Cover Image:
The valley floor of Tawa, with the bridge at McLellan Street in the foreground, 1906

_Tawa - Enterprise and Endeavour_ by Ken Cassells, 1988
Porirua Stream Walkway

Scoping Report & Implementation Strategy

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1 Introduction

This study by Opus International Consultants was commissioned by Wellington City Council Parks & Gardens to address a strong need, identified from within the Tawa Community, for a pedestrian walkway and cycleway following the Porirua Stream. This document outlines the first stage of the project by analysing and defining an optimum route alignment, the design of which is to be developed in greater detail in future stages.

1.1 Project Objectives

Within the broad objective of this new public route along the full length of the community there are also more specific outcomes and opportunities. These are:

- a primary pedestrian route along the valley between Willowbank Reserve and Kenepuru Railway Station.
- improve links across the valley and between schools, retirement villages, Tawa centre and other community facilities.
- be suitable for both utility trips and for leisure purposes.
- a route that is safe, accessible, desirable and suitable for commuters as well as recreational users.
- linking local parks and reserves
- connecting the Tawa Community – North/South
- creating more opportunities for key East/West connections
- providing recreational and amenity value along a 6km route
- connecting local recreational and community facilities
- providing new strategic stream crossings
1.2 Policy Context

The Porirua Stream Walkway creates a link for pedestrians and cyclists between the residential areas of Tawa and community facilities, including shops, schools, transport depots, and recreational facilities. It will make cycling and walking an attractive form of transport and will help achieve the Government Policy Statement on Land Transport (GPS) targets and Wellington City Council draft Walking Policy and draft Cycling Policy objectives.

The GPS outlines a number of targets for the transport sector and measures which will support achievement of these targets. It identifies increasing the use of cycling and walking, and encouraging development that makes these modes attractive and safe as a way to support the achievement of four of the GPS targets:

- reduce the kilometres travelled by single occupancy vehicles in major urban areas on weekdays by 10 percent per capita by 2015;
- no overall deterioration in travel times and reliability on critical routes by 2015;
- reduce fatalities and hospitalisations from road crashes by 2015; and,
- increase patronage on public transport by three percent per year through to 2015.

Additionally, the GPS has a specific cycling and walking target: to increase the number of cycling and walking trips by one percent per year through to 2015. The GPS aims to achieve this target by making cycling and walking an attractive, easy and safe transport mode and setting funding ranges for activity classes that support walking and cycling infrastructure.

Wellington City Council adopted a Walking Policy and a Cycling Policy on 26 November 2008. The Porirua Stream Walkway will improve the experience of those walking to and from public transport stops, and will increase the number of walking trips to and from educational and suburban centres, three of the key objectives in the draft Walking Policy. The Porirua Stream Walkway also has the potential to help achieve a number of the key objectives in the draft Cycling Policy:

- to improve cycle safety throughout Wellington;
- to improve convenience of cycling in Wellington;
- to improve the experience of cycling trips made to and from Suburban Centres;
- to improve the experience of cycling trips made to and from educational centres; and,
- to improve the experience of cycling trips made for recreation.

1.3 Methodology

Our methodology in undertaking this study is outlined below:

- inception/briefing meeting;
- review of background documents, plans and studies, and identify gaps;
- develop planning objectives and project goals with WCC;
- stakeholder workshop to evaluate options against urban design and planning objectives and goals and evaluate route benefits, engineering feasibility, cost, risk and implementation;
- preparation of a scoping paper; and
- finalise concept design report and implementation strategy.

Specifically we have also

- liaised with WCC’s representative, Dave Halliday to gain knowledge of WCC approach and requirements when developing new pedestrian/cyclepaths
- walked the route several times with members of the Tawa’s Community Steering Group to gain a better knowledge of the alignment options, constraints, opportunities and the general environment.
- liaised with Greater Wellington City Council (GWCC) and Wellington City Council (WCC) environmental engineering teams to discuss any possible site constraints, requirements and consents.
- held a community workshop on the 10th of September 2008 with the Steering Group and Dave Halliday from WCC Parks and Gardens to review and evaluate route alignment options in depth. The Steering Group subsequently produced a document summarising feedback on their preferred alternatives.
- reviewed track surface material options in a joint site visit to recent reserve track installations at Tawatawa Reserve in Owhiro Bay and Mt Victoria with Dave Halliday and members of the Steering Group.
1.4 This Document

This report is structured as follows:

- set out the context - including history and urban design analysis.
- define key engineering design criteria
- outline environmental effects and benefits, and review consenting requirements
- detail the preferred route alignment, including a summary of the route evaluation for each section
- summary table of indicative construction costs for each section including options on track surface
- Implementation strategy

Fig.1.4.1 Bridge over the Porirua Stream at Willowbank Reserve
2 Urban Design Analysis

2.1 Land Form & History

The suburb of Tawa is predominantly contained within an alluvial valley centred on Porirua Stream. The southern boundary is Takapu Road which is also the connection to SH1 and the northern end borders Porirua City at Kenepuru.

Tawa is a strong and distinct satellite suburb on the major northern transport corridor from Wellington. The Porirua Stream has carved out the valley in which Tawa sits and it has long been the natural route up to the Porirua Harbour, and beyond. It linked in to other tracks between the Porirua and Wellington Harbours via Te Korokoro, Kaiwharawhara or Waitohi streams. When Edward Jerningham Wakefield visited in 1839 he described the area as…

"a fine alluvial valley through which a considerable stream brawled and cascaded. Noble forest-trees and plentious underwood intercepted all view of anything but the beaten track along which we progressed."

And Stokes who was part of a survey party in 1840, noted that…

"The path leads …through the valley, crossing the Porirua Stream fourteen times. …The stream is at no place where we forded it more than six yards wide or knee deep".

Over time this initial route has been supplemented with the old Porirua Road, rail corridor, and more recently SH1. There has also been considerable growth in the urban form - as some of the early photographs attest. The rail and motorway developments have been the hardest to integrate into the community – effectively separating the communities on the eastern and western slopes of the valley.

The proposal for the Porirua Stream Walkway and Cycleway is the latest development in the transport infrastructure of Tawa. It offers an ideal opportunity to promote pedestrian and cycling and reconnect the community from north to south and east to west with a new ‘green corridor’.
2.2 Urban Form Analysis

Tawa is primarily a residential suburb. It has a commercial core around Main Road, with some local shops around Collins Ave in the north. A light commercial / industrial area runs broadly from Takapu Road through to Tawa St on the western side of the stream., Including the Dressmart outlet shopping centre. There are a number of primary schools and a central intermediate and secondary college located on the eastern side south of McLellan St.

Another key feature of Tawa is the string of public parks, reserves and open space areas that are almost continuous throughout the suburb. From south to north they include Willowbank Reserve, Taylor Park, reserve area opposite Tawa station, Grasslees Reserve next to Tawa Pool, Duncan Park, Linden Park west and Linden Park. These WCC owned and maintained open spaces and other ancillary land offer a wide variety of recreational activities to the local residents from walkways, picnic areas, tennis courts, playgrounds, roller rinks, and dedicated sports fields. There are a number of other community based facilities located on or adjacent to these recreational areas. These include Tawa Pool, skate facilities, badminton courts, a BMX track, social and bridge clubs, sports club facilities and a number of lawn bowls facilities. Taken together the list above provides a significant amenity value to the community.

The Porirua Stream itself also offers, in parts, some picturesque landscape values with established planting. There is an opportunity for this to be significantly enhanced through this project with careful planting and remediation of the stream banks.

The urban design challenges generated from this study centre on reinforcing the north-south and east-west connections across the Tawa community. The Kapiti rail corridor in particular, and to a lesser extent the Porirua Stream, reinforces a sense of severance between the eastern and western sides of the valley.

In particular the route offers an opportunity to create enhanced connections between residential areas and the local centre shopping, schools (in particular Tawa College and Tawa Intermediate which have a suburb-wide catchment), local rail stations and a wide range of community recreational spaces, facilities and amenities outlined above.
2.3 Urban Design Intent

The *New Zealand Urban Design Protocol* provides a platform to make New Zealand towns and cities more successful through quality urban design. It is part of the Government's *Sustainable Development Programme of Action* and Urban Affairs portfolio. Urban design seeks to ensure that the design of buildings, places, spaces and networks that make up our towns and cities, work for all of us, both now and in the future.

The Urban Design Protocol identifies seven essential design qualities that together create quality urban design. These are Context, Character, Choice, Connections, Creativity, Custodianship and Collaboration.

In urban design terms the proposed Porirua Stream Walkway and Cycleway specifically addresses the Connections and Choice objectives, and support the others to a lesser extent. In more detail these objectives promote the following:

**Connections** – ‘good connections enhance choice, support social cohesion, make places lively and safe, and facilitate contact among people. All networks connect and support health towns, and where physical layouts and activity patterns are easily understood, residents and visitors can navigate easily’.

**Choice** – ‘fosters diversity and offers people choice in the urban form of our towns and cities, and choice in densities, building types, transport options and activities’.

For the proposed Porirua Stream Walkway and Cycleway the urban design intent is to connect the series of open, green spaces into a *green corridor*. This north-south route then becomes:

- a key pedestrian and cycle arterial through the community
- facilitates local journeys and reducing vehicle trips
- both links existing and new recreational and community spaces
- enhancing east-west connections and reducing community severance
- provides enhanced amenity value around the stream

These important design outcomes have been used to determine route options and develop evaluation criteria.
2.4 Demographic Data Analysis

A high level analysis of data from the 2006 Census for the suburb of Tawa was undertaken as part of this study. This took Meshblock data and converted it into Some of this data is summarised in the diagrams opposite.

There are some interesting points to note:

- The population is predominantly concentrated on the western side of Main Road, with a pocket of higher density housing in the northeast of Linden.
- The local primary schools serve their respective immediate communities with four along the western side and two in the north east. Journeys would therefore tend to be local.
- The Intermediate and secondary College are adjacent on a campus located on the eastern side of the rail corridor. Therefore there a significant amount of student journeys that traverse the suburb particularly east west but also north south. An attractive route that caters for these desire lines would be of significant benefit, particularly in relation to reducing local vehicle trips.
- There are five rail stations along the 6km length from Takapu Road to Kenepuru, Redwood is split into a north and southbound platform either side of the Tawa St intersection. It is clear there are still opportunities to grow the rail passenger use from those living closer to the rail corridor. Any route should therefore pick up and reinforce the use of these key transport nodes, either directly, or through additional local links.
- The pedestrian travel to work indicates that most residents tend not to work locally and commute into either Wellington or Porirua. This particular data does not capture the local, non-work related journeys, which a route would offer significant benefit. More data and analysis is required to determine these specific benefits.
- There is a significant amount of council owned land along the length of the valley floor. This tends to be in the form of parks and other public recreational open spaces. Any route would add additional recreational and amenity benefits from connecting these green spaces.

This analysis was used to define key connections and the evaluation criteria used to determine route options.
3 Engineering Design Criteria

In order to provide an adequate cross section for commuters and recreational users we consulted the current standards, liaised with colleagues and gained understanding of New Zealand best practice. We believe a 3m wide sealed path, with a channel on one side and sumps at regular intervals, will be the most suitable construction for this route. The following standards and guidelines have been considered in our design:

- Austroads Part 13: Pedestrians;
- Austroads Part 14: Cyclist (read in conjunction with TNZ’s supplement);
- Austroads AP- R297/06 Pedestrian – Cyclist Conflict Minimisation on Shared Paths and Footpaths;
- NZS4121 Design for Access and Mobility;
- Greater Wellington Regional Cycling Strategy;
- The Design of the Pedestrian Network by Land Transport NZ;

3.1 Cross Section, Gradient and Surfacing

Cross Sections

Based on the standards above, we studied the advantages and disadvantages of using a 2, 2.5 and 3m path. We believe that the community would benefit from a 3m path wherever possible. When there are site constraints, we recommend reducing the width of the path rather than extensive engineering works. 2 metres should be the minimum width considered.

The table below explains the advantages/disadvantages of the selected widths for each option.

<table>
<thead>
<tr>
<th>Width</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>2m</td>
<td>Lower impact on the environment than wider paths.</td>
<td>It allows for only 1 pedestrian and 1 cyclist at a time with no clearance area.</td>
</tr>
<tr>
<td></td>
<td>Lower costs than 2.5m and 3m paths.</td>
<td>Not suitable for full range of recreational users.</td>
</tr>
<tr>
<td></td>
<td>Suitable for constricted areas.</td>
<td>It does not promote higher usage.</td>
</tr>
<tr>
<td></td>
<td>Maximum Speed limited to 20km/h. Doesn’t allow fast commuting.</td>
<td>Maximum Speed limited to 20km/h. Doesn’t allow fast commuting.</td>
</tr>
<tr>
<td>2.5m</td>
<td>Lower impact on the environment than wider paths.</td>
<td>It provides no clearance area for 2 pedestrians and 1 cyclist to pass, or 0.5m clearance for 1 cyclist and 1 pedestrian at a time (0.3m clearance only for a wheel chair user). Some vulnerable users (ie. young children, disabled or the elderly) might feel threatened by cyclists due to the small clearances.</td>
</tr>
<tr>
<td></td>
<td>Lower costs than 3m path.</td>
<td>Maximum Speed limited to 20km/h. Doesn’t allow fast commuting.</td>
</tr>
<tr>
<td>3m</td>
<td>Suitable for commuters and recreational users.</td>
<td>Higher impact on the area.</td>
</tr>
<tr>
<td></td>
<td>30km/h permitted. Allows commuters to get faster to and from work.</td>
<td>Higher costs than other options above.</td>
</tr>
<tr>
<td></td>
<td>Promotes a higher usage of the route.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1m clearance/passing space between 1 cyclist and 1 pedestrian or 0.5m clearance between 1 cyclist and a couple walking at a time (very common in recreational paths)</td>
<td></td>
</tr>
</tbody>
</table>
Gradients

Based on the current design standards, we have considered the following gradients in our design. We have aimed to provide access to all users but understand the need to reduce accessibility in some areas to meet cost constraints.

Table 3.1.2 – Gradients

<table>
<thead>
<tr>
<th>Gradient</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 in 20</td>
<td>• Suitable for all users.</td>
<td>• In some locations this gradient will increase the amount of earthworks considerably.</td>
</tr>
<tr>
<td>1 in 12</td>
<td>• Will reduce the earthworks costs.</td>
<td>• Not suitable for disabled users unless treated as a ramp with landings and handrails in both sides.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Would increase costs significantly if considered as an accessible ramp.</td>
</tr>
</tbody>
</table>

Recommendations

We recommend a 3m path as the most suitable for this route. This width of path will promote high usage among commuters and provide reasonable clearance between cyclists and pedestrians (See table 3.1.1).

Where the site constraints do not permit this width, we propose further site investigation to study the options to reduce the path width to 2-2.5m.

The maximum crossfall recommended is 2%. Wherever possible we recommend that the crossfall is kept within 1%. This permits the water to drain, as well as creating a suitable track surface for all users.

For most of the length of the route, we propose a design that makes the cyclepath/footpath accessible for all users, with a maximum gradient of 1 in 20. However there are areas where these standards have been relaxed, in order to decrease the amount of earthworks required. A maximum gradient of approximately 1 in 12 has been applied along the route at Willow Bank Reserve.

Tawa’s Community Steering Group feedback

During our workshop with Tawa’s Community Steering Group, a 3m path was seen as a suitable option and the Group favoured the shallow gradients (1 in 20). However, it was agreed that in some sections accessibility might need to be compromised (due to cost constraints) and a narrower path might need to be constructed (due to the site constraints).
3.2 Drainage

We have analysed various drainage options detailed below:

<table>
<thead>
<tr>
<th>Drainage</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>No drainage</td>
<td>• No drainage costs.</td>
<td>• Uncontrolled water discharge.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Not recommended for sealed surfaces as water won’t be able to run off adequately.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Path might become unusable as a result of puddles, floods and erosion.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Possible ponding on the lower side of the path.</td>
</tr>
<tr>
<td>Formed channel</td>
<td>• Lower construction costs than sealed channel option.</td>
<td>• Higher maintenance costs than sealed channel option.</td>
</tr>
<tr>
<td>+ Sumps</td>
<td>• Will help keep path usable as water will run off quickly</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Storm water will discharge into the stream/existing drainage system is controlled.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Offers some level of protection to the footpath construction.</td>
<td></td>
</tr>
<tr>
<td>Concrete channel</td>
<td>• Low maintenance costs.</td>
<td>• Higher construction costs.</td>
</tr>
<tr>
<td>+ Sumps</td>
<td>• Will help keep path usable as water will run off quickly</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Storm water will discharge into stream/existing drainage system is controlled.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Offers some level of protection to the footpath construction.</td>
<td></td>
</tr>
</tbody>
</table>
3.3 Outline Construction Detail

We have analysed various options for the walkway surfacing: unsealed, chip sealed, clay overburden and asphaltic concrete construction. We have discarded the unsealed and chip sealed options due to higher maintenance costs and unsuitability for some of the users (wheelchairs, pushchairs, etc). Our preferred options are:

<table>
<thead>
<tr>
<th>Asphalitic Concrete Construction</th>
<th>Clay Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>20mm AC mix 6</td>
<td>Clay Overburden</td>
</tr>
<tr>
<td>100mm GAP40 Basecourse</td>
<td>Existing Ground Reformed</td>
</tr>
<tr>
<td>Existing Ground Reformed</td>
<td></td>
</tr>
</tbody>
</table>

There will be ‘cut and fill’ earthworks to some extent along most of the length of the route in order to accommodate the path. At this stage, we have assumed that the excavated material will be re-used on site, thereby reducing costs of removing excavated material to landfill. We have included some allowance for this in our costs table below.

During the detailed design we would be able to assess the exact quantities of earthworks and identify if there are excavated materials that need to be disposed of off-site.

Important note with regards the requirement for stronger construction:

In the path sections that run along the stream, the path construction would need to support maintenance vehicles so that they can access the stream banks. The criteria for maintenance vehicles loadings have been included in our current design. We propose that further investigation is carried out on site (Scala Penetrometer Tests) to determine the CBR (California Bearing Ratio) and the type of soil.

We believe that in those areas of the stream that are prone to flooding there is a high risk that the path construction will be damaged by floodwater. At such sections the design of the footpath pavement will be adjusted such that it can withstand flooding.

Tawa’s Community Steering Group feedback

During our workshop, Tawa’s Community Steering Group confirmed they would prefer a sealed path along the route so that it is accessible to all users. They were concerned that an unsealed path might discourage future users if not well maintained.

3.4 Fencing Requirements

ONTRACK require a 5m clearance from the centre of the nearest railway track to any area accessible to the public. It also recommends fencing when footpaths are located next to the railway corridor, in order to offer a safer environment for pedestrians and other route users. In accordance with ONTRACK’s regulations, we recommend that 1.5m pool fencing is installed to separate the railway corridor from the path.

Fencing will also be required in those sections where the path is adjacent to private properties, in order to provide a safer environment for the residents. However, this fencing might also restrict their access onto the route.
3.5 Lighting

We have assessed the use of street lighting columns along the route and note the advantages and disadvantages in the table below:

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provides a safer environment with improved visibility after dark.</td>
<td>• Significant increase in costs.</td>
</tr>
<tr>
<td>• Provides an enhanced perception of security and helps discourage people's fear of crime.</td>
<td>• Possible disturbance to residents due to the increase in light pollution.</td>
</tr>
<tr>
<td>• Promotes the route usage to all users as they will consider the route as a safe alternative option.</td>
<td>• Requires maintenance.</td>
</tr>
<tr>
<td>• Lighting design can be considered with other street furniture to provide an integrated design solution</td>
<td>• Might be prone to vandalism. Possible to provide lanterns with vandalism protection.</td>
</tr>
</tbody>
</table>

We recommend that street lighting is provided to the footpath. We have allowed a spacing of 70m between lighting columns to provide homogenous lighting along the path. However, this would require further investigation by our lighting engineer. We propose the installation of solar powered LED lamps as they would promote the council objectives for Sustainable Design. Further investigation will be required to determine spacing and confirm costs.

3.6 Summary

The table below shows a summary of the costs per metre for the different construction elements of the footpath. We have included a rate for earthworks in the Walkway Construction element. The costs below do not include any provision for consents, land costs or other Management Surveillance and Quality Assurance of Physical Works.

<table>
<thead>
<tr>
<th>Cost Element</th>
<th>Option 1: Asphalitic Seal</th>
<th>Option 2: Clay Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walkway Construction*</td>
<td>20mm mix 6 Asphalitic Concrete Construction with 100mm Gap40 basecourse, 3m wide (incl. minimal earthworks allowance to accommodate the path)</td>
<td>120/m</td>
</tr>
<tr>
<td>Concrete channel + sumps</td>
<td>140/m</td>
<td></td>
</tr>
<tr>
<td>Formed channel + sumps</td>
<td>105/m</td>
<td></td>
</tr>
<tr>
<td>Lighting</td>
<td>86/m</td>
<td></td>
</tr>
</tbody>
</table>

*Note: We have assumed a cost of $5 per metre for earthworks along the path. This cost is expected to vary at different sections of the route.
4 Environmental Effects and Consenting Issues

At this early route definition stage our team has considered the hydraulic and RMA issues of the proposed walkway. These are summarised below.

4.1 Environmental Effects: Porirua Stream

The Porirua Stream is an important watercourse for the conveyance of flood flows originating from the Tawa and Porirua area. It is currently below regular design capacity. As such, any modifications to the main channel or its lateral floodplain areas that reduces the existing cross-sectional area will have detrimental effects. Greater Wellington Regional Council (GWRC) will only accept a footpath design that causes no (or only minor local) water level rises. Additionally, GWRC needs to be able to access the stream along the entire length through Tawa with machinery for maintenance works. However, access from only one side of the stream should be sufficient, and it is possible to design the walkway such that maintenance vehicles will be able to drive on and operate from it.

Four design scenarios for the sections of walkway that pass close to Porirua Stream were considered in terms of any hydraulic or environmental effects:

- **A1. Cutting the walkway into the existing stream embankment.**
- **A2. Backfilling behind gabion walls.**
- **B. Provide raised boardwalk on piles supported by stream embankment.**
- **C. Provision of a walkway above embankment requiring stabilisation.**

Option A2, backfilling behind gabion walls, is not a feasible design solution since it will considerably reduce the hydraulic cross-section. However, option A1, cutting the walkway into the existing stream embankment would increase hydraulic cross-section and therefore would be a favourable option worth considering.

Option B, providing a raised boardwalk on piles supported by the stream embankment, could be prone to clogging by debris, especially during flood flows which would result in a reduced hydraulic cross-section. This would also require intensified maintenance since debris accumulations would need to be removed from time to time. There is also a risk of structural failure due to extreme loads caused by accumulated debris and high flow velocities.

Option C, provision of a walkway above embankment requiring stabilisation, is a feasible design option, especially if the walkway stabilisation / foundation can be place beyond the main channel and its embankments. This option may not be feasible in some locations due to limited space, in particular in the area of the Tawa Stream/Oxford Street esplanade reserve adjacent to the shopping centre. The cost of rip rap / rock armour protection is approximately $70-$80 per tonne and $600-$900 per basket for gabions.

Due to the resulting reduction in the stream cross-section, backfilling behind gabion walls (option A2), and providing a raised boardwalk on piles supported by the stream embankment (option B) are not feasible options. However, cutting the walkway into existing stream embankment (option A1) and provision of a walkway above the embankment requiring stabilisation (option C) can be considered depending upon the specific conditions in each location. Any modifications or works in waterways will require some kind of environmental assessment as part of the consent application.

See also a more detailed Hydraulic and Environmental Comments in Appendix D

4.2 Environmental Effects: Earthworks

We have assumed that there would be earthworks along the route in order to accommodate the footpath. We have assumed that we will be able to dispose these earthworks on site.

Please refer to Appendix B for further information on earthworks for other options considered.

From our preliminary design, we noticed a problematic area at option G2 from approximately 100m south of Taylor Park to the start of Willowbank Reserve the terrain is very steep on the eastern side of the path. Detailed design would involve carrying out some measurements to ensure the stability of the slope. The options we have investigated are:

- Extensive earthworks with benching in between.
- Retaining wall. This could possibly require a consent

Any of these options would require geotechnical investigation in detailed design stages.

See also a more detailed Earthworks Comments in Appendix B

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1 See Appendix D for the assumptions these values are based upon.
4.3 Environmental and Planning Consents

Given the assumptions made regarding the works and activities involved in the construction and use of the proposed walkway the following consents are anticipated to be required:

**Wellington City Council District Plan**

Under the Wellington City District Plan, the following land use consents are anticipated to be required:

<table>
<thead>
<tr>
<th>Rule</th>
<th>Activity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1.9</td>
<td>Earthworks exceeding 250m²</td>
<td></td>
</tr>
<tr>
<td>7.4.7</td>
<td>Earthworks less than 5m from Porirua Stream</td>
<td></td>
</tr>
</tbody>
</table>

**Greater Wellington Regional Council**

Under the Regional Freshwater Plan the following consent may be required:

<table>
<thead>
<tr>
<th>Rule</th>
<th>Activity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>The erection and maintenance of bridges over rivers with a span of more than six metres</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Gravel extraction greater than 15 cubic metres</td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>The use of any river or lake bed that is not permitted by or cannot meet the requirements of rules 22 to 48. (River crossings)</td>
<td></td>
</tr>
</tbody>
</table>

Under the Regional Air Quality Management Plan the following consent may be required:

<table>
<thead>
<tr>
<th>Rule</th>
<th>Activity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>General rule covering dischargers to air not covered by rules 1-22.</td>
<td></td>
</tr>
</tbody>
</table>

See also a more detailed *Preliminary Planning Assessment* in Appendix C
5 Preferred Route

The team, in conjunction with Dave Halliday of WCC and the Tawa Community Steering Group, has identified a preferred route along the full length of the proposed walkway. This section summarises the method of defining options, the evaluation framework and detailed commentary on each section.

5.1 Option Definition

Following our site visit, we divided the path in sections based on linkage nodes (those sections of the path where it could change direction to provide access to different amenities). We then developed several options for each section and consulted with Dave Halliday from WCC on the approach to cyclepath/walkways in Wellington.

After that initial review, we prepared a workshop with the Tawa Community Steering Group where we presented the different options and discussed advantages and disadvantages of each route. The Group then submitted a written report of their preferred choice.

5.2 Evaluation framework

The team used the following framework for prioritising alignment options for the Porirua Stream Walkway through Tawa. The framework has been developed primarily as a tool for identifying the degree to which each option meets the scheme objectives. The framework will also highlight the differences between the expected costs for each option as well as the relative time frames needed for implementation.

Objectives for the walkway as determined by the community group are to:

- provide a primary pedestrian route along the bottom of the valley between Willowbank reserve and Kenepuru Railway Station;
- improve links across the valley and between schools, retirement villages, Tawa centre and other community facilities; and
- be suitable for both utility trips and for leisure purposes.

Discussions with the community group, with Wellington City Council officers and a review of available data have been used as the basis for evaluation. Discussions with the community group were focused on:

- Function / Utility
- Amenity
- Land Ownership
- Consenting
- Cost

Assessment of each option will be summarised on a single sheet within a decision matrix. (see Appendix A)

Fig. 5.1.1 Preferred Route of the Porirua Stream Walkway and Cycleway
5.3 Section A

Tawa’s Community Steering Group have chosen Options A1 and A3 as their preferred routes through this section.

**Option A1**

This option runs between Porirua stream and the railway tracks from Kenepuru Station to Linden Park. It does not provide access to Kenepuru Station as it is on the other side of the railway tracks but the station users could use the existing overbridge at this point to access the path.

This option joins with option A3 at the south end of Linden Park.

The table below shows a summary of the pros and cons of this option.

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Flat terrain. Slightly cambered towards the stream. Easy route for all users. Nice route along river.</td>
<td>• Consents required (environmental, resource and building consents, possibly earthworks consent) (cost excl. in above amount).</td>
</tr>
<tr>
<td>• Avoids the possible need of upgrading existing rail crossing.</td>
<td>• Doesn’t provide access to Kenepuru Station.</td>
</tr>
<tr>
<td>• Promotes a healthier environment (reduction in traffic, noise and improvement of air quality).</td>
<td>• On-Track’s land. Requires Deed of Grant, Permit and Standover.</td>
</tr>
<tr>
<td>• Possibility of using and upgrading On-Track’s maintenance track and negotiating cost share agreement with On-Track.</td>
<td>• Might require retaining structure/gabions/riprap.</td>
</tr>
<tr>
<td>• There is room for a 3m path.</td>
<td>• Requires consultation with Historic Places Trust and Iwis to check if there are any historic places.</td>
</tr>
<tr>
<td>• Fencing required to separate path from rail track.</td>
<td>• Possible flooding risk. Mitigation methods to be investigated.</td>
</tr>
<tr>
<td>• Contributes to the extension of Wellington’s walkways/cycleways network.</td>
<td>• High possibility of encountering public utilities underground network. Liaison with service companies required. Possible increase in costs if any services are encountered.</td>
</tr>
</tbody>
</table>

During our workshop, the Community Group showed concerns with regards of using On-track’s maintenance track as there might be a conflict of interests.

They believe that although there are not many amenities along this option, it provides a quick and fast transport route and it will reduce severance from the part of Tawa that is on the Eastern side of the rail.
Option A3

This option runs from the end of option A1 at the south end of Linden Park to Findlay Street. From A1, it crosses over to the other side of the stream at the south end of Linden Park.

There is an existing bridge at this point. This bridge is on GWRC’s land. However, the property in this land is leased. We could study the option of upgrading the existing bridge to incorporate it into the path or if this is not suitable, we could construct a new bridge.

The table below shows details of the pros and cons of Option A3.

Table 5.3.2 – OPTION A3

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Flat terrain. Slightly cambered towards the stream Easy route for all users Nice route along river.</td>
<td>• Consents required (environmental, resource and building consents, possibly earthworks consent) (cost excl. in above amount)</td>
</tr>
<tr>
<td>• Joins Linden Park to the route. Contributes to linking Tawa’s main amenities.</td>
<td>• Bridge or Bridge Upgrade required.</td>
</tr>
<tr>
<td>• Avoids the possible need of upgrading existing rail crossing.</td>
<td>• Part of this option runs along GWCC land that might be currently leased.</td>
</tr>
<tr>
<td>• Promotes a healthier environment (reduction in traffic, noise and improvement of air quality).</td>
<td>• Might require retaining structure/ gabions/rip-rap.</td>
</tr>
<tr>
<td>• There is room for a 3m path.</td>
<td>• Requires consultation with Historic Places Trust and Iwis to check if there are any historic places.</td>
</tr>
<tr>
<td>• Contributes to the extension of Wellington’s walkways/cycleways network.</td>
<td>• Possible flooding risk. Mitigation methods to be investigated.</td>
</tr>
<tr>
<td></td>
<td>• High possibility of encountering public utilities underground network. Liaison with service companies required. Possible increase in costs if any services are encountered.</td>
</tr>
</tbody>
</table>

The Community Group mentioned they would prefer to construct a new bridge at this option rather than upgrading the existing bridge.
5.4 Section B

Tawa’s Community Steering Group has chosen Option B2 as the most favoured option along this section.

This Option runs from the corner of Findlay Street with Gee Street at the south of Linden Park to Linden Avenue. It requires one road crossing from Linden Park into Findlay Street and will be kept along the western footpath of Findlay Street.

![Findlay Street Diagram]

The table below details the pros and cons of option B2.

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Flat terrain. Existing footpath might need to be widened into a grassed area to fit a 3m path. Liaison with owners required. Easy route for all users</td>
<td>• Takes the route through a road. However it is a quiet, wide and residential street.</td>
</tr>
<tr>
<td>• Provides access to the route to all houses in Finlay Terrace. Promotes a healthier environment (reduction in traffic, noise and improvement of air quality).</td>
<td>• No river view or green scenery.</td>
</tr>
<tr>
<td>• There is room for a 3m path.</td>
<td>• Brings footpath closer to houses. Some residents might not like this idea. Consultation required. Possibility of requiring fencing to separate/protect existing houses.</td>
</tr>
<tr>
<td>• Contributes to the extension of Wellington’s walkways/cycleways network.</td>
<td>• Does not provide link to West Linden Park.</td>
</tr>
</tbody>
</table>

Tawa’s Community Steering Group has chosen this option as a most pragmatic option as although it takes the route into a local road, it is a quiet street with enough room to upgrade the footpath to 3m width and it will not be as costly as other alternatives along this section.

However, the Community Group believes that option B3 could be a long term aspiration as it provides a more desirable environment.

Option B3 would go from the southern end of Linden Park into Gee St and then run along the Old Porirua Rd into Linden Avenue. This option has the advantage of connecting Linden Park West into the route but might cause some issues with property owners as part of the route runs along existing properties.
5.5 Section C

Tawa’s Community Steering Group has favoured option C1 as the most suitable option for this section.

The table below shows the pros and cons of this option.

Table 5.5.1 – OPTION C1

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat terrain. Slightly cambered towards the stream. Easy route for all users.</td>
<td>Takes the route through a road. However it is a quiet, wide and residential street.</td>
</tr>
<tr>
<td>There is a section of this option that runs along the river providing nice scenery.</td>
<td>No river view or green scenery in this section.</td>
</tr>
<tr>
<td>Links Linden Social Centre to route. Contributes to linking Tawa’s main amenities.</td>
<td>Requires 3 road crossings.</td>
</tr>
<tr>
<td>There is a playground at the back of the social centre that provides an attractive feature to the route.</td>
<td>Consents required (environmental, resource and building consents, possibly earthworks consent).</td>
</tr>
<tr>
<td>There is a section that runs along Nathan St connecting all the houses in this street to the route. Contributes to linking community to Tawa’s main amenities.</td>
<td>Might require retaining structure/ gabions/riparian in section along some sections of the river.</td>
</tr>
<tr>
<td>Bridge structure reduces severance between east and west.</td>
<td>High flooding risk in section along river. Mitigation methods to be investigated.</td>
</tr>
<tr>
<td>Room to fit 3m shared path. Possibility of using one of the existing footpaths along Nathan St and add extra required width. Reduce in costs.</td>
<td>Requires bridge construction.</td>
</tr>
<tr>
<td>Provides access to the route to all houses in Nathan Street.</td>
<td>1 parcel of private land affected but has no property in it. Liaison and negotiations with owners required.</td>
</tr>
<tr>
<td>Promotes a healthier environment (reduction in traffic, noise and improvement of air quality).</td>
<td>Brings footpath closer to houses. Some residents might not like this idea. Consultation required. Possibility of requiring fencing to separate/protect existing houses.</td>
</tr>
<tr>
<td>Contributes to the extension of Wellington’s walkways/cycleways network.</td>
<td>Requires consultation with Historic Places Trust and Iwis to check if there are any historic places.</td>
</tr>
<tr>
<td></td>
<td>High possibility of encountering public utilities underground network on section along Nathan St. Liaison with service companies required. Possible increase in costs if any services are encountered.</td>
</tr>
</tbody>
</table>
The Community Group considered this option the most suitable as it introduces Duncan Park and all the amenities near by the park into the route (i.e. Linden Social Centre, Mana Bridge Club, Duncan Park’s playground). The option of having a bridge into Nathan St was very favoured as it would reduce the severance between east and west areas of Tawa.

As part of this section, we have considered some possible local links that contribute to the linkage of Tawa’s community.

Local Link 2

This link connects to Option C1 at the northern end of Duncan Park and continues along Linden and Collins Avenues into Linden Station.

Local Link 3

This link connects with local links 2 and 4 at Linden Station and continues into Hinau Street.

Local Link 4

This link connects Rawson Street into local link 3 at Linden Station.

Local links 3 and 4 contribute the concept of joining Tawa’s east and west areas.
5.6 Section D

The preferred options in this section by Tawa’s Community Steering Group were D1 and D5.

**Option D1**

This option runs from the southern end of Nathan St where it crossed to the other side of McLellan St and continues along this street into Luckie St. Then, continues along the eastern side of Luckie St into Grasslees Reserve where it runs along the western side of the stream and links with Option D5 at the southern end of the Reserve.

**Table 5.6.1 – OPTION D1**

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Flat terrain. A section running along McLellan and Luckie Streets. Existing footpath might need to be widened into grassed area to fit 3m path. Liaison with owners required. Easy route for all users.</td>
<td>• Takes a section of the route through a road. However it is a quiet, wide and residential street. This section does not have river view or green scenery.</td>
</tr>
<tr>
<td>• A section running along the stream. Flat terrain. Slightly cambered towards the stream. Grassed and bush area. Room for 3m path.</td>
<td>• 2 road crossings.</td>
</tr>
<tr>
<td>• Connects with Grasslees Reserve, Bowling club and Tawa Pool. This makes the route attractive to the users of these amenities. Contributes to linking Tawa’s main amenities.</td>
<td>• Brings footpath closer to houses. Some residents might not like this idea. Consultation required. Possibility of requiring fencing to separate/protect existing houses.</td>
</tr>
<tr>
<td>• Provides access to the route to all houses in Luckie St. Contributes to linking community to Tawa’s main amenities.</td>
<td>• Consents required (environmental, resource and building consents, possibly earthworks consent) (cost excl. in above amount)</td>
</tr>
<tr>
<td>• Promotes a healthier environment (reduction in traffic, noise and improvement of air quality).</td>
<td>• Possible flooding risk in section at the Grasslees Reserve. Mitigation methods to be investigated.</td>
</tr>
<tr>
<td>• There is room for a 3m path.</td>
<td>• Requires consultation with Historic Places Trust and Lias to check if there are any historic places.</td>
</tr>
<tr>
<td>• Contributes to the extension of Wellington’s walkways/cycleways network.</td>
<td>• High possibility of encountering public utilities underground network. Liaison with service companies required. Possible increase in costs if any services are encountered.</td>
</tr>
</tbody>
</table>

Tawa’s Community Steering Group preferred this option as it does not have any private property issues, there is a section that provides good views of the stream and it is an ideal linkage into Grasslees Reserve, Tawa Pool and Bowling Clubs.
Option D5

From the southern end of Grasslees Reserve, this option continues along the western side of the stream all the way up to Tawa’s School where it connects with Option E1.

Table 5.6.2 – OPTION D5

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Flat terrain. Slightly cambered towards the stream. Easy route for all users. Grasped and bush area.</td>
<td>• Might require retaining structure/ gabions/rip-rap, along stream.</td>
</tr>
<tr>
<td>• Connects with Grassless Reserve, Bowling club, Tawa Pool and Tawa Station. This makes the route attractive to the users of these amenities. Contributes to linking Tawa’s main amenities.</td>
<td>• There are obstacles on the way (Lifting device) that require to be moved. Width of path to be confirmed in some areas depending on site constrictions.</td>
</tr>
<tr>
<td>• Provides access to the route to all houses in Luckie St. Contributes to linking community to Tawa’s main amenities.</td>
<td>• 2 road crossings.</td>
</tr>
<tr>
<td>• Promotes a healthier environment (reduction in traffic, noise and improvement of air quality).</td>
<td>• 1 bridge to link into Local Link 9</td>
</tr>
<tr>
<td>• There is room for a 3m path.</td>
<td>• Consents required (environmental, resource and building consents, possibly earthworks consent) (cost excl. in above amount)</td>
</tr>
<tr>
<td>• Contributes to the extension of Wellington’s walkways/cycleways network.</td>
<td>• Possible flooding risk. Mitigation methods to be investigated.</td>
</tr>
</tbody>
</table>

Tawa’s Community Steering Group favours this option as the most suitable for this location as provides good linkage between Tawa and Redwood suburbs as well as running along flat land providing accessibility to all users.

Local Link 5

This link provides access from Tawa Pool into Duncan St by means of a subway underneath the railway tracks. The Community Group considers this linkage to be essential as it would provide a fast route to Tawa College and Tawa Intermediate institution as well as linking Tawa’s Eastern and Western suburbs.

Local Link 6

This link provides access to the route to Oxford St by means of a bridge. It contributes to the linkage of the Western suburb into the route.

Local Link 7

This link considers an upgrade of the existing overbridge at Tawa Station to provide access to Duncan St.

Local Link 8

This link proposed to link the route to Melville street, crossing at Oxford St and continuing into Cambridge St to provide access to Tawa library. This link contributes to expand the access to amenities.

Local Link 9

This link runs off the option D5 into Oxford St. Further investigation needs to be carried out to determine land ownership.

Tawa’s Community Steering Group favours this option as it provides good linking into Oxford St.
5.7 Section E

The preferred option in this section is E1. This option runs between Porirua stream and the North platform at Redwood Station. It joins with D5 but does not provide access into Tawa School and continues straight into Tawa St.

Table 5.7.1 – OPTION E1

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Flat terrain slightly cambered towards stream. Grassed and bush area. Nice route along river. Easy route for all users</td>
<td>• Requires further investigation to confirm if it is possible to fit a 3m path. Possible site constraints as river banks not stable.</td>
</tr>
<tr>
<td>• Does not require river crossing</td>
<td>• Does not connect Tawa School to route.</td>
</tr>
<tr>
<td>• Provides access to the route to all houses in Finlay Terrace.Contributes to linking community to Tawa’s main amenities.</td>
<td>• Consents required (environmental, resource and building consents, possibly earthworks consent)</td>
</tr>
<tr>
<td>• Promotes a healthier environment (reduction in traffic, noise and improvement of air quality).</td>
<td>• Might require retaining structure/ gabions/rip-rap.</td>
</tr>
<tr>
<td>• Possibility of negotiating a cost share agreement with ONTRACK if upgrading their maintenance track for the whole section of the path.</td>
<td>• On-Track land. Requires Deed of Grant, Permit and Standover.</td>
</tr>
<tr>
<td>• Contributes to the extension of Wellington’s walkways/cycleways network.</td>
<td>• Possibility of requiring fencing within On-Track’s land.</td>
</tr>
<tr>
<td></td>
<td>• Possible flooding risk. Mitigation methods to be investigated.</td>
</tr>
<tr>
<td></td>
<td>• Requires consultation with Historic Places Trust and iwis to check if there are any historic places.</td>
</tr>
<tr>
<td></td>
<td>• High possibility of encountering public utilities underground network. Liaison with service companies required. Possible increase in costs if any services are encountered.</td>
</tr>
</tbody>
</table>

The Community Group considered this option as the most suitable as it is a direct continuation of option D5 and would provide a good route to rail commuters, workers to the local industrial business and primary school commuters.
5.8 Section F

Option F2 is the preferred route along this section. This option crosses over to the other side of Tawa St, then crosses over the railway tracks (possible upgrading of existing crossing required) and then runs along the eastern side of the railway tracks into the southern end of Taylor Park where it joins with option G3 by a means of a subway underneath the rail tracks.

Further investigation will be required to determine the most suitable position for this subway.

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A section of flat terrain. Existing car park.</td>
<td>• Requires 1 road crossing, upgrading of one existing railway crossing at Tawa St and a railway underpass at the southern end of Taylor Park.</td>
</tr>
<tr>
<td>Links Redwood Station South Platform into route.</td>
<td>• No river view or green scenery.</td>
</tr>
<tr>
<td>• Another section running along existing path and bush. Flat terrain.</td>
<td>• On-Track land. Requires Deed of Grant, Permit and Standover.</td>
</tr>
<tr>
<td>Provides access to Tennis Club and Taylor Park.</td>
<td>• Possibility of requiring fencing within On-Track’s land.</td>
</tr>
<tr>
<td>• The last section of this option runs along slightly inclined terrain. Grasmed area. Room for 3m path. Route runs along Taylor Park.</td>
<td>• Requires consultation with Historic Places Trust and Iwis to check if there are any historic places.</td>
</tr>
<tr>
<td>• Room for 3m path along most of the route length but needs to be confirmed at the section along the Tennis Club.</td>
<td>• High possibility of encountering public utilities underground network. Liaison with service companies required. Possible increase in costs if any services are encountered.</td>
</tr>
<tr>
<td>• Possibility of negotiating a cost share agreement with ONTRACK if upgrading their maintenance track.</td>
<td></td>
</tr>
<tr>
<td>• Promotes a healthier environment (reduction in traffic, noise and improvement of air quality).</td>
<td></td>
</tr>
<tr>
<td>• Contributes to the extension of Wellington’s walkways/cycleways network.</td>
<td></td>
</tr>
</tbody>
</table>

Tawa Community Steering Group considers this route the most suitable for this section as it provides direct access to the running club and has the possibility of connecting with Taylor Terrace with local link 11.

Local Link 10

Consideration has been given to construct a link north of the retirement village onto the Main Rd. This link will ease commuting to St Francis Xavier School as well as local industry workers and eastern suburb residents. However, further investigation needs to be carried out to determine the exact position of this link as it would either need to go through private property or through the retirement village.

Local Link 11

This link runs along Redwood Station southern car park into Taylor Terrace. This link offers a good option to Tawa western suburb and will ease commuting distances to the station and into the route.
5.9 Section G

The preferred options in this section are G3, then into G1 and into G4 to end at Takapu Road Station. G3 runs along the eastern side of the stream next to the railway line, it starts at the retirement village, continues along to Dressmart Shopping Mall where it crosses the stream at the southern end of the mall's parcel and links into G1 which continues along the western side of the stream through Willowbank Reserve and play area, then it joins into option G4 where it continues to Boscobel Lane into Takapu Road Station.

Table 5.9.1 – OPTION G3 AND SECTIONS OF G1 AND G4

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A combination of flat terrain and slightly inclined terrain.</td>
<td>• Possibility of requiring fencing within ONTRACK’s land.</td>
</tr>
<tr>
<td>• Nice river view and green scenery.</td>
<td>• On-Track land. Requires Deed of Grant, Permit and Standover.</td>
</tr>
<tr>
<td>• Possibility of providing linkage to retirement village residents only through bridge.</td>
<td>• Consents required (environmental, resource and building consents, possibly earthworks consent)</td>
</tr>
<tr>
<td>• Possibility of negotiating a cost share agreement with On-Track if upgrading their maintenance track.</td>
<td>• Possibility of requiring fencing within On-Track’s land.</td>
</tr>
<tr>
<td>• Bring shops and Willowbank Reserve into the route, it connects route to Takapu Rd Station promoting green travel to train commuters.</td>
<td>• Requires 2 bridges across the stream.</td>
</tr>
<tr>
<td>• Promotes a healthier environment (reduction in traffic, noise and improvement of air quality).</td>
<td>• Requires consultation with Historic Places Trust and Iwis to check if there are any historic places.</td>
</tr>
<tr>
<td>• There is room for a 3m path along most of the route although some sections require further investigation to confirm width.</td>
<td>• High flooding risk at some of the sections along the stream. Mitigation methods to be investigated.</td>
</tr>
<tr>
<td>• Contributes to the extension of Wellington’s walkways/cycleways network.</td>
<td>• High possibility of encountering public utilities underground network. Liaison with service companies required. Possible increase in costs if any services are encountered.</td>
</tr>
</tbody>
</table>

Tawa Community Steering Group favours G3 as the most direct route through to Dressmart and Willowbank Reserve. The Group is considering the alternative of providing a bridge for the retirement village residents so that they can access the village from the route. This bridge will be limited to residents use only.

The connection of route G3 with G1 by means of a bridge over the stream will provide easy access to Willowbank Reserve and the connection with G4 will link the route to the existing paths in this area as well as connecting the route with Takapu Rd Station which will create a pleasant route for train commuters.
### 6 Implementation Costs

Below is a summary of the implementation costs (as at December 2008) for the preferred route and additional local links.

<table>
<thead>
<tr>
<th>Cost Element</th>
<th>Option</th>
<th>A1</th>
<th>A3</th>
<th>B2</th>
<th>C1</th>
<th>D1</th>
<th>D5</th>
<th>E1</th>
<th>F2</th>
<th>G3</th>
<th>G1</th>
<th>G4</th>
<th>Sub Total (A-G)</th>
<th>Local Links</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. Length</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drainage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

**Total: $2,698,900.00**

**Sub Total:**
- Overburden Clay with formed channel
- Asphaltic Concrete with concrete channel

---

**Important notes:**
1. For the purpose of the estimates above, we have not priced for consents, land costs, design fees, testing, labour or other Management Surveillance and Quality Assurance of Physical Works.
2. The quantities above will be confirmed during the detail design.

---

**Wellington City Council**

**March 2008**

Reference: 460535.00 Status: FINAL Rev 02
7 Implementation Plan & Next Steps

7.1 Implementation

It is acknowledged that the implementation of this route is likely to be in stages. Therefore a prioritisation of the sections outlined previously is required.

We would recommend the following order

<table>
<thead>
<tr>
<th>Stage</th>
<th>Section</th>
<th>Details</th>
</tr>
</thead>
</table>
| Stage 1 | Section D | • Is the central section and provides key connections to local shopping centre, east-west crossing point to the Intermediate and College with a subway local link at Tawa Pool  
• Part of this section around the proposed retirement Village will be completed by the developer as a condition of the resource consent. |
|       | Section E | • Completes the central section of the route from McLellan through to Tawa Street  
• Provides more direct pedestrian connection from the southeast to the local shopping centre |
| Stage 2 | Section C | • Connects the playgrounds at Grasslees Reserve and Duncan Park provides a potential more direct route to the bridge and Social Club |
| Stage 3 | Section A | • Connects into the pedestrian overbridge at Kenepuru Station  
• Provides a more direct link the higher density Linden community in the northeast with the recreational benefits of Linden Park |
|       | Section B | • Easy section to implement as it primarily follows Findlay Street |
| Stage 4 | Section F | • Route along the South bound platform  
• Requires a subway under the rail corridor at the southern end to connect to Section G |
|       | Section G | • Connects Taylor Park and Willowbank Reserve  
• Provides accessible access with a new bridge to the east side of the stream. |

7.2 Sources of Funding

Funding for the capital costs for the Porirua Stream Walkway should be sought from a range of organisations that can each provide a portion of the amount needed. Also, funding for different aspects of the walkway/cycleway may be pursued from various relevant organisations. For example, a local conservation/environment charity could fund native bush planting along the route whilst an arts based charitable organisation might fund iconic wayfinders. Potential funding sources include:

- NZTA for projects that are consistent with district and regional cycling and walking strategies;
- NZTA through their school travel planning mandate (formerly administered by EECA);
- Sport and Recreation NZ (SPARC) through their ‘Active Communities’ projects;
- Health board funding, particularly related to diabetes prevention;
- The Community Trust of Wellington;
- Bikewise, Health Sponsorship Council for events and promotions;
- Council Departments focusing on providing recreational opportunities; and,
- Road Safety Trust, for projects that improve road safety.

The funding criteria for each organisation needs to be examined in more detail as the project is developed.

7.3 Next Steps

We would recommend that this report be reviewed by all the key stakeholders and if acceptable endorsed.

Then a detailed programme of implementation then needs to be drawn up to address fundraising, confirmation of section staging, detail design of sections, land designations and purchases, Environmental Impact Assessment (EIA) leading to resource consent. Once approved documentation can then be produced for building consent (if required), tender and construction.
APPENDIX A – Option Details
### Porirua Stream Walkway – Route Analysis & Definition Study

**March 2008**

Wellington City Council  
Reference: 460535.00 Status: FINAL Rev 02  
Parks & Gardens

<table>
<thead>
<tr>
<th>Section</th>
<th>Option</th>
<th>Width (m)</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| A | 1 | 3 | • Suitable for commuters and recreational users.  
• 30km/h permitted. Allows commuters to get faster to and from work.  
• Regular use  
• 1m clearance/passing cyclist between cyclist or 0.5m clearance between 1 cyclist and a couple walking at a time (very common in recreational paths)  
• Suitable for maintenance vehicles. | • More earthworks than the 2-2.5m widths.  
• This area will require stronger construction so that it can be used by maintenance vehicles. Higher cost than the 2-2.5m widths. |
| | 3 | 3 | • Advantages as described above for 3m path. | • Disadvantages as described above for 3m path except no stronger construction required. |
| B | 2 | 3 | • There is room to upgrade the footpath to a 3m path.  
• Advantages as described above for 3m path. | • Disadvantages as described above for 3m path. |
| C | 1 | 3 | • There is room to upgrade the footpath at Nathan St to a 3m path.  
• Advantages as described above for 3m path. | • The section of the path along Duncan Park will require a stronger construction so that maintenance vehicles can have access. |
| | 1 | 3 | • There is room to upgrade the footpath at Luckie St to a 3m path.  
• As above. | • Disadvantages as described above for 3m path. |
| D | 1 | 2.5 | • We recommend a 3m path wherever possible. In those sections where path width might be constricted, we recommend a 2.5m path.  
• A 2.5m would be cheaper and have a smaller impact in the area.  
• Advantages as described above for 3m path. | • A 2.5m path provides no clearance area if 2 pedestrians at a time and 1 cyclist or 0.5m clearance for 1 cyclist and 1 pedestrian at a time (0.3m clearance only if a wheel chair user). Some vulnerable users (ie. Young children, disabled or elderly) might feel threaten by cyclists due to the small clearance.  
• Speed permitted in 2.5m paths is 20km/h. Not as fast commuting route as 3m path.  
• Disadvantages as described above for 3m path.  
• This option will require stronger construction to allow access to maintenance vehicles. River bank might need reinforcement. |
| | 1 | 3 | • A 2m path would have lower impact in the environment than other options.  
• A 2m would have lower costs. | • Constricted space. Not enough room for a 3m path. We recommend a 2-2.5m path within this section but further site investigation required to confirm width. Reinforcement to river bank required.  
• A 2m path is not suitable for recreational users.  
• A 2m path does not provide any clearance area between cyclist and pedestrian.  
• Disadvantages as described above for 2.5m path. |
| E | 1 | 2.5 | • Advantages as described above for 2.5m and 3m. | • Further site investigation is required to confirm suitable width.  
• Disadvantages as described above for 2.5m and 3m. |
| F | 2 | 2.5-3 | • Advantages as described above for 2.5m and 3m. | • Disadvantages as described above for 3m path. |
| G | 3 | 3 | • Advantages as described above for 3m path. | • Disadvantages as described above for 3m path. |
| H | 1 | 2 | • A section of our prior option G1 has been preferred. This section links option G3 onto G4.  
• Advantages as described above for 3m path. | • A stronger footpath construction will be required along this section to permit the access of maintenance vehicles.  
• Disadvantages as described above for 3m path. |
| I | 3 | 3 | • There is room for upgrading the existing footpath to a 3m path.  
• Advantages as described above for 3m path. | • Disadvantages as described above for 3m path. |
APPENDIX B – Earthworks Comments

We have provided costs for indicative earthworks along the path making the assumption that the earthworks will be re-used on site. This will need to be re-assessed during our detail design.

We noticed in our preliminary design that some of our options had a significant amount of earthworks. Below are details of the most problematic area:

EARTHWORKS OPTION G2

From our preliminary design, we noticed a problematic area at option G2 from approximately 100m south of Taylor Park to the start of Willowbank Reserve the terrain is very steep on the eastern side of the path. Detailed design will require geotechnical investigation to ensure the stability of the slope. The options we have investigated are:

• Extensive earthworks with benching in between.

• Earthworks impact on Cost, Risk & Environmental Impacts (approx.$12,000 for gradient 1:20 and $11,000 for gradient 1:12)

  • Gradient
  • Cut Volume
  • Fill Volume

  • 1:20
  • 1100m³
  • 1300m³

  • 1:12
  • 1200m³
  • 1000m³

• Retaining wall. This could possible require a consent

• A 1.5m tall x 40m long retaining wall (approx. cost of $140,000)

Any of these options would require further investigation.
APPENDIX C – Preliminary Planning Assessment

Prepared by Laura Cameron – Environmental Consultant / Legal Advisor
Opus International Consultants

Introduction

The proposal will see a footpath/board walk constructed for public use from northern Tawa following the Porirua Stream south to the northern edge of Porirua City. The new footpath/boardwalk will follow existing footpaths in some locations with new boardwalk type structures constructed within the general area of the Porirua Stream.

The following assessment has been undertaken to identify potentially applicable rules under the Wellington City District Plan, the Wellington Regional Freshwater Plan, the Wellington Regional Soil Plan and the Wellington Regional Air Quality Management Plan. Any consents that may potentially be required have been identified.

Assumptions

The proposed works are assumed to include the following activities:
- Construction of footpaths
- Construction of Boardwalks
- Piling
- Various earthworks including cutting and excavation into the river bed
- Construction of Bridges

The assessment has been made in the absence of any dedicated plans or information such as volumes, lengths, or materials for the proposal. The plan assessment that has been compiled within this preliminary assessment will need to be revisited once more details have been decided.

Activity Status

Under the District Plan and Regional Plans an activity will be specified as permitted, controlled, or discretionary (with or without restrictions). If a rule specifies that an activity is permitted, then it can take place without resource consent, provided any conditions specified in the rule are met. If a rule specifies that an activity is controlled or discretionary, then it cannot take place without resource consent. A controlled activity requires resource consent but the Council must grant the consent. Controls may be applied according to the matters which the Council has explicitly retained control over in the Plan. A discretionary activity also requires resource consent. The Council may refuse an application for a discretionary activity. It retains discretion over the conditions or standards it applies to consents for such activities.

Objectives and Policies are included within the District Plan and Regional Plans. The role of the objectives and policies is to guide the consideration and assessment of any activities for which resource consent is required.
District Planning Documents

Wellington City District Plan

The proposed walkway is located within Outer Residential and Suburban zoning. Part of the proposal also falls within a Hazard Flooding Area. The zones and any restrictions are indicated on the planning maps provided in appendix A.

Residential Rules:

Any activity not specified as Controlled, Discretionary (Restricted) or Discretionary (Unrestricted) is a Permitted Activity provided that it complies with the relevant permitted rule and any conditions as stated within Section 5 Residential Rules of the District Plan. The rules, including permitted activity, that are potentially relevant to the proposal are contained within the boxed text below.

Therefore, where the proposal would involve the upgrade of existing public accessway this would be covered by Rule 5.1.7. As is stated with this rule, any earthworks associated with an upgrade or maintenance of an existing accessway is a permitted activity and no resource consent will be required.

Any new construction work that would take place as part of the proposal would be captured by Rule 5.4.1 and will therefore require resource consent for a Discretionary (Unrestricted) Activity, and will be guided by the following Objectives and Policies.

Objective
4.2.2 To maintain and enhance the amenity values of Residential Areas

Policy
4.2.2.2 Control the establishment and effects of non-residential activities in Residential Areas.

Objective
4.2.3 To maintain and enhance the physical character of Residential Areas and identified areas of special streetscape or townscape character.

Policy
4.2.3.4 Maintain and enhance the streetscape by controlling the siting and design of structures on or over roads and through programmes of street improvements.

Objective
4.2.5 To maintain and enhance natural features (including landscapes and ecosystems) that contribute to Wellington's natural environment.

Policy
4.2.5.1 Protect significant escarpments, coastal cliffs and areas of open space from development and visual obstruction.

4.2.5.3 Ensure that any approved earthworks are designed and engineered to reflect natural landforms.

Objective
4.2.7 To avoid or mitigate the adverse effects of natural and technological hazards on people, property and the environment.

Policy
4.2.7.1 Identify the hazards that pose a significant threat to Wellington and ensure that areas of significant potential hazard are not occupied or developed for vulnerable uses or activities.

4.2.7.4 Ensure that earthworks and structures in Residential Areas do not exacerbate natural hazards, particularly flood events.

Rule 5.1.7 Any Activity relating to the upgrade and maintenance of existing formed roads and public accessways including associated earthworks, except the construction of new legal road, is a permitted activity.

Rule 5.1.9 Earthworks are Permitted Activities provided that they comply with the following conditions:
- The existing ground level is not to be altered by more than 2.5 metres measured vertically.
- The total area of ground surface disturbance is less than 250m².
- That earthworks do not take place in Hazard (Flooding) Areas.
- That earthworks are not undertaken on slopes of more than 45°.
- That no earthworks are carried out within 5 metres of a waterbody or the coastal marine area.
- That no contamination, including siltation, of any waterbody or coastal water occurs.

Rule 5.3.9 Earthworks that do no comply with the conditions for Permitted Activities (above) are a Discretionary Activity (Restricted) in respect of:
- The alteration or disturbance of the ground
- The degree of slope
- The undertaking of earthworks in a Hazard (Flooding) Area
- The undertaking of earthworks within 5 metres of a water body or the coastal marine area.

Rule 5.4.1 Non-residential activities, non-residential buildings [and structures] (including additions and alterations) not specifically provided for as Permitted or Controlled Activities or that do not meet the conditions or standards and terms for Permitted or Controlled Activities are Discretionary Activities (Unrestricted).

NOTE: Noise limits are stated within Appendix 1. Noise, of Chapter 5 Residential Area of the District Plan.
Suburban Rules:

Any activity not specified as Controlled, Discretionary (Restricted) or Discretionary (Unrestricted) is a Permitted Activity provided that it complies with the relevant permitted rule and any conditions as stated within Section 7 Suburban Centre Rules of the District Plan. The rules, including permitted activity, that are potentially relevant to the proposal are contained within the boxed text below.

It is anticipated majority of the walkway will follow the Porirua Stream and involve earthworks within 5 metres from the stream. These works would be captured by Rule 7.4.7 and will therefore require resource consent for a Discretionary (Unrestricted) Activity, and will be guided by the following Objectives and Policies.

Objective
6.2.6 To avoid or mitigate the adverse effects of natural and technological hazards on people, property and the environment.

Policies
6.2.6.1 Identify those hazards that pose a significant threat to Wellington, to ensure that areas of significant potential hazard are not occupied or developed for vulnerable uses or activities.

Regional Planning Documents

Wellington Regional Soil Plan

The Regional Soil Plan applies to soil disturbance and vegetation disturbance on erosion prone land. There are four rules in the Plan, these are related to the following:
- roading and tracking
- soil disturbing
- vegetation clearance

Any development or use of land that is not specifically restricted by a rule in the Plan is allowed as of right, unless it is restricted by a rule in a district plan or another regional plan.

Note: The proposal falls within Area 2 as defined by Appendix 1 of the Regional Soil Plan which includes the area of land within the Wellington Regional Council’s jurisdiction where:
- the eastern boundary is the Ruamahanga River; and
- the western boundary is the west coast south of Pukerua Bay and State Highway 1, north of Pukerua Bay.

The rules that are potentially relevant to the proposal are contained within the boxed text below.

Rule 7.3.7 Earthworks which are more than 5 metres from the Porirua Stream that are not controlled activities, are Discretionary Activities (Restricted) in respect of:
- The level, extent and gradient of earthworks
- Building location within the site
- Building floor area
- The displacement of flood waters from the site.

Rule 7.4.7 Earthworks less than 5 metres from the Porirua Stream within the Tawa Hazard Flooding Area are discretionary Activities (Unrestricted).

NOTE: Noise limits are stated within Appendix 1, Noise, of Chapter 7 Suburban Centre of the District Plan.

It is anticipated the proposed walkway will not involve soil disturbance exceeding the thresholds outlined within Rule 1 of the Regional Soil Plan. Therefore, resource consent will not be required.

Rule 1 requires a consent if any roading or tracking activity will result in a road or track having a continuous length of new upslope batter extending for greater than 200 metres, with a height of greater than 2 metres measures vertically. This is a Restricted Discretionary Activity.

This rule does not apply if the roading or tracking is already authorised by a subdivision consent from the district or city council. If the activity does not exceed those thresholds, no land use consent is required from the Regional Council, although a land use consent may be required from the district or city council.

Roading and tracking includes access ways and paths.
Wellington Regional Freshwater Plan

The Regional Freshwater Plan applies to all types of activities that use freshwater or that are in the beds of rivers and lakes.

Activities covered by the plan include:
- discharges to fresh water
- the taking, using, damming, or diverting of fresh water
- building and modifying structures in river and lake beds
- disturbing river and lake beds
- introducing plants to river and lake beds
- depositing substances on river and lake beds
- reclaiming or draining river and lake beds
- development on the flood plain
- flood mitigation

Under the Freshwater Plan the definition of river includes streams.

The rules that are potentially relevant to the proposal are contained within the boxed text below.

### Bridges and other structures over rivers and lakes

**Rule 31** of the Regional Freshwater Plan permits the erection and maintenance of bridges over rivers if they are less than six metres long and provided the activity complies with the conditions stated in the rule.

**Conditions:**
1. The bridge is no more than 6 metres in total length.
2. The bridge does not reduce the ability of the river to convey flood flows.
3. The bridge does not alter the natural course of the river, including any diversion of water from the natural course during floods.
4. The bridge is maintained free of any flood debris.
5. No part of the structure occurs in, on, or under the area of river bed covered by water.
6. All material used during construction, but which is not part of the bridge, is removed from the river bed and disposed of in an appropriate manner.

**Standards:**
1. No contaminants (including but not limited to oil, petrol, diesel, paint, or solvent) shall be released to water from equipment being used for the operation, and no refuelling of equipment shall take place on any area of river or lake bed.
2. Any excess material from the construction operation, shall be removed from the river or lake bed and disposed of in an appropriate manner.
3. In any part of the river or lake bed covered by water in any water body identified in Policy 4.2.14 (Appendix 4 – Water bodies with important trout habitat), the activity shall not take place between 31 May and 31 August.
4. Fish passage shall not be impeded once the culvert is operational.

**Terms:**
1. The consent holder shall notify either the Manager, Consents Management, Wellington, or the Manager, Planning and Resources, Wairarapa, at least two working days before any work commences.
2. A charge, set in accordance with section 36(2) of the Act, shall be paid to the Wellington Regional Council for carrying out its functions in relation to the administration, monitoring, and supervision of the activity, and for carrying out its functions under section 35 (duty to gather information, monitor and keep records) of the Act.

### Gravel or shingle extraction from the bed of a river or lake

**Rule 38** of the Regional Freshwater Plan permits the extraction of up to 15 cubic metres of gravel per year from any river bed, provided the extraction complies with conditions specified in the rule. Up to fifty cubic metres may be extracted if the person taking the gravel owns the river bed.

**Conditions:**
1. The sand, shingle, gravel, or rock shall be extracted from an area of the river bed not covered by water at the time of extraction.
2. No vegetation is disturbed or damaged.
3. The area from which the material is extracted shall not be excavated to a depth of greater than half a metre.
4. The area from which the material is extracted shall be smoothed over after use so that there are no mounds, depressions, steep cut banks, or edges left on the river or lake bed.
5. No contaminants (including but not limited to oil, petrol, diesel, paint, or solvent) shall be released onto the bed from equipment being used for the operation, and no refuelling of equipment shall take place on any area of river or lake bed.
6. There shall be no machinery within the area of river bed covered by water while the activity is in progress.

**Rule 49** of the Regional Freshwater Plan requires a land use consent for any activity that is not allowed by Rule 22, 25, or 31, or that doesn't meet the standards of Rule 43 or 47. This is a discretionary activity.

**Rule 49** of the Regional Freshwater Plan requires a land use consent for any extraction of gravel from a river or lake bed if the extraction is not permitted by Rule 38. This is a discretionary activity.

(7) than half a metre.
It is assumed the proposed walkway only involve the placement and use of new structures, not the alteration of any existing structure over or in a river.

It is assumed that the new river crossings proposed will be more than 6 metres in total length and as such will be a discretionary activity requiring resource consent under rule 49. These conditions include that no part of the structure occurs in, on, or under the area of river bed covered by water.

If a river crossing is required that exceeds 6 metres in total length a resource consent will be required as for a discretionary activity under rule 49, which covers all activities not allowed by another rule and will be guided by the Objectives and Policies outlined below.

The amount of gravel required to be extracted cannot be anticipated at this stage. If 15 cubic metres or less is required to be extracted this will be a permitted activity and no consent will be required. However, if a greater extraction is required resource consent will be required for a discretionary activity under rule 49, which covers all extractions greater than 15 cubic metres and will be guided by the Objectives and Policies outlined below.

Objectives
7.1.1 Appropriate uses of the beds of rivers and lakes are allowed while avoiding, remedying, or mitigating any adverse effects.

7.1.2 The risk of flooding or erosion is not increased by locating structures or carrying out activities in the beds of rivers and lakes or on the floodplain.

7.1.3 Activities do not cause damage to, or destruction of, existing lawful flood mitigation works.

7.1.4 The uses of river and lake beds are, as far as practicable, consistent with the values of the tangata whenua.

Policies
7.2.2 To not allow the use of river and lake beds for structures or activities that have significant adverse effects on:
- the values held by tangata whenua; and/or
- natural or amenity values; and/or
- lawful public access along a river or lake bed; and/or
- the flood hazard; and/or
- river or lake bed or bank stability; and/or
- water quality; and/or
- water quantity and hydraulic processes (such as river flows and sediment transport); and/or
- the safety of canoeists or rafters.

7.2.3 To not allow new uses within the beds of rivers and lakes, and subdivision, use and development on the floodplain where the potential effect of flooding significantly increases the risk to human life, health, and safety; or

Where the actual or potential effect of flooding has significant adverse effects on:
- private or community property; and
- flood mitigation structures and works; and
- natural values.

7.2.6 To have regard to any relevant Floodplain Management Plan and the information provided in any relevant flood hazard assessment, or in connection with any River Management Scheme, when considering subdivision, use, or development within any river bed or floodplain.

7.2.7 To avoid any adverse effects on the structural integrity and effectiveness of lawful flood mitigation structures and works in river beds and on floodplains from the adverse effects of subdivision, use, and development.

7.2.10 To ensure that all structures in or on the beds of rivers and lakes which are visible are adequately maintained so that:
- the structures is safe; and
- any adverse effects on the visual amenity of the area are minimised.

Regional Air Quality Management Plan
The Regional Air Quality Management Plan applies to all types of discharges to air.

The relevant that are potentially relevant to the proposal are contained within the boxed text below.

**Rule 22** The discharge of contaminants into air in connection with any industrial processes associated with paving activities, other than the manufacture of hot-mix asphalt paving mixes, is a permitted activity provided it complies with the following condition:
- There is no discharge of particulate matter, smoke, odour, gas, aerosols or vapours from the process, which is noxious dangerous, offensive or objectionable at or beyond the boundary of the property.
In regards to the construction of the proposed walkway a discharge permit will be required if the works involve the manufacture of hot-mix asphalt paving mixes, which is a discretionary activity requiring resource consent and will be guided by the Objectives and Policies outlined below. All other paving activities are a permitted activity requiring no resource consent.

Objective
4.1.1 High quality air in the Region is maintained and protected, degraded air is enhanced, and there is no significant deterioration in ambient air quality in any part of the Region.

Policies
4.2.4 To avoid, remedy or mitigate any adverse effect of the discharge of contaminants to air that is noxious, dangerous, offensive, or objectionable.

4.2.7 To avoid, remedy or mitigate the adverse effects of the discharge of contaminants to air on amenity values.

Conclusion
Given the assumptions made regarding the works and activities involved in the construction and use of the proposed walkway the following consents are anticipated to be required:

Wellington City Council District Plan
Under the Wellington City District Plan, the following land use consents are anticipated to be required:

<table>
<thead>
<tr>
<th>Rule</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1.9</td>
<td>Earthworks exceeding 250m²</td>
</tr>
<tr>
<td>7.4.7</td>
<td>Earthworks less than 5m from Porirua Stream</td>
</tr>
</tbody>
</table>

Greater Wellington Regional Council
Under the Regional Freshwater Plan the following consent may be required:

<table>
<thead>
<tr>
<th>Rule</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>31</td>
<td>The erection and maintenance of bridges over rivers with a span of more than six metres</td>
</tr>
<tr>
<td>38</td>
<td>Gravel extraction greater than 15 cubic metres</td>
</tr>
<tr>
<td>49</td>
<td>The use of any river or lake bed that is not permitted by or cannot meet the requirements of rules 22 to 48. (River crossings)</td>
</tr>
</tbody>
</table>

APPENDIX: Wellington City District Planning Maps
APPENDIX D – Hydraulics and Environmental Comment

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As outlined some of the route options for the proposed walkway pass close to Porirua Stream. There are four design scenarios we have commented on regarding any hydraulic and environmental effects, consenting issues and risks associated with these effects / issues. The four scenarios are:

A. Cutting walkway into existing stream embankment or back filling behind gabion walls.
B. Provide raised boardwalk on piles supported by stream embankment.
C. Provision of a walkway above embankment requiring stabilisation.
D. Provision of bridge abutments.

In order to get a better understanding of the existing situation and hydraulic engineering issues I initially met with Sharyn Westlake (Team Leader Strategy and Technical Support Flood Protection) and James Flanagan (Senior Eng. Flood Protection) of GWRC on 13th August. It was a very constructive talk. Both seemed very supportive of the project and have offered their assistance in the next design stages. For future meetings Sharyn suggested to take minutes to document the consultation for the resource consent.

Sharyn explained that under their watercourses agreements with Wellington City Council and Porirua City Council, GWRC maintains the Porirua Stream from the CMA to Seton Nossiter Park (Northeast of Paparangi). Amongst other things the maintenance requirements comprise:

a) stream access to carry out maintenance works and
b) maintenance of the flow / flood capacity, e.g. by cutting trees on the embankments, gravel extraction etc.

Sharyn also pointed out some GWRC property ownership issues that might affect the walkway design (e.g. in the Linden Park & Findlay Street area, i.e. end of section A / start of section B). However we did not cover this aspect in greater detail and this would have to be dealt with separately.

As far as the stream access is concerned, GWRC needs to be able to access the stream along the entire length through Tawa with machinery and from the bank edge to minimise any disturbance to the stream bed. However in view of the stream width I believe an access only from one side of the stream should be sufficient for the maintenance works. Moreover there exist a couple of identified access points that would need to be taken into account in future design stages. GWRC are only able to access along the stream bed in emergency conditions under the current freshwater plan and a specific resource consent is required to access the stream bed otherwise, which is not practical for general maintenance activities.
Where the stream banks are vertical or near vertical, for safety reasons this requires machinery to operate with a minimum distance from the bank edge. Where a walkway is proposed along the stream edge, GWRC would like to minimise the risk of damage to the proposed walkway. To allow safe working distance back from the edge of the river bank and to also allow for a walkway, they would expect a minimum width of not less than 7 metres. I pointed out that due to local confinements or property issues this space may not be available in places. A walkway design that allows maintenance machinery to drive on and operate from the walkway may be a feasible solution in those areas. This is common practise in other places and merely may require temporary walkway closure during maintenance works.

The focus of the meeting was on the flow and flood capacity of the Porirua Stream in the Tawa reach. GWRC has some limited hydraulic modelling information from the modelling carried out for the Porirua Stream Improvements in the late 1990's, and more recent modelling for a few sections of the stream (e.g. Findlay Street) and for the Seton Nositor and Stebbings dam break analyses. The latest hydraulic model for flood hazard of the Porirua Stream was carried out by Connell Wagner for Wellington City Council in 1997. It's a 1D computational hydraulic model using MIKE11, a Danish Hydraulic Institute (DHI) software pack. Our Opus Water Resources Group has also standardised on the 1D and 2D DHI software for hydraulic modelling and has plenty of background experience of using them.

I had the chance to briefly inspect the flood inundation maps for Tawa that illustrated the potential flood zones for 50 and 100 year return period design flows and was able to make a few copies of the final Connell Wagner report (executive summary and hydraulic longitudinal sections). Meanwhile I have also contacted John Boot at WCC for digital versions of the flood inundation maps but have not received any to date.

GWRC has been operating a gauging station on the Porirua Stream approximately 1km from the outlet to the Porirua Harbour since September 1965 (called “Porirua Stream at Town Centre”). The following table, extracted from the GWRC webpage, reflects the flood return periods and respective flows that need to be taken into account in any design works. (Note that Mitchell Stream flows into Porirua Stream north of Tawa but above the gauging station site, so that the flows in Tawa will be smaller.)

<table>
<thead>
<tr>
<th>Return Period (Year)</th>
<th>Average Annual Possibility (%)</th>
<th>Flow (m³/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 year flood</td>
<td>50</td>
<td>31</td>
</tr>
<tr>
<td>5 year flood</td>
<td>20</td>
<td>45</td>
</tr>
<tr>
<td>10 year flood</td>
<td>10</td>
<td>55</td>
</tr>
<tr>
<td>20 year flood</td>
<td>5</td>
<td>65</td>
</tr>
<tr>
<td>50 year flood</td>
<td>2</td>
<td>80</td>
</tr>
<tr>
<td>100 year flood</td>
<td>1</td>
<td>92</td>
</tr>
</tbody>
</table>

The flood inundation maps show that the 50 and 100 year return period design flows cannot be retained in the main channel, but spill out of the channel in various places and cause inundation, even in built-up areas. This means that the Porirua Stream is indeed below common design capacity. Any modifications within the main channel and to its lateral floodplain areas that reduce the existing cross-section area, e.g. with the aforementioned scenarios A, B and D, will result in water level changes with most certainly detrimental effects. Sharyn made it clear that GWRC will only accept a footpath design that causes no (or only minor local) water level rises.

Taking this information into account scenario A2, i.e. back filling behind gabions, does not seem a feasible design solution for the walkway along the Porirua Stream. This would reduce the hydraulic cross-section area considerably and result in raising water levels upstream and increase of flow velocities along the modified stream reaches. However scenario A1, i.e. cutting the walkway into the existing stream embankment, would increase the hydraulic cross-section and therefore be a favourable option worth considering.

An assessment of effects / issues of scenario B will require in-depth hydraulic calculations and modelling of the potentially affected stream reaches. We have been informed, however, that the latest MIKE11 hydraulic model is owned by Connell Wagner and not by WCC. At this point it is uncertain whether we could access the model, e.g. with the help of WCC, to carry out modelling works. From a cost-efficiency point of view it would be beneficial, in any case, to obtain and use the existing model.

An issue that would need to be addressed in conjunction with scenario B is potential clogging by debris. Single spaced piles tend to catch floating debris, especially during flood flows. Such debris accumulations can result in flow capacity reductions and local water level rises. In extreme cases the weight of debris accumulations together with the resulting loads from flow velocity forces can pose a risk to the structural integrity of piles or piers and therefore need to be taken into account in the structural design. Debris accumulations also need to be removed from time to time, i.e. require intensified maintenance.

Initially scenario C seems the most feasible design option, especially if the walkway stabilisation / foundation could be placed beyond the main channel and its embankments. However this scenario would require further hydraulic investigations to determine sufficient walkway setbacks levels above the design flood levels including freeboard recommendations.

The design and placing of bridge abutments (Scenario D) or piers should always be investigated from a hydraulic engineering point of view to assess their hydraulic effects, for example on water levels up- and downstream of the bridge, scour and lateral erosion potential and the need for erosion / scour protection. In view of the existing flow capacity issues I suggest to merely envisage single span bridges (i.e. without piers) with abutments beyond the main channel and its embankments. This scenario would also require further hydraulic investigations to determine adequate setback levels for the design flood levels including freeboard recommendations.
I have compiled some typical costs to assist you with your costs estimates:

- Rip Rap / Rock armour protection: 70 - 80 $/t (stones incl. placing)
  Assume a specific weight of 1.7 t/m³ and layer thickness of 0.6 - 0.8 m plus 0.1 - 0.2 m filter layer or geosynthetic (e.g. filter fleece at 25 $/m²).

- Gabions: 400 - 475 $/m³ or between 600 - 900 $/basket depending on basket size.
  Common basket sizes vary between 1.5 - 2 m in length and 0.5 - 1 m in width/height.
  For examples see: www.maccaferri.co.nz/afawcs0121364/ID=67/SID=465517339/productdetails.html

Unfortunately I cannot provide you with standard costs for boardwalks on piles. The costs are site- and design-specific and will depend on the construction, i.e. its foundation, supporting substructure, cantilever (width), balustrade, wood material etc.

Works or modifications in waterways nearly always go along with environmental impacts. The effects that need to be distinguished are:

- temporary effects, e.g. during construction works and
- long-term effects, e.g. during its lifetime operation and possible decommissioning of an asset.

Construction works can have major impacts to the environment, but they usually can be mitigated to a certain degree. Possible effects are:

- Noise, air pollution (e.g. dust, emissions, odours) etc.
- Alterations to the stream hydrology.
- Direct disruption of aquatic habitat due to machinery working in the stream / river bed.
- Turbidity due to earthworks which in extreme cases can result in colmation (clogging) of the hyporheic interstitial causing oxygen deficiencies in the stream bed.
- Pollution from faulty machinery or negligent handling of hazardous substances on the construction site.

Long-term effects can result from the alterations to the natural environment or habitat.

It is advisable to assess all possible effects to the environment during the detail design phases, e.g. by means of an Environmental Impact Assessment (EIA). The basic idea of an EIA is to identify, predict, evaluate and mitigate the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made.

The identified issues can then be planned for and/or precautions taken. These can be for example

- special conditions in the tender documents,
- specific site measures (e.g. safety devices or designated areas for refuelling machinery, changing hydraulic oil or applying lubricants),
- experts (e.g. ecologist) supervising certain works of the contractors and interacting with the contract manager, who can for example identify existing features of stream habitat worth preserving and suggest or carry out specific remedial works if necessary (e.g. fish recovery).

From our experience with projects in the Wellington area, works or modifications in waterways will require some kind of environmental impact assessment as part of the consent application. For example the EIA for the Hutt River Stopbanks Improvements was carried out by a planner from GWRC (being the client of the works).

The time requirement and costs for these kinds of works are difficult to assess at this early stage as they depend on the design of the walkway, the affected stream length, the type of possible environmental impacts, the construction time and other determining factors. In other countries costs for EIA and expert advice have been found to be between 1 and 3% of the total project costs (max. 5% in complex infrastructure projects). Accordingly I suggest to include an item for a study-like EIA and some expert advice during the construction phase.

Another environmental aspect that will require some further consideration is the WCC “Wellington Wet and Wild Bush and Streams Regeneration Plan” that I am aware of. I am currently trying to get hold of the details and to find out if the Porirua Stream is part of this programme.

As far as the consenting issues and its associated risks are concerned our Wellington Environmental Management Team can assist you with the information you need for the next steps. I will contact Lisa Gooch and ask for the relevant information to be compiled for you.