

Riverstone Holdings Limited

Fiordland Link Experience

Vegetation and Habitat Management Plan

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1. INTRODUCTION

Riverstone Holdings Limited proposes the “Fiordland Link Experience” to improve access to Te Anau, Milford Sound and Fiordland generally by reducing travel times from Queenstown. The Fiordland Link Experience is intended to be a high quality tourism experience which will provide an opportunity for local and international visitors to experience landscapes and ecosystems that they would not normally encounter, whilst at the same time reducing the tourist load and improving visitor experience at Milford Sound/Piopiotahi by spreading arrivals more evenly throughout the day.

The route crosses 29.5 km of land administered by the Department of Conservation which would be traversed by monorail. The proposed monorail route crosses a broad area of mountain, silver and red beech forest with short excursions into grassland along the river flats of the Mararoa, Whitestone and Upukerora valleys. The route lies within Snowdon Forest Conservation Area and is within the South West New Zealand World Heritage Area. The route includes examples of nationally, regionally and locally significant ecosystem types which require protection. Snowdon Forest generally is regarded as having regional importance.

Any adverse effects on the remaining indigenous vegetation in this area would be a cause for concern because of the high ecological values the area has. Specifically the following habitats are regarded as particularly important:

- Red beech forest. This forest has intrinsic value, but also provides habitat for threatened species including birds and bats. This habitat is located in patches along the route.
- Moderately tall, dense beech forest. This provides habitat for threatened species such as rifleman. This is the most common forest type along the route.
- Regenerating forest with a high diversity of species, including fruiting species. This habitat is adversely affected by deer and is rare along the route and in the wider area. This habitat type is valuable for fruit eating fauna.
- Forest edges. The route is located close to the forest edge along most of its length. This habitat is also adversely affected by deer, but is important for buffering the forest from external events.
- Red tussock. Grassland near Kiwi Burn and Dunton Swamp.
- Short tussock grassland dominated by hard tussock, blue tussock, and chewing fescue in the Mararoa River valley.
- Lower elevation fertile river flats near the Mararoa, Whitestone, and Upukerora River valleys.

- Mature matagouri shrublands in the Upukerora River valley.
- Bog pine shrublands, particularly in the Whitestone River valley.
- Threatened plant species such as *Alepis flavida*.

Once the final route has been selected the exact habitats affected will be known. This management will be developed further at that point. The differing terrains and ecological settings along the route will also result in different construction methods being applied, so management particular to some sections of the route may need to be developed further by the project manager and engineers in consultation with the Project Liaison Officer.

[At this stage the Vegetation and Habitat Management Plan is in draft form. As the developed design and construction methodologies are finalised the plan will need updating to account for improved knowledge. Updated versions will be produced after comment and input from stakeholders and once a supplier joins the project and a contractor is selected to construct the works. The document should be thought of as a “live document” that will be updated throughout the construction process and to which the applicant and its contractors and others will be required to conform.]

1.1 APPROACH TO CONSTRUCTION

In order to construct the monorail a separate construction track is proposed, to be located at some distance from the monorail track. This approach was deliberately chosen to reduce the width of the vegetation clearance required in any one location and retain canopy cover where practicable. Furthermore a number of ecologically significant sites, such as Dunton Swamp, have been deliberately avoided by the proposed route.

The construction tracks and spur tracks do not have any particular constraints on their location and the location can be selected to avoid removal of large trees. In selecting a route where the monorail needs to climb or descend a slope, the alignment is constrained with respect to grade and angle of curvature, which means that avoidance of large trees, while theoretically possible, is practically likely to be difficult to achieve.

Most spur tracks will be completely rehabilitated (including planting if appropriate) after the construction is complete, while a small number will be partially rehabilitated (excluding planting) and remain for emergency access. The construction track will remain as a route for cyclists and be maintained to provide for emergency access.

1.2 POTENTIAL ADVERSE EFFECTS

Construction of the monorail will require vegetation clearance including that growing within the route and that overhanging the route to a minimum height of approximately 7 m. The exact height of vegetation clearance will depend on how high above the ground the monorail is at any particular location.

Clearance of vegetation is necessary to provide a 6m wide monorail track footprint and a 3m wide construction track, with short spur tracks approximately every 200 – 300m linking the two.

It is anticipated that this will result in clearance of 21.96 ha of forest habitat along the route. This is conservatively estimated to include approximately 10,859 trees and 14,439 saplings and represent a volume of 10,637 m³ of wood (Mitchell Partnerships January 2010). In terms of area, 21.96 ha represents 0.049% of the forested portion of the Snowdon Forest Conservation Area (estimated at 44,880 ha). A similar proportion of trees found within the reserve would be affected, but because of the patchy distribution of species in the forest according to their site preferences, some trees could be over-represented in the vegetation to be removed if their preferred sites were more common along the route.

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2. OBJECTIVES

The purpose and overall goal of this plan is to guide the way in which construction and operation of the concession activities will occur in order to avoid, remedy or mitigate to the extent that is practicable any adverse effects on indigenous flora and fauna, and in particular any significant habitats identified.

The objectives of this plan are to:

- Guide the final route selection and all construction and maintenance activities in order to reduce any significant adverse effects on terrestrial ecology.

To minimise the effects of the proposal on the terrestrial ecology, the objectives include:

- Having regard to **appropriate ecological criteria** in order to select the final route alignment to avoid as far as is practicable significant ecological areas including large beech trees and bat roost trees.
- **Minimise the project footprint and collateral damage** to standing vegetation near those required to be cleared.
- **Minimise the introduction and spread of weeds and pests** on both disturbed and undisturbed areas.
- **Minimise damage to roots** of trees near the route.
- **Maximise reuse of leaf litter and other materials** that will be useful in the establishment of appropriate vegetation on spur tracks and other rehabilitated areas.
- **Manage woody debris** and trees felled during clearance so as to avoid any adverse effects on the remaining vegetation.
- Identification of **rehabilitation goals** and monitoring to ensure appropriate rehabilitation is achieved.
- **Monitoring** methods to ensure that environmental outcomes are being achieved.

While the adverse ecological effects have been predicted, it is appropriate that monitoring of vegetation and fauna along the route during construction and operation of the monorail be carried out to confirm expected effects are being mitigated and identify any unexpected effects. Monitoring is outlined in Section 5.

Associated with the monitoring is a need to have a range of contingency measures identified which can be implemented promptly to address any

observed effects greater than those predicted. Contingency planning is considered in Section 6.

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3. ECOLOGICAL CRITERIA

In the ecological survey which accompanied the Concession Application to the Department of Conservation to allow construction and operation of the monorail ecological criteria were proposed to take account of the habitats and species identified along the monorail route and protect ecological values (Mitchell Partnerships Ltd, October 2009, Section 8). These criteria have been modified as a result of discussions with Department of Conservation staff and advisor, and the amended criteria have been adopted by this plan.

When selecting the final route alignment the following criteria will be had regard to:

- i. The following significant habitats shall be avoided where practicable:
 - Short tussock grasslands.
 - Wetlands.
 - Bog and pine shrubland.
 - Matagouri shrubland, or other divaricating shrubland.
 - Red tussock grasslands.
 - Threatened plant species such as *Alepis Flavida*.
 - Mature red beech forest (with heights exceeding 25m and diameters exceeding 55cm).
 - Mature mountain beech or silver beech forest (with heights exceeding 20m and diameters exceeding 45cm).
 - Regenerating shrublands and forest edges.
 - Fertile, well drained flood plains (Environment L1.1c) covered with indigenous vegetation.
- ii. The amount of earthworks shall be minimised to reduce weed invasion. This will include locating the construction track to suit topography and minimise changes to local hydrology.
- iii. The alignment shall identify and avoid threatened plant species such as *Alepis flavida*.
- iv. The alignment shall be chosen so as to retain as much tree canopy over the monorail as practicable.
- v. If trees with a diameter exceeding 40 cm must be removed then priority shall be given to protecting either bat roost trees, the largest trees, or the largest number of large trees.
- vi. The construction track shall avoid swampy ground where practicable and cross streams at the most ecologically advantageous location.
- vii. The construction track shall stay out of the forest where it is ecologically advantageous to do so, for example if the grassland vegetation is predominantly exotic.
- viii. "Nodes" of spur tracks, passing bays and minor site depots will be located in places with low ecological values that are easily rehabilitated once construction is complete.

The developed design phase and alignment selection will:

- Implement these criteria where practicable.
- Identify where the criteria cannot be met.

- Propose mitigation to provide for instances where the criteria cannot be met.

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4. METHODS

4.1 MANAGEMENT OF VEGETATION CLEARANCE

The methods to manage vegetation clearance and habitat disturbance will include:

Pre-Construction Phase

- Define the monorail alignment and the exact location of construction track, spur tracks, passing bays and any minor depots. This will be an iterative process which seeks to minimise adverse ecological effects, including avoidance of large trees and bat roosts (detected by survey if necessary) where possible. This will involve the Project Liaison Officer (as outlined in the proposed Concession Conditions).
- Identify the number and location of large trees that will be removed and agree on any management actions necessary to protect ecological values or mitigate their loss with the Department of Conservation. This process will include representatives of Riverstone Holdings and the Department of Conservation/Project Liaison Officer walking the route and deciding each instance on a case by case basis.
- Quantify the actual amount and volume of vegetation clearance that will be required (including number of trees and volume of vegetation within specific sections of the route).
- Carry out a pre-construction survey of plant species and forest health along the route (This is described further in Section 5 Monitoring).
- Undertake pre-construction weed control using hand removal, herbicide or other suitable methods to remove any weeds found in the pre-construction survey.
- All construction staff and contractors will participate in an “environmental induction” which includes specific training for staff and operators so that they are aware of the values along the route, the World Heritage Status of the site and the need to adhere to and implement the requirements of the Vegetation and Habitat Management Plan.

Construction Phase

- Physically mark the 3m wide horizontal alignment of the construction track and spur tracks on the ground implementing the ecological criteria outlined above and providing at least 10m horizontal clearance from any large trees where possible so as to protect their roots. Physical marking of the footprint will ensure areas outside those required to be cleared can be protected. The vertical height of the construction track (to allow traffic movement) will also be marked.
- Fell and clear vegetation according to the process identified in Section 3.
- Direct transfer of tussocks where this is appropriate and practicable to do so. Appropriate methods will be used if direct transfer techniques are proposed.
- During construction of the concession activities host plants of the threatened mistletoe *Alepis flavida* will be avoided where possible. If it is not possible to avoid host trees then mitigation such as possum control will be considered.

- Remove leaf litter and any soil required and stockpile.
- Construct the construction track providing at least 50mm of granular metal base, with a deeper base used in areas with a soft or wet substrate.
- Physically mark the actual 6m wide horizontal alignment and the vertical alignment (dependent on pier height) of the monorail on the ground allowing for any temporary cut and batters or sediment control that may be required.
- Fell vegetation and remove according to the process identified in Section 4.
- Remove any leaf litter and soil required and stockpile. Create any sediment control/water tables required and excavate foundations for piers.
- Put piers in place, construction of the monorail can then occur independently.
- Reinstate ground profile and rehabilitate (with litter, mosses) as required ensuring the area around each pier is rehabilitated as required and complete before moving to the next pier. Plant and machinery will proceed in one direction only along each short section of the monorail route between spur tracks so as to allow sequential rehabilitation behind the construction.
- Regular annual surveys of plant health along the route and at the control site as outlined in Section 5.
- Monitor plant health and weed control, including any transfer areas as described in Section 5.
- Manage (by removal, trimming, or a decision not to manage) any vegetation adversely affected by the construction track.
- Reinstatement of natural vegetation will be immediately in areas where construction activities have been completed.
- Any areas of bare soil or disturbed tussock grasslands or wetlands will be replanted with native species after completion of any construction activities to prevent weed invasion.
- Where bare soil is exposed for longer period (longer than four weeks) weed control will also be implemented.

On-going Management

- Weed monitoring and removal will be carried out on a regular basis. Monitoring the effectiveness of weed control will form part of this monitoring.
- Monitoring of any revegetation or rehabilitation, including transfers will be conducted to ensure it is successful.

4.2 FOREST VEGETATION CLEARANCE

4.2.1 Tree Felling

Tree felling will take place progressively over a period of up to three years as the construction proceeds. By clearing a small area at a time the potential for weed invasion at any one site is reduced.

4.2.2 Volume

As indicated in Section 1.2 above, the construction of the monorail is conservatively estimated to require the removal of approximately 10, 859 trees

and 14, 439 saplings and represent a volume of around 10, 637 m³ of wood (Mitchell Partnerships January 2010). This includes 5, 248 small trees (diameter at breast height ('dbh') 10-29.5 cm), 3, 903 moderate sized trees (dbh 29.5 – 50 cm), 1, 647 large trees (dbh 50 – 100 cm) and 61 very large trees (dbh > 100 cm). It should be noted that this estimate has made no attempt to avoid large trees and thus the estimates for large trees represent a conservative maximum. This estimate will be refined once the final alignment is confirmed.

4.2.3 Method

Chainsaws will be used to fell the trees as precisely as possible. Of the 22.9km of the route through forest, approximately 6.1km is located on flat land and a further 2.6km is located on swampy land. At these locations (8.7km in total) it should be easy to fell trees along the route and prevent collateral damage to standing trees outside the alignment. The remaining 14.2km of the route are located on side slopes, although only approximately 3km of the route crosses areas where these slopes are steep. For the 11.2km located on gently sloping side slopes it should be relatively easy to fell trees along the alignment. For the 3km located on steep slopes it will be more difficult and may require other methods to ensure standing trees nearby are protected such as felling trees piece by piece or using excavators to help control tree fall.

4.2.4 Disposing of Vegetation

Cut vegetation could be disposed of in one or more of the following ways:

- Subject to the approval of the Department of Conservation, under certain circumstances vegetation could be removed from the public conservation estate, for example some trees may be large enough to be of use for cultural or other purposes (wood turning etc).
- Removed from the monorail route, but left within the public conservation estate, for example trees could be moved to suitable locations where they will not obstruct construction.
- Left where they fall along the monorail route with those that impede construction moved to a location nearby.
- Left where they fall and then cut into smaller pieces to make them easier to move. They could then be moved aside, relocated within the public conservation estate or removed altogether.
- Mulched. The mulch could then be left in the vicinity of the monorail, relocated within the public conservation estate or removed altogether.

The following considerations are relevant in the disposal of cut vegetation:

- Depositing the cut material in nearby forest (on conservation land) could potentially lead to additional habitat damage to transport cut material to its final location.
- If large quantities of wood were deposited in one place there is a potential for insect and fungal infestation that could spread to living trees under stress, for example a *Sporothrix* outbreak. *Sporothrix* in particular favours wet, dead wood.

- Decomposing forest material has ecological benefits by recycling nutrients and providing habitat for decomposers and saprophytes.
- Under normal circumstances native wood from the public conservation estate is only rarely available for cultural or other purposes, and then only when specifically permitted.

It may be that it is appropriate for wood to be removed under certain circumstances. The following suggestions are proposed as a basis for discussion:

- Any trees with a dbh of 400mm or more could be offered for iwi use in the first instance. If they are not required by iwi then a small number could be made available for other purposes (wood turning, furniture making etc).
- Other trees with a dbh of 400 mm or more could be stockpiled and used to rehabilitate spur tracks or for other rehabilitation.
- Trees with a dbh 200 – 400mm could either be stockpiled and used as part of rehabilitation or cut into shorter lengths and relocated within the public conservation estate away from the monorail route. The lengths will be such that they can be positioned away from the route without causing further damage to vegetation.
- Trees and saplings with a dbh < 200mm will be mulched and the mulch used as part of rehabilitation or scattered across rehabilitated sites.

4.3 TUSOCK GRASSLANDS AND WETLANDS CLEARANCE

Direct transfer methods will be used where it is feasible and practicable to do so to minimise the adverse effects of disturbance on significant tussock and wetland habitats within the construction footprint. Where this is not possible replanting of tussock and wetlands with native species will be carried out post construction. These areas will require frequent weed survey and removal and follow up until such time as the area is rehabilitated, when the ongoing rehabilitation of plant health will be required.

If direct transfer methods are used it will likely involve the use of skilled contractors to operate two diggers (one extracting and one replacing the plants), and two trucks to transfer the plantings.

4.4 MAINTAINING A CLEAR ROUTE

Once construction is complete the route will be walked every six to twelve months with Department of Conservation staff to identify any trees that need to be removed or pruned. A similar approach has been adopted by DownerEDI Works in the maintenance of the Milford Road.

4.5 PEST CONTROL

Regular monitoring of the vegetation health along the route during the construction and operation of the concession activities will determine if the activities are contributing (or likely to be) to increased mammalian predator numbers in the area. Predator control will be implemented if necessary.

5. MONITORING

5.1 NATIVE VEGETATION

5.1.1 Monitoring of Existing Habitats During Construction

This involves:

- Monthly inspection of worked areas and any track cleared to date during construction to identify and remove common weeds;
- The frequency of this monitoring will reduce to twice annually (in spring and autumn) after construction is completed and may be reduced to annually if the detection of new weed species is low;
- The location of all existing weeds along the route and construction areas will be mapped so that the most likely location for new weed populations can be identified. This information may allow weed sources to be identified and the removal of these sources will reduce the future weed control required;
- Weeds or small vegetation affecting the construction of the monorail route or other activities, can be manually removed or treated with herbicide during the six monthly surveys. A simple clearance rule for native vegetation near the track will be developed once the exact parameters of the clearance required by the monorail route are known.

5.1.2 Minimising Collateral Damage

In order to minimise collateral damage along the construction track regard will be had to the ecological criteria outlined in Section 3 in the final route selection. In addition the footprint will be kept as small as practicable at any given time, experienced woodsmen will be employed and large trees will be felled in small pieces if necessary to avoid collateral damage.

In addition, when the clearance is taking place the applicant's Project Manager will visually inspect each construction area on a weekly basis to ensure the following performance standards are being met by the contractors and subcontractors carrying out the clearance. Contracts will include penalty clauses where appropriate if these standards are not met. Areas which are being felled prior to construction will be inspected regularly and the performance standards below (or others negotiated with the Department of Conservation) will apply.

5.1.3 Performance Standards

- To protect trees near the monorail alignment and construction track route no more than 10% of trees will be allowed to fall outside the clearance footprint.
- Contractors or sub-contractors carrying out the vegetation clearance will be required to record daily any instances when a tree falls outside the footprint and report them to their supervisor who will in turn report them to the Project Manager. The Project Manager will inform the Department of Conservation's Independent Project Advisor when the above standard is breached.

More than 10% of trees falling outside the clearance footprint on a given day will trigger the contingency process outlined in Section 6.

5.1.4 Vegetation Health

Vegetation health could be affected by canopy removal or damage to roots caused by vehicle or other movements. Roots will be protected where practicable by avoiding cutting of any roots of mature red beech forest (with heights exceeding 25m and diameters exceeding 55cm) and mature mountain beech or silver beech forest (with heights exceeding 20m and diameters exceeding 45cm) left standing and where necessary filling over roots to create a benched surface rather than excavating.

Vegetation along the route and in construction areas will be monitored using a Before – After: Control – Impact ('BACI') design. This involves monitoring vegetation health along the route and in one similar control site nearby before construction begins and at regular intervals thereafter. Tussock and wetlands along the route and construction areas will also be monitored to document the species present, identify significant habitats and in particular to document prior to construction commencing the degree of weed presence in the tussock and wetlands areas to determine appropriate rehabilitation goals.

For this purpose the route will be divided into short sections appropriate to the speed of construction. Data to be gathered within each section will include species composition, cover abundance in all tiers of vegetation, plant condition considering leaf colour, leaf wilt, and physical dieback of plants (or parts of plants) and weed presence. The second monitoring will be carried out three months after construction of a particular section is completed and then annually thereafter for a period of two years after construction is complete. This may include photo points and will be completed by a suitably qualified ecologist during construction.

If translocation of species is required for tussock and wetland areas, then monitoring will be necessary to ensure that the transfer is successful. Replanting may be required in areas where translocation is not feasible.

The precise identification of minor effects within the monitoring sites will be very difficult because stands of bush naturally change, and are naturally variable across the landscape. For this reason, monitoring will be carried out at a level of detail that will detect the more obvious changes, with the monitoring effort being increased as and when indicator triggers are observed. In forested areas triggers of significant plant health issues will include:

- Obvious dieback in the canopy along the route or within 10m either side of the corridor.
- A reduction in average canopy cover of more than 10% along the alignment or within 10m either side of the alignment for more than 100m in one location or for more than 3000m along the whole route after vegetation clearance and construction is complete.

- More than 10% mortality of understory species along the alignment or within 10m either side of the alignment for more than 100m in one location or for more than 3km along the whole route.
- Discolouration and/or wilting of leaves in more than 10% of the plants along the alignment or within 10m either side of the alignment for more than 100m in one location or for more than 3km along the whole route.

In the event of one of the triggers being activated the contingency response will be activated. This response is described in Section 6.

5.2 WEEDS

Vegetation clearance will be progressive and undertaken in stages to minimise the size of the disturbed area at any one time. Sites will be rehabilitated as soon as practicable to establish a cover resistant to weed invasion. Weed monitoring will involve:

- Monthly inspection of the working area, including any imported materials such as gravel, and any track cleared to date during construction will be completed by a contractor sufficiently able to identify the weeds present. The frequency of this inspection will reduce to twice annually (in spring and autumn) once construction of a particular section is complete.
- The target is 0% presence of weeds in forested sections. The targets for tussock and wetland areas will be established once the species composition and presence of existing weeds has been identified in accordance with the baseline survey.

Triggers of significant weed issues will include:

- Presence of any woody weed species within the forested sections of the route.
- Importation of weed propagules on materials (i.e. failure of site biosecurity).

5.3 MONITORING OF REHABILITATED SITES

The vegetation beside the route will be rehabilitated as construction progresses with the goal of restoring a vegetative cover that is low growing but appropriate to the area and which matches as far as is practicable the surrounding vegetation. Vegetation on spur tracks between the construction rack and the monorail route will be rehabilitated to match the surrounding vegetation. Monitoring will determine whether this goal is being achieved.

Specifically monitoring of rehabilitated sites will include:

- Survey of the rehabilitated areas approximately one month after rehabilitation has been completed. The purpose of this survey will be to identify which plants have survived planting or transfer, and what further rehabilitation methods might be required if the rehabilitation is not achieving its desired purpose;

- Survey of the rehabilitated areas approximately three months after the initial one month survey. This will provide an additional check on how rehabilitation (or the revised methods) is proceeding;
- Thereafter six monthly surveys (in Spring and Autumn). This is expected to coincide with the monitoring of other sites along the route. This will allow prompt management action such as weed control or planting to improve the chances of success. Once native vegetation is dominant (at least 70% cover in tussock/wetland areas and at least 95% cover in forested areas then the rehabilitation will be deemed a success.

5.4 MONITORING OF PESTS

Pest species (rats, possums, mustelids) will be monitored four times per year (once in each season) before, during and after construction (for at least a period of two years) at two locations, along the route, and at a nearby control site. The method of monitoring will be developed in consultation with the Department of Conservation. If pest numbers increase in construction or operational areas, or adverse effects on native vegetation (or rehabilitated areas) is identified, then discussion will be held with the Department of Conservation as to the most appropriate pest control methods.

6. CONTINGENCY PLAN – RESIDUAL ADVERSE EFFECTS

A plan will be prepared to provide compensation for residual adverse effects of the concession activities. In the event that significant natural habitats are adversely affected, any compensation for these effects will be determined on a case by case basis. The scope and scale of the compensation shall be designed in consultation with the Grantor and reflect the scope and scale of residual adverse effects of the concession activities.

In particular, the following actions will be implemented if collateral damage, significant plant health issues or weed issues arise.

6.1 CONTINGENCY FOR COLLATERAL DAMAGE

This contingency will be triggered if more than 10% of felled trees fall outside the clearance footprint.

6.1.1 Actions

- The staff responsible will meet with the Project Manager and Department of Conservation staff (or the Project Liaison Officer) at the location where the trigger was activated.
- The staff responsible will explain why the trigger was activated and how, in their view, a repeat can be avoided if possible.
- The Project Manager and Department of Conservation staff or the Project Liaison Officer will review the situation and determine how best to proceed.

6.2 CONTINGENCY FOR SIGNIFICANT PLANT HEALTH ISSUES

This contingency will be triggered if any one of the following occurs at the three monthly or subsequent monitoring inspections:

- Obvious dieback in the canopy along the route or within 10m either side of the alignment.
- A reduction in average canopy cover of more than 10% along the alignment or within 10m either side of the alignment for more than 100m in one section or for more than 3km along the whole route after vegetation clearance and construction is complete.
- More than 10% mortality of understory species along the alignment or within 10m either side of the alignment for more than 100m in one section or for more than 3km along the whole route.'
- Discolouration and/or wilting of leaves in more than 10% of the plants along the alignment or within 10m either side of the alignment for more than 100m in one location or for more than 3km along the whole route.

6.2.1 Actions

The contingency measures would need to rectify the observed vegetation ill-health. In the first instance this will involve identifying the cause of any ill-

health. Identifying the cause of ill-health will be undertaken in consultation with the Department of Conservation and other recognised experts where appropriate.

By way of example remediation options could include:

- Supplying or removing water to affected trees by way of drainage diversion.
- In the case of threatened flora, translocation of the affected plants to a better site, if practicable.
- Increased herbivore control.
- Replacement planting, including species more likely to survive.
- Controlled removal of trees that might fall and cause further damage.

In cases where remediation is not possible, or would not be achieved promptly, such as replacement planting, then alternative mitigations could be targeted.

Any mitigation measures would need to be undertaken in consultation with the Department of Conservation and any affected landowners. Consents or approval from local authorities may also be required.

6.3 CONTINGENCY FOR WEEDS/REHABILITATION SITES

This contingency will be triggered if live weeds are found during the regular inspections of the construction and rehabilitated areas.

6.3.1 Actions

- Weeds along the route can be manually removed or treated with herbicide (spray, gel or granules as appropriate) during the surveys.

7. REFERENCES

Mitchell Partnerships. October 2009. Terrestrial Ecology of the Proposed Fjordland Monorail Route. Prepared for Riverstone Holdings Ltd. Mitchell Partnerships Ltd. Auckland.

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