

Work methodology and effectiveness

(a) Non-Structural

District Plan – Hazard information

- The River Corridor (which is also a zone), Ponding and Over Flow paths were included in the Kapiti Coast District Plan in 1995. These categories were revised in 2002 to reflect both changes brought about through construction of stopbanks and revised flood hazard categories.
- All resource consent applications in floodable areas are referred to GW.
- Where appropriate GW will advise KCDC of conditions to be applied to all development. Some properties have had flooding registered on their titles.
- Between 1995 and 2009, 83% of all building consents issued in a flood zone included a minimum floor level condition. Of these 74% are specified to the 1 in 50 year level and 9% are specified to the 1 in 100 year level.
- In addition to these figures GW advises Kapiti Coast District Council, developers and residents on development and building in floodable areas.
- Approximately 350 vacant sites could still be in filled within existing residential areas identified as being within the 100 year flood spread. These sites would only require building levels to the 1 in 50 year level. The district plan has no rules to provide control over activities in flood risk areas that would flood in a greater than 100 year event. No allowance for climate change has been included over the flood plain. This can not be done easily without upgrades to existing flood models.

Land use

WFMP policies seek to:

- Encourage open space provision, riparian management; reserve contributions or esplanade strips, discourage clearance of the upper catchment, and encourage reforestation of the upper and middle catchment through district and regional plans.
- Utilise structural methods to protect existing development.
- Ensure uses of flood-prone land use is appropriate to the hazard and costs associated with flooding.
- Implement long-term means of land use planning to reduce the flood hazard and limit future growth in potential flood damages.

- Prevent inappropriate development of the river corridor and overflow paths and ensure that development does not adversely affect flood mitigation structures.

Findings

- GW has achieved progress with these policies largely through resource consents. Some progress has been made in riparian management and restoration through the Environmental Strategy and Ecological Strategy. GW during this period has not had a large focus on upper catchment restoration (reforestation).
- The remaining policies have largely been achieved by GW through the district plan provisions, resource consents and consistent advice to KCDC and the community. The development of the Environmental Strategy and a lesser extent the Ecological Strategy for the River has also helped.

The changes on the floodplain in terms of development may be somewhat different than anticipated. Most new development has only been raised to the 50 year level, not to the 1 in 100 year level. Policies may need to be updated to reflect more current thinking in particular the 'avoidance approach' being articulated in the proposed RPS.

Education/Community Preparedness/Civil Defence and Emergency Management

- GW has prepared generic flood hazard information; KCDC has a community education programme; and Emergency Management has an active role in providing emergency response. Flood Protection responds to flood events and improves community preparedness through planning exercises in the community. Two exercises have occurred in Kapiti between 1995 and 2009.

However, sections in the WFMP need updating and refocusing including Civil Defence/Emergency Management links. Post disaster recovery issues need to be identified.

Land Procurement

The objective in the WFMP in the long term is that the remaining 56 hectares of privately owned land in the River Corridor be brought into public ownership (S.3.1.1.4)

Findings

Total land area in river corridor	178.52 Ha
Total land area public ownership in 1994	127.56 Ha (71.45%)
Total land area public ownership in 2008	136.68 Ha (76.56%)

Land acquisition is only being pursued when required for capital works. Reserve contributions through subdivision have not been significant at this stage.

Iwi

To date our responses have largely been issue driven or in response to resource consent applications. Further opportunities exist through the Environmental Strategy and Ecological Strategy and should be advanced with iwi. Inclusion of or reference to the 'Cultural Health Index' needs to be considered. Other opportunities for communication exist through Ara Tahi or regular meetings outside formal walkovers or annual inspections of the river.

Ecology

Policies included in the WFMP include protecting habitats and species of high conservation value, maintaining habitat diversity and value, minimising disturbance and damage to habitats and species during river management activities, and enhancing the riparian environment wherever possible. Further, to identify and protecting features and areas of significant landscape value and recreational resources of significant value, minimising disturbance and damage to the recreational and landscape resources of the floodplain and enhancing recreational and landscape values wherever possible. For heritage, the WFMP policies seek to maintain adequate knowledge of sites of historical importance to the local community and to include consideration of historic sites when evaluating flood mitigation options and other developments within the floodplain.

Findings

These policies have been achieved through the development of best practice guidance for undertaking river works and the development of an Environmental Strategy and Ecological Strategy.

Comments

Best practice methods need continual improvement to minimise adverse effects. More emphasis needs to be placed on the best practice guidance and Environmental Strategy for implementation of the above policies or the policies changed to reflect what we actually do.

Community

Policies include preparing a management strategy for the Waikanae River, ensuring the community recognises that flooding is a natural process that cannot always be prevented or controlled. Ensure consultation with the community takes place before implementing flood mitigation methods and reducing or avoiding the adverse effects of flooding through careful management and timing of flood mitigation methods. Finally, minimising any resulting inconvenience to the community.

Findings

The establishment of the Friends of the Waikanae River has provided a key link between GW and the community and the meeting of the Community Policies set out in the plan. Support of the Friends Group and other GW programmes has also resulted in a significant improvement to the environmental and ecological outcomes.

- GW advice (Streams Alive), riparian planting guidelines

- Ongoing Consultation: Annual “walkovers” of the river corridor with FWR,DOC,KCDC, Fish and Game and iwi (through conditions of consent)

Comments

GW has achieved most if not all of the key non-structural components of the WFMP. However, it is a much more difficult task to measure the effectiveness of them in terms of damages saved or community awareness and preparedness. From our review of the effectiveness of land use measures, development on the floodplain may not be taking into account flood risk beyond a 1 in 50 year flood event. To date an ‘avoidance approach’ has not been discussed with the community and development behind structural flood defences will go on unchecked unless rules are strengthened to recognise the residual risk of over topping.

Environment Strategy

An environmental strategy was developed in 1999 by GW and KCDC with input from iwi, DOC, landowners, environmental organisations and the community. The first review is due for completion shortly.

Methods for protecting and enhancing the river corridor are identified (for GW and KCDC). Most of these have been established. A close working relationship with Friends of the Waikanae River (FWR) has also been established. A 5 year planting plan has been prepared. Planting sites for native trees has been prepared for FWR.

(b) Structural

Road Raising

- Otaihanga Road south - 800m length from start of Makora Road was completed in 2000. Performed well in the 2005 flood.
- Makora Road west - Works did not proceed at the request of residents because of their concerns regarding traffic safety and access issues. KCDC have no plans to upgrade this section of road. Protects 6 houses. Flooding occurred on these properties during the 2005 flood.
- Makora Road (adjacent to the Otaihanga Domain) - A flood wall was constructed in 2003 rather than raising the road as originally planned. Overtopping occurred at the Otaihanga Domain entrance in the 2005 flood. There have been problems with the performance of the flap gate and flooding from behind the floodwall. Further investigation is recommended.

Stopbanks

- Stopbanks that have been completed are Kauri/Puriri Road (510m), Greenaway Road (30m) and Chillingworth (120m). All these stopbanks performed well in the 1998 (15 and 28 year

flood events) and 2005 floods (80 year flood event), providing protection to over 450 houses. Previously the stopbank only provided protection for a 10 year flood event.

- Stopbanks that have not yet been constructed are Jim Cooke Park (760m), Lion Park (180m) and Waimeha Golf Course (520m). The Jim Cooke Park stopbank, which includes a retaining wall at the upstream end, is programmed to commence in 2013/14. The Lion Park stopbank is not programmed for construction within the next 10 years. Options for ring banking vs house raising may need to be reconsidered as site conditions have changed. The Waimeha Golf Course stopbank will be reconsidered following a detailed review of the hydrology and hydraulics of the Waimeha and Ngarara catchments.
- Summary of overall achievement:

Length of stopbank in WFMP	Length of stopbank completed	% complete
2120m	660m	31

- The hydraulic review raises concerns that the existing stopbanks need raising in places to cope with future climate change.

Bridge Lengthening

- The Fieldway bridge needs lengthening to 18m, the channel widened, debris arrestors put in place, and further channel realignment is needed at the Waimeha mouth. This has not proceeded because of uncertainty about flood discharges from the Waimeha and Ngarara Streams owing to lack of catchment information and rainfall data. In addition there is little information regarding historical flooding in the area.
- A detailed review of the hydrology and hydraulic model for the Ngarara/Waimeha catchment areas is presently being undertaken by KCDC. This information will be used to confirm or otherwise the need for bridge lengthening.

House Raising

- 73 Makora Road and 11, 13 Toroa Road house raising were completed in 2000. These houses were not flooded in the 2005 event.
- 1-17 Makora Road. Only number 17 has been raised to date. It is anticipated that only 4 additional houses need be raised as the majority of these houses have already been rebuilt to the 100 year flood level.
- 61 Makora Road Stopbank. This house has had a substantial upgrade since the WFMP was prepared with the lower area now primarily being a basement. The property was flooded in the January 2005 flood, however the owners have not requested any assistance from GW.

- In addition to the above, 15 Toroa Road was raised and 21 Makora Rd was flood proofed following flooding that occurred to these properties in the 2005. 15 Toroa Road had not been included in the WFMP.
- Summary of overall achievement:

Number of houses to be raised in WFMP	Number of houses in WFMP raised to date	Extra number of houses raised to date	Revised number of houses yet to be raised	% complete
14	4	2	4	60

- All houses raised to date have withstood flooding, notably those that were raised prior to the 2005, 80 year flood event.
- The hydraulic review raises concerns that the houses raised may be susceptible to future climate change.

(c) River Management

Routine Maintenance

- The normal river training techniques have been reasonably successful in maintaining the river channel within the preferred channel alignment. However, these low cost methods have not always proved successful, particularly during major floods. Major channel realignments and hard bank edge protection works (rock rip-rap and groynes) have been required at some locations as described in the Plan.
- A major flood in October 1998 eroded several sections of existing erosion protection work below SH1 and resulted in the advancing of construction of the major protection works proposed in the WFMP.
- Cross-blading has been reduced following the completion of the hard edge protection works. The main location where cross-blading is regularly required above Greenaway Road, XS 210-260RB. This location was identified for hard edge protection in the WFMP (Greenaway Road)
- The current level of operations expenditure \$65,000 (1997) or \$103,000 (2008/9) is still considered appropriate.
- Gravel extraction has been undertaken annually as recommended in the 5 yearly gravel analysis reports.
- The current river maintenance practices, together with the major improvements made, have resulted in a relatively stable and efficient channel which has lowered flood levels and reduced potential damages to the river berms, environmental plantings, stopbanks and properties.

Gravel Extraction

- The recommendations in this section of the WFMP have been carried out in order to achieve the aim of maintaining overall bed levels at the status quo (1991 surveyed levels), where possible, and hence maintain the existing channel capacity of the river.
- Cross sections were initially surveyed in 1991 and subsequently in 1995, 1999 and 2004. The bed levels from these surveys were analysed and recommendations made for locations and amounts of gravel to be extracted. Overall the results show a general trend of aggradation from the mouth to Jim Cooke Park (JCP) and degradation above this point. The change from aggradation to degradation at section 300 coincides with a change in grade in the river.
- The 1995 gravel analysis resulted in a recommendation to continue extracting 3000m³ of gravel annually, in locations that provide the maximum benefit to the river channel management.
- Following the 1999 bed level survey it was recommended that work be initiated to determine optimum bed levels for the lower reaches of the river. This resulted in a resource consent (WGN 020106) being obtained to extract a further 35,000m³, over 5 years 2002-2007, from the lower Waikanae River to remove the gravel build-up that occurred following the 1998 floods. The area within the DOC Scientific Reserve was excluded owing to objections received. The amount that could be extracted during the 5 year period amounted to 30,815m³.
- Analysis of the 2004 survey results showed that aggradation below JCP had increased, which has resulted in the annual extraction volume being increase from 3000m³ to 9000m³. The objective was to extract within the reach between Sections 70-220 and hence minimise the requirement to work in the DOC scientific reserve and coastal marine area.
- Over the three years 2005/6 to 2007/8 an average of only 5,130m³ of gravel was able to be extracted per annum under the current resource consent conditions. This occurred between El Rancho and Jim Cooke Park. Extraction below El Rancho was not feasible under the current conditions of the consent.
- The 2004 gravel analysis report recommended that:
 - (a) Flood Protection applies for an amendment to their resource consent to enable extraction from below water level.
 - (b) Supply the results of the survey to DOC and discuss the implications. If appropriate, seek their approval to proceed with extraction in the tidal reach. This approval should be sought as part of an overall agreement to undertake river management works in the Scientific Reserve.

The above tasks are underway but are not yet been completed.

- The 2004 gravel analysis report recommended that the 10 year WFMP review should include:
 - (a) A study of the impacts of the erosion in the upper catchment following the 2005 flood to determine what benefits would be gained from greater controls on vegetation cover in the upper catchment.
 - (b) Reconsider the river training approach above Jim Cooke Park to determine whether more bed control structures may be required to minimize bed level degradation.

These matters are being considered.

- A limited cross section survey was carried out in 2008 which showed that 10,000m³ of fine gravel had accumulated at the upstream end of the Scientific Reserve and a further 10,000m³ of sand had accumulated further downstream within the Scientific Reserve. This has the affect of raising the 100 year flood level at the Makora Road but only by an estimated 100mm. The situation will be considered as part of this review and will also be reassessed following the next bed level survey in early 2010.

River Mouth Management

- The river mouth has been inspected on a regular basis to ensure the recommendations in this section of the WFMP are followed. Minimal maintenance has been necessary since the mouth was last cut in December 2001. It was expected that a mouth cut would be required every 5 years but only one has been required in the 12 years since the plan was adopted.
- There are issues relating to gravel/sand build up just upstream of the mouth which will be investigated in this review and also during the next gravel survey investigation in 2010.
- The trigger point for when “tide levels at Otaihanga rise to a point where they are 300 mm above normal sea levels,” needs clarifying.
- An agreement (MOU) is required with DOC for proposed future works within the Scientific Reserve.
- Predicted future increases in sea levels and coastal accretion means that more frequent cutting of the mouth and sand/gravel extraction together with structural mitigation measures may be necessary in future.
- Further studies on river mouth migration and coastal processes are suggested to determine the most appropriate form of mouth management into the future.

Programmed Major River Realignment Works

- River realignment and bank edge protection works that have been completed are Otaihanga (part-190m), El Rancho (420m), Jim Cooke Park (690m), River Glade (200m), Kebbels (290m), Edgewater Park (300m) and State Highway One (410m). Apart from Otaihanga (completed 2009) and Jim Cooke Park (completed 2007), these works performed well in the 1998 and 2005 floods. The exception was the SH1 and Kebbels weirs which have eroded on a number of occasions and required topping up.
- River realignment and bank edge protection works that have not yet needed to be carried out are the mouth (460m), Otaihanga (570m) and Greenaway Road (990m).

- Summary of overall achievement:

Length of river realignment in WFMP	Length of river realignment completed	% complete
4520m	2500m	55

- At the mouth (XS 0-50) there is minor erosion of the south bank and the main river channel has moved southward outside the preferred channel alignment. This is possibly caused by sand build up on the northern side of the channel opposite the Waimanu Lagoon. The area requires monitoring and will be further assessed following the next gravel survey in early 2010. Options to be considered are gravel/sand removal, bank edge protection works, mouth cutting and foredune lowering. Any future major works will protect the Scientific Reserve and properties in Waiheke Street and Manly Street.
- At Greenaway Road the river channel is on a long left turning bend and the willow and block line edge protection is regularly eroded on both sides of the river. Cross blading and gravel extraction has been necessary over the years to prevent serious erosion of the existing edge protection and access ways on the north and south banks.