

Hutt River Floodplain Management Plan

Revised Priority Schedule for Structural Works

Basis and Methodology

Introduction

This document details the methodology used to develop a revised priority schedule for proposed structural works under the Hutt River Floodplain Management Plan.

Why the Revised Schedule?

The current priority list is based on limited criteria because only economic benefit, and the standard of existing defences are included. The revised priority schedule assesses a broader range of components than those considered as part of the design standard selection phase prior to October 1999. The additional components include:

- Number of people directly affected
- Area affected
- Social benefits
- Environmental benefits

Remember : Structural Works Programme Already Set

The structural works programme up to 2010 has already been determined through the Regional Council's Long-term Financial Strategy. The revised structural works priority schedule does not affect the agreed programme. Instead the schedule would act as a guide to decision-making under future LTFS rounds.

How Have We Done It

Weighting Components

Each component has been weighted accordingly:

- *Economic Benefit:* 60%
- *Present Protection Level:* 10%
- *Number of People Directly Affected:* 5%
- *Area Directly Affected:* 5%
- *Social Benefits:* 10%
- *Environmental Benefits:* 10%

The increased range of components and their associated weighting are founded on the priority schedules established for the Otaki and Waikanae Floodplain Management Plans. The proportion of weighting applied to each component was heavily influenced by public feedback during the consultation phases of those Plans.

Proposed Works Grouped for Extensive Reaches

The existing priority list considers individual works. The revised schedule groups works according to more extensive suites of works. Individual works combine to form 13 separate suites. Reaches were selected in a manner to ensure independence between each of the individual floodplain areas. These reaches cover all urban areas protected by proposed works.

Considering Environmental and Social Costs

Environmental costs are not included. The costs and effects of actual works have been considered in broad terms during the design standard and structural works selection process (prior to October 1999). These effects will be assessed in more detail during the resource consent and application processes for each set of works. The merit of each set of works will be determined against these effects.

Basis for Evaluating Changes

The basis for evaluating environmental, social and economic components is the comparison of:

- a snapshot of the existing situation concerning flood-prone land.
- changes to the existing situation provided by proposed improvements to the flood protection system.

Using Simple Indicators

The indicators chosen to reflect social, environmental and economic benefits are:

- relatively easy to understand and measure
- stand alone
- certain
- limited in subjective value judgements where possible.

A desire to keep this wider evaluation of benefits as straightforward as possible influenced the selection of indicators.

Components Measured

Economic Benefits

Cost of Works

The costs are based on concept designs and have an accuracy of $\pm 30\%$.

Annual Saved Damages

Average annual saved damages are calculated on a reach by reach basis by estimating the damages that can be saved by upgrading each reach to the risk-based 2300 cumec standard¹.

Financial Benefit-Cost Ratios

Benefit Cost Ratios have been calculated based on saved damages and implementation costs. The damage costs originally assessed in 1990² were indexed to reflect 1999 costs. The damages include direct and indirect tangible costs to:

- residential, commercial and industrial/business properties.
- public services and utilities.

It was assumed that the implementation would be at an average expenditure rate of \$2 million per year.

A total weighting of 60% was distributed equally among the annual flood damages saved and the Benefit-Cost ratio.

Present Protection Level

The present level of protection associated with each suite of works is the flood that can be contained by the stopbanks without overtopping or breaching due to structural failure.

Area and Population Affected

These are direct measurements of areas liable to flooding and the number of people affected in each reach. It should be noted that the flood extent of some reaches overlap, for example: KGB to Pomare (left bank) reach overlaps part of the Ava to KGB (LB) reach.

¹ HRFMP Phase 3 Investigations: Risk Assessment and Hydraulic Modelling. *Wellington Regional Council, September 1999.*

² HRFMP Phase 1 Investigations: Flood Damage Assessment. *Wellington Regional Council, September 1999.*

Environmental Benefits

Components Used

The components to determine environmental benefits are:

- ecology
- recreation and landscape
- heritage.

Scoring

Environmental benefits receive a 10% weighting, with each component comprising 3.3%. The variables representing each component combine equally to make 3.3%.

Ecology

Indicators Used

1. *Erosion Protection: Riparian Plantings and Rock Lining*

Measuring What	Degree of ecological improvement provided by reduced erosion
How Measured	Evaluate the difference between current actual and potential erosion levels, and improved erosion protection
Data Source	Use expert engineering opinion
Scoring	Low to High: scores 1 to 3

Assumptions: Rock linings and riparian vegetation enhance in-stream and riparian values. Riparian vegetation provides shading, shelter for fish, and act as a buffer for pollutant and sediment run-off. Rock-linings, and to a lesser degree, riparian vegetation prevents more regular erosion and scour of berm areas: this reduces the input of sediment to the active bed and channel. Rock linings also provide pool areas and additional habitat for fish species.

The current incidence of erosion was measured by combining areas of actual erosion with areas of potential erosion. Potential erosion was determined by judging the existing alignment and current erosion protection. The degree of improved protection was averaged for each extended reach area. In most cases, areas of high increased future benefit combined with low benefit areas to give an overall medium benefit.

Additional reaches downstream of Te Marua not specific to urban areas were included for this assessment including:

- Melling to Belmont (RB)
- Belmont to Pomare (RB)
- Pomare to Silverstream (RB)
- Silverstream to Moonshine (RB)
- Moonshine to Totara Park (RB)
- Norbert St to Akatarawa Bridge (RB and LB)
- Gemstone Drive (RB).

2. *Ecological Areas : Areas with Ecological and Conservation Values*

Measuring What	Presence of ecological and conservation sites in the river corridor and on the floodplain
How Measured	Determine numbers of parks, reserves and KNE (Key Native Ecosites) sites with these values located in flood or erosion prone areas
Data Source	- Dept of Conservation Ecosite database - KNE database
Scoring	Relative numbers present in each area (%)

Other Indicators Considered

Increases in Indigenous Species

- The Environmental Strategy provides no certainty about increases in indigenous species.³
- The floodplain and river corridor environment are heavily modified, therefore actual increases in indigenous vegetation cover are likely to be minimal.

Habitat Quality

- The Environmental Strategy provides no certainty about increases in habitat quality.
- Assessments would not be comparing like with like. Comparing varying reaches provides difficulties assessing differing habitats, e.g. comparing habitat values of estuarine areas with mid the reaches.

³ The Environmental Strategy provides conceptual ideas for enhancing various reaches of Hutt River, in line with the selected Linear Park vision. Potential projects exist as ideas at this stage, and require tangata whenua, relevant Council committees, user groups and clubs, other agencies, and the wider community to consider and evaluate them before enhancement projects are selected.

Recreation and Landscape

Indicators Used

1. *Landscape Damage : Affected Area*

Measuring What	Flood-prone area affected as an indicator of the damage extent
How Measured	Determine size of the flood-prone area affected by each suite of works
Data Source	GIS calculations
Scoring	Relative area affected (%)

Assumptions: The greater the area – the greater the damage.

2. *Special Areas : Parks and Reserves with Recreational Values*

Measuring What	Presence of parks and reserves
How Measured	Determine numbers of parks, reserves located in flood or erosion prone areas
Data Source	<ul style="list-style-type: none"> - Proposed District Plan listings - Street map directories
Scoring	Relative area affected (%)

Assumptions: Parks and reserves have a greater amenity value than other less developed river corridor areas, because they are generally maintained for more intensive recreational use.

Note: No distinction was made between park and reserve sizes. For instance: Fraser Park is intensively used for sports as well as more passive uses. Some smaller parks would not be used to anywhere near that degree.

Other Indicators Considered

Capex Works

- 5% of all capital works expenditure is allocated to environmental enhancements. This expenditure is likely to equate to basic improvements to the river environs.
- Certain reaches may be more intensively developed for recreational uses than others; therefore comparing existing amenity with future amenity may be unfair.
- The Environmental Strategy provides no certainty about the nature of improved recreational amenity.
- Placing value on the nature of upgraded recreational amenity is likely to be very subjective.

Heritage

1. *Heritage Sites : Sites with Heritage Values*

Measuring What	Presence of heritage sites
How Measured	Determine number of heritage sites located in flood or erosion prone areas
Data Source	<ul style="list-style-type: none"> - Proposed District Plan heritage listings - Waahi tapu listings in the Environmental Strategy and Phase 1 investigations
Scoring	Relative numbers present in each reach (%)

Note: The Jackson Street precinct in Petone has not been scored. However, it is an area containing significant values. One solution is to give the overall area a higher individual score – perhaps 10.

Social Benefits

Components Used

The components to determine environmental benefits are:

- Disruption
- Stress and Trauma

The potential benefit of community preparedness and non-structural land use measures has not been measured.

Scoring

Social benefits receive a 10% weighting, with each component comprising 5%. The variables representing each component combine equally to make 5%. Area and population multipliers (% of greatest affected population) have been applied to measures of disruption and stress and trauma, respectively.

Disruption

1. *Business Areas : Area of Industrial, Business and Commercial Development*

Measuring What	Area of industrial, business and commercial zones
How Measured	Determine area contained in these zones located in flood or erosion prone areas
Data Source	Proposed District Plan zone maps
Scoring	Relative area affected (%)

Assumptions: All relevant zones are assumed to contain full commercial, industrial or business activities, despite zone maps incorporating additional areas not yet developed for these uses. No distinction is made between the level of disruption attributable to each land use type.

2. Residential Areas : Number of Schools

Measuring What	Presence of primary and secondary schools
How Measured	Determine numbers of schools located in flood or erosion prone areas
Data Source	<ul style="list-style-type: none"> - GIS data - Street map directories
Scoring	<ul style="list-style-type: none"> - High schools and intermediates = 2 - Primary schools = 1

Assumptions: High schools and intermediates are considered generally larger than primary schools, despite some primary schools having roles similar in size to intermediates and high schools. No distinction is made between areas on the basis of ponding depth. Any school sited on the flood extent margin must have 30% of the school area covered by the predicted flood extent in order to be counted.

3. Key Facilities : Number of Hospitals and Sub-stations

Key facilities are the highly vulnerable parts of emergency and community services and infrastructure. Damage to key facilities will escalate the impacts of flooding.

Measuring What	Presence of hospitals and sub-stations.
How Measured	Determine numbers of hospitals and sub-stations located in flood or erosion prone areas.
Data Source	<ul style="list-style-type: none"> - GIS data - Street map directories
Scoring	Relative numbers present in each area (%) <ul style="list-style-type: none"> - Hospitals = 1 - Sub-stations = 2

Assumptions: Hospitals counted incorporated those providing over-night stays, including some rest-home facilities⁴. No distinction is made between the size and significance of hospitals. Sub-stations were given an extra point because of the direct impacts on all valley residents of losing power.

⁴ Hospitals included were Hutt Hospital, Boulcott Private Surgical Hospital, Bloomfield Medical Hospital, Elderslea Medical Hospital, Woburn Aged Care Complex, Watsonia Hospital.

Emergency services or telecommunications facilities were not included because they are able to operate from remote sites. Water supply or sewerage services have also not been counted, though there may be merit in considering relative lengths of lines receiving improved protection. Additional reduced disruption effects to the wider region as a measure of benefit (for example: telecommunications and transportation links) also were not counted.

Stress and Trauma

1. *Flow, Erosion and Ponding : Area of Hazard*

Measuring What	Area of ponding, flow and erosion hazard affecting urban areas
How Measured	Determine area affected by varying ponding severity, or flow and erosion located in flood or erosion prone areas
Data Source	<ul style="list-style-type: none"> - draft 2300 cumec Flood Extent Plans - draft River Corridor Plans - draft Geographic Flood Risk Area Plans
Scoring	<ul style="list-style-type: none"> - Low ponding (0 – 0.5m) = 1 - Moderate ponding (0.5m – 1.0m) = 2 - Deep ponding (1.0m) = 3 - High velocities and potential erosion = 4

Assumptions: Population and area multipliers adjust disruption, stress and trauma measures because size and numbers are directly related to social impact.