Memo – Williamson Pond Upgrades

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CC:	Brian Richmond (WRC), S7(2)(a) LGOIMA 1987
DATE:	23 February 2024

Introduction

This memo provides an overview of the environmental impacts of converting Williamson Pond in Whangamata into a dry detention basin. This includes impact of upgrades on:

- Discharge water quality
- Beach erosion

Design Concept

Purpose

This project is intended to address upstream flood risk and aesthetic concerns in the area. Hydraulic modelling indicates that the properties on Williamson Road and Ocean Road have risk of habitable floor flooding. Williamson Pond is at the downstream end of Williamson and Ocean Road piped catchment, receiving runoff via two stormwater pipes (see Figure 1).



Figure 1: Existing stormwater network (source from TCDC GIS). The green lines represent existing stormwater pipelines

During periods of sustained rainfall, the incoming pipes are partially submerged under the pond water level (see Figure 2). Works on Williamson Pond may improve flows in the upstream pipe network.



Figure 2: Inlet pipes to the pond during periods of sustained rainfall

The Whangamata Residents Association have expressed safety and aesthetic concerns around the pond. They wish to increase space available for recreation by removing the pond. To address the identified flood risks and aesthetic concerns raised by residents, it is proposed to upgrade the existing Williamson Pond into a dry detention basin.

Existing Design

Williamson Pond receives runoff via two stormwater pipes (900mm and 1050mm diameter). At present, it retains stormwater and discharges it through soakage. Overflows are directed over a weir onto Whangamata Beach. The following pictures (Figure 3, Figure 4 & Figure 5) show the inlet pipes, the overflow channel to the beach, and existing weir with gabions.



Figure 3: Two inlet pipes to the pond



Figure 4: Overflow channel from pond to weir



Figure 5: Existing weir and gabions

Proposed Upgrades Design

The upgrades will add a low-level outlet to drain the pond more quickly under low return period events. The pond will then function as a dry detention basin, temporarily holding water under high return periods. Construction works on the upgrades include earthworks to partially infill the pond, a new low-level pipe, outlet structure (including wingwall), water quality device, and non-return valve. Refer to Attachment 1 for concept drawings.

Waikato Regional Council consenting issues

Discharge from the current pond is authorised under the existing Comprehensive Discharge Consent (no. 105667). Initial discussions with WRC indicate that the new discharge may also be permitted under this consent, if impacts to beach erosion and discharge quality are less than minor. The existing and proposed works are both outside of the Coastal Marine Area (see Figure 6 below), so the new outlet structure will not require WRC consent.



Figure 6: Aerial photo of Williamson Pond. The orange line represents the boundary line of the Coastal Marine Area

Water Quality Impact

Influent Quality

The upstream catchment for Williamson Pond is largely urban but includes a small golf course on Williamson Avenue. The runoff characteristics are likely to be typical of an urban catchment, including some litter and sediment. The pond currently experiences algal blooms in the spring and early summer (see Figure 7). This suggests high nutrient loading in the pond influent, potentially coming from fertiliser use at the golf course. The influent has been observed as colourless and odourless, which implies low level of sediment and dissolved organics.



Figure 7: Algal growth in Williamson Pond

Existing Discharge Quality

At present, algae and pond vegetation are likely to consume most of the influent nutrients. The pond also likely functions as a settling basin for sediment. The hydraulic retention time is long (in the order of weeks), which likely leads to high sediment removal performance. As the stormwater is discharged via soakage, suspended solids are likely filtered by underground sand and rocks.

Proposed Discharge Quality

The upgrades include a Stormwater360 Vortcapture device at the outlet to mitigate water quality issues. The Vortcapture is designed to remove coarse litter and sediments (>5mm) washed into the stormwater system before discharge enters Whangamata beach. Smaller particles not collected directly by the Vortcapture may be removed through filtration, as the outflow passes through the gabions before reaching the beach.

The purpose of positioning Vortcapture at the basin outlet instead of inlet is to capture litter that may get blown into the basin from the surrounding picnic and barbecue areas. An inlet grille may be included for safety purposes.

The Vortcapture will be maintained by Thames-Coromandel District Council (TCDC) Water Services. Periodic cleaning will be incorporated into the maintenance contractor's responsibilities.

Water Quality Impacts of Proposed Design

It is acknowledged that the existing pond may offer some biotreatment. This approach may be preferred by WRC. However, the Whangamata Residents Association has rejected design approaches that involve planting and/or standing water. TCDC has previously suggested converting the existing pond into a wetland, but residents have stated their strong preference for a dry detention basin instead.

As runoff in Whangamata is unlikely to be severely contaminated, it is anticipated that the upgrade will not cause quality issues at Whangamata Beach. Its water treatment performance is anticipated to be close to existing treatment offered by the pond. The upgrades are expected to result in less than minor effects on beach water quality.

Erosion Control

Existing Erosion Controls

Erosion risk from the existing pond design is low. A majority of flows are contained within the pond during low return period events. Only overflows are discharged to the beach. Gabions at the discharge point dissipate the overflow velocity during high-flow events. The weir also serves to reduce the flow velocity. It is estimated that the weir only activates at the 10 year ARI event or higher.

Proposed Erosion Prevention

The upgrades aim to direct all stormwater from the Willamson and Ocean Road piped catchment to Whangamata Beach. An increase in volume of stormwater is likely to increase the erosion risk at the beach. Appropriate erosion control practices will be incorporated in the upgrade plan to mitigate the risk.

The proposed rock-lined channel reduces the velocity of flow between the pond inlet and outlet. This in turn reduces the outflow velocity to the beach. The outlet pipe is designed to be embedded into the existing gabions to additionally slow discharge velocity. Sizing of energy dissipation will be conducted during the detailed design phase. The gabions may be extended further into the beach if required. The gabion rocks may be substituted with larger diameter rocks if required for erosion protection. We will also investigate the use of baffle blocks within the outlet pipe.

In conclusion, it is likely the upgrade will cause less than minor effects on beach erosion as appropriate erosion mitigation measures can be practically implemented.

Conclusion

To reduce water quality and erosion impacts to Whangamata Beach, the dry detention basin incorporates the following mitigation measures:

- Gross Pollutant Trap to mitigate water quality issues
- Rock-lined channel to reduce erosion at Whangamata Beach
- Discharge pipe embedded into the existing gabions for erosion control at the beach

This memo has shown that converting Williamson Pond to a dry detention basin will have less than minor effects on water quality and erosion at Whangamata Beach.

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The Client should take appropriate professional legal advice prior to implementing any recommendations made within this Memo that may impact on the legal exposure of the Client.

We trust the information presented in this memo provides clear guidance. Should you have any questions, please contact the undersigned.

Regards,

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Attachments

Attachment 1: Concept Drawings

Provided as a separate document.