

Report 99.137

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Report to the Hutt River Floodplain Management Advisory Committee
from Mark Healey, Assistant Engineer, Flood Protection (Strategy and Assets)

Hutt River Floodplain Management Plan : Channel Management and Protection Works

1. Purpose

To give the Advisory Committee a detailed explanation of the work involved, and of progress made, on the Channel Management and Protection Works component of the Hutt River Floodplain Management Plan.

2. Background

Selecting a Design Standard for the Hutt River Floodplain Management Plan will be based on considering the existing management option and three design flood events. These chosen flood events have peak flows of 1900, 2300 and 2800 cumecs.

The physical ability of the Hutt Valley flood protection system to pass a particular design flood is a combination of the size and alignment of the channel, its bank edge protection works and the height and integrity of the stopbanking system.

The Channel Management and Protection Works component of the Hutt River Floodplain Management Plan focuses on what is required in terms of available or desirable berm width, channel size and alignment, and bank edge protection and maintenance works to pass each design flood.

The associated costs, which will be estimated as part of this component, will be combined with those estimated in the stopbanking system investigations, along with the costs of any other compatible measures, to give the total cost to achieve each design flood.

3. **Scope**

To meet each design flood, the Channel Management and Protection Works component will, for the entire Hutt River from the Hutt Gorge to the Mouth, define appropriate:

- design channel alignments and widths
- bank edge protection works
- channel management strategies

to meet each design flood.

Based on this, costings will then be undertaken to define the total cost of achieving each design flood.

4. **Process**

The Channel Management and Protection Works component of the Hutt River Floodplain Management Plan is being undertaken by the Flood Protection Group. The work is managed by Mark Healey with input from Gary Williams, an Engineering Consultant specialising in river channel management.

The following subsections describe the various components of this investigation. **Attachment 1** shows pictorially some of the concepts mentioned below.

Design River Channels

Efficient passing of a design flood event requires definition of a design river channel.

The selection of design river channel widths and alignments for the various design standards is based on:

- Natural river channel meander curvatures and widths.
- Achieving the minimum desirable river channel berm widths.
- Level and cost of channel maintenance required.
- Hydraulic conditions during floods.
- Consideration of practical constraints (e.g. heavily developed areas adjacent to the river channel).

Several alignment scenarios were developed for most reaches of the river. Selection of the most desirable alignment scenario for a particular design flood was based on the above considerations and on the ability to apply appropriate bank edge protection measures.

Bank Edge Protection Works

Maintaining a design river channel alignment requires suitable bank edge protection works.

Standard designs for protection works have been drawn up so that these may be costed and applied to each design channel. The broad categories of protection works considered, in order of reducing robustness, are:

- Heavy rock (e.g. full rock revetment or large rock groynes)
- Light rock or equivalent (e.g. toe rock, small rock groynes, rail iron and Gabion basket fences)
- Strengthened vegetative buffer zones (e.g. willows and debris fences/permeable groynes)
- Vegetative buffer zones (e.g. willow and native plantings of various widths)

The necessary width of vegetative buffer zone depends on the location on the river, the width of the design channel and the degree of strengthening of the buffer zone.

Selection of the most appropriate protection works for a particular area is a function of:

- The severity of the hydraulic conditions at a site.
- The height of the river bank being protected.
- The width available in which to establish protection works.
- The level of service required to the area being protected.

The severity of hydraulic conditions during the design flood event (i.e. design standard) is based on experience and the results of computer modelling.

The “Level of Service” provided to a particular area has been defined as the protection given against river bank erosion from a flood of a particular probability of occurrence. In general, for a wide berm where stopbanks or development are not at risk this level of service has been set at approximately a 20 year return period flood event. i.e. the bank edge protection works have been selected such that the area on the landward side of the buffer zone will not be affected by erosion in a flood event with a return period of less than approximately 20 years.

In some cases the berm width is very narrow and the necessary buffer width extends to the edge of a developed area (e.g. residential housing) or stopbank toe. In this case the level of service to the stopbank or developed area is necessarily the same as the design flood. This level of service is achieved by selecting an appropriately robust bank edge protection measure.

It should be noted that the bank edge protection works, berm and stopbanks combine as a unit to provide the required level of protection (design standard) to the floodplain. In the design event, failure of some of the bank edge protection works may be expected. However, the system will have done its job provided water does not reach the “protected” floodplain.

Channel Management Strategies

Channel management strategies will be developed to ensure that sustainable operation and maintenance of the design standard is achieved. These channel management strategies will define how the active river channel is managed and how the protection works are maintained.

A management approach for the river channel will depend on the combination of the design channel and protection works selected for a particular design flood. Channel management tools may include:

- Cross-blading, beach re-contouring, beach clearing/ripping.
- Gravel extraction.
- Willow (and native) planting and replacement, layering and tethering.
- Maintenance of the structural bank edge protection works.

Costings

Total channel management costings will be undertaken for each design flood. The costings will include both capital and on-going maintenance expenditure and estimated flood damage costs. These costs will then be combined with those from the Flood Defences Upgrade and other compatible options to give total costs to achieve each design flood.

5. Consultation

Throughout this process consultation has and will continue to be undertaken with affected parties.

To date consultation has been undertaken through the Technical Liaison Group, the Hutt City Council and the Works and Services Committee of the Upper Hutt City Council.

As this work progresses and options are further developed consultation will be undertaken with the wider community and with individuals likely to be directly affected. The public consultation strategy for the Hutt River Floodplain Management Plan Design Standard work is detailed in Report 99.148.

6. Progress

To date, various options for design channel alignments have been drawn up for the whole length of the river. Using these alignments a complete design channel and associated protection works have been selected for the three design floods.

Attachments 2, 3 and 4 show possible alignments through the Strand Park, Manor Park and Awa Kairangi Park reaches respectively. These alignments may be refined or discarded as the investigation progresses.

Capital and maintenance costing of standard protection works is near completion. Total costings for each design channel are expected to be complete by late April.

7. Recommendation

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

Report prepared by:

Approved for submission:

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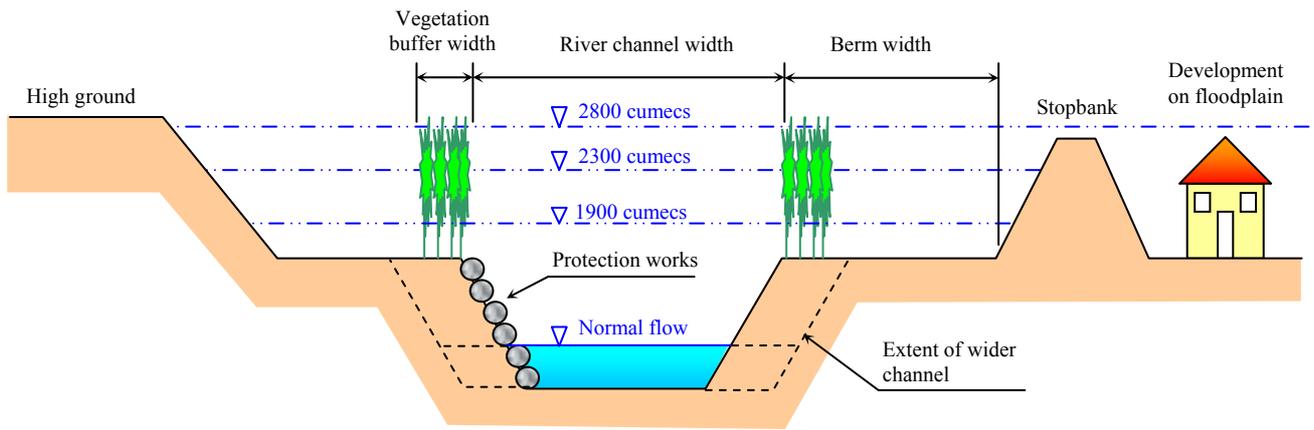
Attachment 1 : Conceptual Overview of Hutt River Channel Management

Attachment 2 : Proposed Channel Alignments : Strand Park

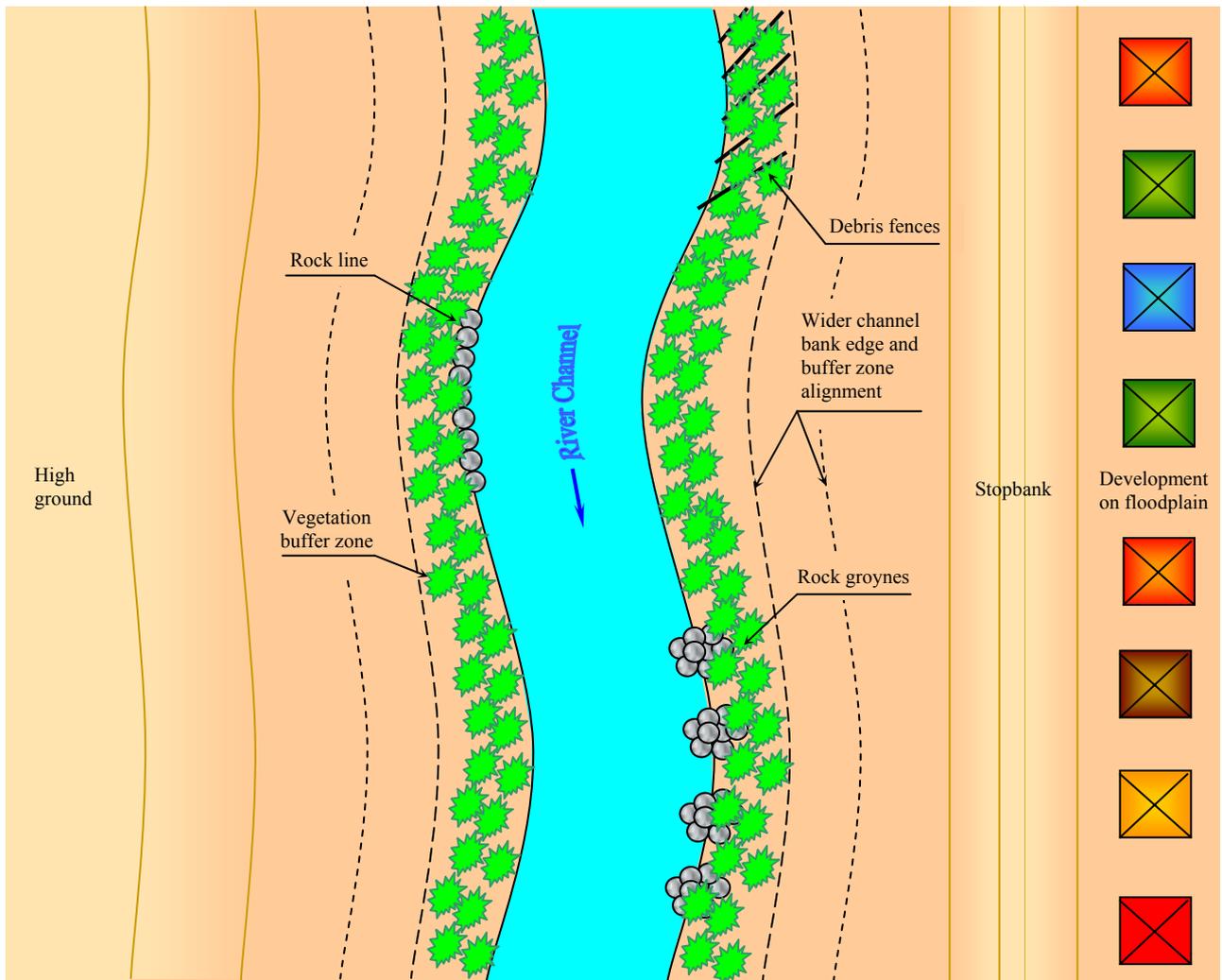
Attachment 3 : Proposed Channel Alignments : Manor Park

Attachment 4 : Proposed Channel Alignments : Awa Kairangi Park

Conceptual Overview of Hutt River Channel Management



Cross Section



Plan



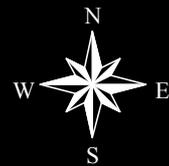


Legend

Stopbanks

Design Channel

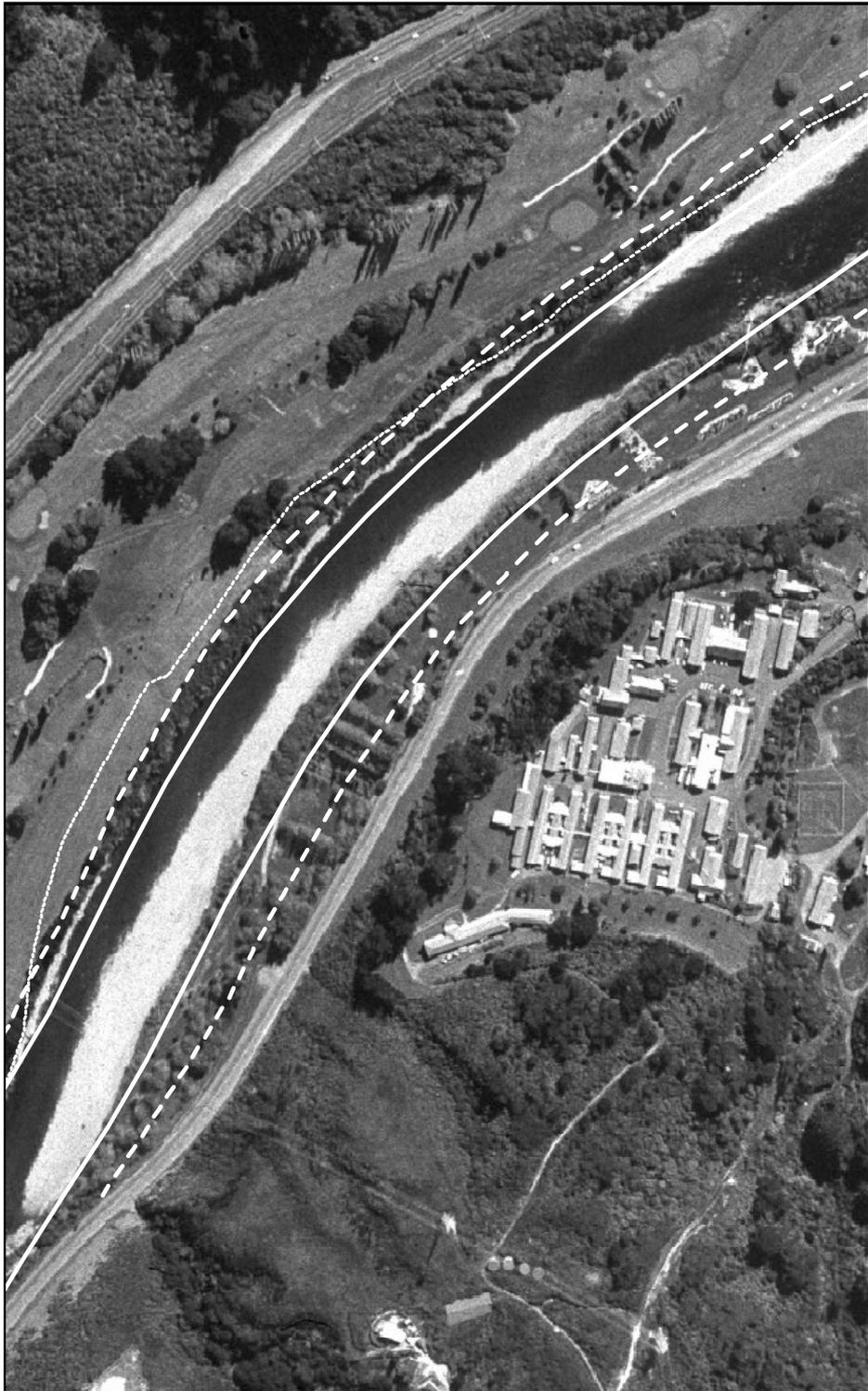
River Bank
Buffer Zone



Proposed Channel Alignments : Strand Park

Copyright: Wellington Regional Council.

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Legend

- Design Channel
- River Bank
- Buffer Zone
- Bank Edge



Proposed Channel Alignments : Manor Park

Copyright: Wellington Regional Council.





Legend

- Design Channel
- River Bank
- Buffer Zone
- Stopbanks



Proposed Channel Alignments : Awa Kairangi Park

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