

# UPPER WAIRARAPA VALLEY FLOODPLAIN MANAGEMENT PLAN

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## ABSTRACT

The town of Masterton, in the Upper Wairarapa Valley is bordered by three large active gravel bed rivers (Ruamahanga, Waipoua and Waingawa). The resource consents for undertaking river maintenance activities on these rivers as well as another three rivers in the Upper Wairarapa Valley are due to expire in 2015. This has presented an opportunity to review the type of activities undertaken in and around these rivers with a more holistic view of the entire floodplain that incorporates the needs and interests of the broader community.

The process being used to undertake this review is described in the Greater Wellington Regional Council (GWRC) Floodplain Management Plan (FMP) Guidelines. The process was originally developed back in the late 1980's and was based on flood risk management international best practice concepts including the New South Wales Government's Floodplain Management Manual and those presented in Neil Ericksen's seminal paper "Creating Flood Disasters?". The fundamental concepts of the process are:

- Managing the continuum of flood risk from small, frequently occurring flood events through to the largest floods a catchment can generate;
- Active participation of the community in the process of defining the flood problem and developing acceptable solutions for their river;
- Using a combination of measures to manage the continuum of flood risk, such as river management (in channel works) structural protection (stopbanks, rip-rap etc), planning controls and emergency management;
- A planning philosophy based around making sure land use is compatible with the flood risk. This philosophy includes avoiding new development in flood prone areas and keeping people away from floodwaters rather than trying to keep floodwaters away from people.

The process was successfully used in the 1990's for developing FMPs for the Otaki, Waikanae and Hutt Rivers. The process is currently being updated to incorporate the lessons learnt from developing these FMPs along with current community expectations, resource management requirements and co-management opportunities.

This paper will describe the updated FMP process and how it is going to be applied to the floodplains surrounding Masterton.

## KEYWORDS

**Floodplain management planning, collaborative decision making, Upper Wairarapa Valley.**

## **PRESENTER PROFILE**

George Harley is a flood protection engineer with Greater Wellington Regional Council, he is based in their Masterton office, Wairarapa and is currently part of the project team tasked with delivering Phase 1 of the Upper Wairarapa Valley Floodplain Management Plan. Before joining GWRC his previous experience has been primarily within engineering consultancy in the UK and New Zealand. Over the last 10 years he has been involved in projects covering small hydro development, flood protection, sustainable urban drainage and reticulated water and wastewater systems.

## **1 INTRODUCTION**

Floodplain management planning is an internationally recognised process that provides a comprehensive long-term strategy for managing areas at risk from flooding. However, effective management of risk requires political leadership and widespread community understanding and acceptance of the range of flood risk measures available which, in turn, can present particular challenges concerning the selection and implementation of an appropriate response. A common example of this is avoiding development in flood prone areas versus building structural protection measures that result in development of these areas.

Floodplain management planning generally involves the following steps:

- Investigating and understanding the probability and likely extent and consequences of flooding on the economic, social, cultural and environmental values within a defined catchment;
- Identifying, evaluating and selecting a range of appropriate flood risk management options; and
- Implementing a preferred option(s) for managing the flood risk in a manner that ensures a co-ordinated response by relevant agencies and/or individuals.

The above process results in a Floodplain Management Plan (FMP). Floodplain management planning is a high-level strategic planning tool which allows decision-makers and the community to identify and agree policies and methods for sustainable flood risk management.

This paper outlines the national legislative framework that sets the context and responsibility for floodplain management, and provides a summary of how the GWRC floodplain management philosophy evolved and was applied to the floodplain management plans developed for the Otaki, Waikanae and Hutt rivers. It includes details of the updated version of the GWRC FMP guidelines and how these are being applied to managing flood risk in the Upper Wairarapa Valley.

## **2 NATIONAL LEGISLATIVE FRAMEWORK**

There are five key statutes in New Zealand that provide the legal framework for flood risk management. They cover a broad range of private property and public good issues relating to; land development and management; land use controls; flood risk management and its funding; flood emergency response and recovery; and flood protection insurance. Each of the statutes performs a distinct and important role in

managing flood risk and provides a range of legislative mechanisms to enable effective flood management across local and central government. The statutes are:

- Resource Management Act 1991;
- Building Act 2004 (and Building Code 1992);
- Local Government Act 2002;
- Soil Conservation and Rivers Control Act 1941;
- Civil Defence Emergency Management Act 2002.

A number of other statutes also influence to a lesser degree flood risk management; these are:

- Public Works Act 1981;
- Land Drainage Act 1908;
- Local Government Official Information and Meetings Act 1987;
- Earthquake Commission Act 1993;
- Environment Act 1986;
- Local Government (Rating) Act 2002.

An important feature of the flood risk management legislation is that it is generally enabling rather than requiring (MfE, 2008). It puts the responsibility of managing flood risk on regional and territorial authorities without specifying specific levels of protection or the approach that should be taken in providing that protection. The exception is the Building Code which requires residential properties to be free from inundation from a 2% annual exceedance probability (AEP) event.

The enabling nature of the legislation has resulted in regional and territorial authorities developing their own objectives, rules and levels of protection for flood risk management through district and regional plans as well as non-statutory guidance documents.

The Proposed Regional Policy Statement for the Wellington Region is the primary statutory document which sets the objectives and policies for flood risk management. Key policies relevant to floodplain management planning are:

- Policy 28 Avoiding subdivision and inappropriate development in areas at high risk from natural hazards.
- Policy 50 Minimising the risks and consequences of natural hazards.
- Policy 51 Minimising adverse effects of hazard mitigation measures.

Implementing these policies is shared between regional and territorial authorities, through methods such as Regional and District Plans, resource consents, and provision of information. GWRC have a Regional Freshwater Plan that enables a number of flood risk management activities to be undertaken as well as a number of resource consents that enable works to be undertaken to manage flood risk.

The FMP provides the framework for determining the nature and extent to which each of the above methods is necessary to respond to identified flood risks. The FMP Guidelines set out the background and purpose of floodplain management planning and the FMP process. The next section explains the overall philosophy that has underpinned these guidelines over the last 20 years.

### **3 OVERALL PHILOSOPHY**

The GWRC philosophy originated from a 1990 paper by Brendan Paul to the then Operations Committee entitled "Floodplain Management Planning". The key message from this paper was the change in approach from focusing on structural solutions to one of floodplain management planning. This approach was very much aligned with the recommendations of the seminal work undertaken by Ericksen (1986) and the 1986 NSW Floodplain development manual.

The following quote from Ericksen (1986) sums up the shift in focus very succinctly:

"The flood hazard is defined as the interaction between two systems: the physical flood event, and human use of the floodplain. Characteristics of the physical flood event that are important for analysing impacts on human occupation of the floodplain include in particular: magnitude, frequency of occurrence, speed of onset, and areal extent of flooding. Characteristics of human use of the floodplain important for analysing flood impacts include: perception of risk; types, densities and distributions of land uses and social organisation on the floodplain. Clearly, then, the flood event is not in itself the flood hazard. Its potential for hazard is not realised until related to people and their works. Thus, flood potential – defined mainly in terms of human casualties, property damages, and social disruption – depends not only on the characteristics of the flood event, but on characteristics of human activity on the floodplain".

This change in focus to looking at the characteristics of the human activity on the floodplain rather than only looking at structural measures to try and prevent flooding of the floodplain was the real cornerstone of the philosophy. This type of approach can also be described as keeping people away from flooding rather than trying to keep flooding away from people.

From this starting point, the original GWRC approach to floodplain management planning developed. The key features of this approach being the management of the full continuum of flood risk from the smallest to largest imaginable flood considered, that a fully inclusive, collaborative approach to identifying, evaluating and selecting management measures was used, and that any decisions were made on a full and clear understanding of the river and floodplain environment.

This original process evolved and was used to develop FMPs for the Otaki, Waikanae and Hutt Rivers during the 1990s. The key outcomes from the development of these plans is summarised in the following section.

## **4 WELLINGTON REGION FMP KEY OUTCOMES TO DATE**

### **4.1 OTAKI AND WAIKANAЕ RIVERS**

These two FMPs were developed over the same period (mid-late 1990's) and in the same district so share many similarities in their intended outcomes and implementation.

#### **4.1.1 NON-STRUCTURAL**

Non-structural outcomes focussed on flood mapping showing different flood hazard categories; the Kapiti Coast District Plan has implemented land-use and building controls based on these, such as controlling new residential development in ponding and overflow areas. There is still further work to do in requiring minimum flood levels in residual flood hazard areas and putting in place building controls for existing residential lots. GWRC provides advice to Kapiti Coast District Council (KCDC) on resource consent applications within flood hazard areas.

Flood warning systems have been put in place for both rivers based on both telemetered stage gauges and rainfall alarms.

#### **4.1.2 STRUCTURAL**

Out of approximately 6,700 m of stopbanks proposed under the Waikanae and Otaki FMPs, around 2700 m has been constructed. All stopbanks protecting urban areas are designed and built to a 1% AEP standard (including an allowance for climate change effects) while stopbanks protecting rural areas have been built to a lower standard. The most important feature of the structural works is the link back to the non-structural outcomes, in particular the land use and building controls associated with residual risk. This linked approach is fundamentally important to avoiding the situation where the construction of stopbanks could enable floodplain intensification which increases the consequences of failure.

Other structural outcomes have included stream clearing/widening, new floodgates, upgraded culverts and house raising/floodproofing. Bridge raising or lengthening is proposed for two bridges but this will likely be delayed until the bridges are due for replacement.

#### **4.1.3 RIVER MANAGEMENT**

Under the Waikanae and Otaki FMPs, river management included both day-to-day maintenance activities (gravel extraction, vegetation maintenance, channel clearing and cross-blading, bank erosion repairs, mouth cuts) and also major works on the river channel and berms. Both rivers have had realignments carried out with the inclusion of rock groynes and edge lining. Both rivers are managed to a design channel alignment with a vegetated buffer established where land ownership permits. In some cases, land has been purchased or river realignments carried out to establish the design alignment and allow the buffers to be created.

#### **4.1.4 ENVIRONMENTAL STRATEGY**

An Environmental Strategy has been prepared for each river, which sets out the overall community vision and guides methods used to implement channel management and recommends environmental enhancement works carried out on the river. In practice the environmental strategy is used as a reference tool to ensure that river management activities are carried out in a way sensitive to values and 5% of the budget for all structural/capital works is invested in environmental enhancement. The intention of the Environmental Strategies can be used by all parties with an interest in environmental enhancement to guide and structure environmental works in the river corridor (which include amenity facilities and improved recreational access). GWRC also spends a portion of the planting budget each year on native planting in support of community groups doing this work.

#### **4.1.5 LESSONS LEARNED**

Both the Otaki and Waikanae River FMPs were a success due to the process followed and the plan document produced. The FMPs have delivered more than the original key

outcomes. The process followed in developing the FMP included full community engagement throughout the development process. This process has created a legacy where the FMP was endorsed by local authorities, iwi and the Friends of both the Waikanae and Otaki Rivers, and these organisations continue to work with GWRC in delivering the FMP vision and projects. The durability of the plans can be attributed to the nature and level of engagement and including everyone's point of view. In addition, with wide ranging views and interests, the successful outcome highlighted the necessity to trust the FMP process to refine and provide the best FMP recommendation.

The process for developing and preparing these FMPs was very time consuming and long (i.e. 7 years). Although a lengthy process may seem undesirable, it delivered numerous additional intangible benefits to the GWRC Flood Protection Department, GWRC overall, local authorities and the community. The benefits included improving awareness of the flood risk, building relationships, confidence and understanding at all levels. These lessons were carried forward into the development of the Hutt Floodplain Management Plan which commenced in 1998.

## **4.2 HUTT RIVER**

The Hutt River FMP was completed after the Otaki and Waikanae FMPs and was undertaken in a very different environment with a much larger and diverse population and significant level of existing development on the floodplain. The floodplain of the Hutt River contains New Zealand's largest urban area at risk of flooding and the scale of investment in floodplain management. Notwithstanding this, the general approach of the FMP (non-structural, structural, river management and environmental outcomes) and its emphasis on keeping development away from flooding rather than keeping flooding away from development, remained unchanged from the earlier FMPs. Key differences between the earlier FMPs and the Hutt River FMP include:

- Adoption of a risk-based 2300 m<sup>3</sup>/s design standard for the Hutt River. Major stopbanks are to be upgraded to a 2800 m<sup>3</sup>/s (rare flood), most other stopbanks are designed/upgraded to a 2300 m<sup>3</sup>/s standard (0.23% AEP). Bank-edge and berm protection is designed to a 2300 m<sup>3</sup>/s standard for main urban areas and a 1900 m<sup>3</sup>/s standard (1% AEP) for isolated and small urban areas;
- Channel and berm capital works are included under structural outcomes;
- Implementation of land-use controls is complicated because the floodplain resides within the boundaries of two separate city councils;
- Non-structural measures were covered in greater detail, going into areas such as hazardous substance storage, key infrastructure locations, stronger earthworks controls and the inclusion of voluntary actions that will be encouraged under the FMP;
- The inclusion of a moving erosion area upstream of Upper Hutt where development is discouraged and landowners/developers will be responsible for constructing and maintaining any erosion protection works that are required.

### **4.2.1 LESSONS LEARNED**

The Hutt River FMP was a different challenge to both Otaki and Waikanae FMPs. Being the most urbanised floodplain in New Zealand, it had potential to affect a vastly greater number of people. The scale of potential damages exceeded that of Waikanae and Otaki combined and the river had already been confined into a much less natural state.

The Hutt River had historically been confined against the Western side of the valley to allow for further development of Hutt city and Upper Hutt city on the floodplain, and this development potential had been further encouraged by creation of a network of stopbank infrastructure. This existing development constrained the outcomes for the Hutt FMP, and reduced the opportunity for implementation of avoidance flood risk management options. As a result, a risk based standard approach was developed, where varying levels of protection were agreed for different areas of the floodplain. The urban centres were provided a higher design standard protection (0.23% AEP) than less densely populated suburbs (1% AEP), and planning controls focused on securing the remaining river corridor and advice around locations of key lifeline and high vulnerability assets such as hospitals and civil defence control centres.

Difficulties were encountered with managing community engagement on this scale, and the development of a "Friends of the Hutt River" as a representative community organisation was not achieved during the development of this plan.

The Hutt River FMP highlighted the opportunities for avoidance of risk that are lost when a floodplain management plan is developed when a floodplain that is already in a fully urbanised state. It highlighted the difficulties in engaging urban communities. It recommended the use of a risk based standard as an approach to floodplain management planning as a reactive method of ensuring land use is appropriate to the flood risk. It sought and achieved endorsement from local authorities, iwi and affected communities.

## **5 GREATER WELLINGTON FMP GUIDELINES**

GWRC's approach to floodplain management planning evolved into a five stage process during the development of the Otaki and Waikanae FMP's. This process was subsequently applied to development of the Hutt FMP.

Separate to this, in 2004, Standards New Zealand revised its Risk Management Standard NZS4360:2004 and followed this by developing NZS9401:2008 Managing Flood Risk – A Process Standard. The intent of the process standard was to provide a guide for decision making and not to be a technical or performance based standard. As with the legislation related to flood risk NZS9401:2008 is geared towards enabling local decision making and management rather than stating what standards should be met. This was the first process standard to be released in New Zealand and it was broadly aligned with the approach used by GWRC in the development of the Waikanae, Otaki, and Hutt FMPs.

One superficial difference between the GWRC process and NZS9401:2008 was the use of a five stage approach by GWRC compared to the three stage approach proposed in NZS9401:2008. The three stages in the NZS9401:2008 process standard are; establish the context, understand the risk and treatment options, and achieve sustainable solutions. The GWRC stages covered the same topics but included two separate steps covering the understanding and selection of the treatment options as well as two separate steps for achieving sustainable solutions.

Even though there were some differences in the definition of each step the overall outcome was still the same and more fundamentally the six key principles underpinning the NZS9401:2008 process were very much aligned with the GWRC philosophy and were in fact the key things that underpinned the success of the Waikanae, Otaki and Hutt FMPs. The six key principles stated in NZS9401:2008 are:

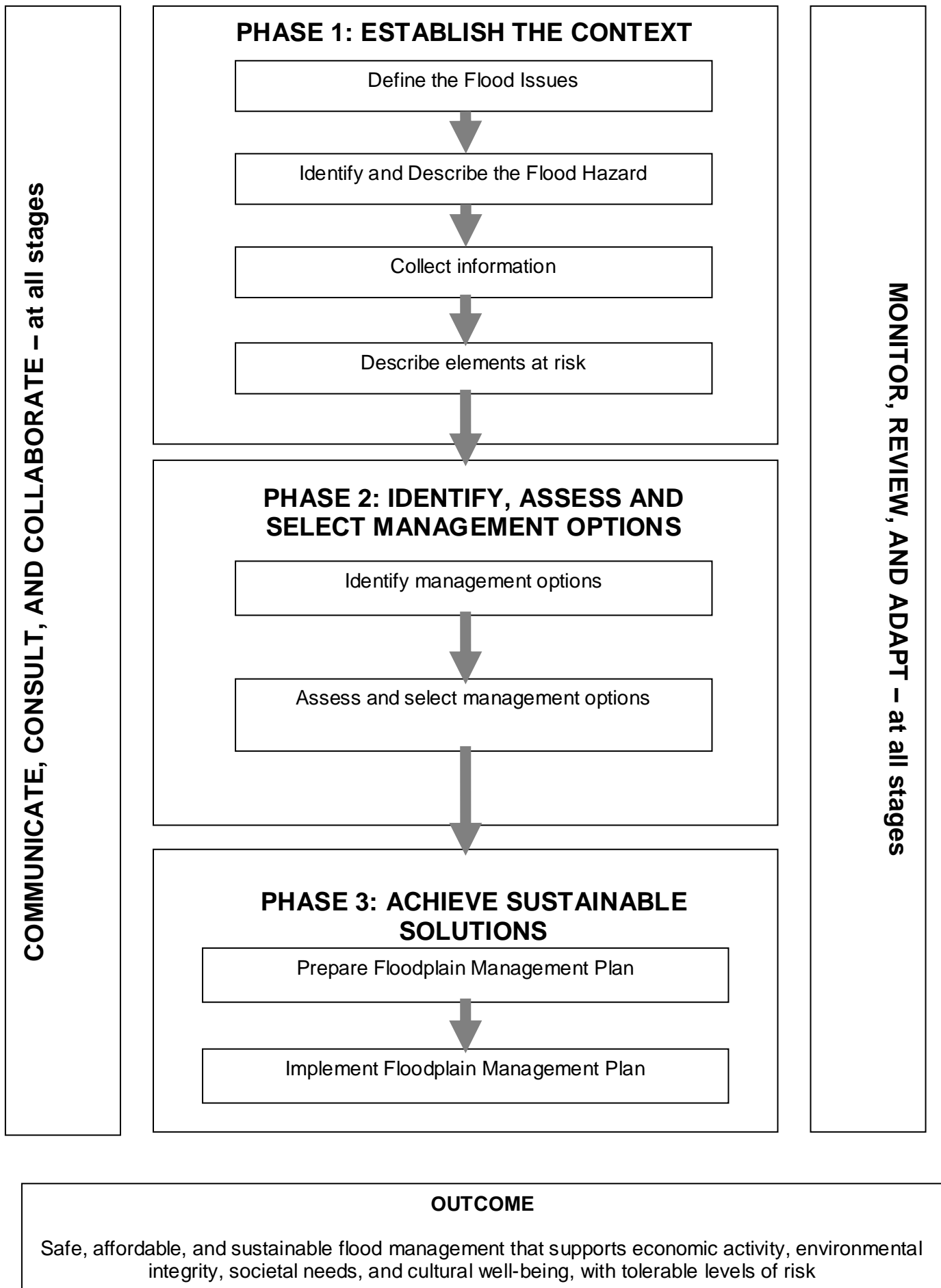
- Engaging communities and stakeholders;
- Understanding natural systems and catchment processes;

- Understanding the interaction of natural and social systems, in a catchment-based context;
- Decision-making at the local level;
- All possible forms and levels of management;
- Residual risk.

GWRC considered it important to incorporate and align its FMP approach with NZS9401:2008 so a review was initiated to create a more prescriptive guideline for GWRC officers involved in the development of FMPs. This guideline would encompass GWRC's core values and build on the lessons learnt and strengths of the Otaki, Waikanae and Hutt FMP development processes, and align the five stage process with the three stage process described in NZS9401:2008. The three stage GWRC process aligned with NZS9401:2008 is shown in Figure 1 overleaf.



Figure 1: GWRC FMP Process (based on NZS9401:2008)



The GWRC FMP guidelines provide a list of principles very similar to that contained in NZS9401:2008. These principles are:

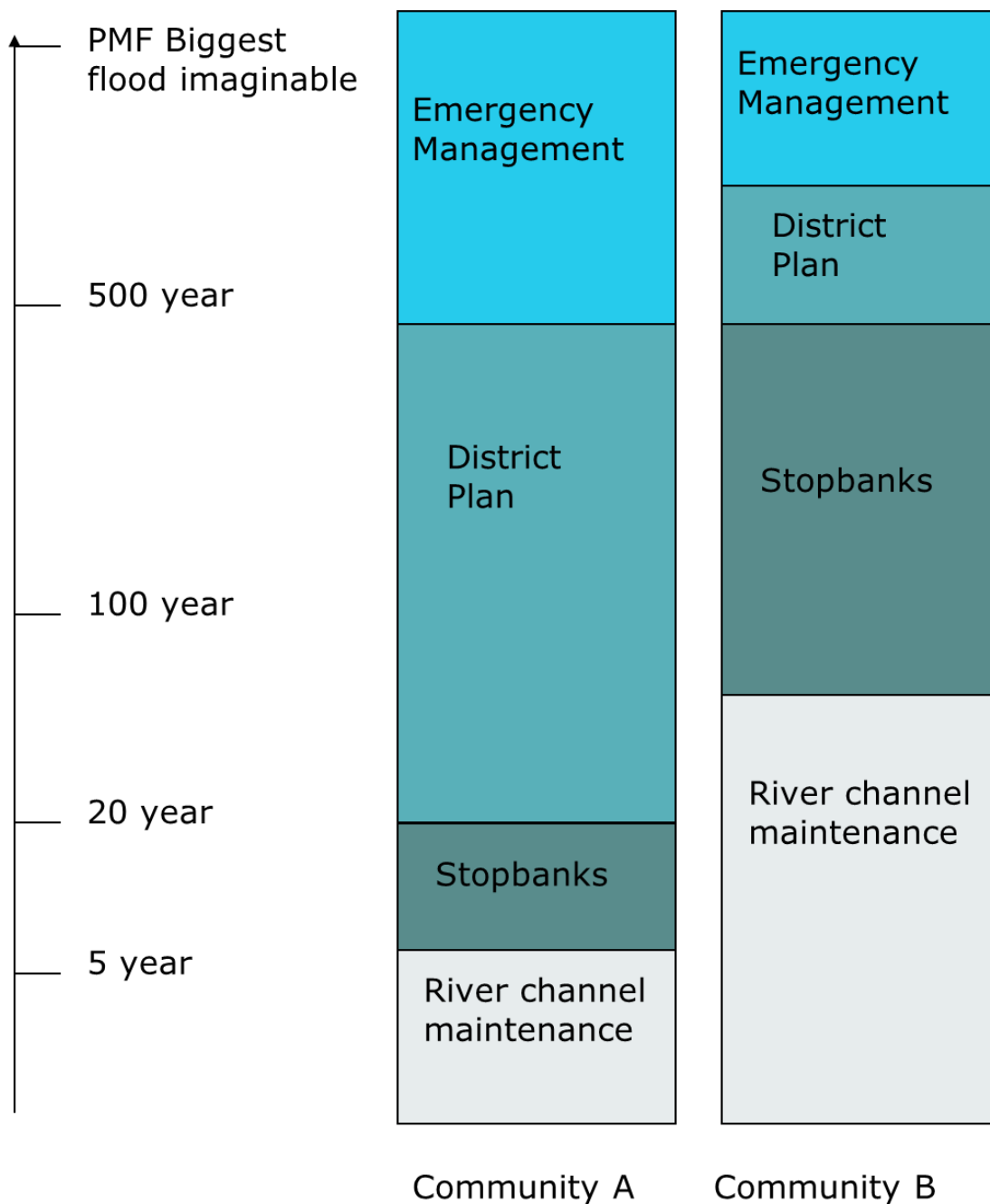
- Engage with communities and stakeholders to identify and understand flood issues and risks, formulate and evaluate flood risk management options and implement the FMP, where decisions are a shared responsibility of all relevant interests. Decisions will be based on how communities seek to manage risk in terms of their interests and affordability;
- Undertake an assessment of current and projected flood risk from all sources within the catchment by understanding the parts that make up risk (both probability and consequence) and the effect of current measures to reduce flood risk;
- Identify opportunities and constraints within the catchment to reduce flood risk through strategic changes or responses such as changes in land use, land management practices and/or the flood protection infrastructure;
- Develop complementary policies to manage long-term flood risk that take into account the likely impacts of climate change and the effects of land use and land management within the floodplain and wider catchment, and that offer a range of benefits, including contributing towards sustainable development;
- Identify opportunities when managing flood risk to maintain, restore or improve the natural, recreation and cultural values of the river and catchment; and
- Identify and assess the relative priorities for actions or projects to manage flood risk within the catchment, and assign responsibility for their implementation.

Any weighting that might be applied between structural and non-structural measures will be influenced by practical considerations, such as:

- The nature and extent of development on the floodplain;
- Whether the river's natural pathway is already confined by development; and
- The costs of constructing and maintaining structural measures and the imposition on landowners of land use controls.

To provide a better idea of the practical application of the FMP process the four broad categories of management options are shown (Figure 2.) in relation to their design standard and how this can vary between different communities.

Figure 2: Design standards for the categories of FMP options for two different communities.

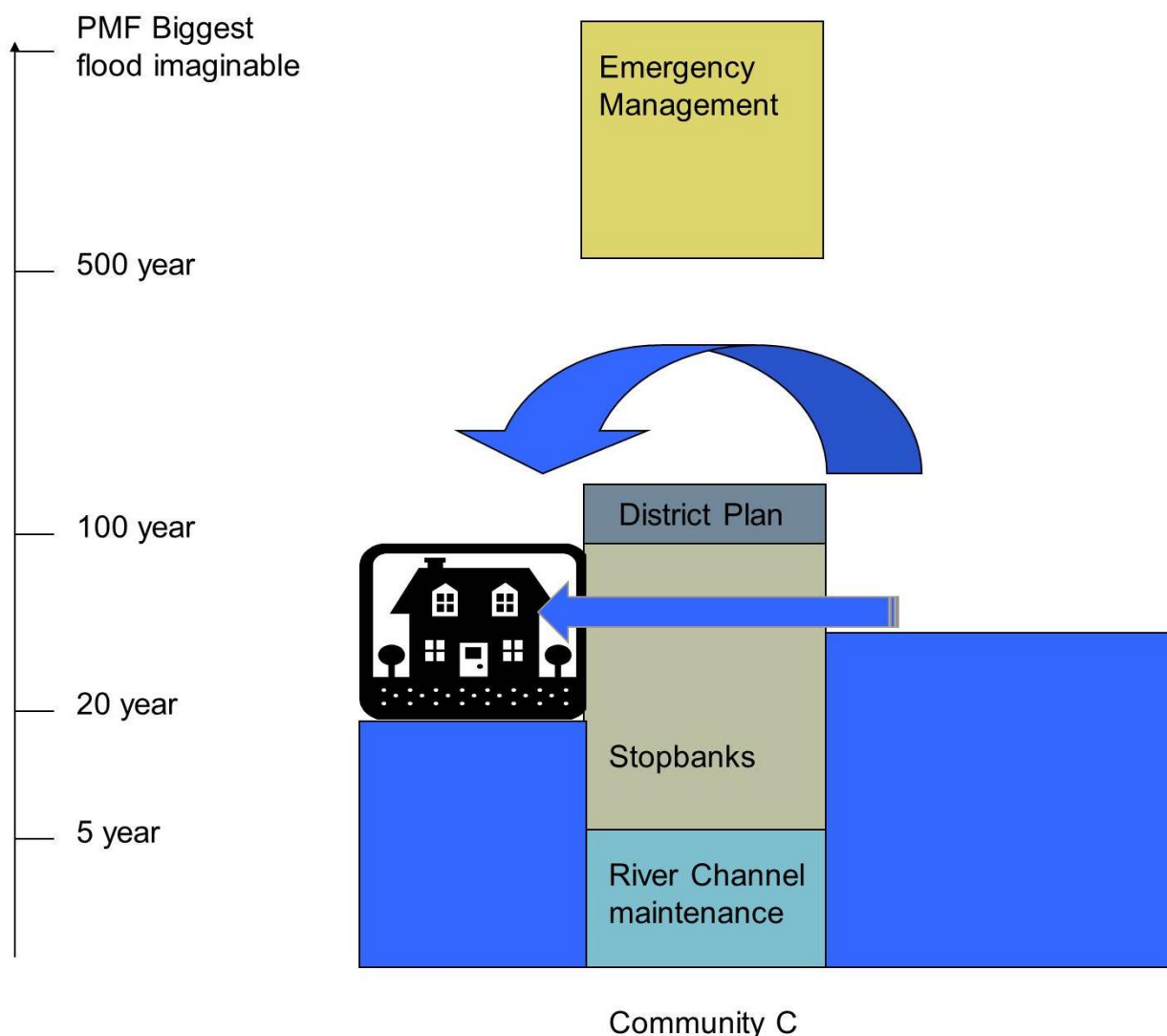


This simple figure tells a very valuable story that encompasses all of the key principles of effective floodplain management planning. Firstly, each community is different and will have different expectations and requirements for managing flood risk. The only way to work out what is going to work for a particular community is to engage with them and take them on the journey of understanding the flood risk, exploring and selecting the options and then implementing those options. Each option has a range of design conditions which can be applied to it but there must not be any gaps.

Figure 3 shows an example of where stopbanks are built to a 1% AEP, the District Plan rules cover events up to the 1% AEP but Emergency Management is only planned for the most extreme events (> 0.2% AEP). A number of potential issues arise from this arrangement. Firstly stopbanks can fail at events less than the 1% AEP for a range of reasons including piping, stock damage, leakage along pipelines, channel aggradation/avulsion, erosion, growth of vegetation in excess of design. Stopbanks and

other structural measures can also fail when the design flood is exceeded. If the District Plan rules and Emergency Management procedures don't allow for these residual risks over the full continuum of events then flooding will inevitably occur.

Figure 3: Impact of gaps in the floodplain management options.



The next fundamental aspect is that flood risk management is NOT about designing stopbanks to the 1% AEP plus climate change level. It is about considering the range of options that can be used to manage the continuum of flood risk that exists on a floodplain and the residual risks associated with these option. The importance of river channel maintenance and how this links to the effectiveness of structural options such as stopbanks is also vitally important. Stopbanks built to a particular height based on the river bed level and channel vegetation at the time of design can become irrelevant if a lack of channel maintenance results in excessive vegetation growth and aggradation that reduces the channel capacity.

Likewise the residual risks associated with stopbank failure or overtopping need to be accounted for with sensible planning controls in district plans. This is vitally important in ensuring the further development of the floodplain is done in a way that avoids the highest risk areas and imposes sensible building height platforms in lower risk areas.

The final requirement is to manage the risks not able to be mitigated by the other management options. This is achieved through effective emergency management. Flood forecasting is a fundamental aspect of emergency management but the most important aspect is making sure the community at risk knows when a flood is predicted, where to go and how to get there. The primary goal of emergency management is to avoid loss of life by evacuating people from high risk areas before major floods occur.

## **6 APPLICATION TO UPPER WAIRARAPA VALLEY**

The resource consents that allow GWRC to undertake a number of key river management activities in the rivers of the Upper Wairarapa Valley are due to expire over the next two to three years. It has been decided that the FMP process will provide an effective way of engaging with the community to determine an effective combination of options to manage flood risk.

Rather than develop FMPs for each floodplain independently it has been decided to develop the FMP for the major rivers in the Upper Wairarapa Valley as a single project in order to deliver a more efficient, cost effective and consistent approach. The 'Upper Wairarapa Valley' is defined as the area above the confluence of the Waiohine and Ruamahanga Rivers.

### **6.1 THE UPPER WAIRARAPA VALLEY AREA**

The river system upstream of the confluence of the Ruamahanga and Waiohine rivers, have a total catchment area of 1560 km<sup>2</sup>. The floodplain is generally formed from alluvial parent materials from two different sources. The rivers from the Tararua Ranges on the western side of the catchment contribute greywacke alluvium, while the rivers sources from the Eastern Wairarapa hills contribute alluvium silts and sands eroded from mudstones, sandstones and limestones.

Different soil types have developed at various locations on the floodplain depending on the rate of flood deposition, the source of the material, time since deposition and natural drainage. Therefore, there is a high degree of variability in soil properties across the floodplain.

Land use in the catchment is dominated by native forest in the Tararua Ranges, and primary industry (dairying, dry stock grazing, cropping and plantation forestry) on the floodplain; in addition to this there is increasing rural lifestyle development, and a number of urban centres (Masterton, Carterton, and Greytown) on the floodplain.

### **6.2 CURRENT SCHEMES**

This project area includes the following existing river schemes;

- Upper Ruamahanga – Gladstone
- Upper Ruamahanga – Mt Bruce
- Upper Ruamahanga – Te Ore Ore
- Waipoua
- Waingawa
- Kopuaranga

- Whangaehu
- Taueru

### **6.2.1 RUAMAHUNGA (GLADSTONE, TE ORE ORE, MT BRUCE)**

The current Upper Ruamahunga river scheme was established in 1982, and covers a combined length of 58km. It was subsequently split into three individual schemes (2004) to reflect the rating and service level requirements of the community within the urban and rural areas. The scheme protects rural land and a number of public utilities using a combination of stopbanks, heavy bank protection, and vegetation buffer zones.

### **6.2.2 WAIPOUA**

The Waipoua river scheme was set up in the mid 1950s to mitigate flooding and erosion hazards for rural land and the Masterton urban area. The scheme consists of stopbanks, grade control weirs, vegetation buffer zones, protective willow planting and rail, rock and river groynes.

### **6.2.3 WAINGAWA**

The Waingawa river scheme was established in 1992 to mitigate the flooding, course change and erosion hazards to productive rural land upstream and downstream of Masterton and to the town itself. The scheme consists of stopbanks, vegetation buffer zones, protective willow planting and rail, rock and river groynes. The main scheme beneficiaries are riverside landowners, Masterton and Carterton District Councils, KiwiRail and the NZTA.

### **6.2.4 TAUERU, WAHNGAEHU, KOUARANGA**

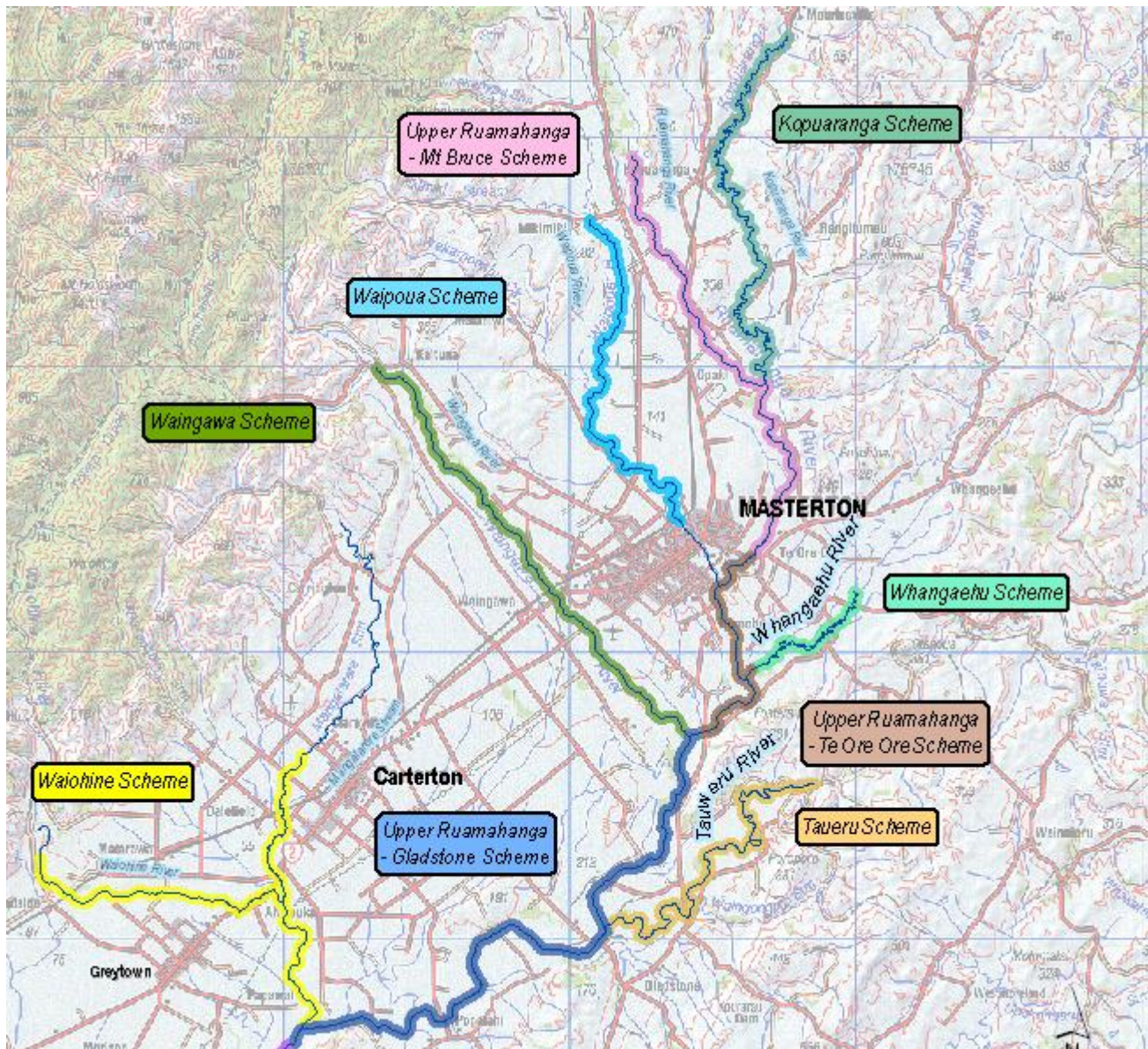
The schemes on the smaller, eastern hill rivers, the Taueru, Whangaehu and Kopuaranga were primarily set up to alleviate flooding from channel congestion caused by willows and other debris in the channel. These schemes now operate under a maintenance regime with limited budgets allocated to control willow re-growth and to enable some native planting initiatives.

### **6.2.5 MANAGEMENT AND FUNDING**

These schemes were established to provide a co-ordinated approach to flood and erosion protection for occupants, landowners and assets located within these particular floodplains. The schemes are managed by GWRC and include an annual work programme of in-channel, river bank and flood defence maintenance operations. The current funding arrangement for managing the rivers in the Upper Wairarapa Valley is based on each individual river management scheme. The funding for each scheme comes from two sources:

- A targeted river rate paid by those who directly benefit from operation of the scheme;
- A general GWRC regional rate.

Figure 4: Upper Wairarapa Valley – Current operational river management schemes



### 6.3 SCHEMES TO FMPS

The consent expiration and the likely requirement for some form of river management continuation provides an ideal opportunity to shift from the current narrow focus on river management schemes to a more holistic FMP approach. This process is supported by the presence of the existing river scheme committees which comprises primarily of landowners adjacent to the rivers. These individuals have a wealth of experience in river management through living and working with the rivers for, in many cases, generations.

This broadening in focus will achieve several significant outcomes;

- supporting application for likely future resource consents which may be required for river management once the existing resource consents expire in 2015/16;
- providing consistency in managing the regions rivers and floodplains based on internationally recognised flood risk management principles;
- provide holistic picture of the floodplains with consideration of the broader catchment that continues to consider the existing flood and erosion risk

management, and improves inclusion of cultural, environmental and recreational values;

- allow for inclusion of broader community representation which will assist with decisions prioritising flood risk and values of the river and floodplain;
- provide a long term strategy for managing flood risk in the Upper Wairarapa Valley catchment;
- Strengthen the governance structure for future management and implementation of outcomes of the FMP process in the Upper Wairarapa Valley area.

## **6.4 OPPORTUNITIES AND CHALLENGES**

The FMP process provides a consistent framework to apply whilst recognising each individual river, floodplain and local community is different. This creates interesting opportunities and challenges for all people involved in the development of an FMP.

The flood risk within the Upper Wairarapa, for the most part, impacts on rural land uses. This provides the opportunity to control future development in a way which allows for landuse compatible to flood risk, and avoids the creation of residual flood risk areas that would exist behind stopbank infrastructure. It allows for sharing of knowledge with those who make use of this land for their livelihood, and to enable future land use change decisions to be made with a fuller understanding of the risk.

This understanding of risk is complicated by the diversity in type of landuse, low population concentrations and therefore the likelihood of low consequence when measured against traditional damage assessment methodologies which typically focus on fixed assets rather than productivity. This productivity impact poses challenges for economic assessment of flood risk management options. This assessment is further complicated by poor levels of flood risk awareness particularly within Upper Wairarapa urban centres whose residents have not been involved in past scheme management, and have not been significantly affected by flooding within the recent past.

The project area is also subject to regional governance debate and there remains a potential for a new local authority structure to be created during the project.

## **7 CONCLUSIONS**

The lessons learnt during development of the Waikanae, Otaki, and Hutt River floodplain management plans in combination with the NZ standards have contributed to the creation of GWRCs current floodplain management planning guidelines. This work experience strengthens the underpinning philosophy espoused by Ericksen and the NSW Government. These lessons learnt have streamlined the FMP development process, and it is envisaged that what was a 7 year FMP development cycle for Waikanae River between 1990 and 1997 can be condensed into a 3 year FMP development cycle between 2013 and 2016 for the Upper Wairarapa Valley rivers.

The project team is meeting the challenges of the project through application of GWRCs FMP guidelines, and the fortunate position of being able to draw on the experience of the officers who developed the Waikanae, Otaki and Hutt FMP's who remain in senior roles within GWRC. To strengthen community ownership of future plans the existing scheme committees are being engaged as lead representatives for community and broader stakeholders in an open Phase 1 investigation process. It is anticipated that this fully inclusive approach will continue through Phases 2 and 3, and throughout ongoing future



management of the Upper Wairarapa Floodplains. The engagement and support of local authorities, local community and iwi will provide the Upper Wairarapa Valley FMP with the same durability of the Waikanae, Otaki and Hutt FMPs.

Application of GWRCs FMP guidelines will deliver a holistic floodplain management plan, providing affordable flood risk management for the rural and urban populations of the Upper Wairarapa Valley, while respecting the environmental, social and cultural values of both the local and regional community.

## **ACKNOWLEDGEMENTS**

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## **REFERENCES**

Paul, B. (1990). Floodplain Management Planning – Presentation to the Operations Committee (File: N/50/2/2), Wellington Regional Council, Wellington.

Ericksen, N.J. (1986). Creating flood disasters. Water and Soil Miscellaneous Publication No. 77. National Water and Soil Conservation Authority, Wellington.

Department of Infrastructure, Planning and Natural Resources, (1986). Floodplain Development Manual – The Management of Flood Liable Land, NSW Government, Sydney, Australia.

Department of Infrastructure, Planning and Natural Resources, (2005). Floodplain Development Manual – The Management of Flood Liable Land, NSW Government, Sydney, Australia.

Ministry for the Environment (New Zealand) and The Flood Risk Management and River Control Review Steering Group (2009). Meeting the Challenges of Future Flooding in New Zealand. Ministry for the Environment (New Zealand) publication.

Standards New Zealand (2008). Managing Flood Risk – A Process Standard. NZS9401:2008.