TWO MILE CREEK WAIHI BEACH – IMPLCATIONS TODAY OF A 1930S DECISION

K.P. Hill., and C.K. Ertel., - Western Bay of Plenty District Council

ABSTRACT

Two Mile Creek was established in the 1930's to drain the backshore area, facilitating both land development for subdivision and assisting in draining areas of land for farming use (creek extends from Waihi Beach to Broadlands Block for 600m and drains approximately 550 hectares of residential and rural land).

Broadlands Reserve acts as a buffer/storage area for stormwater flowing into the creek. An existing road bridge downstream (Dillon Street) acts as a throttle for stormwater discharging onto the beachfront. Creek water levels are typically controlled by sand build-up damming on the foreshore.

During the last 70 years, development has seen both sides of the creek being inundated with properties and associated stormwater discharge flows entering the creek.

Damming at the creek outlet has caused constant wetting and drying of the creek banks. This coupled with storm surge/wave energy from the coastal marine area has led to significant erosion of the banks.

The creek was established by the landowners of large agricultural blocks in the 1930's. These blocks were subsequently subdivided and developed, and zoned as both residential and commercial areas. The subsequent landowners have reacted with protests to Council about flooding and streams bank erosion issues. They perceive Council to be the owner of the stream based on previous maintenance work, and believe Council has a duty of care to investigate these issues.

This paper will outline the processes and actions undertaken over the last four years to achieve some form of resolution and physical works outcome. Currently split into two components, work is being undertaken for downstream of Dillon St Bridge residents of Two Mile Creek, however upstream some 40 odd property owners while in agreement that a bank protection is the given solution, are still are yet to reach consensus on who should be paying for this $4.5 million project.

KEYWORDS

Creek banks, Erosion Protection works, Coastal Environment, Private property,

Overland flow paths, Stormwater solutions.

PRESENTER PROFILE

Kelvin Hill is a qualified Civil/Mechanical Engineer with over 38 years experience gained within the industry sector. His experience includes engineering and management roles within the private sector as a consultant and contractor. Kelvin is currently employed by Western Bay of Plenty District Council (WBOPDC) as Utilities Manager, a role he has held for the past 10 years. This position has provided him

with significant opportunity to be involved in 3 Waters operations and asset management. Stormwater being a key component of this role has afforded the author exposure to the impacts and challenges WBOPDC communities face in dealing with flooding and erosional matters, and the considerable anguish and subsequent debate that arises, especially when the question of who pays is raised.

1 INTRODUCTION

Waihi Beach is a coastal town at the western end of the Bay of Plenty, located about 10km to the east of the town of Waihi, at the foot of the Coromandel Peninsula. History tells us the name Waihi means rising water and is the stream flowing through the camping ground near the surf life saving club, at the northern end of the beach.

Two Mile Creek was established in the 1930's to drain the backshore area, facilitating both land development for subdivision, and assisting in draining areas of land for farming use (the creek extends from Waihi Beach to Broadlands Block for 600m and drains approximately 550 hectares of residential and rural land).

Broadlands Reserve acts as a buffer/storage area for stormwater flowing into the creek. An existing road bridge downstream acts as a throttle for stormwater discharging onto the beachfront. Creek water levels are typically controlled by sand build-up on the foreshore.

Figure 1: Two Mile Creek

Two Mile Creek extends from the Waihi Beach coastline to Broadlands Block, a distance of approximately 600m. The creek has been divided into two parts for the purposes of assessment and potential longer term solutions; the watercourse downstream of Dillon Street Bridge, and the watercourse upstream of Dillon Street Bridge.

Dillon Street Bridge was constructed in the 1960's consisting of two concrete cast in situ bridge abutments, sitting on piled foundations with a concrete bridge decking. The alignment of the bridge is not perpendicular to the flow of two mile creek. Recent scouring of the creek bed has seen the pile caps being exposed however the structural integrity has not been compromised. The throat of the bridge between the abutments is 9.5m and obviously dictates the maximum flow possible. The bridge deck is of sufficient height to manage storm events over the last five years. The bridge structure also provides support for a number of Infrastructure Services, including a wastewater rising main.

Figure 2: Two Mile Creek

Downstream of Dillon Street Bridge, the existing creek protection measures include a combination of structures that were either original constructed by the Ohinemuri County Council, or by private residents. The section extends for a length of approximately 180m.

The section upstream of Dillon Street Bridge is located entirely within private property, measuring approximately 350m in length. It includes a number of adhoc creek protection structures built by private residents, tree, and other structures that provide restriction to conveyance of flood flows.

Approximately 40 residential properties are affected by the erosional affects, with some residents facing serious consequences with properties being extremely close to the creek banks. Council has already assisted two property owners by undertaking emergency works and installing temporary sand bag rock protection measures.

Broadlands Block

The Broadlands Block stormwater reserve provides attenuation of stormwater entering Two Mile Creek. It is also an effective means of improving the quality of stormwater prior to its discharge into the ocean.

Figure 3: Broadlands Block stormwater reserve

Modelling of this stormwater has confirmed that the current attenuation is well optimized for reducing the flood hazard in the Two Mile Creek catchment; however, future excavation within the reserve could provide not only an increased treatment capacity for stormwater, but also could be affective in reducing the flood hazard in localized areas for more frequent design storms.

The problem is that the last 70 years development has seen both sides of the creek being inundated with properties and associated stormwater discharge flows entering the creek.

Figure 4: Developments along Two Mile Creek

Damming at the creek outlet has caused constant wetting and drying of the creek banks. This coupled with storm surge/wave energy from the coastal marine area has led to significant erosion of the banks.

The creek was established by the landowners of large agricultural blocks in the 1930's. These blocks were subsequently subdivided and developed, and zoned as both residential and commercial areas. The subsequent landowners have reacted with protests to Council about flooding and streams bank erosion issues. They perceive Council to be the owner of the stream based on previous maintenance work and believe Council has a duty of care to investigate these issues.

From recent observations, the beach levels fronting Two Mile Creek have been around the lowest recorded for the period leading up to July 2014. The low beach levels have resulted in the lowering of the creek bed and reduced protection from the raised beach north of the creek mouth. The combination of the low beach and creek bed levels have resulted in increased storm surge/wave action up and along the creek.

Figure 5: Two Mile Creek outlet onto Waihi Beach

2 DISCUSSION

2.1 OWNERSHIP

The residential catchment area being around 47 hectares has two stormwater reticulation discharge outlets that discharge into the Broadlands Drainage Reserve, and then into Two Mile Creek. The creek passes through private property prior to discharge into the beach environment.

Although it is not know how many properties along Two Mile Creek discharge their stormwater directly into the creek, we do know that on sub-divisional applications Council has taken drainage easements over two properties adjoining the creek. The terms of the easement allow Council to enter the easement area to undertake drainage work if necessary, and to prevent the owner from doing anything that interferes with the drainage flood path over the easement area.

For some time now, property owners along Two Mile Creek have complained that Council has a duty of care to maintain the creek to prevent erosion from occurring to its banks. This issue has been further accentuated in April 2013, when a storm event caused flooding and erosion in places along Two Mile Creek, threatening some houses.

This storm event triggered Council to enquire whether is has any legal responsibility for maintaining Two Mile Creek.

In order to assess Council's potential liability for flood damage to private properties adjoining Two Mile Creek, it is first necessary to determine whether the creek is a public drain for which council has the responsibility to maintain or control the flow of the stormwater in the drain.

The question whether a drain is a public drain for which council has responsibility, or a private drain, has been the subject of a number of legal decisions over the years. Those decisions have established a number of tests or guidelines for determining the status of a drain, but the weight to be given to these tests depends on the circumstances of each case. An important underlying factor however, will be whether the drain serves a public or private purpose.

Some of the tests considered by the Court are:

- Does the drain serve a number of properties rather than for the benefit of any particular property owners?
- Was the drain constructed at public expenses?
- Has the local authority, through its actions, exercised an element of control over the drain?

In the case of Two Mile creek, the drain services a large number of residential properties. Evidence is found with the two Council-owned reticulation stormwater outlets in the upper catchment discharging onto the Broadlands Drainage Reserve and then into Two Mile Creek. There are also eight other Council-owned stormwater outlets discharging directly into Two Mile Creek.

A strong argument can be made that in using the drain to discharge stormwater from a public stormwater reticulation system, Council has an obligation to maintain the drain to ensure it functions properly. By this Council must also ensure that it has capacity to handle storm events of a reasonable design standard, not withstanding the drain also serves a large rural catchment with natural run-off entering the drain.

In Summary, Council has chosen to use the drain for public purposes and as a consequence has agreed to maintain and control the functioning of Two Mile Creek.

2.2 TWO MILE CREEK – DOWNSTREAM OF DILLON STREET BRIDGE

The existing creek protection measure downstream of the Dillon Street Bridge includes a mixture of tipped rock, and timber and steel protection measures. The structures tie into the recently constructed coastal protection measures on the true left bank and includes a private structure on the true right bank. Other than the existing private structure, the existing structures are no longer consented and have passed their useful life. Without reconstruction of the creek bank protection measures, the creek banks will continue to erode causing continued loss of public and private land and loss of amenity.

The first property downstream of Dillon Street Bridge suffered significant erosion, losing 3 meters in width of bank overnight during a storm event in 2014. This resulted in emergency works needing to be undertaken by council to protect the property from falling into the creek.

Figure 6: Downstream erosion

WBOPDC commissioned Tonkin & Taylor (T&T) to provide a conceptual options report for creek and coastal protection measures. The report provided a recommended option for a combination of a mass block retaining wall along the creek banks and Sandbag training groynes fronting Two Mile Creek. Feedback from the community and the neighbouring properties voiced their serious concern about the visual impact these training groynes would poise when completed. The preliminary design had also highlighted that the training groynes to be effective and to stand the rigours of coastal environment, would be of a size that would detract from beach walkers crossing the creek entrance as they currently enjoy. An elevated walkway bridge could have been a possible solution, however the visual impact could not be mitigated and given the communities feedback the plan was considered no further.

An interim solution for creek bank protection has become the more pressing issue within the community and a solution is now sought which takes into account the existing structures and requirements of the recently completed Two Mile Creek Model.

2.3 SCOPE OF WORKS

To meet the objective outlined above, the following scope of works was agreed to with T&T:

- Develop a consultation strategy and program for meeting with neighbouring property owners and other potentially affect or interested parties.
- Prepare conceptual design drawings of the proposed creek bank protection measures
- Undertake consultation with neighbouring property owners and other potentially affected or interested parties including the consent holder of the existing private structure and the Waihi Beach Community Board.

- Prepare an assessment of environmental effects in support of the consent application.

- Lodge the application with both the WBOPDC and Bay of Plenty Regional Council (BOPRC).

2.4 MODEL FEEDBACK

The 2012 flood model combined with recent storm flows and creek bank erosion has identified the importance of Two Mile Creek for the collection and transfer of stormwater. The model has also highlighted the need to maintain the width of the creek, which is potentially compromised by infill development, land modification, and access restrictions. The creek banks are currently characterized by ad hoc protection measures and it would appear that there are no planning controls or legal mechanisms in place for the area of the creek where riparian areas are under private ownership. This makes it problematic to ensure access is provided for the installation and maintenance of erosion protection work. Consideration must also be made to ensure the development of individual sites does not have a consequential effect on the functionality of the watercourse as a method of conveying stormwater from the urban area to the Coast Marine Area.

The recently completed flood model for the catchments of Two Mile Creek has also reported potentially higher flood heights for this area of Waihi Beach. There is merit in providing an update to the extent of the floodable areas notated on the District Planning Maps to reflect the results of the hydraulic model. The Plan Changes which are to be imminently publicly notified would provide a cost effective and timely mechanism for affecting the update to floodable areas.

Council also considered that there was merit in developing another planning method to protecting the channel width of Two Mile Creek which has been identified through the hydraulic modelling as being required to convey the design storm for the catchment under a fully developed state, including the proposed diversion of flows from Maranui

Estate.

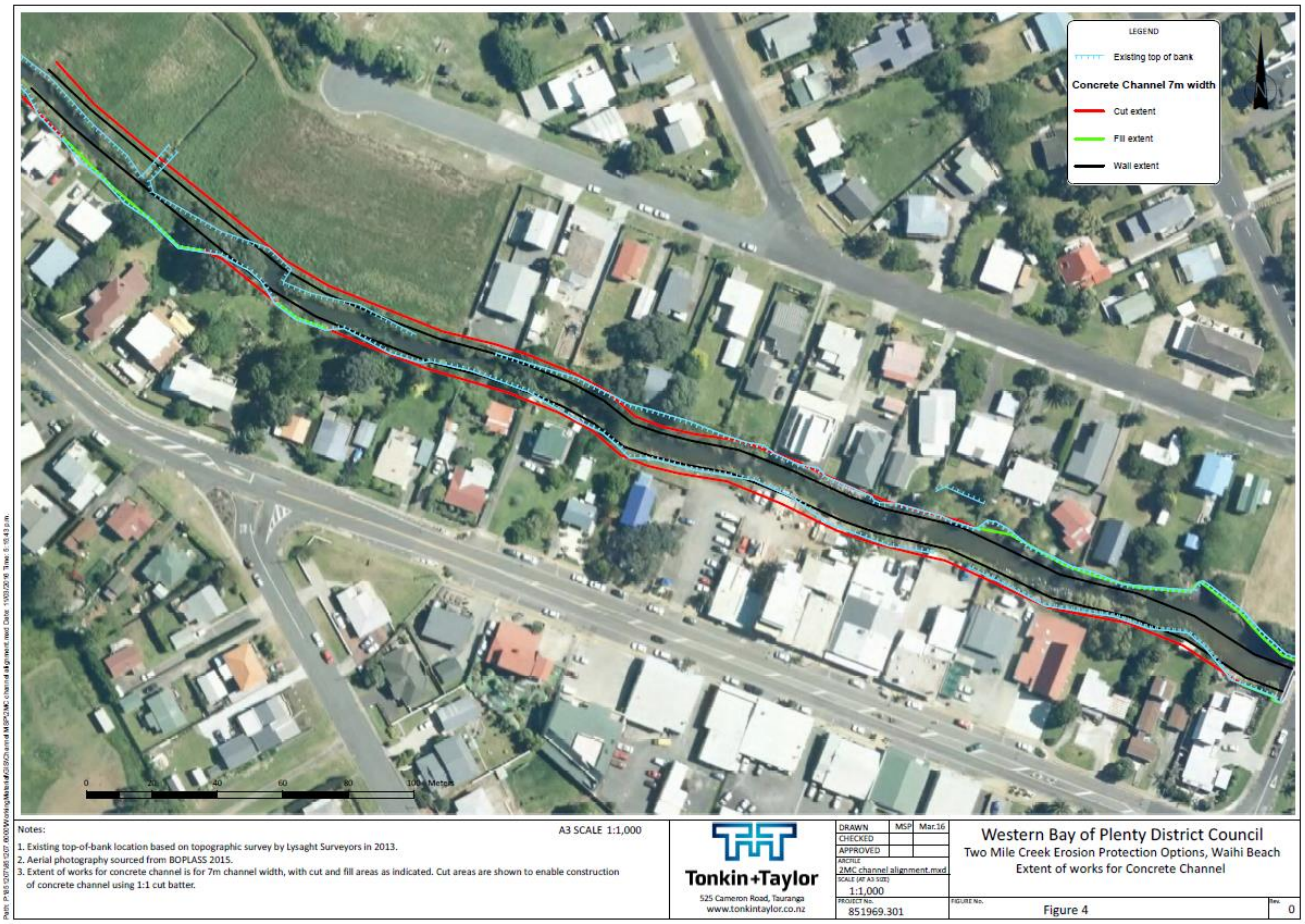


Figure 7: Proposed stormwater catchment plan

2.5 DRAINAGE WORKS AND PROPERTY ACCESS

If council decides to undertake flood protection works along Two Mile Creek, then the next question to resolve is what options are available to Council in gaining entry onto private properties to undertake the work?

Legal advice was sought to answer this question resulting in Council considering two options.

The first option is to seek a designation as part of the consenting process for the work, and if successful, then take the designated land under the Public Works Act. Under this option, an affected landowner has the right to challenge the designation (and appeal to the Environmental Court). If the designation is upheld, the landowner can then oppose the taking of the land by objecting to the Environmental Court (although this issue is largely pre-determined by the granting of a designation), and then object to the Land Valuation Tribunal against Council's assessment of compensation of the value of the land taken and any injurious affection to the balance of the land.

The second option is to undertake the work using the relevant provisions of the Local Government Act 2002. Under that Act, Council can enter upon private land to undertake stormwater drainage work subject to the written consent of the owner, but if that is not obtained by following the process set out in Schedule 12 of the LGA:

Schedule 12 provides for notice to be given to the owner and occupier of land likely to be affected by the construction of a public drain. If the owner or occupier objects within 1

month of the notice, the territorial authority must appoint a day for the hearing, and after the hearing the objection may either determine to abandon the work, or proceed with the work, with or without any alterations. However, a person aggrieved may appeal to the District Court and Court may determine the matter.

Once the drainage work has been completed, Council has under s.181(4), the right to access the land at any time in the future to inspect, renew, or repair the work, subject to giving reasonable notice. This is what is known as a Statutory Easement.

Under this option, Council does not acquire the land but is obliged to pay to the owner compensation for any injurious affection to the land to be assessed in accordance with the provisions of the Public Works act. In assessing any compensation for injurious affection, betterment can be taken into account, so in this situation where the work will avoid or reduce erosion or flooding to private land along the creek, the level of any compensation is likely to be small or non-existent.

We have looked at whether Council should seek a designation along Two Mile Creek, in addition to exercising its powers to undertake the drainage work on private land under LGA 2002. The purpose of the designation would be to have the drainage area notated on planning maps and to prevent work being undertaken within that area without the consent of Council.

The granting of a designation is unlikely to trigger an order made by the Environmental Count under s.186 of the RMA for Council to compulsorily acquire the designated area due to its blighting effect on the salability of the affected property, as its blighting effect would be minimal.

Council has maintained open dialogue with the community regarding the process which requires buy-in by property owners and prefers to work together to find an amicable outcome, rather than imposing a regulatory or legislative position which would further disengage the affected property owners.

2.6 THE PROCESS

Written approval was required from all property owners neighbouring the creek, in support of the resource consents from BOPRC and also WBOPRC. A letter and accompanying drawing was provided to each property owner showing the proposed design along with a form to sign acknowledging approval to proceed with a Resource Consent application.

The approval did not bind property owners into agreeing to fund the construction of the protection works. The written approval confirms the property owner’s agreement that protection works are required and that the alignment and method of protection proposed is acceptable to them.

Running parallel to this process, Council was undertaking an assessment of the funding arrangements for the project. Once the resource consent was granted and funding mechanisms confirmed, detailed design and construction of the creek bank protection measures could be undertaken.

While the process appears to be simple, the magnitude of obtaining multiple approvals can provide a challenging and frustrating process. Some of the challenges arose with trying to undertake the following tasks:

- Creek alignment and creek bank protection measures/options.

- Questions were raised about the fairness of options regarding loss of land with the location of the creek alignment.

- Questions were raised around the type of structure to be built. Not all were in favour of one design, as 6 design options were discussed with the property owners, each varying in capital and long term maintenance costs.

- Different drivers for commercial property owners verses private property owners. Commercial owners did not want to lose valuable land that could be utilized within their business operation, whereas private owners were more generally concerned with protecting their property.

2.7 DOWNSTREAM OF DILLON STREET BRIDGE

Only 7 private property owners are affected by the proposed creek bank protection works. Council also has a stake in the overall process with ownership of a 'paper road' that abuts both sides of the creek. The owners were very quick in acknowledging the benefit of the bank erosion structures to assist in protecting from the coastal environment. They noted that while they would benefit, they were not the major contributors of the stormwater flows from upper catchment area and as such would only be prepared to fund a portion of the total cost. A mutually agreed figure of 25% of the cost of the project based on individual creek frontage measured in meters was provided to Council.

The proposal was accepted by Council and direction provided to staff to proceed with the resource consent application, which was lodged in early 2015 and approved by June 2015. This allowed Council to finalized the funding model and include the project in the 2015/2016 calendar. The physical works part would be tendered out in March/April 2016, with physical works scheduled for completion by August 2016.

2.8 UPSTREAM OF DILLON STREET BRIDGE

A similar process to downstream property owners was undertaken, however with 37 property owners, the task of obtaining approval to progress with a resource consent application has proved to be considerably harder to achieve.

During the course of the 18 month process, Council could only get agreement from 30 out of the 37 property owners. A couple of property owners refused to sign stating their properties were not at risk and did not want to be burdened with any additional rates. A number of commercial property owners did not want to lose any further land given this reduced their ability to develop the site. Furthermore if they were to agree with any of the protection options, it would be on the basis of a vertical wall structure as the first choice and not a sloping structure.

Unfortunately the existing route of Two Mile Creek has 'pinch points', where the width of the creek is limited by existing structures being non-removable. Concern was also raised about the additional area required to undertake construction of certain solutions. A mechanically stabilized earth (MSE) wall is one example that while cost effective to construct, has significant impact on the profile width of land required.

Other concerns related to existing trees located on the banks and the loss of these. Loss of a 'paper road' service lane on the edge of the creek, albeit not currently used, the potential loss of this may affect the commercial properties adjacent to this. The premises for all these comments was based on a creek width of 11m being able to accommodate and convey a 50 year storm event as prescribed by BOPRC requirements.

Feedback was provided to the community by way of letter thanking the 30 property owners for their support, but due to the inability to gain the majority of the signatures for the purposes of a resource consent, the project would have to be put on hold. Subsequent discussions with the consenting staff at Bay of Plenty Regional Council confirmed that based on the present situation, the likely hood of being granted a resource consent was extremely remote.

The decision to put the project on hold, as expected, was not well received with the affected property owners being divided into two groups. Two private properties had extensive bank erosion with a minimal setback of 2.5m to 3m before reaching their respective dwellings. The majority of the property owners who elected not to sign did not have this issue of properties being at risk.

Council were requested by the community via the Long Term planning process, to review the options and come back to the property owners and specifically address the concerns raised by the non signees. It was agreed that funding should be incorporated in the Long Term Plan on the understanding that a suitable solution could be found, so this would not imped the lodging of a Resource Consent application in the 2015/16 operating year allowing construction activities to commence in the 2016/17 operating year.

2.9 DESIGN REVIEW CRITERA

For the downstream design, in reviewing the design the rock revetment option was considered a cheaper and more affordable option over the mass block option. A specific concrete wall design however, was required for the first property adjacent to Dillon Street Bridge which had previously suffered extensive bank erosion.

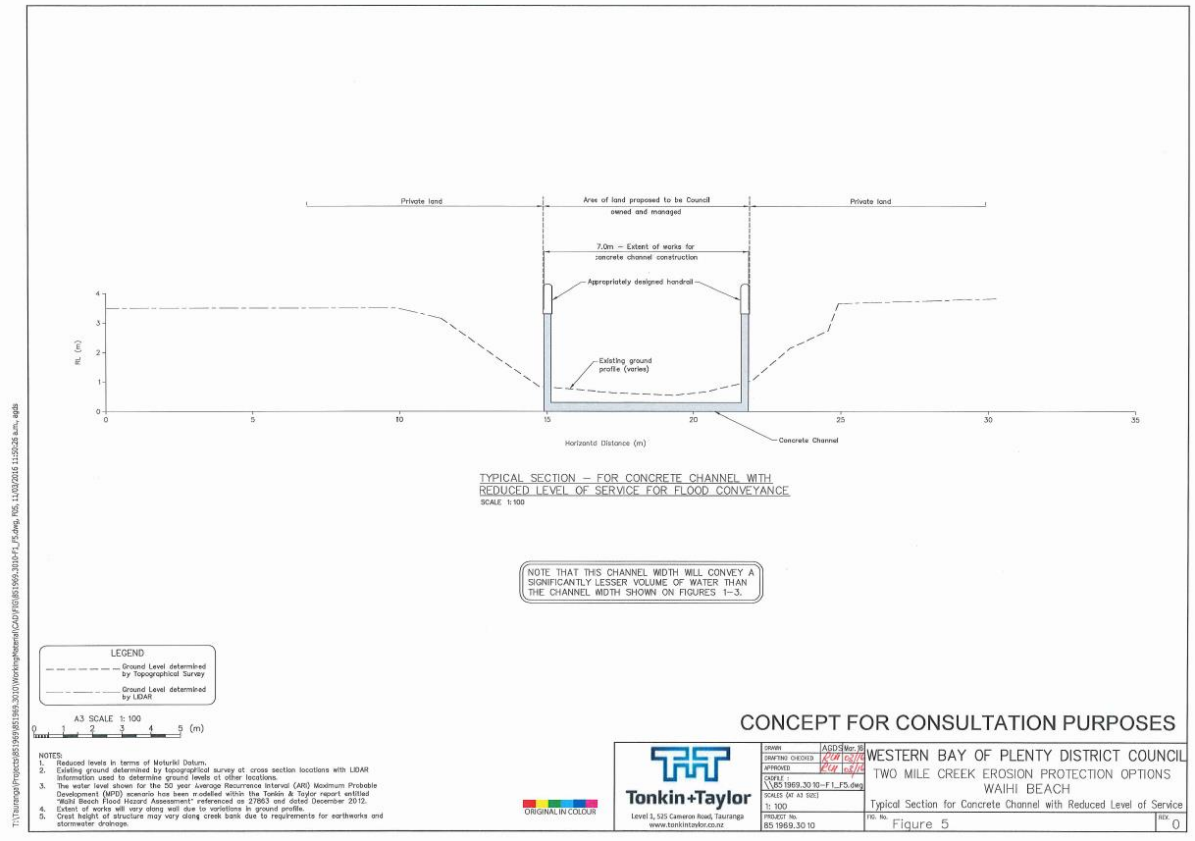


Figure 7: Proposed concrete wall design

To determine the upstream design, in December 2015, Council instructed Tonkin & Taylor to undertake a number of geotechnical test along the creek banks. These were to be used to determine the bedding material and to provide important data for design comparisons.

Three potential options were evaluated using the geotechnical data, as shown in the appendices;

1. Timber Piles and timber retaining wall structure.

2. Concrete U shaped precast drainage panels

3. Rock revetment base/ Mechanical Stabilised Earth (MSE) wall.

Each option has advantages and disadvantages in terms of the design, cost, constructability, and footprint required. The geotechnical information has confirmed that the bedding material for supporting the Timber Piles requires 8m to 10m in depth below creek bed to achieve a 2m high support. Spacing of these piles was every 1.2m.

The rock revetment base/MSE wall would require a significantly larger footprint than originally anticipated. In some locations this would be as wide as 23 meters, which would not be possible in a number of locations along the creek.

The concrete channel design provides a suitable solution to convey a 50 ARI MPD event when designed with a 10m throat width; however a 17m width construction space would be required. A budget estimate of around $4million is anticipated to construct this solution.

All three options are currently being evaluated in more detail. This information is being compiled into a summary document which will form part of a report to Council and also as an engagement tool with the 40 odd property owners. Consideration is being given to reducing the width of the concrete channel down to 7m wide and assessing the implications and risks associated with this design. A sensitivity analysis for a design top width is expected to result in a lower capacity under significant flood conditions. If the community buy-in to this solution of reducing the creek width, then it is likely Council will be able to get agreement with most property owners..

3 CONCLUSIONS

The decision by a couple of local farmers back in the 1930's to drain the backshore dunes and swamp areas for farming and horticulture activities, might have been seen as the appropriate solution at the time. History documents Two Mile Creek as being excavated using a mechanical excavator, with a profile of less than 1m in width. Today the creek has aggressively increased in width to 7m-8m in with, bought about by increased stormwater flows from both urban developed land, and rural catchment areas where land activities have subsequently changed overtime.

The original drainage flow paths prior to the 1930s were noted as meandering parallel with the coastline in a southerly direction, exiting into the inner harbor around the Athenree Community. The formation of the Two Mile Creek system had given some consideration to private property owners by aligning the route on the back boundary lines of properties prior to exiting onto the beach.

The township of Waihi Beach has subsequently been developed around both Two Mile and Three Mile Creek and over reclaimed swampland. Low lying flat contours have helped provide additional issues for managing stormwater. In hindsight, the preparation of a stormwater catchment management plan for the Waihi Beach community would have provided longer term protection, rather than the ad hoc drainage system that is currently available.

The original Capital Project Assessment undertaken across the whole of Waihi Beach highlighted the requirement for nearly $30 million to significantly reduce the occurrence of flooding within the urban areas. Two Mile Creek is part of this overall expenditure.

The financial impact on the Waihi Beach community and the wider Western Bay District is considerable, and not really an affordable option for the community. In saying this, it is important that any form of remedial work provides a longer term solution for the community. Over the last 85 years a community footprint has been developed, which would be expensive to change.

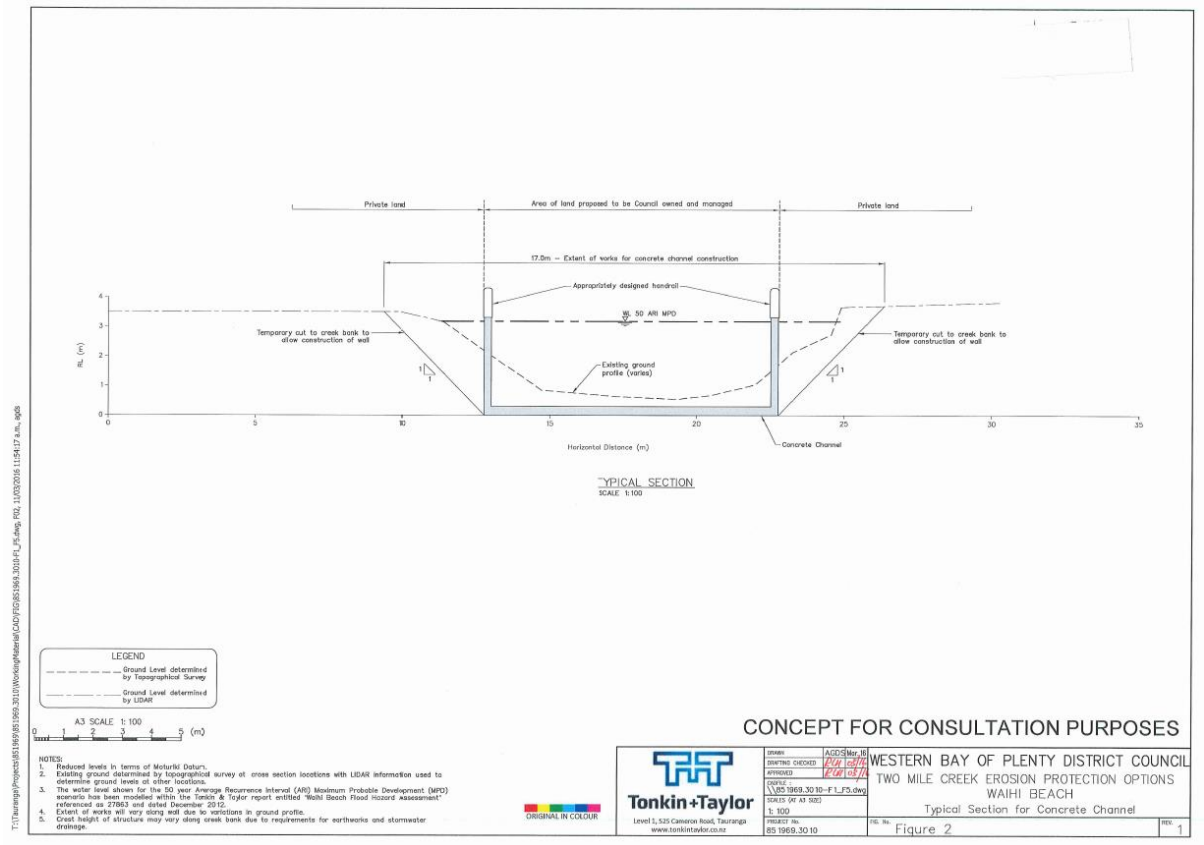
Council has given consideration to reinstating the original drainage system prior to the 1930's, however at an estimated capital cost of $22million in addition to the operational yearly costs of the pumping stations required to manage the stormwater, this is not considered a viable option. Further the current route of Two Mile Creek would need to remain as an overland stormwater flow path given the nature and contouring of the surrounding receiving environment.

Over the last five years, Council has recognized the need for change, particularly in the way stormwater should be managed. Two Mile Creek needs to be accepted by the community as an important part of the solution in managing the conveyancing of stormwater and the need to spend around $5.5million to ensure this is achieved.

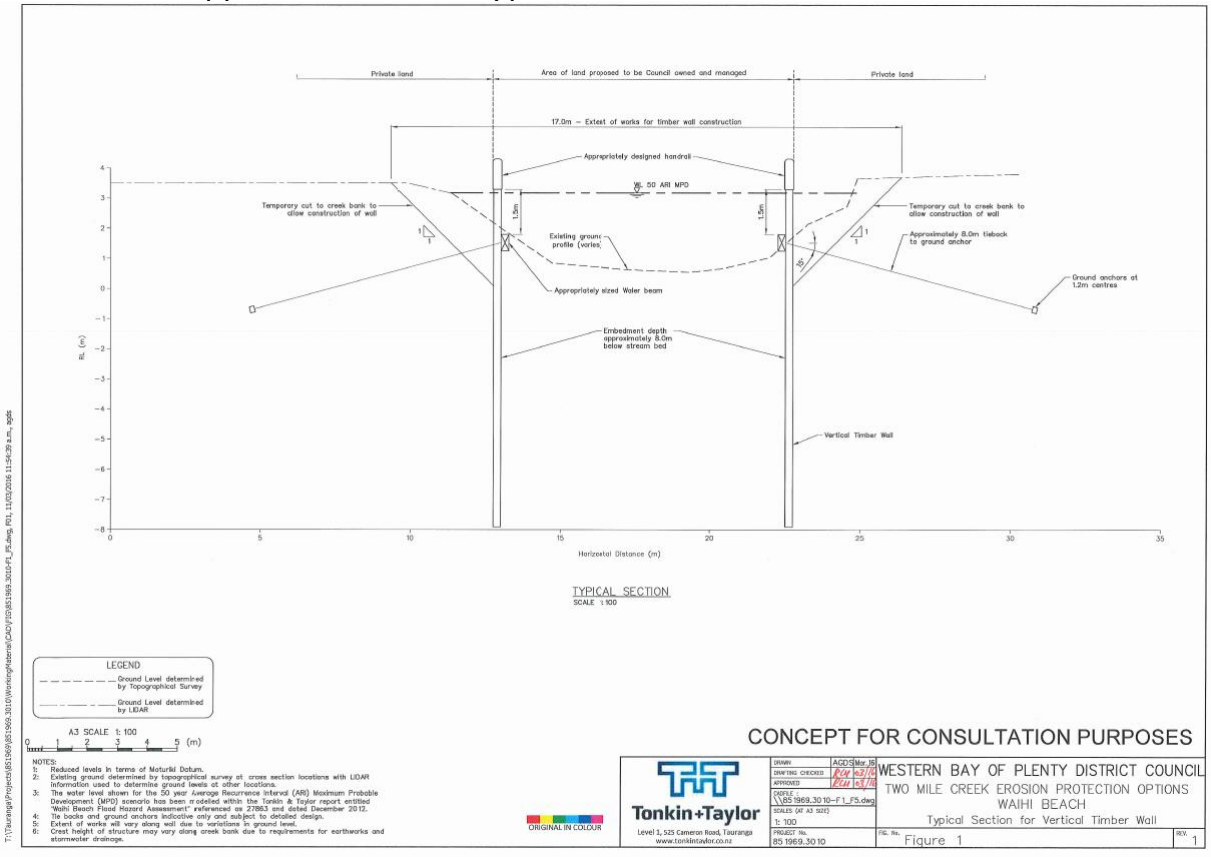
ACKNOWLEDGEMENTS

Council's professional service provider Tonkin & Taylor

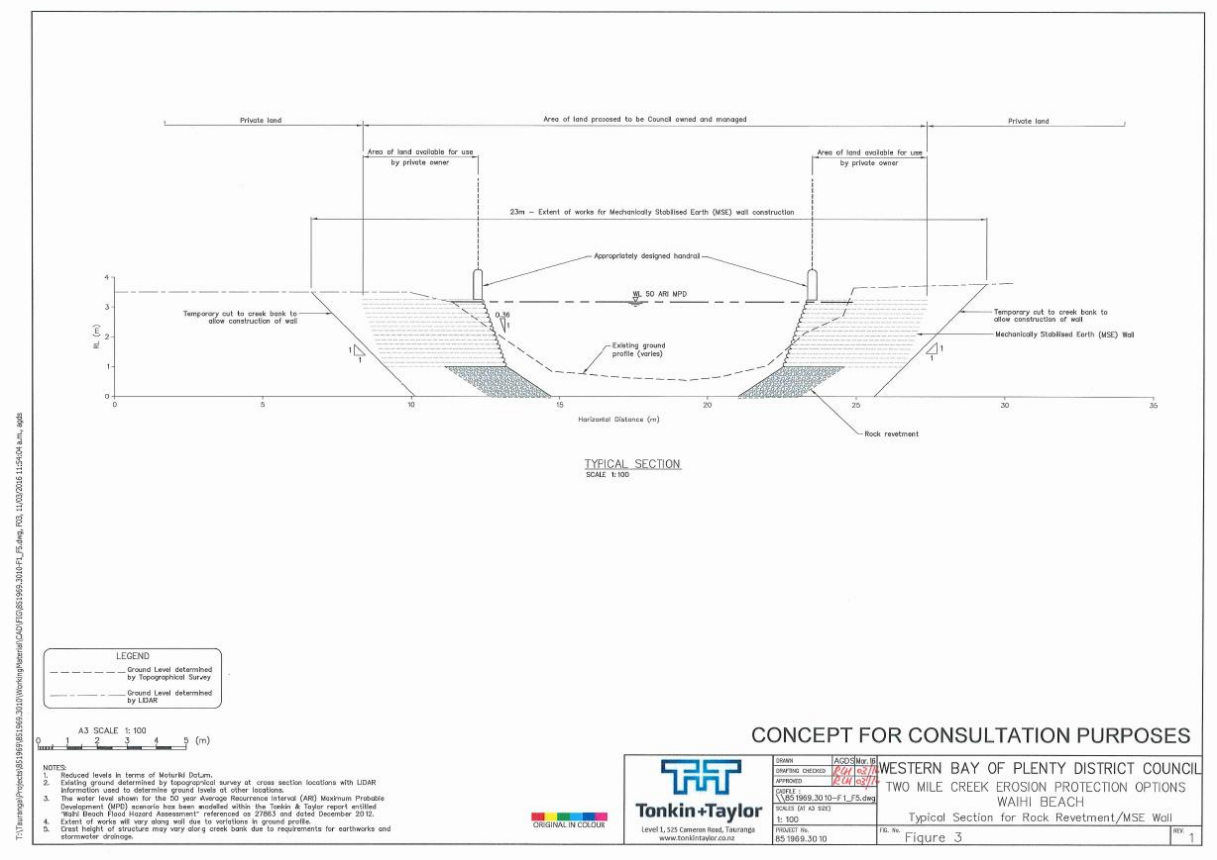
APPENDICES



Appendices 1: Typical Section for Concrete Channel



Appendices 2 : Typical Section for Vertical Timber Wall



Appendices 3 : Typical Section for Rock Revetment/MSE Wall