

**ASHBOURNE - STATION ROAD PROJECT**  
**Greenway Design Memo**

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## 1.1 Introduction

This memo outlines the design of the proposed Greenway, its associated infrastructure, and contributing catchments. The Greenway is hydraulically linked with Basin B, with both components working together to provide conveyance and attenuation as needed for upstream catchments. The design and approach are outlined in this memo and the stormwater Management plan Rev A.

The Greenway and Basin B have been designed in accordance with guidelines

- TR20-06 Waikato Stormwater Runoff Modelling Guideline
- Tr20-07 Waikato Stormwater management Guideline

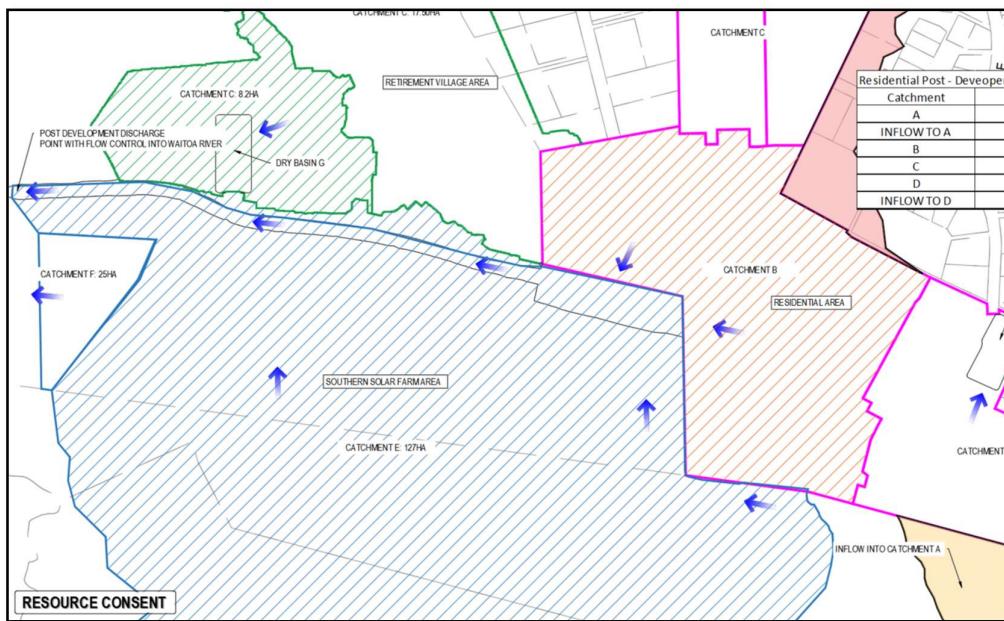
The primary purpose of this infrastructure is.

- To provide conveyance of Existing inflows south of Greenway.
- To provide conveyance of the attenuated flow RV Basin southern catchment
- To provide conveyance and attenuation of flows (100year cc ARI) above the 10year cc event from Catchment B of the Residential.
- To provide attenuation such that the total outflow equals to 100% of inflows (conveyance) plus 80% of the Basins B predevelopment 100yer flow.

This memo is to be read in conjunction with the Stormwater Management Plans Rev A and Associated Plans and Calculations

## 1.2 Catchment Characteristics and Design Parameters

The diagrams and images below, along with the tables further down, provides information regarding catchments and parameters used for calculation, Design and modelling of this Greenway.



Catchment	Area (Ha)
RES B	19.5
Inflow RV	8.2
Inflow South	127

Pre-Development CN		Post Development CN	
Pervious	Impervious	Pervious	Impervious
61	98	74	98

	Pre Development		Post-Development (RCP 8.5)		
	10yr	100 yr	10yr	100yr	100yr-10yr
24 hour rainfall depth (mm)	128	200	167	265	98

The 127-hectare inflow south catchment includes the neighbouring lands located south of the proposed solar farm and residential subdivision. A review of LiDAR data indicates that these lands generally slope gently from south to north.

There are a number of farm drains located throughout the area which appear to convey and direct flows into the Waitoa River. These farm drains are illustrated in the figures 13 of the Stormwater management plan Rev A. However, given the limited accuracy of the LiDAR data, and given these existing drains may become overwhelmed or blocked we have taken a conservative approach and

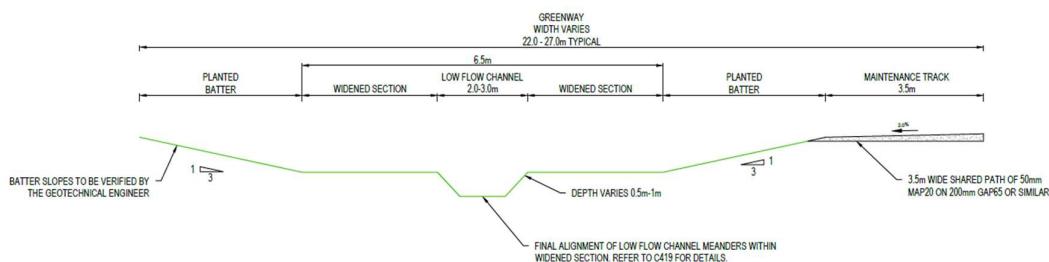
designed the greenway to accommodate the full 127-hectare catchment, along with RES B and inflow RV, bringing the total to 155 hectares under an RCP8.5 1:100-year storm event.

Attenuated flow through Southeastern RV Catchment and flows from Residential Catchment B above 10year cc and up to the 100year cc event has been considered to enter the proposed greenway.

### 1.3 Design Summary - Greenway



The upstream areas, 10 year cc ARI are proposed to be discharged via soakage in the road carriageway and the in the lot areas upstream of the proposed Greenway. Additionally, there is an inflow from the RV site through proposed South Easter RV Basin as shown in the section 1.2 diagram. This basin provides stormwater mitigation by capturing and discharging flows at 80% predevelopment flow into the greenway. Lastly inflow south Catchment of the greenway that flows through the Southern Solar farm area will be captured and conveyed through the Greenway and discharged through the outlet. Refer to outlet section 1.4



A low-flow channel is incorporated at the base of the proposed greenway to replicate existing flow conditions and support continuous baseflows through the corridor. The channel is designed to have a width of approximately 2 to 3 meters and a depth of 0.5 to 1 meter, providing a defined conveyance path for low flows while maintaining ecological connectivity. This configuration ensures that hydraulic function is preserved during dry weather periods and provides controlled conveyance under baseflow conditions. The alignment and shape of the low-flow channel will follow the greenway's finished levels, and an impermeable liner will be considered where required to retain flow and minimize infiltration losses.

To provide for future maintenance of the greenway a 3.5m wide maintenance track will be constructed along the northern side of the greenway. The maintenance track will also provide a shared access track for pedestrians and cyclists. The greenway will have widened sections to provide some additional flood storage and to enhance the aesthetics of the greenway.

Greenway and Basin B summary results below.

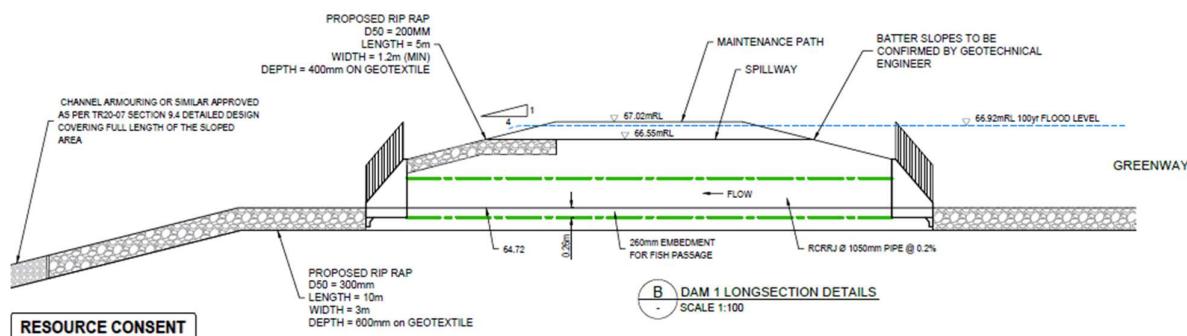
- **Peak Storage Volume** Greenway & Basin B (10year ARI cc) 17,503.3m<sup>3</sup>
- **Peak Water level** (100-year ARI cc): 66.92m RL
- **Peak Flow Rate** (100-year ARI cc): 7.57m<sup>3</sup>/s (note rip rap at entry, exit, through the spillway and through the steep bank will or have been designed to control and cater for the incoming high flow during this extreme event).
- **Treatment:** RG and Soakage upstream will provide for treatment in line with both Regional and District requirements for Res Catchment B and RV Area. For the solar farms, its mainly utilizing the existing natural drains and swales as means for treatment during these low flow events.

## 1.4 Outlet Design

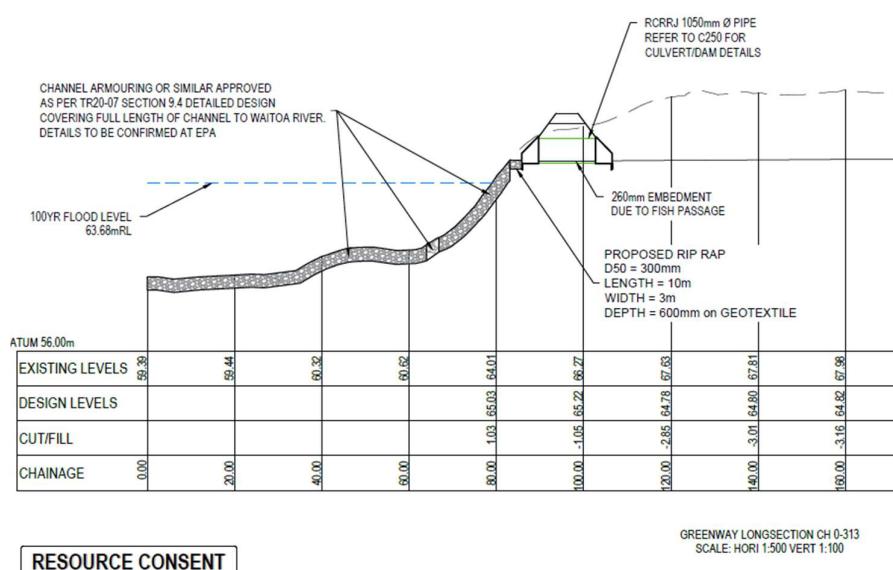
The proposed outlet for the Greenway consists of a weir with an orifice sized to allow required flow as detailed in previous sections of this memo. The outlet will discharge flows into the Existing Waitoa River. The orifice invert is set at 65.3m RL (note this is at Centre of Orifice) with an overflow weir is set at 66.55m RL

Greenway	100year Orifice	Orifice Invert (m, centre of Orifice) m RL	Broad Crested Weir width (m)	Top of weir (m RL)
Greenway + Basin B	900mm	65.3	15	66.55

The broad 15m wide weir shape allows flows during larger events to disperse whilst discharging into the Waitoa River. Riprap will also be included at the discharge location for further energy dissipation.



Due to higher longitudinal gradient further down the bank which will result in higher velocity through this area generated, channel armouring is proposed and extended for the full length of the downstream bank. See section below showing full length and 100 year flood level within the Waitoa River.

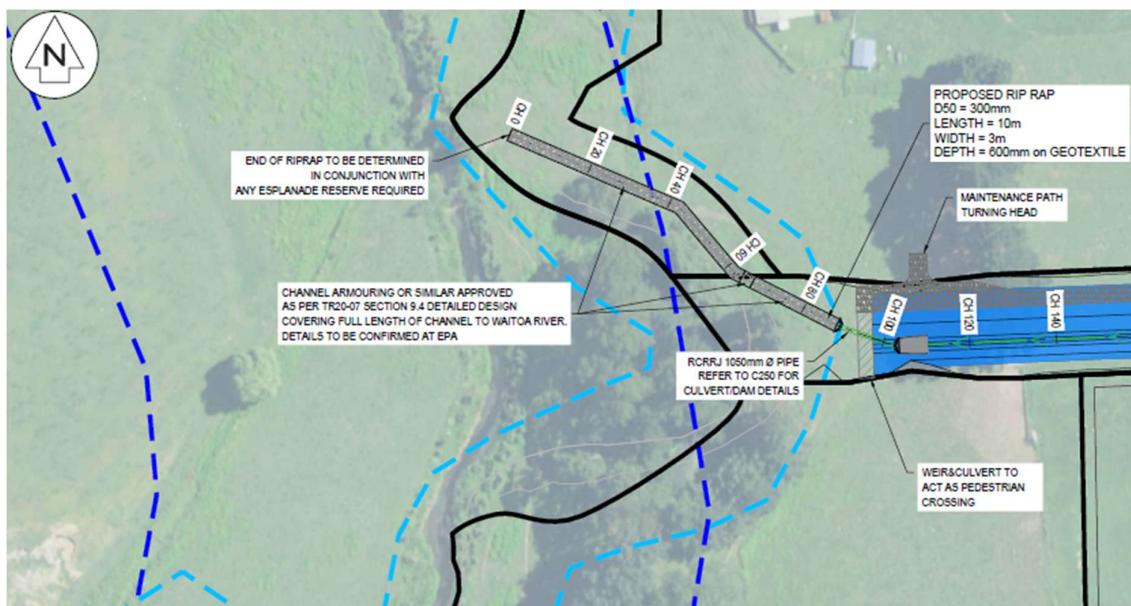


The figure above shows zoomed out and exaggerated section through Waitoa River.

## 1.5 Civil Works in Riverbed

The civil works proposed within the riverbed include earthworks, outlet construction, and erosion and sediment control measures.

Construction is planned to begin at the outlet and progress upstream toward the development in a staged manner (Refer to 4.12 of the EWMP Rev C). The main outlet structure consists of a RCRRJ 1050 mm diameter pipe with a gradient of 0.2%, discharging into the Waitoa River. The outlet design also includes a 260 mm deep pipe embedment for fish passage, maintaining ecological connectivity with the river system. The increase in diameter of pipe to be installed is larger than the design needed due to embedment mentioned above. This will still allow the needed surface area. this will further be detailed at next stage of design.



To protect the outlet and adjacent banks from scouring and high velocities, riprap is proposed both within and downstream of the structure. Downstream area of the weir, a section of D50 = 200 mm riprap is specified over a geotextile layer, with a minimum length of 5 meters, a width of 1.2 meters, and a depth of 400 mm. Downstream of the outlet, heavier-duty riprap with D50 = 300 mm is proposed, extending 10 meters in length, 3 meters in width, and 600 mm in depth over geotextile. In addition, channel armouring or a similar approved treatment is proposed along the whole sloped area downstream, in accordance with TR20-07 Section 9.4, to ensure long-term erosion resistance.

The embankment slopes at a 1:4 ratio on both sides and Safety fences are provided where required, particularly at the culvert openings, and handrails are included where the culvert diameter exceeds 600 mm. A geotechnical engineer will confirm the batter slopes and geotechnical stability of the embankment and channel during the detailed design phase. An ecologist has already been engaged and has provided feedback that has been integrated into the outlet design to ensure environmental compliance, including provisions for fish passage and riparian protection. Further ecological infrastructure is/are likely to be proposed along this bank as part of this development and that will be further detailed in the ecological report.

## 1.6 Conclusion

This memo provides the design methodology for the Greenway and Basin B, to support subdivision Resource Consent application. Key points design summary is listed below:

- The proposed Greenway and basin B have been designed to handle both conveyance and attenuation purposes in line with RITS and TR20-06 and 07.
- Upstream Treatment via roadside raingardens, on lot soakage and existing swales/farm drains for lower events.
- Controlled discharge to the Waitoa River via a weir and orifice set up with energy dissipation devices placed adjacent to the culvert.

Overall, the proposed infrastructure will reduce flood risk, by conveying and attenuating flows, improve functionality and amenity of the development while complying with regional and district standards. This memo is to be read in conjunction with the Stormwater Management Plans Rev A and Associated Plans and Calculations