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Report to the Hutt River Floodplain Management Advisory Committee
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Hutt River Floodplain Management Plan : “Local Area” Design Standard Investigations

1. Purpose

- To inform the Advisory Committee of the outcomes of the “Hutt River Floodplain Management Plan (HRFMP) Local Area, Design Standard” investigations.
- To facilitate the Advisory Committee making a recommendation to the Landcare Committee on “Local Area Design Standards”.

2. Background

The Advisory Committee at its meeting on 20 September 1999 recommended, to the Landcare Committee, design standards consistent with preferences resulting from the public consultation programme. The standards recommended by officers were changed at the four locations:

- Belmont
- Whirinaki Crescent
- Bridge Road
- Gemstone Drive

Subsequently the Landcare Committee asked for further information on the effectiveness of the standards and solutions recommended by the Advisory Committee. This report contains the outcomes of the additional investigations and consultation, and puts forward revised design standard options for consideration by the Advisory Committee.

3. Design Standards

The following table shows the original proposals taken to the public in August 1999 and the standards recommended by the Advisory Committee in September 1999. The table also contains the additional information requested by residents at public meetings.

Local Area	Original Proposal (August 1999)	Advisory Committee Recommended Standard (September 1999)
Belmont	Edge Protections to 1900 cumec standard.	Edge Protections to 2300 cumec standard. (In addition residents requested information on the cost of a stopbank and that floors of houses liable to flooding be “levelled” ¹ .)
Whirinaki Crescent	Upgrade existing Stopbank to 2300 cumec standard.	Upgrade existing Stopbank to 2800 cumec standard.
Bridge Road	Edge Protections to 1900 cumec standard.	Edge Protections to 2300 cumec standard. (In addition to above the residents requested the floors of houses liable to flooding be “levelled” ¹ and noted that relocation, compensation and house raising must be considered as part of HRFMP.)
Gemstone Drive	Protection to 1900 cumec standard with flood wall along Akatarawa Road to prevent backflow.	Protection to 2300 cumec standard with flood wall along Akatarawa Road to prevent backflow.

4. Additional Investigations

Additional investigations to determine the effectiveness of various local area options, included:

- Floor level surveys and flood level comparisons
- Akatarawa Road flood wall design and costing
- Belmont stopbank design and costing
- Edge protections design and costing (Belmont, Bridge Road, Gemstone Drive)
- House raising costings
- Economic analysis

Floor levels for houses liable to flooding at Belmont and Bridge Road were obtained by field survey. Levels for houses in Gemstone Drive were read from contour plans.

For the stopbanking option at Belmont, two approaches were considered. The first requires a full realignment of the river while the second requires purchase of six residential properties.

For all options, economic analysis including benefit cost calculations to assist in option evaluation and selection.

Attachment 1 gives details of the various evaluations.

¹ Use of surveying instruments to determine floor levels of individual houses.

5. Consultation (Derek Wilshere)

5.1 Meetings

Meetings were held with the communities of Bridge Road/Gemstone Drive (150 invitations, 11 attendees), and Belmont (144 invitations, 27 attendees). Although attendances were small, the meetings were lively, the discussion extensive and the level of understanding reasonable. We did not consult with Whirinaki Crescent residents directly as there had been no submission from there. Advocacy for the area came through Upper Hutt City Council and the Advisory Committee.

5.2 Presentations

At each meeting staff:

- Presented up to date information on the Hutt River Floodplain Management Plan.
- Presented previous recommendations and decisions made on the “Design Standard” particularly for the location. The priority for the proposals, consent requirements and the likely timing under various scenarios were also advised.
- Reported on undertakings given at previous meetings.
- Presented technical details and estimates for options studied at each location.
- Presented the results of floor level surveys.
- Introduced the Long-term Financial Strategy and mechanism for community input.
- Sought confirmation of the community position for proposed protection measures.

5.3 Main Outcomes from Meetings

Belmont:

- Confirmed previous preference for a 2300 cumec standard for the protection measures is preferred.
- No major stopbank at Belmont (confirms previous preference).
- The feasibility of localised stopbanks should be studied.
- The Floodplain Management Plan should fund house raising or other protection measures for affected properties.

Bridge Road/Gemstone Drive:

- Confirmed previous preference for a 2300 cumec standard for the protection measures is preferred.
- No stopbank at Bridge Road (confirms previous preference).
- Imaginative alternatives to the Akatarawa Road floodwall need consideration. These include a combination of road raising and a low wall, house raising and flood proofing (the loss of road access is understood).
- To obtain vehicle access from Akatarawa Road to the Hutt River recreation area.
- The Floodplain Management Plan should fund house raising or other protection measures for affected properties in Bridge Road (confirms previous preference).

5.4 Undertakings

At each location we undertook to:

- Distribute a flood map to households in the communities.
- Advise owners of properties potentially affected by flooding of the water levels for various design standards for their property.
- Provide the depth of flooding above floor level for houses flooded.
- Advise the communities of the decisions included in the LTFS and how they can “Voice their Choice”.

6. “Local Area” Design Standard Options

6.1 Belmont

Provide edge protections to 1900 or 2300 cumec standard

The options are to provide edge protections to a 1900 or 2300 standard. Four to six houses located near the riverbank are at risk of severe erosion damage caused by the lateral movement of the river. Edge protections will restrict the lateral movement. However, the houses located in the areas liable to flooding will continue to flood irrespective of the edge protection standard adopted.

Officers believe that 1900 edge protections can withstand a 2300 cumec flood with erosion damage to developed sections, however, it is believed that the erosion will not reach the houses. The additional cost for increasing the protection level from 1900 to 2300 is \$191,000. The marginal benefit/cost ratio for increasing to 2300 edge protections is less than 0.35². Accordingly, the 1900 edge protection standard is again recommended.

House raising or other measures

This option assists residents, who own floodable houses, to minimise their losses. The standard for house raising has to be compatible with the wider community’s preferred standard for non-structural measures, which will be finalised in June 2000. Officers believe that the non-structural standard for Belmont is likely to be 1900.

There are 15 houses liable to flood to a depth of at least 500mm during a 1900 cumec event. The approximate cost of raising these houses is \$450,000. Potential flood damage can also be reduced by localised stopbanks and flood proofing of individual houses. The optimal combination can be determined at the detailed design stage.

Officers believe that \$450,000 will be sufficient to cover final design variations. The benefit/cost ratio for house raising is less than 0.65; notwithstanding the economic issues, officers believe that assistance to house raising is a social benefit to the community which should be provided.

² Economically viable when benefit/cost ratio is greater than 1.

6.2 Whirinaki Crescent

Stopbanks to 2300 or 2800 standard

The existing stopbank height is just under the 1900 cumec standard. The stopbank is located well away from the river and wave action and floating debris effects will be minimal. The standard adopted by Upper Hutt City for the adjacent ProMall development is 1900, however, the Regional Council has advocated a 2300 standard and has appealed the decision.

The stopbank upgrade costs for 2300 and 2800 standards are \$470,000 and \$680,000 respectively. While the 1900, 2300 and 2800 upgrades return benefit/cost ratios of 11.6, 1.8 and 1.3 respectively, the marginal benefit/cost ratio for upgrading from 1900 to 2300 level is about 0.4 and that for 2300 to 2800 is 0.20. The principal design standard adopted for the scheme is 2300 and this standard was recommended for other similar communities such as Manor Park and Totara Park. The 2300 standard is recommended for the Whirinaki Crescent stopbank.

6.3 Bridge Road

Provide edge protections to 1900 or 2300 standard

This option is to provide edge protections to 1900 or 2300 standard. About 50 percent of the Bridge Road reach of the riverbank has base rock restricting lateral river erosion. Potential property damage in this reach is mainly due to bank slumping in the rear yards. This cannot be prevented without spending \$50,000-\$60,000 at each individual property. The house flooding and bank slumping (to a lesser extent) will continue irrespective of the edge protections standard adopted. The additional cost for increasing the level of edge protection from 1900 to 2300 is \$323,000 and the marginal benefit/cost ratio is less than 0.05. The situation at Bridge Road is not dissimilar to Belmont and the 1900 edge protections standard is recommended.

House raising or other measures

This option is to assist residents who own floodable houses to minimise their losses. The standard for house raising has to be compatible with the community's preferred standard for non-structural measures which will be finalised in June 2000. Officers believe that the standard for Bridge Road is likely to be 1900. This compares with the 100 year structural/non-structural standard adopted in the Upper Hutt City District Plan for other areas of the city.

There are six houses liable to flood by more than 500mm during a 1900 cumec event. The approximate cost of raising these houses is \$180,000. Other methods of reducing damages such as flood proofing can be considered for houses that cannot be raised.

Officers believe that \$180,000 will be sufficient to cover final design variations. The benefit/cost ratio for house raising is less than 0.75. As for Belmont, officers believe assistance to raise or flood proof houses is a social benefit to the community which should be provided.

6.4 Gemstone Drive

Floodwall and stopbank upgrade with Edge protections to 1900 or 2300

This option is to construct an Akatarawa Road floodwall and to upgrade the Gemstone Drive stopbank with corresponding edge protections to 1900 or 2300 standard. The main section of the floodwall will be 250m long with maximum heights of 1.5m and 2.5m for 1900 and 2300 standards respectively. The floodwall will restrict the access to river and will also have adverse visual effects, particularly for those residents on the eastern side of the Akatarawa Road.

This option costs \$1,190,000 and \$2,292,000 for 1900 and 2300 standard respectively. The benefit/cost ratios for both options are less than 0.10. The flood wall has the advantage of maintaining access to Akatarawa up to the design standard of the wall and Upper Hutt City Council officers believe a floodwall (to at least 1900 standard) should be provided.

House raising or other measures

This option is to assist residents who currently own floodable houses to minimise their losses. The standard for house raising has to be compatible with the community's preferred standard for non-structural measures, which will be finalised in June 2000. Officers believe that the standard for Gemstone Drive is likely to be 1900 as for Belmont and Bridge Road. This also compares with the 100 year structural/non-structural standard adopted in the Upper Hutt City District Plan for other areas of the city.

There are about 11 houses floodable in a 1900 event due to back flow of floodwaters over Akatarawa Road. The approximate cost of raising the 11 houses to 1900 standard is \$330,000. This option will not have the adverse environmental effects associated with the floodwall but the area (not the houses) will still be flooded causing services and traffic disruption.

The total cost of a 1900 standard stopbank and edge protection upgrade (\$720,000) and house raising (\$330,000) is \$1,050,000. The total cost of the alternative option for providing a 1900 floodwall is \$1,190,000. Both options are not economically viable. While house raising minimises the adverse environmental effects, the floodwall minimises the services and traffic disruption. The community will have the opportunity to provide input at the detailed design stage.

The equivalent options to provide a 2300 standard range from \$1,835,00 to \$2,292,000.

Officers recommend provision of \$1,190,000 to provide 1900 standard flood protection to Gemstone Drive.

6.5 Summary Statement

Officers have made a judgement to recommend a 1900 standard for both edge protections and house raising at the local Belmont, Bridge Road and Gemstone Drive areas. They also believe that opportunities must be made available for the communities at Belmont, Gemstone Drive and Bridge Road to provide input at detailed design stage.

The overall effect of the recommendations is a reduction of \$0.5 million in the total \$78.1 million estimate. Recommendations are based on the fact that lives will not be at risk and a reasonable level of protection will be provided to all residents in “local areas”, despite relatively low economic benefits.

The Advisory Committee has the option of increasing the house raising standard at Belmont, Bridge Road and Gemstone Drive to 2300 (including the stopbank and edge protections at Gemstone Drive). This will lead to an overall increase of \$0.7 million over the \$78.1 million design standard estimate. This additional expenditure will have a very low economic efficiency and it is unlikely that the wider community will prefer a 2300 non-structural standard for these areas of the floodplain.

7. Total Cost Estimates

7.1 “Local Area” estimates : September 1999

The total “design standard” implementation cost at September 1999 was \$78.1 million. This estimate included the following amounts for the areas under consideration:

• Belmont edge protections (2300)	\$ 804,000
• Whirinaki Crescent stopbank upgrade (2800)	\$ 670,000
• Bridge Road edge protections (2300)	\$ 340,000
• Gemstone Drive flood wall + stopbank (2300)	\$1,780,000
Total	\$3,594,000

7.2 Recommended 1900 “Local Area” Options and Estimates

• Belmont (1900 edge protections + 1900 House raising)	\$1,063,000
• Whirinaki Crescent (2300 stopbank)	\$ 470,000
• Bridge Road (1900 edge protections + 1900 House raising)	\$ 337,000
• Gemstone Drive (1900 stopbank + floodwall or house raising)	\$1,190,000
Total	\$3,060,000

7.3 Alternative 2300 “Local Area” Options and Estimates

• Belmont (1900 edge protections + 2300 house raising)	\$1,423,000
• Whirinaki Crescent (2300 stopbank)	\$ 470,000
• Bridge Road (1900 edge protections + 2300 house raising)	\$ 607,000
• Gemstone Drive (2300 stopbank + 2300 house raising)	\$1,835,000
Total	\$4,335,000

8. Recommendations

That the Advisory Committee:

(1) Receive this report and note its contents.

(2) Recommend to the Landcare Committee:

- *For Belmont, 1900 cumec standard (\$613,000) edge protections with assistance for house raising or other measures (\$450,000) at a total cost of \$1,063,000.*
- *For Whirinaki Crescent, a 2300 cumec standard for the stopbank upgrade at a total cost of \$470,000.*
- *For Bridge Road, 1900 cumec standard edge protections (\$157,000) with assistance for house raising or other measures (\$180,000) at a total cost of \$337,000.*
- *For Gemstone Drive, a 1900 cumec standard upgraded stopbank (\$720,000) with a 1900 cumec standard floodwall or assistance for house raising or other measures (\$470,000) at a total cost of \$1,190,000.*

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Attachment 1 : Local Area Investigations – Outcomes