

## 5. CONSTRUCTION

### 5.1 APPROACH TO CONSTRUCTION

Riverstone has commissioned Opus International Consultants Limited ('Opus') to undertake civil and structural engineering work on the monorail in the revised concession application (in addition to the work already carried out by Stewart Consulting Services), where it crosses land administered by the Department. The Opus report is attached as **Appendix E**. Opus reviewed the engineering feasibility, constructability and environmental impact of the monorail proposal and have advised on the development of design and construction methodology.

Opus has carried out initial engineering assessments of:

- Monorail geometric constraints.
- Geotechnical considerations and slope stability.
- Likely pier heights, beam curvature and working constraints.

In conjunction with HEB Construction, Opus has developed a conceptual design and feasible construction methodology, which is described in their report (see **Appendix E**). A key aspect in defining the alignment is the capability of the monorail train, especially in terms of grade, radius, super elevation and associated speed, warp rate etc.

This construction methodology and its environmental impact has been refined during a series of workshops with the team assembled by Riverstone for this project. A construction management plan will be developed in conjunction with the Department and used to manage the environmental and other effects of the construction along the route (See Section 9 for more details).

The Opus report recognises that further work will be required as the monorail proposal develops. Key aspects requiring further consideration as part of the detailed design phase of the project include:

- Monorail alignment, to be developed in conjunction with a supplier and a ground model.
- Access/mountain bike track standards and location to suit construction and operation.
- Geotechnical investigation, especially in the areas of more difficult topography.
- An environmental site management plan including further development of erosion and sediment control measures.
- Development of monorail operational requirements.

A 30 month construction period is proposed on the basis that the construction of the foundations and piers is independent of the erection of the monorail beams and that the construction would proceed on three concurrent fronts. Beams, piers and foundation pads would be precast off site and components would then be transported to the depots by truck and trailer.

A total of up to 115 people are expected to be employed during the construction of the monorail.

## 5.2 FOUNDATION AND PIER CONSTRUCTION

Three foundation types are proposed – bored piles, precast pads and precast pads supported by drive piles. The foundation and pier construction is shown in Figures 5.1 and 5.2. These foundation types are discussed in more detail in the Opus report (**Appendix E**). Precast foundations are preferred because they minimise the amount of work on site negating concrete mixing on site with the associated need for water and waste disposal. Therefore they will have a lower environmental impact.

Piled foundations will be required within the alluvial gravels of the river channels. Precast pads will be used in all other areas (where suitable). The exception being where wet or soft ground conditions exist and pads with driven piles will be used.

The concrete piers would also be precast and would include a range of heights to suit the monorail alignment. At this stage it is intended that the piers will be grouted into the precast concrete foundations. Piers will generally be required every 20 m along the route although there is some flexibility around this distance.

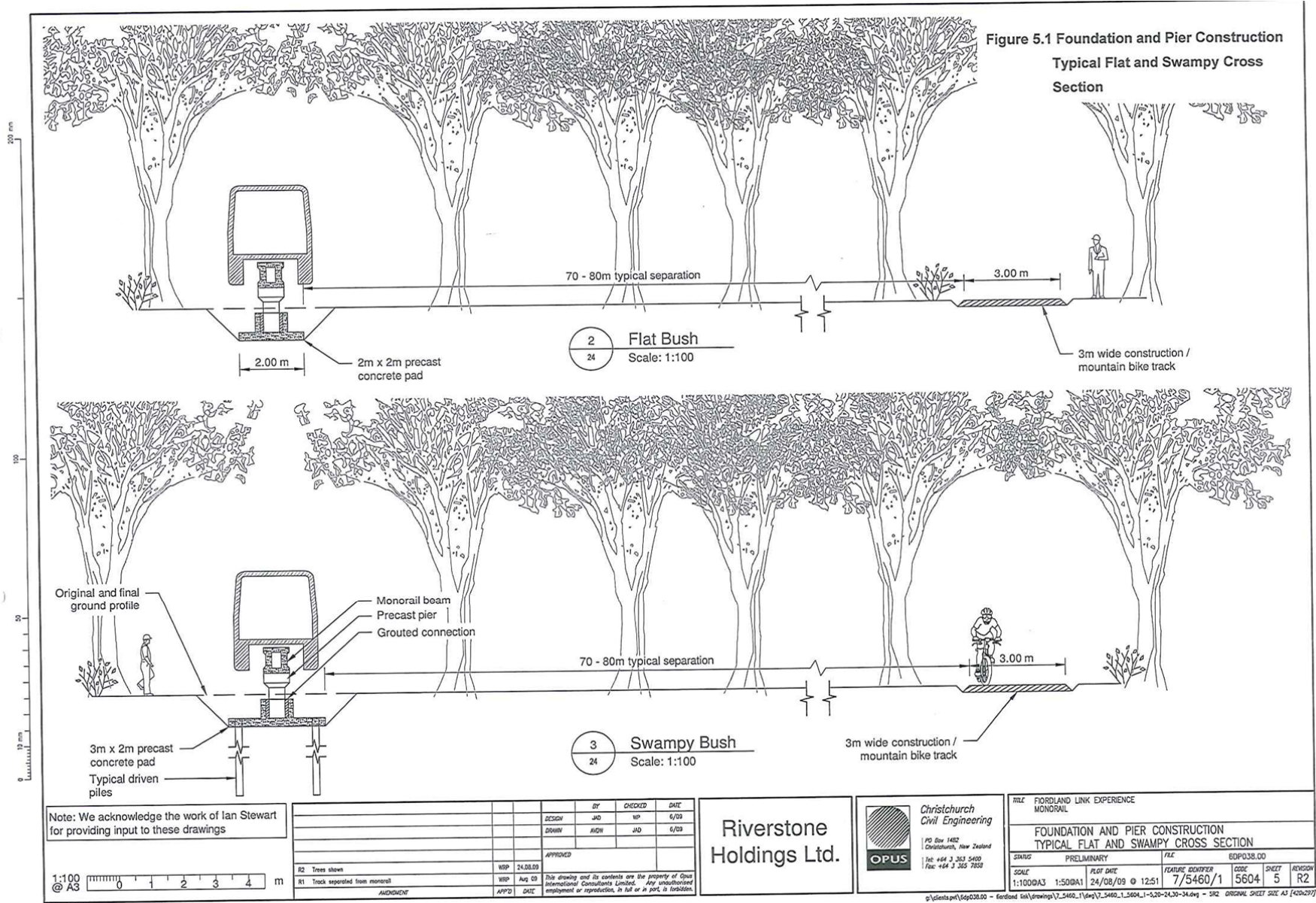
At river crossings it is proposed that all footings will be attached to piles for the complete width of the active flood channel (but not the active flood plain). These concrete piles will be about 1 m in diameter and installed about 10 m deep into the substrate of moraine and alluvial gravels to allow for future scour of the river bed.

Foundation and Pier construction is expected to involve multiple teams of 2-5 people.

Sequentially this would involve:

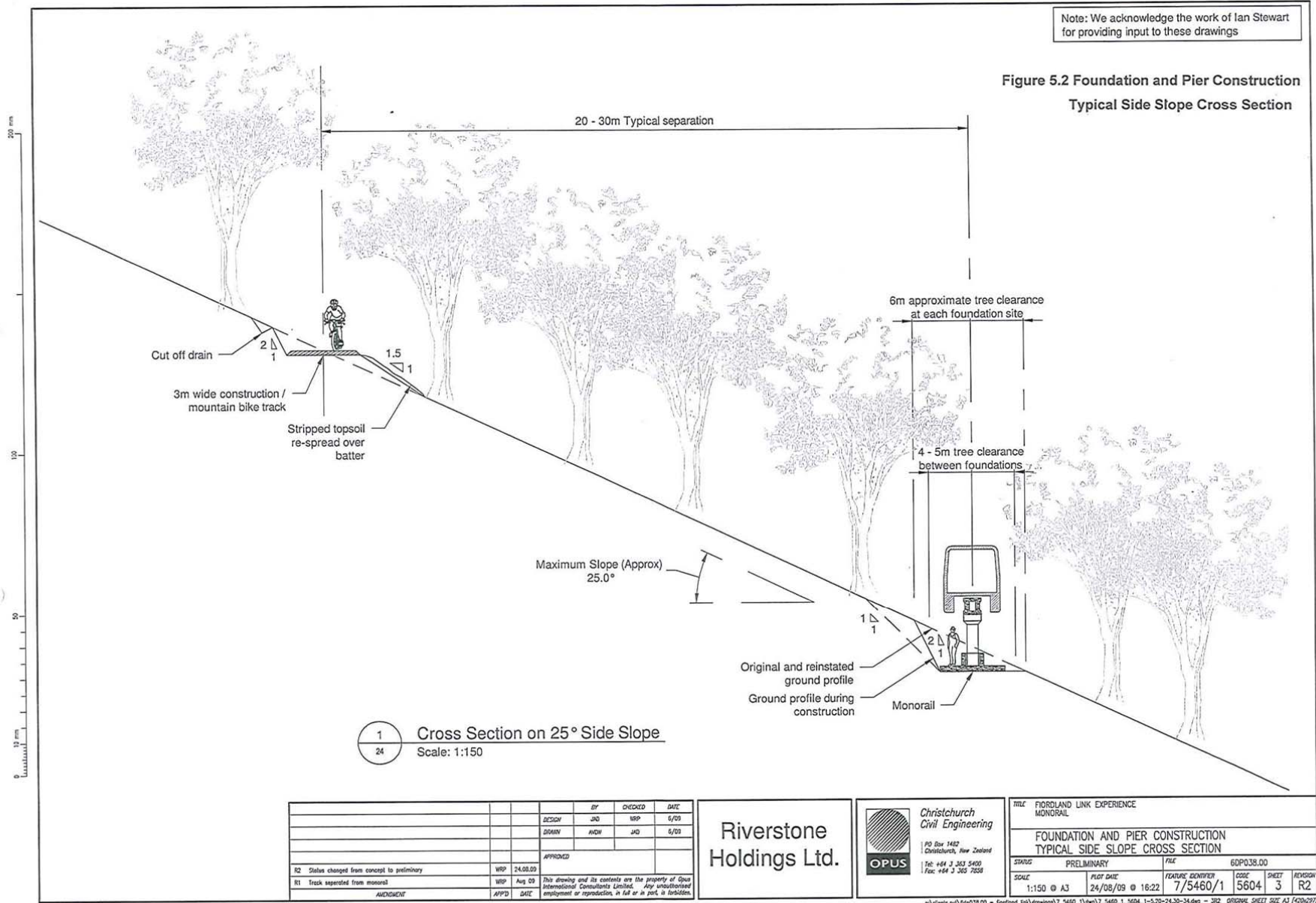
- Survey – the survey teams would peg out the route for clearance and undertake detailed survey for the location of foundations and piers and for design and construction of the beams.
- Tree Clearance/transplantation – these teams would clear vegetation along the marked route and remove the vegetation from the route. This may involve salvage of materials or plants to be used in rehabilitation.
- Construction Track/Erosion and Sediment control – these teams would clear topsoil for later re-use, install drainage and sediment control measures and construct a metalled construction track
- Excavation and placement of pad foundations and pier and backfilling – these teams would excavate each foundation, place the foundations and pier and grout them together. The foundation would then be backfilled with excavated material and rehabilitated. Where required a pile driving attachment to the excavator would be used to drive piles for the pier.
- Piling of river foundations – these teams would access and construct each piled foundation in rivers where necessary.

The type of equipment required for construction is expected to include 12 tonne excavators (including a pile driving attachment), 4WD trucks, 4WD utilities, a fuel bowser, an air compressor, a 10 tonne hiab for bringing in precast foundations, a tracked or possibly 4WD hiab for difficult terrain and 4WD grouting equipped utility vehicles. Where river foundations are required a 35 tonne piling rig, flat bed truck with reinforcing cage and concrete trucks will also be required.



Note: We acknowledge the work of Ian Stewart for providing input to these drawings

Figure 5.2 Foundation and Pier Construction  
Typical Side Slope Cross Section



1 Cross Section on 25° Side Slope  
Scale: 1:150

BY	CHECKED	DATE
DESIGN JND	WRP	5/09
DRAWN ANDW	JND	5/09
APPROVED		
R2	WRP	24.08.09
R1	WRP	Aug 09
AMENDMENT		
APPD	DATE	

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TITLE FORDLAND LINK EXPERIENCE MONORAIL			
FOUNDATION AND PIER CONSTRUCTION TYPICAL SIDE SLOPE CROSS SECTION			
STATUS PRELIMINARY	FILE 6DP038.00		
SCALE 1:150 @ A3	PLAT DATE 24/08/09 @ 16:22	FEATURE IDENTIFIER 7/5460/1	CODE SHEET 5604 3 R2

GRAPHIC SCALES

g:\clients\h\6dp038.00 - Fordland link\Drawings\7\_5460\_1\dwg\7\_5460\_1\_520-2420-24.dwg - 302 ORIGINAL SHEET SIZE A3 (A20x297)

### 5.3 MONORAIL BEAM

The proposed rail beam system is pre-stressed concrete beams spanning 20 m between piers with an allowance for steel beams on longer spans or in areas of tight curvature. Once the piers are constructed the monorail beam will be placed using a launching gantry operating from the completed section of the monorail beam. In open areas the beams will be brought to the work front by flat bed road trucks, while the forest beams would be brought on a jinker operating along the completed monorail between the construction depot and the construction front.

Further teams of people will be required to carry out rehabilitation and restoration along the route.

### 5.4 CONSTRUCTION TRACK

The construction/mountain bike track can be located to avoid trees, minimise the effect on vegetation and take advantage of the topography to minimise earthworks (Opus 2009). The construction track can also be located to cross streams at the most environmentally advantageous sites (such as where the stream is narrowest or the banks highest). Junction points with spur tracks could also be selected to minimise vegetation clearance and will also be used for passing bays and turning points along the construction track. The construction track will be constructed generally in accordance with the Department of Conservation Track Construction and Maintenance Guidelines with pavement and surfacing adjusted to suit the proposed uses.

Spur tracks will be temporary and can be located to avoid trees, difficult topography or natural drainage patterns. The spur tracks will be substantially rehabilitated after construction of the monorail.

The monorail route is more constrained in its location, but access to each foundation in environmentally sensitive, swampy or steep ground will be minimised since the construction track is located separately. The access required along the monorail during construction will be of sufficient standard to access approximately 5 – 8 piers in each direction from a spur track and will only be metalled if required. Rehabilitation will be able to proceed as soon as the 10-15 foundations and piers accessed from each particular spur track are completed.

### 5.5 MANAGEMENT OF THE CONSTRUCTION ENVIRONMENT

An overall Construction Management Plan (CMP) (see Section 9) will be developed for the project (refer **Appendix B** for draft). A key component of this plan will be management of erosion and sediment mobilisation. The draft details of this plan will be developed during the detailed design phase and finalised prior to construction commencing. Possible methods to control erosion and sedimentation include diversion channels or bunds, contour drains, sediment retention ponds, grit traps and silt fences. The particular method adopted will be specific to each situation.

Three construction depots are planned along the route and they will all be located on existing highly modified private land so as to minimise the adverse effects on the conservation estate.

Safety and effects on other users of the area, including trampers, hunters, fishers and farmers will also be managed through the CMP. Over and above physical control methods, management techniques will include signage and education of contractors.

## 6. OPERATION

The project group has considered operational matters at a high level. This section outlines the key operational issues particularly those relevant to facilities in the DoC estate. Following the completion of the concession and consenting process, significant work will be required to develop in-depth operational plans. An outline of the Operational and Environmental Management Plan is attached as **Appendix C** to provide an understanding of the type of information that will be included in these plans.

### 6.1 OPERATIONAL MANAGEMENT

#### 6.1.1 Staff

A Project Manager will be appointed to manage the project, initially through construction to the start up of operations. During the construction phases key staff would be brought on progressively and would document plans and procedures to ensure the successful start up of the operation. During the start up phase operational management would be involved with the testing of equipment as it was brought on site and then training operators once it was installed. Sales and marketing staff would be initially focused on promotional activity and ensuring distribution links are put in place to establish and expand demand.

It is estimated that the following staffing levels would be required for the normal running of the business:

**Table 6.1 Staffing Level by Category**

Description	Staff No.
Managerial, IT and HR	13
Sales/Marketing and Reservations	12
Operations – Management and Engineering	10
Operations – Drivers, Hostesses, and Terminal Staff	65
<b>TOTAL</b>	<b>100</b>

#### 6.1.2 Office Locations

Overall management of the business would be from an office in either Queenstown or Te Anau. An operational hub with the key responsibility for the transport systems and maintenance would be based at Te Anau or Te Anau Downs. A sales office would be required in Queenstown to showcase the Experience and provide an outlet for direct sales.

#### 6.1.3 Educational Opportunities

The passengers on the monorail will spend approximately 30 minutes within the monorail cabins in each direction. They will also spend a variable amount of time at both termini. Both these locations provide an opportunity to provide



educative and informative material to members of the public about the ecological, landscape, cultural and other values of the area through which they are passing. This material could be presented in a variety of media including written (pamphlets, signs, interpretative panels) or verbal (voiceover or recorded film) and provided as either a fixed static display or in a form those interested could take away (such as short DVDs, booklets or brochures).

At Te Anau Downs the Fiordland National Park Management Plan governs how the management and servicing of visitors to the area is to be managed. The proposed Fiordland National Park entrance on the Milford Road is listed as a priority site for interpretation of the area, particularly in relation to Takahe (Policy 2a), and the termini at Kiwi Burn and Te Anau Downs provide other opportunities to reinforce this message and promote protection of the values of Te Wahi Pounamu – South West New Zealand World Heritage area (as prescribed by Policy 4 of the management plan).

#### **6.1.4 Waste Management**

The emphasis for waste management will be to firstly minimize the waste stream and then to sort for recycling. Products sold to be consumed en route will, where possible, be packaged in recyclable materials. A waste management plan will be drawn up prior to commencing construction and this will be reviewed periodically.

Waste will be collected at each of the two monorail termini (where most will be created) and bagged for transport away from the area. During operations waste will be collected from rubbish containers on each monorail and vehicle as well as at the termini. Disposal of septic waste is considered in Section 4.5.4 above.

The waste will be self sorted at the points of collection and stored in closed bins at the Te Anau Downs Terminal. Any commercial waste from the terminals will be sorted and added to the bins. The binned waste will be transported for disposal at the District Council landfill/recycling station at least weekly.

#### **6.1.5 Hazardous Substances**

No hazardous substances have been identified as likely to be produced from the monorail, the power supply or the ATV's. Should any be identified, a management plan will be drawn up for the minimization, storage, handling and use of the hazardous material.

### **6.2 TRIP AND PASSENGER MANAGEMENT**

The Experience is designed as a through trip from Queenstown to Lake Te Anau with many options for onward travel available from there. Passengers will not be permitted to disembark from the monorail.

Interlinking would occur for passengers choosing to travel by coach to Milford Sound/Piopiotaahi and then take up to a two hour boat trip there. Boat trips on Lake Te Anau will also be an option once passengers arrive at Te Anau Downs. The opportunity to carry passengers on these repositioning trips is discussed below in Section 6.2.3 Peak and Off Peak Flows.

### 6.2.1 Passenger Transitions (from Mode to Mode)

There are unique management issues with all tourism products. There are two distinct features of this proposal that would require careful management. One is that it is multi modal, having three interlinking modes which passengers transition through. The aim is to achieve a smooth transition from mode to mode within the allotted time whilst maintaining an environmental experience rather than a commuter feel.

Careful mode design, site layouts and onsite management of terminals will be combined to ensure that the changeover is easy for the passenger and can be achieved in ten minutes. The catamaran could utilize a number of boarding/disembarking points to ensure that loading/offloading is streamlined. It is anticipated that the ATVs will pull right alongside the end of the wharf. A second entrance/exit on the ATVs to facilitate loading is also an option. Once on the ATV the group size effectively decreases to 55. The movement across the terminus at the Kiwi Burn would be streamlined. The boarding of the monorail will be made straight forward by each row of four seats having its own entrance in to the monorail cars. Alternatively a central aisle would be included within the configuration. In addition the tidal nature of flows means there will often only be one full load of passengers transitioning through the Kiwi Burn terminus at any time. .

The loading/changeover time is addressed in the Traffic Impact Assessment, included in **Appendix N**. The professional view expressed in that assessment is that the movement of passengers through the modes, as described within the ten minute timeframe, is achievable.

### 6.2.2 Passing Bays

Another distinct feature of the proposal is its scalability. As demand increases plant can be added to increase capacity. There is potential to run up to four trains on a single rail by installing up to three passing bays at approximately 10km intervals. A scheduling tool combined with an accurate GPS would be used to amend the trains' speed providing for one to pass the other whilst it is in the passing bay. The non-tidal train would be generally less full and would stop to enable passing. Travel timing and schedules for the passengers would not be materially affected by adding more trains into service.

### 6.2.3 Peak and Off Peak Flows

The passenger flows will be quite tidal. The main flow will run from Queenstown to Lake Te Anau in the morning and Lake Te Anau to Queenstown from around 2pm in the afternoon. The likely tidal flows result from the number of people who will use the Experience and then travel on to view Milford Sound/Piopiotahi, Te Anau and other Fiordland destinations.

There will be attractively priced opportunities for travel outside this peak demand period and in opposite directions to this tidal flow. The project owners believe that this will be attractive to local people, budget conscious travellers

and the more flexible FIT's. There will also be low cost commuter options from Te Anau to Queenstown.

#### 6.2.4 Operating Hours and Seasonal Capacity

The hours of operation will be predominantly daylight hours. Tables 6.2 – 6.4: Monthly Capacity, Passenger Volumes and Schedule illustrate the relationship between daylight hours, hours of operation and current seasonal demand. Operations outside the times below may be possible and will facilitate the operation of a Te Anau or Milford Sound/Piopiotaahi dinner cruise, returning the passengers to Queenstown later at night. With the last trips travelling after dusk, directional, low spill lighting will be provided in required areas to ensure passenger comfort and safety without these facilities being visible from a distance.

The schedules in Tables 6.2 - 6.4 are indicative only and would be aligned with demand.

There are three representative scenarios outlined.

**Table 6.2** This table shows the maximum capacity scenario with four trains on the track each making a maximum of six trips per train and a train size of 160 passengers per trip. The number of passengers required for this scenario is well beyond current and projected levels in the next 10 to 15 years. However it demonstrates that the Experience has the ultimate capacity to accommodate over one million passengers per year if significant increases in demand should eventuate. This potential capability reinforces that the project could be an important component in solving some of the issues around visitor access and flows for tourism activities in the Southern Lakes and Fiordland area.

**Table 6.3** This outlines a start-up scenario with one train set for 160 persons. Annual capacity is 281,200 passengers (return trips). This reflects a scenario that would cater for approximately 30% of the visitor market to Milford Sound/Piopiotaahi from Queenstown. An additional 68,800 people are shown here as “PAX – for Te Anau Downs”. These passengers are all assumed to use the experience to access other Fiordland or Southland destinations such as Te Anau, Manapouri and Doubtful Sound.

**Table 6.4** This outlines a higher growth scenario. Annual capacity is increased to meet approximately 47% of those passengers travelling to Milford Sound/Piopiotaahi from Queenstown. This scenario illustrates how the operation may increase carriage numbers on a train set to accommodate the additional demand.

**Table 6.2 Monthly Capacity, Passenger Volumes and Schedule – Maximum Capacity Scenario**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
<b>CAPACITY - MAXIMUM</b>													
Approximate Daylight hours	6am-9pm	6am-9pm	7am-6:30pm	7am-6:30pm	7am-6:30pm	8am-5:30pm	8am-5:30pm	8am-5:30pm	7am-7pm	7am-8pm	7am-8pm	6am - 9pm	
First Departure Ex Queenstown	7:00am	7:00am	7:00am	7:00am	7:00am	8:40am	8:40am	8:40am	7:00am	7:00am	7:00am	7:00am	
Last Return Arrival At Queenstown	10:44pm	10:44pm	9:00pm	9:00pm	9:00pm	7:20pm	7:20pm	7:20pm	9:00pm	9:00pm	10:44pm	10:44pm	
Days of month operable <sup>1</sup>	31	28	31	30	31	29	30	30	29	30	30	31	360
No. of Train Sets	4	4	4	4	4	4	4	4	4	4	4	4	
Passengers per trip	160	160	160	160	160	160	160	160	160	160	160	160	
<b>Return passenger trips/day <sup>2</sup></b>	<b>6</b>	<b>6</b>	<b>5.5</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>5</b>	<b>6</b>	<b>6</b>	
<b>Monthly Capacity Return Passengers</b>	<b>119,040</b>	<b>107,520</b>	<b>109,120</b>	<b>96,000</b>	<b>99,200</b>	<b>55,680</b>	<b>57,600</b>	<b>57,600</b>	<b>92,800</b>	<b>96,000</b>	<b>115,200</b>	<b>119,040</b>	<b>1,124,800</b>

1. Assumes five non operative days through June to October

2. Excludes repositioning trips, 5.5 trips reflects a mix of 5 and 6 trips per day during the month

**Table 6.3 Monthly Capacity, Passenger Volumes and Schedule – Start Up Scenario One (Low Growth)**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
<b>INSTALLED CAPACITY - MINIMUM</b>													
Approximate Daylight hours	6am-9pm	6am-9pm	7am-6:30pm	7am-6:30pm	7am-6:30pm	8am-5:30pm	8am-5:30pm	8am-5:30pm	7am-7pm	7am-8pm	7am-8pm	6am-9pm	
First Departure Ex Queenstown	7:00am	7:00 a.m.	7:00am	7:00am	7:00am	8:40am	8:40am	8:40am	7:00am	7:00am	7:00am	7:00am	
Last Return Arrival At Queenstown	10:44pm	10:44 p.m.	9:00pm	9:00pm	9:00pm	7:20pm	7:20pm	7:20pm	9:00pm	9:00pm	10:44pm	10:44pm	
Days of month operable <sup>-1</sup>	31	28	31	30	31	29	30	30	29	30	30	31	360
No. of Train Sets	1	1	1	1	1	1	1	1	1	1	1	1	
Passengers per trip	160	160	160	160	160	160	160	160	160	160	160	160	
<b>Return passenger trips/day <sup>-2</sup></b>	<b>6</b>	<b>6</b>	<b>5.5</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>5</b>	<b>6</b>	<b>6</b>	
<b>Monthly Capacity Return Passengers</b>	<b>29,760</b>	<b>26,880</b>	<b>27,280</b>	<b>24,000</b>	<b>24,800</b>	<b>13,920</b>	<b>14,400</b>	<b>14,400</b>	<b>23,200</b>	<b>24,000</b>	<b>28,800</b>	<b>29,760</b>	<b>281,200</b>
<b>VOLUME</b>													
% of annual visitors for month <sup>-3</sup>	11.9%	10.8%	11.8%	8.9%	7.1%	2.9%	2.9%	4.1%	7.2%	9.0%	11.9%	11.5%	100%
Milford visitors/month <sup>-4</sup>	66,780	60,607	66,219	49,945	39,844	16,274	16,274	23,008	40,405	50,506	66,780	64,535	561,177
Market Share <sup>-3</sup>	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	
PAX - for Milford	20,034	18,182	19,866	14,983	11,953	4,882	4,882	6,902	12,121	15,152	20,034	19,361	168,353
PAX - for Te Anau, Manapouri, Doubtful Sound	4,207	3,818	4,172	3,147	2,510	1,025	1,025	1,450	2,546	3,182	4,207	4,066	68,800
<b>Total monthly PAX</b>	<b>24,241</b>	<b>22,000</b>	<b>24,037</b>	<b>18,130</b>	<b>14,463</b>	<b>5,908</b>	<b>5,908</b>	<b>8,352</b>	<b>14,667</b>	<b>18,334</b>	<b>24,241</b>	<b>23,426</b>	<b>237,153</b>

**Notes**

1. Assumes five non operative days through June to October
2. Assumes start up scenario of one monorail train with 160 capacity (excludes repositioning trips)
3. Project team estimates
4. Assumes growth of 4.5-5%p.a.

**Table 6.4 Monthly Capacity, Passenger Volumes and Schedule – Start Up Scenario Two (High Growth)**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
<b>INSTALLED CAPACITY - VARIABLE</b>													
Approximate Daylight hours	6am-9pm	6am-9pm	7am-6:30pm	7am-6:30pm	7am-6:30pm	8am-5:30pm	8am-5:30pm	8am-5:30pm	7am-7pm	7am-8pm	7am-8pm	6am-9pm	
First Departure Ex Queenstown	7:00am	7:00am	7:00am	7:00am	7:00am	8:40am	8:40am	8:40am	7:00am	7:00am	7:00am	7:00am	
Last Return Arrival At Queenstown	10:44pm	10:44pm	9:00pm	9:00pm	9:00pm	7:20pm	7:20pm	7:20pm	9:00pm	9:00pm	10:44pm	10:44pm	
Days of month operable <sup>-1</sup>	31	28	31	30	31	29	30	30	29	30	30	31	360
No. of Train Sets	1	1	1	1	1	1	1	1	1	1	1	1	
Passengers per trip	224	224	224	208	160	160	160	160	176	208	224	208	
<b>Return passenger trips/day <sup>-2</sup></b>	<b>6</b>	<b>6</b>	<b>5.75</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>5</b>	<b>6</b>	<b>6</b>	
<b>Monthly Capacity Return Passengers</b>	<b>41,664</b>	<b>37,632</b>	<b>39,928</b>	<b>31,200</b>	<b>24,800</b>	<b>13,920</b>	<b>14,400</b>	<b>14,400</b>	<b>25,520</b>	<b>31,200</b>	<b>40,320</b>	<b>38,688</b>	<b>353,672</b>
<b>VOLUME</b>													
% of annual visitors for month <sup>-3</sup>	11.9%	10.8%	11.8%	8.9%	7.1%	2.9%	2.9%	4.1%	7.2%	9.0%	11.9%	11.5%	100%
Milford visitors/month <sup>-4</sup>	66,780	60,607	66,219	49,945	39,844	16,274	16,274	23,008	40,405	50,506	66,780	64,535	561,177
Market Share <sup>-3</sup>	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%
PAX - for Milford	31,472	28,563	31,208	23,538	18,778	7,670	7,670	10,843	19,042	23,803	31,472	30,415	264,475
PAX - for Te Anau, Manapouri, Doubtful Sound	8,187	7,430	8,118	6,123	4,885	1,995	1,995	2,821	4,954	6,192	8,187	7,912	68,800
<b>Total monthly PAX</b>	<b>39,660</b>	<b>35,994</b>	<b>39,326</b>	<b>29,661</b>	<b>23,663</b>	<b>9,665</b>	<b>9,665</b>	<b>13,664</b>	<b>23,996</b>	<b>29,995</b>	<b>39,660</b>	<b>38,327</b>	<b>333,275</b>

**Notes**

1. Assumes five non operative days through June to October
2. Assumes start up scenario of one monorail train with flexible capacity (excludes repositioning trips)
3. Project team estimates
4. Assumes growth of 4.5-5%p.a.

### 6.2.5 Increases in Operating Capacity

There are a number of factors which could lead to growth beyond this scenario and a desire to increase operating capacity beyond the start-up scenario in Table 6.3. These factors include; strong growth of visitors to Milford, an increase in the proposal's market share versus other surface transport options, higher than projected demand to take the monorail trip to go to Te Anau or other destinations within Fiordland.

### 6.2.6 Weather and Climatic Conditions

As a year round all weather operation, the facilities will be built to ensure the experience can be enjoyed in just about all weather conditions. All walkways in the changeover areas will be covered and protection from the predominant winds provided as necessary.

There is the potential for extreme unusual weather to lead to the trip or part of the trip to be cancelled. This is similar to the current scenario where weather conditions occasionally prevent travel along sections of SH94 especially in the vicinity of the Homer Tunnel. The journey would be engineered to operate in most weather conditions. The concrete rail would be heated for part of the length with special attention to frosty or shady lengths over the saddles. Wind loading and earthquake risks would also be addressed. The train and monorail track specification would include specific requirements for designs to manage these factors. The possibility of snow on the rail may also be managed through the mounting of a snowplough type of scoop on the front of the train. This could also clear minor debris such as small branches.

## 6.3 MAINTENANCE

Whilst there are about 10 monorails which have been built in various parts of the world over the last decade all of these use either short tracks in amusement parks or gardens or they run through busy urban centres (Marshall Day Acoustics 2009). While Opus were able to identify six manufacturers of monorail technology worldwide (W. Parker pers. comm.), there are currently no monorails operational in this type of environment anywhere in the world and it is likely that a monorail will have to be purpose built and designed for this unique situation. Thus some of the operational parameters remain unclear and will be worked through during the detailed design phase of the project if and when a concession is granted. As mentioned earlier, this aspects will be worked through with the Department, Riverstone and the monorail supplier through the Operational and Environment Management Plan (refer outline in **Appendix C**).

Both the monorail corridor and the mountain bike track will require maintenance. It is anticipated that inspection of the track will occur daily because of operational safety considerations and any maintenance required will be monitored. Maintenance on the monorail alignment will be required for:

- Vegetation management.
- Clearing fallen trees.
- Inspection/ maintenance of the electrical system.

It is anticipated that this maintenance would be carried out from rail mounted equipment. However, the mountain bike track could provide emergency access if required.

The mountain bike track will require periodic maintenance for reasons such as:

- Clearing fallen trees.
- Maintaining culverts.
- Periodic metalling or contouring of the track surface.

An annual inspection of the vegetation along the route with Department staff is proposed so that clearance of trees posing an imminent risk to either the monorail or wildlife can be identified and removed. Environmental monitoring during construction and operation is discussed further in Section 9.

The maintenance of the train and the electrical supply system would constitute the other major maintenance items. Maintenance of the trains themselves and the running gear would be carried out at the Te Anau Downs end, where the trains would be parked. A maintenance workshop would be constructed to facilitate work being carried out on the units undercover. It is anticipated that the maintenance facility would be located on farmland, screened by native vegetation near the airstrip with road access alongside.

## 6.4 SAFETY

The monorail will operate to a Safe Operating Plan approved by the New Zealand Transport Agency (NZTA). The full Safe Operating Plan will be completed within the final design and engineering phases at the end of the consenting process and submitted to the NZTA to obtain a services passenger license. A number of safety features will be incorporated in the design and fitting out of the catamaran, trains, ATV's as well as the terminus and transfer areas. A risk register with mitigation strategies and responsibilities would form part of the ongoing management procedures of the operation.

Preliminary discussions between members of the project team and the NZTA occurred in December 2003. As there is no monorail operating in New Zealand, it was agreed between the parties that proven overseas practices were acceptable to the LTSA with respect to the monorail operation.

Health and safety matters, including train checks will be covered in detail in the Operational and Environmental Management Plan (refer outline in **Appendix C**).

### 6.4.1 Track Check

The track will need to be kept clear of debris. There are a number of alternative ways to monitor the track and ensure it is clear before the monorail commences operations. Where necessary a complete track visual inspection by jigger could be carried out to look for any material obstructing the track such as unexpected tree falls. The whole track may be continuously electronically monitored by



sensors able to detect major impacts from tree falls, track misalignment or settlement at any time.

#### **6.4.2 Train Specification**

Below are elements from the draft train specification which illustrate some of the safety considerations that would be addressed through the design and engineering processes.

##### **Lighting**

- Interior Lighting - Full interior lighting required with automatic emergency battery lighting.
- Headlights - Headlights and rear lights required, plus stop lights and emergency flashing lights.

##### **Safety Devices**

- Automatic stopping at terminals.
- Derailment must not be possible.
- Trains will be capable of control by an on-board autopilot triggered from track, including on-loop manoeuvres through switches.

##### **Safety Systems**

- Diesel emergency generator housed at Te Anau Downs maintenance facility. On-board batteries for train lighting.
- Shunt engine available if generator fails to move stalled train.
- Evacuation along track: exterior ground levels close to trains floor level on one side or other as often as possible. Alternative means are required for elevated areas.

#### **6.4.3 Emergency Evacuation and Recovery – Monorail**

Full emergency procedures would be required as part of the Operational and Environmental Management Plan referred to above. However an overview of some key features are outlined below.

It is anticipated that there will be synchronised individual motors for each set of wheels and two sets of drive wheels per carriage. In the event that one or some of these motors fail, the train will still be able to move at a reduced speed and be able to return to an accessible area within a few minutes.

The risk of the train becoming immobilised because of power cuts is mitigated by the power supply coming from both ends of the track and the emergency power generator to be placed at Te Anau Downs. If the power fault is caused by a failure of the power cable along the track, a petrol or diesel on-track towing vehicle based at the Te Anau Downs end would be dispatched and would tow the train back to the terminus. The possibility of the train being trapped between tree falls is unlikely. The communication system for the monorail would be capable of being powered independently.

The mountain bike track will be able to be used for emergency access to the monorail if required. A small number of spur tracks will be left in place for emergency and maintenance access.

In addition emergency lateral access is available by 4WD to parts of the monorail track via the Whitestone River Valley, the Upukerora River Valley and the farm access roads through Te Anau Downs Station.

#### **6.4.4 Emergency Evacuation - Termini**

The transfer area at Mt Nicholas and the Kiwi Burn and Lake Te Anau termini are essentially single storey buildings. Evacuation plans would be developed as part of the NZTA requirements and the building consent process. In the event of an emergency it is likely that alternative transport would return passengers to Te Anau or Queenstown depending on the circumstances.

## 7. STATUTORY PLANNING

### 7.1 CONSERVATION ACT

The Conservation Act 1987 was developed to promote the conservation of New Zealand's natural and historic resources. To achieve this, the Act established the Department of Conservation, bringing together under one department the conservation functions formerly managed by five different government agencies.

Under the Act the Department has a number of functions. These are set out in section 6 of the Act and include:

- The management for conservation purposes of all land and natural and historic resources held under the Conservation Act;
- The preservation of indigenous freshwater fisheries (so far as is practicable);
- The protection of recreational freshwater fisheries and freshwater fish habitats;
- Conservation advocacy;
- Promotion of the benefits of international co-operation on conservation matters;
- Promotion of the benefits of the conservation of natural and historic resources in New Zealand, the Subantarctic islands, the Ross Dependency and Antarctica;
- The provision of educational and promotional conservation information;
- Fostering recreation and allowing tourism on conservation land, providing the use is consistent with the conservation of the resource;
- Provision of advice to the Minister.

The Department works to a range of plans, strategies and agreements which set out goals, actions and directions for management work and strategic directions. The Statement of Intent is a forward-looking document. It sets out the longer term directions for the Department, as well as the management actions that will be undertaken in the coming year. It sets out the Minister of Conservation's and Government's annual expectations of the department. The proposal is assessed against the Statement of Intent below.

Conservation management strategies are 10 year regional strategies that provide an overview of conservation issues and give direction for the management of public conservation land and waters and the species for which the Department has responsibility. They provide a guide as to how the department intends to manage the area and how it will set priorities about what has to be done. An assessment of the proposal against the Mainland Southland – West Otago Conservation Management Strategy is undertaken below.

The Department also issues concessions to enable activities to operate in land owned or administered by the Department. The Conservation Act requires concession applications to cover the matters set out in Part 3B of the Conservation Act. In relation to applications for concessions, the Act requires that granting the concession will not be contrary to the purposes for which the

land is held. It also requires an assessment of environmental effects of the concession activity (including positive effects) and identification of any measures reasonably and practicably available to avoid, remedy, or mitigate any adverse effects associated with the activity (section 17U(1) and S(1) of the Conservation Act).

This application for concession has been undertaken in accordance with the relevant matters set out in Part 3B of the Conservation Act. The Conservation Act also sets out the powers of the Minister of Conservation to grant concessions (section 17Q). This states that the Minister may grant a concession in the form of a lease, licence, permit, or easement in respect of any activity. The Minister is not however permitted to grant an easement in respect of an activity if a lease, licence or permit is more appropriate in that case. Riverstone is applying for an easement, for a term of 49 years which is considered appropriate in this case.

## **7.2 NATIONAL PARKS ACT 1980**

The National Parks Act provides for the continuance of existing national parks, the creation of new parks, and the management of all national parks. The terminus building proposed at Te Anau Downs is situated within the Fiordland National Park and as such this Act is of relevance to this proposal.

The National Parks Act deals with the principles to be applied in national parks. These include: preservation in their natural state; preservation of native plants and animals and removal of introduced ones, as far as possible; preservation of archaeological and historical sites and objects; maintenance of soil, water and forest conservation values; freedom of access to the public, as far as possible. Part V of the Act specifically deals with the control and management of national parks. This part of the Act covers aspects such as the preparation of conservation management strategies and plans and the granting of concessions. The Department of Conservation has prepared the Fiordland National Park Management Plan in accordance with the provisions of the National Parks Act, and an assessment of this plan against the proposal is undertaken below (refer section 7.4.3).

## **7.3 DEPARTMENT OF CONSERVATION STATEMENT OF INTENT 2009-2012**

The Government's driving goal is to grow New Zealand's economy in order to deliver greater prosperity, security and opportunities to all New Zealanders and ultimately a stronger New Zealand society. The Department of Conservation Statement of Intent sets out how the Department will contribute to this goal over the medium term. The statement recognises that conservation is both an economic investment and has social value, particularly with respect to the intrinsic worth of natural and historic heritage. Conservation is seen as playing a critical role in validating the "clean pure" brand which has given New Zealand producers a market advantage internationally. The Department contributes both directly and indirectly to economic growth through tourism and the provision of ecosystem services such as freshwater yield and carbon storage.

The Department is responsible for encouraging recreation activities on the lands and waters it manages and works within the statutory concessions framework to authorise tourism operators and other third party activities and uses in those places.

The strategic direction outlined in the Statement of Intent indicates that the overarching purpose of the Department is to increase the values that New Zealanders attribute to conservation which is expected to lead to enhanced care of New Zealand's unique heritage for people to benefit from and enjoy. In order to deliver the strategic direction the Department will promote the benefits and value of conservation, demonstrate that conservation contributes to economic prosperity, achieve conservation results through collaboration and demonstrate excellence in conservation knowledge and practice.

There are seven intermediate outcomes expected from this approach, three of which are relevant to this concession application. These intermediate outcomes are:

- That New Zealanders increasingly engage with conservation.
- That New Zealanders have increased opportunities for recreation.
- Those business opportunities consistent with conservation are enabled.

The overall outcome expected from this approach is that New Zealanders gain environmental, social and economic benefits from healthy functioning ecosystems, from recreation opportunities and from living our history. In order to achieve these outcomes the Department will engage the public with conservation in a range of ways including learning about conservation and experiencing natural heritage. The Department will work with a range of stakeholders, including the tourism sector to provide a range of recreation opportunities. This range covers the spectrum of outdoor activities from hunting, diving, tramping, walking, mountain biking, camping and motorised recreation through to activities such as picnicking and sightseeing. It is expected that the Department will need to partner with others in the provision of these services.

The Experience proposal creates new ways of accessing and enjoying the New Zealand landscape and the ecosystems found along the route. The retention of the construction track as a cycle way is a benefit, or positive effect, of the monorail construction in that it will allow increased opportunities for recreation in the area and has the potential to create an important off-road cycling experience. This increases the diversity of recreation options in the Te Anau and Queenstown area. The monorail will provide those people not usually able to access the outdoors such as elderly or disabled people with an opportunity to experience the ecosystems along the route from the monorail car. This increases the diversity of people able to use the area. By providing interpretive information at the termini and within the monorail cars people using the monorail route will be able to learn about the environments they are seeing and engage with them.

The Department's three natural heritage intermediate outcomes are all focused on maintenance of ecological integrity:

- Examples of the full range of ecosystems are secured and their health and functioning is improved.
- Irreversible decline of ecosystems on public conservation lands and waters is prevented
- The security and recovery of New Zealand species most at risk of extinction is improved.

The objectives set out in the Statement of Intent to achieve the above outcomes include:

1. Maintaining ecosystem processes;
2. Reducing the spread and dominance of invasive species;
3. Achieving security and recovery of managed species;
4. Maintaining or restoring ecosystem composition;
5. Improving ecosystem representation.

The construction and operation of the monorail is not inconsistent with these outcomes and above objectives in regards to ecological values. Good site management and mitigation will reduce the adverse effects of construction, and monitoring during the construction phase will ensure that management measures can be adapted to best protect the ecological values present along the route.

Maintenance of the ecological integrity within the area is important to Riverstone because the opportunity to experience the indigenous habitats along the route, within a World Heritage Area, is likely to be a major attraction of the Experience.

The effects of operating the monorail on ecological values will be monitored and the results will be used to inform future management of the habitats along the route. The effects of the operation of the monorail on the terrestrial ecology of the area are expected to be minor. Construction effects will be more significant but these are able to be managed so as to protect the ecological integrity of the area (Mitchell Partnerships Limited 2009).

It is proposed to contribute to the Operation Ark predator control programme currently operational in the Eglinton Valley. This contribution would form environmental off set to identified habitat loss as a result of the construction of the monorail. This is discussed further in section 9 below, and in the MPL terrestrial ecology report (refer **Appendix I**).

### 7.3.1 Summary

At an overall level it is considered that most of the local effects generated by the construction and operation of the Experience will in the main be not more than minor. It is accepted that the effects relating to loss of habitat and effects on existing recreation users will occur but appropriate mitigation and management protocols can be applied to ensure that the way that the scheme is operated

can be adapted to manage any unforeseen risk. It is therefore considered that none of the adverse effects are so significant as to tip the balance in favour of a decline to issue a concession. Rather the balance of the matters weighed (local effects versus regional benefit) steers strongly in the direction where the grant of a concession is considered to be the appropriate outcome.

## **7.4 RELEVANT STATUTORY DOCUMENTS**

The Mainland Southland – West Otago CMS (1998-2008) and the Fiordland National Park Management Plan 2007 are the key documents defining the relevant high level objectives that provide guidance for the management of public conservation lands affected by this proposal. The period for the CMS is still current as it has been extended by the Department until 2012.

### **7.4.1 Mainland Southland – West Otago Conservation Management Strategy 1998 – 2008**

The CMS divides the Mainland Southland/West Otago area into 19 Landscape Units based on physical features with issues and objectives contained for each. The majority of the monorail route is situated in the Te Anau Basin landscape unit. That part of the proposal situated at Te Anau Downs lies within the Fiordland landscape unit. The Snowdon Forest falls within the Te Wahipounamu (South-West New Zealand) World Heritage Area.

The CMS identifies four key issues relevant to conservation in the Mainland Southland – West Otago area. These are:

- Ecological Management
- Resource and Estate Use
- Historic Conservation
- Recreation and Tourism

These issues are specifically addressed in regards to each landscape unit. The following provides a summary of the relevant objectives within the CMS and an assessment of the proposal against these.

#### **Ecological Management**

The CMS identifies that one of the highest priorities for species management is the protection of habitats<sup>1</sup>. The CMS regards red tussock grasslands on alluvial plains, particularly in northern Southland, as a distinguishing feature of the region<sup>2</sup>. There are limited areas of red tussock protected in the region, with less than 2000ha in lowland Southland. Beech forest is the most extensive type of native forest in Southland, with the major areas being northern and western Southland and Fiordland<sup>3</sup>. Beech forest is thought to be still expanding its range as part of the recovery from glaciation. Silver beech is the most widespread species of beech. Red beech forest is found in eastern Fiordland and throughout northern Southland. Mountain beech dominates drier parts of

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<sup>1</sup> Page 67 of the CMS

<sup>2</sup> Page 23 of the CMS

<sup>3</sup> Page 24 of the CMS

Fiordland, particularly Hope Arm of Lake Manapouri and extends into northern and western Southland<sup>4</sup>.

The overall goal for ecosystem management given in the CMS is to protect Mainland Southland/West Otago's natural biodiversity and vitality<sup>5</sup>. Management activities that assist in achieving biodiversity are seen to include the protection of ecosystems, species management through relocation, fire control, animal and plant pest control and restoration. Extensive, largely natural areas such as Snowdon Forest are regarded as important to conservation because they are able to support a wider range of species and habitats. These extensive areas are to be managed to maintain their overall ecological integrity.

The CMS states that generally there is adequate protection of representative ecosystems in the Te Anau Basin landscape unit with two exceptions: podocarp forest, such as that at Lynwood Bush, and bog pine shrublands<sup>6</sup>.

The ecological objectives outlined in the CMS recognise the lack of protection for these habitat types and seek to give priority to protecting bog pine communities and wetlands in this unit. Weeds are recognised as a threat to extensive, largely natural areas like Snowdon Forest and the Department seeks to control levels of weed infestations in forest and shrublands and control and eradicate, where practicable, levels of infestations of significant pest plants along high-use areas and areas of high landscape value<sup>7</sup>. The CMS identifies Snowdon Forest as an ecosystem of international importance, but considers that the area is only of "regional importance" for species distribution.

The large growth in visitor numbers within environmental constraints is recognised as a challenge within the CMS and the potential for a monorail proposal is explicitly mentioned<sup>8</sup>. The effects of any monorail proposal on the ecology of the area are not considered within the CMS document but it is recognised that the provision of such a facility would have a significant influence on the future recreational use of the surrounding area and significantly alter how affected areas would be managed.

### **Resource and Estate Use**

The CMS identifies that there is a range of commercial activities occurring within the Te Anau Basin landscape unit, including commercial fishing, grazing concessions, as well as a commercial nursery. The CMS notes that the Department is considering an application to operate a monorail transport system through the landscape unit. The CMS notes that recreational opportunities will be altered as the proposed route runs through areas managed as backcountry walk in and/or remote recreational experiences. Objective 3 specifically states:

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<sup>4</sup> Page 20 of the CMS

<sup>5</sup> Objective 2, section 2.3.1.4, page 51 of the CMS

<sup>6</sup> Page 305 of the CMS

<sup>7</sup> Objectives 1 – 7 of the CMS, page 306

<sup>8</sup> Objective 3, section 6.20, page 307 of the CMS



*To ensure that any proposal for a monorail avoids damaging important natural values including landscape features in this unit; and that any proposed route through Snowdon Forest is fully assessed for its effects on the existing back-country walk-in and/or remote recreation opportunities of that area.*

The CMS has been through a public consultative process and has specifically retained the monorail proposal as requiring consideration. This is considered to be an important inclusion considering other general policies in the CMS which do not consider the potential for this activity.

The recreational assessment undertaken by Rob Greenaway & Associates (**Appendix L**) considers the impact of the proposal on recreation in the area, and it is concluded that the proposal has the potential to create a more developed recreation setting in the Kiwi Burn and Snowdon areas. This will result in some adverse effects on traditional users of these settings, but will also create new opportunities for users, particularly mountain bikers. The Kiwi Burn area will be the most affected, with the location of the Kiwi Burn terminus alongside a traditionally low-key access point for walking, angling and kayaking activities. Beyond this site, the relocation and redevelopment of hut and track facilities can mitigate almost all effects resulting from the sight, sound and footprint of the monorail in the natural settings of the Snowdon area. The proposed mountain bike track has the potential to create an important off-road cycling experience for domestic and international cyclists. This opportunity increases the diversity of recreation options in the Te Anau and Queenstown area.

The geomorphology and landscape assessments contained in **Appendix F** and **Appendix J** respectively consider the natural and landscape values of the area, and conclude that these values can be maintained.

### **Historic Management**

The CMS identifies that the 'Hodges Stock Track' is located in the Snowdon State Forest<sup>9</sup>. The proposed route may run within a few hundred metres of the stock track alignment. It is noted that this track is not maintained and the impacts are expected to be less than minor. It is possible however that there are unrecorded archaeological sites within the vicinity and all pre-1900 archaeological sites, recorded or unrecorded, are protected against disturbance under the Historic Places Act 1993. An accidental discovery protocol is proposed to protect any undiscovered archaeological sites along the route.

### **Recreation and Tourism**

The CMS contains overarching objectives which relate to recreational activities in the region. These seek to ensure that all recreation developments conform to the recreation opportunities objectives as set out for each Landscape unit, or

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<sup>9</sup> Page 307 of the CMS

the Fiordland National Park Management Plan<sup>10</sup>. This assessment is undertaken below.

The CMS identifies popular locations within the Te Anau Basin landscape unit which are regularly visited, as well as the facilities that the Department manages. The Kiwi Burn hut is a popular destination for family groups and less experienced trampers, and hunting is the predominant use of the Snowdon Forest area.

The relevant objectives seek to provide and maintain the central Snowdon Forest area as a remote area with opportunities for low impact recreational use<sup>11</sup>. The objective also seeks to ensure that access to the area is not too difficult, but that visitors are self reliant<sup>12</sup>. The Central Snowdon Remote area boundary is not clear in the CMS and has been refined by the Department during the time elapsed as part of the concession application process. The proposed monorail is not designed to deliver recreational visitors to the Snowdon Forest area and does not support increased access to any destination except Queenstown and Te Anau Downs. The proposal is therefore not considered to be inconsistent with this objective.

The CMS seeks to provide opportunities outside of central Snowdon Forest for visitors to enjoy backcountry areas which offer day and overnight excursions<sup>13</sup>. As outlined in the recreational assessment (**Appendix L**) the proposal will have minor to moderate impacts on visitors at the Kiwi Burn terminus and the intersection of the Upukerora River and the proposed monorail route. Beyond these immediately affected areas the relocation and redevelopment of hut and track facilities can mitigate almost all effects resulting from the sight, sound and footprint of the monorail.

The CMS also recognises that mountain biking in specified back country areas should be allowed, where they are compatible with the protection of natural values<sup>14</sup>. The mountain bike track is not considered to be incompatible with the natural values of the surrounding area and has the potential to create an important off-road cycling experience for domestic and international cyclists.

Implementation methods to achieve the recreational objectives are also contained in the CMS<sup>15</sup>. These seek to ensure that tramping tracks to Kiwi Burn and Army Huts are maintained, and acknowledges that changes to the location of the Kiwi Burn track and hut may need to be considered as a potential mitigation if the monorail proposal proceeds. The retention of the Kiwi Burn Hut for mountain bikers, and development of an alternative hut for walkers combined with the relocation of sections of the Kiwi Burn track and Kiwi Burn to Whitestone River walk are proposed as mitigation of the effects of the proposed

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<sup>10</sup> Objective 3, section 4.3, page 122 of the CMS

<sup>11</sup> Objective 4, section 6.20, page 308 of the CMS

<sup>12</sup> Objective 3, section 6.20, page 308 of the CMS

<sup>13</sup> Objective 4, section 6.20, page 308 of the CMS

<sup>14</sup> Objective 2, section 6.20, page 308 of the CMS

<sup>15</sup> Page 309 of the CMS

monorail in these areas. No additional facilities are required to service current visitors to the area in order to mitigate the effects of the proposal.

The CMS also states that concessions in the area will be limited to low impact day use and that party size will be a maximum of 12 in the valleys and seven on the more remote ranges of the Snowdon Mountains. The Central Snowdon Remote area boundary is discussed in detail in the recreational assessment (**Appendix L**). The proposed monorail route has been developed to ensure that these restrictions imposed by the CMS do not apply to this concession application.

#### 7.4.2 World Heritage Status

As outlined above the proposal affects Snowdon Forest, which falls within the Te Wahipounamu (South-West New Zealand) World Heritage Area. In 1972 the United Nations Educational, Scientific and Cultural Organization (UNESCO) adopted the international "Convention Concerning the Protection of the World Cultural and Natural Heritage". This seeks to protect natural heritage of outstanding value which is included on a World Heritage List. Sites are selected based on the area meeting at least one of four natural or six cultural selection criteria. There are three World Heritage Areas in New Zealand, Te Wahipounamu – South West New Zealand, Tongariro National Park and the New Zealand Sub-Antarctic Islands.

The Te Wahipounamu World Heritage Area covers 2,600,000ha. Four national parks form the core of the World Heritage Area: Mount Cook, Westland, Mount Aspiring and Fiordland. Other areas are also included such as Mavora Lakes Park Snowdon, Dean, Rowallan and Waitutu Forests<sup>16</sup>.

World heritage areas are designated under the World Heritage Convention because of their "outstanding universal value". World heritage status does not affect the underlying protective status for which the land is held under New Zealand law; rather it places an obligation on the host nation to "take appropriate legal, scientific, technical, administrative and financial measures necessary for the identification, protection, conservation, presentation and rehabilitation of this heritage". There is an obligation on the Department to manage the World Heritage Area in such a way that its integrity is preserved<sup>17</sup>. This is achieved through the CMS and Fiordland National Park Management Plan.

The objectives of the CMS seek to maintain the ecological and landscape integrity of the Te Wahipounamu World Heritage Area<sup>18</sup>, and to develop a coordinated approach to the management and servicing of visitors to the Te Wahipounamu Works Heritage Area<sup>19</sup>. The monorail clearly has a strong visitor

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<sup>16</sup> Page 177 of the CMS

<sup>17</sup> Page 177 of the CMS

<sup>18</sup> Objective 1 and 2, section 6.1, page 177 of the CMS

<sup>19</sup> Objective 1 and 2, section 6.1, page 177 of the CMS

management component, considering its potential of delivering a managed, predictable and quality experience with easily prescribed information services.

Riverstone recognises the importance of the subject area, for both ecological and landscape values. Because of the adverse effects expected during the construction and operation of the monorail mitigation will be necessary to ensure the overall ecological integrity and landscape values of the area are not lost. Site management during construction is regarded as critically important to maintain that integrity in the face of changes brought about by the construction and operation of the proposed monorail. Provided that this site management is effective and timely the national and international importance of the site is expected to be maintained. Monitoring will be implemented to ensure that this is the case.

This is important from Riverstone's perspective as the opportunity to experience the indigenous habitats along the route and within a World Heritage Area is likely to be a major draw card to the experience.

#### **7.4.3 Fiordland National Park Management Plan (2007)**

The Department has produced a management plan for Fiordland National Park which aims to maintain the ecological and landscape integrity of the South West New Zealand World Heritage Area and to develop a coordinated approach to the management and servicing of visitors to the area. This is to be achieved according to the following implementation methods, of which 2 a) is relevant to the monorail project:

1. *Consider the addition of areas of high ecological and/or landscape values to Te Wahipounamu – South West New Zealand World Heritage Area.*
2. *Provide information on the state of Te Wāhipounamu – South West New Zealand World Heritage Area as required under the Convention:*
  - a) *Priority sites and themes for interpretation of the area have been identified as: Fiordland National Park visitor centre in Te Anau (kakapo) or an equivalent alternative, the proposed Fiordland National Park entrance on the Milford Road (takahe), and the West Arm visitor centre (glacial lakes); and*
  - b) *Secondary sites and themes for interpretation of the area have been identified as: Milford Sound / Piopiotahi (fiords and alpine faults); Milford Track entrance (glaciation and scenery); and*
  - c) *Publish a brochure on the World Heritage Area and include it on the Department of Conservation website.*
3. *In managing for ecological values within Te Wahipounamu – South West New Zealand World Heritage Area the international status of this designation will be taken into account.*

4. *Advocate to protect the values of the Te Wahipounamu - South West New Zealand World Heritage Area. In particular, advocate to ensure integrated management of the marine areas adjoining this world heritage area to support the values of the area<sup>20</sup>.*

The Department has investigated areas to be considered for inclusion in the Fiordland National Park. The proposed monorail route is not one of them. The proposal does however affect land within the Fiordland National Park at Te Anau Downs where the western terminus is proposed to be located. Te Anau Downs is zoned within the management plan as being a 'front country setting'. This management setting is accompanied by the following objectives<sup>21</sup>:

1. *To provide opportunities for predominately passive to mildly active recreation activities with high vehicle accessibility, while protecting other national park values. Key attributes defining front-country include:*
  - (a) *Visitors will be seeking an instant immersion with nature;*
  - (b) *Visitors are likely to be seeking sights with a high scenic or historical interest;*
  - (c) *It will be low risk, with minimal skills required; and*
  - (d) *Visits will often be of a short duration.*
2. *The six front country areas will be managed to allow vehicle-based visitors (i.e. short stop travelers), to experience the Fiordland National Park with safety and without compromising national park values.*
3. *To ensure the roads within these settings continue to provide significant access opportunities into the backcountry and remote settings of the Fiordland National Park;*
4. *To ensure that other facilities do not have an adverse impact on the national park values of the setting or surrounding areas.*

The monorail will create a sense of arrival to the National Park, with the opportunity to educate visitors as to the values of the Park while on route. The monorail will deliver visitors to the National Park in a controlled, timed manner, which will assist the management of potential effects of visitors throughout the National Park and beyond.

The proposed location of the monorail terminus at Te Anau Downs is currently leased by the Department for commercial purposes (accommodation, restaurant and bar facilities).

Section 5.3.9.6 of the management plan defines the purposes and development options for Te Anau Downs in more detail. This section defines the management zone (front country setting) to include the "hotel and backpacker

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<sup>20</sup> Page 47 of the Fiordland National Park Management Plan (2007)

<sup>21</sup> Page 248 of the Fiordland National Park Management Plan (2007);

*accommodation, a jetty and other associated infrastructure” at Te Anau Downs. The management plan makes reference to the potential to develop the area as a transport node. The management plan also contains a number of implementation methods to achieve the objectives for the area.*

Implementation method 3 states that any revision or extensions to existing buildings or structures at Te Anau Downs should be designed and constructed in harmony with the natural amenities of the surrounding landscape, and that where new buildings are proposed these should be developed in accordance with the criteria set out in section 5.3.9.1 of the management plan<sup>22</sup>. Section 5.3.9.1 relates to the siting, design, colour and materials of new or altered buildings. The proposed terminus building at Te Anau Downs will be designed taking into account these criteria (**Appendix P**). It is recognised that the existing facilities located at Te Anau Downs have limited aesthetic appeal. The monorail proposal may trigger a refurbishment of the National Park Lodge and its surrounds. Any such development would be sympathetic to the natural environment and locality in which they are located and it is therefore conceivable that the current proposal would actually have some positive side effects on the wider site. It is considered that the adverse effects of the terminus building within the Fiordland National Park are likely to be minor or less, and might ultimately be positive in relation to the entire lodge site over time.

Implementation method 4 refers to the development of the area as a transport node and provides that:

4. *Should a request be made to further develop this site as a transport node, the following provisions should apply:*
  - a) *Such an activity will only be for the purpose of reducing the perception of congestion and overcrowding at Milford and along the Milford Road (refer to sections 5.3.9.1 and 5.3.9.2); and*
  - b) *The applicant should have to demonstrate that this option has been assessed in terms of a wider transportation analysis for options to Milford as referred to in section 5.3.9.2; and*
  - c) *That this option is the preferable option in terms of point b) above; and*
  - d) *Such an option may provide for the following:*
    - i) *Transport hub for land based vehicular traffic; and*
    - ii) *Provision of a hotel and accommodation facility; and*
    - iii) *Café facilities; and.*
  - e) *Separate facilities for residential activity should not be provided at the site; and*
  - f) *The activity should minimise any adverse effects on those accessing backcountry, remote, or wilderness recreation experiences from this site; and*
  - g) *Implementation 3. c) of this section applies<sup>23</sup>.*

<sup>22</sup> Page 250/251 of the Fiordland National Park Management Plan

<sup>23</sup> Page 251 of the Fiordland National Park Management Plan

Method 4 is directly relevant to the subject application. The Moriarty report concludes that the Experience will provide the opportunity for visitors to Milford to arrive throughout the day, thus reducing the current middle of the day congestion that occurs at Milford (Moriarty 2009). It may be that further development of the Te Anau Downs terminus and Fiordland National Park Lodge is appropriate in the future.

The Greenaway report concludes, that with some re-routing of existing walking tracks, the monorail will not generate significant adverse effects on existing recreation users in the area (Greenway, 2009).

Section 5.4 of the Fiordland National Park Management Plan relates specifically to concession applications. The Management Plan states that concessions enable wider visitor enjoyment and appreciation of areas managed by the Department. In return for the privilege of a concession, a resource rental is paid to the Crown and operators must provide quality visitor services that are consistent with the natural values and recreational opportunities of the area. The Plan states that overall concession operations should be kept at levels which do not detract from other visitors' use and enjoyment.

The objectives in regards concession applications in the Fiordland National Park area seek to:

1. *Enable a range of appropriate, high quality commercial visitor services to be provided through the granting of concessions which are compatible with the visitor settings described in this plan and national park values, and which will ensure adverse effects on natural, cultural or historic resources are minimised.*
2. *To grant concessions (including variations to existing concessions) in such a way that their adverse effects can be understood and monitored in the context of other general independent use of Fiordland National Park<sup>24</sup>.*

The proposal is likely to alter the level of human activity within the vicinity of Te Anau Downs. However, the area is already recognised as a node of activity, and is defined in the Fiordland National Management Plan as a front country setting. Overall it is considered that the proposed terminus will fit within this existing activity setting and will have no more than minor effects on the wider ecological and recreational values that exist within the Fiordland National Park.

Section 5.7 relates to roading, vehicle use and other transport options. The two objectives within this section aim to:

- maintain the existing road access routes available to visitors within Fiordland National Park<sup>25</sup>, and
- consider the provision of new roading or other land transport links in frontcountry visitor settings only, and then only if they will improve visitor access and enjoyment of Fiordland National Park without

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<sup>24</sup> Page 253 of the Fiordland National Park Management Plan

<sup>25</sup> Objective 1, page 311 of the Fiordland National Park Management Plan

impacting signification on the recreation opportunities and national park values<sup>26</sup>.

The plan then lists thirteen methods to implement these two objectives. Firstly, it is noted that the only part of Fiordland National Park the monorail will enter is a frontcountry visitor setting, thus meets the objectives and associated methods in that respect.

Method 2 states:

*Any proposal for a rail or monorail transport system should demonstrate the necessity for the project and will be required to identify how the proposal will improve the effective management of Fiordland National Park. Any such proposal will require a full assessment of effects. This assessment should detail how the potential adverse effects on the natural, historical and cultural, recreational, landscape and amenity values resulting from the project will be managed. An audit of this assessment to determine whether the effects are either acceptable or can be adequately mitigated should be required. Consideration of such proposals should include full public consultation<sup>27</sup>.*

This document is a proposal for a monorail transport system, as referred to in this method. Within this document, and its associated appendices, the necessity for the project is demonstrated, and included is a full assessment of environmental effects. All of the matters listed in the method are covered in detail. Riverstone has been working with DoC representatives to discuss the peer review process referred to in the method, including presenting to this group prior to lodgment.

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<sup>26</sup> Objective 2, page 311 of the Fiordland National Park Management Plan

<sup>27</sup> Page 312 of the Fiordland National Park Management Plan



## **8. ASSESSMENT OF ENVIRONMENTAL EFFECTS**

### **8.1 INTRODUCTION**

This section of the application identifies and assesses positive and adverse effects of the monorail and mountain bike activities on the values within the receiving environment discussed in section 3 above<sup>28</sup>.

The effects assessed are split into the following categories:

- effects on tourism in the local, regional and national context;
- effects on existing and new recreation users in the area;
- effects on landscape values;
- effects on cultural values;
- effects of noise generation;
- effects on terrestrial ecology;
- effects on aquatic ecology in the receiving environment's waterways;
- effects on the hydrology and geomorphology of the receiving environment's waterways; and
- traffic effects.

### **8.2 TOURISM**

As already discussed in this report, Fiordland, Central Otago and the Southern Lakes are popular tourist destinations primarily due to the spectacular natural and physical environment, consisting of lakes, rivers, forests, plains and mountains. Infrastructure in both regions has developed over time to attract and cater for tourists, but there remains a challenge to overcome the principal inhibiting factor of time inefficient travel for the majority of visitors accessing Fiordland, Milford in particular, from their popular overnight base in Queenstown.

The Experience has the objective of addressing these issues by providing an alternative route from Queenstown to Fiordland. It proposes a multi-modal journey that would be: more time efficient than current surface transport alternatives, offers controlled access to wilderness vistas en route, reduces congestive loads at Milford Sound and creates new visitor opportunities by establishing a substantial "port of entry" into Fiordland at Te Anau Downs.

While the Tourism Assessment recognises that the establishment of any tourism product includes a degree of impact, it is noted that successful ventures not only provide favourable commercial returns for their community and investors but also improve social well-being through more effective use of resources.

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<sup>28</sup> The assessment as it relates to the mountain bike track, particularly that part which deviates from the monorail route is preliminary only, and further assessment including field work is planned for spring/summer 2009.

The tourism assessment (Moriarty, 2009) finds that the Experience is an innovative tourism product that will be expected to have very significant favourable commercial and social impacts on its peripheral communities.

Principal benefits include the provision of approximately 95 full time employees, both during and post construction, and downstream benefits of construction. Benefits from increased employment (from both quantity and job skills perspectives) are expected to be experienced in Te Anau in particular, as most staff are expected to be based there. This will assist in strengthening the regional skill-base. The labour impact of the proposal, based on remuneration rates for 2009, equates to a community contributions of approximately \$7 m, and a visitor contribution of some \$233m per year.

Favourable impacts are also expected to arise from increased collaboration within the tourism industry and market share growth within Fiordland. The likely impact of increasing patronage will be increased overnight stays in Fiordland whilst stimulating additional inflows to Queenstown.

Assessment of the indirect social impacts finds that improved time efficiency will have the potential to boost visitor expenditure, reduce some state highway traffic and therefore the likelihood of crashes, and strengthen the region's brand value.

In addition, the mountain bike track would be an impetus for additional overnight visitation in Fiordland, particularly Te Anau, and would encourage new recreational opportunities, in the periphery of the route.

### 8.3 RECREATION

Rob Greenaway & Associates (**Appendix L**) concluded that possibly the most important potential impact of the proposal on recreation will be from noise effects, mainly because the monorail and trains will not be visible from most tracks and rivers in the general locality of the route. Trampers and anglers may be able to perceive the noise of the monorail when it cannot be seen, and should noise impacts be severe, any recreational setting in the affected area would be significantly downgraded. Marshall Day Acoustics (2009) considered that noise levels from the monorail operation will generally be unacceptable to trampers on tracks which are currently close to the monorail alignment—simply because man-made noises detract from the wilderness experience which this environment offers, rather than because the monorail is particularly noisy.

On this basis, it will be necessary to relocate walking tracks, or upgrade existing alternative routes to ensure that trampers have viable options which are not affected by monorail noise.

Fishing activities will be much less affected because of the reasonably high levels of water noise near the rivers. However, it is possible that a short section of the Mararoa River near the Kiwi Burn Terminus will receive levels of noise which are sufficient to detract from the natural quiet of the area. If the detailed design shows that this will happen, it may be necessary to provide access to an alternative section of river. Marshall Day's initial analysis suggests that a buffer

zone of around 200m would be appropriate between the monorail and a fishing area.

The proposed monorail route fits within a back county 4x4 drive-in Recreation Opportunity Setting (“ROS”) setting (“a modified environment but one that is dominated by natural vegetation or landscapes and is natural looking”). This ROS class includes motorised access and, “it may include small or environment based facilities”. This classification recognises the visibility and noise of the monorail, with the latter, at maximum train frequency, difficult to discern at distances of a kilometre over open land and 300 metres in bush or hill land. The monorail, being located within predominantly natural settings and not changing the area’s core recreation experience characteristics (difficulty of access, reliance on outdoor skills, etc), does not warrant classifying its proximate ROS setting as ‘rural’.

The setting requirement for the proposed monorail differs from the back country walk-in ROS class. This conflict does not result from changing the access standard to these areas for visitors. As already mentioned, the monorail will not offer a transport option for delivery to the settings in the study area beyond the termini. However, independent visitors who could be in the area of the monorail will experience a setting altered by the presence of the monorail (that is, a transport option that would normally be encountered in another ROS setting). Greenaway & Associates propose a ROS setting for the study area that would result should the monorail proposal proceed (Figure 8.1). This shows a back county 4x4 drive-in corridor either side of the proposed route. The width of the corridor would be defined by the audibility of the monorail in operation: 1km over flat land, reducing to a few hundred metres through forest or in hills.

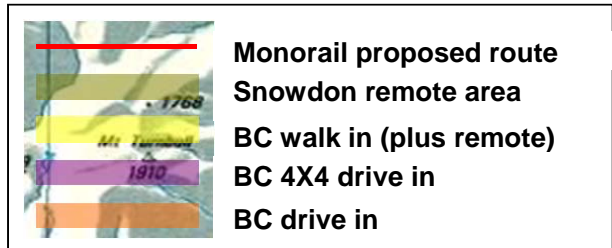
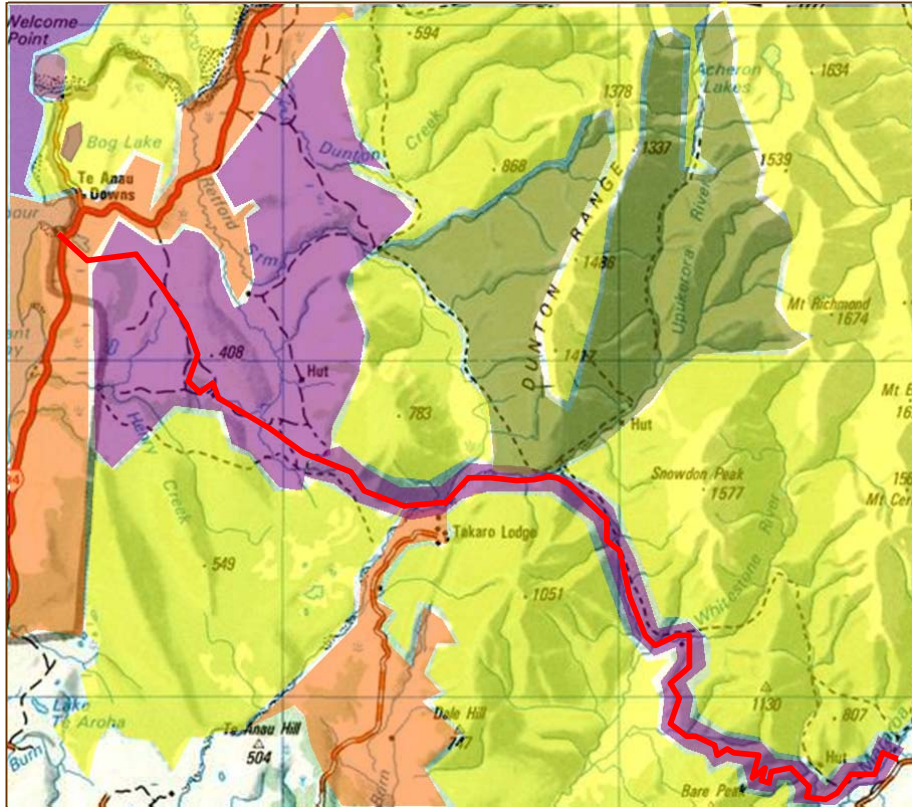
The level of impact of the proposal on recreation is assessed for the recreation sites where the proposal is likely to have at least minor effects. The definitions of the level of impact are:

- Minor: The services and structures associated with the proposal can only be seen from within the recreation setting from isolated vantage points, or involves the same or similar activity as currently occurs. There is no interaction with users of the proposed service, or interaction with such visitors is an expected part of the experience.
- More than minor: The services and structures can be seen and heard from within the recreation setting, and these effects have the potential to degrade the recreation experience. There is no or only limited interaction with users of the proposed service.
- Significant: The services and structures overlay or displace existing recreation facilities. There is the potential for interaction between people using the proposed monorail and other site visitors who are expecting a lower scale of interaction.

Where impacts are likely to occur outside a remote area, the assessment of effect is moderated to take into consideration the likely number of recreational visitors who will be affected by the proposal. That is, it is assumed that a remote area is intended to feature a low level of personal interaction, but that this is

less of an issue in other recreation settings. The proposed route is outside any remote area boundary. The affected areas, likely effects and proposed mitigations are shown in Table 8.1.

**Figure 8.1 Proposed ROS Classification**



The monorail proposal has the potential to create a more developed recreation setting in the Kiwi Burn and Snowdon areas. This will result in some adverse effects on traditional users of these settings. The Kiwi Burn area will be the most affected, with the location of the Kiwi Burn terminus alongside a traditionally low-key access point for walking, angling and kayaking activities. Beyond this site, the relocation and redevelopment of hut and track facilities can mitigate almost all effects resulting from the sight, sound and footprint of the monorail in the natural settings of the Snowdon area.

The proposed mountain bike track has the potential to create an important off-road cycling experience for domestic and international cyclists. This opportunity increases the diversity of recreation options in the Te Anau and Queenstown area.

Table 8.2 Summary of Recreation impacts by site

Site and proposed activity	Current recreation services, use and ROS class	Impact without mitigation	Impact with mitigation and consideration of level of use of setting
Kiwi Burn parking area, including Mararoa River, access to Mararoa River, access to Kiwi Burn Track. Kiwi Burn terminus and bridge over Mararoa River.	Parking area, track start, swingbridge. Kayaking, viewing river, fishing, swimming, walking. No ROS class: assume <i>back country drive-in</i> .	Significant – overlay of proposed terminus facilities on parking area and tracks. Potential for interaction between visitors.	More than minor. However, ROS class remains 'backcountry drive-in'.
Part of Kiwi Burn round trip and start of Snowdon Forest route. Monorail route.	Walking, tramping. ROS class: <i>backcountry walk-in</i> . Change immediate ROS class in CMS to <i>BC 4x4 drive-in</i> within narrow corridor.	Significant – overlay of facilities and proximity to Kiwi Burn Hut.	Minor. Current activities relocated to same ROS class and beyond noise effects of monorail.
Intersection of Army Hut 4WD access, Takaro Lodge walks. Monorail route.	4WD access to Army Hut (local use), tramping, hunting. ROS class: <i>backcountry walk-in</i> .  Change immediate ROS class in CMS to <i>BC 4x4 drive-in</i> within narrow corridor.	More than minor – noise and sight of monorail.	Minor. With mitigations, monorail may be visible from specific vantage points, notably so at the Upukerora intersection. Very low use area.
Whitestone River to Retford Stream. Monorail route.	Tramping, hunting, fishing. ROS class: <i>backcountry walk-in</i> and <i>remote</i> . Change immediate ROS class in CMS to <i>BC 4x4 drive-in</i> within narrow corridor.	More than minor – facility proximity to recreation facilities.	Minor. Interactions will be short, but in the specific location the monorail will be audible (for the few independent visitors who are in the area when the train passes).
Snowdon Forest hunting area. Monorail route.	Hunting. ROS class: <i>backcountry walk-in</i> and <i>remote</i> . ROS class changes to <i>BC 4x4 drive-in</i> within narrow corridor.	More than minor – facility overlay may occur within hunting area, but as hunting is a dispersed activity, this is not considered to be major.	Minor. Very low frequency of use.

Site and proposed activity	Current recreation services, use and ROS class	Impact without mitigation	Impact with mitigation and consideration of level of use of setting
Lake Mistletoe. Monorail route. Potential for passengers at the Te Anau Downs terminus to visit site.	Walking. ROS class: <i>backcountry drive-in</i> .	More than minor – the proposed monorail route passes near the Lake Mistletoe parking area.	Minor. The location is located beside a main road and the current and potential visitor type would be compatible. Lake Mistletoe setting improvements potentially a general benefit.
Snowdon Forest, particularly Snowdon Peak and southern Dunton Range	Hunting, tramping. ROS class: <i>backcountry walk-in</i> .	Minor – current activity is essentially the same as is proposed. Matches ROS class. No sound and very limited potential for sight of monorail in vast majority of setting.	Minor.

## 8.4 LANDSCAPE

Stephen Brown Environments Limited (2009, **Appendix J**) considered that the monorail track would be substantially isolated within the margins of the Snowdon Forest. Although intermittently emerging from the main body of forest at the Mararoa River, Whitestone Basin and River and the Upukerora River, the bulk of the proposed corridor is contained within the beech forest at the margins of the wilderness area. For the most part, it would not, therefore, be exposed to any significant external catchments or audiences.

Although sited close to Glen Echo Station within the Whitestone Basin and Takaro Lodge near the Upukerora River, the proposed monorail corridor would, for the most part, be located sufficiently far from those properties – and largely within the bush line – so as to minimise any impacts upon those two areas of elevated sensitivity. It might be possible for those living at, or visiting, the Whitestone Basin and Upukerora River (near Takaro Lodge) to see the monorail and its train within the bush, but such exposure would be highly intermittent and would almost certainly result from awareness of the movement of the train and carriages – glimpsed through and between trees on the forest edge – rather than because of the visual character and location of the monorail track. In fact, once the track's margins have been rehabilitated, as part of the construction programme, it would be all but imperceptible within its forest confines, especially when viewed from the adjoining areas of open space.

The track and train would both be more visible crossing the Mararoa, Whitestone and Upukerora Rivers, but such exposure would be substantially

limited to the more immediate confines of the immediate river environs. Even though the Mararoa River is subject to a greater degree of public surveillance from the Mavora Lakes Rd, the actual crossing would be largely hidden behind physically elevated and enclosing river banks immediately north-west of the road. Moreover, the bridge and track would be located well below the viewing plane from the road, with intervening shelterbelts and farmland – complete with fencing, tracks and other farm structures – further limiting the overall sensitivity of such views. The Whitestone and Upukerora Rivers are flanked and visually confined by both valley landforms and beech forest. As a result the crossing points have quite restricted visual catchments. Although the Whitestone crossing can be viewed from private properties within the adjoining Whitestone Basin, and the Upukerora crossing would be visible from a four wheel drive track, both would still be physically ‘tucked away’ in relatively recessive locations that would limit the impact of the monorail overall.

Within the tussock covered terraces north-west and, much more sporadically, south-east of the Upukerora River, as well as near the Kiwi Burn Stream and Hut (in its present location), the actual track would have a very low profile. It would, in effect, largely merge with the tussock and shrubland either side of the corridor, even more so once construction rehabilitation has been completed. On the other hand, the actual train would be a more significant – albeit intermittent – feature of the local landscape and would clearly add a man-made / cultural component and dimension to the existing, highly natural, landscapes that it passes through. Although four wheel drive and other use of the vehicle track near the Upukerora River also appears to be sporadic, and such use affects the relative naturalness of the river and near-forest environs in its own right, introduction of the monorail to the river margins would still be reasonably apparent – especially so north-west of the river, near (but with no impact on) Dunton Swamp.

Perhaps of the most significance, the monorail track and probably the train would also be exposed to those using the Kiwi Burn Track and existing Kiwi Burn Hut. The level of interaction would be limited and intermittent; however the train would be highly visible and would fundamentally change the character of the Kiwi Burn locality for those visiting it. In particular, it would appreciably diminish the naturalness, endemic value and overall coherence of the local landscape. To address these issues an alternative alignment for the Kiwi Burn Track and alternative – more remote – location for the Kiwi Burn Hut is proposed (Greenaway & Associates 2009). These would essentially avoid the proposed monorail, apart from at the Track entry on the Mararoa River: consequently, adoption of these proposals would circumvent the effects identified in relation to these DoC facilities.

In summary it is anticipated that the general public might be irregularly exposed to the monorail proposal near the margins of the Mararoa and the Upukerora Rivers, as well as near the Kiwi Burn Track and Hut. However, the remainder of the proposed corridor is substantially divorced from locations that are publicly accessed and used on a more than sporadic, intermittent basis. For the great majority of the public, who do not tramp or hunt, the proposal would have an



even more limited 'public' profile – essentially limited to the Mararoa terminus and the Te Anau Down terminus.

The Kiwi Burn terminus would also be subject to a degree of scrutiny from passing motorists and local farm owners, but this facility would not affect the quality of experience within the actual forest and would, in all likelihood, have a relatively low profile that is compatible with its rural setting. The concept designs prepared to date by Salmond Architecture complement both the natural landscape across the Mararoa River and the wider mix of natural / rural / alpine landscapes that are experienced around Mavora Lakes Rd. Without being self effacing and diminishing the significance of the terminus, they are nevertheless both striking and recessive – as opposed to being ostentatious. As such, the terminus should complement its landscape setting.

Focusing on biophysical features of the Snowdon Forest landscape and its margins Stephen Brown Environments Limited concluded that the monorail would have no appreciable impact on Dunton Swamp: although travelling close to that feature, there would remain sufficient physical separation and screening by intervening beech forest to ensure that the Swamp retains it's physical and landscape integrity. Taking into account:

- the proposed monorail and construction tracks would avoid the larger beech (especially red beech) 'specimens' that are a feature of the forest landscape between the Whitestone Basin and Retford Stream in particular; and
- that the remaining bush areas and forest floor around the monorail route would be rehabilitated and revegetated to minimise their long term effects; and
- that the monorail would have a very limited impact on the rivers and streams that its passes over.

It is considered that the monorail corridor and its use would have a low, or at worst, quite limited, impact on the wider landscape character and integrity of the Snowdon Forest and related river corridors.

Furthermore it was concluded by Stephen Brown Environments Limited (2009) that the Experience proposal would have little or no impact on the Outstanding Natural Landscape status and appeal of the Snowdon forest and it's margins.

It was recognised that the current lodge facility at Te Anau Downs has limited aesthetic appeal in its own right. With the monorail proposal likely to trigger a refurbishment of the National Park Lodge and its surrounds, it is conceivable that the current proposal would actually have some positive side effects on the wider site. The effects on Fiordland National Park would be minor, at worst, and might ultimately be positive in relation to the entire lodge site over time. The proposed development would – at the very least – complement the current hotel and backpacker accommodation within the 'management zone' at Te Anau Downs. It would not break new ground in relation to the 'front country setting' and wider appreciation of Fiordland National Park. Future growth of plants along the margins of the State Highway which screen the site can only increase the visual isolation of the distinctive and physically discreet entity that is the

Fiordland National Park Lodge over time. It appears likely that the monorail bridge, track and terminus would reinforce some of the distinction between Te Anau Downs and the remainder of the National Park, but would not lead to more wide-spread erosion of the Parks' core values.

Stephen Brown Environments Limited (2009) also considered that the Experience would in no way diminish the overall experience of travelling from Queenstown to Te Anau and on to Milford from a landscape perspective, but would instead enhance the journey by capturing and informing visitors about the natural ecology, geomorphology and ecosystems in this part of New Zealand in a way that the current trip through a largely modified farming landscape does not. The close proximity of the forest environs and natural sequence of forest, river margin and wetland views combined with the dramatic views of Lake Te Anau once the monorail leaves the DoC land would also convey a sense of arrival at a destination.

## 8.5 CULTURAL

From the perspective of tangata whenua the key effects of the proposal are likely to be on the mauri (life giving essence) of the area, on the natural resources themselves (water, soil, aquatic biota, terrestrial vegetation, fauna) maunga (mountains) and mahinga kai and the ability of Ngāi Tahu to exercise their traditional kaitiakitanga (stewardship) of these natural features of the environment (Te Ao Marama 2006). Prolonged or significant adverse effects that reduce these values are not acceptable to Ngā Rūnanga o Murihiku.

The primary management principle for Ngāi Tahu is the maintenance and enhancement of the mauri of a resource. While there are many intangible qualities associated with the mauri of a resource, elements of the physical health which Ngāi Tahu use to reflect the status of mauri include:

- Aesthetic qualities such as natural character, presence of indigenous flora and fauna
- Life supporting capacity and ecosystem robustness
- For rivers, the continuity of high quality water from the mountains to the sea
- Fitness for cultural usage
- Productive capacity

The mauri will be adversely affected if these values are diminished. Many of these values are assessed here and the expected effects reported elsewhere such as in Sections 8.7 (Terrestrial Ecology) and 8.8 (Aquatic Ecology). Any adverse effects on these values will be minor and/or short term and are not expected to diminish the mauri of the resources along the route.

Each generation has an obligation to exercise kaitiakitanga (stewardship) and preserve the special characteristics of the various elements of the environment, recognising the holistic nature of the natural world. This means ensuring the health and wellbeing of the Murihiku region is protected for the present generation and future generations. Monitoring is required to assure Ngā

Rūnanga o Murihiku that adverse effects on the surrounding environment are minimized and the rights of future generations are protected.

The proposal has the potential to significantly affect Ngāi Tahu values and beliefs if it is not managed appropriately. These values include the mauri, mahinga kai and mahinga mātaitai (sea food), terrestrial vegetation, aquatic biota and water quality. Ngā Rūnanga o Murihiku recognize that these adverse effects can be avoided. Riverstone recognises this concern and are committed to ensuring the values and beliefs of Ngāi Tahu are protected. Riverstone believes a collaborative management plan approach with the Department and Ngā Rūnanga o Ngāi Tahu will help ensure this protection. This is dealt with further in Section 9 Mitigation and Monitoring.

## 8.6 NOISE

### 8.6.1 Construction Noise

The Construction noise standards in New Zealand only provide recommended noise limits for dwellings, and not recreational settings, and the limits depend on the duration of the noise. Although the construction of the monorail will certainly exceed 20 weeks<sup>29</sup>, the effects of noise on any one person will not, because users of the area only visit for short periods of time and do not stay in one place. The construction fronts will also be moving, albeit more slowly. However trampers in the area will notice construction noise at times and this will result in short term adverse effects.

The proposed construction methodology makes extensive use of precast concrete, which should reduce the noise overall, however there are a number of noise sources during the construction process including:

- Chainsaws during initial bush clearance;
- Bulldozers and/or excavators for track clearance and construction access formation;
- Trucks delivering concrete items to site;
- Other construction vehicles travelling to the site;
- Small excavators to dig foundations;
- Mobile cranes to place precast concrete.

Calculations by Marshall Day Acoustics show that this type of activity will result in noise levels of 65-70 dbA at distance of 50 metres. Whilst this noise will occur for more sustained periods of time than a monorail pass, the maximum noise level will be similar. As such, their analysis regarding monorail noise is also valid for construction noise—at distances beyond 400 metres in bush covered areas, construction noise will be essentially inaudible (see **Appendix H**). Proposed realignment of walking tracks will need to be undertaken prior to commencement of construction on any given section of the monorail track, to provide a reasonable buffer distance. However, construction noise will be

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<sup>29</sup> The New Zealand Standard 6803:1999 “Acoustics – Construction Noise” definition of “long-term” construction. It should be noted that that standard is concerned about noise “at any one location”.

clearly audible on the realigned section of the Kiwi Burn Loop track whilst construction occurs there.

### 8.6.2 Operational Noise Along the Route

Noise from the monorail itself has the potential to affect a number of users of this area, because of the length of the track.

The only residential building along the route is Takaro Lodge, and this is approximately 1km from the proposed monorail alignment, which is set back into the forest beyond the Upukerora River by at least 150 m. The Lodge itself is located very close to a small stream and as such Marshall Day Acoustics expected the ambient noise level to be at least 30 dB ( $L_{Aeq}$ ). The effects of monorail noise on the visitors and residents at Takaro Lodge are expected to be negligible.

Like most users of this area trampers spend time in the outdoors for the ability to “get away from it all” and man-made noises are not well accepted. In order to avoid adverse noise effects, the monorail will need to be inaudible to recreational users. In the quieter sections of the track this requires the monorail to be less than about 30 dB ( $L_{max}$ ) as it passes.

Measurements based on truck passes suggest that for the monorail:

- At distances of about 200 metres with even a very small hill between the monorail and the tramping track, a monorail pass will be less than 30 dBA and completely inaudible.
- With no acoustic screening (i.e. the monorail would be visible if the bush wasn't present) monorail noise will be inaudible (less than 30 dBA) at a distance of 400 metres.

There are three existing tracks within this distance of the proposed monorail route: a section of the Kiwi Burn loop track; parts of the Whitestone River to Retford Stream tramping route; and the loop track at Lake Mistletoe.

The Lake Mistletoe track already experiences significant man-made noise from traffic on the State Highway. A monorail passing will be no noisier than cars and buses passing, and as such, we do not expect users of this track to be adversely affected by monorail noise.

For those fishing or canoeing higher ambient noise levels are expected due to the water, the monorail will be significantly less noticeable in these situations than on the tramping tracks. A monorail pass is expected to be inaudible to fishers and kayakers at a distance of approximately 50 m. As such, there will be minor noise effects where the monorail crosses the Mararoa River.

Noise from the monorail will be clearly audible on the mountain bike track. However, mountain biking is not particularly sensitive to noise, with bikers often being very close to road traffic. In addition, because this would be a completely new track, bikers would enter it knowing that the monorail exists, and mountain

bikers generate noise while riding. As such, we do not believe that there will be any adverse effects from noise on mountain biking. Noise from mountain biking activities will occasionally be audible on the first section of the Kiwi Burn Loop track, but will otherwise be completely un-noticed by existing users of this area.

### **8.6.3 Operational Noise at Each Terminus**

There are a number of noise sources which need to be considered in and around the two terminus buildings including mechanical equipment noise, people noise, vehicle noise and noise from the maintenance workshop. With appropriate acoustic design it is possible to achieve very low noise levels from mechanical equipment and noise from the maintenance workshop (Marshall Day Acoustics 2009). Noise from groups of people is likely to be at a similar level to the monorail itself and hence the required buffer distances are likely to be similar. The effects of noise from people at the two termini should be negligible.

In terms of vehicle noise the two terminus locations are acoustically quite different. Te Anau Downs already has a lot of vehicle activity and the effects of vehicle noise around the terminus are expected to be negligible. At Kiwi Burn there is little traffic and it is relatively quiet, however the background noise from the Mararoa River is such that when walking on the Kiwi Burn loop track vehicles have arrived and departed without walkers being aware of them. If the loop track is moved walkers will be even more removed from the Kiwi Burn car park and the noise from vehicles using the terminus will be minor.

### **8.6.4 Effect of Noise on Wildlife**

Within the forest no adverse effect from noise is expected on bird or animal residents beyond 10—20 metres from the monorail track. Within this distance, there may be some minor noise effects, resulting in animals relocating slightly further away. However, it is concluded that any noise effects on wildlife will be minor.

## **8.7 TERRESTRIAL ECOLOGY**

The route lies within an ecologically significant area and passes through ecologically important habitats. The area is managed to protect the ecological integrity of the habitats found there (Department of Conservation 2000). Ecological integrity is not defined within the CMS, but is interpreted to consider whether all indigenous plants and animals typical of a region are present, major ecosystem processes are intact, and ecosystems occupy the full environmental range. The fundamental components of ecological integrity are indigenous dominance, species occupancy, and environmental representativeness. Key effects of the proposal on the continued significance and ecological integrity of the area are outlined below.

### **8.7.1 Rarity and Distinctiveness**

The proposed construction of the monorail will result in the removal of 21.96ha of forest habitat including mountain, silver and red beech. This removal is spread over 22.9km, and represents approximately 0.05% of the DoC landholding. This habitat is not rare within the ecological district or ecological

region and the monorail will be surrounded by large areas of similar habitat within Snowdon Forest Conservation Park (46,750ha) and the nearby Fiordland National Park.

The route is located near the edge of the forest. The vegetation to be cleared includes some areas of tall red beech forest found mostly at the western end of the route (between 26km and 28km), but also between 20km and 21.5km, from 12.5 – 13km and intermittently between 4km and 8.5km. The density of large trees (dbh > 50cm) along the route is approximately 245 per ha. This tall red beech forest probably provides nesting and foraging habitat for acutely threatened kaka, mohua and possibly bats, particularly at the western end where threatened birds were more commonly recorded. The effects of vegetation removal in any one area along the route are diluted by the long, thin, linear nature of the route and the likely low density of the threatened species found there. Mitigation to protect these acutely threatened species from the removal of this habitat is achievable and may be required if monitoring indicates that these species are adversely affected.

The proposal also involves removal of mountain beech forest along much of the route. This habitat is not rare either, but it provides habitat for chronically threatened rifleman and yellow mistletoe and possibly geckos and long-tailed cuckoo. Mitigation to protect these chronically threatened species from the removal of this habitat is also achievable and may be required if monitoring shows an increase in predator or pest abundance or a decrease in birds along the route. By reducing the amount of exposed canopy the effects of this vegetation removal can be reduced and monitoring will reveal whether further management is required.

The proposal will also remove 4.35ha of grassland spread over 6.6km. These grasslands provides habitat for chronically threatened plants such as tufted hair grass (*Deschampsia cespitosa*) and geckos. Grassland will be removed sequentially, that is not all at once, and most of the grassland vegetation will be replaced soon after construction. This will not be possible in the very small areas where piers are located, but weed control and good site management during and after construction will reduce the effects of this removal. Approximately 600 piers will be required through grassland and allowing 0.5m<sup>2</sup> for each pier, the permanent removal of grassland is expected to total around 300m<sup>2</sup>.

Refinements to the proposed route mean that particularly important environments such as wetlands and some red beech forest are now no longer affected by the proposal. Good site management and mitigation to protect threatened species will ensure that the adverse effects of the project on the rarity and distinctiveness of the area are minimised and there is no change in the ecological status of the site.

### **8.7.2 Species Abundance, Diversity, Composition and Association**

At present the forested sections of the route contain few weeds, while the grassland sections have been more modified. This is particularly evident in the

Whitestone River valley and parts of the Upukerora River valley where exotic pasture species dominate at the expense of native tussock grassland. Nonetheless native species comprise most of the communities encountered along the route. Provided that weed and pest species are prevented from invading the site the species composition and the association of species present is expected to remain similar and native species can be expected to continue to dominate throughout the route.

Population viability of any of the species along the route is unlikely to be compromised, although particular care will need to be taken to avoid bat roost trees, the removal of which could have a disproportionately large effect on bat populations (O'Donnell 2001). Mitigation to protect these acutely threatened species from the effects of this habitat removal is practically achievable and may be required if bats are shown to be common in the area or trees providing bat habitat are required to be removed. The proposed further surveys will inform this.

### **8.7.3 National and International Importance**

The focus of management for both Snowdon Forest and the South West New Zealand World Heritage site is maintaining ecological integrity. Because of the recognised national importance of habitats such as mountain beech forest and the international importance of the tussock grassland habitats, site management is regarded as critically important to maintain that integrity in the face of changes brought about by the construction and operation of the proposed monorail. Provided that site management is effective and timely the national and international importance of the site is expected to be maintained. This is important from Riverstone's perspective as the opportunity to experience the indigenous habitats along the route and within a World Heritage Area is likely to be a major draw card to the experience.

### **8.7.4 Representativeness**

Much of the Livingstone Ecological District remains unmodified and while less of the Upukerora Ecological District remains natural, much of the northern section where the route is located remains in mountain beech forest typical of the district.

The CMS indicates that most of the habitats found along the route are representative of the region. Furthermore it indicates that many of these habitats are well represented within the network of formally protected natural areas (Department of Conservation 2000). LENZ analysis suggests that all the land environments found locally except L1.1c have adequate representation (more than 30% remains) and legal protection (more than 20% is legally protected). Small areas of Environment L1.1c occur near the Whitestone and Upukerora Rivers, where they have already been substantially modified by weeds and grazing by mammals and no longer support indigenous vegetation. Indigenous tussock grassland of the type expected in this land environment still occurs on the terraces near the Mararoa River and is found intermittently along the first 3.5km of the route.

It is proposed to remove 4.35ha of this tussock vegetation along the route and then replace it and rehabilitate the monorail route and spur tracks (approximately 2.36ha) when construction is complete. The remaining areas would either form part of the proposed cycle track (1.96ha) or be the location of piers (0.03ha) and thus would not be able to be rehabilitated.

Provided that stringent weed hygiene protocols are adhered to during the construction of the route, regular monitoring of the route occurs after construction and there is prompt attendance to weed issues then the area will continue to be dominated by native species and representativeness of the habitats found there need not be compromised.

### **8.7.5 Ecological Context**

The route forms a narrow ribbon on the interface between the managed farm ecosystems and the natural forest and tussock ecosystems of the Snowdon Forest Conservation Area. The route and construction track will be surrounded by natural habitat in very close proximity and the two tracks will be separated by up to 100m. Individually they are unlikely to be wide enough to disrupt the ecological context of the habitat present along the route, provided that the site is managed appropriately and introduced mammals and weeds are prevented from using the route or construction track as an access corridor. Thus the creation of such a narrow footprint is unlikely to adversely affect the intactness or connectivity of the habitats found along the route. The area's role as a buffer between the farm landscape and the forest environment should be similarly unaffected.

The tall red beech forests and shorter mountain beech forests along the route are core habitat for threatened species including birds and bats. The removal of 21.96ha of this forest represents approximately 0.05% of the natural vegetation found within the Snowdon Forest Conservation Area, and furthermore the effects of habitat removal will be reduced in any one home range by the long thin nature of the route. Again, if the site management during and after construction reduces the adverse effects of weeds and mammals along the route then the loss of this core habitat is unlikely to be important at the population level for those species affected.

### **8.7.6 Ecological Functioning**

Ecological processes at the site, including forest regeneration, may be being compromised by deer browsing, but weeds are limited to forest margins and grasslands and the site is predominantly natural indicating that natural processes predominate.

The creation of narrow linear features is not expected to compromise ecosystem function to any appreciable degree, provided that best practice site management, particularly of soils and run off, is employed during construction and subsequent rehabilitation of the monorail corridor. The construction of a second track will have additional effects but these will be more limited than those from the monorail construction route because of the ability to locate the route around significant features such as large trees, or sites such as wet faces.



In addition the monorail beam may act as a linear barrier to some animal movements for short distances along the route, but this will not be the case with the construction track. The effects of using the construction track as a cycleway are expected to be similar to the effects of the walking track that winds through the forest near the Mararoa River footbridge and across the tussock grassland.

Disturbance is an important process in forest dynamics. Regeneration following forest disturbance is dependent on the scale of the disturbance, the forest type and the presence of introduced grazers and browsers. Small scale disturbances, such as individual canopy tree fall, often result in accelerated growth of saplings and sub canopy trees nearby until canopy closure occurs. Larger scale regeneration involves similar processes but can involve the establishment or proliferation of more light-demanding species which may persist for some time, particularly if they are unpalatable. By minimising the amount of canopy gap created along the route and exercising good weed management at ground level the scale of the disturbance along the route will be reduced and adverse effects on forest structure and composition will be minimised.

The route passes through a large area of primary forest which links the Eglinton Valley and Mavora Lakes with the Dunton Range as well as the Livingstone, Thomson and Eyre mountain ranges and areas to the north such as the Ailsa ranges and the Hollyford valley in northern Fiordland. This corridor of habitat may be especially important for species that rely on red beech such as kaka, mohua, kakariki and bats. The local functioning of this corridor is unlikely to be affected by the removal of a small strip of habitat near the southern margin.

#### **8.7.7 Sustainability**

Again, site management during and after construction is the key to ensuring sustainability at the site is maintained. It is in Riverstone's best interest to ensure that sustainability and ecological integrity are not compromised, to ensure that the experience remains distinctive and worthwhile for visitors. Monitoring of the habitats along the route before, during and after construction, combined with monitoring at similar sites nearby and regular reporting will allow the early detection of undesirable trends in the wildlife or flora that are due to the existence of the monorail and will allow site management to be adapted to ensure the values at the site are protected over the long term.

#### **8.7.8 Ecological Integrity**

A management plan approach is intended to deal with the adverse effects of vegetation removal and its consequent effects on the canopy, the microclimate and the potential for an increase in weed abundance. The management plan will outline biosecurity and weed control methods along the proposed route and outline rehabilitation and environmental risk management at the site. Provided that environmental best practice is implemented and becomes a part of the culture of the construction and operation team then the adverse effects on the ecological integrity of the site are manageable and the ecological values along the route need not be reduced. Riverstone is committed to ensuring a positive, or at worst a neutral, environmental outcome.

## 8.8 AQUATIC ECOLOGY

The greatest potential for the monorail to have effects on aquatic ecosystems will be during the construction phase. These effects are analogous to forestry operations where canopy trees are selectively removed and access roads are constructed. These include:

- Release of sediments into waterways
- Removal of canopy from forested streams
- Run off of other pollutants such as liquid fuels or raw cement into waterways.

Each of these is discussed in more detail below.

### 8.8.1 Effect of Sediments

Construction of the monorail track will require vehicles to cross all the rivers and streams along the route. It is likely that at some crossing points, such as across wide river beds, it may be necessary for vehicles to cross the river channel frequently and possibly work in the bed and/or active channel in order to construct and install the piers for the beam. This will result in sediment from the bed being released downstream. While there will be no need to work in small streams that can be crossed by a single section of beam, vehicles may be required to cross them. There is also the potential for increased sediment input from the construction and drainage of the spur tracks and construction route/mountain bike track.

In large rivers the effects of disturbance from river crossings is likely to be short lived and slight, and therefore negligible in comparison to that occurring during a typical flood event (Hoyle and McKerchar 2009).

Release of sediments into the rivers and streams of the proposed route during construction of the monorail, service tracks and spur tracks will be unavoidable, but the sequential and concurrent construction method means that individual locations will be affected over a relatively short period with low frequency. The ecological effects are therefore expected to range from minor to moderate (NIWA 2009b). Sediment is unlikely to accumulate due to the frequency of small floods – approximately once every 25 days in these rivers (NIWA 2009b).

A short section of disrupted stream bed with short-term sediment release is unlikely to have long lasting effects on periphyton communities in the downstream reaches provided that the sediment is flushed through the system rapidly. This is likely in the larger tributaries and main stems. However, the smaller, more stable streams are likely to be more severely affected because flood events are not as common there and sediment inputs will last for longer potentially abrading and smothering periphyton, invertebrate and bryophyte communities. If sediment deposition does occur the most severe effects will be localized and will dissipate in a downstream direction.

The ecological effects of construction related sediment on invertebrates is expected to be relatively minor since the taxa that live in these rivers are adapted to surviving frequent pulse disturbances such as floods through their life history traits and physical and behavioural characteristics (NIWA 2009b). Within the smaller stable tributaries effects on invertebrates may be more severe and persistent as described for periphyton.

Streams that support bryophyte communities are particularly vulnerable to the effects of sedimentation. These plants are generally intolerant of suspended sediment since it becomes trapped between their stems and abrades their leaves, both of which reduce their photosynthetic ability. Given the importance of bryophytes as invertebrate habitat any loss of bryophytes from areas downstream of construction sites will have flow-on effects on other parts of the ecosystem.

In larger rivers the effects on fish and fish habitat at and downstream of crossing points are likely to be minor and temporary (NIWA 2009b). Most fish species in New Zealand are benthic (bottom dwelling) and inhabit interstices in streambed substrates. Again effects may be more significant in smaller streams and may affect fish directly by “smothering” their habitat. Most fish depend on aquatic invertebrates for food and consequently the most significant potential effect of disturbance and sedimentation is an indirect one caused by loss of invertebrate prey.

Changes to the morphology of streams caused by vehicles or machinery crossing or working in streams could have an adverse effect on native fish populations if the changes allow trout to gain access further upstream than they currently are.

### **8.8.2 Removal of Canopy**

Removal of some of the forest canopy adjacent to streams will be required during construction of the monorail and construction tracks. The adjacent canopy trees are expected to grow to fill this gap in most places but this may take some time (years) to achieve full canopy cover. This will result in short reaches of some streams being exposed for long periods of time. This will increase periphyton productivity and community composition is likely to change when shade is removed. Provided no additional species are introduced, such as didymo, then these effects are considered to be minor (NIWA 2009b).

The change in aquatic plant community brought about by increasing light levels will also change invertebrate communities to one dominated by grazing species. Canopy removal is also likely to result in the loss of bryophyte communities. Only few streams supported a high bryophyte cover along the proposed route and these represent relatively uncommon environments in this area. Loss of such habitats as a result of increased sedimentation or removal of the canopy is considered a moderate effect.

Recovery of the invertebrate and other communities after the route construction disturbance will depend on the degree of disturbance. The presence of

undisturbed habitat upstream and the relatively unmodified nature of the area are expected to have a positive influence on the rapidity of recovery.

### **8.8.3 Pollutant Runoff**

During construction there is also the potential for contamination of aquatic environments from hydrocarbons and heavy metals associated with vehicles and machinery use as well as dust, chemicals, waste and sewage from the construction process. These effects are expected to be minor and temporary.

### **8.8.4 Operational Effects**

The monorail and its associated tracks will not be in contact with the aquatic environment except for possibly some supporting structures in large river beds. The possibility exists that increased sediment input into waterways may result from drainage of tracks, particularly where substantial earthworks are required.

Movement of machinery or personnel from the didymo affected main stems of the Mararoa, Whitestone and Upukerora Rivers to the presumably unaffected tributaries carries the risk of transferring live didymo cells. Stable streams in full sunlight with low nutrient levels provide good conditions for didymo establishment and growth. Once the monorail is operational human traffic on the new mountain bike track will increase the risk of the spread of didymo and other unwanted organisms. The provision of bridges across all streams will minimise the risk.

## **8.9 HYDROLOGY AND RIVER GEOMORPHOLOGY**

Since the final route has not been determined the exact location and number of river and stream crossings remains unknown. However, because of the active channel widths of the Mararoa, Whitestone and Upukerora Rivers it is inevitable that support pillars will be required within the river bed at each crossing point, regardless of the exact location of the crossing. The 20 m pier spacing should allow the track to span the entire active channel of Kiwi Burn and other small streams.

The construction and operation of the monorail will have no effect on the hydrology of the rivers it crosses because there are no plans for diversion or extraction of water.

The beds of all the waterways larger than Kiwi Burn along the route display a degree of armouring. That is, the coarser surface bed material protects finer sub surface material inhibiting bedload transport. The construction track will make use of light bridging units to cross rivers, but the 35 tonne piling rig will operate within the channel of the larger rivers when constructing the piles at the river crossings. This will disrupt the armour of the bed and will likely lead to a short term and very localised increase in bedload transport.

The construction of the bridging units and access of any vehicles or machinery into or out of the river may lead to increased bank erosion which will increase the supply of sediment into the river and if severe may increase the likelihood of lateral channel course adjustment. The effect of increased sediment supply and

transport on the geomorphology of these rivers is likely to be short lived and very localised and able to be mitigated, hence this effect is regarded as minor (Hoyle & McKerchar 2009).

Construction activities alongside a river, particularly where the route or construction track cross small side streams, may result in an increase in suspended sediment entering the river systems. This effect on the geomorphology of the river is also likely to be short lived and minor.

Any removal of material from the toe slope of unstable slopes near waterways or increased loading at the head of these slopes (such as at the area identified as “Bluff slip”) may increase slope instability and increase sediment supply to the waterway. This would result in channel adjustment. In the case of “Bluff slip” this would probably result in an increased tendency for channel braiding in the Upukerora River and this area would be best avoided altogether.

Once constructed the operation of the monorail will have only minor impact on the geomorphology of the rivers along the route. Any maintenance works that require access of vehicles and/or machinery into and out of the active channel bed will have effects similar to those described above for construction which are likely to be minor.

## **8.10 TRAFFIC**

Overall from the perspective of seeking a concession to establish and operate 29.5km of the monorail within land administered by the Department there are no particular or general matters of a traffic or transportation nature that would prevent the granting of consent (Traffic Design Group 2009; Appendix J), primarily because the concession sought does not include any road administered by the Department. However since the proposal is ultimately concerned with transportation a brief discussion of the environmental effects of the project on vehicle movements is relevant.

Based on a 29.5km monorail length and consideration that 90% of the length would be constructed using 20m sections, the transport of concreted beams would involved up to 2,200 deliveries of beams to the project depots. These movements would probably be spread evenly between the three construction fronts over the life of the construction.

Other construction related traffic including staff activity would be expected to be 20 – 30 light vehicle movements per day to each construction front together with up to 20 heavy vehicle movements per day (Traffic Design Group 2009). For much of the construction period the number of traffic movements would be far less and primarily related to individual staff car (or organised shuttle) movements to the three construction depots.

The construction materials, including beams, and staff involved in the construction would use roads outside the DoC estate to reach the area. These local roads are considered adequate to cope with the expected increase and type of traffic expected (Traffic Design Group 2009).

Once operational the Experience would contribute less traffic to all these roads except Mavora Lakes Road and the Mount Nicholas/Von Road, but again these are outside the DoC estate.

The Experience is intended to spread the load of visitors, and hence vehicles, at Milford Sound from the current midday peak to a more even distribution through the day. If the Experience is successful in attracting between 40% and 50% of the existing coach based visitors to Milford Sound then there may be a reduction in the number of daily coach movements between Queenstown and Te Anau Downs from an annual daily average of 40 coach movements per day to around 24 coach movements per day. The associated annual CO<sub>2</sub> savings generated would amount to between about \$118,000 and \$228,000 per year (Traffic Design Group 2009).

Taking into account the estimated costs of CO<sub>2</sub> emissions from the ATV sector of the trip, it is concluded that the nett CO<sub>2</sub> savings would be between about \$5,000 and \$115,000 per annum for the land transport aspects of the project.

If the Experience is successful in reducing coach movements along the State Highway routes between Te Anau and Queenstown, then there would be the potential for a saving of around two injury accidents involving coaches over a five year period (0.4 accidents per year) based on a 40% reduction. There would be more significant and further benefits if free independent travellers, particularly foreigners unfamiliar with New Zealand roads adopted the Experience rather than driving themselves.

Thus from a traffic perspective there are particular advantages and benefits arising from:

- Reduced CO<sub>2</sub> emissions from coaches and cars currently travelling on State Highways from Queenstown to Milford, only partially offset by the increased emissions resulting from the increased ATV and catamaran sectors.
- Potential reduction in coach-related accidents along the State Highway routes as a result of the reduced number, frequency and distances travelled by coaches between Queenstown and Te Anau Downs.
- Significant reductions in the intensity of visitor and coach movements into and out of Milford Sound as a result of the dispersion of daily visitors generated by the project.

## **8.11 ASSESSMENT OF ENVIRONMENTAL EFFECTS CONCLUSIONS**

Key positive effects relate to tourism and the economy. The monorail will encourage visitors to Fiordland, and will provide the opportunity to alleviate the existing middle of the day congestion in Milford. The provision of the mountain bike track will be a significant positive effect of the construction of the monorail in terms of tourism and recreation opportunities.

Overall the monorail will enable those who would not otherwise have the opportunity to experience the beauty of the Snowdon Forest area to do so, in a controlled, comfortable way.

In terms of adverse effects, the majority of these will be during the construction of the monorail, such as noise and traffic generation, and effects on terrestrial and aquatic ecology, hydrology and recreation users. The development of a construction management plan will specifically deal with the sensitive nature of the site and put in place robust measures to ensure adverse effects do not exceed acceptable levels.

Longer term, loss of habitat and effects on existing recreation users will occur. The establishment of, or contribution to, a predator control programme will form environmental off set to the loss of habitat. The re-routing of the Kiwi Burn and Army Hut tracks, and construction of a new Kiwi Burn Hut will largely mitigate ongoing adverse effects on recreation users.

The Operational and Environmental Management Plan will be developed to set appropriate operational parameters, and ongoing environmental monitoring will be required to identify and mitigate additional adverse effects if necessary.

The development of the management plans will enable some flexibility to be obtained in the management of potential construction and operational effects and will assist in the incorporation of additional research and monitoring findings as they become available. Because draft management plans have been prepared and are included within **Appendix A-C** the Department has a "heads up" as to what is likely to occur. It is proposed that management plans will be submitted to the Department for approval, and will be aimed at achieving clear objectives which are set out in conditions.

Given the nature of the current proposal it is unrealistic to suggest that the way these complex systems will respond to changed conditions can be predicted with 100% certainty. There is therefore a need to monitor closely and respond to effects as they manifest themselves. In some cases the effects may not manifest themselves for many years if at all, and mitigation should be tailored to meet actual as opposed to theoretical effects. The alternative is to say that because there is no absolute certainty, there should be no concession granted. This approach does not promote the sustainable management purpose of the Act, since on that analysis no project like the current proposal would ever proceed. The information already gathered in relation to the route corridor, in addition to the proposed "pre-activity" conditions will ensure that potential adverse effects are avoided, remedied or mitigated as required by the Conservation Act. The Department can be confident that prior to the construction of the Experience, any residual fundamental questions about the effects will be satisfactorily answered, and that an appropriate range of mitigation options is available to address all effects which might arise over the term of the concession.

Therefore, having considered all of the relevant matters it is considered that none of the adverse local effects are so significant as to tip the balance in

favour of a decline to issue a concession. Rather the balance of the matters weighed including local effects versus regional benefits steers strongly in the direction where the grant of a concession is considered to be the appropriate outcome.



## 9. AVOIDANCE, MITIGATION AND MONITORING

In considering this concession application, the Minister is required to have regard to any measures reasonably and practicably available to avoid, remedy or mitigate the adverse effects of the proposal (section 17H(1)(c)) of the Conservation Act). Such measures must relate to the resource administered by Department of Conservation affected by the monorail proposal and the conservation purposes of the Conservation Act.

Section 10 of this application identifies and evaluates the alternatives assessed by Riverstone when developing the concept of an alternative transport mode linking Queenstown and Fiordland.

Since the initial concession application was submitted to DoC in 2004, Riverstone has embarked on an extensive consultation process with likely interest parties and groups (refer section 11 of this report for more detail). Feedback received from these parties during this process has informed decisions made regarding various aspects of the project, including mitigation opportunities.

Over the past 18 months Riverstone has engaged a wide range of independent experts who have thoroughly investigated the effects arising from the proposed monorail development, and have developed appropriate avoidance and mitigation responses using a team approach. The avoidance of adverse environmental effects was the primary goal where this is practical; where avoidance was not practicable, mitigation has been considered an appropriate response.

Using this approach avoidance and mitigation proposals were required to be:

- Effective and capable of being demonstrated as being so;
- Sustainable, including financially sustainable, in the long term;
- Consistent with the level of environmental effects expected;
- Provide measurable or tangible outcomes; and
- Able to respond to changing knowledge, including the results of environmental monitoring, where appropriate.

Monitoring to determine whether these responses are adequate for the scale of environmental effects generated as a result of the project is also proposed and a management plan approach is seen as the best way of reducing the scale of the expected effects.

### 9.1 AVOIDANCE STRATEGIES

The primary goal of the project has been to avoid adverse environmental effects where it is practical to do so. This premise has influenced route decisions and will continue to do so. For example, the 200m corridor has been amended to avoid the Dunton Swamp due to the values this area holds. Throughout the detailed design phase, and once construction has commenced, large trees will be avoided where ever practical. This will be achievable for the construction/mountain bike track in particular.

## 9.2 MANAGEMENT PLANS

Riverstone and its team of specialists have conducted a comprehensive assessment of the environmental effects and determined appropriate measures for avoidance and mitigation across the relevant environmental values. It has been determined that the most appropriate method of managing effects during construction and operation of the monorail is via a series of management plans and protocols. Management plans set out the processes to be applied to achieve a certain environmental outcome during each stage of the construction or operation process. In general the content of each management plan will reflect:

- The recommendations of the technical reports prepared as part of the environmental impact assessments;
- Inputs from engineers, the monorail supplier and the applicant with regard to specifics over how the monorail would be constructed and operated;
- Inputs from consultation including DoC as part of the concession and resource consent application process;
- Input from stakeholders and the community as a result of ongoing consultation.

Riverstone will continue to develop the management plans and would seek input from the Department at each stage.

The final management plans will be prepared subsequent to the granting of the concession application<sup>30</sup> and conditions could be imposed on the concession documents requiring their preparation and approval prior to the commencement of construction and operational testing of the monorail.

The following management plans will be developed in consultation with the Department and implemented following the granting of the concession:

- Construction Management Plan
- Operational Management Plan

Riverstone is committed to working with the Department to minimize and manage any potential adverse environmental effects so as to ensure the best possible environmental outcome. In addition to these two management plans Riverstone proposes a communication protocol which would formalise the communications between the Department and Riverstone (or their appointed representatives). The purpose of the protocol will be to reach agreement with respect to how the project proceeds through the detailed design phase and construction methodology for the proposed monorail development. This protocol will also establish a framework to ensure the working relationship between the parties continues to be developed in a positive way during construction and operation of the monorail. A draft communication protocol to form a basis for discussion is attached as **Appendix A**.

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<sup>30</sup> Noting that the management plans will remain 'live documents' throughout the detailed design, construction and operational phases of the project and will be updated as required.

### 9.2.1 Construction Management Plan

Riverstone will prepare in consultation with the Department a Construction Management Plan ('CMP'). This plan will set out how the construction works would be undertaken, duration, methods of construction, and methods for managing any potential or actual adverse effects. A draft of the CMP is attached as **Appendix B** to this application.

The management plan will set out the methods for managing activities including erosion and sediment control, hazardous substances, in river works, dust, noise, and site rehabilitation following construction.

The Construction Management Plan will contain a series of more specific plans relevant to each topic area. The specific issues to be addressed within the CMP are:

- Health and safety plan
- Effects on other users of the area (e.g. fishers, hunters, trampers, kayakers etc)
- Hazardous substances management
- Erosion and sediment management
- Management of in river works
- Construction traffic management
- Noise management
- Terrestrial Ecology Management (including monitoring and rehabilitation during construction)
- Risk management
- Waste management
- Archaeological and Heritage protocols

The CMP will include the detailed design and describe the construction methodologies once these have been established. Requirements for managing in river construction works, earthworks on land and vegetation removal will also be included. Noise management methods and the protocols for ensuring the cultural and archaeological values are appropriately managed are also proposed for inclusion in the CMP. A traffic management plan and health and safety management plan are also envisaged as being part of the CMP. In addition the CMP will describe the communication that will be undertaken and process to be adhered during construction of the monorail.

### 9.2.2 Operational and Environmental Management Plan

An Operational and Environmental Management Plan ('OEMP') will be completed prior to the operational testing phase of the monorail. The OEMP will set out the details with respect to the monorail operation and maintenance requirements. The monorail operator will be required to adhere to the OEMP and implement any of the obligations outlined therein. The OEMP will also consider ongoing health and safety requirements of the monorail for both the public and employees. This includes identification of hazards (tree fall, slips, weather conditions), and protocols to be adhered to during emergency

situations such as a fire or earthquake. A draft OEMP is attached to this application as **Appendix C**.

The OEMP will also detail any environmental management and mitigation obligations during the operational phase of the monorail. The OEMP outlines the ongoing monitoring required to ensure that site rehabilitation is successful and adverse effects are avoided or mitigated. The plan also includes a predator control programme which will be implemented in order to offset the loss of some 20ha of forest through Crown Land. This is planned to be in the form of a contribution to Operation Ark, a predator control programme currently operating in the Eglinton Valley.

An operational risk register will also be prepared as part of the OEMP. The plan will also address any decommissioning requirements, should this be necessary.

### 9.3 TERRESTRIAL ECOLOGY

As outlined in the Terrestrial Ecology Report attached as **Appendix I**, the mitigation of adverse effects arising from the loss of vegetation and habitat will involve:

- Minimising the project footprint.
- Rehabilitating areas as quickly as possible after completion.
- Minimising the potential for weeds to invade the route line and construction track and their margins, and monitoring and eradicating weeds if they establish in these areas.
- Minimising the potential for predators to increase their use of this area, monitoring and controlling such pest species so that at least they are no more numerous than in the surrounding forest.
- Monitoring to ensure that environmental outcomes are being achieved.

As outlined in the project description and alternatives, the proposed monorail route and construction track will be designed to avoid significant ecological habitats or areas wherever possible.

The CMP will include measures to:

- Control of the “*Platypus-Sporythrix* association”. This depends on minimising the buildup of *Platypus* populations by reducing suitable habitat (i.e., recently dead wood). This would include reducing the damage to standing trees when felling. With respect to the removal of suitable habitat the alternatives are to remove all wood, to cut large logs up into smaller pieces (1-2 m lengths) that will dry out more easily, to mulch fallen wood or to employ some combination of all three methods depending on the site and other constraints.
- Monitor weeds.
- Control and prevent the spread of weeds.
- Control predators in and around the affected area to allow natural ecosystem function to be restored as much as possible and assist in recovery of the vegetation and fauna of the site.

- Protect the environment from the accidental spill of a toxic material such as diesel or oil and minimise the risk to local habitats.
- Allow for recycling or removal of all rubbish and waste (including septic waste) from along the route (including the termini) regularly.
- Identify the boundaries of the working area to ensure that areas outside the intended footprint will be protected from accidental damage.
- Time construction to occur outside breeding season (October to March) in key habitats such as red beech forest.
- Ensure rehabilitation programmes are completed to the required standard in a timely fashion.

Prompt rehabilitation of storage depots, constructed portions of the monorail route and spur tracks that are no longer required combined with the monitoring and removal of weeds and pests will be also be undertaken in accordance with the procedures and programs set out in the CMP.

Monitoring during construction and operation of the monorail will also be undertaken, monitoring is regarded as critical to ensuring the high ecological values of the site are not compromised. Monitoring is also required to ensure public safety, for example regular inspection of the monorail track will be required to monitor for obstructions such as tree or branch falls and protect the safety of monorail users. The CMP will ensure that monitoring requirements are met.

Regular monitoring of the flora and fauna along the route during construction and operation of the monorail is also required to determine if the route is having any adverse effect on the terrestrial ecology of the route and to trigger management action if necessary. Since the adverse effects (such as weed invasion) may occur at some distance from the track itself, monitoring surveys will also need to consider the habitats surrounding the route. Monitoring is also necessary to determine how effective rehabilitation along the route has been and whether further intervention is required to assist the vegetation in returning to its natural state. A further requirement of monitoring is that the data collected is regularly collated and interpreted so that management decisions are informed and timely. This will be described in detail in the CMP.

As mentioned above Riverstone also proposes an intensive predator control programme to be implemented, to offset the loss of indigenous vegetation and habitat along the route (approximately 27ha). The predator control programme will be developed in consultation with the Department and will be described in detail in the OEMP. The OEMP will establish a programme for the monitoring of pests, the control of predators and any ongoing monitoring throughout the control programme. It would also define management triggers at which point further control is required. It is important that baseline and control monitoring occurs so that the success of the programme can be measured over time against the pre-existing conditions.

Several options exist, and the Mitchell Partnerships terrestrial ecology report discusses three options considered (refer section 9.4 of that report, **Appendix I**). It is recommended that an existing predator control programme contributed

to, known as “Operation Ark” in the Eglinton Valley, as it would be possible to add value to the scheme there by adding a fourth predator control area.

It is proposed that predator control be carried out to control possums, stoats and rats within area of 200ha. This area is almost 10 times the habitat area that would be affected along the monorail route, and would increase the area of protection within the Eglinton Valley by approximately 20%.

#### **9.4 AQUATIC ECOLOGY**

During construction, methods will be employed to mitigate any potential adverse effects arising from the construction of the monorail in the bed of rivers or elsewhere around water bodies. In river works will be minimised as far as practicable and erosion and sediment control methods will be employed to mitigate any potential discharges arising during the construction and earthwork activity. These methods will be described in the CMP.

Cleaning of equipment will also be necessary to ensure that no pest species, including didymo, are introduced to the water bodies along the route. A pre and post construction inspection will also be undertaken to determine the extent and management of didymo should it be required.

#### **9.5 CULTURAL**

Ngā Rūnanga o Ngāi Tahu will be provided with an opportunity to review and comment on the management plans as they are developed to ensure that their values are protected and the risks minimized. Removal of mature trees will be avoided where possible and where this is not possible Ngā Rūnanga will be given the opportunity for customary use of those resources in consultation with the Department. A Koiwi (skeletal remains) and taonga (artefact) accidental discovery protocol will be developed in association with Ngā Rūnanga o Ngāi Tahu and used throughout the construction and operation of the monorail. A draft protocol has been set out in the draft CMP.

#### **9.6 RECREATION**

The Greenaway recreation report and consultation with various parties including users of the route area identifies that the introduction of the monorail will generate some adverse effects on traditional users of the area, and a minor displacement effect. This will be offset by the recreation benefits and opportunities that will be created, including the provision of the mountain bike track which has the potential to create an important off-road cycling experience for domestic and international cyclists.

With respect to the traditional users of the area, the Kiwi Burn area will be most affected, with the location of the Kiwi Burn terminus alongside a traditionally low-key access point for walking, angling and kayaking activities. Other areas will be affected to a lesser extent, if at all.

It is proposed therefore to:

- Consider separation of terminus facilities from car parking facilities;

- Relocate part of the Kiwi Burn loop track, and establish a new Hut for use by trampers and hunters (retain existing hut for mountain bike use).
- Relocate the tramping route between the Whitestone River and Retford Stream;
- Ensure underpass for 4WD access to Army Hut.
- Consider landscaping Lake Mistletoe car park and upgrading of track if required.

## 10. ALTERNATIVES

### 10.1 MONORAIL ALTERNATIVES

In selecting the proposed straddle monorail system, a range of alternatives including other forms of rail based transport and construction methodologies have been considered and assessed, and are discussed in this section of the report.

A number of options around the type of rail system and train have been investigated over a considerable period of time. The conclusion has been consistent. A straddle monorail with rubber wheels on a concrete track provides the best overall solution to transportation that is environmentally sound, feasible to engineer, able to be constructed according to best practice, economically attractive plus provide a superior visitor experience.

From a construction perspective, a monorail is more flexible than might be initially considered. The rubber tyres on a concrete surface allow grades of up to 6.5% or 1:15. The spacing between beams can be varied to suit foundation, topography and alignment conditions. Natural undulations and variability in pier height (thus track height), will allow easy movement of wildlife, people, rivers, creeks and stock. Pre-cast beams and piers minimise on-site fabrication.

#### 10.1.1 Concrete versus steel

- The decision to use concrete for the majority of track was driven by cost considerations for both construction and maintenance.

Straddle versus suspended

- Riverstone investigated a suspended rather than straddle monorail plus it evaluated cableways and a number of hybrid systems. Again, the conclusion driven by cost was that the system must either be a concrete monorail beam supporting straddle running gear just above the ground or a conventional steel two-rail system on sleepers bearing continuously on the ground.

#### 10.1.2 Light rail

- Light rail has many problems that are overcome by a monorail beam system. Conventional rail systems involve labour intensive maintenance plus the following other considerations:
- A significantly wider disturbed width of operating corridor.
  - On the ground all the way. This creates major cost issues in challenging foundation locations and demands more extensive cuttings and embankments.
  - Steel wheels on steel rails limit grades to 2.5% - 1:40.
  - Rail replacement every 15 years at least.
  - Frequent alignment considerations.



- Overhead power supply considerations will create visual experiential challenges, involve greater canopy removal and substantial and regular tree management to keep the supply lines clear.

### **10.1.3 Beam and pier fabrication and placement**

- Progressive placement of pre-cast beams from track. The construction method proposed for beams whereby placement is done from a cantilevered lifting rig operating from already laid track allows for less damage to the environment by not requiring a disturbed width greater than the final operating corridor.
- Offsite prefabrication of piers reduces the level of in situ concreting and grouting required and particularly with 20m centres, reduces the amount of in-ground fabrication. This results in substantial labour savings which provides a further cost attraction over light rail.

## **10.2 ALTERNATIVE TRANSPORT OPTIONS – QUEENSTOWN – MILFORD SOUND/PIOPIOTAHİ**

The distance in a straight line from Queenstown to Milford Sound/Piopiotaħi is 75km. A number of people travel by air and use this direct route. For those travelling by surface transport the current trip is around 600km return and approximately nine and a half hours of coach travel, including a stop each way at Te Anau. When a boat trip at Milford is added the total trip time becomes 11-13 hours. The access between Queenstown and Milford Sound/Piopiotaħi was recognised as an issue even before the numbers of visitors increased and the middle of the day peak became a concern.

Both Central and Local Government have been aware of the need for enhanced access between Queenstown and Milford Sound/Piopiotaħi for many years. There have been a series of investigations and reports over the past 30 years that has seen policies aimed at providing a road linkage between Queenstown and Milford Sound/Piopiotaħi.

Up until the Local Government reorganisation in 1986, the Milford Sound/Piopiotaħi area was included within the jurisdiction of the Lakes County Council. In 1973 a proposed plan change to the Queenstown Wakatipu Combined District Scheme was appealed to the then Town and Country Planning Appeal Board that sought to provide for initial investigations to construct a road through the Greenstone Valley. This plan change was appealed by the National Parks Authority and the Mount Aspiring National Park Board (pre-cursors to the Department of Conservation).

A subsequent report in 1975 by the Ministry of Works and Development assessed the environmental impact of the proposed Kinloch – Elfin Bay Road. In submissions to the Commission for the Environment the National Parks Authority contended that this report was inadequate and that it should cover the full length of the proposed Greenstone Road. At this time the focus from both

local and central government was on using the Greenstone Valley as the preferred route.

In 1976 work commenced on the Lands and Survey report (1981) to assess all options for access between Queenstown and Milford Sound/Piopiotahi. In 1981 a report was prepared by the Lands and Survey Department (Environmental Assessment of Road Routes Between Queenstown and Milford Sound/Piopiotahi 1981) to assess alternative access options between Queenstown and Milford Sound/Piopiotahi. This is a detailed and methodical investigation of the alternative road routes, taking into account the potential impacts upon the natural environment, recreation and adjoining land uses. The report concludes that two options are available; the Greenstone Valley and a route from Walter Peak Station through to Te Anau. The Greenstone Valley option is found to have unacceptable ramifications, particularly in regard to its impact, both direct and indirect, on environmentally sensitive areas within the Fiordland National Park. Since that report was written the Fiordland National Park and adjoining sections of State Forest have been included within the Te Wāhipounamu - South West New Zealand World Heritage Area.

In 2005 Venture Southland commissioned GHD to assess the current situation of Southland's transport network and provide an integrated transport study for the region. The Southland Integrated Transport Study - Final Report was completed in December 2005. Appendix E – Milford Report deals with the Milford Road and looks at the options to mitigate current issues surrounding Milford Sound and its access. An addendum to the report to consider the Milford Dart Tunnel was completed in June 2006. Although the report was not specifically aimed to address Queenstown/Milford Sound access, the issues outlined in it are closely related. The following options, in addition to this proposal, were outlined in The Southland Integrated Transport Study – Milford Report and addendum:

- Sky trail Milford - Gondola;
- One - way Greenstone Valley Road;
- Haast - Hollyford Road;
- Shuttle Service on existing road - 'Park and Ride' transit system;
- Controlled road environment - Existing State Highway 94
- Upgrade of Milford Sound airport to allow larger aircraft
- Booking system Milford Road Corridor, and
- Upgrade existing road – SH94.
- Milford Dart Tunnel
- Status Quo

In addition to these options an earlier monorail proposal firstly through the Greenstone Valley and then in 1995 through the Snowdon to Dunton Creek on SH94 have been considered in the past. In 1980 a Ministry of Works study looked at the option of a new road through the Snowdon forest which would connect to the Von River road and a ferry across Lake Wakatipu. The road through the Snowdon forest took a similar route to the one for the monorail proposed in this application.

Each of the options listed above were discussed in summary in the 2006 Fiordland Link Experience application. Many are no longer being pursued for various reasons (e.g. the Sky trail gondola and a road through the Greenstone Valley). It is not considered appropriate to enlarge on the merits or otherwise of each potential option, as this could not be done comprehensively without significant detail on the robustness and effects of each. Riverstone considers that the proposed Experience provides an environmentally sound solution, that has additional tourism and economic benefits not offered by the other options.

## 11. CONSULTATION

### 11.1 OVERVIEW

The goal of the consultation programme was to obtain public (stakeholder) feedback on the proposed Experience project. For commercial reasons the consultation process with most groups formally commenced after the draft Environmental Impact Assessment (EIA) and any other additional information required to support the application for a concession, was supplied to the Department in September 2004. Since this time, Riverstone has systematically and thoroughly consulted with many key and interested parties regarding the project.

The consultation process commenced earlier with Te Ao Marama undertaking a Cultural Impact Assessment which is currently being updated currently. The Project team also considered feedback that was obtained through the investigation process undertaken to prepare this EIA.

Any project of this scale raises a number of issues for a range of groups and individuals. Through the consultation process a number of issues were raised and a wide range of views were expressed. Some of these issues have already been able to be addressed. It is anticipated that some of the issues raised will be able to be worked through with ongoing consultation and by the final design and engineering phases of the project. The way in which the Experience is ultimately operated will also be important. As expected some resistance to change or development of any kind was encountered. Unfortunately it is not possible to accommodate those views when putting forward a proposal of this scale. However nearly all the people who were part of the consultation process appreciated the opportunity to hear about the project directly from the proponents, ask questions and have their views listened to. Significant positive feedback was received on the consultation process undertaken.

### 11.2 CONSULTATION PROCESS

The overall strategy is to keep the public informed, listen to and acknowledge concerns and provide feedback on how public (stakeholder) comment influenced any decisions on the development of the proposal. This will be ongoing, particular once the easement is confirmed and the detail design phase of the project can commence.

#### 11.2.1 Communication, Information Gathering and Consultation

The following objectives have guided the consultation process.

**Objectives:**

- Determine the people, groups and organisations that will have an interest in the project.
- Establish open dialogue and continue as a basis for on-going communication.
- Communicate information regarding the project.
- Discuss the perceived and potential effects of the project.

- Gain further understanding of the activities undertaken in the general area of the route and the specific interests and concerns of the different people, groups and organisations.
- Explain the areas addressed by the technical investigations and communicate information from technical investigations.
- Receive any additional technical information from stakeholders who wish to provide it.
- Explain the process that is likely to be followed through the consultation and application phases.
- Open up general discussion regarding potential mitigation measures.
- More detailed discussions with people, groups and organisations about specific potential effects of interest or concern to them.
- Show how any concerns raised in the initial discussions have been investigated, taken into account, and where practicable have been addressed.
- Demonstrate how any effects, if adverse, will be avoided or mitigated through mitigation measures, environmental offset, performance standards and conditions, as appropriate.
- Maintain dialogue and on-going communication regarding outstanding concerns and processing of application.

**Approach:**

There were a wide range of people and groups on the consultation list. Consequently the approach used and steps in the process was varied to suit the situation.

1. Introductory letter (or phone call) to all parties:
  - outlining the project generally;
  - enclosing a colour copy map showing the route;
  - acknowledging their interest in the area and project;
  - stressing that Riverstone wants to find out about their interests in the proposed project;
  - asking them to think about how they would like to talk and/or meet with the project team;
  - giving an overview of the process going forward;
  - noting that investigations are still on-going, and that all details have not been finalised;
  - explaining who to contact;
  - letting them know that they will be contacted soon.
2. Follow up by letter or phone to arrange meetings and discussions, either individually or in small groups, as suitable.
3. Provide further information about the project either prior to meetings or given to people at meetings.
4. Meetings or phone discussion with individuals or in small groups, as appropriate.

5. Follow up acknowledging interests and concerns mentioned and reiterating process from that point on.
6. Provide open opportunity for written or verbal feedback after meetings and discussions.

### 11.3 CONSULTATION PARTIES

The following parties were included within the consultation programme.

- Ngai Tahu

#### **Government Agencies**

- Department of Conservation
- Including The Milford Sound Sustainable Development Project
- Southland Conservation Board
- Otago Conservation Board
- Southland District Council
- Invercargill City Council
- Queenstown - Lakes District Council
- Environment Southland
- Venture Southland
- Otago Regional Council
- Transit NZ
- Ministry and Minister (former Government) of Tourism
- Tourism New Zealand

#### **Landowners**

- Mt Nicholas station
- Hikuraki Station
- Takaro Lodge
- Glen Echo Station
- Te Anau Downs Station

#### **Recreation Groups**

- Fiordland Tramping and Outdoor Recreation Club
- Te Anau Rod and Gun
- Otago University Tramping Club
- Deerstalkers Association
- Southland Canoe Club
- Federated Mountain Clubs

#### **Interest Groups**

- Southland Branch and Otago Branch, Fish and Game Council
- Public Access New Zealand
- Royal Forest and Bird Society
- Fiordland Trails Trust

**Commercial Organisations, Community Groups**

- Te Anau Residents and business people
- Mossburn Residents
- Queenstown Business - through Chamber of Commerce
- Tourism Holdings Limited
- Real Journeys
- Skyline Holdings Limited

**11.4 COMMUNICATION PROGRAMME**

In addition to the consultation programme the company is committed to an open process of providing high quality information at key steps through the project. This will involve discussions with the tourism sector, nationally and locally, local and regional councils, Te Anau business leaders and environmental and recreational groups and Iwi.

Public information was initially made available through launch functions in Queenstown and Te Anau in September 2004 together with an extensive mail out of the project information memorandum to around 500 people. The information pack included an introductory letter, the project information memorandum, press releases and answers to frequently asked questions. An extensive website was also launched which included the full Environmental Impact Assessment. This will continue to be updated. The company is committed to an open and public process ensuring feedback is incorporated as much as possible in the development of the Experience.

## 12. SUGGESTED CONDITIONS

### GENERAL

#### Concession Term

1. The concession term shall be for a period of 49 years.

### PRE-CONSTRUCTION

2. Prior to the commencement of construction the concession holder shall submit a Communications Protocol to the Department of Conservation for approval. The Communications Protocol shall require the following agreements between the concession holder and DoC:
  - (a) Agreement on the precise route of the monorail within the 200m corridor;
  - (b) Agreement on the actions that will be taken in the event of a range of events occurring during the construction of the monorail;
  - (c) Agreement on the methods proposed for construction of the monorail and associated facilities and the program for construction of each element;
  - (d) Agreement on the route and form of the mountain bike track, from that location where it will deviate from the monorail;
3. Prior to the commencement of construction the concession holder shall walk with Department of Conservation representation to determine and agree on the final monorail construction/mountain bike routes.
4. Prior to the commencement of construction the concession holder shall submit to the Department of Conservation for approval detailed design and site plans showing structural and elevation details of all activities authorised by this concession.

#### Construction Management Plan

5. Prior to the commencement of construction, the concession holder shall submit a Construction Management Plan to the Department of Conservation for approval. The overall objectives of the Construction Management Plan shall be:
  - (a) To provide guidance on environmental management for the construction of the monorail and associated facilities;
  - (b) To avoid, remedy or mitigate any adverse environmental effects associated with construction activities;
  - (c) To provide detail of the construction methodologies and management of effects during construction.

The primary goals of the Construction Management Plan shall be to:



- (d) Describe the methods proposed for the construction of the monorail and associated infrastructure and the programme for construction of each element;
  - (e) Describe what actions will be taken to manage the actual or potential effects of construction activities;
  - (f) Provide a list of key personnel and points of contact throughout the construction period;
  - (g) Describe how stakeholders will be kept informed during construction and how complaints (if received) will be managed; and
6. The concession holder shall ensure that the Construction Management Plan includes a sub set of management plans that cover the following topics:
- (a) Health and Safety;
  - (b) Hazardous Substances;
  - (c) Traffic Management;
  - (d) Noise Management;
  - (e) Risk Management;
  - (f) Waste Management;
  - (g) Archaeological and Heritage Protocols and Plans;
  - (h) Mitigation of Effects on Users of the Area (e.g. trampers, fishers, hunters, kayakers);
  - (i) Erosion and Sediment Control;
  - (j) In River Works;
  - (k) Terrestrial Ecology Management.

#### **Operational and Environmental Management Plan**

7. Prior to the commencement of operational testing of the monorail through Crown Land, the concession holder shall develop in consultation with the Department of Conservation an Operational and Environmental Management Plan. The objectives of the Operational and Environmental Management Plan shall be:
- (a) To ensure the monorail and its associated tracks and infrastructure are maintained to best practice standards;
  - (b) To ensure at all times the health and safety of the public and employees during the operation of the monorail;
  - (c) To ensure the footprint and operation of the monorail minimises adverse effects on ecological and recreation values in the area;
  - (d) To ensure that any environmental off-set (such as predator control) is successful in achieving its objectives.
8. The concession holder shall ensure that the Operational and Environmental Management Plan:
- (a) Describes the monorail, mountain bike track and termini operational parameters, and all ongoing maintenance requirements, including environmental obligations such as sediment control.
  - (b) Describes the ongoing health and safety requirements of the monorail and mountain bike track for both the public and employees. This includes

identification of hazards (tree fall, slips, weather conditions), and protocols that will be adhered to during emergency situations (e.g. fire).

- (c) Includes an operational risk register which will be prepared and adhered to during the operation of the monorail.
- (d) Outlines methods to identify and mitigation effects on users of the area, via a recreation management plan.
- (e) Outlines the ongoing monitoring to ensure site rehabilitation is successful and to identify and respond to adverse environmental effects during the operational phase of the project.
- (f) Outlines the predator control programme which will be implemented in order to offset the loss of some 20ha of forest land through Crown Land.

## **CONSTRUCTION**

- 9. The concession holder shall implement and adhere to the requirements of the Construction Management Plan required by conditions 6 and 7 at all times during construction of the monorail and associated facilities.
- 10. The Construction Management Plan shall be updated by the concession holder, as either the concession holder or the Department of Conservation considers necessary. The Department of Conservation shall advise the concession holder of its requirement to update the Construction Management Plan in writing. Such a request may not occur more frequently than twice per calendar year. Each updated version of the Construction Management Plan shall be submitted to the Department of Conservation.

## **OPERATION AND ENVIRONMENTAL MANAGEMENT**

- 11. The concession holder shall implement and adhere to the requirements of the Operational and Environmental Management Plan required by conditions 8 and 9 post construction of the monorail and associated facilities.
- 12. The Operational and Environmental Management Plan shall be updated by the concession holder, as either the concession holder or the Department of Conservation considers necessary. The Department of Conservation shall advise the concession holder of its requirement to update the Operational and Environmental Management Plan in writing. Such a request may not occur more frequently than once per calendar year. Each updated version of the Operational and Environmental Management Plan shall be submitted to the Department of Conservation.

### 13. CONCLUSION

This application is for a concession from DoC for an easement to establish, operate and maintain a monorail and associated construction/mountain bike track through the DoC estate. The application is one part of the Fiordland Link Experience being pursued by Riverstone Holdings Limited, which aims to provide a tourism experience between Queenstown and Fiordland. One of the primary objectives of the project is to alleviate congestion in Milford Sound during the middle of the day, and enhance Fiordland's tourist market share.

The monorail has been recognized as a likely proposal and possible solution within the key DoC statutory and non statutory documents. The application assesses the proposal against these documents, and concludes that the monorail will be consistent with relevant provisions.

Key positive effects relate to tourism and the economy. The provision of the mountain bike track will be a significant positive effect of the construction of the monorail in terms of tourism and recreation opportunities.

Overall the monorail will enable those who would not otherwise have the opportunity to experience the beauty of the Snowdon Forest area to do so, in a controlled, comfortable way. It will therefore consist of a tourist attraction in its own right.

In terms of adverse effects, the majority of these will be during the construction of the monorail, such as noise and traffic generation, and effects on terrestrial and aquatic ecology, hydrology and existing recreation users. The development of a construction management plan will specifically deal with the sensitive nature of the site and put in place robust measures to ensure adverse effects do not exceed acceptable levels.

Longer term, loss of habitat and effects on existing recreation users will occur. The establishment of, and contribution to, a predator control programme will form environmental off set to the loss of habitat. The re-routing of the Kiwi Burn and Army Hut tracks, and construction of a new Kiwi Burn Hut will largely mitigate ongoing adverse effects on recreation users.

The Operational and Environmental Management Plan will be developed to set appropriate operational parameters, and ongoing environmental monitoring will be required to identify and mitigate additional adverse effects if necessary.

At an overall level the effects are such that it is considered that the concession should be granted. The only point of concern relates to the localised effects during construction, and longer term loss of habitat and effects on recreation users. These effects need to be considered in context. Part of that context is the very substantial regional benefits derived from the proposal that would accrue from implementation of the project. It is therefore considered that this localised effect is not sufficient to tip the balance of the merits of the proposal sufficiently to the negative to warrant withholding a concession to the proposal.

As indicated above the proposal will have a significant benefit both locally and regionally. All other effects have been comprehensively studied and assessed. Any adverse effects have been identified and wherever it is possible to do so, they can be appropriately mitigated. Several Environment Court decisions have confirmed that mitigation does not require that there is “no net effect” on the environment, or that all effects are compensated for in some way. Adopting this approach means that the effects of the activities promoted by the Experience need to be considered at a broad scale. The approach to mitigation adopted by Riverstone provides environmental outcomes that are sustainable, and which preserve those important qualities that prevail in the Snowdon Forest, and people’s enjoyment of that environment.

It is therefore considered that the concession should be granted, subject to appropriate conditions of the nature described in the preceding section of this report.

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# APPENDIX A

Draft Department of Conservation Communications Protocol

# APPENDIX B

## Draft Construction Management Plan



# APPENDIX C

Draft Operations and Environmental Management Plan

# APPENDIX D

## Certificates of Title

# APPENDIX E

## Preliminary Engineering Assessment of Monorail Proposal

# APPENDIX F

## Hydrology and River Geomorphology Assessment

# APPENDIX G

## Assessment of Potential Effects on Aquatic Ecology

# APPENDIX H

## Noise Assessment

# APPENDIX I

## Terrestrial Ecology Report

# APPENDIX J

## Landscape Effects Report



# APPENDIX K

## Tourism Assessment

# APPENDIX L

## Assessment of Recreation Effects

# APPENDIX M

## Cultural Impact Assessment

# APPENDIX N

## Transportation Assessment Report

# APPENDIX O

Catamaran and ATV Description Sheets

# APPENDIX P

Monorail Terminal Buildings for Kiwi Burn and Te Anau Downs