Submission – Jason and Lisa Breen, 161 Dukes Road South, Mosgiel

April 6th 2023

This is an objection submission to the Otago Regional Council's (ORC for ease of reference in this submission) appeal against the prosed Second Generation District Plan (2GP) in relation to the Gordon Road Floodway.
The ORC wants new or expanded "Natural hazards sensitive activities" to become prohibited activities.
This would mean increasing the flood hazard overlay in the 2GP from the existing 'Hazard 1 flood overlay zone', to the more stringent 'Hazard 1A flood overlay zone'

We object to the proposed 1A flood hazard overlay. We wish for the overlay to remain at 1 for the whole of the Gordon Road Floodway.

Please note we have also supported and signed the collective submission lodged by the Gordon Road Spillway Residents Group and our submission includes all matter covered in both submissions.

Introduction

161 Dukes Road South, Mosgiel – Legal description – Lot 3 DP6930

Under the 2GP District Plan the property is classed as Rural and sits within the Taieri Zone. The property falls under 'Hazard 1' overlay zone – high risk of flood due to its position on the Gordon Road Floodway (Area 14B North Taieri Floodway)

Jason and I and our family have owned and happily lived on the property since March 2015. The property is 3 acres of land with a 210m2 home which was built in 1955 which we have made significant renovations to in 2019, a standalone garage and a large 3 bay shed/workshop. The land use is 2 paddocks, large lawn and garden.

Background

We have lived on our property for **2920 days, only 4** of those days **0.001%** have been in a flood situation: meaning water laying over some of the property. I have included in that 4 days the time it takes for the water to also reside.
The Silverstream is to the rear of the property. The Gordon Road spillway and M4 drain are located approx. 700m to the East from the back of our property. The M3 drain runs across in front of our property all the way down Dukes Road South.
Our home is positioned 35 meters from the front of the property and sits above the crown of Dukes Road South, thus meaning that flood waters have **NEVER** breached our home since it was built in 1955, not even in the 1980 flood (the largest event on record). This

information has come from the previous owner who was on the property for 26 years and a neighbour across the road who has been there since the late 1970's.
In November 2021 we applied for building consent to build a 55 sqm second dwelling on our property. This activated a red flag for the DCC because of where the property is located on the Gordon Road spillway and has a flood overlay hazard 1. We then needed to apply to the ORC for resource consent because of the flood overlay hazard 1.
Despite minimising the risk by designing the dwelling on piles (to allow flood waters to flow under) and having the floor height at least 400mm above any recorded water levels on that part of the property our application was finally declined in June 2022 by the ORC.
As far as we are aware this has been the first application for new residential second dwelling activity on the Gordon Road Spillway area.

* Please see below- letter of decline from the ORC

Otago Regional Council

Our Reference: A1649994

7 June 2022

Mr J & Mrs L Breen 161 Dukes Road South Mosgiel 9092

By email only: samzeek@slingshot.co.nz and richardandnoeline@gmail.com

Dear Sir/Madam

Decision on Designation Application BFP22.0011 – J & L Breen – to construct additional dwelling

I advise that a decision has been given on your application for designation approval. A copy of the staff recommending report is enclosed along with the memorandum on decision.

Your application for Designation Approval has been declined. The decision to decline the Designation has been made pursuant to s178 of the Resource Management Act 1991.

You can appeal, or object to the decision to decline the Designation approval. Under section 179(1) of the Resource Management Act 1991, you may appeal to the Environment Court[1] against any or all of the conditions above. The appeal must be made in writing, must state the reasons for the appeal and the relief sought, state any matters required by regulation, and must be received by the Environment Court and Council within 15 working days of receiving this letter. If an appeal is lodged the designation approval cannot be exercised until the appeal has been resolved.

Please contact me or Michelle Mifflin Manager Engineering should you require clarification of any matter relating to this decision letter.

Yours sincerely Alison Weaver - Commercial and Regulatory Lead

Flood Events

Each flood event we have experienced is unique in water level, water flow, direction of inundation and what the ground conditions were like before the flood started (ie already had 3 days of rain in the week preceding the flood or relatively dry)
In the last 20 years there have been 5 rainfall events where the Gordon Road spillway has been partly operational or imminent, they were July 2007, May 2010, April 2014, June 2015, and Nov 2018. There have also been 2 events where the spillway has been in full operation, they were April 2006 and July 2017.

We have experienced 3 events while living on the property below is our account of each.

2015 June 3rd – spillway partly operational or imminent - Little to no effect across our property. Up to 100mm laying in swale areas. Water receded quickly.

2017 July 21st – spillway fully operational – estimated 100 - 300mm over 90% of our property (300mm in low lying swale areas on the property), M3 drain at the front of our property was above capacity. No water breaching house or shed/workshop. Driveway still functional and accessible with a vehicle. Flood water levels receded well. Within 24 hours nearly 90% of water gone only lying water was in low lying swale areas (up to 100mm which was gone 36 hours post peak levels).

2018 November 20th – spillway partly operational or imminent - estimated 100 - 300mm over 70% of our property (up to 300mm in low lying swale areas on the property) most of the water arrived from the front of the property, M3 drain at capacity and Dukes Road Riccarton Road culvert and drain completely not working to relieve water. Dukes Road and Riccarton Road heights acting a dam because of their high level, in turn not allowing water to get away. Driveway still functional and assessable with a vehicle. Waters receded by the following morning (12hrs maximum).

After the July 2017 flood event the Dukes Road Spillway Residents Group was formed to try and get some interaction directly with the ORC, the residents and members of the Mosgiel Taieri Community Board wanted to address concerns and ideas with the ORC to help minimise effects of future flood events through maintenance and upgrades to existing substandard infrastructure.
Many emails, meetings, reports, and a walk around the affected properties took place, along with viewing of substandard drains and culverts, overgrown culverts and road heights looked at.
In writing this submission a similar power-point was found from a 2006 walk around with affected residents and the ORC. The same issues raised, and similar ideas proposed to minimise inundation across properties on the floodway.

Now nearing 6 years on from the 2017 flood event we find it despicable and grossly negligent of the ORC that the issues we raised have not been addressed.
In Jean-Luc Payan affidavit dated 16th Dec 2022 he states that…
" The Gordon Road Spillway and Floodway form an integral part of the Lower Taieri Flood Protection Scheme. It is critical that the safe operation and integrity of the spillway and floodway are maintained and protected in order to guarantee the level of service of flood protection scheme the Mosgiel community is relying on"

A report dated 7 June 2019 (attached with submission) shows that the Silverstream channel when designed in 1974 had a capacity of 175.58 m3/s before the spillway became operational. In observations made in the November 2018 flood event the spillway activated at 115m3/s – a 34% reduction in capacity. This is due to aggradation, degradation along the channel as well as bank erosion. Nearly 4 years on from the report we are still waiting on global consents to be approved to dredge the Silverstream. This is not the level of service that the Mosgiel community is relying on. This lack of maintenance is directly causing the increased inundation levels on the floodway.

You will see from the below photographs (exhibits A, B, C, D) the lack of maintenance and substandard size and design of culverts and M3 and M4 drains that form part of the drainage in the Lower Taieri Flood protection scheme. (Photographs were taken on April 1st 2023). We believe these photos to well contradict the above statement.

Exhibit A – Riccarton Road M4 drain looking toward Silverstream Bridge. Bottom of photo is where the M4 culvert meets the M3 at the corner of Dukes Road South.

Exhibit B – Drains at Riccarton Road and Dukes Road South corner where M4 meets M3 and takes water under the road to continue on down Dukes Road South towards the Upper Pond.

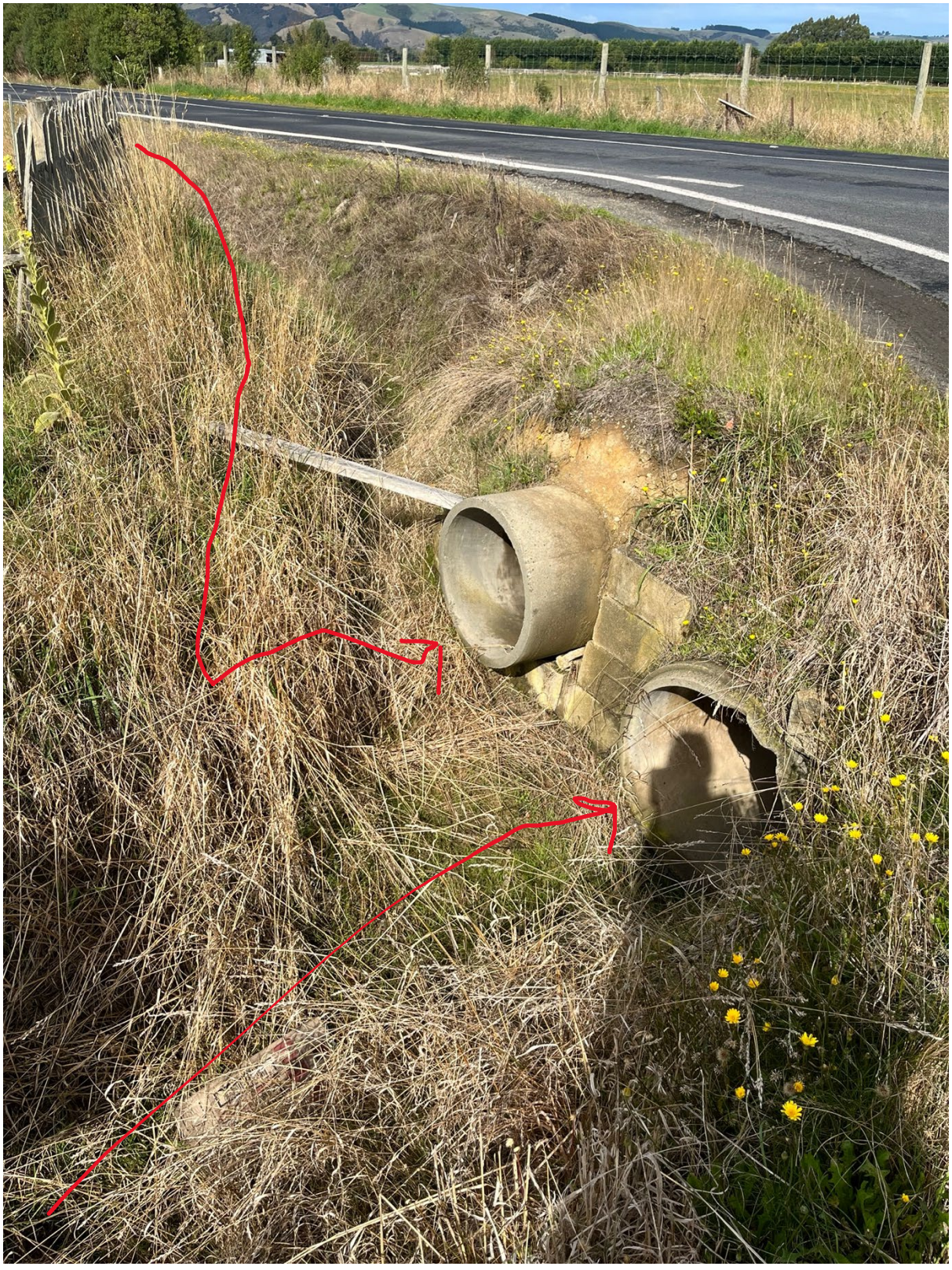
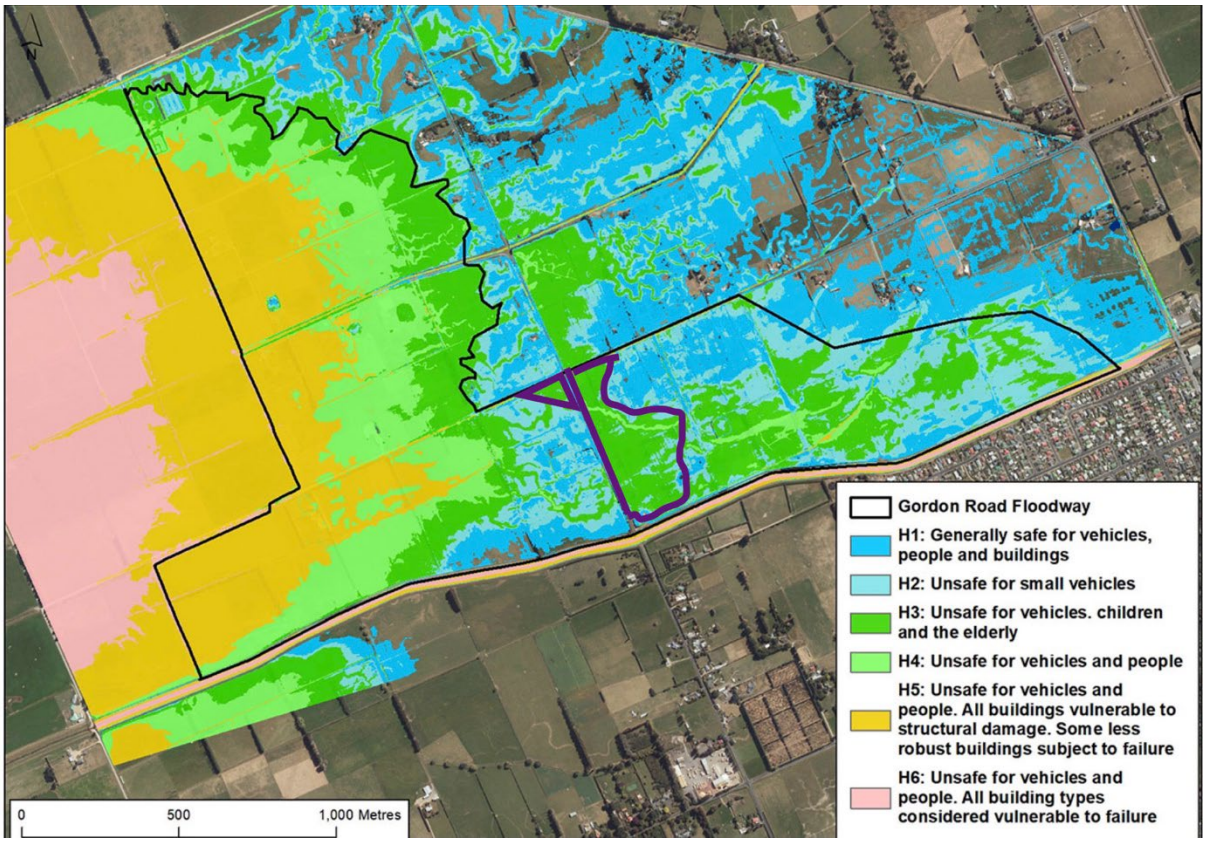


Exhibit C – M3 drain and culvert on Dukes Road South on the south side of Riccarton Road.

Exhibit D – M3 culvert on lower Dukes Road South heading towards the Upper ponding area.

Exhibit E - Modelling based on July 2017 flood event.



Key:Modelled flood hazard categories based on Australian Rainfall and Runoff Guidelines

Exhibit E shows inundation levels across the floodway area. Note similar inundation levels not in the mapped area. The area highlighted with a purple edge is the area shown in exhibits A-D. Water becomes trapped and backed up at the meeting of the M3 and M4 drains at the corner of Riccarton Road and Dukes Road South in a heavy rainfall event. Lack of drain capacity to move water under Riccarton Road towards the upper ponding area causes backup of water to the properties shown in the highlighted area. The road acts as a dam until water levels become high enough to spill over the road.

Most (80-85%) of the residential buildings in the mapped area are within the category of H1 – generally safe for vehicles, people and buildings.
As the property owners we know which parts of our property are safe and know what the different inundations levels are in any given part of our property in a flood event.

Tools for keeping safe in heavy rain events– for residents of the Gordon Road Floodway

Heavy rainfall events do not usually come unannounced and the residents of the Gordon Road Floodway have many warning systems in place and access to up to date information across many platforms.

All of the below are tools we use/ or are available for us to use in risk management in a flood event to keep all residents safe and up to date with the changing conditions.

Communication tools…

- Gordon Road Spillway Residence Group – text updates directly from ORC
- Dunedin Civil Defence Emergency Facebook page and website
- ORC website
- DCC website
- Community Noticeboards
- Telephone and property visits with neighbours on the floodway
- Radio updates

Checking in with each other and the sharing of…

- Farm vehicles to move stock and other items that may be subject to flood water
- Latest updates/ evacuation status
- Sharing of homes with any displaced residents

Sand bags are made available well in advance of each flood event from the local collection point.

Our concerns

- Why does the ORC believe it necessary to increase the hazard overlay across the Gordon Road Floodway from 1 to 1A when they have declined our application for new residential activity as recently as June 2022. We believe ORC has demonstrated their ability to control the hazard sensitive activities within the current hazard overlay of 1.

- The ORC has made no attempt to talk to individual landowners with a site visit to learn about what happens at each property in a flood event but are happy to rely on modelling from data to make their decision to increase the flood overlay from 1 to 1A. The data is not accurate with our experiences in flood events in that the inundation levels are not consistent with what is shown on the report.

- By increasing the level from 1 to 1A overlay has the potential to significantly impact the property values of all the properties affected by this proposed change.

- The Gordon Road Spillway residents' group (55 individuals across 22 properties on the Gordon Road Floodway) have been actively making suggestions to both the DCC and ORC for 5 ½ years since the 2017 flood event on how improvements could be

made to minimise the inundation to properties on the Gordon Road Floodway based on our experiences from each flood event. We believe that if the proposed increase of the flood overlay hazard goes ahead it will take even longer for the ORC and DCC to act on any serious maintenance plans to help reduce inundation levels in flood events to the properties affected on the floodway. We believe they are just simply moving the risk onto the residents

- We are relying on a flood protection scheme that was designed 50 years ago. Mosgiel has seen huge urban and industrial expansion, but the flood protection infrastructure has not seen any major upgrades to deal with increased water into the Silverstream and predicted increase in frequency due to climate change. Local government is responsible for providing the level of service of the flood protection scheme that the Mosgiel community is relying upon. Currently they are not.

- We are concerned about only being able to reply on "Existing use rights" for our existing home if something happened, not even relating to flooding, and it needed to be rebuilt. Existing use rights currently stands at 12 months. If something outside of our control happens, such as a delay in settling insurance, or delays in accessing builders or materials we do not think that this timeframe is long enough to allow for rebuilding and our existing use rights could be lost. The prohibited activity means we could not apply for resource consent to get a longer timeframe to rebuild.

- 80-90% of homes in the affected area have never been breached by floodwaters however the ORC wishes to throw a 1A over the whole floodway. This is completely unjust and unfair.

- There is huge potential for significant loss of value to every single property if the 1A is applied to our property. There is also potential that our property may become uninsurable.

Summary

Local government (ORC) operates under a range of principles in reference to managing future flood risk that are set out in legislation under the Resource Management Act 1991, Civil Defence Emergency Management Act 2002, Building Act 2004, Local Government Act 2002, Soil Conservation and Rivers Control Act 1941. The ORC is not meeting its responsibilities and obligations in the maintenance of the Silverstream as part of the Taieri Flood Protection Scheme. Through lack of maintenance of the Silverstream bed (as shown in report written by Jean-Luc Payan and Bikesh Shrestha in 2019) the ORC has not managed the exposure to the risk of inundation caused by flooding to not only the residents of the Gordon Road Floodway but also the larger community and properties of Mosgiel.

What the ORC are proposing is UNJUST and UNFAIR to all the affected property owners.

Otago Regional Council

Document Id:

Recommending Report

To: Gavin Palmer

CC: Scott Fowlds

From: Jean-Luc Payan and Bikesh Shrestha

Date: 07/06/2019

Re: Morphological changes in Silver Stream and implication on scheme operation – Gordon Road Spillway

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1. Background – Morphological changes in Silver Stream

The active channel of the Silver Stream is a dynamic system where flood events and sediment movement regularly cause changes in channel morphology. Changes in the longitudinal profile and morphology of the river bed are occurring because of aggradation, degradation along channel as well as bank erosion. Sediment sources in the Silver Stream are mostly restricted to bank collapse and remobilisation of channel storage (Fountain, 2013). The Natural Hazards Team assessed the changes in morphology of the Silver Stream between the Wingatui Road and the confluence with the Taieri River for the period 2003 to 2017. The comparison of the latest two cross-sections survey (2011 and 2017) shows aggradation for majority of cross-section (Figure 2) and decrease in sectional area for majority of cross-section (Figure 3). The changes in morphology can have implications on floodwater conveyance and performance of the scheme. Historically, the Silver Stream stop bank system and Gordon Road spillway layout was envisaged to provide a higher level of flood protection for the urbanised Mosgiel side than for the predominantly rural floodplain north of the stream (Opus, 2010). The Wingatui Road to Gordon Road bridge reach of Silver Stream was designed to carry flow of 283.17 m^3/s and rest of reach was designed for flow of 175.58 m^3/s. This means that the Gordon Road spillway is designed to operate at flow higher than 175.58 m^3/s (OCB, 1974). The current set level of operation for Gordon Road spillway is between the flow of 125 – 130 m^3/s. However, the spillway now operates at flow rate of 115 m^3/s (based on observation made in November 2018 flood event) which is most probably due to bed aggradation and decreased sectional area of the Silver Stream.

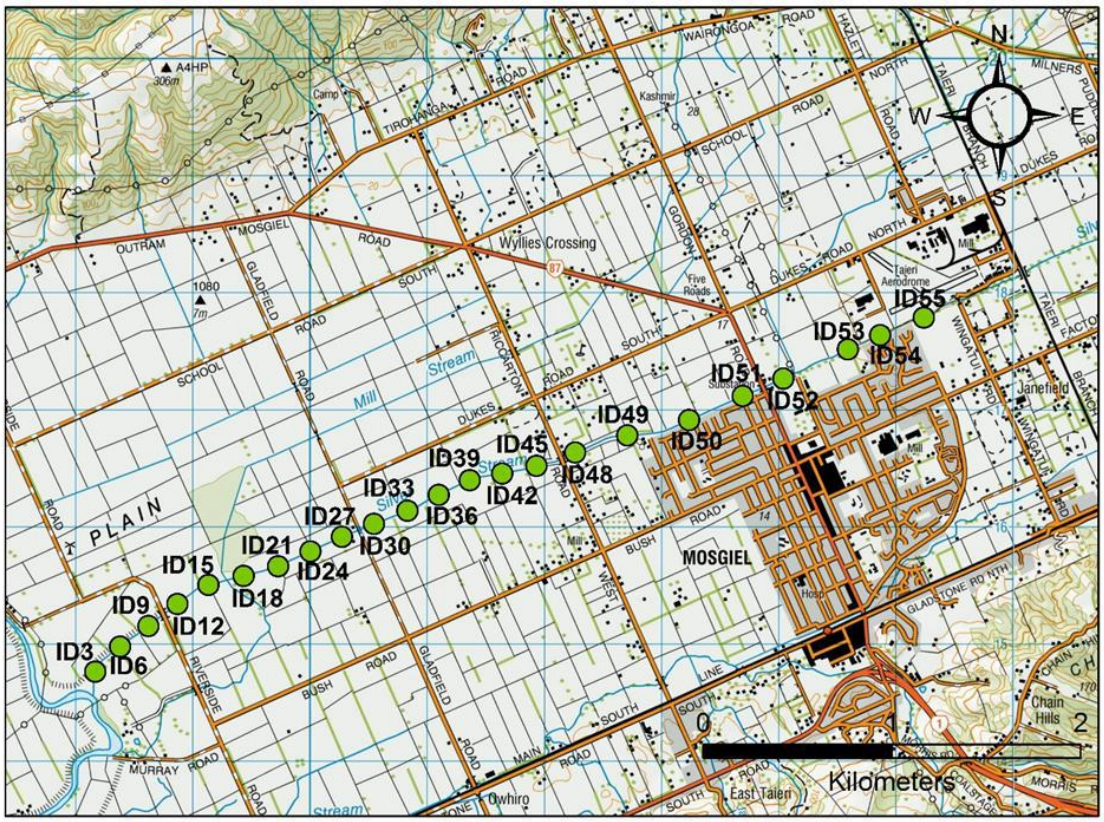


Figure 1. Location of surveyed cross-sections on the Silver Stream.

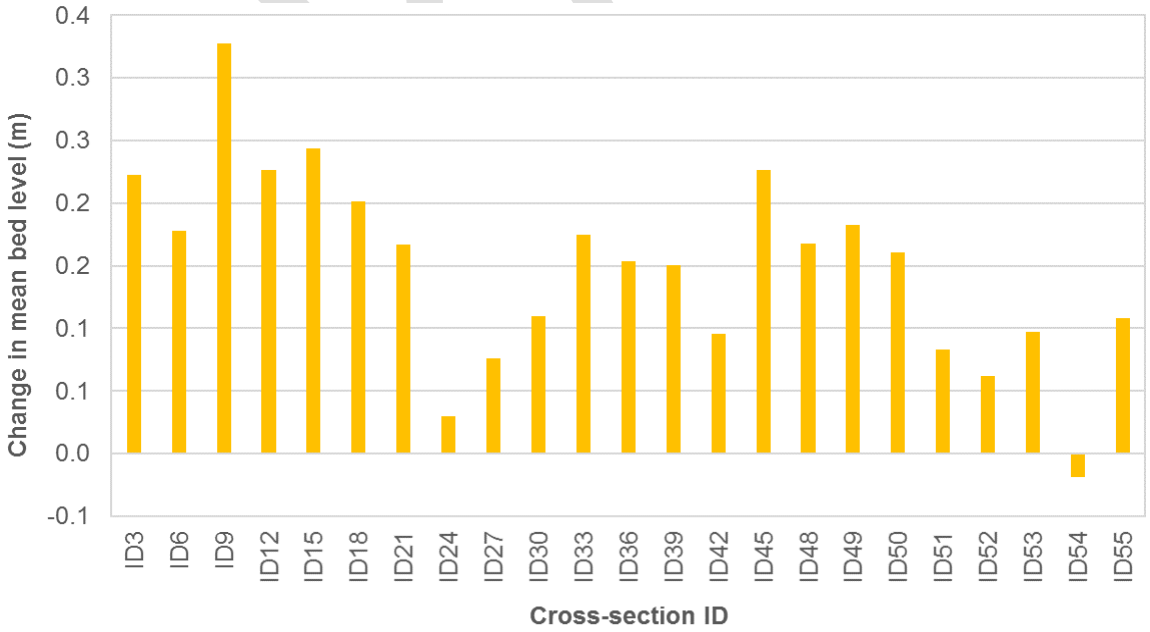


Figure 2. Changes in mean bed level (MBL) at cross-sections on the Silver Stream between 2011-2017. MBL is defined as “area below a certain datum divided by prescribed channel width” (Sriboonlue & Basher, 2003). MBL are used to determine trends of aggradation and degradation in river bed.

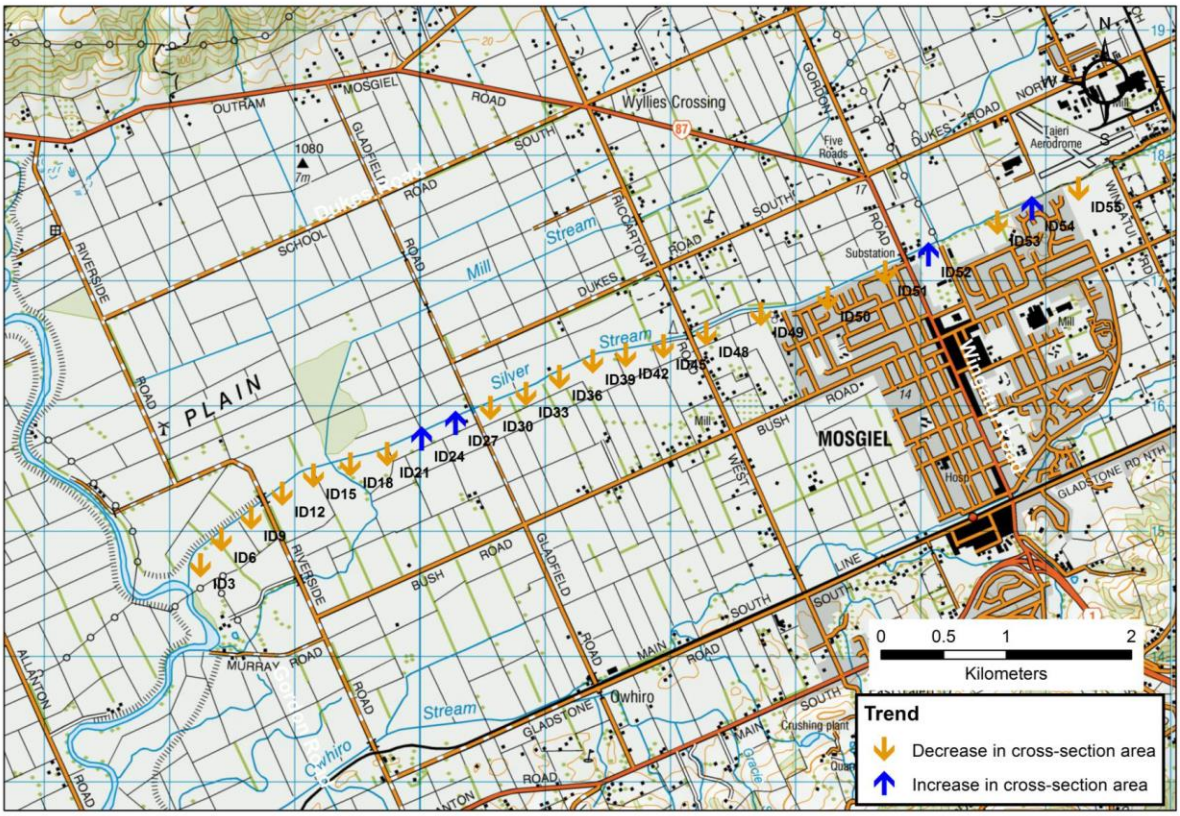


Figure 3. Changes in cross-sectional area at cross-sections on the Silver Stream between 2011-2017.

2. Scope of the investigation

The Natural Hazards Team at ORC carried out an assessment of the implication of morphological changes of the Silver Stream on the performance of the Gordon Road spillway and recommend possible measures to reduce the impact. To achieve the scope of the investigation a 1Dimensioinal / 2Dimensional hydraulic model was developed for the Silver Stream. HEC-RAS 5.03 was the hydraulic model used for this investigation. The model has been calibrated for June 2015 event and validated for May 2006, 2010 and July 2017 events (as presented in Figure 4).

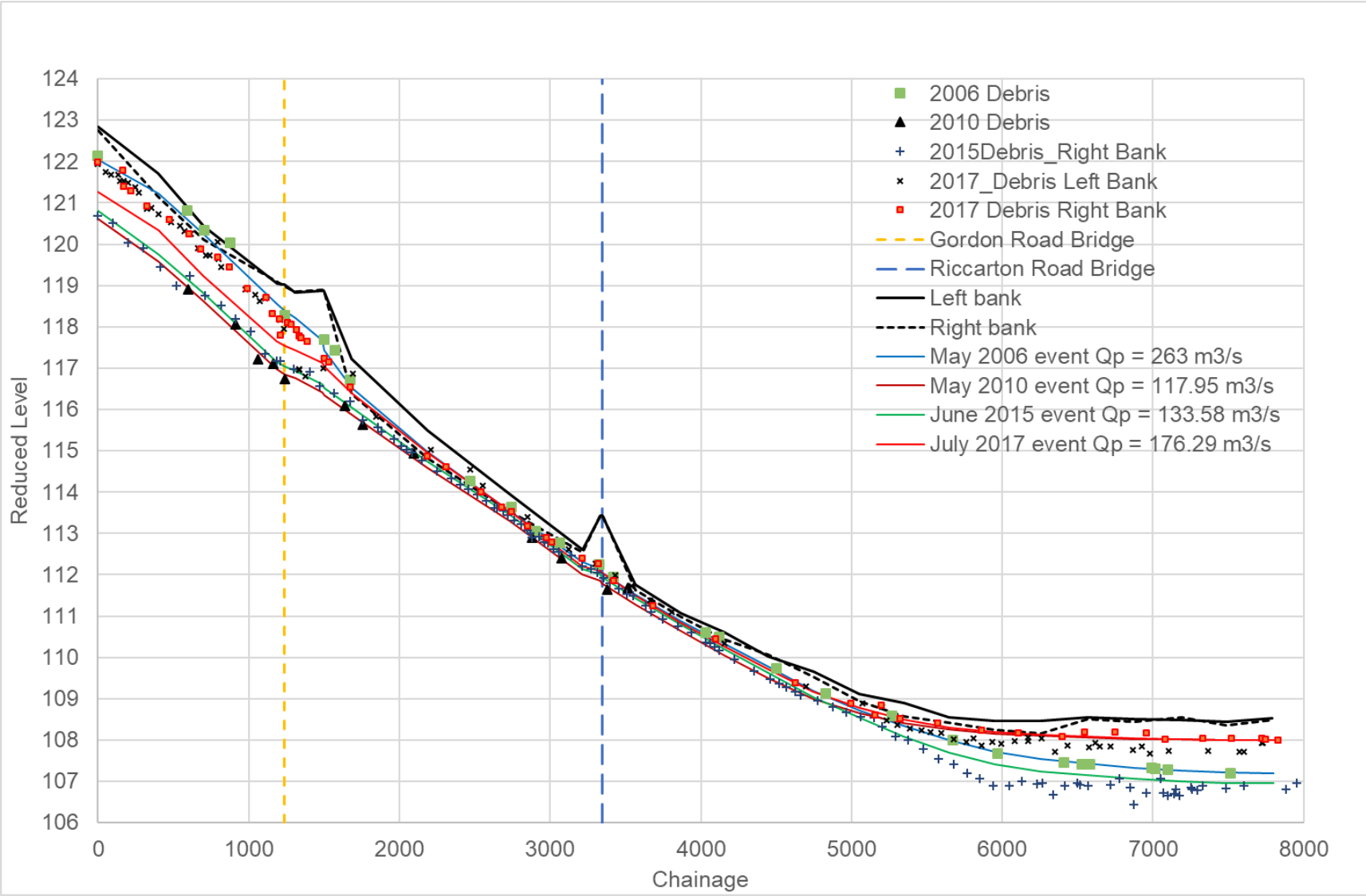
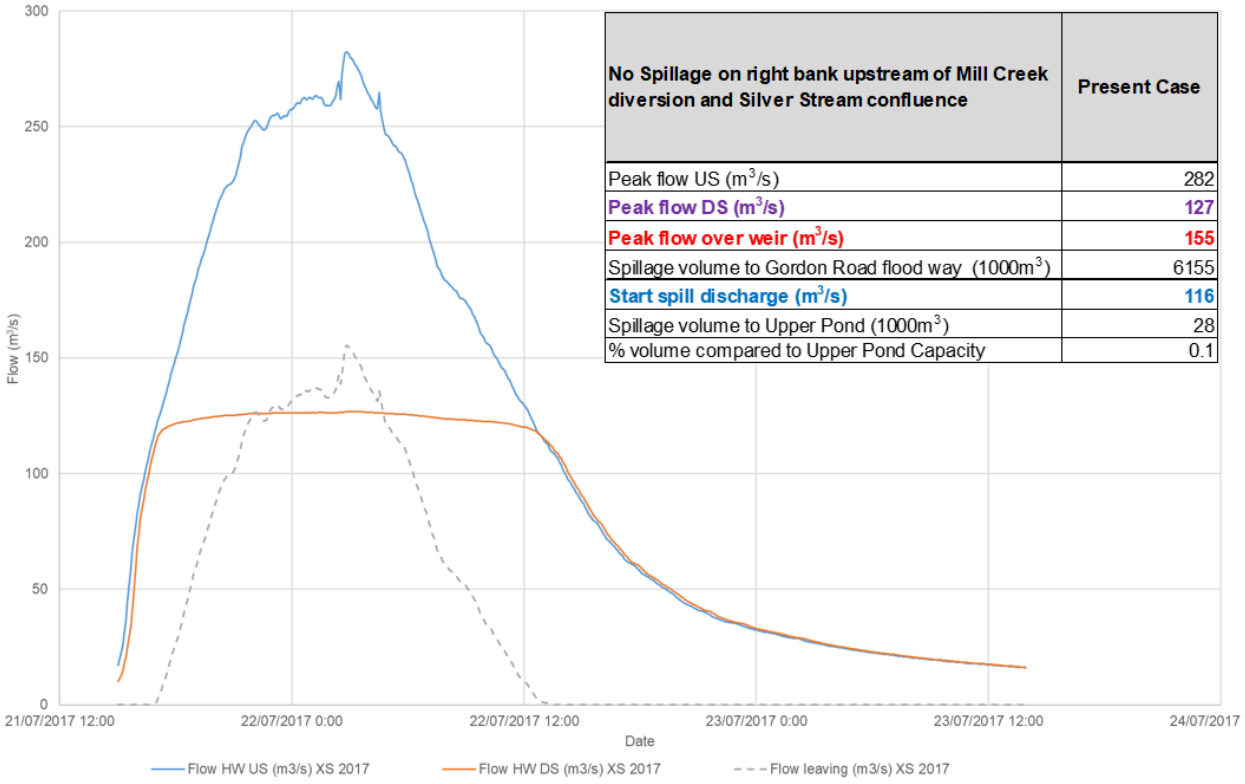


Figure 4. Comparison of observed high water level against simulated water levels.

3. Assessment of current state of the operation of Gordon Road Spillway

For assessment of current state of the operation of Gordon Road Spillway, the calibrated HEC-RAS model for the Silver Stream was simulated using surveyed cross-section data of year 2017, and 2017 crest level survey data for the spillway and flood banks. The upstream boundary of the model was flow hydrograph with peak discharge of 283.17 m^3/s and the downstream boundary was set as a constant water level of RL 108.00 m (Otago Datum). The model results show that under present geomorphological condition of the Silver Stream the Gordon Road spillway will start to operate at discharge of 116 m^3/s and the flow in the Silver Stream downstream of the spillway will be 127 m^3/s (Figure 5). This suggests that the aggradation of river bed and decreased sectional area of Silver Stream has reduced the channel flood carrying capacity downstream of Gordon Road bridge and resulted to early operation of the spillway. The early operation of spillway will increase duration and volume of spill resulting to increased flood extent and depth of inundation.



No Spillage on right bank upstream of Mill Creek diversion and Silver Stream confluence	Present Case
Peak flow US (m^3/s)	282
Peak flow DS (m^3/s)	**127**
Peak flow over weir (m^3/s)	**155**
Spillage volume to Gordon Road flood way ($1000m^3$)	6155
Start spill discharge (m^3/s)	**116**
Spillage volume to Upper Pond ($1000m^3$)	28
% volume compared to Upper Pond Capacity	0.1

Figure 5. Flow status at Gordon Road spillway for the current morphological state of Silver Stream. Note: Flow HW US means flow in Silver Stream upstream of the spillway; Flow HW DS means flow in Silver Stream downstream of the spillway; Flow leaving means flow over the spillway.

4. Mitigation options assessed

Five mitigation options were developed and assessed for the Silver Stream.

- Option 1: Raising the low spots of the Gordon Road spillway. The option considers crest level realignment of the Gordon Road spillway. The low spots along the Gordon Road spillway is proposed to raise by magnitude of 200mm (Figure 6). The main objective of this option is to delay the operation of the spillway and reduce the amount of spillage.

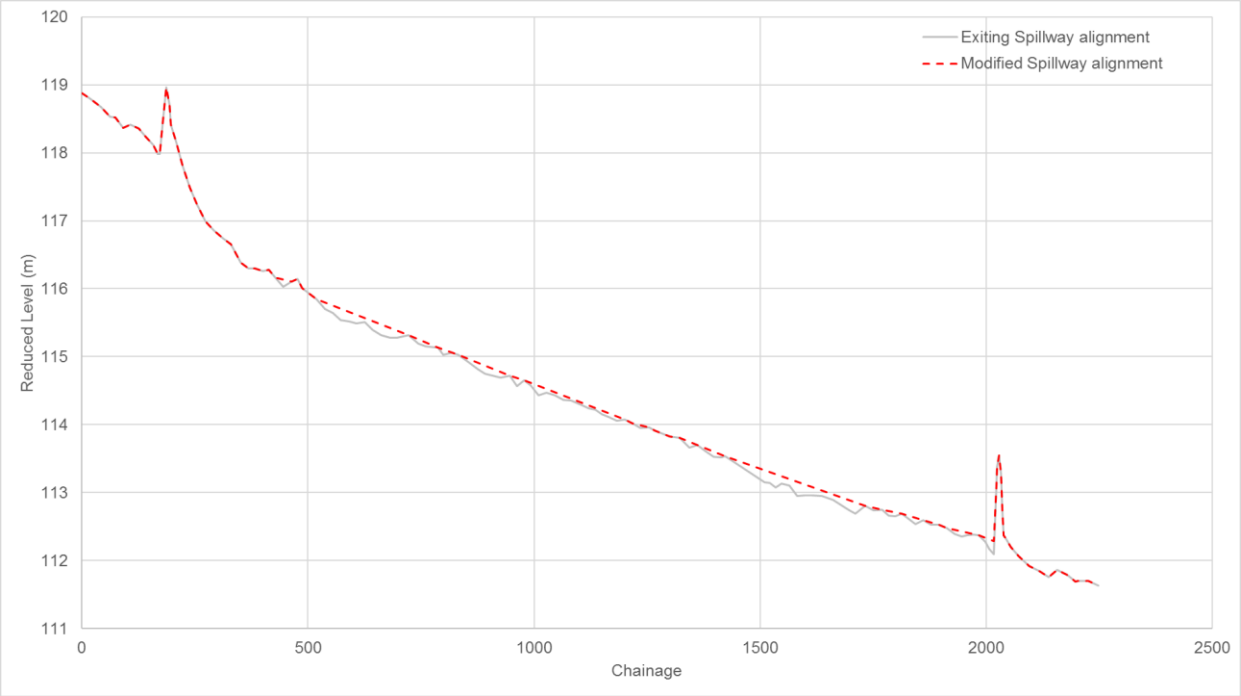


Figure 6. Existing crest level versus proposed crest level of the Gordon Road spillway.

- Option 2: Channel modification trial 1. The option considers a minimum channel widening of the Silver Stream reach below Gordon Road bridge. The channel is proposed to widen to follow a bank slope of 1:2 (V:H). The main objective of this option is to increase the flood carrying capacity of the Silver Stream. This will also limit the spillage volume over the Gordon Road spillway.

- Option 3: Combination of options 1 and 2. The rationale for this alternative is to combine the benefits of increasing the channel conveyance and providing additional flood relief by delaying the operation of Gordon Road spillway.

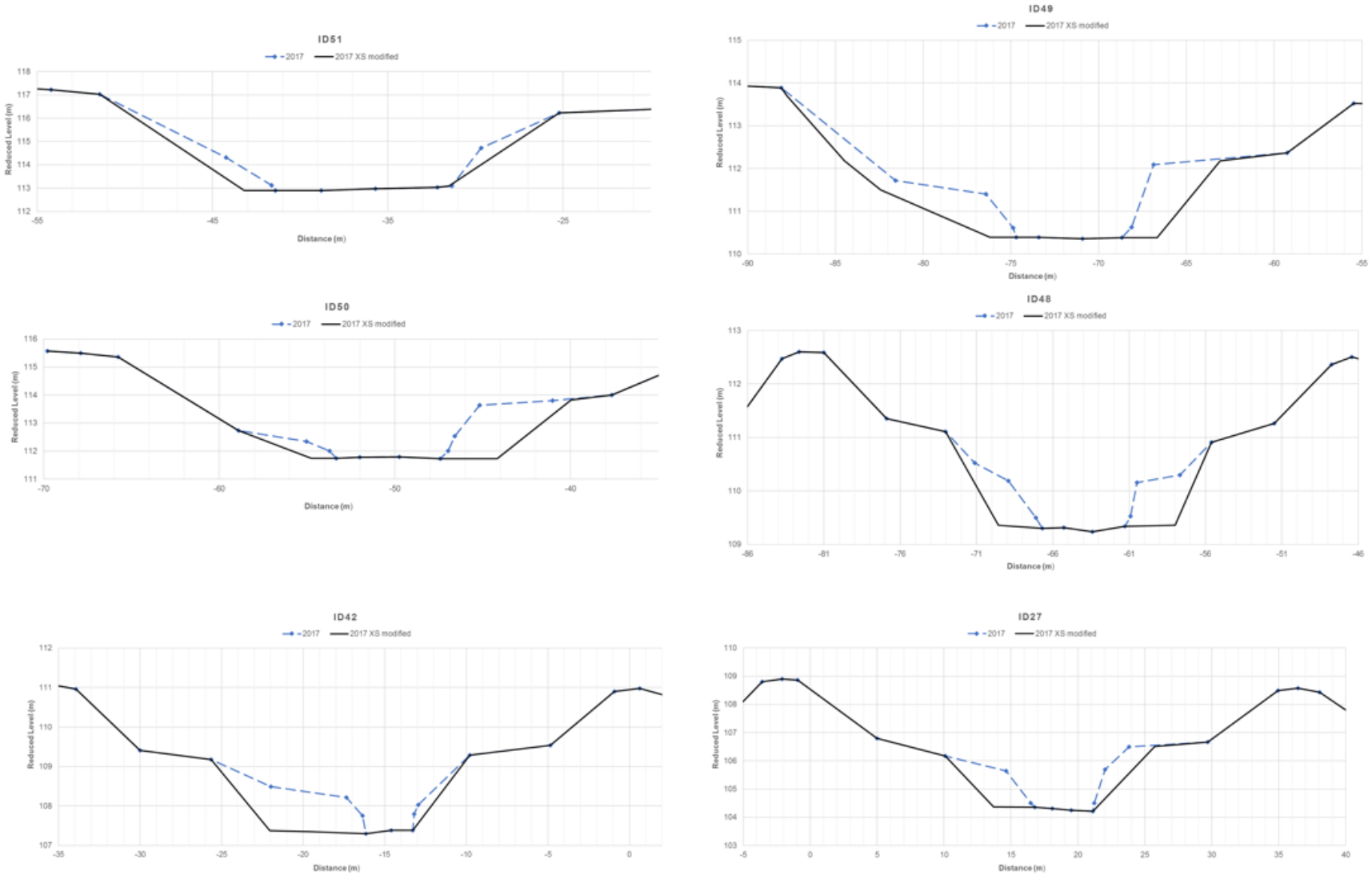


Figure 7. Proposed channel widening for selected cross-section under Option 2. The proposed limits for channel widening are presented by line coloured black.

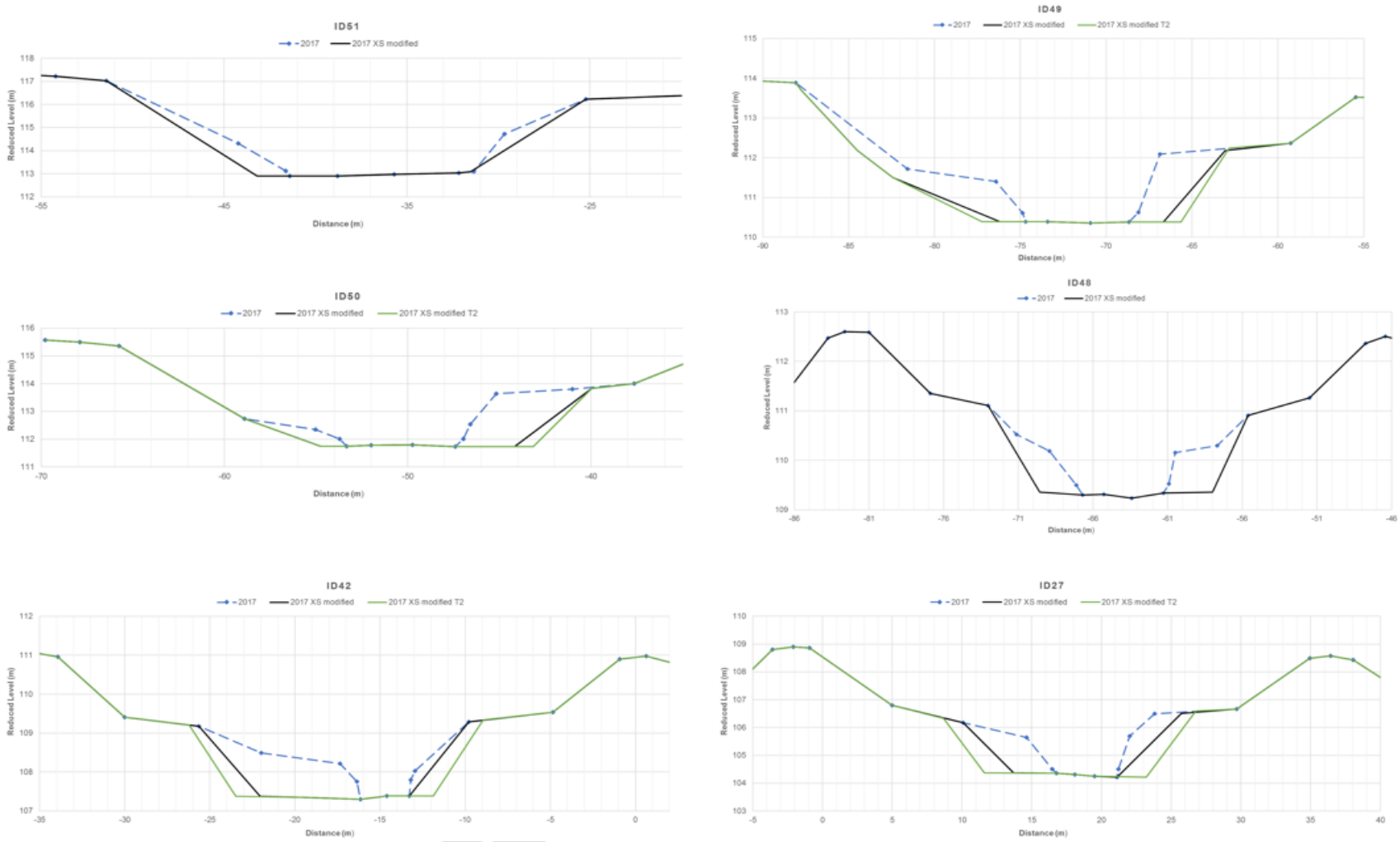


Figure 8. Proposed channel widening for selected cross-section under Option 4. The proposed limits for channel widening are presented by line coloured green for Option 4.

- Option 4: Channel modification trial 2. In this option the channel modification is proposed to the original design level. The reach downstream of the Gordon Road bridge is proposed to widen so that the channel bed will have width of 11.59m and bank slope of 1:1.5 (V:H) (Figure 8). This option is tested to identify whether the designed level of protection can be achieved. The channel downstream of the Gordon Road bridge should be able to convey flow with magnitude of ~ 176 m^3/s.

- Option 5: Combination of options 1 and 4. The rationale for this alternative is to combine the benefits of increasing the channel conveyance and providing additional flood relief by delaying the operation of Gordon Road spillway.

5. Assessment of options

The options 1 to 5 were modelled and assessed for the designed discharge of 283.17 m^3/s. The hydrograph shape of July 2017 was used because the duration of flow higher than 115 -120 m^3/s (flow which triggers the Gordon Road spillway to operate) was longer for this event as compared to other observed high flow events.

Table 1. Summary of assessment of options.

	Present Case	Option 1	Option 2	Option 3	Option 4	Option 5
Peak flow US (m^3/s)	282	282	282	282	282	282
Peak flow DS (m^3/s)	**127**	**135**	**161**	**168**	**166**	**174**
Peak flow over weir (m^3/s)	**155**	**147**	**121**	**113**	**116**	**108**
Spillage volume to Gordon Road flood way ($1000m^3$)	6155	5609	4004	3543	3749	3282
Start spill discharge (m^3/s)	**116**	**128**	**143**	**155**	**146**	**164**
Total Spill duration (hrs)	21	19	18	17	18	16
Spillage volume to Upper Pond ($1000m^3$)	28	159	467	774	344	626
% volume compared to Upper Pond Capacity	0.1	0.5	1.3	2.2	1.0	1.8

Table 1 provides a summary of the assessment of the five different mitigation options. Option 1 (raising the low spots of Gordon Road spillway) can be adequate solution if the objective is to set the level of operation for Gordon Road spillway between the flow of

125 – 130 m^3/s. Option 5 is most favourable if the objective is to achieve a service level close to design i.e., the channel downstream of Gordon Road able to convey flood of magnitude close to 175.58 m^3/s. Widening of channel can encourage sediment deposition due to reduction in velocity. Hence, before implementation of channel widening the influence on velocity and possible sediment deposition needs to be investigated in detail. However, whether sediment will be eroded, transported or deposited is also depended on the particle size of sediment (Figure 9).

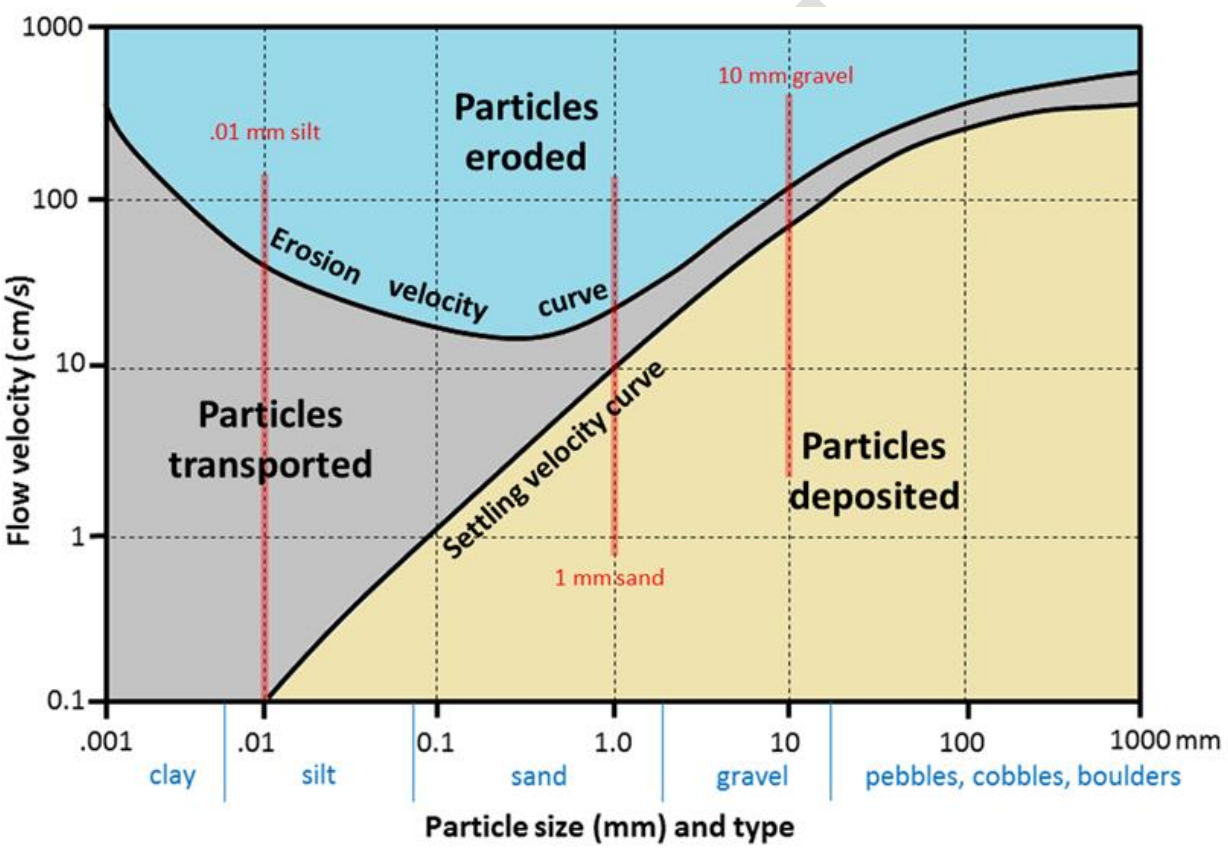


Figure 9. The Hjulström-Sundborg diagram showing the relationships between particle size and the tendency to be eroded, transported, or deposited at different current velocities (Source: Earle, 2015).

The model result suggests that in majority of reach the mean channel velocity will not drop as result of channel widening (Figure 10) under high flood conditions. The result shows reach upstream of Gordon Road bridge and some sections between Riccarton Road and Gordon Road with velocity higher than 2.4 m/s, which is higher than the maximum permissible mean channel velocities for grass-line earth channel (USDA, 2007) such as the Silver Stream. Hence, in these sections of the Silver Stream rock lining may be necessary. Although high flow velocities of up to 4 m/s have been identified in some reaches under flood condition, yet the flow conditions are subcritical (Froude value < 1).

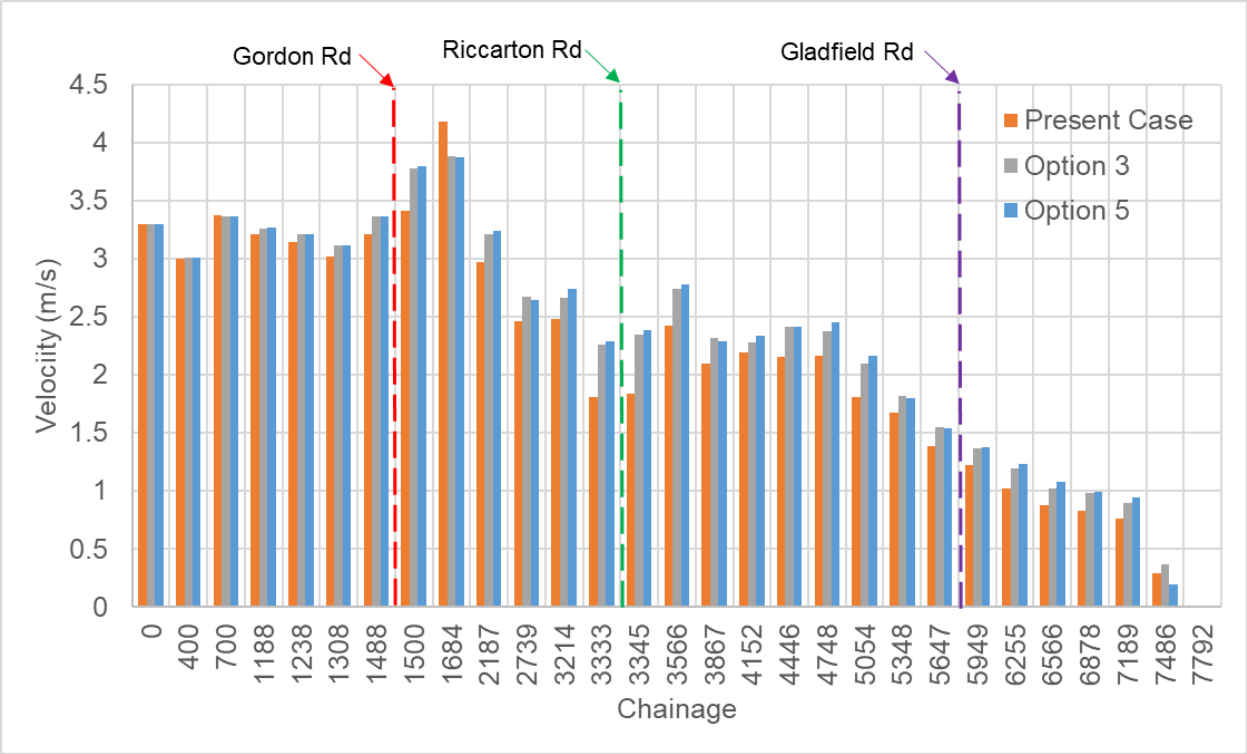


Figure 10. Mean velocity along the channel.

The model results showed that improving the flood carrying capacity of channel results to increased spillage of flood water to Upper pond, nevertheless the magnitude of spilled volume of flood water compared to Upper pond capacity is not that significant. There are few low spots on the right flood bank downstream of the Riccarton Road which allows spillage to Upper pond (please refer to Figure 11) and the reach downstream of the Gladfield Road gets influenced by water level in Taieri. Higher water level in Taieri confluence causes backwater effect. This suggests that in order to contain the flood water within the Silver Stream, at these spillage points, the right flood bank level raising may be required. This investigation is more focused on improving the channel capacity and performance of Gordon Road spillway. We have not assessed the service level of flood banks.

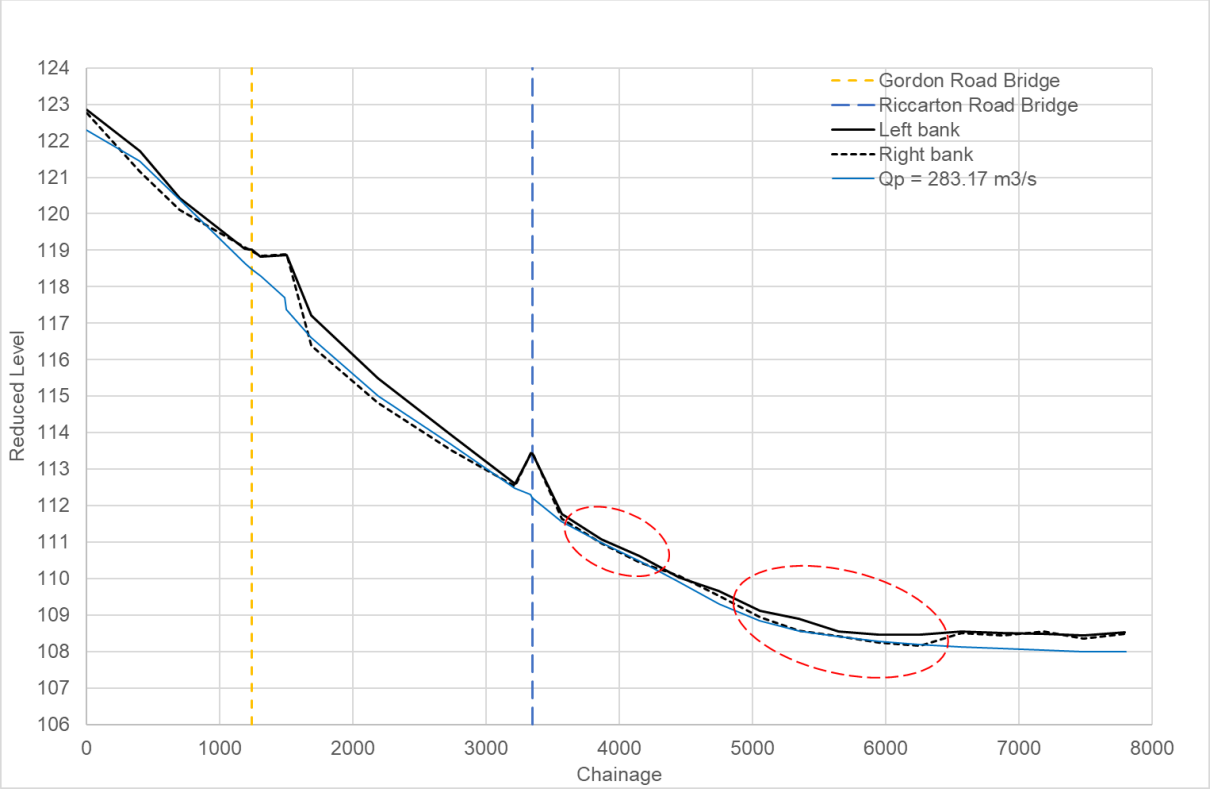


Figure 11. Backwater profile for July 2017 event and low spots in flood bank.

6. Recommendation

Based on the assessment following recommendations are made:

- Raising the low spots of Gordon Road spillway (Option 1) can be adequate solution if the objective is to set the level of operation for Gordon Road spillway between the flow of 125 – 130 m^3/s.
- Combination of channel widening to design level and raising the low spots of Gordon Road spillway (Option 5) is most favourable if the objective is to achieve a service level close to design i.e., the channel downstream of Gordon Road able to convey flood of magnitude close to 175.58 m^3/s.
- Channel widening is the most effective option to improve the service level of the scheme but may not be the most economically viable option. Hence, before considering the channel widening option a detail cost-benefit analysis is recommended.

7. References

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