggested Draft Conditions
Appendix 15: Waitaha Hydro Scheme: Terrestrial Flora Description and Assessment of Effects

Vegetation found within the project area is described fully in the Vegetation Report (TACCRA, 2013) and summarised in Section 4.

The effects of the Scheme on the vegetation are considered in two distinct areas (Table 11) given that the Scheme is essentially split by topography into two geographically separate areas (refer Appendix 15, Maps 1-3) approximately 1.5 kilometres apart in a straight line distance between closest proposed work points. These areas are linked by the proposed tunnel and are described as:

1. Area 1 - includes the works, activities and structures relating to the headworks site at the top of Morgan Gorge.
2. Area 2 - includes the works, activities and structures relating to construction and operation of the tunnel, powerhouse and access road.

NATURAL VALUES

Vegetation within Area 1, Area 2 and their surrounds would be considered as having high natural heritage values under the CMS criteria of intactness and viability. It is considered significant indigenous vegetation under provisions of the WDP on the basis of two criteria - intactness and size of area, and protected status.

The vegetation type assemblages present are common and widely represented in both the Wilberg Ecological District and the Waitaha Catchment. The indigenous forest assemblages also occur extensively in catchments of similar valleys throughout central Westland.

No threatened plant species and no vegetation community uniqueness, attributes, species associations or presence that would warrant a classification of significant indigenous vegetation on the basis of flora, were identified within or surrounding the Scheme's project footprint.

Riparian margins have been considered in relation to relevant regional and district council planning provisions for riparian margins for streams 1 - 3 m wide and greater than 3 m. It is noted that the vegetation types present in riparian margins in Area 1 and Area 2 are not unique or distinguished floristically from their counterparts not occupying a riparian strip. It is the arbitrary riparian designation of fixed-width distance from stream bank, not vegetation, that distinguishes these zones and that may have environmental planning restrictions that would not otherwise apply.

POTENTIAL EFFECTS

The report identifies the principal environmental effect of the Scheme on indigenous vegetation as:

- vegetation clearance or disturbance, including within riparian margins, during construction activities within the project footprint;
- the permanent removal of vegetation, including within riparian margins, in areas permanently occupied by Scheme components; and
- the potential effect of weed incursion and dispersal and establishment of weeds in an area particularly during construction.

The following table provides a summary of the areas of vegetation potentially affected by the Scheme.

Table 11: Areas of Vegetation Potentially Affected by Scheme Components and in Total

Scheme Component(s)	Construction (ha)	Permanent (ha)	Riparian (Construction, ha)
Area 1: Headworks and Associated Infrastructure Item(s)			
Weir.	0.0050	0.0010	0.0
Intake Channel.	0.0325	0.0163	0.0
Intake Structure and Intake Portal.	0.0478	0.0278	0.0294
Tunnel Portal Entrance.	0.0187	0.0187	0.0
Tunnel Portal Entrance Apron, Intake Access Road and River Protection at Road Toe.	0.1370	0.0790	0.0410
Road to Contractors' Facilities Area.	0.1040	0.0	0.0300
Contractors' Facilities Area.	0.2200	0.0	0.0
Flushing Tunnel Outlet.	0.0100	0.0100	0.0100
Area 1 Sub-totals	***0.5750***	***0.1528***	***0.1104***
Area 1 Sub-totals Rounded Up	***0.58***	***0.16***	***0.12***
Area 2: Infrastructure Item(s)			
Tunnel Portal Exit and Construction Apron.	0.2480	0.1800	0.0
Access Road and Transmission Line Parallel.	2.5470	2.4198	0.0450
Waterway Training and Flood Protection at Alpha Creek.	0.3375	0.1688	0.1750
Powerhouse, Switchyard and Hard-fill Area.	0.3150	0.3150	0.0
Powerhouse to Tunnel Portal Exit Access Road and Penstock.	0.1275	0.1275	0.0
Tailrace.	0.2000	0.2000	0.0250
Stopbank as River Protection for Powerhouse, Switchyard, Tailrace, Penstock and Access Road.	0.1755	0.1169	0.1755
Area 2 Sub-totals	***3.9505***	***3.5280***	***0.4205***
Area 2 Sub-totals Rounded Up	***3.96***	***3.53***	***0.43***
Scheme Totals	**4.5255**	**3.6808**	**0.5309**
Scheme Totals Rounded Up	**4.53**	**3.69**	**0.54**

Note: Areas given as rounded sub-totals and totals in the above table are rounded up to two decimal places in every case so as to avoid dropping any area as could occur if using conventional rounding of figures less than five. Riparian (construction) and permanent areas are a subset of the total construction footprint.

ASSESSMENT OF EFFECTS

The scale of proposed works and the levels of disturbance within both Area 1 and Area 2 are considered in the context of the project footprint, a local base area, the Waitaha Catchment and Wilberg Ecological District. The indigenous forest assemblages also occur extensively in catchments of similar valleys throughout central Westland.

Area 1 - Headworks

The scale of vegetation clearance is well within the spatial scale of natural disturbances typical of this environment i.e. does not represent clearance of large areas in conjunction with a change in land use and cover type. The nature of vegetation disturbance (removal) caused by the proposed work is considered to be consistent with natural disturbance events e.g. slips, at this or similar sites. Construction involves clearance or at least some disturbance to approximately 0.58 ha of indigenous vegetation. This area, based on the Land Cover Database (**LCDB**) land cover classes, is an extremely low proportion of types present being:

- 0.15% of the c. 396 ha of the similar indigenous forest vegetation (385 ha)/sub alpine shrubland (11 ha) assemblages contained in the zone below the 400 m contour and on the true right of the Waitaha

River/true left of Macgregor Creek carrying vegetation typical of that in the project footprint, containing and surrounding the project footprint and considered its general locale;

- 0.007% of the 8,583 ha of their counterparts in the Waitaha Catchment; and
- 0.001% of the 45,172 ha of their counterparts in the Wilberg Ecological District.

The headworks operational footprint is significantly less again, being approximately 27% of the project footprint for headworks. Following the construction phase, the activity becomes relatively benign, with low likelihood of requiring disturbance of vegetation at any of the areas. Therefore, the proposed activity is not considered to have any long term detrimental effect on vegetation surrounding the various sites. Natural regeneration should occur across any areas affected by construction (except those areas occupied by structural components).

The report therefore considers the Scheme effects on indigenous vegetation in Area 1 as negligible.

Area 2 - Powerhouse/Switchyard, Access Road &Transmission Line, Tunnel, Protection Works

For the Scheme components in Area 2, the scale of proposed works is well within the spatial scale of natural features contributing to discontinuity in vegetation cover because:

a) the narrow linear footprint of the access road/transmission corridor, at 20 m maximum, is less than half the width of the Waitaha River bed at its narrowest in the portion that the road parallels. (Note: for purposes of estimating vegetation clearance for the road/transmission line an average of 15 m has been used); and

b) the alluvial flat area on which the proposed powerhouse, switchyard, access road to the tunnel portal exit, tailrace and stopbank are located is of similar width to the Waitaha River bed adjacent to it (and it is already predominantly open, i.e. not carrying closed-canopy vegetation cover).

Construction involves clearance or at least some disturbance to 3.96 ha of indigenous vegetation that, based on LCDB land cover classes, is an extremely low proportion of the types present being:

- 1.0% of the c. 385 ha of the similar indigenous forest vegetation assemblages contained in the Base Area, a zone below the 400 m contour and on the true right of the Waitaha River/true left of Macgregor Creek carrying vegetation typical of that in the project footprint, containing and extending beyond the project footprint and considered its general locale;
- 0.09% of the 4,334 ha of their counterparts in the Waitaha Catchment; and
- 0.01% of the 27,903 ha of their counterparts in the Wilberg Ecological District.

As for Area 1, following the construction phase, the activity becomes relatively benign, and again appears to have low likelihood of requiring disturbance of vegetation. Therefore, the proposed activity is not considered to have any long term detrimental effect on vegetation surrounding the various sites. Natural regeneration should occur across any areas affected by construction (except those areas occupied by structural components).

Forming and maintaining an access road to the powerhouse and tunnel portal exit affects the greatest area and range of vegetation. While no uniqueness in terms of overall vegetation type(s) is attributable to the general area in which the proposed access routes to these facilities would be located, defining a route that results in least damage to all vegetation, and especially large hardwood trees taken as being 60+ cm diameter at breast height (**dbh**) and large podocarp trees taken as being 30+ cm dbh is a priority. This should be achievable because large hardwood and podocarp tree densities across the recent terrace landforms the

access road would mainly traverse are very low. Appropriate final route delineation and ground survey will be key activities in achieving this.

The report therefore concludes the Scheme effects on indigenous vegetation in Area 2 are considered minor.

MITIGATION

Mitigation measures have been recommended through the report and relate to reducing the likelihood of weed incursion. The recommended measures include:

- earthmoving machinery should be thoroughly washed down prior to entering any part of Area 1 or Area 2 so as to reduce the risk of weed seed transport;
- monitoring is recommended for weed establishment, in particular for *Ulex europaeus* but also for other woody species e.g. *Leycesteria formosa*. It is proposed that this should be undertaken at least annually and be ongoing for all areas where gravel/rock has been carted in that comprise the operational footprint; and
- for all areas decommissioned after construction is finished, annual monitoring for weed establishment for a minimum of five seasons is recommended.

The results of the proposed monitoring will identify if there is any need for weed control within the project footprint. If weed control is required then it needs to be done as soon as practicable in the most effective season for best control results (using the most appropriate control methods) for the species concerned, and in any case prior to plants attaining seeding maturity. It is proposed that a Pest and Weed Management Plan that will include methodology for weed monitoring and management shall be incorporated into the Concession.

While potential effects due to vegetation clearance are considered minor, they can be further reduced by defining access road/transmission line, intake access road and access road to the contractors' facilities area routes that, subject to engineering considerations, result in least damage to all vegetation, and especially large (60+ cm dbh) hardwood trees and podocarp trees (30+ cm dbh). A survey to enumerate and mark all large trees within a fixed width of the road formation centerlines would be undertaken. The findings would be used to make any practicable road alignment adjustments to avoid as many of these large trees as possible. Provision for these matters is proposed through the attached suite of conditions.

It is expected that once constructed, and over time, there will be a reasonable degree of re-vegetation. Natural regeneration of the range of species present prior to any clearance would be expected to occur relatively quickly over all areas other than those required permanently for operations. Scarification or ripping to loosen up substrate can enhance this process and supplementary planting can enhance the speed of re-vegetation if required and where suitable substrate exists. The deposition of soil material obtained from other Scheme component construction (if available) can increase the speed and success of natural regeneration in areas of little or no soil cover and would be beneficial on such sites prior to any supplementary planting if that is planned.

SUGGESTED CONDITIONS

Westpower has considered the suggested mitigation measures contained in the Vegetation Report and has adopted these in the form of suggested conditions with the aim of avoiding or mitigating potential effects of the Scheme.

More particular to the recommended measures are the following conditions as set out in Section 9 of this application.

CONDITIONS	*1.1-1.2, 4.1-4.5, 4.10, 5.1-5.8, 5.11, 5.13-5.16, 7.1-7.4, 8.10, 11.1-11.6, 12.1-12.5, 13.2, 18.1-18.4, 18.21*

CONCLUSION

Scheme design and location ensures that only a very small total area of indigenous vegetation is affected. Infrastructure location largely avoids areas that carry mature podocarp/hardwood forest or higher densities of large hardwood trees in those types where podocarp presence is reduced. The access road/transmission line, intake access road and access road to the contractors' facilities area traverse a variety of vegetation types and together incorporate most of the Scheme project footprint as it affects vegetation.

Overall, the report concludes the effects of the Scheme on vegetation contributing to high natural heritage values under the CMS will be minor (negligible for Area 1 and minor for Area 2). This is based on the small amount of clearance (approximately 4.53 ha) that will occur within the surrounding contiguous area and within the combined indigenous forest and shrubland cover of the Base Area of c. 396 ha, combined with measures to avoid affecting important habitat components (e.g. large forest trees) and minimise weed incursions.

7.5 BIRDS AND BATS OVERVIEW

Section 4:	Existing Environment
Section 9:	Suggested Draft Conditions
Appendix 16:	Assessment of the Potential Effects of the Proposed Waitaha Hydro Scheme of Vertebrate Fauna (Birds and Bats)

Wildlife Surveys Ltd was commissioned to prepare an assessment of environmental effects of the Scheme on terrestrial fauna in particular birds and bats. The Birds and Bats Report (Buckingham, 2014) also includes an assessment on the presence of Powelliphanta snails.

NATURAL VALUES

The project area contains areas of significant habitat for indigenous fauna based on assessment of guidelines/criteria for significance set out in the relevant regional and district planning provisions RPS (Policy 9.2 (a)-(p)) and the WDP (Policy 4.9D(i)-(viii)), and accordingly have high natural heritage values based on assessment criteria in the CMS (Policy 3.3.2.3(1)). The area's significance is largely defined by the relative intactness of the proposed footprint, the presence and representativeness of Threatened and At Risk species, and the potential distinctiveness of at least one species (western weka).

Short-tailed bats were not detected and are very unlikely to be present.

Living populations of *Powelliphanta* are unlikely to be present in the survey area given the search effort to date. It is considered most likely that the shells found at Kiwi Flat in 2007 and 2011 were washed downstream in a flood, rather than representing snails living in the vicinity. The only known *Powelliphanta* snail species present in the general area is restricted to alpine habitats, very likely including the headwater catchments of the Waitaha River.

Notwithstanding the overall level of significance and natural heritage values, all species recorded have a wide distribution range, and similar habitats are found widely throughout the West Coast.

POTENTIAL EFFECTS

The report has identified the following potential effects:

- loss of faunal habitat and potential direct loss of fauna during the construction phase (particularly during breeding);
- changes in food source or breeding habitat caused by changes in river flows or sedimentation;
- disturbance of riparian areas used by bats for foraging;

- Improving access to predators (such as dogs) by construction of new roads (but only in the lower valley from Macgregor Creek to the proposed powerhouse);
- Increased risk of road kills, especially during the construction period;
- noise and disturbance caused by humans and machinery (also mainly during the construction phase);
- lighting from the powerhouse and intake (very localised and intermittent) this may be a positive effect for bats and moreporks, while an adverse effect for their prey: i.e. flying insects;
- minor positive effects other than from lighting might include power poles being used as perches or roosts for some birds, and road access routes being used by bats for navigation.

ASSESSMENT OF EFFECTS

The loss of faunal habitat and potential direct loss of fauna during the construction phase (particularly during breeding) are the main adverse effects on terrestrial fauna (birds and bats) caused by the Scheme. However, overall effects are considered negligible, given the small size of the Scheme's construction footprint (c. 4.53 ha of vegetation affected) and that it largely avoids significant terrestrial faunal habitat such as mature forest.

Although riverine birds may be indirectly affected (positive or adverse) by any change to their food source or breeding habitat caused by changes in river flows or sedimentation, the effects on riverine birds (excluding blue duck which is discussed separately) are considered likely to be negligible given that:

- Threatened or At Risk birds are relatively scarce within the abstraction reach;
- the abstraction reach is only 2.6 km;
- productivity of aquatic fauna is relatively low in the main stem compared to stable tributaries that are either not affected, or minimally affected by the Scheme (McMurtrie & Suren 2014);
- sediment accumulation is unlikely given the frequent flooding events (Allen & Hay 2013; Doyle 2013; Hicks 2013); and
- Scheme design and proposed mitigation aim to avoid or minimise potential effects.

Similarly, indirect effects on bats that appear to select riparian areas for foraging are considered negligible.

The small scale of the Scheme and its minimal effect on significant habitats and natural heritage values greatly reduces the level of potential effects in terms of the RPS, WDP and CMS. All species and their habitats found within the Scheme footprint are well represented elsewhere, regionally or nationally.

MITIGATION

While the report considers that the Scheme design has largely avoided adverse effects on terrestrial fauna (bats and birds) within the Waitaha Valley, it recommends some mitigation measures to further reduce effects on terrestrial fauna. These include:

- minimising where possible the effects of construction activities within the main breeding season for bats and birds (spring and early summer) at particularly sensitive areas (e.g. tunnel portal entrance and other headworks sites where large-diameter trees are to be removed);
- a survey for potential and occupied bat roost trees within the proposed construction sites immediately prior to construction;
- a survey to detect nesting kaka within the proposed construction sites (carried out at the same time as the bat roost survey);
- reducing road speeds to minimise road deaths of birds such as weka and kereru (use of road signs and staff induction);
- ensuring all food and rubbish is collected and removed from the site promptly to avoid local pest problems, or encourage scavenging behaviour from kea or weka; and
- implementing measures to reduce dog access to the Waitaha Valley (signage and advocacy).

Given the assessed negligible effects of the Scheme on terrestrial fauna, the report advises that there is no particular benefit in carrying out specific monitoring on any terrestrial fauna covered in the report (other than the pre-construction survey for bats and kaka) although bats should be monitored if they are to be managed by predator control.

SUGGESTED CONDITIONS

Westpower has considered the suggested mitigation measures contained in the Birds and Bats Report and has adopted these in the form of suggested conditions with the aim of avoiding or mitigating potential effects of the Scheme.

More particular to the recommended measures are the following conditions as set out in Section 9 of this application.

CONDITIONS	*1.1-1.2, 4.1, 4.4-4.7, 4.10, 5.8-5.10, 5.16, 7.1-7.4, 12.1-12.3, 15.1-15.6*

CONCLUSION

The report concludes that, given the small and linear footprint of the Scheme, its design and the proposed mitigation, the Scheme is predicted to have negligible effect on terrestrial fauna values currently present in the Waitaha Valley. Predators are considered to be a far greater threat to terrestrial fauna in the Waitaha Valley than any adverse effects caused by the Scheme. The absence of kiwi and relatively low numbers of Threatened bird species and individuals are indications of high predation levels in the Waitaha Valley.

7.6 LIZARDS

Section 4:	Existing Environment
Section 9:	Suggested Draft Conditions
Appendix 17:	An Assessment of the Potential Impact of the Proposed Westpower Hydroelectric Development on the Lizard Fauna of the Lower Waitaha River, Westland

The assessment of potential effects on lizard habitat was undertaken by Whitaker Consulting Ltd. A full description of the environment in regard to these matters is provided in the Lizard Report (Whitaker, 2013) and summarised in Section 4, Existing Environment.

NATURAL VALUES

There are no known records of lizards from within the project area and there is scant information on the lizard fauna in the surrounding district. However, the limited data available on the occurrence of lizards in central Westland, together with the author's knowledge of the overall range and habitat preferences of the lizard species that occur on the West Coast, means it is possible to predict what might be present in the project area. A field survey of two sites chosen for their potential quality of habitat, were undertaken at Robinson Slip and Kiwi Flat. No lizards or any sign (e.g. sloughed skins, faeces) were found during this survey.

Two gecko species (*Mokopirirakau granulatus s.s, Naultinus tuberculatus*) are expected to occur within the project area as these taxa are widespread in forest and shrubland habitats in northern and central Wetland. The two gecko species expected from the project area are not of conservation significance in relation to the project development, despite their threat listings of 'At Risk-Declining' and 'Threatened-Nationally Vulnerable' respectively, due to their widespread distribution on the West Coast and their habitat being so extensive.

One skink species may occur in open habitats on forest margins and riparian areas within the project area as there are a few isolated and scattered records of small skinks (*Oligosoma polychroma s.l.*) in such habitats in the general region. This taxon has a very wide national distribution and is listed by DOC as 'Non Threatened'

and would therefore only of low conservation significance. On the other hand, if the taxon in the project area proves to be *Oligosoma* aff. *polychroma* 'Clade 4', its conservation significance to the development would be a lot higher than for *Oligosoma polychroma s.s.* as its national range is relatively restricted, its DOC threat listing is 'At Risk–Declining', and its occurrence on the West Coast is presently based on a single locality (Oneone River).

Three other skink taxa of the speckled skink complex (*Oligosoma* aff. *infrapunctatum*) were considered in terms of their conservation status. The distributions of these three taxa clearly indicate that the most likely one to be in the Waitaha area is *Oligosoma infrapunctatum s.s.* However, south of Greymouth it is presently known only from lowland locations, generally on or close to the coast, suggesting its occurrence in the project area is unlikely.

While the potential habitat in the project area for taxa in the speckled skink species complex is very restricted, the report does consider the conservation status of these species. If *Oligosoma infrapunctatum s.s.* is present it would be of moderate conservation significance because, although it has a relatively large national range, its occurrence in central Westland is very patchy and localised and it has a DOC threat listing of 'At Risk–Declining'. It is highly improbable that either of the other taxa in the speckled skink species-complex is present in the project area. However, should they occur *Oligosoma* aff. *Infrapunctatum* 'crenulate' would be of moderate conservation concern because although relatively widespread and locally abundant in north Westland, it has a DOC listing of 'At Risk–Relict' and the project area is well south of its known range. The occurrence of *Oligosoma* aff. *infrapunctatum* 'Chesterfield' would be of high conservation concern as it is a very rare and poorly known species with an extremely restricted range, with the sites at Chesterfield under extreme threat from agricultural development through dairy conversions. Reflecting this, it has a DOC threat listing of 'Threatened–Nationally Critical'.

POTENTIAL EFFECTS

There may be the potential loss of some habitat for, or displacement of, any lizards and skinks as a direct effect of vegetation clearance, earthworks and, at least in the short term, changed water flows above the intake weir.

ASSESSMENT OF EFFECTS

As presently defined, the Scheme will have no detrimental effect on the broader conservation status of the lizard fauna known from central Westland. At the local scale, the project is expected to have very little effect on the lizard fauna of the project area, though clearly those lizards living within the final project footprint will be lost or displaced.

The loss or displacement of *Hoplodactylus granulatus* s.s. and *Naultinus tuberculatus* from within the project footprint through the clearance of forest and shrubland habitats for the construction of roads, access ways and sites for the power station and ancillary structures will have essentially no conservation effect. The area of habitat likely to be involved is minimal, contiguous with it there are vast tracts of similar habitat, and suitable habitat for these two species extends throughout the region.

The report considers the situation for skinks is a little different. Within the project area, habitat suitable for skinks is very limited in extent and almost entirely restricted to herbaceous vegetation and open shrubland in riparian areas and old flood channels along the Waitaha River. The extent to which this habitat will be affected in the vicinity of the access road, power house and tailrace is unknown. However, on Kiwi Flat some loss of riparian habitat for skinks may occur above the intake weir as the river establishes a new gradient but this will affect a very small area in relation to the available habitat in the catchment as a whole. On the other hand, forest clearance and earthworks associated with the development could inadvertently create new forest margin or open rocky areas that may be habitable by skinks.

Changed flow regimes in the Waitaha River resulting from the project would not affect lizards.

MITIGATION

The report concludes that no mitigation for potential effects of the Scheme on lizards is seen as necessary. This is because the areas likely to be affected by the project are very small in comparison to the habitat available and the lizard taxa that are potentially present are expected to be widespread.

However, in order to obtain better information on the lizards of the project area, any lizards detected during environmental and engineering surveys for the Scheme, and during the construction phase, must be captured and forwarded to DOC staff at Hokitika so that their identity can be confirmed by genetic testing. Westpower will obtain the appropriate wildlife permit for collection of lizards prior to construction.

It is only with additional information and confirmed identities that the true significance of the lizard fauna can be determined and put into regional context, and informed management decisions relating to its welfare can be made.

SUGGESTED CONDITIONS

While no mitigation measures are proposed in the Lizard Report, Westpower has included a suggested condition relating to the collection of any lizards found during the construction phase. The suite of suggested conditions in Section 9 also include a number of general conditions relating to the avoidance and mitigation of effects on wildlife.

CONDITIONS	*1.1-1.2, 7.1-7.4, 15.8*

CONCLUSION

Whilst there are some unknowns in regard to particularly skink presence there are no records of lizards within the project area, and no lizards were found during the field survey. Taking into account these matters, no mitigation was considered necessary through the report. The report concludes that at a local scale, the project is expected to have very little adverse effect on the lizard fauna of the project area, though clearly those lizards living within the project footprint will be lost or displaced. The Scheme will have no detrimental effect on the broader conservation status of the lizard fauna known from central Westland.

7.7 TERRESTRIAL INVERTEBRATES

Section 4: Existing Environment
Section 9: Suggested Draft Conditions
Appendix 18: Potential Effects of the Waitaha Hydro Scheme on Terrestrial Invertebrates

Entecol Ltd were commissioned to undertake the assessment of effects on terrestrial Invertebrates. A full description of the environment in regard to these matters is provided in the Invertebrate Report (Toft, 2014) and summarised in Section 4 Existing Environment.

NATURAL VALUES

None of the terrestrial invertebrates identified during the survey are known to have a threat status under the DOC threat classification system (Townsend et al, 2008). In general, the invertebrate fauna surveyed is typical of wet, western South Island locations, and strongly related to the vegetation types present.

The native invertebrate communities around the project area appear to have a relatively high degree of natural integrity, with invasive species at low abundance. This would be typical of South Westland, with extensive areas of wet native forest.

POTENTIAL EFFECTS

There will be some direct disturbance and removal of habitat as a result of road and facility construction.

The primary effect of the Scheme is expected to be on the riparian communities, at least in the short term. This will be through the:

- habitat removal and modification caused by construction of roads and facilities;
- temporary backwater effect on habitat at Kiwi Flat;
- changed water flow regimes affecting sediment deposition dynamics in riparian zones downstream of the weir; and
- an increased risk of new weeds and invasive invertebrates (e.g. introduced ants and molluscs) establishing in natural habitats as a result of vehicles and equipment being brought into the area for project construction and ongoing maintenance.

ASSESSMENT OF EFFECTS

The Scheme is expected to have a relatively low level of effect on invertebrate communities in the area.

Although there will be some limited forest clearance, the invertebrate communities affected by this have extensive areas of contiguous habitat to support their ongoing survival. The report considers whether the effect of habitat clearance will extend beyond the area of clearance due to edge effects. This is especially likely where taller forest is abruptly exposed to an open edge which can cause an increase of daily fluctuations in climatic variables such as wind speed, temperature and humidity in the exposed forest, the extent depending in part on the degree of exposure to climate of the new edge.

However, the forest clearance indicated for the Scheme is relatively minor and is taking place next to an existing natural edge (i.e. the river margin itself). As indicated in the Vegetation Report (TACCRA, 2013), this will allow for rapid regrowth of vegetation consisting of species already present in the area (including many edge species). The remediation measures recommended in the Vegetation Report will enhance the rapid development of a suitably armoured edge to ensure there are no long term edge effects beyond those that are natural to the area.

The effect of forest clearance on invertebrate communities will be relatively minor and short term, and a temporary increase in edge effects can be mitigated through revegetation along exposed edges where required.

Clearing of vegetation within the project footprint is also likely to increase the quantity of dead wood lying on the edges of adjacent habitats. This will lead to an increase in invertebrate species specialising in the use of dead wood in the short to medium term. This effect occurs naturally in indigenous forests after such events as major windfalls and/or snow damage and the invertebrate community will ultimately adjust back to a more normal makeup as the available resource is used up.

The effects of changed water flow regimes are not expected to have substantial impacts on riparian specialists, as the important sand and gravel deposition events will continue during floods. River systems are naturally dynamic and subject to significant changes, and the riparian invertebrates that live adjacent to them are generally well adapted to cope with change. The changes in flow regimes caused by the Scheme are well within the natural scope of a dynamic river system, and there is no reason to believe that the riparian invertebrate communities present alongside the Waitaha River will suffer any long term effects from the Scheme.

The old boulder fields in the Macgregor Creek area represent an unusual and potentially important habitat for some invertebrates, as it is generally more stable than true riparian margins. The construction of a road through this area will affect some of the habitat but extensive areas of this habitat will remain undisturbed.

The open sand banks at Kiwi Flat are important habitat for a range of riparian specialists, such as the stiletto flies, and are maintained through regular flood events. One potential risk to these communities is if they become too stable and support permanent plant growth, which has the effect of binding the sand. Weed invasion is a particular threat to them (with or without the Scheme), and there is already an area of extensive Canada thistle (*Cirsium arvense*) growing on riparian sand banks near the confluence of Whirling Water and Waitaha River.

There will be an increased risk of new weeds and invasive invertebrates (e.g. introduced ants and molluscs) establishing in natural habitats as a result of vehicles and equipment being brought into the area for project construction and ongoing maintenance. The Vegetation Report lists a number of useful mitigation measures for reducing risk of weed incursions, and measures such as washing dirt and debris from vehicles will also assist in reducing the risk of transporting invasive invertebrates on to the site.

MITIGATION

The report endorses the mitigation measures proposed in the Vegetation Report to reduce the risk of weed incursions. Measures such as washing dirt and debris from vehicles will also assist in reducing the risk of transporting invasive invertebrates on to the site.

SUGGESTED CONDITIONS

While no specific mitigation measures are proposed in the Invertebrates Report, it supports the recommended mitigation, particularly with respect weed management as proposed in the Vegetation Report with the aim of avoiding or mitigating potential effects of the Scheme on invertebrate habitats. General conditions relevant to the avoidance and mitigation of effects on invertebrates and riparian habitats are listed below and set out in Section 9 of this application.

CONDITIONS	*1.1-1.2, 5.16, 7.1-7.4, 12.1-12.7, 18.21*

CONCLUSION

The Scheme is expected to have a relatively low level of effect on invertebrate communities in the area.

The report concludes that overall, the invertebrate communities found in the project area are typical for the region with no terrestrial invertebrates of known conservation concern being found in the project area. Riparian invertebrates occurring along West Coast rivers are naturally adapted to cope with highly dynamic river systems and their populations along the Waitaha River are unlikely to suffer any long term decline as a result of the Scheme.

The effect of forest clearance on invertebrate communities will be relatively minor and short-term, and a temporary increase in edge effects can be mitigated through revegetation along exposed edges where required. Good biological hygiene practices should be applied to vehicles and machinery being taken into the area to reduce the risk of invasive weeds and invertebrates being transported to natural sites.

7.8 AQUATIC ECOLOGY

Section 4:	Existing Environment
Section 9:	Suggested Draft Conditions
Appendix 10:	Proposed Waitaha Hydro Scheme: Assessment of Environmental Effects: Benthic Ecology of the Waitaha Catchment
Appendix 11:	Proposed Waitaha Hydro Scheme: Assessment of Environmental Effects: Fish of the Waitaha Catchment
Appendix 12:	Instream Habitat Flow Assessment for the Waitaha River: Morgan Gorge to Douglas Creek

EOS Ecology was commissioned to provide baseline information about the Waitaha River and associated tributaries, and to assess the potential effects of the Scheme on the aquatic ecology including plants, invertebrates and fish. A full description of the environment in regard to these matters is provided in the Aquatic Ecology reports and summarised in Section 4.

7.8.1 BENTHIC REPORT

The Benthic Report (McMurtrie & Suren, 2014) looks at the water quality, habitat, aquatic plants (periphyton/algae, bryophytes, macrophytes) and benthic invertebrates (small animals such as insect larvae and snails that live on or near the stream bed) of the Waitaha Catchment, the potential effects of the Scheme on these communities, and how these effects can be avoided, mitigated or remedied where the effects are adverse or significant.

NATURAL VALUES

All 52 periphyton taxa recorded during surveys are common and widespread in South Island rivers and the communities are typical for the catchment type in terms of their diversity and species composition. Similarly for the invertebrate species (104 taxa recorded) none of particular conservation interest or rarity were collected, but there were several new records for the distribution of taxa in the area.

Periphyton biomass was low in all areas throughout the mainstem sites (of both the Waitaha and Wanganui River) and stable tributaries, but slightly higher in other tributaries. Low biomass was attributed to the low-nutrient waters and flood prone nature of the Waitaha River. All sites were dominated by diatom assemblages rather than filamentous algae, also reflecting the instability and flood prone nature of most of the waterways.

A total of 104 different aquatic invertebrate taxa were found in the survey area, with the fauna of the Waitaha Catchment composed of a diverse assemblage of insect taxa. Invertebrate density and diversity were significantly higher in stable tributary sites than other mainstem sites or tributaries. The stable tributaries are locally important for maintaining biodiversity values and ecosystem functioning. In contrast, invertebrate density in the mainstem of the Waitaha River was low and dominated by only a few taxa capable of persisting through frequent flood events and times of moving substrate.

No waterways within the Scheme could be regarded as significant under the RPS for aquatic benthic biota, but the report considers that this is in part because aquatic invertebrate taxa and bryophytes are poorly described to species level in New Zealand. Because of the lack of information on the distribution and ecology of many aquatic invertebrates, a habitat-based approach to conservation of aquatic invertebrates is preferred over a species-based approach (Collier, 1993).

Based on such an approach, the Stable Tributary, a biodiversity 'hotspot', on the true right side of the river in the Douglas Creek Reach was regarded as locally significant. This is due to the assemblages of bryophytes and aquatic invertebrates and the higher diversity and density of species, brought about by the particularly stable nature of the system in comparison to other waterways in the survey area. By virtue of the stability of the stream and the aquatic benthic community that has evolved as a result, this system would also be more susceptible to disturbance than other water bodies in the area.

POTENTIAL EFFECTS

The potential effects of the Scheme on the aquatic benthic community of the Waitaha Catchment can be separated into construction and operational effects.

The construction effects relate to the creation of the access roads and other infrastructure (intake weir, underground settling basins, tunnel, powerhouse, tailrace etc.). Potential effects during the construction phase are summarised as:

- sediment mobilisation;
- release of concrete- and hydrocarbon-based contaminants;
- riparian vegetation clearance; and
- the spread of the invasive algae *Didymosphenia geminata* (Didymo) in tributary waterways.

The operational effects of the Scheme are summarised as:

- residual flow regime (effect on aquatic benthic habitat);
- sediment release during flushing of the settling basins/operation of the Scheme;
- the backwater effect of the weir; and
- effects related to the permanent infrastructure (waterway crossings, riparian vegetation loss, stormwater runoff, lighting).

ASSESSMENT OF EFFECTS

The potential effects of the construction phase are partly mitigated via the planned programme to reduce effects as well as the nature of the environment e.g. the existing unstable nature and high sediment load of the Waitaha River mainstem and of most of the tributary waterways within the construction footprint, and the dry nature of some of the tributary waterways that will be crossed by the access road).

Construction

The report considers that the greater risk from construction activities is around the Stable Tributary on the true right bank of the river in the Douglas Creek Reach. This stable tributary could potentially be impacted by the removal of vegetation within the riparian zone for the construction of the access road that will run parallel to it in some sections, also from input of sediment during construction.

However, the potential effects on this sensitive and ecologically significant waterway will be greatly reduced or avoided by keeping the access road and all other activities a sufficient distance away from the stream (ideally 20 m with a minimum allowable distance of 10 m where topography and other matters limit a wider buffer strip). This will serve as a buffer zone of intact vegetation to help protect the stream from runoff and shield the system from activity. The creation of road drains that would direct stormwater away from the stream would also assist in keeping the stable and clean-water system free of sediment. It is noted however that the ability to successfully avoid runoff from the road construction entering the Stable Tributary will ultimately be dependent on the grade of the ground between the access road and tis waterway, which has not as yet been detailed.

The report proposes a range of recommended mitigation/avoidance measures that should ensure a 'minor/less than minor' effect during the construction phase. Monitoring is considered warranted to make sure that this sensitive system is being adequately protected.

Operations

The report considers the findings of the IFIM modelling in determining the operational effects of the Scheme as a result of reduced flow on the aquatic ecology. The IFIM modelling predicts a large (155-174%) increase in short filamentous algae and a decrease in diatoms within the abstraction reach as a result of the residual flow, while there are variable predicted effects on the aquatic invertebrate community ranging from decreases to

increases in habitat availability depending on the particular Habitat Suitability Curve used. The report advises that the IFIM modelling is limited to predicting changes in habitat suitably in relation to water depth, velocity and substrate. However, any predicted changes based on the IFIM modelling will most likely be overridden by the low nutrient and high disturbance regime of the river, which appear to be the overarching factors affecting the benthic aquatic community of this river and that will not change under the residual flow conditions.

Thus, on balance, the report considers that the overall impact of the residual flow on the benthic aquatic community of the Waitaha River is likely to be low (or 'minor/less than minor').

This is due to:

1. the comparatively short distance of the abstraction reach (totalling approximately 2.6 km or roughly 6% of the Waitaha mainstem between the coast and headwaters at Ivory Lake);
2. the existing low periphyton biomass and low diversity and density of aquatic invertebrates within the abstraction reach;
3. all species within the abstraction reach also being found throughout the rest of the Waitaha mainstem and tributaries unaffected by the Scheme; and
4. the overarching dominance of the disturbance regime and sediment dynamics on the benthic fauna remaining unchanged.

The backwater effect on the Waitaha River at Kiwi Flat is predicted to be short-lived, with the area behind the weir filling with coarse sediment (gravel and cobble substrate) and the low flow channel regrading to suit the local conditions following the first large flood event. Given the short time frame and the fact that this part of the river already undergoes periods of inundation and channel regrading (from the flood flow pinch point caused by Morgan Gorge), there will be no real effect of the smaller and short-lived backwater effect created by the weir.

The long term effects of any waterway crossings are likely to be negligible (or 'less than minor') once the recommended mitigation measures are implemented. The avoidance of any waterway crossing of the Stable Tributary in the current Scheme plan serves to protect this sensitive habitat from any disturbance relating to stream crossings. Removal of riparian vegetation is not considered to have any noticeable effect on the functioning of waterways (with the possible exception of the Stable Tributary as discussed below) due to the limited influence that riparian vegetation has on the Waitaha River mainstem (caused by the large distance between streamside vegetation and the river edge caused by the scouring effect of frequent floods), and the small amount of vegetation being removed in relation to tributary stream crossings.

Any potential effects during the operational phase of the Scheme on the Stable Tributary, primarily relating to removal of riparian vegetation for the road and transmission line corridor and from potential road runoff, can be adequately resolved to a 'minor/less than minor' effects level via similar avoidance and mitigation measures as proposed for the construction phase. It is noted however that the ability to successfully prevent road runoff entering the Stable Tributary will ultimately be dependent on the grade of the ground between the access road and the Stable Tributary, which has not yet been detailed. While there will be no permanent lights along the road corridor, and lighting around the powerhouse and intake will already be kept to a minimum, recommendations for the type of lights used (in terms of wavelength and light direction) are provided on the basis that these measures are environmentally sensitive options.

MITIGATION

A comprehensive range of mitigation is proposed, some of which are generic and reflect good construction management practices, for example, those relating to fuel storage, and will be incorporated into the Construction Management Plan. The recommended mitigation measures are listed below.

Construction

- The access road and associated corridor be located at a sufficient distance (ideally 20 m, with a minimum allowable distance of 10 m where topography or other matters limit a wider buffer strip) away from the Stable Tributary to allow for a protected vegetated riparian zone of trees, shrubs and groundcover that will shelter the waterway from the road and help to intercept runoff from the road.
- Any formal or informal drainage channel should ensure surface runoff (e.g., from the access road) is not directed into the Stable Tributary. The ability to successfully achieve this will ultimately be dependent on the grade of the ground between the access road and the Stable Tributary, which has not yet been detailed.
- All construction activity and equipment should be kept away from the Stable Tributary waterway, and systems or measures are put in place to ensure that flood flows cannot direct sediment-laden water into the Stable Tributary.
- Sediment removed from any construction settling pond is taken off-site for appropriate disposal.
- The use of concrete-containing materials (e.g., concrete slurry, shotcrete material) should be carefully managed and monitored to ensure that pH-altered water is not released into any tributary waterway or the mainstem river.
- Construction of waterway crossings is undertaken during low flow conditions and as far as practicable should make use of pre-cast structural elements to minimise the quantities of wet concrete required within waterway channels.
- It is recommended that a single-span bridge be used to cross Granite Creek. If this is not feasible and a pier is required, if practical, the pier should be located out of the permanently wetted channel. For waterways with permanent flow, the use of bridges (and culverts, if subsequently needed) should be constructed to take into account the design features listed in Boubée et al. (1999) and Christchurch City Council (2003).
- Where feasible, the contractor's facilities areas will be located as far as logistically possible away from waterways, in particular those that are permanently flowing.
- The quantity of tunnel spoil to be temporarily stored at the powerhouse site and the contractor's facilities areas should be kept as low as possible by continuous, periodic removal of the tunnel spoil to its designated destination (adjacent farmland).
- The use of environmentally aware hydraulic fluids (based on vegetable products rather than petroleum-based products) should be considered as it will reduce the level of damage to any surface waterways should a spill occur.
- Any fuel tanks should be located within a bunded area with a capacity of 110% of fuel tank volume when in storage overnight.
- Although likely to be incorporated as part of the construction plan, it is imperative that a strict protocol for thorough cleaning (check, clean, dry) of all potential vectors of Didymo be documented in the construction plan for all construction workers, equipment or machinery that is/are moving either within or on/off site.

Operations

- All runoff from hard surfaces (e.g. the access road, powerhouse building and associated grounds) should be allowed to soak to ground where possible.
- Following completion of the construction phase, supplementary planting of some of the construction areas that are not permanently occupied as recommended by TACCRA (2013), will also serve to benefit aquatic systems.
- If at all possible the outside sensor lights around the powerhouse and intake site should use lighting that produces light at one wavelength, but emit no UV.

- Lighting that incorporates full cut-off or shielded light fixtures to prevent light scattering into the sky and laterally into the surrounding areas will further help to completely minimise the impacts of lighting on aquatic insects.

MONITORING PROGRAMME

- The Stable Tributary is monitored during the construction phase for pH and sediment (e.g., measures such as total suspended solids, turbidity, and water clarity).
- Monitoring to determine if there has been any discernible accumulation of sediment within the abstraction reach – due to residual flow or flushing of settling basins. This can be used to inform the Scheme operators as to the frequency (if required) of flushing flows needed to mobilise sediment from this section.

SUGGESTED CONDITIONS

Westpower has considered the suggested mitigation measures contained in the Benthic Report and has adopted these in the form of suggested conditions with the aim of avoiding or mitigating potential effects of the Scheme. More particular to the recommended measures are the following conditions as set out in Section 9 of this application.

CONDITIONS	*1.1-1.2, 4.1, 4.3, 5.14-5.16, 6.1-6.3, 7.1-7.4, 8.1-8.10, 8.12, 8.14-8.18, 11.1-11.6, 12.1-12.7, 14.1-14.5, 15.5-15.6, 18.1-18.4, 18.9-18.10*

CONCLUSION

Overall it is considered that the effects of the proposed construction and operation of the Scheme will be minor or less than minor, subject to the implementation of avoidance/recommended mitigation measures.

Although 'life-supporting capacity' is a broad-scale term that encompasses numerous facets of ecosystems, many of which are beyond the scope of the Benthic Report, the life-supporting capacity of the Waitaha River and its tributaries - with respect to the aquatic invertebrate, periphyton, bryophyte, and macrophyte communities at least - is not likely to be significantly affected by the Scheme provided the recommended avoidance/mitigation measures are implemented.

7.8.2 FISH

The Fish Report (Drinan & McMurtrie, 2014) looks at the fish communities of the Waitaha River Catchment, potential effects on these communities, and how these effects can be avoided, mitigated or remedied.

NATURAL VALUES

Eight fish species were found in the Waitaha River, in decreasing order of abundance these were koaro, brown trout, longfin eel, torrentfish, lamprey, redfin bully, common bully and shortfin eel. Freshwater crayfish were also recorded from a single tributary. Of these, koaro, redfin bully, torrentfish, longfin eel and lamprey are listed as declining[9] in the latest assessment of their conservation status. Freshwater crayfish[10]/ kōura are also listed as being in gradual decline.

[9] The conservation status of fish in New Zealand is provided in Allibone et al. (2010). For fish, one or more of the following criteria were used to assign the threat status (Threatened, At Risk and Not threatened): total number of mature individuals; ongoing or predicted population trend (due to existing threats); total number of populations; number of mature individuals in the largest population; or area of occupancy of the total population (Townsend et al., 2008). 'Declining' taxa do not qualify as 'Threatened' because they are buffered by a large total population size and/or a slower decline rate. However, if the declining trends continue, these taxa may be listed as 'Threatened' in the future. Further information is available in Townsend et al. (2008).

[10] For crayfish/kōura, similar status and trend criteria are used to evaluate their threat status (Hitchmough et al., 2007). The trend criterion for 'Gradual Decline' (listed as Chronically Threatened) is a predicted decline of 5–30% in the total population in the next 10 years due to existing threats, and the decline is predicted to continue beyond 10 years (Molloy et al., 2002).

Notwithstanding the survey findings, none of these species are unique to the Waitaha Catchment and all of these species are quite common in other West Coast catchments.

Of particular interest, koaro were the only fish species recorded above Morgan Gorge. This suggests that Morgan Gorge represents a natural barrier to fish passage. Below Morgan Gorge, fish species richness was highest in the Douglas Creek Reach with seven species (including freshwater crayfish/ kōura). This was mainly attributed to one tributary waterway (the Stable Tributary) that supported three species (kōura, lamprey and redfin bully) that were recorded nowhere else in the Douglas Creek Reach or upstream.

There were clear differences in fish communities between the mainstem and tributaries. Apart from Kiwi Flat, where koaro were the only species recorded, fish species richness and total fish densities were considerably higher in tributaries. Fish densities in the mainstem were particularly low. The greatest species richness (seven species) and density of fish (46 individuals per 100 m^2) were recorded in the Stable Tributary, on the true right of the Waitaha River downstream of Alpha Creek. This tributary, which is downstream of the abstraction reach but close to the access road, was a 'hotspot' for fish diversity and density within the Waitaha Catchment, including a large number of lamprey ammocoetes. With the exception of the Stable Tributary the higher fish densities in the tributaries of the Douglas Creek and Kiwi Flat reaches were due to koaro, as this was (apart from longfin eel) the only fish species recorded from tributaries upstream of the Stable Tributary.

POTENTIAL EFFECTS

The potential effects of the Scheme on the fish communities of the Waitaha Catchment can be separated into construction and operational effects. Potential effects during the construction phase are summarised as:

- sediment release:
- release of concrete- and hydrocarbon-based contaminants;
- vegetation clearance, including riparian vegetation; and
- the spread of the invasive algae *Didymosphenia geminata* (Didymo) in tributary waterways.

Longer-term potential operational effects are summarised as:

- loss of in-stream habitat (both within the mainstem and tributaries due to loss of surface water connection) due to residual flow;
- fish strandings and displacement within the abstraction reach due to sudden flow changes (i.e. down-ramping and up-ramping);
- impaired koaro/improved salmonid and eel passage due to the residual flow and the weir;
- injury/mortality to larval koaro from passage through the headworks, settling basins and turbines;
- riparian vegetation loss;
- increased predation risk to fish (both native and introduced) that have been attracted into the tailrace;
- sediment release during flushing of the settling basins; and
- impeded fish passage at tributary waterways that require road crossings.

ASSESSMENT OF EFFECTS

In general, the majority of construction related effects are likely to have a less than minor effect on the fish communities once the planned programme to reduce effects, and the recommended avoidance/mitigation measures, are implemented.

With respect to residual flow effects, the report advised that the IFIM modelling predicts that habitat availability for adult brown trout is likely to be greatly reduced during dry and typical flow months (55–105% habitat retention) and habitat for the native fish known to occur in the abstraction reach (koaro and torrentfish), will generally increase (93–241% habitat retention during dry and typical flow months), apart from

longfin eel, which is predicted to decrease slightly. Notwithstanding these predictions the overall effect of residual flow on the fish communities would most likely be minor, provided that upstream of Morgan Gorge remains free of salmonids and longfin eels. This is due to:

1. the comparatively short distance of the residual flow (totalling approximately 2.6 km);
2. the low diversity and densities of fish species within the abstraction reach (brown trout, koaro, longfin eel, torrentfish);
3. the overall sub-optimal fish habitat in the mainstem within the abstraction reach;
4. the ability of koaro to still migrate upstream into tributary waterways within the abstraction reach and upstream into Kiwi Flat; and
5. the protection of flow and surface water connections for the Stable Tributary and Douglas Creek (that are located approximately 800 m downstream of the end of the abstraction reach).

Despite this conclusion, the report notes that here is some level of uncertainty regarding the long term effects of the Scheme on the koaro population upstream of Morgan Gorge (especially from koaro passage through the turbines). Thus, a more integrated, monitoring-based approach is required to confirm that the fish populations, upstream of Morgan Gorge especially, are not adversely affected by the Scheme in the intermediate to long term. Furthermore, the long term effects associated with fish strandings, fish attraction into the tailrace and the flushing of the settling basins are difficult to accurately predict prior to the Scheme operating; therefore, monitoring is required for these effects to confirm that their level of effect is as predicted (minor or less than minor). The effects of waterway crossings on the fish communities are likely to be less than minor once the recommended mitigation measures are implemented. The long term effects associated with fish displacements due to sudden flow changes is also likely to have a less than minor effect on fish communities. Similarly, the effects of riparian vegetation loss and waterway crossings on the fish communities are likely to be less than minor once the recommended mitigation measures are implemented.

MITIGATION

The planned programme to reduce these effects currently mitigates a large portion of the potential effects associated with the construction phase of the Scheme. A number of additional measures are also recommended that will help to further reduce any potential effects.

Many of the recommendations made in the fish and benthic ecology reports for both construction and operational effects are common to both reports, and are not repeated here where included in Section 7.8.1. Many of the potential effects are significantly reduced as the majority of construction activities will take place away from the sensitive waterways. The measures and proposed monitoring specific to fish are listed below.

Construction and Operations

- Careful design of weir and intake channel to ensure unhindered passage of koaro into Kiwi Flat while preventing trout and other fish species from accessing Kiwi Flat.

MONITORING PROGRAMME

- While it is expected that the potential effect of sharp down-ramping on fish communities will be limited, it is recommended that some monitoring be carried out within the first year of the Scheme operation to ascertain the risk/level of fish stranding from down-ramping rates within the abstraction reach. The results of this monitoring can be used to inform Scheme operators if any management of ramping rates is required during planned Scheme operational activities (e.g. at times when managed ramping rates are possible).
- To confirm koaro are traversing the weir during its operation, monitoring of koaro passage at the weir is recommended for the initial five years post-completion of Scheme construction. In addition, monitoring of a similar duration should be carried out upstream of the weir to confirm that salmonids and longfin eels have not gained access to Kiwi Flat and its tributaries.

- It is probable that koaro larvae will pass through the turbines unharmed, however as there is no empirical data to support this theory, monitoring is recommended to ascertain the proportion of koaro larvae being diverted into the turbines, and (dependent on these findings), the injury/mortality rate of larvae passing through the turbines.
- Monitoring should be undertaken once the tailrace is constructed and operational to quantify fish abundance within it. If monitoring reveals that a considerable number of fish are entering the tailrace then some form of a trap and transfer system or guidance system may be required, at least during peak fish migratory periods. In addition, ensuring that the tailrace channel morphology is devoid of suitable refuge areas (e.g. large boulders) will also help reduce trout numbers as such an environment is not conducive to good adult trout habitat.

SUGGESTED CONDITIONS

Westpower has considered the suggested mitigation measures contained in the Fish Report and has adopted these in the form of suggested conditions with the aim of avoiding or mitigating potential effects of the Scheme. More particular to the recommended measures are the following conditions as set out in Section 9 of this application.

CONDITIONS:	*1.1-1.2, 4.1, 4.3, 5.14-5.16, 6.1-6.3, 7.1-7.4, 8.1-8.10, 8.12, 18.14-8.19, 11.1-11.6, 12.1-12.7, 14.1-14.5, 15.5-15.7, 15.9, 18.1-18.4, 18.9-18.14*

CONCLUSION

Overall it is considered that the effects of the proposed construction and operation of the Scheme will be minor or less than minor, subject to the implementation of avoidance/recommended mitigation measures.

Although life-supporting capacity is a broad-scale term that encompasses numerous facets of ecosystems, many of which are beyond the scope of the Fish Report, the life-supporting capacity of the Waitaha River and its tributaries, with respect to the fish communities at least, is not likely to be significantly affected by the Scheme provided the recommended mitigation measures are implemented.

7.9 BLUE DUCK

Section 4: Existing Environment
Section 9: Suggested Draft Conditions
Appendix 13: Assessment of Environmental Effects of the Proposed Waitaha Hydro Scheme on Whio/Blue Duck (*Hymenolaimus Malacorhynchos*)

The Blue Duck Report (Overmars, 2014) assesses the environmental effects of the Scheme on the blue duck. A blue duck population is present on waterways within and adjoining the Scheme area.

Identification of the values of the Scheme area[11] for blue duck and assessment of the Scheme's potential effects are founded on baseline studies in the Scheme area in 2006–2008, four short surveys between 2009 – 2012, and application of advances in knowledge of blue ducks including threats and management for the species' persistence and evolution. The report presents information on blue duck biology and conservation status; habitats in the Scheme area; the population in the Scheme area and adjoining waterways; density, breeding, mortality and immigration/dispersal; a demographic analysis of the Kiwi Flat blue duck population; aquatic habitat use preferences; and predators and predator control. There was low natural productivity in the population between 2006–2011, and a period of high adult loss. A demographic analysis shows the population was receiving immigrants from elsewhere, probably juveniles, and it could not persist in the absence of this immigration.

VALUES

The blue duck is an endemic species and genus, and is one of only four mountain torrent waterfowl species out of 165 worldwide. It is assessed as a nationally vulnerable species, due to a significant decline in abundance and distribution (Robertson et al. 2013). The species occurs on mainland rivers and cannot be secured on offshore islands; without management intervention, it is likely to continue to decline towards extinction (Glaser et al. 2010). Blue duck have cultural, spiritual, historic and traditional significance to Maori (Young 2006), and are a Taonga species under the Ngai Tahu Claims Settlement Act 1998. The blue duck is an iconic, upper trophic-level species of clear, fast-flowing New Zealand rivers and streams in highly natural condition.

Significance and Natural Heritage Values of the Waitaha Hydro Scheme Area

The blue duck habitat in the report is assessed in terms of the Scheme area rather than the project or Scheme footprint in relation to blue ducks (i.e. Kiwi Flat to below the Douglas Creek confluence, including tributaries and riparian margins), because of:

- its coherence in providing for the range of blue duck habitat requirements; and
- potential adverse effects, at the blue duck population level, may extend over this area.

The report considers that significance and natural heritage values for blue ducks in the Scheme area are triggered for six assessment criteria in the RPS, the WDP and the CMS. These criteria are protection status and the desirability for protection by statute or covenant; representativeness and diversity; viability, modification/intactness/size; threatened and rare species and their habitats; distinctive species; and connectivity, ecological and reproductive processes. This assessment is subject to the ongoing persistence of the blue duck population, and a broad interpretation of the blue duck population and habitat to be assessed.

[11] In this report, 'Scheme area' in relation to blue ducks and their habitat is taken as the Waitaha River, its tributaries and riparian margins, and (where appropriate) the habitat of predators, from (and inclusive of) Kiwi Flat to below the Douglas Creek confluence.

The threat status of blue duck was recently lowered from 'endangered' to 'vulnerable' but with a 'conservation dependent' qualifier on account of improving populations at some sites as a result of successful predator control, although the population is still declining at other sites (Hitchmough 2013).

POTENTIAL EFFECTS

In relation to blue ducks and their environment, the different structures, works and activities of the Scheme will affect different parts of the river in different ways and over different time frames (principally construction period vs. operational period). The potential effects on blue duck have been assessed in terms of the location of the main Scheme components and under the following headings.

A. Morgan Gorge:

1. The effects of disturbance and noise during the construction period, including changes to nesting behaviour and raising young, feeding habitat, and roosting behaviour.
2. Trout access and duckling access to Kiwi Flat.
3. Weir ponding and aggradation above Morgan Gorge.
4. The effects of ongoing scheme operation.

B. Effects of water abstraction and sediment discharge in and below Morgan Gorge.

C. Effects of works and structures at and downstream of the powerhouse/tailrace site.

D. Multi-site potential effects.

ASSESSMENT OF EFFECTS

The blue duck populations and habitats have been described in a broad scale context relevant to understanding natural processes and blue duck habitats (principally the Scheme area).

The assessment of effects, however, focuses more on the actual Scheme components, which are marginal to the main blue duck population and habitats at Kiwi Flat. It assumes that the characteristics of the blue duck population as determined between 2006-2012 will persist for the time-being.

Avoidance and Minimisation of Effects through Scheme Design

Avoidance and minimisation of potential adverse effects on blue duck were considered during site selection and design of the current Scheme. Its location and design configuration were chosen in an options selection process over an alternative intake location and configuration at the Waitaha Gorge. The current location and configuration is the strongly preferred option to reduce effects on the blue duck population and its habitats. The abstraction reach length is c.50% shorter; major effects on the high quality blue duck habitat at Kiwi Flat are avoided or minimised; and the potential for trout to establish in the currently trout-free ecosystems above Morgan Gorge can be avoided.

A. Morgan Gorge

1. Effects of Disturbance and Noise during Construction Period

The report considers that the greatest potential effect of disturbance and noise during the construction period at Morgan Gorge will be from the larger scale disturbances and higher intensity noises associated with the construction of the weir and intake structures. The greatest source of noise and disturbance will be the regular helicopter use (typically up to four return trips per day, plus *c.*15 non-consecutive days of up to 50 return trips when delivering concrete and other materials for weir and intake construction). Blasting will cause more intense but less frequent noise, over approximately one month. General construction noise will be of lower intensity but more prolonged duration. The greatest potential effect of disturbance and noise during the operational period at Morgan Gorge will also arise from helicopter use for maintenance of the weir and intake structures.

The report considers that, based on lower bird hearing noise sensitivity relative to humans, the loudest noise (blasting) is unlikely to directly affect blue ducks significantly beyond the 500 m buffer proposed for recreational users and livestock. For the more frequent helicopter noise, the 400 m estimated 'harassment' distance for two North American threatened bird species may be taken as a guide for potential effects on blue duck. Noise and disturbance effects thus may extend up to the Whirling Water confluence of the Waitaha River, and partly up Caesar Creek and Anson Stream and down Morgan Gorge.

The report considers that these effects will principally affect the breeding pair in whose territory the activities will occur. The works site is in the flight path between the likely previous nesting site downstream of the gorge entrance and feeding habitat upstream at Kiwi Flat. Potential effects include changes to nesting behaviour and raising young, feeding habitat, and roosting behaviour. This is highly likely to cause the loss of breeding and recruitment for either one or two years (depending on the seasonal timing of the works).

Blue duck use of Morgan Gorge as a flight path between Kiwi Flat, downstream of Morgan Gorge, and the tributaries, may also be adversely affected. Adjoining blue ducks and their habitat use could be affected by territorial displacement if the resident pair at the gorge entrance site competed for territory away from the construction area.

The report advises that the effect of these changes needs to be assessed at a population level. In years when there would naturally be no juvenile production from the breeding pair, the construction works (potentially extending over two breeding seasons) would have no effect on the Kiwi Flat population. Their territorial use and breeding activities would resume after completion of the construction works. Loss of juvenile production and recruitment would occur in otherwise naturally productive years, but the evidence of low natural productivity and population support via immigration indicates the loss of this contribution to the overall Kiwi Flat population may not be significant.

After mitigation to avoid and minimise disturbance and noise to the extent practicable, the most likely effects of noise and disturbance during the construction and operational periods at Morgan Gorge on the Kiwi Flat blue duck population are assessed as highly likely to be minor. However it is appropriate to address any possibility of an unfavourable outcome for the Kiwi Flat population through a monitoring programme with appropriate response triggers to assure that there are no adverse effects on the blue duck population as a result.

2. Trout Access and Duckling Access to Kiwi Flat

The blue duck territory in which the weir is located is probably the most productive of any at Kiwi Flat, because it encompasses the confluences of two major tributaries (Whirling Water and Caesar Creek) with the Waitaha River. The resident blue duck pair in this territory in 2007–2008 likely nested in Morgan Gorge. Had the breeding attempt been successful, it is likely that the ducklings would have been raised on Kiwi Flat, and access would have been required terrestrially or upstream through the Morgan Gorge entrance.

Although the final design features of the weir are not confirmed, the report proposes that future duckling access could be impeded by the 4-5 m high water fall and/or the vertical concrete walls of the weir and intake channel. This could result in a permanent impediment to upstream duckling access or displacement of this nesting site, possibly to a site more accessible to predators. This potential effect can be avoided by designing part of the downstream face of the weir to provide for upstream access for ducklings (while preventing trout access and facilitating koaro movement).

3. Weir Ponding and Aggradation

At its completion, the weir will cause temporary ponding (probably 1–2 weeks), and subsequent sediment equilibrium aggradation over a short period (weeks–months) that at its maximum will extend upstream to about the Caesar Creek confluence. These changes are within the natural range of the hydrological and sediment regimes and aquatic biota. Although the zone is within part of the most productive blue duck

territory at Kiwi Flat in 2007–2008, evidence strongly indicates this part of the territory had low direct blue duck occupancy and habitat use and it is of lower habitat quality. While the changes caused by the ponding and aggradation behind the weir will be discernible for a short period (weeks–months), they are largely within the range of natural habitat variability, to which blue duck are adapted. The temporary ponding and aggradation behind the weir are considered to have less than minor adverse effects on blue ducks.

B. Effects of Water Abstraction and Sediment Discharge in and below Morgan Gorge

Blue duck surveys and other observations between 2005–2012 indicate that blue duck presence in the abstraction reach (outside Morgan Gorge) has been low (0–2 birds), and may be declining. Based on IFIM habitat modelling predictions, major changes in periphyton and macro-invertebrate communities (important blue duck habitat features) are not expected, and it is possible the extent of preferred blue duck habitat (shallow depths and low velocity) in the abstraction reach may increase. Overall, the abstraction and periodic sediment return will have minor adverse effects on the blue duck habitat quality and population in the abstraction reach, and there may be an improvement in habitat quality.

C. Effects of Works and Structures at and Downstream of Powerhouse/Tailrace Site

Between 2006–2012, there was a low level of periodic blue duck habitat use of the Waitaha River around the Douglas Creek confluence, and movement is almost certain to have occurred in the locality of the powerhouse/tailrace site. The scale of the works at the powerhouse/tailrace site is less in magnitude and time compared with the Morgan Gorge headworks site, and is generally located away from the river itself. External lights that will be used at the powerhouse and tailrace site during tunnel construction, and infrequently during the operational period, should be shielded to prevent its visibility to ducks on the Waitaha River or using it as a flight path. Otherwise, given the low level of blue duck use of the Waitaha River in this locality, effects of these structures and works on blue ducks and their habitat during the construction and operational periods are anticipated to be less than minor.

D. Multi-Site Potential Effects

The assessment of the following effects and mitigation proposals of Drinan & McMurtrie (2014) and McMurtrie & Suren (2014) are endorsed in respect of potential effects on blue ducks and their habitat: sediment discharge, location of contractors' facilities, management of fuel and other hydrocarbons, and Didymo. The assessment of the effects and mitigation proposals of Buckingham (2014) in respect of predators are endorsed in respect of potential effects on blue ducks and their habitat.

MITIGATION

The report recommends the following seventeen measures to avoid, minimise and mitigate actual and potential adverse effects on blue ducks and their habitats arising from the Scheme.

Above Morgan Gorge Entrance

- Design the Morgan Gorge weir and intake to prevent trout access, while retaining access for koaro and for blue ducks with ducklings traversing upstream over the weir.

At Morgan Gorge Headworks Site

- Include the minimisation of noise and disturbance to blue ducks within the scope of the construction noise management plan (Staples 2014).
- Where not required for operational and safety reasons, avoid using the Waitaha River as a helicopter flight path to and from Morgan Gorge and its contractors' facilities site; in particular fly as far as practicable away from the Douglas Creek confluence and Morgan Gorge exit.
- Avoid helicopter flying up-valley of the Morgan Gorge headworks contractors' facilities.

- Locate the helicopter landing site in the Morgan Gorge contractors' facilities site at its maximum down-valley practicable extent, and maximise the buffer zone between the riverbank and the landing site.
- When blasting occurs, move any blue ducks present away from the Morgan Gorge entrance, to the extent practicable.
- To the extent practicable, time the construction of the weir and intake structure to avoid impacting two blue duck breeding seasons, or to minimise the overlap with the breeding seasons.
- Once the scheme is operational, monitor the extent of maintenance activities at the Morgan Gorge headworks site, including the extent of helicopter use and the presence of and any effects on blue duck.

The Abstraction Reach

- The recommendation of Hicks (2013b) that monitoring be carried out once the Scheme is operational to determine if there has been any discernible accumulation of sediment within the abstraction reach is endorsed.

At and below the Powerhouse and Tailrace Site

- External lights at the powerhouse/tunnel portal should be shielded to avoid light spillage (including reflected light) outside of essential works sites and structures. Lights should be turned off whenever they are not essentially needed. This applies to both the construction and operational periods.

Multi-Site Potential Effects

Multi-site mitigation measures include (based largely on Drinan & McMurtrie, 2014; Buckingham, 2014).

- Prepare a site environmental management plan (EMP) incorporating the mitigation and best practices for the entire Scheme works and activities.
- Implement strict sediment and construction-derived contaminant control measures; these particularly are to include coverage of the contractors' facilities, hydrocarbon storage and handling, and bunding of fuel tanks.
- Locate contractor's facilities away from waterways as far as possible.
- Implement a strict protocol for thorough cleaning (check, clean, dry) of all potential vectors of Didymo for all construction workers, equipment or machinery that is/are moving either within or on/off site.
- Ensuring all food and rubbish is collected and removed from the Scheme sites promptly to avoid local pest problems (especially rats).
- Implement measures to reduce dog access to the Scheme area, in partnership with the Department of Conservation as land administrator (signage and advocacy).
- Include the local eradication of gorse at Kiwi Flat in the pest and weed management plan for the Scheme, to avoid a potential natural adverse effect on blue ducks.

MONITORING

Although adverse effects on blue ducks and their habitats are assessed as highly likely to be minor, a monitoring programme is recommended to assess that intended outcomes are achieved. Specific response triggers are proposed to address unfavourable outcomes should any eventuate as a result of the Scheme, and assure that there will be no adverse effects.

The monitoring programme aims to assess the blue duck population at Kiwi Flat prior to the commencement of construction, a maximum of two years for the works, and three post-construction years. It would be extended if necessary. The nearby Amethyst Ravine population is included to assist understanding of environmental factors that may affect blue duck in the Scheme area, and because it may contribute to

maintaining the long term viability of the Scheme population. The monitoring programme consists of the following actions.

- Monitor the Kiwi Flat to Douglas Creek blue duck population pre-construction and annually thereafter for five years. The surveys would be undertaken in April; this timing provides an opportunity to assess juvenile production (and follows the annual moult when birds are flightless and cryptic).
- Concurrently monitor the Amethyst Ravine population, as a non-treatment monitoring control, and also to monitor the likely source of possible migrants into the Waitaha population.
- Collect data of the location, timing and extent of principal noise and/or disturbance events at the Morgan Gorge headworks and contractors' facilities site (helicopters, blasting, heavy machinery).
- Record observations by construction personnel of blue ducks at the Morgan Gorge headworks site.
- Seek information on rimu fruiting and stoat populations in podocarp forest in central Westland (DOC), on pest control undertaken in the Waitaha Valley (TBfree), and hydrological information, for the purpose of assessing the major external environmental variables that may impact on blue ducks in the Scheme area.
- Once the scheme is operational, monitor the extent of maintenance activities at the Morgan Gorge headworks site, including the extent of helicopter use and the presence of and any effects on blue duck.

A report would be prepared annually of survey results, analysis and recommendations, for submission to the DOC. The results of the monitoring will be used to determine if specific actions, programmes or further monitoring are of value and need to be implemented to restore or enhance the blue duck population in the Scheme area should it decline (compared to pre-construction levels) during construction or in the three years following Scheme completion. It is proposed that these actions or programmes will be developed and agreed to in conjunction with DOC, relevant ecologists, and in consultation with other organisations (e.g. Iwi, Royal Forest and Bird Protection Society of New Zealand). This may include consideration of the state of the blue duck population in the Scheme area at the time that concessions and resource consents are granted, advances in predator trapping and other blue duck protection methods, and changes in the TBfree New Zealand TB vector (possum) control programme in the Scheme area.

Example Scenario arising from Monitoring Outcomes

The Blue Duck Report provides the following scenario for decision making applying the monitoring information outlined above to assess if unintended effects caused by the Scheme are occurring. It assumes the local blue duck population remains extant, and the objective is to avoid or respond to any adverse effect of the Scheme on blue ducks or their habitat. Actual decision making will be dependent on pre-construction population levels.

The most important population parameters to measure to establish the ongoing presence of the blue duck population at Kiwi Flat and in the abstraction reach are total numbers, the presence of pairs and the presence of juveniles as an indication of breeding success. The evidence suggests a fairly consistent level between 2006–2012 of *c.*8–12 birds in total, and 3 breeding pairs.

The following actions could be undertaken in response to possible monitoring result scenarios (derived on the basis of weight of evidence):

1. The overall current blue duck population in the abstraction reach and at Kiwi Flat is maintained (three pairs and *c.*8–12 adults): *no action would be necessary as an effect of the Scheme*.
2. The overall blue duck population in the abstraction reach and at Kiwi Flat declines below 3 pairs and *c.*8–12 adults, *and* this occurs when stoat numbers over the period are elevated or substantial floods

occur during the breeding season (the decline is most likely not caused by the Scheme): *no action is necessary as an effect of the Scheme*.

3. The overall blue duck population in the abstraction reach and at Kiwi Flat declines below 3 pairs and *c.*8–12 adults, *and* this occurs a. when stoat numbers over the period are low and b. there is not a corresponding decline in adult abundance at Amethyst Ravine (the decline may be caused by the Scheme): *institute predator control (at Kiwi Flat and/or Amethyst Ravine), or whio operation nest egg (WHIONE), so that the local population is restored to at least 3 pairs and ≥10 birds (after consultation with the DOC).*

SUGGESTED CONDITIONS

Westpower supports the monitoring and response programme proposed for blue duck as a precautionary approach given the significance of the blue duck and the blue duck's vulnerable status. The result of monitoring will enable a positive gain in understanding of the local population and pressures on that population that might be able to be managed.

Westpower has considered the recommended mitigation and monitoring measures contained in the Blue Duck Report and has adopted these in the form of suggested conditions with the aim of avoiding, remedying or mitigating potential effects of the Scheme. More particular to the recommended measures are the following conditions as set out in Section 9 of this application.

CONDITIONS:	*1.1-1.2, 4.8-4.9, 5.16, 7.1-7.4, 8.1-8.12, 9.1-9.4, 12.1-12.7, 14.1-14.5, 15.1-15.7, 15.10 - 15.11, 18.1-18.4, 18.15-18.20*

CONCLUSIONS

On its own, the blue duck population in the Scheme area appears to be at some risk from adverse natural environmental factors, particularly predation. The risk is likely mitigated by its connectivity and interactions with adjoining populations (in particular, that at Amethyst Ravine), and possibly by future TBfree 1080 possum control operations.

Provided the recommended mitigation measures in this report are adopted, while there will be some recognisably different blue duck habitats present in the Scheme area, it is anticipated those habitats will have the capacity to sustain the blue duck population in future, and adverse effects of the Scheme on blue ducks and their habitats are assessed as highly likely to be minor. A monitoring programme, with specific response triggers for possible monitoring outcomes, is recommended to assure there are no adverse effects as a result of the Scheme.

7.10 TURF PLANT COMMUNITIES

Section 4: Existing Environment
Appendix 14: Email 11.09.13 re Turf Communities

A brief assessment of turf plant communities which comprise those plants that grow in riparian margins was considered for the Morgan Gorge area. An opinion was provided by Dr D Glennie in response to a request from Mr F Overmars as outlined in email correspondence.

VALUES

It is considered there would not be any threatened species of bryophytes and lichens that would be found with the Scheme habitat particularly within Morgan Gorge.

ASSESSMENT OF EFFECTS

In habitats, such as Morgan Gorge, with such extreme abrasion during flooding that leads to smooth rock walls, there are only a few specialist species that will grow there in more protected sites i.e. where there are back eddies that do not get the full force of the water in flood. These are not considered to be rare species. The flooding within Morgan Gorge is likely to reach up to the tops of the rock walls where mossy areas on top will have mixture of colonising species like *Stereocaulon* and forest species where there is an accumulation of litter and which are not unusual.

MITIGATION

No specific conditions are required in regard to these turf communities. There are, however a range of suggested conditions provided in Section 9 which will ensure that potential effects are avoided or minimised on riparian margins and which are listed below.

SUGGESTED CONDITIONS

CONDITIONS:	*1.1-1.2, 4.1, 4.3, 5.14 - 5.16, 7.1-7.4, 8.1-8.10, 8.12-8.19, 11.1-11.6, 12.1-12.7, 14.1-14.5, 18.1-18.4, 18.9, 18.10*

CONCLUSION

It is considered there will be negligible potential effect on turf communities.

7.11 CULTURAL VALUES

Section 4: Existing Environment
Section 9: Suggested Draft Conditions

This section is based on the current understanding in regard to cultural matters as they might pertain to the area within which the Scheme is to be located, including the Waitaha River.

CULTURAL VALUES

Based on consultation with Te Rūnanga o Ngāti Waewae and Te Rūnanga o Makaawhio to date, Westpower is not aware of any specific or significant cultural or archaeological sites of Maori origin or activities undertaken historically or traditionally within the project area by Ngāti Waewae and/or Makaawhio.

Areas of interest and concerns through consultation have been focussed on changes in water flow and environmental effects, and Taonga species including the Kōwhiowhio or blue duck. The effects of the Scheme on the aquatic and terrestrial ecology including Taonga species have been comprehensively assessed from a scientific perspective and descriptions provided of the species found within the area.

Taonga species

Schedule 97 of the Ngāi Tahu Claim Settlements Act (1998) provides a list of Taonga species including birds and plants. All of the bird species listed in the Birds and Bats Report (Table 3: Threat Status and abundance of Threatened and at Risk Species) are found in Schedule 97. In addition, some of the indigenous plant species listed are also found within in the project area (Vegetation Report, 2013).

Blue duck have cultural, spiritual, historic and traditional significance and are a Taonga species under the Ngāi Tahu Claims Settlement Act 1998. The blue duck is an iconic, upper trophic-level species of clear, fast-flowing New Zealand rivers and streams in highly natural condition. The Kōwhiowhio is of particular significance to Te Rūnanga o Makaawhio from which the hapū takes its name.

Koaro which has been identified as the only fish present at Kiwi Flat is not listed in Schedule 98 of Taonga Fish species but as discussed in the Fish Report is now listed as “At risk Declining”. Torrentfish, or PIripiripōhatu, which is included in Schedule 98 has been recorded within the abstraction reach and in Douglas Creek.

ASSESSMENT OF EFFECTS

There are no known physical sites or items with cultural value within the project area which may be affected by the construction and operation of the Scheme. Assessments of effects on terrestrial and aquatic flora and fauna, from a scientific perspective, are provided in the preceding sections.

MITIGATION

Whilst there are no known physical sites or items of interest to Iwi in the area within which the Scheme is to be located, Westpower does seek to ensure that the finding of as yet unknown sites or items is appropriately managed through the development and implementation of an accidental discovery protocol.

SUGGESTED CONDITIONS

Based on the current information Westpower has considered the need to provide for accidental discovery of cultural sites or items through the development of the Scheme. Accordingly it is proposed through the development of the Construction Management Plan that an accidental discovery protocol be implemented.

The following conditions are set out in Section 9 of this application and provides for the development and implementation of an accidental discovery protocol.

CONDITIONS	*1.1-1.2, 7.1-7.5*

CONCLUSION

It is concluded, based on the current information known about the area within which the Scheme is to be located, that the effects of the proposed activity on cultural values are likely to be no more than minor.

7.12 EFFECTS ON HISTORIC AND ARCHAEOLOGICAL VALUES

VALUES

No historic features are known in the proposed work area. There are no sites recorded or reported nor has any anecdotal information been provided about archaeological sites within the area. No historic sites of significance have been identified or registered by the West Coast DOC, the WDC or the New Zealand Historic Places Trust. The WDC Schedule of Historic Places (WDP: Appendix A) does not list any historic places but does list a copse of trees in the Waitaha Valley. These trees are not within the area potentially affected by the Scheme.

DOC has a list of actively managed historic sites. This does not list any sites in the Waitaha Valley. The Hokitika Office Advisor is unaware of any historic sites that may be relevant but not recorded. The West Coast Archaeological Register has no sites recorded and is unaware of any significant features within this location (pers comm. 23.11.12 L. Wright).

None of those consulted with to date have referred to specific archaeological or heritage matters within the area under consideration. There are no buildings present in the area other than the Kiwi Flat Hut which will remain unaffected by the proposal. If new information comes to light, or if during the construction of the Scheme new discoveries are made an accidental discovery process clause would cover the situation.

ASSESSMENT OF EFFECTS

There are no known sites or items within the project area which may be affected by the construction and operation of the Scheme.

MITIGATION

Whilst considered of very low probability as there are no known sites or items of historic or archaeological interest in the area Westpower does seek to ensure that the finding of as yet unknown sites or items is appropriately managed.

SUGGESTED CONDITIONS

Based on the current information Westpower has considered the need to provide for accidental discovery of historic sites or items through the development of the Scheme. Accordingly it is proposed through the development of the Construction Management Plan that an accidental discovery protocol be implemented.

The following conditions are set out in Section 9 of this application and provides for the development and implementation of an accidental discovery protocol.

CONDITIONS	*1.1-1.2, 7.1-7.5*

CONCLUSION

It is concluded that the effects of the proposed activity on historic values are negligible.

7.13 RECREATION AND TOURISM

Section 4: Existing Environment
Section 9: Suggested Draft Conditions
Appendix 19: Westpower Waitaha Hydro Investigations: Recreation and Tourism Assessment of Effects (including external Peer Review)

The Recreation Report (Rob Greenaway & Associates, 2014) presents the results of an investigation of the Waitaha Valley's recreation and tourism values, and the potential effects of the Scheme upon these values. The study area is defined as the Waitaha Catchment. The report considers the effects of the operation of the Scheme proposal on the local, regional, national and international recreation and tourism values of the Waitaha Catchment.

A full description of the environment in regard to these matters is provided in the report and summarised in Section 4.

RECREATIONAL VALUES AND USE

In considering potential effects of the Scheme the report considers the use and natural values of the area. In terms of use of the Waitaha Catchment, the report advises that whilst there are a range of potential uses of the area, actual levels of use are relatively low, with a drop off in some users (kayakers) over more recent times.

Despite this level of use, the Waitaha Catchment is considered an important recreation setting due to its accessible but 'remote' natural setting, and the characteristics of its white water resource. The assessment concludes that the kayaking resource is likely to be of sufficient interest to off-shore and highly advanced kayakers as part of the West Coast kayaking complex.

The values and use of the Waitaha Valley can be summarised as:

- internationally and nationally significant for extreme kayaking (Morgan Gorge, upper Waitaha Gorge) and high grade kayaking (Waitaha Gorge) as part of the West Coast kayaking complex;
- regionally significant in the lower valley (Kiwi Flat area) for tramping but nationally significant in the upper valley, particularly at Ivory Lake. Low use throughout;
- regionally significant for hunting;
- regionally significant for hot springs in the Morgan Gorge (mostly an element of the tramping and kayaking experience but identified as a specific destination by some visitors);
- regionally significant for angling (lower Waitaha River only, outside Scheme footprint); and
- locally significant for jet boating (lower Waitaha River only, outside Scheme footprint).

Existing non-recreational activities in the area are also considered in the report. In this regard it is concluded that existing concessions and/or consents for gold mining in the upper Waitaha Valley and for schist removal in the lower valley around the Macgregor and Douglas Creek areas are of sufficiently low scale and infrequency as to not modify the key setting characteristics for recreation of the Waitaha River.

POTENTIAL EFFECTS

In considering the potential effects arising from the Scheme, the report identified three components of the Scheme with the potential to effect recreational use of the area. Accordingly the components of the Scheme which have the potential to effect recreation and use of the area can be summarised as:

1. temporary construction activities at Kiwi Flat and at the powerhouse site;
2. modified flow regime between the top of Morgan Gorge and the powerhouse tailrace; and the
3. introduction of head-works and generation infrastructure into settings which have only minimal developments for recreation purposes.

RESULTS OF ASSESSMENTS

For the purpose of discussing the potential effects, recreational use has been split in to land and water based activities.

In terms of land-based recreational activities in the Waitaha Valley, it is concluded that these will be able to continue with only indirect effects caused by the introduction of hydro development structures in the setting and effects on natural character and visual amenity.

Of the water based activities, jet boating and angling occur downriver of the Scheme area and are not potentially affected by the Scheme. However there are potential effects on the use of the river for kayaking. Whilst there will still be an opportunity to kayak the part of the river occupied by the Scheme, the kayaking use will be constrained by residual flow effects in the abstraction reach and the construction of a weir at Morgan Gorge. These effects include:

- the introduction of control and generation structures on an otherwise free-flowing river;
- the introduction of permanent (albeit removable) structures in a backcountry-remote landscape setting otherwise developed only for recreation;
- an additional 1530 m portage when flows between the top of Morgan Gorge and the Scheme tailrace are inadequate;
- a reduced opportunity to kayak the Morgan Gorge;
- a new information regime with, potentially, more live data about flow characteristics; and
- a new requirement to communicate with a management agency (Westpower) if ceases to abstraction are sought for the Morgan Gorge and/or the Douglas Creek reach.

With the Scheme in place the potential effect is a constraint on the kayaking opportunity in the Gorge, and in much of the Douglas Creek reach for those portaging the Gorge (in terms of a longer distance to walk) as well as those kayaking it (a shift from the quite common availability of moderate-range flows below Morgan Gorge to relatively infrequent availability).

There will be no direct adverse effects on kayaking options in the river above Kiwi Flat (including the Waitaha Gorge) from the Scheme. Whilst there will be no direct effects on the river above Kiwi Flat the potential for inadequate flows in the abstraction reach – which includes Morgan Gorge and the section below the Gorge that those portaging the Gorge will normally rely on to complete their journey – may influence some potential kayakers not to make use of the opportunity above Kiwi Flat.

The residual net effect of the Scheme on Waitaha Catchment recreation values will remain 'high' in the Kiwi Flat area and from the top of Morgan Gorge to Douglas Creek. This is due to the introduction of development structures into a predominantly unmodified (besides for recreation) backcountry-remote recreation setting, and flow effects along the abstraction reach.

At the regional level, the effect of the Scheme on West Coast recreation and tourism generally will be very slight due to the high number of alternatives available for all activities affected by the Scheme and the relatively low level of use of the Kiwi Flat area. The West Coast will retain its international reputation as a challenging kayaking setting with the Scheme in place, and the Morgan Gorge (and the remainder of the River) will retain its ability to challenge highly skilled kayakers, albeit with additional restrictions on its use due to the need to confer with (Westpower) if a cease to abstraction is required to provide a natural flow. The change from an uncontrolled river for kayaking may remove a key quality which makes the Morgan Gorge internationally significant for the activity (albeit rarely used).

MITIGATION

Options for mitigation of these effects on recreational use are limited due to the basic change to the natural character and visual amenity values of the Waitaha Valley. It is recommended through the report that:

- the lower face of the weir be designed to allow kayaking access to Morgan Gorge. This would be done in consultation with Whitewater New Zealand;
- there are controlled ceases to abstraction at agreed times to provide natural flows in and below the Morgan Gorge;
- online river flow information including camera footage is provided to allow kayakers to optimise timing of their visits to all parts of the River;
- the location and standard of the access track to Kiwi Flat is reviewed to limit the visibility of generation infrastructure and to provide better views into Morgan Gorge, and to ease the additional portage below the Gorge when flows are inadequate;
- alternative locations for the Kiwi Flat swingbridge are considered so as to limit visibility of the Scheme head-works by walkers and trampers; and
- during construction online information would be provided on construction activities, including the type, location and duration of works, potential hazards (including in-river hazards), advice on avoiding hazards and construction activities generally, and any effects on the flow regime

SUGGESTED CONDITIONS

Westpower has considered the suggested mitigation measures contained in the Recreation Report and has adopted these in the form of suggested conditions with the aim of avoiding or mitigating potential effects of the Scheme, and to retain an opportunity for kayaking use. The potential for developing a regime of controlled ceases is to be considered in consultation with Whitewater New Zealand.

Alternative locations for the Morgan Gorge swingbridge need to be considered as part of the review and provision of alternative track access. There remain benefits to retaining the swingbridge at the current location and, as discussed in the Landscape Report (Boffa Miskell, 2014), from an effects perspective relocation could create further visual effects.

More particular to the recommended measures are the following conditions as set out in Section 9 of this application.

CONDITIONS	*1.1-1.2, 7.1-7.4, 17.1-17.5*

CONCLUSIONS

In considering the potential effects on recreational use, the CMS defines the setting as a backcountry-remote zone. The report concludes that a hydro-development is not directly compatible with this recreation management category from the perspective that the CMS does not readily identify this type of activity, and associated infrastructure, as occurring within the zone. Activities such as those proposed in this application are required to be the subject of specific consideration and assessment in terms of the provision of the Act and the CMS, which is the purpose of this application.

Effects of the Scheme essentially relate to the location of the infrastructure in the existing natural setting and the effect on kayaking use of both the Morgan Gorge (albeit, rarely used) and the abstraction reach.

The introduction of development structures into a predominantly unmodified (besides for recreation) backcountry-remote recreation setting, and flow effects along the abstraction reach, will result in a residual 'high' net effect on Waitaha Catchment recreation values in the Kiwi Flat area and from the top of Morgan Gorge to Douglas Creek due to the development of the Scheme. This is essentially due to the change from an unmodified environment in terms of these types of structures to one containing these structures. Whilst provision is to be made to mitigate potential effects as far as is possible the presence of the required structures will remain.

Importantly in this regard, the key components of the Scheme (weir, diversion structure and powerhouse) are removable if the generation capacity is no longer required at some future date.

As discussed above there will be only indirect effects on all land-based recreational activities, with all of those activities being able to continue. All forms of recreation, with the exception of kayaking which is discussed below, in the Waitaha Valley will retain their regional and local significance.

From a kayaking perspective the Morgan Gorge (and the remainder of the Waitaha River) will retain its ability to challenge highly skilled kayakers, albeit with additional restrictions on the use of the Morgan Gorge due to the need to confer with a management authority (Westpower) if a cease to abstraction is required to provide a natural flow. This change from an uncontrolled river for kayaking may remove a key quality which makes the Morgan Gorge internationally significant for the activity (albeit, rarely used). The Scheme may sustain nationally significant kayaking values on the River with the retention of current kayaking opportunities above Morgan Gorge.

In considering the effects on the internationally and nationally significant status of kayaking opportunities on the river, it is important to note that this scale of significance relates as much to the West Coast complex of kayaking opportunities as it does to the values of any single river. The West Coast will retain its international reputation as a challenging kayaking setting with the Scheme in place.

From a regional perspective the effect of the Scheme on West Coast recreation and tourism generally will be very slight due to the high number of alternatives available for all activities affected by the Scheme and the relatively low use of the Kiwi Flat area.

From a conservation management perspective, in terms of considering effects, the CMS does set intended future "Outcomes" in regard to "Places" within the West Coast Region, the application being located in the 'Hokitika Place' (refer Appendix 23). The report concludes that the "Outcomes", from a recreation perspective, set out in the CMS for the 'Hokitika Place' will still be achieved with the Scheme in place.

7.14 NOISE

Section 4:	Existing Environment
Section 5:	Scheme Overview: Operational Infrastructure
Section 6:	Description of Construction
Section 9:	Suggested Draft Conditions
Appendix 20:	Waitaha Hydro Scheme Assessment of Noise Effects

The Noise Report prepared by Marshall Day Acoustics (2014) has assessed the potential noise effects that may arise from the construction and operation of the Scheme. As the Scheme is to be situated in a conservation area, potential noise effects have been considered not only for residents, but also recreational users and wildlife.

The noise assessment has taken a conservative approach and considers all potential construction noises. For example, the amount of blasting required, or piling to be undertaken will be determined as part of defining the construction methodology. The assessment considers the maximum number of traffic and helicopter movements that may occur during particular phases in the development of the Scheme.

VALUES

Away from roads and rural activities in the Upper Waitaha Catchment, the current noise environment is dominated by the sound of the water when close to the river and otherwise natural soundscape. Occasional noise associated with some aspects of recreational activities, such as hunting and use of helicopters (for access) can occur and at the lower end of the application site there can be some noise from more industrial stone extraction operations around the Macgregor-Douglas Creek areas. Should the existing access concession

and mining permit for a small scale suction dredging operation be utilised, there will be some noise from the pumps where ever work is occurring. This permit covers the Waitaha River over the section of river extending between the top of Kiwi Flat and Macgregor Creek.

POTENTIAL EFFECTS

Noise effects associated with the Scheme are primarily related to the construction period and include:

- the construction of access roads;
- construction of Scheme infrastructures, i.e. piling, blasting, tunnelling;
- use of light and heavy vehicles; and
- helicopter movements.

Following construction there can be some noise associated with the Scheme during operation, including the powerhouse and vehicles used for maintenance.

RESULTS OF ASSESSMENTS

The Report discusses the potential noise effects of both construction and operational periods in terms of residents of nearby dwellings, recreational users and wildlife.

Construction

Dwellings

The report considers the effects of noise of Scheme activities on the closest dwellings and residents and relates this to distance from activities and significant noise sources. The closest dwellings are located on private farmland across which Westpower will require access for the Scheme. Provided that the recommended noise limits set out in NZS 6803:1999, the Construction Noise Standard, are achieved at 1095 Waitaha Road (the closest residential dwellings) at all times during construction of access roads, the noise effects at the dwellings are considered to be acceptable. Construction of the access road in close proximity to these dwellings is only carried out during the daytime hours specified in the Standard (0730-1800 hours).

The location of the Scheme infrastructure is such that construction noise sources will generally be over four kilometres away from the nearest dwellings. At this distance, noise from the majority of construction activities will be negligible.

The report predicts that noise from any piling activity (if it is required) will be less than 40 dB L_{Aeq} at the nearest dwelling, without allowing for any screening from terrain or barriers. This is well below both the recommended construction noise limits provided in Construction Noise Standard NZS 6803:1999 and the WDP. Similarly blasting which will be required during tunnel excavation and construction of the headworks is expected to be well below acceptable limits at all dwellings. Notwithstanding this, it is recommended Westpower advise residents within five kilometres of any blasting work to keep property owners informed and minimise any potential adverse reactions. Provision for this has been included in the sample construction noise management plant (**CNMP**) located in Appendix C attached to the Noise Report.

While construction traffic on Waitaha Road may be more relevant to any resource consent application, the report describes traffic in terms of likely noise effects. It considers that even during days of peak vehicle movements traffic noise levels will still be within acceptable guidelines. The report therefore concludes that construction traffic noise effects will be acceptable. Most heavy vehicle movements will occur within the project footprint - between the powerhouse/tunnel portal exit location and the contractor facilities/spoil disposal area on private land north of Macgregor Creek.

Due to the decision not to form a road into Kiwi Flat to avoid other potential effects, helicopters will be used to construct parts of the weir intake. Hughes 500 helicopters (which were used at the Amethyst) are likely to be used to transport personnel, equipment and materials from the powerhouse site or contractors' facilities site

on the northern side of Macgregor Creek to the weir and intake construction site. It is anticipated that there would be could typically be up to eight movements per day (i.e. two return trips at the start of the day and two at the end of the day) between these sites over a period of up to 18 months. This period allows for days on which the river levels are too high for construction activities and or conditions are unsuitable for flying.

During certain activities such as concrete pouring, there may be intense helicopter activity between the powerhouse and headworks. For example, during the Amethyst construction where flying distances are similar, on the busiest days there were approximately 100 trips using 2 helicopters. The return trip time was about 5-6 minutes so the actual flying time for each helicopter was about 5 hours. This occurred on a maximum of 15 days which were generally non-consecutive.

The proposed flight path for these periods of intense helicopter activity is in the order of four kilometres away from the nearest dwelling. Based on measurements of similar sized helicopters performing similar activities, the report predicts that noise levels will still be below the 50 dB L_{Adn} noise limit recommended in NZS 6807:1994 at all dwellings.

To ensure noise from helicopters accessing the Scheme site is adequately controlled, helicopters should be flown in accordance with noise abatement techniques such as the Helicopter Association International's 'I Fly Neighborly' programme. Helicopter activity must also be managed such that noise emissions achieve the appropriate limits contained in NZS 6807:1994. Provided that the recommendations provided in the sample CNMP are adhered to as far as practicable, helicopter noise emissions will be below the recommended noise limit provided in NZS 6807:1994 at all dwellings. The Noise Report therefore considers any potential noise effects from helicopter activity to be acceptable at nearby dwellings.

Recreational Users

The Recreation Report (Rob Greenaway & Associates, 2014) discussed in Section 7.13, found that the Waitaha study area receives low use from kayakers, trampers and hunters. The primary recreational value of the area is its high quality whitewater and remote characteristics.

From an acoustic perspective, the whitewater characteristics of the river result in a relatively high level of ambient noise. Although the river flow will reduce under the proposal, noise from the river and associated rapids will still provide useful masking of construction and operational noise from the Scheme, and reduce the potential for adverse noise effects to arise.

Ambient noise measurements from previous projects in similar remote locations show that within a few metres of even very small streams, the background noise level is in the order of 55-65 dB L_{A90}. Kayakers and other recreational users who operate on the river will experience higher levels of background noise and therefore noise from the Scheme will be less noticeable.

Based on the background noise levels, the report predicts that even the noisiest construction activities such as piling (where required) will be inaudible beyond a distance of approximately two kilometres. Noise from general construction activities, which are temporary in nature, is not expected to be intrusive to water based recreational activity beyond a distance of 200 – 300 m.

A DOC walking track currently passes close by the Scheme. Westpower is proposing to re-route this track away from construction areas for health and safety reasons, which will also include noise effects. However, parts of the track could still come within 100 m of construction areas. As a result, construction noise will be clearly audible on parts of the walking track at times during construction.

As a conservative measure, the report recommends that the walking track be temporarily closed during blasting, such that a 500 metre buffer is maintained between the track and the blasting activity. As blasting typically only occurs over short periods, it is anticipated that the duration of any track closures would be

measured in minutes rather than hours. Trampers would not be significantly affected by the temporary closure.

During the initial stages of tunnelling it is common practice to confine work to a single extended dayshift to limit the blasting to daylight hours, and that is what is proposed in this case. Once tunnelling works are entirely underground this work will become a 24 hour operation to ensure it is completed in as short a time frame as possible.

The nearest hut is located on Kiwi Flat, approximately 1 km away from the proposed weir and intake. When the hut is occupied it is recommended that construction activities are managed in accordance with NZS 6803:1999, and comply with the recommended noise limits contained in that Standard. There will be no noisy construction activities undertaken during night-time hours.

Considering the separation distance involved and the level of visitor numbers annually, it is anticipated the any potential noise effects will be no more than minor. This is due to the hut's proximity to the river and the resulting higher level of background noise.

To minimise noise effects, and as mentioned previously, helicopters should be flown in accordance with noise abatement techniques such as the Helicopter Association International's 'I Fly Neighborly' programme to mitigate noise effects as far as practicable. Notwithstanding this, it is considered that noise generated from helicopter activity is likely to have a temporary, moderate adverse effect on tramping on nearby walking tracks.

These effects are somewhat mitigated by there already being some level of helicopter activity in the area. Helicopters are the main form of transport when kayakers are accessing the Waitaha River runs above Morgan Gorge. Hunters and trampers may also use helicopters to fly in and/or out of Kiwi Flat and the surrounding area. DOC has issued 11 irregular aircraft landing concessions in the Hokitika area, which includes the Waitaha Catchment. Four operators have been identified as recently or currently active in delivering kayakers to the Waitaha River (Rob Greenaway & Associates, 2014). Whilst it is recognised that these levels have declined over recent times, this is related to a lower number of recreational users seeking to use the river.

Wildlife

The Noise Report provides a literature review of the potential noise effects on livestock and wildlife and has provided a discussion of the available research knowledge in Appendix B of that report, and summarises this as follows:

1. Once animals become habituated to noise, especially when it is steady and associated with clearly non-threatening activity, they generally demonstrate little adverse response. This is particularly true with cattle, horses, sheep and other livestock.
2. Similarly, birds appear to readily adapt to noise and whilst very loud events can startle birds, noise events that meet applicable criteria for human exposure, are extremely unlikely to cause startle or similar effects.
3. The response of birds, reptiles, fish and livestock to noise will also depend on the character and duration of the sound and observations suggest that steady broad band noise will generally create less negative response than transient, intermittent or tonal sounds.
4. Birds may suffer physical hearing damage if exposed to repeated sound level blasts above 125 dBA. The report notes that noise from blasting activity associated with the construction of the Scheme is likely to be below this level beyond approximately 10 m from the blast site.

The report states that the above is consistent with the author's experience and suggests that the only likely causes of disturbance for animals will be impulsive type noises such as blasting and piling.

Wildlife – Other Reports

Noise effects have also been considered in the Birds and Bats Report (Buckingham, 2014) who considers the effects of noise on birds from the Scheme are quite localised and mainly temporary (i.e. during the construction phase). In addition, birds (and possibly bats) habituate to regular or constant noise to some extent.

The Blue Duck Report (Overmars, 2014) considers the effect of noise on the blue duck and provides a review also on the effects of noise on birds. The report takes a precautionary approach with respect to the possible adverse effects of construction activities and noise on the effects of breeding if construction activity occurs across the breeding season when there is a pair of blue duck using the Morgan Gorge or its environs for breeding.

In addition to the recommendations proposed in the Noise Report, Westpower has agreed to a series of noise related conditions recommended in the Blue Duck Report.

Currently there is no livestock on or above the true left bank of Macgregor Creek. Westpower will be working with the private land owner with respect the various activities that will occur on the farmland during the period of construction and once the Scheme is operational. The Sample CNMP will also include measures to reduce the effects of noise on farming operations and livestock.

Operational Noise

Once construction is complete, noise emissions from the operation of the Scheme will be low in comparison to the relatively high levels of ambient noise produced from water flowing down the Waitaha River. Operational noise emissions from the Scheme will comfortably comply with the WDP noise limits.

The Scheme will be largely inaudible over river noise based on river noise level measurements. It is therefore considered that any potential noise effects will be no more than minor for recreational users, including those using the walking tracks, given the separation distances involved. It is also considered that there will be no more than minor potential effects on wildlife.

The separation distances from the nearest dwellings to the Scheme is such that operational noise from the Scheme itself will easily comply with the District Plan noise limits and be so low as to be negligible. The only noticeable noise associated with the Scheme once it enters the operational phase will be staff vehicle movements on the local road network and access road to the powerhouse. There may be infrequent helicopter use required for monitoring, maintenance or repair purposes.

MITIGATION

The report has recommended a comprehensive set of measures for ensuring the effects of noise from construction and operation of the Scheme are mitigated as far as it practicable (refer Sections 5.0 and 6.0 and a sample CNMP in Appendix C of the Noise Report).

It is recommended as previously discussed that a CNMP is implemented as a requirement of any approval for this project. This plan should deal with such issues as compliance with the requirements of NZS 6803:1999 "*Acoustics – Construction Noise"* and appropriate limits for blasting. The noise limits will ensure that dwellings will be subject to appropriately low noise levels at night (< 45 dB L_{Aeq} / < 75 dB L_{AFmax}) to avoid potential adverse noise effects.

The Report proposes the following conditions as a requirement for project approval.

1. Prior to the commencement of any activity, the Consent Holder shall prepare a CNMP which shall address, as a minimum, the following:
   a) the consent conditions that relate to noise;
   b) noise sources and potential impacts;

c) methods to be used for noise control;
d) managing noise from blasting;
e) managing noise from helicopter activity;
f) training of operators and contractors;
g) contingency plans (in the event that noise limits are exceeded); and
h) complaints and reporting procedures

2. The Consent Holder shall undertake the activities authorised by this consent in accordance with the provisions of the CNMP prepared pursuant to the provisions of the preceding condition.
3. A copy of the current CNMP shall be provided by the Consent Holder to the Westland District Council and the Department of Conservation for approval.
4. Noise from construction activities, excluding blasting and helicopter movements, shall be managed in accordance with NZS 6803:1999 *"Acoustics – Construction Noise"* and shall comply with the recommended noise limits for "long term duration" set out in Tables 2 and 3 of that Standard.
5. Air overpressure from blasting (including any implosive jointing of transmission line cables) must comply with the limits set out in Australian Standard AS 2187-2006 "*Explosives – Storage and Use: Use of Explosives*" when measured at any dwelling.
6. Helicopter movements shall be managed such that noise emissions achieve the appropriate recommended noise limits contained in NZS 6807:1994 "*Noise management and land use planning for helicopter landing areas"*, and flown in accordance with noise abatement techniques provided in The Helicopter Association International's 'I Fly Neighborly' programme.
7. Noise from operation of the Scheme shall comply with the following standards:

0700 – 2100 hrs Mon – Fri	*55 dB L_{A10} at any point within the notional boundary of a residential activity.*
0700 – 1800 hrs Saturday	
All other times including public holidays	*45 dB L_{A10} at any point within the notional boundary of a residential activity.*

All measurements are to be taken and assessed in accordance with the NZ Standards 6801:1991 "Measurement of Sound" and 6802:1991 "Assessment of Environmental Sound" and amendments thereto.

The CNMP includes measures related to specific activities as outlined below.

General Noise Management

These noise measures will ensure that the specified noise limits are not exceeded due to poorly maintained equipment, or machinery which has not been envisaged, and ensure that noise emissions are kept at a reasonable minimum level. Such measures will be included as an integral part of any subcontract let for any part of this project.

Specific Noise Management for Blasting

- Prior to blasting, residents within five kilometres of the proposed blast site shall be informed of the activity 48 hours prior to commencement.

Night-time Construction Traffic

- Heavy vehicle traffic on Waitaha Road should be avoided as far as practicable during night-time hours.

Specific Noise Management for Helicopter Movements

The following noise management measures shall be adopted to minimise the effects of noise from helicopter movements:

- all helicopter movements should be flown in accordance with noise abatement techniques (e.g. The Helicopter Association International's 'I Fly Neighborly' programme);
- flight sectors should be restricted to avoid residential areas, as far as it is practicable to do so. Helicopters should minimise overflights of dwellings while at less than 500 feet above ground level; and
- movements should be restricted to 0700-2100 hours Monday to Friday and 0700-1800 hours on Saturdays as per the District Plan daytime hours. However, occasional helicopter movements during daylight hours on Sunday would be acceptable.

Noise Management for the Protection of Recreational Users and Wildlife

The following noise management measures shall be adopted to minimise the effects of construction noise on recreational users and wildlife:

- all sections of walking track within 500 m of any blasting activity shall be temporarily closed during blasting;
- the construction noise limits provided in NZS 6803:1999 shall not be exceeded at Kiwi Flat Hut when the hut is occupied; and
- a buffer distance of 500 m for blasting (except for blasting occurring within the tunnel), and 250 m for piling shall be maintained from any livestock.

In addition to the mitigation measures that have been included in the sample CNMP, Westpower also proposes to make information about construction activities available on its website as well as installing appropriate temporary signage as agreed and approved by DOC.

SUGGESTED CONDITIONS

Westpower has considered the suggested mitigation measures contained in the Noise Report and has adopted these in the form of suggested conditions with the aim of avoiding or mitigating potential effects of the Scheme. These conditions include development and implementation of a construction noise management plan as set out, in draft, in the Report. In addition Westpower has included specific conditions as proposed in the Blue Duck Report (refer to Section 7).

More particular to the recommended measures are the following conditions as set out in Section 9 of this application (refer to Section 9 for wording);

CONDITIONS	*1.1-1.2, 7.1-7.4, 9.1-9.4, 16.1*

CONCLUSION

It cannot be said that there will be no noise effects from the construction and operation of the Scheme. There is no doubt that there will at times be intense periods of activity during construction, especially where helicopters are required to move concrete and equipment to the intake site. Such intense periods are not continuous for the entire construction period and occur from time to time as the need arises. Whilst there will be these higher noise levels during construction, this is for a temporary period until completion.

Once operational there will be a relatively low level of activity associated with the Scheme. Accordingly noise from the Scheme will be minimal and mitigation of noise from the powerhouse will be essentially achieved by the sound of the adjacent Waitaha River. The separation distances from the nearest dwellings to the Scheme is such that operational noise from the Scheme itself will easily comply with the District Plan noise limits and be so low as to be negligible. The only noticeable noise associated with the Scheme once it enters the operational phase will be staff vehicle movements on the local road network.

The report concludes therefore that any operational noise effects on residents of nearby dwellings, recreational users and wildlife will be no more than minor.

7.15 POTENTIAL BENEFITS AND POSITIVE EFFECTS

Whilst not specifically effects on the natural and heritage resources of the conservation land there are potential benefits from the Scheme, and the development of the application from both a community and environmental point of view. While not intended as a counter balance or trade-off for potential adverse effects they are nevertheless relevant matters arising from the Scheme. These matters are provided here in the form of an assessment of economic benefits and a brief overview of the potential positive effects of the Scheme.

Economic benefits are included here as they are important factors for the community who live and work in the area within which the Scheme is to be located. Westpower intends to develop a successful, renewable hydro-electric power scheme to meet the current and future needs of the West Coast community it serves, and is owned by. This Scheme will complement the Amethyst Hydro Scheme, also successfully developed on conservation land, in increasing the self-sufficiency and security of generation and supply of electricity for the community.

Both the General Conservation Policies and the West Coast Conservation Management Strategy recognise and provide that utilities may be located on conservation land. This ability to consider utilities being established on conservation land is recognition of the public good aspect of utilities' role in the well-being of the community.

7.15.1 ECONOMIC BENEFITS

Section 2:	The Applicant
Section 11:	Alternatives Locations and Options
Appendix 21:	Assessment of Economic Effects of the Proposed Waitaha River Hydro Scheme.

An assessment of the economic effects of the Scheme for the West Coast community was prepared by Copeland & Brown Ltd. The following is a summary of key elements of the Economics Report.

ELECTRICITY DEMAND AND SUPPLY CHARACTERISTICS

The Westpower distribution area covers Westland and the Grey District and the southern part of the Buller District below Westport but including Reefton. Westpower's distribution area has limited own generation capacity totalling 25 MW generating approximately 145 GWhs per annum. This compares with peak demand of 50 MW and annual electricity consumption of around 300 GWhs and means that the region imports electricity all of the time. Around 50% of peak demand and 52% of electricity consumption must be met with electricity generated outside the region.

The Scheme by adding between 16 to 20 MW to local supply could potentially decrease the current reliance on national grid supply from around 25 MW (i.e. about 50% of peak demand) to between 5 to 9 MW (i.e. about 10 to 18% of peak demand), depending on river flows at the time of system peaks.

IMPORTANCE OF ELECTRICITY TO THE ECONOMY AND THE FORECAST GROWTH IN DEMAND

Historically, demand for electricity has been closely linked to economic growth. Over the period 1990 to 2004, New Zealand's electricity consumption grew at an average annual rate of over 2% per annum as a consequence of strong growth in the economy and population. Since 2004, electricity consumption growth has slowed to an average annual rate of 0.5% per annum as a consequence of weak global growth and the Christchurch earthquakes.

On the basis of moderate future growth in the economy and population, the Ministry of Business, Innovation & Employment is forecasting future growth in demand averaging between 0.9% and 1.3% per annum over the period 2012 to 2040. The Ministry's assumed average growth in gross domestic product over the 28 year period is less than the 2.2% averaged over the period 1990 to 2004. Also much of the growth to occur is assumed to take place in the less energy intensive service sector of the economy, whilst energy efficiency

improvements are assumed to continue. These factors explain the expected slower growth in electricity demand in the future.

Peak demand for electricity in the Westpower distribution area has been forecast to grow from 50 MW in 2012 to 70 - 80 MW by 2030,[12] whilst electricity consumption is forecast to grow from 300 GWhs to 400 GWhs per annum by 2030. These growth rate forecasts incorporate possible new mining developments and ongoing growth in dairy farming and milk processing. This will increase the reliance on imported electricity via the national grid in the absence of new generating capacity on the West Coast.

There is uncertainty surrounding the future plans of the Tiwai Aluminium Smelter (which consumed 13% of New Zealand's total electricity demand in 2012). Also the demand for new electricity generation capacity may be restricted by restructuring of the wholesale electricity market by a future government. Notwithstanding future uncertainties for demand, there will be a role for new renewable energy sources like the Scheme in meeting electricity demand, even if demand growth is slow. New renewable sources of supply will be required to replace retired thermal capacity. Also the Scheme will enable an increase in West Coast electricity supply self-sufficiency.

ECONOMIC BENEFITS

The construction and operation of the Scheme will increase economic activity for the local Westland District and West Coast regional economies.

Effects during the Construction Period

Construction of the Scheme will use, where practicable, local products and services over its expected three to four year construction period. Goods and services that could be provided locally include concrete, tunnelling, civil construction and labour. The total construction cost is estimated at between $80-100 million, of which about 70% or $56-70 million ($19-23 million per annum assuming a three year construction period) could be spent in Westland and 80% or $64-80 million ($21-27 million per annum assuming a three year construction period) could be spent on the West Coast. Employment directly created by this local expenditure is estimated to average 20 full time equivalent jobs over a three year construction period with wages and salaries paid estimated at $1.8 million per annum.

In addition to the direct economic effects, there are indirect effects arising from the effects on suppliers of goods and services to the firms directly contracted by the Scheme from within the district and region (i.e. the "forward and backward linkage" effects); and the supply of goods and services to the employees of firms directly contracted by the Scheme (i.e. the "induced" effects). For example, there will be additional jobs and incomes for employees of supermarkets, restaurants and bars as a consequence of the additional expenditure by employees directly involved in construction at the site.

District and regional multipliers can be estimated to gauge the size of these indirect effects. Using district multipliers for the Westland District, during the three year construction period could result in:

- $25-30 million per annum in additional expenditure;
- 30 additional jobs; and
- $2.6 million per annum in additional wages and salaries.

For the West Coast region, the total (direct plus indirect) effects during the three year construction period are estimated to be:

[12] Over the period 2003 to 2011 peak demand has grown at an average rate of 4.32% per annum. This growth would have been higher still but for the closure of the Pike River Mine in 2010.

- $29-38 million per annum in additional expenditure;
- 33 additional jobs; and
- $3.0 million per annum in additional wages and salaries.

Operational Effects

Once the Scheme is operational there will be an additional fulltime equivalent staff member required to undertake regular operations and maintenance duties. There will also be additional expenditure within the Westland District and West Coast regional economies on other goods and services purchased locally.

Again, there will be both direct and indirect economic effects associated with this additional employment, income and expenditure.

CONTRIBUTION TO ECONOMIC WELL BEING

As indicators of levels of economic activity, economic effects (in terms of expenditure, income and employment) are not in themselves measures of improvements in economic welfare or economic wellbeing. However, there are economic welfare enhancing benefits associated with increased levels of economic activity. These relate to one or more of:

Increased economies of scale: Businesses and public sector agencies are able to provide increased amounts of outputs with lower unit costs, hence increasing profitability or lowering prices;

Increased competition: Increases in the demand for goods and services allows a greater number of providers of goods and services to enter markets and there are efficiency benefits from increased levels of competition;

Reduced unemployment and underemployment of resources: To the extent resources (including labour) would be otherwise unemployed or underemployed, increases in economic activity can bring efficiency benefits when there is a reduction in unemployment and underemployment. The extent of such gains is of course a function of the extent of underutilised resources within the local economy at the time and the match of resource requirements of a project and those resources unemployed or underemployed within the local economy; and

Increased quality of central government provided services: Sometimes the quality of services provided by central government such as education and health care are a function of population levels and the quality of such services in a community can be increased if increased economic activity maintains or enhances population levels.

It is reasonable to assume that the anticipated increases in economic activity (i.e. expenditure, income and employment) as a consequence of the Scheme construction and operation will give rise to one or more of these four welfare enhancing economic benefits at the local district and regional level.

LOWER COST ELECTRICITY GENERATION AND SUPPLY

There will be cost savings to the extent that the costs of generation from the Scheme are less than the generation and transmission costs of alternative new generation capacity elsewhere in New Zealand, which is displaced or delayed. These cost savings reflect:

- lower or at least comparable average generation costs per kWh compared to alternative new generation options to meet predicted growth in electricity demand in New Zealand Alternatively, if new capacity does not keep pace with growth in demand, there will be increased costs for electricity consumers and for the economy generally;
- a reduction in the transmission line losses incurred in supplying local consumers with electricity via Transpower's national grid;
- a reduction in the transmission charges for Westpower and its consumers. Transpower charges Westpower (and other lines companies) on the basis of Westpower's average load at the time of the

Upper South Island's 12 highest loads over half-hour periods throughout the year. So long as the Scheme is able to provide capacity at all or many of these 12 periods, Westpower will face lower transmission charges.

These various cost savings (or at least reductions in future cost increases, which would otherwise occur) will in the first instance accrue to Westpower as a generator and as the local lines company. Westpower is a community owned company, and lower costs will be passed through to local business and residential consumers either via lower retail electricity prices and/or via larger annual rebates to consumers.

INCREASED SECURITY OF SUPPLY

Although the Scheme, being run-of-river, will have no water storage capability, increasing the amount of generating capacity on the West Coast improves security of supply for local business and residential consumers by reducing reliance on supply via the national grid network. The Scheme will provide some protection against situations when no or restricted external transmission capacity into the region is available. For residential consumers, outages as a result of transmission failures are likely to be sufficiently brief to cause only minor inconvenience. However for business customers with high electricity reliance or consumption the costs can be more significant – either in terms of lost production or the requirement to invest in expensive back-up sources of electricity supply.

Also in relation to security of supply, the Scheme will provide geographic diversity of supply of electricity from hydro generating stations, which in the South Island are heavily dependent upon water catchments and climatic conditions in South Canterbury and Otago.

ENVIRONMENTAL BENEFITS

The Government has adopted an economy-wide target for a 50% reduction in New Zealand's carbon equivalent net emissions compared to 1990 levels, by 2050. Emissions from electricity generation accounted for 19.6% of New Zealand's total energy sector emissions in 2012. The Government also has a target that 90% of electricity generation be from renewable sources by 2025 (in an average hydrological year) providing this does not affect security of supply. This is against a backdrop of renewable electricity sources accounting for 81% of total generation in 1990, falling to 65% in 2008, in the face of new electricity demand being largely met by new thermal generation over the period 1990 to 2008. In 2012 renewable electricity sources accounted for 73% of total generation.

Increased development of hydro power, such as the Scheme, is clearly consistent with the Government's energy policy.

If the Scheme results in the avoidance of an equivalent level of generation from gas thermal plants there will be an estimated reduction of 51,120 tonnes of carbon dioxide equivalent greenhouse gases (CO_2-e) and applying a carbon price of $25 per tonne this implies an annual saving of $1.3 million in terms of reduced emission units which would need to be purchased offshore by the New Zealand electricity generation sector. The equivalent annual saving if coal thermal generation is displaced is estimated at $1.9 million.

The Scheme will help to enable the people and community of the Westland District and West Coast region to provide for their economic well-being, by making West Coast consumers significantly less reliant on electricity imported via Transpower's transmission system. It will also be consistent with the efficient use and development of natural and physical resources.

ECONOMIC COSTS OF THE SCHEME

Tourism Expenditure

The Waitaha Catchment area is used for kayaking, angling, hunting, tramping and mountaineering. Whilst the area has been assessed as having significant recreational values, the economic effects of the Scheme, in terms of reduced expenditure for the local tourism industry, will be negligible because:

- there is a low level of recreational use on or near the Waitaha River and this is likely to continue in the future with or without the Scheme;
- there are a range of alternative locations on the West Coast for all recreational activities affected;
- all land based recreational activities in the Waitaha Catchment will be able to continue after the Scheme is built with only visual effects;
- because of the high level of skill required to paddle the Waitaha River, the number of kayakers able to paddle it are small – only around 50 persons per year kayak the Waitaha Gorge section of the river and most (80%) portage the Morgan Gorge section. In any one year, fewer than 10 individuals might kayak the upper Waitaha Gorge (above Moonbeam Hut) and/or Morgan Gorge. Also these sections of the river might not be run at all for long periods and for these sections there is a very small pool of suitably skilled kayakers.

Utility Costs

Externality costs from a project such as the Scheme arise when public sector agencies (local, regional or central government) must provide and fund new infrastructure that is required, without appropriately set levies or charges for such costs to be recovered from the development. However no such externalities will arise in the case of the Scheme because it will not require any new infrastructure from public sector agencies.

Road Congestion Costs

The Scheme construction will lead to additional volumes of traffic on the road network. However the local road network has sufficient capacity to handle the additional construction traffic. It is not anticipated that the additional traffic will result in significant congestion effects.

Loss of Biodiversity, Landscape and Recreational Values

A number of non-market valuation techniques (e.g. willingness to pay surveys or inferring values on the basis of differences in property values) for assessing "intangible" effects have evolved over time. However, these techniques are frequently subject to uncertainty and criticism. As a consequence, it is generally better to not attempt to estimate monetary values for these effects but leave them to be part of an overall judgement. These matters are assessed and considered through the range of specialist assessment appended to the application.

CONCLUSION

The Scheme will help enable the people and community of the Westland District and West Coast region to provide for their economic well-being, by making West Coast consumers significantly less reliant on electricity imported via Transpower's transmission system. It will also be consistent with the efficient use and development of natural and physical resources.

7.15.2 POSITIVE EFFECTS

There are many positive effects or benefits associated with the Scheme and as Westpower is a 100% community owned company, all of the benefits are accrued by the community as consumers/shareholders within the Westpower distribution area as well as contributing on the regional, national and international level in terms of renewable energy generation. The Scheme will provide a significant long term and renewable asset to be owned by West Coast residents and businesses.

Positive effects of the Scheme and the development of the application can be divided into a range of areas relating to national, community, economic (as discussed above) and environmental benefits. All of these matters are raised throughout the various sections of the application, and the assessment of effects. The following is a summary of potential benefits/positive effects of the Scheme.

NATIONAL

- The Scheme utilises a renewable water resource to generate electricity and improves resource efficiency.
- The Scheme will offset an estimated 51,120 tonnes of CO_2 emissions/year associated with the equivalent output from a thermal generation source.
- The proximity of the Scheme to end-users reduces transmission losses (approaching up to 20%), improving resource efficiency and reducing costs to consumers (also a community benefit).
- At the national level, the Scheme which is aligned with the NZES target for renewable electricity generation (a 50% reduction in New Zealand's carbon equivalent net emissions compared to 1990 levels, by 2050) and will improve resource use efficiency by:
    - lowering the costs of generating additional quantities of electricity;
    - reducing transmission line losses;
    - increasing the geographic diversity of supply of electricity from hydro generating stations; and
    - potentially reducing New Zealand's climate change liabilities.

COMMUNITY

- The Scheme will increase the Westpower distribution area's installed electricity capacity by 16 – 20 MW and approximately 110-120 GWh per year. This is equivalent to the power needed to supply approximately 12,000 households per year.
- This additional local generation will reduce the need to import electricity. In conjunction with the existing hydro schemes within the distribution area and along with the recently constructed Amethyst Hydro Scheme the local available peak power will almost be doubled.
- The Scheme will improve the economic wellbeing of the Westland District and West Coast region by increasing employment, incomes and expenditure in the Westland District and West Coast economies during the Scheme's construction and, to a lesser extent, during the Scheme's operation.
- During construction increased spending on associated goods and services for the project plus Indirect economic effects (i.e. multiplier effects) could potentially create additional jobs and result in additional spending within the region.
- Once operational, while minimal staff requirements, the facility will continue to use local contractors and resources for maintenance and infrastructure purposes.
- Improvements in electricity supply self-sufficiency and security of supply will help sustain employment in the key growth sectors for the Westland District and West Coast regional economies by providing increased confidence for business investment in Westland and on the West Coast through a more reliable and cost effective electricity supply.
- Provides long term benefit for current and future generations on the West Coast.

IMPROVEMENT IN ENVIRONMENTAL INFORMATION AND KNOWLEDGE

- The wealth of information that has been gathered during the investigations of the Scheme provides a wide range of new information with regard to the Waitaha Catchment's natural and recreational values that were previously unknown or not investigated, e.g. the existence of a significant long tail bat population, that koaro are the only fish species above Morgan Gorge.
- A significant level of information has been developed to assist with the understanding and possible management of the blue duck population on the Waitaha River.
- The cataloguing and recording of vegetation, invertebrates, avifauna, aquatic plants and invertebrates, fish, blue duck can be added to the relevant inventories (for example, freshwater ecosystems) in the West Coast Tai Poutini Conservancy.
- The range of highly detailed information can be utilised to assist in understanding and managing the dynamics of ecological systems in the region and can be of use in enhanced decision making and future management of natural heritage values, including threatened species.

ENVIRONMENTAL

- A run-of-river Scheme has a very small environmental footprint, and retains the ecological intactness of the area.
- Potential for Improved walking access into Kiwi Flat which may increase visitors to the area.
- Increased, and publicly available, information on the river for recreational users of the area.
- Potential to improve the habitat for blue duck and other species, through weed and pest management or other enhancement projects (e.g. WHIONE).

7.16 CONCLUSION

A summary of the levels of potential effects are presented in Table 12. As can be seen from the summary there are two distinct phases to the Scheme, construction and operational. There is no doubt that there will be an intense, but temporary, period of construction after which the Scheme will settle into its setting.

Based on the assessments, it can generally be considered that effects on natural flora and fauna, aquatic ecology and historic values will be low. Similarly, it is concluded, based on the current information known about the area within which the Scheme is to be located, that the effects of the proposed activity on cultural values are likely to be no more than minor.

The higher potential effects relate to landscape (including natural character and visual amenity) and recreation opportunities. These effects arise from the introduction of structures into the currently unmodified environment and changes to the flow regime in the abstraction reach. Both the Landscape and Recreation Reports note that for some there will be a changed perception in regard to the river outside the affected reach due to the controlled flow in the abstraction reach.

Ultimately the landscape assessment concludes that with respect to Natural Character, Landscape and Visual Amenity the Scheme will meet the emphasis of the Conservation Act, will sit well within its landscape and respond to its setting, and overall is considered appropriate with respect to natural character, landscape and visual amenity.

The Recreation Report concludes that direct restrictions on the ability to carry out existing recreation activities in the study area are limited to kayaking. All land-based recreational activities in the Waitaha Valley will be able to continue with only indirect effects caused by the introduction of hydro development structures in the setting and effects on natural character and visual amenity. Kayaking will be constrained by residual flow effects in the abstraction reach and the construction of a weir at Morgan Gorge. Mitigations are available to reduce the scale of effects on kayaking (ceases to abstraction and improved portage tracks) but the change

from a natural state waterway means that the final effect on kayaking remains 'high'. However the net effect on the West Coast kayaking scene is likely to be minor, considering the number of kayaking alternatives, the ability to retain the kayaking opportunity in the Morgan Gorge, and the relatively low level of use of the Waitaha River, and far lower level of use of Morgan Gorge.

The challenge in protecting the regional kayaking resource, with the Morgan Gorge in mind, will be establishing a protocol for ceases to abstraction that is suitably flexible for kayakers, and ensuring that weir design and construction is carried out in consultation with kayakers. Westpower has recognised these issues and proposed conditions which are included in the suggested conditions in Section 9.

Table 12: Summary of the Assessment of Potential Effects

Natural, Historic or Recreational Value	Scheme Phase	Potential Effect	Assessment of Effect (post avoidance, mitigation and monitoring measures)	Avoidance, Mitigation and Monitoring
River Dynamics & Natural Hazards	Construction	Loss of sediment into waterways during construction	Minor	*See Section 9 for suite of suggested conditions derived from recommended avoidance, mitigation and monitoring.*
	Operation	Alteration to natural patterns of floods, freshes and fluvial processes	Nil	
		Stability of waterway	Nil	
		Formation of backwater due to presence of weir	Minor and temporary	
		Aggradation of Kiwi Flat upstream of the weir and intake structure	Minor and temporary	
		Fine sediment build-up in the abstraction reach from sediment discharges from the flushing tunnel	Minor	
		Erosion due to powerhouse stopbank	Minor	
		Additional seismic hazards or seismic risk	Nil - due to no storage of significant amounts of water	
Natural Character	Construction Operation Operation	Intake Works	High Moderate to Low (Broad scale) High (Local scale)	
	Construction Operation Operation	Powerhouse (including access road)	High Moderate to Low (Broad scale) High (Local scale)	
	Operation	Reduced River Flow (Abstraction Reach)	Low (Abiotic & Biotic natural character) Moderate (perceptual aspects of natural character)	

Natural, Historic or Recreational Value	Scheme Phase	Potential Effect	Assessment of Effect (post avoidance, mitigation and monitoring measures)	Avoidance, Mitigation and Monitoring
Landscape	Construction	Intake Works	High	*See Section 9 for suite of suggested conditions derived from recommended avoidance, mitigation and monitoring.*
	Operation		Low (Broad scale)	
	Operation		High (Local scale)	
	Construction	Powerhouse (including access road)	High	
	Operation		Low (Broad scale)	
	Operation		Moderate (Local scale)	
Visual Amenity	Construction	Intake Works	High	
	Operation		Low (Broad scale)	
	Operation		High (Local scale - near)	
	Operation		Low (Local scale - distant)	
	Construction	Powerhouse (including access road)	High	
	Operation		Low (Local scale - near)	
	Operation		High (Local scale - near)	
	Operation		Low (Local scale – distant)	
Vegetation	Construction & Operation	*Area 1 - Vegetation clearance or disturbance (including riparian):*		
		Weir	Negligible	
		Intake Channel	Negligible	
		Intake Structure and Intake Portal	Negligible	
		Tunnel Portal Entrance	Negligible	
		Intake Access Road (Portal to Intake)	Negligible	
		Road to Contractors' Facilities Area	Negligible	
		Contractors' Facilities Area	Negligible	

Natural, Historic or Recreational Value	Scheme Phase	Potential Effect	Assessment of Effect (post avoidance, mitigation and monitoring measures)	Avoidance, Mitigation and Monitoring
		Flushing Tunnel Outlet	Negligible	*See Section 9 for suite of suggested conditions derived from recommended avoidance, mitigation and monitoring.*
		Cumulative clearance and disturbance	Negligible	
	Construction & Operation	*Area 2 - Vegetation clearance or disturbance (including riparian):*		
		Tunnel Portal Exit and Construction Apron	Negligible	
		Access Road and Transmission Line	Minor	
		Alpha Creek - Training and Flood Protection	Negligible	
		Powerhouse and Switchyard	Negligible	
		Access Road and Penstock - Powerhouse to Tunnel Portal	Negligible	
		Tailrace	Negligible	
		Stopbank Protection - Powerhouse, Switchyard, Tailrace, Penstock & Access Road	Negligible	
		Cumulative clearance and disturbance	Minor	
Birds and Bats (Vertebrate Fauna)	Construction & Operation	Loss of Faunal Habitat	Negligible	
		Direct loss of Fauna	Negligible	
		Change in riverine Habitat	Negligible	
		Bats - roosting, breeding habitat, foraging behaviour, commuting routes	Negligible, possibly minor positive effect with respect to foraging and commuting	
		Birds - fernbird, hole-nesting birds, other forest or non-riverine birds, riverine birds	Negligible	
		Other Effects - improved predator access, increased road kill risk, noise and disturbance, lighting	Negligible	

Natural, Historic or Recreational Value	Scheme Phase	Potential Effect	Assessment of Effect (post avoidance, mitigation and monitoring measures)	Avoidance, Mitigation and Monitoring
Lizards	Construction & Operation	Conservation status of lizard fauna known from central Westland	Nil	*See Section 9 for suite of suggested conditions derived from recommended avoidance, mitigation and monitoring.*
		Loss or displacement of lizard fauna	Negligible	
		Local loss of gecko Habitat	Negligible	
		Local loss of skink Habitat	Unknown - very small area affected in relation to available habitat in the catchment as a whole. Potential for creation of habitat by works.	
		Changed flow regime	Nil	
Invertebrates	Construction & Operation	Loss of vegetation, including riparian and edge effects	Minor and short term	
		Road Construction over Macgregor Creek	Minor or less than minor	
		Introduction of weeds	Minor or less than minor, potentially positive in riparian areas with mitigation	
		Change flow regime - including riparian habitat	Minor or less than minor	
Aquatic Ecology **Benthic Communities**	Construction	Release of Sediment (from vegetation clearance and construction of infrastructure)	Minor or less than minor	
		Release of concrete and hydro-carbon based contaminants (from construction of infrastructure and machinery)	Minor or less than minor	
		Riparian vegetation clearance	Minor or less than minor	
		Spread of the invasive alga *Didymosphenia geminata* (Didymo)	Minor or less than minor	
	Operation	Loss of aquatic benthic habitat with the mainstem due to residual flow	Minor or less than minor	
		Sediment release during flushing of the settling basins/operation of the scheme	Minor or less than minor	

Natural, Historic or Recreational Value	Scheme Phase	Potential Effect	Assessment of Effect (post avoidance, mitigation and monitoring measures)	Avoidance, Mitigation and Monitoring
		Backwater effect of the weir on the mainstem at Kiwi Flat	Less than minor	*See Section 9 for suite of suggested conditions derived from recommended avoidance, mitigation and monitoring.*
		Waterway crossings	Less than minor	
		Loss of riparian vegetation	Less than minor	
		Stormwater runoff from the access road and associated hard surfaces	Minor or less than minor	
		Lighting Effects	Minor or less than minor	
Fish Communities	Construction	Sediment release	Less than minor	
		Release of concrete and hydro-carbon based contaminants	Less than minor	
		Vegetation clearance (including riparian vegetation clearance)	Less than minor	
		Spread of the invasive alga *Didymosphenia geminata* (Didymo)	Less than minor	
	Operation	Loss of instream fish habitat within the mainstem and tributaries (the latter due to loss of surface water connection) due to residual flow	Minor	
		Fish strandings within the abstraction reach due to down-ramping	Minor or less than minor	
		Impaired koaro/improved salmonid and eel passage to Kiwi Flat due to residual flow and the weir	Less than minor	
		Injury/mortality to larval koaro from passage through the headworks, settling basins and turbines	Minor or less than minor	
		Riparian Vegetation Loss	Less than minor	
		Increased predation risk to fish (both native and introduced) that have been attracted to the	Minor	

Natural, Historic or Recreational Value	Scheme Phase	Potential Effect	Assessment of Effect (post avoidance, mitigation and monitoring measures)	Avoidance, Mitigation and Monitoring
		tailrace		*See Section 9 for suite of suggested conditions derived from recommended avoidance, mitigation and monitoring.*
		Sediment release during flushing of the settling basins	Minor or less than minor	
		Impeded fish passage at tributary waterways that require road crossings	Less than minor	
Blue Duck	Construction	*Whole Scheme:*		
		Fire Risk	Nil/Less than minor	
		Clearance of Riparian Vegetation	Nil/Less than minor	
		Local Weed and Pest Management	Potential benefit of the scheme	
		Weir and Intake Construction at Morgan Gorge:		
		Disturbance and Noise	Highly likely to be minor. Monitoring programme and associated trigger responses to ensure no adverse effects on blue duck population.	
		Powerhouse, Tailrace, Tunnelling, Stopbank and Access Road:		
		Powerhouse, tailrace and stopbank construction	Minor/Less than minor	
		Lighting	Minor/Less than minor	
		Piling at Granite Creek and possibly Macgregor Creek and powerhouse	Less than minor	
		Disturbance and Noise from helicopter flights	Minor/Less than minor	
	Operation	*Whole Scheme:*		
		Fire Risk	Nil/Less than minor	
		Local Weed and Pest Management	Potential benefit of the scheme	

Natural, Historic or Recreational Value	Scheme Phase	Potential Effect	Assessment of Effect (post avoidance, mitigation and monitoring measures)	Avoidance, Mitigation and Monitoring
		Weir and Intake at Morgan Gorge:		*See Section 9 for suite of suggested conditions derived from recommended avoidance, mitigation and monitoring.*
		Potential for trout access in to Kiwi Flat	Nil	
		Duckling Access through Morgan Gorge to Kiwi Flat	Nil, potential of benefit for duckling access through upper reaches of Morgan gorge in terms of lower flow	
		Initial temporary ponding and aggradation behind the weir	Less than minor	
		Ongoing operation	Minor/Less than minor	
		Disturbance and Noise from helicopter use during maintenance	Highly likely to be minor. Monitoring programme and associated trigger responses to ensure no adverse effects on blue duck population.	
		Abstraction Reach:		
		Reduced Flow	Minor, potential for benefit in terms of new habitat created due to lower flow	
		Sediment Accumulation	Minor	
		Powerhouse, Switchyard, Tailrace and Access Road:		
		Noise	Less than minor	
		Lighting	Less than minor	
		Location of Transmission and Communication Lines	Nil	
Recreation and Tourism: **Local**	Construction	All setting users above Macgregor Creek (kayaking, tramping, hunting, track maintenance)	Significant but temporary	
	Operation	Kayaking the upper Waitaha Gorge, including the Waitaha Gorge and Kiwi Flat reach	Low - kayak options remain in place	
		Kayaking Morgan Gorge	High - residual flow reduces ability to kayak abstraction reach	
		Kayaking between Morgan Gorge and Douglas Ck	High - residual flow reduces ability to kayak abstraction reach. Extension to portage below Morgan Gorge	

Natural, Historic or Recreational Value	Scheme Phase	Potential Effect	Assessment of Effect (post avoidance, mitigation and monitoring measures)	Avoidance, Mitigation and Monitoring
		Kayaking whole river	High - change in natural state	
		Tramping and Hunting	High but may moderate over time - Kiwi Flat Low to Nil - Upper Valley (perceptual only)	*See Section 9 for suite of suggested conditions derived from recommended avoidance, mitigation and monitoring.*
		Hot Spring visitors - soundscape changes to Morgan Gorge experience (hot springs included) - natural character effects of residual flow	Low	
		Angling	Nil	
		Jet Boating	Nil	
Recreation and Tourism: **Regional**	Construction & Operation	All activities	Low	
Noise	Construction	Dwellings:		
		Construction of Access Roads	Acceptable - 1095 Waitaha Road Minor - all other dwellings	
		Construction of the Scheme, including:		
		Piling	Minor	
		Blasting	Well below acceptable limits	
		Vehicles on Waitaha Road	Acceptable	
		Helicopter movements	Acceptable	
		Recreation:		
		Walking and Tramping Tracks	More than minor, depending on proximity	
		Nearby Tramping Hut	Minor	
		Helicopter Movements	More than minor temporary effects on nearby tramping tracks	
		Wildlife:	Minor or less than minor effects on livestock	

Natural, Historic or Recreational Value	Scheme Phase	Potential Effect	Assessment of Effect (post avoidance, mitigation and monitoring measures)	Avoidance, Mitigation and Monitoring
	Operation	Dwellings Recreation Wildlife	Negligible Minor Minor	*See Section 9 for suite of suggested conditions derived from recommended avoidance, mitigation and monitoring.*
Cultural	Construction & Operation	No known sites or features of cultural significance.	Minor (accidental discovery protocol proposed through Construction Management Plan)	
Historic and Archaeological	Construction & Operation	No known sites or features of historical or archaeological significance or interest.	Negligible (accidental discovery protocol proposed through Construction Management Plan)	

Whilst not a natural or historic resource, there are benefits or positive effects from the development of the Scheme, which are discussed above under Section 7.15. A range of positive effects at the national, community, and environmental scales are listed in 7.15.2. The following table provides a summary of the economic benefits of the Scheme as described in 7.15.1.

Table 13: Summary of the Economic Benefits

Scheme Phase	Description of Effect
Construction	Direct (based on 3 year construction period): Use of local products and services; i.e. concrete, tunnelling, civil construction, labour Estimated construction cost - $80-100 million ($56-70 million potentially spent in Westland, $64-80 million spent on the West Coast) Employment directly created by expenditure estimated to average 20 full time equivalent jobs over a 3 year construction period with wages and salaries estimated at $1.8 million per annum. Indirect (based on 3 year construction period): Suppliers of goods to contracted firms Supply of goods and services to employees of firms contracted by the Scheme Direct plus Indirect Effects for Westland District during 3 year construction period: $25-30 million per annum in additional expenditure 30 additional jobs $2.6 million per annum in additional wages and salaries Direct plus Indirect Effects for West Coast Region during 3 year construction period: $29-38 million per annum in additional expenditure 33 additional jobs $3.0 million per annum in additional wages and salaries
Operation	Additional expenditure within Westland District and West Coast regional economies on goods and services

Scheme Phase	Description of Effect
Other	Lower Cost Electricity Generation and Supply: Lower or at least comparable average generation costs per kWh Reduction in transmission line losses Reduction in transmission charges for Westpower and its consumers (West Coast community) Any savings to Westpower, as a community owned company, are savings to the community Increased Security of Supply: Increase in generating capacity on the West Coast Reduced reliance on supply via national grid Protection against situations where no or restricted transmission capacity into the region is available Provides geographic diversity of supply of electricity from hydro generating stations Environmental Benefits: Potential for avoidance of an equivalent level of generation from gas or coal thermal plants (reduced carbon dioxide emissions) Economic Costs: Negligible effect on tourism expenditure Recreational activities will be able to continue Small number of kayakers using the river, and low use of the river Utility Costs: No such costs arise due to additional public infrastructure not being required Road Congestion Costs: While there will be additional traffic on local roads during construction there is sufficient capacity to cater for such traffic. It is not anticipated that congestion will arise.

8. AVOIDANCE, MITIGATION AND MONITORING

In considering this concession application, the Minister is required to have regard to any measures that are reasonably and practicably available to avoid, remedy or mitigate the adverse effects of the activity (section 17U(1)(c) of the Conservation Act 1987).

Since the Scheme was first investigated in 2005, Westpower has adopted an approach of expert technical and environmental assessment, consultation, consideration of options and project refinement. Westpower engaged a wide range of independent experts who have comprehensively assessed the effects of the Scheme across a range of environmental values relevant to the Scheme and the location. Appropriate avoidance and mitigation responses have been developed using a team approach, which has enabled both the location of the Scheme, various components, and design aspects to be tailored to the values of the environment as far as has been technically and feasibly possible .

The avoidance of adverse environmental effects has been the primary objective of Westpower, however, where this is not practical or feasible, mitigation methods have been adopted or proposed through suggested conditions set out in Section 9. These conditions have been developed through the expert advice obtained and seek to ensure that various environmental parameters or thresholds are maintained through controls on construction and operational activities. It is important that the mitigation measures proposed are sustainable, both environmentally and financially, and proportionate to the levels of effects expected. To be effective mitigation methods also need to provide measurable or tangible outcomes.

An integral component of managing effects of the Scheme, particularly through construction but also during operation in regard to some aspects, is the use of Management Plans. These Management Plans, coupled with thresholds set out in the suggested suite of concession conditions (e.g., relating to minimum flow, maximum vegetation disturbance areas) are regarded as the most effective and efficient way of managing and mitigating potential effects to a level appropriate to the environment within which the Scheme is located. Any Management Plans will also allow for incorporation of future relevant resource consent conditions to enable an integrated approach to the management of activities and the potential effects that might arise. As discussed in Section 1.3, resource consents will be applied for if concession is granted and it is anticipated that there will be a range of conditions imposed through the resource consent application process.

Along with identification, avoidance and mitigation of potential effects of the Scheme monitoring activities are also an integral component of the construction and operation. Monitoring of various aspects of Scheme development and operation, including work prior to commencement of construction, has been identified through the expert assessment and advice.

Compensation measures to address adverse residual effects are outlined below.

8.1 AVOIDANCE STRATEGIES

Section 11 (Alternative Locations and Options) identifies and evaluates the alternatives considered and assessed by Westpower when developing the Scheme. Westpower's primary goal has been to avoid adverse environmental effects where it is practical to do so. As detailed in Section 11, significant adverse effects have been avoided by locating the intake at the bottom of Kiwi Flat rather than at the top of Kiwi Flat. The avoidance approach has been used throughout the design process. For example, potential bat roosting trees will be identified and surveyed prior to vegetation clearance to avoid disturbing or displacing roosting bats. The Stable Tributary has been recognised as having high aquatic values and accordingly decisions have been made in regard to alignment of the access road to avoid the need to cross the tributary and to retain adequate buffer distances from its margins. This approach will continue to be applied in finalising the Scheme plans and topic-specific management plans.

In summary, potential adverse effects have been avoided by:

- deciding not to build a road into Kiwi Flat;
- utilising a development envelope to provide some flexibility in terms of design and location to be able to take into account site specific environmental values;
- selecting a tunnel and intake (known as Option B – refer Figure 12, Section 11) where overall effects on fauna, aquatic ecology, recreation and landscape were considered by experts to be significantly less than for a weir at the top of Morgan Gorge (known as Option A);
- using underground tunnels for sediment settling ponds and transporting water from the intake to the powerhouse;
- a low weir design and avoidance of the creation of a storage lake, above the weir;
- reducing the length of the abstraction reach by locating the powerhouse closer to Morgan Gorge;
- locating the powerhouse and switchyard as far from the Alpine Fault zone as possible;
- aligning the access road to avoid the need to cross, or disturb the margins of, the Stable Tributary as this waterway has been identified as having particular importance for aquatic fauna;
- positioning the access road to the powerhouse along valley flats that comprise least important habitat for terrestrial fauna;
- designing the Scheme to ensure the ongoing distribution of sediment down the river system as would naturally occur;
- a Scheme design which does not change the natural patterns of floods and freshes within the river;
- aligning the power transmission line along the access road from the powerhouse to reduce habitat clearance;
- disposing of tunnel spoil off conservation areas; and
- location of primary contractors facility outside conservation areas.

8.2 MITIGATION STRATEGIES

Westpower supports a range of mitigation measures recommended by its experts to address potential adverse effects of the Scheme that cannot practically be avoided. Some of the mitigation measures have been proposed or endorsed by more than one expert. For example, the weed management recommended in the Vegetation Report (TACCRA, 2013) benefits and maintains the integrity or intactness of the indigenous vegetation which in turn benefits both the terrestrial invertebrate (Toft, 2014) and vertebrate populations (Buckingham, 2014), the aquatic ecology (McMurtrie & Suren, 2014) and in addition minimises the visual effects of the Scheme on landscape values.

In some instances, the final mitigation measures to be implemented will be dependent on the final design details taking into account technical and environmental advice and requirements, and subject to final survey. For example, prior to construction commencing: the identification of potential bat roosts will be undertaken and factored into works; the final alignment of the main access road will be developed in consultation with relevant experts, including in relation to the Stable Tributary; the weir will be designed in consultation with relevant experts to account for koaro access, avoidance of trout access, blue duck duckling access and kayaking access at the weir. Again this has been the reasoning for utilisation of an envelope within which the project footprint will be located. In some instances, proposed mitigation measures may no longer be required because the effect will be avoided through this process.

Many of the construction effects are considered best managed via management plans and protocols.

A suite of suggested conditions is provided in Section 9 which will ensure the management, avoidance and mitigation of effects as identified through the technical and expert reports. Westpower have considered the advice and recommendations. Some adjustments to design and layout of the Scheme have occurred through

the planning and investigation phase e.g. intake design and access road alignment around the Stable Tributary and this suite of conditions has been developed to reflect the remaining matters to be attended to prior to, and through, the construction and operational phases.

8.2.1 MANAGEMENT PLANS

Westpower's experience in developing the Amethyst Hydro Scheme on conservation land, which has many of the same components and issues arising, has highlighted that the most effective and efficient method of managing effects during construction and operation is via a series of management plans coupled with specific controls or parameters specified in appropriate conditions. DOC's appointment of a Liaison Officer (in conjunction with and funded by Westpower) will be integral in this process and will assist to manage the working relationship between Westpower and DOC. This approach has worked very successfully for the Amethyst Project and is reflected in the suggested conditions provided in Section 9.

Management plans set out the processes to be applied to achieve a certain environmental outcome during each stage of construction or operation of the Scheme. In general, each management plan will reflect, as relevant:

1. the recommendations made in the technical reports prepared as part of the environmental assessments;
2. inputs from engineers, contractors and Westpower as to the most effective and efficient building/construction methods and techniques;
3. inputs from DOC as land owner/manager through the concession application and administration process, including relevant conditions;
4. conditions of any resource consents issues by the WCRC and the WDC for the project; and
5. input from stakeholders and community as part of the pre-lodgement consultation process.

CONSTRUCTION MANAGEMENT PLAN

Prior to the commencement of construction a Construction Management Plan will be submitted by Westpower to DOC for approval. The overall objectives of the Construction Management Plan will be to:

1. provide guidance on environmental management for the construction of the Scheme and associated facilities;
2. undertake construction works in a timely and efficient manner to avoid prolonging potential effects on the environment;
3. avoid, remedy, or mitigate any adverse environmental effects associated with construction activities (including consideration of timing to minimise construction activities during the breeding seasons for blue duck, bats and kaka and across two breeding seasons at the weir and intake site), where practicable;
4. describe the methods for managing the actual or potential effects of construction activities.

The Construction Management Plan will include provision for:

- staff and contractor's responsibilities and reporting frameworks;
- construction methodology for each aspect of construction, how the construction works will be staged, and the duration of the various stages;
- how stakeholders will be kept informed during construction and how any complaints will be managed;
- key personnel and points of contact throughout the construction period;
- protocols for establishing when expertise and certification is required for certain elements of construction;
- an outline of the relationship with the Liaison Officer; and

- the aspects to be managed during construction include the following:
  - vegetation clearance;
  - wastewater, groundwater, erosion and sediment;
  - hazardous substances;
  - noise;
  - in – river works;
  - construction traffic;
  - waste;
  - pest and weed;
  - landscape design;
  - rehabilitation;
  - health and safety; and
  - archaeological and cultural discovery protocols.

In attending to these matters the Construction Management Plan is the overarching plan which may include a subset of topic-specific management plans which describe the methods for managing the actual or potential effects of construction activities. Management plans and their specific objectives are set out in suggested conditions in Section 9 and include:

1. Wastewater, Groundwater, Erosion and Sediment Management Plan;
2. Construction Noise Management Plan (see draft included within the Noise Assessment of Effects (Marshall Day Acoustics, 2014 – Appendix C);
3. Landscape Management Plan;
4. Rehabilitation Management Plan;
5. Pest and Weed Management Plan;
6. Safety Plan;
7. Environmental Monitoring Plan.

The appropriate personnel, and technical experts, will be involved in the preparation of these topic-specific management plans. When developed, the management plans will be submitted to DOC for approval. For example, it is expected that a member of the NZ Institute of Landscape Architects will prepare the draft Landscape Management Plan for Westpower.

The Construction Management Plan (and its appendices) will be prepared and approved prior to construction commencing. Details for topic-specific management plans may be provided for certification prior to commencement of later stages of work as appropriate. The overall timing of development of plans will be outlined in the overarching Construction Management Plan approved at the outset.

Approval and Use of Management Plans

DOC will review and approve the management plans when developed. Whilst not a part of this process, the WCRC and the WDC, dependent on the nature of any subsequent resource consent conditions, may also have a role in review and certification of the management plans. Once audited and approved, the management plans will form part of the Concession. Westpower will follow the requirements of those plans and will not deviate from the plans without prior written approval from DOC.

It is anticipated that there will be, from time to time, a need to make adjustments to the management plans to reflect actual situations or issues arising. There will be a specific process for making amendments to the management plans which will ensure that the need to respond to changing circumstances can be balanced against the need for DOC to be satisfied that the outcomes required by conditions are being met.

8.2.2 MONITORING

To ensure the outcomes and effects of the construction and operation of the Scheme are as anticipated through the design and assessment process it is important that monitoring of a range of matters highlighted by the technical experts is undertaken. This can occur at all stages of the process e.g. pre-construction surveys for presence/location of bat roosts and blue ducks; during construction for water quality, particularly around the Stable Tributary; post construction and during operation for fine sediment distribution, take and river flow rates, koaro and blue duck surveys. The outcomes of the monitoring process can assist to identify issues arising and assist with making refinements to the activities, both construction and operation, to ensure that potential effects are avoided or otherwise mitigated.

The technical and environmental assessments have included a range of mitigation recommendations, including the need for specific monitoring at various stages of the project. As with potential mitigation measures Westpower have accepted this advice and a range of suggested conditions are attached to this application at Section 9. These suggested conditions include a suite of suggested monitoring conditions (including those examples above) which provide the required linkages between actions/activities and potential effects and methods to avoid, remedy or mitigate those effects. There will be aspects of monitoring required for the duration of the Scheme in particular those relating to water abstraction and flows as well as monitoring relating to the overall maintenance of the Scheme and associated infrastructure.

Having undertaken a range of technical environmental assessments, Westpower is aware of the natural values of the area and has sought to provide for these in the Scheme design and location, including proposed mitigation measures.

Based on the advice received by Westpower in regard to predation being the primary threat to the local blue duck population there is value in ongoing collection of information about this vulnerable species. As a result of this advice, Westpower has proposed to undertake monitoring of blue duck within the project area and in the Amethyst during construction and for 3 years post construction. Predation of native species is considered the main limiting factor for indigenous species in this area (Buckingham 2014, Overmars, 2014). While currently there are no active programmes for protecting these species within the Waitaha Catchment, there may be opportunities to do so in the future. This information will be shared with DOC, Iwi and other relevant agencies e.g. TBFree and Royal Forest and Bird Protection Society of New Zealand.

ENVIRONMENTAL MONITORING PLAN

An Environmental Monitoring Plan will be prepared for DOC approval prior to construction commencing. This plan shall detail the programme for monitoring compliance with all conditions of the concession, including monitoring of compliance of all approved Management Plans forming part of this concession. It will be an integral part of the Construction Management Plan and once the Scheme is operational will be amended to become part of the Operation Management Plan.

The objectives of the Environmental Monitoring Plan are to ensure:

1. that the Scheme and structures are maintained to best practice standards;
2. the health and safety of the public;
3. during construction, within the project footprint, and during operation of the Scheme that adverse effects on natural, ecological and recreational values in the area are minimised/mitigated.
4. that the content of management plans is appropriate, efficient and effective and where required amendments are made; and
5. that conditions of the concession are being met.

Requirements for any aquatic or terrestrial fauna and flora monitoring pre, during and or post construction will be included in the Environmental Monitoring Plan. The matters/species to be monitored are set out in the suggested suite of conditions contained in Section 9. The Plan will detail the frequency of monitoring, specify

the period for undertaking monitoring, review periods of monitoring, remedial requirements if the monitoring determines an adverse effect and reporting requirements.

In addition this Monitoring Plan will cover monthly monitoring of weirs, races, roads and tracks, water tables, culverts and pipelines for signs of erosion, blockages, leakages etc. This will be included as part of the routine maintenance schedule for the Scheme.

Once approved, the Environmental Monitoring Plan will form part of the Concession. Westpower will follow the recommendations of that plan and will not deviate from the plan without the prior written approval of DOC.

8.3 COMPENSATION

Under section 17U of the Conservation Act 1987 the Minister must consider any measures that can reasonably and practicably be undertaken to mitigate adverse effects. The Minister, in granting a concession, can also impose conditions requiring the payment of compensation for any adverse effects on the Crown's or the public's interest on the land concerned.[13] Compensation can cover both adverse effects that have been remedied or mitigated (because there may still be long term adverse effects on the Crown's or public interest in the land concerned) and adverse effects that remain after Westpower has avoided, remedied or mitigated adverse effects to the greatest extent possible, that is – 'residual' adverse effects.

For this Scheme the residual adverse effects, after proposed mitigation, result from the introduction and presence of structures and infrastructure into a predominantly unmodified river and valley, and the reduced flows within the abstraction reach. The assessments of these effects have been comprehensively covered in the expert reports and summarised in Section 7. The residual effects arise in terms of landscape and recreational matters in regard to both the physical presence of structures (localised effect) and from a broader perspective on the perceptions of some users of the river.

Forms of compensation have been discussed with DOC as a means of providing further ecological/recreational benefit to the Waitaha area and its users, and to compensate for residual effects of the Scheme. For Westpower, as a community owned company, it is important that any compensation is well considered and it is Westpower's preference that, if required, it be used to provide conservation opportunities in as close a proximity to the Scheme location as is possible. Westpower looks forward to continuing those discussions with DOC.

[13] Section 17X (d) Conservation Act 1987.

9. SUGGESTED CONDITIONS

As set out in Section 7, Westpower has commissioned a range of technical and environmental assessments to ensure that potential effects of the scheme are identified and, where possible, avoided or otherwise remedied or mitigated. Each expert report contains recommendations to reduce adverse effect through measures such as design and suggested conditions for construction, operation and monitoring.

Westpower has incorporated, where possible, recommendations regarding design and layout into the actual Scheme description, for example the intake location, minimum residual flow, access road alignment around the Stable Tributary. Further, Westpower seeks to ensure that the recommended mitigation and monitoring forms an integral component of the application and final concession granted. On a proactive basis the recommended mitigation has been developed into a suggested set of conditions which seek to ensure that the assessed levels of effect, which are based on mitigation having been undertaken, of the Scheme are achieved, or where possible reduced.

This section therefore contains suggested conditions for the concession which are in part based on conditions contained within the Amethyst Hydro Concession documents, in terms of standard topics and wording, and in addition reflect the expert recommendations commissioned by Westpower.

As discussed in Section 8 it is considered, based on Westpower's successful development of the Amethyst Hydro Scheme on conservation land, that management plans are the best method for managing and implementing measures to minimise the effects of construction and operational activities. A number of the suggested conditions refer to a range of management plans but it is expected that the finer detail of the plans will be finalised in conjunction with DOC. This process also allows for the incorporation of any conditions that may be imposed through future resource consent processes into those plans. Westpower, in regard to the Amethyst Hydro Scheme, found that the establishment of a Liaison Officer at DOC was an integral and successful component in ensuring that matters and requirements were attended to. Accordingly the establishment of such a position is an integral component of the suggested conditions.

These suggested conditions do not differentiate conditions specific to a particular type of concession e.g. easement/licence/lease and it is understood that some conditions will be more appropriate under one type of concession document than the other. It is understood that there are a range of other standard and specific conditions imposed by DOC in relation to concession activities and these have not been reproduced in full here. It is anticipated by Westpower that there will be the opportunity to comment on a proposed full set of conditions at the relevant phase of the process.

The conditions suggested here reflect the matters requiring attention to ensure the Scheme is constructed and operated in a manner that:

a) is in accordance with the details of the application;
b) recognises and provides for the values of the environment within which it is located; and
c) will have no greater effect on the environment than set out in the range of reports appended to this application.

Suggested Draft Special Conditions

1 General

1.1 The Concessionaire shall provide final Management Plans required by these conditions to the Grantor for the Grantor's approval. The Grantor will audit and approve these plans in a timely manner to ensure that final construction does not differ substantially in location, scale or level of effect to the concession application lodged by the Concessionaire. The Concessionaire shall ensure that these plans are prepared by a suitably qualified person. The concession application lodged by the Concessionaire comprises those documents listed in schedule #.

1.2 Once audited and approved by the Grantor, the Management Plans shall form part of this Concession, and the Concessionaire shall not deviate from these plans without prior written approval of the Grantor.

1.3 The Concessionaire shall pay the costs incurred by the Grantor in auditing and approving all plans required pursuant to this Concession.

1.4 The Grantor may require plans provided pursuant to this concession to be independently audited by an auditor approved by the Grantor. The auditor shall certify that the plans have been prepared in accordance with best practice for the relevant discipline. The costs of independent audit shall be borne by the Concessionaire.

1.5 All plans provided pursuant to this Concession shall be provided by the Concessionaire to Grantor within reasonable time frames to allow the Grantor to review these plans.

2 Bond

2.1 Prior to commencing the Concession Activity, the Concessionaire must provide as surety a trading bank, insurance company or bond guarantor who is acceptable to the Grantor.

2.2 The surety must execute (in the case of two or more jointly and severally) in favour of, and on terms acceptable to**,** the Grantor a performance bond initially set at NZ$_____ (_____dollars) for due and faithful performance by the Concessionaire of the obligations under the Concession and/or reinstating any disturbed area of the Land to a standard satisfactory to the Grantor where disturbance has been caused by the Concessionaire or any agent of it and/or otherwise remedying or mitigating any adverse effects of the Concession Activity.

2.3 If the initial amount of the bond has not been set in clause 2.2 then prior to the Concession Activity commencing that amount will be set by the Grantor following an independent risk assessment using a methodology approved by the Grantor**.**

2.4 The initial amount set under either Conditions 2.2 or 2.3 may be reviewed at the discretion of the Grantor at any time.

2.5 The cost of any independent risk assessment or review will be paid by the Concessionaire within 10 working days of being given a notice by the Grantor.

2.6 Notwithstanding the expiry, surrender or termination of the Concession document, the bond will not expire and is to remain in full force and effect until such time as all obligations of the Concessionaire under the Concession document have been complied with to the satisfaction of the Grantor.

2.7 If the Concessionaire breaches any condition or fails to carry out any condition of the Concession or in carrying out the Concession Activity there arise adverse effects not authorised or reasonably foreseen in the Concession document the Grantor may call on the bond entered into under this Document or any portion of it to ensure compliance with the conditions of the Concession document or to remedy or mitigate those adverse effects referred to above.

3 Liaison Officer

3.1 The Concessionaire must fund a Department of Conservation employee or external contractor who will act as a liaison contact between the Concessionaire and the Grantor during the term of construction of the Scheme. The exact role, brief of service and level of remuneration of the Liaison Officer will be agreed between the Concessionaire and the Grantor, and failing agreement will be determined by arbitration under Condition # of Concession Documents standard conditions.

3.2 The Concessionaire and the Grantor record that the role of the Liaison Officer includes:

a) reviewing annual Work Plans and other documentation submitted to the Grantor under this concession or otherwise associated with the Concessionaire's activities and operations under this concession, and making appropriate recommendations to the Grantor based on those documents;
b) monitoring compliance by the Concessionaire with Plans required pursuant to this concession and any other requirements of the Grantor; and
c) monitoring compliance with the Rehabilitation Plan, monitoring and liaising over the success or otherwise of ongoing restoration works and making recommendations to the Grantor regarding successful progressive and long term restoration and rehabilitation of the Site.

3.3 The appointment of the Liaison Officer will be by the Grantor following consultation with the Concessionaire, and the Liaison Officer will report to the Grantor.

3.4 The Concessionaire and the Grantor agree that the Liaison Officer will be a senior position, requiring a range of professional skills necessary for liaising effectively and autonomously with the Concessionaire, the Grantor, the West Coast Regional Council and Westland District Council, other external consultants, insurance companies and bondsmen. The Liaison Officer must have a strong proven performance in relationship management for large-scale developments in environmentally sensitive areas.

3.5 The Liaison Officer must be appointed by the commencement date for this concession. Pending such appointment the Grantor may, if considered necessary and desirable by the Grantor, appoint an interim liaison person at any time between the date of execution of this Concession and the commencement of this concession; and such interim liaison person will carry out the role of the liaison officer as envisaged by condition 3.2 of the Special Conditions for this concession.

3.6 The Liaison Officer may, with the prior approval of the Grantor, call on additional independent external consultants for specialist advice on matters reasonably raised by the Concessionaire's

operations carried out under this concession. The Liaison Officer will advise anticipated costs of consultants to both the Concessionaire and Grantor. The Concessionaire shall meet the costs reasonably charged by such consultants.

4. Pre- Construction Activities

4.1 Prior to Construction of the Scheme, the Concessionaire will submit for the Grantor's approval, the precise route of the access road and transmission line from the Macgregor Creek boundary of the Concession to the switchyard and powerhouse site. The transmission line, poles and wires/lines, will be located within the 20 metre access road corridor. If a pole is required to be located outside the 20 metre corridor this shall be included within the alignment information submitted to the Grantor for approval.

4.2 The submission of a proposed access road and transmission route to the Grantor must include an assessment to demonstrate that the proposed alignment is in compliance with all other relevant conditions of the Concession.

4.3 The access road and transmission route shall retain a margin of up to 20 metres, with a minimum allowable margin of 10 metres where topography and other matters limit provision of a wider margin, between the access road and associated corridor and the Stable Tributary. This margin is to allow for a protected vegetated riparian zone of trees, shrubs and groundcover that will shelter the waterway from the road and help to intercept runoff from the road.

4.4 Prior to construction the Concessionaire shall survey, identify and map all large trees with a dbh (measurement of diameter at breast height) of greater than 30 cm dbh for podocarp trees or greater than 60 cm for hardwood trees proposed to be removed or disturbed within the:

a) proposed access road and transmission line alignment;
b) construction footprint including the areas around the possible tunnel portal entry site, and temporary road to the contractors facility above Morgan Gorge.

4.5 This data will be used to make any practicable road alignment adjustments to avoid as many of these large trees as possible.

4.6 The tree survey outlined in Condition 4.4 shall also include a survey for potential bat roosting trees based on criteria provided by a suitably qualified bat expert.

4.7 The data collected under Conditions 4.4 and 4.6 will be used by the Concessionaire to identify any potential bat roosting trees and to define access and transmission routes that result in least damage to all vegetation, in particular large (60+ cm dbh) hardwood trees and podocarp trees (30+ cm dbh).

4.8 During the month of April, prior to construction, the Concessionaire shall undertake monitoring of the blue duck population for the following three parameters:

a) total numbers;
b) the presence of pairs; and
c) the presence of juveniles.

4.9 Monitoring of the blue duck population under 4.8 shall be undertaken at the following sites:

a) from (and including) Kiwi Flat to Douglas Creek; and

b) the Amethyst Ravine.

4.10 Boundaries of all areas to be disturbed shall be marked out on the ground prior to work commencing and approved by the Grantor. Disturbance outside these marked areas are not permitted unless prior written approval from the Grantor is obtained. The Concessionaire is to pay the Grantors costs in approving marked areas and considering any requests for deviation from those areas.

5. Disturbance Areas

5.1 The area to be disturbed for construction shall not exceed 5.33 ha in total and shall be within the areas marked out under Condition 4.7 and as set out on the maps attached (Appendix 1: Maps 5 and 6).

5.2 Notwithstanding the total areas permitted to be disturbed in Condition 5.1, the maximum construction and operational footprint areas permitted shall not exceed the areas set out below:

	Construction Footprint (ha)	**Operational Footprint (ha)**
Surface Area:		
Area 1: Headworks	0.73	0.235
Area 2: Powerhouse Site	2.0	1.3
Access Road	2.6	2.4
Total Surface Area	**5.33**	**3.935**
Total Subsurface Area	**2.6**	**2.6**

Note:

1. The surface figures include

a) the areas estimated for vegetation clearance as provided in the report on Terrestrial Flora Description and Assessment (TACCRA 2013 Appendix 15) and

b) allows for the non – vegetated areas within the footprint, for example work within the bed of the river.

2. Powerhouse site includes stop banks and flood protection.

3. The operational footprint is within the construction footprint.

4. The subsurface area allows for all the works underground including the tunnel, sediment settling basins, flushing tunnel .

5.3 The Concessionaire shall avoid or minimise the removal of large hardwood trees (≥ 60 cm dbh) and podocarp trees (≥ 30 cm dbh).

5.4 The Concessionaire shall obtain the Grantors approval for removal or disturbance of any Podocarp measuring more than 60 cm dbh.

5.5 The Concessionaire shall obtain the Grantor's approval for removal or disturbance of kamahi and other non podocarp species measuring more than 100 cm dbh.

5.6 Unless otherwise approved by the Grantor, trees or areas around trees, with a dbh of greater than 60 cm for any podocarp species or 100 cm for any non-podocarp species are not to be disturbed closer than their outer canopy drip line.

5.7 The felling of any trees is to be done in a manner so that damage to surrounding vegetation is minimised as far as is practicable.

5.8 Dead standing trees shall not be removed unless they pose a hazard or obstruction. If such trees pose a hazard or obstruction the Concessionaire shall obtain the approval of the Grantor prior to removal.

5.9 Prior to any tree felling where a tree has been identified in Condition 4.6 as likely to be occupied by bats the Concessionaire shall engage a suitably qualified person to monitor for the presence of bats the evening prior to tree felling (using an electronic bat detector) to ensure no bats are occupying tree when felled. If the tree is occupied then tree felling shall be delayed until the bats have vacated the tree.

5.10 At the same time as the specialised bat survey, a search shall be undertaken at similar sites for nesting kaka. If kaka nests are found within the proposed construction area, activities shall be temporarily halted or alternative routes found to avoid disturbance.

5.11 The Grantor shall not withhold permission to remove trees unreasonably, but will ensure that the Concessionaire minimises disturbance and removal of significant trees as far as is practicable.

5.12 All large trees felled pursuant to this concession are to remain the property of the Grantor. The Concessionaire shall comply with all reasonable instructions given by the Grantor to remove large trees to a site approved by the Grantor for disposal.

5.13 Subject to the provisions of the approved Rehabilitation Management Plan (see Condition 11.1), any vegetation disposed of on Site shall be in areas approved by the Grantor.

5.14 The Concessionaire shall ensure that there is no dumping of substrate or side casting of material into forest beside any road formation. All material shall be disposed of at designated or otherwise approved sites.

5.15 The Concessionaire shall remove all excess fill from the Land within 4 weeks of fill being created unless written approval is given by the Grantor for it to remain on the Site for longer.

5.16 The Concessionaire shall ensure that disturbance of riparian margins is minimised.

5.17 Once construction of the Scheme components and infrastructure authorised under this concession are complete (including the tunnel, access roads, tunnel portal and staging area, intake structure, treatment pond, penstock, stopbank, powerhouse, and switchyard) the Concessionaire shall provide a survey map, prepared by a suitably qualified land surveyor and in a form able to be registered, of all areas occupied for the Grantors approval. The Grantor shall vary this concession by replacing the map attached pursuant to Condition 5.1 (maximum permitted disturbance area approved for construction) with this map recording actual 'as built' developments.

6 Water Take, Diversion and Use

6.1 The Concessionaire shall ensure flow in the Waitaha River below the intake weir is not less than the Minimum Residual Flow of 3.5 m^3/sec at all times during operation of the Scheme when water is being diverted through the turbines.

6.2 Abstraction of water shall cease whenever the flow falls below the Minimum Residual Flow of 3.5 m^3/sec below the intake weir. The Concessionaire shall notify the Grantor within 5 working days of the occurrence of the flow in the Waitaha River falling below 3.5 m^3/sec at the flow-monitoring site.

6.3 The Concessionaire shall design the intake to include the facility to bypass the full base flow of the river if a flushing flow in the river appears necessary from the monitoring of fine sediment discharge in the abstraction reach.

7 Construction Management Plan

7.1 Prior to the commencement of construction, the Concessionaire shall submit a Construction Management Plan to the Grantor for approval. This will set out how the construction works will be staged, the duration of the various stages, methods of construction and methods for managing any environmental effects during construction. The overall objectives of the Construction Management Plan shall be to:

a) provide guidance on environmental management for the construction of the Scheme and associated facilities;
b) undertake construction works in a timely and efficient manner to avoid prolonging potential effects on the environment;
c) avoid, remedy, or mitigate any adverse environmental effects associated with construction activities (including consideration of timing to minimise construction activities during the breeding seasons for blue duck, bats and kaka and across two breeding seasons at the weir and intake site), where practicable; and
d) describe the methods for managing the actual or potential effects of construction activities.

7.2 The Construction Management Plan shall include:

a) staff and contractor's responsibilities and reporting frameworks;
b) construction methodology for each aspect of construction, how the construction works will be staged, and the duration of the various stages;
c) how stakeholders will be kept informed during construction and how any complaints will be managed;
d) key personnel and points of contact throughout the construction period;
e) protocols for establishing when expertise and certification is required for certain elements of construction;
f) protocols to be followed in the event of the accidental discovery of cultural or heritage items or artefacts; and
g) an outline of the relationship with the Liaison Officer.

7.3 The Concessionaire shall ensure that the Construction Management Plan describes the methods/actions and timing for managing specific aspects during construction. These aspects will be provided for either in the body of the Construction Management Plan or managed via the topic-specific management plans set out in Conditions 8 to 13. The aspects to be managed relate to the management of:

a) vegetation clearance;
b) wastewater, groundwater, erosion and sediment;
c) hazardous substances;

d) noise;
e) in – river works;
f) construction traffic;
g) waste;
h) pests and weeds;
i) landscape design;
j) rehabilitation;
k) health and safety; and
l) archaeological and cultural protocols, including accidental discovery.

7.4 Once audited and approved by the Grantor, the Construction Management Plan shall form part of the Concession, the Concessionaire shall follow the recommendations of that plan and shall not deviate from the plan without prior written approval of the Grantor.

7.5 The Concessionaire shall ensure that the Accidental Discovery Protocols established in the Construction Management Plan will be followed and complied with in the event of discovery of any artefact or historical, cultural or archaeological material during construction activities.

8 Wastewater, Groundwater, Erosion and Sediment Management

8.1 Prior to the commencement of construction, the Concessionaire shall submit a Wastewater, Groundwater, Erosion and Sediment Management Plan to the Grantor's approval. The objectives of this Plan are to:

a) protect and maintain the ecological integrity of the Waitaha River and Stable Tributary (Appendix 1: Map 6);
b) prevent contamination of waterways; and
c) prevent erosion and land instability.

8.2 This plan shall provide for both the construction activities and ongoing operation of the Scheme including detailed methodology for treatment of water and measures that will be established to minimise erosion and run off. The plan will include:

a) sediment and erosion control and management of runoff from:
    i. access roads;
    ii. waterway crossings;
    iii. river protection works;
    iv. portal areas;
    v. intake site;
    vi. powerhouse site;
b) treatment of water from tunnel;
c) water abstraction for potable water and drilling water;
d) greywater and toilet facilities; and
e) monitoring.

8.3 Once audited and approved by the Grantor, the Wastewater, Groundwater, Erosion and Sediment Management Plan shall form part of the Concession, the Concessionaire shall follow the recommendations of that plan and shall not deviate from the plan without prior written approval of the Grantor.

8.4 The Concessionaire shall prepare and submit annually to the Grantor a report detailing the results of the Wastewater, Groundwater, Erosion and Sediment Management Plan out as per Condition 8.2.

8.5 Following analysis of the information provided pursuant to Condition 8.4 and any other relevant information regarding water quality obtained by the Grantor, the Grantor may, after discussions with the Concessionaire and the relevant territorial local authorities require the implementation of further management measures for water quality throughout the concession period.

Stable Tributary

8.6 The Concessionaire shall implement a combination of sediment management practices and informal drainage channels to ensure that any sediment-laden road runoff, including flood flows, is directed away from the Stable Tributary.

8.7 No construction activity, including the location of machinery or equipment, shall occur within the Stable Tributary or within the riparian margin for this tributary as described in Condition 4.3.

Waterway Crossings

8.8 Construction of waterway crossings shall be undertaken during low flow conditions and, as far as practicable, should make use of pre-cast structural elements to minimise the quantities of wet concrete or cement based products required within waterway channels.

8.9 A bridge shall be used to cross Granite Creek. If a pier is required, this will be located out of the permanently wetted channel if technically feasible.

Contractors' Facilities

8.10 The Concessionaire shall maximise the vegetated buffer zone (with a minimum of 10 m) between the Waitaha River bank and the contractors' facilities and helicopter landing site located above Morgan Gorge.

8.11 The helicopter landing site at the headworks contractors' facilities site will be located at the maximum down-valley extent practicable, taking into account operational and safety requirements.

Waste - including Foulwater and Greywater Facilities

8.12 The concessionaire will ensure that amount of waste is kept to a minimum and ensure that no refuse material be stored or disposed of within any waterway or its associated riparian margins (including excess cement). All waste and materials will be stored above flood levels.

8.13 All foulwater and greywater facilities shall be developed in accordance with the requirements of the Building Act 2004 and the Building Code.

Potential Contaminants of Water

8.14 Sediment removed from any construction settling pond shall be disposed of outside the concession area at a designated disposal site.

8.15 The duration of time working in the channel during weir construction will be minimised so as to reduce the risk of flood damage and sediment/concrete-based contaminant release, as well as effects on koaro migration.

8.16 The use of concrete-containing materials (e.g. concrete slurry, shotcrete material) shall be carefully managed to ensure that contaminated water is not released into any tributary waterway or directly into the mainstem river.

8.17 The quantity of tunnel spoil to be temporarily stored at the powerhouse site, and the contractors' facilities areas, shall be no more than a maximum volume equivalent to 100 m^3. Tunnel spoil shall be regularly removed to the designated disposal site outside the concession area.

8.18 All runoff from hard surfaces (e.g. the access road, powerhouse building and associated grounds) shall be discharged to ground where site conditions allow.

8.19 Rock protection material for the armour-rock stopbank around the powerhouse site will be sourced from the powerhouse and tunnel excavations where suitable and available at the time required.

Erosion Control

8.20 The Concessionaire shall ensure that any structure designed to accommodate the discharge from the power station to the Waitaha River is constructed in such a way as to avoid scouring or erosion of the natural watercourse.

9 Construction Noise Management Plan

9.1 Prior to the commencement of construction, the Concessionaire shall submit a Construction Noise Management Plan to the Grantor for approval. The Construction Noise Management Plan shall be prepared by a suitably qualified acoustic noise consultant. The objective of the Construction Noise Management Plan is to minimise as far as practicable the effects of noise arising from construction activities.

9.2 The Construction Noise Management Plan shall include:

a) criteria and standards for construction noise;
b) general noise management methods;
c) specific noise management for helicopters movements, traffic, blasting, piling, the protection of recreational users and wildlife (including blue duck);
d) contingency measures;
e) training; and
f) complaints.

9.3 Once audited and approved by the Grantor, the Construction Noise Management Plan shall form part of the Concession, the Concessionaire shall follow the recommendations of that plan and shall not deviate from the plan without prior written approval of the Grantor.

9.4 Civil and construction works shall be undertaken only during daylight hours with the exception of emergencies and that the underground work associated with the tunnel construction is permitted at any time of the day or night.

10 Landscape Management Plan

10.1 Prior to the commencement of construction, the Concessionaire shall submit a Landscape Management Plan to the Grantor for approval. The overall objective of the Landscape Management Plan will be to use construction methods and materials where feasible that will minimise adverse visual effects on the environment, including reducing visual prominence and enabling recolonisation of vegetation.

10.2 The Landscape Management Plan is to include (but not be limited to) defined landscape goals, timelines and methods that will be followed by the Concessionaire to achieve that overall objective. A member of the NZ Institute of Landscape Architects shall draft the Landscape Management Plan in consultation with the Concessionaire and other relevant experts.

a) Specific Objectives for the Powerhouse Area are:
   i) to ensure that the footprint of the powerhouse is clearly defined and that works do not extend outside of these parameters;
   ii) that the design of the powerhouse and adjacent penstock and portal avoids imposing structures with as much as practical kept underground;
   iii) to minimise the removal of indigenous vegetation; and
   iv) to ensure that a Landscape Planting Plan is developed incorporating the requirements of the Boffa Miskell: Natural Character, Landscape, and Visual Amenity Effects Report and in particular Part 6.2 of that report.

b) Specific Objectives for the Intake Area are to:
   i) avoid significant cuts and battered slopes for access roads, including avoiding their proximity to river bank features and keeping works in the bed of the river to the minimum required to construct and maintain the road;
   ii) ensure that the intake structures intersect with the existing topographic features and that appropriate cliff stabilisation measures are sensitively implemented; and
   iii) ensure that active and passive rehabilitation measures are effective, notably for the construction sites.

10.3 All structures and activities associated with the Scheme are to be constructed (and coloured) in a manner that is in keeping with their surroundings.

10.4 Once audited and approved by the Grantor, the Landscape Management Plan shall form part of the Concession, the Concessionaire shall follow the recommendations of that plan and shall not deviate from the plan without prior written approval of the Grantor.

11 Rehabilitation Management Plan

11.1 Prior to the commencement of construction, the Concessionaire shall submit a Rehabilitation Management Plan to the Grantor for approval. The Plan is to include (but not be limited to) defined rehabilitation goals, timelines and methods that will be followed by the Concessionaire to rehabilitate the site following construction activities.

11.2 Once audited and approved by the Grantor, the Rehabilitation Management Plan shall form part of the Concession, the Concessionaire shall follow the recommendations of that plan and shall not deviate from the plan without prior written approval of the Grantor.

11.3 The Concessionaire shall rehabilitate all areas (including all contractors' facilities and storage areas within the Concession area) not required for either the ongoing construction or operation of the Scheme following completion of construction within a time frame agreed to with the Grantor. This will include enabling of natural regeneration or supplementary planting with appropriate indigenous species through appropriate methods of ground preparation.

11.4 Rehabilitation to be supervised by a suitably qualified person approved by the Grantor (paid for by the Concessionaire). This person may be the Liaison Officer.

11.5 The Concessionaire must ensure that all surplus materials, structures, machinery and equipment are to be removed from the Site at the completion of construction works.

11.6 The Concessionaire shall provide a report on rehabilitation progress to the Grantor on an annual basis until the rehabilitation goals set out in the Rehabilitation Plan have been met.

12 Pest and Weed Control Management Plan

12.1 The Concessionaire shall provide a Pest and Weed Control Management Plan to the Grantor for approval prior to any work commencing.

12.2 This Management Plan shall include detailed methodology for pest and weed control management to reduce the risk of weed and pest incursion and to manage and suppress weeds and pests within the concession area and will include:

a) the monitoring of weeds establishment (in particular *Leycesteria formosa* but also for other woody species such as *Ulex europaeus*), with any necessary weed control undertaken as soon as practicable in the most effective season for best control results for the species concerned, and prior to plants attaining seeding maturity;
b) in agreement with the Grantor, predator control along the access route and around Scheme Infrastructure. Predator control shall target possums, feral cats, mustelids and rodents.

12.3 Once audited and approved by the Grantor, the Pest and Weed Control Management Plan shall form part of the Concession, the Concessionaire shall follow the recommendations of that plan and shall not deviate from the plan without prior written approval of the Grantor.

12.4 The Concessionaire must ensure that all machinery is cleaned (water blasted) before entering the site. For the purpose of this condition, the site entrance shall be taken as the contractors' facilities on the north bank of Macgregor Creek.

12.5 The Concessionaire shall ensure that all gravel, fill or other material brought onto the Site comes from a weed free source.

12.6 The Concessionaire must comply with the Didymo (*Didymosphenia geminata)* prevention and cleaning protocols as set out in Schedule # before and after contact (including people, equipment, clothing, footwear and other items) with any waterway.

12.7 The Concessionaire shall comply with all guidelines and notices put out by Biosecurity New Zealand regarding measures to avoid spreading the pest organism *Didymosphenia geminata* (refer to www.biosecurity.govt.nz/didymo).

13 Safety

13.1 Prior to the commencement of construction, the Concessionaire shall submit to the Grantor an independently audited Safety Plan which meets the requirements of Conditions ## of the General Conditions *(cross reference to these)*. The Concessionaire must comply with and keep that document in force during the term of this concession.

13.2 The Concessionaire shall produce a fire plan which meets the approval of the Grantor prior to commencing construction on the Site. No fires are to be lit on the Site and extreme care is to be taken with equipment likely to start fires. Full fire extinguishing equipment is to be kept on the Site at all times during construction.

14. Fuel

14.1 The Concessionaire and its contractors must ensure that any refuelling vehicle carries a spill kit of loose absorbent material at all times, to absorb spilled fuel. In the event of a spill, the absorbent material shall be laid immediately over the site of the spill, and every practical step taken to contain the fuel. All contaminated soil must be removed from the site and disposed of in an environmentally safe manner. The Concessionaire must immediately report all fuel spills over 1 litre to the Grantor.

14.2 Machinery with fuel or oil leaks shall not be used onsite.

14.3 Any diesel storage tanks (maximum size 1250 litres) are to be bunded when onsite. The bund shall have a capacity of 110% of the fuel tank volume). The tanks and bunded area shall not be located any closer than 10 metres to any waterway and shall be located outside of any large flood event flow path.

14.4 Refuelling shall not take place within 10 metres of waterways.

14.5 The Concessionaire shall consider the feasibility and use of environmentally aware hydraulic fluids (based on vegetable products rather than petroleum-based products).

15 Protection of Terrestrial and Aquatic Fauna

15.1 The Concessionaire shall ensure that their agents, servants, contractors, employees or invitees do not take dogs onto the Land unless authorised by the Grantor for environmental monitoring purposes e.g. locating blue ducks.

15.2 Subject to agreement of the Grantor, the Concessionaire shall install “no dogs allowed” signs for general public accessing the area in which the scheme is located. The most suitable location of any signs will form part of the agreement.

15.3 The Concessionaire shall ensure all food and rubbish arising from construction and operational activities is collected and removed from the site promptly.

15.4 The Concessionaire must train staff and contractors of the need to maintain appropriate road speed limits and shall set appropriate road speed limits (30 -50 km/hr) to minimise potential road deaths of birds.

15.5 The Concessionaire will ensure lights are turned off unless essential for operational and safety purposes during both construction and operational periods.

15.6 Where external sensor lights are installed permanently at the powerhouse/intake site these shall incorporate full cut-off or shielded light fixtures to prevent light scattering and use lighting that produces light at one wavelength, but emit no UV.

15.7 The intake weir shall be designed in consultation with the appropriate specialists to allow for:

a) koaro passage in and out of Kiwi Flat while preventing trout and other fish species from accessing Kiwi Flat; and
b) blue duck duckling access.

Lizards

15.8 The Concessionaire shall advise the Grantor should any gecko/skink be discovered during construction activities. The Concessionaire will apply for the necessary wildlife permit required for collection of reptiles prior to construction so that any gecko/skink may be collected and handed to the Grantor.

Aquatic Ecology

15.9 The tailrace channel will be designed, in consultation with a suitably qualified ecologist, to reduce suitable trout refuge areas (e.g. large boulders) so that it is not conducive to good adult trout habitat.

Blue Duck

15.10 Unless required for operational, monitoring and safety reasons, helicopters servicing the scheme shall:

a) avoid using the Waitaha River as a helicopter flight path between Macgregor Creek and the Morgan Gorge intake site contractors' facilities, and fly as far as practicable away from both Douglas Creek Confluence and Morgan Gorge exit; and
b) avoid helicopters flying up-valley of the Morgan Gorge intake site contractors' facilities**.**

15.11 Prior to any rock blasting the Concessionaire shall undertake a visual inspection to ensure that blue ducks are not present within or about the entrance to Morgan Gorge or within the potential fall zone.

16. Aircraft Access

16.1 Aircraft access is permitted with authorised Aircraft Concessionaires only.

17.0 Recreational Use

17.1 During the construction period, the Concessionaire shall provide information on construction activities that may affect recreational users within the area surrounding the Construction Footprint. This information shall be made available on the Westpower website, and on appropriately located signage approved by the Grantor. The information shall include:

a) a description of the type, timing sequence and location of construction activities;
b) potential hazards (including in-river hazards) arising from construction activities, including advice on avoiding hazards and construction activities generally; and
c) any effects on the flow regime.

17.2 Subject to the agreement of the Grantor, the Concessionaire shall provide alternative track access on the true right of the Waitaha River for recreational visitors between Macgregor Creek and Kiwi Flat. This shall be provided and maintained at the Concessionaire's expense for the duration of the Concession, and routed to avoid the powerhouse site construction area.

17.3 The downriver face of the weir shall be designed to allow kayaking access into Morgan Gorge. The Concessionaire will consult with Whitewater New Zealand on the development of the weir design.

17.4 The Concessionaire shall consult with Whitewater New Zealand on the potential for developing a regime of ceases to abstraction to provide natural flows in Morgan Gorge, to support a continued kayaking opportunity in Morgan Gorge.

17.5 Once the Scheme is operational, the Concessionaire shall provide real-time flow data and camera footage of the Waitaha River at the intake location on its website. That information shall be available for kayakers, other recreational visitors and the general public to view.

18 Environmental Monitoring

18.1 Prior to the commencement of construction, the Concessionaire shall submit an Environmental Monitoring Plan to the Grantor for approval. This plan shall detail the Concessionaire's programme for monitoring compliance with all conditions of this concession, including monitoring of compliance of all approved management plans forming part of this concession.

18.2 The Environmental Monitoring Plan shall specify the frequency of monitoring, timing of monitoring, review of monitoring, actions required if the monitoring determines an adverse effect.

18.3 Once audited and approved by the Grantor, the Environmental Monitoring Plan shall form part of the Concession, the Concessionaire shall follow the recommendations of that plan and shall not deviate from the plan without prior written approval of the Grantor.

18.4 The Concessionaire shall prepare and submit annually to the Grantor a report detailing the results of the monitoring as required as part of the Environmental Monitoring. The report shall also include an assessment of the results and if appropriate, make recommendations to the Grantor with respect to the outcomes of the monitoring.

Infrastructure

18.5 The Concessionaire shall undertake minimum monthly monitoring of weirs, races, roads and tracks, water tables, culverts and pipelines for signs of erosion, blockages, leakages etc. This will be included as part of the routine maintenance Schedule of the Scheme.

Water

18.6 The Grantor shall review water monitoring requirements in consultation with the Concessionaire and the West Coast Regional Council within 6 years of the commencement of water diversion, and every three years thereafter.

Take, Diversion and Use

18.7 The Concessionaire shall install a continuous flow monitoring device that is located below the intake. An electronic copy of these records shall be provided to the Concessionaire at the end of each calendar month in the format of flow rate, date and time.

18.8 The Concessionaire shall measure and record daily totals of water abstraction calculated from the power output. A copy of these records shall be provided to the Grantor annually.

Stable Tributary - Water Quality

18.9 The Concessionaire shall monitor the water quality of the Stable Tributary during the construction phase for pH and sediment (e.g. measures such as total suspended solids, turbidity, and water clarity) to ensure that water quality within the waterway is not reduced through construction activities.

Fine Sediment - Waitaha River

18.10 The Concessionaire shall establish a programme to monitor any discernible accumulation of fine sediment within the abstraction reach (i.e. between Morgan Gorge and the tailrace discharge point) due to residual flow or flushing of settling basins once the Scheme is operational. The monitoring will be by visual inspection of the channel margins downstream from Morgan Gorge, for example, weekly during periods when for example more than 2 weeks passes without a fresh in the river.

Fish - Koaro

18.11 The Concessionaire shall undertake annual monitoring for the initial five years post-completion of Scheme construction for the following purposes:

a) to record koaro passage at the weir; and
b) to confirm that salmonids and longfin eels have not gained access to Kiwi Flat and its tributaries.

18.12 The Concessionaire shall undertake monitoring to ascertain:

(a) when peak koaro larval drift occurs (from at least the Kiwi Flat 'Stable Tributary') and the proportion of these larvae being diverted into the turbines; and
(b) (dependent on these findings), the injury/mortality rate of larvae passing through the turbines.

18.13 The Concessionaire shall undertake monitoring once the tailrace is constructed and operational to quantify fish abundance within the tailrace. If monitoring reveals that a considerable number of fish are entering the tailrace then some form of a trap and transfer system or guidance system may be required, at least during peak fish migratory periods.

18.14 Within the first year of operation of the Scheme the Concessionaire shall undertake monitoring to ascertain the level of fish stranding (if any) due to sudden flow changes arising from the operation of the Scheme. The results of this monitoring will be used to inform the concessionaire as to whether further management of ramping rates is required, in terms of fish stranding management, during planned Scheme maintenance activities.

Blue Duck Population

18.15 During the month of April in each year of construction and for 3 years post construction the Concessionaire shall undertake monitoring of the blue duck population for the following three parameters:

a) total numbers;
b) the presence of pairs; and
c) the presence of juveniles.

18.16 Monitoring of the blue duck population under 18.15 shall be undertaken at the following sites:

a) from (and including) Kiwi Flat to Douglas Creek; and
b) the Amethyst Ravine.

18.17 If monitoring under Conditions 18.15 and 18.16 shows an overall decline in the blue duck population within the site set out in Condition 18.15(a) compared to pre-construction monitoring undertaken in Conditions 4.8 and 4.9(a) and where during the corresponding period:

a) stoat numbers over the period are low; and
b) there is not a corresponding decline in adult abundance at Amethyst Ravine;

the Concessionaire, where approved by the Grantor, will review/modify the Pest and Weed Control Management Plan (Condition 12.1) to either institute predator control (at Kiwi Flat and/or Amethyst Ravine), or implement whio operation nest egg (WHIONE), in order to ensure pre-construction population levels established through Conditions 4.8 and 4.9(a) are maintained.

18.18 To inform decision making under Condition 18.17, the Concessionaire will seek information on rimu fruiting and stoat populations in podocarp forest in central Westland (DOC), and on pest control undertaken in the Waitaha Valley (TBfree). This information, together with hydrological information collected by the Concessionaire at Kiwi Flat, will be used for the purpose of assessing the major external environmental variables which are unrelated to the Scheme and that may impact on blue ducks in the Scheme area.

Blue Duck (Knowledge Improvement)

18.19 During construction the Concessionaire shall:

a) record any observations of blue ducks at the Morgan Gorge headworks site and within the construction area; and
b) collect data of the location, timing and extent of principal noise and/or disturbance events at the Morgan Gorge headworks and contractors' facilities site (helicopters, blasting, heavy machinery).

18.20 Once the Scheme is operational, the Concessionaire will record any observations of blue duck made during maintenance/site visits and keep a record of the visits

Weeds

18.21 The concessionaire will undertake post construction weed monitoring on:

a) an annual basis during use and for a minimum of 5 years after decommissioning of the temporary access road to and including the contractors' facilities area at the intake site; and
b) an annual basis within and for the duration of the concession at all other areas of the Concession Area.

19.0 Geotechnical

19.1 The Concessionaire is responsible for the structural integrity and maintenance of all structures or development activities associated with the Scheme.

19.2 The Concessionaire shall either at its sole cost meet all responsibilities and requirements, or reimburse the Grantor in respect of any costs of it meeting any responsibilities or requirements, under either the Building Act 2004 or the Resource Management Act 1991, in respect of any dam and weir structures associated with the concession activity, and will at its sole cost meet all statutory, regulatory of common law responsibilities, requirements or legal obligations arising in relation to such facilities, and indemnify and reimburse the Grantor or the Department of Conservation in respect of any costs or liabilities arising out of its statutory, regulatory or common law responsibilities, requirements or legal obligations in relation to such facilities.

10. STATUTORY PROVISIONS

10.1 CONCESSION APPLICATIONS AND THE CONSERVATION ACT 1987

The consideration and granting of an application for concession by the Minister is undertaken pursuant to *Part 3B Concessions* of the Conservation Act 1987 (**Act**).

The information to be supplied in an application for concession is set out through *Section 17S Contents of Application* of the Act. Table 2 of Section 1 of this application provides an overview of the Sections of this application with respect to S17S matters. It is therefore not proposed to set out all of the matters under S17S here as they are provided for throughout the application.

Section 17T of the Act sets out the process for every complete application received by the Minister. At Section 17T(2) the Act states:

> *(2) If the Minister is satisfied that the complete application does not comply with or is inconsistent with the provisions of this Act or any relevant conservation management strategy or conservation management plan, he or she shall, within 20 working days after receipt of the application, decline the application and inform the applicant that he or she has declined the application and the reasons for declining the application.*

Section 17T(2) is discussed in Section 13 Conclusion of this application.

Section 17U of the Act sets out a range of matters which must be considered by the Minister for any application for concession. These matters are discussed at 10.2 below.

Section 17W of the Act requires consideration of the "Relationship between concessions and conservation management strategies and plans" and states at Section 17W(1):

> *(1) Where a conservation management strategy or conservation management plan has been established for a conservation area and the strategy or plan provides for the issue of a concession, a concession shall not be granted in that case unless the concession and its granting is consistent with the strategy or plan.*

The West Coast Conservation Management Strategy is discussed at 10.2.3.5 below. There are no relevant conservation management plans for the area.

10.2 MATTERS TO BE CONSIDERED BY MINISTER - SECTION 17U

10.2.1 MATTERS TO WHICH REGARD SHALL BE HAD

Section 17U(1) requires, in considering any application for concession, that the Minister have regard to a number of matters. This application provides for the following relevant matters:

- *17U(1)(a) - nature of the activity and type of structures/facilities*
- *17U(1)(b) - effects of the activity, structure or facility*
- *17U(1)(c) - measures that can reasonably and practicably be undertaken to avoid, remedy or mitigate any adverse effects*
- *17U(1)(d) - information contained in an application*
- *17U(1)(e) - a relevant environmental impact assessment, including any audit or review.*

These matters have been attended to throughout the sections of this application. Table 2, of Section 1 of this application provides an overview of the sections of this application with respect to S17U matters.

The purpose of this section is to canvas those matters which require assessment with regard to statutory and policy matters taking into account the detail provided throughout the sections of the application.

Matters included within 17U(1)(f) and (g) are process oriented and will be attended to, as required, through the course of processing and consideration of the application.

10.2.2 DECLINING AN APPLICATION

Section 17U(2) provides that the Minister may decline an application if it is considered that:

(a) the information available is insufficient or inadequate to enable him or her to assess the effects (including the effects of any proposed methods to avoid, remedy, or mitigate the adverse effects) of any activity, structure, or facility; or

(b) there are no adequate methods or no reasonable methods for remedying, avoiding, or mitigating the adverse effects of the activity, structure, or facility.

It is considered that the information contained in the application is adequate and sufficient for the purpose of assessing environmental effects of the Scheme.

A comprehensive assessment of potential adverse effects has been undertaken as part of planning for the location and design of the Scheme. Where possible features of the Scheme have been designed to avoid or mitigate potential effects, e.g. location of intake, access road alignment in relation to the Stable Tributary and the development envelope approach. The application also suggests a suite of conditions which reflect expert advice in a range of areas to ensure that potential effects are avoided, remedied or mitigated. A major component of these conditions is the development of management plans for a range of issues. Westpower, through successfully developing the Amethyst Hydro Scheme on conservation land, has experience with the development and implementation of such plans.

Through the expert assessment of effects it is apparent that there are effects, relating to landscape and recreation matters, which cannot be avoided, remedied or mitigated. This is from the point of view that the Scheme introduces structures into the environment which would not naturally occur. The actual physical effect of this decrease with distance from the Scheme and associated infrastructure, however the presence of the Scheme may change the perception of the area for some users of the area. Such effects do not mean that the Scheme is inappropriate at this location, rather that is a decision to be made considering the matters on a holistic basis.

For example, whilst recognising that there will be a 'high' landscape effect at the local level arising from the Scheme, the conclusion of the Landscape Report is that the Scheme is still appropriate in this setting. Likewise the Recreation Report concludes that there will be a 'high' residual net effect in Kiwi Flat and the abstraction reach from the Scheme in terms of the introduction of structures and a managed flow regime. Having said that, the report concludes that the river including the Morgan Gorge, will retain its ability to challenge highly skilled kayakers, albeit with additional restrictions in terms of the potential need to confer with Westpower in terms of flow in the abstraction reach. At the regional level the effect on West Coast recreation and tourism will be very slight due to the high number of alternatives available for all activities affected by the Scheme and the relatively low level of use of the Kiwi Flat area.

10.2.3 PROVISIONS OF THE ACT AND PURPOSE FOR WHICH THE LAND IS HELD

In considering any application for concession Section 17U(3) of the Act states that:

> *The Minister shall not grant an application for a concession if the proposed activity is contrary to the provisions of this Act or the purposes for which the land is held.*

10.2.3.1 CONSERVATION ACT 1987

According to its long title, the Act has been developed, "*to promote the conservation of New Zealand's natural and historic resources*".

'*Conservation*' is defined in Section 2 of the Act as:

The preservation and protection of natural and historic resources for the purpose of maintaining their intrinsic values, providing for their appreciation and recreational enjoyment by the public, and safeguarding the options of future generations.

In regard to '*conservation*' the terms '*preservation*' and '*protection'* have the following meanings per Section 2 of the Act:

Preservation - in relation to a resource, means the maintenance, so far as is practicable, of its intrinsic values

Protection - in relation to a resource, means its maintenance, so far as is practicable, in its current state; but includes—
(a) its restoration to some former state; and
(b) its augmentation, enhancement, or expansion'

10.2.3.2 THE DEPARTMENT OF CONSERVATION

To achieve the intended outcome/purpose of the Conservation Act 1987 (*the Act*), the Department of Conservation (**DOC)** was established.

Section 6 of the Act sets out the functions of DOC.

In undertaking its functions DOC work with a range legislation, plans, policies and strategies. Of relevance to this application are the:

- Conservation Act 1987 (**Act**);
- Conservation General Policy 2005 (**CGP**); and
- West Coast Conservation Management Strategy 2010-2020 (**CMS**).

10.2.3.3 PURPOSE FOR WHICH THE LAND IS HELD

The Scheme components subject to this application are located entirely within the Waitaha Forest Conservation Area. This area is defined at *Section 5, Vol. 2* of the CMS as:

Land Unit No	Land Unit Name	Land Status	Area (ha)
I34011	Conservation Area - Waitaha Forest	Stewardship Area - Section 25 Conservation Act 1987	30796.4

The management of land held as Stewardship Area under the Act is set out in Section 25, which provides that:

Every Stewardship area shall so be managed that its natural and historic resources are protected.

In regards to this management requirement the following definitions are provided in the Act,
Natural resources means -

(a) plants and animals of all kinds; and
(b) the air, water, and soil in or on which any plant or animal lives or may live; and
(c) landscape and landform; and
(d) geological features; and
(e) systems of interacting living organisms, and their environment;
and includes any interest in a natural resource.

Historic resource means a historic place within the meaning of the Historic Places Act 1993; and includes any interest in a historic resource.

Protection has the same definition as set out in 10.2.3.1 above.

In considering the purpose for which the land is held it is also relevant to consider *Part 4 Specially Protected Areas* of the Act. This Part of the Act provides for the gazettal of areas where specific protection or

preservation measures are required to conserve high natural and heritage resource values. These Specially Protected Areas include:

- Wetland Areas notified to the Ramsar Secretariat *(Section 18AB)*
- Conservation Parks *(Section 19)*
- Wilderness Areas *(Section 20)*
- Ecological Areas *(Section 21)*
- Sanctuary Areas *(Section 22)*
- Watercourse Areas *(Section 23)*
- Amenity Areas *(Section 23A)*
- Wildlife Management Areas *(Section 23B)*

The Scheme is not located within any Specially Protected Area gazetted under *Part 4* of the Act.

For completeness, and in assessing the status/purpose of the area in which the Scheme is to be located, the Waitaha River is not subject to any Water Conservation Order established under the RMA.

In regard to Stewardship Areas the emphasis in the Act is on management of the area to protect the natural and historic resources. In this regard, protection means to maintain, as far as is practicable, the resource in its current state.

Westpower has undertaken a range of expert assessments to identify natural heritage values and implement a range of measures to avoid, remedy or mitigate potential effects. These measures have been provided for either through the design, layout and location of the Scheme, or through a suite of suggested conditions. The various reports have identified a range of high natural values but have in regard to the majority of flora and fauna, including aquatic ecology, matters determined that it is possible to avoid, remedy or mitigate potential effects to a no more than minor degree. In the case of blue duck a monitoring programme, with specific response triggers for possible monitoring outcomes, is proposed to ensure that there are no adverse effects on the blue duck population as a result of the Scheme.

The exception, with regard to potential effects, arises with respect to landscape and recreation matters. The assessments of effects related to these matters both raise high levels of potential effects. These effects principally arise from the fact that there will be a change to the existing environment from one which does not contain the Scheme structures to one which does (both Landscape and Recreation) and that there will be a change in flow in the abstraction reach which will change the nature of the kayaking opportunity in that reach (Recreation). In both instances the actual effects are localised and, whilst there may be some wider perception of effects on the River for some users of the area, do not raise actual physical effects on the natural resources of the river above Kiwi Flat and below the Douglas Creek reach or in the wider Stewardship Area within which the Scheme is located.

In regard to the issue of structures and development associated with the Scheme all practicable steps have been taken to avoid or mitigate effects, including location and design. From a landscape perspective it is concluded that even with a high level of local effect the Scheme is not inappropriate at this location. From a recreational perspective whilst the structures will be present and the flow below the weir changed in nature (i.e. from natural to controlled) it is proposed to provide, in the design of the weir, for continued access into Morgan Gorge for kayaking opportunities. Westpower is also proposing in the suite of suggested conditions to provide, subject to DOC approval, alternate foot access for recreational users which will be to an improved standard over the access currently available. This will also make portaging for kayakers easier than is currently the case.

In terms of the change from a natural to a controlled flow in the abstraction reach, again, this is a change that cannot be avoided as it will remain for the life of the Scheme. However a kayaking opportunity, whilst

changed, will remain and the suite of suggested conditions includes consultation in regard to developing a system of ceases to abstraction to provide natural flows in Morgan Gorge to support a continued kayaking opportunity in the Gorge. It is also proposed to provide real-time flow data, and camera footage at the weir, on the Westpower website for use by recreationalists who may be considering using the area. There will be no direct adverse effects of the Scheme above Kiwi Flat (including the Waitaha Gorge). The Recreation Report makes the conclusion that the scale of significance of the kayaking opportunity on the river relates as much to the West Coast Complex of kayaking opportunities. At the regional level the report concludes that, "*the effect of the Scheme on West Coast recreation and tourism will be very slight due to the high number of alternatives available for all activities affected by the Scheme and the relatively low level of use of the Kiwi Flat area. The West Coast will retain its international reputation as a challenging kayaking setting with the Scheme in place, and the Morgan Gorge (and the remainder of the River) will retain its ability to challenge highly skilled kayakers, albeit with additional restrictions on its use due to the need to confer with a management authority (Westpower Ltd) if a cease to abstraction is required to provide a natural flow.*"

It is important to note when considering potential recreation issues/effects in relation to the protection of natural and historic resources that recreation is not a natural or historic resource, as defined in the Act. Rather recreational opportunities are derived from the natural and historic resources, and can themselves have impacts on those resources. This is not to say that recreational issues are to be discounted, rather recreational opportunities are to be considered holistically, and in light of DOC conservation management Objectives and Policies and the "Outcomes" expected for any 'Place' in this regard. This matter will be discussed later in this section in regard to the CGP, the CMS and the envisioned "Outcomes" for the 'Hokitika Place' relating to recreational opportunities.

10.2.3.4 CONSERVATION GENERAL POLICY 2005

Section 17A of the Act sets out the linkage between general conservation policies, conservation management strategies and the management and administration of conservation areas and natural and historic resources by DOC. Section 17A states:

Subject to this Act, the Department shall administer and manage all conservation areas and natural and historic resources in accordance with:

(a) statements of general policy approved under section 17B or section 17C; and

(b) conservation management strategies, conservation management plans, and freshwater fisheries management plans.

The CGP provides guidance for the implementation of the Act and other conservation related legislation. Any Conservation Management Strategies and Plans prepared under the Act must be consistent with the CGP. The CMS at *Objective 1* of *Section 3.5 Authorised Uses of Public Conservation Lands* seeks:

> *To implement Conservation General Policy 2005 and General Policy for National Parks 2005 when considering applications for authorisations on public conservation lands and waters.*

The CMS has been prepared in accordance with the CGP and it can therefore be considered that attendance to Objective and Policies in the CMS will also provide for the majority of Policies in the CGP. There are however some Policies in the CGP which remain relevant and are summarised and discussed below.

CGP Policy 4.5 - Geological features, Landforms and Landscapes.

Policy 4.5(b) states that:

> *Activities which reduce the intrinsic values of landscape, landform and geological features on public conservation lands and waters should be located and managed so that their adverse effects are avoided or otherwise minimised.*

Of relevance to Policy 4.5(b) the term *'Intrinsic value'* is defined in the CGP as:

> *A concept which regards the subject under consideration as having value or worth in its own right independent of any value placed on it by humans.*

Westpower has undertaken an expert landscape assessment to understand the natural values of the area in which the Scheme is to be located. It is the conclusion of that assessment that the landscape within which the Scheme is located would be classified as an outstanding natural landscape and the Morgan Gorge an outstanding natural feature. The report concludes that while there will be a moderate to high level of effects on natural character, landscape and visual amenity at the local level, due to the introduction of structures, the underlying values which make the landscape outstanding, and Morgan Gorge an outstanding natural feature, will be maintained. Ultimately it is concluded that the Scheme is not inappropriate to the location and landscape within which it is located with respect to natural character, landscape and visual amenity.

The CMS, and Landscape Report, note the Waitaha Hot Springs at the outlet of Morgan Gorge. The Waitaha Hot Springs are listed, at Appendix 6 of the CMS, as a site of "*Regional Scientific, Educational or Aesthetic Importance*" that can be *"Moderately vulnerable to human modification".* These hot springs, as a geological feature, are outside the project footprint.

It is therefore considered that the Scheme and concession, subject to the suggested conditions, is consistent with this Policy.

CGP Policy 4.6 - Ecosystem services

Policy 4.6(a) states:

> *Activities on public conservation lands and waters should be planned and managed in ways which avoid or otherwise minimise adverse effects on the quality of ecosystem services.*

Westpower have undertaken a range of expert assessment and modelling to consider ecosystem matters. The outcomes of these various assessments have been factored in to the design, layout and suggested concession conditions in order to avoid, remedy or mitigate potential effects on ecosystems. It is considered that the Scheme and concession, subject to the suggested conditions, is consistent with this Policy.

CGP Policy 8 - Natural Hazards

Policy 8(a) states:

> *Management for natural hazards on public conservation lands and waters:*
> *i. should be undertaken with minimal interference to natural processes, natural resources, and historical and cultural heritage;*
> *ii. should be consistent with the purpose for which the land is held; and*
> *iii. will include an assessment of the risks to people, places and property.*

Westpower has considered natural hazards in the design and layout of the Scheme (refer Appendices 7 and 8). The Alpine Fault runs through the area, to the north of the Scheme, and the siting of the powerhouse has been finalised taking into account the location of the fault rupture zone. The Geological Feasibility Report (Appendix 8) concludes that, "*There are significant risks to the Scheme from natural hazards in the area, in particular the future possibility of an Alpine Fault earthquake during the lifetime of the Scheme. However, because the proposal does not involve the storage of significant amounts of water the proposed construction of the various scheme components will not create additional seismic hazards or seismic risks to either the local environment or river users.*"

Westpower proposes to manage planned starting and stopping of the Scheme using appropriate ramping procedures to prevent a sudden increase in flow in the main stem of the river or, in the case of starting, increased flow from the tailrace. Procedures will also be put in place to manage situations which may result in the Scheme shutting down without notice, e.g. automatic emergency shutdowns. Effects of stops and starts on river flows will be dependent on the volume of water in the river and the volume diverted, and will be

closely monitored during commissioning and the initial operational period. The information gained from this monitoring will be used to determine the appropriate safety procedures and level of response to manage these situations and ensure public safety.

It is also proposed during construction of the Scheme to provide information to keep the public and users of the area informed of progress. To achieve this, Westpower's intention, as set out in the suggested conditions, is to provide information on its website with regard to:

- description of the type, timing sequence and location of construction activities;
- potential hazards (including in-river hazards) arising from construction activities, including advice on avoiding hazards and construction activities generally; and
- any effects on the flow regime.

Timing of proposed construction is required to be reasonably flexible to allow for works within the river when flows are at their lowest, and flood flows potentially less frequent. When constructed the weir will not prevent flood flows or the distribution of sediment down the river.

Various protection works are required in regard to waterways however these will not be out of character with those that may be found throughout the region, and will be designed to suit the purposes for which they are required. Works around Alpha Creek are designed to confine flood flows and debris within the channel and will not alter the frequency, volume of water or debris carried down the creek during flood flows. A stopbank is proposed to protect the powerhouse from larger floods and the potential effect of this on the river and the opposite bank has been assessed by NIWA. It is considered in that regard that there will be a no more than minor change to the natural processes.

Accordingly whilst there will be some larger works, i.e. powerhouse stopbank and Alpha Creek, these will not change the processes occurring in those waterways to any more than a minor degree. Each waterway will still carry flood waters, sediment and debris and the pattern of flooding will not be altered to a more than minor degree.

The Scheme and concession, subject to the suggested conditions, is consistent with this Policy although Alpha Creek flood flow paths will be more defined than may naturally be the case.

CGP Policy 9.1 - Planning and management for people's benefit and enjoyment

Policy 9.1(a) states:

> *Recreational opportunities will be provided on public conservation lands and waters. Where provided, they should be consistent with the values of and outcomes planned for places.*

As discussed above recreational opportunities are to be consistent with the values and "Outcomes" planned for 'Places'. The Scheme is located in the 'Hokitika Place' which has been established through the implementation of the CMS. This is a relevant matter given the potential higher levels of effects highlighted in the Recreation Report, particularly in regard to kayaking opportunities. The report concludes that opportunities will remain for kayaking after the Scheme is developed, albeit in a changed environment in regard to the Morgan Gorge opportunity and the abstraction reach. The Recreation Report highlights the potential incompatibility between recreation management (backcountry-remote zone) on the one hand and a hydro-development on the other. Having said that the report goes on to conclude that the "Outcomes" set out in the CMS for the 'Hokitika Place' will still be achieved with the Scheme in place.

As discussed this matter is not so much related to an effect on the natural resource but to effects on other users of the natural resources and, in this case, whether there will be lost recreation opportunities as a result. These matters will be discussed further in relation to the provisions of the CMS. It is considered that the Scheme and concession, subject to the suggested conditions, is consistent with this Policy.

CGP 9.5 - The use of vehicles and other forms of transport

Policy 9.5(a) states:

> *The use of vehicles and any other forms of transport should be compatible with the statutory purposes for which the place is held, or be necessary to enable the Department to perform its functions.*

Helicopters are an important component of the construction, and from time to time maintenance of the Scheme. Vehicles will also be required for construction and maintenance, and will involve an initial intense period of traffic movement which will reduce to low levels during operation. These matters will be discussed below in terms of the CMS, however it is noted that the CMS does provide for authorisation of aircraft and vehicular use of conservation land, subject to assessment on a case by case basis. It is considered that the Scheme and concession, subject to the suggested conditions, is consistent with this Policy.

CGP Policy 11 - Activities Requiring Specific Authorisation

Policies 11.1(a)-(d) deal with all activities requiring specific authorisation, including concessions. These policies state that activities:

- will comply with, or be consistent with, the objectives of the relevant Act, the statutory purposes for which the place is held, and any conservation management strategy or plan;
- should where relevant avoid, remedy or mitigate any adverse effects (including cumulative effects) and maximise any positive effects;
- both the Department and concessionaires should monitor effects, including effects on public enjoyment, to inform future management decisions; and
- concessionaires are to be responsible for the safe conduct of their operations.

These matters are all considered, and discussed, throughout this application. Having said that, and as discussed elsewhere, there are residual effects from the Scheme with regard to the effect on landscape and recreation matters through the development of structures which cannot be avoided, remedied or mitigated. These potential effects do not automatically mean that the Scheme is inappropriate. It is not considered that the Scheme is contrary to the purpose for which the land is held, nor will the Scheme prevent the achievement of the desired "Outcomes" for the 'Hokitika Place'.

The matters contained in Policies 11.1(a)-(d) are to be considered in conjunction with specific policies for specific activities identified in the CGP. The identified activities include *Utilities*.

CGP Policy 11.3 - Utilities

Policy 11.3 states:

(a) *Utilities may be provided for on public conservation lands and waters where they cannot be reasonably located outside public conservation lands and waters, or if specifically provided for as a purpose for which the place is held.*

(b) When new utilities are installed or existing utilities are maintained or extended, they should be of a scale, design and colour that relates to, and is integrated with, the landscape and seascape.

(c) Public access to utilities may be denied where necessary for the protection of public safety or the security or competent operation of the activity concerned.

(d) Utilities should, wherever possible, be located in, or added to, an existing structure or facility and use existing access options.

(e) Utilities that are redundant should be removed from public conservation lands and waters and the site restored as far as practicable to a natural state to minimise effects on the landscape.

The CGP provides the following definition for *Utilities:*

> *Includes but not limited to: structures and infrastructure for telecommunications; energy generation and transmission; sewerage; water supply and flood control; oil and gas; roads and airstrips; hydrological and weather stations.* (emphasis added)

Policy 11.3(a) reinforces the consideration required under Part 3B (Section 17(U)(4)(a)) of the Act, which states:

> *The Minister shall not grant any application for a concession to build a structure or facility, or to extend or add to an existing structure or facility, where he or she is satisfied that the activity:*
>
> *(a) could reasonably be undertaken in another location that:*
> *(i) is outside the conservation area to which the application relates; or*
> *(ii) is in another conservation area or in another part of the conservation area to which the application relates, where the potential adverse effects would be significantly less; or....*

It is clear from Policy 11.3 that Utilities, including structures and infrastructure for energy generation and transmission, can be provided for on public conservation lands and waters.

Westpower, prior to making application for concession, has undertaken an analysis of options for development of a hydro-electric power scheme. Given the topography of the West Coast, and the overlying land tenure and extent of land owned and managed by DOC, all of the feasible options considered were located within or partly within the conservation estate. Accordingly it is not considered reasonable to locate the Scheme outside conservation land or waters. This assessment of options in terms of both the choice of, and location on, the Waitaha River included consideration of an option which created the least potential adverse effects given the nature of a hydro scheme.

The scale, design and colour of the Scheme have been the subject of specific landscape assessment to assist integration into the landscape. These matters have been taken into account in terms of location, design and suggested conditions relating to the Scheme and concession in order to avoid or mitigate effects. It is the conclusion of the Landscape Report that whilst there are some residual 'high' levels of effect from the establishment of the structures and Scheme, the Scheme is not inappropriate to the location with respect to natural character, landscape and visual amenity.

There will be parts of the operation which will require public access to be restricted, and this is not uncommon for such activities from a safety perspective. Such restrictions will not affect the ability for public access to and along the Waitaha River.

The road and transmission line are to be located within the same corridor, as far as is practicable, to reduce potential disruption and effects. Lines for transmission of electricity from the Scheme and electrical and communication lines to the Scheme will be located on the same structures to avoid duplication and minimise potential effects.

As noted in the Recreation Report, ultimately the key Scheme components (weir, diversion structure and powerhouse) could be removed if the Scheme was to become redundant.

Accordingly it is considered that the Scheme and concession, subject to the suggested conditions, is consistent with the CGP in regard to *Utilities*.

Conclusions in respect of Conservation General Policy

The CGP provides for *Utilities* to be established on conservation land and waters, and requires an analysis of effects and design of *Utilities* with particular regard to landscape matters (*11.3(b)*). This re-enforces the requirements of Part 3B of the Act in respect of concessions (i.e. matters to be considered when granting a concession).

The above assessment concludes that the Scheme and concession, including design, location and suggested conditions, is consistent with the CGP.

10.2.3.5 WEST COAST CONSERVATION MANAGEMENT STRATEGY 2010-2020

The CMS is an important matter in considering the application for concessions for the Scheme. This is for a number of reasons relating to:

- The management and administration by DOC of conservation areas and natural and historic resources as required, and discussed in 10.2.3.4 above, under Section 17A of the Act.
- Section 17W of the Act, which provides for the consideration of the consistency between concessions and conservation management strategies and plans and, relevant to this application, states at 17W(1):

  Where a conservation management strategy or conservation management plan has been established for a conservation area and the strategy or plan provides for the issue of a concession, a concession shall not be granted in that case unless the concession and its granting is consistent with the strategy or plan.

- Section 17T(2) which provides that the Minister shall decline an application for concession which is inconsistent with a conservation management strategy. Section 17T(2) states:

  If the Minister is satisfied that the complete application does not comply with or is inconsistent with the provisions of this Act or any relevant conservation management strategy or conservation management plan, he or she shall, within 20 working days after receipt of the application, decline the application and inform the applicant that he or she has declined the application and the reasons for declining the application.

There are no conservation management plans relevant to this application.

The CMS at Section 1.1 advises that:

> *This conservation management strategy establishes objectives for the integrated management of natural and historic resources, including species managed under a number of different Acts, and for recreation, tourism and other conservation purposes in the West Coast Tai Poutini Conservancy. It is the key conservation management tool which the Department uses to implement legal, policy and strategic direction. Each conservation management strategy is prepared with public participation.*

In achieving the management of natural and historic/cultural heritage resources and recreational and tourism opportunities within the Conservancy, over the 10 year period of the CMS, 7 land based 'Places' and 1 marine 'Place' have been established. The CMS advises that the boundaries of these 'Places' have been chosen for practical management reasons. Each of the 'Places' set a range of conservation "Outcomes" for the period (2010-2020). The "Outcomes" are topic/issue based descriptions of the anticipated results of implementing the CMS, and associated Objectives and Policies. These "Outcomes" relate to:

Outcome in 2020	**Section**	**Page**
Geodiversity, Landforms and Landscapes	4.2.6.3	241
Indigenous Biodiversity	4.2.6.4	241
Human History	4.2.6.5	244
Historical and Cultural Heritage	4.2.6.5	244
Cultural values of significance to Poutini Ngäi Tahu/Ngäi Tahu	4.2.6.6	245
People's benefit and enjoyment	4.2.6.7	246

The Scheme is located within the 'Hokitika Place' (see Section 4.2.6 *Desired Outcome for Hokitika Place*, page 238, of the CMS).

Section 3 of the of the CMS sets out the *Management Objectives and Policies* which seek to achieve the "Outcomes" for the Conservancy and the 'Hokitika Place'. Section 3 is divided into 6 matters relevant to this application:

Matter	Section	Page
Nature Heritage Conservation	3.3	55
Historical and Cultural Heritage	3.4	96
Authorised Uses of Conservation Lands	3.5	111
Peoples Benefit and Enjoyment	3.6	113
Other Use of Public Conservation Lands - Utilities	3.7.11	158
Other Management Responsibilities - Public Access	3.8.4	167

The Objectives and Policies from these sections, where relevant to this application, are discussed in the following paragraphs. This discussion includes, where appropriate, linkage to the "Outcomes" of the 'Hokitika Place'.

SECTION 3.3 NATURE HERITAGE CONSERVATION

3.3.2.3 Prioritising natural heritage work

Policy 1. *Natural heritage should be identified and its relative value assessed using standard criteria such as representativeness, viability, diversity, presence of threatened and/or taonga species and their habitat, intactness and natural landscape character.*

Whilst not a policy specific to considering the concession application this policy was used as a consistent basis for assessing the natural heritage values of a range of flora and fauna in the concession application area. Landscape assessment, including consideration of natural character and visual amenity, was undertaken using accepted standard practices to ensure a comprehensive, consistent and sound approach to the assessment. The work undertaken in developing the application has also enhanced the knowledge of natural values in the Waitaha Valley and may be of value to other DOC conservation management initiatives in the area.

This information also assists to achieve desired "Outcomes" for the West Coast Conservancy set at *Section 4.1* of the CMS, namely:

- *Identification and assessment of conservation values in 2020, and*
- *Proactive management of conservation values in 2020*

3.3.3.2 Maintenance and restoration of the indigenous natural character of ecosystems

Objective 1. *To maintain, and restore where practicable, the indigenous natural character of the full range of West Coast Te Tai o Poutini terrestrial, freshwater and marine ecosystems.*

Policy 1. *Management of threats to terrestrial and freshwater species, habitats and ecosystems across all public conservation lands on the West Coast Te Tai o Poutini should be prioritised, taking into account the need to:*

a) prevent the loss of indigenous species and the full range of their habitats and ecosystems;
b) maintain contiguous sequences of indigenous ecosystems (e.g. from mountains to sea);
c) maintain representative examples of the full range of indigenous ecosystems;
d) maintain populations of indigenous species, habitats and ecosystems with unique or distinctive values;
e) achieve recovery of threatened indigenous species (including their genetic integrity and diversity) and restore their habitats where necessary;
f) restore threatened indigenous ecosystems and connections between ecosystems where necessary;

g) maintain the ecological integrity of indigenous ecosystems consistent with the purposes for which the land is held;

h) protect recreational freshwater fisheries and freshwater fish habitats; and

i) achieve integrated management at priority sites.

In developing the Scheme, and concession application, Westpower have commissioned a range of expert assessments of indigenous flora and fauna i.e. vegetation, birds and bats, blue duck, lizard habitat, invertebrates, and aquatic ecology.

It is apparent from the reports that there are high natural values present within the application area, particularly in regard to indigenous fauna, and from an aquatic ecology perspective the particular values of the Stable Tributary for aquatic biodiversity. The Fish Report also highlighted the unusual situation where there are no trout above the Morgan Gorge.

These assessments have been used in considering the location and design of infrastructure, including two completely different intake location options on the river. The assessments have also been used to suggest a range of conditions/mitigation measures in the application which, if implemented, will minimise potential effects in regard to these matters.

The presence of blue duck/whio in the Scheme area[14] has been subject to particular consideration to ensure the population is maintained. As a precautionary measure a monitoring and response programme has been recommended and is included in the suggested conditions to ensure that there will not be adverse effects on the blue duck population.

There are no priority sites affected by this application.

Based on the conclusions of the expert assessments it is considered that the Scheme will not compromise the desired "Outcomes" for the 'Hokitika Place' with respect to indigenous biodiversity.

It is therefore considered that the Scheme and concession, subject to the suggested conditions, is consistent with this Objective and Policy.

3.3.3.3 Management of freshwater fisheries

Objective 1. *To prevent further extinctions of indigenous freshwater fish species and declines in species abundance and range.*

Policies 1. *Existing and potential threats affecting indigenous fish populations, including barriers to migration (see Policies 2-4), habitat degradation and loss (see Section 3.3.1.5), introduction of pest species (see Policy 9 and Section 3.3.1.5), and interactions between exotic fish, including sports fish, and indigenous fish (see Policy 9) should be addressed.*

2. *The Department should safeguard fish migration through application of the Freshwater Fisheries Regulations 1983 fish passage provisions, advocacy through local authority planning processes, and monitoring.*

4. *Where of benefit to native fish species, the Department should advocate for the removal of barriers or the installation of fish passes that allow native fish to travel both upstream and downstream, and monitor the effectiveness of such fish passes.*

9. *Where feasible, the eradication or containment of non-indigenous species in freshwater habitats with high indigenous freshwater fishery values should be encouraged.*

[14] In the Blue Duck report (see Appendix 13), 'Scheme area' in relation to blue ducks and their habitat is taken as the Waitaha River, its tributaries and riparian margins, and (where appropriate) the habitat of predators, from (and inclusive of) Kiwi Flat to below the Douglas Creek confluence.

Consideration of the potential effects of aquatic ecology has been a specific part of the development of the Scheme and concession application. Assessments have been undertaken in regard fish, benthic ecology and instream habitat flow and have been used in the design and layout of the Scheme, the setting of a residual flow, and the development of a suite of suggested conditions to avoid, remedy or mitigate potential effects.

In undertaking these assessments it has become apparent that whilst koaro are to be found above Morgan Gorge there are no trout present above the Gorge. There are therefore two potential effects in regard to the Objective and Policies which require attention. These are the:

- potential for koaro passage into Kiwi Flat to be blocked by the weir;
- potential for low flows in the abstraction reach to enable trout to move above Morgan Gorge and in to Kiwi Flat.

It is recommended through the reports, including the Blue Duck Report, that the weir be designed to both enable koaro passage over the weir whilst at the same time preventing the passage of trout over the weir. Monitoring annually, for a 5 year period post construction, is also suggested to ensure these design methods are achieving the desired results. Westpower has taken these recommendations into account, and these requirements are included in the attached suite of suggested conditions.

It has also been recommended through the Fish Report that, whilst probable that koaro larvae will pass through the turbines unharmed, monitoring of the proportion of larvae diverted through the turbines and (dependent on those findings) the injury/mortality rate be undertaken. Provision for this is included in the suggested suite of conditions.

Based on the conclusions of the expert assessments it is considered that the Scheme will not compromise the desired "Outcomes" for the 'Hokitika Place' with respect to indigenous biodiversity.

It is therefore considered that the Scheme and concession, subject to the suggested conditions, is consistent with the Objective and Policies.

3.3.3.5 Threatened species management

Objectives 1. *To prevent further extinctions or range contractions of indigenous species found on the West Coast Te Tai o Poutini.*

2. *To ensure, where practicable, that representative populations of all indigenous species have long term security in predominantly natural habitats within their natural range.*

Policy 3. *Work on threatened species should focus on preventing extinction and maintaining genetic diversity. Subsequent priorities should include progressively increasing the security, range and population size of species.*

Assessments undertaken in the development of the Scheme highlighted a range of species, both terrestrial and aquatic, with a range of conservation status. Examples include:

- nationally critical (long-tailed bat)
- nationally vulnerable (blue duck/whio)
- declining (koaro)
- not threatened (kereru/New Zealand pigeon)

All assessments have recommended mitigation measures to minimise potential effects on threatened species. The reports conclude that the scale, design and suggested mitigation will ensure that avoidance or mitigation of effects will be achieved. Westpower have taken these matters into account through the development of the Scheme in terms of design, layout and location and a suggested suite of conditions.

As discussed above specific expert assessment, the Blue Duck Report has been undertaken to ensure that effects on the local blue duck population are avoided, remedied or mitigated. A range of mitigation measures have been recommended and have been adopted in the suggested suite of conditions. The report concludes that, "*Provided the recommended mitigation measures in this report are adopted, while there will be some recognisably different blue duck habitats present in the Scheme area, it is anticipated those habitats will have the capacity to sustain the blue duck population in future, and adverse effects of the Scheme on blue ducks and their habitats are assessed as highly likely to be minor. A monitoring programme, with specific response triggers for possible monitoring outcomes, is recommended to assure there are no adverse effects on the blue duck population as a result of the Scheme.*"

Based on the conclusions of the expert assessments it is considered that the Scheme will not compromise the desired "Outcomes" for the 'Hokitika Place' with respect to indigenous biodiversity.

It is therefore considered that the Scheme and concession, subject to the suggested conditions, is consistent with the Objectives and Policy.

3.3.3.6 Biosecurity and pest management

Objective 1. *To protect natural heritage values from the adverse effects of unwanted organisms, invasive weeds and animal pests.*

Policy 3. *Public and resource user awareness of the adverse impacts of unwanted organisms on indigenous species and ecosystems, and of ways to avoid their introduction and spread, should be enhanced.*

Westpower, having successfully developed the Amethyst Hydro Scheme, is aware of the potential for particularly weeds to be spread during civil construction. Such issues were raised through a number of the expert ecological reports and suggested conditions, including the development of a weed and pest management plan, are included within the application.

Through assessment of potential effects on blue duck/whio it is apparent that existing predation is a major threat to the population within the Scheme area. Westpower is proposing to undertake local predator control which will assist with maintenance of the local population. Through the monitoring and response programme suggested in the suite of conditions in this application, whilst not considered likely, were the Scheme to be found to have had an effect on the blue duck population two potential response options are proposed. The first is to undertake further predator control in the area, whilst the second is to implement whio operation nest egg (WHIONE). The preferred approach to be adopted would be the subject of consultation and agreement with DOC.

Based on the conclusions of the expert assessments it is considered that the Scheme will not compromise the desired "Outcomes" for the 'Hokitika Place' with respect to indigenous biodiversity.

It is considered that the Scheme and concession, subject to the suggested conditions, is consistent with the Objective and Policy.

3.3.3.7 Ecosystem services and economic benefits

Objective 1. *To protect the quality of life sustaining ecosystem services.*

Westpower has recognised the need to maintain the life supporting capacity of the ecosystems within the Scheme area, and to this end commissioned a range of terrestrial and aquatic reports. This was particularly important in considering and determining a residual flow in the abstraction reach of the Waitaha River. The residual flow of 3.5 m^3/s was set to ensure the life supporting capacity of the river in the abstraction reach was maintained.

From an aquatic ecology point of the view the assessments confirm that the Scheme, with the suggested mitigation in place will retain the life supporting capacity of the freshwater ecosystems. Potential effects on

the Stable Tributary, a biodiversity 'hotspot', were raised and measures taken to avoid (access road alignment) and mitigate (sediment management). These matters are provided for in the suggested conditions accompanying this application.

In terms of blue duck/whio whilst there will be some recognisably different blue duck habitats present in the Scheme area, it is anticipated those habitats will have the capacity to sustain the blue duck population in future. In general effects on terrestrial ecosystems will be low due to the development and operation of the Scheme, given the scale, design and location of the proposal.

Based on the conclusions of the expert assessments it is considered that the Scheme will not compromise the desired "Outcomes" for the 'Hokitika Place' with respect to indigenous biodiversity.

It is considered that the Scheme and concession, subject to the suggested conditions, is consistent with the Objective.

3.3.4.3 Management of geodiversity and landscapes

Objective 1. *To protect geodiversity and landscapes from adverse effects of human use or management.*

Policies ***1.*** *The Department should seek to protect and preserve the natural character, integrity and values of landscapes, landforms, geological and soil features and processes in all aspects of conservation management.*

2. *Landscape assessments should be conducted on an as-needed basis, e.g. when considering proposals to develop utilities on public conservation land.*

The development of the Scheme and application has included the commissioning, by Westpower, of an expert assessment of potential effects on natural character, landscape and visual amenity values. In assessing the values of the area it has been concluded in the report that the area within which the Scheme is to be located is considered an outstanding natural landscape and the Morgan Gorge an outstanding natural feature.

The Scheme is essentially comprised of two distinct areas i.e. the powerhouse site and the intake site, which are linked by the underground tunnels. The Landscape Report advises that of the two areas of the Scheme the intake site is the most sensitive location. This is because it is located at the entrance to the Morgan Gorge, within the backcountry-remote setting, and separated to a greater degree from the modified lower valley. It is concluded that careful design will avoid more significant effects, with further design continuing to mitigate larger construction and permanent effects. A suite of conditions is included with this application which includes landscape management measures, and the development of a landscape management plan.

The CMS, and Landscape Report, note the Waitaha Hot Springs at the outlet of Morgan Gorge. The Waitaha Hot springs are listed, at Appendix 6 of the CMS, as a site of "*Regional Scientific, Educational or Aesthetic Importance"* that can be *"Moderately vulnerable to human modification".* These hot springs, as a geological feature, are outside the Scheme footprint and will remain intact with the introduction of the Scheme.

As a final conclusion the Landscape Report advises that:

"*The mitigation measures proposed, and the iterative design process, has enabled the Scheme to sit well within its landscape and respond to its setting and to acknowledge the outstanding landscape, natural character and visual amenity values the Upper Waitaha Catchment holds by avoiding potential major effects. Overall, it is considered that the Scheme is appropriate with respect to natural character, landscape and visual amenity despite the fact that at more local levels the natural character, landscape and visual amenity effects are assessed as being moderate to high .... . At a broader scale the effects are low .... .*"

Based on the Landscape Report conclusions it is considered that the Scheme will not compromise the desired "Outcomes" for the 'Hokitika Place' with respect to geodiversity, landforms and landscape.

It is considered that the Scheme and concession, subject to the suggested conditions, is consistent with the Objective and Policies.

SECTION 3.4 HISTORICAL AND CULTURAL HERITAGE CONSERVATION

3.4.1 Historical and Cultural Heritage Values and Threats

Objective 1. *To gain a better understanding of historical and cultural heritage values and threats and establish priorities for protection and active management, and to enhance people's appreciation.*

3.4.1.5 Understanding historical and cultural heritage values

Policies 7. *The New Zealand Archaeological Association database should be maintained and the Conservancy Protection Plan (including land inventories) updated on a regular basis. Information on historical and cultural heritage values should also be incorporated into other databases as applicable.*

10. *Where access arrangements authorise an activity in an area with historical and cultural heritage values, a requirement for archaeological surveys and collection of heritage information may be made.*

There are no known or identified historic or cultural heritage sites within the Scheme area. Pre-application consultation with local Iwi did not raise any significant concerns in regard to cultural values, and Westpower has been advised that a Cultural Impact Assessment will not be required for completion and lodgement of the application.

It is important that the potential for accidental discovery of cultural or heritage items is provided for through any concession. The development and implementation of an accidental discovery protocol within the construction management plan has been provided for through the suite of suggested conditions.

The CMS does highlight a range of "Taonga Species" (Section 3.1.3.6, page 44) which includes species identified within the expert terrestrial and aquatic assessments. The conclusion of the expert assessments is that, provided mitigation is undertaken as recommended, effects on terrestrial and aquatic species will be minimal, and no more than minor. The Blue Duck Report does provide, as a precautionary measure in the unlikely event that there is an impact on the local population, a monitoring and response programme to ensure there will be no adverse effects on the blue duck population as a result of the Scheme. The application includes a suite of suggested conditions which provides for the recommendations made in the various reports.

Based on the current information it is considered that the Scheme will not compromise the desired "Outcomes" for the 'Hokitika Place' with respect to human history, historic and cultural heritage, and cultural values of significance to Poutini Ngāi Tahu/Ngāi Tahu.

It is considered that the Scheme and concession, subject to the suggested conditions, is consistent with the Objective and Policies.

SECTION 3.5 AUTHORISED USES OF PUBLIC CONSERVATION LANDS

Objectives 1. *To implement Conservation General Policy 2005 and General Policy for National Parks 2005 when considering applications for authorisations on public conservation lands and waters.*

2. *To protect natural, historical and cultural heritage values from adverse effects of recreation, tourism or other uses.*

3. *To protect recreational opportunities from adverse effects of authorized uses of public conservation lands.*

4. *To protect places and other taonga of cultural significance to Poutini Ngäi Tahu from adverse effects of authorised uses of public conservation lands.*

5. *To consult, where necessary, with Papatipu Rünanga, conservation boards, the West Coast Fish and Game Council, authorisation holders, communities and other people and organisations over the consideration and granting of concessions, access arrangements and other authorisations for use of public conservation lands.*

Policies ***1.*** *The cumulative effects of other authorities for use, issued in respect of a particular area or opportunity, should be taken into account when considering new applications for those areas or opportunities.*

2. *When approving concessions or other authorisations, specific conditions may be applied as deemed appropriate.*

3. *The Department should periodically monitor compliance with authorisation conditions.*

The matters arising from these Objectives and Policies are essentially canvassed in the paragraphs above and below this review of CMS Objectives and Policies. As discussed at above, in 10.2.3.4 CGP Policy 11.3, the CGP allows for Utilities such as those proposed in this application, to be located on conservation land and waters, subject to consideration of a range of matters (CGP Policies 11 and 11.3).

Policy 1 above refers to other authorised uses issued in respect of an area. It is apparent that there are concessions issued for helicopter flights up the Waitaha River. Whilst helicopter flights taking recreationalists upriver have declined over recent times there is potential for flights to occur. This concession would not prevent that from occurring. A concession has been issued for a small scale gold suction dredge operation between the bottom of the Waitaha Gorge down to Macgregor Creek. Westpower has consulted with the owners of that concession and considers that the two concessions are able to operate together.

Based on the assessment of the matters in this section it is considered that the Scheme and concession, subject to the suggested conditions, is consistent with Objectives and Policies.

SECTION 3.6 PEOPLES BENEFIT AND ENJOYMENT

3.6.1.1 Provision and management of recreational opportunities

Objectives 1. *To provide a comprehensive range of recreational opportunities that enable people with different capabilities and interests to enjoy and appreciate West Coast Te Tai o Poutini public conservation lands, whilst protecting natural, historical and cultural heritage from adverse impacts of recreational use.*

2. *To avoid or minimise conflicts between different users, including people undertaking different types of activities in the same location.*

Policies ***1.*** *The Department's recreational zoning framework should be used to identify and manage an appropriate range of recreational opportunities within the Conservancy's public conservation lands and to minimise conflicts between different types of recreational uses.*

2. *The Department's recreational zoning framework and appropriate restrictions on mechanised access and use should be implemented in order to safeguard natural, historical and cultural heritage and the ability of the public to experience solitude, peace and natural quiet in public conservation lands.*

3. *Recreation opportunities that are based on the special character and features of West Coast Te Tai o Poutini public conservation lands should be provided, taking into account existing opportunities available elsewhere in the country, both within and outside of public conservation lands.*

The Scheme is located in the backcountry-remote zone, which is discussed in the next section. Recreation zoning is intended to achieve a range of recreation and tourism "Outcomes" with respect to identified 'Places' within the Conservancy. The Scheme is proposed to be located within the 'Hokitika Place' and while it is advised in the Recreation Report that a hydro-development, as such, is not compatible with the backcountry-remote zone management category it is concluded that, "*the outcomes of the CMS for the Hokitika place will still be achieved with the Scheme in place*".

Of relevance to the above Objectives and Policies the Recreation Report, at page 23, notes that the supply of particularly kayaking opportunities must be considered on the regional scale due to mobility of kayakers and their national and international origins. The report concludes that:

"*At a regional level, the effect of the Scheme on West Coast recreation and tourism generally will be very slight due to the high number of alternatives available for all activities affected by the Scheme and the relatively low*

level of use of the Kiwi Flat area. The West Coast will retain its international reputation as a challenging kayaking setting with the Scheme in place, and Morgan Gorge (and the remainder of the River) will retain its ability to challenge highly skilled kayakers, albeit with additional restrictions on its use due to the need to confer with a management authority (Westpower Ltd) if a cease to abstraction is required to provide a natural flow. This change from an uncontrolled river for kayaking may remove a key quality which makes the Morgan Gorge internationally significant for the activity (albeit rarely used)".

Objective 1 and Policies 1 and 3 are aimed at management for a range of recreation opportunities both within the Conservancy and within zones, in this case the backcountry-remote zone. It is concluded in the Recreation Report that whilst there will be a change to the nature of the opportunity there will not be a loss of opportunity to kayak the Morgan Gorge. Even with that change there will not be a loss of a range of recreational opportunities both within the Conservancy, the backcountry-remote zone, or the Waitaha Valley and River as a result of the Scheme.

Policy 2 relates to the use of recreation zoning and restrictions on mechanised access and use to "*safeguard natural, historical and cultural heritage and the ability of the public to experience solitude, peace and natural quiet in public conservation lands*". The discussion of zoning, aircraft and vehicles is undertaken in the following sections. In terms of solitude, peace and natural quiet it is accepted that for a temporary period there will be an increase in activity, numbers of people and noise as construction is undertaken. This will, in general, all be localised to the Scheme and construction footprint. Following construction the level of activity involved with operation of the Scheme drops considerably and personnel and overall noise levels are low.

Objective 2 seeks to avoid or minimise, "*conflicts between different users, including people undertaking different types of activities in the same location*". It is clear from the Recreation Report that the introduction of hydro-development structures and managed flow at Morgan Gorge, and through the abstraction reach, changes the nature of kayaking opportunities. Whilst there may be a perceived effect outside the localised area of the Scheme, all land-based recreational activities will be able to continue and there will be no direct effects on kayaking opportunities above Kiwi Flat (including the Waitaha Gorge) and below the abstraction reach. There is a potential need for continued access for kayakers into the Morgan Gorge and to provide for the continued opportunity to kayak the Gorge, and the potential for a longer portage for the majority of kayakers who do not kayak the Gorge. These matters have been recognised, and conditions suggested in this application, to provide for:

- design of the weir to retain kayaking access into the gorge;
- consultation on development of a regime for ceases to abstraction to allow a natural flow to support a continued opportunity to kayak the gorge;
- provision of information on the Westpower website in regard to river flow conditions and, during construction, matters related to;
    - description of the type, timing sequence and location of construction activities;
    - potential hazards (including in-river hazards) arising from construction activities, including advice on avoiding hazards and construction activities generally; and
    - any effects on the flow regime;
- relocation of the existing walking track to an appropriate standard.

It is considered that the Scheme and concession, subject to the suggested conditions, is consistent with Objectives and Policies.

3.6.1.4 Backcountry-Remote zone

Objective 1. *To provide access to a range of recreational opportunities via facilities that enable people to enjoy challenging natural settings in the backcountry*

Objective 2. *To enable people to access extensive natural settings where:*

a) facilities are provided but a considerable degree of physical challenge, self-reliance and isolation is involved;

b) groups of recreational users are generally small and encounters with other groups are infrequent (except on a limited number of high-use tracks and rivers);

c) huts and tracks provide the opportunity for solitude for those who seek a greater sense of isolation and challenge, but still need the security of some facilities; and

d) overnight use is more intensive at some sites and at certain times of the year.

Policies 1. *The backcountry-remote zone should be managed to meet the desired outcomes described in Part 4 of this CMS and in any relevant management plans, providing facilities and services that cater principally for the needs, interests and abilities of most backcountry comfort seekers and backcountry adventurers.*

7. *Regular aircraft landings (a definition of this term is provided in Section 3.6.4.2) may be authorised. The number and frequency of landings should be considered on a case-by-case basis.*

8. *Irregular and occasional aircraft landings (definitions of these terms are provided in Section 3.6.4.2) may be authorised. Each operator may undertake no more than 2 landings per day, and no more than 20 per annum, at a given location within the backcountry-remote zone.*

10. *Where practicable, the aircraft landing sites available to each concessionaire will be specified in concession conditions.*

The CMS utilises a zoning system to identify and manage a range of recreation opportunities, in the case of this application the zoning is "backcountry-remote". The CMS advises at Section 3.6.1.1, page 114, that, "*The zoning system identifies broad recreation outcomes at Places, by describing where the major recreational facilities and services are and thereby identifying the areas that will remain free of high levels of public use because of a lack of, or lower grade, facilities. Detailed descriptions of recreation outcomes for specific locations within each Place are provided in Part 4, Chapter 4.2, under the subheading 'Recreation and tourism in 2020"*.

In regard to the backcountry-remote zone the Recreation Report concludes that a hydro-development is not compatible with this recreation management category. This is because the backcountry-remote zone is a recreation management mechanism and is not intended to relate to other types of activity. Ultimately the Recreation Report concludes that the "Outcomes" set for the 'Hokitika Place' will still be achieved with the Scheme in place.

The question is whether the Scheme will prevent the achievement of the Objectives of this zone i.e. to provide access to a range of recreational opportunities and to enable people to access extensive natural settings.

Higher levels of effect were raised by the Recreation Report with actual physical effects being localised to the lower end of Kiwi Flat and through the abstraction reach, in terms of structures and flow regime. There is the potential for there to be a change in the perception of the area for some users but this will depend on the individual as to what effect that might have. The Recreation Report concludes that, "*all land based activities in the Waitaha Valley will be able to continue with only indirect effects caused by the introduction of hydro development structures in the setting and effects on natural character and visual amenity*". In regard to kayaking the report concludes that "*Kayaking options in the River above Kiwi Flat (including the Waitaha Gorge) will have no direct adverse effects from the Scheme*", although the report does note that the potential for inadequate flows in the abstraction reach, including for portage, may influence some loss of uptake of the upriver opportunities. The direct effect of the Scheme in regard to kayaking opportunities relates to the constraining of flows in the abstraction reach and the construction of the weir at the Morgan Gorge.

These potential effects have been considered by Westpower and, based on the recommendation of the Recreation Report, a range of mitigation measures (discussed in the previous section) have been adopted and

included in this application as suggested conditions. The intent of these conditions is to retain an opportunity, albeit of a changed nature, to kayak the Morgan Gorge and improve the portage for the majority who do not seek to kayak the Gorge.

In considering whether the above Objectives have been achieved it is required that the backcountry-remote zone be managed to meet the desired "Outcomes" for the Conservancy and relevant 'Place', in this case the 'Hokitika Place'. Based on potential effects of the Scheme it is noted, with particular reference to kayaking, that the 'Hokitika Place' seeks as an "Outcome" that,

Hokitika is a world-renowned rafting and whitewater kayaking destination. The Styx, Toaroha and Kakapotahi rivers and Totara Lagoon are maintained as key places for kayaking that are free from high numbers of other users during kayaking trips (see Section 3.6.4.10).

In terms of this "Outcome" it is noted that the Toaroha and Kakapotahi rivers were both on an initial list of rivers considered for hydro-development by Westpower and were excluded for, amongst other things, reasons related to potential effects on recreational opportunities. In regard to the supply of kayaking opportunities the Recreation Report advises that the use of a 'Place' does not provide an adequate scale of assessment for the supply of some recreation opportunities. The supply of these opportunities must be considered at a regional scale due to mobility of kayakers and their national and international origins, as discussed in the previous section with the conclusion of the Recreation Report being that, "*At a regional level, the effect of the Scheme on West Coast recreation and tourism generally will be very slight due to the high number of alternatives available for all activities affected by the Scheme and the relatively low level of use of the Kiwi Flat area".* Matters relating to helicopter flights are discussed below and are in accord with these Policies.

It is recognised that the Recreation Report concludes that a hydro-development is not directly compatible with the backcountry-remote zone recreation management category. This is due to the introduction of development structures into a predominantly unmodified (besides for recreation) backcountry-remote recreation setting, and flow effects along the abstraction reach. However the report also concludes that:

- all land-based recreational activities in the Waitaha Valley will be able to continue with only indirect effects;
- kayaking options in the River above Kiwi Flat (including the Waitaha Gorge) will have no direct adverse effects from the Scheme;
- the Morgan Gorge, and the remainder of the river, will retain its ability to challenge highly skilled kayakers (albeit with additional restrictions in the abstraction reach);
- the West Coast will retain its international reputation as a challenging kayaking setting with the Scheme in place;
- the "Outcomes" of the 'Hokitika Place' will still be achieved with the Scheme in place; and
- the effect of the Scheme on West Coast recreation and tourism generally will be very slight due to the high number of alternatives available for all activities affected by the scheme and the relatively low level of use of the Kiwi Flat area.

Therefore whilst there will be localised effects and for some a change in perception of the river as a whole, which are classified as 'high', it is considered that there will remain a range of recreational opportunities in natural settings in the backcountry-remote zone and there will be no loss of ability for people to access natural settings within the zone as envisioned in the "Outcomes" for the 'Hokitika Place'.

It is considered that the Scheme and concession, subject to the suggested conditions, is consistent with Objectives and Policies.

3.6.4.2 Aircraft

Policies ***1.*** *Aircraft may be authorised to land within public conservation lands where this:*

a) is necessary for the Department to perform its functions; or
b) facilitates access for emergency or search and rescue purposes; or
c) is compatible with the statutory purposes for which the place is held and consistent with any relevant national park management plan; and
d) is consistent with the objectives and policies for the relevant recreational zone/s (see Sections 3.6.1.2 to 3.6.1.6); and
e) does not compromise the desired outcomes for Places (see Part 4, Chapter 4.2).

Clauses (c)-(e) apply to applications for aircraft landings associated with recreation and tourism purposes (e.g. scenic flights, recreational access to the backcountry, private landings) and non-recreational purposes (e.g. wild animal recovery operations, provision and servicing of utilities, mining, management of the pounamu resource, filming and other commercial activities).

2. *Aircraft landing sites on West Coast Te Tai o Poutini public conservation lands will be assigned to one of the following four categories, depending on which recreational zone the site is located in and the legal status of the site:*

Excluded: *Aircraft landings should be excluded except for conservation management purposes, emergencies or search and rescue purposes.*

Regular: *Regular landings are defined as occurring when a concessionaire undertakes 3 or more landings per day and/or 21 or more landings per annum, at specific sites. Regular landings may only be authorized within the backcountry-remote zone and may occur all-year-round or on a seasonal basis. Numbers and frequencies of landings should be considered on a case-by-case basis.*

Irregular: *Irregular landings are defined as no more than 2 landings per day, and no more than 20 per annum, at a given location. Landings may be authorised for the purposes of transportation of personnel and/or equipment to or from a variety of possible locations within the remote or backcountry-remote zones, or at frontcountry sites. This provides for landings for air charter purposes, but does not include regular landings at specific sites or scenic snow landings.*

Occasional: *'One-off' permits for landings may be granted for specific purposes (short-term, one-off events such as filming, management of utilities) at specific sites within the remote or backcountry-remote zones, or at frontcountry sites.*

6. *Regular aircraft landings should be restricted to specified landing sites, where practicable.*

This policy does allow for the authorisation of helicopter landings within the Stewardship Area. Helicopter flights taking recreational users up the Waitaha River have in the past been a feature of recreational use of the area, particularly kayaking, although it is noted that that has declined over recent times.

During the construction period for the Scheme 2 - 4 flights (8 movements) on average per day may occur when conditions are suitable for flying. However more intense helicopter movement between the powerhouse site and the headworks site may occur for a number of days, although not all on consecutive days, during certain activities such as concrete pouring. As an example at the Amethyst site, which was also on Stewardship Land administered by DOC, there were up to 15 days of intense helicopter activity where, on the busiest days, there were approximately 100 trips using 2 helicopters. Following construction there will be the intermittent use of helicopters for maintenance and inspection purposes and, although this may include brief periods of reasonably intense activity dependent on maintenance requirements, it will be much less than for construction activities.

Potential effects from helicopter flights has been raised and considered, in the Blue Duck Report, in regard to blue duck/whio and potential mitigation measures are suggested in the suite of conditions accompanying this application.

The use of helicopters would not therefore be incompatible with the purpose of the area, or the Objectives and Policies (particularly Policy 7) of the backcountry-remote zone regarding regular aircraft landings. It is noted that Policy 2 provides for regular landings (i.e. 3 or more landings per day and/or 21 or more landings per annum) to be considered on a case by case basis. Regular landings may only be authorised in the backcountry-remote zone, and will be considered on a case by case basis.

The location of flights and landing areas has been provided for through the application and suggested conditions.

The proposed use of helicopters would also not compromise the desired "Outcomes" for the 'Hokitika Place' with respect to peoples benefit and enjoyment.

It is considered that the Scheme and concession, subject to the suggested conditions, is consistent with this policy.

3.6.4.3 Animals

Policy 1. *Dogs, horses and other pack animals should only be taken into West Coast Te Tai o Poutini public conservation lands and waters where consistent with legislation and where adverse effects such as (but not limited to) damage to indigenous flora or fauna, spread of weeds, damage to recreational facilities and conflicts with other recreational users, are avoided, remedied or mitigated.*

Westpower, having successfully developed the Amethyst Hydro Scheme on conservation land, is aware of this requirement in regard to dogs and suggested conditions are included in the application in this regard. Conditions restricting dogs do provide for the exception, subject to the approval of DOC, for the use of dogs for monitoring purposes (i.e. blue duck monitoring).

Based on the suggested conditions it is considered that the Scheme will not compromise the desired "Outcomes" for the 'Hokitika Place' with respect to indigenous biodiversity.

It is considered that the Scheme and concession, subject to the suggested conditions, is consistent with this policy.

3.6.4.17 Vehicle use

Policy 11. *In some circumstances, authorisation may be granted for the use of motorised vehicles on public conservation lands where roads have not previously been formed (e.g. research, search and rescue, emergency works). In the case of national parks, this may only occur if specifically provided for in the national park management plan. Assessment will be undertaken on a case-by-case basis and conditions on use may be imposed.*

This policy allows for authorisation of the use of vehicles required for the Scheme. It is noted that vehicle use will be relatively heavy during the construction of the Scheme and greatly reduced through operation, with the exception of maintenance from time to time when movements may increase to some degree dependent on the nature of work required. The majority of vehicle use is limited to the access road up to the power house site, with limited requirements at the Morgan Gorge intake area during construction. It may be that an excavator is stored within the upper tunnel portal entrance for use in maintenance of the weir, however this use will be on an as needed and intermittent basis.

The use of vehicles in relation to the Scheme will not compromise the desired "Outcomes" for the "Hokitika Place".

It is considered that the Scheme and concession, subject to the suggested conditions, is consistent with this policy.

SECTION 3.7 OTHER USE OF PUBLIC CONSERVATION LANDS

3.7.2 Activities on or in Beds of Rivers or Lakes

Policies ***1.*** *When assessing applications for any activity on or in the bed of a river or lake, consideration should be given to (but not limited to) the following guidelines:*

a) Adverse effects on freshwater and terrestrial species, habitats and ecosystems, historical and cultural heritage values, public access, recreation opportunities and amenity values should be avoided or otherwise minimised;

b) Riparian vegetation should be maintained or enhanced;

c) Activities should not damage riverbanks;

d) No pests, weeds or other unwanted organisms (e.g. Didymo) should be likely to be introduced to, or become established within, the area as a result of the activity; and

e) The natural character within the setting of the activity should be maintained.

2. *Biological communities, physical habitat, channel profiles and substrate may be monitored, in order to evaluate and manage the long term impacts of activities occurring on or in the beds of rivers or lakes.*

A range of expert reports have been developed by Westpower as part of the design of the Scheme. These reports have assessed the potential effects in regard to the matters set out in Policy 1, as discussed in the paragraphs above. In general, from a biodiversity point of view, effects of the Scheme ranged from nil to no more than minor, provided that certain mitigation measures as outlined in Section 7 of this application was undertaken. Westpower has adopted the recommendations through the suite of suggested conditions included at Section 9 of this application.

Higher levels of effects were raised in terms of landscape and recreation matters with actual physical effects being localised to the lower end of Kiwi Flat and through the abstraction reach. There is the potential for a high level of effect due to a change in the perception of the area, and river, for some users but this will depend on the individual as to what level of effect that might be. Generally the higher levels of effects relate to the introduction of built development into the environment and, additionally, from a recreational perspective the change to a managed regime in the abstraction reach for kayaking activities.

Ultimately, and taking into account recommended mitigation measures, the Landscape Report concludes that the Scheme sits well within its landscape and responds to its setting. Whilst there will be moderate to high effects on natural character, landscape and visual amenity at a local level the Scheme is considered to be appropriate with respect to these matters.

There will likewise be a higher level of effect on some aspects of recreational use, in particular this relates to kayakers seeking to use Morgan Gorge and the abstraction reach. This is due to both the introduction of structures and a controlled flow in the abstraction reach. It is concluded through the Recreation Report that these matters do not preclude the opportunity to kayak the Morgan Gorge with the Scheme in place, rather that consultation would be required with Westpower to cease flows to provide for that to occur. The portage for those not seeking to kayak the Morgan Gorge, which is understood to be the majority of kayakers on the river, will potentially be longer taking into account the abstraction reach. Westpower has taken these matters on board in developing the Scheme and application and a suggested suite of conditions is included with respect to:

- design of the weir to retain kayaking access into the gorge;

- consultation on development of a regime for ceases to abstraction to allow a natural flow to support a continued opportunity to kayak the gorge;
- provision of information on the Westpower website in regard to river flow conditions and other matters; and
- relocation of the existing walking track to an appropriate standard.

The potential effect of works in riparian margins has been an important component in design, layout and assessment of the Scheme. It is inevitable that there does have to be a degree of riparian modification given that the Scheme revolves around access to water for hydro generation purposes. Riparian modification has been kept to the minimum required through designing the Scheme, as far as is practicable, so that works in and around margins are aligned to cross the margin rather than run for larger distances along them. This was one factor in excluding the potential intake option at the lower end of the Waitaha Gorge. The Stable Tributary was identified as a biodiversity 'hotspot' where special care was needed in terms of riparian issues. The decision was made by Westpower to avoid a crossing of this waterway, and limits have been suggested in conditions accompanying this application to ensure that a suitable riparian margin is retained along the Stable Tributary. It has generally been concluded in the reports that there will be minimal effect on the Waitaha River from the work required in the riparian margin given the size and width of the river.

Potential bank and riverbed stability issues have been considered by NIWA, in terms of the establishment and operation of the Scheme and the development of the stopbank around the powerhouse. NIWA has concluded that there will be minimal potential effects on bank and bed stability in regard to these matters.

Pest and weed matters have been an integral component of development of the Scheme, and assessment, and a suite of conditions (including matters related to Didymo) are included with this application. This includes the development of a pest and weed management plan.

It has been suggested in this application that a suite of conditions be implemented to monitor aspects of the Scheme.

Based on the conclusions of the expert assessments it is considered that the Scheme will not compromise the desired "Outcomes" for the 'Hokitika Place'.

It is therefore considered that the Scheme and concession, subject to the suggested conditions, is consistent with these Policies.

3.7.11 Utilities

Policy 3. *The development, installation, maintenance and management of utilities on public conservation lands should be consistent with the desired outcome for the relevant place/s (see Chapter 4.2).*

As discussed in this assessment, it is considered that the proposed development, installation, maintenance and management of the Scheme on conservation land will not compromise the desired "Outcomes" of the 'Hokitika Place'.

It is therefore considered that the Scheme and concession, subject to the suggested conditions is consistent with this Policy.

3.8 OTHER MANAGEMENT RESPONSIBILITIES

3.8.4 Public Access

Objective 1. *To provide for public access to conservation areas in ways that meet people's reasonable aspirations but do not compromise public safety or the protection of conservation values.*

Policy 3. *Activities and access to public conservation lands may be restricted in accordance with legislation:*

a) where necessary to protect natural, historical or cultural heritage values; or

b) where a particular activity will adversely affect the enjoyment of the area by other people, including the qualities of solitude, remoteness, wilderness, peace and natural quiet, where these qualities are present; or
c) where a particular activity will prevent the desired outcome for a Place from being achieved (see Part 4); or
d) for public health and safety reasons.

In general, approval of the concession will not prevent public access to and along the Waitaha River. Having said that, there will be some site specific restrictions required for operational and safety reasons, for example the parts of the intake, tunnel, powerhouse and switchyard. Any restrictions on access to pieces of DOC land within the concession area will be relatively minor and will not restrict access through the area.

The access road from Macgregor Creek to the powerhouse site will not be restricted to the use of Westpower only and will provide an alternate foot access for visitors to move up river. A component of the application includes the relocation, with the approval of DOC, of the existing foot access track up the right bank of the river to Kiwi Flat to reduce potential construction effects at the powerhouse site on visitors passing through the area on the way to Kiwi Flat. This track will be formed to the appropriate standard as set out in the suggested conditions attached to the application.

The Scheme will, subject to the suggested conditions, will not compromise the desired 'Outcomes' in the "Hokitika Place" with respect to public access and peoples benefit and enjoyment.

It is considered that the Scheme, and concession, is consistent with this policy.

Section 4.2.6 Desired Outcomes for the Hokitika Place

Based on the above assessment of the provisions of the Act, purpose of Stewardship land, the CGP and the Objectives and Policies of the CMS the Scheme and concession, subject to the suggested conditions, will not compromise the conservation "Outcomes" for the 'Hokitika Place' in 2020.

10.2.4 LOCATION ON CONSERVATION LAND

Section 17U(4) requires that:

The Minister shall not grant any application for a concession to build a structure or facility, or to extend or add to an existing structure or facility, where he or she is satisfied that the activity—

a) could reasonably be undertaken in another location that—
(i) is outside the conservation area to which the application relates; or
(ii) is in another conservation area or in another part of the conservation area to which the application relates, where the potential adverse effects would be significantly less; or
b) could reasonably use an existing structure or facility or the existing structure or facility without the addition.

These matters are discussed above under CGP Policy 11.3 which states,

(a) Utilities may be provided for on public conservation lands and waters where they cannot be reasonably located outside public conservation lands and waters, or if specifically provided for as a purpose for which the place is held.

As discussed above it is clear from CGP Policy 11.3 that Utilities, including structures and infrastructure for energy generation and transmission, can be provided for on public conservation lands and waters where they cannot be reasonably located outside public lands and waters.

Again, Westpower has undertaken an analysis of options/alternatives for development of a hydro-electric power scheme (refer Section 11 and Appendix 22). Given the topography of the West Coast, and the overlying land tenure and extent of land owned and managed by DOC, all of the feasible options considered were

located within or partly within the conservation estate. Accordingly it is not considered reasonable to locate the Scheme outside conservation land or waters.

The consideration of alternatives included other rivers within the conservation estate and other locations on the Waitaha River. The assessment of options in terms of both the choice of, and location on, the Waitaha River included consideration of an option which created the least potential adverse effects given the nature of a hydro generation scheme.

10.2.5 GRANTING OF LEASE OR LICENCE

Section 17U(5), (6) and (7) relate to types of concession and limitation on granting a lease or licence. Sections 17U(5), (6) and (7) states:

(5) The Minister may grant a lease or a licence (other than a profit à prendre) granting an interest in land only if—
(a) the lease or licence relates to 1 or more fixed structures and facilities (which facilities do not include any track or road except where the track or road is an integral part of a larger facility); and
(b) in any case where the application includes an area or areas around the structure or facility,—
(i) either—
(A) it is necessary for the purposes of safety or security of the site, structure, or facility to include any area or areas (including any security fence) around the structure or facility; or
(B) it is necessary to include any clearly defined area or areas that are an integral part of the activity on the land; and
(ii) the grant of a lease or licence granting an interest in land is essential to enable the activity to be carried on.

(6) No lease may be granted unless the applicant satisfies the Minister that exclusive possession is necessary for—
(a) the protection of public safety; or
(b) the protection of the physical security of the activity concerned; or
(c) the competent operation of the activity concerned.

(7) For the purposes of subsection (6), the competent operation of an activity includes the necessity for the activity to achieve adequate investment and maintenance.

Types of concession applied for, and required, are set out in Section 3 of this application, and discussed above in terms of access to structures and facilities. There are requirements that aspects of the Scheme are exclusive to ensure public safety, security of infrastructure and operation and maintenance of the Scheme. This approach is consistent with concessions granted for the Amethyst Hydro Scheme which has also been developed by Westpower on conservation land.

10.3 CONCLUSION

In assessing the concession application the Minister must consider a number of matters as set out in *Part 3B* of the Act, including:

- the effects of the proposed activity, and the possible avoidance and mitigation measures available and proposed;
- whether the concession is consistent with the CMS;
- the values of the natural and historic resources the Stewardship Land status seeks to protect;
- whether the granting of the concession application, with or without conditions, would be contrary to the purpose of a Stewardship Area; and
- whether the granting of the concession application, with or without conditions, would be contrary to the provisions of the Act.

It cannot be said that there will be no effects arising from the Scheme and, as is apparent from the above discussion, there will remain some moderate to higher levels of effect in regard to certain landscape and recreational matters. Of the other matters assessed the potential effects were generally able to be avoided or mitigated to a minor or less than minor degree. A specific monitoring programme, with associated response triggers is proposed to assure that the blue duck population is not adversely effected.

The higher levels of effect are due to the actual physical effect of the introduction of structures into the environment and the abstraction reach controlled flow regime, at the local scale, to wider perceptual effects for some users of the river. Having said that the respective expert assessments conclude that:

- with respect to Natural Character, Landscape and Visual Amenity the Scheme will meet the emphasis of the Conservation Act, will sit well within its landscape and respond to its setting, and overall is considered appropriate with respect to natural character, landscape and visual amenity; and
- with respect to Recreation and Tourism whilst a hydro-development and backcountry-remote zone recreation management category are not compatible the "Outcomes" of the CMS for the 'Hokitika Place' will still be achieved with the Scheme in place. At the wider regional scale, which is more appropriate for kayaking opportunities due to mobility of kayakers and their national and international origins, the Report concludes that "*.... the effect of the Scheme on West Coast recreation and tourism generally will be very slight due to the high number of alternatives available for all activities affected by the Scheme and the relatively low level of use of the Kiwi Flat area. ....* ".

Taking into account the potential effects, and the proposed measures to avoid remedy or mitigate those effects, it is considered that the granting of this Concession application with the suggested conditions will:

- be consistent with the CMS and will not compromise the desired conservation "Outcomes" for the 'Hokitika Place' and the West Coast Conservancy; and
- not be contrary to either the purpose for which the land is held as a Stewardship Area or the provisions of the Act.

11. ALTERNATIVE LOCATIONS AND OPTIONS

This section provides a summary of the alternative locations, and options considered by Westpower and the key decisions made in investigating the Scheme and potential effects which may result. The Assessment of Alternatives and Options Report is located at Appendix 22.

11.1 PREFERENCE FOR A RUN-OF-RIVER SCHEME

A hydro-electric power scheme has been investigated in preference to other forms of renewable energy generation options. This is because of the potential for harnessing the plentiful rainfall and flows on the West Coast. The West Coast area is limited as to what types of electricity generation can be installed; hydro- electric generation is still the most logical, efficient, effective and economic form of renewable energy for the West Coast. There is limited potential for commercial wind power generation due to low wind power densities.

While there are opportunities for small scale or domestic electricity generation e.g. solar or micro generation, at current costs these would not meet current demands from the West Coast community. There is also some efficiency, in terms of both resource use and potential effects, in development of a larger scheme over a large number of smaller schemes with the associated requirements for infrastructure and transmission. Emergent technologies are still in the development stage (e.g. marine, biomass) and are not economic alternatives.

A run-of-river scheme has been selected in preference to a storage dam because of its smaller environmental and construction footprint. Additionally for many rivers with a high sediment load, such as the Waitaha River, a dam would soon fill up with gravel and any storage advantage would be lost.

11.2 LOCATIONS

The majority of the locations which have been assessed for potential hydro schemes by Westpower and within the Westpower distribution area are within or partly within conservation areas managed by DOC. This is unsurprising as conservation areas account for 84% of land area on the West Coast and incorporates virtually all areas suitable for hydro schemes. This is reflected in the 2008 report on Renewable Energy Assessment undertaken by SKM in conjunction with EECA on behalf of the WCRC. This report concludes that most of the West Coast region's hydro-electric potential is located in conservation areas. Proximity to distribution networks is also an important factor in determining appropriate locations, as locations that are too remote result in high access and transmission costs and additional potential effects from the development of infrastructure.

11.3 WESTPOWER INVESTIGATIONS

Between 2004 and 2005 Westpower undertook a survey of rivers with a potential for hydro-electric power schemes within the Westpower distribution area. This included consideration of previous reports, including a Report prepared for the Ministry of Works and Development on Small Hydro Electric Potential of West Coast in 1985 (Royds Sutherland and Macleay Consulting Engineers).

Rivers were removed from further consideration in the first instance if they were assessed as too remote, required a dam and associated storage lake, located in a National Park or were excluded by water conservation orders. A short list of six rivers was produced for further site inspection and assessment, including a thorough aerial inspection by helicopter.

These six rivers were the:

1.Waitaha River	4.Amethyst River;
2.Kakapotahi River;	5.Rough River;
3.Toaroha River;	6. Big River.

The potential for development of a hydro scheme on each of these 6 rivers was then assessed by Westpower. Factors taken into consideration in comparing the sites and in selecting a site(s) included:

- being within the Westpower distribution area (refer Figure 1);
- the size of the catchment area;
- tunnel length required;
- potential environmental effects (including recreational);
- head (or fall) of the Scheme and generating capacity;
- foundation conditions for the headworks and tunnel portal;
- river alignment;
- effects of possible sediment intake;
- general geology;
- access to the area; and
- the economics of each scheme/option.

All of these sites were either located within or partly within conservation land.

On the basis of a full assessment and consideration of these criteria it was recommended that two of the rivers, where a potential hydro-electric power scheme could be located, be continued to the pre-feasibility stage. The pre-feasibility phase allowed for a better comparison of the potential schemes with the Amethyst Hydro Scheme, which had already been progressed to the pre-feasibility stage.

The two scheme locations were on the Waitaha and Kakapotahi (Little Waitaha) Rivers in Westland, some 15 km south of Ross. These sites were selected above the others as there were fewer issues arising when considered over the full range of selection criteria. A civil pre-feasibility study was undertaken on these two schemes, including a number of options for location, design and layout being identified for each river. There were three scheme options identified for the Kakapotahi River (Figure 10). Six initial options were identified for the Waitaha River from a combination of two intake locations and three powerhouse sites (Figure 11).

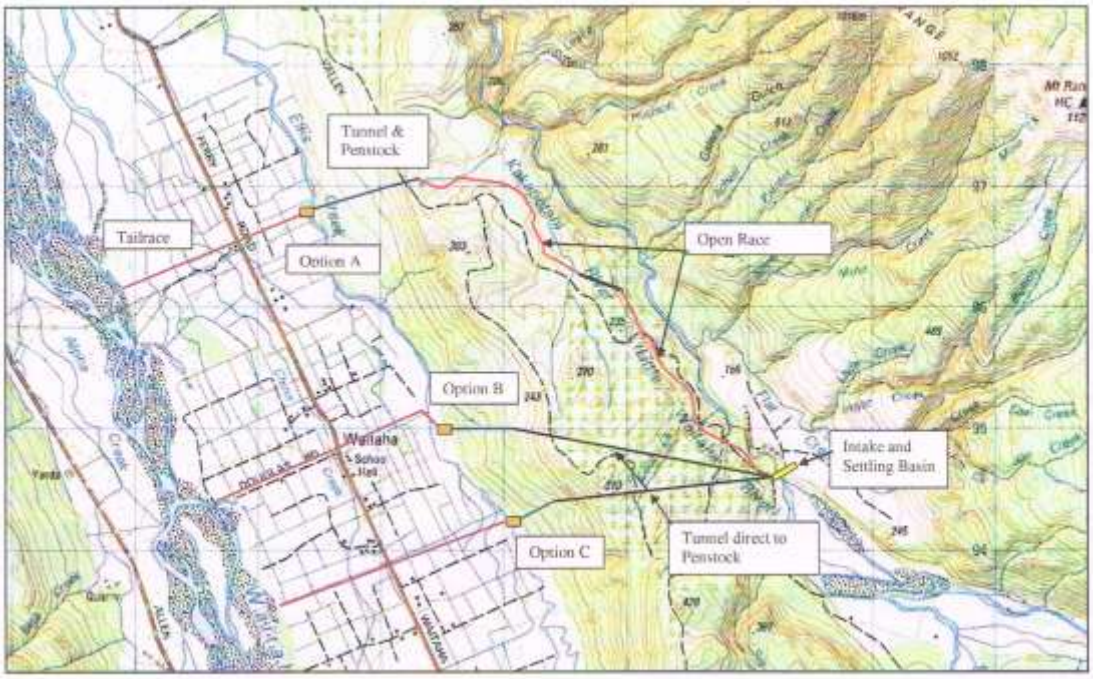

Figure 10: Three options identified for the Kakapotahi Scheme.

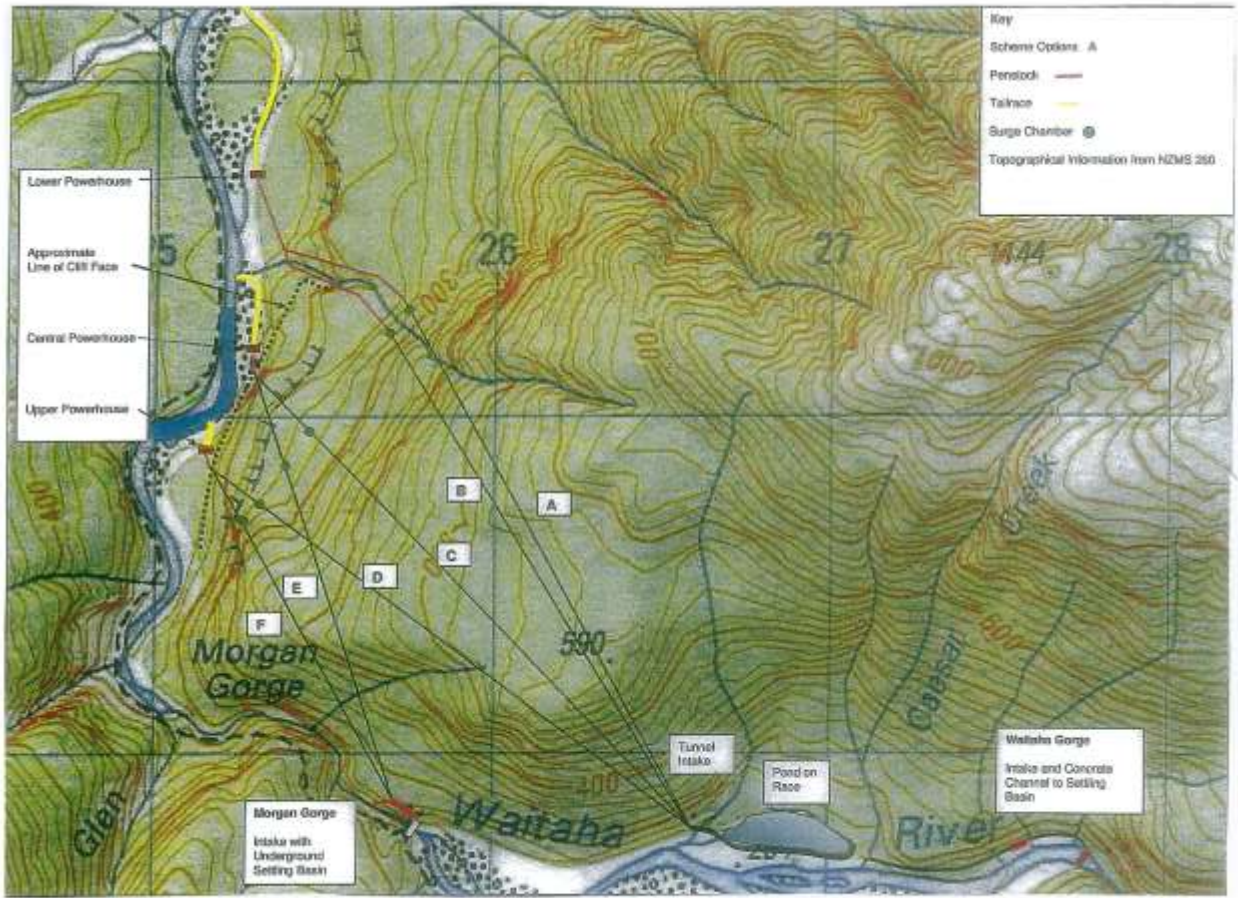

Figure 11: Six options identified for the Waitaha Scheme.

The investigations into the civil engineering components of the proposed schemes at the time indicated that a hydro-electric power scheme would be feasible on each river.

The Waitaha scheme options were selected for further investigation over the Kakapotahi because of environmental and possibly cultural concerns arising from the diversion of water from one catchment to another. Among the factors considered was recreational use - the Kakapotahi Gorge was a well-known and popular canoeing and kayaking site, and also that the intake dam would have resulted in long term aggradation in the river for over 6 km upstream. Additionally all the Kakapotahi scheme options had a higher cost per kWh than the Waitaha schemes. At the time of that study no-one had kayaked the Morgan Gorge.

11.4 WAITAHA RIVER SCHEME OPTIONS

In the original Waitaha Scheme project description, there were 6 options proposed (A – F) relating to two water intake sites (bottom of the Waitaha Gorge or the top of Morgan Gorge) and 3 potential powerhouse sites (Figure 11). The original civil feasibility study identified two preferred schemes (Option B and Option C). Both of these preferred scheme options included a stream bed intake and settling basin at the bottom of the Waitaha Gorge, with an open race and storage pond on Kiwi Flat leading to a 1.8 km long tunnel. These two earlier preferred options were selected because they were the highest head options which would generate the most electricity.

A pre-feasibility environment risk assessment was undertaken in 2005 to determine whether there were any compelling reasons (or "show stoppers") as to why a scheme proposal could not be developed and that applications for concessions and consents should not be pursued. This assessment did not find any single environmental factor that would halt any further investigations into all the scheme options considered. The chance of future discovery of such a feature e.g. a highly threatened and locally endemic organism was considered low although not zero (Overmars, 2005). A range of recommendations were made to further identify and understand the environmental values within the Scheme area and uncertainties that may represent a risk to the project.

Prior to Westpower commissioning this work there was very little documented information about the area including environmental, amenity and physical values and attributes. There had been no scientific investigations undertaken in the area. The initial investigations and studies considered the following aspects of the existing environment:

- terrestrial fauna;
- aquatic plants and invertebrates;
- Instream Flow Incremental Monitoring (IFIM);
- fish;
- small mammals;
- blue duck;
- visual impact; and
- recreational use.

In 2006, hydrological monitoring equipment was installed at Kiwi Flat just below the Waitaha Gorge to monitor and record flows in the river.

Subsequent work on the options recognised that an intake at Morgan Gorge should also be reconsidered with Whirling Water providing additional flow that would make up for any reduction in head loss due to the lower fall (100 m at Morgan Gorge as compared to 120 m at the higher Waitaha Gorge intake). The Whirling Water tributary enters the Waitaha River near the bottom of Kiwi Flat and increases the Waitaha flow by approximately 20%.

After further consideration, the two options were reviewed in regard to a wide range of technical and environmental matters. The two preferred water intake options were renamed as Option A and Option B (refer Figure 12). Option A had a water intake at the bottom of the Waitaha Gorge (at the top of Kiwi Flat). Option B had a water intake located at the top of Morgan Gorge (at the lower end of Kiwi Flat).

The Waitaha Hydro Scheme (the Scheme) proposal was then put on hold in 2009 by Westpower to focus on the construction of the Amethyst Hydro Scheme. In 2012, with the successful development of the Amethyst Hydro Scheme nearing completion, Westpower resumed investigations into the potential for a run-of-river hydro scheme on the Waitaha River and commenced public consultation. Westpower commissioned a vegetation survey of the Waitaha, sediment investigations and an economic assessment.

While the various investigations undertaken in the area previously provided a comprehensive description of the area, the completion of these reports and preparation of an assessment of effects was dependent on Westpower making a final decision as to the preferred water intake location.

11.5 OPTION SELECTION

Westpower, in the process of refining the Scheme, considered a number of location, design features, and operating options. These included: siting of the intake; siting of the powerhouse; the lower tunnel portal and road access route; residual flow and specific design details of each of the components.

While economic feasibility is essential to the success of the Scheme and the benefits to the community, Westpower is committed, where practicable, to avoid or minimise any effects of the Scheme in order to protect and maintain the values within the area. All aspects of the Scheme were taken into consideration when assessing alternative options and in selecting a preferred option and in the design process.

11.6 INTAKE SITE

The preferred intake option was selected at an expert workshop in October 2012. A rating method incorporating a wide range of factors and based on information available at the time (including environmental, engineering, planning and economic information) was used. The experts who rated the two options all considered the effects of the options on their respective disciplines.

Each expert reviewed the environmental effects of each option focussing on key issues, and reflecting the stage of the process and the information available. Consideration was given to the key policies and objectives in the relevant policy, planning and strategy documents administered by DOC, WCRC and WDC. Consideration was also given to feedback received from Iwi, interested groups and individuals. Where able, possible mitigation options, and recommendations were provided.

While this process was not a full assessment of effect of each option, it was a robust review of matters arising and adequate to identify the preferable choice from a variety of perspectives. All experts recommended the selection of Option B, the Morgan Gorge intake, as being the preferred option.

Option B was selected over Option A for a number of reasons but primarily due to environmental matters. A water intake at the top of Morgan Gorge has a much smaller footprint than for Option A (the bottom of Waitaha Gorge), a shorter abstraction reach and therefore fewer ecological, visual and recreational effects. Option B did not require the associated canal structures, or permanent infrastructure, needed if the intake was to be located at the bottom of the Waitaha Gorge. It would largely leave the Kiwi Flat environment intact for the whio/blue duck and koaro populations and recreational users travelling through the area. It also avoided a section of the river with a higher use by kayakers.

Figure 12: Water intake options.

The additional work needed to prepare an assessment of effects for a water intake at the top of Morgan Gorge was identified. Following on from this Westpower commissioned a range of new investigations which included a survey of terrestrial invertebrates, lizard habitat, road access and assessment of noise effects. Further investigations were carried out in to relation to aquatic ecology (including completion of IFIM work), blue duck, birds and bats, geology, vegetation, landscape and recreation with a focus on a Scheme with the intake at the top of Morgan Gorge.

Preliminary engineering design concepts could now be considered and prepared for this location, as well as determining what residual flow could be proposed for the Scheme.

The preliminary design of the headworks structures have been developed to incorporate methods to avoid, manage and mitigate any effects the Scheme may have. For example, the intake structure has been modified following discussions between engineers and expert landscape consultants to lessen the visual impact. The weir will be designed to enable the passage of koaro in and out of Kiwi Flat while preventing trout from gaining access into this section of the river. It will also incorporate features to enable blue duck duckling access. The weir is also to be designed to enable access by kayakers into the Morgan Gorge. Further refinements will continue to be made as the Scheme designs are finalised. These more specific details will be determined in consultation with the appropriate experts.

11.7 RESIDUAL FLOW

After determining a preferred option for location of the intake an important matter was determination of a residual flow regime in the abstraction reach. After consideration of the Instream Flow Incremental Monitoring Report by Cawthron Institute, the aquatic ecology (fish, periphyton and invertebrates), the

hydrological regime of the river, and economic/generation factors associated with the Scheme, a minimum residual flow of 3.5 cumecs was decided by Westpower. This decision was arrived at, in consultation with the hydrologist, and with, and on the advice of the expert aquatic ecologist with a specific aim being to maintain a residual flow level which will ensure that the life supporting capacity of the river is maintained.

11.8 ACCESS ROAD AND TUNNEL EXIT PORTAL.

A decision that there would be no formed access road into Kiwi Flat was made as part of the commitment by Westpower to minimise the project footprint, and in response to the ecological and landscape concerns associated with vehicle access into Kiwi Flat.

Road access, however, is required to provide access to the selected powerhouse site and lower tunnel exit portal. The access road is required for both the construction and operation phases. This road may be up to 7.0 km long, although approximately only 2.0 km of this will be on conservation land, including a section across Macgregor Creek (subject to final alignment and survey). The first sections of the road cross private land and crown land managed by LINZ. Westpower will maintain any roading access to the powerhouse after construction.

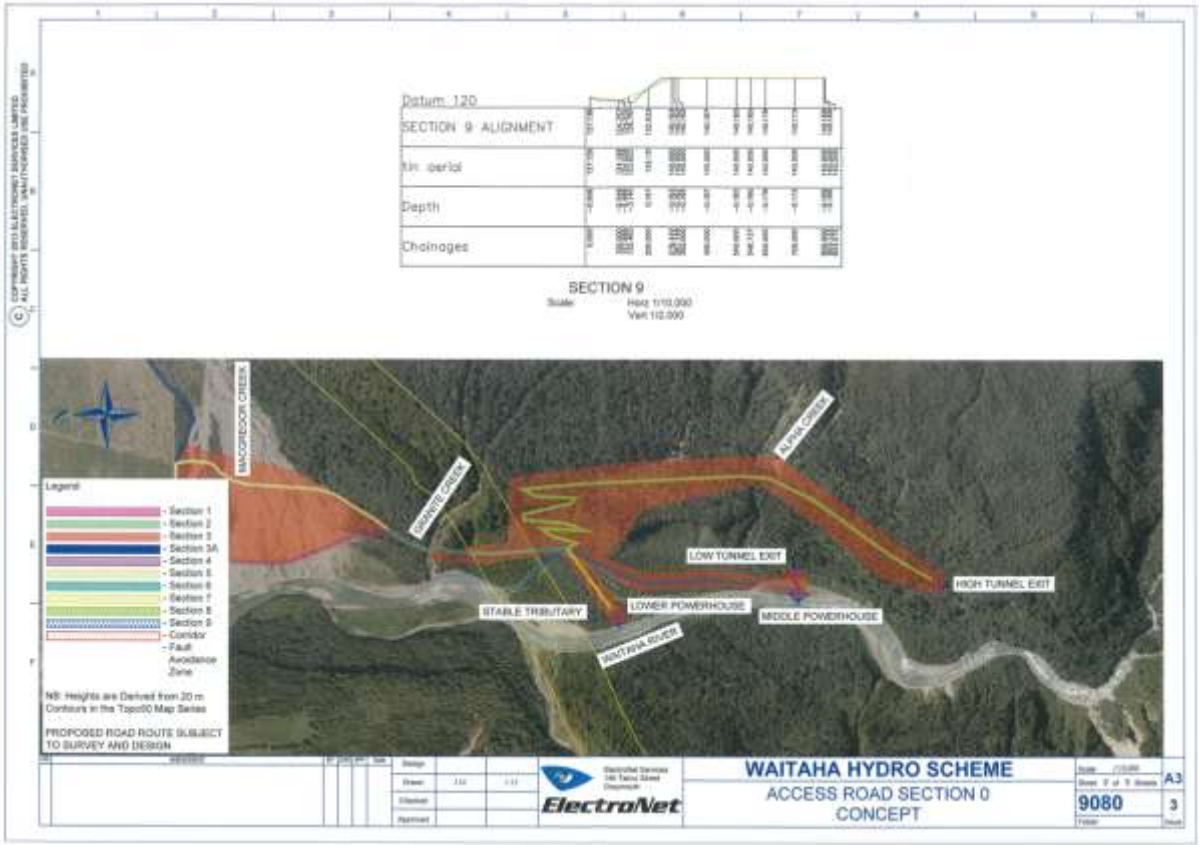

Figure 13: Main Access Road Toad and Tunnel Exit Options

Two possible tunnel exit portal sites and associated access routes to the portal and powerhouse sites were initially considered and these options (Figure 13) were evaluated. The high tunnel exit would reduce the tunnel length, while the low tunnel exit would be closer to both powerhouse sites. Based on this study the high road access leading to the high tunnel exit was discounted on the basis of cost and operational risk. The preferred road terminates at the low tunnel exit portal.

This decision also reduces the area required for vegetation clearance and avoids the areas of regenerating and more mature podocarp/hardwood forest on the elevated terrace above the powerhouse site and on the lower slope of the hill. This also reduces the likelihood of disturbing any potential bat roosting trees.

Access routes to the chosen lower portal were also considered given the identified aquatic values of the Stable Tributary. The proposed road route avoids crossing the Stable Tributary and retaining an appropriate riparian margin in order to ensure the values of that waterway are maintained (McMurtrie & Suren, 2014, Drinan & McMurtrie, 2014).

The choice to avoid development of road access in to Kiwi Flat means that access for construction and maintenance of the headworks will likely be via the tunnel. Helicopters are also likely to be used for construction and intermittently for maintenance. The existing walking track along the right bank of the Waitaha River, subject to the approval of DOC, will be relocated and upgraded.

11.9 POWERHOUSE SITE SELECTION

Originally there were three alternative powerhouse sites under consideration, the upper, central (middle) and lower powerhouse sites. The upper site was discounted early on because of the difficulty of access to the location, while the central and lower sites remained open for consideration.

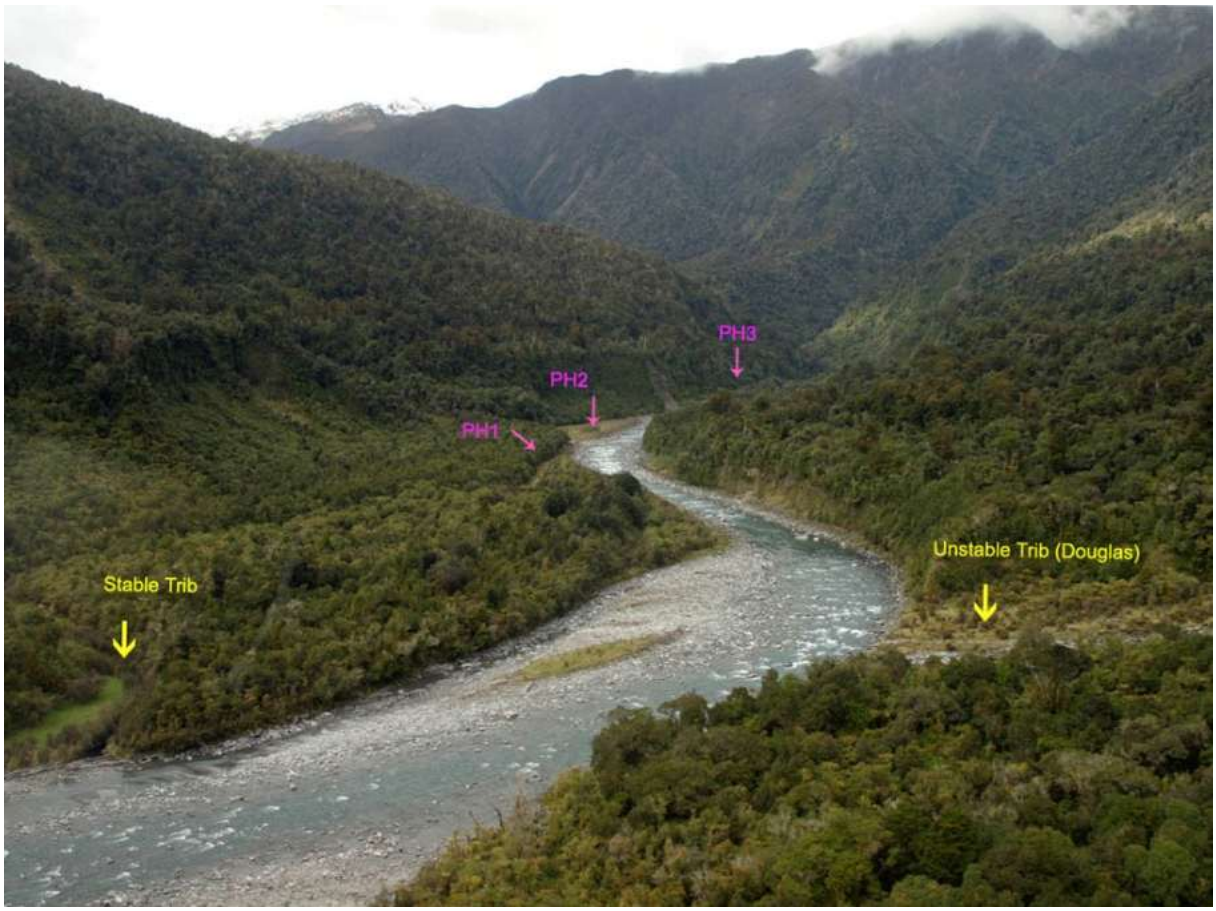

Figure 14: Powerhouse site options. PH2 is the site of the Scheme powerhouse

A decision about the location of the powerhouse was made following a geological assessment, including a field survey in May 2013, undertaken by Geotech Consulting Ltd. Previous field work had been undertaken in 2005 however in the intervening period new information on the fault lines, including the Alpine Fault, in the area

had become available. An assessment by Geotech Consulting concluded that lower powerhouse site was within an area of vulnerability for earthquakes and a powerhouse located here was too close to a sub fault of the main Alpine Fault. While earthquakes are still a design issue for the central powerhouse site, there is a much lower risk of movement as compared to the lower site. The Scheme will be designed and engineered to manage this risk.

This central location also has advantages over the lower powerhouse site from an ecological perspective and in particular aquatic ecology as it reduces the length of the abstraction reach. With the powerhouse sited in this location the Scheme avoids any effect on Douglas Creek and the Stable Tributary.

11.10 CONCLUSION

The decision to proceed with the Scheme on the Waitaha River has been subject to a comprehensive consideration of a wide range of alternatives, options and factors (i.e. technical, engineering, environmental, economic) and after undertaking appropriate investigations and receiving advice from relevant experts at all key stages.

Westpower considers that the chosen option for Scheme location, design and layout provides the best balance between making the most efficient and effective use of the renewable hydro resource for the benefit of current and future generations of the West Coast community whilst, as far as is practicable, avoiding or minimising effects of the development and operation of the Scheme.

12. CONSULTATION

The consultation process commenced at an informal level in March 2012, and prior to the selection of the intake location and completion of field surveys and technical investigations. This process provided an opportunity for interested individuals and groups to find out about the Scheme and provide feedback early on. This feedback was able to be considered in the ongoing development and design of the Scheme. This approach was based on the following objectives:

1. to determine the people, groups and organisations that are likely to have an interest in the Scheme;
2. to establish and encourage open dialogue and continue as a basis for on-going communication;
3. to communicate information regarding the Scheme including key changes to the Scheme;
4. discuss the potential effects of the Scheme;
5. gain further understanding and information from users of the area and the specific concerns of individuals, organisations, groups;
6. outline the process and approach Westpower is taking; and
7. undertake more focussed discussions with people, groups and organisations about the areas of specific concern to them and how these can be avoided or mitigated.

PRE – APPLICATION PERIOD

In March - April 2012, Westpower provided an outline of the Scheme (by way of presentation) to all the relevant statutory bodies including DOC, WCRC, WDC, Te Rūnanga o Makaawhio, Te Rūnanga o Ngāti Waewae and the Fish and Game Management- NZ West Coast Region.

Copies of the draft ecology reports, available at that time, were provided to DOC as part of the pre-application discussion and to understand the level of information that would be required for an application. This consultation highlighted some areas where further investigations or field surveys would be warranted. Te Rūnanga o Makaawhio, Te Rūnanga o Ngāti Waewae and Fish and Game were provided with an opportunity to review the early draft reports and to raise any areas of concern/questions they may have with the Scheme or where there were information gaps.

Representatives of key interest groups were advised (by phone or meeting) of Westpower's plans to re-start investigations into the Scheme.

Two information days were held in June 2012 for local communities in Hokitika and Harihari. A wide range of groups (both local and national) were advised of the information days by either email, letter or phone. Those advised included conservation and recreational bodies, Waitaha landowners, concessionaires, business and community groups, and Members of Parliament. Advertisements were placed in the local newspaper. It was anticipated that where there were local or national bodies they would inform their members.

These information days were beneficial and provided an opportunity to provide information about the Scheme and hear comments and receive feedback from community members. Key experts were on hand to answer questions about their area of expertise.

Included in the initial consultation letter was an open invitation to those unable to attend the open days to contact Westpower to arrange a time to meet.

Westpower has met with and/or provided presentations on one or more occasions to representatives of Tai Poutini Conservation Board - West Coast, Te Rūnanga o Ngāti Waewae, Te Rūnanga o Makaawhio, West Coast Fish and Game Council, Whitewater New Zealand, Royal Forest and Bird Protection Society of New Zealand), Federated Mountain Clubs of New Zealand, New Zealand Alpine Club, West Coast Federated Farmers, Westland Milk Products, Greymouth High School, the Business Round Table, and the Ross Community Group.

Field visits to the Waitaha have been undertaken with representatives from DOC, Royal Forest and Bird Protection Society of New Zealand and Whitewater New Zealand.

In addition to meetings and presentations and in order to maintain an open line for consultation, information and progress about the Scheme has been provided on the Westpower website as well as via email/telephone and or letter updates. All of those who have sent emails, letters and/or made enquiries about the Scheme have been added to a consultation database and put on the emailing/mailing list to be advised of any future updates. The majority of communications received has been via email from recreational interests, particularly kayakers expressing their likely opposition to the Scheme.

Only a small number of the recipients of mail/email notifications have acknowledged or followed up with requests for further information from, or a wish to meet with Westpower, however unless advised otherwise all parties have been retained on the consultation database to ensure that the communication channel remains open.

ISSUES AND QUESTIONS

A range of issues, concerns, questions and comments have been raised during this ongoing consultation process. A wide range of views have been expressed with varying levels of support. The list below summarises the key areas of concern and interest raised during this process.

Infrastructural, physical effects

- Inundation of Kiwi Flat
- Structures within riparian zones and flood zones
- Irreversibility
- Sediment build up
- Period for construction, rehabilitation of area
- Access for transmission lines – lack of contact with landowners.
- Build-up of debris, logs etc. behind weir especially Option B

Electricity Generation

- Who is Westpower/Electronet?
- Do we really need this power?
- Isn't there enough generation?
- Apparent haphazard and financially based damage that some of these proposals may cause.
- What other alternatives /better alternatives/sites?
- Like to see a National Strategy on Hydroelectricity Generation
- Complete waste of time and money as too much opposition to Scheme
- Good Scheme - wrong place
- Electricity prices will still increase
- In support of small scale & other hydro proposals
- Support proposed Waitaha Hydro Scheme
- Looks a good Scheme

Recreational

- Waitaha great value to New Zealand and international kayaking communities
- Recreational amenity value
- Access compromised
- Impact on hot pools and experience
- Affect kayaking bottom of Morgan Gorge

- Lack of suitable mitigation
- Why not use already modified river?
- No issues with it

Natural character, visual & landscape

- Loss of natural character
- Iconic wilderness
- Still flowing in a natural unaltered state, need to preserve our wild rivers.
- Impacts on potential for World Heritage area status
- Surprised that the Scheme is low impact.
- Less impact than what was first thought it would.
- Transmission route (external to concession area)

Ecological effects

- Surprised at the work that had been done and the efforts regarding fish and bird life
- Impact on bird life, bats and ecological values
- Leave unchanged for future generations – enough biodiversity already sacrificed
- Impact on whio habitat-in particular the loss of available habitat as a result of dewatering.
- Impact on koaro, in particular the risks of trout moving into habitat that is currently free of exotic fish and koaro ability to move through the gorge as a result of lower flows.
- What proposals for mitigation/off setting are being considered?
- Precious asset, threats to water/ banks unacceptable
- Impact on fish habitat and hatchery (trout, salmon, whitebait)
- Effects of vegetation clearance on habitat removal etc.,
- No specific work on lizards and terrestrial invertebrates
- Impact of reduced flows on periphyton
- Impact of tailrace on stable trib and biodiversity hotspot
- Reduced flows on aquatic invertebrates
- Uncertainty regarding flow regime changes

Health & Safety

- Impact on helicopter safety
- At risk of geological events, unstable area.
- Proximity to fault exclusion zone
- Building tunnel hazard to workers with flooding
- Weir – incredibly dangerous to river users

Hydrology

- What will residual flow be?
- Computer modelling may not provide strong enough evidence if proposed residual flows lower than mean annual low flow

Other

- Well thought out proposal,
- Open approach to consultation
- A local approach to a local project
- Appreciated the approach taken and for providing the information.

- The proposal is different/better to what was expected.

The above feedback has been considered as Scheme investigations have progressed. While consultation has been open to enable a broad range of issues and ideas from interested parties to be put forward, not all concerns raised were directly related to the Scheme, or able to be addressed by Westpower, e.g. the need for a National Strategy on Hydro-Generation. Neither has all feedback been directly relevant to this concession application process, however it has been acknowledged and recorded.

Some concerns have arisen through an initial lack of information or misunderstanding about the Scheme e.g. inundation of Kiwi Flat was a concern for some parties however this will not occur because this is a run-of-river Scheme with no storage as opposed to a dam.

Westpower is confident that the majority of concerns have been considered and addressed or answered through the provision of information, the results of subsequent investigations, proposed mitigation and through final design and engineering of the Scheme. However it is understood that there may be instances where there will be differing views on any particular issue and it has been the aim of the consultation process to be open to listening to those different views and perspectives.

Irrespective of the views held, many people have been appreciative of the opportunity to receive information about the Scheme well in advance of an application being submitted.

Westpower has consulted with groups such as Whitewater New Zealand to understand and identify the key effects of the Scheme on kayaking within the Waitaha River, and more specifically the abstraction reach, including Morgan Gorge. Westpower has provided flow data to enable the organisation to analyse the effects of the scheme on the opportunity to kayak the Morgan Gorge and has met and discussed the Scheme with Whitewater New Zealand on several occasions.

Westpower is proposing a number of measures that will be of benefit to kayakers (design of the weir, real time flow information) and which have been suggested as draft conditions (refer Section 9). It is expected the consultation will continue throughout the application process particularly in relation to ceases to abstraction to support an ongoing opportunity to kayak the abstraction reach.

Westpower has been in communication with the owner of the suction dredging permit over the Kiwi Flat to Macgregor Creek area and does not consider that the two activities are incompatible. Similarly discussions with the owner of the schist stone extraction operations in the vicinity of Macgregor Creek have raised no concerns.

Various key reports (draft versions for consultation) were provided in February – May 2014 to representative groups (and as requested) for their review and feedback prior to finalisation and submission of this application including: Royal Forest and Bird Protection Society of New Zealand; Whitewater New Zealand; Federated Mountain Clubs of New Zealand; New Zealand Alpine Club; West Coast Alpine Club; West Coast Branch of the NZ Jet Boating Association; Permolat members. The reports included the:

- Landscape Report
- Recreation Report
- Aquatic Ecology (Fish) Report
- Aquatic Ecology (Benthic) Report
- Aquatic Ecology (IFIM) Report
- Hydrology Report
- Lizard Report
- Birds and Bats Report
- Vegetation Report
- Terrestrial Invertebrates Report

The Blue Duck Report was not completed until the end of June but the final version was provided to interested parties at the beginning of July.

Other than from discussions with Whitewater New Zealand, Westpower has not received any specific feedback on these reports.

These reports were also provided to Tai Poutini Conservation Board - West Coast, Te Rūnanga o Ngāti Waewae, Te Rūnanga o Makaawhio and Fish and Game. Based on consultation with, and information provided to Te Rūnanga o Ngāti Waewae and Te Rūnanga o Makaawhio, Westpower has been advised that a Cultural Impact Assessment is not likely to be required to be prepared in order to complete and lodge the application.

POST – APPLICATION PERIOD

Westpower will continue its consultative approach throughout the application process and, depending on outcome of this process, throughout any subsequent resource consent application process.

13. CONCLUSION

Westpower proposes to construct and operate a hydro-electric power scheme, the Waitaha Hydro Scheme, based on renewable resources, for the benefit of current and future generations of the West Coast community. Westpower is 100% owned by the West Coast community which it serves.

The Scheme is located on conservation land designated as Stewardship Land. The Scheme will result in the potential removal of less than 4.53 ha of vegetation during construction. This represents a very small percentage of the conservation land on the West Coast, and indeed of the Waitaha Forest Stewardship Area within which the Scheme is to be located. A large portion of the Scheme is underground with two distinct and physically separated nodes of activity, being the intake site and powerhouse site. The narrow linear footprint of the access road/transmission corridor accounts for the majority of the operational footprint of the Scheme (2.6 ha of 3.9 ha) alongside a short stretch of the Waitaha River.

Westpower has engaged a wide range of independent experts who have comprehensively assessed the effects of the Scheme across a range of environmental disciplines relevant to the natural and heritage values, and recreational opportunities, of the conservation land and location. Appropriate avoidance and mitigation responses have been developed using a team approach, which has enabled both the location of the Scheme, and various components, and design aspects to be tailored to the values of the environment as far as is technically and feasibly possible. A suite of suggested draft conditions, based on the expert recommendations and assessments, is included in Section 9.

While there are ecologically significant species located in the area surrounding the Scheme, including a range of species with varying conservation status such as the iconic blue duck, long tailed bat and other birds, the project footprint is part of a much wider land area containing much of the same habitat and species. The Scheme will continue to be surrounded by natural habitat in very close proximity and will not disrupt the connectivity with the wider environment. In general, the Scheme will have minimal effects on indigenous flora and fauna, including aquatic ecology, and a range of mitigation measures are suggested as conditions to ensure that this remains the case.

Population viability of any of the species within the area is unlikely to be compromised, with specific monitoring effort proposed to ensure the local blue duck population is not adversely effected by the Scheme. Avoidance of some potential effects has been achieved through the design process which has taken into account site factors and environmental concerns. A degree of development flexibility has been factored into the proposed construction of the Scheme through use of a "development envelope" to provide an ability to adapt to site specific and environmental factors whilst still achieving the intended outcomes and avoiding uncertainty. Good site management during construction will be implemented through a series of management plans. Mitigation and monitoring measures to protect threatened species will ensure that any adverse effects of the Scheme on the distinctiveness of the area are minimised and there is no change in the ecological status of the habitats surrounding the Scheme.

The avoidance of adverse environmental effects has been the primary objective of Westpower through the design of the Scheme and the consideration of options and alternatives. The aim of the Scheme planning process has been to make the most efficient and effective use of the renewable hydro generation resource whilst ensuring the maintenance of natural heritage values as far as is practical given the nature of such a Scheme. Where this is not practical or feasible, mitigation methods including monitoring have been adopted or proposed through the suggested conditions in Section 9. These conditions have been developed through the expert advice obtained and seek to ensure that various environmental parameters or thresholds are maintained through controls on construction and operational activities.

It cannot be said that there will be no effects arising from the Scheme as there will remain some moderate to higher levels of effect in regard to certain landscape and recreational matters. Of the other matters assessed, the potential effects were generally able to be avoided or mitigated to a minor or less than minor degree. A specific monitoring programme, with associated response triggers, is proposed to assure that the blue duck population is not adversely effected.

The higher levels of effect are due to the actual physical effect of the introduction of structures into the environment and the abstraction reach controlled flow regime at the local scale, to wider perceptual effects for some users of the river. Having said that the respective expert assessments conclude that:

- with respect to Natural Character, Landscape and Visual Amenity the Scheme will meet the emphasis of the Conservation Act, will sit well within its landscape and respond to its setting, and overall is considered appropriate with respect to natural character, landscape and visual amenity.
- with respect to Recreation and Tourism whilst a hydro-development and backcountry-remote zone recreation management category are not compatible the "Outcomes" of the West Coast Conservation Management Strategy 2010-2020; for the 'Hokitika Place' will still be achieved with the Scheme in place. At the wider regional scale, which is more appropriate for kayaking opportunities due to mobility of kayakers and their national and international origins, the Report concludes that, "... *the effect of the Scheme on West Coast recreation and tourism generally will be very slight due to the high number of alternatives available for all activities affected by the Scheme and the relatively low level of use of the Kiwi Flat area. ....* ".

While not a primary consideration in the approval of the concession, economic effects have also been considered to provide background and context as to why Westpower is investigating renewable energy generation on behalf of the West Coast community (the consumers/shareholders). There is also a range of positive benefits and effects which have been recognised through the development of the Scheme proposal and expert reports which are relevant when considering the Scheme on an holistic basis.

Section 17W(1) of the Conservation Act provides, in regard to an application for concessions, that:

> *Where a conservation management strategy or conservation management plan has been established for a conservation area and the strategy or plan provides for the issue of a concession, a concession shall not be granted in that case unless the concession and its granting is consistent with the strategy or plan.*

Section 17T of the Conservation Act sets out the process in respect to a complete application and of relevance to a decision on the application provides, at 17T(2) and (3), that:

> *(2) If the Minister is satisfied that the complete application does not comply with or is inconsistent with the provisions of this Act or any relevant conservation management strategy or conservation management plan, he or she shall, within 20 working days after receipt of the application, decline the application and inform the applicant that he or she has declined the application and the reasons for declining the application.*
>
> *(3) Nothing in this Act or any other Act shall require the Minister to grant any concession if he or she considers that the grant of a concession is inappropriate in the circumstances of the particular application having regard to the matters set out in section 17U.*

The West Coast Conservation Management Strategy 2010-2020 provides at *Section 3.7.11 Utilities* that authorisation is required to site a utility on public conservation land. Utilities include structures and infrastructure for energy generation and transmission. *Policy 3* of *Section 3.7.11* provides that:

> *The development, installation, maintenance and management of utilities on public conservation lands should be consistent with the desired outcome for the relevant place/s (see Chapter 4.2).*

A link is also provided through the commentary of *Section 3.7.11* to the Conservation General Policy 2005, specifically *Policies 11.3(a)-(e)* to provide guidance on the management of Utilities. These matters are discussed in Section 10.2.3.4 of this application but it is relevant to note *Policy 11.3(a)* which states,

> *Utilities may be provided for on public conservation lands and waters where they cannot be reasonably located outside public conservation lands and waters, or if specifically provided for as a purpose for which the place is held.*

In assessing the concession application the Minister must consider a number of matters as set out in *Part 3B* of the Conservation Act, including:

- the effects of the proposed activity, and the possible avoidance and mitigation measures available and proposed;
- whether the concession is consistent with the West Coast Conservation Management Strategy 2010-2020
- the values of the natural and historic resources the Stewardship Land status seeks to protect;
- whether the granting of the concession application, with or without conditions, would be contrary to the purpose of a Stewardship Area; and
- whether the granting of the concession application, with or without conditions, would be contrary to the provisions of the Conservation Act.

The application is complete and contains sufficient information to enable consideration of the effects of development and operation of the Scheme.

The application is for the development of a Utility, being a hydro-electric power scheme, on conservation land and it is not reasonable, based on an assessment of alternatives, to locate the Scheme outside conservation land or elsewhere on the river.

It cannot be said that there will be no effects from the Scheme, however it is considered that the granting of this application, with appropriate conditions as suggested, would not undermine the protection of the natural and historic resources of the Stewardship Area in that the natural and historic resources will be maintained as far as is practicable, given the nature of such a scheme, in its current state.

The Scheme is consistent with the West Coast Conservation Management Strategy 2010-2020 and will not compromise the desired conservation "Outcomes" for the 'Hokitika Place' and the West Coast Conservancy.
It is considered that the granting of the concession would not be contrary to the purpose for which the land is held, as a Stewardship Land, or the provisions of the Conservation Act.

Accordingly it is considered that the application is not inconsistent with the provisions of the Conservation Act or the West Coast Conservation Management Strategy 2010-2020, is not inappropriate in the circumstances having regard to Section 17U, and can be granted by the Minister.

A suite of conditions has been suggested in Section 9 of the application to ensure potential effects are avoided, remedied or mitigated to the greatest extent possible and it is submitted that the Minister should impose these conditions through Section 17X of the Conservation Act when granting the concessions.

ABBREVIATIONS AND GLOSSARY OF TERMS

Term – Abbreviation	Description
	Scheme Areas
Scheme	Waitaha Hydro Scheme
Project Area	Includes the project footprint but also where any direct effects may occur e.g. aggradation, the abstraction reach and where the ecological surveys have been undertaken. The Project Area includes Kiwi Flat down to and including access across the farm to Waitaha Rd. Also referred to as Scheme Area.
Development Envelope	The physical boundaries within which the Scheme will be located and includes provision for flexibility with final design, lay out, construction methods and equipment and particularly of those components related to the Scheme which will be dependent on final design and/or pre-construction surveys such as for the access road alignment.
Project Footprint	Area within the Project Area which encompasses temporary and permanent installations and infrastructure and access ways. Also referred to as Construction Footprint.
Operational Footprint	The permanent footprint once construction is completed and the Scheme is operational.
	Sections of the Waitaha River
Upstream Reach	Upstream of the upper boundary of Kiwi Flat and the lower entrance of the Waitaha Gorge.
Kiwi Flat Reach	Between the lower entrance to the Waitaha Gorge and the upper entrance to Morgan Gorge.
Morgan Gorge	Steep turbulent confined section of Waitaha River below Kiwi Flat. Bottom of Morgan Gorge defined as confluence of Glamour Glen.
Douglas Creek Reach	Bottom of Morgan Gorge to the confluence of Douglas Creek. This section is characterised by the " Boulder Garden".
Downstream Reach	That part of the Waitaha River below the Douglas Creek confluence.
Abstraction Reach	The section of river between the intake at the top of Morgan Gorge and where the water re-enters the river at the tailrace. Approximately 2.6 km long.
	General
Access Road	Road connecting Waitaha Road to the Powerhouse and Tunnel Portal Exit.
Access Tunnel	Between the main tunnel and sediment settling basins - for maintenance. Also referred to as Access Drive.
AEE	Assessment of Effects.
CGP	Conservation General Policy 2005.
CMS	West Coast Conservation Management Strategy 2010-2020.

Term – Abbreviation	Description
Conservation Land	Public land administered by DOC, also known as the Conservation Estate.
Contractors Facilities	Area required for equipment, material and fuel storage used for construction work and re-locatable office facilities. May be used to temporarily store spoil removed from the tunnel.
Crown Land	Land managed by LINZ (Land Information New Zealand)
Cumec	Unit of Measurement for the rate of flow. Also referred to as m^3/s . One cumec is 1000 litres/second.
Dbh	Diameter of tree at breast height
Diversion of Water	The process of redirecting the flow of water.
DOC	The Department of Conservation
Fault Avoidance Zone (FAZ)	The Alpine Fault (Avoidance Zone) recognised within the Westland District Plan.
Flushing Tunnel	Between “settling basins” and Morgan Gorge - for discharge of sediment to Morgan Gorge.
Flushing tunnel outlet	Exit from flushing tunnel in Morgan Gorge. Also referred to as adit outlet.
Headworks	Describes all those works associated with the intake and weir at the top of the Morgan Gorge including intake portal and sediment Settling Basins.
Instream Flow Incremental Methodology	The IFIM is a decision-support system (or framework), which provides a process for solving water allocation problems where there are concerns for maintaining instream habitat. Also referred to as "habitat modelling”. Within this process, computer modelling of instream habitat availability for selected species (or suitable depths and velocities for given aquatic activities), over a range of flows, provides a basis for decision making regarding allocation of water resources.
Intake Access Road	Short road connecting intake and weir with Tunnel Portal Entrance.
Intake Portal	Through which water flows from intake channel into sediment settling basins. Has low level and high level intakes and gates.
GWh	Giga watt hour (being a measure of electricity output produced in an hour).
kV	Kilo volts (being a measurement of electricity potential)
kWh	Kilo watt hour (being a measure of electricity output produced in an hour).
LCDB	Land Cover Database.
Main Tunnel	Tunnel from tunnel portal entrance at Kiwi Flat to tunnel portal exit below Morgan Gorge.
Mean Flow	The average flow of the river.

Term – Abbreviation	Description
Median Flow	The flow which is exceeded 50% of the time. Might be considered the "normal flow".
msl or m asl	Metres above mean sea level.
MW	Megawatt (being a measure of electricity output).
Penstock	The pipe carrying water under pressure from the intake to the powerhouse.
Powerhouse	Building that houses turbine(s).
Power Station	Includes all infrastructure associated with generation of electricity.
Pressure Tunnel	Tunnel carrying water directly under pressure from the intake to penstock prior to powerhouse.
Proposed Residual Flow	The residual flow immediately downstream of the intake structure that has been proposed by Westpower as the basis for its applications for concession and consent = 3.5 cumecs or 3.5 m^3/s.
Ramping Effect	The steady rise or fall of the river in or below the abstraction reach caused by the gradual change in the rate of take (and coincident discharge from the power station).
Residual Flow	The minimum flow retained in the river over the abstraction reach following abstraction or diversion of water in this case for the purposes of electricity generation.
RPS	West Coast Regional Policy Statement 2000
Sediment Settling Basin(s)	Permanent structures located within tunnel near the intakes. Also referred to as "settling basins".
Settling Ponds	Temporary structures used to manage sediment during construction activities.
Stable Tributary or "Stable Trib".	Waterway located between Granite Creek and Alpha Creek, downstream of the Abstraction Reach. Represents a biodiversity hotspot.
Switchyard	Type of substation located in enclosed area adjacent to the powerhouse for the switching facilities. The generators from the power station supply their power into the yard and the transmission lines take their power from the site.
Tailrace	Channel which conveys water exiting the turbines back into the river.
Take	The maximum rate of abstraction or flow rate abstracted from the river.
Transmission Route	Proposed route for carrying electricity from the switchyard to the State Highway.
Tunnel Portal Entrance	Entrance of Main Tunnel above Morgan Gorge. May also be referred to as Upper Portal.
Tunnel Portal Exit	Exit of Main Tunnel below Morgan Gorge. May also be referred to as Lower Portal.
Tunnel Spoil	The material removed from the tunnel. Measured in m^3.

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