Management and Monitoring Plan

Western Wastewater Treatment Plant Effluent Pipeline

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Control Sheet

Document Title: Management and Monitoring Plan – Western Wastewater Treatment Plant Effluent Pipeline

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Document Control Register

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Executive Summary

The Maintenance and Monitoring Plan (MMP) covers the requirements of the Wellington City Council (WCC) Western Wastewater Treatment Plant (WWTP) regarding the Western WWTP effluent pipeline inspection and maintenance of integrity. The effluent pipeline must be managed and monitored for leaks or failures to avoid, mitigate, and remedy any adverse effects of discharging treated wastewater to the Karori Stream. An annual report regarding the outfall pipeline must be generated to cover inspections, observations, repairs and planned remedial activities over the previous year. Also, the methodologies and mitigation measures for highly sensitive areas identified in the Ecological Report were also incorporated into the MMP.

The information contained within this MMP is intended to meet GWRC requirements and prepared with reference to the “Erosion and Sediment Control Guidelines for the Wellington Region”.

This MMP must be read and implemented as part of any contract documentation prior to commencement of earthworks on the site.

Emphasis is placed on the avoidance, mitigation, or remediation of potential adverse effects on surrounding properties and the aquatic habitat values of the Karori Stream as a direct result of any maintenance and repair works.

As the Karori Stream environment is dynamic and conditions are constantly changing, the proposed works have been described as a series of possible scenarios to suit the typical conditions in the different parts of the stream along the length of the pipeline. However, variations to the proposed methodologies may be required on a case by case basis to maintain protection of downstream environments (e.g. from sediment released by stream bed disturbance) while also working within local site constraints.

This MMP supersedes all previous MMP documents submitted to Greater Wellington Regional Council (GWRC). Any changes to this MMP must be submitted for approval to GWRC and written approval obtained in advance of actions made on site. The approved variations shall be appended to this document as a permanent record.
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1. Introduction & Document Scope

This MMP describes the inspection process and methodologies of typical planned and unplanned maintenance and repair works required to ensure the ongoing integrity of the Western WWTP effluent pipeline.

It includes the following:

- Details required by GWRC for the discharge of treated wastewater from the Western WWTP via the outfall pipeline following the Karori Stream to the Coastal Outfall on Wellington’s South Coast;
- The methodologies and mitigation measures for highly sensitive; and
- A framework covering reporting requirements and responsibilities to assist with consultation, implementation, monitoring and consent compliance processes.

Key features of this MMP are:

- Avoiding,remedying, and mitigating the risks and/or effects of pipeline leaks and failures which have the potential to discharge treated wastewater effluent to the Karori Stream;
- Methodologies for the various maintenance and repair works processes to minimise release of sediment to the Karori Stream during the works and the potential adverse impacts on the habitats of native fish species that have been previously observed in the Karori Stream and its tributaries;
- Methods to avoid or address erosion and scour effects as a result of maintenance and repair works; and
- Consultation with stakeholders regarding access to the works areas and the works programs.

The overall focus of the MMP is maintenance and protection of the receiving environment (water quality and freshwater aquatic habitat of native fish species) while also ensuring the inspections, maintenance, and repair processes do not adversely impact landowners’ ability to utilise their properties for lawfully established activities.

Emphasis is placed on avoidance, remedy or mitigation of potential adverse environmental effects as a direct result of works described in this MMP, in particular prevention of sediment release to the Karori Stream or loss of freshwater aquatic habitat. This is primarily achieved by ensuring planned works occur in the dry as much as practicable or at times outside the known migration and spawning seasons.
1.1. Compliance and Amendments

This MMP should be read and implemented in full compliance as part of any contract documentation and conditions of the relevant resource to the satisfaction of GWRC officers. Relevant resource consents must be included as part of any contract documents.

1.2. Reference Documents

The following is a list of relevant supporting & reference documents:

- Western Wastewater Treatment Plant Effluent Pipeline Plans (see Appendix A)
- Greater Wellington Regional Council Resource Consents (see Appendix B)
  - WGN060283 [33277]
  - WGN160340 [34178] & [34179]
- Hazard Identification Form (see Appendix C)
- Defect Record Form (see Appendix D)
- Fish Rescue Methodology (see Appendix E)

1.3. Legal Descriptions of Land Accessed for Pipeline Maintenance

Set out below is a summary of the ownership details for the land required for access and maintenance of the pipeline:

<table>
<thead>
<tr>
<th>Registered Land Owner</th>
<th>Legal Description</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wellington City Council</td>
<td>Section 1 SO 37211</td>
<td>South Karori Road</td>
</tr>
<tr>
<td>CS &amp; PA Griffiths</td>
<td>Lot 2 DP 414390</td>
<td>555, 567 South Makara Rd</td>
</tr>
<tr>
<td>NZ Forestry Group Limited (Kinnoull Station)</td>
<td>Lots 1, 16 &amp; 20 DP 414390, Lots 3-12 DP 425554, Lots 13 &amp; 4 DP 366070</td>
<td>588 South Makara Road</td>
</tr>
<tr>
<td>Terawhiti Farming Company Limited</td>
<td>Secs 4 &amp; 17 &amp; Pt Secs 13, 14, 15, 19, 33 &amp; 50 Terawhiti District, Lot 3 DP 5864.</td>
<td>1079 South Makara Road</td>
</tr>
<tr>
<td>Erin Go Bragh Limited</td>
<td>Lots 2 &amp; 3 DP 422854</td>
<td>509 South Makara Road</td>
</tr>
</tbody>
</table>

Please refer to the consultation and notification processes in Section 7.0 and Appendix A: South Makara Rd - Access to WCC's Western Wastewater Treatment Plant Main Outfall Pipeline.
2. Location & Access Information

The Western WWTP effluent pipeline runs between Wellington City Council’s Western WWTP and the mouth of the Karori Stream on Wellington’s South Coast at the end of South Makara Road. This is shown approximately as a red line in the image below.

![Figure 1: Aerial Location Plan – Annotated Extract from Google Earth Online Maps](image)

The effluent pipeline largely follows the alignment of the Karori Stream. South Makara Road provides access to the pipeline and terminates approximately four kilometres from the South Coast outfall.

Four-wheel-drive access is available from the end of the road to the outfall. This follows a forestry track constructed over the alignment of the unformed extension of South Makara Road (legal/paper road). The track runs parallel with the Karori Stream and crosses it several times, via fords. Most of the “paper road” access occurs on land owned by CS & PA Griffiths, the NZ Forestry Group or Terawhiti Farming Company. Public access is not available over the track without prior permission of the affected private land owners whose land also has to be accessed.

The existing track provides access to the majority of the pipeline when repairs are required from the bank areas without the need to access the stream bed with machinery. Farm tracks provide access over private land to those parts of the pipeline or stream not adjacent to the access. These mainly occur on land owned by Erin Go Bragh Ltd (EGBL) and Terawhiti Farming Company (see Appendix A).
## 3. Inspections

Inspections of the effluent pipeline need to be sufficiently frequent to ensure the integrity is protected and maintained. The flowing table defines the programme for planned and unplanned inspections:

<table>
<thead>
<tr>
<th>Inspection Frequency</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Monthly</td>
<td>Vehicle based inspection of pipeline from South Makara Road end to Coastal Outfall.</td>
</tr>
<tr>
<td>Annual</td>
<td>Full inspection of pipeline including walkover on walking only access section in January/February when weather conditions are good.</td>
</tr>
</tbody>
</table>
| Events Based         | A full inspection of the pipeline is undertaken following major storm/severe weather events or earthquakes which may have caused slips or damage to the pipeline or increased risk to the pipeline. Inspections are also triggered:  
  • When telemetry information from the Solar Powered Flow Meter near the Coastal Outfall shows a change in flow rate in the MOP or data from the meter is not received. Inspections need to check for leaks and/or whether the Flow Meter is working correctly.  
  • In response to notification of events such as tree fall. |

Any maintenance or repair works triggered following inspections should be undertaken as soon as practicable.

## 3.1. Procedure for Inspections

### 3.1.1. All Inspections

Before any inspection is performed on the outfall pipeline, the employee/contractor should:

1. Hold a Warrant of Authorisation which gives approval to enter private property in accord with Local Government Act (LGA).
2. Notify relevant landowners in writing a minimum of 48 hours before inspection is performed. Please refer to the consultation and notification processes in Section 7.0 and Appendix D: Interested Parties Contact Details to find the relevant landowners their contact details.
3. Bring along all the required equipment listed in Section 6.2.

During Inspections, the following must be undertaken:

1. Comply with Health & Safety requirements set out at Section 6.1;
2. Check condition of pipeline – refer Inspection Procedure set out in Section 3.1.
3. Record pipeline condition and any defects observed, undertake sampling and monitoring as required for inspection period, ensure all new hazards are identified and recorded accurately to update hazard register. Separate procedures for recording hazards, defects, sampling and checking the flow monitor are provided in the following sections. On return from all inspections the Follow Up actions at Section 3.5 must be completed.

3.1.2. Event Based Inspections

The sections of the pipeline visible from the vehicle are to be inspected on each occasion to look for defects and risks to the integrity of the pipeline.

Staff should follow the procedure set out below:
1. Ensure compliance with requirements in Section 3.1.1 above;
2. Complete the Defect Record Form - refer copy of Form at Appendix D and Section 3.2 for how to identify defects. If any defect is observed along the pipeline, also refer to Section 3.5 for follow up procedure;
3. Take a 200mL sample from the stream flow at every suspected leak site to test for faecal coliforms and fluoride, following Sampling & Assessment Procedure set out at Section 3.4.

3.1.3. Annual Inspections

Inspections carried out on a 12-monthly (Annual) basis shall adopt the criteria set out for 3-monthly and events based inspections in Sections 5.3.1 and 5.3.2, and shall also include a walkover of the entire length of the pipeline including areas not readily accessible by vehicles.

The best time to undertake the annual MOP inspection is during the summer months of January/February.

3.1.4. Wet Weather Overflow Inspections

Please refer to the document: “Western Treatment Plant Overflow Contingency Plan”.
3.2. Procedures for Identifying & Recording Faults in the Pipeline

The purpose of inspections is to assess the pipeline for defects and report any found so that repairs can be made as soon as practicable. When undertaking inspections of the pipeline, look for the following indicators of defects which may result in or represent a leak in the pipeline:

<table>
<thead>
<tr>
<th>Defect Type</th>
<th>Description</th>
<th>Pictures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaks</td>
<td>Inspect pipe bridge ends, wet areas, and check for evidence of erosion near the pipeline.</td>
<td>![Picture of a leaky pipeline]</td>
</tr>
<tr>
<td>Defect Type</td>
<td>Description</td>
<td>Pictures</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Pipe Defects</td>
<td>Undermined, backfall, or uphill pipe.</td>
<td><img src="image1.jpg" alt="Picture of pipe defect" /></td>
</tr>
<tr>
<td>Encasement Defects</td>
<td>Broken or cracked encasement, missing support nuts/bolts on pipe bridges.</td>
<td><img src="image2.jpg" alt="Picture of encasement defect" /></td>
</tr>
<tr>
<td>Defect Type</td>
<td>Description</td>
<td>Pictures</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Access track overgrown/blocked.</td>
<td>Vegetation should not prevent sections of the pipeline from being inspected.</td>
<td><img src="image1.jpg" alt="Picture" /> <img src="image2.jpg" alt="Picture" /></td>
</tr>
<tr>
<td>Excessive vegetation growth in vicinity of effluent pipeline.</td>
<td>A leak in the effluent pipeline will release nutrients encouraging plant growth close by. This will be most noticeable in summer months when plant growth is promoted. Samples should be taken if this is observed.</td>
<td><img src="image3.jpg" alt="Picture" /> <img src="image4.jpg" alt="Picture" /></td>
</tr>
<tr>
<td>Defect Type</td>
<td>Description</td>
<td>Pictures</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Erosion</td>
<td>Check the stream alignment for potential erosion of the pipeline foundations, or damage from slips.</td>
<td><img src="image" alt="Erosion Picture" /></td>
</tr>
</tbody>
</table>

If any defects are found the Defect Record Form (see Appendix D) must be completed for each defect. In addition to the information recorded on the form photographs and other information considered relevant should be attached, with all documents correctly labelled for reporting purposes later.
3.3. Procedure for Flow Monitor Data Capture

Details regarding the monitoring and reporting of the effluent flow rate at the outfall included in this MMP. Monitoring and reporting are required to help identify potential leaks in the effluent pipeline so they can be repaired as soon as practicable.

A solar powered flow monitor is located at Manhole MAK 175 near the Coastal Outfall Structure. The flow meter sends data back to the office by telemetry. If the data stream ceases or trends in data indicate a different in flow rates compared to the Western WWTP effluent flow meter, the effluent pipeline flow meter needs to be inspected and the pipeline may need to be inspected for leaks.

The meter should be inspected when an inspection of the effluent pipeline is performed to ensure proper operation. If the data has not been automatically sent to the office, it can be manually downloaded from the flow meter during inspections.

Remote monitoring of the effluent pipeline flow data needs to be performed periodically. This will ensure that data is being transmitted. The flow trends should be compared with the effluent flow from the Western WWTP. Where trends indicate a change in flow rate and/or the data is not being received, refer Follow Up procedures at Section 3.5.
3.4. Sampling & Assessment Procedure

3.4.1. Testing for Suspected Pipeline Leaks

Wherever a defect is observed along the pipeline, water samples must be collected from the stream nearby. The samples of water will be tested for faecal coliforms and fluoride. The results will be compared with known indicators of wastewater contamination to determine if there is a leak.

The procedure below provides information to ensure viable samples are collected and properly transported to the laboratory. A table sets out the comparison indicators for assessment and reporting procedures.

3.4.2. Sampling Technique

When preparing for the effluent pipeline inspection, the staff member should bring the appropriate equipment for sampling (set out at Section 6.2). The staff member performing the inspection should also be trained to correctly collect and transport the samples.

When taking a sample:

1. Only use sterile sample bottles sourced from Eurofins-ELS Laboratory (refer to Section 8.0 for contact details). Complete any labelling requirements for the bottle (it is easier to write on a dry label).

2. After removing the lid, take a 200mL sample from the stream at the site of the suspected leak. The water is collected by dipping the bottle directly into the stream.

3. Replace the lid and ensure it is tightly closed. Place the bottle in the chilly bin.

3.4.3. Sample Assessment

1. Results received from the laboratory should be checked against the guidelines provided in the table below to determine if the samples contain wastewater from the Western WWTP effluent pipeline.

<table>
<thead>
<tr>
<th>Comparison Indicator Faecal</th>
<th>Faecal Coliforms (cfu)</th>
<th>Fluoride (Mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rain Water</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Karori Stream Water</td>
<td>200 – 1,000</td>
<td>0</td>
</tr>
<tr>
<td>Groundwater</td>
<td>1 - 200</td>
<td>0 - 0.4</td>
</tr>
<tr>
<td>Farm Runoff</td>
<td>0 - 10,000</td>
<td>0</td>
</tr>
<tr>
<td>Western WWTP Effluent</td>
<td>50 - 1,000</td>
<td>0.8</td>
</tr>
</tbody>
</table>

2. Perform the relevant follow up actions as defined in Section 3.5.
### 3.5. Follow Up

The following table sets out the follow up procedures for inspections and maintenance:

<table>
<thead>
<tr>
<th>Task</th>
<th>Remediation Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed Defects on Pipeline</td>
<td>Where any defects are observed along the pipeline, the Defect Record Form must be completed, with a separate entry and photograph provided for every defect observed (refer to Appendix D). The completed Defect Record Form(s) must be submitted to Contracts Officer on completion of the inspection, including any photographs or other information to assist in determining what maintenance and repairs will be required. The Contracts Officer to visit defect sites and determine and programme maintenance and repair works required and engage contractors. Completed works to be reported by the Contracts Officer to the Consent Manager for quarterly and annual reporting.</td>
</tr>
<tr>
<td>Observed Faults with Flow Meter</td>
<td>Same as above</td>
</tr>
<tr>
<td>Flow Meter Data Recording</td>
<td>Flow meter data is received automatically (refer Section 3.3). If this does not occur a manual download can be undertaken at the meter. Data must be provided by the Contracts Officer to the Consent Manager for quarterly and annual reporting.</td>
</tr>
<tr>
<td>Identification of Hazards</td>
<td>Where any hazards are identified during pipeline inspections and maintenance events, each of these must be recorded on the Hazard Identification Sheet (see Appendix C). Ensure the latest version of the Hazard Sheet is used for any site inspection. Where the hazard referenced on the Hazard Sheet is no longer present, it should be recorded. The information on the completed and updated form is to be provided to the Consent Manager on return to the office and the Hazard Register updated.</td>
</tr>
<tr>
<td>Identification of Leaks</td>
<td>When a leak in the pipeline is detected through analysis of the grab sample taken from the</td>
</tr>
<tr>
<td>Task</td>
<td>Remediation Procedure</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------</td>
</tr>
<tr>
<td></td>
<td>stream near the potential defect, the information is to be provided to the Consent Manager for quarterly and annual reporting. Details of any subsequent repairs (or planned repairs) and the outcome of these are also required in reporting processes.</td>
</tr>
</tbody>
</table>
4. Maintenance and Repairs

4.1. Responsibilities of Contracts Officer

The Contracts Officer is responsible for supervising all repairs and maintenance of the effluent pipe covered by this MMP.

In addition to the procedures and responsibilities set out in Section 3.0, the following must be complied with.

1. Visit the site(s) referred to in the Defect Record Form as soon as practicable to determine:
   (a) What works are required (e.g. repair work, replacement of pipeline structure, or vegetation clearance);
   (b) The urgency for the work to be completed (e.g. as soon as practicable or less urgent); and
   (c) Who should carry out the work;

2. Engage a contractor to carry out the necessary works;

3. Set up a timetable for the repair work;

4. Keep other relevant staff informed on progress at regular intervals;

5. Supervise the repair work through to completion. Ensuring that the repair procedures, methodologies, and mitigation methods set out in this MMP are followed by all staff and contractors involved.

4.2. Responsibilities for All Maintenance & Repair Work

Before undertaking any pipeline maintenance and repair work (including site visit to follow up on defect reports to determine work requirements), all staff/contractors involved must:

1. Notify relevant landowners in accordance with procedures set out at Section 7.0. Contact details are provided at Section 8.0.

2. Pack necessary equipment into inspection vehicle – refer Checklist at Section 6.2.

During Site Visits and Maintenance and Repair Work, the following must be undertaken:

1. Comply with Health & Safety Requirements set out at Section 6.1.

On return from all site visits and when works are completed the relevant follow up actions at Section 3.5 must be completed.
4.3. Overview of In-Stream Maintenance & Repair Works

This MMP sets out details of all in-stream activities and structures required to gain access to all parts of the pipeline and undertake planned and unplanned maintenance and repairs. The range of maintenance and repair works that may need to be undertaken along the effluent pipeline includes:

- Clearance of slip or flood debris (including fallen trees);
- Repairing scoured sections of stream bed affecting the pipeline stability;
- Repairs to fords/river crossings (re-grading);
- Construction of access ramps/platforms for machinery to safely access the pipeline;
- Disturbance and redistribution of bed material (including deposition of redistributed material) on the bed of the stream to create stable access and works areas or divert scouring flows away from the pipeline; and
- Temporary and permanent diversions to facilitate works.

The potential adverse effects of the maintenance and repair works set out in this MMP are limited to disturbance of the bed and banks of the stream and potential release of sediment and effects on freshwater aquatic habitat. The MMP includes methodologies and mitigation measures to address the relevant effects on the environment and ensure that they are managed to an acceptable level.

The following sections list the potential types of repairs required for the pipeline and the methods of work in the Karori Stream to perform those repairs. This will ensure the quality of the stream and freshwater habitat are protected.

4.4. Vegetation Clearance

When vegetation growth is preventing accurate and efficient inspection of the pipeline or access along inspection track, this needs to be removed, subject to the following procedures being complied with:

1. Notify relevant landowners in accordance with procedures set out at Section 7.0.
   Contact details are provided at Section 8.0.
2. Comply with Health & Safety Requirements set out at Section 6.1, and in addition to this, ensure:
   a. A minimum of 2 staff are on-site with scrub cutting equipment to clear access track;
   b. Spray work is undertaken by hand where vehicle access is not possible or safe. A vehicle mounted spray unit may be used where safe access is available.
3. All vegetation cleared shall be removed from the site, unless otherwise agreed with the landowner, and disposed of at the Southern Landfill or other approved disposal site.
4. Notify affected landowners when work has been completed (as per item 1 above).
4.5. Acceptable Methods of Repair for Pipeline Leaks

Once a leak has been detected and confirmed, the following procedure shall be followed:

1. Notify the affected landowners about:
   (a) The timing of the repair works (once confirmed with the contractors); and
   (b) When works have been completed.

   Notification shall be in accordance with procedures set out at Section 7.0. Contact
details are provided at Section 8.0.

2. The Contracts Officer shall determine with the contractors the best way to repair the
   leak and the timing of the work.

3. Depending on the location and nature of the leak, one of the following repair methods
   will be used (all of which must be kept clear of stream flows):
   • Epoxy concrete repair compound;
   • Reinforced concrete bandage and cement encasement;
   • Install rubber seal on a section of pipe;
   • Flexible joint - where expansion or movement is expected (e.g. on a pipe bridge).

   Notes:
   • If required, the flows in the pipeline can be stored at the Wastewater Treatment
     Facility for short periods of time to enable repairs to be completed. Refer WWTP
     contact details at Section 8.0 to make arrangements if necessary.
   • When the works are to be undertaken, additional “in-stream” activities may be
     required to gain access to the pipeline. The following sections set out details of
     these activities and methodologies to avoid adverse effects of works on the Karori
     Stream environment.
4.6. Types of In-Stream Works Anticipated for Repairs and Maintenance

This section of the MMP describes the situations when certain types of works will be undertaken in and around the stream bed and banks. It will explain the issues that need to be addressed followed by the methodologies to avoid or mitigate any adverse effects of those works on the stream environment.

4.6.1. Clearance of Flood or Slip Debris

Flood debris, slip debris or fallen trees will be removed, whenever required, from the channel of the Karori Stream to ensure there is no risk of damage to the effluent pipeline. Areas where clearance may be required include, but are not limited to:
- Sections of the channel which have become blocked (e.g. in narrow and incised areas of the watercourse);
- Areas where debris has built up against the pipeline structure and presents a risk to the integrity of the pipeline (e.g. pipe bridge supports); and
- Where flood waters diverted by debris present a risk to the pipeline structure and its integrity.

Removed material will be disposed of at an appropriate land based disposal area. For areas where the debris is accessible from the stream banks (and subject to suitable access to the bank from roads) a hydraulic excavator will be used. If material is not redistributed in the stream bed the cleared material may be loaded on to a truck (suitably sized for the volume involved), which will be parked on the side of the watercourse.

Where access is not suitable for the excavator, or the reach of the excavator is not sufficient to remove material from the bank, it will be necessary to use a tracked vehicle. The vehicle will access the stream bed from the closest safe position on the stream bank and travel up the stream bed to the works area.

4.6.2. Deposition of Gravel

The physical characteristics of the stream environment (flow, velocity, channel geometry) and the design of existing pipeline support structures in the stream bed have the potential to create scour holes. Gravel will be deposited where scour holes arise in locations that can threaten the integrity of the effluent pipeline structure. When scour holes are identified during inspections, a visual assessment will be made by the Contracts Officer of the following:
- Severity and extent of the undercutting,
- Likely risk of exposing the support foundation of the pipeline, and
- Availability of riverbed material in the immediate vicinity of the scour hole.

The results of the visual assessment by the Contracts Officer will determine the course of action to address the scour hole. For example, deciding whether infilling or replacement of scoured gravel material is necessary, and when the work would need to be undertaken.
4.6.3. Construction of Temporary Access Platforms

Temporary access platforms may need to be formed in the stream bed when it is not possible to work on the stream bank. Working from the bank is not possible when:

• The distance between the bank and the watercourse is too great to use machinery based on the bank (difficulties with reach of excavator);
• The watercourse bank is too steep or does not offer sufficient width from which to safely or practically base the machinery; or
• Access is only available via the bed of the stream and machinery has to be driven up to the works area.

The extent of the temporary platform will depend on the effluent pipeline maintenance or repair requirements, the nature of the stream bed where the work is required, and where access is required.

Typically, a platform needs to be created when there is a deep pool on one side of the stream bed which does not allow machinery to operate safely. The area needs to be filled with sufficient material to create a level work surface for machinery. The platform would be kept to the minimum size necessary for the safe operation of machinery.

A temporary access platform should be created from suitable, locally sourced gravel (estimated particle size 2mm-200mm) and may be constructed with a boulder base using larger material sourced locally (particle size >200mm). This is usually undertaken by moving the material from nearby areas into the deeper sections. The gravel cannot be screened in situ so the particle sizes are provided as an estimate.

When the temporary access platform is no longer required, the stream bed is to be returned to the pre-works conditions.

4.6.4. Re-Grading of Existing Fords

There are several fords that cross the stream on the paper road used to access the pipeline. From time to time these are damaged by storm flows and need to be regraded. Similar methods used for Temporary Access Platforms will be employed in these situations.
4.7. Works Methodologies & Mitigation Measures

The types of work described in the previous section will be undertaken in accordance with the relevant methodologies and mitigation measures set out below. The methodologies and measures are used to minimise any adverse effects that the maintenance and repair activities could have on the Karori Stream environment. For example, to protect or repair the pipeline it may be necessary to divert flows away from the structure. The diversion activity will follow a specific methodology, including suitable erosion and sediment controls, to protect downstream waters and fish habitat. If work affects a stream length greater than 30 metres then the Fish Rescue Methodology must be applied (see Appendix E).

4.7.1. Temporary Diversions, Permanent Diversions, and Works in Active Flowing Sections of Stream

Diversions are required to separate work areas from the stream flow path. These are stabilised systems such as gravel bunds, excavated channels, or a combination of both in the dry stream bed. The diverted flows will be discharged back into the stream channel below the work area to avoid scour.

The preferred temporary diversion method involves opening a channel in the dry bed without breaking into the stream flow. This approach relies on the natural changes in the stream during and after flood flows to move the flows away from the vulnerable effluent pipeline structures. This method is preferred to allow the stream to find its own path rather than diverting the stream back on completion of the works (which would create more disturbances).

In certain instances a permanent diversion may be necessary to move the flow away from the Western WWTP effluent pipeline to prevent destabilisation of the support structures.

Any temporary or permanent diversions necessary to protect the effluent pipeline shall be undertaken in accordance with the “General Procedures for Temporary Diversions” in Section 6.1 (pages 87-88) of the GWRC, “Sediment and Erosion Control Guidelines (September 2002)”. The guidelines refer to use of a range of materials (i.e. geotextile cloth or concrete) as well as gravels that can be used. No materials other than the in situ gravels and/or rock should be used in diversions to protect the effluent.

The steps suggested in the Guidelines which cover minimising sediment generation and discharge from diversion works within a water body will also be followed.

Due to the physical characteristics of the Karori Stream, there may be some instances where it is not feasible to divert the flow from the work area. In these cases, the work will need to be performed in the active flowing sections of the stream. Every effort should be made to minimise adverse effects on the downstream environment by minimising the time of disturbance.
4.7.2. Erosion and Sediment Controls

Work requiring the creation of temporary diversions, the construction of platforms and fords, and vehicle access in the stream bed all has the potential to release sediment into the watercourse or alter the stability of the stream bed or banks. Other maintenance work such as gravel re-contouring, stockpiling of debris, and aggrading gravels can also have similar effects.

The degree of sediment release depends on the extent of the work, the duration of the work, and if the work is located in a flow section of the stream.

Erosion and sediment management will be based on the maintenance and repair work required on the effluent pipeline. The type of control implemented will depend on the location of the work along the pipeline, the type of work being undertaken, and the extent of disturbance to the bed and/or banks of the stream.

Typical sediment controls will include the following:
• Limiting planned maintenance works to times of low flows; and
• Ensuring that planned work in flowing sections of the stream avoid the key recruitment migration period for native fish species between 1 August to 31 December inclusive.

The stream bank will be repaired if remedial works cause scour or erosion.

4.7.3. Other Contaminant Controls

Work on the pipeline may involve repairs to the concrete support structures or pipe casings. Wet concrete or dry mix must never enter the stream and all work involving concrete repairs must be undertaken as planned maintenance in a dry area.

Oil or diesel spillage to the stream must be avoided. All necessary precautions must be taken to prevent this from occurring.

4.7.4. Aquatic Fauna

During maintenance or repair work in the stream the fish passages must be maintained at all times.

When constructing access platforms or re-grading fords the surface of the stream bed will be altered. Over time the stream will reinstate the interstitial spaces that native fish rely on are refuges. Once the original configuration of the riverbed has been reinstated no additional work is required to recreate this environment.

Due to the localized area where the maintenance or repair activities are being performed, the impact on eel habitat or migration over the stream is minimized.
4.7.5. No Net Loss

A majority of the maintenance or repair work involves repairs to sections of streams disturbed by high flow events. In this case, disruption to stream habitat may have already occurred and the repair works can often be completed without causing further disturbance of sensitive habitat. That is not always the case. In order to ensure that maintenance work can be conducted without any unnecessary loss of high value fish habitat, it is recommended that an approach of “no net loss” in respect of bank vegetation and riffle habitat be adopted.

The follow are some recommendations regarding the no net loss approach:

1. Avoid disturbance of bankside vegetation (potential inanga spawning habitat) within the estuarine reach;

2. Take all reasonable steps to avoid the disturbance of bank vegetation that overhangs the stream channel or provides shade or cover over flowing water. In those instances where removal of bankside vegetation cannot reasonably be avoided, the works shall include a planting programme to reinstate vegetation over a distance equal to 1.5 times the length of the stream bank disturbed, over a width of at least 5m;

3. Take all reasonable steps to avoid the disturbance of riffle habitat. In those instances where the loss of riffle habitat cannot reasonably be avoided, the works programme shall include reinstatement of an equivalent area of riffle habitat in the finished stream alignment.

A full ecological report regarding the fish population in the Karori Stream can be found in Appendix G.
5. Monitoring and Reporting

5.1. Annual Reporting

An annual report covering the period from 1 July of the previous year to 30 June of the current year shall be prepared by the Consent Manager. This report will be submitted to GWRC by 31 July each year and include the following:

1. The number of overflows that have occurred and any relevant details regarding the overflow;

2. A detailed list of all the leak repair work undertaken;

3. Inflow and infiltration work undertaken within the catchment.
6. General Management


6.1.1. General

All contractors shall have an approved Health and Safety Plan in accordance with the Health and Safety Act 1992. The contractor shall comply with all relevant health and safety regulations and adopt best practice guidelines for activities occurring on and off site which are directly related to the nature of work required.

6.1.2. Inspections

Staff must comply with the following:

(a) A minimum of two (2) people is required for all inspections;

(b) Try to set the inspection to follow a period of dry weather, and check the weather forecast to ensure fine weather on the inspection day;

(c) Review and be familiar with all identified hazards listed on the latest Hazard Register (refer to Hazard Identification Sheet at Appendix C and check with the Contracts Officer for latest version of this).

(d) Take a copy of the latest Hazard Identification Sheet and
   (i) record whether hazards listed on the Sheet are still present or not, and
   (ii) add details any new hazard observed;
   (iii) attach photographs and other information to help explain where the hazard is and the nature of the hazard;
   (iv) Take day trip gear (Refer table in Section 8.2);
   (v) Wear PPE (Refer table in Section 8.2).

6.1.3. Maintenance & Repair Work

Staff and contractors must comply with the following:

See Section 6.1.2.
6.2. Equipment Requirements

Take the items listed below for monitoring, inspections, or maintenance and repair activities. Additional equipment, monitoring forms, or resources may be required to perform the tasks referenced in other sections of the MMP.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Monitoring</th>
<th>Inspection</th>
<th>Maintenance and Repairs</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camera</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Record observations for later reporting.</td>
</tr>
<tr>
<td>Sampling Bottles and Chilly Bin</td>
<td>X</td>
<td></td>
<td></td>
<td>Routine monitoring and checking suspected leaks. Take suitable bottle for specified sampling.</td>
</tr>
<tr>
<td>Manhole Key</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>A manhole key should be kept in all maintenance vehicles. It is used to lift manhole covers for inspections inside manhole structures on the effluent pipeline.</td>
</tr>
<tr>
<td>Writing Material</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>To record any observations.</td>
</tr>
<tr>
<td>Day Trip Gear (water, lunch, hat, sunscreen, and first aid kit rain jacket/warm jacket)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Health and safety requirement.</td>
</tr>
<tr>
<td>Equipment</td>
<td>Monitoring</td>
<td>Inspection</td>
<td>Maintenance and Repairs</td>
<td>Comments</td>
</tr>
<tr>
<td>------------------------------------------------------------</td>
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<td>--------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Personal Protection Equipment (PPE, hi-viz clothing, safety boots), hand sanitiser</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Health and safety requirement.</td>
</tr>
<tr>
<td>Copies of all forms for recording defects, hazards, and completing monitoring requirements</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>See Appendices C and D.</td>
</tr>
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</table>


6.3. Discovery of Artefacts

If koiwi, taonga or other archaeological material is discovered in any area during the maintenance activity, work shall immediately cease. The consent holder shall contact Ngati Toa Rangatira, Heritage New Zealand and Wellington Regional Council within twenty four hours.

If human remains are found, the New Zealand Police shall also be contacted. The consent holder shall allow the above parties to inspect the site and in consultation with them, identify what needs to occur before work can resume.

Note: Evidence of archaeological material may include burnt stones, charcoal, rubbish heaps, shell, bone, old building foundations, artefacts and human burials.

6.4. Cartage of Materials and Machinery

Precautions will be taken to prevent spillage from the loading and unloading of vehicles in any private or public place during conveyance off the site. Private land areas used for access to the pipeline shall be left in a state acceptable to the affected land owner.

In the event contaminants are deposited on the roadway, the contractor shall ensure the area is promptly cleaned to the satisfaction of the Wellington City Council.

6.5. Vegetation Removal, Storage & Disposal

The contractor shall ensure that the vegetation removal, storage, and disposal process is performed in such a manner that minimises potential adverse effects. Vegetation cannot enter a water body or cause diversion, damming, or erosion of any waterway.

If required, areas of protected vegetation shall be clearly marked to avoid undue disturbances.

6.6. Weather Forecasts

The staff member or contractor involved with inspections or repair work shall monitor weather forecasts daily by checking the Meteorological Service of New Zealand webpage (http://www.metservice.com/towns-cities/wellington/wellington-city). Work shall be planned to avoid any hazards associated with extreme weather events. Attention should be given to the potential for sediment becoming a nuisance during the works process.
6.7. Monitoring, Plan Review and Amendments

The Contract Officer and the Contractor shall meet as required to discuss works on site and environmental management issues. The Consent Holder (via their representatives) shall work with Greater Wellington Regional Council (GWRC) officers to monitor the impacts of maintenance work. Adjustments to the erosion and sediment controls may be required to minimize any adverse environmental effects.

In the event there is a conflict between works requirements on site and the MMP, a review of the MMP shall be conducted. The review will occur in consultation with all relevant responsible persons listed at Section 8.0.

The MMP must be reviewed every five years once it has been approved. Where changes to the MMP are required, they shall be approved in writing by GWRC in advance of implementation, and attached as a formal record at Appendix F.

6.8. Register of Public Complaints/Incidents and Reporting Procedures

The contractor shall maintain a register of complaints received alleging adverse effects from or related to the site works. This record will be made available on request. The record will include (but not be limited to) the following:

- The name and address of the complainant;
- The date and time that the complaint was received;
- Details of the alleged event;
- Weather conditions at the time of the complaint (as far as practicable);
- Any measures taken to remedy the effects of the incident/complaint; and
- Measures put in place to prevent occurrence of a similar incident.
7. Consultation / Notifications

7.1. Procedures for Notifying Landowners, GWRC, and Others

The process for notification was established when the CLG was set up and has been ongoing since that time. The information in this MMP adopts the current process.

7.1.1. Landowners

Notification to relevant landowners must be provided in writing (email is an acceptable method) at least 24 hours prior to inspections or work programmes commencing.

Notification must be provided on completion of works, subject to the additional comments below:

- Forestry Group and Terawhiti Station have acknowledged that monthly trips to the Coastal Outfall Structure are routinely carried out.

When maintenance or repair work is proposed, notifications must include the following details:

(a) The nature of the leak;
(b) The timing of the repair works (once confirmed with the contractors); and
(c) When works have been completed.

A list of landowners and contact details is provided at Section 8.0.

7.1.2. GWRC

Annual Reports will be submitted to GWRC in both electronic format and hard copies. GWRC’s Consents Officer must also be contacted when there are leaks detected or any other issues associated with the pipeline discharges. Contact details for GWRC are provided at Section 8.0.

7.1.3. Others

Other parties who may need to be contacted are set out in the following table:

<table>
<thead>
<tr>
<th>Interested Party</th>
<th>Reason for Notification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hutt Valley District Health Board</td>
<td>Contact in the event of a leak or discharge.</td>
</tr>
<tr>
<td>Contracts Officer</td>
<td>In the event of repairs being required/hazards observed.</td>
</tr>
<tr>
<td></td>
<td>Other reasons such as telemetry data capture issues or need for Warrants to allow access.</td>
</tr>
</tbody>
</table>

Contact details for other interested parties are provided at Section 8.0.
# 8. Contact Personnel And Responsibilities

<table>
<thead>
<tr>
<th>Organization</th>
<th>Responsibility</th>
<th>Key Contact</th>
<th>Department</th>
<th>Role</th>
<th>Telephone</th>
<th>E-mail</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wellington Water Limited</td>
<td>Wastewater Infrastructure Asset Manager on behalf of Wellington City Council (WCC). Managing contractors, inspections, monitoring and reporting to ensure consent compliance.</td>
<td>Anna Hector</td>
<td>Operations</td>
<td>Manager, Wastewater Contracts</td>
<td>027 285 6040</td>
<td><a href="mailto:anna.hector@wellingtonwater.co.nz">anna.hector@wellingtonwater.co.nz</a></td>
<td>Private Bag 39804, Wellington Mail Centre 5045 Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt</td>
</tr>
<tr>
<td>Wellington Water Limited</td>
<td></td>
<td>Sam Lister</td>
<td></td>
<td>Manager Contracts and Customer Service</td>
<td>021 998 553</td>
<td><a href="mailto:sam.lister@wellingtonwater.co.nz">sam.lister@wellingtonwater.co.nz</a></td>
<td></td>
</tr>
<tr>
<td>Wellington Water Limited</td>
<td></td>
<td>Paul Davison</td>
<td></td>
<td>Operations Engineer</td>
<td>021 306 451</td>
<td><a href="mailto:Paul.davison@wellingtonwater.co.nz">Paul.davison@wellingtonwater.co.nz</a></td>
<td></td>
</tr>
<tr>
<td>Wellington Water Limited</td>
<td></td>
<td>Malcolm Giles</td>
<td></td>
<td>Contracts Officer</td>
<td>027 249 957</td>
<td><a href="mailto:malcolm.giles@wellingtonwater.co.nz">malcolm.giles@wellingtonwater.co.nz</a></td>
<td></td>
</tr>
<tr>
<td>Wellington Water Limited</td>
<td></td>
<td>Adrian Smart</td>
<td></td>
<td>Technician</td>
<td>027 220 2528</td>
<td><a href="mailto:adrian.smart@wellingtonwater.co.nz">adrian.smart@wellingtonwater.co.nz</a></td>
<td></td>
</tr>
<tr>
<td>Wellington City Council</td>
<td>Wastewater Infrastructure Asset Owner.</td>
<td>N/A</td>
<td>Call Centre</td>
<td>N/A</td>
<td>04 499 4444</td>
<td><a href="mailto:info@wcc.govt.nz">info@wcc.govt.nz</a></td>
<td>101 Wakefield St PO Box 2199 Wellington</td>
</tr>
<tr>
<td>Veolia Water International</td>
<td>Operates Western WWTP</td>
<td>Stuart Pearce</td>
<td>N/A</td>
<td>Contract Manager</td>
<td>027 466 0563</td>
<td><a href="mailto:stuart.pearce2@veolia.com">stuart.pearce2@veolia.com</a></td>
<td>320 South Karori Rd PO Box 3523 Wellington</td>
</tr>
<tr>
<td>Veolia Water International</td>
<td></td>
<td>N/A</td>
<td></td>
<td>Reception</td>
<td>0800 928 371</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td>Responsibility</td>
<td>Key Contact</td>
<td>Department</td>
<td>Role</td>
<td>Telephone</td>
<td>E-mail</td>
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<tr>
<td>Greater Wellington Regional Council</td>
<td>Consent Authority, Administration of Regional Plans.</td>
<td>Claire Baldwin</td>
<td>Consents Management</td>
<td>Resource Advisor, Consent Officer</td>
<td>021 813 384</td>
<td><a href="mailto:Claire.Baldwin@gw.govt.nz">Claire.Baldwin@gw.govt.nz</a></td>
<td>Shed 39, 2 Fryatt Quay, Pipitea, Wellington</td>
</tr>
<tr>
<td></td>
<td>To be contacted in the event of a leak/discharge.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PO Box 11646, Manners St, Wellington 6142</td>
</tr>
<tr>
<td>Hutt Valley District Health Board</td>
<td>Public Health (to be contacted in the event of a leak/discharge)</td>
<td>N/A</td>
<td>Regional Public Health</td>
<td>Health Protection Officer</td>
<td>570 9002</td>
<td><a href="mailto:RPH@huttvalleydhb.org.nz">RPH@huttvalleydhb.org.nz</a></td>
<td>Private Bag 31-907 Lower Hutt</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Call Centre (ask for on call Health Protection Officer).</td>
<td>570 9007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eurofins-ELS</td>
<td>Testing of samples</td>
<td>Jacinta Hira</td>
<td>General Chemistry</td>
<td>N/A</td>
<td>0800 576 5016</td>
<td><a href="mailto:info@eurofins.co.nz">info@eurofins.co.nz</a></td>
<td>85 Port Road, Seaview, Lower Hutt</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sunita Raju</td>
<td>Microbiology</td>
<td>N/A</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Landowner Contact Name</td>
<td>Company Name</td>
<td>Special Instructions</td>
<td>Telephone</td>
<td>E-mail</td>
<td>Address</td>
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</tr>
<tr>
<td>Dr Janet and Mr Michael Warren</td>
<td>Erin Go Bragh Limited</td>
<td>48 hour notice to be provided. Note: Resource consent may need to be obtained for works and access upstream of where the South Makara Road meets the Karori Stream.</td>
<td>476 6316</td>
<td><a href="mailto:eringobragh@eringobragh.co.nz">eringobragh@eringobragh.co.nz</a></td>
<td>509 South Makara Road, Makara, Wellington</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mr Philip Uren</td>
<td></td>
<td></td>
<td>476 6316</td>
<td></td>
<td>330 South Karori Road, Karori, Wellington</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mr Peter Lissington</td>
<td>NZ Pine Management Ltd</td>
<td></td>
<td>06 347 9365</td>
<td><a href="mailto:p.lissington@xtra.co.nz">p.lissington@xtra.co.nz</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mr Guy Parkinson</td>
<td>Terawhiti Station</td>
<td></td>
<td>476 4804</td>
<td><a href="mailto:parkinsons@xtra.co.nz">parkinsons@xtra.co.nz</a></td>
<td>Terawhiti Station</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landowner Contact Name</td>
<td>Company Name</td>
<td>Special Instructions</td>
<td>Telephone</td>
<td>E-mail</td>
<td>Address</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Mr Bill Grace</td>
<td>Terawhiti Farming Co Ltd</td>
<td></td>
<td></td>
<td><a href="mailto:jwsys@iconz.co.nz">jwsys@iconz.co.nz</a></td>
<td>Terawhiti Farming Co Ltd, PO Box 105479 Auckland 1030</td>
<td></td>
<td></td>
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<tr>
<td>Mr Wesley Garratt</td>
<td>New Zealand Forestry Group</td>
<td></td>
<td>09 624 2780</td>
<td></td>
<td>New Zealand Forestry Group, PO Box 24 475 Auckland</td>
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<tr>
<td>Mr Clem Griffins</td>
<td>Kinnoull Station</td>
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<td>021 644 007</td>
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<td>Lot 2 Kinnoull Station</td>
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## Appendix A: Plans of Pipelines

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<th>Plan Number</th>
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<td>Figure 2</td>
<td>Access Summary Plan (original of plan provided by Wellington Water)</td>
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<td>700011 Sheet S1 of 3</td>
<td>Plan by Duffill Watts &amp; Tse Ltd – South Karori Sewer CCTV/Sample Locations (Lower section of stream including coastal outfall)</td>
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<td>700011 Sheet S2 of 3</td>
<td>As above (middle section of stream)</td>
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<td>700011 Sheet S3 of 3</td>
<td>As above (upper section of stream including Treatment Plant)</td>
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Appendix B: Resource Consents
Appendix C: Hazard Identification Form
Appendix D: Defect Reporting Sheet
Appendix E: Fish Rescue Methodology
APPENDIX F: Approved Amendments to this MMP

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APPENDIX G: Survey of Habitat Types and Fish Communities of Karori Stream