greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Report	15.439
Date	31 August 2015
File	CCAB-12-27
Committee	Te Kauru Upper Ruamahanga River Floodplain Management Subcommittee
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Masterton Options Development Update

1. Purpose

To update the Subcommittee regarding the options development for the urban reach of the Waipoua River through Masterton.

2. Background

Masterton is vulnerable to flooding in an event somewhere between a 1-in-36 year and 1-in-75 year return period event. A target level of 1-in-100 year flood protection, inclusive of climate change impacts, has been accepted by the subcommittee, GWRC and MDC as the design standard for this reach of the Waipoua River.

The Subcommittee, project team and officer working groups have worked on development of options for management of this risk, and to look for opportunities created by these options, as well as negative impacts that may occur if these options are implemented. These options are summarised in the following sections.

For ease of description in this report, the river has been split into four sections;

1. Upstream of Railway Bridge
2. Railway Bridge to SH2 Bridge
3. SH2 Bridge to Colombo Road Bridge
4. Downstream of Colombo Road Bridge

2.1 Option A – Narrow Option

Option A was developed on the principles of maximising the amount of protected land while using the existing stopbank alignments. This essentially meant an in situ upgrade to the existing stopbanks. The estimated works for each section of river are listed below.

2.1.1 Upstream of railway bridge

This option requires the creation of a stopbank on the true right bank (TRB) that connects to high ground at Akura Road at the edge of the urban area. This stopbank protects against the identified overflow that affects Masterton by flooding over the railway line. This stopbank would be between 1-2m above existing ground level.

On the true left bank (TLB) the flooding through the underpass connecting Mahunga Drive to Oxford Street is controlled by a stopbank running alongside Mahunga Drive. This has the additional benefit of securing access to the homes situated at the end of Mahunga Drive. This stopbank would be between 1 – 3 metres above existing ground level.

2.1.2 Railway Bridge to SH2

This option requires raising of the existing stopbank on the TRB by an amount between 0.5m and 2m, along a length of 1150m.

The TLB on the Oxford Street side is aligned as close as possible to property boundaries and will require creation of a stopbank between 1m and 3m above existing ground levels.

2.1.3 SH2 to Colombo Road

The TRB area requires 430 m of stopbank raising by 1-2 m in height, 430 m of gabion raising (>0.5 m raising), and some additional works to ensure stopbank integrity and prevent seepage over an estimated 20m.

The TLB requires 240 m of stopbank raising between 1 - 1.5 m in height, 340 m of gabion raising (>0.5 m raising) and an estimated 70 m of seepage stability works.

2.1.4 Downstream Colombo Road Bridge

Requires 650 m of new stopbanks up to 1.5 m in height on the TRB

2.2 Option B1 – Wide option

Option B was created by trying to adhere to the aims of the project developed by the Subcommittee. This emphasized the aspects of creating space for the river and natural processes and creating opportunity for recreation, environment and open space. This option makes use of naturally formed river terraces for containment of flood waters, while retaining existing development.

2.2.1 Upstream of railway bridge

This option tested the creation of a stopbank on the true right bank (TRB) that connects to high ground at Akura Road further upstream from the urban fringe

than that tested in Option A. This stopbank protects against the identified overflow that affects Masterton by flooding over the railway line. This stopbank would be approximately 1000m long and between 1-1.5m above existing ground level.

On the true left bank (TLB) the flooding through the underpass connecting Mahunga Drive to Oxford Street is controlled by modification of the road access to create an under-over arrangement at the underpass. This would in effect be similar to a very small stopbank closing off the flow path through the underpass. This could also be achieved by some form of flood gate which would have the same impact as that shown in the modelled flooding.

2.2.2 Railway Bridge to SH2

Due to the restrictions imposed by the developed areas along this reach there is only a small difference in this area between option A and B.

This option requires raising of the existing stopbank on the TRB by an amount between 0.5m and 2m, along a length of 1140m.

The TLB on the Oxford Street side is aligned as close as possible to property boundaries and will require creation of a stopbank between 1m and 3m above existing ground levels.

2.2.3 SH2 to Colombo Road

The wide option B proposes the greatest impact in this section of the river. This includes the removal of large sections of the existing stopbanks on both sides of the river from 200m downstream of SH2 bridge on the TLB (Landsdowne side), and from 120m downstream of SH2 bridge on the TRB (Queen Elizabeth park side). At these locations some new stopbank sections are required to connect the existing stopbanks to the river terraces.

The TLB requires a new 100m stopbank along the alignment of the footpath from the swingbridge. In addition the section of stopbank between SH2 and the swingbridge requires 70m of gabion raising.

The TRB requires a new stopbank along the southern edge of the skate park, connecting to the cricket oval, before turning to run along close to the café, bowling green and connecting into the river terrace at the edge of the cemetery. From here it follows the alignment of the old river terrace. In total this requires 940m of stopbank upgrades from 2m in height near the skate park, dropping to less than a metre near the café and half a metre near the cemetery.

2.2.4 Downstream of Colombo Road Bridge

On the TRB a stopbank of up to 1m in height is required along 650m.

2.3 Option B2

Option B2 is the same as option B, with the addition of a small stopbank along the alignment of the existing stopbank to protect the lake and park from a 1-in-20 year flood, and aid the function of the lake as a stormwater management pond.

2.4 Option C

Option C is a hybrid of Options A and B. It protects Queen Elizabeth Park to a 1-in-100 year return period level, but removes the stopbank on the Landsdowne side of the river to allow the Red Star rugby ground area to flood in a large event.

2.4.1 Upstream of railway bridge

Option C tests channel realignment combined with a stopbank to create a berm on the TRB of the river, this includes a stopbank protecting the properties close to Masterton, before connecting across to high ground near the junction between Akura Road and Ngaumutawa Road. On the TLB it aligns a stopbank along the road up to the first junction on Mahunga Drive from Oxford St, before connecting to the river terrace, near 10 Mahunga Drive.

2.4.2 Railway Bridge to SH2

Due to the restrictions imposed by the developed areas along this reach there is only a small difference in this area compared with option A. This is the inclusion of a 20 year stopbank to protect the camp ground at Mawley Park.

This option requires raising of the existing stopbank on the TRB by an amount between 0.5m and 2m, along a length of 1140m.

The TLB on the Oxford Street side is aligned as close as possible to property boundaries and will require creation of a stopbank between 1m and 3m above existing ground levels.

2.4.3 SH2 to Colombo Road

The hybrid option C proposes that the TLB takes the form of Option B, and the TRB takes the form of Option A. This protects Queen Elizabeth Park to a 1-in-100 year level, and allows the natural river terrace to protect Landsdowne. A new stopbank section is required to connect the existing TLB stopbank to the river terrace.

The TLB requires a new 100m stopbank along the alignment of the footpath from the swingbridge. In addition the section of stopbank between SH2 and the swingbridge requires 70m of gabion raising.

The TRB requires a stopbank upgrade and strengthening works along approximately 1000metres of the existing stopbank alignment.

3. Comment on options

3.1 Flood Protection

3.1.1 Ongoing Erosion

The current channel capacity will be increased under both options, meaning that frequent small floods will be passed without the banks breaking. The dominant erosion occurs due to these more frequent events and the impacts of these will be similar for all options.

3.1.2 Risk of Failure

Due to confinement of flood waters, option A presents a greater risk to the stopbank structures. This is created in part by an increased water level which is on average 1m higher than the water levels experienced in the main channel area bounded by the stopbanks in option A. These increased water level effects when compared with option B start adjacent to Villa Street, caused by the backing up effect created by confinement of the channel downstream. These risks would be factored into design of all options, however, it is likely greater risk of failure remains in option A.

The increased water levels and proximity of the main channel to the stopbanks in option A mean an increased risk of failure of the flood protection structures when compared with Option B and option B1.

3.1.3 Consequence of Failure

Modern stopbanks are designed and built with reasonable factors of safety but consideration of the consequences of failure still needs to be taken into account. Consequences of failure of any of the options would result in flooding of urban areas. The greatest risk to life would occur as a result of failure along the Oxford Street section of stopbank. A lesser consequence to life failure would occur as the result of the failure of the stopbank adjacent to Villa St. Failure in these areas would both be worse under conditions in Option A where an additional water head of 1m exists.

3.2 Cost

3.2.1 Construction

Preliminary cost estimates put option A and B at $4M and $3.5M respectively. Option B1 and C are likely to be somewhere in this region due to their development from concepts included in both options A and B.

3.2.2 Maintenance of flood protection assets cost

The ongoing maintenance costs of flood protection assets for both options are likely to be similar.

3.2.3 Repair Cost

Repair cost for Option A is likely to be significantly higher in the event of a large flood due to the proximity of flood protection structures in close proximity to the river channel. Option B will suffer similar effects in the section of the river between the Railway Bridge and SH2 Bridge.

3.2.4 Maintenance of parks and reserves

Ongoing maintenance costs of park and reserve areas is likely to be similar for all options

3.2.5 Repair/Cleanup cost for parks and reserves

Repair and cleanup costs for parks and reserve areas are likely to be higher for option B in the event of a major flood. This is due to deposition of flood debris in and around Queen Elizabeth Park and the lake. Option B1 mitigates this

somewhat by the inclusion of protection from flooding up to a 20 year return period event for Queen Elizabeth Park.

3.3 Transport and Roads

3.3.1 Bridges

Option B allows Colombo Road to flood during large flood events. This would mean Colombo Road on the TLB would turn into an overflow path. This would damage the road in this area and prevent its use during the flood event. This means that only a single crossing point would be available at SH2. This creates a potential risk for hospital access for people in southern Masterton.

Option A increases the water levels throughout the reach by a metre. This additional water head puts increased pressure on structures and the river bed. This may create additional risk when compared with option B for the bridge pier foundations for both SH2 bridge and Colombo Road bridge.

3.3.2 Bypass Road

All options would allow integration with the concept heavy truck bypass road in the vicinity of Villa St.

3.4 Recreation

3.4.1 Queen Elizabeth Park Stage 4 Development

The Queen Elizabeth Park redevelopment was designed with the existing conditions in mind. The existing conditions are most similar to Option A.

However there are many enhancements proposed in the Stage 4 development plan which could be implemented as part of the wider option. These include:

- Strengthening the pedestrian connection to the suspension bridge and river trail
- Reviewing accessibility and pedestrian connections around the suspension bridge
- Creating an area for specimen trees adjacent to the stopbank
- Clearing all vegetation growing on or in the stopbank and extending views out beyond the edges of the park and stopbank
- Reviewing of path locations, heights and interfaces

The other aspects of the development plan would not be impacted by Option B.

3.4.2 Cycling and Walking Trails

All options allow for improvements to cycling and walking trails. Option B creates more opportunity to connect the town with the river.

3.4.3 River Access

Option B removes the barrier with the river created by the existing stopbank.

3.4.4 Safety

Both options create opportunity for safety and feeling of safety improvements. Option B creates opportunity for more open space and improved sight lines to the river berm areas.

3.5 Environment and Ecology

3.5.1 Terrestrial

Both options would allow for improvements to terrestrial ecology

3.5.2 Aquatic

Both options allow for improvements to aquatic ecology. Option B would create more space that could be turned into wetland space.

3.5.3 Avian/Birds

Both options create opportunities for improvement to avi-fauna habitat and encouragement of a wildlife corridor.

3.5.4 Mauri

Under both options the urban reach of the Waipoua remains a highly modified section. Opportunities could be found under both options to restore Mauri to the Waipoua.

3.6 Other

3.6.1 Stormwater Management

Option B may impact on the secondary function of the Lake of Remembrance as a stormwater detention pond. Under Option B1 this function would be retained by the inclusion of a 1-in-20 year stopbank close to the existing alignment. Further modelling may be required to identify and confirm the stormwater function provided by the lake.

4. Further Work

Work is ongoing to further develop the options and to quantify the impacts and improvement opportunities for each of the options. This will be reported back to the Subcommittee at a future meeting.

5. The decision-making process and significance

No decision is being sought in this report.

5.1 Engagement

Engagement on this matter is unnecessary.

6. Recommendations

That the Subcommittee:

1. ***Receives** the report.*

2. ***Notes** the content of the report.*

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