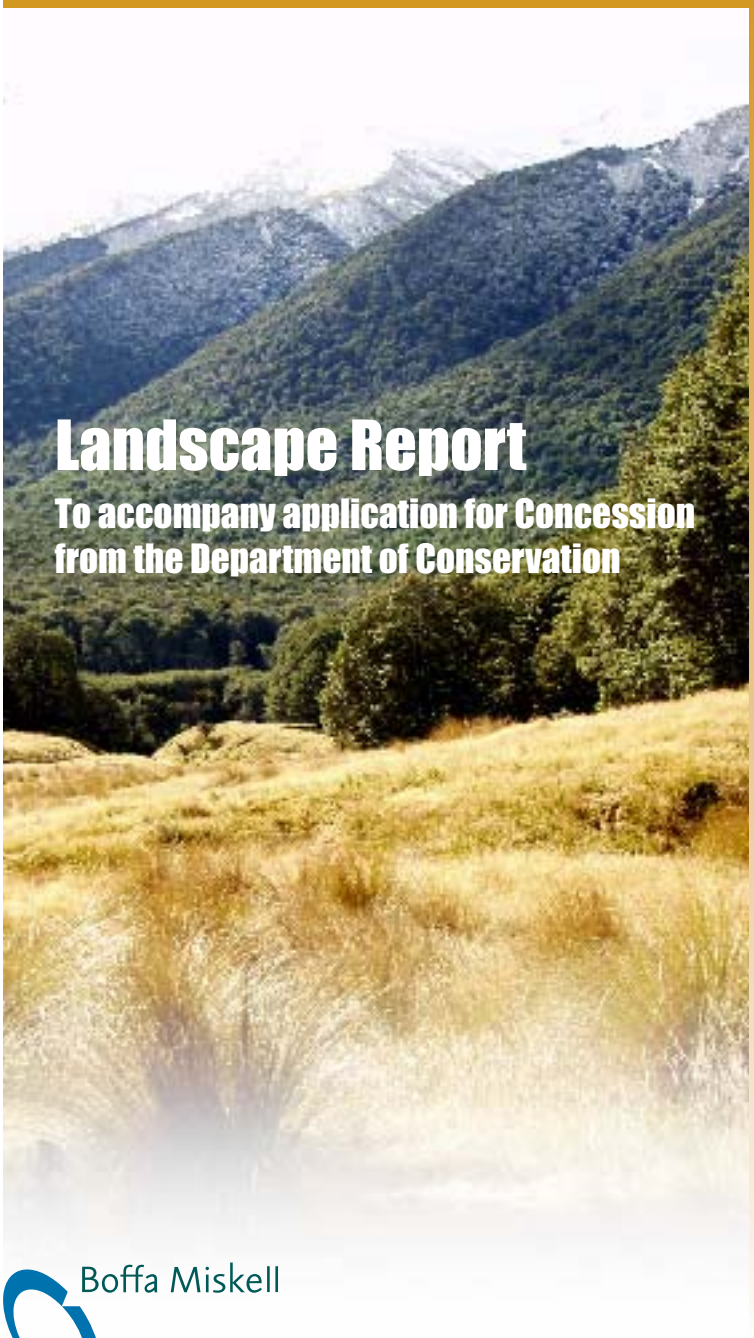
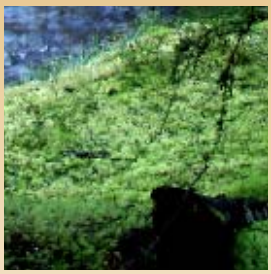
the fiordland experience



Landscape Report

To accompany application for Concession from the Department of Conservation



Boffa Miskell

August 2006

C05242

The Fiordland Link Experience

LANDSCAPE, NATURAL CHARACTER & VISUAL AMENITY

FINAL REPORT

To accompany application for concession from the Department of Conservation

Prepared for

Riverstone Holdings

by

Boffa Miskell Limited

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August 2006

CONTENTS

1.0 INTRODUCTION

1.1 Purpose of Document

The Fiordland Link Experience aims to provide a tourism experience that involves transporting visitors from Queenstown to Te Anau Downs through a variety of terrain via three different methods – Catamaran, All Terrain Vehicle and Monorail. Approximately 28.5 kilometres of the monorail section travels through land that comes under DoC jurisdiction - Snowdon Forest, Fiordland National Park (Te Anau Downs Terminus only), Crown land and marginal strips.

Proposed activities, structures or facilities in land administered by DoC require concessions under Section 17, Part 3B of the Conservation Act. The purpose of this report is to identify and address issues relating to the potential effects on the landscape that may arise from the construction and operation of a monorail in this area. The landscape assessment contributes to an Assessment of Environmental Impacts in preparation for an application for a concession.

The term “corridor” in this report refers to the area for which the concession application is being made. It will be approximately 6m wide. Within this area, a “route” of between 4 and 4.6 metres will be located on a line that will be finalised in discussion with DOC. The track and train are likely to require approximately 4 metres clearance on straight sections and 5-6 m on curves. Substantial vegetation above track height will be removed for construction and operational purposes within the route, with the intention that the canopy be allowed to re-form where possible. Vegetation outside the route and within the 6m corridor that poses a safety risk, may have to be removed.

Figure 1 illustrates these terms.

A scoping report for landscape issues was completed in early March 2004. It highlighted a number of issues requiring closer examination:

- General issue of introducing mechanical and human components into an environment perceived as remote and natural
- General effects on natural character, landscape and amenity values
- Effects on recreational users of the area
- Effects at points where rail enters and leaves dense beech forest
- Effects of construction disturbance, particularly at bush edges, on steep gradients and river margins
- Visual impact of a monorail corridor contrasting with strong natural lines and forms in the landscape
- Effects of operation in dense bush
- Effects of location, construction and design of terminals

- Effects of crossing farmland

A landscape assessment of the preliminary route options was completed in June 2004. The original report assessed the following alignment:

- Kiwi Burn Terminal to Whitestone Flats,
- Across the Flats (with a potential variation around Limestone Hill), to the Whitestone/Upukerora Saddle,
- Down to the Upukerora River and across to Dunton Toe,
- Over Dunton Toe to Dunton Swamp, and
- From Dunton Swamp to Retford Stream.

Since that time, the Department of Conservation have confirmed the location of the boundary to the Snowdon Remote Area. It is our understanding that the original monorail route that was assessed in June 2004 would now pass through the Snowdon Remote Area and in doing so, would not meet Department of Conservation requirements. In addition, a number of issues and constraints were identified regarding the route from the Upukerora River over Dunton Toe and across Dunton Swamp. Consequently, an alternative route that avoids both the Snowdon Remote Area boundary and the Dunton Toe/Dunton Swamp area, has been identified and is assessed in this revised report.

The original alignment across Dunton Swamp has been included in this report as Option 'B', for comparative purposes however the original section across the sensitive Dunton Toe is no longer considered and has been discarded.

For consistency with all other reporting on the Fiordland Link Experience, the corridor/route alignment is described from east to west and the sections in this revised report are:

MAIN CORRIDOR	ALTERNATIVE CORRIDOR OPTIONS
Kiwi Burn Terminus to Whitestone Flats (0.0-9.5km)	
Whitestone Flats to Whitestone/Upukerora Saddle (9.5-17.0km)	Limestone Hill Variation
Whitestone/Upukerora Saddle to Upukerora River (17.0-20.5km)	
Upukerora River Flats - Option 'B1' (Lower) (20.5-25.0km)	Upukerora River Flats – Option 'B2' (Higher)
Upukerora River flats to First Clearing (25.0-25.75km)	Option 'B' – Dunton Swamp to Retford Stream
First Clearing to DoC Boundary (25.75-28km)	

1.2 The Proposal

The proposed monorail is electrically powered, capable of carrying 160 passengers and crew and would make approximately 3 to 6 trips each day between the Kiwi Burn Terminal and Te Anau Downs at Lake Te Anau. The structure itself would comprise a single, box section track. The beams will be 0.8 x 1m and the supporting piers will be 0.5 x 0.4m. The carriages will be 2.6m wide and rise 2.4m above the rail. The standard design is based on pier intervals of 20m however there are likely to be areas where curves in the line will require shorter intervals (and a greater number of piers) of approximately 10m for engineering reasons. The piers will vary between 1 and 6 metres above ground level.

The proposal is fully described in the EIA. *'The Project Overview 23-02-04'*. summarised the project and was supplied to all consultants prior to starting work. This report generally provided the base against which the route was initially described. Modifications made to the route by the proponent since release of this document have also been taken into account. During the field work, a route was followed that had been previously flagged by Riverstone Holdings' consultant engineer. Route alternatives previously discussed with the proponents were also considered at this time. This report addresses the project as known when site investigations were carried out in early April 2006, and takes into account subsequent clarifications.

Some mitigation options proposed as a result of these investigations have since been incorporated into the project and can now be considered as part of the proposal. These changes will be discussed in the full EIA.

Consideration of alternatives pertaining to landscape matters is discussed in Section 8 of this report.

Figure 1 is a location map of the corridor alignment at the time that the 2006 field work was undertaken.

1.3 The Method

Desktop investigations

A preliminary desktop analysis of the area using topographic and aerial maps was undertaken to help to focus the on-site landscape assessment by identifying potential issues in advance.

Following the site visit, a resource study based on a range of relevant literature (see Bibliography attached), discussions and visual material, built on the initial desktop analysis and collation of field observations. This helped to identify and evaluate landscape, natural character and amenity values within the area and establish key constraints and opportunities.

Site investigations

A number of site visits have been made to different sections of the proposed corridor.

Key project team leaders took part in a site familiarisation visit over one day in December 2003. In March 2003 a Scoping Report was prepared in which the main ecological and landscape issues for the Kiwi Burn - Te Anau Downs route were discussed.

The primary on-site landscape investigations for the first preferred monorail alignment were carried out 5-8 April 2004. NIWA wetland scientists and BML ecology and landscape specialists spent time in the field together, guided by a Fiordland Link Experience consultant.

This 2004 field survey involved walking the then preferred monorail corridor from the DoC land/private land boundary near Retford Stream to the proposed Kiwi Burn Terminus. Key notes on various landscape, natural character and visual amenity aspects were made and photographs were taken using an Olympus 50mm Digital SLR Camera.

Following a significant re-alignment of the corridor, further site investigations were carried out on the 12th of April 2006. The revised alignment from the Upukerora River (20.5km) to the DoC boundary near Retford Creek (28.5km) was walked from east to west. Again, notes on various aspects of landscape related issues were made and photographs were taken using a Nikon 18-70mm Digital SLR Camera.

Discussions of those landscape issues pertaining to this report have been ongoing – before, during and after the site visits - with a number of the Project team.

2.0 LANDSCAPE PROVISIONS IN RELEVANT STATUTORY DOCUMENTS

2.1 Conservation Act

Part 3B - Concessions

Proposed activities on land administered by the Department of Conservation require concessions under part 3B of this Act.

The greater part of the study area lies within the Te Anau Basin landscape unit identified in the Southland – West Otago Conservation Management Strategy (CMS) (DOC, 2000). The exception to this is the proposed Te Anau Downs Terminus which is sited on land just inside the boundary of Fiordland National Park. This location however, was not included in a detailed site investigation. A discussion of the site based on oblique aerial photographs shall be made, however potential effects cannot be thoroughly assessed in this report.

Department of Conservation Management plans (CMS and Draft Fiordland National Park MP) recognise that Fiordland National Park is contiguous with other mountain and low-land indigenous forests throughout Fiordland, western Southland and Otago and should be managed to reflect this and the area's international importance as a World Heritage Area.

The outstanding natural values in Snowdon Forest are protected under the CMS - objectives "*to maintain the ecological and landscape integrity of the Te Wahipounamu World Heritage Area."*

The CMS has also identified an area described as the 'Snowdon Remote Area' which includes values related to wilderness and lack of development. The preferred monorail alignment (as at April 2006) skirts the edge of the Snowdon Remote Area on the true left of the Upukerora River for a distance of approximately one kilometre.

2.2 The Resource Management Act 1991

The application for a Concession for this proposal requires an environmental impact assessment be prepared as set out in the RMA. The relevant paragraphs in the RMA to this landscape assessment are:

s5 Purpose

(1) The purpose of this Act is to promote the sustainable management of natural and physical resources.

(2) In this Act, "sustainable management" means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while –

(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) Safeguarding the life-supporting capacity of air, water, soil and ecosystems; and

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

s6 Matters of National Importance

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:

(a) The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use and development:

(b) The protection of outstanding natural features and landscapes from inappropriate subdivision, use and development:

(c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:

(d) The maintenance and enhancement of public access to and along the coastal marine area, lakes and rivers:

(e) The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga.

S7 Other Matters

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development and protection of natural and physical resources, shall have particular regard to –

(a) Kaitiakitanga: [(aa) The ethic of stewardship:]

(b) The efficient use and development of natural and physical resources:

(c) The maintenance and enhancement of amenity values:

(d) Intrinsic values of ecosystems:

(e) Recognition and protection of the heritage values of sites, buildings, places or areas:

(f) Maintenance and enhancement of the quality of the environment:

(g) Any finite characteristics of natural and physical resources:

(h) The protection of the habitat of trout and salmon.

Section 2 of the Act defines amenity values as:

"…those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence and cultural and recreational attributes."

This report focuses on sections 6a, 6b and 7c which are central to landscape concerns.

3.0 DESCRIPTION OF LANDSCAPE AND CONTEXT

3.1 The Broader Landscape

The project is located in south-west New Zealand, an area of the country that is often considered in terms of its remoteness, ruggedness, grandeur, abundance of water and largely pristine landscape.

The Fiordland area is particularly well-known for its glaciated landforms. The glaciers that left behind the Te Anau and Manapouri Lakes also distributed large amounts of

debris across the surrounding alluvial plains. While seismic activity folded, lifted and hardened the landscape, glacial retreat and the ensuing river and stream processes cut narrow gorges, stream channels and terraced valleys into the morainic deposits, contributing to the landforms it is renowned for today – steep granite mountains, U and V shaped valleys, stepped terraces, smooth rolling hills and truncated spurs.[1] It remains a landscape dominated by fiords and river systems.

Forest in the valleys and lower mountain slopes of the Fiordland area is predominantly beech with grasslands and herbfields on the upper alpine slopes. The region provides habitats for a large range of indigenous fauna.[2]

There are few large permanent settlements in the region. Land use is typically divided between semi-intensive beef and sheep farmland, large tracts of conservation land and a few small urban populations.

3.2 The Corridor Landscape

The sections of the Fiordland Link Experience that this assessment is concerned with lie between Mararoa River, just upriver from the Kiwi Burn stream and the boundary of Te Anau Downs Station near the junction of Morainic Creek and Retford Stream.

The study area traverses and is affected by a range of typical fiordland landscapes: mountain peaks, rolling hills and terraces, rivers, wetlands, highly natural forested areas and modified farmland. The route skirts the southern slopes of the Dunton Range and Snowdon Peak – these, the Countess Range and the Livingstone Mountains are significant elements in the landscape, particularly on a clear day when their forested slopes frame views and enclose spaces around the proposed rail corridor. A possible fault line crosses the study area, possibly associated with the Hollyford Fault, which can be seen on a topographical map running west of the Livingstone Range.

The proposed corridor is never far from water of some description. It crosses close to the headwaters of the Mararoa, Whitestone and Upukerora Rivers, all of which are moderately large semi-braided rivers in the Te Anau basin. It also travels alongside and traverses a number of smaller tributaries, creeks and wetlands.

A slight rainfall gradient exists along the route with a decrease in rainfall from west to east, as does an altitude gradient with a general increase in altitude from west to east. The vegetation reflects these gradients with a general decrease in diversity and an increased dominance of mountain beech from west to east.

[1] Darby, J., Ewan Fordyce, R., Mark, A., Probert, K. and Townsend, C., (Eds.), 2003. The Natural History of Southern New Zealand. and Landforms

[2] Darby, J., et al., (Eds.), 2003. The Natural History of Southern New Zealand.

Typical topographical features crossed en route include pronounced terrace landforms, toe-slopes, colluvial fans, semi-braided and narrow river channels, valley floor depressions, steep gullies and low passes. Altitude ranges between approximately 210 (at Lake Te Anau) – 675 metres above sea level (masl).

The forest primarily supports red, silver and mountain beech communities. Wetlands and bog pine shrublands have been identified as areas of special ecological interest within the basin but the region also supports pockets of red tussock grasslands which is likely to once have been the dominant vegetation type in this area. Lee and Elliot (1995) identified yellowhead, kaka, yellow-crowned parakeet and long-tailed bats as threatened fauna that occur along the proposed corridor.[3] The Te Anau Basin has experienced significant clearing of lowland areas for semi-intensive beef and sheep and deer farming and signs of historic and recent modification for these purposes can be seen in some areas along the proposed rail corridor.

3.3 The Route

Kiwi Burn Swing Bridge Terminal to edge of Whitestone Valley (Glen Echo Station)

Main alignment: (0.0 – 9.5km)

The Mararoa is a significant semi-braided river in a glaciated valley. Grazed terrace flats on the true left bank contrast strongly with those draped in beech on the right. Walking tracks to the Kiwi Burn hut converge at the Mararoa River at a narrow, rock-lined gorge which is crossed by a light swingbridge.

The hut lies in tussock flats that narrow from approximately 250m to less than 50m as they bend and follow the Kiwi Burn upstream.

Beyond the hut the route sidles quickly up through predominantly mountain beech to Dunton Saddle at approximately 700masl. It traverses moderately steep slopes and two significant guts on the way, one of which has a particularly steep southern face.

A sizeable plateau at the saddle drops off at more gentle grades down to river terraces towards the Whitestone flats.

Whitestone Flats to Whitestone/Upukerora Saddle

Main alignment: (9.5 – 17.0km)

The Whitestone flats are an open and modified landscape, interrupted only by grids of deer fencing. Open elevated positions such as at the southern base of the proposed route around Limestone Hill afford attractive pastoral views.

[3] Lee, W. G. and Elliot, G. P., 1995. Snowdon Forest – proposed monorail route: biological assessment. Unpublished report. Landcare Research, Dunedin, NZ.

Very strong, straight terrace landforms run alongside the Whitestone River which is a substantial semi-braided river at this point. Limestone Hill itself is a prominent feature at 878m, with much of its south and western slopes developed for grazing. There is an attractive tussocky clearing on the eastern, forested slopes with picturesque views north to Snowdon Peak.

The valley running north from the Whitestone to the saddle, has a pronounced sinuous forest edge and mainly modified simple transition from bush to clearing. The character of the clearing is mostly quite enclosed but appears more open when travelling from north to south since the clearing opens into the Whitestone flats at the southern end with excellent views of the wider landscape. The width of the tussocky valley varies from 100 to 500 metres. Tongues of bush and undulating spurs open and close space and views in both directions. It is thought that the DoC boundary lies primarily within the clearing.

Whitestone/Upukerora Saddle to Upukerora River

Main alignment: (17.0 – 20.5km)

This is a narrow river valley, entirely clothed in beech with steep sides climbing immediately out of the riverbed in many stretches. The sight and sound of the river is the dominant focus of this landscape. The tributary is a moderately sized, attractively meandering river. It flows downhill at a gradient sufficient to create dynamic river character in terms of its natural patterns and processes. There are clear signs of river flood effects in places where big flows have undercut banks. There are occasional small waterfalls on the upper terraces and boggy areas where there are lower flood terraces. Signs of recent and significant snow damage are common with many large fallen trees.

This is a very contained landscape.

Upukerora River Flats (Options 'B1' and 'B2'):

Main Alignment: 20.5 – 25.0km

The Upukerora is a substantial semi-braided river. In this area it flows through grassed flats between steep bush covered slopes. The extent of the bush edge varies along the Upukerora river terrace, moving close to then away from the rivers edge. The surrounding hills generally rise steeply and quickly from just inside the bush edge.

Downstream, tongues of beech appear to completely enclose this narrow valley. The Dunton Toe landform rises from the north-west in distinct but irregular terraces and culminates in a high, steep beech-covered scarp facing the Upukerora river valley.

The marked route sidles along the true left of the terraced river bank, skirting the Snowden Remote Area, at times passing through wide grassy flats and at times across narrow bush-covered terraces that drop immediately down to the river bed. At

the proposed crossing point (at approximately 22km), the river flows in a broad arc through a large, open, grassy area at the 'opening' to Dunton Swamp.

There are dramatic views up and down the Upukerora River, particularly to the Livingstone Mountains upriver.

There is an unformed 4-wheel drive track across the river flats where hunters and anglers gain access to the upper reaches of the Upukerora.

Upukerora River to First Clearing Beyond the Upukerora

Main Alignment: 25 – 25.75km

The river valley is wider and more open in character through this section than it is further upstream. The river hugs the narrower beech-covered terrace and slopes to the northwest, while generous grass and shingle flats spread out to the southeast.

The proposed alignment follows the true right of the river through this section. After crossing the grassy flats at the 'opening' to Dunton Swamp, it will mostly pass through bush or close to the edge of the bush. The beech terraces generally form quite an open under-storey here. There is a short distance where a steep spur above the river will have to be negotiated and this has a more dense, scrubby character. As the proposed route moves away from the river to follow the base of the hill, the ground becomes quite level and the vegetation more open again.

The scattered buildings associated with Takaro Lodge are tucked up a valley above these flats. Some of these lodge facilities are visible from parts of this route, mostly around the 25km mark.

As with the upper Upukerora section, there are informal 4-wheel drive tracks across the river flats where hunters and anglers gain access to the upper reaches of the Upukerora.

First Clearing to DoC Boundary near Retford Creek

Main Alignment: 25.75 – 28.5km

This section is characterised by open beech forest on gently sloping terrain. The hills to the northeast and southwest are typical lateral moraine deposits and the proposed route skirts the base of the large northern deposit.

It is intended that the monorail pass through two clearings in this section if possible or alternatively, close to them. One is a large grassy clearing with quite a diverse and coherent bush-edge, including open, wet pools. There are views to the distance, beyond the beech forest. The second clearing is a small raised bog, enclosed by a sharp forest edge.

Between approximately the 28km mark, and the DoC boundary, the terrain becomes steep and the proposed route crosses sizeable gullies containing small creeks, and sidles along moderately steep faces.

Dunton Swamp (Alternative Route Option 'B') - now superseded

Dunton Swamp is considered by the Department of Conservation to be one of the most significant wetland areas in the Te Anau Basin that they manage. It is a large open clearing approximately 1kilometre wide and 3 kilometres long. The lower slopes of the Dunton Range end in fingers of bush that create a long sinuous bush edge to the Swamp. There is a feeling of enclosure in spite of the large size of the clearing. The Dunton Range rises immediately to the east to over 1400masl. Another range climbs to about half that elevation on the western edge, only a narrow valley opens to the north and the southern end of the swamp is blocked by peaks of approximately 1000masl rising out of the Upukerora River. There are some picturesque views through to the rugged mountains around the head of Lake Te Anau.

The ground is undulating along the eastern bush-line where it rises up to meet the bush in places. It also rises on a north-south alignment, to a distinct saddle close to the northern end of the swampy clearing.

Dunton Swamp to Retford Stream (Alternative Route Option 'B') – now superseded

As with most of this route, the sight and sound of rivers and streams play a large part in the experience of the landscape in this section. The proposed route runs gently down to the north through a broad shallow valley for much of this section. Most of the valley is bush-covered and dominated by mountain beech. Being in this type of landscape tends to focus the senses on the most dynamic feature – the river.

There are a number of small clearings in this section and one large open area of grass and wetland. There are some impressive, intimate views of the Dunton Range from this clearing as well as limited views out to the mountains around Lake Te Anau.

Terraced landforms become more legible and dramatic as the route climbs up the Dunton Swamp. There is a marked transition into an attractive narrow stream valley immediately prior to entering or leaving Dunton Swamp.

Te Anau Downs Terminus

The proposed site which is within Fiordland National Park boundaries, lies between Lake Te Anau and the Te Anau-Milford Highway and immediately adjacent to a cluster of buildings that comprises the Best Western Hotel complex. The site was not visited but viewed from the air.

The grounds slope smoothly away from the highway, down towards the lakeshore. There is a band of riparian vegetation and a small stand of beech around the shoreline immediately below the existing complex and the large promontory to the west and south of the site is well vegetated with dense, indigenous cover.

The hotel complex sits in grounds of modified open character, with existing structures that include buildings, carparks and roads. Trees and shrubs close to the buildings have been grouped together while the grounds that stretch south of the hotel consist of larger areas of open, maintained lawn with scattered individual trees and shrubs. It is proposed that the terminus be positioned in these modified grounds, south of the existing buildings, between the highway and the lake.

The existing complex appears to be made up of a scattered collection of buildings of varying colour and design.

The slope of the ground could be used to maximise the effectiveness of any screening of the terminus and monorail from the main road while the existing riparian vegetation provides a backdrop that could also help to blend the facility into the site.

4.0 LANDSCAPE VALUES AND VISUAL AMENITY ISSUES

4.1 Introduction

The landscape values of the study area are now discussed under the headings of natural character, outstanding natural features and landscapes, amenity values and visual sensitivity/absorption capability. Photographs 1-15 illustrate the landscape character and these values.

4.2 Natural Character

The term natural character is used to refer to levels of modification in landscape.

> *The highest degree of natural character (greatest naturalness) occurs where there is least modification.*
>
> *The effect of different types of modification upon the natural character of an area varies with the context and may be perceived differently by different parts of the community. EPI, BML (2002)*

The study area has a character that is perceived to be, overall, wild and unpopulated. It is a landscape that has a high degree of naturalness. The ‘Snowdon Remote Area’ (discussed in section 2.1), encapsulates values relating to wilderness and isolation. For the purposes and usefulness of this report it has been necessary to examine the proposed corridor in an intimate, critical context that allows for localised modifications. Consequently, natural character values of this landscape have been assessed within the context of a New Zealand high country landscape and found to range between Moderately Low and Very High across the study area. (see Appendix 1)

- The Upukerora, Whitestone and Mararoa are the three largest rivers in the study area. The proposed corridor traverses these significant, semi-braided rivers close to their headwaters in a setting that is generally on the margins of modified farmland.

- Many small streams and creeks with dynamic natural patterns and flow processes cross or follow the proposed route.

- There are a number of open clearings in the area that vary markedly in their size and degree of natural character. Most appear to have experienced some degree of modification whether by grazing or burning. Some are distinctly dry, others wet, and most a combination with wet centres and dry margins.

- The dry grasslands and dry areas of the wetlands are typically more modified and dominated by introduced species, however there are some with higher natural values that support significant pockets of red tussock.

- Dunton Swamp is the largest wetland within the study area (although it is no longer adjacent the current proposed route). Both the swamp and the bush edge appear to have experienced some modification, particularly around the north-eastern edge and southernmost tip. These areas are drier and appear to have a less diverse composition. In the southeast there is a pocket of wetland with a more diverse structure and a remarkably coherent transition where it meets the forest edge. The natural character of this section of the swamp is particularly high.

- The stepped landforms along Whitestone River and the south and western slopes of Limestone Hill have been cleared for pasture but other terraced areas, spurs and toe slopes along the route remain draped in beech. Some bush lines however, are truncated across the lower slopes of small spurs where they meet cleared valley floors. There is very little sign of any erosion or slippage, natural or otherwise, on the steep slopes through the area.

- There is extensive Beech forest throughout the study area. There are particularly coherent, mature and unmodified patterns and processes in some pockets of forest across the proposed corridor.

- Transitions between bush edges and clearings vary in the quality of their natural values but most have been modified to some degree by disturbance in the clearing – fire, grazing etc – which has created an artificially sharp edge between forest and clearing. Natural values are higher in areas where the bush has retained a coherent gradation between mature beech and open clearing.

- Where the proposed corridor skirts cleared, modified farmland with associated fences, farm vehicle tracks and other visible signs of ongoing farming processes, the level of natural character drops.

4.3 Outstanding Natural Features and Landscapes

The proposed corridor lies within Snowdon Forest which is part of the South West New Zealand World Heritage Area. The World Heritage Area has been identified as an outstanding landscape in the Southland Regional Landscape Assessment Part 1, BML (1997):

> *The following two extensive landscapes [Te Wahipounamu/ South West New Zealand World Heritage Area and Rakiura/ Stewart Island] are considered to be outstanding. Within them are numerous natural features that are themselves outstanding in different ways, but it is the quality of the total area that is exceptional.*

- The Department of Conservation and the Southland District Council have identified Dunton Swamp as a significant feature of this area. In landscape terms it is an attractive open wetland with a striking naturally sinuous bush edge. The size of the clearing adds value to its character and allows for charming views to distant mountains. It is a special landscape, however it is not entirely unmodified.

- The sight and sounds of water are a dominant contribution to the experience of the landscape in this area. Every river and stream expresses the dramatic, dynamic nature and history of the wider Fiordland landscape. In themselves, they are attractive features that contribute an essential story to the overall landscape while their context has typically experienced some degree of modification or disturbance.

- Landforms across the route are typical of the wider Te Anau Basin landscape. Limestone Hill is one of the most distinguishable natural landforms along the route. It appears to have risen directly from the ground with slopes that climb steeply and suddenly from otherwise flat paddocks. Much of the south and western faces have been developed for pasture though the eastern and northern slopes of the hill remain forested.

The Snowdon Forest landscape setting is special as part of an extensive, contiguous corridor of glaciated landforms cloaked in beech forest and relatively unpopulated wilderness landscapes. The quality of the total area is outstanding. The proposed monorail route traverses the margins of this area where the landscapes express the overall quality of the region but are not exceptional in themselves.

The Te Anau Basin, which encompasses Snowdon Forest, also includes large areas of modified farmland. The proposed corridor runs close to and alongside these farm boundaries for some kilometres.

4.4 Amenity Values

The concept of amenity values is intertwined with the visual aspects of natural character and visual sensitivity.

It is recognised that the introduction of a monorail may change the way people use and experience the area. To understand the effects and identify their potential extent

and relative importance it is essential first to consider the amenity values known to be present in this area.

- Accessibility and popularity – Use of the area is light since access to and through most of this region is relatively difficult. Primary access points are via the Kiwi Burn swingbridge and track, up the Whitestone River, up the Upukerora River and up the Retford Creek. Vehicle access at the latter three points requires permission from private landowners. There is an appreciation amongst general public of the values associated with remote, back country areas as well as amongst the relatively small number of individuals who use these areas.

- Recreational users – There is an existing walking track through the study area that is part of a route linking the Eglinton Valley to the Mavora Lakes area. The track runs alongside and crosses the proposed rail corridor in different places for approximately 12 kilometres. The condition of the track within the corridor (excluding the Kiwi Burn tracks) suggests it may have been well used or regularly used in the past but has not been used in this manner for some time.

- The site of the proposed Kiwi Burn terminal and approximately the first 4 kilometres of the rail is the part of the study area used most regularly and for a variety of recreational pursuits from picnicking to angling, kayaking and tramping. The Kiwi Burn Hut is a popular destination for family groups and less experienced trampers. The narrow part of the Mararoa River where the swingbridge crosses is popular with kayakers and canoeists. A basic carpark, swingbridge and DoC signage in the vicinity of the proposed terminal currently provide access and information for all visitors.

- Trout fishing and deer hunting are popular activities across this landscape. Hunters and anglers are likely to be among the most frequent visitors to the study area although the difficult access limits these users to relatively small numbers.

- There are views into the study area from public access points around the Kiwi Burn Hut, carpark and Mavora Lakes Road.

- There are limited views into the study area from neighbouring farm properties and particularly from Takaro Lodge facilities.

- There must be some consideration of the integrity and coherence of landforms, bush lines and their outlines (silhouettes) and their contribution to the appreciation and value of views into and out of the study area.

4.5 Visual Sensitivity/Absorption Capability

The visual sensitivity of the receiving landscape may have consequences for the extent of any effect on that landscape.

The sensitivity of the landscape will depend on existing land use, the pattern and scale of the landscape, visual enclosure/ openness of views (including location,

context and expectations of viewers), scope for mitigation and values placed on that landscape.

Landscape types within the study area are now discussed in terms of their sensitivity or absorption capability with regards to the alignment and construction of a monorail:

- The open character inherent in clearings and wide river valleys increases their sensitivity. The degree of sensitivity to a monorail development increases correspondingly with the size of the clearing, the sinuous quality of the surrounding bush edge, the level of natural character and the lack of relief within the clearing.

- The proposed route follows some narrow, bush covered river valleys. The vegetation cover and narrow valley formation increases the ability of the wider landscape to absorb a monorail structure and movement. However, on a more intimate scale, the narrow focus from within such a setting increases the sensitivity of that landscape.

- Steep slopes with gullies and spurs have a reasonably high capability for absorbing a monorail in terms of screening the alignment. However, the restricted turning radius of the monorail means that very steep gullies are likely to be relatively sensitive to this particular proposal since they may require a more substantially engineered structure to bridge them. Steep gradients along the route will generally be sensitive to construction.

- Terraced landscapes have potential for high absorption capability because they are well-defined linear, raised landforms that can be used to both complement and screen the design of artificial structures.

- Vegetation cover typically increases the capacity for a landscape to accommodate a development like the monorail since it provides a level of natural screening that increases with the height and extent of the vegetation.

  With regards to the alignment of the monorail, the beech forest in this area has sufficient height and mass to absorb it easily.

  Density and canopy spread however, mean that the same beech forest landscapes will be sensitive to the construction of the monorail to varying degrees depending on the frequency and size of certain pockets of trees and the ability of the rail to pick a path between them. On the other hand, where there is evidence of frequent disturbance this suggests these parts of the forest have some ability in visual terms to absorb further disturbance.

- A partially modified landscape such as fenced farmland will typically be capable of high levels of absorption since modified structures have already been introduced into a natural landscape. Additional modifications are likely to create less of a visual contrast and blend in more easily.

- Sensitivity is also concerned with the numbers of people likely to view the landscape and their expectations.

5.0 CONSTRAINTS

5.1 High Constraints

Previously, the route between the Upukerora and Retford Stream included some areas of high and very high constraints. This section of the route is now superseded. The current route does not have 'high' or 'very high' constraints.

5.2 Moderately High Constraints

These areas stretch from the carpark and swingbridge at the Mararoa River to the Kiwi Burn Hut and include the river valley from Upukerora to Whitestone saddle, and the Upukerora River – particularly the crossing point and where the rail is very close to river margins.

They reflect:

- Areas identified as having either high amenity values or high natural character values
- The aesthetic appeal of the swingbridge and gorge area
- The remote wilderness appeal of a coherent river valley that drains from saddle to major river
- The values of large, semi-braided rivers
- visual prominence from public viewpoints
- The potential for conflict with other users
- The value as a setting for public use

The need to minimise disturbance to:

- Steep slopes
- River margins

The need to maintain the integrity of:

- features that add uniqueness and a sense of wilderness

Development:

- Buildings and structures should be located to minimise impact from viewpoints
- Avoid frequent transitions between bush and clearing where possible
- Avoid visually dominant riparian areas

- Siting of the terminus and the route alignment between 0-4.5km should avoid swingbridge and gorge area and should generally be sited with extreme care to minimise impacts on other users as much as possible

- Although much of the alignment near the Upukerora passes through a modified grassland environment, the importance of this large river should be reflected in appropriate care with placement of piers, particularly where the route crosses or passes within the riparian margins.

- Add appropriate colour to structures to blend into landscape

5.3 Medium Constraints

These areas include the steep guts up to the Kiwi Burn saddle, the long narrow clearing from Whitestone flats to the Whitestone/Upukerora saddle, where there are steep gullies and clearings between the Upukerora and the DoC Boundary near Retford Creek, and most of Dunton Swamp.

They reflect the need to maintain the integrity of:

- landforms and natural bushlines

- natural character values of wetland/bog areas

- views in and out of open clearings

- steep slopes

The need to minimise:

- Visibility in open clearings

Development:

- Curving, low profile of rail structure through clearings and across steep gullies

- Care required with placement of piles on steep slopes and near potentially sensitive wetland areas

- Add colour to structure to blend into environment

- Where rail moves through a clearing, the alignment should follow close to the bush edge and repeat the existing bush and contour lines

- Avoid frequent transitions between bush and clearing where possible

5.4 Moderately Low

This area occurs around the back of Limestone Hill.

It reflects the need to consider the:

- value of the hills as a prominent feature in the landscape
- integrity of views out from a clear elevated position

The need to minimise disturbance to the:

- red tussock clearing

Development:

- Use topographically varied landscape and modified bush to provide rail screening opportunities

5.5 Low

These areas occur along most of the section between the Upukerora and the DoC boundary near Retford Creek (excluding the clearings and the areas of steep gradient), and from Whitestone flats up to Kiwi Burn saddle and from the saddle to the clearing at Kiwi Burn Hut (with the exception of the steep gullies)

They reflect:

- Areas that include modified farmland
- Areas that have experienced frequent disturbance
- Contained valley flats with open understorey and generally low tree density

The need to address:

- Disturbance on occasional steep slopes around river margins
- Conflict with farm operations
- Disturbance to large, potentially habitat trees and to canopy

Development:

- No specific design controls
- Care with placement of piers on steep slopes, particularly around stream margins
- Care with route selection through beech forest – select route to avoid as many trees as possible, particularly to avoid larger specimens

6.0 OPPORTUNITIES

6.1 Potential

- The valleys and spurs create spaces and open and close views that could influence the design of the final alignment
- The landforms are an opportunity to tell a story of the glacial history of the area
- The areas with steeper gullies and pronounced terraces have the potential to create a dramatic experience
- The charming and picturesque views offer a memorable setting
- The track alignment near the opening of Dunton Swamp provides a great opportunity for wetland interpretation and education

7.0 SIGNIFICANCE OF EFFECTS

7.1 Specific Issues and Effects along the Route

Main alignment: 0-4.5km

Construction, alignment and operation of the proposed terminal and original rail route are likely to have adverse effects on:

- existing recreational use
- visual impacts
- general amenity values
- landscape and natural character values

These effects can be reduced by:

- keeping the terminal site to the left of the access road
- pushing the crossing point approximately 900m downstream from the swingbridge
- care in alignment of river crossing in terms of choosing a location and direction that does not block long open views, crosses quickly and provides a back-drop to help blend the structure into the wider landscape
- keeping the alignment of the track outside of the bush as much as possible once it has crossed the Mararoa, until it meets the Kiwi Burn.

- curving the track to match the naturally sinuous bush edge
- the final design of the terminal building will help determine its effects on landscape and natural character values but these effects can be reduced by using the stepped terrace landforms to screen and inform the design of the terminal, platform and track alignment.

Main alignment: 4.5-9.5km

Construction and alignment of the proposed monorail is likely to have adverse effects on:

- Landscape and natural character values where the monorail traverses two particularly steep gullies.
- Disturbance of the ground and canopy of large viaduct-type structures

Effects could be reduced by:

- Careful placement of piers
- Keeping a profile to the ground that is as low and tight as possible

Alternative alignment: 9.5-14.25km (route southwest of Limestone Hill)

Construction, alignment and operation are likely to have limited adverse effects on:

- Farming operations
- Visual impacts
- Landscape and natural character values of river crossing

Effects could be reduced by:

- Small alterations to the route alignment to follow the base of the south and western slopes of Limestone Hill more closely
- Care in alignment of river crossing (as described for Mararoa River crossing)

Main alignment: 9.5-14.25km (route behind Limestone Hill)

Construction and alignment are likely to have limited adverse effects on:

- The integrity of the red tussock clearing

- Natural character values along the edge of the Whitestone River
- Disturbance along river margin
- Landscape and natural character values of river crossing

These effects can be reduced by:

- Pushing alignment of the rail inside the bush edge where it follows the Whitestone River
- Careful placement of piers and track through the tussock clearing to tuck the rail against the forest edge and follow its sinuous pattern as closely as possible
- Care in alignment of river crossing (as described for Mararoa River crossing)

Main alignment: 14-16.9km

Construction, alignment and operation are likely to have limited adverse effects on:

- Landscape and natural character values of the sinuous bush line
- Visual impacts
- Forest edges where the monorail passes from bush to clearing

These effects can be reduced by:

- Avoiding too many bush/clearing transitions but where they're required, angling the line into/out of bush preferably on curve (following natural contours where appropriate).
- A slight adjustment to the alignment if possible (requires agreement with private landowners) by tucking it just outside the bush edge and following the curves in topography and bushline as much as possible.
- If restricted to DoC land, the comments above apply but the alignment will be just inside the bush edge

Main alignment: 16.9-20.5km

Construction and alignment are likely to have adverse effects on:

- Localised visual impacts
- Landscape and natural character values

These can be reduced by:

- Locating route away from river margins as much as possible
- Careful installation of piers on steep slopes
- Care in alignment of river crossing (as described for Mararoa River crossing)

Main alignment: 20.5-22km

(Options 'B1' and 'B2')

Construction, operation and alignment is likely to have adverse effects on:

- Natural character and landscape values around the riparian edges, particularly at steeper slopes where some cut and/or fill may be required
- Visual amenity values, particularly at river crossing point

These effects would best be mitigated by:

- On the wide grassy flats, tuck the rail directly against the bush edge and follow the bushline as much as possible.
- Where the river valley is more contained and the grassed terrace areas narrow considerably, an alignment just inside the bushline would be preferable.
- Careful installation of piers on steep slopes and narrow terraces and where possible avoid cut and fill on steep slopes that drop directly into the river bed.
- Care with alignment at crossing point – minimise distance across river and from bush edge to bush edge

Main Alignment: 22 – 25.75km

Construction, operation and alignment is likely to have adverse effects on:

- Natural character and landscape values around the riparian edges, particularly at steeper slopes where some cut and/or fill may be required
- Localised visual amenity values – particularly Takaro Lodge users

These effects can be reduced by:

- Careful placement of piers in sensitive areas

- Positioning the route just inside the bush edge wherever possible otherwise following the curves in topography and bushline

Main Alignment: 25.75 – 28.5km

Construction, operation and alignment is likely to have adverse effects on:

- Natural character and landscape values of the forest edge where the monorail passes from bush to wetland clearing
- Disturbance to canopy and to steep slopes near DoC Boundary

These effects can best be mitigated by:

- Locating the route to avoid most sensitive fringe areas and angling the line into/out of bush preferably on a curve.
- Selecting a route that minimises the need to remove large beech trees

Alternative Route Option 'B' (23.9-25.7km) – now superseded

Construction and alignment are likely to have adverse effects on:

- Natural character and landscape values of the forest edges where the monorail passes from bush to wetland
- Natural character of the sinuous pattern of the bush edge
- Visual impact of the rail

These effects can be reduced by:

- Avoiding too many bush/clearing transitions but where they're required, angling the line into/out of bush preferably on curve (following natural contours where appropriate).
- Tucking the alignment just outside the bush edge and following the curves in topography and bushline as much as possible.

Alternative Route Option 'B' (25.7-26.5km) – now superseded

Construction and alignment are likely to have adverse effects on:

- Natural character and landscape values
- steep slopes around stream margins

These effects can be reduced by:

- careful placement of piers on steep slopes and near stream margins
- small adjustments to alignment as necessary to minimise disturbance to vegetation and landforms

Alternative Route Option 'B' (26.5-32km) – now superseded

Construction and alignment is likely to have limited adverse effects on:

- steep slopes around river margins
- bush/clearing transitions

These effects can be reduced by:

- careful placement of piers in sensitive areas
- angling the alignment into/out of bush edges, on a curve where appropriate (as natural contours dictate).

Te Anau Downs Terminus

Two options for the approach and location of the terminus and turning circle are under consideration. If the route approaches from the south, the location of the turning circle appears to be inside a pocket of red beech adjacent to the lakeshore, not much bigger in diameter than the size of the turn-around. Construction is likely to involve some disturbance to a large proportion of this remnant however significance of the effects is difficult to ascertain without an outline plan and a clearer understanding of its landscape values.

The northerly route appears to run through the edge of a band of riparian vegetation for a short distance once it crosses the State Highway. The direction of the route, parallel and at the modified edge of this band of vegetation will minimise effects from construction and operation. The terminus and turning circle are located entirely on the modified grasslands, closer to other existing structures. It appears that this option would have no significant adverse effects on landscape values.

7.2 General Issues and Effects

Methods of vegetation clearance

Felling large trees will be necessary during construction. Neighbouring vegetation can be damaged during the felling process which can create or enlarge gaps in the canopy. Experienced, skilled felling contractors and prior planning should help minimise this adverse effect on natural character and amenity values

Disposal of vegetation

Some of the areas of beech have experienced patterns of frequent and ongoing disturbance. Vegetation cleared during the construction process is likely to persist longer and at more concentrated levels than most naturally occurring woody debris. It is recommended that cleared vegetation be chopped up as much as possible which would speed up the decomposition process and enable it to be used as a mulch and spread in small quantities, over a larger area.

Earthworks

Earth will be moved or removed during the construction period. Placement and installation of each pier will require the clearing of ground cover vegetation and the excavation of between approximately 1 and 3 cubic metres of earth. It is also possible that it will be necessary to create cuttings through spurs, mounds and across slopes at some points. During the construction period such earthworks will have an impact in terms of noise and the visual impact of bare earth. Given the difficult level of access to much of the route, the small footprints concerned and the staged nature of the construction period, the impact is likely to occur in a localised area for a short period of time and be experienced by a small number of people. The impact at areas visited more frequently by greater numbers will be more significant however any adverse effects on landscape, natural character and visual amenity values can be effectively mitigated for the long term duration of the project using the following guidelines. Where possible, excavated soil should be used for any fill requirements. If there is surplus soil it should be spread in very low mounds that follow natural contour lines, away from river margins. Slash from cleared vegetation should be spread over the mounds to help prevent erosion. Creating steep batters with a uniform slope should be avoided. It would be beneficial to form the slope 'roughly' to create natural pockets across the slope that will aid quick and effective revegetation and prevent potential erosion.

Storage sites for construction materials

Potential effects on natural character and amenity values could be reduced by selecting sites that are already in modified open areas, with established access, screened from public viewpoints where possible (preferably by existing vegetation or topography) and away from river margins.

Workforce facilities

It is anticipated that existing facilities will be used where appropriate outside of the DoC estate. However where new facilities are required their site selection, construction and management should be sensitive to the environment they are in. The creation of large clearances should be avoided by selecting modified, open sites and the disposal of sewerage and rubbish should be treated by removing waste off site.

Additional access

At the point of writing this report it is anticipated that construction of the foundations and the track will occur by utilising track already in place and will not require any additional construction of access ways within Department of Conservation land.

Changeover areas

Location, design and construction of walkways in changeover areas should be appropriate in scale and materials to the setting to integrate them well into the environment.

7.3 Operation and Maintenance

- While the long term effects of operation and maintenance on the landscape are difficult to assess, it is anticipated that the following points may have some limited effects.

- Provisions for emergency access - existing tracks and aircraft should be used where possible. Any consideration of additional emergency access routes would require further assessment.

- Ongoing vegetation clearance - the additional disturbance involved in continuous cutting back of trees and plants along the route should be minimised. Where necessary, it should be done in such a way as to replicate the sinuous qualities of a natural bushline.

- Power along the track - power and heating is unlikely to have any adverse effect on landscape and natural character values. Potentially there could be an increase in fire risk although it is difficult to gauge given that there is no similar monorail operating in a rural or natural landscape with which to make comparisons.

- Operation of termini – the monorail will introduce a significantly larger number of people into the Kiwi Burn site than there has been previously. The proposed terminus at Lake Te Anau is adjacent to the highway and an existing accommodation complex which means the increase in visitor numbers is likely to be absorbed more easily. The final design of the terminus buildings will effect how well people are able to move around the site while minimising adverse effects on the landscape. It may be an opportunity to provide small walkways and interpretation panels as part of an educational experience for visitors.

8.0 CONSIDERATION OF ALTERNATIVES

8.1 Route

As discussed under Section 1.1 Purpose of Document, alternative route alignments are being or have been considered in the following places:

- Limestone Hill

- Upukerora River terraces (higher or lower alignment)

- Dunton Toe to DoC Boundary near Retford Creek (more southern alignment)

- Dunton Swamp to Retford Stream (more northern alignment)

The proposed alignments have been suggested as a result of a number of concerns including ecological and landscape issues. The differences in effects between the Limestone Hill and Upukerora River terrace variations are likely to be minor in terms of potential impacts on landscape, natural character and visual amenity values.

However, this report identifies considerable concerns in the Dunton Swamp area regarding potential adverse effects on wetland and forest fringe values in particular, whereas constraints identified along the more southern alternative route are generally assessed as being considerably less. Therefore, the change in preferred alignment from Option 'B' to the more southern route from Dunton Toe to the DoC boundary near Retford Creek is recommended.

This report also recommends that due to a relatively high level of constraints, alternative route alignments and siting (and other mitigation such as relocation of existing hut and track areas) also be considered in the following places:

- Kiwi Burn Terminal
- Route from terminal to Kiwi Burn Hut

In summary, a final track line should be carried out in the field by a team comprising ecologist, landscape architect, Fiordland Experience representatives, DOC representatives and engineers.

8.2 Construction Techniques

Site specific pier placing and fine-tuning of track alignment will be specifically carried out at the following places:

- Clearing at Kiwi Burn hut to Kiwi Burn saddle
- Across the tussock clearing behind Limestone Hill
- Forest margin in the Whitestone clearing
- Whitestone/Upukerora Saddle to Upukerora River
- Alongside the Upukerora River
- Through the clearings between the Upukerora and the DoC boundary; and
- Across the steep gullies between approximately the 28km mark and the DoC boundary
- Option 'B': Alongside Dunton Swamp
- Option 'B': Morainic Creek

9.0 CONCLUSION

Snowdon Forest is part of an exceptional landscape – its qualities are derived from its relationship to the wider Fiordland landscape, extensive beech forest, wetland and grassland clearings, interesting landforms, and numerous rivers and streams.

The landscape, natural character and amenity values of the proposed monorail route which lies on the margins between this landscape and modified farmland, have been surveyed and the potential effects have been identified. A development of this nature, in this location inevitably raises concerns over adverse effects. Methods to avoid or mitigate these adverse effects on landscape values have been proposed.

Introducing a monorail into a back-country landscape will result in changes to the landscape and the way people use it. Throughout much of the route, the monorail will have limited adverse effects which simple measures can further reduce.

Some areas will experience more substantial effects, for which mitigation can also be applied. This report has identified three areas in which adverse effects have been assessed as being sufficiently significant to warrant consideration of an alternative alignment or site location.

Concerns about adverse effects on landscape and amenity values at the Kiwi Burn Terminal and the first 4.5 km of the track, are being addressed by investigations into modifications to alignment and building location.

The introduction of mechanical transport through an area perceived as remote and natural will change the way people experience that landscape. However, if final alignment and construction are done by a team of suitably experienced and skilled professionals representing both the Department of Conservation and Fiordland Experience, there is potential to create a unique and memorable journey that also provides for landscape and ecological values.

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APPENDIX ONE: **SUMMARY TABLE OF LANDSCAPE FIELD NOTES**

PREFERRED ROUTE	NATURAL CHARACTER*	AMENITY	VISIBILITY/VISUAL SENSITIVITY	KEY LANDSCAPE ELEMENTS	KEY ISSUES AND EFFECTS	OPTIONS
Kiwi Burn Terminal to Whitestone Flats (0.0 – 9.5 km)	Kiwi Burn Terminal area most modified and well-used point in study area. Grazed terraced flats on true left bank; dramatic rock-lined gorge where mararoa river narrows. Swingbridge crosses river at this point providing access to tracks and hut around the Kiwi Burn. Established track as far as hut. Route then climbs up and over Dunton saddle to the Whitestone flats at Glen Echo Station. From 5km to approx 6.5km mark landscape is very steep in places and with large pockets of dense tangled undergrowth. **Natural character: Moderate**	High amenity values around Kiwi Burn 'carpark' and swingbridge; rapids through gorge popular with kayakers; hut and tracks in this area used regularly if not frequently. Regular noise of fixed wing aircraft in area. **Amenity values: High**	Rough character of topography along section of route beyond hut to Whitestone flats should help absorb monorail structure. Higher amenity values of section from terminal to hut mean structure will be visible to more people. From the stretch of track alongside the Mararoa, the Mavora Lakes road, power poles and farm buildings can be seen on the true left bank. Existing modifications can reduce the sensitivity of the receiving landscape and permit additional modifications to blend in more easily than a natural setting. In this case the river reduces this effect a little since it acts as a natural division between the less modified right bank and the more modified left bank. **Visual sensitivity: Moderate**	The Mararoa is a significant braided river; terraced landforms either side of river - cleared on true left, draped in beech on right. The riparian edge on the true left has been fenced off and is revegetating. Beyond the hut the route sidles up to Dunton saddle at approx. 700m, crossing steep slopes and two significant deep guts on the way. A sizeable plateau at the saddle drops off at more gentle grades down to river terraces towards Whitestone flats.	Construction and alignment across steep guts - effect on ground and canopy of large substantially engineered structures; conflict with those using the Kiwi Burn area for recreational purposes; construction and operation of terminal	Move terminal site to left of access road and push crossing point downstream to 1km mark; once in bush on true right, stay in until Kiwi Burn clearing; care with construction and alignment across steep guts and faces - curve rail to follow contours and stick as close to ground-level as possible. **Benefits: limit effects on the recreational experiences of other users** **Disadvantages:difficulty aquiring land**
Whitestone Flats to Whitestone/Upukerora Saddle (9.5 – 17.0 km)	Strongly terraced landforms around Whitestone river flats; quite modified rural landscape around Limestone Hill and up towards Whitestone/Upukerora saddle; large amount of deer fencing. Attractive tussocky clearing on slopes around the back of Limestone Hill with picturesque views north to Snowdon Peak. **Natural character: Moderately Low to Moderately High**	Access up Whitestone River requires owners permission; used by fishermen and hunters. Private hut up Whitestone river at base of Limestone Hill **Amenity values: Moderately low due to difficult access**	The route around Limestone Hill that avoids Glen Echo land runs through some attractive and varied landscape. This route is likely to disturb landscape values more than an alignment across the farmed Whitestone flats in front of limestone hill, however it remains on the margins of modified landscapes and provides a more scenic experience for the monorail traveller. Whitestone River terraces able to absorb a more linear alignment but river margins are typically more sensitive **Visual sensitivity: Moderately Low**	Very strong, straight terrace landforms run alongside the Whitestone River which is a substantial semi-braided river at this point. Limestone Hill itself is an interesting feature at 878m, half vegetated and half grazed. Sinuous edge along cleared tongue (towards Whitestone saddle) but modified simple transition from bush to clearing. Character of clearing between kms 12 and 15 appears more open when travelling north to south since the clearing opens into the Whitestone flats at this end. Attractive terracing around Whitestone River becomes visible at approximately 13km.Tongues of bush and undulating spurs open and close space and views in both directions.	Care in alignment along sinuous bush edge up narrow clearing - ideal if route can be tucked close to but outside bush edge and follow curves in topography and bushline as much as possible. Avoid too many bush/clearing transitions but where they're required, angle line into/out of bush preferably on curve (following natural contours where appropriate).	
Whitestone/Upukerora Saddle to Upukerora River (17.0 – 20.5 km)	Narrow, steep-sided river valley. Quite dense tangled undergrowth in places with gaps in canopy. Higher in -river values - meandering substantial river. **Natural character: High**	Dramatic view up Upukerora river to mountains in distance - braided river bed in foreground and mountains framed by steep valley sides. Downstream, tongues of beech appear to enclose valley completely. Track up river well marked but does not appear to be well used. Access up Upukerora River requires owners permission; used by fishermen and hunters. **Amenity values: Moderately low due to difficult access**	A rail tucked into one side of a narrow bush-covered valley would be significantly less sensitive than one pushed closer to the valley floor and river bed. In this case, many river crossings would be required and the monorail would be likely to replace the river as the focus of the valley. **Visual sensitivity:** **Broad scale - Moderately Low** **Localised scale - Moderately High**	Occasional little waterfalls on upper terraces. Sizeable trees and dense in places but not of the same dramatic diameter seen over Dunton toe. Boggy areas on lower flood terraces. Obvious river flood effects in places where big flows have undercut banks. Significant snow damage-many large fallen trees.	Construction and alignment in a narrow river valley where there are steep slopes rising immediately from river. Care in alignment away from river bed and care in construction on slopes above.	
Upukerora River Flats	Follows the Upukerora River, one of the largest, semi-braided rivers in the study area, traversing it where there are more open river flats. Some of the steeper slopes on either side of the river are bush-covered down to the water, while the flatter terraces are generally dominated by exotic pasture species. The introduction of a monorail into this environment will effect perceptions of the current level of naturalness. Some cut and fill may be required for the first kilometre downstream where the slopes into the river are steeper. **Natural character: Overall, high but sense of localised modification.**	Visitors to this area around the Upukerora River are most likely to be hunters and anglers. Four wheel drive access up the river is possible and requires permission from the property owners. This alignment is generally on the edge of more modified rural landscapes, rather than encroaching on the more remote and wild landscapes. Would mostly be viewed beyond exotic grassland-covered river flats, set against bush slopes and terraces. **Amenity values: Overall, moderate**	A rail tucked against the beech fringes would be absorbed more easily into the landscape than one pushed into the open valley or close to the river bed. Where the river must be crossed the monorail will be highly visible. **Visual sensitivity:** **Moderately High**	The large, semi-braided river and modified grasslands surrounded by sinuous beech edge are the key characteristics of this area.	Careful installation of piers on steep slopes and narrow terraces and where possible avoid cut and fill on steep slopes that drop directly into the river bed.· Care with alignment at crossing point – minimise distance across river and from bush edge to bush edge.	

APPENDIX ONE: **SUMMARY TABLE OF LANDSCAPE FIELD NOTES**

ALTERNATIVE OPTION 'B' (Superceded)	NATURAL CHARACTER*	AMENITY	VISIBILITY/VISUAL SENSITIVITY	KEY LANDSCAPE ELEMENTS	KEY ISSUES AND EFFECTS	OPTIONS
Upukerora River to Dunton Swamp (18.5 – 22km)	Bush here has an aged feeling. Coherent natural patterns and processes illustrate ecological cycles that are clearly frequent and ongoing.The trees are predominantly red beech, many with large trunks, high canopies (30m+) and frequent coverage. Terrace landforms are pronounced enough to remain legible under the vegetation. **Natural character: Very High**	Size of trees is immediately impressive. Four wheel drive access up Upukerora River is possible but requires property owners permission. Walking track cuts further west across lower toe. **Amenity values: Overall, low due to limited use and difficult access**	If rail could be threaded between trees beneath canopy without removing it, the track and carriages could be well absorbed into the landscape. However, the size and density of the trees here means any cut into the vegetation is likely to cause some noticeable gaps in the canopy and disturbance to an otherwise relatively sheltered and stable site **Visual sensitivity: Moderately High**	Terraced toe of Dunton peak with mostly gradual rise on northwestern side and very steep drop-off where the route sidles down to meet the Upukerora. Quite undulating before reaching escarpment. More undergrowth, lower canopy and patchy sunshine near the top of the 'plateau'. Trees of a less impressive size around scarp. Varied bush edge at Upekeroa terrace, rises steeply and quickly just inside bush edge.	Size of tree canopy is a cause for concern in regards to the amount of canopy that would be removed with the felling of a single tree. Density of large trees is also concerning in terms of construction - extreme care would have to be taken to create location specific rail spans and curves to avoid as many trees as possible. Construction on gradient of escarpment above Upukerora river.	Move alignment to follow downstream of the Upukerora as far as Dunton Swamp then cut around base of toe approximately along route of existing walkway. **Benefits: avoids area of high natural character and landscape values** **Disadvantages: possible engineering issues through river bend**
Dunton Swamp	Large open clearing, approximately 1km wide and 3km long. The wetland and the bush edge have been modified at the northeastern edge and southernmost tip of the clearing. The transition between forest and swamp is quite sharp in these places. There is a pocket of wetland in the southeast with high natural character values including a more coherent transition where it meets the forest edge. **Natural character: Moderate (apart from area described above)**	Walking track comes within 20-30m of swamp/bush edge in places. Looks like it has been well used in the past but not for some time - frequent tree fall. Picturesque views of surrounding mountains in most directions. Proximity of Dunton Peak creates a dramatic transition from bush to clearing at the northern end of Dunton Swamp. **Amenity values: Overall, low due to limited use and difficult access**	The size of the clearing and being ringed by hills and mountains makes it an arena of focus where structures and movement alien to existing characteristics are likely to be highly visible. **Visual sensitivity: Moderately High**	The lower slopes of the Dunton range end in fingers of bush that create a long sinuous bush edge to the Dunton swamp. There is a feeling of enclosure in spite of large size of clearing - Dunton range rises immediately to the east to approx. 1400m, another range to about half the elevation on the western edge, only a narrow valley opens to the north and southern end blocked by another peak of approx. 1000m; narrow swampy margin right at bush edge where water collects from dunton range then disperses into swamp; undulating ground rises to distinct saddle at approximately the 23km mark.	Entrance/exit of rail at bush/clearing edges as above; alignment should complement (rather than contrast) sinuous pattern of bush edge; visibility of line through swamp; avoid alignment through area identified as having particularly high values	Alignment through swamp should enter/exit bush edge at approx. 22km to avoid special landscape area. COLOUR
Northern edge of Dunton Swamp to Retford Stream (23.7 – 30.0 km)	Modified farm country prior to approximately 30km and signs of a vehicle track on slopes above Retford Stream. Scrubby re-growth gives way to more mature beech forest approximately 500m from farm boundary. There are a number of modified grassland clearings from here to the northern edge of Dunton Swamp. Apart from a distance of approximately 1500-2000m the route corridor runs within sight of Morainic Creek or its left branch (junction at 25.5km) for most of this stretch. Between kms 26.4 and 30 it appears to be a significant meandering river. The left branch is narrower and runs through a small narrow river valley down from Dunton Swamp. The natural processes and patterns are coherent and legible for much of this stretch (29-23.7km) with signs of frequent natural disturbance in the form of windthrow. **Natural character:** **Grasslands-Moderate** **Bush-Moderately High**	Access requires land-owners permission; views in and out minimal on bush-clad valley floor; scenic wilderness experience; very attractive transition at Dunton Swamp edge. **Amenity values: Overall, low due to limited use and difficult access**	Rail could be visible in clearing from some points along walking track but this is rarely used. Otherwise views in and out largely protected by bush cover and landforms **Visual sensitivity: Moderately Low**	Rivers/streams - sound and/or sight major part of experience along much of route; terraced landforms become more legible and dramatic at approximately the 24,25 km mark where there is a marked transition into a narrow river gut; steep slopes up from river around 28,29 km mark; one main clearing with scenic mountain views of the Dunton Range.	Construction on steep slopes around river margins, particularly area around 24km just northeast of Dunton swamp where river valley narrows; care with alignment at bush/clearing transitions	Rail at northern transition point could naturally flow into/out of river 'neck' but is part of a very attractive area - either needs to be constructed and aligned with extreme care (which is likely to provide an interesting and dramatic experience for travellers), or suggest a more northern route. **Benefits (of northern route): avoids landscape with high values** **Disadvantages: lose dramatic transition narrow river gully experience**

*note - ranked in high country context