

Riverstone Holdings Limited

Fiordland Link Experience

Construction Management Plan

3 November 2011

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# 1 INTRODUCTION

## 1.1 PURPOSE OF THIS PLAN

The Fiordland Link Experience aims to create a new tourism experience between Queenstown and Te Anau Downs including:

- Queenstown to Mt Nicholas - 20kms by catamaran across Lake Wakatipu,
- Mt Nicholas to Kiwi Burn Terminus - 45kms by all terrain vehicle (ATV) using the existing road network (with appropriate up-grading where necessary) from the wharf to a new terminus area proposed on the true left of the Mararoa River just upstream of the Kiwi Burn confluence,
- Kiwi Burn to Te Anau Downs area - 43.8kms by electrically powered monorail, 29.5kms of which is on Department of Conservation ("DoC") administered land.

The Kiwi Burn and Te Anau Downs termini and 29.5km of the monorail route west of Kiwi Burn Terminus lie on Crown land managed by DoC as the Snowdon Forest Conservation Area. The Te Anau Downs terminus is in Fiordland National Park, on land currently occupied by accommodation, restaurant and bar facilities.

This Construction Management Plan ("CMP") applies to the construction of the monorail and associated facilities.

Throughout the project development, approval, detailed design, construction and operation phases of the project, Riverstone Holdings Limited ("Riverstone") has a commitment to conservation and environmental protection. The construction methods will be carefully developed to avoid, remedy or mitigate adverse environmental effects using best practice techniques.

The CMP has been developed in response to the identification of actual and potential adverse effects during the technical assessment and preliminary design phases of the project. The benefit of a CMP is that it can continue to evolve as more detail is developed relating to construction and monitoring activities.

The overall objectives of the CMP are:

- To provide detail of the construction methodologies and management of effects during construction.
- To provide guidance on environmental management for the construction of the monorail and associated facilities;

To avoid, remedy or mitigate any adverse environmental effects associated with construction activities;

The primary goals of this CMP are to:

- Describe the methods proposed for construction of the monorail and associated facilities and the program for construction of each element;

- Describe what actions will be taken to manage and avoid or reduce the risk of adverse environmental effects during construction of the monorail and associated facilities;
- Provide a list of key positions and points of contact during construction;
- Describe how stakeholders will be kept informed during construction and how issues will be managed.

*[At this stage the CMP is in draft form. Further versions will be published once a supplier joins the project and a main contractor is selected to construct the works. Further detail will be added following additional consultation with DOC. The contractor will develop highly detailed construction methodologies and programmes for construction works. Thereafter, any material changes to the program during construction will mean that the CMP will need updating throughout the construction process. The document should be thought of as a 'live document' that will be updated and referred to throughout the construction process.]*

The most recent version of this plan will be held at the main site office at all times throughout construction. Contractors and subcontractors will be required to acknowledge that they have read the CMP and agree in writing to abide by its terms and conditions.

## 1.2 STRUCTURE OF THIS PLAN

The CMP is structured to:

- Provide an overview of the project and outline compliance with statutory obligations and approvals (e.g. concession conditions) (Section 1);
- Identify key staff contacts for the project (Section 2);
- Outline consultation and communication processes during construction, including a process whereby issues from the public can be dealt with (Section 2);
- Outline of the construction methodology and key construction activities (Section 3); and
- Describe measures to address particular adverse effects expected via individual management plans (Sections 4 – 14).

This plan includes as separate sections the management plans which will apply during construction. This includes:

- Health and safety of people on site during construction (Section 4);
- Hazardous substances that might be introduced to or produced at the site (Section 5);
- Management of traffic around the site (Section 6);
- Management of noise and lighting during construction (Section 7);
- Risk management (including financial and other risks, Section 8);
- Management of waste generated at the site or brought to the site (Section 9);

- An accidental discovery protocol if items of historical or archaeological values are discovered along the route during the construction of the monorail and/or mountain bike track (Section 10);
- Controlling erosion and mobility of sediment (Section 11); and
- Protection of aquatic ecosystems whilst working in rivers (Section 12).

Many of the plans provide cross references to each other where activities are relevant to more than one topic.

## 1.3 OUTLINE OF THE PROJECT

The scheme is comprehensively described in the following documents:

- Opus International Consultants Limited – Preliminary Engineering Assessment of Monorail Proposal, September 2009
- Mitchell Partnerships – Concession Application, September 2009
- *[additional/alternate references to be added at later stages of design/construction].*

However, a brief description of the initial concept and components is included here for completeness.

*[note that the following description is from the existing level of detail. It will be updated in detail at later stages of detail and construction]*

### 1.3.1 Overview

The monorail component of the Fiordland Link Experience consists of the following:

- A 43.8km long monorail track within a six metre wide footprint, 29.5km of which is within the Public Conservation Estate.
- A three metre wide construction track along the length of the monorail route within the Public Conservation Estate, to be retained as a mountain bike track.
- Spur tracks three metres wide which connect the construction track to the monorail route for construction access some of which will be retained.
- Terminus buildings and facilities at Kiwi Burn.
- Terminus buildings and facilities at Te Anau Downs within Fiordland National Park.
- A mountain bike track from the location where the monorail leaves DoC land and enters Te Anau Downs Station, through DoC land to Te Anau Downs.

A set of maps and construction diagrams showing the route plans, foundation and pier construction and indicative layout is provided in Appendix A *[include once finalised following confirmation of easement]*.

The construction track will be aligned and constructed so as to minimise adverse environmental effects. Therefore the exact route, and hence length,

will be finalised in consultation with DoC and the contractor. After construction of the monorail the construction track is intended to remain as a mountain bike track. The purpose of the spur tracks is to connect the construction track with the monorail route. After construction most of the spur tracks will be substantially rehabilitated. A number of spur tracks will be retained for emergency access and maintenance purposes.

An easement is sought over a 200m wide corridor of land within which the monorail track and construction track would be located, except between approximately 24km and 26.5km along the route, on the true right of the Upukerora River where a 300m wide easement is sought to allow for construction around a slip.

This width would accommodate the monorail and the construction/mountain bike track and has been proposed for three reasons:

- To provide a visual and experiential separation from the monorail, expected to be typically 70-80m in flat terrain.
- The mountain bike track could be on either side of the monorail, but is intended to be on the uphill side in sloping terrain.
- To provide some flexibility to suit topographic features, such as streams, gullies, steep banks, large trees or ecologically significant sites.

Once the optimal route for the monorail and construction track is determined the area over which the easement applies can be finalised.

### **1.3.2 Conditions of Concession**

*[To be added when confirmed]*

### **1.3.3 Conditions of Resource Consent(s)**

*[To be added when confirmed]*

### **1.3.4 Construction**

Construction is proposed to occur on three separate fronts concurrently. Consequently there will be three construction depots:

1. In the Mararoa River valley.
2. In the Whitestone River valley.
3. On farmland at Te Anau Downs.

Each depot is expected to have laydown areas for building components, fuel storage areas, maintenance facilities, site offices and kitchen, vehicle washing facilities, toilet and shower facilities.

The construction uses three types of foundation pad and precast materials will be used where possible. Precast piers and beams will also be used (See Section 3 for more details about construction). The project consists of the following construction elements:



- Depots and access
- Construction and spur tracks
- Vegetation clearance
- Foundation and pier construction
- Component transportation
- Erection of monorail beams
- Completion of monorail surface
- Termini
- Rehabilitation

These are discussed in further detail in Section 3 of this CMP.

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## 2 PROJECT MANAGER

### 2.1 RESPONSIBILITIES AND CONTACT DETAILS

The Project Manager has overall responsibility of the project engineering and contracting, including supervising contract works and ensuring that the contractor(s) meets their obligations under the construction contract, the technical specifications and this plan.

In addition, the project manager will have responsibility for managing and responding to any environmental issues during construction. In doing this, he/she must ensure that all environmental consent or concession conditions are met, and that the environmental requirements of the CMP and associated Management Plans are adhered to at all times.

The project manager will also be the point of contact between the community and the project.

Name	<i>[position yet to be filled]</i>
Postal address	<i>[to be filled]</i>
Email	<i>[to be filled]</i>
Phone	<i>[to be filled]</i>
Cellphone	<i>[to be filled]</i>

### 2.2 PROJECT LIAISON OFFICER

The project manager will be responsible for liaising with the Project Liaison Officer in accordance with the Implementation Protocol.

### 2.3 COMMUNITY LIAISON

The project manager will be responsible for establishing relationships with the following parties, and communicating with each as appropriate throughout the pre-construction, construction and operation phases of the project:

- Department of Conservation
- Environment Southland
- Southland District Council
- New Zealand Transportation Agency
- Te Runanga o Ngai Tahu
- Adjoining landowners
- Community representatives including (but not limited to), neighbours, Takaro Lodge, Fish and Game Council, Forest & Bird, New Zealand Deerstalkers Association, Otago Tramping and Mountaineering Club, Whitewater New Zealand, Federated Mountain Clubs, Fiordland Trails Trust.

It may be appropriate to establish a community liaison group, which would be the conduit between the parties they represent and the project, and would ensure that effective communication takes place.

### 2.3.1 Objectives of Communication During Project

The objective of communication procedures are to:

- Maintain effective working relationships and mutual trust between key stakeholders (including DoC, neighbouring properties, local community, iwi and the project managers (including its contractors) during construction;
- Promote the free flow of timely and appropriate information in all directions between key stakeholders (including DoC, neighbouring properties, local community, iwi, the project managers, and contractors), in order to try to anticipate and resolve any potential issues before they arise;
- Evaluate the results of monitoring activities on a periodic basis;
- Oversee a Community Complaints Procedure, ensuring appropriate responses from Riverstone are forthcoming; and
- Respond to matters which may arise as a result of the monitoring.

### 2.3.2 Community Contact Procedure

Contact from the community or members of the public will be dealt with in the first instance by the Project Manager for the project. A 24 hour/seven day freephone contact line will be established for the local community to call if there are any concerns regarding construction. The contact number will be advertised at regular intervals in the local newspaper, as well as being displayed on signs where the construction works is nearby to roads.

A log will be kept of all contacts which will include the following details:

- Date and time
- Complainant name and contact details
- Nature of complaint including cause and effect (if known).

The target of the Project Manager will be to respond to the issue within 24 hours, ideally with a solution, or if not, with a programme for solution. All communications related to the issue will be logged.

The log of issues and actions will also be made available to the Consent Authorities on request.

## **3 CONSTRUCTION METHODOLOGY**

### **3.1 INTRODUCTION**

This section details how the monorail will be built. It also provides specific design detail of the significant temporary works components.

*[At this stage of the project, this description discusses the types of work that will be needed as part of the construction and offers estimates of the likely timing, sequence and duration of particular construction activities.]*

*The specific methodology will not be determined until route selection and detailed design has been finalised and the construction contract awarded. Some departure from the description here is expected, but the overall effects are likely to be similar, irrespective of the detailed methods employed. For this reason the objective of this section at the present time is to highlight the type of expected activities. This will be updated as the project progresses.]*

### **3.2 CONSTRUCTION PROGRAMME**

A preliminary 30 month programme has been developed on the basis that the construction of the foundations and piers is independent of the erection of the monorail beams (see Appendix B *[to be added once easement confirmed]*).

The main reason for this is that construction of foundations is by its very nature uncertain, therefore the likelihood of delay during foundation construction is very much greater than during erection of prefabricated superstructure components. By separating these activities, any problems during foundation construction do not have a direct effect on the erection programme.

### **3.3 THE MONORAIL ENVELOPE**

#### **3.3.1 The Easement**

A 200m wide easement has been sought for the monorail route (except for the portion located between 24 and 26.5 km, where a 300m wide easement has been sought). This width would accommodate the monorail and the construction/mountain bike track, and has been proposed for the following reasons:

- To provide a visual and experiential separation from the monorail, expected to be typically 70-80m in flat terrain.
- The mountain bike track could be on either side of the monorail, but is intended to be on the uphill side in sloping terrain.
- To provide some flexibility in alignment to suit topographic features, such as streams, gullies, steep banks etc.

As the monorail design is further developed, the preferred construction/mountain bike track location can be determined.

### 3.3.2 Monorail Alignment

The approximate monorail route has been assessed on site and an indicative route has been marked in drawings 31-34 of the Opus report. This is based on:

- Initial field survey of the route.
- Expected capabilities of the monorail train, with respect to geometric constraints such as grade and the radii for curves.

Further work is required to fit a three dimensional monorail alignment to the ground. This can be done when a more detailed ground model is available.

The monorail alignment will have some scope to be adjusted to avoid features such as large trees, banks, bluffs, creeks, and wetlands. However due to the form of construction, the monorail beam could span some of these features when necessary.

Tree clearance will be required along the monorail alignment to provide a safe operating envelope for the trains. This is expected to be a width between trees of 4-6m. It is expected that trees will need to be assessed beyond this envelope and some, for example those in poor condition, rotten or leaning, will need to be removed. For further information, refer to section 4.4 of the Opus report.

## 3.4 CONSTRUCTION ACTIVITIES

### 3.4.1 Depots and Accesses

Three main construction depots along the route are proposed:

1. The Mararoa River valley.
2. The Whitestone River valley.
3. On farmland at Te Anau Downs.

Each depot is expected to have:

- Laydown areas for components, i.e. beams, piers, precast foundations and metal for tracks.
- Fuel storage.
- Maintenance facilities.
- Kitchen, toilets, showers, cafeteria etc.
- Site offices.
- Vehicle wash stations.

It is anticipated that all precast items, including beams, piers and foundation pads would be precast off site. Components would then be transported to the depots by truck and trailer. Existing roads, farm access roads and access tracks to the depots (and beyond in some locations) would be used where possible and some of these roads may need to be upgraded to enable truck and trailer units access to the site depots.

### 3.4.2 Foundation and Pier Construction

The personnel and plant involved in this phase of the construction is outlined below:

#### 1. Survey Team

These teams would carry out initial pegging of the routes for clearance. Detailed survey would then be undertaken for foundations and piers.

- 4 teams of 2 people.
- 4WD truck.

#### 2. Tree Clearance/Transplantation

Each team would work on a front clearing and harvesting vegetation for stockpiling/transplantation along the marked route of the monorail and the construction track. Material would either be mulched on site or removed to approved locations still within the Public Conservation Estate.

- 4 teams of 2 people.
- 12t excavator per team.
- 4WD support vehicles.

#### 3. Construction Track/Erosion and Sediment Control Construction

Teams would clear topsoil to one side for later re-use, install drainage and sediment control measures as required (refer to section 5.1.1 of the Opus report for further information) and construct a metal track.

- 4 teams of 3-4 people.
- 12t excavator per team.
- 4wd trucks bringing in metal, silt fences, geotextile and pipes as required.

#### 4. Piling of River Foundations

Access to each piled foundation would be constructed including all environmental management measures. The piling rigs themselves would be self propelled on either tracks or wheels. Refer to section 4.8 of the Opus report for further details on river crossings.

- 2 teams of 4-5 people.
- 35t piling rig per team.

#### 5. Excavation and Placement of Pad Foundations and Pier and Backfilling

Small tracked machines would excavate each foundation placing excavated material nearby. Each component (foundations and pier) would be placed in position by the excavator and, following curing of the grout to secure the pier in place, the foundation would be backfilled with the excavated material. The quantity of surplus soil would be small due to the small volume taken up by the precast foundation pad.

- 18 teams of 3-5 people.
- 12t excavator per team.

#### **6. Excavation and placement of foundations with driven piles and pier and backfilling**

The plant and equipment would generally be the same as for the pad footings. The equipment required is therefore covered in the previous section, but with a pile driving attachment for the excavator. Each foundation component would be placed in position by the excavator and piles driven by a driving unit attached to the excavator. Following placement of the pier the methodology would be the same as for the precast foundation pad.

- Pile driving attachment for 12t excavator.

#### **3.4.3 Access Track and Component Transportation**

The plant involved in this phase of the construction is expected to be approximately as follows:

##### **1. Depot to Construction Front**

Travelling to the several construction fronts from each depot during each step in the construction process would be:

- 4WD utility towing a fuel bowser.
- 4WD equipped with mechanical and hydraulic breakdown gear and mechanic.
- 4WD towing a compressor.
- Survey team.

##### **2. Foundation Pads and Piers**

Equipment used to transport the precast concrete foundation and pier components to their specific location on site will be:

- 10t Hiab bringing in precast foundations in the open/flat terrain.
- Tracked, or possibly 4WD, vehicle in difficult terrain.

##### **3. Placement of Piers**

The grouting vehicle would be completely self contained and able to carry all materials which would be mixed on site and pumped into each foundation with no spillage.

- 4WD grouting equipped utility vehicle to grout pier into pad.

##### **4. Transportation for River Foundations**

These vehicles would follow the route created for the piling rig. Specific measures would be put in place to prevent spillage as outlined in section 4.8 and 5.4 of the Opus report.

- Flat bed truck with reinforcing cage.

- Concrete trucks.

#### 3.4.4 Erection of Monorail Beams

Beams would be placed with a launching gantry operating from the section of monorail beam already completed.

- Beams would be brought in on a jinker operating on the completed monorail beam from the construction depot.
- Beams would be placed by launching gantry with one gantry operating from each depot, therefore 3 or 4 gantries would be required.

At river crossings it may be preferable to have longer span beams to reduce the number of piers within the active river channel. Construction of these spans could be carried out using two rough terrain cranes where access permits.

#### 3.4.5 Completion of Monorail Running Surface

The final running surface will influence the ride comfort and has the potential to minimise noise created by the trains' operation as well. *[At this stage there are several options to complete the final running surface. An allowance for site work required to complete this component of work has been included in the overall construction sequencing and program, and it is anticipated that 4 crews of 2 people would be required to undertake this task.]*

#### 3.4.6 Rehabilitation

Rehabilitation will be undertaken in accordance with the Vegetation and Habitat Management Plan and implemented as soon as possible after the completion of construction works.

#### 3.4.7 Construction/Mountain Bike Track and Spur Tracks

The construction/mountain bike track can be located to avoid trees, minimise impact on vegetation and to take advantage of the topography to minimise earthworks. It is envisaged that the construction track would become a permanent mountain bike track at the completion of the monorail construction. The 3m wide mountain bike track would also be located to provide a visual separation from the monorail. At this stage this is likely to be 20-30m on sloping ground with the track generally on the uphill side, and likely to be 70-80m in flat country. Refer to drawing 24 of the Opus report for an indicative layout.

A number of 3m wide spur tracks would be required to gain access to the monorail during construction of foundations and piers. It is envisaged that one spur track would provide access to a number of foundations (10-15) that can be constructed linearly (i.e. from the farthest foundation back) without affecting overall project progress.

The route for the construction/mountain bike track and the spur tracks will be selected to ensure that there is always a significant barrier of bush visible from the monorail train (i.e. there is no view straight down a track or route). The junction points where the spur tracks meet the monorail route will be selected to



minimise bush clearance and may have special reinstatement and replanting treatment if required.

The construction track will be located to cross streams at the most advantageous location (e.g. where the stream is at its narrowest or the banks highest) reducing or eliminating the impact on the stream environment. At stream crossings, the main track or spur track will make use of light bridging units spanning bank to bank, thereby minimising disturbance to the stream itself.

The construction track and the spur tracks will be located to avoid trees wherever possible, thereby preserving as much of the canopy as possible. The construction and spur tracks will follow a route that takes advantage of better topography and avoids crossing sensitive swampy ground that the monorail crosses, accepting that access to each foundation would be necessary but for only a few trips for equipment.

The construction/mountain bike track will require maintenance and will therefore need to be designed for long term vehicle traffic. This track could also be used for emergency access for the mountain bike track users or for the monorail.

### **3.4.8 Track Construction for the Construction/Mountain Bike Track**

#### **1. Standards**

The access required during construction parallel to the monorail alignment needs to be of sufficient standard to provide access along the complete monorail route for a large amount of equipment for construction of the foundations and piers for the monorail. The track also needs to be constructed to a standard to ensure it is suitable for permanent use as a mountain bike track, for maintenance purposes, and for emergency access. We therefore propose that this track be constructed generally in accordance with the Department of Conservation Track Construction and Maintenance Guidelines (VC 1672) with pavement and surfacing adjusted to suit the proposed uses. Refer to the construction methodology for further details on construction equipment.

#### **2. Construction of Spur Tracks**

The access required during construction needs to be of sufficient standard to access approximately 10-15 piers. Because the track is temporary and can be routed to avoid trees, difficult topography and natural drainage paths, the amount of ground disturbance can be limited.

Track construction will require:

- Stripping of topsoil for use in reinstatement along the spur track.
- Creation of a 3m wide metallised pavement.

The spur tracks are expected to be substantially rehabilitated after construction of the monorail.

### 3. Construction on the Monorail Alignment

The access required during construction along the monorail alignment needs to be of sufficient standard to allow access to piers in each direction. The amount of ground disturbance can therefore be limited to that required to create a working track for equipment.

Track construction will require:

- Stripping of topsoil to side for later rehabilitation.
- Creation of a 3m wide metalled pavement where required.

The construction route on the monorail alignment will be rehabilitated after construction of the foundations and piers. The rehabilitation will commence as soon as the foundations and piers accessed from the spur track are completed.

#### 3.4.9 Future Maintenance

Both the monorail corridor and the mountain bike track will require maintenance. It is anticipated that inspection of the monorail corridor will occur daily from the monorail because of operational safety considerations and any maintenance required will be monitored during these inspections. The mountain bike track will require periodic maintenance for reasons such as:

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

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 by rail mounted equipment. However, the mountain bike track could provide emergency and scheduled maintenance access if required.

## 4 HEALTH AND SAFETY PLAN

A comprehensive health and safety plan will be prepared by the Project Manager and Contractor(s) prior to the start of construction.

The objectives of the health and safety plan will be to ensure compliance with all relevant health and safety legislation, regulation and procedures including the Health and Safety in Employment Act (1992 and 2002).

### 4.1 LEGAL REQUIREMENTS

The Health and Safety in Employment Acts 1992 and 2002 generally require that an employer does all that is reasonable to ensure the safety of staff at work, and in particular develops procedures for dealing with any emergencies that may arise.

The contractors employed by Riverstone must do all that is reasonably possible to avoid injury and illness, including ensuring that:

- All persons are appropriately trained, skilled and/or supervised for their tasks.
- All hazards are managed to accepted industry standards.
- Personal protective equipment is always worn.
- Members of the public and visitors to the site are safe at all times.

#### 4.1.1 Key Provisions of the Act

##### 5. **Objects**

- (1) *The Act's principal object is to provide for the prevention of harm to employees at work.*
- (2) *For the purpose of attaining its principal object, this Act:*
  - (a) *Promotes excellence in health and safety management by employers;*
  - (b) *Prescribes, and imposes on employers and others, duties in relation to the prevention of harm to employees;*
  - (c) *Provides for the making of regulations, and the development and approval of codes of practice, relating to hazards to employees, and in particular (but without limiting the generality of the foregoing) to significant hazards.*

##### 6. **Employers to ensure safety of employees**

*Every employer shall take all practicable steps to ensure the safety of employees while at work, and in particular shall take all practicable steps to:*

- (a) *Provide and maintain for employees a safe working environment; and*
- (b) *Provide and maintain for employees while they are at work facilities for their safety and health; and*

- (c) *Ensure that plant used by any employee at work is so arranged, designed, made, and maintained that it is safe for the employee to use; and*
- (d) *Ensure that while at work employees are not exposed to hazards arising out of the arrangement, disposal, manipulation, organisation, processing, storage, transport, working, or use of things:*
  - (i) *In their place of work; or*
  - (ii) *Near their place of work and under the employer's control; and*
- (e) *Develop procedures for dealing with emergencies that may arise while employees are at work.*

## 4.2 OBJECTIVES

The intended outcome of this plan is the avoidance of harm to the workforce and visitors to the site. The plan will also identify where construction works are likely to overlap with areas used by the public and include management provisions to ensure the safety of all. In addition, the Health and Safety Plan will include information on hazard identification, management and mitigation, emergency protocols and incident reporting.

## 4.3 BACKGROUND

The nature of the monorail route is such that construction and other staff will be required to work at sites that are remote and/or in rugged terrain and that are subject to sudden weather changes.

## 4.4 TRAINING

Until they become familiar with working in difficult or remote terrain, construction staff should be given an induction course and training in:

- Appropriate weather clothing and personal safety equipment
- Recognition of local weather patterns. This comes with experience and a trial time is proposed until the project manager decides said person is capable of working in a remote location.
- 4 wheel drive vehicle use.
- Minimum first aid course.

## 4.5 LAND ACCESS AND TRANSPORT

The majority of work will involve minimum impact activity. Transport in and out of the field area will occur in a light vehicle where access is via well maintained sealed and unsealed public roads, unsealed construction tracks and 4WD only tracks in some locations. Along the route, access to areas of interest will be generally be on foot to specific localities or using machinery such as diggers to access the sites of interest. Alternatively helicopters may be used to gain access to the route at some times or for some purposes.

## 4.6 GENERAL HEALTH AND SAFETY ISSUES

The mobile phone and handheld radio coverage varies along the route. Staff are expected to know what the level of coverage is in the area they are working and plan accordingly. Each team must carry at all times:

- Portable First Aid kit
- Handheld Tait radio
- Mobile Phones for backup emergency communication
- A secondary means of emergency communication, such as a satellite phone or an EPIRB.

Incident Reporting: All incidents are to be reported to the Site Safety Coordinator

## 4.7 DAILY COMMUNICATION PROCEDURE

A daily communication procedure will be designed to provide the general location of all staff whilst on site and provide confirmation to the project manager that all staff have returned to the construction depot at the end of each day.

Radio coverage is expected to be patchy over the whole of the route. Where significant dead spots are identified an alternative form of communication is to be found.

## 4.8 EMERGENCY PLAN

An emergency plan will be developed by the Project Manager, detailing emergency response procedures.

## 4.9 FLOODING DURING IN RIVER CONSTRUCTION

Because the construction will take approximately 30 months there is the potential for floods of various magnitudes to occur during construction. Inundation of works during construction would most likely result in the loss of any temporary works, or partially completed works and could have implications for the health and safety of people both at the site and downstream.

In order to protect staff and people downstream from damage due to the works being flooded, the construction engineer will maintain an up to date knowledge of weather forecasts and will respond to any forecast heavy rainfall in catchments that could lead to flooding of rivers and streams in the project footprint as follows:

- Works in the river will be secured as far as possible from likely damage
- All construction machinery, equipment and materials will be moved to high ground away from any likely flood path.

- Any other items that could result in spill of hazardous substances (or other materials) during flooding will also be moved to high ground away from any likely flood path.
- Construction in the river will cease until the risk of further heavy rainfall has passed.

#### **4.10 SPECIFIC HAZARDS AND HEALTH ISSUES**

Once construction methodology is finalised a hazards register will be developed and kept up to date by being reviewed at least monthly during construction by the Project Manager or delegated authority. As new hazards are discovered risk treatment options will be developed as an ongoing concern and this health and safety plan re-issued to the appropriate people.

Some likely hazards are:

1. Sudden and unexpected weather changes: High winds, lightning strike, heavy rain and sunny and hot weather
2. Steep slippery slopes on hillsides
3. Trip Hazards when working on foot
4. Rock falls
5. Rapidly rising creeks with heavy rain
6. Normal road driving hazards
7. Getting lost
8. Landslides
9. Using machinery such as chainsaws under sometimes difficult circumstances
10. Operating heavy equipment
11. Hazards associated with snow, such as poor visibility, avalanche, reduced temperature.

#### **4.11 MITIGATION OF SPECIFIC HAZARDS AND HEALTH ISSUES**

1. Carry adequate outdoor clothing and personal protective equipment ('PPE') including wet weather gear and warm clothes, sunscreen and sun hat. Avoid working in exposed places during high wind or storm conditions. Cease work if lightning occurs and return to the vehicle.
2. Take care when traversing steeper slopes especially in wet weather or if slope is dry and slippery.
3. Helicopter induction for each worker likely to require it.
4. Remove any specific trip hazards from work area and take general care.
5. Do a specific site inspection for rock fall hazards or other hazards due to the local terrain.
6. Avoid working along creeks, or traversing creeks, in especially heavy rain, take care on unstable ground.
7. Employ common sense.
8. Sensible defensive driving while travelling to and from the construction front. Unless the driver has undergone formal 4WD training no 4WD to take place.

9. Carry GPS and maps/aerial photos at all times while traversing ground in the field. Load GPS coordinates for known access points and tracks.
10. Wear safety glasses, ear muffs and other protective equipment as necessary.
11. Ensure all machinery or equipment is regularly serviced so as to operate safely.
12. Ensure all staff operating machinery or equipment have sufficient training and experience for working in the conditions likely to be encountered.
13. Be wary of stags during period of the Roar (March/April).
14. Signage will be employed where necessary to inform the public or visitors about the hazards present along the route and to temporarily exclude people from areas of active construction.

#### **4.12 MINIMUM PERSONAL PROTECTIVE EQUIPMENT STANDARDS**

Safety glasses, hi-vis vest/clothing, adequate warm clothing, wet weather gear, insect repellent and sunhats (and sunscreen).

Steel cap boots, hard hats and hearing protection if working machinery and/or participating in helicopter transport.

#### **4.13 RESPONSIBILITIES**

- The Project Manager will be responsible for the preparation of the health and safety plan, ensuring staff are adequately trained and ensuring compliance with the Health and Safety in Employment Act.

## 5 HAZARDOUS SUBSTANCES MANAGEMENT PLAN

Under the Hazardous Substances and New Organisms ('HSNO') Act 1996 a hazardous substance is any substance that exceeds the level, defined by regulation, of any of the following properties:

- Explosiveness
- Flammability
- Ability to oxidise
- Corrosiveness
- Acute or chronic toxicity
- Ecotoxicity, with or without bioaccumulation
- Ability to generate a hazardous substance on contact with air or water.

A comprehensive hazardous substances management plan will be prepared which ensures the contractors will implement sound practices for the storage and use of hazardous substances so as to prevent them adversely affecting the environments along the route.

### 5.1 BACKGROUND

A number of potentially hazardous substances will be in use throughout the construction of the monorail. It is not possible to eliminate the use of these substances so careful management becomes integral to reducing the potential for adverse effects.

The majority of hazardous substances on the construction of the monorail will consist of petroleum based products such as diesel, petrol and oil for use in machinery that is required for construction. Storage of these products will be in sufficient volume to enable refuelling of fleet on site. Grouting materials and cement for construction of foundations (where required) will also be needed.

### 5.2 OBJECTIVES

To minimise environmental impacts and eliminate health risks and nuisance to site staff and public from the accidental discharge of hazardous substances.

The plan requires that all practicable measures are undertaken to safely store hazardous substances and to reduce the potential for spills and to ensure if spills do occur that appropriate procedures are implemented to contain the effects.

### 5.3 METHODS

A list of hazardous substances stored, handled or used during construction will be compiled. Material Safety Data Sheets ('MSDS') will be held on site for all chemicals included in this list.



Procedures for the storage and handling of these substances will be developed including signage and secure lockup where necessary.

A protocol to prevent any spills will be developed along with procedures to minimise or contain the effects of any spill.

Spill management strategies include, but are not limited to the following:

- Management of the transportation of hazardous substances to and from the site.
- There shall be no refuelling of vehicles or machinery over water.
- Equipment will be regularly inspected and maintained for leaks or damage before they burst or fail.
- A spill kit or alternative material will be available on site or where fuel or chemicals are stored in the event that a spill occurs. PVC chemical resistant gloves will be made available for personnel to use while cleaning up a spill.
- All personnel will be made aware of the location of the spill kit or clean up materials at the site induction. Nominated spill response personnel will be trained in their use.
- Regulatory Authorities will be notified when a spill occurs that may result in environmental impact to ascertain their involvement and receive instructions if appropriate.
- Procedures for the control, containment and clean up of a spill will be developed
- Records will be kept in the event of a spill and will be made available to the appropriate authorities. These records will be reviewed on an ongoing basis to ensure incidents are not repeated.
- Hazardous substances will be stored in covered and imperviously bunded areas.
- Hazardous chemical storage areas will be monitored to ensure they are complying with the appropriate standards/guidelines/consents.
- Easy availability of MSDS sheets so that in the event of an incident they can be quickly complied with.

## 5.4 RESPONSIBILITIES

- Development and Maintenance of the Fiordland Link Experience Hazardous Substances Management Plan.
- Ensuring that the hazardous substances inventory is up to date.
- Ensuring that the appropriate equipment to deal with spills is available and accessible where it is likely to be needed.
- Ensuring that the materials and safety data relevant to hazardous substances found at the construction sites, particularly in relation to storage and containment requirements, are held on site and are accessible.
- Providing details of the regular inspection and maintenance of the plant, vehicles and equipment used during construction if required.
- Maintaining a record of incidents or near misses to allow for continuous procedural improvements.

## 6 TRAFFIC MANAGEMENT PLAN

Possible effects of the construction programme on traffic include an increase in traffic flow, increased noise due to traffic and changes to traffic safety.

### 6.1 OBJECTIVES

The objective of the traffic management plan is to minimise construction traffic and vehicle movements so as to allow a safe and efficient construction programme and minimise the impact of traffic associated effects, including safety, noise and traffic flow on both site roads and the roading network.

### 6.2 METHODS

When the construction methodology is finalised this traffic management plan will be updated to consider the final method chosen. The traffic management plan will detail the following measures and strategies:

- Details of the construction traffic, volumes and haulage requirements;
- The methods for construction traffic controls on public roads including State Highway 94 and Mavora Lakes Road;
- Approved routes for haulage of materials along public roads (including the State Highway network) and measures for ensuring that public road network is maintained in a satisfactory condition;
- Management of site traffic during construction including any speed limits to minimise noise and dust adjacent to occupied areas and restricted times of operation to minimise the effects of noise if required.

### 6.3 RESPONSIBILITIES

- Develop a traffic management plan.
- Ensure that the traffic management plan is adhered to and that all staff and contractors are aware of the plan and how it affects their role.
- Maintain a record of complaints about traffic management and report to DoC and Southland District Council as to the efficacy of traffic management.

## 7 NOISE AND LIGHTING MANAGEMENT PLAN

Construction of the monorail will employ the use of heavy machinery, vehicles, and power tools and light machinery such as chainsaws that have the potential to generate nuisance noise effects to nearby dwellings or recreational users of the area. Lighting may also be used during the construction period.

Although there are no immediately adjacent dwellings surrounding the construction area, construction activities will include numerous potentially noisy processes over a period of 30 months which have the potential to affect recreational users, visitors or residents in the area. Accordingly a noise and lighting management plan will be prepared to address these potential issues.

### 7.1 OBJECTIVES

To avoid, remedy or mitigate adverse effects of noise and lighting arising from construction activities.

### 7.2 METHODS

When the details of construction are finalised this noise and lighting management plan will be developed and updated to consider the following matters:

- What practicable measures will be undertaken to reduce noise levels from equipment and personnel operating on site to achieve compliance with any conditions of the concession, District Plan and/or applicable New Zealand standards.
- An assessment of noise from any mechanical equipment associated with the two terminus buildings.
- Realignment of part of the Kiwi Burn Loop track, as detailed in the Recreation Effects report.
- Relocation of some of the Whitestone River to Army Hut tramping route.
- Selection of piling equipment to suit appropriate noise limits.
- Whether additional acoustic treatment to the monorail is necessary or appropriate to further reduce noise emissions. In particular, it may be a simple task to fit sound absorptive linings inside the skirts of each train. Some manufacturers may provide this as standard. Treatment of ventilation openings around the monorail engine may also be possible.
- Whether detailing of track joints is required to minimise potential tyre noise.
- Details of a subjective assessment to be undertaken during commissioning trials, to ensure that there are no unexpected “squeals” or similar noises from the monorail when in operation.
- Monitoring of noise levels where possible on adjacent occupied sites to ensure compliance with NZS 68023:1999.
- Noise associated with helicopter landings that may be required during construction shall be measured and assessed in accordance with NZS6807:1994 – Noise Management and Land Use Planning for Helicopter Landing Areas.
- A Contingency Plan (in the event that construction noise limits are

- exceeded) to be developed.
- A detailed complaints procedure will be put in place to record the date, time and location of noise complaints. Documentation will include what response was taken as a result of the complaint.
  - Management of any night lighting required during the construction period to ensure light spill is minimised.

### **7.3 RESPONSIBILITIES**

Ensure that the noise and lighting management plan is implemented and that staff and contractors are aware of the plan and how it affects their role.

- Ensure that noise levels are monitored and comply with the relevant standards or conditions throughout the duration of construction.
- Manage the risk when site standards cannot be met due to operational or topographical constraints
- Develop and maintain the Noise and Lighting management plan.
- Maintain a record of complaints relating to noise and/or lighting and report to DoC as to the efficacy of mitigation or management.

## **8 RISK MANAGEMENT PLAN**

### **8.1 OBJECTIVES**

The objective of the Risk Management Plan is to identify potential risks and determine a risk management strategy with the options being to avoid, to mitigate, to transfer or to accept the risks identified.

The objective of the risk management plan is to ensure that measures are in place to deal with accidents and emergencies and that any incidents or near misses are dealt with effectively and efficiently.

### **8.2 METHODS**

As details of the construction methods and timeframes become available a risk management plan will be developed which identifies the risks to the project at each stage of construction.

Riverstone will maintain on a regular basis a risk register that covers at least the following core areas:

- Health and Safety
- Environmental
- Cost / Financial
- Technical
- Political
- Timing
- Procurement
- Public Interface
- Fire
- Weather Natural Hazards

### **8.3 RESPONSIBILITIES**

- Ensure the risk management plan is implemented.
- Ensure all necessary equipment is in place in the event of a fire or other emergency.
- Organising a direct response and coordinating the response on site.

## 9 WASTE MANAGEMENT PLAN

### 9.1 OBJECTIVES

The intention is to avoid or minimise the production of solid waste, manage the storage of waste so as to prevent contamination of soil or water at or near the site and to manage the disposal of waste in accordance with legislation.

The presence of vermin could have adverse effects for the native species found at the site. Maintenance of a tidy construction site at all times will help to prevent vermin from being attracted to the work area by waste such as food scraps and other rubbish.

### 9.2 METHODS

A waste management strategy will be developed which identifies the main types of waste likely to be generated at the site and includes strategies for dealing with them.

Likely strategies to achieve this include:

- Encourage the reduction of waste at source, for example by reusing products on site or using alternative suppliers with reduced packaging.
- Preference of supply will be given to products that can be reused or recycled easily.
- Provision for the reuse of objects and materials prior to recycling or disposal.
- Provision of facilities on site that enable waste material to be recycled or recovered.
- Provision of industrial bin/s of sufficient size for construction waste and empty these regularly.
- Collection of surplus hazardous waste (oils, grease, chemicals etc) and store separately.
- Concrete trucks will be washed-out on site into prepared containments.
- Provision of bins for the collection of domestic waste.
- Disposal of waste at suitably licensed landfill sites.
- Disposal of hazardous waste (oil, grease, chemicals etc) at licensed recycling facility.
- Regular inspection of site facilities to monitor the outcomes of this plan.
- Development of Emergency Response procedures in particular for hazardous waste as part of the Hazardous Substances Management Plan
- Records of all inspections to be kept.
- Use of a licensed waste disposal contractor to remove all human waste from the site for appropriate disposal.

### 9.3 RESPONSIBILITIES

- Ensure that the waste management plan is implemented. This will involve at least annual audits to ensure compliance with the plan.

- Manage the risk when site standards cannot be met due to operational or other constraints.
- Ensure all reusable/recyclable waste is reused or recycled.
- Ensure all solid waste is disposed of appropriately.
- Ensure all staff and contractors are aware of the plan and how it affects their role.
- Ensure that the discharge of sewage and greywater meets acceptable standards.

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## **10 ARCHAEOLOGICAL AND HERITAGE PROTOCOLS**

### **10.1 OBJECTIVES**

To manage any potential or actual construction effects on any cultural, archaeological or heritage sites (either identified prior to construction or unearthed during the construction phase).

### **10.2 METHODS**

Prior to the start of any construction, training will be given to all construction staff by the Project Archaeologist regarding methods of identifying, reporting and managing features of archaeological significance.

The following protocols will be adhered at all times during earthworks and construction activities.

### **10.3 KOIWI ACCIDENTAL DISCOVERY**

If Koiwi (human skeletal remains) are discovered whilst undertaking construction work, then the following shall be undertaken:

- Construction work within a 50m radius of the site shall cease immediately and indefinitely until Te Ao Marama Inc and/or New Zealand Police advise that it can recommence;
- Advice of the discovery shall be reported, as soon as practicable, to Te Ao Marama Inc (Ngāi Tahu Murihiku Resource Management Consultants), the New Zealand Police, the Project Liaison Advisor and the Grantor.
- No work shall recommence until an agreement has been reached between the parties regarding appropriate protection measures for the artefact or material found.

### **10.4 TAONGA OR ARTEFACT DISCOVERY**

Taonga or artefact material (with the exception of pounamu which is outlined below) other than Koiwi will be treated in a similar manner so that their importance can be determined and the environment recorded by qualified archaeologists along side the appropriate Tangata Whenua.

### **10.5 POUNAMU DISCOVERY**

If during construction any pounamu is accidentally discovered, the following shall be undertaken:

- Any artefact made of pounamu discovered or found within the project area on land administered by DoC should be left untouched and notified immediately both the local Department of Conservation Officer and Te Runanga o Ngai Tahu. If the artefact happens to be collected it should be



handed directly to the local Department of Conservation Officer along with all information about the find and Te Runanga o Ngai Tahu is to be notified.

- Any artefact made of pounamu discovered or found on all other land within the project area should be left untouched and notified immediately to the local regional museum and Te Runanga o Ngai Tahu. If the artefact happened to be collected it should be handed directly to the local regional museum along with all information about the find and Te Runanga o Ngai Tahu is to be notified.
- All pounamu discovered, other than through authorised or accidental collection, cannot be removed without consultation with Te Runanga o Ngai Tahu.

## 10.6 RESPONSIBILITIES

- Notify affected parties as soon as an accidental discovery is made as prescribed in the plan.
- Ensure all staff are trained in these accidental discovery protocols and know what to do if something of potential archaeological significance is discovered.

## 11 EROSION AND SEDIMENT CONTROL PLAN

Construction of the monorail will require earthworks and vegetation clearance which introduces the potential for erosion during rainfall events if protective action is not taken in advance.

Some of the erosion and sediment control practices will be necessary during construction activities only, while others will remain operational for the life of the monorail. The required life-span for particular erosion and sediment control measures will be determined during the detailed design phase for the monorail and the erosion and sediment control plan will be developed once the final route and construction details are determined.

### 11.1 OBJECTIVES

The goal with respect to sediment control is to minimise erosion and landform instability as a consequence of construction activities.

### 11.2 METHODS

The construction team will use best practice methods to minimise or avoid erosion and sediment mobilisation along the route. These will be aimed at protecting the environment from contamination and may include excluding surface flow from the works area as much as possible or collection of sediment at the extent of the site. The protective works will generally be in accordance with Auckland Regional Council TP90, and relevant Department of Conservation Standards, and may include the following features:

- Minimising areas of disturbance at any one time. This includes areas of bare soil, and where possible these will be mulched or planted as soon as practicable after clearance.
- Diversion of clean runoff and streams around the construction site.
- Use of energy dissipaters on any drop structures on steep sections of stream and drainage channels.
- Cut all batters to a stable slope.
- Provide toe drains and cut off drains to excavated batters.
- Provide sediment traps within drain channels.
- Silt fencing at the downslope extent of the site. Hay bales will not be used because of their potential to introduce weeds.
- Containment of runoff from the worked site in a pond to settle sediment before discharge to the receiving stream or water.
- Where practicable, the discharge from sediment ponds will be passed over a vegetated swale to further reduce the sediment load.
- Protection against erosion will be provided at the discharge points.
- Rehabilitation of natural drainage patterns after construction and rehabilitation of batters and slopes with planting to minimise sediment generation after construction is complete.

The specific location of the soil protection features will be identified as the project progresses to the detailed design phase, which will include a thorough assessment of construction methods.

Wherever practicable, clean water will be kept separate from that which has suspended sediment. This clean water will be conveyed along channels and discharged to existing watercourses that are closest to the extraction or diversion point.

The sediment control works will be in place prior to any significant earthworks, other than establishing access routes which will enable the works. The first step will be to excavate the contour drains at the upslope edge of the site. These will be shallow channels and will immediately be stabilised. Where grades in the channel are steep or expected flows are high, armouring may be established in specific areas to avoid erosion during use. The diversion channels will discharge to the natural water courses that cross the scheme alignment.

Sediment control works will then be set-up at the downslope extent of the works. This will consist of another series of contour drains and/or silt fences that filter sediment discharge locally, or direct sediment laden flow towards sediment traps and possibly sediment ponds where the solids can be settled out. These traps or ponds will be specifically sized depending on their catchment area and will be maintained following storm events to ensure that they are functional. The settled sediment will be excavated and disposed of within the works area after drying out as appropriate. The catchment areas for individual sediment traps or ponds will be minimised as far as practicable with a preference towards discharging lower volumes at more locations.

The extent of stripped area will be kept to the minimum practicable. Once work has been essentially completed in each area, it will be covered with topsoil and re-vegetated as soon as possible to minimise the potential for sediment generation.

Where issues with sediment discharge do occur Regulatory Authorities including DoC and the Regional Council will be notified as soon as possible by the Project Manager. Cleanup work will be agreed between these parties and started as soon as practicable.

### **11.3 STREAM CROSSINGS**

The monorail necessarily crosses streams along its path and this is a critical area for good soil management to avoid sediment discharges. The work will be kept remote from flowing water to the extent practicable to minimise this potential.

### **11.4 RESPONSIBILITIES**

- Supervise the construction and development along the route including development of all earth bunds, temporary diversion channels, roads,

tracks and stream crossings. Ensure that all such areas and any associated structures are constructed in accordance with current best practice and the erosion and sediment control plan.

- Develop and maintain the sediment and erosion control management plan.
- Undertake regular visual inspections of the site boundaries. This will be especially critical after heavy rainfall events and in the evenings after any activities near the site boundaries.
- Any physical effects of the earthworks will be noted and rectified within 24 hours (this may include, for example, removal of soil or debris or lining of drainage channels).
- Sign off any rehabilitation area to ensure that natural drainage patterns are restored.
- Inform regulatory authorities if erosion or sediment control targets are not being met.

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## 12 IN RIVER WORKS MANAGEMENT PLAN

The construction of the monorail and associated facilities has the potential to impact aquatic stream habitat by disturbing the bed and/or banks of rivers and streams, and by mobilising sediment along the route during the construction. The use of machinery in waterways also has the potential to introduce the exotic aquatic periphyton *Didymosphenia geminata* (didymo) and other aquatic weeds to streams where they are currently absent. Didymo is present in all three of the large rivers along the route (Mararoa, Upukerora and Whitestone).

The exact location where the monorail will cross rivers and streams is yet to be determined, but one of the considerations to be applied during the detailed design phase of the construction is that crossings will be located in the most ecologically appropriate sites, that is where adverse effects on the water can be avoided or minimised.

### 12.1 OBJECTIVE

This Plan aims to ensure that a healthy aquatic ecosystem is maintained in the rivers and streams along the route and any adverse effects from the construction are avoided, remedied or mitigated. Any adverse effects are to be limited both in extent and duration where possible.

In-river works may be necessary where the monorail crosses the path of streams and rivers. Special measures will be undertaken during construction in recognition of the potential for adverse effects.

### 12.2 METHODS

The key mitigation measures to ensure the works do not affect the water quality either within the project footprint or downstream of the construction include:

- Implementing best practice construction methodologies at all times;
- Avoidance of work within active river beds as far as practicable except where necessary to cross large rivers;
- Avoidance of any activities which affect the stream bed and bank structure as far as practicable;
- Cleaning of all machinery and equipment before entering or shifting between waterways to prevent the spread of didymo;
- Constructing the monorail within waterways during the summer months where practicable. During summer insect flight and instream invertebrate drift increases, enhancing invertebrate community recovery times;
- Ensuring construction in river beds is completed as quickly as possible.
- Ensuring that hazardous substances such as petroleum products are managed in accordance with the Hazardous Substances Management Plan to prevent these substances entering waterways.
- Erosion and sediment mobilisation will be managed as prescribed in the Erosion and Sediment Control Plan to avoid or minimise loss of soils into waterways.

The primary goal will be to keep the area of any works in rivers to the minimum required to complete the work. To achieve this, all preparatory materials and equipment will be stored away from wet areas and where possible preparatory works will be carried out well away from the river. Essentially, works will avoid areas of flowing water where possible.

### **12.3 PRE-CONSTRUCTION MONITORING**

Prior to the construction of the monorail starting, a survey of all streams crossed by the route will be undertaken to determine the distribution of didymo through the catchments. This will form the basis of determining whether the streams are didymo free and whether didymo control methods are required where didymo is later found.

### **12.4 FLOODING DURING IN RIVER CONSTRUCTION**

Because the construction will take approximately 30 months there is the potential for floods of various magnitudes to occur during construction. Inundation of works during construction would most likely result in the loss of any temporary works, or partially completed works.

The construction engineer will maintain an up to date knowledge of weather forecasts and will respond to any forecast of heavy rainfall in the catchments that could lead to flooding of rivers and streams in the project footprint as follows:

- No discrete unit of construction work (such as laying of each foundation and placement of one pier) will be started within a river if the weather forecast indicates that the unit of work cannot be completed to a flood-safe standard before the expected heavy rain arrives.
- Works already underway in a river when rain likely to cause a flood arrives will be secured from possible damage.
- All construction machinery, equipment and materials will be moved to high ground away from any likely flood path.
- Any other items that could result in spill of hazardous substances (or other materials) during flooding will also be moved to high ground away from any likely flood path.
- Construction in the river will cease until the risk of further heavy rainfall has passed.

This will also be necessary for health and safety purposes.

### **12.5 MONITORING DURING CONSTRUCTION**

Water quality will be monitored regularly at one or more sites upstream and downstream of any construction works in rivers for the duration of the work. Construction work in streams and rivers will be inspected regularly so that maintenance work or remediation can be undertaken as quickly as possible where necessary.

The results of this monitoring will be reported not less than six monthly to the relevant regulatory bodies.

The frequency and duration of this monitoring will be determined by the construction timetable and the amount of work required in rivers and streams. This will be finalised during the detailed design phase of the project.

## 12.6 RESPONSIBILITIES

- Supervise the construction along the route including development of temporary diversion channels and stream crossings. The Project Manager will ensure that all such areas and any associated structures are constructed in accordance with current best practice.
- Maintain an up to date knowledge of weather forecasts and respond to any heavy rainfall forecast in the local catchments that could lead to flooding of rivers and streams in the project footprint as prescribed in the In River Management Plan.
- Ensure all staff are aware of the need to protect aquatic habitat and that they are trained and enabled to do that within the parameters of their role.
- Develop and implement the Fiordland Link Experience In River Management Plan
- Monitor the surface water quality at specified locations when construction is occurring in streams or rivers nearby.
- Regularly inspect construction work in streams and rivers so that maintenance work or remediation can be undertaken as quickly as possible.
- Report regularly to DoC and other regulatory bodies if required on the whether the management practices are working effectively.