

**Report 99.243**

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Report to the Hutt River Floodplain Management Advisory Committee  
from Malcolm Abernethy, Senior Engineer, Flood Protection (Strategy and Assets)

## **Hutt River Floodplain Management Plan : Stopbank Upgrade Measures**

### **1. Purpose**

To provide the Advisory Committee with a description of the work involved, and of the progress made, to determine the Stopbank Upgrade Measures (part of the Structural Component) of the Hutt River Floodplain Management Plan.

### **2. Background**

Selecting a Design Standard for the Hutt River Floodplain Management Plan is largely based on considering the stopbank and channel management measures required to achieve security for three “design” flood events. The design flood events chosen have peak flows of 1900, 2300 and 2800 cumecs respectively and are used to determine the level to which stopbanks should be constructed. This report describes the stopbank investigations.

The stopbank investigations form the major part of the Structural Measures component of the Hutt River Floodplain Management Plan. These investigations consider what is required of the stopbanks for each design flood event. They focus on stopbank materials, an acceptable profile for maintenance purposes, height, services within existing stopbanks, and structures that encroach or occupy the stopbanks.

The costs which will be estimated as part of the investigation will be combined with those estimated in the channel management investigations, along with the costs of any other compatible measures, to give the total cost to achieve the level of security for each design flood.

### 3. **Scope**

The Stopbank Upgrade investigations will consider, for each design flood:

- existing deficiencies within the stopbanks
- the height of stopbanks required to contain the flood
- material properties to limit seepage potential through stopbanks to acceptable levels
- material properties which provide acceptable slope stability
- the impact of existing utility services within stopbanks
- a geometric shape to reduce maintenance costs
- stopbank position and alignment to satisfy channel management options

Stopbanks to provide a structural solution are considered for all existing developed and floodable areas which extend from the river mouth to Gemstone Drive in Upper Hutt. Stopbank measures are not considered for “greenfield” areas – in new development situations wise planning would suggest alternative development methods or sites should be used.

Based on the above considerations, estimates are being prepared to determine the total cost of stopbanks which will provide a high level of security for each design flood.

### 4. **Process**

Consultants Beca Carter Hollings & Ferner are undertaking the investigations. Malcolm Abernethy manages the Consultant for this investigation.

#### **Stopbank Deficiencies Identification**

Stopbanks currently protecting the Hutt Valley give a variable level of protection both in terms of capacity and quality of construction. This is due to their being constructed and upgraded in several periods over the last 100 years. Many of the stopbanks display the following deficiencies:

- Poor material and construction quality (in some cases no more than grass covered mounds of gravel)
- Poor shape, requiring expensive maintenance methods to retain grass cover.
- Poor core material and construction quality (gravel core capped in the 1950s with weathered greywacke to reduce the seepage potential).
- Services located within stopbanks (installed and maintained to unknown standards).
- Large trees and shrubs, located on stopbanks (tree roots may die, rot and initiate “piping” failure).
- Small structures (paths, roads, kerbs, stairs, and poles) which may initiate scour.

- Old and poorly maintained structural retaining walls supporting stopbanks.
- Stopbanks encroaching onto private land (reduces security from landowner modifications).

### **Stopbank Solutions**

A preferred stopbank profile is included as **Attachment 1** to this report. This optimum profile provides:

- A robust and durable stopbank.
- Factors of safety which accommodate variable stopbank construction quality (the latter is inevitable with such a long length of stopbanks).
- Some flexibility to change, modify or improve the bank.
- Reduced maintenance costs (stopbank can be mown with flat mowers in damp conditions).
- Access along the top of stopbanks when the river is in flood.

Through the Lower Hutt CBD development has restricted the available width for the construction of earth stopbanks. As a result new retaining walls will be required to maximise the area of land available for the river channel.

Other options being considered are the addition of crest retaining walls in locations where space is restricted and where existing stopbanks are constructed to an acceptable standard.

### **Cost Estimates**

For each design flood, acceptable stopbank profiles have been superimposed on actual cross sections. Where the profile cannot be achieved due to property restrictions, alternative designs are considered. Quantities are determined from the cross sections for the various solutions and unit rates applied. The unit rates have been determined based on actual and indexed construction costs. Quantities and rates are determined for:

- Earthworks.
- Retaining walls.
- Site works and fencing.
- Services relocations.
- Building relocation or replacement if located within the floodway.

Lump sum rates are applied to the construction cost as a percentage:

- A general contingency to allow for unforeseen costs.
- Preliminary and general construction contractors costs.
- Engineering consultants fees.

For this stage of design, the accuracy of the estimates is considered to be within plus or minus thirty percent of the total cost of works, over the length of river investigated.

The estimates will be combined with those determined for the channel management measures and other compatible components to give total costs to achieve each design flood. The costs will be presented at the Advisory Committee workshop in mid June.

## 5. Progress

All flood defence deficiencies have been identified and are described on drawings and supporting spreadsheets. The flood defences upgrade works have been determined and are shown on drawings with supporting spreadsheets that detail the work.

All the above work is currently being reviewed for accuracy and completeness. Draft estimates have been prepared based on the work described above. Total estimates for each design flow are expected to be complete by late May.

## 6. Recommendations

*That the Hutt River Floodplain Advisory Committee receive this report and note its contents.*

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Attachment 1 : Preferred Stopbank Profile