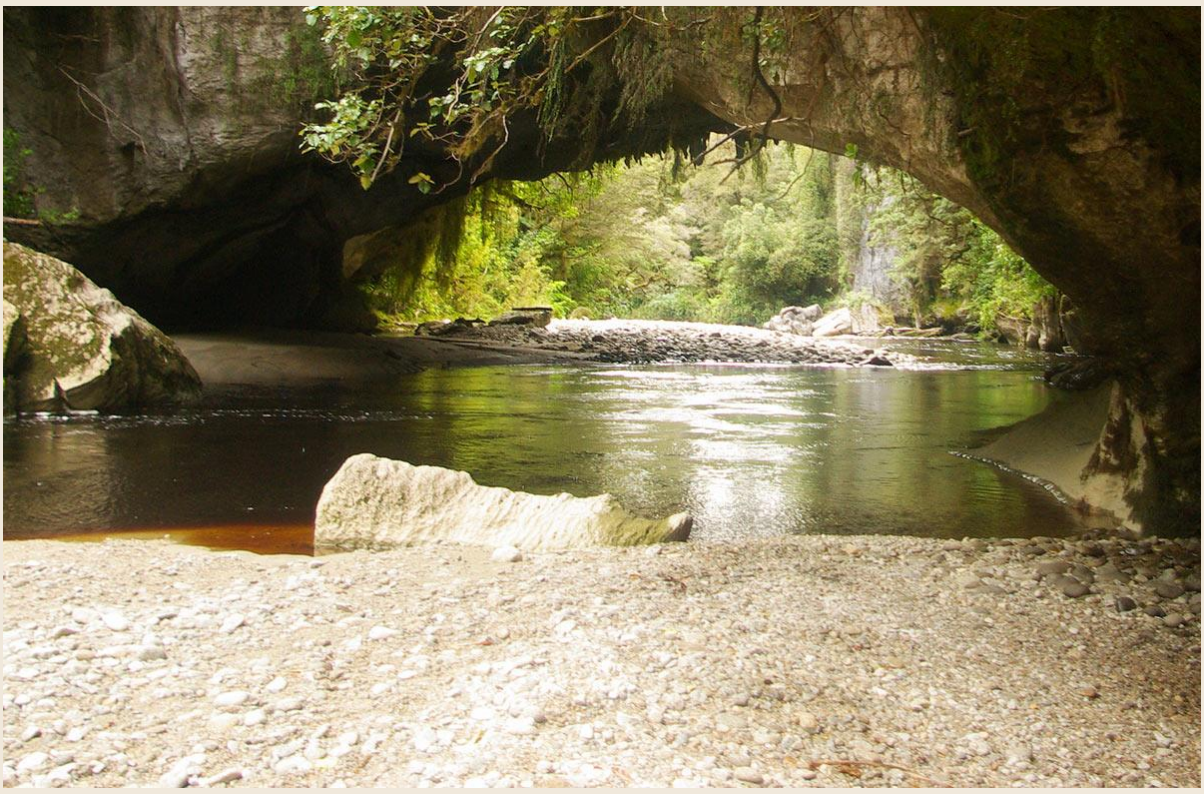
Ōpārara Arches Project



Assessment of Environmental Effects

Richard Nichol Ecology

Department of Conservation
Te Papa Atawhai

New Zealand Government

Cover: Moria Gate, Ōpārara Basin *Photo: www.doc.govt.nz/parks-and-recreation/places-to-go/nelson-tasman/places/kahurangi-national-park/oparara-basin/*

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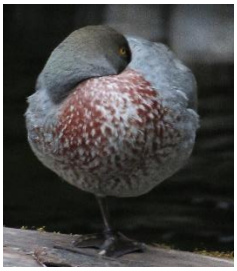

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Oparara Arches Project

Assessment of Environmental Effects

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Amendment number	Description of change	Effective date	Updated by
1	Information regarding the location of the monitoring equipment has been removed. Drawing of proposed Mirror Tarn platform removed as no longer representative of proposed structure.	21 July 2020	A Larkin

Contents

Executive Summary

In 2018 $5.7M was granted to The Department of Conservation from the Provincial Growth Fund (PGF) to progress the Oparara Arches Project, Kahurangi National Park. This park stands as a premier example of natural New Zealand and is sanctuary for a diversity of nationally and internationally important geological features and indigenous plants and animals. Many of these are represented in the Oparara Valley. The Department of Conservation is leading this project, in partnership with the Oparara Valley Trust as well as Ngāti Waewae who are kaitiaki of this area.

This project comprises eight components, which encompass a major road upgrade, track and toilet construction and upgrades, viewpoint development and security system installation. The aim of the proposed works is to make visiting the Oparara Basin a safe and memorable experience and a sustainable activity for future generations, whilst providing protection to the natural features from human impact.

The largest project component is the proposed road upgrade, which aims to achieve safer travel in to the Oparara Basin through road-targeted safety improvements along a 14km unsealed road from the park entrance through to the Oparara Basin carpark and onward a further 2km to the Box Canyon carpark. The detailed final road design will influence the magnitude of the impacts of the road upgrade. There is an opportunity to undertake improvements to fish passage, with up to half of the 93 culverts requiring replacement to provide fish passage or remediation of remaining culverts. Appropriate mitigation will reduce the potential adverse effects on all fauna to low level. The level of effect on the vegetation, which includes taonga species and At Risk plant species, ranges between low to moderate, depending on the footprint of the final detailed design.

A viewpoint and interpretation area with parking is proposed on entering the Oparara Valley. Proposed works will see an upgrade of an old logging skid-site, installation of interpretation panels within a shelter (design to be finalised) and clearance of a window through regenerating native forest to allow views over the valley. The levels of effect are mainly low, though lizard survey is required and the vegetation clearance footprint is yet to be determined.

The proposed toilet upgrade at Box-Canyon carpark entails the replacement of the existing single long-drop toilet with a design that is of the same design, but smaller, as that at the main Oparara carpark. Water will be drawn from a nearby stream and a dispersal field for fluids will be established beneath the existing road formation to the north of the carpark. While the level of environmental effects of this proposed upgrade is considered to be low to very low, it is especially important that Ngāti Waewae is consulted fully with respect to this project component.

Installation of a live-stream monitoring system is proposed to prevent unauthorised entry into the Honeycomb caves that lie within the Honeycomb Hill Specially Protected Area. The internationally significant subfossils within this extensive cave network are vulnerable to damage and/or theft and a security system is proposed that would alert DOC staff of intrusion. The environmental effects of the installation and presence of this system are considered minimal.

Safety and accessibility are key considerations for proposed track and facility improvements at Moria Gate and the Oparara Arch track. The former will entail only the installation of a single section of stairs with handrail(s) and the overall level of environmental effect is considered to be negligible.

An upgrade of the Oparara Arch track proposes installation of an elevated walkway and an adjoining bridge as well as a realigned track section to avoid a high-risk rock-fall zone and moving the trail away from Nationally Critical moss. The visual impact of the elevated walkway will have a more significant impact on the landscape values than on any other project component and this is considered in the appended landscape report. Additionally, geotechnical assessment will be required to determine whether the structure is feasible in the first instance. If the elevated walkway option is not pursued, then it may be necessary to widen the existing track and perhaps install a safety barrier alongside the track adjacent to the proposed walkway.

The anticipated environmental effects of the construction of the elevated walkway and bridge are likely to range between low to moderate with disturbance effects on whio posing the greatest potential risk. It is recommended that the Department convene a gathering of whio specialists in order to ensure that any disturbance is minimised and to seek alternative construction methodologies where appropriate.

A proposed track extension from the existing Mirror Tarn carpark back towards the main carpark will take the visitor on a new track alongside the Oparara river rather than along the road verge, thereby enhancing user-safety and experience. The trail alignment has already been largely cleared of vegetation to give access to the existing trap-line. Appropriate mitigation will reduce potential adverse effects on vegetation and any fauna to low.

Construction of a viewing platform at Mirror Tarn will reduce the damage to the lake edge and tree roots from visitors accessing the site. The platform, the design of which has yet to be finalised, is likely to have only a low level of effect on the environment.

An existing cleared site will be utilised to develop a viewing and interpretation area adjacent to McCallums Mill Road. The site selected is currently modified but would require the clearance of a window of secondary forest adjacent to the carpark, through which views out over the Oparara Basin would be gained. This clearance would potentially result in the main adverse effects which can be managed to reduce their overall level of impacts. Further survey needs to be undertaken to assess the presence of lizards within the proposed footprint and whether any mitigation is required.

1 Introduction

The Oparara Basin is a spectacular and sensitive part of Kahurangi National Park in the Buller District at the northern end of the South Island's West Coast. This area is home to the largest limestone river caves in Australasia, subfossil bones of extinct birds, amphibians and reptiles as well as unique living fauna including birds, bats, snails and plants, many of which are Threatened or At Risk.

The Oparara Basin provides a rare opportunity for the visitor to experience a diverse cross-section of the ecological and other values that are represented in the park. There is perhaps no other place on mainland New Zealand where the opportunity of seeing such a wide range of avifauna is available outside of a predator-proof fence; where a spectacular karst landscape and towering tall forests can be experienced by people across all ages and abilities.

The Oparara Valley Trust (OVT) was formed in 2002 and has as its overall objectives to preserve, enhance and promote the natural features of the Oparara Valley. Works already undertaken by the trust include building the track from Moria Gate to Mirror Tarn and new track linking the Oparara basin with the Fenian track as well as an upgrade of the main Oparara carpark and facilities. The OVT sought to build on this progress and undertake further facilities upgrades and track development. Together these form the Oparara (Arches) Project and include eight components as follows:

1. Honeycomb Caves monitoring system
2. Box canyon toilet replacement
3. Oparara Arch Track Upgrade including realignment and elevated walkway
4. Mirror tarn track extension to main carpark
5. Oparara Viewing Area (and Interpretation) on McCallums Mill Road
6. Oparara Basin Road (McCallums Mill Road) Upgrade
7. Moria Gate Stairway
8. Mirror tarn Viewing Structure

In 2018 the Provincial Growth Fund (PGF) granted $5.7M to undertake these works, part of a significant package to invest money on the West Coast, especially within the tourism sector. The Department of Conservation will lead this project, since all the components fall within the boundaries of the conservation estate, but DOC will partner with the OVT and hapū Ngāti Waewae who are kaitiaki of this rohe (area).

The Department sought expressions of interest to undertake an Assessment of Environmental Effects for all the works proposed within the Oparara Project in June 2019. After successfully tendering for that work and undertaking field work between September and November 2019, this report documents the findings of those surveys, including consideration of alternatives where these exist. This report makes recommendations with respect to project design and undertaking the project components in a manner that will assist in achieving the best environmental outcomes by

managing the potential for adverse effects and making recommendations around design that may further enhance these outcomes.

2 Scope of this assessment

This report summarises an on-site investigation of values, a desk-top exercise compiling additional relevant ecological information and an assessment of the anticipated effects from eight different components, together referred to as the Oparara Arches Project.

The scope of the report includes:

- Background to the proposal
- Description of the Environment
- Statutory Framework
- A description of the vegetation and flora found within the Project Area; including special attention given to species listed as At Risk or Threatened, as well as species at their distributional limit.
- A compilation of all bird species noted whilst on site and a literature search to determine whether any species additional to those seen may be present.
- A description of the results of a walk-through survey with attention given to the presence of any snail species or lizards observed or the suitability of habitat for these fauna as well as native bats.
- Consideration of measures to avoid, remedy and/or mitigate the anticipated adverse effects, including examining alternatives where appropriate including construction methodology whilst on site.
- This assessment does *not* include anticipated environmental effects outside of the Project Area, in particular the impacts at the sites of gravel or limestone extraction for use on road upgrades or tracks within the Project Area.

Site visits were undertaken by Richard Nichol (Senior Ecologist) on the following dates:

- 11th to 13th September 2019;
- 16th and 17th October 2019; and
- 31st October/1st November 2019.

Some of this time was spent together with Department of Conservation Works Officer Mal Hansen who provided valuable information with respect to various aspects of the proposed works. Mal's assistance and knowledge is gratefully acknowledged.

3 Description of the Environment

3.1 Existing Environment

The Project Area lies entirely within the Kahurangi National Park, within Karamea Ecological District. Karamea Ecological district is characterised by a warm, wet climate with a rainfall between 2000-3200mm per annum. The district has a diverse geology ranging from dune deposits and Pleistocene gravels, through to extensive areas of granite geology and underlain in many places by calcareous rocks from the Eocene or younger. The soils are podzolised and gleyed soils on terrace and rolling lands through to strongly leached soils in the ranges. The Karamea District was originally mostly forested, and dominated by silver beech on upper slopes, through red beech, silver beech and hard beech with scattered rimu on mid-slopes, hard beech and kāmahi on lower slopes (especially in coastal locations) to dense semi-coastal at lowest elevations near the sea. Forests dominated by silver beech occur on more fertile soils in the Oparara and Corbyvale basins. Lowland forest remnants include trees rare in the district such as kōwhai, kānuka, akeake, pukatea, mataī and silver fern (McEwan, 1987).

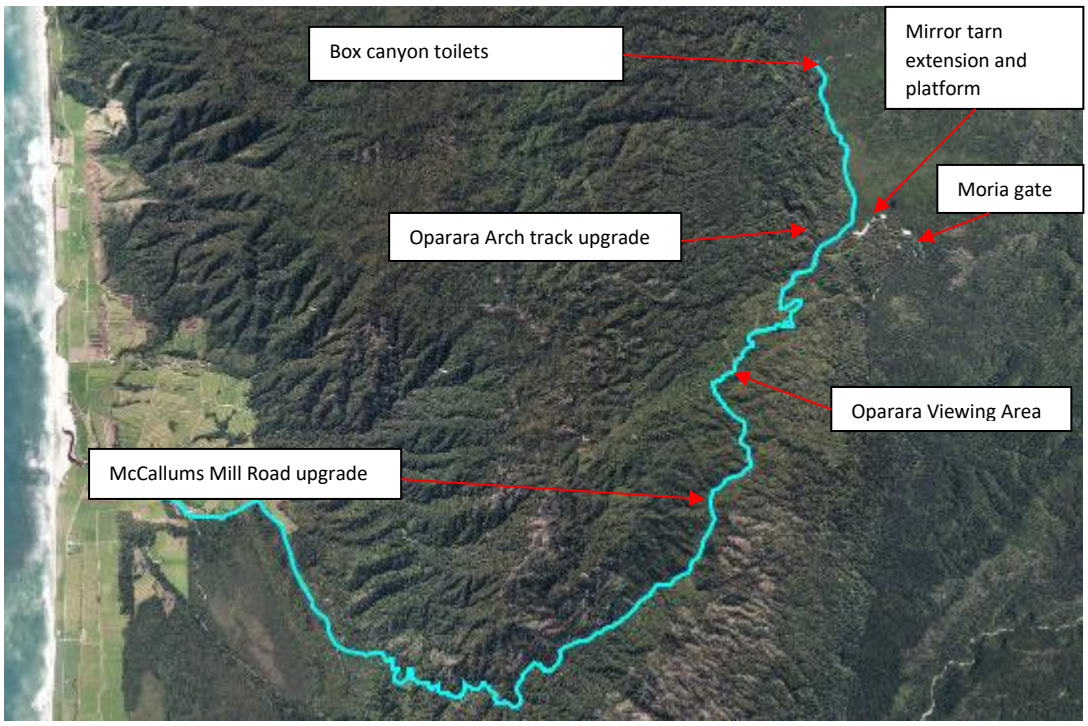

Figure 1. The Oparara Project Area. McCallums Mill Rd is highlighted. Basemap sourced from westcoast.govt.nz.

3.1.1 Geology

The Oparara Valley is a fault-bounded inland depression between the Fenian Range/Bald Hill to the east and the Oparara Plateau to the west. The catchment generally offers gentle relief in contrast to many of the mountains and tablelands that make up much of North-west Nelson. However, the Nile limestone formation, laid down in the Oligocene epoch[1], runs from north to south as a thin band up to only a few hundred metres in width through the central valley (Figure 2).

[1] From about 37 to 16 million years before present (Miller and Silverwood, (2018).

This has given rise to a rugged karst[2] environment with features such as tomos, caves and arches, underground water capture and resurgences. While Nile limestone is not richly fossiliferous in nature, the karst topography that has become etched within the landscape has become the receiving ground for a diverse range of sub-fossils from more recent times and that have become entombed within the extensive cave network, especially within the 14km long Honeycomb system in the upper valley.

Karst is a rare landform in New Zealand, with just 3% of New Zealand's land surface comprising of exposed karst, compared to a continental average of 14% (Kenny, Hayward, 2010). Caves within the karst landscape are protected to a certain extent from the effects of weathering, erosion and biological processes but are particularly sensitive to human impacts. Protection of unique cave features is an important objective of the Oparara Arches Project. Consideration of the karst values at each site is considered where pertinent (not all of the project components occur on karst) and discussion of the likely effects within the karst landscape is an inherent part of the evaluation where this is the case.

Of the eight components of the project, the Oparara Arch track realignment and the Moria Gate occupy an area where there is conspicuous surface exposure of the Nile formation limestone geology. Both the Oparara Arch and Moria gate are listed Geopreservation sites[3] . The Oparara Arch is listed[4] as a site of *national* Scientific, Educational or Aesthetic Importance with a vulnerability score of 3 i.e. unlikely to be damaged by humans. Moria Gate limestone arch is considered to be moderately vulnerable to human modification and is listed as a site of *regional* Scientific, Educational or Aesthetic Importance.

A short section of the McCallums Mill Rd will traverse the Nile formation but proposed works are most unlikely to intrude further upon the geology than at present, through any modification or excavation of the limestone for road widening.

The Box Canyon toilets occupy quartzose sands in close proximity to the Nile formation and the Mirror Tarn track extension occupies alluvium deposited over the top of karst. Surface impacts, especially those that cause acceleration of natural processes at the surface, may be transferred underground, usually by water (Silverwood and Miller, 2018) and consideration is given to the potential for adverse effects of both the toilet installation and the Mirror tarn track extension in this regard.

The area is tectonically active, with a fault running along Narya Creek to Mirror tarn having offset the Tertiary limestone and mudstone strata by about 400m, thereby creating the distinctive north-eastward bend in the Oparara River.

[2] Karst is defined as any rock type that dissolves in freshwater. In New Zealand this is usually limestone or marble, but can include sandstone or mudstone with a high lime content (Silverwood and Miller, 2018).

[3] http://www.geomarine.org.nz/NZGI

[4] West Coast Conservation Strategy 2010-2020, Appendix 6.

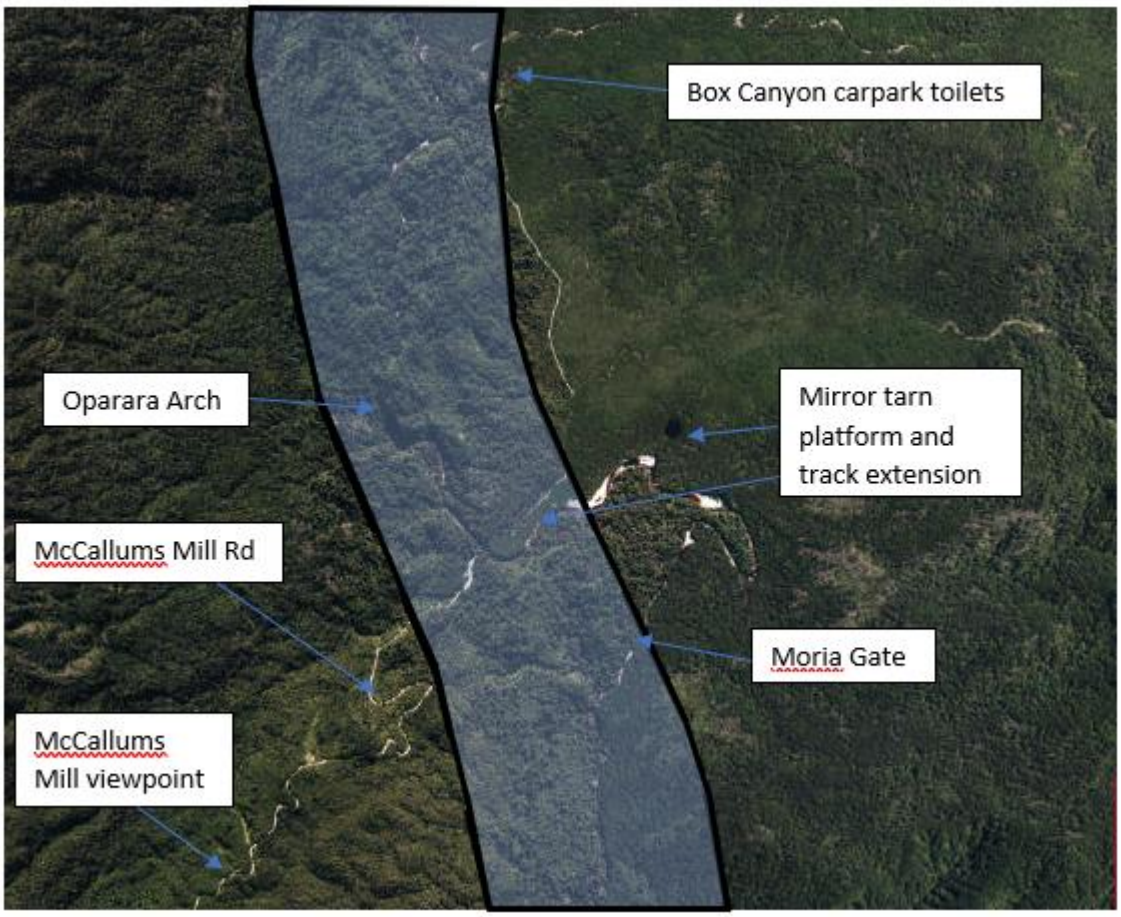

Figure 2. Nile Formation in relation to Project Elements. Box canyon includes toilet upgrade while Mirror tarn track extension is shown in detail in 13.1. Basemap from https://data.gns.cri.nz/geology/.

The underlying geology (Figure 2) consists of:

- Karamea suite megacrystic potassium feldspar-biotite granite basement (Karamea Batholith) igneous rocks
- Undifferentiated Nile group limestone; crystalline to sandy limestone and calcareous mudstone and sandstone
- Undifferentiated Lower bottom group siltstone and mudstone to the south and east of the Nile formation; blue-grey calcareous siltstone and mudstone basal calcareous sandstone
- Middle Pleistocene river deposits (along the 'pakihi' section of road). These are slightly weathered gravel and minor fan deposits forming intermediate aggradation terraces.

3.1.2 Vegetation

The project area assessed includes the road corridor from Break Creek No.2 near the commencement of McCallum's Mill Rd, to the road-end in the mid Oparara Basin, plus seven other sites of proposed development in the Oparara Basin. The vegetation encompasses a large range of

associations, from pakihi shrubland on lowland terrace at about 40m elevation, past exotic blackwood forest, secondary cutover indigenous forest and old-growth indigenous forest, karst vegetation and riparian shrubland associations.

The forest within the Oparara basin is predominantly lowland podocarp and beech forest. Silver beech is the predominant beech species on the fertile but colder valley floor of the basin, while red beech occupies warmer sites and hillslopes. Podocarps within the old growth forest include mataī, mīro, rimu and kāhikatea. A significant proportion of the forest was logged from the 1960s until it ceased in 1986, though the forest around the several walks within the basin were spared from logging. The forest areas felled more than thirty-five years ago are now in a fairly advanced stage of regrowth and include a representative mix of the original species components, while some areas within the project areas were planted with exotic species such as Tasmanian blackwood[5].

Some of the notable vegetative features of the Oparara Basin are often associated with the karst lithology. Species which grow on or are associated with limestone are termed calcicolous species. Their presence may be a result of a range of variables including soil chemistry, reduced light, soil moisture conditions etc. Some species known to be present in the basin include fern species *Asplenium cimmerorium*, *Asplenium lepidotum* and the shrubs *Hoheria ovata* and *Pseudopanax macintyrei* to name just a few. In addition, the Nationally Critical moss *Epipterygium opararense*, whilst not growing on a calcareous substrate, occupies a single site in the near vicinity of the Oparara Arch and appears to be restricted to sites within a very specific range of environmental variables.

Many of the plant species within the project area are recognised as rongoā (having medicinal values) or for weaving or other uses. Mānuka (*Leptospermum scoparium*), harakeke (*Phormium tenax*) and tōtara (*Podocarpus tōtara*) are just a few of the taonga species found within the Oparara Basin. All taonga plant species observed during this study are identified within the plant species list (Appendix).

3.1.3 Fauna

Within the context of this diverse environment, an equally diverse avifauna is present. Some species that are rarely encountered elsewhere not only occur together in this single catchment but are often easily observed by the visitor i.e. whio (blue duck). Threatened species such as whio and roroa (great-spotted kiwi) have benefitted from targeted intensive management, including predator control, and other species have no doubt fared better as a result of this reduction in pests.

The endemic large snail *Powelliphanta annectens* and the long-tailed bat (*Chalinolobus tuberculatus*) are two threatened species that require intensive predator control in order to thrive and both are found in the Oparara basin and are subject to detailed monitoring by the Department. The cave spider *Spelungula cavernicola* is found only in north-west Nelson cave systems and can be readily observed within the caves at Box Canyon.

[5] Elsewhere in the Oparara Basin trials with exotic species including pines, eucalypts and even kauri (*Agathis australis*) have been undertaken.

The lizard fauna of Kahurangi National Park and Oparara Valley in particular, is poorly known. There is a need for investigative survey to better determine the species present and it is considered that both lizard and gecko taxon may be present (see 5.5).

Pest species within the basin include red deer, possums, rats, mice and stoats. Goats occur along the southern part of the Project Area only (*pers.obs.*) while feral pigs are absent.

3.1.4 Threatened Environment Classification

The Project Area is largely designated as Category 6 under the Threatened Environment Classification (Landcare Research, 2017) with some Category 3 areas within the central Oparara basin as shown in Figure 3.

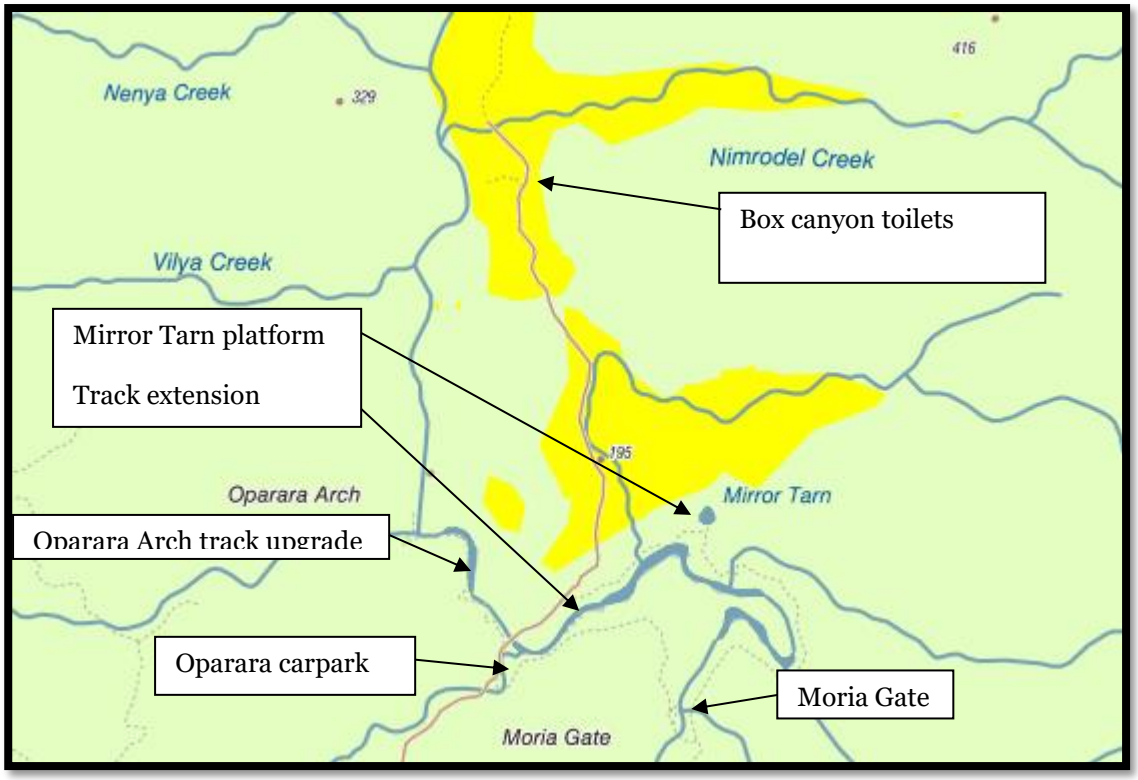

Figure 3. Threat classifications. All but the Honeycomb caves monitoring system and the Box canyon carpark toilet are within Category 6 designation. A proportion of the culvert upgrades and road widening occurs within this designation also, though the roadside environment is heavily modified and not representative of the higher threat classification of Class 3.

Category 6 is defined as environments where indigenous biodiversity is less reduced and better protected; this includes environments in which indigenous vegetation cover has been less reduced (greater than 30% remains) and a relatively greater proportion of the land area (greater than 20%) is protected for the purpose of maintaining its natural heritage.

Category 3 environments have 20-30% indigenous cover left with less than 10% legally protected. Indigenous biodiversity in these environments has been much reduced and habitats are seriously fragmented.

4 Statutory Framework[6]

The Oparara Basin is central to Kahurangi National Park and is administered by the Department of Conservation (DOC) under a statutory framework that includes the National Parks Act (1980), the Conservation Act (1987) and the Resource Management Act (1991).

The National Parks Act (1980) states that "the public shall have freedom of entry and access to the parks, so they may receive in full measure the inspiration, enjoyment, recreation, and other benefits that may be derived" not-withstanding the need to impose provisions that may be necessary 'for the preservation of the native plants and animals or for the welfare in general of the parks".

Kahurangi National Park Management Plan (KNPMP), is one of the five statutory Park plan documents for the West Coast and was produced in accordance with the requirements of the National Parks Act. This plan was last amended in 2016/17. The Kahurangi National Park Management Plan outlines a vision for the park; a guide for how the park is to be managed under the heading "Diversity ~Sanctuary~ Wilderness"[7]. It states that on its fringes a network of high-quality tracks will allow visitors to make short excursions to explore its historic areas, karst landscapes, forests, coastal and mountain scenery and experience peace, solitude, inspiration, recreational enjoyment and challenge. The Park will be treasured and supported by the local communities surrounding it and by the nation."

The primary objectives of the management plan include:

"To preserve in their natural state in perpetuity the landscape, natural ecological systems, wilderness and natural and historic features.."

"To retain the essential character of Kahurangi National Park as a remote, undeveloped, natural area of great beauty, natural quiet and diversity, and of value for whakapapa, recreation, appreciation and study."

…*and* "To give the public the opportunity to gain benefit, enjoyment, inspiration and opportunities for recreation from the park."

The West Coast Conservation Management Strategy 2010-2020, is the "key conservation management tool which the Department uses to implement legal, policy and strategic direction[8]" This document sets out the proposed intentions for the integrated management of natural and physical resources located on land administered by the Department. The Kahurangi National Park Management Plan was prepared prior to the CMS and it is noted that "nothing in the plan shall derogate from the provisions of the CMS[9]. At the same time, the CMS must be consistent in its treatment of the provisions of the KNPMP.

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[6] With contribution from Rebecca Inwood, Consultant Planner.

[7] Pg 39.

[8] 1.1 CMS, 2010-2020

[9] Foreword, CMS 2010-2020

Relevant implementations from the KNPMP, or sections from the CMS (2010-2020) or other statute are referred to when considering each project component.

The Department of Conservation works alongside a number of organisations with respect to management of public conservation lands. Foremost amongst these is the Department's responsibility to work in partnership with its Treaty partners. The Oparara Basin falls within the rohe of Te Rūnanga o Ngāti Waewae, who are kaitiaki (guardians) of this area. Cave and karst areas are managed to protect wāhi tapu and natural values as a priority above recreation, tourism or other uses of these sites (CMS s. 4.2.1.6) and so the Oparara Arches Project must not only include consultation with Ngāti Waewae but also ensure that their concerns are heard and acted on.

The Resource Management Act (1991) states[10] that the purpose of the act is "to promote the sustainable management of natural and physical resources…in a way which enables people and communities to provide for their social, economic and cultural wellbeing and for their health and safety while –

(b) safeguarding the life supporting capacity of air, water, soil, and ecosystems *and*

(c) avoiding, remedying, or mitigating, any adverse effects of activities on the environment."

The Buller District Plan sets out objectives, policies and methods of implementation that provide the framework for managing natural and physical resources in the Buller District. The plan operates within the framework of the RMA (1991). It includes the Oparara Arches Project area within the Natural Character Area (covering National Parks and Ecological Areas).

Section 4 (3) of the RMA (1991) includes a provision that enables an exemption for actions of the Department on public conservation lands where a resource consent may otherwise be necessary for land use activities managed by district councils[11]." Included in this list, and of pertinent to the Oparara Arches Project is the exemption for:

- Track construction and maintenance
- Construction/maintenance/replacement of recreation facilities
- Installation of signage and interpretation
- Radio installation (for management and safety purposes)
- Vegetation management and control

It is within this context that the objectives of the current proposal must be examined.

As well as the statutory direction given by the above, The West Coast Karst Management Plan (Silverwood and Miller, 2018), provides guidance on management considerations for karst areas throughout the West Coast and dedicates a significant focus to that area of karst landscape that

[10] Section 5 RMA (1991)

[11] 3.8.9 CMS, pg 173

occurs within the Oparara Basin. A management vision of that document is 'the conservation of West Coast karst in its natural state in perpetuity, while allowing for its use and appreciation in a manner that is consistent with its conservation."

5 Methodology

5.1 Vegetation

A field investigation was undertaken during three site visits between September and November 2019 to establish the vegetation types and species composition present within the Project Area. A walk-through survey of the site focused on areas likely to be directly impacted by the various project elements. All vegetation recorded on site was identified to species level (appendix 2 and 3), whilst tier height and stature of dominant species was also noted. The degree of naturalness, and physical, biotic and human impacts or influences were noted where these were considered relevant. The presence of any invasive species was also noted since this was considered relevant with respect to construction management and managing invasive weeds generally within such a high priority conservation area.

5.2 Birds

Birds observed during the site visit were recorded as point observations and note was made of the general abundance of species encountered. Knowledge of the Oparara basin, and previous bird observations recorded by the author are referenced in later chapters.

A roving kiwi listen was undertaken on two evenings (16th and 31st October) whilst also spotlighting for fish along McCallums Mill Road and the Mirror Tarn track. Listening commenced thirty minutes after sunset (as per standard kiwi listening protocol) and continued for two to three hours. On the first evening the stretch of road from Break Creek No. 3 to culvert 040 was surveyed i.e. a distance of about 5km. Suitable listening conditions were experienced for at least two hours.

On the second night, a section from McCallums Bridge to Mirror Tarn (and back to the Mirror Tarn carpark), then along the road to culvert 087 and back to the main carpark was traversed. This was a distance of about 2.8km in total and listening was undertaken for two hours before heavy rain set-in.

5.3 Snails

Powelliphanta annectens is a very large snail listed as Threatened: In serious Decline (Hitchmough, 2007). It occupies a range from Bellbird Ridge (just south of Heaphy hut) through the Oparara Valley, with some outlier upland populations in the Karamea and Wangapeka Ecological Districts. While it is able to occupy a relatively wide range of habitats, from high altitude silver beech forest to coastal nīkau forest 'alluvial soils on limestone substrate in silver and red beech forest…at 150– 245 m a.s.l' are considered to be optimal (Walker, 2003). Despite being the *Powelliphanta* species with the largest known range, this species currently occurs at very low densities due to predation pressures from rats, stoats, thrushes, pigs, possums and weka (Walker 2003).

While no effort was made to undertake snail searching[12] at any of the sites visited during field work, all snail shells encountered were documented including waypoint information. Snail monitoring undertaken in the Oparara Basin in 2018 (Simister, 2018) has also informed this assessment.

5.4 Freshwater fish

Gee-minnow traps were deployed on three nights during the survey period. Gee-minnow traps are a wire mesh funnel trap that are easy to install and allow any fish caught to be counted and identified and released back into the environment. A small porous screw-top container filled with Marmite was placed in each trap as a lure.

In addition to setting gee-minnow traps, spotlighting of streams and pools considered to offer potential fish habitat was undertaken on two nights. No effort was made to capture any fish seen during spotlighting, but a general identification of broad fish groupings was undertaken i.e. identification of eels, bullies, galaxids (whitebait species) and koura (freshwater crayfish).

All 93 culverts along the length of McCallums Mill Rd were visited over two days and these were assessed for existing fish passage as well as consideration being given to any remedial works required as part of anticipated culvert replacement or extensions. Data was collected on stream volume, velocity within the culvert, height of fall from the culvert and any other relevant information pertaining to stream health. This data was entered on to a separate excel spreadsheet which accompanies this report.

5.5 Lizards

Spotlight searching was undertaken on the evening of 16th October whilst also kiwi listening and spotlighting for fish. The lowland section from Break Creek No. 5 to Break Creek No. 3 was covered. Generally, the temperatures were considered too cold for lizards to be active. A desktop assessment was undertaken for this taxon grouping and takes into consideration the fact that the entire Oparara Basin would have been covered in intact old-growth mixed podocarp-beech forest until the completion of the forestry road to the Oparara River in 1969 and the subsequent logging that took place in the 1970's and 1980s. This would have had a significant influence on the habitat types available to herpetofauna at that time and those likely to be extant today.

5.6 Bats

The Department of Conservation initiated comprehensive monitoring for long-tailed bats (*Chalinolobus tuberculatus*) in the Oparara Basin in 2018 and this has provided information to inform aspects of the works proposed. Field work was undertaken during spring when it was too cold for bats to be active and so no additional effort was made to focus on bat activity or presence. Consideration of the presence of potential bat-roost trees i.e. trees with a trunk diameter at breast

[12] The author has undertaken plot searches as part of monitoring of *Powelliphanta annectens*, at several sites whilst working at the Department staff as well as completing surveys for the Buller Kawatiri office.

height (dbh) of greater than 15cm[13] was given whilst undertaking all fieldwork where tree clearance is proposed.

5.7 Assessment of Effects

In assessing the overall level of effect of the Oparara Arches Project on ecosystems and species, consideration has been given to the approach detailed in the Guidelines for undertaking Ecological Impact Assessments (EcIA) published by the Environment Institute of Australia and New Zealand (EIANZ, 2018). The approach involves deriving an overall effects rating for a proposed activity based on combining ecological values with magnitude of effects, using a matrix approach (Table 1).

Values identified within an assessment are ascribed an ecological value based on their current threat ranking so that Threatened species are ranked very high, At Risk species are rated high, and nationally local and common species are low. Threat classifications have been sourced as follows: bats (O'Donnell *et al* 2018), birds (Robertson *et al* 2017); reptiles (Hitchmough *et al* 2016); fish (Dunn *et al* 2018) and plants (de Lange *et al* 2018).

In determining a rating for the magnitude of effects on each ecological value, consideration was given to the scale of habitat loss relative to the size of the available resource, duration of the effect, likely effect at the local, as well as national, population level with respect to individual species and degree to which the Project was likely to impact on the sustainability of the ecosystem and associated species. The magnitude of the effects is described as 'negligible', 'low', 'moderate', high' or 'very high'.

Table 1. Criteria for describing the level of effects (EIANZ, 2018)

MAGNITUDE	ECOLOGICAL VALUE				
	Very High	**High**	**Moderate**	**Low**	**Negligible**
Very High	Very High	Very High	*High*	Moderate	Low
High	Very High	Very High	Moderate	Low	Very Low
Moderate	*High*	High	Moderate	Low	Very Low
Low	Moderate	Low	Low	Very Low	Very Low
Negligible	Low	Very Low	Very Low	Very Low	Very Low
Positive	Net gain	Net gain	Net gain	Net gain	Net gain

For the purposes of this assessment, at the end of each project component section a table is presented that summarises the level of effects on the ecological values identified. This is intended to help give a snapshot view of the overall anticipated effects of the proposed activities. The level of effect or risk posed on ecological values may range from very high, where high value species are severely affected by an activity through to net gain where an ecological value may benefit from an activity. Moderate level effects, or greater, typically require measures to avoid, remedy or mitigate

[13] Brian Lloyd, bat specialist from Mapua, advocates 15cm being the cut-off trunk diameter for potential bat roosts rather than the larger 30cm that has frequently been used in the past (from conversation B. Lloyd, *pers. comm,* February 2019).

effects, while net gains may be possible through off-setting or enhancing a habitat through proposed works.

Within each table, a value is presented showing the potential effect in the absence of the mitigation measures recommended while an additional rating, and the more important one, is a rating value if all mitigation measures have been undertaken as outlined.

6 Ecological Values

6.1 Introduction

There is a disproportionately high level of species endemism in the North-West of the South Island and an impressive biodiversity that reflects the diverse landforms, topography, climate, geology etc. There are around 1200 species of native vascular plant within Kahurangi National park, about half of New Zealand's native plant flora[14]. The park is also home to the most diverse range of *Powelliphanta* snails in the country and includes the most important populations of whio and great-spotted kiwi, plus a diversity of other species.

The Oparara Basin is geographically central to Kahurangi National Park and is located in the 'Karamea Place' for the purposes of the West Coast Conservation Strategy (CMS). The CMS includes amongst its 2020 biodiversity outcomes for Karamea Place "viable populations of southern short-tailed bats *pekapeka*, blue duck *whio*, great spotted kiwi *roroa* and the locally endemic moss *Epipterygium opararense* and land snail *Powelliphanta annectens* are maintained in the Oparara basin priority site."

These are just some of the unique and often threatened biological values within the Oparara Basin. In fact, this statement reveals the vulnerability of those values and the short time frames over which losses to our biodiversity can occur, since the lesser short-tailed bat is now likely extinct in the Oparara Basin while the long-tailed bat is still present.

For the purposes of this assessment, there was a focus on the recognised values within the Oparara Basin, within the context of the importance of the area in contributing to overall biodiversity within the Kahurangi National Park.

6.2 Vegetation

The vegetation types and species present are described for each separate component of the overall project (Table 2). Some sites contain threatened or localised species while an assessment of all areas included the possibility that new plant records would add value to our understanding and enable an opportunity to manage threats to these species also.

The table below identifies plant species that were identified as significant because of their threat ranking, distributional limit or other notable features. Two of these species, southern rāta and mānuka, are taonga species – all other taonga plant species are denoted within the full species list in the appendix of this report.

[14] Kahurangi National Park Management Plan, 2001.

Table 2. Threatened or At Risk plant species according to de Lange *et al.* (2018) observed within the Project Area.

Species	Location	Threat Status	Notes
Epipterygium oparanense	Oparara Arch	Nationally Critical	Found on a single rock face next to existing Oparara Arch track
Metrosideros umbellata, Southern Rāta	Throughout area	Threatened: Nationally vulnerable	Threat status elevated in 2017 after arrival of myrtle rust
Metrosideros colensoi	Throughout area	Threatened: Nationally vulnerable	Threat status elevated in 2017 after arrival of myrtle rust
Metrosideros fulgens	Throughout area	Threatened: Nationally vulnerable	Threat status elevated in 2017 after arrival of myrtle rust
Metrosideros diffusa	Throughout area	Threatened: Nationally vulnerable	Threat status elevated in 2017 after arrival of myrtle rust
Metrosideros robusta *Northern Rāta*	Throughout area	Threatened: Nationally vulnerable	Threat status elevated in 2017 after arrival of myrtle rust
Myriophylum robustum	Mirror tarn	At Risk: Declining	Around at least the lake edge on the sunnier southern shoreline
Leptospermum scoparium, Mānuka	McCallums Mill Rd	At Risk: Declining	Threat status elevated in 2017 after arrival of myrtle rust

6.3 Birds

Three threatened bird species and a further five listed as At Risk were heard or seen within the Project Area. A further 14 native or endemic species and at least four introduced species were noted (Table 3). At least 19 taonga bird species (as listed within Schedule 97 of the Ngai Tāhu Claims Settlement Act, 1998) are included within the avifauna identified within the project area.

Table 3: Bird species recorded within the Project Area; * denotes indigenous species while Taonga species are denoted by #. The degree of cell shading indicates threat ranking (with darker shading signifying a greater threat)

Species	**Common and/or Māori name**	**Threat Status**	**Notes**
Anas platyrhynchos	mallard	Introduced and naturalised	Hybridises with native grey duck
*Anthornis melanura**	Bellbird, Korimako#	Endemic, Not Threatened	Common throughout
*Apteryx haastii**	Great Spotted kiwi, Roroa #	Threatened - Nationally Vulnerable	Heard, sign observed
Carduelis carduelis	Goldfinch	Introduced and Naturalised	Heard along road margins

Carduelis flammea	Redpoll	Introduced and Naturalised	Known to be present
*Chrysococcyx lucidus**	Shining cuckoo, Pīpīwharauroa#	Native, not threatened	Known to be present
*Cyanoramphus auriceps**	Yellow-crowned parakeet, Kākāriki #	Endemic, –Not threatened	Heard at upper carpark
*Eudynamys taitensis**	Long-tailed cuckoo Koekoeā #	Endemic, At Risk – Naturally Uncommon	Heard previously
*Falco novaeseelandiae**	New Zealand Falcon Kārearea #	Endemic, At Risk - Recovering	Known to be present, sparse
Fringilla coelebs	Chaffinch	Introduced and Naturalised	Common
*Gallirallus australis**	Weka #	Endemic, Not Threatened	Common
*Gerygone igata**	Grey Warbler Riroriro #	Endemic, Not Threatened	Common throughout
*Hemiphaga novaeseelandiae**	Kererū #	Endemic, Not Threatened	Occasional
*Hirundo neoxena**	Welcome swallow	Native, not threatened	Scattered throughout, by water
*Hymenolaimus malacorhynchos**	Blue Duck Kōwhiowhio #	Endemic, Threatened - Nationally Vulnerable	Observed on Oparara River only
*Mohoua novaeseelandiae**	Brown Creeper	Endemic, Not Threatened	Scattered throughout
*Nestor notabilis**	Kea #	Endemic, Threatened - Nationally Endangered	Heard around main carpark (2 birds)
*Nestor meridionalis**	Kākā #	Endemic, At Risk - Recovering	Heard occasionally in basin
*Ninox novaeseelandiae**	Morepork Ruru koukou #	Native, Not Threatened	Heard at night during site visit
*Petroica australis**	South Island Robin Kakaruai #	Endemic, At Risk - Declining	Common throughout
*Petroica macrocephala**	Tomtit Mīromīro #	Endemic, Not Threatened	Common

*Phalacrocorax carbo**	Black shag Kōau #	Native, At Risk: Naturally uncommon	Seen roosting within Oparara arch
*Prosthemadera novaeseelandiae**	Tūī #	Endemic, Not Threatened	Common throughout
Prunella modularis	Dunnock	Introduced and Naturalised	Heard
*Rhipidura fuliginosa**	New Zealand Fantail Pīwakawaka #	Endemic, Not Threatened	Common throughout
*Tadorna variegata**	Paradise Shelduck Pūtakitaki #	Endemic, Not Threatened	Seen on McCallum Mill Rd, Break Creek No 6.
Turdus merula	Blackbird	Introduced and Naturalised	Heard throughout
Turdus philomelos	Song Thrush	Introduced and Naturalised	Occasional
*Zosterops lateralis**	Silvereye	Native, Not Threatened	Common

Of the three threatened species two are known to utilise areas within the development footprint of at least one of the project components. Kōwhiowhio, whio or blue duck (Threatened: Nationally Vulnerable) occupy, or are immediately adjacent to, and utilise the Oparara River and Narya Creek and the adjacent riparian areas for nesting. Whio were noted on a number of occasions about the area of proposed works for the Oparara Track upgrade and the Mirror tarn track extension.

Roroa or great-spotted kiwi (Threatened: Nationally Vulnerable) were found to be present along the McCallums Mill road corridor. Three individual birds were heard or their movement seen on the lowland around Break Creek 4 and 5 (Figure 4). Two male birds were heard calling while movement of a third bird was seen within roadside vegetation in between these two birds. Kiwi probes were also seen on a grassy clearing beside culvert 063. Kiwi are found throughout the kiwi sanctuary area within the Oparara basin and may utilise habitat within the Box Canyon construction footprint, Oparara Arch track upgrade and also the McCallums Mill Rd viewing area.

The bird with the highest threat ranking within the Oparara Basin however is the kea, which is listed as Nationally Endangered. Unlike popoulations of kea in highly visited tourist or recreation hotspots elsewhere in the South Island i.e. Arthurs Pass village and some of the Canterbury ski-fields, the few kea in the Oparara Basin tend to be more timid and haven't presented any issues with respect to damage of vehicles or buildings etc. While kea have been known to breed in the upper valley, there is no indication at present that they are utilising the habitat specifically at the sites within the proposed development footprint.

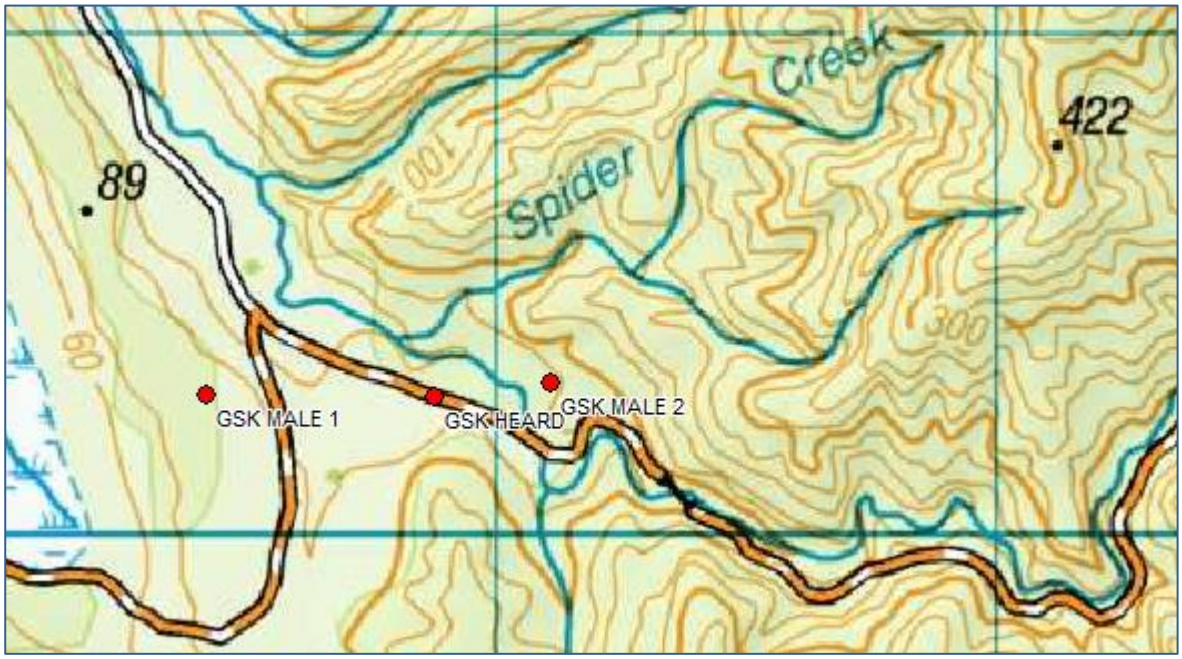

Figure 4. Roroa/Great spotted kiwi (GSK) heard or noted on side of track during roving listen on evening of 16th October.

6.4 Snails

No live *Powelliphanta annectens* snails were detected during six days of field work, although snail shells were found at or near to a number of the project sites including:

- Box Canyon carpark toilet
- Mirror tarn track extension
- McCallums Mill viewing area
- Oparara road upgrade (within the Oparara basin only)
- Moria Gate stairway

The prevalence of shells or likelihood of occurrence is discussed within each Project i.e. Chapters 7-11 and 14.

6.5 Freshwater fish

Native fish were seen at night within most catchments where a moderate flow was observed and the majority of these were within waterways within the Break Creek catchment, i.e. to the south of the Oparara basin (Table 4). Banded kokopu (*Galaxias fasciatus*) and longfin eels (*Anguilla dieffenbachii*) were the only fish species identified with any certainty since the species of some individuals noted whilst spotlighting was difficult to confirm beyond being members of the galaxiid family. Galaxiids noted in Mirror Tarn are believed to be banded kokopu (Contours, 2004). Banded kokopu were observed in tributaries of the Oparara River, including Narya Creek, although no fish were caught within the one trap set within the Oparara River. A single northern koura (*Paranephrops planifrons*) was seen in a small stream at 320m elevation adjacent to McCallums

Mill Rd. Longfin eel were the only threatened fish species seen (At Risk: Declining, Goodman *et al*, 2014) though other threatened species may be present. Banded kokopu are the only migratory species of galaxiid on the West Coast that is regarded as not threatened (Dunn *et al* 2018).

The NIWA freshwater fish database provided little recent information for any of the catchments within the Project Area. There are records of banded kokopu, longfin eel, koaro (*Galaxias brevipinnis*), and the upland bully (*Gobiomorphus huttoni*) within lower Break Creek from the 1990s, but no survey information within the last twenty years has been documented.

Table 4. Fish species observed during spotlighting or caught and released from gee-minnow traps set overnight.

Waterway (waypoint no.)	Date	Species caught	Perched or other fish passage impediment	Notes
Break Creek No 3 (003)	16/10/19	5 banded kokopu	partial	Various sizes up to 120mm length
Break Creek No 4 (028)	16/10/19	4 banded kokopu above, 6 below culvert	partial	Fish seen within culvert also while spotlighting
Break Creek No 5 (031)	12/9/19	5 banded kokopu	yes	Longfin eel seen, also galaxids
Break Creek bridge (033)	12/9/19	2 banded kokopu	n.a.	Short distance below bridge
Culvert 035 upstream	16/10/19	2 banded kokopu	yes	Spotlighting showed koura and galaxids present
Culvert (063)	12/9/19 31/10/19	Nil caught 3 banded kokopu	Yes	n.a Other individuals seen spotlighting
Culvert (064)	31/10/19	1 banded kokopu	Yes	2 other kokopu seen while spotlighting
Buried culvert (072)	12/9/19	Nil caught	No passage	n.a
Dam above road at culvert 074	31/10/19	Nil caught	Yes	Frogs in dam, no fish seen.
Narya Creek (080)	12/9/19 31/10/19	Nil caught n.a	partial	n.a banded kokopu and longfin eel seen
Creek by Box Canyon carpark, culvert 093	31/11/19	Nil caught	Goes underground just downstream	Nothing seen

Mirror Tarn	31/11/19	N. A	N. A	Banded kokopu common. Likely land-locked population[15]

6.6 Lizards

Spotlight searching of shrubland along McCallums Mill Rd failed to find any lizards on what was considered suitable potential habitat i.e. mānuka shrubland. A desktop assessment identified three lizard species that may occur within the project area (Table 5).

Table 5: Lizard species potentially present within the Project Area.

Scientific name	Common name	Conservation Status (Hitchmough *et al.* 2016)
Naultinus stellatus	Starred gecko	Threatened-Nationally Vulnerable
Oligosoma infrapunctatum	Speckled skink	At Risk: Declining
Mokopirirakau granulatus	Forest gecko	At Risk : Declining
Oligosoma polychroma	Northern grass skink	Not Threatened

The most highly ranked species, the Starred gecko (*Naultinus stellatus*) is a diurnal, arboreal species including occupying mānuka and beech forest but may spend time on the ground. The forest gecko also inhabits mānuka or kānuka shrubland as well as occupying trunks, foliage or branches of trees (van Winkel *et al*, 2018). These two species are listed as Threatened and At Risk, respectively.

The other lizard that may be present within the Project Area is the speckled skink. This is listed as At Risk: Declining (Hitchmough *et al*. 2017). Speckled skink utilise open non-forested habitat such as fernland or shrubland and so there is a possibility of their presence along the McCallums Mill Rd or on clearing nearby.

The Northern grass skink as well as being the most abundant of the three species also occupies a wide range of habitats from coastal through to subalpine (de Winkel *et al*, 2018) and is perhaps the species most likely to be present within the Project Area. The starred gecko and forest gecko are likely present at low densities and for most project area components the likelihood of harm to these species is correspondingly low.

6.7 Bats

The Oparara basin has historically had two species of bat present, the long-tailed bat (*Chalinolobus tuberculatus)*[16]and the endemic southern Lesser short-tailed bat (*Mystacina tuberculata*

[15] Mirror tarn does not appear to have an outlet above ground and fish migration to other water bodies is therefore highly unlikely.

[16] Closely related to five other species of bat in Australia and elsewhere

tuberculata). Though the long-tailed bat has a higher threat ranking (Threatened: Nationally Critical, O'Donnell *et al*, 2018) than the subspecies of short-tailed bats that is found elsewhere in the South Island, it is the latter that is likely to have become extinct in the Oparara basin. The last vestige of this population occupied areas from about Vilya Creek northwards but extensive monitoring in 2018 and 2019 failed to record any short-tailed bats and the last reliable record in the area is considered to be from 2003 (Pryde, 2019).

Annual bat monitoring was commenced in 2018 and long-tailed bats were recorded at 70% of sites where recorders were placed in the Oparara Basin in 2019 (Pryde, 2019). Long-tailed bats have home ranges of up to 100km and while monitoring does give a very good picture of the areas in which bats were found, and also indicative information on overall abundance, it does not allow any absolute numbers to be obtained. Intensive predator control, including both ground trapping for rats and stoats and aerial 1080 operations for rats and mice, stoats and possums will help ensure that bats remain in the Oparara Basin[17].

7 Honeycomb Caves Monitoring system

7.1 Background and nature of proposal

The Honeycomb caves system, recognised as one of the treasures of Kahurangi National Park, contains over 13km of passages and has yielded the most varied collection of subfossil bones ever recovered from a New Zealand Cave. These include over 50 species of bird, more than a third of which are now extinct, including several moa species[18]. The caves are within a Special Protection Area and this restricts access to concessionaires and their clients as well as authorised personnel, including staff from the Department of Conservation undertaking work in the area such as predator monitoring and control.

The rationale for restricting access to the Honeycomb Caves, including increasing security around the site, is that in addition to karst sites and caves representing perhaps the most fragile and easily disturbed sites on conservation land, these caves contain fossils and sub-fossil remains that may have considerable monetary value on the black market.

Damage to cave systems can include damage to formations within the cave, trampling or compaction of cave floors, the disturbance of cave sediments and the introduction of pollutants, nutrients or foreign organisms. For this reason, tours operated by the Oparara Valley Trust under concession from the Department of Conservation, ensure that the caves are visited by members of the public in a manner that minimises potential impacts.

The risk to the fossils within the cave system is likely to be greater than the risk of damage. The Honeycomb Hill system, though relatively remote, is still accessible and easily located. During the winter off-season the amount of visitation to the area is minimal meaning that it would be easier still for unauthorised entry to occur without the Department or Oparara Valley Trust being aware. There has been an increase in unauthorised entry in recent times and this has already come at the

[17] BT Mining has a commitment to funding pest control in the Oparara Basin for at least 20 years beyond the cessation of mining operations in the Cypress Stream (Sam Taylor, Environmental Manager, BT Mining pers.comm. 20/12/19).

[18] West Coast Te Tai O Poutini, Conservation Management Strategy Volume 1, 2010-2020.

cost of damage within the cave and there is the very real risk that fossils or other cave relics may be taken.

There is a pressing need to increase the security at the caves and Oparara Arches project proposes that this be undertaken by installing a remote electronic monitoring and alarm system to record and warn of unauthorised entry into the Restricted Area. This needn't be the only means of increasing security and the Department should remain open to other means of securing access to the Honeycomb caves.

7.2 Outline of the proposed security system

The system will operate from two sites. Both sites will be linked and will relay information via the Bald Hill repeater to receiving stations at both the Karamea and Westport DOC offices. Out of hours monitoring of any alarm alerts would be undertaken and actioned by a duty officer. The system, as well as sending an alarm alert, would capture high definition footage such as registration plates on vehicles via four remote cameras (two at each site), that will enable digital information to be stored and analysed for use in establishing identity in any criminal conviction.

7.3 Anticipated effects of the Security System Installation and Maintenance

Neither aerial site was visited for the purposes of this assessment but is understood that the installation is on vegetation that was severely damaged by Cyclone Ita or grassed areas.

The installation of the system will require minimal modification of the environment at both monitoring sites.

The installation of a non-lattice aerial structure of the size proposed is allowed within the provisions of the Buller District Plan. Building consents may be required for these structures[19] although it could be argued that the installation falls within the exemptions for the Department relating to "radio installations for management and safety purposes."[20]

[19] Carissa du Plessis, Acting team Leader Planning, B.D.C. e-mail correspondence, 30th October 2019.

[20] CMS Appendix 9, pg 399.

Overall Level of Effect of the Proposal: Negligible or Low

8 Box Canyon Carpark Toilet

8.1 Background and nature of proposed toilet upgrade.

Whilst only a proportion of the visitors to the Oparara Basin venture as far as the road-end to embark on a short walk to the Box canyon, the numbers are increasing and could be expected to continue to do so. In addition to visits by casual day visitors, and a few overnight freedom campers, the carpark at the road-end is also the meeting point for those who wish to join on the guided trip to the Honeycomb caves[21]. There is therefore a need for a toilet facility at the carpark and there currently exists a long-drop or pit toilet set a short distance in to the bush (Figure 5).

Figure 5 Existing longdrop toilet at the Box canyon carpark.

Figure 6. Existing toilet block at the main carpark. The proposed toilet block would replicate this design but would be a single pan design rather than double as shown.

It is likely that the existing toilet will be inadequate to fulfil the needs for a projected increase in the number of visitors[22], as well as there being some perceived user-resistance to long-drop toilets. This has led to an issue with some visitors avoiding using the toilet and leaving toilet waste and rubbish in the bush. The existing toilet does not have hand-washing facilities and it was therefore considered appropriate to upgrade to a system that not only provided a higher standard toilet facility but provide a place for handwashing (Figure 6). This is especially important given that some

[21] Some clients on this trip will travel in the Oparara Valley Trust vehicle from Market Cross, while others who prefer to be more independent arrange to meet on site, in order to have the freedom to visit the other attractions in the basin in their own time.

[22] Where the septic system is connected only to a toilet, the tank system design is based upon up to 60 visitors per day or a 18,000 capacity (DOC Back Country Guidelines).

visitors choose to have lunch at the car-park site and an appropriate level of hygiene must be considered when providing toileting facilities nearby. Implementation 11 of the KNPMP states that "road-end facilities must be maintained and upgraded where appropriate and practicable" while implementation 13 states that all new or upgraded toilet facilities at developed road-ends meet disabled access standard. The proposed activity meets the requirements of the CMS (s.3.8.9) that allows an exemption from obtaining land use consent to undertake the activity.

It is proposed that a replacement flushing toilet, based on the design of the existing toilets in the main carpark, will be sited slightly to the north of the existing long-drop toilet. Rather than a two-pan toilet, a single pan toilet would be installed, reflecting the lower level of visitation at this upper carpark (Figure 7).

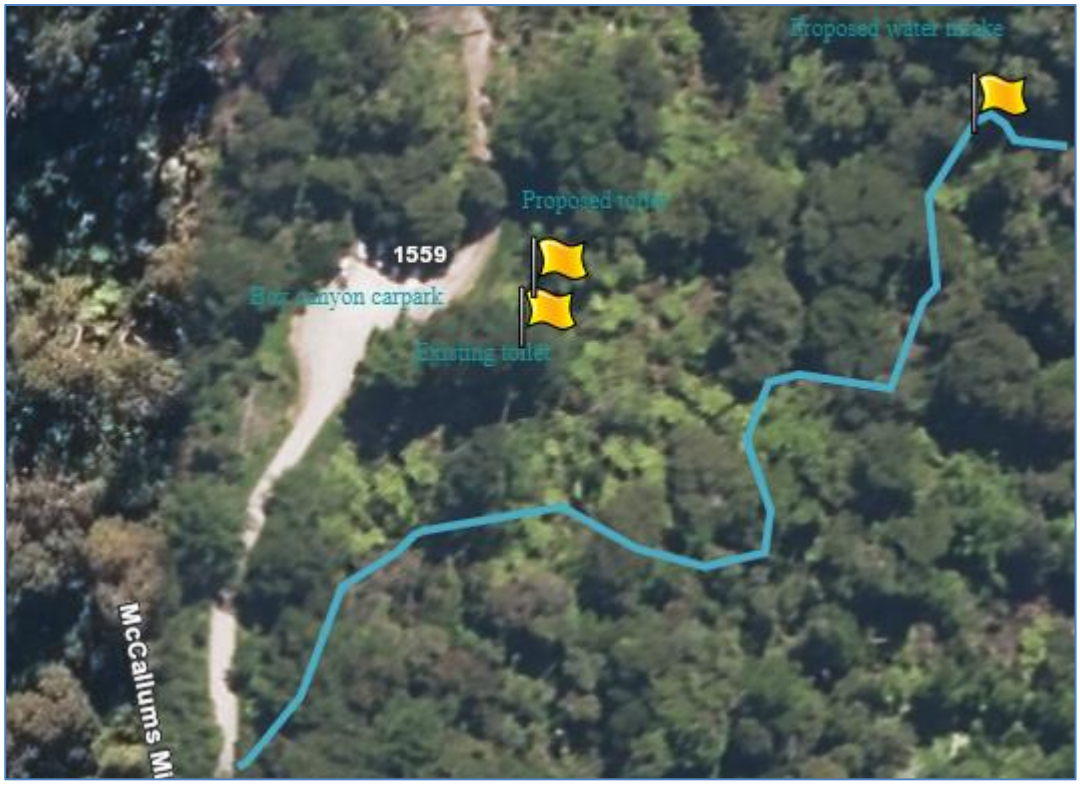

Figure 7. Proposed toilet upgrade, water intake and Box canyon carpark, the blue line shows the stream-course (flowing from right to left) of the waterway from which water-take is proposed. Basemap from westcoast.govt.nz

A 3500 litre septic tank will be installed and septic tank effluent flowing from the septic system will be filtered and flow into one of two 15m long dispersal fields. These dispersal fields will be excavated to approximately 400mm in depth and width, lined with bidim geotextile cloth (which is highly porous but prevents soil migration) and a 100mm diameter perforated pipe will be laid along the full length of each trench. The pipe will be surrounded by limestone fill placed in the trench and will receive the filtered septic tank effluent. The wastewater received from the septic system will then drain outward to a dispersal field. A 20 tonne digger would be used to dig the dispersal field trenches, while a 1.2 tonne digger would be used to dig a trench from the toilet block through regenerating bush to the septic tank. Grey-water from the handbasin will flow into the septic system also, while stormwater from the roof of the building will be collected in a spouting and downpipe from the building and be diverted to the south-east where it will flow out in to the existing natural environment.

Water for the toilet and handbasin washing will be sourced from a small stream to the east of the toilet facility and conveyed via a pipe laid on the ground surface. The flow-path of this stream was traced and mapped from where it cascades down from a nearby terrace, to where it disappears underground soon after passing through a culvert under McCallum Mill Road. It is believed that this stream flows all year round. It is proposed that a small weir will be constructed in the vicinity of the cascade/waterfall and that a pipe would take a small proportion of the flow as required (rather than it filling a separate water-tank) to supply the toilet and hand-basin. The tap installed at the hand-basin would have a return so that water would not be needlessly wasted from being left on.

The installation of the septic system and dispersal field will be undertaken by a certified and experienced plumbing/wastewater specialist and a joint on-site meeting preliminary visit by a local tradesman was undertaken on the 1st of November, to discuss the proposed works and the feasibility of the proposal. It was agreed at this meeting, rather than the dispersal field occupying the forested area to the north of the proposed toilet block, that the septic tank could be placed on the edge of the road[23] northern end of the carpark and that the dispersal field could be laid beneath the existing road formation. This would enable ready access to the septic tanks for cleaning and repair if necessary, whilst also reducing the ecological impacts.

It is anticipated that the septic system will be pumped out by an approved operator, every 18 months or so, depending on the amount of usage. The new toilet system is designed so that it can be added to i.e. a second toilet would be sited adjoining the first, if demand should require it in the future. The existing toilet by contrast retains all solids on the site and will have a limited life-span before a new toilet site would require excavation.

The Oparara Valley falls within the rohe of Ngāti Waewae. Water is taonga of great importance to Māori and the RMA (1991) recognises this relationship and the role of kaitiaki in managing the water resource. It is therefore critically important that Ngāti Waewae are consulted in relation to the proposed toilet upgrade, including the proposed water-take and discharge to ground via a dispersal field.

The Oparara Basin tracks and Caves are listed as a Front-Country site within the CMS (2010-2020) and policy states that there should be provision of "facilities and services that cater principally for the needs, interests and abilities of most day visitors."[24]

With respect to the provisions of the KNPMP, it is considered that the lower order objective of giving "the public the opportunity to gain benefit and enjoyment" and which will be facilitated by providing a quality toilet facility at this site, does not in this instance derogate from the higher order objectives relating to preserving the landscape and natural systems in a natural state. This is due to the positioning of the toilet amongst modified vegetation, the ability to rehabilitate the existing toilet site and the ability to mitigate against potential adverse effects. These aspects are detailed below.

[23] This is not a public road and is the start of the access track for guided tour parties and authorised personnel visiting the Honeycomb Caves Restricted Area.

[24] 3.6.1.5, pg 125

8.2 Existing Environment

The proposed development footprint lies immediately to the east of the existing metalled carpark for the Box Canyon short walk at the end of the McCallums Mill Road. The site comprises a relatively flat terrace at 220m in elevation, with a gentle north-east to south-east aspect (approximately 1° slope) and is covered in regenerating forest vegetation. A small stream flowing from north to south, and which will provide the water for the facility, continues southwards and enters the Oparara river approximately 250m away. The nearest point of the stream to the dispersal field is approximately 60m away[25]. Spotlighting of the stream and setting a gee-minnow trap, yielded no fish seen nor caught.

The vegetation at the site of the proposed toilet block is small stature regenerating forest and includes kanono (*Coprosma grandifolia*), soft tree fern (*Cyathea smithii*), horopito (*Pseudowintera colorata*), stinkwood (*Coprosma foetiddisima*) hard tree fern (*Dicksonia squarrosa*) and broadleaf (*Griselinia littoralis*) (Figures 8 and 9).

Figure 8 Proposed site of toilet block establishment, approximately 3-4 metres back from the road edge, showing secondary forest and shrubland on the site.

Figure 9 showing roadside and secondary vegetation likely to be affected by the establishment of the septic system at the end of McCallum Mill Road. The outlet pipe to the proposed toilet would extend to the right-hand side of the field of view.

Other species in the lower tier vegetation includes crown fern (*Lomaria discolor*), *Parablechnum procerum,* bush rice grass (*Microlaena avenacea*), and shrubs of *Coprosma rotundifolia*, rōhutu (*Neomyrtus pedunculata*), as well as occasional small red beech saplings (*Fuscospora fusca).* One small kahikatea (*Dacrycarpus dacrydioides*) will likely be lost to the development but small rimu and silver beech around the site would remain. A short path-way from the carpark to the toilet block will require the clearance of only 3-4m in length and the vegetation is relatively sparse. A large ongaonga (*Urtica ferox*) at the entrance to the proposed path can be cut back to prevent visitors being stung.

[25] The Toilet standards for DOC Back Country huts state that dispersal fields should be at least 20m from any waters. The repositioning of the dispersal field was proposed partly to meet these conditions after it was discovered that the earlier dispersal field, as proposed, may not have met this distance requirement.

A small corridor of vegetation, approximately 5m long, between the toilet block and the septic tank, is lightly vegetated and includes a sparse cover of bush rice grass and crown fern beneath a tree fern canopy. One relatively large fuchsia (*Fuchsia excorticata*) occupies ground immediately to the right of the proposed trench and this should be retained due to the scarcity of this nectar-producing species in the Oparara Basin, and in many parts of Kahurangi National Park (Nichol, 2015).

Two soil core samples were taken from the site of the proposed dispersal field. These showed that relatively homogenous quartzose sediments extend to between 50cm and 1m in depth, beneath a shallow soil layer (Figure 10). This will permit drainage for waters arriving from the dispersal field and seeping outwards. The Nile formation limestone occupies the ground westward of the toilets and is not considered be affected in any way by dispersal field fluids or grey-water.

Figure 10. Soil/subsoil profile showing loosely consolidated quartzose sediments down to at least metre in depth (i.e. tape length shown).

8.3 Anticipated effects of the proposed construction

8.3.1 Effect on Vegetation

The proposed development will require the removal of about 30m² of secondary vegetation for the toilet block facility (including a septic tank designed to hold 3500 litres), and the temporary disturbance of a 1200mm wide, 5m long corridor for the outlet pipe from the toilet to the septic tank (Figure 9).

The proposed toilet location was chosen to minimise the effects of vegetation removal by selecting the smallest stature vegetation available and where the number of long-lived tree species i.e. beeches and podocarps to be affected was reduced. All the species likely to be affected by the proposal are common in the vicinity and within the Oparara Basin generally. There were no species observed that are listed as Threatened or At Risk (according to de Lange *et al*, 2017), though kahikatea, red beech (tawai), broadleaf (kapuka) and tree fuchsia (kōtukutuku) are noted as taonga species. The overall vegetation effects are therefore considered to be negligible i.e. a negligible effect on the known population or range of the element/feature (EIANZ, 2018).

The vegetation within the proposed development footprint is likely to provide habitat for the land snail *Powelliphanta annectens* however and this is discussed in 8.3.2. The importance of the vegetation within the footprint area, for any other faunal species i.e. birds or bats is considered to be very low overall though the area may be used by kiwi for feeding, as discussed below.

8.3.2 Effect on Powelliphanta snails

The habitat within the proposed toilet block area is likely to offer at least moderate habitat for *P. annectens*, and while no shells or live snails were found on the proposed development site, shells were found near-by. Eight snail monitoring plots are located within 500m of the proposed toilet

and while the results of recent monitoring from these plots was not examined, it is held by the Department and will give a good indication of the densities that might be expected within the proposed footprint.

The threat posed to *Powelliphanta annectens* may be categorised as:

- The threat from damage or mortality as a result of habitat loss during toilet block construction and from crushing during construction of that facility and formation of the 5m long trench from the toilet block to the septic tank.

There is a risk that, without any precautions being taken, there may be mortality of snails as a result of the proposed toilet construction. Site preparation will require the removal of all vegetation prior to laying a concrete pad beneath the toilet block. The overall area required for the building and access pathway will result in the permanent loss of about 30m^2 of potential snail habitat as well as disturbance of an area of approximately 6m^2 to lay the pipe to the septic system. A small 1.2 tonne digger will likely be used to undertake all this work, thereby minimising any unintended vegetation damage, but snails could be crushed during vegetation removal. Searching and removing snails immediately prior to works being undertaken is therefore considered an integral and critical part of the overall works proposal. This is discussed in more detail in chapter 8.4.1.

The loss of approximately 30m^2 of potential habitat is considered to be a relatively minor loss. The removal of the old toilet block from its present site will allow regeneration there as well as on the access track and this will more than compensate for the area lost for the new development, due to the longer pathway to that facility. Any vegetation removed or crushed during trench excavation is expected to regenerate relatively rapidly but can be encouraged by undertaking appropriate rehabilitative measures including the planting.

8.3.3 Effect on Great Spotted Kiwi (*Apteryx haastii*)

There is a high probability that great-spotted kiwi, which are listed as Threatened: Nationally Vulnerable (Robertson *et al*, 2017) may utilise the proposed toilet block footprint, although this is likely to be solely for feeding rather than roosting or nesting, due to the absence of banks, rock crevices holes or logs which any resident birds might otherwise utilise for these purposes.

The removal of potential feeding habitat, at only a few square metres of ground, is therefore considered to be an insignificant loss. Mitigation measures are nonetheless recommended and these are detailed in 8.4.3.

8.3.4 Potential effect on lizards

It is not known whether lizards are present on the site but there are very few records of lizards within the Oparara Basin. The habitat available may be suitable for both skink and gecko species and it is recommended that an assessment is undertaken by a qualified herpetologist during the summer months. If lizards were found to be present, mitigation measures would likely include trapping and relocating or holding in captivity any animals caught until the main works were complete or releasing elsewhere, as well as leaving any vegetation felled near to the site for animals to utilise without further disturbance.

8.3.5 Effect on freshwater biota

No fish or aquatic invertebrates were seen within the small volume stream that passes by the proposed development footprint. A gee-minnow trap was set overnight just above the road, as well as spotlighting approximately 30m length of this stream both failed to detect any instream life.

The proposed water take for the toilet block is not intended to fill an on-site tank. Rather, a small proportion of the stream flow would be drawn off as it is used at the toilet and hand-wash facility.

It is recommended that stream flow should be monitored and measured by an appropriately skilled technician, in order to determine whether this water source would be sufficient to supply the proposed facility. This would be especially important during dry spells and it is therefore recommended that the site be visited after a minimum of 10 rain-free days, during summer in order to inform a conclusion.

8.4 Recommended Mitigation

A number of mitigation measures are recommended with respect to environmental considerations and these are outlined below. In addition to these, a contingency plan for mitigation in the event of concrete spills must be detailed and/or discussed with the Oparara Project Works Manager prior to commencement of any concrete being poured for the toilet pad.

8.4.1 Mitigation for vegetation

- Damage to vegetation must be minimised by using appropriately sized machinery for the job and all care being taken to avoid disturbance and damage beyond the development footprint. All machinery must be thoroughly washed down prior to arriving on site to avoid the introducing weeds. Any gravels used for building up a base for the toilet block must be from a weed-free site if practicable.

- Preliminary discussions have agreed on the use of a 1.2 tonne digger for the preparation of the toilet site and trench to the septic system and a larger digger to excavate the trench along the road.

- Any organic material must be stockpiled in a suitable place for later rehabilitation of the old toilet site and pathway.

- The large fuchsia, a taonga species, on the right-hand side of the proposed trench line to the septic tank should be avoided. The Oparara Project Works Officer/DOC staff member should be on-site to over-see all site preparation work, including trench excavation.

- Once the old toilet is decommissioned, it should be removed and the hole capped and the site and the pathway leading up to it rehabilitated. This would entail raking the surface with the bucket of the digger, and removing any salvageable gravel, then planting with any saplings removed from the new toilet site (potted up and kept on site) and/or new plants sourced from the Karamea Ecological District, depositing and spreading any organic material stockpiled from the new site including soil and humic material and spreading a thin layer of blood and bone to encourage plant establishment.

- If the works are undertaken during the months of April to October then plants may be potted up directly, but if outside of this period then they should be prepared by wrenching a couple of weeks prior to potting up, in order to reduce stress.

- Planting out would ideally be undertaken in the months of April to October.

- Weed checks of the site would be undertaken as part of a routine monitoring programme and eradication of any invasive species undertaken by DOC staff.

8.4.2 Mitigation for snails

- Snail searching must be undertaken of the development footprint required for all works. This would include the entire site of the toilet block, the pathway to this facility, a 1200mm wide corridor from the toilet to the site of the septic tank and the excavation footprint for this component. Ideally this would occur no earlier than the day before the works commencing, to prevent snails recolonising the area.

- A DOC biodiversity staff member would need to be present to oversee and assist with this work and any relocation of snails found *or* a collection permit granted to an experienced ecologist to undertake this work on the Department's behalf.

- It is recommended that as soon as the development footprint is cleared of any snails that the works would proceed.

8.4.3 Mitigation for great-spotted kiwi

- A trained certified kiwi dog must be taken through the site immediately prior (i.e. on the same day) as any works undertaken for vegetation clearance, to assist with locating any birds present on site. The nearest kiwi dog and trainer is based at Mokihinui[26].

- In the unlikely event that a kiwi is encountered than it would simply be flushed from the site to prevent injury while any works were undertaken and potential habitat removed. In the very unlikely event that a kiwi is found to be nesting on the development footprint then works would cease immediately and a decision made on whether to postpone further works or whether to incubate the egg in a suitable facility.

8.4.4 Recommended mitigation for lizards

There is a possibility that lizards might occupy the site proposed for development, though given the limited scale of the development and the paucity of lizard records in the area the probability of detection is considered slight.

- It is recommended that a herpetologist be consulted to discuss possible lizard occurrence, and a lizard management plan for the site drawn up if required. It may be necessary for a

[26] Lynne McGuire, and her dog Mica, who work for MBC, based on Power-house Rd, Westport.

site visit and trapping/spotlighting undertaken to better determine objectives. This would likely tie in with lizard assessment along the McCallums Mill Rd.

8.4.5 Overall level of effects for the proposed toilet block

Table 6. Overall level of effects for the proposed toilet block

	Critical species	Level of Effects	Level of effects with mitigation measures
Vegetation	n.a	Low	Very low
Snails	*Powelliphanta annectens*	Moderate	Low
Avifauna	Great-spotted kiwi	moderate	Very Low
Lizards	Not known	Very low, at most	Very low

The level of effect on vegetation at the site is considered to be low due to the absence of any particular plant species listed as Threatened or At Risk (Table 6). Though the footprint area falls within an area identified as being of higher value than others within the Project Area[27], the small area of vegetation clearance and the mitigation measures to restore the vegetation from the removal of the old structure, mean that that the overall effects, after mitigation, are considered to be very low. However, if toilet usage does increase markedly it could conceivably have a significant effect on the stream and any biota present.

The overall level of effects for the key associations or species that might be affected by the proposed toilet block are presented. *Powelliphanta annectens* is a threatened species and therefore has a high threat rating. A moderate level of effect without mitigation is derived from the habitat being sub-optimal due to previous disturbance, the likelihood being that the snails are therefore likely to occur at very low densities at best. Given the conservation status, mitigation is proposed for this species and this will further reduce the anticipated level of effects to low.

Great-spotted kiwi have a very high threat rating and may utilise the area for feeding, although the area is very small and would be unlikely to comprise a significant portion of any individual kiwi's home range. There is some possibility that they may roost in the footprint area, though a lack of suitable habitat makes this unlikely. A moderate overall level of effect, in the absence of mitigation, reflects there being a remote possibility of injury or mortality to kiwi. Mitigation measures outlined reduce this level of effect to very low.

[27] Indigenous biodiversity in these environments has been much reduced and habitats are seriously fragmented

8.4.6 Summary

There is a need for a higher standard of toilet facility at the Box Canyon carpark than currently exists. The proposal to install a disabled access standard, flush toilet with handwashing would provide a standard of facility that would be consistent with that which exists currently at the main car-park. The toilet will be of a similar design, materials and colour-scheme, though smaller in scale, and will incorporate a dispersal field and be sited unobtrusively within low stature shrubland/regenerating forest. Dispersal field outputs will be discharged beneath the existing road, beyond the mapped Nile formation limestone, to the north of the car-park, subject to approval from Ngāti Waewae. Mitigation measures will reduce anticipated adverse environmental effects to between low and very low.

9 Oparara Arch Track Restoration and Upgrade

9.1 Background and nature of proposed track development

For some time the Oparara Valley Trust has sought to have the Oparara Arch track upgraded to allow for the protection of the natural features whilst at the same time providing for public safety and enjoyment. The track currently sits at day visitor/short-stop traveller standard and is negotiable by somebody who is reasonably fit and active but includes sets of stairs, some rock obstacles and some slippery sections, especially near the viewing area. This one kilometre track leads the visitor through a variety of environments on a short journey to the largest natural limestone arch in New Zealand. Currently between 15,000 and 20,000 visitors use this track and the number is set to rise, as the site is listed as one of the top 6 'iconic attractions' on the West Coast (www.westcoast.co.nz) and has received a considerable amount of promotion in recent times.

The proposed track upgrade would see the replacement of two sections of track on the true right bank of the Oparara River to be replaced with an elevated walkway/bridge/track section and a realigned track respectively, while all other sections of the track will be subject to upgrades to ensure higher safety and overall standard. The upgraded track will provide wheelchair access but would not meet the required regulatory standard to be formally classified as 'wheelchair accessible'[28].

A significant amount of material will need to be brought in to undertake this work and though some of the transporting will be undertaken with a power-barrow, there are 81 hours of helicopter time allocated for this project component (M. Hansen, *pers. comm*, 8/11/19). While a small proportion of this flying time will be in the near vicinity of the track, there remains a significant potential for disturbance of whio from helicopter noise and visual disturbance.

The proposed activity meets the requirements of the CMS (s.3.8.9) that allows an exemption from obtaining land use consent to undertake the activity and the Oparara Arch Track is specifically listed in Appendix 9 of the CMS (2010-2020) in this regard. The Kuharangi National Park Management Plan and the CMS both state that tracks be maintained to "an acceptable standard and carrying capacity" and that they may need to be upgraded to cater for an increasing number of visitors. The CMS specifically states that recreational opportunities at these Frontcountry sites are

[28] Assyst Request R159613: Upgrade and rerouting of the Oparara Arch access track.

to be "safe and easily accessible[29]". However, this must be balanced by the need to prevent over-use and overdevelopment and the KNPMP states that ongoing monitoring of the social and environmental impacts of visitors must be undertaken[30]". While it is impossible to know to what extent any track improvement may contribute to increased use, monitoring of visitor numbers and effects is considered critical in order to ensure that over-use does not result in measurable impacts on the unique biota and the karst landscape and cave features associated with the Oparara Arch.

Detailed design drawings for the elevated walkway have not yet been finalised and therefore the landscape assessment (appended) was prepared without the benefit of having a full schedule of relevant detail. Implementations within the KNPMP relevant to landscape[31], state that (3)..any new structures must "not be intrusive" nor (6)…"cause any undue damage to geological and natural features". It should be noted that exceptions to these implementations may be allowed for safety reasons only[32]. The landscape assessment undertaken for this project found that the proposed walkway was not considered obtrusive (appendix). Nevertheless, the conclusions from this assessment should be revisited after final design is available. It is worth noting that the CMS states that where there is uncertainty about potential adverse effects associated with the provision of recreational facilities, a precautionary approach should be adopted."[33]

9.1.1.1 Realignment 1A (Elevated Walkway and adjoining 15m bridge)

Originally the track upgrade proposal included the installation of three elevated walkways at various places along the full trail length. Subsequently, the favoured option has been for an elevated purpose-built structure along an almost vertical 60m section of the limestone river-bank and an adjoining single span bridge of approximately 15m (Figure 11 and 12).

[29] CMS, Karamea Place, Frontcountry Sites, pg 193.

[30] Implementations 1 and 2, pg 79.

[31] Pg 66.

[32] Implementation 8, Pg 66.

[33] Policy 7, pg 116, CMS 2010-2020.

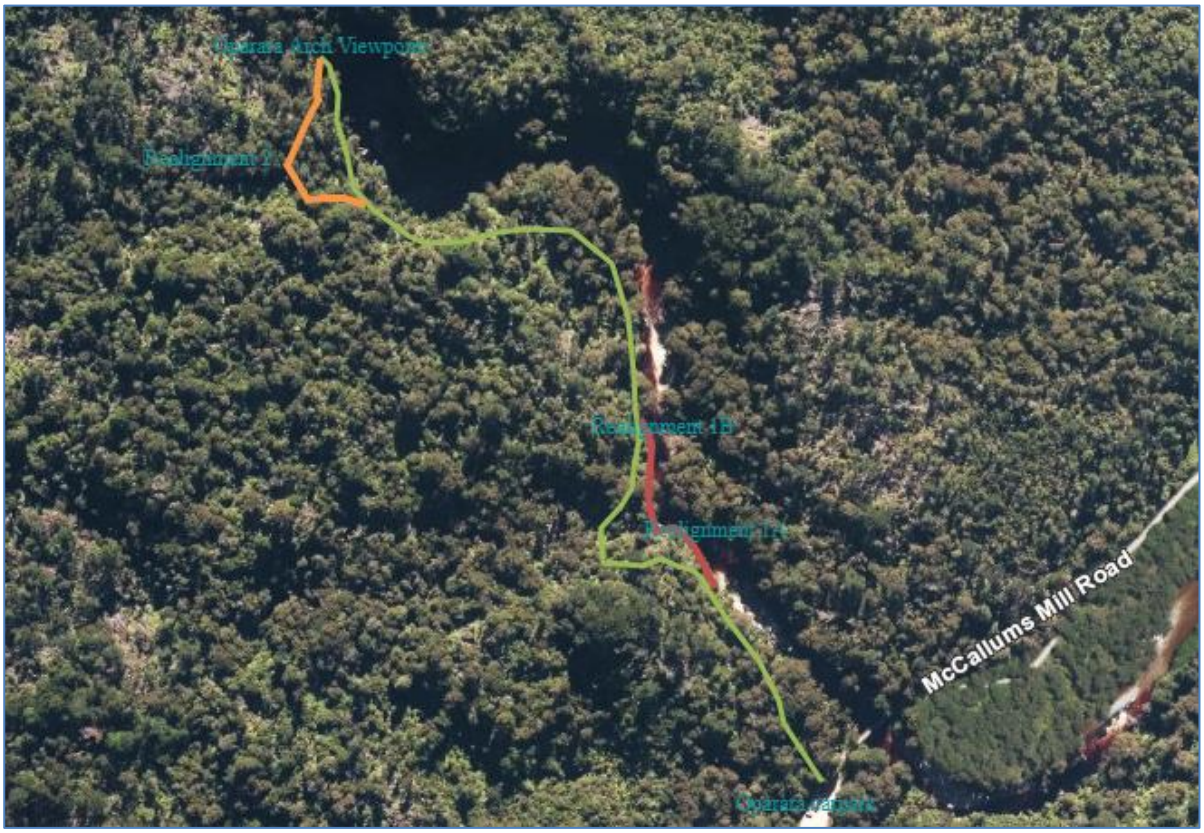

Figure 11. Oparara Arch Track upgrade, showing existing track (green) and two proposed realignment sections. Westcoast.govt.nz 'Localmaps' basemap is acknowledged.

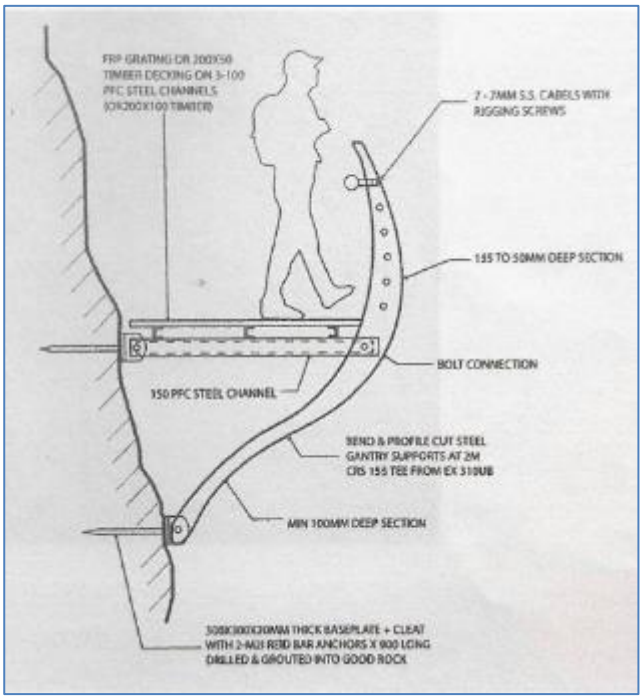

Figure 12. Elevated walkway design. This is an indicative profile of the type of structure that *might* be installed.

On leaving the bridge, a new section of trail approximately 60m in length will continue along the river bank at about 4m above the level of the river and re-join the trail on the next section of river terrace forest. The cumulative length of walkway/bridge and new track to this point would total approximately 150m compared with the existing 340m of track. Decommissioning the old track would allow the removal of several sets of wooden steps, a bridge and approximately 200m of track surface.

The elevated walkway design has not yet been progressed beyond concept but would be a purpose-built structure that would be designed by an IPENZ accredited structural engineer and be installed by experienced certified operators. While a preliminary geotechnical assessment has been undertaken of the site and has indicated that the limestone substrate can be built upon, a detailed investigation by a geotechnical engineer will be required to assess the quality/strength of the rock for attaching the proposed walkway. A PS1 (Producer Statement) from both the geotechnical engineer and the structural engineer[34] would be required as part of the building consent application to Council (G. Irving[35], *pers. comm.* 6/11/19).

It is anticipated that the adjoining bridge would be included as part of the total assessment and application process, rather than be treated separately.

Installation of the elevated walkway would require the clearance of any vegetation that would be an obstacle to walkers along this walkway section, as well as any vegetative growth that would obscure attachment points and access for the installation of the walkway. The installation would likely entail the installation of the bolts for the structure, the sections of walkway being flown in and located in place and bolted together. Once a workable structure had been installed any finishing work could be undertaken from the walkway i.e. vegetation clearance and barrier rails or cable attachment etc. The work would be put out to tender and might attract different methodologies for installation i.e. the construction team might abseil down the from the track above or alternatively approach from the river using a cherry picker or digger.

9.1.1.2 Realignment 1B

From the egress of the bridge, approximately 60m of new track would be built alongside the river, at an elevation of between 4-6m above the river at normal flow. This thereby maintains the gentle gradient of the trail, without the need to install any steps, whilst leading the walker back into the forest of the second river flat section. While the 60m of track can follow a small bench in places, there is a short 5m section where about halfway along where the steep gradient (about 40°) would make it challenging to establish a benched track of the desired width, without the need to excavate the underlying lithology. An alternative would be to establish a short section of boardwalk and this would avoid the need to alter any of the underlying limestone rock that has occasional surface along this section.

[34] Only one statement would be required if both sets of work were provided by a single company.

[35] CGW, Consulting Engineers.

9.1.1.3 **Realignment 2**

The need to reroute the track along the final approaches to the arch arise for two reasons and these relate to visitor safety as well as a need to safeguard a moss that is listed as Nationally Critical and is at risk due to its location immediately beside the existing track.

Visitor safety: Oparara Arch may be described as being made up of two parallel arches since a separate formation, running parallel to the larger arch, and of a smaller dimension, is evident immediately above the visitor on nearing the end of the track. It is this smaller arch that presents a safety issue, since geotechnical specialists have identified a potential fracture zone that exposes the track-user to an unacceptable degree of risk (Figure 13).

With the number of track users forecast to increase, there is a very real need to consider the associated risk to which track users are currently exposed. The realignment of this section is consistent with policy 31 of the West Coast Karst Management guidelines (Miller and Silverwood, 2018) which state that "Any physical structures and track surfacing should be installed only to manage health and safety and/or prevent damage to site values. This should occur in a way that it does not impact the values of the cave or karst."

Figure 13 showing zone of weakness that presents a rock-fall hazard to track-users. The current proposal would allow visitors to view the arch without exposing them to a direct risk from arch collapse.

Threatened Moss: The moss *Epipterygium opararense* is listed as Threatened: Nationally Critical (de Lange *et al*, 2018) due to the very limited distribution and very low absolute numbers of this plant. This species grows only within a narrow range of site conditions and the Oparara population was reduced in number after Cyclone Ita felled many trees in the vicinity of one of the two small populations growing there. The enhanced light levels and substrate disturbance appear to have proven unsuitable for one of the populations (M. Hansen, *pers. comm.* 11/10/2019) although there are indications that some regrowth may now be happening (K. Simister, biodiversity ranger DOC,

pers. comm. 6/11/19). The remaining known site is located immediately next to the track, a short distance after crossing the unnamed creek but before arriving at the arch. It was recommended that no track widening, rock removal or vegetation clearance be undertaken along the stretch of track where it remains (Fife and Knightbridge, 2005).

Vegetation clearance would be undertaken using a combination of workers on the ground using hand tools including chainsaws to fell trees along the alignment while cutting a preliminary route, as well as using a small digger (between 1 and 2 tonne) to clear logs and side-cast any litter, soil and subsoil, to form a benched surface for track construction.

New track would have a limestone chip surface and the track margins would be comprised of flaked limestone, to fit in with the limestone environment within which the track will pass. These materials would be flown in from the proposed site of the upgraded viewing area on the McCallums Mill Road where there would be a stockpile of limestone sourced from the Karamea limestone quarry.

9.1.1.4 Upgrading of remaining track surfaces and structures

All other track surfaces would be upgraded so as to achieve a consistent standard along this most popular track in the Oparara basin. On river flat sections it is proposed to elevate the track surface by about 200mm, to reduce the risk of floodwaters covering the track. Some small diameter culverts may need to be installed at intervals to ensure that drainage is not impeded after heavy rain events. This is especially so at the section nearest the carpark.

It is proposed to use rounded granite boulders with an average diameter of 200mm to provide a defining border and for limestone chip to infill between these borders. Boulders and infill material will be brought in on a small tracked dumper for the first 130m but beyond this a helicopter would be used to fly in all track material. Flaked limestone would be used as a border where the track passes over limestone substrate. The most significant portion receiving this treatment will therefore be any areas on limestone approaching realignment 2 (as well as on that section of track).

9.2 Existing Environment

The existing one-kilometre track runs through indigenous beech-podocarp forest alongside the true right of the Oparara River for its full length to the Oparara Arch, where there is a viewing area. The main arch is 200m long, approximately 49m wide and 37m in height and is the largest feature of its kind in New Zealand.

The track to the Oparara Arch commences at the main carpark and passes through tall silver beech-dominated forest for the first 130m. This is old-growth forest similar to that encountered on the walk to Moria Gate, and represents a forest type that was widespread prior to logging in the basin in the 1970s and 1980s. The tallest trees reach 25m in height and matai (*Prumnopitys taxifolia*) is a notable feature amongst them. Understorey species include abundant *Coprosma grandifolia* on the track edges, crown fern on the forest floor, soft tree fern (*Cyathea smithii)*, pate (*Schefflera digitata*), kāmahi (*Weinmannia racemosa*) and *Coprosma rotundifolia*. Less common are

Parablechnum colensoi, bush rice grass (*Microlaena avenacea)* and *Astelia fragrans*. The track margins are mainly vegetated in moss species (Figure 14).

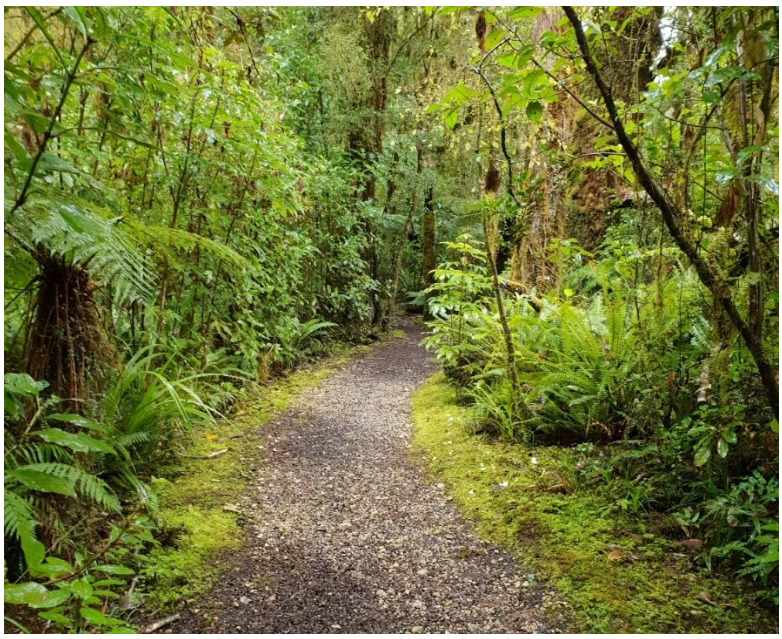

Figure 14. The existing track through old-growth forest near the start of the walk to the Oparara Arch

At the upper end of the terrace the track is then forced upward in order to negotiate the steep limestone face upon which the elevated walkway is proposed (this is referred to as alignment 1A and is described separately in 9.2.1.1). A series of steps gain approximately 25m in elevation (Figure 15), at the top of which is gained a view up-valley and looking out over the river.

Figure 15. Steps lead up from the existing terrace and across the limestone bluff on which the elevated walkway is proposed. The flight of steps has an overall gradient of about 22° but are only 600mm wide compared with the existing track surface of more than a metre.

Figure 16. Regenerating vegetation about the proposed bridge northern abutment is secondary regrowth with a few larger kāmahi and tōtara.

The vegetation is of a smaller stature than that previously encountered along the route, due to its more exposed situation and thinner soils but species composition is similar to that in the general area. The track is benched once gaining elevation and continues around into a small gully that has a small un-named stream flowing across a granite bed before joining the Oparara river immediately to the east.

On proceeding northwards, old-growth beech-podocarp forest occurs again on a small flood-plain terrace. Vegetation along this 180m section comprises mixed silver beech-podocarp forest in which kāhikatea is a feature. This section also includes a short side-track (less than 10m) giving access to a cobble beach on the edge of the Oparara River. This river flat section will be raised by approximately 200mm and bordered by granite cobbles of an appropriate dimension. Existing track-side vegetation not seen elsewhere includes kaikomako (*Pennantia corymbosa*) and hinau (*Elaeocarpus dentatus*).

The final third of the track sees the existing track once again climb to negotiate north to eastern-aspect hill-slopes of about 30° to 40° in gradient and transitions in to a beech-podocarp forest in which rimu is the dominant emergent species. This last section occupies a broad gully, some of which suffered damage from Cyclone Ita in 2014. A small stream runs down-slope and enters the Oparara river a short distance from the Oparara Arch. The new proposed track alignment would veer left and uphill shortly before crossing this creek and traverse around the gully slopes to arrive at the existing arch viewing area. This will result in the decommissioning of approximately 130m of track and will not only provide a safer route but will serve to divert the visitor away from one of New Zealand's rarest plants, *Epipterygium opararense*.

9.2.1.1 Realignment 1A

The first realigned section will see the replacement of the existing track section (a few metres above above the proposed realignment) with a 60m long elevated walkway scaling around the riverside limestone formation, approximately 6m above the river surface (Figure 17). The limestone bank has vegetation that reaches only 6 to 8m in height at most, due largely to the near vertical nature of much of the strata. Species encountered on this eastern-aspect slope include shrubs such as kanono, mountain flax, wineberry, marbleleaf, broadleaf and pate while small specimens of tōtara and silver beech occur in a band at about 15m to 20m above the waterline where the gradient is less extreme. *Cordyline banksii* and *Astelia fragrans* occupy the mid-bank along with a single specimen of *Brachyglottis hectori*.

Closer to the water are species that appear better able to withstand occasional exposure to floodwaters such as maidenhair fern (*Adiantum cunninghamii*), *Austroblechnum lanceolatum*, *Metrosideros diffusa* and moss species. Small *Fuchsia excorticata* and *Coprosma propinqua* were also seen within this zone in less exposed positions i.e. small pockets within the rock embankment.

Figure 17 showing the limestone bluff around which the elevated walkway would pass. At the right-hand end of the walkway an attachment point would provide the abutment for a 15m bridge across the backwater seen. At the head of this backwater is the confluence of a small un-named stream. The bridge would cross that piece of water in a single span and the northern abutment of the bridge would be situated within forest in the right-hand field of the panorama.

9.2.1.2 Realignment 1B

A 60m section adjoins the proposed bridge and maintains a similar elevation above the river, passing through moderately open forest which has been subject to wind-fall after exiting the bridge and then traversing steeper river-bank slopes to re-joining the existing track. The topography on immediately leaving the bridge is gently-sloping ground just above the confluence of an un-named (aka 'mossy') creek. This has a well-developed small stature tree/shrubland cover with rōhutu, horopito (*Pseudowintera colensoi*), soft tree fern and hard tree fern, *Coprosma rhamnoides*, small Cunningham's tōtara (*Podocarpus laetus*) and broadleaf (Figure 18). Sparse tall trees are mainly kāmahi and silver beech. It is likely that no larger stature trees will be along the proposed alignment. The forest floor is covered in a dense layer of *Parablechnum procerum*, bush rice grass and hen and chicken fern (*Asplenium bulbiferum*) while *Metrosideros diffusa* is seen scrambling over fallen logs as well as growing as an epiphyte.

Proceeding northwards from this point, the slope increases and the stature of the vegetation is lower in places. The shrub kanono is more common, kāmahi and marbleleaf (*Carpodetus serratus)* is more prevalent and *Cordyline banksii* and *Cranfillia fluviatilis* are more conspicuous, especially

on a short five metre section where the steepness of the bank may require a short, elevated walkway or gallery.

Figure 18. The approximate position of the proposed western abutment for the short single span bridge from the elevated walkway to join with the realignment 1B, showing dense shrub and small tree layer amongst sparse tall tree cover. Minimal tree clearance will be required along this proposed track footprint.

9.2.1.3 Realignment 2

A suitable diversion point has been identified for leaving the existing track about 130m before arriving at the arch viewing area, and climbing at about 5-7° into a small gully, crossing a small eastward-flowing creek and continuing to climb at a similar gradient to gain the highest point on the track, leading the visitor in to a protected position for the remainder of the walk, rather than walking directly beneath the danger-zone of the existing arch. The new track would be approximately 40m above the river at this high point. The length of new track has not been accurately determined, pending survey, and will depend on gradients selected and positioning within the gully in order to achieve the best overall gradient. In all likelihood however, the realignment length will be longer than that existing and may reach 150-200m in length.

The vegetation along this route is mixed beech podocarp, with rimu becoming more prevalent amongst the taller vegetation, though many of the taller trees were felled by Cyclone Ita and now lie on the hill-slope and are gradually breaking down. A dense regrowth is therefore evident with abundant pate, kanono, tree ferns and scattered kāmahi, quintinia (*Quintinia serrata*) and soft mingimingi (*Leucopogon fasciculatus*) (Figure 19). Kiokio is dense in places. Nearing the top of the proposed realignment, the walls of the arch are reached and some plants typical of the 'twilight zone' were found including *Lastreopsis glabella* (smooth shield fern) while curtains of the climbing rata *Metrosideros colensoi* hang down from the overhung limestone walls.

Figure 19. Typical vegetation within the small gully to be traversed by the proposed trail. Cyclone Ita felled a lot of the taller trees here and the secondary vegetation is quite dense in places.

There is quite a lot of tracking evident from the high point reached, alongside the vertical or slightly overhung wall of the arch and this is due to visitors exploring beyond the existing viewing area and into the adjacent environment. The new track would be properly defined and appropriately surfaced along this same route. There are a number of slip and trip hazards here currently and it is proposed that these will be largely overcome by infilling with crushed limestone and existing surface trip hazards may be broken down without the use of explosives by using expanding mortars such as 'Dexpan' (Figure 20 and 21). The final gradual descent, over approximately 30-40m in distance, and losing about 5 or so metres in elevation, reaches the end of the track where both the new and the existing alignment arrive at the viewpoint area. This area will be resurfaced with limestone chip and may have a low wall of flaked limestone to dissuade people from venturing further (Figure 22). An existing spindly specimen of *Pseudopanax macintyrei*[36] is on the edge of the existing viewpoint area and is vulnerable to being damaged further. It is recommended that this plant, listed as At Risk : Naturally Uncommon (de Lange *et al*, 2018) needs remedial action to ensure its survival.

[36] This was since identified as either *Pseudopanax arboreus* or perhaps a hybrid by Landcare Plant I.D Services, Lincoln.

Figure 20. A number of slip and trip hazards exist along the proposed new route following alongside the wall of the arch. This 'track' exists as a result of visitors exploring further than the existing viewing area.

Figure 21. Some low obstacles may be broken down for the proposed track build while infilling the ruts and channels will help to reduce slip and trip hazards near the viewing area.

Figure 22 Existing approach to the Oparara arch viewing area via the steps at left. The realigned track will descend from the right-hand side, with protection being afforded by more stable geology along the arch wall.

9.3 Anticipated effects of the proposed track upgrade

9.3.1 Effect on Vegetation

The anticipated effects on the vegetation from the upgrade of the track will range from no detectable change along the areas where upgrades of the existing track are proposed through to more significant effects along the two realignment sections. At the former, there is anticipated to be little change to the track width with the main effect being the loss of common moss species on the outer edges of the existing track formation. Elsewhere on the track, the surface may be widened by only a few centimetres to ensure a consistent width and flaked limestone may be placed on the outside track edge when traversing a slope, to help retain the infill gravels.

The new realignment sections will require the complete removal of all vegetation, including rotting logs and vegetative litter. The old areas of track will have timber steps and bridges removed and the track be allowed to return to a native vegetative cover.

Whilst the position of the alignment along realignment 1A and 1B has been well determined, and is constrained by factors such as distance above the river, attempting to maintain a relatively even gradient as well as avoidance of any large trees, there is a much wider range of possibilities for the final route for realignment 2.

Realignment 1A was assessed, as far as it could be undertaken safely, on the steep river bluff following the proposed alignment, as well as viewing from within the Oparara riverbed. The only feature of particular note was a single specimen of *Brachyglottis hectori* growing in the vicinity of the proposed elevated walkway. While this species is not listed as Threatened, and has been recorded above the Oparara Arch, it has a sparse occurrence in the Oparara Basin, (*pers.obs*, also records on nzpcn.org.nz) but does not appear to be common in the area despite the prevalence of limestone favoured by this species.

One specimen of what was thought to be *Pseudopanax macintyrei* (At Risk: Naturally uncommon), but was later identified as *Pseudopanax* arboreus or a hybrid, was found within the likely development footprint, occupying calcareous substrate near the edge of the existing viewing area. However, *Pseudopanax macintyrei* has been found at Oparara Arch (www.nzpcn.org.nz) and is a highly calcicolous species[37]. It is important that checking for this species and other calcicolous or range-restricted species is undertaken whilst determining the final track alignment.

One other species known to occur at the Oparara Arch, but not seen, was the fern *Asplenium cimmeriorum* (At Risk: Naturally uncommon) which is a 'twilight zone' species, occupying cave entrances. A more detailed search should be undertaken at the same time as defining the exact track alignment, as should searching for the Nationally Critical *Epipterygium opararense*.

It is likely that building track along realignment 2, and decommissioning the existing section will not only help safeguard the rare moss, but will facilitate the re-establishment of other species which favour the talus slopes around the final ascent to the viewing area, a drier section of track beneath the over-hang. This includes red māpou (*Myrsine australis*), *Hoheria ovata* and a grass tentatively identified as *Poa anceps*[38]. Both of the latter appear to be rather sparse on the West

[37] Only found on high carbonate substrates.

[38] Tentative identification by Shannel Courtney, DOC botanist, Nelson.

Coast though neither are threatened or At Risk. *Hoheria ovata* has some preference for limestone habitats (nzpcn.org.nz).

While it is likely that a smaller helicopter will be used for the proposed works, care should still be exercised with respect to avoiding damage to the fragile *Epipterygium* moss and other sensitive vegetation generally. Large helicopters can carry enormous loads but these can create sufficient downdraft to damage vegetation including trees. This is discussed further in 9.4.1.

9.3.2 Effect on birdlife

9.3.2.1 Effect on whio

One pair of whio currently occupy a territory from just above the Oparara Arch downstream to about the Mirror Tarn carpark and these birds have nested on both sides of the existing track for which the upper realignment is proposed. (G. Quinn, DOC Biodiversity ranger[39], *pers. comm.* 6/11/19). It appears therefore that the current amount of visitation is not causing any significant disturbance to the birds and the proposed realignment of upper track is likely to have a beneficial effect on the birds, once works are complete, by minimising any potential disturbance of nesting birds or their young in that area.

However, with respect to the anticipated effects of the proposed works, whio behaviour may be adversely affected in a number of ways:

- Proximity of structures and visitors to areas utilised by whio. Whio were observed roosting on a log which will be beneath the proposed bridge leading off the elevated walkway. In addition, whio may nest within the limestone bank on which the proposed walkway will be erected.
- Disturbance of the whio pair that occupy territory on the stretch of river on which the track upgrade and new structures are proposed. The main area of concern relates to the use of a helicopter to fly rocks and limestone on to site, also aircraft noise from the lowering of the elevated walkway sections in to place.
- The use of any other machinery within the territory of the whio on the river, especially that used during installation of the walkway.

A helicopter will be used for undertaking a significant proportion of the heavy works on the Oparara Track upgrade. Rock and gravel will be flown, slung from beneath the machine on a long strop, and materials dumped at selected points along the trail where they can be best utilised. Existing conditions restrict the use of helicopters within known whio territories and these same conditions would be adhered to for proposed works. The period mid-August to December must therefore be avoided. The whio pair holding territory on the stretch of river for which works are proposed will likely "shuffle off" (G. Quinn, *pers. comm.* 8/11/19) in order to avoid any noise disturbance and the territory held by these birds includes a stretch of river on the far side of the Oparara Arch, beyond the area of works.

A number of mitigation measures are recommended in order to reduce and manage the potential adverse effects on whio and these are outlined in 9.4.2.

[39] Graham Quinn has been involved in the whio protection programme in the Oparara for more than 15 years.

9.3.2.2 Effect on great-spotted kiwi (roroa)

In addition to the effects on whio, there is a possibility that great-spotted kiwi habitat may be encroached upon whilst constructing the realignment 1B, but more particularly along realignment 2. Intensive predator control is undertaken in the Oparara Basin within the great-spotted kiwi sanctuary area, an initiative which benefits not only kiwi, but a whole range of indigenous birds, bats and invertebrates including snails. Clearance of vegetation with machinery may result in injury or mortality of roosting or nesting birds and specific mitigation measures are recommended for this species (9.4.2)

9.3.3 Effect on snails

The development footprint is within what is considered preferred habitat range for *Powelliphanta annectens*, that is, occupying a band alongside the Oparara River, where there is limestone substrate, the building block of the shell of this *Powelliphanta* species. While no *Powelliphanta* shells or live animals were found within this part of the valley, they do occur in the vicinity (*pers. obs.*) and any works should be undertaken on the understanding that they are likely to be present at low densities. A snail plot is located alongside the existing track, and though data from that plot was not accessed, it will give guidance to the densities of *Powelliphanta* in the area.

The threat posed to *Powelliphanta annectens* may therefore be categorised as:

- The threat from damage or mortality as a result of track construction, and loss of habitat to the track itself.
- The threat to resident snails as a result of ongoing visitation, being accidently crushed by visitors etc.

There is a risk that, without any precautions being taken, there may be mortality of snails as a result of the proposed track construction. Track preparation will entail the removal of vegetation, logs and vegetative litter, followed by formation of bench tracked on hillslopes, with the use of light machinery (powerbarrows and a small digger) to deposit rocks and gravel to form up the track. The final track formation will likely be compacted to give a durable surface. Searching and removing snails prior to the critical early stages of the trail formation are therefore considered to be essential. This is discussed in more detail in chapter 9.4.3

9.3.4 Effect on bats

Long-tailed bats have been recorded in the vicinity of the Oparara Arch in both 2018 and 2019 (Pryde, 2019) though it is not known where these animals are roosting. The preferred roosting sites for long-tailed bats are holes and crevices in large trees such as red beech (Sedgeley, 1999) and these occur along the existing track as well as around the proposed realignment. All effort will be made to avoid the need to fell any large trees and this assessment confirms that this aim is achievable. Nevertheless, some trees will need to be felled and it is recommended that if any trees greater than 15cm dbh are identified for felling then an assessment of those trees for suitability as bat roost trees must be undertaken by a bat specialist.

9.3.5 Other anticipated environmental effects:

A resource consent already exists allowing the taking of 1500 tonnes of rock from 3 sites beyond the wetted area of the Oparara River, within the Project Area. This consent commenced in

February 2019 and is for a five-year period. The proposed works on the Oparara Arch track will require small granite boulders along approximately 620 lineal metres (while the Mirror tarn track extension will require a further 400 lineal metres of rock edging). Calculations suggest that 80 m^3 of river rock will be required to undertake all the proposed track edging (M. Hansen, e-mail 7/11/2019) for the two track upgrades. From an ecological perspective, it will depend on where that rock is sourced and the size of boulders removed as to what that amount of rock 'looks like' and therefore what environmental effects might accrue. The Oparara River has a presumed lower replenishment rate than some rivers in the district, i.e. the Karamea (M. Hansen, *pers. comm.* 8/11/19) and it may be necessary to engage a specialist in river engineering and hydrology to help determine the likely effects of such rock removal. It is considered imperative to maintain existing flow channels on the river as well as retain the overall naturalness of the Oparara River system within this National Park setting.

The installation of the elevated walkway will require a series of holes for attachment points to be drilled out and this will likely generate a significant amount of limestone fines. Since the drilling will occur over, or near to the water, there is the potential for these fines to enter the river, potentially affecting the river chemistry, but also posing the risk of introducing suspended or floating sediment. It is therefore considered that this risk needs to be managed as well as sediment control being undertaken along all sections of new track. These considerations are covered in 9.4.5.

The Oparara Arch track upgrade will have relatively little impact on the karst that is such a prominent feature of this walk. The two main areas where some modification would be required are within realignment 1A and realignment 2. Vegetation would need to be cleared from the limestone face along the alignment of the elevated walkway to enable access to suitable attachment points during construction as well as removing obstructive vegetation from the passage way along-side the completed walkway. It is anticipated that mosses, ferns and small epiphytes will re-establish on these surfaces over time. The existing limestone face is relatively regular in profile and would likely require little removal of protrusions to accommodate the walkway.

The furthest section of the track, once it gains its highest point along the trail and begins the descent to the viewing area, will follow close to the overhung wall of the arch and the trail formation will require infilling between blocks of limestone that have fallen from the ceiling over time. Some of these may also require breaking down to remove obstructions and trip hazards. It is unlikely that limestone within the intact formation will be impacted by trail formation and none that is currently exposed. It is possible that in excavating the trail through the small gully along realignment 2, that the underlying limestone will be reached in creating a bench for the track but the intention would be to build up the bench rather than excavate down into the underlying rock.

9.4 Recommended Mitigation

9.4.1 Mitigation for vegetation

- All effort must be made to avoid felling large diameter[40] trees. The final track alignment should be agreed upon with biodiversity staff from the department or a qualified ecologist

[40] Elsewhere the threshold diameter has frequently been 30cm, but in this instance, where bats are known to be present, a 15cm threshold has been selected.

to ensure that no Threatened or At Risk or otherwise notable plant species are removed or damaged.

- All effort must be made to remove only that vegetation which occupies the intended track footprint or vegetation overhanging the final alignment or which presents a risk to the safety of track-users because of rotten limbs or poor health of the tree.
- Where possible, the final cutting back or removal of vegetation along the elevated walkway should be undertaken only after on-site consultation with the Department botanist, or a qualified ecologist with plant identification skills.
- The final alignment of the 'gully section' of realignment 2 should be checked by the Department botanist or moss expert to ensure that the final alignment will not affect any sites that include *Epipterygium opararense*.
- The trail should be situated far enough away from the walls of the arch that the climbing rata (Metrosideros colensoi) alongside the proposed trail are not within easy arms reach of users, to prevent this curtain of vegetation being pulled away from the limestone surface.
- The clearance of vegetation to establish walkway or bridge attachment points (realignment 1A) and the installation of the structure, shall be kept to the minimum required to undertake this work.
- Vegetation removed from the bluff shall be removed to adjacent ground to naturally decompose.
- Any trees greater than 15cm in diameter shall be assessed for suitability as a bat roost tree before felling. If they are assessed as potential roost-trees then an alternative track alignment should be assessed unless mitigation to remove a tree without causing harm to any bats can be achieved.
- Any vegetation cleared from the alignment shall be cut up into smaller sections and remain in the vicinity of the works, without causing further damage during removal.
- Signage should be installed at the viewing area highlighting the fragility of the karst environment and twilight zone flora growing there. [41]
- Propagation of calcicolous species such as *Hoheria ovata* from plant material gathered on site should be undertaken. Replanting of the section old track i.e. talus slopes climbing up to the viewing area with these, as well as other species that are prevalent on the adjacent slope, such as kanono, māhoe and pate should be undertaken.
- 6-monthly weed checks should be undertaken on any areas of old track and weed control undertaken as appropriate.
- The propagation of the single specimen of *Brachyglottis hectorii* on the rock-bluff about the proposed elevated walkway should be undertaken if this specimen is likely to be affected by the positioning of the walkway. The location of this plant should be made known to any contractors if the plant is able to be retained, so that any unnecessary damage is avoided.
- Monitoring of visitor impacts on the Key Biodiversity Areas must be undertaken as required by the KNPMP. This should include ongoing monitoring of *Epipterygium opararense*, as

[41] This and other mitigation is consistent with recommended management outlined for the Oparara Arch according to Miller and Silverwood, (2018).

well as any interference or damage on climbing rata on the walls of the arch as mentioned above.

9.4.2 Mitigation for avifauna

- No heavy machinery or helicopter usage should occur between the period of mid-August to December, in order to avoid potential disturbance to whio and reduce potential effects on nesting kiwi.
- Flight paths should be carefully considered to avoid disturbance to whio within the area of works.
- It is recommended that DOC convene a gathering of whio specialists from within and outside the Department to discuss the potential impacts on whio in order to better determine what the effects on whio might be in response to helicopter activity proposed.
- A contingency plan should then be prepared in order to best manage potential effects on whio.
- Monitoring of whio by DOC staff used to working the birds within the area should be undertaken, at least at the commencement of machinery operation, and to assess whether there is any perceived disturbance to the whio occupying the area. If it is considered that the birds are upset by the works then the contingency measures shall be implemented after first immediately ceasing all works.
- A certified kiwi dog and its trainer should be engaged to undertake pre-work checks of any areas where kiwi are likely to roost or nest. As the likelihood of occupancy is low along most sections of this proposed track then this initial check could be undertaken within approximately two weeks of works commencing. If the kiwi-dog did pick up scent though, a repeat visit would be necessary on the day of works commencing.
- Ideally works would be undertaken outside of the kiwi breeding season of June to December. However, an earlier check of the site with a kiwi-dog will help ascertain whether kiwi are likely to be encountered and whether constraints on timing will eventuate.

9.4.3 Mitigation for snails

- Snail searching must be undertaken of the development footprint required for all new track once the final design is available. It would be appropriate for a team of three or four people to spend a full day searching the section of new alignment.
- A DOC biodiversity staff member would need to be present to oversee and assist with this work and any relocation of snails found *or* a collection permit granted to an experienced ecologist to undertake this work on the Department's behalf.
- It is recommended that as soon as the development footprint is cleared of any snails that the works would proceed.

9.4.4 Mitigation for bats

- Installing automatic recording devices around any large trees (>15cm trunk diameter) along the alignment that need to be felled for the proposed works in order to determine whether bats are present. This would need to be undertaken during summer/early autumn and could be undertaken by local DOC staff.

- If bats are found then a bat specialist should be engaged to assess whether the tree is a bat roost tree and a plan of action devised.

9.4.5 Mitigation for management of sediments and rock extraction

- A sediment control plan should be prepared prior to commencement of works and this should be signed off by the Department. Any contractor undertaking the works shall be required to comply with this plan and all works should be regularly monitored by DOC staff.

- Sediment control should include containment and disposal of any fines produced from drilling into the limestone for walkway anchors and bolts, sediment traps/fences alongside any bare surfaces/new track formation and other measures to minimise sediment input into the river.

- Monitoring of the sites where rocks are sourced for the trail borders should be undertaken by DOC and if there are concerns around the amount exceeding that originally envisaged then an alternative rock source, outside of the Project Area, should be sought.

- If rocks are sourced from outside of the area then they should come from a source free from Didymo (*Didymosphenia geminata*), in order to avoid spreading this invasive diatom.

9.4.6 Overall level of effects for the proposed track upgrade

Table 7. Overall level of effects for the Oparara Arch track upgrade, incorporating realignment and installation of structures.

	Critical species	Level of Effects without mitigation	Level of effects with mitigation measures
Vegetation	*Epipterygium oparaense* Calcicolous species	Very high	Low
Avifauna	Whio Great-spotted kiwi	High High	Low to Moderate Low
Snails	*Powelliphanta annectens*	Moderate	Low
Bats	Long-tailed bats	High	Low

Effects on vegetation at the site could be significant without mitigation because of the presence of Threatened and At Risk species as well as specialist localised flora on calcareous substrates (Table 7). While one of the intentions of the proposed works is to realign the track away from one of New Zealand's rarest plants, there is a possibility that the new track could, without specialist

assessment, impact on other sites where the rare moss grows. It is therefore important that a plant specialist be employed to check the final alignment for *Epipterygium* moss[42]. In addition, the decommissioning of the old section of track, and the regrowth of trees and shrubs along that alignment could change the growing conditions for the rare moss. While part of the impetus for realigning the track was to remove the potential disturbance from trail-users, ongoing monitoring of the growing conditions around the *Epipterygium* should assess whether vegetation regrowth may also impact on these bryophytes. Mitigation measures are recommended for other vegetation aspects and these are also considered important to reduce overall effects. If mitigation is undertaken as proposed then the level of effects on vegetation may be reduced to low.

In the absence of mitigation, effects could also be significant for whio. This is due to the potential for works to occur during breeding by the pair of birds that hold territory being disrupted and the possibility that these birds vacate their territory (or abandon a nest) in response to helicopter noise. There are limitations in anticipating what the response of a wild animal will be to a human induced activity because individual animals vary in their responsiveness to the same stimuli. The resident whio at Oparara have been exposed to helicopter noise and are regularly exposed (on a daily basis) to human intrusion and occasional disturbance and on that basis could be expected to be acclimatised to such disturbances.

Mitigation measures are recommended, the main one being that no works are to be undertaken within the whio breeding season. It is concluded that if mitigation measures are implemented as proposed then the overall level of effects on whio within the proposed footprint will likely be low to moderate. This rating is offered with a note of caution and it is recommended that DOC convene a gathering of whio specialists to discuss the potential impacts on whio in order to better determine what the effects on whio might be and to put together a contingency plan to best manage those potential effects. If the proposed construction methodologies are considered to pose an unacceptable risk to the welfare of the birds then alternatives will need to be explored.

Great-spotted kiwi have a very high threat ranking and may utilise the area for feeding, roosting and nesting. The magnitude of effects for this species is considered high but this can be reduced to low after adopting the recommended mitigation.

Powelliphanta annectens also has a high threat ranking. A moderate level of effect without mitigation is based on the likelihood that the snails appear to be at low densities within the proposed development footprint, but are known to occur nearby. Detailed searching would need to be undertaken to confirm whether they occur on the proposed realignment. This would be undertaken as part of the mitigation and if effective would reduce the anticipated level of effects to low.

Long-tailed bats are known to be active in the area during the warmer months and may roost in the proposed development footprint. Mitigation is proposed which can reduce the potential effect on this species from a high rating to low.

[42] A preliminary check of the approximate route undertaken by the Department Botanist has been undertaken, and a detailed search of the area around the known moss site may be undertaken by a specialist over the coming summer (J. Marshall, *pers.comm*., 20/12/2019).

9.4.7 Alternative to aspects of the proposed track restoration and upgrade

While it is recognised that realignment 2 may be justified on the basis of safety and the avoidance of potential damage to a Nationally Critical species, the proposed installation of the elevated walkway and bridge (realignment 1A) must be assessed against statutory provisions as outlined in 9.1.

If the presence of the proposed structures is deemed to be incompatible with statutory provisions or unable to be installed because of unsuitable geology, then alternative options may need to be assessed. This would likely include the widening of the existing track along the section adjacent to the proposed elevated walkway and may also include the provision of safety barrier (due to the fall hazard at that point). It should be noted that according to the KNPMP, if the walkway is not allowed due to visual impacts on landscape and/or undue damage to the geology and natural features, then the only exceptions that would permit the building of the structure would be to ensure that adequate safety was provided for users.[43]

The alternative to building the walkway would likely entail an upgrade of the existing track alignment, with a specific focus on increasing visitor safety, especially in light of a recent incident where a walker fell from the trail and sustained injuries. Provision of increased safety would likely entail an increase in stairway and trail width along this section, bridge replacement, and the likely installation of a safety barrier on the outside of the track to prevent the likelihood of visitors from falling from the track.

This alternative was not considered in any detail for this assessment but will need to be examined further should the walkway/bridge option be taken off the table.

9.4.8 Summary

The proposed Oparara Arch track upgrade is anticipated to a have a low level of effect on ecology, after mitigation is implemented, with the potential for a moderate level of effect on whio. It is recommended that an advisory group be brought together to consider potential effects on the Nationally Vulnerable whio and that if the risk to the birds is considered too great then alternatives may need to be investigated.

The impact on the karst from installation of the elevated walkway is anticipated to be restricted to clearance of vegetation from the karst where the proposed elevated walkway would be positioned, drilling in to the limestone for attachment points and some removal or refining of small projecting rock for fixings or if they are obstructive to the track-user. Karst modification along realignment 2 is likely limited to breaking down into smaller pieces some blocks of fallen limestone along the final short section of track and some possibility of cutting in to the underlying formation to form the benched track in the vicinity of the small gully.

While the realignment of the section of track nearest the arch may be justified on the grounds of safety and for the protection of a Nationally Critical moss, alternatives for the proposed elevated walkway will need to investigated if it is considered that the installation is not consistent with provisions contained within the KNPMP, especially in relation to introducing intrusive structures in to the landscape. A landscape assessment undertaken as part of this project, and based on

[43] Implementation 8, Pg 66, KNPMP.

information available at the time, did not consider that the proposed walkway would be intrusive. Further geotechnical assessment is required however, as well as further consideration after detailed design is finalised. Alternatives would likely include an upgrade of the existing track along 'realignment 1A' to improve safety standards.

10 Mirror Tarn Track Extension

10.1 Background and nature of proposed track extension.

A new 330m long trail, built to DOC 'short-stop traveller standard'[44] will be constructed to provide a through-forest walk from the site of the existing Mirror Tarn carpark, on the true left bank of the Oparara River, re-joining McCallum Mill road approximately 20m from the bridge over the Oparara River (Figure 23). This will allow the visitor to undertake the circuit walk via Moria Gate and Mirror Tarn, returning to the main car-park whilst minimising the amount of walking on McCallum Mill Road, thereby enhancing the overall visitor experience as well as increasing safety by moving pedestrians off the public road.

The proposed track would be a 1.2m wide construction using 200mm crushed limestone for the entire depth, bordered by granite boulders sourced from the Oparara river-bed just downstream from the Mirror tarn carpark. Access to the river will require a small dumper to be driven down a temporary wooden ramp to the river-bed and rocks to be loaded by hand from a site from which rock take has an existing consent. This method has been used in the past from this site.

[44] Appendix 3 shows specifics of short stop traveller and day visitor standards

Figure 23 showing proposed alignment from existing mirror tarn carpark to McCallums Mill Road, re-joining the road approximately 20m from the bridge over the Oparara river, seen at left. Basemap from gis.westcoast.govt.nz.

10.2 Existing Environment

The proposed track runs almost entirely within mature silver beech forest, up to 25m in height on the true left bank of the Oparara river. Silver beech dominates in this situation in response to cold air settling on the valley floor although both red beech and hard beech seedlings were found within lower tier vegetation. Some tall shrubland will be traversed immediately on leaving the Mirror Tarn carpark.

The area in which the alignment lies has been designated as Category 6 under the Threatened Environment Classification (Landcare Research, 2017). Category 6 is defined as environments where indigenous biodiversity is less reduced (greater than 30% remains) and better protected (greater than 20%) and a relatively greater proportion of the land area is protected for the purpose of maintaining its natural heritage.

The proposed track lies on alluvium overlying limestone, with no surface karst evident or likely to be impacted by track building. The underlying karst is unlikely to be affected by any changes to natural water percolation, water chemistry or flow balances due to the small scale of the works proposed.

The forest along the track corridor is relatively homogenous with a canopy dominated by silver beech and has a sparse subcanopy and understory at least down to the forest floor. Subcanopy species include kāmahi, and a mixed shrub layer with kanono and *Coprosma rhamnoides*, rōhutu, *Pseudopanax colensoi* and occasional broadleaf. There there is a moderately dense fern layer dominated by crown fern (Figure 24) as well as *Cranfillia fluviatilis*, Prince of Wales feathers fern *(Leptopteris superba)* and scattered bush rice grass (*Microlaena avenacea*). The smallest forest-

floor species include *Nertera villosa* and *Gunnera monoica* while climbing rata (*Metrosideros diffusa*) scrambles over the forest floor and rotting logs as well as growing as an epiphyte.

In order to provide efficient access to the trap-lines which are a critical component of predator control for whio and great-spotted kiwi protection there is an existing trap-line accessed from the proposed alignment and this is well-maintained. Approximately one half of the length of the alignment (the eastern portion) was clear of any significant vegetation when visited on 11th September 2019 and the remainder had been cleared when revisited on the 31st October 2019. This appeared to have been cleared with a scrub-bar (Figure 25 and Figure 26).

Figure 24. Typical vegetation as seen near the northern end of the proposed trail. A pathway through the crown fern had been cleared when revisited on 31st October.

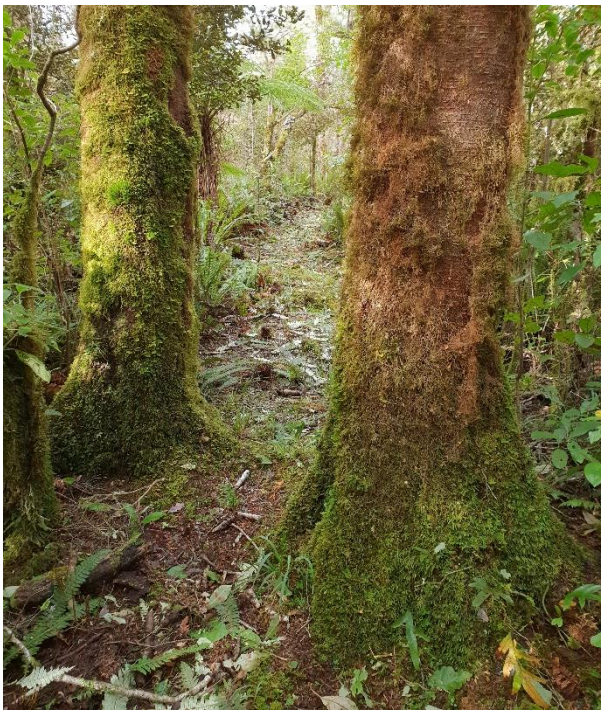

Figure 25 showing existing vegetation clearance along maintained trapline. The proposed track will follow this alignment for at least 95% of its length.

Figure 26 Two relatively large silver beech stature beech trees straddle the existing alignment, presenting a pinch-point on the proposed trail. The trail will pass between these trees rather than clear any additional vegetation.

There are currently at least two species of weed at the Mirror Tarn car-park. These are bittercress (*Barbarea vulgaris*) and apple (*Malus x domesticus*). Both species should be controlled by the Department prior to commencing any works.

10.3 Anticipated effects of the proposed Mirror Tarn Track Extension

10.3.1 Effect on Vegetation

Vegetation clearance has already been undertaken for all but approximately 10m of trail at the eastern end of the proposed trail as part of track maintenance for pest control. Clearance to a width approximately equal to that required for a paved track has reduced the vegetative height to just a few centimetres and mosses and some fern bases are present on the ground surface plus a few small saplings of rōhutu, *Coprosma spp* and the like. Allowing for a 1.5m clearance width in order to form a 1.2m wide trail, the remaining vegetation clearance, along the remaining 10m of proposed trail equates to approximately 15m^2.

All rata species now have a minimum threat ranking of Threatened: Nationally Vulnerable (de Lange *et al*, 2018) due to the potential threat posed by the arrival of myrtle rust. Clearance of some very small areas of climbing rata (*Metrosideros diffusa)* may be required. This species is abundant in the area and regionally. None of the other species likely to be affected by the track proposal have a threat rating, are at or near a geographical distributional limit or are otherwise notable. Rather, all these species are common in the vicinity as well as the wider area. Some species such as bush

rice grass offer concealment for *Powelliphanta* snails and snail shells were found close to the proposed trail route. The potential effects on snails are considered below.

There is one pinch-point, approximately 90m from the Mirror Tarn carpark, where two silver beech trees, approximately 40cm trunk diameter and 22m+ in height, straddle the existing maintained access-way. It was agreed (with M. Hansen, DOC) that this was not an obstacle to the track alignment, and that there was adequate room to pass between these trees (Figure 25).

Building the track as proposed will result in the loss of low stature vegetation along a total length of approximately 320m within forest and shrubland on the river terrace. There will be no loss of forest canopy cover or threat to the intactness of the taller tier forest. The total area lost to the trail formation equates to about 480m^2. This is considered to be a low[45] magnitude of effect rating, according to EIANZ (2018) criteria, despite the requirement to clear some climbing rata from logs and the forest floor.

10.3.2 Effect on *Powelliphanta* snails

The threat posed to *Powelliphanta annectens* can be categorised as:

- The threat from damage or mortality as a result of track construction, and loss of habitat to the track itself.
- The threat to resident snails as a result of ongoing visitation, being accidently crushed by visitors etc.

There is a risk that, without any precautions being taken, there would be mortality of snails as a result of the proposed track construction. Track preparation entails the removal of vegetation, followed by the shaping and levelling of the ground surface, the use of light machinery (powerbarrows) and wheelbarrows to deposit rocks and gravel to form up the track. The final track formation likely be compacted to give a durable surface. Searching and removing snails prior to the critical early stages of the trail formation are therefore considered to be essential. This is discussed in more detail in chapter 10.4.2.

The habitat in the vicinity of the proposed track extension is considered to be amongst the best for *Powelliphanta annectens* (Walker, 2003) and two shells were found during time on site, without any particular effort being made to find live animals. The loss of approximately 480m^2 of potential habitat may be considered to be a relatively minor loss, despite the habitat offered being amongst that favoured by the species. Monitoring by the Department of Conservation has found that the average density of *Powelliphanta annectens* in the Oparara Basin is 0.4 live snails per 100m^2 (Simister, 2018) and so, based on these densities, the habitat lost to the track footprint might be expected to accommodate around 2 snails. The potential for injury or mortality during any proposed track development can be mitigated against, as can the loss of habitat.

The ongoing threat posed to live snails from being trodden on is considered relatively minor given that snails tend to be more active at night time, although they also mobilise during the day-time in damp conditions, especially after a dry spell of weather. There is a potential risk that the large attractive nature of the snails may make them attractive to collectors or from the novelty factor to

[45] A minor shift away from existing baseline conditions…and/or having a minor effect on the known population or range. The change or loss will be discernible of the element or feature.

someone who may be unaware of the uniqueness and relative rarity of these snails. It is considered that while education plays a role in protecting from the latter, the risk from collectors is ever-present and hard to prevent.

10.3.3 Effect on birds

The Oparara catchment has been a focal location for efforts to protect whio or blue duck (*Hymenolaimus malacorhynchos)* and the riverbank area near Mirror tarn carpark and the bridge crossing the Oparara River are two areas that are likely to reward the visitor with a sighting of these unique birds (Figure 27).

Whio are listed as Threatened : Nationally Vulnerable (Robertson *et al*, 2017) and the high threat ranking is therefore a critical consideration with respect to the proposed track development, in particular with respect to the potential effects on the birds from both track construction and the changed environment as a result of increased visitation.

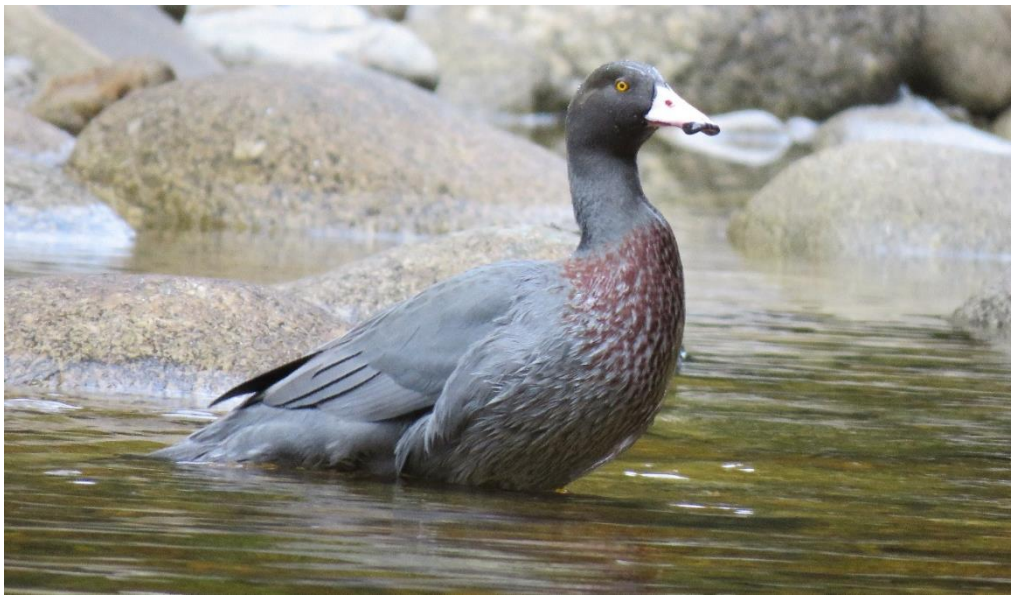

Figure 27. An adult whio seen just below the Oparara Bridge. Photo R. Nichol.

The track building process may include the use of light machinery and there is therefore the potential for disturbance of any whio present along this stretch of waterway. Whio are more vulnerable to disturbance during the breeding season, since they are known to nest along the riparian fringes of the Oparara River. Nesting begins in mid-September and a pair was noted just above the bridge Oparara searching[46] for suitable nest sites on 12 September. The young are usually seen from about the start of October in the South Island. Re-nesting is uncommon and

[46] One bird of the pair was seen flying up to inspect potential nesting sites while on the wing before landing back on the water, continuing downstream and repeating the process several times.

rarely occurs later than November (www.nzbirdsonline). It is important therefore that mitigation includes measures to avoid any disturbance to whio that are nesting (10.5.2).

Whio are fiercely territorial birds with the pair bond and the territory maintained throughout the year (www.nzbirdsonline). It is therefore likely that any pair or pairs that are resident on this section of the Oparara River are very used to visitors, given that this area is close to the central hub from which most visitors embark on various walks. In addition, the bridge over the Oparara River, close to the western end of the trail, is the one place on the entire river where whio are regularly exposed to vehicle traffic. It is considered that while the completed track will bring an increase in visitor numbers, the birds that frequent this stretch of river are likely well-accustomed to people. Since the track is on an elevated terrace, visitors may gain views of the birds without allowing them to cause undue disturbance due to the difficulty of leaving the track alignment to get down to the river. Therefore, no additional mitigation is considered necessary for the anticipated effects of increased visitation.

Great-spotted kiwi are unlikely to utilise the construction footprint since most vegetation has already been removed. A routine check of the alignment with a kiwi-dog should be undertaken as a precaution i.e. there is at least one log across the proposed track and therefore potential for kiwi to roost there.

10.4 Measures to Avoid and Mitigate

10.4.1 Mitigation for vegetation (including weed control)

The existing track alignment has been cleared of most vegetation for access to a predator trap line and only a small additional amount of vegetation would require clearance for track construction.

- Some small saplings require removal and these should be felled with hand tools, removed a short distance and left to decay naturally. This aligns with objectives of mitigation for lizards, which may be present in the area, but there is such a small proportion of required clearance that it is not considered separately.

- Care should be taken to avoid damage to the roots of any large trees, should there be a need to undertake any earth movement with a small digger.

- The practicality of removing low stature bryophytes, leaf duff/humic layer should be considered in order that this may be utilised for rehabilitation elsewhere. This would also serve to salvage small invertebrates, micro-snails etc inhabiting this material.

- Care should be exercised when using the small dumper to be used to carry rocks and fill material to avoid damage to any remaining vegetation.

- Gravel used on the track should ideally come from a weed free source and this should be discussed with the DOC weed specialist.

- Weed checks should be undertaken at six-monthly intervals, at the completion of the track and control undertaken as appropriate. Reporting of any weed occurrences should be documented and control undertaken as required.

- Control of a number of existing weeds at the Mirror Tarn carpark should be undertaken prior to commencement of works. This includes an

10.4.2 Mitigation for snails

- Snail searching must be undertaken along the development footprint prior to the commencement of works and this should be undertaken by experienced snail searchers and will need to be undertaken in collaboration with DOC personnel (or under authorisation from the Department).
- Any snails encountered should be moved an appropriate distance into nearby suitable habitat.
- As noted above (10.4.1), consideration should be given by the Department to salvaging leaf duff and low stature vegetation, if practicable. This would also serve to salvage small invertebrates, micro-snails etc. inhabiting this material.

10.4.3 Mitigation for effects on birds

- The track construction is anticipated to have minimal effects on resident whio. However, track construction should be undertaken outside of the whio breeding season of mid-August to December.

10.4.4 Overall level of effects for the proposed track upgrade

The level of effect on vegetation would be very low, but for the presence of climbing rata, whose threat status was elevated due to the potential threat posed by myrtle rust (Table 8). Myrtle rust is present in the uppermost South Island but does not appear to have become established further in a natural ecosystem. The removal of a very small area of climbing rata is considered to be insignificant. While most of the alignment has been cleared of vegetation already, recommended mitigation will reduce the overall effects rating to low.

Table 8. Overall level of effects for the Mirror tarn track extension.

	Critical species	Level of Effects without mitigation	Level of effects with mitigation measures
Vegetation	*Metrosideros diffusa*	Moderate	Low
Avifauna	Whio Great spotted kiwi	Moderate Moderate	Low Low
Snails	*Powelliphanta annectens*	Moderate	Low

In the absence of mitigation, a moderate level of effect of effect rating is ascribed for whio. This is due to the potential for breeding by the pair of birds that hold territory being disrupted. This effects rating can be reduced to low by avoiding all construction within the whio breeding season.

Great-spotted kiwi are unlikely to utilise the construction footprint since most vegetation has already been removed. A routine check of the alignment should be undertaken as a precaution i.e. there is at least one log across the proposed track and therefore potential for kiwi to roost there.

Powelliphanta annectens is a threatened species and therefore has a high threat rating. A moderate level of effect without mitigation is derived based on the known presence of this species around the alignment. The removal of a small proportion of snail habitat is considered to have a relatively insignificant effect on snails, and vegetative cover has already been removed. Mitigation recommended for snails will reduce the overall effects rating from moderate to low.

10.4.5 Summary

Only a low level of effects is anticipated after mitigation is implemented for the proposed works and the establishment of the proposed walking track will result in an enhanced user experience as well as greater level of safety. The mitigation measures required prior and during construction are considered relatively easy to implement while post construction mitigation is mainly in relation to ongoing weed control checks.

11 Oparara Basin Road Upgrade

11.1 Background

McCallums Mill Road is a 16km long single lane gravel road that was built in the 1960's to give access to the valuable timber resource that existed within the Oparara basin. The Department is responsible for maintaining McCallums Mill Road, which was never designed to be a 'tourist road' but was a well-engineered and graded formation that, when logging ceased in the 1986, allowed access to an area that would have otherwise have been seldom visited but now provides access to one of the most spectacular and unique areas within the country and is a key attraction benefitting the local tourist industry.

Increased vehicle usage and adverse weather events have taken their toll on the road surface and the presence of steep gradients, blind corners and steep drop-offs beyond the road edge are beyond what many tourists are used to travelling on. As a result, there are a disproportionate number of vehicle accidents, especially during the summer months. Normally these accidents and near misses are of a minor nature but the Department has a responsibility to provide a road of a reasonable standard appropriate to the level of visitation. Without improvements being undertaken, the anticipated increase in visitor numbers will result in an increase in the number of vehicle-related incidents.

The most significant component of the Oparara Project, from an engineering, geotechnical and cost perspective, is therefore the upgrade of the entire 16km of road, from Break Creek No. 2 to the road-end carpark at Box Canyon. This will ensure that the road future-proofs the opportunities within the Oparara Basin, whilst increasing the level of safety and satisfaction for many visitors.

It should be noted that the proposed road upgrade is timely with respect to the current focus on freshwater ecosystem health. The recently released New Zealand Fish Passage guidelines (Franklin *et al*, 2018) seek to assist authorities (and individuals) in addressing the issues around fish passage. The Department of Conservation (and Regional Councils) have responsibilities to ensure fish passage is provided for, under the Freshwater Fisheries Regulations (1983). There are 93 culverts along the stretch of road proposed for upgrade and the Department therefore needs to ensure that

it leads by example in providing for fish passage on waterways where indigenous fish are known or are likely to be present.

To this end, all 93 culverts along the length of McCallums Mill Rd were visited over two days and these were assessed for existing fish passage as well as consideration given to any remedial works that might be required as part of anticipated culvert replacement or extensions. Data was collected on stream volume, velocity within the culvert, height of fall from the culvert and any other relevant information pertaining to fish passage.

The information gathered for the culverts also included the potential for vegetation clearance that might be required since any culvert that is retained has the potential for being a pinch point for proposed road widening, while culvert extensions and replacements will usually come at the expense of some road-side vegetation. Each culvert was measured for length and diameter, effective road width and the potential for accommodating a wider passageway. The approaches to culverts were also inspected within the context of safety improvements i.e. road straightening to improve visibility and whether and how the existing structure might be best modified whilst minimising environmental impacts, especially with respect to avoiding significant trees or other indigenous vegetation.

Consideration was given to stormwater drainage as well as the potential for the increased road surface to shed increased amounts of rainfall from the road surface into roadside drains.

Finally, note was made of weed species along the roading corridor, so that any soil movement, stockpiling or dumping may be managed in such a way that invasive weeds are not spread throughout the project area. Weeds encountered throughout the Project Area are listed in the Appendix. Many of these were found on McCallums Mill Road.

It should be noted that a geotechnical and engineering assessment has yet to be undertaken as part of preparing detailed road design and the detail contained may have a significant bearing on aspects such steepness of slopes that can be cut and the likes. Once that detail is available a more precise assessment of vegetation and instream effects can be progressed. For the purposes of this assessment however a fairly general assessment of vegetation was documented along sections of the road and this is presented in 11.3.

11.2 Proposed works

The roading upgrade has a number of elements. Tourism West Coast, in assisting the Oparara Valley Trust's feasibility study for the Oparara project, engaged WSP Opus to produce an overall plan for the proposed road (WSP Opus 2018). This provided further foundation to the proposal put forward by OVP. The road upgrade proposal includes:

- Reduce gradient and widen the road on 12 sections, 1km in total.
- Widen the road at 17 sections, some minor, adding 1.5m to 2m in width.
- Replace at least 57 culverts and widen for 6m roadway. Stone armouring at high volume or vulnerable road edges, especially at existing culvert outlets.
- Re-establish drainage by cutting new drainage channels as required, armouring at vulnerable sites such as active waterways and road sections widened to accommodate passing bays.
- Establish 23 passing bays and upgrade existing passing bays.

- Rock armour at least 12 collapsed corners and add gabion baskets if required.
- Prepare and resurface 16km of gravel carriageway with AP20 crushed gravel.
- Prepare and seal 1.75km of carriageway at approximately 5 sites with steep gradients.

The existing drainage patterns are expected to be little affected by the proposed road upgrade except that the existing stormwater channels will likely be filled in with gravel fill, built upon and a new channel formed adjacent to the new road formation. In all other respects there are not anticipated to be any changes to the location of the receiving environment, alterations or diversions of stormwater channels etc.

In places where there is limited scope for accommodating greater road width, a concrete dish channel is recommended on the upslope side of the road (Figure 28).

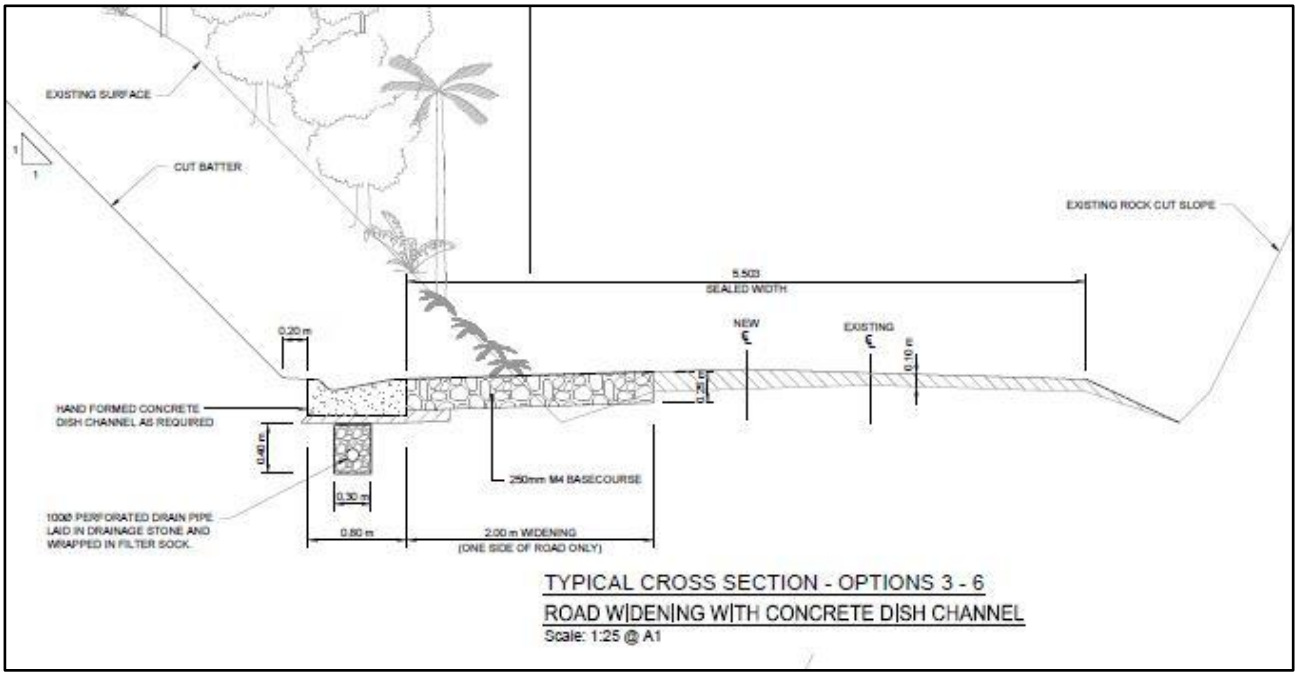

Figure 28. Road profile incorporating a shallow concrete dish channel that can be utilised by a vehicle if meeting on-coming traffic. Image from Opus (2018).

11.3 Existing Environment

The road is broken into sections based principally on upon vegetation (this also reflects the history i.e. existing forestry, or logging history) and existing road characteristics i.e. gradient and width (these are often both a reflection of the underlying lithology) and geology (Figure 29).

Section A

The roading upgrade would commence at Break Creek No.2, approximately one kilometre from the turn-off on to McCallums Mill Road, and at the entry point to Kahurangi National Park.

The road starts at about 10m above sea-level where it leaves the farmland and undergoes a short steep climb of 9° to a modified pakihi terrace and maintains this elevation for about 2km. On the

northern side of the road is a schedule 2 wetland and this abuts the road formation for approximately half of the road length (Figure 30). While the vegetation within this wetland was not examined beyond what could be seen from the road, it appeared to consist of a mānuka dominated shrubland/sedgeland with *Gahnia xanthocarpa* and regenerating forest species such as hard beech, soft mingimingi, hard treefern, kāmahi and toro.

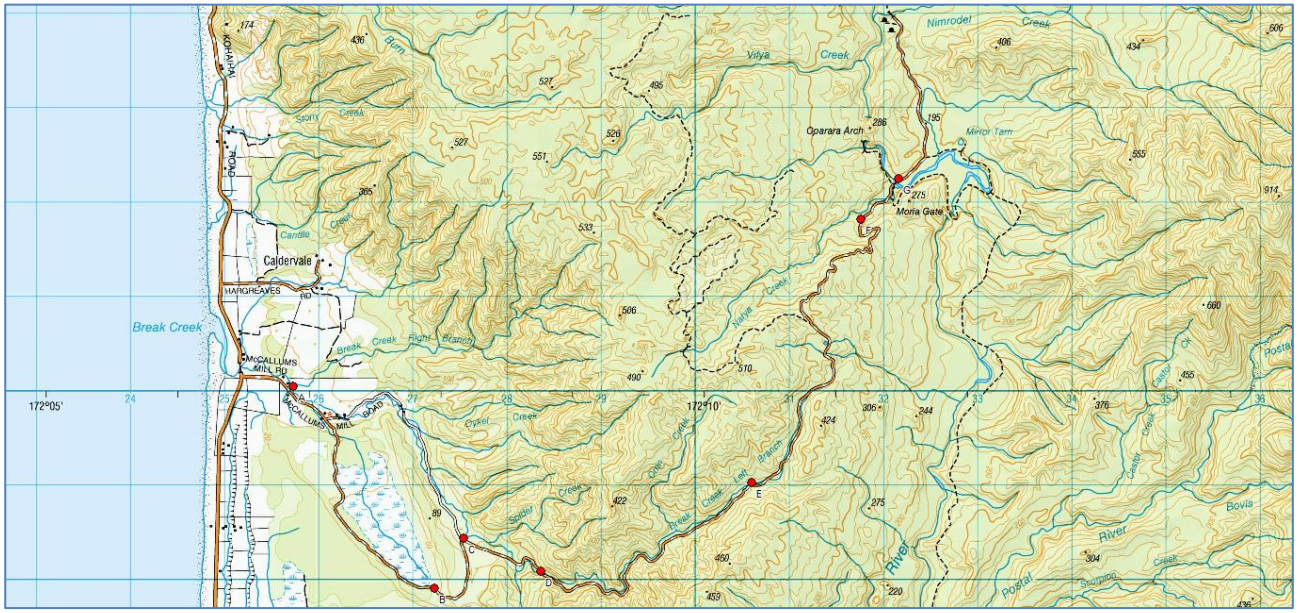

Figure 29. McCallums Mill Road upgrade showing start point of each section referred to i.e. section A, Section B etc. The carpark road-end is as shown by caves in north of map area.

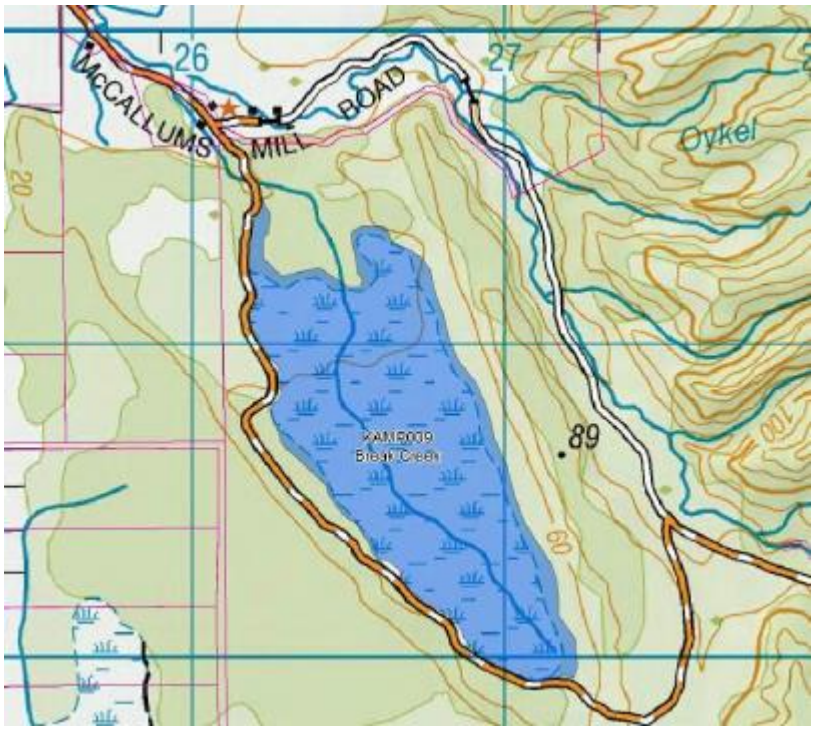

Figure 30 showing Break Creek schedule 2 wetland (KAMP009), as listed in the WCRC Operative Land and Water Management Plan.

This section of road is, apart from the steep climb at the start, typically a low gradient gravel road with broad curves and generally a low bank formation bounding one side (usually the north). The gentle gradient and proximity to the wetland, results in a large number of culverts being crossed. Most of these are sluggish and of a small volume but Break Creek No. 2 and Break Creek No. 3 have good fish habitat and good flow.

Roadside vegetation within this section typically comprises a mix of grasses and weeds on the verge, with an increasing indigenous component on proceeding further from the road edge. Adventive species include sweet vernal (*Anthoxanthum odoratum*), Yorkshire fog (*Holcus lanatus),* lotus (*Lotus pedunculata*), plantain (*Plantago major*), buttercup (*Ranunculus repens*), broad-leaved fleabane (*Conyza sumatrensis*) and *Juncus planifolius* and less frequently more invasive weeds such as montbretia (*Cocrosmia x cocrosmiiflora*) and gorse (*Ulex europaeus*). Native species within the low stature road berm area include *Dianella nigra*, hard fern (*Paesia scaberula),* crown fern and kiokio and *Centella uniflor*a on wet ground. Proceeding away from the road edge the stature increases with more kiokio, soft mingimingi, saplings of *Coprosma lucida* and kanono, small kāmahi, occasional lancewood and toro. Mānuka occasionally makes it into this zone but hutu is less frequent. This band of vegetation would have been subject to maintenance mowing over time. Beyond this zone and generally beyond the zone proposed for road widening are some small diameter kāmahi, more mature hard tree fern, larger toro and very infrequent northern rata.

One large northern rata has been identified (Figure 31 and 32) and this will be avoided by any road widening (M. Hansen, *pers. comm*, 31/10/19). A block of mature Tasmanian hardwoods (*Acacia melanoxylon*) occupy ground on the right (southern) hand-side, towards the end of this section, and grow right up to the road edge. These can be removed without any adverse ecological effects.

Figure 31. Typical vegetation along broad sweeping curves and gentle gradient of section A. There is generally enough room to easily accommodate a wider carriageway without affecting a significant amount of indigenous vegetation.

Figure 32. Large northern rata to be avoided by any proposed road widening.

Section B. This 850m section extends from near the end of the pakihi and climbs up a steep rise and levels off for a while before descending to Break Creek No. 4. The ascent is about 9° in slope and the intention is to cut from this area and fill at the base to reduce the overall gradient (Figure 33). The descent on the northern side of the rise is of a similar gradient and a similar cut and fill option is proposed. Tasmanian blackwoods are the predominant vegetative cover on the southern side before indigenous regenerating forest is encountered. Secondary forest is the predominant cover on the northern side of the road. The vegetation within the road verge is typically composed of exotic grasses, kiokio, soft mingimingi, hard tree ferns and nearer the road edge is adventive grass, self-heal (*Prunella vulgaris*), fleabane and hard fern. It may be necessary to fell some kāmahi trees, the largest of which has a dbh of 39cm. most would be of a much smaller diameter however. This section includes 3 culverts, the last of which – Break Creek No. 4 - provides significant flow and good fish habitat.

Figure 32. The climb up to the top of the rise on section B. the gradient is about 8° and while there is generally a reasonable amount of room to extend the road width, some native trees will need to be felled to accommodate a 6m carriageway.

Section C. This section from the sharp bend just beyond Break Creek no 4 through to the bridge over the main Break Creek is about 1km in length and sees the road approaching Break Creek crossing 4 culverts on the way including the larger 2 double barrel culverts at Break Creek no. 5. This is a significant waterway and has good quality fish habitat upstream. The vegetation on both sides of the road is secondary forest though there is a higher degree of naturalness on the northern side of the road. Nīkau (*Rhopalostylus sapida*) are seen here, on the true right of Break Creek, the only place along McCallums Mill road where they are seen, testament to a near frost-free climate at this location. Silver fern (*Cyathea dealbata*) occupies this same association and attests to drier conditions within a localised microclimate (*pers. obs*). There is generally ample width along most of this section of road, though less so at culvert 030 (Figure 34), where there is a steep drop off on the outside of the road. Vegetation alongside the roadside within the likely zone of impact include exotic grasses, kiokio and hard fern, hard tree fern, kanono and occasional kāmahi.

A kiwi was heard within the roadside vegetation along this stretch on the evening of the 16th October 2019.

Figure 33. showing a pinch point where a replacement sight rail will need to be installed and rock armouring may be required. The vegetation has a moderately high degree of naturalness but will likely be little affected because of an adequate amount of room to expand the road width without intruding far beyond the existing low stature vegetation/existing drainage channel.

Section D

This section commences at Break Creek Bridge (033) at about 90m elevation and climbs steeply after crossing Break Creek then immediately narrows for much of its length to about culvert 058 at 300m elevation. There are several places where the gradient is between 8° and 10° in slope. The road is confined to the true left of Break Creek and has steep drop-offs as well as subsidence around some road-edges and gullies. This section of the road upgrade presents the greatest challenge with respect to proposed improvements.

The underlying substrate is known to be poorly consolidated throughout this section and has a tendency to slip after heavy rain events. Many of the 23 culverts along this stretch are perched because of the steep banks over which they empty their flows and they also present considerable challenges with respect to remedial works for fish passage. The smallest stream within this study that yielded fish, and also contained koura (*Paranephrops planifrons*), was that which flows into culvert 035. Interestingly, this culvert is one that is perched by about 1.5m but it appears that fish have been able to access the culvert along the mossy rock adjacent to the outlet (Figure 35)

Figure 34. Culvert 035 is perched by about 1.5m and has a very high flow, and yet surprisingly was the smallest catchment in which banded kokopu were found (as well as koura), about 50m upstream of the road within a forested catchment.

Figure 35. 'The rocket launcher'[47]. This culvert is perched by about 5m and does not reflect well on the Department with respect to visitor perception relating to fish passage.

The vegetation within Section D includes some areas of near-natural red beech-podocarp forest, though the vegetative cover nearer the road tends to be dominated by adventive species including low priority invasive weeds such as self-heal, foxglove (*Digitalis purpurea*), broad-leaved dock (*Rumex obtusifolius*) as well as lotus and exotic grasses. At what is known as the 'Abbotsford cutting' there are some small northern rata (to 7cm dbh[48]) that may require felling in order to

[47] This culvert was installed by council before DOC took over responsibility for the road.

[48] Trunk diameter at breast height, in cm

accommodate a wider carriageway, and possibly some larger kāmahi and red beech also, pending a geotechnical assessment (Figure 37).

Figure 36. Abbotsford cutting. Clearance of kiokio and some small trees, including red beech, kāmahi and northern rata would be required on this short section.

Beyond Abbotsford cutting the roadside vegetation tends to occupy the eastern bank and typically includes a grass/adventive weed/moss border and a roadside bank with a mix of ferns such as kiokio, and *Parablechnum procerum*, small kanono, tree ferns and sapling kāmahi.

Section E

This section sees the continuation of the climb from about 300m in elevation but with much gentler gradients, the valley broadens and presents less of a hazard to road users. The saddle between Break Creek and the Oparara catchment, at 420m above sea level, is reached after about 3 km from the start of this section. Mixed beech-podocarp forest remains evident on both sides of the road but there are grassy clearings and small wetland dam areas created by the road formation as well as sluggish streams passing through shrubland. The aquatic plant *Potamogeton suboblongus* (not threatened) was seen within the small creek immediately above culvert 063. The forest shows the damaging effects of Cyclone Ita on proceeding up valley, due to greater exposure to winds as the valley opens out and the disturbance and felling of tall trees has destabilised the ground and slips are evident in places (Figure 38).

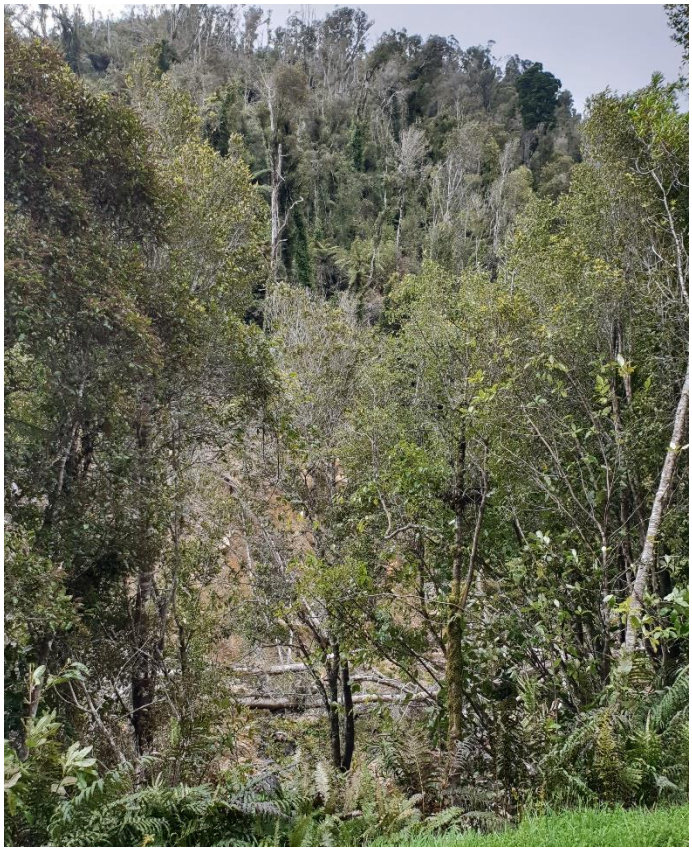

Figure 37 showing damage from Cyclone Ita and slip-face in foreground from disturbance event(s).

On approaching the saddle the vegetation typically becomes lower in stature and roadside vegetation tends to comprise of smaller saplings of kanono and kāmahi, quintinia, pate, hard tree fern, soft mingi mingi and a fringe of kiokio, while the road verge is typically dominated by exotic grasses and herbs (Figure 39). The umbrella fern *Sticherus cunninghamii* [49] and the clubmoss *Lyocopodium scariosum* were noted on the road embankment around the saddle within this section.

A couple of small patches of invasive montbretia were seen within this section and it doesn't appear to have colonised beyond the saddle and in to the Oparara catchment. One small patch of gorse was seen also in this same area[50].

On the Oparara side of the saddle the road descends along a spur and so few culverts are crossed, and none that appeared to offer very good fish habitat. The forest on the descent to the Oparara

[49] Vegetation assessment by the author, for widening the Croesus Road leading to the new Paparoa Track, resulted in the discovery of a discrete population of the visually similar *Sticherus tener* which has a Threat rating of Nationally Critical (WSP Opus 2019). This fern has a preference for growing on coals measures and none are present along the McCallums Mill Road.

[50] One outlier gorse bush was seen about half a kilometre further on, the only one seen in the Oparara Basin, and was removed and the location reported to the local DOC office.

carpark is regenerating after being logged in the 1970s and 1980s and a few tall northern rata tower above a much lower canopy forest.

Figure 38. Low stature forest typical of section E, with adequate road width to form a wider road surface without having to alter the drainage markedly. Most of the vegetation requiring removal would be exotic species plus kiokio and small shrubs and tree ferns.

The roadside vegetation is generally similar to that described on the last part of the ascent to the saddle, though one portion of the road has an even-aged stand of red beech growing on either side. Road widening within this section might require the felling of some small diameter beech trees but generally the main roadside vegetation within the likely development footprint is comprised of kiokio, hard fern, exotic grasses and a few small native shrubs and trees.

A grass clearing next to culvert 063 appears to be a favoured place for kiwi feeding, as it was riddled with probe holes.

Section F

This is a short section of about 400m in length and starts where the road first cuts into Nile limestone formation and continues to descend, at a gradient of about 4 or 5°, before crossing Narya Creek and arriving at the main Oparara carpark, which sits at an elevation of about 190m (Figure 40). The road narrows along this section due to the steep slope across which the road is cut. There are no culverts crossed until crossing the multi-barrel culvert crossing of Narya Creek (shown as Break Creek No. 7) on the bridge signs.

Figure 39 where the exiting road cuts into the Nile formation limestone. No vegetation species of particular note were observed.

Vegetation along the bluff on the eastern side of the road includes fairly typical low stature fern and shrubland cover and no species of particular interest i.e. no calcicolous species. On the outside road edge exotic grasses and herbs were once again noted.

Section G

The final section of roadway is approximately 2km in length and is mainly of a gentle gradient, and sees the road climbing from about 190m to 220m elevation at the road-end. The existing road has broad curves and generally has good sight-lines. Because much of the terrain through which the road passes is gently-sloping, most of the nine culvert crossings are slow flowing or sometimes sluggish and blocked with sediment. Fish were found in one of the streams running beside the road, but not within any of the waterways passing within the culverts.

Vegetation on either side of the road tends to be dominated by silver beech forest on the Oparara River terrace and then grades into red beech towards the road-end, with some more open shrubland on areas in between (Figure 41). Most of the vegetation within the likely development footprint is dominated by exotic grasses such as Yorkshire fog with some kiokio and low shrubland clearance required in places. The medium priority weed species hedge woundwort (*Stachys sylvatica*) was the only significant weed species observed and this was near the Box Canyon carpark and this species has been controlled previously by the Department[51].

[51] T. Belton, weed specialist, DOC, Hokitika.

Figure 40. Typical section of road within Section G, with widening likely to affect mainly exotic grassland on the road verge, but the need for some intrusion in to low fernland and shrubland at times.

11.4 Potential ecological effects from proposed road upgrade

11.4.1 Anticipated effect on vegetation

As noted above, the details gathered for this assessment were based on field observations made without the benefit of having any design in hand other than the Opus Marked Up Overall Plan (2018) of McCallums Mill Road. Detailed geotechnical assessment will help inform whether all of the roading components proposed are feasible and will define the likely spatial footprint. It then will need to be further considered whether the anticipated environmental effects, within that defined context, are acceptable.

The road was broken into sections to help make a preliminary assessment of effects and vegetation effects was one of the primary areas focussed upon.

Overall, it is concluded that the effects on indigenous vegetation can be minimised by careful consideration of the following:

- An informed route alignment which avoids significant trees or zones of vegetation where these have been identified as 'no-go' zones;
- Building rock armouring where required to allow better utilisation of available unstable or eroded ground, especially around eroded culvert outlets. At these sites the ground is often bare or vegetated in exotic grasses that have been quick to establish on the previously disturbed site. Building rock armouring, rip-rap or retaining walls or gabion baskets around the outlets and forming a road surface to meet the structure may thereby reduce the need to cut into the existing hill-slope around the culvert inlet (Figure 42).
- Utilising the full width that is currently or potentially available. One of the main ways of doing this is including design elements that allow the utilisation of a concrete dish channel where appropriate. The latter is considered to be a viable option for much of section D and F, where steep slopes predominate and all effort should be made to avoid cutting into the toe-slopes abutting the road.

Figure 41. A typical site where rock armouring/gabion baskets might allow better utilisation of modified habitat and reduce the amount of indigenous vegetation clearance on the opposite side of the road.

Of the vegetation that is definitely within the proposed footprint, the majority is often exotic in nature and includes grasses and herbaceous species that are colonisers of disturbed sites. With the exception of lupin (*Lupinus polyphyllus*), gorse, montbretia and hedge woundwort, for which most occurred as isolated occurrences, all are low priority weed species[52]. There may be an opportunity presented by the proposed road widening to reduce or remove several of the DOC priority weed species and this will require careful consideration of any spoil dump sites. In doing so, one of the key objectives of the Kahurangi National Park Management plan might be achievable[53], at least for defined sections of the road. This is discussed further in 11.5.1

The vegetation that is *most likely* to be affected by the road widening along any section of the road will usually have a greater indigenous component and include species that are better adapted to variations in site conditions such as heat and cold, drying out as well as frequent inundation, ability to compete with exotic species, and exposure to dust and an ability to rebound after being cut back during road-side maintenance. *Dianella nigra*, kanono, soft mingimingi, hard tree fern, crown fern and kiokio especially, are just a few of the species that fall within this group of indigenous species. They are a common element along many sections of the road and it is expected that they will be amongst the species that will quickly recolonise bare ground surfaces naturally after any road widening.

The vegetation that *might* be affected by road widening at any point along the alignment, generally comprises taller indigenous saplings and small trees growing a little further from the existing road, and these tend to occupy a zone beyond frequent disturbance such as road-side mowing but are likely to have established since widespread disturbance – either logging, road formation or natural disturbance from slips etc. They are mainly longer-lived common hardwood species such as

[52] West Coast CMS 2010-2020, list of priority weed species, Appendix 5.

[53] (1.5, pg 39) "To preserve in perpetuity the landscape, natural ecological systems..and as far as possible eradicate introduced plants and animals."

kāmahi, quintinia, taller kanono, toro and lancewood (*Pseudopanax crassifolius*). Occasional small northern rata and red beech may be affected but less frequently and within fewer of the sections described.

11.4.2 Effect on Birds

Effects on bird species from the proposed roading upgrades would occur either as a direct or indirect effect. The main area of concern with respect to the former, is the potential for direct harm or mortality of great-spotted kiwi. Great-spotted kiwi appear to occupy habitat in the vicinity of the entire road corridor and roosting or nesting birds may easily fall within the zone of proposed works. Recent road-widening on the Croesus Road, has demonstrated that mitigation measures can be implemented to minimise the chances of any harm to resident kiwi (Opus, 2019) and these same measures can be implemented to ensure the same outcome is achieved in the Oparara (see 11.5.2).

All other potential impacts to avifauna are considered to be relatively minor. The amount of vegetation that may be utilised by any species other than kiwi is likely to be relatively minor (as discussed in 10.4) and the chances of disturbance of nesting is less again. Small passerine species i.e. tomtit (*Petroica macrocephala*) robin (*Petroica australis),* grey warbler (*Gerygone igata*) etc may utilise some small trees and shrubs on the road verge for building their nests however and mitigation measures are included for this possibility. Temporary disturbance of bird activity due to noise effects will have a short-term effect at most, with any birds likely to move away from the source of the disturbance activity until it has passed.

11.4.3 Effect on snails

A significant portion of the road corridor - from about where the terrain opens out at 320m elevation within road section D to the Box Canyon carpark - falls within the distributional range of *Powelliphanta annectens*. These very large snails are at risk of desiccation[54] (or getting squashed) if they venture out on to a gravel road. Likewise, the short stature vegetation on the roadsides is unlikely to offer particularly suitable habitat for this large species either, due to fluctuations in temperature, exposure to predators such as rats, weka and introduced birds and that habitat drying out more readily due to exposure to the sun. On moving away from the roadside however, there is more suitable habitat for this species. Any clearance of secondary forest as part of the proposed works therefore exposes *Powelliphanta annectens* to a greater risk of mortality. It is therefore important that preliminary road designs give consideration to the potential impacts on this species. Further mitigation measures are discussed in 11.5.3

11.4.4 Effects on fish

A principal focus of the road upgrade proposal was to assess the 93 culverts that exist along the 16km McCallums Mill Road and to undertake fish searches and trapping to determine the range of species and the kinds of habitats utilised. Consideration was given to places where barriers to fish passage exist and how fish migration might be provided for as part of any roading upgrades. Fish passage remediation will be required at fourteen culverts identified as otherwise adequate with respect to function and capacity to accommodate the greater road width. An additional 34 culverts

[54] New Zealand Geographic, Issue 160, December 2019. The article 'Dead Heat' by Dave Hansford, details the threat posed to *Powelliphanta* from desiccation associated with climate change leading to drought etc.

may need to be remediated once/during extension of length or overall replacement (see accompanying spreadsheet).

Indigenous fish were found in all of the larger waterways sampled, but species diversity was low, with banded kokopu making up most of the fish observed or caught. This might be partly a result of bias due to the methods chosen to assess the fish fauna since bullies and torrentfish may be harder to spot in a fast-flowing stream as they tend to remain close to the stream-bed and remain cryptic. That said, it is not entirely surprising that banded kokopu were the species most commonly encountered, as they are the only migratory species on the West Coast that are not threatened and appear to be widespread in a variety of habitats and common in many of them (*pers. obs.)*. The other galaxiid species that might be expected is koaro (*Galaxias brevipinnis*), which like banded kokopu (juveniles at least) are good climbers and are able to scale vertical rock faces many metres high. Longfin eels were seen in larger streams in Break Creek and the Oparara Basin and this is the only threatened species observed. Longfin eels are also good climbers as well as being able to travel across land.

It is anticipated that as long as sediment control measures are effectively implemented, the effects on fish within the study area are most likely to be minimal. Sedimentation in waterways can have numerous negative effects including clogging of refuges and interstitial spaces within habitat, reducing oxygen saturation in the water and altering the behaviour of aquatic organisms. The waterways within the study area are generally low in turbidity and the aquatic fauna present may have a lower tolerance to sediment discharges that reduce the water quality.

The proposed road upgrades present an opportunity to markedly improve the environment for indigenous fish through remediation of existing culverts and incorporating good fish passage design into any culverts that are replaced. The Department of Conservation has a responsibility to provide for fish passage[55]. The assessment work undertaken to date provides the basis for incorporating good fish passage design into any road upgrades.

The net result is anticipated to be an improvement to the current situation, where fish passage is restored in a number of catchments which have potential fish habitat available. There is an opportunity for the Department of Conservation to showcase the work that it does in achieving these outcomes.

11.4.5 Effects on lizards

It is considered that the effects of vegetation clearance undertaken as part of the proposed activities are likely to have a negligible to low effect on any lizards that may inhabit the area. This is because the density of lizards in the area is thought to be correspondingly low.

There is a need to undertake additional effort to fully assess what species of lizards are present in not only along the roading corridor but for other components of the Oparara Project also. It is suggested that a survey of the road corridor should be undertaken this summer, to prevent any

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55 The Freshwater Fisheries Act (1983) states that "culverts and fords may not be built in such a way as to impede fish passage without a permit (regulation 42(1))"

and .."Culverts and fords must be maintained by the occupier to prevent the development of barriers"

potential delays due to timing, due to inability to survey during the cooler months of the year. Such a survey could be undertaken without the need for detailed road design.

11.4.6 Effect on bats

Bat monitoring has been undertaken over the last two summers and will be continued on an annual basis throughout the Oparara Basin. Native long-tailed bats appear to be the only species present and it is not currently known where these animals roost. However preferred roosts are located at low altitude at the bottom of valleys, less than 500m from the woodland edge. The bats prefer tall roosts of large diameter trees, particularly red beech (Sedgley and O'Donnell, 1999). It is therefore important that in the absence of knowing where the Oparara bats roost, a precautionary approach is taken to the felling of any large diameter trees as part of the road upgrade.

11.5 Recommended Mitigation

11.5.1 Mitigation with respect to vegetation

Mitigation measures should include, but not necessarily be confined to the following:

- Consultation should be undertaken with the road design team before and during the design process, in order that there is an understanding of the standards expected with respect to ecological concerns, and in particular vegetation.

- Any significant trees or high priority forest areas will be pointed out to the road design team so that these can be excluded from the road construction footprint where possible.

- Vegetation clearance should be undertaken to the minimum required for the works and subsequent to that to an appropriate standard for road maintenance, maintaining site lines etc. Felling should occur *away* from the surrounding vegetation to avoid collateral damage.

- Where possible, any small slash and branches from other species should be laid on the ground in the vicinity, without smothering existing vegetation, in order to return nutrients to the soil. Larger trunk sections may be sawn in to rounds and placed on the forest floor to rot down.

- Care should be taken to avoid unnecessary damage to tree roots where the road excavation passes close by a tree that is left in place. If damage does occur then this wound can be covered with Mobil wax emulsion soon after damage occurring. This must be applied to a clean cut and this creates a barrier that stops borer and pathogens (M.Hansen, *pers.comm,* 18/11/2019).

- Spoil and weeds taken off the road during construction should be disposed of at an approved site, after consideration of the risk of weed spread, and in consideration of the potential to eliminate certain weed species from the road corridor.

- Weed checks and control must be undertaken at six-monthly intervals, with the first check being undertaken in the first spring/summer after the road upgrade is completed. Weeds

encountered should be reported to the DOC Weed Specialist[56] and they may provide advice on the most effective means of control if any uncertainty around that species.

- A construction management plan should be supplied by any tenderer for the proposed works and must include provisions for the appropriate management of the vegetation.
- An Environmental Work Plan, should be compiled to ensure that the Department of Conservation and the road construction team have an understanding of expectations, best practice etc.
- A planting plan should be prepared and this should include detail on the management of any cut faces or cleared areas. These should be hydroseeded with weed-free fern spore and native seed only i.e. no exotic grass seed should be used, and spot-planting with eco-sourced mānuka and rata (due to their threat ranking) as well as other species as considered appropriate.

11.5.2 Recommended Mitigation for birds

- Road construction should be preferably be undertaken outside of the breeding season for kiwi in the area to avoid disturbance or mortality to adults or eggs. This is between July and December.
- A registered kiwi-dog should be brought on to site to undertake a preliminary survey of the entire road corridor in order to determine areas that are utilised by kiwi. This could be undertaken at any time of the year but would ideally be undertaken at least within a few weeks prior to commencing any construction, as birds do move around and utilise different roosts. A contingency plan should be prepared in consultation with the kiwi-dog handler so that if a nesting kiwi is encountered there is a clear plan of action.
- If kiwi have been shown to be frequenting an area, pre-start checks of all areas likely to be disturbed during construction must be undertaken. This must happen on the day of commencement of works. Only once an area is cleared of any birds can works commence.
- In the event that a nest or a roosting bird is encountered then the appropriate action shall be taken according to the contingency plan.
- A pre-construction check of any vegetation to be cleared during construction shall be undertaken to ensure that any other native bird species are not harmed by the proposed construction.
- If a nest of any Threatened or At risk indigenous species is encountered during any works, then work should cease and DOC should be consulted before any continuation of work. If unsure, then DOC should be consulted first also.
- It is recommended that once the road is upgraded, signage should be installed at appropriate places advising of the presence of kiwi and limiting the night-time vehicle

[56] Tom Belton, Hokitika.

speed to 30kph, to avoid kiwi being run over. The existing limit is 35kph, but some road-users are likely to exceed this with an improved road conditions.[57]

11.5.3 Recommended mitigation for snails

- All areas to be cleared of secondary shrubland or forest, from Break Creek Bridge upwards, should first be searched for *Powelliphanta annectens*, by authorised personnel with snail searching experience. This will require a wildlife permit, unless a DOC ranger is part of the search team. Search effort should be consistent with the level of search effort employed on a snail monitoring plot.

- Any snails encountered shall be moved an appropriate distance away from any proposed construction to suitable habitat

- Documentation of any live snails, as well as shells found should be undertaken. Details should include size, habitat, photographs taken and any other pertinent information.

11.5.4 Recommended mitigation for fish

- A sediment control plan shall be prepared and implemented as an integral part of any road upgrade.

- Monitoring of the construction as it proceeds is essential to ensure that water quality standards are maintained and remedial action taken where necessary if not achieving desired outcomes.

- A fish management plan should be prepared prior to undertaking culvert replacement or remediation. This should outline methodology for minimising injury or mortality of fish during replacement of structures. If fish need to be cleared from a section of stream prior to replacement, then this will usually require electric-fishing or trapping. Electric fishing can be undertaken without a permit if an experienced, ticketed DOC staff member is present.

- Fish passage shall be provided for at all culverts where fish are known to be present or where there is a high likelihood that suitable habitat exists. The fish survey work undertaken to date provides the groundwork for making this judgement.

- Retrofitting existing culverts and ensuring new culverts are fish-friendly should be achieved by engaging a company specialising in this work. This need not be cost prohibitive and will allow best fit-for-purpose work is undertaken.

11.5.5 Mitigation for lizards

- A survey of the road corridor should be undertaken to assess whether lizards are present and what habitats are being utilised.

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[57] Of the 97 reviews of the Oparara basin on the Trip Advisor website (as at 8th November 2019), a large proportion remark on the poor road conditions or length of travel and advise of taking care on the road.

- The results of this survey will inform management options for the road upgrade but will likely include felling vegetation by hand (rather than with an excavator), carefully removing and laying felled vegetation nearby but out of the way of further construction and search and salvage of lizards prior to vegetation removal followed by removal to similar suitable habitats nearby.

11.5.6 Mitigation for bats

- Installing automatic bat recording devices around any large trees (>15cm trunk diameter) along the alignment that need to be felled for the road widening in order to determine whether bats are present.

- If bats are noted then a bat specialist should be engaged to assess whether the tree is a bat roost tree and a plan of action devised.

11.5.7 Overall level of effects for the proposed road upgrade

Table 9. Overall level of effects for the Oparara Basin Road upgrade

	Critical species	Level of Effects without mitigation	Level of effects with mitigation measures
Vegetation	*Metrosideros spp, mānuka.*	High	Low to moderate
Avifauna	Great-spotted kiwi	Very high	Low
Snails	*Powelliphanta annectens*	Moderate	Low
Fish	Longfin eels, banded kokopu and other native species	moderate	Net gain
Lizards	Not known	Not yet determined	Not yet determined
Bats	Long-tailed bats	High	Low

The effects of the proposed upgrade on vegetation at the site would be significant if undertaken without mitigation (Table 9). Final design will be informed to some extent by this assessment and in turn will help define what the likely effects might be. It is likely that some species now listed as Threatened may be affected and, as stated before, this is due to the precautionary approach taken in elevating the threat status of all myrtaceae species (i.e. rata, kānuka, mānuka). Every effort will be made to minimise the amount of vegetation clearance required though it is highly likely that climbing rata, some small northern rata and perhaps southern rata species will be removed from the road verge. Because the magnitude of effect on the vegetation has yet to be fully determined, an overall level of effects, with mitigation, is ascribed a range from low to moderate. These effects can be mitigated to varying degrees by the mitigation actions proposed.

Great-spotted kiwi have a very high threat rating (according to EIANZ criteria), are known to be present in the area and were observed within the road corridor. Kiwi will utilise the area for feeding and roosting and may nest within the final construction footprint. The magnitude of effects for this

species is considered very high but this can be reduced to low after adopting the recommended mitigation.

Powelliphanta annectens has a very high threat rating. This species has a distributional range including areas enveloping approximately 2/3 of the corridor though the construction footprint will likely include little suitable habitat as a proportion overall. A moderate level of effect without mitigation is derived based on the likelihood the snails appear to be at low densities and the unsuitable habitat and adopting the recommended mitigation may reduce the anticipated level of effects to low.

Though the diversity of fish species within and affected by the road upgrade is relatively low, there is at least one threatened species affected by the proposal, and there may be others. The proposed road upgrade provides an opportunity to undertake remedial works for fish passage that might not be undertaken as a priority otherwise. This may allow a net gain to be made for fish within the area through making available a greater range of habitat and allowing freshwater ecosystem functioning to be restored within a number of small catchments.

Lizard survey is recommended prior to the proposed work being undertaken. This will allow a better understanding of requirements in ensuring that appropriate mitigation can be implemented, as well as providing important baseline information for herpetofauna in the area.

Long-tailed bats are known to be active in the area during the warmer months and may roost in the proposed development footprint. It is not known whether they occur along the Break Creek catchment but they are active through the summer months in the Oparara Basin. Mitigation is proposed which can reduce the potential effect on this species from a high rating to low.

Visitor safety is considered to be an important consideration that needs to be provided for and upgrading the existing access road is considered an important way to achieve this. However, it is considered that there needs to be better provision of transport services for visitors who, given a choice, would prefer not to drive their own vehicle in to the Oparara Basin, and there will be an increase in demand for such a service if visitor numbers increase. The Department of Conservation should encourage any such initiative and this would achieve not only a higher level of visitor satisfaction but also reduce the risk of vehicle accidents on the road.[58]

11.5.8 Summary

There are currently an unacceptably high number of vehicle accidents and near-miss on the 16km McCallums Mill Road. An upgrade of this access road will include widening the road along much of its length, decreasing the gradient where possible, installing passing bays and sealing some sections.

The final design for the road has yet to be prepared and will to some extent be informed by this AEE. It is anticipated that the environmental effects of the upgrade can be effectively managed and mitigation can be implemented to reduce potential adverse effects on vegetation, bats, snails, lizards and avifauna. There are 93 culverts along the length of the road and approximately half of

[58] The Parliamentary Commissioner for the Environment has warned of the consequences of environmental pressures from increased tourism. Oparara Arch is well within the range of an electric bus, thereby leading to zero vehicle emissions and reduced levels of congestion and noise on the road.

these will require remediation or need to incorporate good fish passage design in order to provide for passage of native fish and allow a net environmental gain to be made.

There is likely to be an increasing number of visitors who would choose a transport service to visit the Oparara basin and it is recommended that the Department facilitates any initiatives to provide a such a service.

12 Moria Gate Stairway

12.1 Introduction, including nature of proposed track development.

Moria Gate is one of the key attractions that is accessed from the main carpark area in the Oparara Basin. Although most of the track to the arch is of a very high standard (day visitor standard - see appendix 4) and caters for people with a wide range of physical ability, the last few metres of the track is much more challenging and requires the visitor to hold on to a chain as they scramble (Figures 43 and 44) down to the viewing area on the true right hand side of the Oparara river as it flows through the arch (Figure 45).

Figure 42 showing the entry point to the viewing area at Moria Gate and the clamber down over limestone slabs.

Figure 43 showing the final approach to the Moria Gate viewing area and the existing clamber down in to the viewing area.

Figure 44. Moria Gate viewing area with the Oparara River flowing beneath the arch.

12.2 Existing Environment

It is approximately a 30-minute walk on a well-surfaced limestone chip track of day visitor standard to Moria Gate, an impressive forest-clad limestone arch straddling the Oparara River. While most of the track is of a very gentle gradient, there is a short section that is a wide benched track with the maximum gradient being about 5°. On approaching Moria Gate, the track forks, with the left-hand branch enabling the visitor to cross over the top of the arch and continue to Mirror Tarn or join the Fenian track, while the right-hand fork gives access to Moria Gate. The final section to the Moria Gate viewing area requires a scramble down broken slabs of limestone, losing about 5 or so metres of elevation from the entrance, to the sand 'beach' within the arch.

12.3 Proposed works

It is proposed that a single stairway structure, made of grated stainless steel and approximately 6.1m in length, would be installed just below the cave entrance to give a safe descent down on to a lower slab of limestone. This will thereby remove some of the fall-hazard that currently exists and result in a passageway that is more consistent with the existing track standard to that point.

Implementation 6 of the KNPMP[59] requires that "any new development does not cause undue damage to geological and natural features" and the proposed installation is consistent with this provision, with no rock removal or modification required. Existing bolts (for the current chain) will be retained for supporting the new structure if necessary. The chain itself will be removed and fixed hand-rails will be an integral part of the new structure. The proposed activity meets the

[59] Pg 66 of the plan.

requirements of the CMS (s.3.8.9) that allows an exemption from obtaining land use consent to undertake the activity and the Moria Track is specifically listed in Appendix 9 of the CMS, in this regard.

12.4 Overall Level of Effect on the environment

There are no anticipated direct adverse ecological effects from installation of the proposed structure[60] and the proposal is consistent with statutory provisions. The visual effect of the structure may be considered to detract from the more natural means of descent that currently exists. However, the reduction of abrasion from sand on passing footwear will help to preserve the condition of the limestone where it is currently being worn down.

The overall level of effect for this project component is considered to be negligible.

13 Mirror Tarn Viewing Structure

Mirror tarn is a very popular short walk and is a short side trip (1 min) from the Moria Gate circuit or about 10 minutes from the Mirror tarn carpark (Figure 46).

Figure 45, showing the view that greets the visitor to Mirror Tarn on a calm day.

Small jetties have been constructed on the lake edge in the past (M. Hansen, *pers. comm.* 11/9/19) but there is currently no structure which allows the full enjoyment of the views out on to this small lake. The absence of a built structure on the lake edge has led to vegetation at the existing viewing area to be trodden on and lost over time. The approaches to the lake have become compacted where the soils are better drained and subject to pugging further towards the lake waters as visitors attempt to reach as far out as they can to take a photo. In addition, the root system of a large rimu

[60] It is noted that an unusual micro-snail fauna has been documented around a small seepage area at the upstream side of the arch (Haase, 2007). While this will not be impacted by the proposed structure instalment, it is acknowledged that an increase in visitor numbers has the potential to place an increased level of threat upon unique species such as these.

is threatened by the existing level of foot traffic. It is proposed that a purpose built structure be installed to protect the lakeside environment and to enhance the visitor experience by giving better access to the tarn without disturbing the tranquil lake surface.

13.1 Proposed construction

A single structure with a 1.2m walking surface and a maximum of 7m in length is proposed, to give access a short distance out over the water (Figure 47 and 48). The structure would be cantilevered, either counter-weighted and/or with wire stays. Concrete will need to be poured either for the end of the platform and/or for the cable stays. The design of the proposed structure has yet to be finalised, including the materials of the structure. Materials will be carried/power-barrowed on to site or a helicopter might be used if a single metal structure was to be installed.

Implementation 3 of the KNPMP requires that any new structures are not intrusive and are sensitively designed to blend in to the natural environment and so the final design must be consistent with this requirement as well as not undertaking over-development within the park as required by implementation 1. The length of the structure will therefore need to be appropriate to the environment and this is considered in the landscape assessment (appendix).

13.2 Existing Environment

Mixed silver and hard beech surrounds Mirror Tarn and the visitor approaches the tarn through forest up to about 20m in height along a short section of track extending about 30m off the main Moria Gate-Oparara circuit.

The track is currently surfaced with limestone chip but on approaching the lake viewpoint the chip has been lost and the surface is largely denuded of vegetation and covered in leaf litter, with some lime chip and soil making up the balance.

Myriophyllum robustum, *Isolepis prolifer* and the exotic buttercup *Ranunculus repens* occupy the near-shore waters and would fall beneath part of any structure that extended beyond the lake edge.

Vegetation along the lake fringe[61] adjacent to the immediate footprint of the structure include kiokio, mountain flax, soft mingimingi and *Coprosma propinqua*.

Figure 46 showing width of proposed structure (1.2m), as well as devegetated area on lake edge with exposed tree roots.

[61] Searching of the lake edge for the small turf plant *Gratiola concinna* (Threatened: Nationally Endangered), failed to detect any of this species within the proposed footprint area (J. Marshall, DOC Botanist, *pers.comm.* 20/12/19). This species has been found within suitable moist habitat within the Oparara Basin.

At least three small trees would likely require removal on approaching the lake in order to provide a clear area for the near end of the structure. These are all immature specimens of toro and have trunk diameters ranging from 5.4 cm dbh to a maximum of 9.8cm dbh. There is an old rotten trunk approximately 40cm across and about 4m tall near the proposed platform footprint. This is currently clothed in kidney fern (*Hymenophyllum nephrophyllum*) and is an attractive feature when approaching the tarn. This trunk does not appear to pose a great risk of falling but this may need to be assessed regularly in to the future.

13.3 Anticipated effects of the proposed construction.

The effects of the proposed works are limited and confined to the following:

- Removal of three small toro trees at the near end of the proposed structure.
- Possible removal of standing trunk with kidney ferns.
- Possible shading of aquatic plants along a short section of lake-edge, including *Myriophyllum robustum* (At Risk: Declining, de Lange *et al*, 2018). The effects from reduced light levels along a short section of lake edge will vary according to species.

13.4 Proposed Mitigation

- Only trees needing to be removed for the structure and any supports will be felled.
- Any spoil removed for the pouring of concrete or installation of piles etc, must be carefully managed appropriate use elsewhere i.e. building up of track formation etc.
- Any vegetation shall be removed a short distance into the forest and left to break down naturally.
- The standing dead trunk shall be left intact and monitored regularly to ensure it does not present a hazard to track users.
- A management plan for the use of concrete, including a contingency plan for spills into a waterbody, shall be prepared by the party undertaking the works and this shall be signed off by the Department if acceptable.
- Photo-monitoring of *Myriophyllum robustum* beneath the platform should be undertaken by the Tier 2 monitoring team in Hokitika, in order to determine if any adverse effects occur as a result of the installation of the structure.

13.5 Overall level of effects from the proposed works

It is anticipated that the magnitude of environmental effects of the proposed works are low i.e. a minor shift away from the existing baseline conditions. The change arising from the alteration to the immediate area will be discernible e.g. the removal of a small number of toro trees, but the underlying character, composition and/or attributes of the existing baseline condition will be similar to the pre-development pattern (EIANZ, 2018).

In most respects the effects of the proposal are known and able to be determined, though there is some variability depending on the dimensions, construction methodology and materials of the final structure. One of the main considerations with respect to final design, from a statutory consideration, is ensuring that the structure is non-intrusive and the distance the structure extends out over the water may be one of the main factors to consider. A number of mitigation measures are proposed and these will vary little, regardless of the final design.

Myriophyllum robustum occupies a small area beneath the proposed structure and this At Risk species is therefore assigned a high value rating based on EIANZ guidelines. There is likely to be no measurable effect on this species, and it is common along the southern shore of the tarn. No particular mitigation is proposed for this species though a steel grated structure is likely to let higher light levels through to the plant(s) beneath the structure and photo-monitoring is recommended.

13.5.1 Summary

The establishment of a viewing structure at mirror tarn is anticipated to have a very low level of environmental effect during construction and will help to protect the lake edge once installed. The final design of the structure needs to be consistent with the KNPMP requirement that structures are non-intrusive and perhaps the main consideration of relevance is the distance that the structure extends out over the lake surface. The overall level of effects is considered to be low in any instance.

14 Oparara Viewing Area and Interpretation Site

14.1 Background and nature of development proposed works

The approach to the Oparara Basin is via a long and winding road that gradually ascends to 420m above sea level before commencing the descent into this otherwise isolated broad basin. An old winch bank is located a short distance beyond the high point on the access road, at about 400m elevation and this has been selected as an appropriate point for a viewing area and interpretation locus, thereby setting the scene for the visitor as they near their destination. The proposal is to level the ground over an area of approximately 800m^2 and resurface with AP20 lime chip or river sourced gravel and clear a window through the regenerating forest immediately beside and slightly below the site, thereby giving views to the north, out over the basin and beyond to the mountains of Kahurangi National Park.

The site will be developed to provide parking for 16 vehicles, aligned in a herring-bone layout, with the interpretation kiosk set against the bush-edge at the end of the parking area, and to the right hand-side of the viewing window. Appropriately shaped large limestone boulders i.e. with a flat upper surface, would be placed around the perimeter of the viewing/parking area and these would have the dual-use of preventing vehicles from toppling off the edge as well as being suitable for sitting on. These boulders will be sourced from the Oparara Quarry outside of the park.

Prior to the site being developed, it is proposed that this already flat area may play an important role as a staging area for stockpiled gravels/lime chip being flown for use on the Oparara Arch track development.

The development of the parking area is considered appropriate as a site for interpretation for the visitor as they enter the Oparara Basin and is consistent with the primary objective of the KNPMP to “gain benefit, enjoyment and inspiration from the Park” and develop any interpretation at accessible amenity areas in a way that is consistent with CMS priorities[62]. It is proposed that interpretation will be undertaken in close partnership with Ngāti Waewae.

[62] Implementation 29, pg 81, KNPMP.

14.2 Existing Environment

The existing site was utilised in the 1960s as the site to which logs were winched from the vicinity to a flat pad where further processing of the logs was undertaken. The regenerating forest around the site is therefore 50 years of age at most, while the core area is predominantly covered in exotic grasses such as browntop and Yorkshire fog, as well as buttercup, *Juncus effusus*, bracken (*Pteridium esculentum*) and moss species (Figure 49).

Figure 48. The existing site. Introduced species predominate in the central area with a mixed fern and shrubland around the perimeter then transitions to secondary forest beyond. The proposed interpretation area would be at the far end, while a viewing window would be cleared to the left of this.

Figure 49. Aerial view of the proposed viewing and interpretation area, showing approximate area of required vegetation clearance to allow views to be achieved. It is envisaged that most visitors using the area would enter from the a safe pull-off position (arriving from the bottom left corner). Visibility, when approaching the site from the basin is considered adequate. Basemap from gis.westcoast.govt.nz.

The central low stature vegetation has a fringe of fern and low shrubland on the north-western side and is predominantly indigenous in nature, with hard fern (*Paesia scaberula*), and kiokio (*Parablechnum novae-zelandiae*), shrubs of *Coprosma rugosa* and *Coprosma x cunninghamii* and beyond this a taller shrubland with *Veronica leiophylla*, kanono and broadleaf.

Secondary forest (up to 50 years old) on the surrounding area, including the slopes to the north, through which a clearance window is proposed (Figure 50), is in fairly well-advanced stage of development. This association is comprised of northern rata, kāmahi, broadleaf, pate, kanono, marbleleaf and lancewood (*Pseudopanax crassifolius*). The forest floor is sparsely vegetated, as might be expected beneath a dense, even forest canopy and crown fern is the predominant species found (Figure 51). The vegetation on the proposed clearance window is secondary forest as described and predominantly toro, kāmahi, lancewod, marbleleaf, and occasional southern rata and immature celery pine (*Phyllocladus alpinus*). *Coprosma lucida* occurs at the transition to lower stature shrubland and bush lawyer (*Rubus cissoides*) along the shrubland edge.

Figure 50. Interior of the secondary forest showing even-aged small trees and a sparsely vegetated understory typical of a forest with an even, dense canopy.

Existing vegetation, to the north-east end of the proposed viewing area, and which will therefore be largely unaffected by any vegetation clearance, includes southern rata as well as northern rata (*Metrosideros robusta*), lancewood and *Veronica salicifolia*. Sandwiched between the road and the proposed development area is a low bund that is covered in lower stature vegetation comprising of many of these same species but includes also *Pittopsporum eugenioides*, a small rimu, *Parablechnum procerum*, soft mingimingi, creeping clubmoss (*Lycopdium scariosum*) and a small tōtara (*Podocarpus tōtara*). This vegetation will be retained.

14.3 Assessment of effects

14.3.1 Effect on vegetation of proposed development

The clearance window would require the clearance of a corridor of vegetation approximately 8-10m wide at the level of the carpark, and widening out from the edge of the car-parking/interpretation

area, and extending downslope for perhaps 20 to 30m in order that the tree tops did not obstruct the views from the viewing area. The clearance of perhaps 300-400m² of vegetation (or 0.3 to 0.4ha) is considered to be of a relatively minor nature, given that no large stature trees will be affected and the forest is of a low complexity. However, it was difficult to determine with any surety how far the vegetation clearance would have to extend to achieve the outcome of achieving views and it may be that clearance would be best tackled as a progressive process, commencing at the top and proceeding downslope with reassessment as the works progressed.

In any case, it is considered that rather than cutting off trees at ground level, they may be coppiced and allowed to regrow to an agreed upon height. In doing so, weeds will help to be kept at bay and some degree of naturalness will be provided for.

There will be a small amount of clearance of any indigenous vegetation around the remainder of the site. Removing the shrubland and low stature trees to the top of the hillslopes will enable full utilisation of the existing flat area. It is possible that the low shrubland and rough grass and fernland habitat around the proposed development footprint may provide lizard habitat and it is recommended that lizard searching is undertaken by a specialist herpetologist (see 14.4.5).

14.3.2 Effect on *Powelliphanta annectens* from the proposal

Powelliphanta annectens is a threatened species in serious decline (Hitchmough *et al*, 2007) and as such has a very high value ranking according to EIANZ (2018) guidelines. The proposed development site falls within the known distribution range of *Powelliphanta annectens* (Walker, 2003), although detailed searching would need to be undertaken to confirm whether this species occupies the proposed development footprint. The open forest floor is considered to be less optimal than situations closer to the Oparara river where there is more vegetation cover and the animals would be nearer to a limestone source which is important to facilitate shell development. No empty shells were evident on the ground within the area likely to have tree removal.

While clearance of the taller vegetation would be undertaken to enhance the views from the carpark, the forest floor vegetation would remain and would likely undergo a resurgence of growth under new conditions with increased light levels. This may, in the longer term, provide more habitat for the species than currently exists.

Powelliphanta annectens currently occurs at low densities in the Oparara basin, an average of density of only 0.4 snails per 100m² (Simister, 2018), despite intensive predator control work being undertaken. The number of snails within the overall area of proposed works is therefore likely only 1 or 2 snails at most and since the site is approximately 500m outside of the intensive network of predator control, is likely to be less than this.

It is considered that there is a low risk of *Powelliphanta* mortality as a result of felling of secondary vegetation, though there may be a slightly higher risk from the removal of shrubland and subsequent levelling off of the site. In the longer term, the resurgence of new growth on the site of forest clearance may prove more suitable for snail habitation than currently exists.

14.3.3 Effect on birdlife

The secondary forest is likely to be utilised by a variety of introduced and native passerines (perching birds) as well as weka and perhaps great-spotted kiwi. While there are nesting opportunities for the former, there appear to be few sites that would be utilised by kiwi. Mitigation

can be implemented to manage any potential adverse effects on great-spotted kiwi. It is anticipated that the adverse effects from the loss of a small area of vegetation that provides potential nesting habitat mainly for common forest species is not significant.

14.3.4 Potential effect on lizards

It is not known whether lizards are present on the site but there are very few records of lizards within the Oparara Basin. The habitat available may be suitable for both skink and gecko species and it is recommended that an assessment is undertaken by a qualified herpetologist during the summer months. If lizards were found to be present, mitigation measures would likely include trapping and relocating or holding in captivity any animals caught until the main works were complete or releasing elsewhere. In addition, leaving any felled vegetation near to, but outside of the zone of impact, will provide animals with habitat without further disturbance.

14.4 Recommended Mitigation

14.4.1 Mitigation for vegetation impacts

The amount of vegetation requiring clearing from the site is relatively small at between 300-400m^2 of secondary forest plus the clearance of perhaps an equal amount of shrubland or seral vegetation on the forest edge. The central area of the site is sparsely vegetated and is dominated by adventive grasses and weedy species. Other mitigation recommended includes:

- Secondary forest should be cleared from the top of the slope downward and should be regularly monitored to assess whether the desired clearance window had been achieved. Trees should be felled inwards, to avoid collateral damage.
- Trees should be coppiced, rather than cut off at the base to allow regrowth that can be managed and to retain some natural cover.
- All vegetation cleared should be cut into smaller sections but left on site to break down naturally. No shrubs or trees should be mulched, due to the risk of harm to lizards that may be present.
- The site of forest clearance should be monitored at least six-monthly to assess whether any weed incursion had occurred. Control should be undertaken by Department staff as required.
- Blood and bone may be used to help assist in regeneration of the exposed site.

14.4.2 Recommended mitigation for birds

- A certified kiwi dog and its trainer should be engaged to undertake pre-work checks of any areas where kiwi are likely to roost or nest. This check could be undertaken at the same time as kiwi-checks of McCallums Mill Rd. As the likelihood of occupancy is low this initial check could be undertaken within perhaps a few weeks of works commencing. If the kiwi-dog did pick up scent though, a repeat visit would be necessary on the day of works commencing.

- Ideally works would be undertaken outside of the kiwi breeding season of June to December. However, an earlier check of the site with a kiwi-dog will help ascertain whether kiwi are likely to be encountered and whether constraints on timing will eventuate.

- Undertaking works outside of the spring/summer period would reduce the likelihood of any trees being felled in which forest species were nesting. A pre-start check should be undertaken of the site and if any birds are seen to be nesting then a contingency would need to be implemented to prevent harm.

14.4.3 Recommended mitigation for *Powelliphanta annectens*

- The proposed area of forest clearance should be delineated and snail searching should be undertaken by DOC staff or personnel authorised by DOC to undertake this work. Search effort should be consistent with that undertaken during snail monitoring undertaken elsewhere. Any snails found should be relocated a short distance away from the site of proposed works.
- Details of any snails found should be documented and kept with the monitoring records for the species.

14.4.4 Recommended mitigation for bats

Bats are unlikely to utilise the forest trees likely to be felled for these works, due to their small trunk diameters. However at least one tree was noted with a diameter of approximately 20cm. The Department has bat recorders and staff who are experienced in analysing the recordings. It is recommended that a bat recorder is installed for a few evenings during fine weather over the coming summer, in order to determine whether bats frequent the area. If they are found to be present then further work may be necessary to determine whether any roost trees may be present within the area proposed for tree felling.

14.4.5 Recommended mitigation for lizards

There is a possibility that lizards might occupy the site proposed for development, though given the limited scale of the development and the paucity of lizard records in the area the probability of detection is considered slight.

- It is recommended that a herpetologist be consulted to discuss possible lizard occurrence, and a lizard management plan for the site drawn up if required. It may be necessary for a site visit and trapping/spotlighting undertaken to better determine objectives. This would likely tie in with lizard assessment along the McCallums Mill Rd.

14.4.6 Overall level of effects for the proposed viewing area development

Table 10. Overall level of effects for the proposed viewing area development

	Critical species	Level of Effects without mitigation	Level of effects with mitigation measures
Vegetation	*Metrosideros spp*	Moderate	Low-moderate
Avifauna	Great-spotted kiwi	Moderate	Low
Snails	*Powelliphanta annectens*	Moderate	Low
Lizards	Not known	Not yet determined	Not yet determined

Bats	Long-tailed bats	Moderate	Low

The level of effect on vegetation at the site has a moderate potential rating if undertaken without mitigation (Table 10). This is partly due to the presence of rata species which is now listed as Threatened. Because the exact clearance window needs to be defined on the ground (perhaps requiring survey to minimise the amount of vegetation clearance required) the overall level of effects, with mitigation, is ascribed a range from low to moderate. Mitigation with respect to vegetation clearance and subsequent weed control is recommended.

Great-spotted kiwi have a very high threat rating and are known to be present in the area and were observed within the road corridor. Kiwi may utilise the area for feeding and roosting and may nest within the final construction footprint but the site is generally unsuitable and so a moderate rating is ascribed in the absence of mitigation. The magnitude of effects can be reduced further to low after adopting the recommended mitigation.

Powelliphanta annectens is a threatened species and therefore has a high threat rating. This species has a distributional range including the proposed viewing area though the main area considered as having real potential for habitat is limited to the area to be felled of trees for the viewing window. A moderate level of effect without mitigation is derived based on the likelihood the snails appear to be at low densities. Once the work is complete the area of forest clearance may provide better snail habitat than formerly. Mitigation measures will reduce the level of effects from moderate to low.

Lizard survey is recommended prior to the proposed work being undertaken. This will allow a better understanding of requirements in ensuring that appropriate mitigation may be implemented, as well as providing important baseline information for herpetofauna in the area. The most likely species on this site are skinks, one of which is Threatened while the other is not.

Long-tailed bats are known to be active in the area during the warmer months and may roost in the proposed for tree felling. Most of these are small diameter trees but at least one tree observed had a trunk diameter of over 15cm in trunk diameter and therefore offers potential roosting. Mitigation is proposed which can reduce the potential effect on this species from a moderate rating to low.

14.4.7 Summary

An existing cleared site will be utilised to develop a viewing and interpretation area adjacent to McCallums Mill Road. The site selected is currently modified but would require the clearance of a window of secondary forest adjacent to the carpark, through which views out over the Oparara Basin would be gained. This vegetation clearance would potentially result in the main adverse effects and mitigation measures have been outlined to minimise or avoid these. These impacts can be managed for all the main taxanomic groups, though further work needs to be undertaken to assess the presence of lizards within the proposed footprint and whether any mitigation is required.

15 References

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16 Appendix

16.1 Appendix 1. Summary of Relevant RLWP Rules & Activity Status

Relevant Rule	Activity Status	Explanation
Rule 2	Permitted Activity	Earthworks (e.g. tracking) in riparian margins and any associated discharge of sediment is permitted if the volume of earthworks does not exceed 25m³ and the cumulative disturbance is no more than 20 linear metres in any 200m length of riparian margin.
Rule 3	Permitted Activity	Earthworks on slopes less than 12 degrees, outside of any riparian margins, and any associated discharge of sediment is permitted provided the volume of earthworks does not exceed 5000³ per hectare and there is sufficient sediment control.
Rule 4	Permitted Activity	Earthworks on slopes between 12 and 25 degrees, outside of any riparian margins, and any associated discharge of sediment is permitted provided the volume of earthworks does not exceed 500³ per hectare and there is sufficient sediment control.
Rule 5	Permitted Activity	Earthworks on slopes that exceed 25 degrees, outside of any riparian margin, and any associated discharge of sediment is permitted provided the volume of earthworks does not exceed 10m³ per land-holding and the activity does not cause any instability and sufficient sediment controls are in place.
Rule 6	Permitted Activity	Earthworks for maintaining or repairing roads and tracks and any associated discharge of sediment is permitted provided there is a constructed form of drainage control, sufficient sediment control, no debris is placed in any waterbody and there is no conspicuous deposition of sediment in water bodies or land beyond the boundary of the subject property.
Rule 23	Permitted Activity	The erection of bridges (e.g. Oparara walkway bridge) is permitted if the underside of the bridge is at least 600mm above the level of river's natural bank level and there are no piers in the riverbed. The placement of culverts (e.g. McCallums Mill Road upgrade) is also permitted under this rule provided the river/creek-bed at the point of crossing does not exceed 5m in width and the base of the culvert is installed flush with the bed level and is designed to pass the fullest flow.

Rule 25	Permitted Activity	The construction of the weir/intake structure for the water take for the Box Canyon Carpark toilet is permitted if the base of the structure does not exceed 2m^2.
Rule 40	Permitted Activity	The water take for the Box Canyon Carpark toilet is permitted if it does not exceed 2 litres per second or 25,000 litres per day and the intake is protected by a fish screen.
Rule 79	Permitted Activity	The discharge of any sewage effluent into or onto land from a sewage disposal system is a permitted activity provided various criteria are meet including the discharge is not within 50m of any surface water body or 1m of groundwater.
Rule 81	Permitted Activity	The discharge of stormwater runoff (e.g. from toilet building) into or onto land is permitted provided the discharge does not cause erosion, scouring, ponding etc beyond the subject property.

Notes

1. All the permitted activity rules have criteria that need to be meet. Key criteria only have been mentioned in the table and for most of the rules there are additional requirements that will need to be meet.
2. Rule 23 allows for the erection or placement of culverts and bridges in, on, under, or over the bed of rivers. Lakes are not referenced in the rule therefore the Mirror Tarn viewing structure may be subject to consent.

16.2 Appendix 2. Native Plant species within Project Area

Table 1. Native Plant species within or close to the Project Area including taonga species (according to Schedule 97 of the Ngai Tāhu Claims Settlement Act, 1998) and which are denoted by * and their full Māori name given. Plant species listed as Threatened or At Risk are

COMMON NAME/MĀORI NAME	SCIENTIFIC NAME	CONSERVATION STATUS
Native species		
Maidenhair fern	*Adiantum cunninghamii*	Not Threatened
	Anaphalioides trinervis	Not Threatened
Wineberry, makomako	*Aristotelia serrata*	Not Threatened
Pikopiko	*Asplenium bulbiferum*	Not Threatened
Hanging spleenwort	*Asplenium flaccidum*	Not Threatened
	Asplenium polyodon	Not Threatened
Mountain astelia	*Astelia nervosa*	Not Threatened
	Austroblechnum colensoi	Not Threatened
	Austroblechnum lanceolatum	Not Threatened
	Brachyglottis hectori	Not threatened
	Carex rupestris	Not Threatened
Hook grass	*Carex unciniata*	Not Threatened
Putaputaweta	*Carpodetus serratus*	Not Threatened
Centella	*Centella uniflora*	Not Threatened
Broad-leaved fleabane	*Conyza sumatrensis*	Not Threatened
	Coprosma colensoi	Not Threatened
	Coprosma x cunninghamii	Not Threatened
	Coprosma dumosa	Not Threatened
Stinkwood, Karamū *	*Coprosma foetiddissima*	Not Threatened
kanono	*Coprosma grandifolia*	Not Threatened
	Coprosma linariifolia	Not Threatened
Karamū *	*Coprosma lucida*	Not Threatened
	Coprosma rhamnoides	Not Threatened

COMMON NAME/MĀORI NAME	SCIENTIFIC NAME	CONSERVATION STATUS
Karamū *	*Coprosma robusta*	Not Threatened
	Coprosma rotundifolia	Not Threatened
	Coprosma rugosa	Not threatened
	Coprosma x cunninghamii	Not Threatened
Tī rākau	*Cordyline banksii*	Not threatened
Spider orchid	*Corybas sp.*	
Tutu *	*Coriaria arborea*	Not Threatened
Korokio, mountain hard fern	*Cranfillia deltoides*	
Creek fern	*Cranfillia fluviatilis*	Not Threatened
Silver fern, Ponga *	*Cyathea dealbata*	Not Threatened
mamaku	*Cyathea medullaris*	Not Threatened
Soft tree fern, Kātote *	*Cyathea smithii*	Not Threatened
Kahikatea*	*Dacrycarpus dacrydioides*	Not Threatened
Rimu*	*Dacrydium cupressinum*	Not Threatened
inkberry	*Dianella nigra*	Not Threatened
Wheki	*Dicksonia squarrosa*	Not Threatened
Easter orchid	*Earina autumnalis*	Not Threatened
Bamboo orchid	*Earina mucronata*	Not Threatened
Hinau, Pōkākā *	*Elaeocarpus hookerianus*	Not Threatened
	Epipterygium opararense	Nationally Critical
Tree fuchsia, Kōtukutuku*	*Fuchsia excorticata*	Not Threatened
Red beech, Tawai*	*Fuscospora fusca*	Not Threatened
Gahnia	*Gahnia xanthocarpa*	Not Threatened
Carrier tangle fern	*Gleichenia microphylla*	Not Threatened
Broadleaf, Kāpuka*	*Griselinia littoralis*	Not Threatened
Pigeonwood	*Hedycarya arborea*	Not Threatened
Water fern	*Histiopteris incisa*	Not Threatened

COMMON NAME/MĀORI NAME	SCIENTIFIC NAME	CONSERVATION STATUS
	Hoheria ovata	Not threatened
Drooping filmy fern	*Hymenophyllum demissum*	Not Threatened
Filmy fern	*Hymenophyllum dilatatum*	Not Threatened
Filmy fern	*Hymenophyllum flabellatum*	Not Threatened
Filmy fern	*Hymenophyllum lyallii*	Not Threatened
Much-divided filmy fern	*Hymenophyllum multifidum*	Not Threatened
Filmy fern	*Hymenophyllum scabrum*	Not Threatened
	Lagenophora sp.	Not Threatened
Smooth shield fern	*Lastreopsis glabata*	Not threatened
Mānuka*	*Leptospermum scoparium*	Not Threatened
Mingimingi	*Leucopogon fasciculatus*	Not Threatened
Kaikawaka	*Libocedrus bidwillii*	Not Threatened
Crown fern	*Lomaria discolor*	Not Threatened
Silver beech, Tawai*	*Lophozonia menziesii*	Not Threatened
	Lycopodiella diffusa	Not Threatened
	Lycopodium lateralis	Not Threatened
Creeping clubmoss	*Lycopodium scariosum*	Not Threatened
māhoe	*Melicytus ramiflorus*	Not Threatened
	Metrosideros colensoi	Nationally Vulnerable
White rata	*Metrosideros diffusa*	Nationally Vulnerable
Climbing rata	*Metrosideros fulgens*	Nationally Vulnerable
Northern rata	*Metrosideros robusta*	Nationally Vulnerable
Southern rata, Rātā*	*Metrosideros umbellata*	Nationally Vulnerable
Bush rice grass	*Microlaena avenacea*	Not Threatened
Hounds tongue	*Microsorum pustulatum*	Not Threatened
Red māpou, Māpou*	*Myrsine australis*	Not Threatened

COMMON NAME/MĀORI NAME	SCIENTIFIC NAME	CONSERVATION STATUS
Weeping matipo	*Myrsine divaricata*	Not Threatened
Toro	*Myrsine salicina*	Not Threatened
Rōhutu	*Neomyrtus pedunculata*	Threatened – Nationally Critical
Bead plant	*Nertera depressa*	Not Threatened
Hairy forest nertera	*Nertera villosa*	Not Threatened
Common strap fern	*Notogrammitis billardierei*	Not Threatened
Hard fern	*Paesia scaberula*	Not Threatened
Kiokio	*Parablechnum novae-zealandiae*	Not Threatened
Kaikōmako	*Pennantia corymbosa*	Not Threatened
Mountain flax, Harakeke*	*Phormium cookianum*	Not Threatened
Mountain toatoa, Toatoa*	*Phyllocladus alpinus*	Not Threatened
lemonwood	*Pittosporum eugenioides*	Not Threatened
Gully fern	*Pneumatopteris pennigera*	Not Threatened
	Poa anceps	Not Threatened
Hall's tōtara	*Podocarpus laetus*	Not Threatened
Tōtara*	*Podocarpus tōtara*	Not Threatened
Small kiokio	*Proparablechnum procerum*	Not Threatened
Mīro*	*Prumnopitys ferruginea*	Not Threatened
mataī*	Prumnopitys taxifolia	Not Threatened
Three finger	*Pseudopanax colensoi*	Not Threatened
	Pseudopanax arboreus or hybrid with P.macintyrei	Not Threatened
Lancewood, Horoeka*	*Pseudopanax crassifolius*	Not Threatened
Horopito	*Pseudowintera colorata*	Not Threatened
Leather leaf fern	*Pyrrosia eleagnifolia*	Not Threatened
Tāwheowheo	*Quintina serratus*	Not Threatened
Haumakōroa	*Raukaua simplex*	Not Threatened

COMMON NAME/MĀORI NAME	SCIENTIFIC NAME	CONSERVATION STATUS
	Raukaua anomolus	Not Threatened
Nīkau*	*Rhopalostylus sapida*	Not threatened
Bush lawyer	*Rubus cissoides*	Not Threatened
Leathery shield fern	*Rumohra adiantiformis*	Not Threatened
Patē	*Schefflera digitata*	Not Threatened
Umbrella fern	*Sticherus cunninghamii*	Not Threatened
Sun orchid	*Thelymitra sp.*	Not Threatened
	Veronica leiophylla	Not Threatened
Koromiko*	*Veronica salicifolia*	Not Threatened
Ongaonga	Urtica ferox	Not Threatened
Kāmahi*	*Weinmannia racemosa*	Not Threatened

16.3 Appendix 3. Invasive and Exotic plant species within the Project Area

Table 2. Exotic species within development area. Shading indicates the ranking from list of priority weeds in CMS 2010-2020; unshaded = not currently listed and pale, medium and dark pink being low, medium and high priority respectively.

Location key where found (or as noted):

MMR= McCallums Mill Rd

OAT=Oparara Arch track

EXOTIC SPECIES		
Tasmanian blackwood	*Acacia melanoxyla*	MMR
Sweet vernal	*Anthoxanthum odoratum*	MMR
bittercress	*Barbarea vulgaris*	Mirror tarn carpark
montbretia	*Cocrosmia x cocromiiflora*	MMR
Foxglove	*Digitalis pupurea*	MMR
Yorkshire fog	*Holcus lanatus*	MMR
Catsear	*Hypochaeris radicata*	MMR
Soft rush	*Juncus effusus*	MMR -Viewing Area
Lotus	*Lotus pedunculatus*	MMR
Lupin	*Lupinus polyphyllus*	MMR
Apple	*Malus x domestica*	Mirror tarn carpark and one on MMR to Box Canyon carpark
Wall lettuce	*Mycelus muralis*	OAT
Broadleaved plantain	*Plantago major*	MMR
Self-heal	*Prunella vulgaris*	MMR
Buttercup	*Ranunculus repens*	MMR, Mirror Tarn platform
Blackberry	*Rubus fruticosus*	MMR
Broad-leaved dock	*Rumex obtusifolius*	MMR
Hedge woundwort (stachys)	*Stachys sylvatica*	Box Canyon carpark
White Clover	*Trifolium repens*	MMR
Gorse	*Ulex europaeus*	MMR

16.4 Appendix 4. Track Standards relating to existing and proposed tracks within Oparara Arches Project.

Source: Standards NZ 8630: 2004

Table A1 – Visitor groups and track requirements (continued)			
User group	**DOC visitor group**	**Definition**	**Track requirements**
3	Day Visitor (DV)	Visitors, including both domestic and international, and local community visitors seeking an experience in a natural setting with a sense of space. This is normally associated with a road-end situation or scenic attraction with recreational opportunities for up to a full day's duration. The least mobile are commonly families with young children, school parties and elderly people.	**Walking Tracks** Tracks from a few minutes to a full day return. Relatively easy day walks. Tracks of a high standard that enable use by relatively inexperienced visitors with a low level of backcountry skill. Low level of risk with all but the smallest watercourses bridged or culverted and a reasonable track surface.
2	Short Stop Traveller (SST)	Visitors, including both local and international, travelling either the main tourist highways and access roads or visiting places in their local area. They utilize the natural edge along these roads or in these local areas for visits of up to one hour return.The least mobile are commonly young families (parents with toddlers), younger age school parties, elderly people and, in some cases, people with disabilities.	**Short Walks** Tracks that take no longer than 1 hour return to walk. Easy tracks catering for all ages and most walking abilities. All watercourses bridged or culverted. Good track surface Low risk track.

16.5 Appendix 5. Landscape Report by Innate Designs

LANDSCAPE REPORT

For

Oparara Arches Restoration & Upgrade Project

McCullum's Mill Road, Kahurangi National Park

Karamea

Issue: Final

Date: 2nd April 2020

Prepared By: Innate Landscape Architecture

205 Barrington Street,

Somerfield,

Christchurch

8024

INNATE
LANDSCAPE
ARCHITECTURE

Landscape Report for Oparara Arches Restoration & Upgrade Project

Contents:

1.0 Introduction

Innate Landscape Architecture have been engaged by Richard Nichol from Richard Nichol Ecology, Westport, to assist with landscape matters relating to the proposed Oparara Arches Restoration & Upgrade Project.

The brief Included:

i. One Site Visit (carried out on the 5th September 2019).
ii. Preparation of a landscape assessment report for the main structures proposed. It was instructed that visual renders of the structures were not to be included in the scope of works.

2.0 Site Description

2.1 The Oparara Basin is accessed through McCullum's Mill Road, which turns off the main road heading North of Karamea approximately 8km from the township. McCullum's Mill Road is a gravel road which takes you right up to the end of the public access point.

2.2 The forest is made up of both Beech and Podocarp, with pockets of pine and other introduced species left over from when the area was logged under the forest service.

2.3 The Oparara Basin features a range of attractions, including Box Canyon and Crazy Paving Caves, Moria Gate, Mirror Tarn Loop and the Oparara Arches.

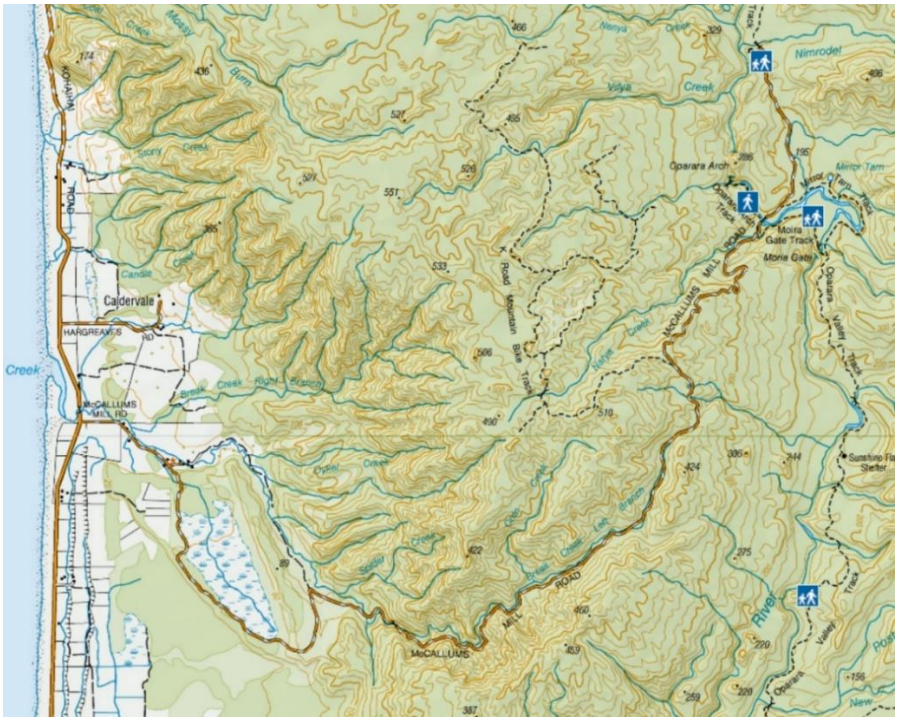

Fig 1. DOC Topo Map showing McCullum's Road turning off the main road heading North of Karamea. You can also see the various attractions such as Mirror Tarn and Moria Gate towards the end of the road.

3.0 Description of Landscape Character

The area in context of its broader surroundings is comprised solely of one Landscape Character Area.

i. Natural Environment Character Area

This area covers those parts of the District that are national park (part of the Paparoa National Park and proposed Kahurangi National Park) and ecological areas.This area is identified to have high conservation values present, whilst also acknowledging that there are also several values / uses attributable to the land, such as recreation, mining, hydroelectric generation and cultural and aesthetic values. The proposed site sits within this area.

4.0 Proposed Development

The proposed restoration and upgrade include the following components:

4.1 Viewing Area off McCullum's Mill Road

The viewing area is proposed at an existing cleared space immediately adjacent to from McCullum's Mill Road which previously served as a skid site when the area was being logged. It includes the following components:

i. Site scrape and resurfacing of the vehicle access and carparking area of McCullum's Mill Road
ii. Construction of a timber Interpretation / Information Panel with colour steel gable roof/ shelter (roof subject to confirmation from local iwi).
iii. The location of large limestone boulders to prevent vehicles going over the edge, whilst doubling as seating within the space.
iv. Clearance of any regenerative vegetation to open views down into the basin.

4.1.1 Size and Form

the size of the area designated for the car park and viewing space is not being enlarged any more than what the current surface area would be, although it would mean clearing scrub and regenerative vegetation around the proposed viewing area to provide the lookout.

4.1.2 Colour & Materials

The surface of the car park would be finished in AP20 road metal in keeping with the McCullum's Mill Road current surface, therefore would not be introducing anything unfamiliar to the site.

4.1.3 Vehicle Access

The access in and out of this area will remain as is. The intended scope for this area is only going to improve the vehicle access by providing a sounder surface to drive on.

4.1.4 Earthworks

The site will require a full site scrape before the area is resurfaced with the AP20 material. This will involve trucks to transport the surface material, along with an excavator to spread the material out.

4.1.5 Plantings

All road and car parking areas within the proposed scope will beresurfaced before the edges are hydroseeded with fern spawn to restore the surface back to its previous state.

Tree removal will only be carried out where completely necessary to make way for the viewing area.

Fig 2. Photo showing the off shoot in proximity to McCullum's Road and the cleared area proposed from the car parking space, with the viewing area to be cleared approximately around where the mountain is visible in the background.

4.2 Toilet Block at Box Canyon Car Park (Road End)

The single unisex/ disabled toilet block is proposed to be located at the existing Box Canyon Car Parking Area close to the end of McCullum's Mill Road. This proposed toilet block will be a conventional septic tank system which will replace the existing long- drop.

4.2.1 Size and Form

The timber framed single bowl toilet block will be a simple rectangular construction with a gable style roof that has a maximum height of approximately 4 metres.

4.2.2 Colour & Materials

The toilet block will be cladded in "Shadow Clad" which will be painted "DOC Green". The Roof will be constructed from coloursteel in a "Grey – Blue"

colour tone, like that of Blue Duck (Whio). The structure will sit on a single concrete pad.

4.2.3 Vehicle Access

The access in and out of this area will remain as is. The intended scope for this area is only going to improve the vehicle access by providing a sounder surface to drive on.

4.2.4 Earthworks

The site will be excavated down to 800mm before being backfilled and levelled off with a subbase material. The area proposed for the concrete pad with be boxed up for pouring and the subbase underneath with be compacted by a plate compactor.

4.2.5 Existing Vegetation & Additional Plantings

The existing vegetation within the proposed site for the toilet block will be cleared away. Once the toilet block is constructed, any remaining areas that are visually disturbed will be planted out with small plants transplanted from around the Mirror Tarn track restoration area. Any disturbed areas around the edge of the car parking area will be hydroseeded with fern spawn to restore the surface back to its previous state.

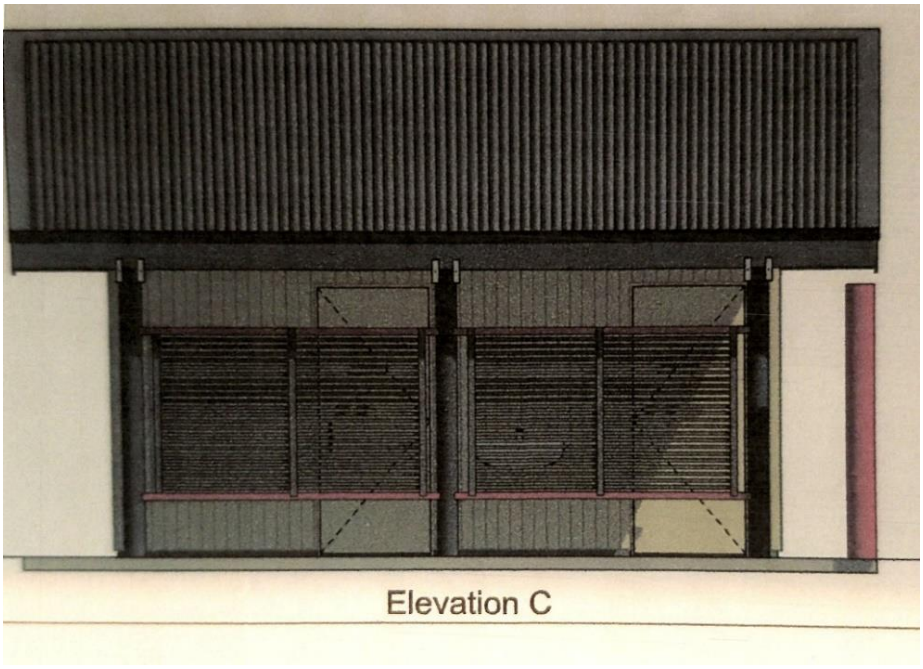

Fig 3. Showing elevation drawing of the proposed toilet block located at the Box Canyon Car Parking area.

4.3 Mirror Tarn Viewing Platfrom

A cantilevered viewing platfrom has been proposed to sit out over the current viewing location at Mirror Tarn. The structure is intended to extend out over the waters edge providing a unique experience which mitigates the disturbance of the waters surface, but more importanlty prevents further degradation of the lake edge and surface roots of a large Rimu tree close by.

4.3.1 Size and Form

It is still to be confirmed whether the structure will be a cable stay or counter weighted structure, but if it is decided to be cable stay design, the main support tower would be no more than 3.2 metres tall from the top of deck surface. The decked walkway would extend approximately 6.5 metres (3.5m out over the water's edge). All counter weighted concrete masses would be underground and therefore not visible.

4.3.2 Colour & Materials

The main supports would be made of steel, while the other structural components would be made from timber, including the decking. All the structure would be painted in "DOC Green".

4.3.3 Vehicle Access

N/A

4.3.4 Earthworks

Excavation is required for the proposed concrete footings and/or counterweights for the structure, although these will not be visible once the structure is complete. A rubber tracked dumper (800kg carrying load) will be used to transport material up and down the track.

4.3.5 Plantings

There will be no need for any significant vegetation clearing during the construction of the cantilevered structure over the tarn. However, once the platform is constructed, any remaining areas that are visually disturbed will be planted out with small plants transplanted from around the Mirror Tarn track restoration area.

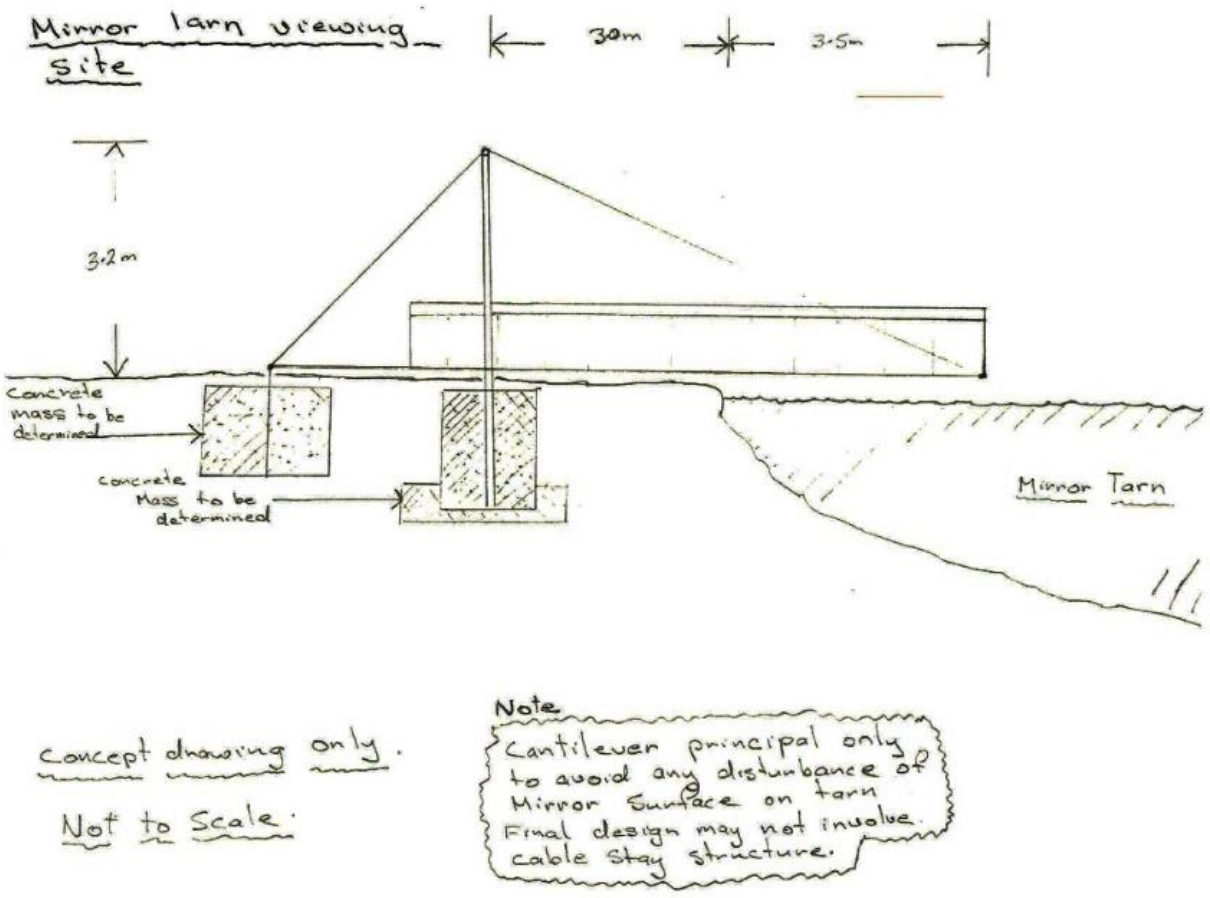

Fig 4. Concept sketch showing the proposed Mirror Tarn Viewing Platform. Drawing is conceptual and subject to further development.

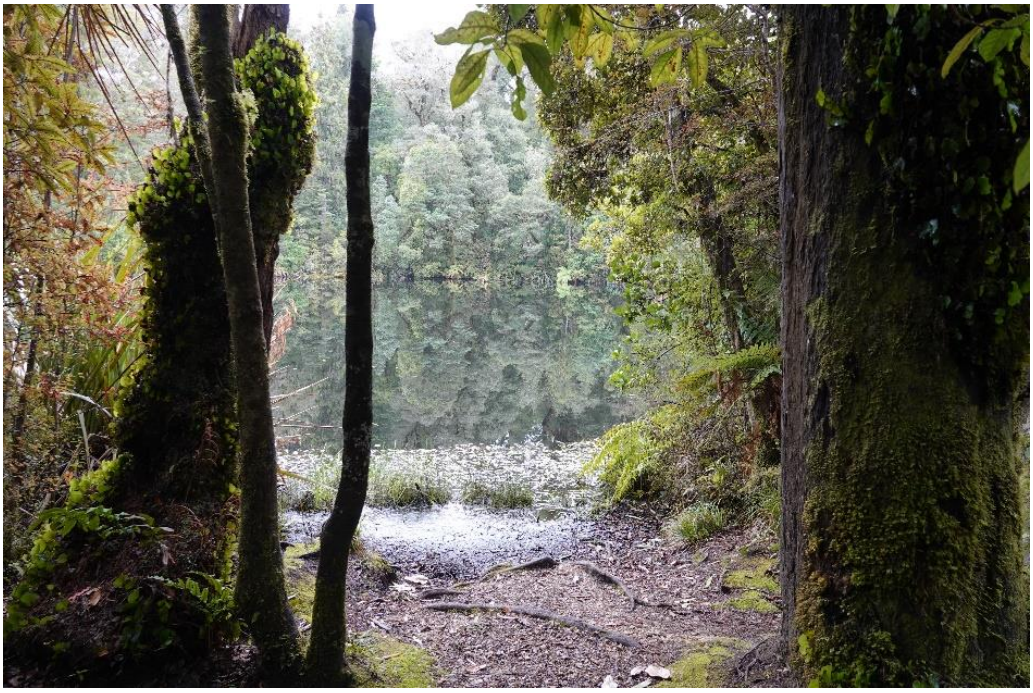

Fig 5. Image showing the current viewing area at Mirror Tarn. Note the degraded surface due to foot traffic which has exposed the root system of the nearby trees.

4.4 Elevated Walkway

Three elevated walkways are proposed to be installed around an existing limestone face approximately 6 meters above normal river level to bottom of walkway frames. This structure has been proposed for three main reasons:

- To make the walkway safer by providing a more level and suitable surface for all-inclusive use.
- To mitigate further degradation to the existing area around the current track.
- To make the track more sustainable into the future.

Please note: It is important to mention that the current track is categorised as “Easy” on the Department of Conservation website. Its definition reads as follows:

Duration: Gentle walking from a few minutes to a day.
Suitable for: People with low to moderate fitness and abilities. Some tracks suitable for mountain biking.
Standard: Track is mostly well formed, some sections may be steep, rough or muddy. Clearly signposted. Stream and river crossings are bridged.

4.4.1 Size and Form

The main vertical steel members (gantry supports) coming up from the deck level acting as a mounting point for the balustrade is in a curved shape in an attempt to make the structure more organic in composition, therefore better integrating with the surrounding landscape.

4.4.2 Colour & Materials

The elevated walkways will be constructed from bend and profile cut steel gantry supports with a steel grating to be used underfoot. All components are to be painted “DOC Green”. Timber steps may be at the approach of both ends of the walkways which will be left to silver off. Large rocks are proposed to be located around the approach of the walkway in some areas to assist with stabilising the bank to mitigate erosion.

4.4.3 Vehicle Access

N/A

4.4.4 Earthworks

A rubber tracked dumper (800kg carrying load) will be used to transport material up and down the track. All gantry supports and other structural elements of the elevated walkways will be lifted and fixed into place by hand (subject to further confirmation).

4.4.5 Plantings

Once all structural components are installed, any remaining areas that are visually disturbed along the old track alignment will be planted out with small plants transplanted from around the Mirror Tarn track restoration area. However, vegetation clearance at the site of the elevated walkway will only be where necessary for construction and user access.

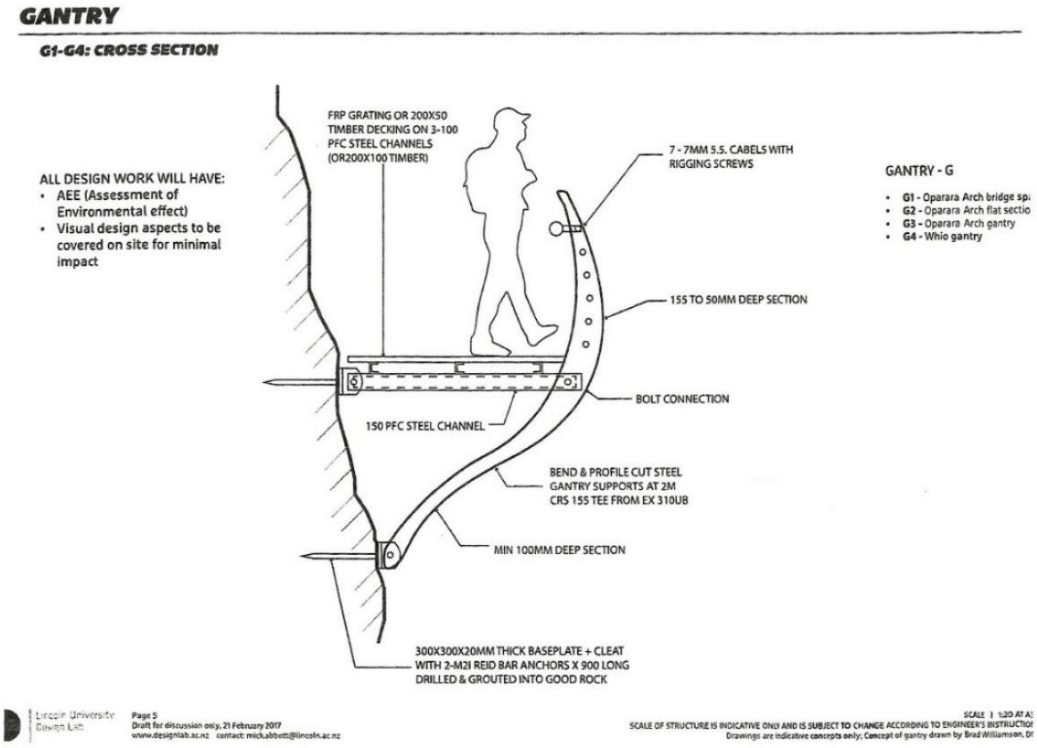

Fig 6. Showing a cross section drawing of the proposed elevated walkway structure.

Fig 7. Image showing the limestone face on the left of the river where the elevated walkway is proposed to be located.

Fig 8. Image showing the limestone face to which the existing track sidles around. There is a thin strip of scrubby vegetation between the track and the steep drop down to the river.

Fig 9. Image showing a closer view of the current track surface condition with various trees roots and And rocky clusters, with the bank falling away down to the river.

5.0 Planning Issues

Because the proposed restoration and upgrade work for the project is defined under the Conservation Management Strategy (which needs to be consistent with the Kahurangi National Park Management Plan) as being exempt from requiring a resource consent, one will not be needed.

However, all proposed structures will require building consents as per NZS 3604. As part of this, all structures will be subject to engineer's approval and sign off.

Appendix 9

RMA EXEMPTIONS (SEE CMS PART 3, SECTION 3.8.9)

Examples of work or activity of the Crown that meets the requirements of s4(3)(a) and (b) of the Resource Management Act 1991 requirement for land use consent:

- track construction and maintenance
- construction/maintenance/replacement of recreation or staff facilities/structures/ huts
- installation of signage and interpretation
- radio installations (for management and safety purposes)
- vegetation management and control (biodiversity, recreation, or historic management programmes).

Fig 8. Above extracted from Appendix 9, page 415 within the West Coast Conservation Management Strategy Document.

	ACTIVITY SCOPE	MANAGEMENT ACTIONS	ENVIRONMENTAL IMPACTS	LOCATION	
RECREATIONAL TRACKS, ROADS AND CAR PARKING AREAS	Upgrade of existing tracks and roads to meet current Departmental Service standards using current alignment. Service standard upgrades of existing tracks and roads by partially or completely realigning to take advantage of better grades, terrain features or to incorporate elements of natural or historic landscape. Construction of new tracks as agreed in consultation with the community. Improvements to any existing track considered necessary in order to mitigate any environmental impact, health and safety concern or to provide improved access for any management purpose.	Track and road construction using cut to fill excavation, cut to waste excavation and levelling using hand tools, motorised equipment and machinery. Excavation of batter slopes to a maximum height of 1.5 metres. Vegetation removal from the full width of track corridor and discretionary removal of any vegetation beyond the track and road corridor that is considered hazardous or may adversely impact upon track components such as batter slopes, drainage or track surface materials. Aggregate surfacing including placement and compaction of local and imported materials (from approved weed free sources). The use of local materials in the vicinity of the asset corridor where necessary for obtaining fill/surfacing materials. Ground works of in ground timber steps including formation and levelling, drainage and timber construction. Construction of drainage and redirection of surface water from track surface to existing natural contours using various means such as culvert pipes, drainage sumps, cut outs and cross boards. Road re-formation and widening to provide safe 2WD or 4WD vehicle access and road stability to the required standards. Drainage improvement to prevent erosion and deterioration of the road surface and structure and provide safe vehicle access.	Soil disturbance including disturbance of the duff layer and subsoil. Disturbance and soil compaction in fill areas. Surface water runoff including modification of existing natural watercourses and control and redirection of surface water using various means such as culvert pipes, drainage sumps, cut-outs and cross boards. Alterations to land contours and slopes during track construction and upgrade. Removal of vegetation from track corridor and from immediately adjacent to asset corridor.	**EXISTING:** Kohaihai Zig-Zag Track Nikau Walk Heaphy Track - Kohaihai to Scotts Beach Heaphy Track - Scotts Beach to Heaphy hut Heaphy Track - Heaphy hut to West Coast boundary Oparara Arch Track Moira Gate Track Mirror Tarn Track Box Canyon Caves Track Honeycomb Hill Caves Track Lower Fenian Track Upper Fenian/Adams Flat tks/Fenian Goldfields Fenian Caves / Miners Cave Track Giant Rimu Tree Track Karamea Gorge Route Mt Stormy Route Wangapeka Track - crpk to Little Wanganui Saddle Lake Hanlon Track Mokihinui Route Chasm Creek Walkway	**EXISTING:** Larry Creek Track Kirwans Loop Track Kirwans Hill Route Golden Fleece Walk Murray Creek Track Waitahu Track Inglewood Branch Track Tram Track Lankey Creek Track Alborns Track Big River Track Waiuta to Big River Big River Dam Route Big River Track - Big River to Inangahua River/ sawmill Track Progress Water Race Track/Inangahua swingbridge picnic area Tawhai picnic area/walk Waiuta Town Walk Prohibition mine and Ball mill, Waiuta Snowy Battery and Joker Level Incline tram Track, Waiuta Duffy Creek Route Lake Stream Route Mt Haast Route

Fig 9. Above table extracted from Appendix 9, page 416 within the West Coast Conservation Management Strategy Document.

	ACTIVITY SCOPE	MANAGEMENT ACTIONS	ENVIRONMENTAL IMPACTS	LOCATION	
Recreational structures and buildings	Upgrade existing structures and buildings to meet Departmental Service standard to meet visitor group requirements such as minimum access width and safety barrier heights as specified within SNZ 8630:2004. Scheduled 'like for like' (substantially similar structures and buildings built on the same footprint or within the immediate vicinity) replacement of existing structures and buildings as these reach the end of their projected / economic life. Construction of new structures and buildings required to meet service standards for existing tracks, roads, amenity areas and campgrounds. Construction of new structures and buildings as a component of development work for new tracks, roads, amenity areas and campgrounds. Improvements to any existing structure and building considered necessary in order to mitigate any environmental impact, health and safety concern or to provide improved access for any management purpose.	Preparatory site works such as vegetation removal, formation and levelling of structures and buildings footprint, and excavation of piles and footings. Works associated with water reticulation and sewage containment / treatment. Construction of drainage and redirection of surface water from structure and building footprint to existing natural contours using various means such as culvert pipes, drainage sumps and cut-outs. Construction of structures and buildings such as bridges, boardwalks, stairs, handrails, safety barriers, viewing platforms, huts, shelters, toilets and ladders in accordance with requirements of SNZ 8630:2004 for the relevant visitor group.	Soil disturbance including disturbance of the duff layer and subsoil. Disturbance and soil compaction in fill areas. Surface water runoff including modification of existing natural watercourses and control and redirection of surface water using various means such as culvert pipes and drainage sumps. Alterations to land contours and slopes during structure and building construction. Removal of vegetation from structure and building footprint and from immediately around. Aesthetic impact and altered sight-lines from man made structures in natural areas.	EXISTING: All structures and buildings on existing and proposed tracks, roads, car parks and camp sites	Other land not managed by the Department where permission has been given by the landowner.

Fig 10. Above table extracted from Appendix 9, page 421 within the West Coast Conservation Management Strategy Document.

Kahurangi National Park Management Plan (2001)

3.2 LANDSCAPE

Policy

To preserve and protect the landscape and scenic values of the Park

IMPLEMENTATION (SEE SECTION 4.2 ALSO)

1. In assessing applications for private or commercial structures in the Park, require the applicant to first demonstrate that the structure cannot be practically located outside the Park, and discourage commercial accommodation developments as not in keeping with the primary objectives of this management plan.

Page 66

2. Assess any proposed development, including huts, tracks, bridges, shelters, picnic sites, camp sites, fences etc, for their impact on the landscape prior to their construction.

3. Require that any new structures are not intrusive, are sensitively designed to blend in to the natural environment, are coloured in sympathy with the surrounding environment, are of high quality and are located sensitively to avoid ridge tops and other sensitive areas, or are located adjacent to existing structures.

4. Ensure signs are produced to national design standards and that the siting of any roadside signs complies with Transit New Zealand requirements.

5. Ensure that earth and vegetation disturbance is kept to a minimum in facility development and that the site is rehabilitated as nearly as possible to a natural state.

6. Ensure any new development does not cause undue damage to geological and natural features.

7. Ensure that any new track development is carefully sited so as to avoid significant visual impacts on landscape values and consider re-routing existing tracks with high visual impacts.

8. Allow for exceptions to the above policies for safety reasons only.

9. Obtain the approval of the Minister for limited removal of vegetation adjacent to huts and tracks to open up significant views where this does not impact on significant natural values.

10. Manage cave and karst features located in areas of the Park in the West Coast Tai Poutini Conservancy, in line with the West Coast Cave and Karst Strategy.

11. Develop, through consultation with key stake holders, a Nelson/Marlborough Conservancy Cave and Karst Strategy for completion in the year 2003 and manage relevant Park cave and karst features in line with that strategy when complete.

Fig 11. Above text extracted from Part 3.2 Landscape, page 66 within the Kahurangi National Park Management Plan (2001).

6.0 Assessment of Effects

As the proposed work is all exempt from the Buller District Plan, there is only the Conservation Management Strategy to Assess the structures against.

6.1 Height, size / scale, external finish, colour and reflective value

6.1.1 Building Height

The most significant items within the restoration and upgrade that may concern height are as follows:

i. Roof of toilet block
ii. Main support tower of Mirror Tarn Viewing Platform
iii. Finished height of Elevated Walkway

All of the above items have been proposed amongst surroundings which result in the structures not being visually dominant. None of the structures will be set on any ridgelines or eye lines, nor will they be noticeable from Any significant viewpoints. All of the proposed locations of the above items will also be well screened by the existing surrounding vegetation.

6.1.2 Size, Scale and Form

This section of the assessment refers to all of the following items:

i. Toilet Block at Box Canyon Car Park
ii. Mirror Tarn Viewing Platform
iii. Elevated Walkway
iv. Viewing Area off McCullum's Mill Road

All of the above proposed items are small in size when compared to the surrounding landscape. Proportionally, the size of these items have not been designed exceeding the size that is functionally or safely suitable for their intended various uses.

Specifically, regarding the elevated walkway, there has been efforts made in designing the main gantry supports in a curved, organic shape more complimentary to the natural environment to which is will be located.

6.1.3 External Finish, Colour and Reflective Value

The materials used for all of the proposed structures within the restoration and upgrade of the Oparara Arches are either constructed from timber frame construction, or where stronger materials are required, there are steel elements for structural support.

Furthermore, apart from secondary timber elements such as steps approaching the structures, which would be left to silver off a natural / neutral colour, all of the other items are to be painted in either "DOC Green" or a "Grey-Blue colour" to that of the native Blue Duck (Whio). Both of these colours are very natural in tone and will assist in integrating the structures into the surrounding areas.

These materials are in recessive neutral tones with low reflectivity values that will integrate well in the surrounding landscape and not dominate.

6.1.4 Building Sites

The sites for all of the proposed structures are either existing / current locations or have been carefully chosen to be both pragmatic and visually unobtrusive.

6.1.5 Visibility from Public Viewing Points

None of the proposed items are visually imposing at any given viewport or location. In most cases the only point where the structure is noticeable, would be upon approaching the structure to walk on / view from.

In the case of the elevated walkway, the structure will be visible from the below riverbed, but this will be softened by colour choice and shape of the structural elements.

7.0 Summary

i. The site proposed for the development sits within the "Natural Environments Character Area".

ii. All of the proposed work within the Restoration and Upgrade Project is exempt from a Resource Consent as defined in appendix 9 of the Conservation Management Strategy.

iii. All of the structures included in this assessment will be subject to building consents as per NZS 3604. As part of this, engineer's approval will be required to the necessary structures.

iv. The proposed locations of the structures either sit within or close by lookouts, tracks or viewing points that are used for the same purpose (excluding the toilet block which is a new amenity in the Box Canyon Car Park).

v. Efforts have been made in the design, choice of materials and colour to help integrate the structures within the respective surrounding areas.

vi. The shape and form of the building allows it to sit comfortably within the surrounding landscape.

vii. Both the Viewing Area off McCullum's road and the Toilet block are proposed in locations currently covered in native vegetation and would require significant clearance.

viii. All areas remaining disturbed after construction and citing of all structures are to be planted out using plants extracted from within the site and / or be hydroseeded with fern spore mixture to reinstate all areas as they were beforehand.

ix. The assessment of effects outlined in this report is based off the conceptual sketches and definitions, as well as written and verbal definitions that were obtained from Department of Conservation during the site visit on the 5th September 2019.

x. I conclude, in consideration of the points noted above, the impact of the proposed structures on this site and the surrounding setting is low. However, in the case of the elevated walkway, there is the alternative of upgrading the current section of track, given that the tracks definition already appears to be in accordance with its physical state (when observed during the site visit on the 5th September 2019).