



MEMO

TO All Councillors
FROM Geoff Dick
DATE 17 September 2004
FILE NUMBER N/03/21/01

FOR YOUR INFORMATION

Waiwhetu Stream - Scoping Report

At its meeting on 23 March 2004 the Landcare Committee passed the following resolution

That a scoping report is prepared on the investigations required to look at options for reducing flood impacts from the Waiwhetu Stream for subsequent consideration by the Committee.

The study is a response to a request by Mayor Terris for the two councils to work together to investigate options to reduce flooding from the Waiwhetu Stream, following the February 2004 flood event.

The joint scoping report is now complete. Officers from both the Greater Wellington (GW) and Hutt City Council (HCC) have agreed in principle to the scope, cost and proposed arrangements for sharing cost and managing the project.

The appropriate Committees will consider the scoping report and its recommendations early in the new triennium (November 2004). However, I thought that it would be helpful if Councillors were provided with a brief summary and update now.

Proposed Waiwhetu Stream Floodplain Management Study

Briefly, the scoping report proposes:

- A joint GWRC/HCC floodplain management investigation, with GW as the lead agency. Flood reduction opportunities will be considered for the Waiwhetu and its major tributaries, principally the Awamutu Stream. The flood mitigation measures will need to be considered alongside, and where appropriate integrated with, the Waiwhetu Stream Action Plan environmental projects.

- A key output from the floodplain management plan study will be a full description, including costs and priorities, of the adopted flood mitigation measures and strategies integrated with environmental, recreational and aquatic weed management measures.
- It will take about 2 ½ years to complete the investigations and prepare the proposed Waiwhetu Stream Management Plan. A considerable amount of information gathering and planning needs to take place before any solutions can be developed.
- The total cost of the study is estimated at \$495,000, with the cost proposed to be shared between HCC and GW (25% HCC, 75% GW). Additional funding will be required for the 2005/06 and 2006/07 financial years.
- The proposed decision making process for the development of the plan is attached. Both Councils will need to be comfortable with any outcomes, hence the project steering group will need to report to both the relevant HCC and GW Standing Committees. There are other options such as reporting through the Hutt River Advisory Committee but this raises other issues which would need to be examined.

Where to from here?

Based on the Landcare Committee's resolution and the recent floods I have decided to continue as far as possible with the investigations without constraining Councillors ability to examine the work in the context of other Council priorities as part of the 2005/06 Annual Plan and the 2006 LTCCP processes

Accordingly I have commissioned the LIDAR aerial survey work. I also propose to complete (as far as possible) a hydraulic model of the stream, calibrate it and develop flood maps this (2004/05) financial year. As with the LIDAR survey I consider that the flood mapping will be a useful output in its own right.

HCC are also providing this information to HCC Councillors so that they are also up to date with developments. We are also aware that there is considerable community interest in this issue so in the next week or so HCC and GW intend to issue a joint media release to let the community know what is happening.

If you have any further queries please feel free to ring me.

Regards

Geoff Dick
Manager, Flood Protection

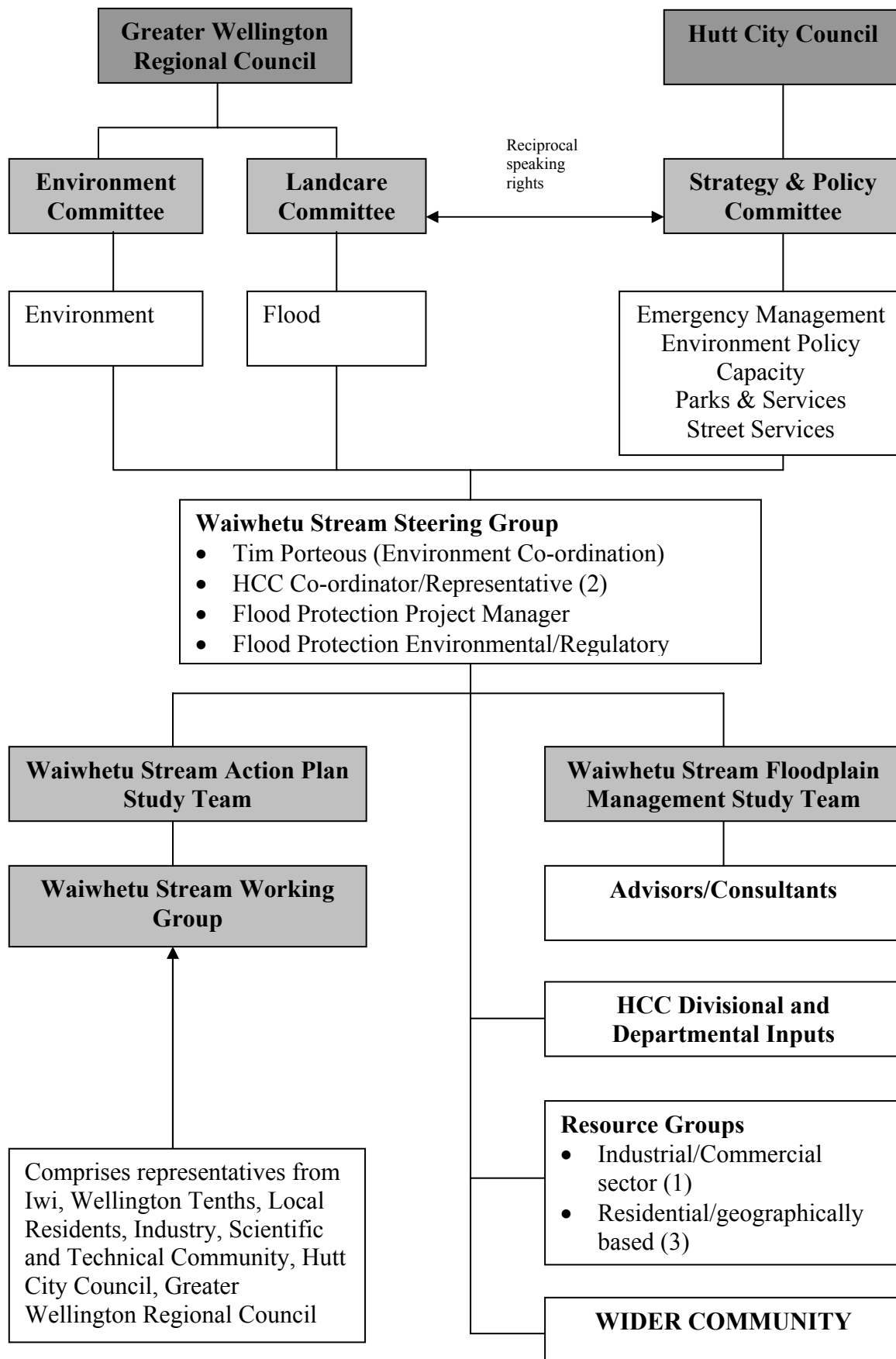


Figure 6.1

MEMORANDUM



Our Reference RM 50-15-11

TO: **Mayor**
Councillors

COPY: Chief **Executive**

FROM: Stuart Duncan

DATE: **9 September 2004**

SUBJECT. NOTES ON WAIWHETU STREAM FLOODING

In response to questions from councillors about Waiwhetu Stream flooding I have asked Capacity to prepare some notes on the matter, these are attached. They outline some of the main issues relating to the stream and recent flooding together with some detail about responsibilities.

As you may be aware after the February 2004 flood the Mayor requested, by way of memorandum (copy attached), that Greater Wellington Regional Council and Hutt City Council officers form a committee to study ways to better contain the Waiwhetu Stream. In May Greater Wellington Regional Council resolved to adopt a Landcare Committee recommendation to have officers prepare a scoping report to look at options to reduce flood **impacts** from the stream. In the next two weeks a memorandum will be issued by officers from both councils which will update councillors on the project including:

- scope,
- cost and proposed cost sharing
- project management
- timeframe and programme for works

STUART DUNCAN
GROUP MANAGER - ASSET SERVICES

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Notes on Waiwhetu Stream Flooding September 2004

Background

The Waiwhetu Stream is the main drainage channel for much of the eastern side of the Hutt Valley from Naenae in the north to the stream outlet to the Hutt River approximately 250 metres south of the Hutt River Estuary bridge. The only significant branch of the Waiwhetu Stream is the Awamutu Stream which joins the Waiwhetu Stream at Hutt Park just upstream of the Seaview Road Bridge. The Awamutu Stream originally had its origins in the Epuni area. The upper sections of the original stream are fully piped and the open section of the Awamutu Stream now commences adjacent to the Woburn Railway Station. There is a side branch of the Awamutu Stream known as the little Awamutu Stream which originates in the Whites Line East/Hinemoa St area. This branch is piped between the Awamutu Stream and Bell Road but remains open between Bell Road and Whites Line East.

Responsibilities

The Greater Wellington Regional Council is responsible for the Waiwhetu Stream from the end of the concrete channelling in Naenae down to the outlet of the stream to the Hutt River at Port Road. Hutt City Council is responsible for the section of Waiwhetu stream above the end of the concrete channel in Naenae, the Awamutu Stream and the little Awamutu Stream.

Problems Experienced

On 16 February 2004 approximately 75 houses in the catchment of the Waiwhetu Stream were flooded when the stream overtopped its banks. The flows recorded in the stream on 16 February 2004 were the highest on record and exceeded those experienced in the Hutt Valley floods of December 1976. There was further flooding of some buildings in the Gracefield/Seaview area on 11 August 2004 due to high water levels in the Waiwhetu Stream.

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Between 1976 and February 2004 there have been a number of occasions where the stream has overtopped its banks in some relatively localised areas without serious property damage resulting.

Ongoing problems have been experienced during severe rainfall with very high levels in the Awamutu Stream causing flooding of some very low lying residential buildings, surface flooding of yard areas and flooding of outbuildings.

Very high water levels have also been experienced in the open sections of the little Awamutu Stream although flooding has generally been confined to yard areas.

The flood risk

The Waiwhetu Stream catchment and stream channel have not changed significantly over the past 50 years. While there has been development in the area the effects of this in the context of the wider catchment is not significant.

In recent years there has been an increase in the frequency of severe storms in Hutt City. This was initially believed to a random fluctuation in the spacing of storms but it has now been confirmed that this results from a change in global weather patterns. This change in weather patterns has seen the emergence of more extreme weather comprising both droughts and often unseasonal storms causing serious flooding in many parts of the world. Other countries which have experienced severe floods in recent years include USA, England, China, Australia, Italy, and Thailand. What might have been a 50 year storm based on historic weather patterns may now only be a 10-20 year storm. This change in weather patterns is expected by meteorologists to continue.

The effect of changes to weather patterns has been to increase the risk of flooding generally including the risk of flooding associated with watercourses.

In recent years Hutt City Council has worked with the Wellington Regional Council through the Hutt River Advisory Committee to put in place a flood protection programme aimed at addressing the flood risk associated with the Hutt River. A report in the early 1990s identified the potential for damage of up to an estimated \$700m and loss of life in the event of a severe flood in the Hutt River while the flood defences remained in their current state. The \$80m long term programme of works which has been adopted will achieve a very high level of protection against major flooding from the Hutt River. Physical works on this programme have commenced in the current financial year.

Now that the flood risk associated with the Hutt River is being addressed attention has turned to the Waiwhetu Stream.

issues

The drainage systems in the Waiwhetu Stream catchment comprise both the systems of pipes and associated assets such as intakes that collect stormwater and the

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watercourses into which the pipe systems discharge. The pipe systems (with a few exceptions where pumping stations are provided) operate by gravity drainage or in other words they rely for their functioning on water running downhill. If the amount of water trying to flow into the pipes exceeds the capacity of the pipes to convey the water, then an overland flow of water will result.

If water levels in watercourses at the outlet from the pipes rise to levels above the level of water at inlets to the pipes then the pipes cease to flow and in some cases can backflow. Backflows can be prevented by the provision of flapgates (a form of one way flow valve) on stormwater pipelines but these flapgates act as an obstruction to the flow and are usually only serve a useful purpose when installed in conjunction with stopbanking designed to prevent an overland flow from watercourses in flood as occurred in both February and August 2004.

Most of the flooding in the Gracefield and Seaview areas in February 2004 including flooding in the vicinity of the Hutt Park roundabout and flooding of the Hutt Park motor camp resulted from the Waiwhetu stream overtopping its banks and flowing into these areas. Larger or additional stormwater drains alone cannot solve this problem. A solution needs to focus on options for reducing flood levels and containing the Waiwhetu Stream to its channel as far as practical together with improvements to the stormwater system

The historic design standard for most of the Hutt City stormwater pipelines was to accommodate runoff resulting from a storm with a 5 year return period or with a 20% chance of being exceeded in any year. This was a typical urban design standard at the time most of the stormwater system was constructed. No provision was made for what would happen when the 5 year return period storm was exceeded. **As** a result it is inevitable that the system will be overloaded to varying degrees whenever rainfall with a return period in excess of 5 years is experienced.

New stormwater pipelines in Hutt City are now designed to accommodate rainfall with a return period between 10 and 50 years depending on risk. In addition secondary stormwater floodpaths are required in green fields developments to convey floodwaters safely when the capacity of the pipe drains is exceeded.

Climate change has been taken account of by increasing rainfall design intensities to reflect the increasing frequency of severe rainfall events.

For a number of years there have been stormwater system renewal programmes in place in Hutt City which provide for the progressive replacement of every stormwater pipe in the city as they reach the end of their useful life. **As** mentioned above when pipelines are replaced as part of this programme they are replaced to higher design standards and to accommodate more severe rainfall. **The** fact that the existing pipelines are generally on very good condition means that the rate of pipeline replacement as part of this programme is less than would otherwise be the case.

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In addition to the stormwater renewal programmes there are also stormwater improvement programmes intended to address high flood risk problems which have been identified.

The measures indicated above are intended to progressively raise the level of stormwater protection in Hutt City at a rate which reflects the ability of the community to meet the cost. Despite these improvements there remains a risk that the stormwater systems in some areas will be “drowned” by water levels in receiving watercourses. While improvements to the stormwater system are an important part of raising standards of stormwater protection the effects of high flood levels in receiving watercourses must also be addressed.

Flood levels in the Waiwhetu Stream are dependent on levels in the Hutt River as well as on the capacity of the stream channel while flood levels in the Awamutu Stream depend on both the capacity of the stream channel and on levels in the Waiwhetu Stream. It is therefore important that flooding problems in the Waiwhetu Stream and its tributary the Awamutu Stream are considered in conjunction with each other.

The Greater Wellington Regional Council has commenced a “Waiwhetu Stream Floodplain Management Study” which sets out how the flooding issues associated with the Waiwhetu Stream can most effectively be approached. A report on the proposed approach is to be considered by the Greater Wellington Regional Council shortly.

As part of the study of options to address flooding problems associated with the Waiwhetu Stream a computer model of the stream is being developed and a detailed aerial survey of the Waiwhetu Stream catchment for Greater Wellington Regional Council and Hutt City Council has been commissioned. The computer model will enable the effectiveness of a range of different options for addressing the flood risk to be assessed and the aerial survey will produce data on the catchment which will enable a computer model of very high quality to be developed.

Options considered for raising the level of flood protection may include measures such as channel improvements, stream realignment, stopbanks, raising buildings, floodgates and pumping and will be the subject of consultation with the community. Options will be considered in relation to other Waiwhetu Stream issues such as the contaminated stream bed issue in the lower reaches of the stream to facilitate a combined approach to the resolution of issues as far as practical.

The aerial survey of the Waiwhetu Stream catchment is expected to be completed in November 2004 and the computer model completed in mid 2005. The timing of physical works will be a matter for decision by Greater Wellington Regional Council in the case of the Waiwhetu Stream and Hutt City Council in the case of the Awamutu Stream although as indicated above it is sensible for a coordinated approach to be taken to addressing the related issues in these two watercourses.

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Infill housing

There is no doubt that the settlement and urbanisation of Hutt City would have had a significant impact on stormwater runoff. Settlement in Hutt City resulted in the removal of much of the native bush which originally covered the area. In its place roads, commercial areas and tens of thousands of houses were constructed. This dramatically altered the nature of the Hutt City catchments and resulted in increased runoff (due to reduced soakage).

Development now covers most of the flat areas of Hutt City and there has also been significant development on hillsides. As a consequence new development is largely confined to infill housing in many parts of the City. In recent years Hutt City has experienced a number of very severe storms that have caused flooding. The question has been raised to what extent recent infill housing might have contributed to this flooding.

The answer is that the impact of infill housing has been minimal. It has certainly not been the difference between flooding occurring and not occurring and the resulting difference in flood water levels would have been imperceptible. The reason for this is that infill housing comprises only a very small proportion of the total catchment contributing stormwater.

The District Plan contains limits on the maximum site coverage that is permissible even where infill housing is carried out. While the impact of infill housing may be measurable in extremely localised areas once the water from these areas joins the general flow of stormwater its effect becomes insignificant. This is because in areas where infill housing occurs, roads and houses, parks and undeveloped areas such as hillsides in their present state make up the majority of the catchments and overall the change resulting from infill housing is very small. Additional runoff from infill housing is insignificant when compared to the runoff from these wider areas. This was confirmed in an independent assessment of the effects of infill housing in the central Hutt City area. This assessment found that the impact of infill housing on stormwater volumes was less than 1.5%. On average an increase in stormwater volumes of this level would produce an increase in flood water levels of less than one half of one percent which is imperceptible.

Effect of severe floods on the wastewater system

The main cause of overflows from the wastewater system is overloading with stormwater, not increased discharges of wastewater from infill housing. It is unusual for wastewater pipelines not to have ample capacity to carry wastewater flows as the wastewater system is designed with the capacity to accommodate normal peak flows, growth in the catchment and a quantity of stormwater.

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It is when the amount of stormwater entering the system become excessive that problems start to occur. Overloading with stormwater is a problem that affects most urban wastewater systems worldwide to varying degrees.

The approach Hutt City Council is taking to wet weather overloading of the wastewater system involves achieving a balance between reducing the amount of stormwater entering the wastewater system and providing additional capacity in the wastewater system. This approach recognises that there are substantial capital and ongoing operating costs to providing additional capacity in the wastewater system.

Stormwater can enter the wastewater system by direct discharges in private property (such as by downpipes discharging to sewer gully traps) through defects in private house drains (cracked pipes, leaking joints etc) as well as through similar defects in Council sewer pipelines. Hutt City Council operates an infiltration/inflow investigation programme which involves inspections and smoke testing of private house drains. This involves the inspection of about 3,000 properties annually. Owners are required to remove any sources of stormwater discharge that are located during these inspections.

It has been found that private house drains are contributing a much higher proportion of wet weather flows to the wastewater system than was previously estimated. The only effective solution to this usually involves the replacement of the house drains at a cost to property owners typically of the order of \$2,000 - \$3,000. Modern materials used for house drains are less susceptible to stormwater infiltration than the pipes and jointing systems typically used over most of the City. There is proposed to be a policy report to Hutt City Council on problems with private house drains before the end of the current calendar year.

For approximately ten years Hutt City Council has operated a renewal programme which provides for the progressive replacement of wastewater pipelines across the city as they reach the end of their useful life. Annual expenditure on this programme is of the order of \$1.7m annually and is tracking upwards each year reflecting the age and condition profiles of the wastewater system.

Where wet weather flows cannot be reduced to acceptable levels through the infiltration/inflow programmes and pipeline renewals there is little alternative to the provision of additional capacity in the system. This may comprise storage (tanks to contain peak flows) or larger pipelines and pumping stations.

If flooding occurs to the extent that house gully traps become submerged it will be inevitable that the wastewater system will be grossly overloaded despite any other measures. This is because in these situations the gully traps become "plugholes" draining floodwaters allowing the entire wastewater system to become flooded.

Improved flood protection is therefore often an important part of managing wet weather overloading of the wastewater system.

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Decision Making with Respect to Waiwhetu Stream

The Hutt River Advisory Committee is a sub committee of Greater Wellington Regional Council which was established to consider issues relating to Hutt River flood management. The Hutt River Advisory Committee comprises representation from Greater Wellington Regional Council, Hutt City Council and Upper Hutt City Council. Flood protection in the Waiwhetu Stream is a Greater Wellington Regional Council and Hutt City Council issue which does not involve Upper Hutt City Council. Greater Wellington Regional Council considers that under the current terms of reference the Hutt River Advisory Committee is not the most appropriate vehicle for considering Waiwhetu Stream issues and have proposed an alternative decision making framework comprising co-ordinated reporting to the relevant standing committees of Hutt City Council and Greater Wellington Regional Council with reciprocal speaking rights on Waiwhetu Stream matters for a nominated councillor at these standing committees. Work would be managed by a Waiwhetu Stream working group comprising officers of both Councils.

Pat Scahill
Stormwater Asset Manager
Capacity

7 September 2004