NZ TRANSPORT AGENCY
WAKA KOTAHI

# Transmission Gully Project



# Indicative Construction Environmental Management Plan

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**Quality Assurance Statement**

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**Revision Schedule**

| Rev. No | Date | Description | Prepared by | Reviewed by | Approved by |
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**NZ Transport Agency**

**Construction Environmental Management Plan**

# 1. Introduction

This is the draft Construction Environmental Management Plan (CEMP) for the Transmission Gully Project (the Project). The Project comprises the Transmission Gully Main Alignment, the Kenepuru Link Road and the Porirua Link Roads. The purpose of the CEMP is to provide the framework, methods and tools for how environmental effects of the Project should be managed, remedied or mitigated during construction, in order to meet resource consent and designation conditions, relevant legislation and the NZTA's environmental objectives.

The Government has identified a suite of 'roads of national significance' (RoNS) and set priority for investment in these as New Zealand's most important transport routes. The RoNS are critical to ensuring that users have access to significant markets and areas of employment and economic growth.

The Transmission Gully Main Alignment is part of the Wellington Northern Corridor (Wellington to Levin) RoNS. The Wellington Northern Corridor is one of the seven RoNS that were announced as part of the Government Policy Statement on Land Transport Funding (GPS) in May 2009. The focus of the RoNS is on improved route security, freight movement and tourism routes.

The Main Alignment will be approximately 27 kilometres in length and will require land under the administrative jurisdiction of four separate territorial authorities: Wellington City Council, Porirua City Council, Upper Hutt City Council, and Kapiti Coast District Council. The Kenepuru Link Road will connect the Main Alignment to western Porirua. The Kenepuru Link Road will provide access from Kenepuru Drive to the Kenepuru Interchange. The NZ Transport Agency (NZTA) is the requiring authority for the Main Alignment and the Kenepuru Link Road.

The Porirua Link Roads will connect the Main Alignment to the eastern Porirua suburbs of Whitby (Whitby Link Road) and Waitangirua (Waitangirua Link Road) and will be designed as local roads. Porirua City Council (PCC) is the requiring authority for the Porirua Link Roads.

The Project will also affect streams, air and land along the through route. Effects on these resources are managed by Greater Wellington Regional Council (GWRC).

This is a draft CEMP which only provides the framework for how the effects will be managed through an environmental management system in order to inform the NZTA and PCC's applications to the Environmental Protection Authority, for resource consents and NORs for the Project.

Following confirmation of the NORs and granting of the resource consent applications, NZTA and PCC anticipate that the final CEMP will be submitted (as part of the Outline Plan of Works for the designations) to the regulatory authorities once a preferred Contractor (Contractor) is selected and the detailed design phase of the Project is complete.

## 1.1 Purpose of the CEMP

The purpose of this CEMP is to describe the environmental management and monitoring procedures to be implemented during the Project's construction phase to manage compliance with all of the conditions of consent and designations. The CEMP provides a methodology and framework of management plans and protocols for implementing the environmental controls specified in relevant consent and designation conditions. The final CEMP submitted by the Contractor will outline all details required to enable the NZTA, PCC and the Contractor to construct the Project with the least adverse environmental effects. Overall, the implementation of the CEMP will manage:

- Compliance with the conditions of resource consents and designations;
- Compliance with environmental legislation;

- The requirements of Section 176A (outline plan) for construction of the Project;
- Adherence to the NZTA's and PCC's environmental objectives; and
- Environmental risks associated with the Project are properly managed.

## 1.2 Scope of this CEMP

The CEMP defines details of who, what, where and when environmental management and mitigation measures are to be implemented. The CEMP covers all anticipated construction elements and presents a framework of principles, environmental policy, objectives and performance standards as well as processes for implementing good environmental management. This CEMP establishes the relationship with the related environmental sub management plans (sub-plans) and Site Specific Environmental Management Plans (SSEMP).

**Section 1**

Sets out the Project background, provides a description of the Project, outlines the scope of the CEMP and the relevant environmental policy, and performance.

**Section 2**

Presents the social and environmental management context of the Project. The section outlines the main construction activities of the Project and the Environmental Risk Register to be populated and maintained by the Contractor to identify significant environmental aspects and risks associated with these activities.

The section also identifies the key RMA requirements applicable to the environmental aspects of the Project and the how the conditions framework relates to the CEMP.

**Section 3**

Outlines how consultation and communication with stakeholders and the wider public will be undertaken during the construction phase of the Project.

**Section 4**

Outlines the implementation and operation of the CEMP. This section details the CEMP's roles and responsibilities and the related training requirements for the construction phase of the Project. Further descriptions of the related sub-plans and SSEMPs and the operating procedures (including measures to mitigate potential adverse environmental effects, which will tie in with the conditions of consents and designations) are provided. It also details the management of emergencies, incidents, complaints and the guidelines for internal and external communications and interface.

**Section 5**

Outlines how the management of environmental effects is to be undertaken as the Project moves from construction to operation.

**Section 6**

Outlines how monitoring and review of the Project will be undertaken once construction has been completed.

## 1.3 Assessment of Environmental Effects

The CEMP and its sub-plans and SSEMP are consistent with and complement the Transmission Gully Assessment of Environmental Effects (AEE). The AEE technical assessment reports will inform the development of the final CEMP, and sub-plans.

Table 1 outlines how the technical assessment reports relate to each management plan.

**Table 1 Management Plan relationship to Technical Assessment Reports**

| Management Plan | Technical Assessment Report Inputs |
|---|---|
| CEMP | • Assessment of Effects on the Environment: Part H, proposed designation and resource consent conditions<br>• Assessment of Land Contamination Effects<br>• Consultation Summary report & Communications Plan<br>• Assessment of Social Effects |
| Construction Noise & Vibration Management Plan | • Assessment of Acoustic Effects (Noise and Vibration) |
| Construction Air Quality Management Plan | • Assessment of Air Quality Effects |
| Concrete Batching Plant Management Plan | • Assessment of Air Quality Effects<br>• Assessment of Water Quality Effects<br>• Assessment of Acoustic Effects (Noise and Vibration) |
| Erosion and Sediment Control Plan | • Assessment of Water Quality Effects |
| Construction Traffic Management Plan | • Assessment of Traffic and Transportation Effects |
| Ecological Management and Monitoring Plan | • Assessment of Ecological Effects and ecological valuation reports |
| Landscape Plans and Landscape Management Plan | • Landscape and Visual Effects Assessment |
| | • Urban and Landscape Design Framework |
| Accidental Discovery Protocol | • Assessment of Effects on Built Heritage |
| | • Cultural Impact Assessment |

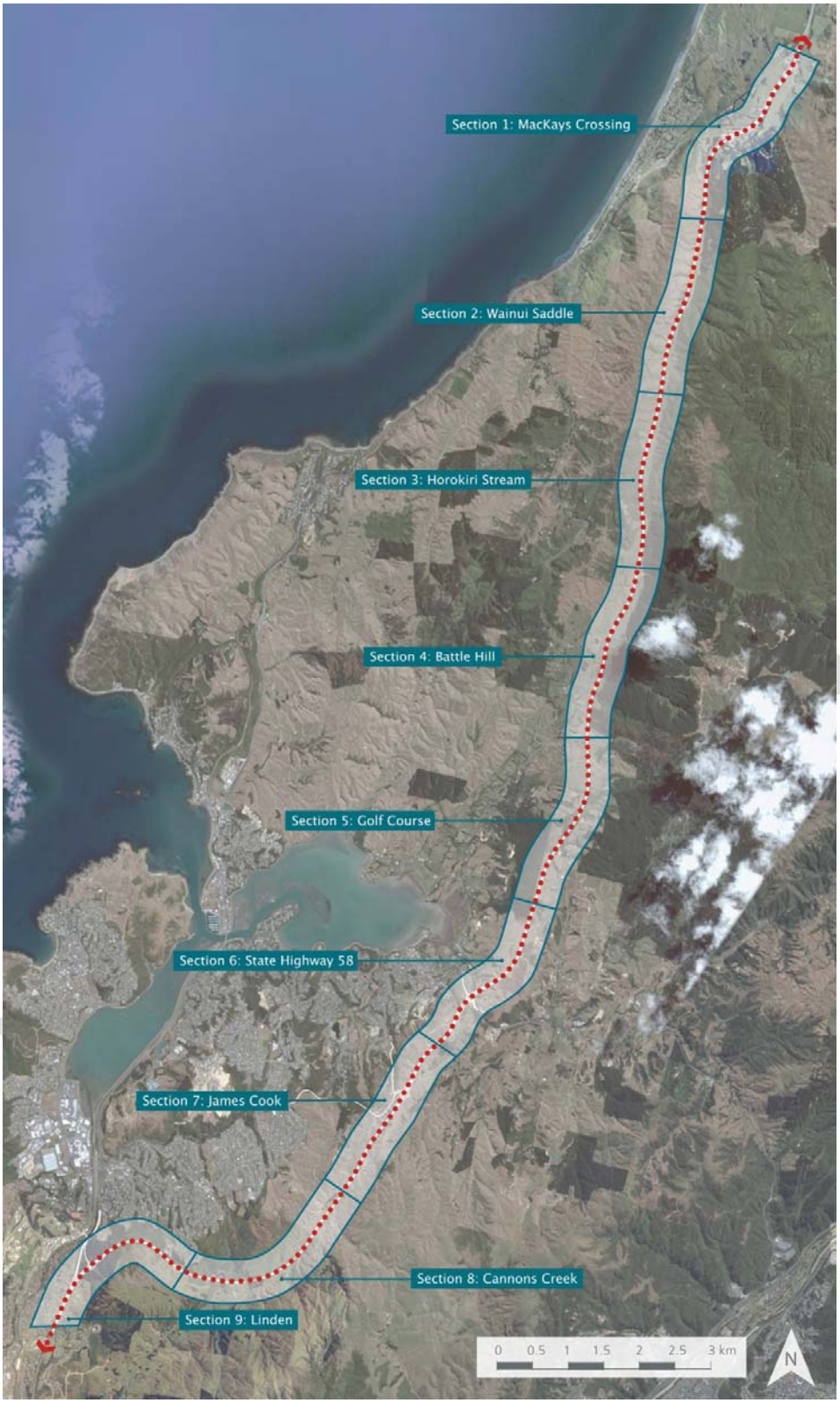
| | |
|---|---|
| | • Assessment of Archaeological Effects |

## 1.4 Project Overview

The NZTA and PCC are seeking consents and confirmation of NORs under the RMA to authorise the construction, operation and maintenance of the Project. There will be six NoRs by the NZTA and two by PCC. The NZTA and the PCC are also seeking all the necessary resource consents required under regional plans to construct operate and maintain all components of the Project.

The Main Alignment is a proposed 27km expressway from MacKays Crossing to Linden and the NZTA is the requiring authority. The two PCC link roads join the Main Alignment at the James Cook interchange and run downhill to Whitby and Waitangirua.

Figure 1: Main Alignment below provides a visual overview of the Project.




- **Figure 1: Main Alignment**

The Main Alignment has been divided into 9 sections. In short, these are summarised as follows:

*Section 1: MacKays Crossing*

This section is approximately 3.5km long, and extends from the tie-in at the existing MacKays Crossing Interchange on SH1 to the lower part of the Te Puka Stream valley. This section of the Main Alignment will provide for three lanes in the northbound carriageway from 00700m and from 02100m in the southbound carriageway. Southbound traffic will be able to exit the Main Alignment at approximately 01250m. This exit will pass under the Main Alignment at approximately 01800m and will connect to the existing SH1 heading south towards Paekakariki. Traffic heading northbound from Paekakariki will be able to join the Main Alignment from a connection at approximately 01200m. Conversely, traffic heading southbound from Paekakariki can either choose to use the Main Alignment via the MacKays Crossing Interchange or use the existing SH1 Coastal Route.

*Section 2: Wainui Saddle*

Section 2 starts at approximately 03500m and will continue climbing for about 2km to the top of the Wainui Saddle at approximately 262m above sea level (at about 05500m). This will be the highest point of the Main Alignment.

*Section 3: Horokiri Stream*

This section is approximately 3km long and extends from the southern end of the Wainui Saddle section to the northern end of Battle Hill Farm Forest Park (BHFFP). For the entire length of this section, the Main Alignment will run generally parallel to the Horokiri Stream.

*Section 4: Battle Hill*

This section is approximately 3km long and extends from the northern boundary of the BHFFP to the Pauatahanui Golf Course. Shortly after the Main Alignment enters the BHFFP from the north it crosses over the Horokiri Stream. Over the remainder of this section heading south the Main Alignment will follow the Horokiri Valley floor which widens from north to south through the BHFFP. Access across the Main Alignment for park users will be provided by a subway. This will provide a connection between the eastern and western part of the park for pedestrians, cyclists and stock. The Main Alignment will continue south from the BHFFP boundary towards the Pauatahanui Golf Course.

*Section 5: Golf Course*

This section is approximately 3km long, and extends from north to south through rural land adjacent to the Pauatahanui Golf Course and Flightys Road. The Main Alignment will cross a number of small tributaries along this section but there will be no major stream crossings requiring bridges.

*Section 6: State Highway 58*

This section is approximately 3km long. The SH58 / Pauatahanui Interchange will be located at approximately 17500m. At this interchange the Main Alignment will be elevated above a roundabout which will provide access to and from the Main Alignment for traffic travelling in both directions on existing SH58. Immediately south of this interchange, at approximately 17660m, there will be a bridge (BSN 14) across the Pauatahanui Stream.

At approximately 18250m the Main Alignment will widen to provide three lanes in each direction. This section finishes at approximately 18500m.

*Section 7: James Cook*

This section starts just south of the SH58 / Pauatahanui Interchange, at approximately 18500m. Three lanes will be provided for both the northbound and southbound carriageways. The James Cook Interchange is a dumbbell interchange with the Main Alignment being elevated above the local road connections. These roads will provide access to the Main Alignment in both directions to and from the Porirua Link Roads.

*Section 8: Cannons Creek*

This section is approximately 3.4 km long. Throughout this section the Main Alignment will run along the eastern side of Duck Creek valley, and across an undulating plateau between Duck and Cannons Creeks. There will be four bridges in this section

*Section 9: Linden*

This southernmost section is approximately 2.8km long. From the start of the section at approximately 24900m, a third lane will be provided in the northbound carriageway heading uphill. The Kenepuru Interchange will be located at approximately 26700m. This interchange will involve the Main Alignment being elevated above a roundabout which will connect to the Kenepuru Link Road.

South of the Kenepuru Interchange, the Main Alignment will continue downhill to where it will tie into the existing SH1 along the Tawa straight. For traffic joining the Main Alignment in a northbound direction, the carriageway will be elevated and will pass over the existing southbound SH1 carriageway. Northbound traffic continuing to Porirua will be able to do so by taking the left lane exit from the existing SH1.

## 1.5 The Kenepuru Link Road

The Kenepuru Link Road will provide a connection from the Main Alignment to western Porirua. This link road will provide a connection from the Kenepuru Interchange to the existing Kenepuru Drive and will be approximately 600m long. There will be a roundabout at the intersection with Kenepuru Drive. The Kenepuru Link Road will be a limited access road State highway. The Kenepuru Link Road will contain a curved 240m long bridge over the existing SH1 and the NIMT (BSN 26).

## 1.6 The Porirua Link Roads

The Porirua Link Roads will connect the Main Alignment to the eastern Porirua suburbs of Whitby and Waitangirua. The Porirua Link Roads will be designed to local road standards.

The Waitangirua Link Road will be approximately 2.5km long and will run from the James Cook Interchange to the existing intersection of Niagara Street and Warspite Avenue. This will be a signalised intersection. The Waitangirua Link Road will cross five waterways. The most significant of these will be a crossing of Duck Creek requiring a culvert (BSN 16). The Waitangirua Link Road will link into the western side of the James Cook Interchange.

The Whitby Link Road will be approximately 900m long and will run from the existing roundabout at the intersection of James Cook Drive and Navigation Drive to the Waitangirua Link Road. The new intersection of the proposed Waitangirua and Whitby link roads will be a T-intersection.

## 1.7 Project Stages

After regulatory approvals are secured and detailed design is completed, the Project will involve three main stages:

1) **Construction:** The construction stage of the Project will occur across a number of fronts to enable separate elements to be undertaken concurrently. Any consents, designations and consent or designation conditions which have been granted and are relevant only during the construction phase will not be carried through to the operational phase. Monitoring of compliance with conditions of all consents and designations held by the NZTA will be entered into the Contractor's CS-VUE project file (described further in Section 2.3.2) and PCC's compliance monitoring system. This CEMP will be prepared for the construction stage.

2) **Transition:** The transition stage is the crossover period between the construction and operational stages of the Project whereby the responsibility for the management of the environment is transferred from the construction contractor(s) to the network operator. During this stage the construction contractor(s) will be required to work with the NZTA and PCC in finalising the construction and meet any post-construction resource consent and designation conditions before the Project is passed to the Operations and Management Consultant (OMC). The transition stage also provides for the transfer of information on conditions which remain operative (such as long term environmental monitoring). Any resource consents and designations with components still operative will be entered into the OMC's CS-VUE project file and PCC's compliance monitoring system managed by the OMC. The transition stage includes the defects liability period.

3) **Operation:** Once completed, the ongoing responsibility for the operations and maintenance of the infrastructure associated with the Project will be transferred to the OMC. The NZTA will use its existing operational maintenance and management methods to manage environmental aspects of the operation and maintenance of the asset.

## 1.8 Statutory basis for the CEMP

This document has been produced to outline the framework for how the Project will manage environmental effects during construction and give effect to the proposed conditions of resource consent and designations. Once the preferred design and construction team is selected for detailed design, the CEMP will be finalised.

## 1.9 Mechanism for revision

The primary reason for changing the CEMP (after it is made final) will be if there is a significant change in the construction methodology or activities undertaken on the site. If a change to the CEMP is required, it will need to comply with all of the conditions of consent and designations granted in respect to this Project. NZTA and PCC anticipate that the altered CEMP will be submitted to the relevant regulatory authorities for confirmation of compliance.

## 1.10 NZTA's Environmental Policy

NZTA's has an Environmental Policy (see Appendix A) which sets out Standards and Guidelines for the assessment of effects. These assessments have been documented in the AEE for the NOR and regional consents. Finally, the management plan framework will set out how the construction of the Project will be managed to meet the designation and consent conditions and relevant performance criteria.

# 2. Social and Environmental Management

## 2.1 Environmental Aspects Register

As part of the management of significant risks and opportunities associated with the Project, an Environmental Aspects Register will be developed by the Contractor for the Project. The register will identify potential significant environmental benefits that may be able to be created and managed during construction. For example, providing sites for ecological mitigation. The register will also identify significant risks. The register will also be informed from the AEE prepared for the project and the NZTA's Minimum Standard for the Contractor's Social and Environmental Management Plan Z/4 in the NZTA SM030 Professional Services Manual. The register will need to comply with all the conditions of the resource consents and designations and the Outline Plan of Works clearance under section 176A.

### 2.1.1 Process

The Environmental Aspects Register will be prepared and maintained using the following process:

- All Project activities will be described including subcontractor, suppliers and ancillary works such as materials transported to or from site and site establishment.
- Actual and potential environmental impacts associated with each activity will be identified.
- Significant potential environmental impacts will be identified using the NZTA Risk Assessment[1] methodology.
- This information will inform the design of environmental management activities, controls and monitoring to prevent or minimise those environmental impacts appropriately.

The function of the risk assessment is to translate the AEE and conditions of designations and consents into actual construction techniques.

The environmental risk analysis process is outlined in the NZTA document "Risk Management Process Manual" (2004) which is consistent with the New Zealand Standard AS/NZS 4360:2004 Risk Management. The risk analysis is based on an index formed from perceived likelihood of an occurrence and the subsequent consequence of that occurrence (how much harm it would cause). Likelihood and consequence are given a rating and a description. The overall risk score and category (ranging from negligible to extreme) is calculated from Tables A, B and C in Appendix B of the "Risk Management Process Manual" (2004).

### 2.1.2 Review of the Register

The Environmental Manager (roles and responsibilities are defined in section 4.1.1) will be required to maintain and review the Environmental Aspects Register. The risk assessment results will be reviewed at regular intervals and will be repeated at critical times within the Project, such as prior to commencement of construction (taking into account finalised construction methodologies), when there is a new or changed activity, equipment or location of activities or when there is a change to legislative or consent and designation requirements. The Register will be reviewed on a quarterly basis as a minimum.

The Environmental Manager, with the assistance of environmental and technical experts, will determine whether the CEMP and sub-plans require revision to reflect the revised risk assessment. The contractor will be responsible for obtaining approvals required (if any) prior to commencing any new or changed activities.

[1] NZTA Risk Management Process Manual Version 3, September 2004

The Environmental Manager will inform the Site Manager, relevant staff, Project Manager and management team of any changes to the Environmental Aspects Register. The Contractor will include any variations to the register within the weekly report to the Project Manager.

## 2.2 Construction methodology and programme

The construction of the Project will occur across a number of work fronts simultaneously, and the AEE and the proposed consent and designation conditions have been devised to enable this. Key construction activities associated with the Project include the construction of new roads, earthworks, stream crossings, diversion of streams, reclamation, construction of bridges, landscape and noise mitigation. These activities have the potential to affect different aspects of the environment, and the CEMP and sub-plans will manage each aspect.

The following construction tasks are examples of the tasks that may be undertaken in the first year:

- At the State Highway 58 (Lanes Flat) intersection area:
  - Establishment of a major site office
  - Building a concrete batching plant at SH58
  - Commence enabling works and bulk earthworks
  - Commence construction of bridge 14 which will then enable construction traffic to use the main alignment rather than Bradey Road
- At the northern end near MacKays Crossing:
  - Establish a site office at NZTA owned land with access via Paekakariki Hill Road.
  - Construct access roads both north and south to allow for bridge construction.
  - Sequential completion of the bridges which can then be used as haul roads for the transfer of cut material.
  - Commence enabling works and bulk earthworks

- At the southern end (between Cannons Creek and Linden)
  - Commence construction of the link between the existing SH1 at Linden with the Kenepuru Interchange and Link Road (to achieve early benefits)
  - Potential harvesting of pine forest near the proposed Kenepuru Interchange
  - Use of local roads in Ranui Heights for access.

The full programme of works and staging will be provided when the final CEMP is provided for approval.

## 2.3 RMA Requirements

Table 2 below outlines the elements of the CEMP and the corresponding resource consent/ designation conditions, in order to demonstrate compliance with the relevant conditions. .

**Table 2 Compliance with RMA requirements**

| **Relevant Resource consent/ designation conditions** | **Corresponding element of the CEMP** |
|---|---|
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## 2.4 Other Approvals

Other than under the RMA, approvals under other legislation are also required. Approvals are required under the following legislation:

- Historic Places Act 1993
- Reserves Act 1977
- Freshwater Fisheries Regulations 1983

The following table provides a cross reference to each section of the CEMP in order to demonstrate compliance with the conditions under each of these approvals:

**Table 3 CEMP Compliance with non RMA legislation**

| Legislation | Relevant conditions | Corresponding element of the CEMP |
|---|---|---|
| Reserves Act 1977 | | Ecological Management and Monitoring Plan |
| Historic Places Act 1993, section 12 authorisations | | Accidental Discovery Protocol |
| Freshwater Fisheries Regulations 1983 | | Ecological Management and Monitoring Plan |

## 2.5 The NZTA Consent Compliance Management System

CS-VUE is a legal compliance system adopted by the NZTA to manage environmental statutory requirements. The NZTA will require, through its contract with the Contractor appointed for construction of the Project, that CS-VUE will be used to manage its statutory compliance. The CS-VUE system manages statutory compliance with legal obligations associated with conditions of resource consents and designations, Department of Conservation concessions, Historic Places Trust authorisations and any other agreements or obligations which have compliance conditions. Following construction of the project, any operational consent or designation conditions will be managed by the Network Management Consultant.

CS-VUE is a secure database which matches each consent (or other legal obligation) with a consent manager and automatically sends an email notifying them of compliance requirements. All entries/changes on CS-VUE are annotated with the person's name and the date when the changes took place. The NZTA'S Highways and Network Operations Professional Services team owns and maintains CS-VUE through its Consultants who are able to access and update the database remotely.

# 3. Consultation and Communications

## 3.1 Consultation

During construction, consultation with affected parties may be required for:

- Accidental discovery of archaeological artefacts;
- A revised construction methodology due to unforeseen physical constraints.

Where accidental discovery of archaeological artefacts occurs, the Accidental Discovery Protocol (ADP) for the Project will be used. A copy of the ADP is attached in Appendix B.

Any consultation required will need to comply with the NZTA's Communications Plan for the Project (which is required as a condition of the designation).

## 3.2 Communications

The impacts of the Project, especially from construction, will be noticeable for the local communities which the Project will interface. Open, two-way communication will be provided keep the community informed about what is happening in their neighbourhood.

There will be targeted consultation with individual property owners located within close proximity to the site. It is noted that this is a requirement of the CNVMP when noisy works are proposed close to people.

A general communications strategy will be developed and will include the following mechanisms to communicate with the general public:

**Website**
Information on the project will be available on the NZTA Transmission Gully Project website http://www.nzta.govt.nz/projects/transmission-gully/. The website will be updated frequently by the Stakeholder Relationship/Communications Manager and will provide details on construction, contact details, consultation processes, and frequently asked questions.

**24hr 0800 Number**
A 0800 contact number will be set up prior to construction to field any calls relating to the Project. This is an important way for stakeholders and members of the public to communicate with the NZTA and contractor. All calls will be recorded electronically, identifying all complaints and enquiries.

**Mail Drops**
During and prior to key stages of construction, targeted mail drops will outline and forewarn of construction activity within the area, and provide the recipient with information on the progress of the Project. The Stakeholder Relationship/Communications Manager's contact details will be included.

**Brochures and Billboards**
Brochures and flyers on the Project will be readily accessible to the public. There will also be billboards positioned around the site, which will include the name, telephone number, and address for service of the Site and Project Manager.

**Community Reference Group**
A Community Reference Group (CRG) will be set up at least 2 months prior to the commencement of construction for the purpose of communicating with the community. The CRG members will be chosen to be

from a wide cross section of the community – including from community groups and interest groups – and will be responsible for assisting to disseminate information out into the community.

**E-Newsletter**
The Project Team will provide a regular bulletin, advising stakeholders and interested parties on Project updates and news. It is anticipated that this will take the form of an e-newsletter, to which anyone can subscribe.

**Media Coverage**
In addition to advertising in the local press, in selected publications and through other media, the Stakeholder Relationship/Communications Manager will provide regular updates to the media and encourage regular editorial updates through print, television and radio channels.

## 3.3 Communications Register

A Communications Register will be kept for the Project, electronically. All enquiries and complaints will be logged. Responses to the questions will tracked and closed out within an agreed timeframe between the respondent and the NZTA. The Communications Register is discussed further in Section 4.3.2.

# 4. Implementation / Construction

## 4.1 Management team structure

The final management roles for the construction of the Project will be based around the following roles:

- Project Manager
- Design Manager
- Construction Manager
- Environmental Manager and/or Planning Manager
- Stakeholder Relationship/Communications Manager
- Site supervisor/Project Engineer

Depending on the Contractor's proposed team structure, a combination of these roles may be able to provided, so long as the following principles are able to be maintained:

- Accountability for all environmental management responsibilities ultimately rests with the Project Manager;
- The Environmental and/or Planning Manager's roles provide a clear management structure for monitoring consents. If required, the roles can be merged into one, and delegation of responsibilities can be passed to other roles if appropriate. For example, the Contractor may choose to employ an Erosion and Sediment Control Manager who may have responsibility for implementing and monitoring the conditions of consent around sediment control.

The key management roles from each organisation in relation to environmental management during the construction of the Project are outlined in Table 4 below:

**[CONTRACTOR TO INSERT ORGANISATION CHART HERE]**

**Table 4 Preliminary Roles and Responsibilities**

| Organisation | Role | Responsibilities |
|---|---|---|
| The NZTA<br><br>Porirua City Council | Consent Holder and Engineer to the Contract<br><br>Environmental Representative | ▪ Compliance with the RMA and with any condition of the designations and resource consents;<br>▪ Applications for alterations to the designations or resource consents or applications for new resource consents and designations and renewal of expired resource consents;<br>▪ Review of Contractors' site specific management plans, and relevant sub-plans. |
| Main Contractors | Project Manager<br><br>Environmental and/or Planning Manager<br><br>Construction Manager<br><br>Stakeholder Relationship/ Communications Manager | ▪ Overall responsibility for site environmental management;<br>▪ Reviewing and reporting on environmental performance;<br>▪ Outline Plan of Works and other RMA approvals;<br>▪ Inspection of works to assess compliance with the CEMP and sub-plans;<br>▪ Inspections, auditing and checking of environmental management practices and procedures;<br>▪ On-site compliance with resource consent and designation conditions and other requirements and tracking compliance information on CS-VUE;<br>▪ Report to the NZTA changes to construction techniques or natural environmental changes which require alterations to the consents/ designations or new resource consents and designations;<br>▪ Prepare, review and update of specific SSEMP's and relevant sub-plans;<br>▪ Facilitate and oversee environmental monitoring;<br>▪ Update and maintain the Environmental Aspects Register;<br>▪ Maintain Complaints, Incidents and Non Compliance forms;<br>▪ Training of all staff including sub-contractors. |
| Sub-Contractors | Construction Manager | ▪ Adherence to the CEMP and sub-plans;<br>▪ Preparation/variation of specific SSEMP's and relevant sub-plans as required. |
| Local Authorities | Consent Manager | ▪ Commenting on specific SSEMP's and sub-plans.<br>▪ Auditing to assess whether the resource consent and designation conditions are being complied with. |

Key roles of personnel as they relate to environmental management during the construction of the Project are detailed below. Roles and responsibilities of personnel which implement specific environmental controls and monitoring programmes (such as the contaminated land expert, erosion and sediment control advisor, archaeologist) are detailed in the relevant sub-plan.

**All Staff**

- Attending tool-box talks and environmental training including familiarisation with the requirements of the CEMP and sub-plans (as directed by the Environmental Manager );
- Responsible for reporting environmental incidents, complaints, defects and other problem areas to senior staff as they arise on site;
- Ensuring that required processes and procedures for environmental management are followed;

- Ensuring that environmental mitigation and protection measures are maintained and working correctly; and
- Within day to day work responsibilities, protect the environment both on site and adjacent to the site.

**Project Manager**
- Takes ultimate responsibility for delivery of the Project, and therefore compliance with conditions of resource consents and designations;
- Approves environmental plans prior to issue; and
- Provides adequate resources to manage environmental issues and obligations.

**Design Manager**
- Incorporates environmental requirements into design as required by the consent and designation conditions, the CEMP and sub-plans; and
- Advises Environmental Manager of any design issues that may impact on the environment.

**Construction Manager(s)**
- Reviews work packages against the CEMP to achieve a high level of performance;
- Develops, implements and monitors construction methods ensuring compliance with consents and designations and CEMP and sub-plans;
- Coordinates environmental interfaces with consultants, subcontractors and suppliers;
- Demonstrates understanding of major environmental and community issues and environmentally sensitive areas;
- Implements environmental protection measures in accordance with the contract and the CEMP and sub-plans;
- Trains all workers in relation to environmental measures;
- Briefs all workers and others (e.g. subcontractors and suppliers) about environmental operating procedures and community relations protocols.

**Environmental Manager / Planning Manager**
- Provides leadership to motivate staff to achieve environmental standards, and comply with all resource consent and designation conditions;
- Develops, implements and reviews environmental management systems including the CEMP and sub-plans for the Project;
- Co-ordinates the interfaces and communications with external agencies and stakeholders in relation to environmental management on the Project in conjunction with the Stakeholder Relationship/Communications Manager;
- Manages and co-ordinates compliance with all consents and designation conditions and any other statutory approvals required;
- Construction monitoring and maintaining/submitting relevant reports and records to the consent authority and the NZTA, as required;
- Notifies the Project Manager and the Consent Authority, Historic Places Trust and/or the Department of Conservation of any significant environmental non-compliances for which they have jurisdiction;
- Responsible for resolving issues of environmental non-compliances;
- Undertakes regular site inspections and audits for compliance with the CEMP and sub-plans and Resource consent and designation conditions;
- Inputs all environmental monitoring results to a CS-VUE database;
- Coordinates all site monitoring including but not limited to groundwater, water quality, ecology, dust, noise, and vibration monitoring and provides necessary related training and advice to staff in relation to this monitoring;
- Trains staff in site specific environmental procedures;
- Coordinates environmental emergency responses;

- Coordinates the preparation of erosion and sediment control plans and preparation of as-built information that is timely and applicable to the consent conditions;
- Manages maintenance and monitoring of the effectiveness of erosion and sediment controls, stormwater devices and other control devices; and
- Makes sure spill kits are available and stocked and provides training on equipment use.

**Project Engineers**

- Provides leadership to the site team to achieve the Project's environmental objectives and targets;
- Responsible for ensuring environmental controls and erosion and sediment control works are installed, modified and maintained as appropriate for each stage of construction;
- Assists in the development, implementation and review of the Project's environmental objectives; and
- Makes sure staff onsite are aware of environmental requirements at all times and sees that routine maintenance to erosion and sediment control facilities and management measures continue with ongoing effectiveness.

**Stakeholder Relationship/Communications Manager**

- Coordinates interfaces with external agencies and stakeholders ensuring all contract commitments and Relevant resource consents and designations conditions are met;
- Responsible for notifying residents of works occurring within the near vicinity and managing mitigation as required;
- Disseminates information to the public as approved by the NZTA; and
- Primary contact for Project related complaints and enquiries.

**The NZTA Environmental Representative**

- Non-compliance reporting to the Consent Authorities in a timely manner;
- Reviews CEMP and sub-plans, Complaints Register, Incidents and Emergency Register, Non-Compliance Report, Environmental Performance Report;
- Meets monthly with the Environmental Manager and Site Manager to discuss non-compliance, complaints, incidents and emergencies, monitoring, auditing and review of the CEMP and sub-plans;
- Reports to the NZTA Project Manager; and
- Oversees the Environmental Manager's use of CS-VUE.

## 4.2 Management Plans

This section will identify actual and potential effects on the environment that may be generated by the Project. These effects have been identified and documented in the AEE, and specific management guidance on how to mitigate those effects will be provided in this section. In order to demonstrate the level of detail that will be provided in the overall CEMP, Site Specific Environmental Management Plans have been developed for the following focus areas along the route:

- Te Puka Stream;
- Horokiri;
- Ration;
- State Highway 58/Pautahanui Interchange;
- Duck Creek;
- Warspite Intersection; and
- Linden Interchange.

Typical details for erosion and sediment control devices have also been provided. These are set out in Appendix E to this CEMP. The process by which these focus areas have been identified and the provision of Site Specific Environmental Management Plans for these areas is described in the Assessment of Alternatives section of the AEE.

As part of the CEMP, general management activities, standards, procedures and practices will be developed in detail by the Contractor. All generic management activities of relevance to the whole Project will need to meet the conditions of the designations and resource consents.

Generic activities that will be managed are:

- Environmental Controls for Refuelling and Maintenance;
- Sealing & Road Surfaces;
- Waste Management;
- Dewatering;
- Environmental Emergency Response;
- Haul & Access Roads;
- Water Collection;

- Stockpiling;
- Tree Felling and Vegetation Clearance;
- Pest management
- Fire control
- Severe Weather Events; and
- Hazardous Substance Use, Handling and Storage.

Specific sub plans will also be provided on the following issues:

- Erosion and sediment control
- Ecological mitigation
- Landscape mitigation
- Traffic management
- Construction noise and vibration
- Air quality management.

As part of the CEMP, detailed management plan advice is not provided, but principles and general management detail for managing effects are documented in each of the sub-plans, which are discussed in each of the relevant technical reports.

## 4.3 Protocols and Procedures

These will include but be limited to:

**Accidental Discovery Protocols**

An archaeological and heritage assessment of the route was undertaken to identify any possible artefacts and heritage resources that may be affected by construction activities along the alignment. The investigation has not identified any sites that will be directly affected by the Project. However, an Accidental Discovery Protocol ADP will remain in place during the construction of the Project. The ADP is outlined in Appendix B.

**Communications procedure and Communications register**

A Stakeholder Relationship/Communications Manager will be appointed for the construction of the Project, who will manage all public enquiries and complaints. The following procedures will be developed for handling complaints from the public:

- All complaints/enquires received by telephone will be forwarded directly to the Stakeholder Relationship/Communications Manager who will determine the appropriate person to respond to the request;
- All complaints/enquires will be managed through an online complaints register, which can be regularly updated. The structure for the register is outlined in Appendix C;
- All complaints/enquires generated as part of sub-plans will also be housed in the register. However, in addition to the above register, all noise complaints in relation to the Main Alignment will also be registered in the NZTA Online Noise Complaints Register, as outlined in the Noise and Vibration Management Plan.

Complaint/enquiry details will include:

- Full name of the caller;
- Time/date of call;
- Detailed outline of the call; and
- Timeframe required to close out the complaint/enquiry.

## 4.4 Training

All personnel will be required to be appropriately qualified and/or trained for their particular role. The following systems will be implemented to manage environmental matters on site:

- Inductions;
- Project briefing;
- On the job training;
- Tool box talks; and
- Posters and information leaflets.

Finally, environmental training records will be maintained on site and will be documented in an Environmental Report. The Environmental Report will document all matters required for environmental reporting as outlined in section 4.7. The records will include:

- Who was trained;
- When the person was trained;
- General description of training content and whether follow up/refresher courses are required at a later date.

Further detail about the Environmental Report is given in section 4.7

## 4.5 Emergency Response

In the event of a non-compliance with a resource consent or designation condition, or other statutory approval or other legislation, and if an incident occurs that results in a significant adverse environmental effect, the following shall occur:

1. Immediate action will be taken to stabilise the situation (i.e. cease work, turn off or move machinery, deploy spill equipment). All spills shall be contained, recovered and disposed of appropriately.
2. The Contractor shall contact the relevant Council within 24 hours, or sooner if appropriate to the situation (for example, a significant oil spill).
3. Any affected parties shall be contacted as soon as possible if an incident occurs that may affect any land outside of the Project area.
4. All steps necessary to mitigate the incident shall be taken. Other external agencies shall be contacted where appropriate.
5. An incident report shall be prepared that shall include, as a minimum,:
   - A Description and location of the incident/ non-compliance;
   - The likely cause of the incident/ non-compliance;
   - Potential or actual effects of the incident/ non-compliance;
   - Mitigation and remedial action taken;
   - Preventive action / changes to prevent a re-occurrence of the incident/ non-compliance; and
   - Monitoring results.

## 4.6 Monitoring and review

### 4.6.1 Monitoring approach

Environmental monitoring of the Project will primarily be based around the monitoring of:

- Erosion and sediment controls;
- Water quality;
- Dust / Air Quality;
- Noise;
- Hazardous substances;
- General construction management.

Monitoring of these effects (both positive and adverse) will provide an immediate picture to all parties of the progress of the Project, scale of potential effects, and mitigation employed.

Monitoring will be based on two levels:

**Construction monitoring level 1:**

Scheduled Operational Monitoring – Regular periodic monitoring to be undertaken during the construction period.

**Construction monitoring level 2:**

Triggered monitoring – Monitoring to be undertaken when certain environmental conditions or incidents are encountered.

Monitoring will be carried out principally by the Contractor.

### 4.6.2 Consent and designation monitoring

All consent and designation conditions for the NZTA and PCC will be managed through CS-VUE. CS-VUE is an online monitoring database, which houses all of the NZTA's consents and designations for the State highway network. For construction of the Main Alignment and Link Roads associated with the Project all consents and designations will be managed through the CS-VUE database.

In terms of monitoring of the consents, key consent monitoring requirements are:

**[MONITORING REQUIREMENTS TO BE INSERTED HERE – WITH REFERENCE TO CONSENT AND DESIGNATION CONDITIONS]**

The key methods for monitoring and measurement to confirm compliance with consent and designation conditions are:

**Routine walkovers:**

Routine walkovers will be undertaken by Environmental Manager and Project Engineers to assess environmental performance on site. During walkovers they will liaise with other team members and check that appropriate controls are in place and procedures implemented. Any non-conformances, non-compliances and opportunities for improvement identified during walkovers will be recorded and actioned.

**Weekly Inspections**

The Environmental Manager will initiate comprehensive weekly inspections of the site to assess ongoing environmental performance and compliance and identify enhancement opportunities. Inspection findings will be recorded within a Site Environmental Inspection Checklist. An example checklist is included in Appendix D. These inspection checklists will be discussed at Environmental Team meetings.

### 4.6.3 Systems monitoring

**Audits:**

The Environmental Manager will undertake monthly audits of compliance with the CEMP. These will include a review of site documentation, records and an inspection of site activities. Based upon the findings of these audits the Environmental Manager will develop a report identifying non-compliances, improvements and opportunities for enhancements and specifying agreed corrective actions.

**Review:**

The Environmental Manager will, as a minimum, undertake a quarterly review of the CEMP in order to identify any required amendments. A review will also be undertaken in the event of significant changes to activities on site or in response to certain incidents. The findings of the review and proposals for amendments to the CEMP will be circulated to key team members (e.g. Project Manager, Design Manager, Construction Manager, Environmental/Planning Manager). If appropriate, findings relating to compliance with consent and designation conditions will be communicated to regulatory authorities.

**Compliance**

The Environmental Manager will undertake system audits on a regular basis and will report back to the Project Manager on performance. In addition, a representative of the NZTA will undertake periodic audits of the management of the Project in order to assess compliance with NZTA SM030 Z/4 Contractor's Social and Environmental Management Plan specification requirements.

## 4.7 Environmental Reporting

Records will take a number of forms including:

**Monitoring Data**:

Data collated from monitoring activities will be stored in a document management system for the Project and will be available online and in hard copy on the Project website.

**Inspection records:**

As set out in Section 4.6.2 above, a number of activities will be regularly inspected. For each inspection a checklist or form will be completed to provide a written report of findings. These will be reviewed during site meetings and project audits.

**Reviews:**

Audit activities will provide a review of overall CEMP performance.

**Communications:**

All internal and external communications relating to environmental performance, including any complaints, will be collated and maintained.

**Training Records**

In order to demonstrate that all site personnel have received appropriate training, records will be kept for each individual on site. These records will be regularly reviewed to identify further training requirements.

Finally, a CEMP review report will be generated and submitted to inform relevant parties of environmental performance on the Project. This report shall be completed by the Environmental Manager, who will produce a monthly Management Review Report, based on the findings of the CEMP Audit, to be submitted to the Project Manager. This report will contribute to a regular management review of the effectiveness of the CEMP.

## 4.8 Corrective actions

The identification, reporting and rectification of environmental effects will be promoted at tool box and site inductions. System deficiencies identified during audits will be documented and rectified within agreed timeframes. Work practice deficiencies or non-compliance with site rules identified at any time during the works will be recorded in Hazard Identification books, which will be carried by all personnel in OHS and Environmental roles.

Generally, the person identifying the unsafe condition will, if possible, rectify the situation immediately. All unsafe conditions or acts identified during inspections or audits will be recorded in a Hazard Register / Incident Database to monitor recommended actions and close out.

## 4.9 Incident / accident investigation

Incidents / accidents, non-conformances with the CEMP or with legal requirements and “near miss” events will be reported and recorded in an on-site register. The incident/accident will be investigated to identify how the incident/accident occurred and to review and rectify the process so the incident/accident does not happen again. This will be recorded on the Opportunity for Improvement (OFI) register.

Actions identified through the OFI to improve the process or system shall be developed by the construction management team and signed off by the Environmental Manager. All information will be recorded into the OHS systems for the on-site Environmental Team. The Environmental Manager will review all environmental OFIs raised on a weekly basis to close out in the timescales specified.

## 4.10 Preventive action

To proactively manage potential environmental issues, a safety and environment committee will be responsible to review the following:

- OFI registers;
- Environmental alerts from other projects; and
- Changes to legislation.

After reviewing all relevant information, any opportunities to improve site procedures will be incorporated into environmental education provided on the Project.

# 5. Transition Phase

The transition phase is the crossover period between the construction and operational phases of the Project whereby the responsibility for the management of the environment is transferred from the construction contractor to the network operator. During this phase the construction contractor(s) will be required to work with the NZTA and PCC in finalising the construction and meeting any post-construction resource consent and designation conditions.

The transition phase also provides for the transfer of information in relation to consent and designation conditions which remain operative (such as long term monitoring), and historical results of environmental management and monitoring that are pertinent to effective ongoing management of the environment. Consents and designation conditions still operative are to be entered into the OMC's CS-VUE Project file and managed by the OMC. Environmental Information transferred to the OMC includes:

- Landscape design and as-builts;
- Agreements between other key stakeholders (e.g., DoC, landowners);
- Environmentally sensitive areas;
- Location of contaminated land and/or fill;
- Monitoring requirements;
- Historical monitoring results;
- Results of audits and inspections in relation to environmental risks that were identified as significant in the risk assessment process;
- A report on consent and designation conditions that have been closed out on CS-VUE (or similar system).

This information is to be collated by the Contractor's Environmental Team following the completion of construction works. In addition, this information will be included in the asset owner's manual (prepared in accordance with the NZTA's Standard Professional Services Guideline PSG/15) and operations and maintenance manuals prepared by the Contractor and handed to the OMC.

# 6. Operation

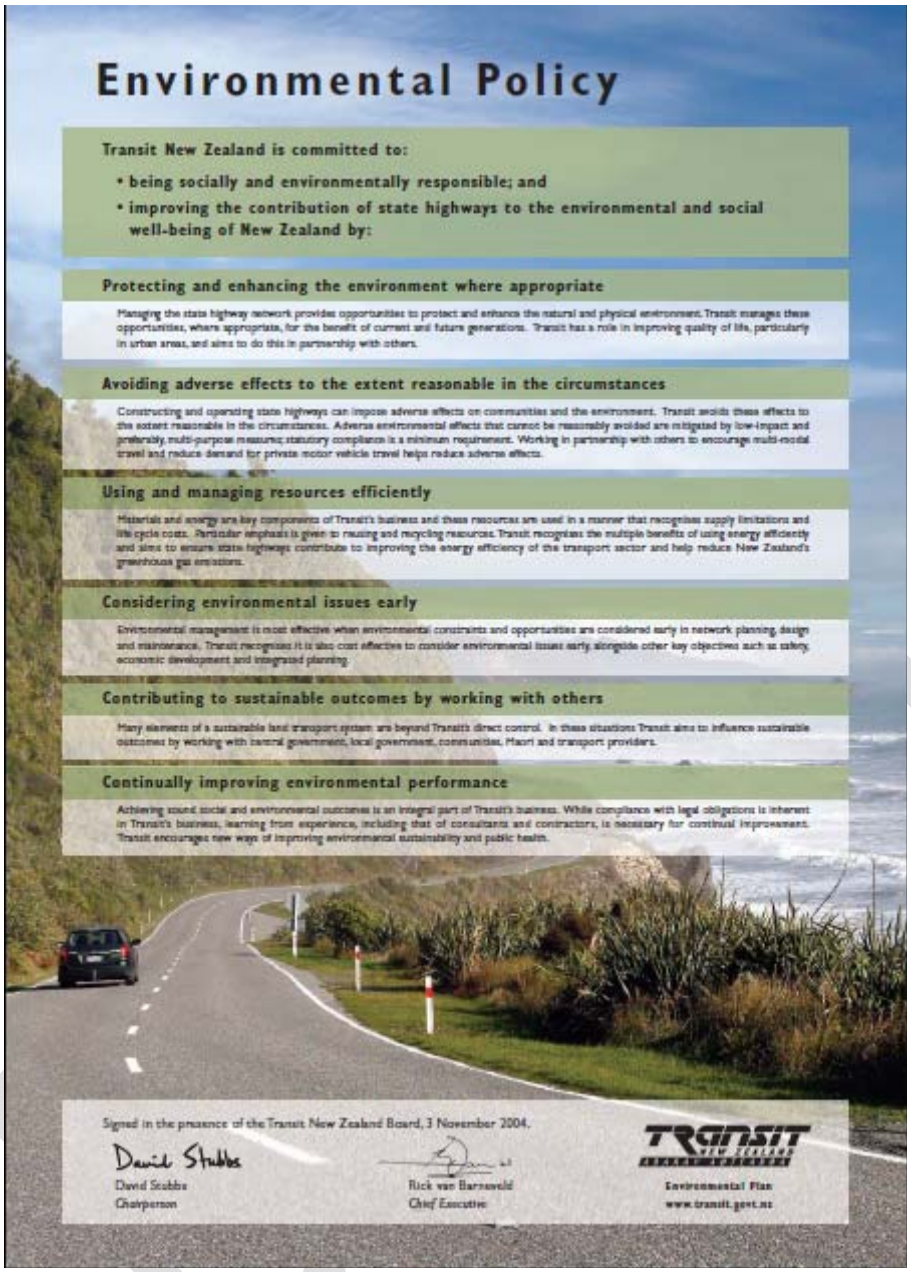
## 6.1 NZTA Monitoring and review

Following construction of the route, all monitoring of conditions of consents and designations for the NZTA will be managed through the CS-VUE system (or similar). Handover of responsibilities for enforcing compliance with operational consents and designations conditions will be given to the NZTA Area Engineer and will be managed by the NZTA Network Management Consultant.

## 6.2 NZTA Environmental Reporting

All environmental reporting associated with the Project will be completed as required by the conditions of the resource consents and designations. Other than providing any compliance reporting to regulatory authorities, performance related to compliance with consents and designations will be reported on through the OMC's monthly report to the NZTA.

# Appendix A NZTA Environmental Policy



# Environmental Policy

**Transit New Zealand is committed to:**

- **being socially and environmentally responsible; and**
- **improving the contribution of state highways to the environmental and social well-being of New Zealand by:**

**Protecting and enhancing the environment where appropriate**

Managing the state highway network provides opportunities to protect and enhance the natural and physical environment. Transit manages these opportunities, where appropriate, for the benefit of current and future generations. Transit has a role in improving quality of life, particularly in urban areas, and aims to do this in partnership with others.

**Avoiding adverse effects to the extent reasonable in the circumstances**

Constructing and operating state highways can impose adverse effects on communities and the environment. Transit avoids these effects to the extent reasonable in the circumstances. Adverse environmental effects that cannot be reasonably avoided are mitigated by low-impact and preferably multi-purpose measures; statutory compliance is a minimum requirement. Working in partnership with others to encourage multi-modal travel and reduce demand for private motor vehicle travel helps reduce adverse effects.

**Using and managing resources efficiently**

Materials and energy are key components of Transit's business and these resources are used in a manner that recognises supply limitations and life cycle costs. Particular emphasis is given to reusing and recycling resources. Transit recognises the multiple benefits of using energy efficiently and aims to ensure state highways contribute to improving the energy efficiency of the transport sector and help reduce New Zealand's greenhouse gas emissions.

**Considering environmental issues early**

Environmental management is most effective when environmental constraints and opportunities are considered early in network planning, design and maintenance. Transit recognises it is also cost effective to consider environmental issues early, alongside other key objectives such as safety, economic development and integrated planning.

**Contributing to sustainable outcomes by working with others**

Many elements of a sustainable land transport system are beyond Transit's direct control. In these situations Transit aims to influence sustainable outcomes by working with central government, local government, communities, Maori and transport providers.

**Continually improving environmental performance**

Achieving sound social and environmental outcomes is an integral part of Transit's business. While compliance with legal obligations is inherent in Transit's business, learning from experience, including that of consultants and contractors, is necessary for continual improvement. Transit encourages new ways of improving environmental sustainability and public health.

Signed in the presence of the Transit New Zealand Board, 3 November 2004.

David Stubbs
Chairperson

Rick van Barneveld
Chief Executive

TRANSIT NEW ZEALAND

Environmental Plan
www.transit.govt.nz

# Appendix B Accidental Discovery Protocol

# Accidental Cultural Discovery Protocol

## 1. Purpose

This protocol outlines the steps to be taken in the event of the accidental discovery of cultural or historic artefacts, as the result of any physical disturbance, expected to be no more than minor, to the existing ground surface.

## 2. Procedures

If any suspected archaeological material is uncovered, all work within 100m of the discovery shall stop immediately. The Consultant shall advise the NZTA Project Manager, who will immediately inform the iwi representative and the archaeologist.

The Contractor, including any sub-contractors, are required to keep confidential all discoveries.

If the discovery contains Koiwi or other human remains, all work within 200m shall cease immediately, and in addition to the above parties the Project Manager shall also inform the NZ Police, and the New Zealand Historic Places Trust.

The Contractor is responsible for on-site safety and may from time to time need to restrict access to the safety of all parties.

In coordination with the Project Manager, the archaeologist shall conduct exploratory work to determine the nature of the find.

The NZTA Project Manager, in consultation with the Archaeologist, Stakeholder Relationship Manager and the iwi representative, shall coordinate the response as follows:

a) In the event of the discovery of any Taonga, Koiwi, artefacts or other signs of previous Maori presence or occupation, work with the iwi representative to ensure that the appropriate steps are taken to make the site safe,

b) Inform the Contractor where work can continue around the site,

c) The archaeologist shall coordinate the appropriate consent process in accordance with the requirements of the Historic Places Act (1993).

d) Works affecting the archaeological site shall not resume until the NZ Historic Places Trust, the Police (if skeletal remains are involved) and iwi have each given the appropriate approval for work to continue.

The Archaeologist shall first liaise on all issues with the NZTA project manager, who will instruct the Consultant, and keep the other parties informed.

Any media statements in relation to this protocol will be prepared with the assistance of iwi and only after discussions between NZTA and iwi.

**Contact Details**

Contractor Project Manager

Name
Title
Company
Postal Address1
Postal Address2
CITY

DDI (##) ### #### Mobile (02#) ### #### Fax (##) ### ####

NZ Transport Agency Project Manager

Peter Ward
Project Engineer - Transmission Gully
New Zealand Transport Agency (NZTA)
Level 13 – Tourism and Travel House
73-79 Boulcott Street
P O Box 27-477
Wellington

DDI (04) 910 8185 Mobile (021) 223 5043 Fax (04) 910 2559

Iwi Representative

**[INSERT NAME]**
Resource Management Officer
Te Runanga o Toa Rangatira Inc
26 Ngatitoa Street
Takapuwaahia
Porirua

Phone (04) 237 7922 Mobile (027) 4572 001 Fax (04) 238 4701

N.Z. Historic Places Trust Representative

Kathryn Hurren
Regional Archaeologist
N.Z. Historic Places Trust (Pouhere Taonga)
Level 1, Tadix House, 1 Blair St
P O Box 19173, Wellington

DDI (04) 802 0003 Mobile (027) 293 7163 Fax (04) 802 5180

Transmission Gully Project Archaeologist

Victoria Grouden
Capital Heritage Limited
Mob: 021 035 3193
Email: victoria@capitalheritage.co.nz

# Appendix C Sample Inquiries and complaints Register

## Sample Inquiries and complaints register

| Reference number | Date | Time | Address | Phone/ email | Inquiry/ complaint/ comment | Significance (positive, neutral or low risk query, negative or high risk) | Received by | Actioned by | Date and time of response | Remedy/ Response | Close out by | Date closed | Further action recommended (by whom?) | Date closed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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# Appendix D Sample Weekly Environmental Inspection Checklist

| **Weekly Inspection** | | | | | | | **Date:** |
|---|---|---|---|---|---|---|---|
| **Inspection Area** | **Inspected by/person responsible** | **x** | | **N/A** | **Action required** | **Person Responsible** | **Action Completed by:** |
| Erosion and sediment control devices (zone x) | | | | | | | |
| Perimeter Boundary/Fencing Secure | | | | | | | |
| Dust – any activities requiring extra management? | | | | | | | |
| Stockpiles maintained | | | | | | | |
| Refuelling areas (bunds in place, spill kit in place) | | | | | | | |
| Hazardous Substances Secured (any new materials onsite) | | | | | | | |
| Waste/recycling Bins Maintained | | | | | | | |
| Open excavations barriers in place? | | | | | | | |
| Weather – any high rain/storm events during the week? | | | | | | | |

# Appendix E Erosion and Sediment Control

# Appendix 15.L Construction - Draft Erosion and Sediment Control Monitoring

## L.1 Introduction

This section describes a draft monitoring plan for the performance of the measures proposed and potential impacts on the streams water quality. It is intended to provide an outline to manage the performance of the erosion and sediment control devices and is considered key to the success of the Project.

## L.2 Monitoring Plan Structure

The monitoring plan will need to detail who has responsibility for its control and ownership and the status of the document. Including:

- Covers the roles of the people who have actions to implement this plan and their responsibilities.
- Provides an overview of the proposed ESC measures for the road alignment.
- Documents the compliance monitoring required to ensure that the proposed ESC measures are operating and performing as designed.
- Inspections and Performance Monitoring
- Compliance Reporting
- Assess the impacts of construction of the Project on water quality are as anticipated and direct action to modify ESC Plans

## L.3 Interaction with other Project Monitoring Documents

The Performance Monitoring Plan will need to cover how it interacts with:

- Construction Management Plan
- Incident Management Plan
- Health and Safety Plan
- Project Management Reporting and Personnel.

## L.4 Document Control and Ownership

This draft plan has been produced for NZTA to support resource consent applications. Post consenting and pre construction this document will need further development. It is anticipated that ownership of the document will pass to the construction contractors. They will be responsible for its finalisation and implementation. It is however expected that the ESC measures will need to adapt and modify during construction. It is intended that this performance monitoring document should be adapted to reflect the operative ESC Plan.

## L.5 Roles and Responsibilities

This section of the plan will outline who are the key contacts and their responsibilities and will be completed once a construction contractor is identified. It will include:

- Site management
- Training records and requirements
- Monitoring of weather patterns (predictions)

- Inspection parties involved, scheduling, records and reporting
- Sampling parties involved, scheduling, records and reporting
- Communications includes Media plan, CEMP changes, Project and site meeting actions and follow ups
- Reporting
- Incident and emergency response.

## L.6 Emergency Contacts

This section will outline key contractor, NZTA, Regional Council and Emergency Services contact details.

## L.7 Overview of Erosion and Sediment Control Activities

The ESC Philosophy outlines the principles to be applied in managing erosion and sediment release as part of this Project. The Project will be an extensive multi-linear construction project over approximately eight years. Site constraints change over the length of the alignment. The Project will require further specification on the application of these measures during construction and will need to be undertaken as part of the detailed design work. This includes the testing and development of measures to contain sediment in steep areas of the construction and matching the best treatment options to the catchment geology.

A similar approach has been taken to specifying the performance and water quality monitoring for the Project. It is not intended to specify monitoring for each of these individual devices in this plan. The general philosophy will be outlined.

The performance monitoring activities will focus on the ESC methods whose use and/or performance can be assessed as outlined in **Table L.1** to **Table L.3**.

As part of the construction of the Project, works will be required in water bodies. These will include stream crossings and stream diversions. Performance monitoring and compliance inspections of these work areas will be required.

## L.8 Performance Monitoring Activities - Overview

The ESC activities proposed cover actions that are proposed to be undertaken on site as well as use of specific devices and methods. These will require a mix of monitoring types to ensure the performance of the ESC plan and compliance with consent conditions. Monitoring types can generally be grouped into inspection activities and physical monitoring activities. With all activities a management action is required should a specific trigger be exceeded. Reporting of inspections, monitoring and actions is also required. Erosion control measures and sediment control measures are considered separately in earlier sections. The GWRC guidelines have been used to develop these procedures.

## L.9 Performance Monitoring Activities for Erosion Control Measures

Table L1 sets out the compliance monitoring activities, for each erosion control method identified in **Error! Reference source not found.**. These include the following activities:

- **Routine inspection** – Documents the inspection frequency that is required to ensure the devices are operative, performing as designed and ready for future rain events.
- **Incident inspection** – Details events that may trigger additional inspections to check the devices are operative

- **Wet weather inspections** – Documents the performance of erosion control measures in circumstances which test the design parameters.
- **Inspection criteria** –Specific factors to be considered and noted during the inspection.
- **Performance measures** - Performance specification identifying what trigger values (narrative and numeric) monitoring results should be compared against.
- **Maintenance / management actions** – Actions to be undertaken when trigger values are determined to be exceeded during inspection ; and
- **Reporting** – Notes what should be reported and who to.

### Table L.1 Performance Monitoring Activities for Erosion Control Measures

| Erosion Control Measure | Routine Inspection | Wet Weather and Incident Inspections | Inspect for | Performance measures | Management Action | Reporting |
|---|---|---|---|---|---|---|
| Control and retention of disturbed soil at earthwork sites<br>(Improve Soil Health) | Weekly | During heavy rain (Q10 event) and after all rain | Soil loss<br>Rill erosion<br>Surface water flow pathways | Retention of soil | Rectify any erosion or channel formation<br>Re-grade surface as required | Inspection, outcomes and management action in site log |
| Provide Short Term Soil Cover | Weekly | When rainfall predicted through weather monitoring.<br>After all rain | Surface water pathways / erosion | Design specifications | Undertake straw mulching<br>Hydro seeding | Inspection, outcomes and management action in site log |
| Provide Long Term Soil Cover | Weekly | During heavy rain (Q10 event) and after heavy rain (Q10 event) | Damage / erosion<br>Growth of plantings (including gaps) | 90% cover or stabilised. | Rectify and repair damage to blankets/netting<br>Replant gaps/dieback | Inspection, outcomes and management action in site log |
| Steep Slope Techniques | Weekly till 90% stabilised (i.e. 90% gassed or equivalent) | During heavy rain (Q10 event) and after heavy rain (Q10 event) | Damage / erosion<br>Growth of plantings (including gaps) | Design specifications | Rectify and repair damage to blankets/netting<br>Replant gaps/dieback | Inspection, outcomes and management action in site log |

## L.10 Performance Monitoring Activities for Surface Water Control Measures

**Table L.2** sets out the compliance monitoring activities for each surface water control method. These include the following activities:

- **Routine inspection** – Documents the inspection frequency that is required to ensure the devices are operative, performing as designed and ready for future rain events.
- **Incident inspection** – Details events that may trigger additional inspections to check the devices are operative
- **Wet weather inspections –** Documents the performance of erosion control measures in circumstances which test the design parameters.
- **Inspection criteria** –Specific factors to be considered and noted during the inspection.
- **Performances measures** - Performance specification identifying what trigger values (narrative and numeric) monitoring results should be compared against.
- **Maintenance / management actions** – Actions to be undertaken when trigger values are determined to be exceeded during inspection ; and
- **Reporting** – Notes what should be reported and who to.

### Table L.2 Compliance Monitoring Activities for Surface Water Control Measures

| Surface Water Control Measure | Routine Inspection | Wet weather and incident inspections | Inspect for | Performance measures | Management Action | Reporting |
|---|---|---|---|---|---|---|
| Clean water diversion bund | Weekly | During heavy rain (Q10 event) and after all rain | Damage / erosion<br>Blockages<br>Sediment build-up | Design specifications | Rectify any damage / erosion or blockages<br>Remove accumulated sediment in diversion channel. | Inspection, outcomes and management action in site log |
| Rock check dam | Weekly | After all rain | Damage / erosion<br>Blockages<br>Sediment build-up | Design specifications | Rectify any damage / erosion or blockages<br>Remove accumulated sediment behind dams when 50% full | Inspection, outcomes and management action in site log |
| Pipe drop structure/ flume | Weekly | After all rain | Damage / erosion<br>Blockages | Design specifications | Rectify any damage / erosion or blockages | Inspection, outcomes and management action in site log |

| Surface Water Control Measure | Routine Inspection | Wet weather and incident inspections | Inspect for | Performance measures | Management Action | Reporting |
|---|---|---|---|---|---|---|
| 'Pinned' Silt socks or gravel check dams | Weekly | During heavy rain (Q10 event) and after heavy rain (Q10 event) | Damage / erosion<br>Sediment build-up | Design specifications | Rectify and damage / erosion or blockages<br>Replace/ repair gaps | Inspection, outcomes and management action in site log |

## L.11 Compliance Monitoring Activities for Sediment Control Measures

**Table L.3** sets out an overview of the compliance monitoring activities for each sediment control method identified in **Table L.1**.

**Table L.3 Overview of Compliance Monitoring Activities for Sediment Control Measures**

| Sediment Control measure | Inspection | Monitoring | Reporting |
|---|---|---|---|
| Sediment Retention Pond | Daily and post incident | Performance audit check | Yes |
| Chemical Treatment System | Weekly and post incident | Performance audit check | Yes |
| Sediment Fence | Weekly and post incident | Performance audit check | Yes |
| Decanting Earth Bund | Weekly and post incident | Performance audit check | Yes |
| Stormwater Inlet Protection | Weekly and post incident | Performance audit check | Yes |
| Works in watercourses | Weekly and post incident | Performance audit check | Yes |

For sediment control measures a greater range of compliance monitoring actions are required. These are further documented below in Table L4 and Table L5.

## L.12 Performance Inspections

Table outlines the inspection required for each proposed sediment control measure. These include the following activities:

- **Routine inspection** – Documents the inspection frequency that is required to ensure the devices are operative, performing as designed and ready for future rain events.
- **Incident inspection** – Details events that may trigger additional inspections to check the devices are operative

- **Wet weather inspections** – Documents the performance of erosion control measures in circumstances which test the design parameters.
- **Inspection criteria** –Specific factors to be considered and noted during the inspection.
- **Performance measures** - Performance specification identifying what trigger values (narrative and numeric) monitoring results should be compared against.
- **Maintenance / management actions** – Actions to be undertaken when trigger values are determined to be exceeded during inspection ; and
- **Reporting** – Notes what should be reported and who to.

### Table L4 Compliance Inspection Activities for Sediment Control Measures

| Device | Routine Inspection | Incident Inspection | Inspect for | Performance Measures | Management Action | Reporting |
|---|---|---|---|---|---|---|
| Sediment Retention Pond | Daily | After all rain. During heavy rain (Q10) | Sediment build up | Measure depth of sediment versus pond volume | Remove sediment when 20% full | Inspection, outcomes and management action in site log |
| | | | Damage/ Function of the decants/ Level Spreaders / Fore bay | Design Specifications | Rectify any damage / blockages to fore bay | Inspection, outcomes and management action in site log<br>Advise GWRC within 24hrs of significant damage and management actions |
| Chemical treatment System | Weekly | After all rain. During heavy rain (Q10) | Damage, low dosing supply | Design Specifications | Rectify any damage or blockages. Replace flocculent | Inspection, outcomes and management action in site log |
| Sediment Fence / Silt Socks | Weekly | After all storm events (Q2-Q10) | Sediment build-up | Measure depth of sediment versus fence height | Remove sediment when 20% of height occupied | Inspection, outcomes and management action in site log |
| | | | Damage/ erosion/ water bypass | Design Specifications | Rectify any damage / erosion. Relocate devices to deal with bypass | Inspection, outcomes and management action in site log |

| Device | Routine Inspection | Incident Inspection | Inspect for | Performance Measures | Management Action | Reporting |
|---|---|---|---|---|---|---|
| Decanting Earth Bund | Weekly | After all rain events<br>During heavy rain (Q10) | Sediment build-up | Measure depth of sediment versus pond volume | Remove sediment when 20% full | Inspection, outcomes and management action in site log |
| | | | Damage/ erosion<br>Blockages | Design Specifications | Rectify any damage / erosion or blockages | Inspection, outcomes and management action in site log<br>Advise GWRC within 24hrs of significant damage and management actions |
| Stormwater Inlet Protection | Weekly | After all rain | Damage/ erosion<br>Blockages | Design Specifications | Rectify any damage / erosion or blockages | Inspection, outcomes and management action in site log |
| Works in watercourses | Weekly | After all rain | Visual release of sediment into the water above that envisaged for works | Documented method for works | Investigate source of sediment and rectify works/modify method | Inspection, outcomes and management action in site log |

## L.13 Performance Monitoring

To ensure ESC measures function as intended it is proposed to monitor performance of sediment control devices at the beginning of each new construction phase (catchment section). Table L5 sets out the monitoring activities required for the sediment control devices to ensure that the designs are operating within their design performance specifications as discussed in section 3. This will allow update and modifications to the design should performance not be as planned. Following this and once compliance has been ascertained frequency for monitoring will drop back to a representative range of devices during a rain event. This section of monitoring assesses the performance of the devices versus their design standards, not the absolute effects on the receiving environment. It is noted that failure to meet the performance standard does not necessarily indicate that an impact will occur in the receiving environment as a result of the discharge. Monitoring proposed in section 4.6 is intended to understand the effect on the receiving environment water quality.

## Table L5 Monitoring Activities for Sediment Control Measures

| Device | Monitoring Required | Frequency | Parameters | Locations | Performances measures | Management Action and Reporting |
|---|---|---|---|---|---|---|
| Sediment Retention Pond | Audit check of device performance | All ponds constructed at the beginning of each new construction phase to enable performance to be ascertained during all rain events which generate a discharge. If devices are performing as intended then frequency should drop to one in every five ponds. Monitoring to occur at times during rain events that generate a discharge. Number of ponds is intended to encompass a representative sample of different soil characteristics in the construction area under the SEMP and as such could be adjusted accordingly. | Flow rates, Total Suspended Solids, calibrated turbidity, particle size analysis. | Inlet to pond and outlet from pond | Sediment retention devices up to Q2 event 90% removal particles >60 µm, 70% removal particles <60 µm | Consider whether discharge has downstream impact.<br>Modify design to meet target and resample if required. Advise GWRC of failure.<br>Report all samples in monthly report |
| Chemical Treatment System | Audit check of device performance | All ponds constructed at the beginning of each new construction phase to enable performance to be ascertained during all rain events which generate a discharge. If devices are performing as intended then frequency should drop to one in every five ponds. Monitoring to occur at times during rain events that | Depends on chemical dosing method. Include Visual check of pond clarity, pH, Flow rates, Total Suspended Solids, calibrated turbidity, particle size analysis and settling rates | Inlet to pond and outlet from pond | System is not being over dosed; this will include limits for pH and Aluminium. (If required)<br>Q2 event 90% removal particles >60 µm, 70% removal particles <60 µm | Modify dosing system if overdosing.<br>Note Inspection, outcomes and management action in site log |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | generate a discharge. Number of ponds is intended to encompass a representative sample of different soil characteristics in the construction area under the SEMP and as such could be adjusted accordingly. | | | | |
| Decanting Earth Bund | Audit check of device performance | All control devices at the beginning of each new construction phase to confirm operation as intended. If performing as designed then frequency should drop to one in every ten bunds checked once during operation during rain storm that creates discharge. | Include Visual check of pond clarity, calibrated turbidity, particle size analysis and settling rates | Inlet to bund and outlet from bund | Up to Q2 event, if 3% of catchment area, >30% TSS removal for particles <60microns 100% removal of >60microns.<br>If less than 3% area ratio this down according to % catchment area/3%. | Consider whether discharge has downstream impact.<br>Modify design to meet target and resample if required. Advise GWRC of failure.<br>Report all samples in monthly report |

## L.14 Reporting

In addition to the outline for the reporting requirements for the inspection and maintenance activities in Table L4 and Table L5, it is considered that a monthly report to GWRC will be required. This would outline:

- Inspections undertaken where issues arose and action taken to rectify those issues
- Results of all monitoring undertaken
- Analysis of trends in monitoring data
- Non-conformances in monitoring results and actions undertaken.

## L.15 Monitoring of Effects on Water Quality

Performance monitoring of the proposed ESC devices is intended to ensure that they operate as designed and that their performance is maintained over the lifespan of their use on the project. The discharges from the site works and the proposed treatment devices will enter watercourses throughout the catchments. The

following monitoring of the receiving environment is proposed to check whether the effects of the discharges are as anticipated.

## L.16 Monitoring Philosophy

Within the Project alignment are a number of catchments. There will be many discharge points from sediment control devices within each catchment. The location of these discharges relate to the various sections of Project being worked on, the staging of works and topography.

It is not intended to monitor impacts at all sites throughout the entire development lifespan. Instead an approach of setting up long term catchment control sites and then short term smaller work area monitoring is proposed. The intent is that the catchment control sites create a long term dataset of upstream and downstream water quality. These can be used for monitoring both construction and operational stormwater discharges.

As work progresses through each area monitoring will assess the effect of each stage of work with sampling effort based on the risk the catchment poses from the ongoing activities. An indication of the monitoring required for a theoretical catchment is shown in **Figure L1**.

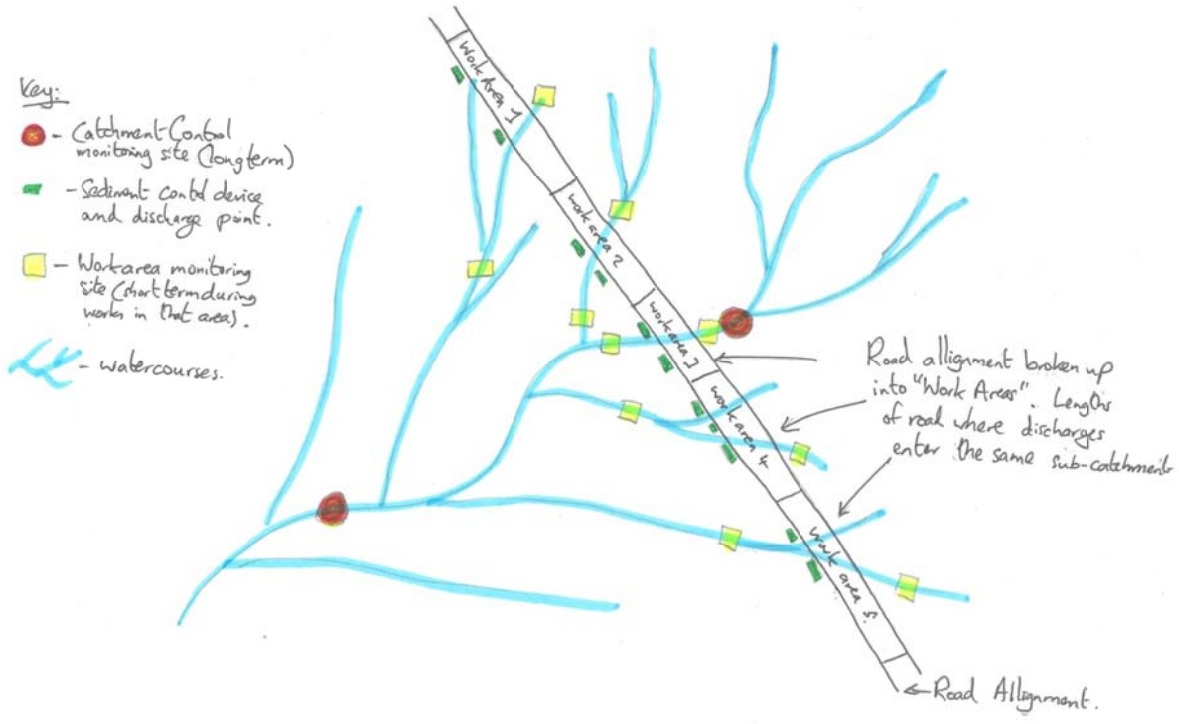



**Figure L1 Indicative Monitoring Requirements for a Catchment**

## L.17 Proposed Monitoring and Reporting

The requirements for the catchment control and work area monitoring are shown in Table L6 and Table L7 These tables outline the following details:

- **Sample Point** – The locations at which monitoring is to be undertaken. For the Catchment Control sites these are a selection of the sites used in the scoping studies.

- **Frequency** - Required frequency of monitoring, this generally varies prior to, during and post construction. The intention is to sample pre construction to develop a baseline, then during and post construction until the catchment is stabilised to assess effects.
- **Parameters** – Recommended parameters to sample. These will be finalised after completion of the AEE. These are a subset of the monitoring undertaken for the scoping studies. For both the catchment control and work area monitoring sites key parameters are a visual assessment of percentage fine sediment, calibrated turbidity, particle size and total suspended solids as these relate to the primary construction contaminant risks. In addition field parameters including flow rates, pH, temp, streambed and macroinvertebrate assessments will be recorded. These are intended to give an early identification of where any changes in sediment load, movement and deposition are affecting basic water quality during works.
- At the catchment control sites additional monitoring will be undertaken for flow rates, turbidity, pH and temperature. These sites will also be used to monitor long term stream health indices by monitoring at regular intervals macro-invertebrate and fish communities.
- Compliance Limits – Proposed limits for certain monitored parameters. These will be finalised after completion of the AEE. These are only proposed for the key parameters of assessment as follows; percentage fine sediment, calibrated turbidity and total suspended solids. These will give the best indication of changes in sediment load and deposition in the catchments. Should these limits be exceeded it will trigger a management action to inspect and investigate the suitability of the ESC operations in that work area/catchment. The remaining parameters are intended to give a picture of longer term temporal changes in the catchments and would be analysed over the lifespan of the project. As such no compliance limits are finalised for this report and should be developed as part of the AEE.
- Reporting – An indication of how and when results should be reported. It is intended that all parameters are reported with analysis in monthly reports and collated with trend analysis in an annual report. Exceedance of compliance limits should be reported to GWRC within 5 working days of receipt of the results.

### Table L6 Monitoring Requirement for Catchment Control Monitoring Sites

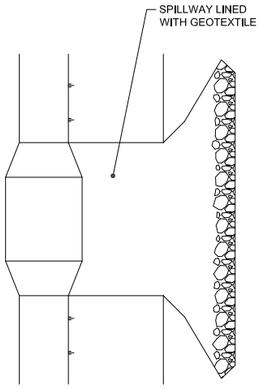
| Sample point | Frequency | Parameters | Compliance Limits | Reporting |
|---|---|---|---|---|
| **Whareroa** – Whareroa 1 (U/S) and new D/S site.<br>Wainui – Wainui 1 (U/S) and new D/S site.<br>**Horokiri** -Horokiri 1 (U/S) and Horokiri 2 (D/S). [To confirm that 1 is upstream of all works – alternatively consider 3 as side control].<br>**Ration** – Establish new upstream and downstream sample points.<br>**Pauatahanui** – Pauatahanui 1 (U/S) Pauatahanui 2 (D/S). | Monthly starting at least 12 months prior to works starting in the catchment.<br>Monthly during construction.<br>For 6 months after opening of the road | Fine sediment percentage by particle size analysis (%) | Change by X% at D/S site compared to pre development | To GWRC within 5 working days of non compliance<br>In monthly report |
| | | Turbidity (NTU) | Change by X units vs. upstream site and/or X% outside the range of background data (If baseline data available) | In monthly report |
| | | Total Suspended Solids (g/m$^3$) | Change by X units vs. upstream site and/or X% outside | |

| | | | | |
|---|---|---|---|---|
| **Duck Creek** – Duck 1 (U/S) Duck 2 (D/S).<br>**Kenepuru** – Kenepuru 1 (U/S) and Kenepuru 3 (D/S).<br>**Porirua** – Porirua 1 (U/S) and Porirua 2 (D/S). | | | the range of background data (If baseline data available) | |
| | | Temperature | Consultation with GWRC | |
| | | pH | Consultation with GWRC | |
| | | Macro-Invertebrates | Consultation with GWRC | To GWRC within 5 working days of receipt of results<br>In monthly report |
| | | Fish community | Consultation with GWRC | To GWRC within 5 working days of receipt of results<br>In monthly report |
| | | Harbour Estuary assessment for cockle health and other benthic fauna parameters | Consultation with GWRC | To GWRC within 5 working days of receipt of results<br>In monthly report |

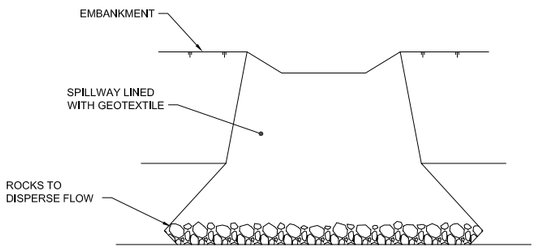
### Table L7 Monitoring Requirement for Work Area Monitoring Sites

| Sample point | Frequency | Parameters | Compliance Limits | Reporting |
|---|---|---|---|---|
| Upstream and downstream of works on each work area<br>(to capture effect of all discharges from sediment control devices in work area sub-catchment) | Monthly starting at least 3 months prior to works starting in the catchment.<br>Monthly during construction.<br>Monthly after works completed in that catchment that result in all bare soils stabilised by non-vegetative means or until stabilisation of 90% of bare soils is achieved. | Fine sediment percentage by particle size analysis (%) | Change by X% at D/S site compared to pre development | Within 24 hrs of non compliance to GWRC<br>In monthly report |
| | | Turbidity (NTU) | Change by X% at D/S site compared to pre development | Within 24 hrs of non compliance to GWRC<br>In monthly report |
| | | Total Suspended Solids ($g/m^3$) | Change by X% at D/S site compared to pre development | |
| | | Temperature | Change by X% at D/S site compared to pre development | |
| | | pH | Change by X% at D/S site compared to | |

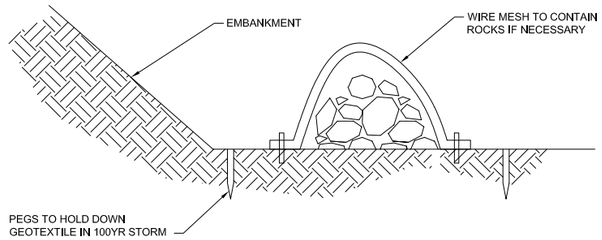
| | | | | |
|---|---|---|---|---|
| | | | pre development | |
| | | Macro-Invertebrates | Change by X units vs. upstream site and/or X% outside the range of background data. | Within 24 hrs of non compliance to GWRC<br>In monthly report |
| | | Streambed assessment | Change in bed matrix at downstream site by x%<br>Visual assessment of re-suspension of suspended solids | Within 24 hrs of non compliance to GWRC<br>In monthly report |




PLAN



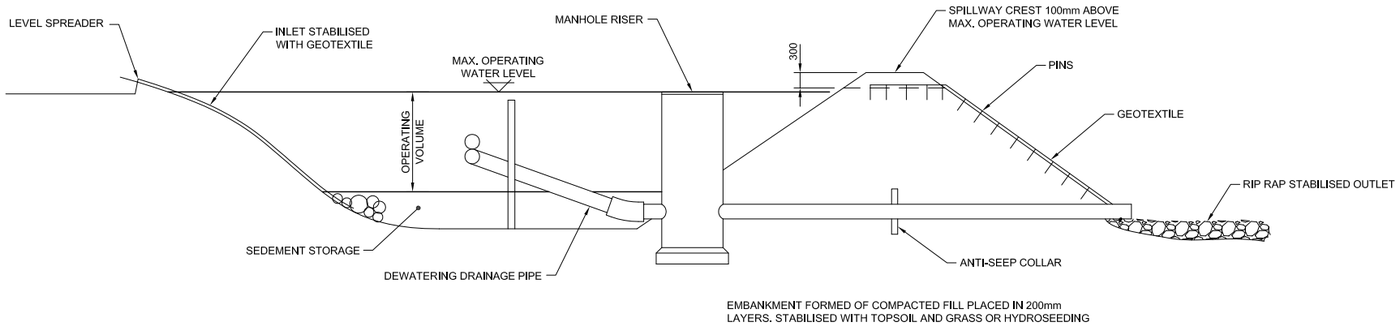

END VIEW




ELEVATION

## SPILLWAY STABILISED OUTFALL

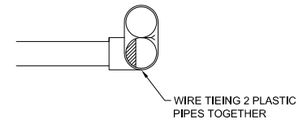
SCALE: N.T.S.




EMBANKMENT FORMED OF COMPACTED FILL PLACED IN 200mm LAYERS. STABILISED WITH TOPSOIL AND GRASS OR HYDROSEEDING

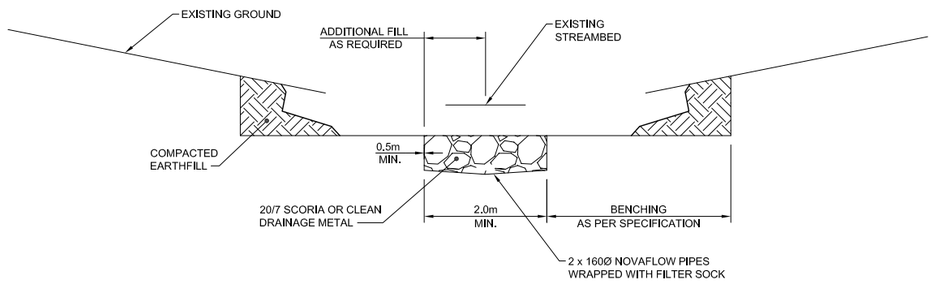
## TYPICAL SECTION THROUGH SEDIMENT POND

SCALE: N.T.S.




## ORIFICE DETAIL 1/-

N.T.S




## TYPICAL STREAM BED STABILISATION

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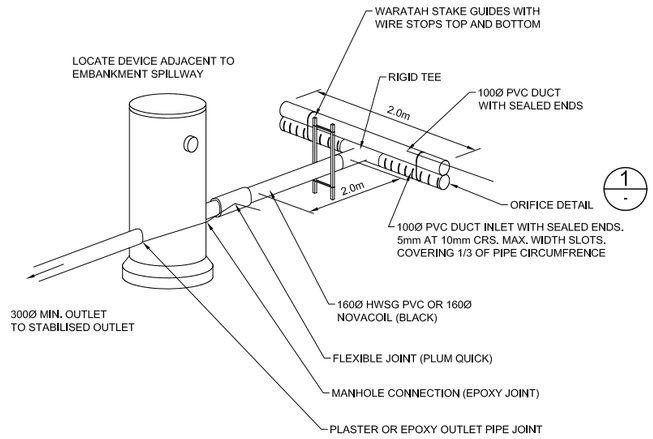



## T-BAR DEWATERING DEVICE TYPICAL DETAIL

SCALE: N.T.S.

| CATCHMENT AREA (Ha) | END CAP ORIFICE SIZING (mm) |
|---|---|
| 0.5 | 20 |
| 0.75 | 25 |
| 1.0 | 28 |
| 1.5 | 34 |
| 2.0 | 40 |

| Revision | Amendment | Approved | Date |
|---|---|---|---|
| | | | |

NZ TRANSPORT AGENCY
WAKA KOTAHI

Project.
# TRANSMISSION GULLY PROJECT

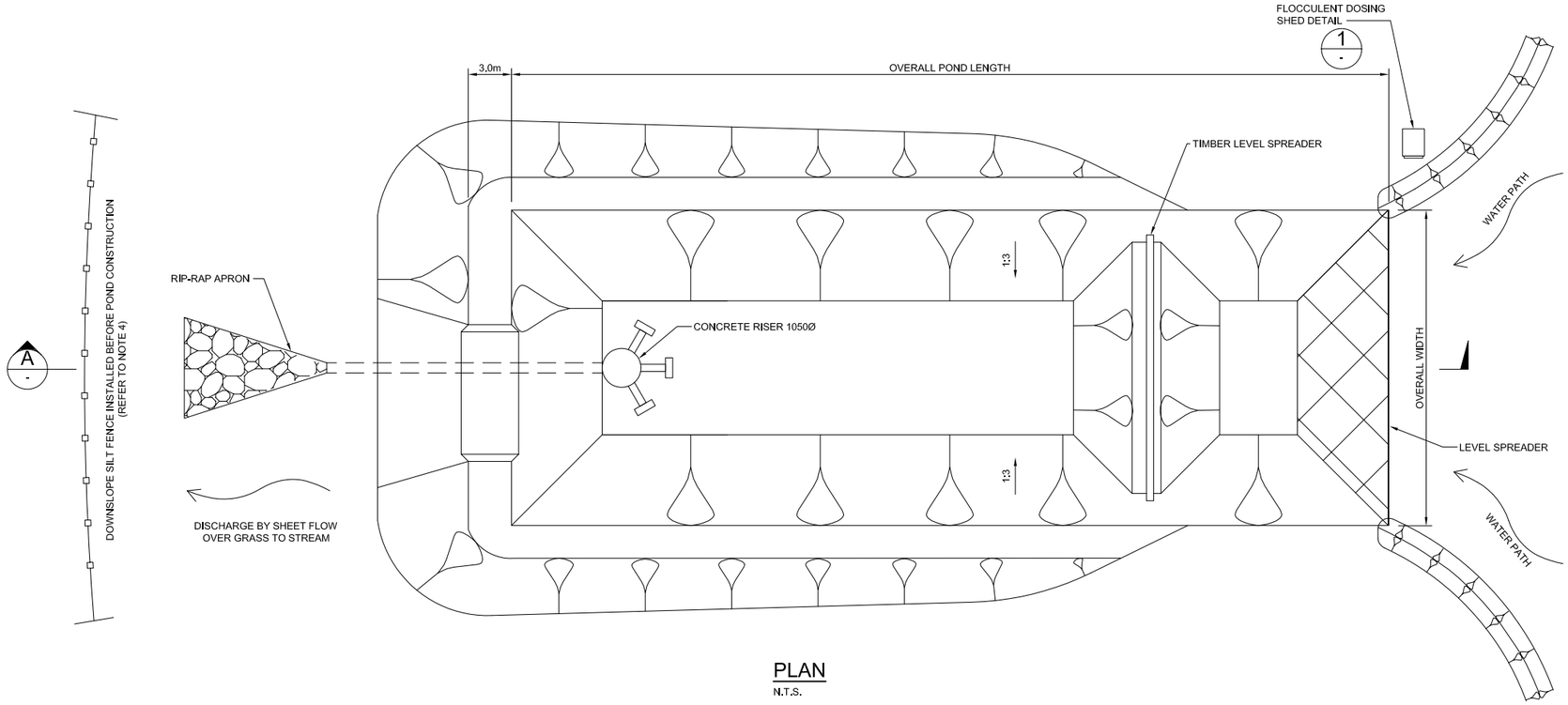
Title.
## Site Environmental Management Plan
Typical Erosion & Sediment Contol Details
Sediment Pond Outlet & Spillway

Status. For Consenting

Sheet. No. 1

Version No. A

Plot Date 13.08.2010 C:\acad\title block_v2.dwg




PLAN
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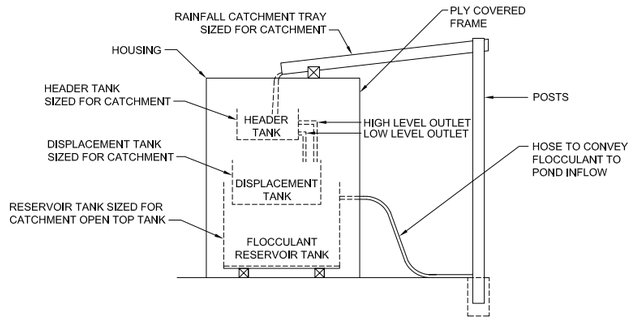
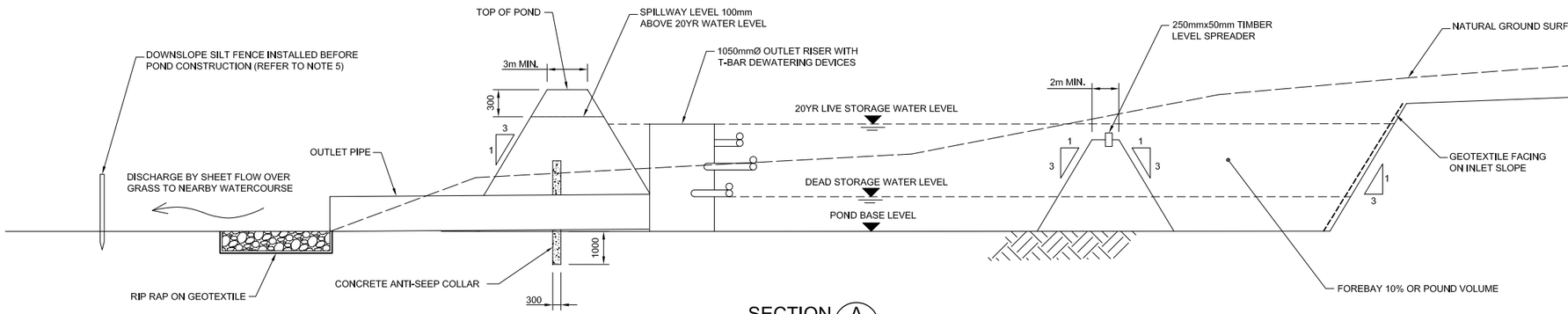



DETAIL 1 - SCALE: N.T.S.

FLOCCULANT SHED

| CATCHMENT SIZE | POND VOL (m³) | POND OVERALL DIMENSIONS LxWxD(m) | FLOCCULANT SHED DETAILS | | | |
|---|---|---|---|---|---|---|
| | | | TRAY (m²) | HEADER TANK | DISPLACEMENT TANK | RESERVOIR TANK |
| 1,000m² | 30 | 28.4x8.4x1.4 | 0.15 | 10L BUCKET | 25L BUCKET | 90L ROUND TANK |
| 2,500m² | 80 | 32.3x9.7x1.4 | 0.375 | 25L BUCKET | 90L ROUND TANK | 240L TANK |
| 5,000m² | 150 | 39.8x11.2x1.9 | 0.75 | 50L WATER TROUGH | 90L ROUND TANK | 240L TANK |
| 1.0ha | 300 | 47x13.6x1.9 | 1.5 | 90L TANK | 150L TANK | 240L TANK |
| 2.0ha | 600 | 57.8x17.2x1.9 | 3.0 | 150L TANK | 400L TANK | 422L TANK |
| 3.0ha | 900 | 65x19x1.9 | 4.5 | 200L TANK | 422L TANK | 550L TANK |




SECTION A - SCALE: N.T.S

NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS SHOWN OTHERWISE.
2. ALL WORKS TO BE IN ACCORDANCE WITH GREATER WELLINGTON REGIONAL COUNCIL EROSION AND SEDIMENT CONTROL GUIDELINES FOR THE WELLINGTON REGION.
3. ALL POND EMBANKMENTS ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE FILL SPECIFICATION FOR ENGINEERED FILL.
4. SILT FENCES ARE TO BE SUPER SILT FENCE.
5. FLOCCULANT DOSING SYSTEM DESIGN BASED ON 8mg/L PAC DOSING RATE. SITE SPECIFIC TRIALS ARE TO REQUIRED TO CONFIRM THE CORRECT DOSING RATE FOR THE SOILS. FLOCCULANT DOSING SHED DESIGN IS TO BE REVISED ACCORDINGLY.
6. FLOCCULANT SHED TANKS LISTED ARE MANUFACTURED BY ROTATIONAL PLASTICS OR STAVERS. ALL SHEDS REQUIRE SPECIFIC DESIGN ACCORDING TO THE TANKS USED.

| Revision | Amendment | Approved | Date |
|---|---|---|---|

NZ TRANSPORT AGENCY
WAKA KOTAHI

Project. TRANSMISSION GULLY PROJECT

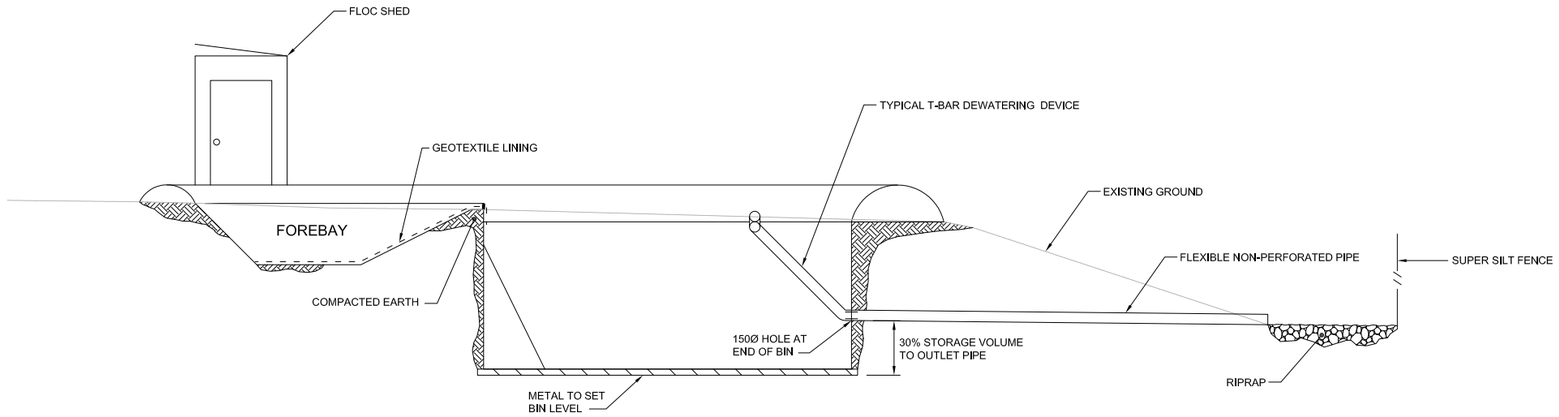
Title. Site Environmental Management Plan
Typical Erosion & Sediment Contol Details
Sediment Pond Outlet & Floc Shed

Status. For Consenting

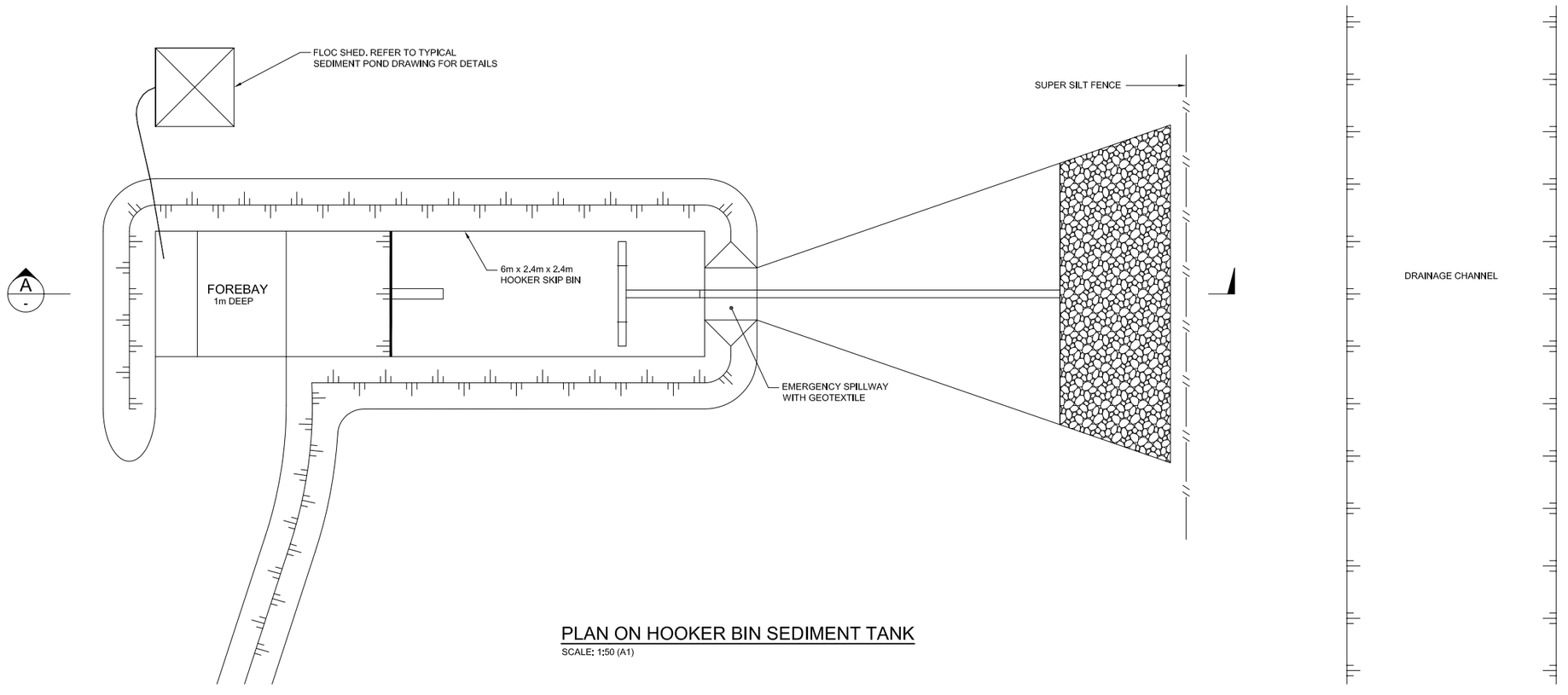
Sheet. No. 2

Version No. A

Plot Date 13.08.2010 C:\acad\title block_v2.dwg




SECTION A
SCALE 1:50 (A1)




PLAN ON HOOKER BIN SEDIMENT TANK
SCALE: 1:50 (A1)

NOTES

1. USE 6m x 2.4m x 2.4m HOOKER SKIP BIN FOR CATCHMENT AREA 1000m² MAX.

SCALE 1:50 (A1) 0 1 2 3 4 5m / 1 0.5

| Revision | Amendment | Approved | Date |
|---|---|---|---|

NZ TRANSPORT AGENCY
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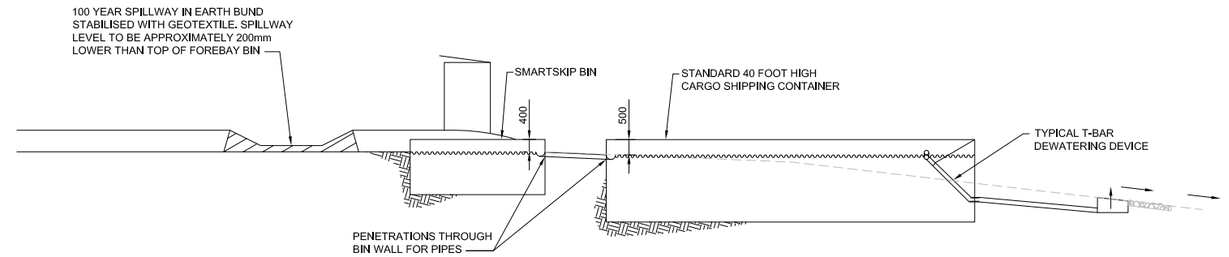
Project.
TRANSMISSION GULLY PROJECT

Title.
Site Environmental Management Plan
Typical Erosion& Sediment Control Details
Skip Bin Sediment Pond

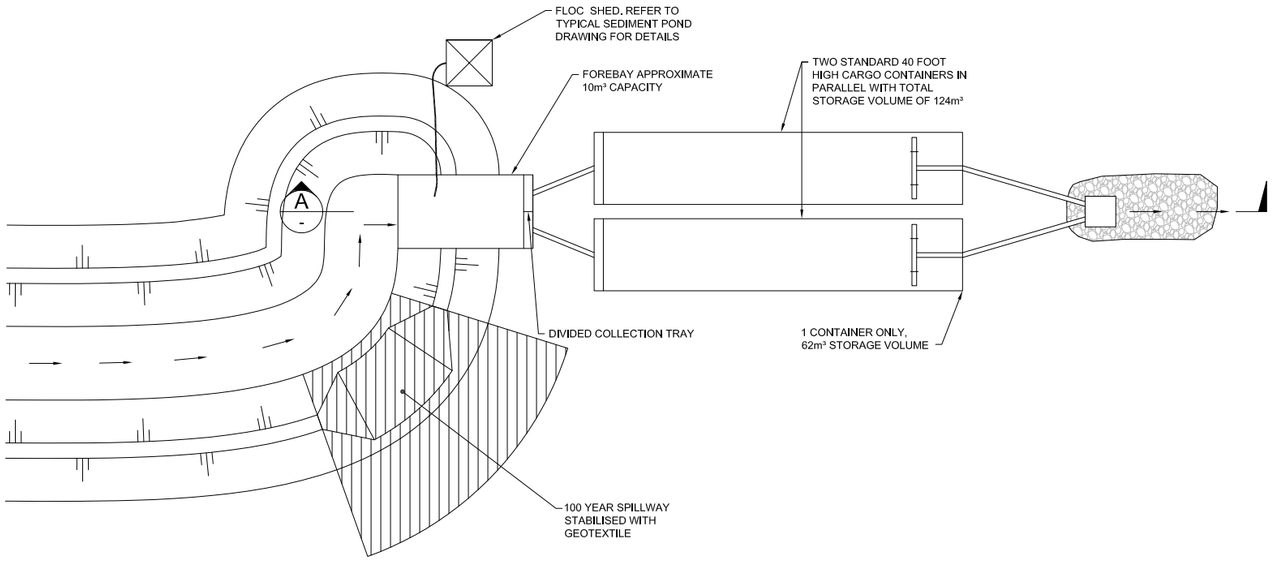
Status. For Consenting
Sheet. No. 3
Version No. A

Plot Date 13.08.2010 C:\acad\title block_v2.dwg



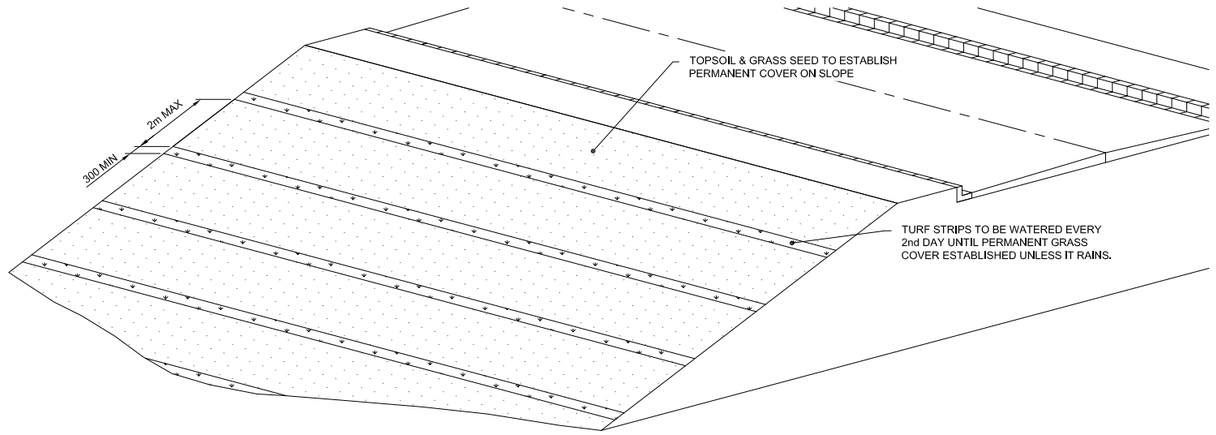

## SECTION A-A

SCALE 1:100 (A1)




## SHIPPING CONTAINER SEDIMENT TANK - PLAN

SCALE 1:100 (A1)




## STRIP TURFING STEEP SLOPES DURING RE-VEGETATION

NOTE

1. 1 SHIPPING CONTAINER CAPACITY = 72m³ FOR 2,000m³ CATCHMENT.
2. 2 SHIPPING CONTAINER CAPACITY = 134m³ FOR 4,300m³ CATCHMENT.
3. STANDARD 40 FOOT HIGH CARGO CONTAINER DIMENSIONS: LENGTH = 12.01m, WIDTH = 2.35m, HEIGHT = 2.69m

SCALE 1:100 (A1) 0 2 4 6 8 10m

| Revision | Amendment | Approved | Date |
|---|---|---|---|

NZ TRANSPORT AGENCY
WAKA KOTAHI

Project. TRANSMISSION GULLY PROJECT

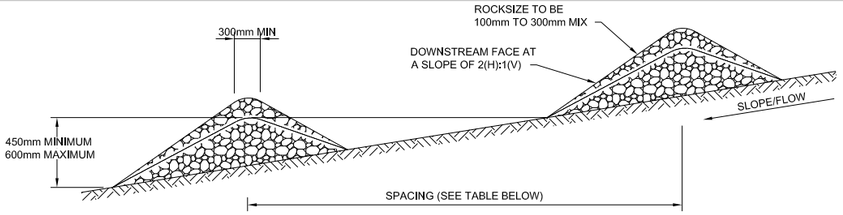
Title. Site Environmental Management Plan
Typical Erosion & Sediment Control Details
Container Sediment Tank

Status. For Consenting

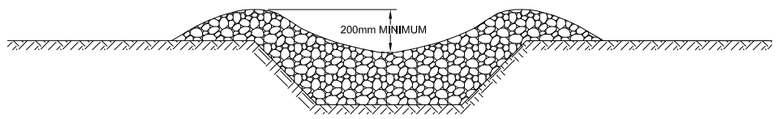
Sheet. No. 4

Version No. A

Plot Date 13.08.2010 C:\acad\title block_v2.dwg

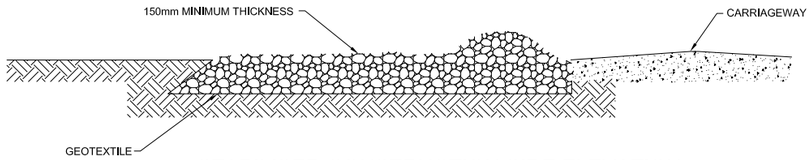



ROCK CHECK DAM ELEVATION



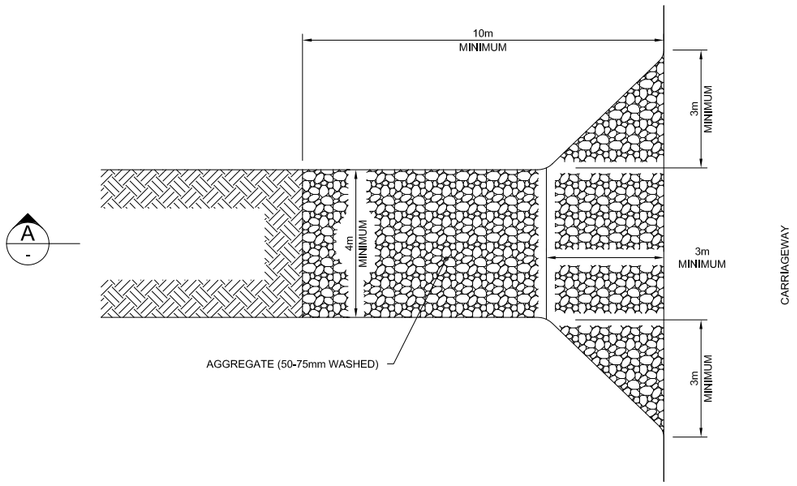

ROCK CHECK DAM CROSS SECTION

| STANDARD ROCK CHECK DAM DESIGN | | |
|---|---|---|
| SLOPE | SPACING (m) BETWEEN DAMS (450mm CENTRE HEIGHT) | SPACING (m) BETWEEN DAMS (600mm CENTRE HEIGHT) |
| 2% OR LESS | 24 | 30 |
| 2% TO 4% | 12 | 15 |
| 4% TO 7% | 8 | 11 |
| 7% TO 10% | 5 | 6 |
| OVER 10% | USE STABILISED CHANNEL | USE STABILISED CHANNEL |



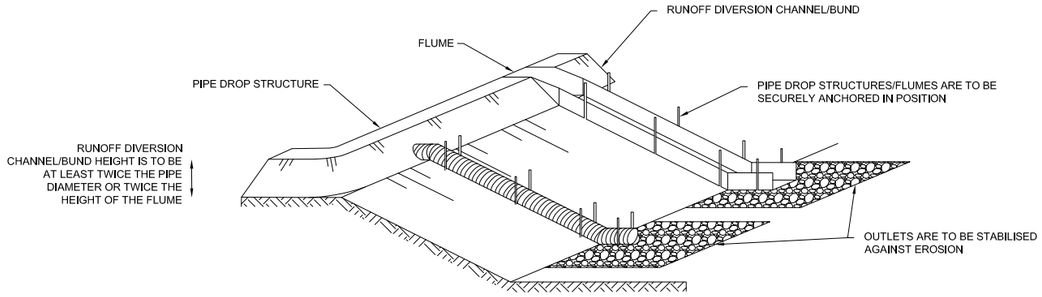

STABILISED CONSTRUCTION SIDE ELEVATION

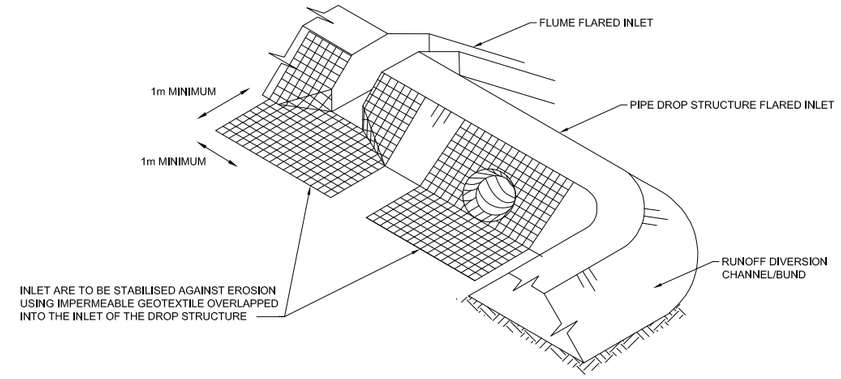
SECTION A
SCALE: N.T.S



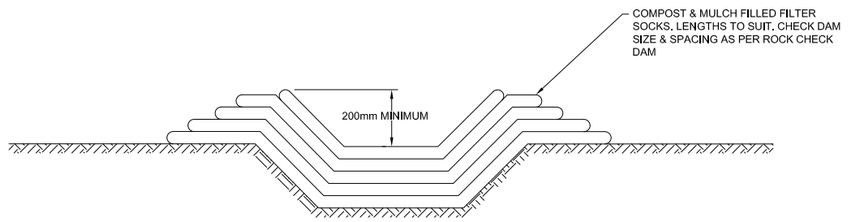

STABILIED CONSTRUCTION ENTRANCE - PLAN

SCALE: N.T.S




| DESIGN CRITERIA FOR PIPE DROP STRUCTURE | |
|---|---|
| PIPE DIAMETER (mm) | MAXIMUM CATCHMENT AREA (ha) |
| 150 | 0.05 |
| 300 | 0.20 |
| 450 | 0.60 |
| 500 | 1.00 |
| 600 | 1.00 |
| NOTE: SPECIFIC DESIGNS ARE REQUIRED FOR FLUME SIZING | |




FILTER SOCK CHECK DAM CROSS SECTION

SCALE: N.T.S

| Revision | Amendment | Approved | Date |
|---|---|---|---|
| | | | |

NZ TRANSPORT AGENCY
WAKA KOTAHI

Project.
TRANSMISSION GULLY PROJECT

Title.
Site Environmental Management Plan
Typical Erosion & Sediment Control Details
Rock Check Dam, Fluming

Status. For Consenting

Sheet. No. 5

Version No. A

Plot Date 13.08.2010 C:\acad\title block_v2.dwg