Folder [20231205 Williamson Park Pond Stormwater Detention Basin Alternate Design]

Alternate Stormwater Proposal for Williamson Pond

Ian Holyoake. 5 December 2023

Reviewed by Rob

Eric and our stormwater group have not been asked to review at this stage.

The purpose of this project is to deal with the stormwater discharges from the major pipe network into the existing Williamson pond.

This design will become part of the the Stormwater assets of Whangamata resource consent 105667.

Metis has presented a proposal for comment. This is an alternate proposal presented by the stakeholders group. This proposal has not been to the greater community under consultation.

Background:

The Williamson Pond was created some time in 1985 when the original discharge pipes directly entered the Ocean were cut back to avoid ongoing erosion and maintenance issues. The basin was created by bulldozing the sand up to form the high sand dune to the North. The pipes were cut back about halfway through Williamson believing the then water discharge would become absorbed into the water table. Maintenance involved digging out the bottom and spreading it around the pine trees to the South.

Over the years the main Williamson pipes have been enlarged and lengthened gradually increasing the catchment. This has caused excess storm water delivery which has an adverse effect on the pond soakage rates, maintenance and over topping into the Ocean. Recent additions are a BBQ area which means children pose a health and safety risk.

The pond is not deep and has a solid sand base. It is not a boggy swamp. The water table reduces in dry spells and the lake dries up. A replacement weir was constructed (undated). Council has no original construction plans or a maintenance specification. It is not currently included in resource consent 105667. Technical and legally it does not exist. It appears as a feature photo on one of TCDC Annual Plans so is a landmark asset. It seems to be purposely created as a feature giving still water openness to wide grass scenery. The adjacent park is used for parking and events.

Basically in hindsight the road discharge pipes should have gone to an estuary where erosion is manageable. The pond should never have been formed. But one problem at a time became resolved by increasing the catchment area to what we have. At least as it is the roads with pipes flood less than the roads relying on natural soakage or purposely located soakage devices. Cutting off the pipes will result in severe flooding of the catchment area.

Our main objective is to remove it entirely. The fallback position is to reduce its adverse effect on the Williamson footprint, sand dunes, Williamson Park and the Ocean.

No-one has an answer to why the weir is set back into the sand dunes in a Vee shape that enlarges storm surge velocity or its height. Storm surges regularly over-top it and debris including substantial logs and sea water enters the pond. The South neighbour has built a swale to protect against further surges. The pond is discussed every storm event and is the subject of an Opus and HAL report. The issue is despite the reports council have not accepted the water level in the pond influences the surrounding ground water levels. This operates in two ways. Catchment stormwater fills the pond to a level above the surrounding water table which lifts the water table. Soakage becomes limited to the sand around the pond that is above the water table. As the levels equalise soakaway stops as the water level in the pond is the same as the water table level. Because Whangamata is built on a delta we have very little fall. Burying stormwater pipes into the ground means inverts are lower than the surrounding land and become closer to sea levels. Sea level is the ultimate low for the water table. Increasing catchment areas meant larger diameter pipes which means inverts are even lower, buried beneath the water table. This is what has happened to Williamson. Larger and larger pipes so soakaway is less. Eventually the Pond level drops or is pumped out but then immediately fills back up to the water table level.

Rainfall increases the water table generally at a ratio of 1mm rain raises water table 2mm. Water tables are often only 1m down which means 500mm of rain creates breakthrough and surface flooding which is intentionally directed to pipes and to Williamson. This creates an even greater catchment area than the now larger pipes were intended for. They are above capacity, and all this is delivered to Williamson pond which was never envisaged to carry this load of water runoff. The pond over-tops the weir and remains full to the level of the surrounding water tables. That removes any chance of soak-away of the pond. Stalemate for months especially over the winter period. At these levels the large discharge pipes from Williamson Road remain full of undischarged stormwater. These pipes were laid without rubber rings so still water in the pipes bleeds back into the water table. Whilst this may not be of significant volumes the problem is until the water table drops - for whatever reason - the remainder of Whangamata will flood again and again as they are reliant on soakage devices to drain away roof water. These raise the water table and they become flooded.

In time as rainfall intensities drop the water table drains into the Ocean. The rate of drain away is reported to be around 200mm/month when rainfall is low. But the water table is by now at least 1m-1.2m higher than it was before the rains as is the pond level which can only drop as the water table bleeds into the Ocean. That means the pipes remain full or partially full for months, bleeding water from the pond back up stream of pipes into land already flooded by roof soakage.

This is all highly contentious and debatable depending on which stance you took when the original decisions were made to increase pipe sizes and catchment area.

The rule that we MUST accept is we must not deliberately over drain the water table - if we do we lose vegetation health along with animal and bird life. However we must drain away surplus water that causes flooding. The point here is when water becomes 'floodwater' it is excess so must be removed. Between these ranges rainwater is naturally replenishes our aquifer.

The Williamson discharge pipes currently remove all water regardless of intensity and regardless of droughts. This MUST be changed.

The Williamson discharge pipes have been designed to remove large volumes of stormwater from flooded areas quickly. We do not need this water. It must be removed, not stored, not recycled, not made into a feature lake.

Therefore the Williamson solution must serve 2 purposes. It is not solely about discharge. We have an excellent piece of land to create a solution. BUT it discharges into the Ocean, our surf and swimming beach so is not ideal. Discharges into the Ocean create erosion and returns storm surges and sand blown problems. It would be desirable to move everything to an estuary discharge location.

The following images are information I have gathered from LGOIMA. I have active LGOIMA requests so still have information gaps. I am providing this alternate proposal in good faith to be tested at the next workshop. Until examination no sensible solution will emerge.

What is exactly wrong that needs solving?

The Pond is an ideal habitat for harmful algae bloom (HAB). Deep water is dangerous to children when unfenced and located by a recreational area. The pond has steep batters, does not drain away and stores unknown toxic pollutants. Its volume is inadequate to act as a stormwater retention pond. The pond water level increases above the water table in high intensity rainfall which increases the water table levels when we want them lowered.

TCDC District plan and WRC do not approve detention ponds that are not self-draining. The pond is not part of consent 105667 and will not assist completing the certificate. All these points require solving.

What do we know about history of flooding in the area?

Opus has prepared 3 substantive reports. I have one from HAL. These are all useful starting points.

I do not have access to the Fire Service call outs or the RFS council has that act as the record of floods.

The Opus 2005 report included a survey of homeowners responses. I will not list these here because the catchment area is extensive, and the influence of Williamson pipe network would be debated.

I have included paragraphs and graphs from the important reports.

What has been done since the Opus and HAL report to reduce the risk of flooding in this area?

Nothing.

Why should something be done to this asset?

To remove a health and safety issue

To immediately discharge excess stormwater runoff

To clear the main Williamson pipes of backed up water

To prevent HAB

To reduce the incidence of surface flooding as reported in Opus 2003 survey

To satisfy the Whangamata resource consent 105667 so it can proceed to issue.

To remove an eyesore when in flood and when the water table drops and the basin goes crusty

To reduce maintenance issues of dumping sludge and the cost of cleaning the pond basin

To comply with the District Plan ordinates - detention basins cannot retain water and must self drain

To improve the Reserve

To utilise the Reserve by providing more facilities for the community

Alternative proposal:

The basis of this alternative proposal is to provide:

1. Move the catchpit for sediment to the road so road services can maintain them
2. Provide a detention basin to temporarily hold water for larger storm events that is self draining
3. The self-draining to be a combination of ground soakage and an overland flow path to the Ocean when soakage rates into the ground are inadequate to manage the stormwater volume
4. Create an overland flow path from the existing discharge pipe invert termination through the weir
5. Provide developed land for community use.
6. Provide a space to expand the BBQ facility and carparking/people in events
7. Provide and develop some garden features

The gallery below includes photographs since Hale. They show the issues with storm surges, erosion and HAB

It is not up to us to provide our preferred option. The reason we are promoting alternate options is for examination at the workshop to add to the 'master plan' that will ultimately be promoted in consultation with the community.

See 2 step plan in gallery below.

The community needs clear and credible information to better understand the Whangamata stormwater management system.

We don't need to re-examine the benefits we have of the sand base. What we do need though is the Whangamata resource consent 105667 to correctly incorporate the fundamental difference we have compared to conventional 10%, 25 and 1%AEP requirements. Almost all of Whangamata stormwater piped or not is being feed into the aquifer. The aquifer is being affected by the Wentworth and Otahu Rivers where the piped discharges we do have discharge. The Williamson discharge direct to the Ocean may have been seen as the 'convenient' way to discharge water at the time but it is not now.

The logic is the sand and aquifer are our detention device. This needs to be drained to a level that it can successfully receive the next precipitation. When it can't we need overland flow paths to detention basins or to waterways. Whilst pipes may be of assistance no pipe design can ever meet a 2% or 1%AEP.

It is therefore essential that our stormwater systems must be capable of reducing the water table before it crests and breaches causing surface flooding in the lower lying ground and natural basins.

This means every improvement we make must include systems that can reduce rising water tables so they don't breach low lying ground to above the breach crests.

This needs debating now.

The LVL of the bottom of the detention basin must be 1m (our arbitrary figure to debate) below the low lying ground. That way the detention basins will be where crests breach so the detention basin must be self draining either back into the water table which will be slow when it crests or to waterways once it reaches a depth of 200mm.

We cannot afford to 'over drain' the aquifer as low water table levels will kill vegetation and starve birds and animals. Dry ground becomes arid and not useful to humans.

We are having trends of cyclones then droughts. Therefore, we cannot over drain the aquifer, or divert rainwater away that is needed to top up the aquifer. This is a balance we need to consider as the number one issue in any stormwater design/specification.

Compliance considerations:

The design must comply with the COP and E1/AS1, or have adequate independent verification to be an alternate solution.

The COP aligns to E1/AS1. The predominate design features need to be:

1. The base of the soakage device must remain above the 'winter' water table
2. The 10%AEP is acceptable up to the point where if soakage rate is exceeded there must be adequate storage to manage the excess to avoid surface flooding causing nuisance
3. The soakage pits must be maintainable
4. Catchpits must be road serviceable

The reference to 'winter' is taken as 'wet season' where rainfall would be expected to cause water tables to rise above drier 'summer' periods. This is a very important consideration because it is during the 'wet season' ie 'during the 10%AEP' that soakage devices design must contribute to managing stormwater from flooding to nuisance level. If the soakage device becomes flooded by the rising water table then it is NOT a soakage device and fails E1/VM1 test. The second consideration is the 'excess' rain above the soakage device is on the assumption the soakage device remains well maintained, and continues to be functional to its design capacity during up to 10%AEP. In these circumstances excess rainwater must be stored and not allowed to surface to cause nuisance.

Here lies the problem. The storage system we have is the sand that surrounds the soakage device. Its NOT 100% by volume but around 50% (Opus 2012 Groundwater study). But to get into the sand the rain must pass through the soakage device walls. Can't if overwhelmed and flooded.

Next issue is when the rain slows the rain water stored in the surrounding sand now re-enters the soakage device preventing it from operating at design capacity for the next rain event. The soakage device is basically compromised and does not contribute to managing stormwater.

The sludge that is present in the existing 'pond' is more likely coming from the surrounding vegetation and batter of the pond banks than road runoff. ie to maintain an open pond the exercise and management brings more issues as the organic wash prevents/slows absorption into the water table.

Shortfalls and issues I have with the Metis proposal:

Drawings cannot be right as the drain off level is 2.6mRL and the discharge invert is 2.2mRL which leaves 400mm still water in the Williamson Rd pipe and the Cirtex submerged.

The reservations I have with the Metis design include:

1. Proposal has no storage detention so at high tide the Wastop will shut and the flow rate will continue and breach the Williamson and Ocean Rd cesspits in minutes.
2. The 1050mm Williamson discharge is directed into an unsized perforated tube drawn to about 400mm so won't cope.
3. Overflow relies on the bubble up through the linear access chamber which relies on the perforated pipe flow rate through the Cirtex. This will be inadequate against gravity with the 1050mm discharge.
4. The drain off to the Ocean at 400mm dia is inadequate sizing. Currently the weir over tops to about 100mm across its width.
5. The Cirtex will be submerged and not function as the invert drain off is above this level.
6. The 'existing water table level' at 1.78mRL is well below its current level at about 2.45mRL. Where did this figure come from?
7. The water table rises as rains fall. This means the Cirtex is serving no purpose for extended periods when we need drainoff.
8. The Wastop invert discharge is well below the current level of sand and will remain blocked.
9. Maintenance will be required after every storm, blow, King Tides and storm surges to remove debris, trees, seaweed and sand.
10. It is not a plausible bet or expectation that the outlet flow rate will overcome the debris and sand build up during or after storms.
11. The recent debris build up was not a rainstorm event but low pressure and wind which combined as a storm tide without much rain. This vent would not provide velocity and force to open the Wastop. It will not clear naturally.
12. How will maintenance be done whilst the weather is wild. No machine or operator will be safe during storms.
13. By filling in the basin we lose the storage capacity at high tide. Whilst sand does store water it takes time to absorb at the soakage rate which is a lot less than liquid water mobility. Won't work.
14. Drawing 4 includes lines for the 100year sea level rise - but this is 520mm above current existing water table levels at 1.78mRL which lifts everything up including storm tides and ability for Cirtex to contribute to soakage.
15. The Cirtex will become submerged and block the Williamson feeder just like it is now.
16. The proposal does not provide much benefit to community users of the reserve.

What should be done now is workshop this proposal into something more useful for the Master Plan.

Conclusion:

This is the second proposal we have been asked to review as part of the stakeholders working group. It was our understanding that the stakeholders groups task was to create a Master Plan of stormwater improvements for Governance to consider for implementation over the next few years.

It is disappointing we still have not received all the available information especially information staff and councillors within the stakeholders group have. I will not repeat the conclusions here I included in the first proposal on Island View. My concerns and view remain as in that report.

Each project needs to be tested for what it can contribute to reduce the risk of flooding. This is important to owners that do flood and others that are affected by wellbeing issues and adverse commercial effects on businesses. This schedule is our suggestion to be used to test each project: This is the debate we need to have so we are all on the same page.

1. What were the options for each project?
2. Were these options tested and debated on merit?
3. What were the alternate costs for the preferred option versus other options?
4. How much does each proposed improvement project cost?
5. How many properties with flooded floors will the project stop from future flooding?
6. How many flood hazard tags will each project remove from properties that flood?
7. What impact (adverse or other) will this project cause or affect another asset (including other types of assets eg land being lost or used)?
8. How long will each project take to complete?
9. Will owners be expected to contribute financially to the project? That is via more rates or individual contributions? Are these voluntary?
10. What significance does this project carry ie priority over others?
11. Is the purpose of the project for regulatory compliance eg getting the resource consent finalised rather than improving stormwater infrastructure?
12. Does the project fix up a safety issue?
13. Does the project make Whangamata a better place to live in?
14. How many residents are going to be better off with this project?

Until all the proposed improvement projects have been through the priority test we don't have a Master Plan that can be presented to governance.

Gallery:

The following images are a selection of photos of Williamson Park and surrounds with explanations and includes images with explanations on the Metis proposal.

Date	Water depth	
20230129	1150	
20230202	250	
20230228	800	
20230313	-100	Pumps running for 2 weeks cleaned out
20230318	600	
20230411	1000	
20230429	900	
20230510	1050	
20230618	1000	
20230627	1200	Weir overtopping, sand against weir
20230713	1000	
20230812	700	
20230904	400	
20230922	150	Algae bloom appearing
20231020	150	Massive algae bloom
20231025	-100	Pumps drained cleaning algae bllom
20231031	700	
20231105	450	
20231116	-100	
20231121	400	

001 water depth Williamson Pond.jpg

Water Table at Discharge Pipe into Williamson Pond

Measurements taken from images at each date.

Data set invert equals 0mm, soffit 1050mm (Metis using Auckland 1946 show my 0 at invert at 2.2mRL)

If my figures are out 100mm it is not important as it is the sequence of highs and lows that are the limitations

It would be useful to include rainfall rates if these were available.

1. In Hale. Weir over tops at 1100mm
2. Water level drops dramatically as water table around pond is low at summer level
3. Gabrielle raises water level but not to Hale levels. NB: I did not photograph every day. Water level may have over topped the weir.
4. Pumps operated for 2 weeks to lower water level so diggers could clean
5. After diggers water raises back to water table
6. Ongoing rain events continue to raise water levels and weir over tops on a regular basis
7. Water table drops significantly between 27 June 2023 and 22 September 2023. Over the 3 month period water levels dropped 1050mm.
8. Pumps drain lake for second clean and to remove algae bloom
9. Water level rises again and is oscillating - more likely water level in lake rises with each rain event but soaks back into surrounding water table until its crest equalizes.

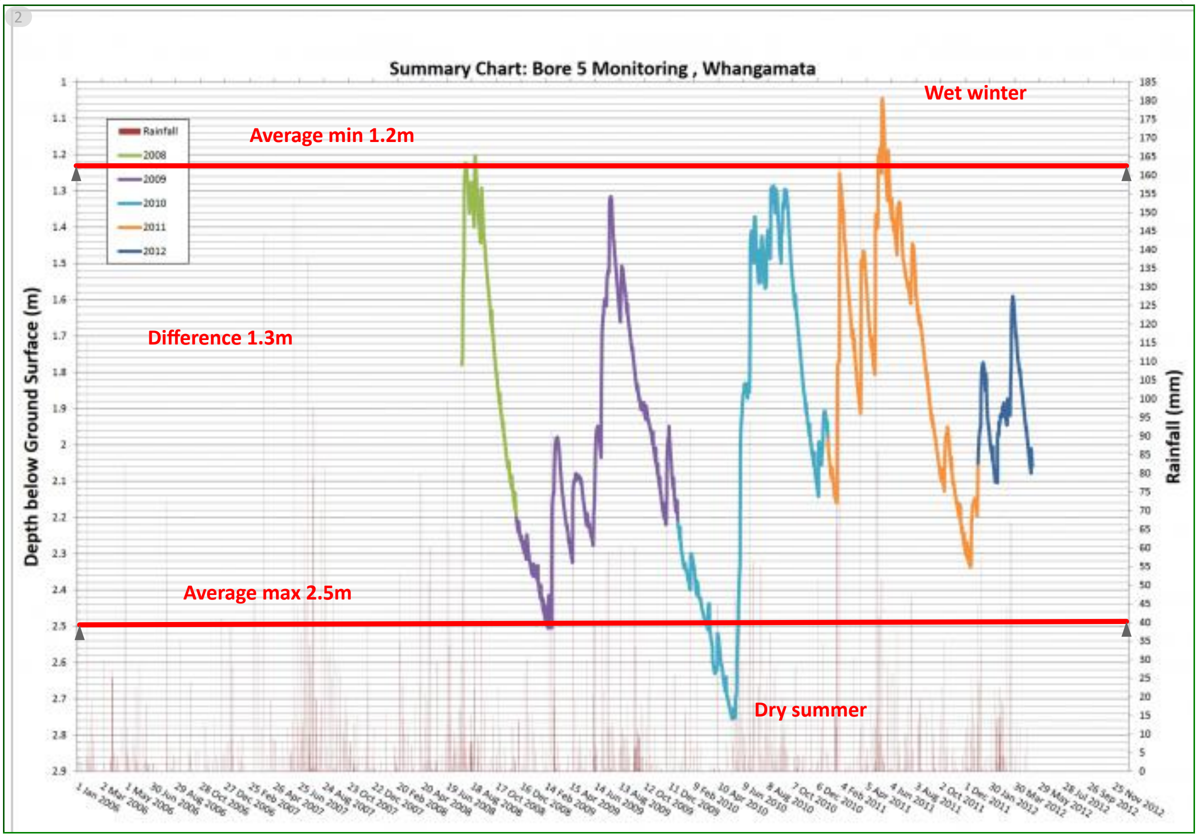
The trendline (blue dotted line) is the computation of lowering water levels since the cyclone. The water level of the aquifer lags behind the pond water level as the water table fills but once rainfall stops the 2 water levels merge.

Water is still discharging but at very small quantities

I believe the lake level will not drop blow mean tide level which must be about -200 blow invert.

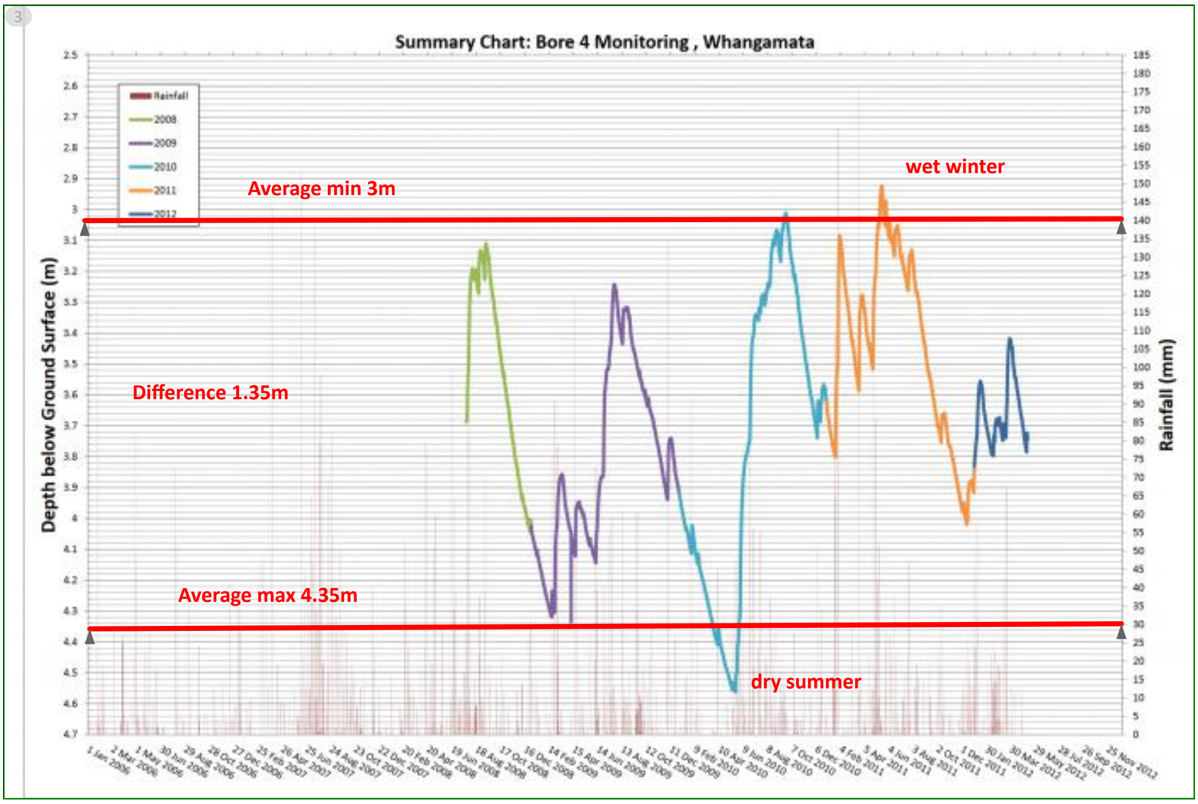
Photos used are at the end of the gallery. These are minimized to reduce report size. If anyone wants these in full resolution I can provide online access to them.

2



010 Opus Bore Hole 05 Rangi water table levels 2008 to 2012.jpg

3



012 Opus BH05 Rangi water tables 2012.jpg

4

OPUS

Williamson Park Pond Stormwater Investigati

3.2 Overall Trend

The daily Dalton Road rainfall data is plotted in Figure 5 with the water level obtained from Borehole No.4 (BH04) and Borehole No.5 (BH05).

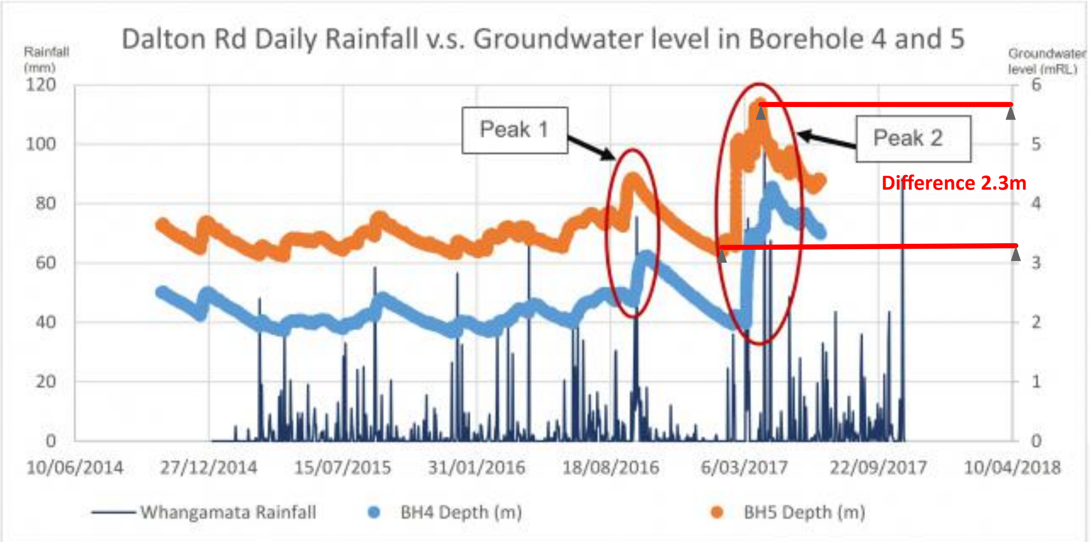


Figure 5: Trend of groundwater level with Dalton Road Rainfall

030 Opus Williamson Park 2012 BH04 and BH05 water levels.jpg

Opus 2017 Williamson Park Stormwater Investigation

3.4 Impact on the Williamson Park Pond

In March 2017, anecdotal evidence indicates the pond in Williamson Park was flooded. Based on the above assessment the following factors are likely to have contributed to this:

- The rainfall event that occurred was the largest in the previous two years; however data limitations mean it is not possible to accurately assess the return period of the storm events in Whangamata.

- The groundwater level during March and April 2017 were the highest in the provided data and were significantly higher than the average during this period.

- TCDC Engineering Standards indicate the water table is approximately 1.5m below ground level at the intersection of Williamson Road and Ocean Road. It is not known whether this is a spot level, minimum, maximum or average level. This level equates to an approximate level of 2mRL – which is also the approximate water level surveyed in the Williamson Park Pond in 2005. The pond survey information shows that the pond crest level is at 2.5 mRL, therefore there is approximately 0.5m storage during this scenario.

- The storage in the Williamson Park Pond is therefore linked to groundwater levels. If the groundwater levels are high, as occurred during the March 2017 storm events, it is likely the permanent water level in the pond was also higher, reducing storage available, and potentially leading to flooding.

- Further, the high groundwater levels likely impacted on stormwater disposal via soakage. As a result, the surface water runoff to the road network was higher which likely increased runoff discharge to the pond both by stormwater network and overland flow.

2017 was cyclone Cook in April with very high rainfall. The difference peaked at 2.3m above summer low water table levels. The summer water table levels are consistent through 3 summers which likely equates to the average tidal influence (mean sea level).

If the water table does peak at 2.3 above mean sea level that means Williamson Pond will breach the weir by 1.2m.

Opus 2017 Williamson Park Stormwater Investigation

4 Conclusions and Recommendations

1. The rainfall data and groundwater level data analysis shows that the March 2017 flooding in Williamson Park could be a result of:

a. Multiple large rainfall events.

b. Water levels in the Williamson Park Pond are linked to groundwater levels. Groundwater levels were the highest in the data period provided.

c. Private soakage performance was likely decreased due to groundwater levels, which would result in an increase in surface water runoff to the road network, increasing discharge to the pond both by the stormwater pipe network and overland flow.

2. The flooding of the Williamson Park pond is part of a more systemic stormwater management issue in Whangamata. Any decisions on the future of the pond should be informed by catchment management planning, that are cognisant of the effects of climate change and key recommendations from the Whangamata Groundwater Monitoring Summary Report (Opus, 2012, which still remain applicable. In particular the need for careful design and detailing of soakage devices, including measures to keep the device shallow and maximise storage volume.

3. Importantly, predicted climate change effect could result in a higher sea level and more intense

rainfall - minimum groundwater levels are likely to be higher. This is expect to impact on stormwater

disposal via soakage as well as pond levels and flooding in the Williamson Park Pond.

4. The need and benefit of the Williamson Park Pond could be reviewed. Groundwater levels mean it is unlikely to be providing much detention/attenuation benefit. Water quality benefit is also likely to be limited. The benefits will be further reduced without regular maintenance. Alternative arrangements could be considered, including removal, conversion to a wetland or watercourse.

5. Improving the discharge arrangement of the pond, such as an improved pond outlet/spillway from the pond may help improve the pond capacity and upstream network system performance by reducing the tailwater level. However providing a piped outlet from the pond could be viewed as having a detrimental effect on the beach, with scour/erosion of the beach occurring. Community consultation is recommended before any decision is made. If the pond water level is not at risk of causing or exacerbating private property flooding, a 'Do Nothing' scenario could also be considered.

6. Data limitations mean a definitive conclusion on the return period of the rainfall events in March 2017 has not been possible to date. Should more detail be required, the following is recommended:

a. Detailed review of the 1 minute rain gauge arrangement at Dalton Road to understand why there is a significant discrepancy with the daily rainfall totals.

b. Consider rain radar data as an alternative data source for analysis of rainfall. However, pre-processing including calibration on the rain radar data is required. The benefit would need to be assessed further.

5

105 Weir at 13 March with pumps running.jpeg

This was about 4 weeks after Gabrielle when the pumps were working and weir was still overflowing.

See the water level in storm surges

One decent log is washed up

Flutter valves will need to be sturdy

6

110 Weir after King Tides 1 November.jpg

Weir buried in sand up to last gabeon with driftwood topping.

7

124 King Tides breach weir 20230227_105746.jpg

Level of breach is significant

Weir MUST be raised

If sea levels do rise the level needs to take account of this.

8

130 King Tides breached weir 1 November 2023.jpg

Storm tides breached the weir on 1 November.

9

140 20230418_081644.jpg

Lake forming on the Beach in front of the weir as 18 April 2023

Note erosion

The shape of the Vee to the weir location is poorly designed as it forms the surge and magnifies the surges velocity and momentum so makes it worse.

10

141 erosion of beach into channel 20230618_090914.jpg

Whilst the water tops the weir we get erosion as water makes its way to the Ocean.

Normally the sand recovers quite quickly but it is not desirable

11

149 sand build up 20230627_082336.jpg

Sand builds up and then retreats

This was at 27 June 2023

Note water level in Lake just over topping the weir

150 20230620_082053.jpg

Weir on 20 June 2023

Note depth of erosion

Old weir is the wire cages in the foreground.

It is unknown if this was pulverized by the Ocean or broken through to create the new weir behind

160 20231020_080047.jpg

HAB quire concentrated on 20 October 2023 just before draining and cleaning.

Due to the temperate climate we will always gt algae bloom in spring and summer.

162 Algae bloom back already 20231204_233904 _SC_.jpg

HAB back already just a month after cleaning.

Our tropical spring and summer will cause this to happen in still water.

Note cleaning involved pumping as much water out as could be pumped - pond floor is sand and solid to work on. But once the pipes were shut down water seeped straight back in. See water tracks around banks.

163 water table bleed tracks 20231118_085403.jpg

Photo shows the water tracks as ground water bleeds back into the lake (and vise versa). Both the pond water and groundwater influence each other just like when we walk around the beach at low tide the water table is seen bleeding onto sand higher up. This is the relationship between the water table and pond level.

170 Lake shape step grade 20230313_092342.jpg

Showing pond drained after 2 mobile pumps worked for around 2 weeks and not been raining for about a month after Gabrielle

Note the 2 pipes in the distance - clear on invert level

BUT only the right pipe is actually connected - or this is from Williamson still draining the Golf

Course

NB: see severe slope of embankment - my understanding is this is not acceptable as kids could fall in and be unable to crawl out.

Signs have recently been posted but these are not fail safe in close proximity to playgrounds.

17

171 Discharge pipe flow rate small 20231116_081130.jpg

Discharge flow rate very small as at 16 November 2023.

18

172 Discharge flow rate minor 20231205_000348 _SC_.jpg

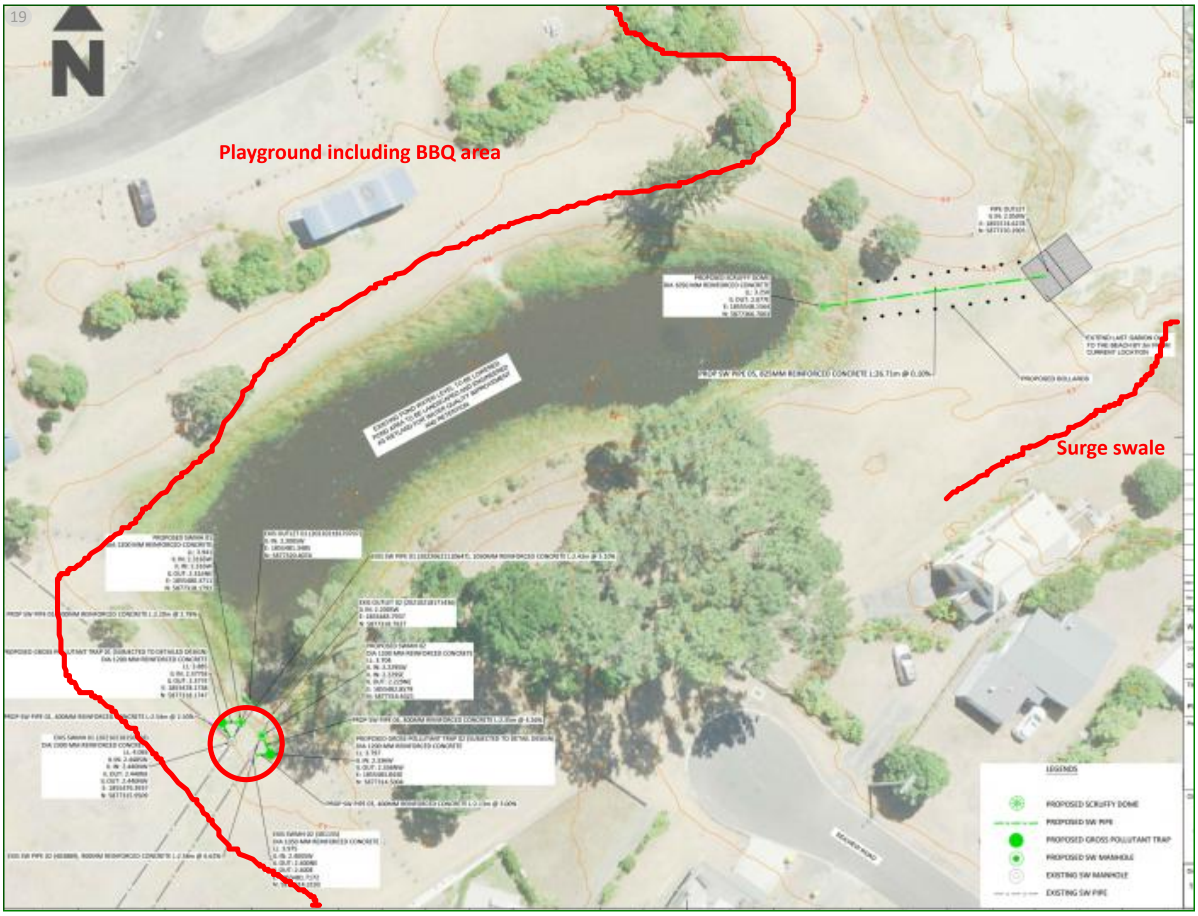
Discharge flow rate remains minor as at 5 December 2023

Note algae bloom is back

Their is no sediment discharge

Water is clear and clean.

It is likely the water is from a broken water pipe or slow bleeding of the water table.



180 Metis proposal wetland 20231204_235241 _SC_.jpg

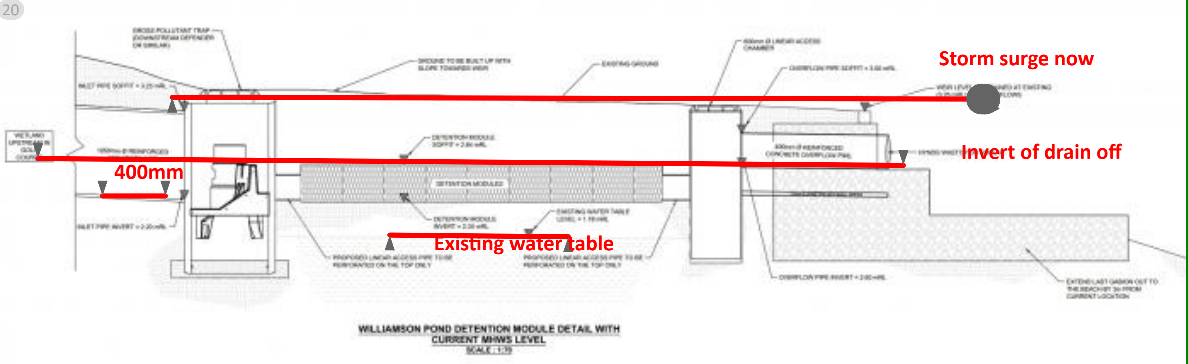
Metis configuration

Issues:

1. The circle represents a gross pollutant trap. It will need servicing so needs to b along Ocean Rd for truck access. Reminder the old sediment trap is along these lines
2. The weir must be raised to prevent surges breaching it
3. The weir must be moved toward the Ocean to change the Vee to stop/minimise surge funnelling
4. The green pipe does not need to be long
5. The pond being changed into wetland is totally unacceptable.
6. The discharge rate other than in storms is only road runoff which is zero in dry weather.
7. Cannot ever have a wetland (or pond) in close proximity to childrens playground.

If council wants a NO then take this concept to the community.

20



181 soak pit design 20231204_235901 _SC_.jpg

Shortfalls and issues I have with the Metis proposal:

Drawings cannot be right as the drain off level is 2.6mRL and the discharge invert is 2.2mRL which leaves 400mm still water in the Williamson Rd pipe and the Cirtex submerged.

The reservations I have with the Metis design include:

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9. Maintenance will be required after every storm, blow, King Tides and storm surges to remove debris, trees, seaweed and sand.
10. It is not a plausible bet or expectation that the outlet flow rate will overcome the debris and sand build up during or after storms.
11. The recent debris build up was not a rainstorm event but low pressure and wind which combined as a storm tide without much rain. This vent would not provide velocity and force to open the Wastop. It will not clear naturally.

12. How will maintenance be done whilst the weather is wild. No machine or operator will be safe during storms.

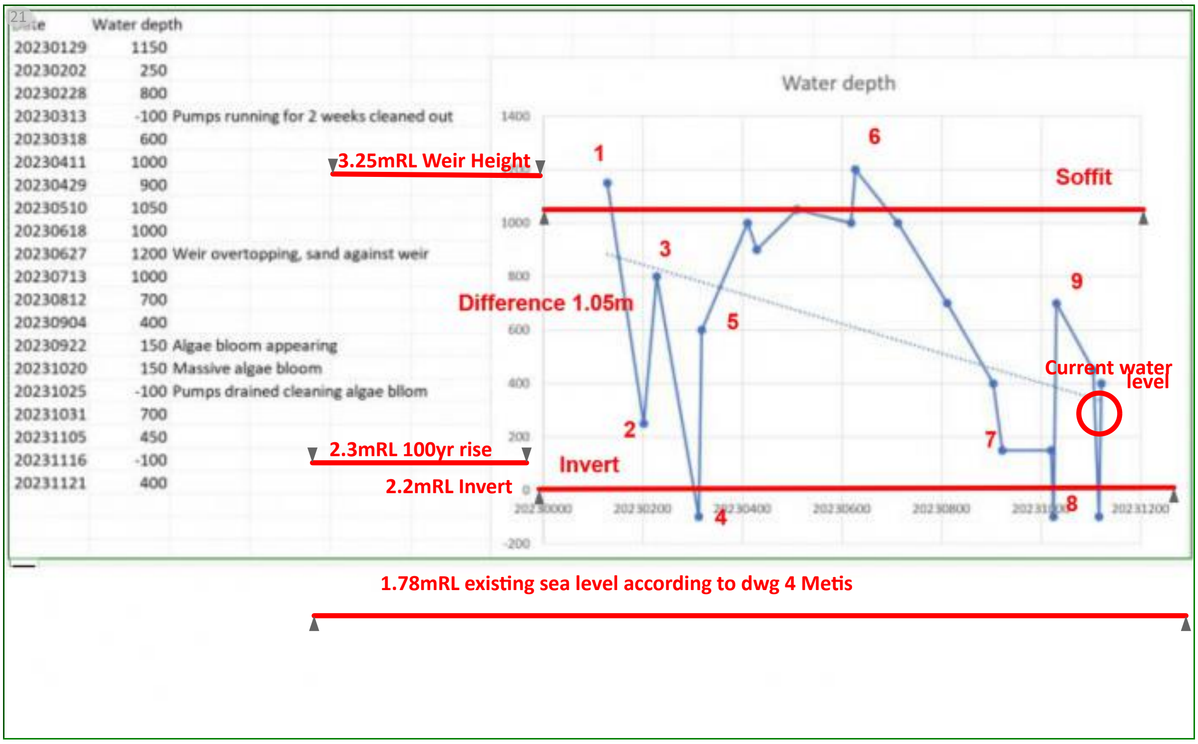
13. By filling in the basin we lose the storage capacity at high tide. Whilst sand does store water it takes time to absorb at the soakage rate which is a lot less than liquid water mobility. Won't work.

14. Drawing 4 includes lines for the 100year sea level rise - but this is 520mm above current existing water table levels at 1.78mRL which lifts everything up including storm tides and ability for Cirtex to contribute to soakage.

15. The Cirtex will become submerged and block the Williamson feeder just like it is now.

16. The proposal does not provide much benefit to community users of the reserve.

What should be done now is workshop this proposal into something more useful for the Master Plan.



182 water table level check 20231205_141244 _SC_.jpg

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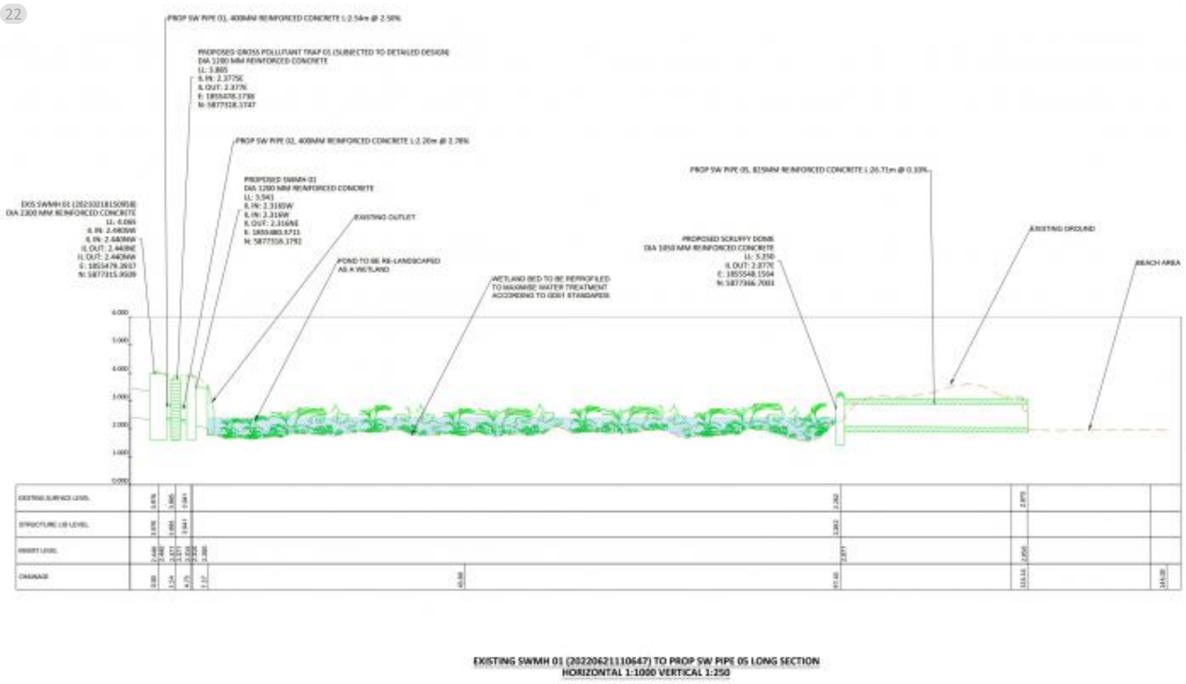


184 Wetland option Metis 20231205_000041 _SC_.jpg

Wetland option:

Issues:

1. Wetlands do not work on sandy soils. Vegetation requires a water table
2. Wetlands are unacceptable as a long term plan for a highly rated Beach. Visitors cannot see this.
3. Wetlands are notorious for maintenance. On sandy soils this will mean replanting after dry spells that we have between weather cycles.

Take this to the community and expect severe feedback.

23

185 Kingsland Gold Estate SA closest I could find.jpg

This is a wetland in Kingsland (Google)

Wetlands are normally constructed as waterways or beside waterways to treat water before it reenters streams.

Planting managers state cannot have clay or sand bases

Normally situated in marshlands that are swampy and cannot be recovered.

This example is about the same size as we have BUT it has nothing useful to us at all. We do not want wastelands by playgrounds in the very centerpiece of our major events like Beach Hop and Crafts.

Who will maintain it to what standard.

The current pond had NO maintenance which becomes evident in hindsight after every storm event. By then the vegetation would have died 3 years ago as the water table will drop below sustainable root species so do not survive. Who will clean this out and replant it and water it for the next rain event.

189 1944 arial view of Williamson Park wher the pond is located.jpg

1944 Arial

I accept we cannot go back in time but what we can do is remove the bad imprint we have made to date.

Catchment areas must be formed from natural catchment waterways. There is no waterway. There is no overland flow pathway. Everything about Williamson Pond we created to our detriment.

We cannot build-up bad infrastructure. We must reduce its influence gradually until its gone. That is our custodial role.

How amazing is this image?

It is never too late to reverse things one degree at a time.

190 Alternate proposal 20231204_235513 _SC_.jpg

I propose a 2 stage development

Stage 1: Interim measure between Opus 'do nothing' option and 'drain the pond'.

Stage 2: Reduce the catchment area progressively year by year as we improve more roads and streets stormwater management until this asset can be managed so it creates no adverse effects on the Beach. This proposal must also take into account protection against rising sea levels, higher intensity and more frequent rain events.

Problems we must overcome:

1. Our biggest issue is elevation. What is compounding this is the existing 1050mm pip diameters. If these were halved to 500mm we would have 50 extra years of inundation defence. Metis 2.3mRL sea level rise.

2. Our second biggest issue is the existing pipe network has been poorly conceived as it directs water to the Ocean where discharge pipes get eroded one minute and buried in sand the next. Eg Otahu and Pipi

3. The bottom, or invert, of all our pipes and detention ponds MUST be elevated above the mean water table level. Otherwise they won't function.

4. The stormwater storage/volume must equate to the discharge rate between high tides. Otherwise the asset will be overwhelmed. Unless the overland flow path itself cannot be overwhelmed.

5. It is better to have many smaller systems than one large system when discharging to the Ocean. That way only small areas of town will become flooded if blockages cause back-up and cannot flush.

6. Cannot develop open stormwater systems in playgrounds.

Stage 1: Interim measure.

1. Install decent catchpit on Ocean Rd as sediment capture. NB: No silt was found at the discharge pipe into the pond. Installing road serviceable catchpits is the better option.

2. Fill the bottom 1/3 of the 1050mm pipe and the bottom 1/4 of the 750mm pipe with concrete. This will raise all levels 300mm. NB: loss of lower 1/3 of pipe only reduces the calculation by less than 22%. Connecting the other pipe would compensate for this. Could probably raise it 400mm if the calculation works. This raises everything and works towards the 100yr sea level rise.

3. Rebuild the front weir higher with a shaped step to allow discharge - I have already provided such a plan. This prepares for sea level rise and reduces over topping

4. Let surplus water flow through. Remove the 30m of back-fill behind the weir.

5. Build a small bunker at the end of the existing invert with a smaller 200mm diameter pipe to run off to behind the sand dunes into Cirtex. The sand dunes have the lowest water table crest so will drain smaller volumes easier. This can be a series of Cirtex running parallel to the beach.

6. Form an overland flow path from the new bunker to the existing weir at 50mm above the pipe to the soakage device. This removes excess stormwater immediately. Parts of this flow path can be 'open and screened', parts piped through mounds and part in concrete channels.

7. Fence and landscape the 'open flow paths' and put walkways over the mounds. Ideally this would be part open and part over pipes.

8. Widen the existing pond to form a consistent depression at 300mm below the soffit level of the current 1050 discharge pipe. The area will be the temporary spillage area for managing storage of stormwater at high tides. Use the model as per the Blackies Lowie Street self draining detention.

Stage 2: Long term systems

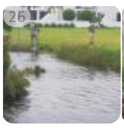
1. Master plan objective reduce catchment area of existing pipe network by 20% each 10 years.

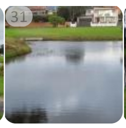
2. Immediately abandon all proposals to review pipe sizes into Williamson

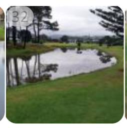
3. Agree on water table drain off methods in preparation for storm events. This by default could progressively reduce runoff into Williamson

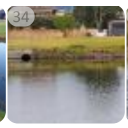
4. Agree on a new location to discharge to estuary to accommodate next round of stormwater improvements eg Tui, Kiwi, Golf Course, Bellona, Mary, Sylvia etc

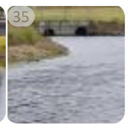
5. Rebuild weir 50m out into the beach to change Vee shape to reduce velocity surge.

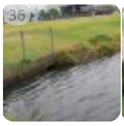








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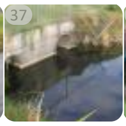
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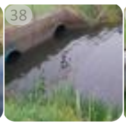
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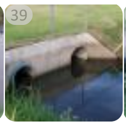
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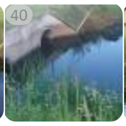
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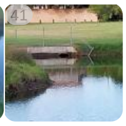
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