

## **1.0 Introduction**

### **1.1 Purpose**

The purpose of this report is to develop a comprehensive stormwater management plan for the Waru Stream and Haisman Stream catchments.

The area of the study is currently experiencing demand for rural residential development and a plan change is proposed to allow development down to 5,000 m<sup>2</sup> sized lots. In order to allow the area to support more housing sustainably, there is a need to develop a set of guidelines to manage stormwater runoff within the catchments. Studies have previously been conducted within the rural residential environment, and this plan serves to build on those studies and provide effective solutions to the problems identified.

It is anticipated that this document will be used to provide evidence and the reasoning for the stormwater structure plan that is recommended to be implemented as part of the proposed plan change.

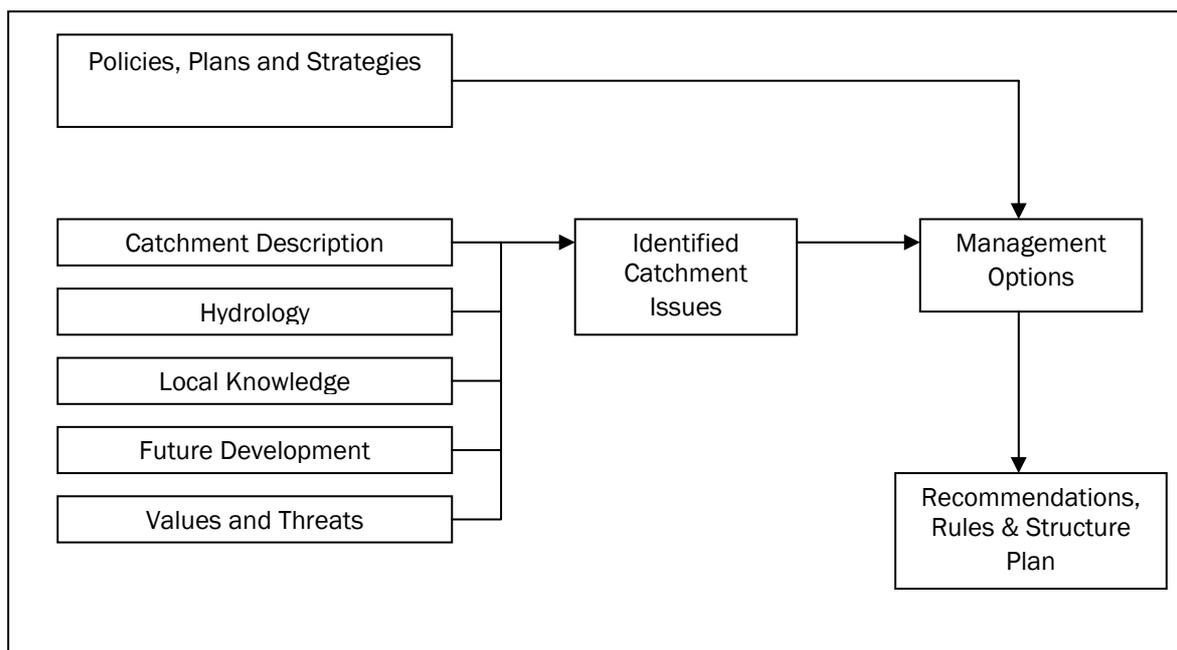
This study also provides Gisborne District Council an opportunity to introduce the concept of sustainable management of stormwater runoff for the catchment and to be fully integrated with regional and district policies.

### **1.2 Study Methodology**

Previous attempts to manage stormwater in the rural residential environment have relied on addressing the issues on a development-by-development basis. They were largely unsuccessful as cross-boundary issues (e.g. the discharge from one development onto another) are difficult to resolve at the subdivision consent stage, without an overarching approach.

The methodology proposed for this study is to firstly look at the entire catchment at a macro level. In particular, the type of catchment, the hydrology, future development, values and threats to the catchment. Lessons learned from other rural residential areas are investigated to identify the issues specific to the Waru/Haisman catchment. These are assessed against existing Council policies and Council's legislative obligations to develop and evaluate management options. The final output of the study will be a list of recommended options and a structure plan to assess any development within the study area.

The methodology is illustrated graphically in Figure 1.1.



**Figure 1.1 Catchment Management Plan Methodology**

### 1.3 Format of Report

A brief description of each of the sections contained in this report follows.

**Section 1: Introduction** outlines the purpose and objectives of the report and the methodology used to conduct the study.

**Section 2: Legislation, Policies and Strategies** present the statutory context of this report.

**Section 3: Catchment Description** describes the catchment physically (spatially and in terms of geology), how the land is currently used and proposed for the future, and how stormwater is currently managed.

**Section 4: Catchment Modelling** details a computer model of stormwater runoff within the catchment for the present land use and a range of future development options.

**Section 5: Other Effects** looks at the values and impacts on the catchment and lessons learned from other rural residential areas.

**Section 6: Catchment Issues** collates all of the above work to identify the specific stormwater catchment issues that need to be addressed.

**Section 7: Management Options** presents a number of options and development proposals for each of the stormwater issues identified. Each option is analysed to show how they conform to the policies and strategies in Section 2.

**Section 8: Proposed Management Strategy** presents the selected options for managing the catchment and costs to implement them.

**Section 9: Structure Plan** shows the location of proposed infrastructure to allow for development.

**Section 10: Recommendations** summarises the work that needs to be completed to sustainably manage stormwater runoff in the catchment.

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## **2.0 Legislation, Policies, Strategies and Codes of Practice**

### **2.1 Introduction**

The legislation, policies and strategies detailed in this section serve to demonstrate why a comprehensive catchment management plan is necessary.

It is recognised that the implementation of a catchment management plan has a wider impact outside of the engineering objective to “remove excess surface water from house sites”. The impact on the ecosystem, habitat, and adjacent land use as well as the liveability of the area, and management options all need to be considered.

The objectives and policies to be used to evaluate the stormwater management options later in this report.

### **2.2 Legislation**

Resource Management Act 1991 and amendments

Local Government Act 2004 and amendments

Local Government Act 1977 and amendments

Soil Conservation and Rivers Control Act 1941

Land Drainage Act 1908

Building Act 2004 First Schedule. Clause E1 – Surface Water

### **2.3 Policies and Strategies**

The relevant documents and the objectives and policies contained therein are outlined below.

**i. Gisborne District Council Combined Regional Land & District Plan [1]**

**Chapter 4 – Natural Heritage**

<b>Objectives</b>	
1	The maintenance and enhancement of the abundance, distribution range and diversity of the Gisborne District Council's indigenous flora and fauna.
2	Protection of areas of significant indigenous vegetation, significant habitats and outstanding natural features and landscapes.
3	Protection of the quality of water, wetlands and aquatic habitats, and the preservation of the natural character associated with lakes, rivers, wetlands and their margins, and the Coastal Environment of the Gisborne District.
<b>Policies</b>	
3	<p>To avoid, remedy or mitigate the adverse effects of activities on riparian areas and aquatic ecosystems including habitat, flora and fauna. Regard to the following will be had when preparing plans or considering applications for plan changes, resource consents or designations affecting areas within the Riparian Management Area:</p> <ul style="list-style-type: none"> <li>• The adverse effects of activities that reduce or disturb riparian vegetation and indigenous riparian vegetation in particular; <i>and</i></li> <li>• Assessing options for the management of the entire catchment before targeting land use controls or management devices to any single water body; <i>and</i></li> <li>• Encouraging the management of the margins of lakes, rivers and wetlands to provide for the health of aquatic ecosystems including habitat, flora and fauna and amenity, access, terrestrial habitat and natural character values and for the natural functioning riparian ecosystems; <i>and</i></li> <li>• Avoiding, remedying or mitigating the adverse in stream effects of activities that accelerate soil, water or nutrient runoff from land, increase directly or indirectly in stream water temperatures, decrease levels of dissolved oxygen, or increase the concentration of toxic chemicals within water bodies;</li> <li>• Encouraging the establishment of tall woody vegetation with an extensive strong root network, on stable land near waterways as soon as is practicable where no indigenous vegetation already exists.</li> </ul>
7	<p>To manage the adverse effects of activities on the health and functioning of aquatic and terrestrial wetland ecosystems including habitat, flora and fauna for the purpose of preserving the natural character of wetlands and protecting them from inappropriate subdivision, use and development.</p> <p>Regard to the following will be had when preparing plans or considering applications for plan changes, resource consents or designations:</p> <ul style="list-style-type: none"> <li>• Consideration of whether or not the wetland was purposely created as such; <i>and</i></li> <li>• Adverse effects associated with the timing, duration, area and location of the activity; <i>and</i></li> <li>• The adverse effects of activities that reduce or disturb vegetation and indigenous vegetation in particular, including vegetation to be retained; <i>and</i></li> <li>• Any adverse effects of activities on water quality and aquatic ecosystems; <i>and</i></li> <li>• Any adverse effects of activities on stream bank stability; <i>and</i></li> <li>• Any measures necessary or proposed to avoid, remedy or mitigate the adverse effects of activities on significant habitat of indigenous fauna, biodiversity, amenity, access and natural character values and the natural functioning of wetland ecosystems.</li> </ul>

## Chapter 5 – Natural Hazards

<b>Objectives</b>	
1	A pattern of human settlement that: <ul style="list-style-type: none"> <li>• Provides a high level of personal safety from natural hazard for its inhabitants;</li> <li>• Avoids or mitigates the risk to property and infrastructure from natural hazards ; <i>and</i></li> <li>• Does not accelerate or worsen the adverse effects of natural hazards upon the natural and physical environment.</li> </ul>
2	A community informed of the potential natural hazards of the District
3	The protection of natural features that could lessen the impact of natural hazards.
<b>Policies</b>	
1	In extreme hazard areas where the natural hazard cannot be avoided or mitigated new development and any related subdivision should not occur.
2	In all hazard prone areas, any new subdivision, use and development should avoid or minimize any risk of loss of life or injury or other environmental damage due to natural hazard.
3	Any assessment of a resource consent application within a hazard prone area shall consider, but is not limited to, the following matters: <ul style="list-style-type: none"> <li>• Whether minimum floor levels for residential buildings should be set to reduce the susceptibility to danger and damage from flooding;</li> <li>• The desirability of residential buildings to be relocatable so they may be moved if the risk of damage becomes imminent.</li> </ul>
4	Patterns of human settlement, development and activities should not induce or accelerate the risk of natural hazards. When assessing an application for a resource consent the effects of that application on any hazard risk shall be considered. This includes but is not limited to the following: <ul style="list-style-type: none"> <li>• The likelihood and effect of unrestrained material escaping and increasing potential hazard damage;</li> <li>• Any diversion of overland flows of floodwaters or stormwater;</li> <li>• The safety of any occupants of buildings and evacuation procedures;</li> <li>• Potential flood conditions, including silt deposition at the site;</li> <li>• Site topography and location of the building;</li> <li>• Likelihood of increased erosion elsewhere;</li> <li>• Stormwater collection and disposal systems should be designed to mitigate any adverse effects on the stormwater system or avoid an increase in the risk or severity of flooding or land instability;</li> <li>• Other measures in place to reduce the potential effects of the proposed buildings or site development on the movement of floodwater;</li> <li>• Extent to which natural buffers exist and are adversely affected.</li> </ul>
5	To recognise the limits of attempts to control natural processes by physical work and restrict such attempts to appropriate situations where they are: <ul style="list-style-type: none"> <li>• Needed to protect existing development, or waahi tapu or new public infrastructure such as ports, roads and bridges; <i>and</i></li> <li>• Have a favourable benefit to cost ratio; <i>and</i></li> <li>• Will have no more than a minor adverse effect on the natural character of the coastal environment, lakes and rivers and their margins, or areas/features of natural or cultural significance, or other adverse environmental effects; <i>and</i></li> <li>• Will not cause or worsen hazards to other lands or waters; <i>and</i></li> <li>• Are the best practical alternative.</li> </ul>

## Chapter 5 – Natural Hazards (Cont.)

6	<p>Mitigation works shall be designed and constructed in sympathy with the environment recognising:</p> <ul style="list-style-type: none"> <li>• The dynamic, complex and interdependent nature of biological and physical processes;</li> <li>• Effect on amenity values;</li> <li>• Effects on the landscape and natural features of the locality;</li> <li>• Any effect on public access.</li> </ul>
7	A precautionary approach should be adopted where activities with unknown or little understood effects are proposed, or the effects on natural processes are difficult to assess.
8	<p>In carrying out hazard assessments or considering resource consent applications the possibility and implications of climate change are to be recognised. In particular the likelihood of the following matters should be considered:</p> <ul style="list-style-type: none"> <li>• A change in sea level;</li> <li>• Altering of coastal processes;</li> <li>• Increased inundation of low lying estuarine areas;</li> <li>• Higher local temperatures;</li> <li>• Changes in rainfall patters;</li> <li>• Increase in cyclonic storms.</li> </ul>
9	<p>The integrity of natural systems and features that provide a defence against natural hazards should be recognised and protected. These include:</p> <ul style="list-style-type: none"> <li>• The capacity of foredunes to act as natural protection against inundation and erosion;</li> <li>• Wetlands;</li> <li>• Margins of estuaries.</li> </ul>
10	<p>In developing plan provisions, and in assessing resource and building consent applications, the Council will adopt 'design flood standards' for flood hazard assessments as follows:</p> <ul style="list-style-type: none"> <li>• <b>Waipaoa River within the Poverty Bay Flats</b> Peak flood flow of 5830 cumecs in the Waipaoa River at Kanakanaia over a period of 30 hours <u>plus</u> a flood equal to the magnitude of the July 1985 event from all other rivers and streams on the floodplain.</li> <li>• <b>Waimata and Taruheru Rivers within the Gisborne Urban area</b> 100 year return period</li> </ul>
11	The Council will recognise that localised flooding may occur outside the areas described in Policy 10
12	When designing and carrying out earthworks or roadworks any adverse effects resulting from the diversion of floodwaters should be avoided, remedied or mitigated.
14	It shall be recognised that most of the elevated land in the district has the potential for land instability. Developers and the Council shall take this into account when developing sites, considering resource consents or preparing plans under the Act. Council may require further more detailed information including the preparation of full geotechnical reports. It may require the effects of the hazard to be avoided, remedied or mitigated or decline the proposal.
15	Areas particularly at risk from known instability problems shall be identified in [the District Plan].
16	The Council will recognise that localised instability may occur outside the areas described in Policy 15.

## Chapter 7 – Beds of Lakes and Rivers

<b>Objectives</b>	
1	Avoidance, remediation or mitigation of adverse effects on the environment, of activities in lakes or river margins and their margins.
2	Preservation of the natural character of lake or river environments and their margins.
<b>Policies</b>	
1	<p>The adverse effects in activities in, under or over the beds of lakes and rivers shall be avoided, remedied or mitigated giving preference to the preservation of natural character. When developing plan provisions and in assessing resource consent applications, the effects of the activity on the beds of lakes or rivers shall be considered. This includes the following:</p> <ul style="list-style-type: none"> <li>• Impacts on ecosystems (including wetland ecosystems);</li> <li>• Adverse effects on habitats of indigenous species and of trout and indigenous aquatic and terrestrial species (including flora and fauna);</li> <li>• Reduction of fish passage along rivers and into lakes and wetlands such as through physical barriers, turbidity barriers or adverse effects on run, riffle, pool composition;</li> <li>• Hindrance of the recharge of groundwater aquifers;</li> <li>• Reduction of water quality;</li> <li>• Alteration of water flow;</li> <li>• Increase in bed instability and flooding;</li> <li>• Reduced flood carrying capacity, increased flood levels, adversely altered floating debris carrying ability of the river, or adverse alteration to rates of aggradation or bank erosion;</li> <li>• Damage to heritage items, waahi tapu, taonga and areas of cultural significance;</li> <li>• Reduction in the value of the rivers, lakes or wetlands for activities such as kohinga kai or recreational use, including the reduction of public access and impacts on natural character and amenity values;</li> <li>• Damage to existing structures.</li> </ul>
2	<p>When assessing applications for resource consents the use of financial contributions or the provision for works and services will be considered where appropriate as a condition on resource consents to avoid, remedy or mitigate adverse effects. The application of a condition relating to financial contributions or the provision of works and services will be considered on a case-by-case basis and will be used to address adverse effects such as:</p> <ul style="list-style-type: none"> <li>• Impacts on aquatic ecosystems including flora and fauna;</li> <li>• Impacts on lake and river dynamics (flooding, flow rate and capacity) or the lake or river bed (including bank erosion, bed destabilisation);</li> <li>• Reduction of natural character, amenity values or public access.</li> </ul>

## Chapter 12 – Subdivision

<b>Objectives</b>	
1	To enable subdivision provided that any consequent adverse environmental effects can be avoided, remedied or mitigated.
2	Subdivision is consistent with high quality urban environments. Subdivision should encourage a pattern of landuse integrated with the provision of infrastructure to: <ul style="list-style-type: none"> <li>• Promote a high level of amenity value, especially in residential and commercial zones;</li> <li>• Promote safe and healthy urban environment;</li> <li>• Encourage resource and energy efficiency;</li> <li>• Avoid, remedy or mitigate adverse effects on the environment.</li> </ul>
<b>Policies</b>	
1	When considering whether to grant consent or impose conditions in respect of any subdivision Council shall have regard to policy contained in the CRL&DP in addition to the following: Stormwater <ul style="list-style-type: none"> <li>• The adequacy of the proposed means of disposing of collected stormwater from the roof of all potential or existing buildings and from impervious surfaces;</li> <li>• The practicality of retaining open natural waterway systems for stormwater disposal in preference to piped or canal systems and adverse effects on existing waterways;</li> <li>• Whether there is capacity in the Council's stormwater system to cater for increased runoff from the proposed allotments in the urban areas;</li> <li>• Where an existing outfall is not capable of accepting increased runoff the adequacy of proposals to cope with the stormwater;</li> <li>• Any adverse effects of the proposed subdivision on drainage to and from adjoining properties and proposed measures to mitigate the adverse effects.</li> </ul>
5	Where a subdivision is located adjacent to or within an overlay identified in Chapter 4 – Natural Heritage, Council shall consider the following matters when assessing a resource consent for subdivision: <ul style="list-style-type: none"> <li>• The effect that the subdivision, including the effect of exotic flora and fauna may have on the values identified in Chapter 4 – Natural Heritage;</li> <li>• Any measures to avoid, remedy or mitigate adverse effects on indigenous flora and fauna. Such measures may include, but are not limited to, buffer areas, fencing and covenants.</li> </ul>

## Chapter 21 – Rural Zones

<b>Objectives</b>	
1	Enable subdivision, use and development in all rural zones provided that adverse environmental effects can be avoided, remedied or mitigated.
2	Maintain rural amenity values.
3	Sustainable management of the life supporting capacity of the soils of the Poverty Bay Flats.
4	Enable rural lifestyle living in appropriate areas where the adverse effects of this activity can be avoided, remedied or mitigated.
<b>Policies</b>	
1	<p>When preparing plans or considering applications for plan changes, resource consents or designations in all rural zones regard shall be given to the following general policy as well as any specific policy relating to the zone:</p> <ul style="list-style-type: none"> <li>• Effect of the activity on the natural landform characteristics;</li> <li>• Effect on significant indigenous vegetation and significant habitats of indigenous fauna with particular references to Chapter 4 – Natural Heritage;</li> <li>• Effect on biodiversity, water quality, land instability and erosion with reference to Chapter 4 – Natural Heritage and Chapter 6 – Land Disturbance;</li> <li>• The location, scale and nature of the proposed activity and its effect on the balance of the land and on adjoining properties;</li> <li>• Alternative methods and locations available to carry out the works or activities;</li> <li>• Physical constraints to the site such as separation by rivers or roads, site configuration and layout;</li> <li>• Any adverse effect that the activity may have on existing rural activities;</li> <li>• The shape, size and location of lots to be subdivided and any adverse effects they may have on amenity values;</li> <li>• Whether covenants, buffer zones or separation distances between activities would assist in mitigating adverse environmental effects.</li> </ul>
7	To manage adverse environmental effects on the soil resource that occur as a result of subdivision, use and development to secure the soil's life supporting capacity in order to meet present and future needs.
12	<p>To enable rural and rural lifestyle residential subdivision, use and development on the fringes of Gisborne urban area:</p> <ul style="list-style-type: none"> <li>• Where rural land fragmentation has already occurred;</li> <li>• Where a rural lifestyle can be accommodated while avoiding, remedying or mitigating adverse effects on the life supporting capacity of the soils on the Poverty Bay Flats;</li> <li>• In areas with physical impediments to farming such as topographic constraints but where rural residential development can be accommodated without creating any adverse environmental effects on adjoining landuses;</li> <li>• In areas capable of providing a range of activities from intensive residential to rural productive;</li> <li>• Preferably in areas in close proximity to the urban area in order to reduce commuting distances.</li> </ul>
13	To enable the use of properties for farming purposes provided the effects can be contained within the boundary of the site.

## ii. **Gisborne District Council Regional Water Plan**

<b>Objectives</b>	
1	Discharges of stormwater to watercourses, either directly or via pumped field drainage should be managed to avoid, remedy or mitigate adverse effects including contamination of natural water, erosion of the banks or beds, or flooding as far as practicable.
2	Discharges of water to water should be managed to recognise and avoid adverse effects on the Mauri of the waters.
<b>Policies</b>	
1	To provide for the discharge of water-to-water that have minor or no adverse effects on the receiving waterbody without the need for a resource consent.
2	<ul style="list-style-type: none"> <li>• When considering applications to discharge water to water, to take into account;</li> <li>• The sensitivity of the receiving environment,</li> <li>• Classification of receiving waters pursuant to section 69 of the Resource Management Act 1991.</li> <li>• The values of tangata whenua that may be affected,</li> <li>• The physical processes acting on the area of discharge including temperature change, scouring, erosion, and flooding.</li> </ul>

### 2.4 Codes of Practice

The existing performance criteria for stormwater drainage systems are set out in section 3.2 of the Gisborne District Council Engineering Code of Practice [3]:

“The stormwater system shall:

- Provide protection from floods of up to 1% probability of exceedance (100 year return period) using a system of primary and secondary flow paths, appropriate to the intended land use.
- Provide protection from floods of up to 10% probability of exceedance (10 year return period) using a system of primary flow paths appropriate for the intended land use. This protection will include preventing the ingress of stormwater into the reticulated sewerage system in all but the 1% event.
- Provide rural lots with an area suitable for effluent disposal that is free from inundation in a storm of up to 10% probability of exceedance (10 year return period storm) and will not cause a health hazard during any inundation.
- Adequately service each lot, road area or land area discharging to a point of entry, and conveying such surface water to an approved outlet.
- Be compatible with the existing drainage network without causing any adverse effects on the existing system, or on upstream and downstream properties.”

It is noted that the GDC Engineering Code of Practice is currently under review.