Biodiversity Advice Request

Assessment against Te Wahipounamu Statement of Universal Value: Monorail and mountain bike track, Fiordland link experience, Snowdon forest and Fiordland National Park.

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Summary

1) My advice relates to the proposed monorail and mountain bike track with respect to its potential impacts on biodiversity values of the Te Wahipounamu South West New Zealand World Heritage Area.

2) In relation to biodiversity, the area affected by the proposal has outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water communities of plants and animals (World Heritage Criterion No. 9)

3) The area affected by the proposal contains examples of the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation (World Heritage Criterion No. 10)

4) The area affected by the proposed monorail undoubtedly contributes to on-going ecological and biological processes as well as having high biological diversity that is characteristic of Fiordland National Park and the World Heritage Area, particularly**:**

- important representative bird, lizard and bat communities;
- many threatened bird, lizard, fish and bat species**;**
- presence of keystone species that contribute to maintaining ecological processes
- significant wetlands containing nationally rare and distinct vegetation associations and habitat types**;**
- braided river communities;

- representative plant communities, particularly excellent examples of red beech forests, tussock grasslands, indigenous shrublands and successional communities**;**
- pristine aquatic environments,
- rich native invertebrate fauna.

5) The proposed 200 m wide habitat clearance corridor is likely to impact on the above values, nationally rare habitats and significant populations of threatened species such as long-tailed bats (nationally critical); the effects would likely be more than "minor" as stated by Mitchell Partnerships, 2010.

6) The proposal affects 6.2 km of red beech forest, 4.6 km of mixed silver beech forest and 12.1 km of mountain beech forest. An estimate of 19,555 trees would need to be removed, which would mean a loss of habitat and foraging areas for a wide range of species particularly bats, kaka, mohua, geckos (and other hole nesting species), and mistletoe species.

7) The impacts of the proposal on any wetland or wetland margins need to be adequately assessed because all wetland habitats affected are significant.

8) The dual corridor (monorail + access track) creates significant edge effects and will cause fragmentation of the habitats and an area of affect larger than that proposed.

9) The presence of rare tall red tussock and short tussock grasslands in this area were a major contributing factor to the inclusion of Snowdon Forest into the World Heritage Area and these habitats should be preserved to maintain the integrity of the area. Rehabilitation of such habitats remains unproven.

10) The main mitigation proposal of allowing flexibility in selection of the route (where the actual route is chosen after the concession is granted) represents significant risk to the integrity of the World Heritage Area as the extent of the adverse effects are not known or quantified at the outset. This means that the effects on biodiversity values cannot be fully and accurately assessed and may be greater than implied by the application.

11) The main proposal for mitigation on bats, to avoid cutting down old large-diameter trees, may seem reasonable but a total of 5479 large trees are likely to be removed and the importance of each of these trees for bats will have to be carefully assessed. If trees are not being used by bats at the time of inspection then

it is difficult even for specialist bat ecologists to assess whether they are used at different times of the year and are preferred roosting or breeding trees.

12) An intensive radio-tracking study of long-tailed bats in the Snowdon Forest must be completed so that the monorail and mountain bike track can avoid core tree roosting areas. Tree removal on the large scale proposed in this application is likely to be catastrophic if it coincides with a roosting area.

13) RHL has offered a small compensation of 200 ha of pest control to be added to the 4800 ha control area in the Eglinton Valley Operation Ark biodiversity protection site in Fiordland National Park. More meaningful compensation would be the protection of additional habitat near to the monorail site and effective pest control along the proposed route at a scale that is likely to contribute to significant improvement in the survival of forest birds.

14) Although pest control could potentially compensate for injuring or killing some wildlife during felling operations, pest control at the scale proposed is too small to have a significant impact on pest numbers. DOC's research on predator control over the last 15 years has indicated that predator control sites need to be very large – in the order of thousands of hectares to have a chance of making a sustained difference to birds and bats.

15) Pest control is not adequate compensation for ongoing loss or modification of foraging habitat or shelter or for the loss or modification of rare and significant ecosystem types.

Purpose

I have been asked to provide advice to enable an assessment of the Fiordland Link Monorail concession application and the effects on biodiversity values described within the Statement of Outstanding Universal Values for Te Wahipounamu South West New Zealand World Heritage Area (UNESCO).

A World Heritage Site is given a Statement of Outstanding Universal Value by the World Heritage Committee and this forms the key reference to future protection and management of this site. The Statement of Outstanding Universal Value includes a summary of why the site has outstanding universal value and identifies the criteria (of which there are ten) under which the property or site was inscribed. This statement also includes the assessments of the conditions of integrity or authenticity, and the requirements for protection and management.

Te Wahipounamu South West New Zealand World Heritage Area was gazetted in 1990 using a Statement of Outstanding Universal Value according to the following relevant criteria:

vii) it contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;

viii) it has outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features;

ix) has outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;

x) contains the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

The Fiordland Link Monorail application from Riverstone Holdings Ltd (RHL) seeks to construct a 29.5 km long monorail plus a service road that would run from the Mararoa

River through the Snowdon Forest Stewardship Area within the Te Wahipounamu World Heritage Area.

- RHL has applied for a 200 m wide corridor 'envelope' in which the monorail, construction track and spur tracks would be linked.
- The construction track would be constructed parallel to the monorail which would provide for monorail maintenance and mountain biking.
- Two termini buildings are proposed, one on the marginal strip near the Mararoa River, the other on land held by Fiordland National Park at Te Anau Downs.
- The monorail is stated to require a 6 m wide strip and the mountain bike/ construction track requires a 3 m strip.
- RHL wish this project to be run as a staged approach where a series of management plans will guide the construction, operations and the actual route so that potential and actual effects are dealt with as they occur and plans can be modified.

Focus of advice

This advice is provided in relation to:

- the biodiversity values relative to World Heritage assessment criteria (ix) and (x) (these criteria being the most relevant to biodiversity);
- the impacts on biodiversity likely to occur during the construction and operation of the monorail and the construction and mountain bike track.

In addition, points relating to potential impacts and the mitigating actions required on specific biodiversity values are addressed below in sections 2 & 3. My area of expertise is birds and bats but I have also provided limited information about lizards, invertebrates, endangered plants, wetland and freshwater areas after consultation with my colleagues; Colin O'Donnell (DOC Principal Science Advisor), Brian Rance (DOC Plant Ecologist), Jo Monks (DOC Herpetologist), Warren Chin (DOC Invertebrate Ecologist), Terry Greene (DOC Kaka Ecologist), Mary Beech (DOC Freshwater Ecologist), Hugh Robertson (DOC Freshwater Scientist) and Philippe Gerbeaux (DOC Freshwater Ecologist).

Definition of biodiversity

The 1992 United Nations Earth Summit defined biological diversity "as the variability among living organisms from all sources, including, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems".

Terminology

I use the following terms and abbreviations

"World Heritage Area" (WHA)

Section 1

1.1 I will assess biodiversity values for the monorail and associated tracks against criteria (ix) and (x) as described in the Statement of Outstanding Universal Value.

1.2 The area affected by the proposed monorail undoubtedly contributes to on-going ecological and biological processes (criterion ix) within the wider WHA.

1.3 The affected area contains a rich diversity of ecological communities and significant native habitat types (Map 1); these being:

- Tall red beech forest
- Moderately tall dense mixed beech forest
- Regenerating forest successional communities with high species diversity and an abundance of fruiting species
- Manuka and kanuka dominant shrublands
- Forest edge ecotone habitats
- Red tussock grassland
- Short tussock grassland (included in the category low producing grassland on Map 1)

- Lower elevation fertile braided river flats
- Mature matagouri shrubland
- Bog pine shrublands
- Wetland areas

1.4 Four wetland areas on the proposed route have been recognised in the Department of Conservation (DOC) ecosystem prioritisation programme as Ecosystem Management Units (EMUs). This programme recognizes that maintaining a whole range of ecosystems in good condition is important to support the conservation of a full range of species nationally (Noss 1996). The wetlands are likely to be in very good condition with intact ecosystems given their relative remoteness (M. Beech, DOC pers. comm.). Over 90% of New Zealand wetlands have disappeared (Aussiel et al. 2008) and therefore any wetland and the associated bird species must be considered significant.

1.5 Wetlands within the affected area are part of a larger Te Anau Basin wetland complex. This system is regarded as an internationally important wetland under the criteria of the Ramsar Convention (Ramsar Convention 2009), an intergovernmental treaty to protect and manage wetland ecosystems. As a signatory to the Ramsar Convention, New Zealand has an obligation to maintain and enhance the ecological character (integrity) of sites that are regarded internationally significant. The proposed route of the monorail will directly impact on the ecological character of sites such as Dunton Swamp through barriers to hydrological flow, the compaction of peatland soils, disturbance of sphagnum vegetation, which are likely to permanently alter the wetland's ecological character as defined by the Ramsar Convention (Ramsar Convention 2008).

1.6 Freshwater environments in the affected area (including the wetland units cited in Point 1.4 above) are an important sequence of alluvial fans, wetlands, surface water bodies and river floodplain and these waters are representative of the wider WHA (DOC Officers Report 2011). The wetland habitats that are likely to be affected are palustrine and floodplain, marsh and swamp wetlands along the margins of the rivers. The various wetlands will provide suitable habitat for a range of wetland birds, fish, invertebrates and flora.

1.7 The affected area contains a diverse range of plant successional sequences from braided river beds, tall tussock grasslands, short tussock grasslands, shrublands, manuka (*Leptospermum scoparium*) and kanuka,(*Kunzea ericoides*), broadleaved indigenous hardwoods including kahikatea (*Dacrycarpus dacrydioides*), totara (*Podocarpus hallii*) and indigenous beech forest including red (*Nothofagus fusca*) silver (*Nothofagus menziesii*) and mountain (*Nothofagus solandri* var. *cliffortioides*) beech (Mitchell Partnerships 2009).

1.8 Diverse plant communities provide a significant resource for territorial birds, and bats using the local area as well as those species foraging over larger landscape scales. In the same way, birds such as kaka (*Nestor meridionalis*) and mohua (*Mohoua ochrocephala*) act as pollinators and seed dispersers to the plant communities (Kelly et al. 2006, Leech 2007).

1.9 A number of "keystone" bird species are present in the affected area (Table 1). Keystone species are those which influence the ecosystem in ways that are disproportionately large compared to their abundance. They are important contributors to maintaining fully functioning ecosystem processes as pollinators, seed dispersers and ecosystem engineers. For example, kaka, tui (*Prosthemadera novaeseelandiae*) and bellbirds (*Anthornis melanura*) are major pollinators and NZ pigeon (*Hemiphaga novaeseelandiae*), tui and bellbirds are major seed dispersers (Kelly et al. 2006). Mohua is a specialist disperser of mistletoe seeds. If pollinators and seed dispersers are reduced in numbers then forest health may decline, seed banks may be reduced, and regeneration of some plants species limited. Kaka act as ecosystem engineers because their activities modify the physical structure of their environment. They are the only species that excavate sapwood of live trees and heart wood of dead or decaying snags usually in search of insect larvae. These activities accelerate important decay processes and nutrient cycling. To sustain fauna populations there needs to be sufficient amounts of foraging, roosting and breeding sites for species to maintain viable populations in perpetuity. Sufficient habitat needs to be available so that fauna can disperse, and still thrive, if unfavourable conditions develop. Any activity that reduces habitat therefore has the potential to have a detrimental effect on ecosystem and biological processes.

1.10 There are likely to be at least six species of lizards present in the area. Lizards are known to be important pollinators and seed dispersers in New Zealand forests (Whitaker 1987) and new research is confirming that these roles are very significant in terms of ecosystem processes (Wotton 2000, 2002; Olesen & Valido 2003; Justin Smith, University of Auckland pers. comm.).

1.11 Together, the values listed in 1.3 to 1.10 contribute to the outstanding examples of ecological and biological processes, ecosystems and communities, which make up the World Heritage Area.

1.12 The affected areas also contribute to criterion (x) by supporting almost complete bird communities characteristic of Fiordland (Table 2);

- The affected area has a significant proportion of indigenous bird species representative of beech (*Nothofagus spp*) forest communities in the WHA (Table 2).

- Although a comprehensive river and wetland bird survey has not been done by RHL, the affected area contains a number of braided river bird species including banded dotterel (*Charadrius bicinctus*), black-billed gulls (*Larus bulleri*), black fronted terns (*Chilidonias albostriatus*) (Mitchell Partnerships 2009) and it is very likely to contain wetland bird species such as fernbird (*Bowdleria punctata*), marsh crake (*Porzana pusilla*) and Australasian bittern (*Botaurus poiciloptilus*) (Table 2). All these species are classed as threatened.

- The site has high biological diversity of nationally threatened bird, bat, lizard, plant and fish species (up to 32 threatened species; Table 2) (Criterion x). Nationally threatened species are those classed as “Threatened” or “At Risk” as defined by the current version of the New Zealand threat classification system (Townsend et al. 2008; Miskelly et al. 2008) and in accordance with the NZ Environment Court’s finalised criteria for assessing wetland significance (in West Coast Regional Council proposed Land and Riverbed Management Plan).

1.12 Three species that are present or likely to be present in the proposed area are classified as nationally critical, the highest threat ranking. Four species are classified as nationally endangered. Five species are classified as nationally

vulnerable, 15 species are declining, 4 are naturally uncommon and one is a relict (Table2).

1.13 RHL have not undertaken comprehensive surveys for lizards along the proposed route. However, the affected area is likely to support the 'Otago large gecko'(*Woodworthia* aff. *Maculates*) (Jo Monks, DOC, pers. comm.). These lizards have been recorded close to the affected area (DOC Herpetofauna Database). They are notoriously difficult to survey. In the Eglinton Valley they were first found up red beech trees in long-tailed bat cavities. Numerous spotlighting surveys over a three month period detected no further sightings (Colin O'Donnell, DOC, pers.comm.). The jewelled gecko (*Naultinus gemmeus*) may also be present as there has been one unsubstantiated record from Te Anau Downs. This species is diurnal and arboreal and could be present at forest edges or in manuka or coprosma shrubland.

1.14 The cryptic skink (*O. inconspicuum*), the common skink (*O. nigriplantare polychrome*), green skink (*Oligosoma chloronoton*) and McCanns (*Oligosoma maccanni*) may also be present.

1.15 Mohua have disappeared from 95% of their former range (Ministry for Environment, 2007, O'Donnell et al. 2002). Mohua are hole nesters so any loss of potential nest trees will have an influence on this species. Loss of additional habitat may result in even further declines.

1.16 Kaka are present in the affected area. Any populations of nationally vulnerable species must be considered significant.

1.17 RHL have not undertaken any surveys of terrestrial invertebrates. The area will contain rich and varied invertebrate communities that contribute to overall biodiversity values of the WHA (W.Chinn, DOC, pers.comm.).

1.18 Surveys of the potentially affected waterways found relatively pristine waters providing a variety of habitats for aquatic organisms. The invertebrate communities present in the streams and rivers surveyed were diverse and scored a high index (MCI > 100) showing good to excellent habitat for aquatic invertebrates (DOC Officers Report, 2011, NIWA 2009).

1.19 Five species of native fish and two species of introduced fish were encountered during river surveys of the affected area. Native species included lamprey (*Geotria australis*), longfin eel (*Anguilla dieffenbachia*), flathead galaxias (*Galaxias depressiceps*), Gollum galaxias (*Galaxias gollumoides*) and upland bully (*Gobiomorphus breviceps*) (NIWA 2009)

Table 1: Keystone bird species present along the monorail/mountain bike route

		Primary foraging behaviours									
Species	Carnivore (Top predator)	Aerial insectivore	Foliage insectivore	Bark insectivore	Ground insectivore	Pollinator	Seed disperser/ Frugivore	Ecosystem engineer	Foliage/ seed browser	Sap feeder	Scavenger
Mohua			Yes	Yes		Yes		Yes			
NZ falcon	Yes										
Harrier	Yes										Yes
Kaka			Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Y-c parakeet			Yes	Yes					Yes		
Morepork	Yes	Yes			Yes						
NZ kingfisher	Yes	Yes									
NZ pigeon							Yes		Yes		
Long-tailed cuckoo	Yes	Yes									
Shining cuckoo			Yes								
SI robin			Yes	Yes	Yes						
Yellow-breasted tit		Yes	Yes	Yes	Yes						
Brown creeper			Yes	Yes							
Grey warbler			Yes								
SI fantail		Yes	Yes	Yes	Yes						
SI rifleman			Yes	Yes							
Bellbird			Yes	Yes		Yes	Yes				
Tui		Yes	Yes	Yes		Yes	Yes				
Silvereye			Yes	Yes		Yes	Yes				

Table 2: Significant species found in the vicinity of the proposed monorail and mountain bike route

Species	Threat status*	Monorail/mountain bike route	Likely location detected
Bats			
Long-tailed bat *Chalinolobus tuberculatus*	Nationally critical	Present	Forest edges and shrublands
Short-tailed bat *Mystacina tuberculata*	Nationally endangered	May be present	Forest interior
Birds			
Mohua *Mohoua ochrocephala*	Nationally vulnerable	Present	Red beech forest
South Island Kaka *Nestor meridionalis*	Nationally vulnerable	Present	Red beech forest
Yellow-crowned parakeet *Cyanoramphus auriceps*	Not threatened	Present	Beech forest
South Island robin *Petroica australis*	Not threatened	Present	Beech forest
NZ falcon *Falco novaeseelandiae*	Nationally vulnerable	Present	Forest and open areas
NZ pigeon *Hemiphaga novaeseelandiae*	Not threatened	Present	Beech forest
Morepork *Ninox novaeseelandiae*	Not threatened	Present	Beech forest
South Island rifleman *Acanthisitta chloris*	Declining	Present	Beech forest
Tui *Prosthemadera novaeseelandiae*	Not threatened	Present	Beech forest
Brown creeper *Mohoua noveseelandiae*	Not threatened	Present	Beech forest

Yellow-breasted tit *Petroica macrocephala*	Not threatened	Present	Beech forest
Bellbird *Anthornis melanura*	Not threatened	Present	Beech forest
Shining cuckoo *Chrysococcyx lucidus lucidus*	Not threatened	Present	Beech forest
Long-tailed cuckoo *Eudynamys taitensis*	Naturally uncommon	Present	Beech forest
NZ kingfisher *Todiramphus sancta*	Not threatened	Present	Beech forest
Grey warbler *Gerygone igata*	Not threatened	Present	Beech forest
South Island fantail *Rhipidura fuliginosa*	Not threatened	Present	Beech forest
Silvereye *Zosterops lateralis*	Not threatened	Present	Beech forest
New Zealand pipit *Anthus novaeseelandiae*	Declining	Present	Grassland
Black shag *Phalacrocorax carbo*	Naturally uncommon	Present	Mararoa and Whitestone rivers
Little shag *Phalacrocorax melanoleucos*	Naturally uncommon	Present	Whitestone or Upukerora Rivers
Black billed gull *Larus bulleri*	Nationally critical	Present	Whitestone or Upukerora Rivers
Black fronted tern *Chilidonias albostriatus*	Nationally endangered	Present	Whitestone or Upukerora Rivers
Banded dotterel *Charadrius bicinctus*	Nationally vulnerable	Present	Whitestone or Upukerora Rivers
Grey duck *Anas superciliosa*	Nationally critical	Present	Mararoa River

South Island pied oystercatcher *Haematopus finschi*	Declining	Present	Upukerora and Mararoa Rivers
Marsh Crake *Porzana pusilla*	Relict	Likely to be present	Wetland areas
Fernbird *Bowdleria punctatus*	Declining	Likely to be present	Wetland areas
Bittern *Botaurus poiciloptilus*	Nationally endangered	Likely to be present	Wetland areas
Lizards			
Jewelled gecko *Naultinus gemmeus*	Declining	Likely to be present	Forest, scrub, tussock grassland
Otago/Southland large gecko *Woodworthia* aff. *maculatus*	Declining	Likely to be present	Native forest, shrubland, outcrops and screes
Green skink *Oligosoma chloronoton*	Declining	Likely to be present	Tussock grassland, scruband boulder fields
Common skink *Oligosoma nigriplantare polychroma*	Not threatened	Likely to be present	Grasslands
McCann's skink *Oligosoma maccanni*	Not threatened	Likely to be present	Grasslands
Cryptic skink *Oligosoma inconspicuum*	Declining	Likely to be present	Shrublands and herbfields
Plants			
Hook sedge *Uncinia strictissima*	Nationally endangered	Likely to be present	Wetland areas
Kirkianella novaezelandiae	Nationally vulnerable	Present	Te Anau Downs
Yellow mistletoe *Alepis flavida*	Declining	Present	Widespread
Tufted hair grass *Deschampsia cespitosa*	Declining	Likely to be present	
Scarlet mistletoe *Peraxilla colensoi*	Declining	Likely to be present	

Slender purei *Carex tenuiculmis*	Declining	Likely to be present	
Ranunculus ternatifolius	Naturally uncommon	Likely to be present	
Fish			
Lamprey (*Geotria australis*)	Declining	Present	
Longfin eel (*Anguilla dieffenbachia*)	Declining	Present	
Flathead galaxias (*Galaxias depressiceps*)	Not threatened	Present	
Gollum galaxias (*Galaxias gollumoides*)	Declining	Present	
Upland bully (*Gobiomorphus breviceps*)	Not threatened	Present	

Data sources: Mitchell Partnerships 2009,2010, *Threat status after de Lange *et al* 2009 for plants, Hitchmough et al. 2007 for lizards and Bird threat classification 2012 for birds. DOCDM 1010108, NZ Threat classification for fish 2010, DOCDM-441457

Section 2

What are the likely impacts of the proposed applications on those values described in the Statement of Outstanding Universal Value?

2.1 I disagree with the statement that **"**the effects on the biodiversity and overall viability of the habitats through which the monorail will pass are expected to be minor at any one location due to the narrow, linear nature of the two tracks" (Mitchell Partnerships 2010).

2.2 The likely impacts on the habitat of indigenous fauna caused by the monorail/ mountain bike application include the following:

- Habitat loss (from felling c. 20,000 trees) including potential roosting/nesting trees and wetland areas along the proposed route. Fauna will be killed, injured and/or displaced;

- Direct deaths of protected wildlife through either; killing birds, lizards, or bats by crushing nests or adults or young when felling trees or undertaking construction work;
- Habitat modification of river, wetland and forest habitats along the proposed route including feeding, roosting and nesting habitats e.g.

  (i) forested areas due to felling forest or shrubland habitats.

  (ii) wetland areas due to clearance or alteration of drainage patterns.

  (iii) all areas due to increasing edge effects

2.3 I have also been asked to address the following specific points; the effects of the proposal on the persistence of populations of threatened species along the proposed route – particularly, mohua, kaka and bat populations including:

2.4 The implications of proposed vegetation clearance including potential edge effect (21.96 ha) forest and 4.35 ha grassland cleared plus 45.8 ha forest edge effect – a total of 67.76 ha affected forest habitat).

2.4 The dual corridor for the monorail and the mountain bike/access track will significantly increase the disturbance and the edge effects compared to a single corridor. Spur access tracks between the two corridors will add to the extent of vegetation clearance and create further edge effects as will the 7 m height clearance required for the monorail track. The estimate of the cleared area is a significant amount of vegetation clearance and will reduce the amount of available habitat for fauna, disrupt the intact nature of individual habitats, cause fragmentation particularly for smaller species and affect the connectivity between habitats therefore compromising the ability of the ecosystem to function effectively (Criterion ix).

2.5 Edge effects have been shown to infiltrate 50 m into the forest (Young & Mitchell 1994). Opening up the canopy will increase air flow, increase exposure; affecting summer drying and winter frost penetration. This may reduce invertebrate abundance and food for birds and bats. Edge effects will be variable depending on wind direction and light diffusion. Other edge effects will be weed invasion and changes in species composition. The proposed route will effectively create two linear tunnels

which is likely to channel the wind increase wind throw and reduce humidity (DOC Officers Report 2011). The direct (damage of habitat) and indirect (invasion by plant and animal species) will impact on the ecological function of a far greater area than estimated in the proposal.

2.6 Hole nesting species such as mohua, yellow-crowned parakeets (*Cyanoramphus auriceps*), robins (*Petroica australis*), rifleman (*Acanthisitta chloris*), kaka and bats will be directly affected by the loss of trees (particularly large trees). Loss of nesting and roosting trees is likely to reduce long-term survival as habitat is reduced (Elliott et al. 1996).

2.7 Clearance of habitat will create a disturbance regime which is likely to increase the spread of weeds along the construction corridor and will encourage exotic invertebrates to colonise thereby changing the balance of native to exotic species and potentially altering ecosystem processes (Criteria ix).

2.8 If mistletoe is located on trees or has the potential to live there the removal of these trees will result in loss of habitat for these species. Mohua are known to be specialist pollinators of mistletoe (O'Donnell & Dilks 1989, 1994, Kelly et al. 2006) therefore the impact is greater than just single species.

2.9 Although long-tailed bats use the edges of forests and natural gaps in the forest as foraging areas they also require intact forest and mature trees for roosting and breeding.

2.10 Clearance of vegetation has the potential to affect wetlands by increasing weed incursions. Wetland weeds have a tendency to spread widely once established and are one of the greatest threats to wetland ecosystems.

2.11 Construction of the track will alter the hydrology of wetlands and increase the sedimentation both in the short and long term. Altering wetland hydrology processes and increasing sedimentation has the potential to affect the ability of fish and invertebrates to move within and in/out of adjoining landscapes. The modification to

wetland hydrology is likely to alter wetland function overall, leading to a shift in plant composition and soil status.

2.12 These are good examples of the intricacies of the biological and ecological processes found within Fiordland National Park and the wider WHA and that may be impacted along the monorail/mountain bike routes.

2.13 **The effects of the passing bays where the monorail clearance will widen to 12 metre wide clearances over three 100 m sections (this is not addressed in the application documentation) on those populations**.

2.14 The amount of vegetation to be cleared has been under-estimated by the applicant as the passing bays, drainage channels and extra clearance at track junctions have not been included. (DOC Officers Report 2011). The effects identified in 2.3 -2.12 will be amplified by this omission resulting in a greater loss of habitat in these areas.

2.15 The effects of removing bat roost trees on the persistence of the bat populations along the proposed route.

2.16 The presence of long-tailed bats (nationally critical) along the monorail route was confirmed by a survey in November 2009 (Mitchell Partnerships 2010). The Officers Report 2011 states that bats are currently sparse along the 22 ha forest clearance area whereas Mitchell Partnerships 2010 say that bats were relatively common along the route. Bat detectors placed along the proposed route recorded the presence of bats at 58% of the sites compared to other locations where the detection rate was much lower (9-28%; Maruia, West Coast, Inangauhua areas). Site specific bat surveys are highly variable and give no indication of actual numbers as they are highly dependent on the proximity to bat roosts. However, based on the detection rates cited, I would not classify long-tailed bats in the area affected as sparse and they are likely to be common and significant based on Mitchell Partnerships 2010. An intensive radio-tracking study is essential to give a better indication of numbers and to identify the core roosting areas.

2.17 The DOC Officers Report states that the effect on bats will be relatively minor given the large area of suitable habitat in the vicinity. I disagree with this statement for the following reasons:

- If the roosting areas lie along the proposed route, the effects may be catastrophic because a large proportion of breeding roosts could be destroyed. Long-tailed bats roost in cavities and have strict preferences in terms of cavity structure and microclimate (Sedgeley & O'Donnell 1999a, 1999b; Sedgeley 2001; O'Donnell & Sedgeley 2006). They are more likely to be crushed or killed when trees are felled than flying birds because they sleep in tree cavities during the day. They often enter a state of 'torpor' (similar to hibernation), and can take a minimum of 15 minutes to wake even when disturbed (let alone successfully escape a tree being felled). For this reason their presence in a tree cavity is very difficult to detect.

- Long-tailed bats have highly complex social structures and use relatively small roosting areas (for example, average 9.5─27 hectares in breeding females; (O'Donnell 2001). Long-tailed bats use traditional areas in the forest and always return to them even though it may seem that there is other apparently suitable forest nearby. Within these roosting areas they use a lot of different trees that they cycle around in a set pattern. Usually a colony is spread over a number of trees on any one day, and usually they move to a new tree each day. They rarely roost outside these areas (O'Donnell 2000, 2001; O'Donnell & Sedgeley 1999, 2006). The loss of any roost trees within a social group would mean that bats may be forced to choose sub-optimal roosts within the roosting area and breeding success and survival is likely to be reduced (Sedgeley & O'Donnell 2004; Pryde et al. 2006).

- Long-tailed bats live in maternity colonies during the breeding season and receive significant benefits (probably thermal) from clustering (Sedgeley 2001). If the population of a social group declines to a low level it may not remain viable. This happened in the Eglinton Valley where a social group declined and then ceased to be a functioning group. A few of the bats turned up in another neighbouring group but the majority of the group was not seen again (DOC unpublished data).

- Foraging long-tailed bats ranged over an area of 11 700 ha in *Nothofagus* forest in the Eglinton Valley. The core roosting areas are much smaller but the bats require a much larger area to fulfil their foraging needs (O'Donnell 2001).

2.18 **The effects of removing kaka and mohua nesting trees on the persistence of the kaka and mohua populations along the proposed route**.

2.19 The Officers Report states that the effect of the vegetation clearance on birds will be minor as they are likely to move and find alternative habitat. I disagree with this statement. Kaka and mohua rely on indigenous forest throughout the year and require sufficient amounts of foraging, roosting and breeding sites to maintain viable populations. They nest in holes and so will be directly affected by the loss of any current or potential nesting trees. Both species, particularly kaka, often re-use the same nesting cavities from year to year. Hole nesting species such as kaka and mohua have specific requirements for nesting trees in terms of cavity size and microclimates (e.g. Elliott et al. 1996). It cannot be assumed that kaka and mohua will simply find another nest tree elsewhere and survive when displaced. Increased competition with neighbouring birds and/or unfamiliarity with the location of food supplies, shelter and breeding sites (particularly for mohua) are likely to reduce survival because of the increased energetic costs of searching for new resources.

2.20 Nationally vulnerable species such as kaka and mohua are rare and uncommon by definition. They tend to be those least able to cope with changes in their habitat brought about by predation and competition with introduced mammals, and modification or loss of habitat. They have specialised food and nesting requirements that need to be met:

- They have become rare because they no longer have enough suitable feeding and breeding trees or adequate shelter to sustain their numbers;
- Individuals are preyed upon by introduced pests at a rate higher than the animals can replace themselves naturally, and introduced species out-compete them for resources they require to thrive. Hole nesting species are particularly vulnerable as females are killed on the nest by predators resulting in male skewed sex ratios (Dilks et al. 2003).

- All populations of kaka and mohua are significant. Every individual's breeding potential is crucial in maintaining populations and buffering them against the threat of extinction.
- DOC estimates that kaka have disappeared from 78% of their former range. Kaka may range over more than 10,000 hectares to fulfil their foraging needs throughout and between seasons (Leech 2006; Leech et al. 2008; Peter Dilks, DOC, personal communication). Kaka travel between different seasonal food sources through their annual cycle.
- Birds move seasonally to different food sources while others move to lower altitudes simply to avoid harsh winter climates. Specific food sources are usually only available in certain seasons. For example, kaka move from high and mid-altitude food sources (e.g. beech invertebrates) to low-altitude food sources such as fuchsia flowers in early spring and mistletoe flowers in mid summer. Usually there is only one or two major food sources available at one time, so if one source is removed then there will be a negative impact on the bird concerned. Therefore, key factors necessary to maintain diverse wildlife communities are the diversity of forest and vegetation patterns and the presence of environmental gradients (such as altitudinal and climate gradients) (O'Donnell 1991).

3.0 The ability to mitigate any effects on the persistence of the populations of these species at these locations

3.1 RHL proposes two key steps to manage and mitigate potential effects of vegetation removal

- Route selection criteria – where the actual route is chosen after the concession is granted and aims to avoid significant habitats.

- Ecology Management Plan- The applicant will finalise the Management Plan once the concession is granted. Construction of the tracks will be an iterative process, which seeks to mitigate adverse ecological effects as they occur.

Both these steps present a significant risk to both the applicant and the Department as the extent of the adverse effects are not known at the outset.

3.2 **Bats -** The main proposal for mitigation on bats is to try and avoid cutting down old large-diameter trees. The guidelines (docdm-91658) state that trees over 60 cm DBH should be assessed for bats. The proposal is for forest clearance to be conducted out of the breeding season when bats are no longer gathered in their maternity roosts. Although at first glance this appears to be a good strategy, it is going to be very difficult to identify bat roosts if the trees are being assessed out of the breeding season. A total of 5479 large trees are likely to be removed and each of these trees will have to be carefully assessed according to the DOC guidelines DOCDM-91658. These guidelines were only set up for situations when a very small number of individual trees might need to be removed for hazard mitigation (on the Milford Road), rather than large scale tree removal. In autumn, and probably winter, long-tailed bats mainly use solitary roosts and are in a deep sleep (in torpor). They are tiny animals (8-10 grams) and would be almost impossible to see once asleep in a cavity. Limited radio-tracking work has shown that there can be multiple solitary roosts in the same tree at this time, often at the extremities of limbs – and in cavities less obvious than maternity roosts (C. O'Donnell, DOC, pers. comm.). In addition, even if trees are unoccupied, it is quite possible that important maternity trees are felled – and these would also be very difficult to detect in winter. As stated previously tree removal on the large scale proposed in this application is likely to be catastrophic if it coincides with a roosting area. <u>An intensive radio-tracking study is essential to identify core roosting areas and provide guidance as to which areas are significant and to be avoided.</u> If trees are not currently being used by bats then it is difficult even for specialist bat ecologists to assess whether they have the potential to be a preferred roosting or breeding bat tree.

3.3 **Birds-**The main mitigation measure is to avoid large trees where possible, monitor introduced pests and implement targeted pest control if necessary. However, pest control is not adequate compensation for ongoing loss or modification of foraging habitat or shelter. There has been no proposal for additional land protection at the site.

3.4 **Pests-** RHL has offered compensation of an additional 200 ha to the Operation Ark site (Eglinton Valley) in Fiordland National Park. Although pest control could potentially compensate for injuring or killing some wildlife during felling operations, pest control at an alternative site does not mitigate the effects at the site and the size

of the area proposed is too small to have a significant impact on pest numbers. More meaningful compensation would be the protection of additional habitat near to the site and effective predator control along the proposed route at a scale that is likely to contribute to significant improvement in the survival of forest birds. DOC's research on predator control over the last 15 years has indicated that predator control sites need to be very large – in the order of thousands of hectares to have a chance of making a sustained difference to birds and bats. The large size of predator control areas reflects our increasing understanding of what wildlife species require, the size of buffers needed to minimize re-invasion of pests, and advances in our ability to control some of these pests (the use of aerial 1080 control).

3.5 **Effects of the proposed vegetation removal on the values in the Statement of Outstanding Universal Value associated with altitudinal and chronological sequences of plant succession, and on the integrity of the area (only to extent this addresses biodiversity values and not landscape values)**

3.6 The Department is obliged to manage a World Heritage Area in such a way that its integrity is preserved. The Snowdon Forest Area was chosen for inclusion into the Te Wahipounamu South West New Zealand World Heritage Area because it represents an intact altitudinal and chronological sequence of plant succession, particularly the low-altitude tall and short tussock grasslands. Loss or modification of this habitat is likely to affect the integrity of this area and degrade the values of the WHA.

3.7 **The viability of replanting grassland (tussock) vegetation in this environment**

3.8 The Draft Management Plan states that the grasslands will be rehabilitated completely. Restoration of grassland is unproven (B. Rance, pers. comm.). The surface can be re-contoured and the tussocks re-planted but this is not the restoration of all the components of an ecological community. There is major doubt that restoration to high ecological integrity is achievable even with very significant resource input, especially in the presence of existing exotic plant populations and continual reinvasion.

3.9 **Any other matters relevant to the biodiversity values described in the Statement of Outstanding Universal Value.**

I have outlined the values of this site for biodiversity as a World Heritage Area and the likely impacts of the proposal on the biodiversity. I have demonstrated that the focus on biodiversity values at risk are much broader than just bats, kaka, mohua and the tussock grasslands. The proposed route is likely to impact on a wide range of significant habitats such as wetlands. It will increase edge effects, increase sedimentation and affect hydrology and this in turn will affect wetland and braided river bird, fish, plant and invertebrates. This is likely to compromise the biological and ecological processes that occur in this area and will be difficult to mitigate. I would like to re-emphasise that these impacts are hard to quantify with the current design of the proposal and this puts the Department of Conservation and the applicant under significant risk.

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