

Memorandum

To	Nathanael Savage
Copy	Jackie Colliar
From	Rodrigo Gonzalez / Michael Howe
Office	Hamilton Environmental Office
Date	4 February 2019
File	3-39300.00 - Te Otamanui Stream
Subject	Flood Impact Assessment

1 Introduction

WSP Opus was engaged by Hamilton City Council (HCC) and Waikato District Council (WDC) to develop a flood model of the Te Otamanui Stream to identify existing flooding constraints. This report was submitted on December 2018 “WSP-Opus (2018) Assessment of Existing Flood Constraints in the Te Otamanui Stream. Reference No. 3-39300.00”

In addition, the model was developed to be used to assess potential flood impacts of options for discharging of water from the proposed Rotokauri North Development Area (RNDA) and from the Mangaheka Stream Catchment.

This memorandum sets out the flood impact assessment of the proposed inflows from the RNDA catchments. Modelling has been undertaken for the 50%, 10% and 1% Annual Exceedance Probability (AEP) design flood events.

The inflows from the RNDA are located in the upper part of the catchment. Draining through culverts under Te Kowhai Road.

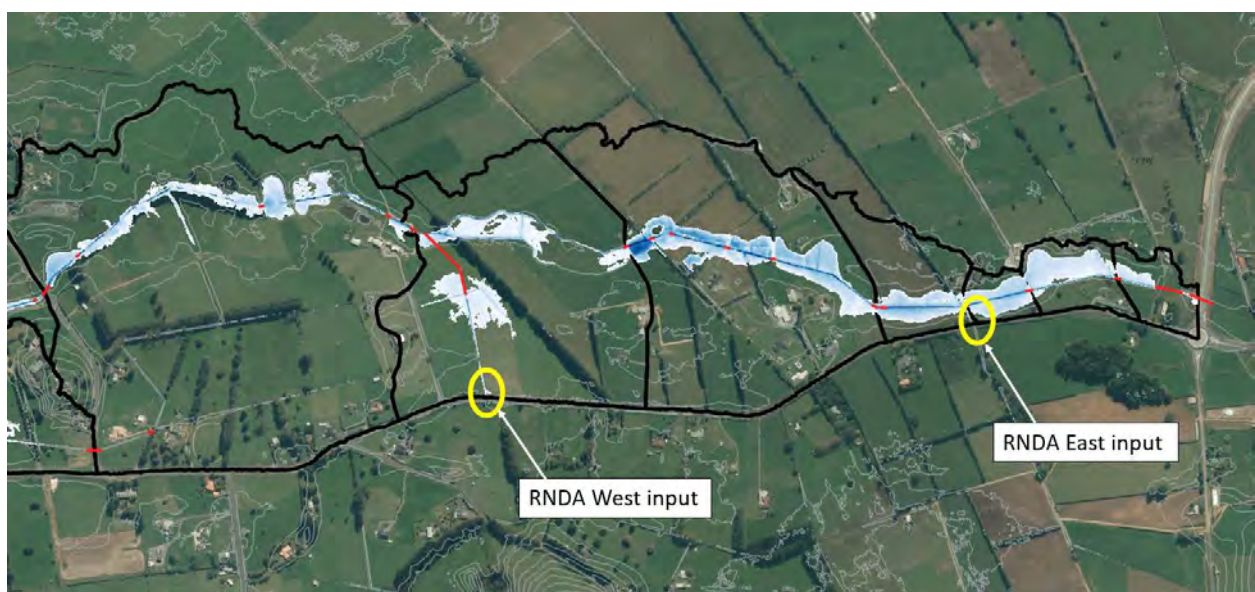


Figure 1-1 : Inputs from RNDA area

2 Background Information & Methodology

A report developed by WSP Opus (December 2018) titled “Te Otamanui Stream SW Modelling – Assessment of Existing Flood Constraints in the Te Otamanui Stream” identified the existing main constrains in the Te Otamanui Stream. To satisfy the above requirement and achieve a strong understanding of the impacts on flooding in the catchment, WSP Opus undertook a detailed hydrological assessment of the Te Otamanui catchment and developed a 1D-2D linked hydraulic model based upon the available data.

The hydraulic model has been used in this stage to assess flood impacts related to potential options of discharging from the proposed Rotokauri North Development Area (RNDA)

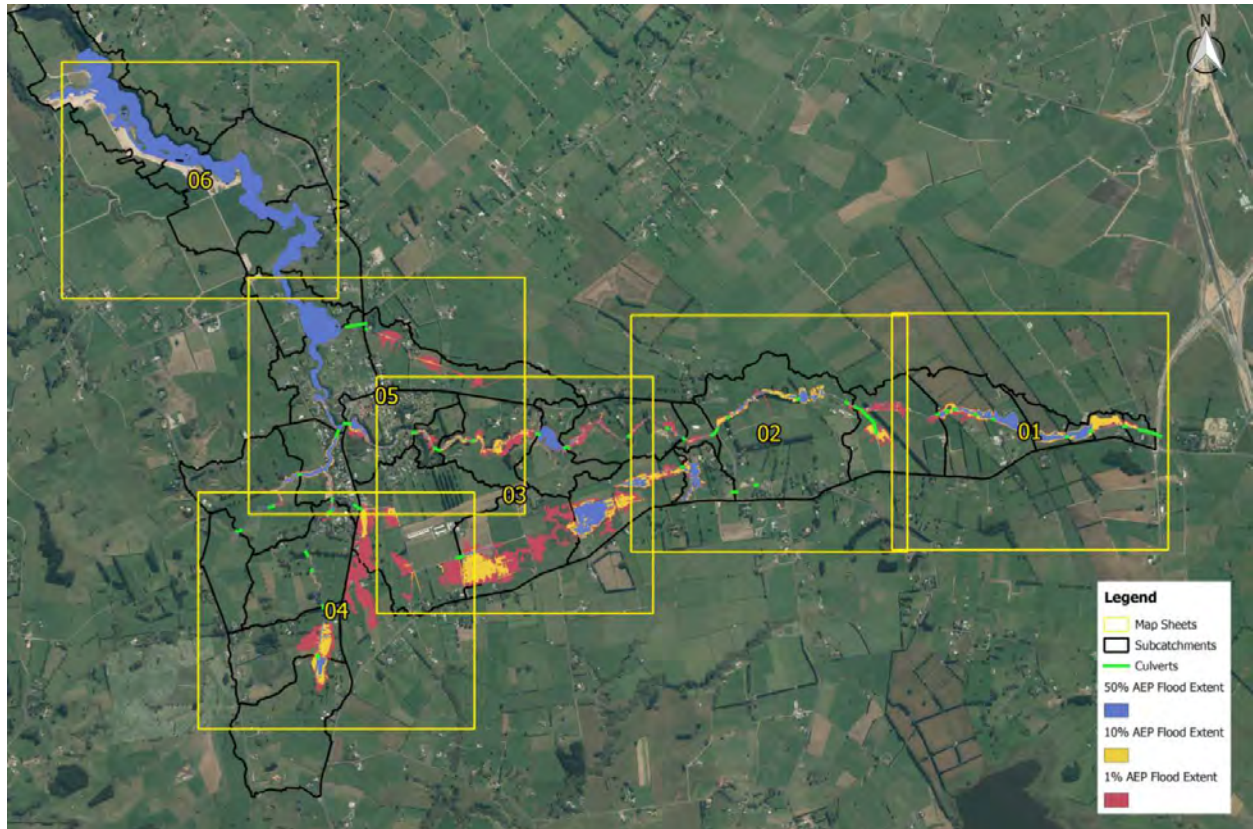


Figure 2-1 : Assessment of main constrains in Te Otamanui Stream

The inputs through the culverts under Te Kowahi Road were provided by McKenzie Engineering Consultants for the existing and proposed case for the RNDA.

- The undeveloped scenario was considered in the RNDA Catchments for the analysis of the main constraints in the Te Otamanui Stream
- The assessment of the flood impacts was develop considering the discharges from the wetland/detention basin for the Maximum Probable Development (MPD), based on conceptual/feasibility design of said devices. They are conceptual/feasibility designs only, with the hydraulic controls having been primarily developed to mitigate the 1% AEP flows to the 80% Existing Development (ED) peak value.

The results of the impact assessment show the increase/decrease on the maximum water level in the Te Otamanui Stream because on the discharge of water from the new developed areas.

3 Flood Impact Assessment

For the impact assessment, the 2D/1D hydraulic model was run with the new inputs from the RNDA:

- As highlighted in the previous section the detention basin was designed, in the RNDA East Catchment, to mitigate the 1% AEP flows to the 80% of the existing peak value. Analysing the hydrographs provided, the proposed peak flows (RNDA east inflows) are far smaller than existing flows for 10% and 50% events and the 80% of the existing peak for the 1% AEP event target was achieved. These new hydrographs are assumed to be with Climate Change rainfall for the Maximum Probable Development (MPD) scenario
- Regarding the RNDA West catchment, the plan change area will be redirect the runoff from this area to the Ohote catchment to the south. Therefore, RNDA West catchment can be considered to have no contribution to the downstream catchment and was not considered in the modelling for the Maximum Probable Development (MPD) scenario.
- It is to be noted that at the time of the reporting WSP-Opus did not have access to the details of the proposed stormwater management systems within the RNDA prior to discharging to the Te Otamanui Stream. The hydrographs provided by McKenzie Engineering Consultants can be found in Appendix D.

Table 3-1 : RNDA Catchment, peak discharge flows

Catchment	50% AEP		10% AEP		1% AEP	
	Base Case	MPD	Base Case	MPD	Base Case	MPD
RNDA West	0.11 m ³ /s	0 m ³ /s	0.12 m ³ /s	0 m ³ /s	0.13 m ³ /s	0 m ³ /s
RNDA East	1.62 m ³ /s	0.16 m ³ /s	1.86 m ³ /s	0.44 m ³ /s	1.98 m ³ /s	1.47 m ³ /s

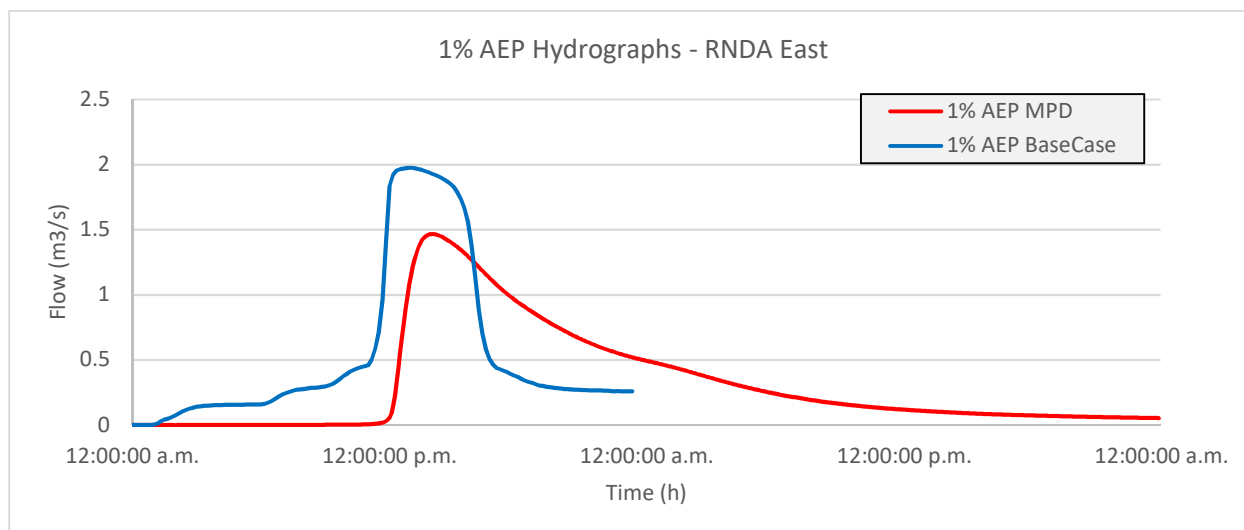


Figure 3-1 : 1% AEP Hydrographs. RNDA East

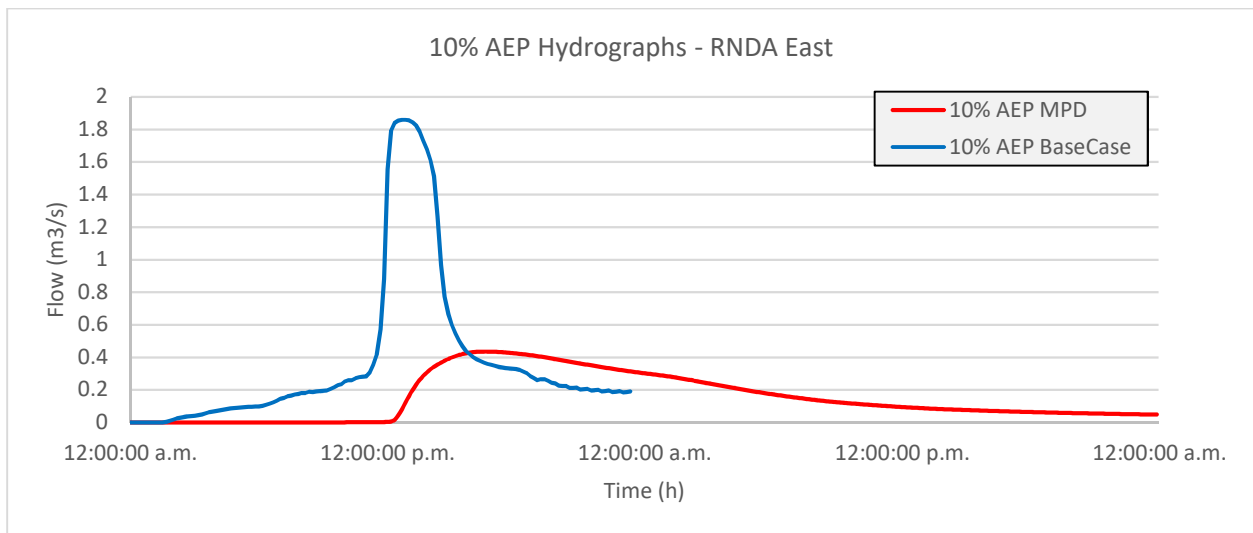


Figure 3-2 : 10% AEP Hydrographs. RNDA East

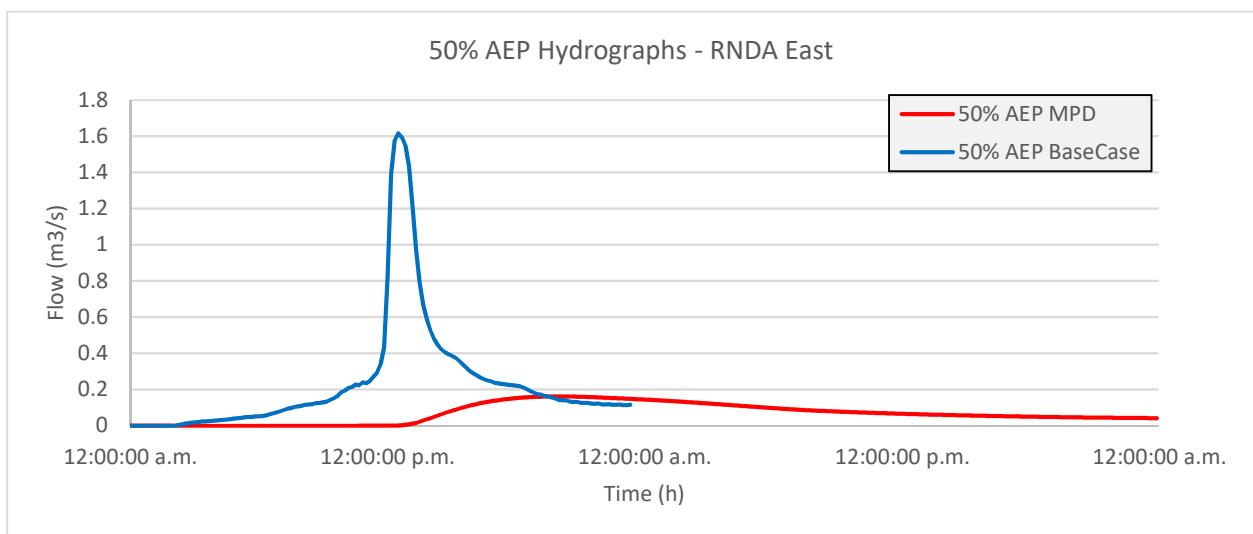


Figure 3-3 : 50% AEP Hydrographs. RNDA East

Due to the storage on the attenuation devices, the hydrograph shapes are elongated at the peak and delay the flow of water down the streams.

The same hydrographs have been maintained in the rest of the subcatchments along the Te Otamanui Stream between the existing case and the development scenario. Therefore, the flood impact analysis only shows the effect of the new Hydrograph on RNDA East and the removal of the RNDA West input. For the characteristics of the rest of the subcatchments and the model build report refer to the previous report “*Assessment of Existing Flood Constraints in the Te Otamanui Stream*”

2 Control Lines (CL) were placed along Te Otamanui Stream to analyse the effect of the new Hydrographs in the flow discharge through the stream:

- CLO1: Downstream of the RNDA East input.
- CLO2: At the end of the stream, near Te Kowhai, before discharging through the culvert under Horotiu Rd.

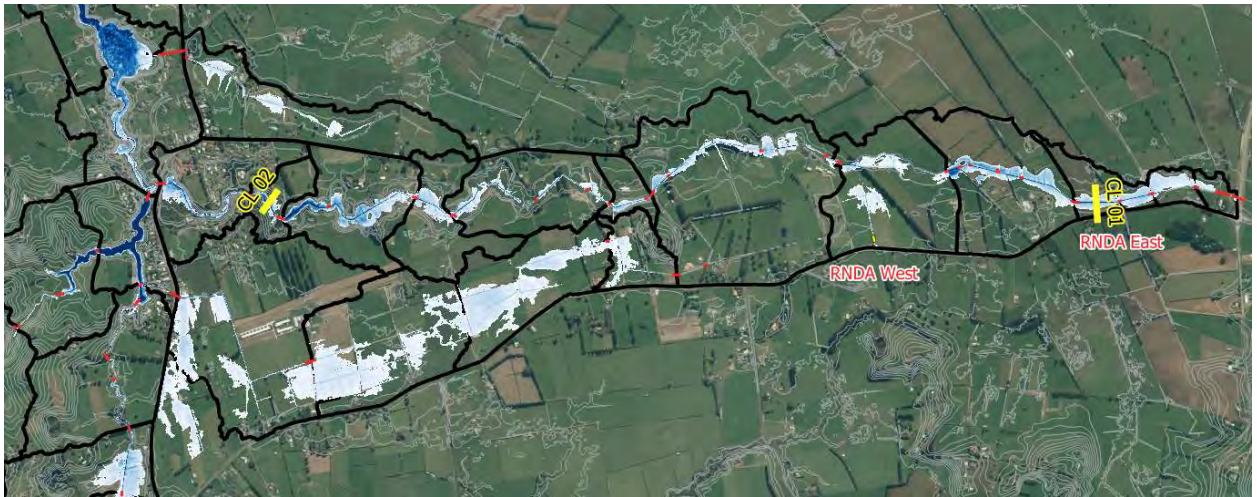


Figure 3-4 : Flood depth for the 1% AEP event in Te Kowhai and Control Lines. (CL)

The results show an attenuation on the peak flow due to the elimination of the RND West inflows and the reduction of the peak flow in combination with elongation of the receding limb of the hydrograph at RND East due to the attenuation devices at RND East. Refer to Figure 3-5 and 3-6 for the comparison on the hydrographs at the control lines.

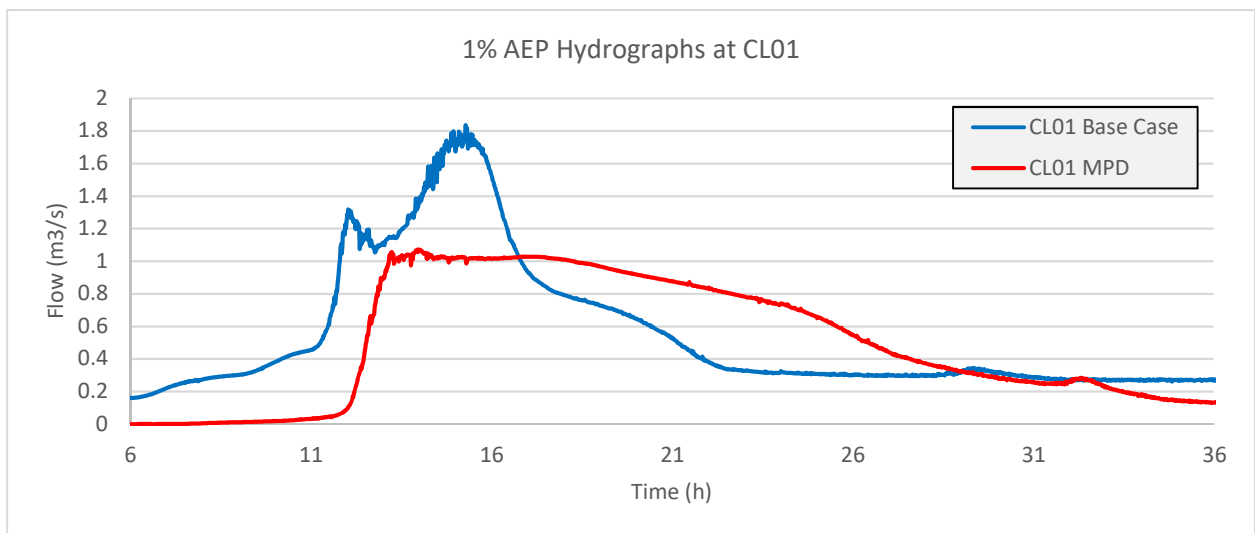


Figure 3-5 : Flow in the Te Otamanui Stream at the control Line CL01

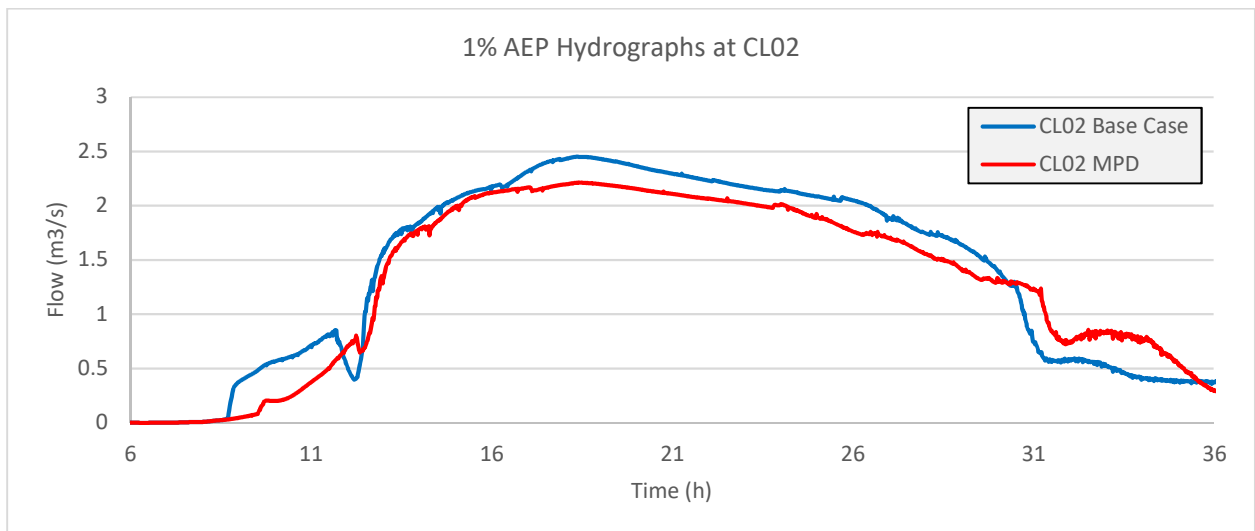


Figure 3-6 : Flow in the Te Otamanui Stream at the control Line CL02

4 Results

The impact assessment predicted a reduction in the flood extent and levels along the Te Otamanui Stream because of the reduction on the Peak Flow from the RNDA East catchment and the redirection of the runoff from the RNDA West to the Ohote catchment.

Mapping of the Te Otamanui catchment was split in 6 sheets (Refer to Figure 4-11 and Appendix A, B & C) to allow for clearer viewing of the assessment. The breakdown of the maps is provided below:

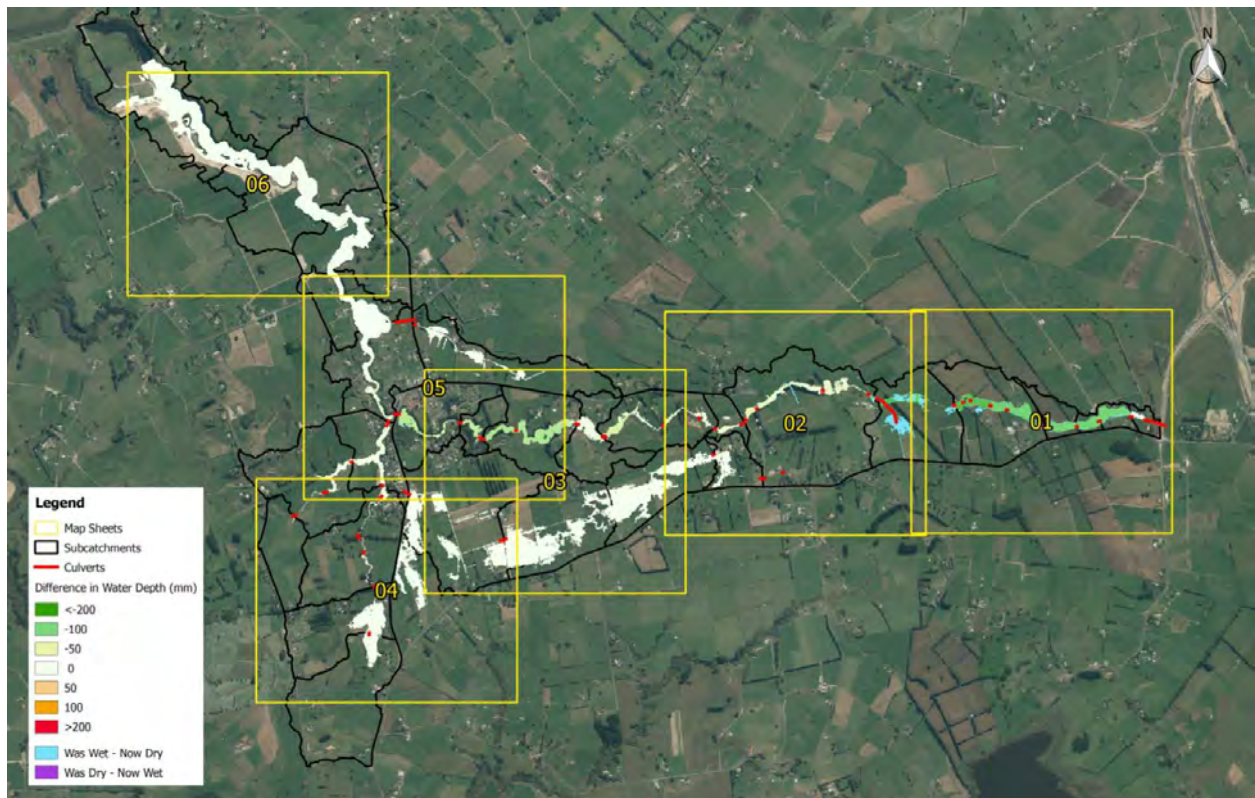


Figure 4-1 : Map sheets in the Te Otamanui Catchment

15 Control points were placed along the stream to allow the measure of the flood levels.

As expected, the RNDA hydrographs only induce changes on the branch upstream of the Horotiu Road in Te Kowhai, with the maximum effect happening upstream of culvert 24 (sheets 01 & 02). The impacts to flood levels reduce downstream from Horotiu Road, this can be mainly attributed to the large floodplain storage within the wetland and the Waipa River levels adopted in the hydraulic model.

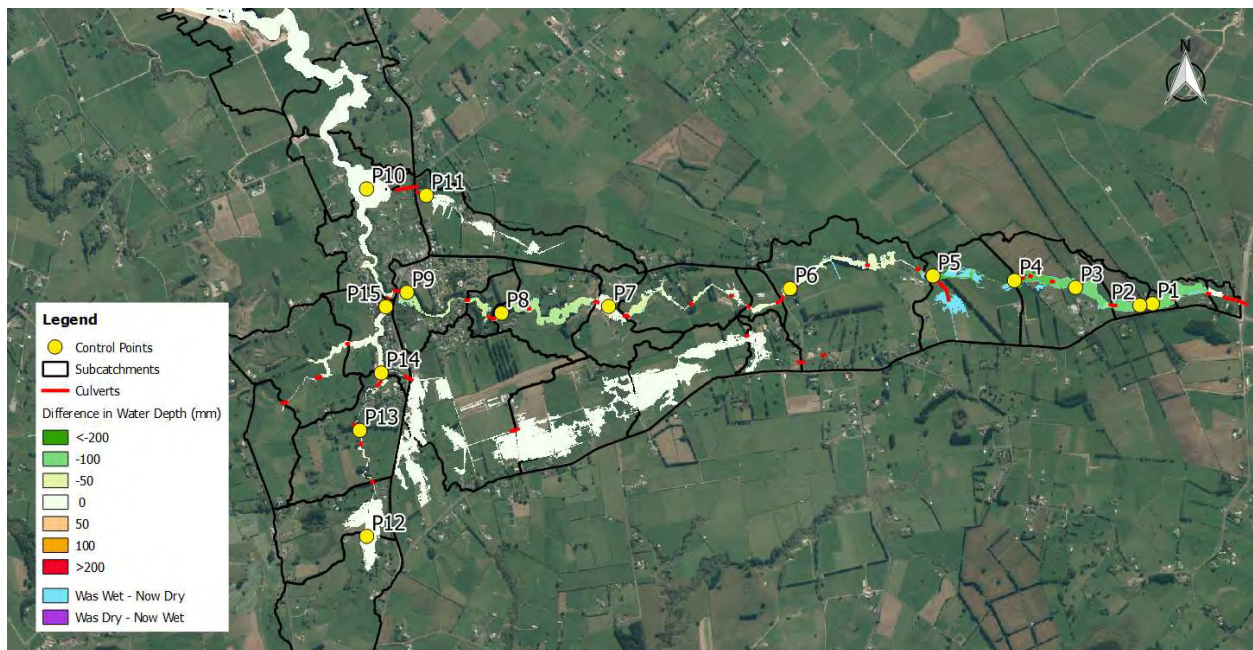


Figure 4-2 : Flood depth impacts for the 1% AEP event in Te Kowhai and Control Points.

Table 4-1 :Increment/Decrease on the Water Flood Levels along the stream at the control points

Control Point ID	Difference in Water Level between Base Case and MPD Scenario (m)		
	50% AEP Event	10% AEP Event	1% AEP Event
P1	-0.42	-0.63	-0.11
P2	-1.22	-0.92	-0.11
P3	-1.08	-0.61	-0.11
P4	-0.65	-0.63	-0.14
P5	-0.34	-0.34	-0.16
P6	-0.14	-0.04	-0.05
P7	-0.05	0.00	-0.01
P8	-0.35	-0.09	-0.07
P9	-0.12	-0.03	-0.07
P10	0.00	0.00	0.00
P11	0.00	0.00	0.00
P12	0.00	0.00	0.00
P13	0.00	0.00	0.00
P14	0.00	-0.01	-0.01
P15	-0.01	-0.01	-0.01

Significant reductions in the peak flows from the RNDA East catchment (particularly for the 50% and 10% AEP events) result in the large flood extents/levels changes of the Te Otamanui Stream.

The maps with the comparison in the flood depth between the existing case and the MPD scenario have been developed for the 1%, 10% and 50% AEP events. Appendix A, B & C present the maps showing the impacts in the flood levels.

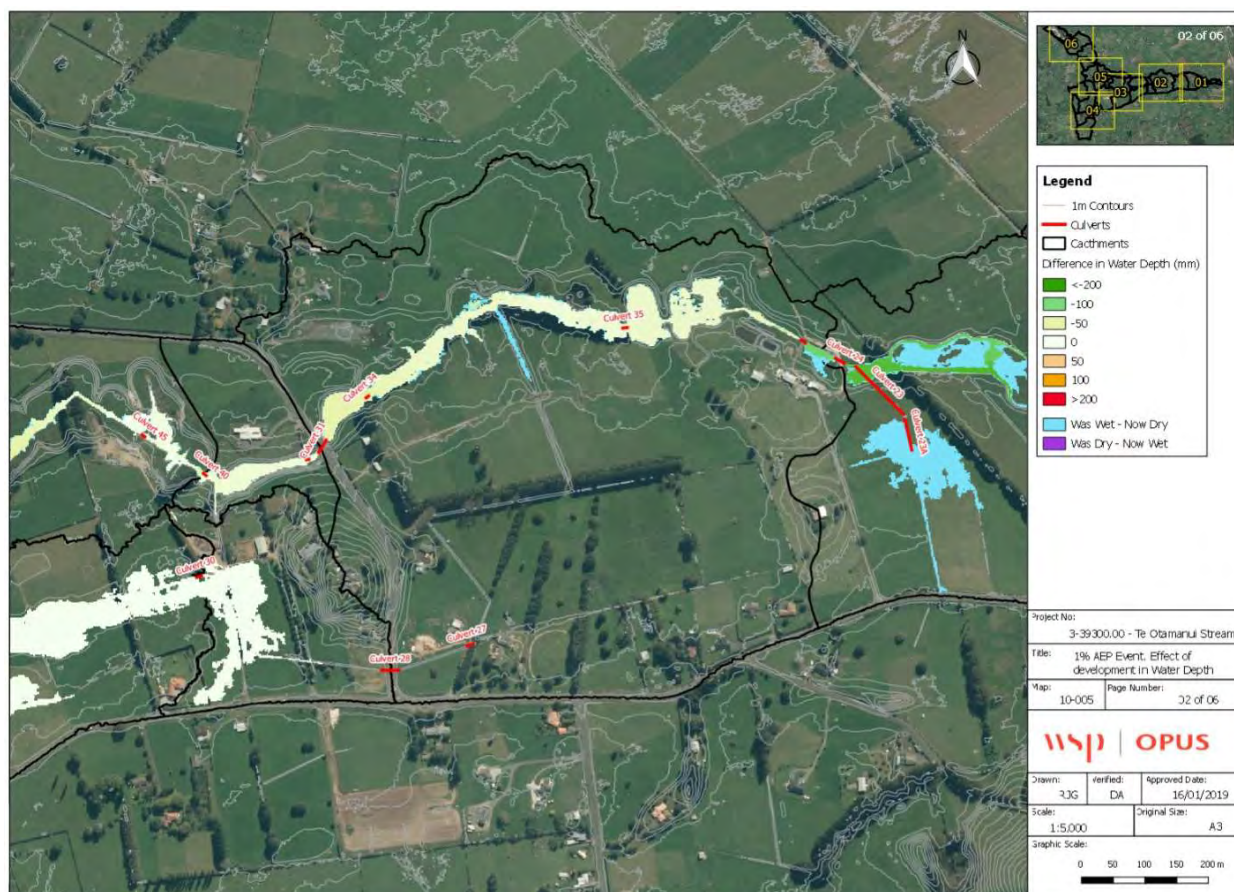


Figure 4-3 : 1% AEP event. Effect of the RNDA inputs in flood depth. Sheet 02

5 Conclusions and Recommendations

The Te Otamanui stream is characterized by a low slope (0.25% average along the stream), which results in long times of concentrations in the subcatchments and elongated hydrographs. Therefore, substantial changes in the inputs are likely to impact the baseline flood results.

The assessment of the flood impacts was developed considering the discharges from the wetland/detention basin from the RNDA Catchment for the MPD, based on conceptual/feasibility design of said devices. They are conceptual/feasibility designs only, with the hydraulic controls having been primarily developed to mitigate the 1% AEP flows to the 80% Existing Development (ED) peak value. It is likely that with further design of the hydraulic controls the discharge relationship will change for the 10% and 50% events.

The input from RDNA west was excluded in the MPD Scenario since the plan change area proposes to redirect the runoff from this area to the Ohote catchment to the south.

The reduction in the peak flows from the RNDA catchment predict a significant to the flood extents within the Te Otamanui Stream. The maximum impact was predicted upstream of culvert 24 (just downstream of the RNDA West input). The modification in the hydrographs have more influence for the 50% and 10% events, since the reduction in the peak flow from RNDA East are substantial for these events.

6 References

WSP-Opus (2018) Te Otamanui Stream – Assessment of Existing Flood Constraints in the Te Otamanui Stream. Prepared by WSP- Opus for Hamilton City Council. Reference No. 3-39300.00.

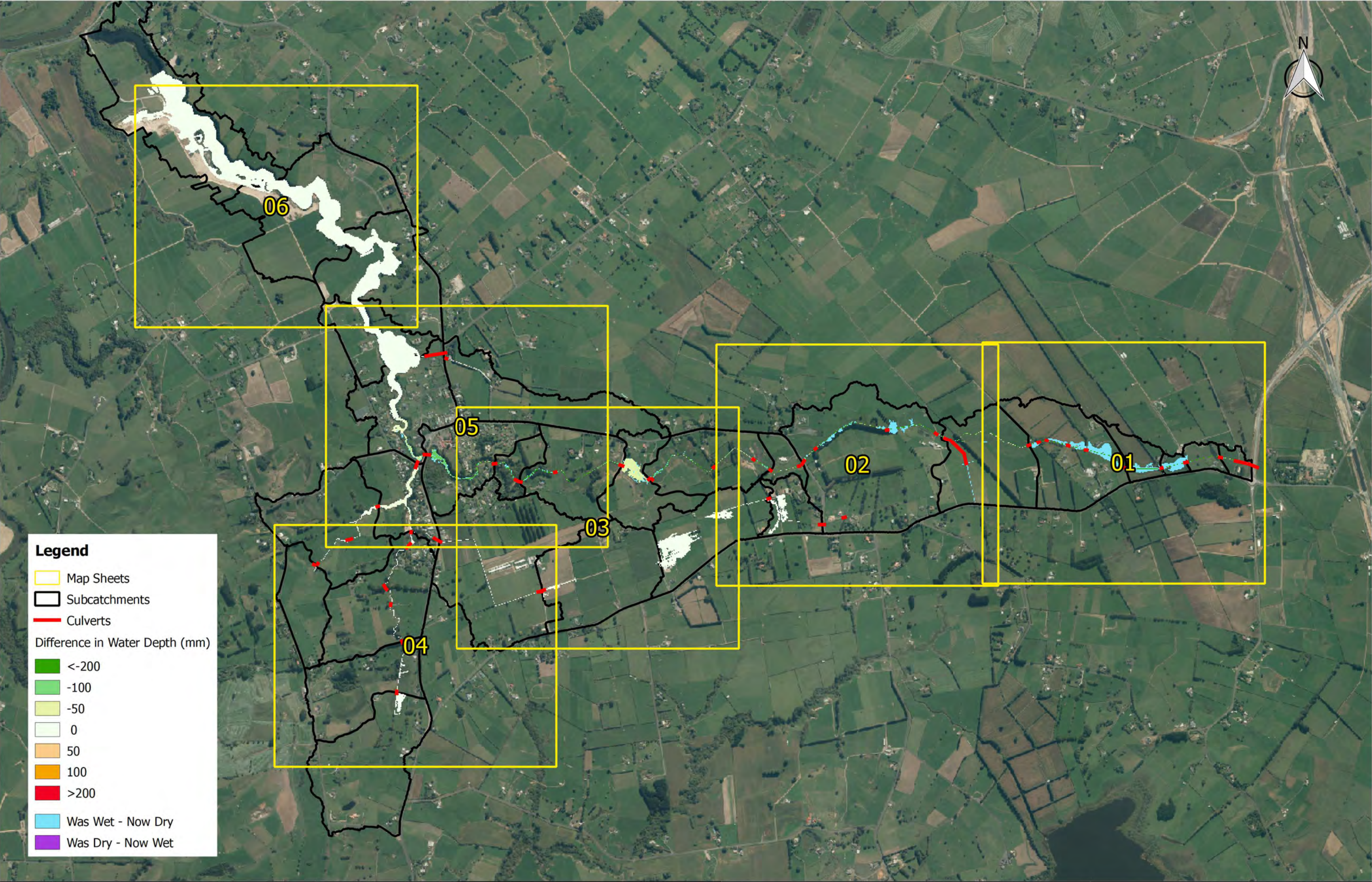
Shaver E., 2018. Waikato stormwater management guideline (TR2018/01). Hamilton

Shaver E., 2018. Waikato stormwater runoff modelling guideline (TR2018/02). Hamilton

Appendix A

Flood Assessment Results

50% AEP - Effect of the RNDA inputs in the Te Otamanui Stream

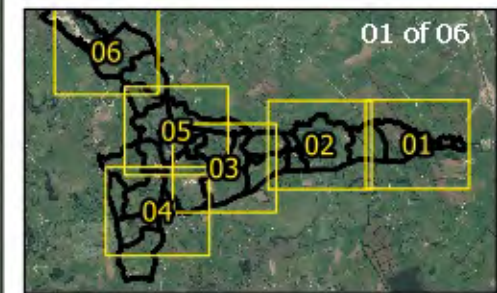


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Drawn: RJG	Verified: DA	Approved Date: 16/01/2019

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Graphic Scale: 0 250 500 750 1000 m	



Legend

- 1m Contours
- Culverts
- Catchments
- Difference in Water Depth (mm)
 - <-200
 - 100
 - 50
 - 0
 - 50
 - 100
 - >200
- Was Wet - Now Dry
- Was Dry - Now Wet

Project No:
3-39300.00 - Te Otamanui Stream

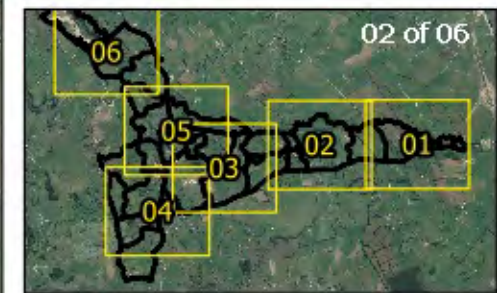
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50% AEP Event, Effect of development in Water Depth

Map:
10-001

Page Number:
01 of 06

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Drawn: RJG	Verified: DA	Approved Date: 16/01/2019
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Graphic Scale: 0 50 100 150 200 m		



Legend

- 1m Contours
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Difference in Water Depth (mm)

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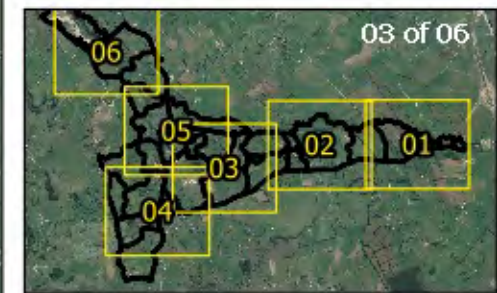
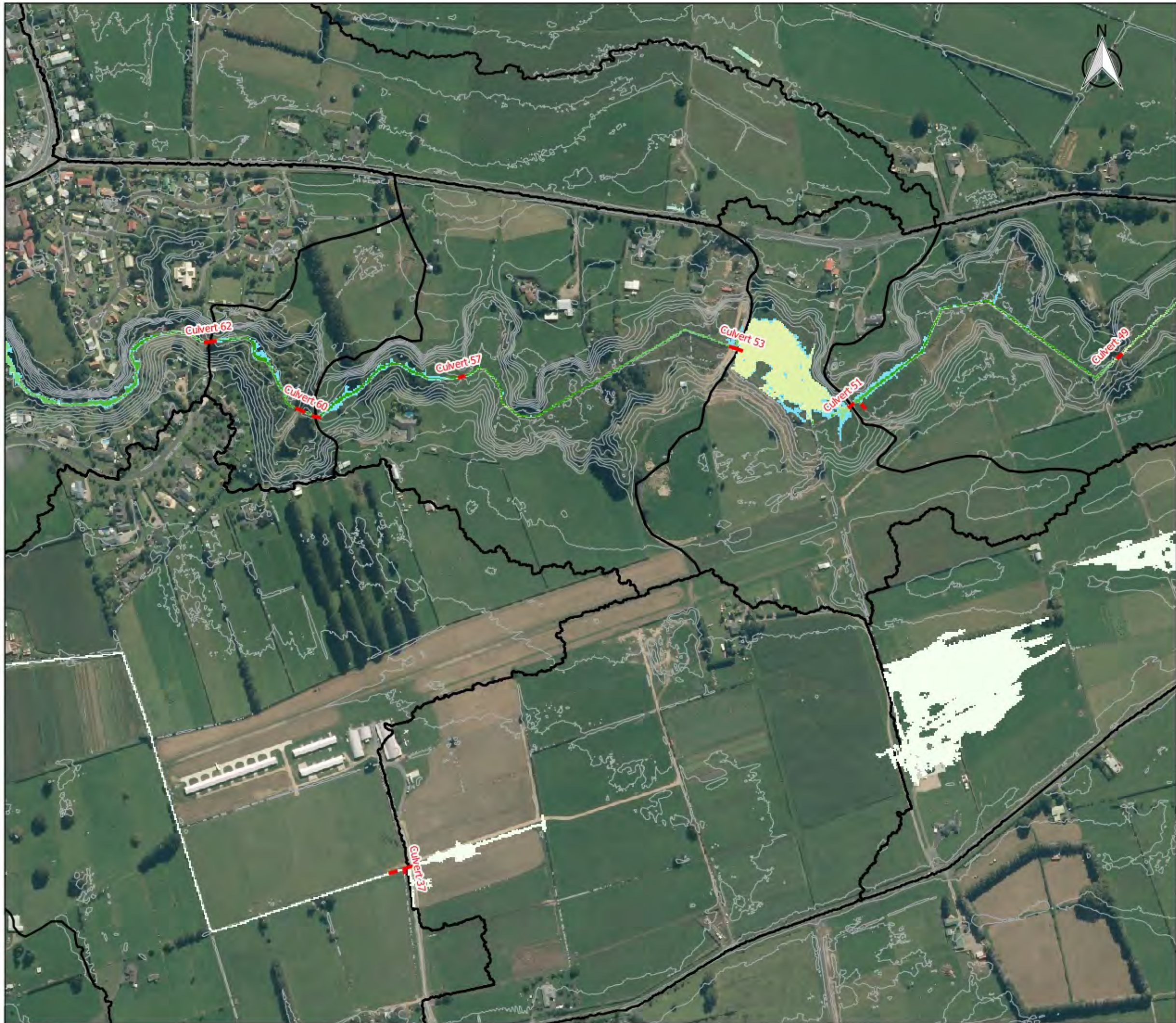
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Title: 50% AEP Event. Effect of development in Water Depth

Map: 10-001 Page Number: 02 of 06

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Legend

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Project No:
3-39300.00 - Te Otamanui Stream

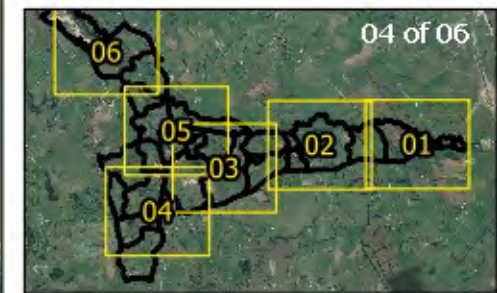
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50% AEP Event. Effect of
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Map:
10-001

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03 of 06

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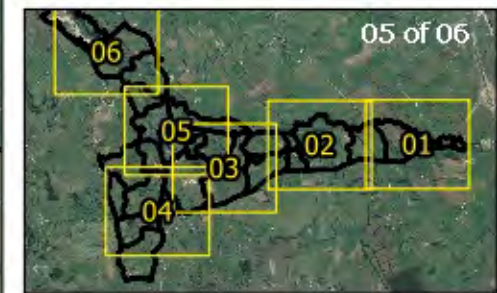
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Legend

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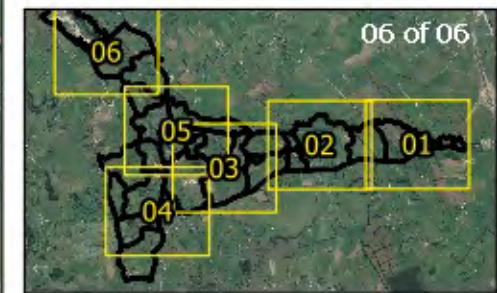
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Title: 50% AEP Event. Effect of development in Water Depth

Map: 10-001 Page Number: 05 of 06

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50% AEP Event. Effect of development in Water Depth

Map:
10-001

Page Number:
06 of 06

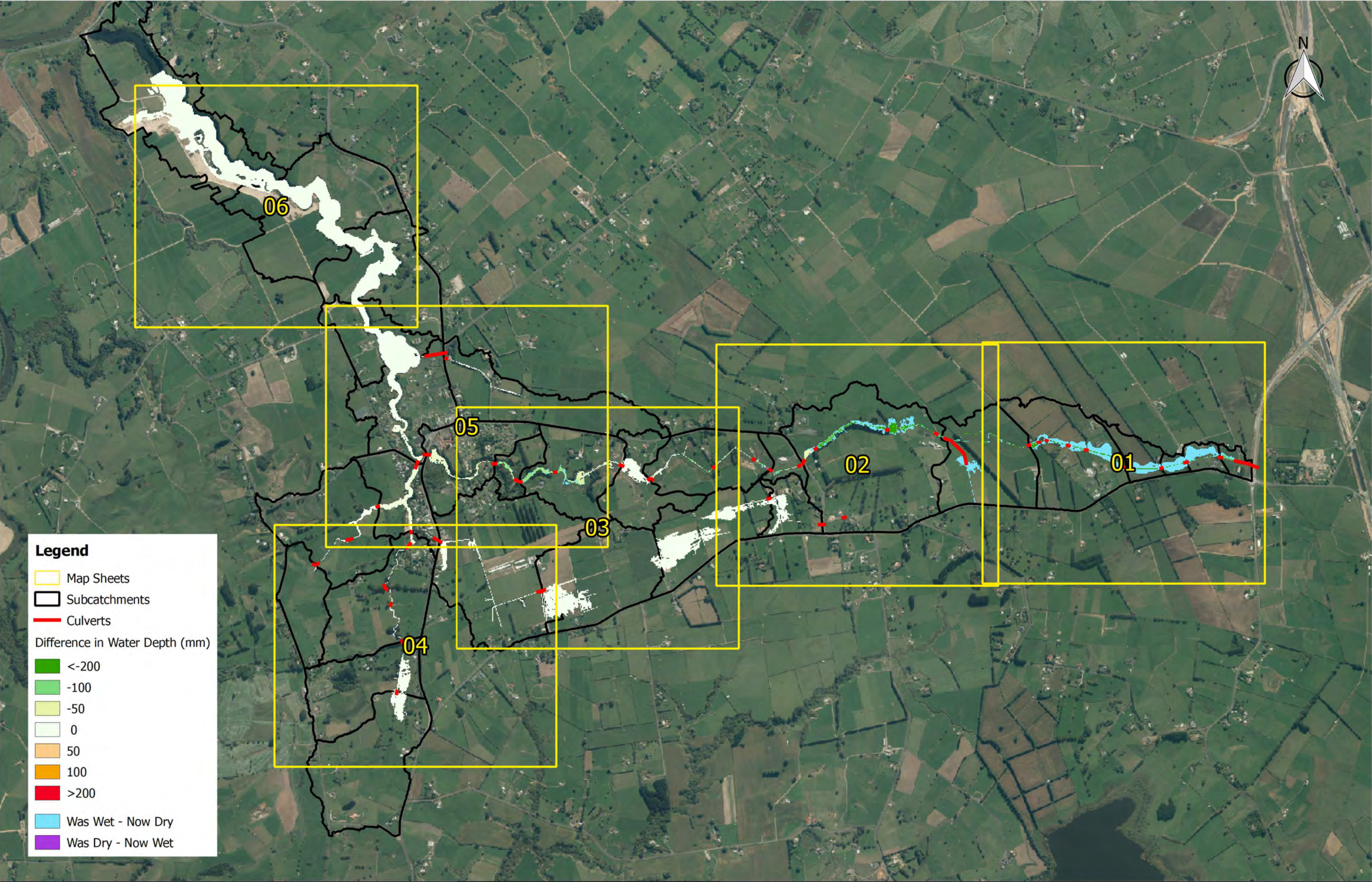
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Appendix B

Flood Assessment Results

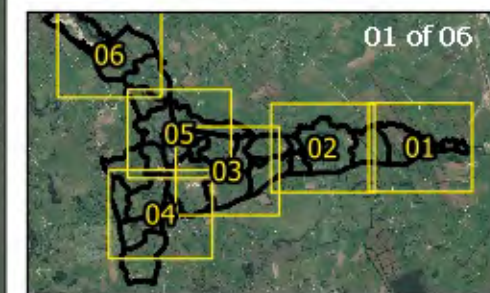
10% AEP - Effect of the RNDA inputs in the Te Otamanui Stream



Revision	Amendment	Approved	Approved Date



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Drawn: RJG	Verified: DA	Approved Date: 16/01/2019		



Legend

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Project No:
3-39300.00 - Te Otamanui Stream

Title:
10% AEP Event, Effect of
development in Water Depth

Map:
10-003

Page Number:
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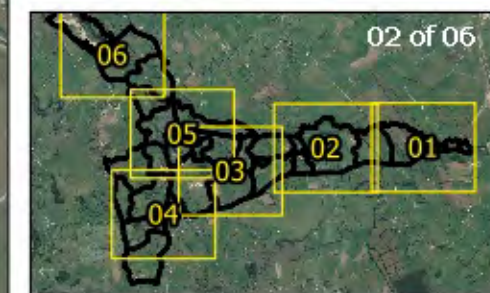
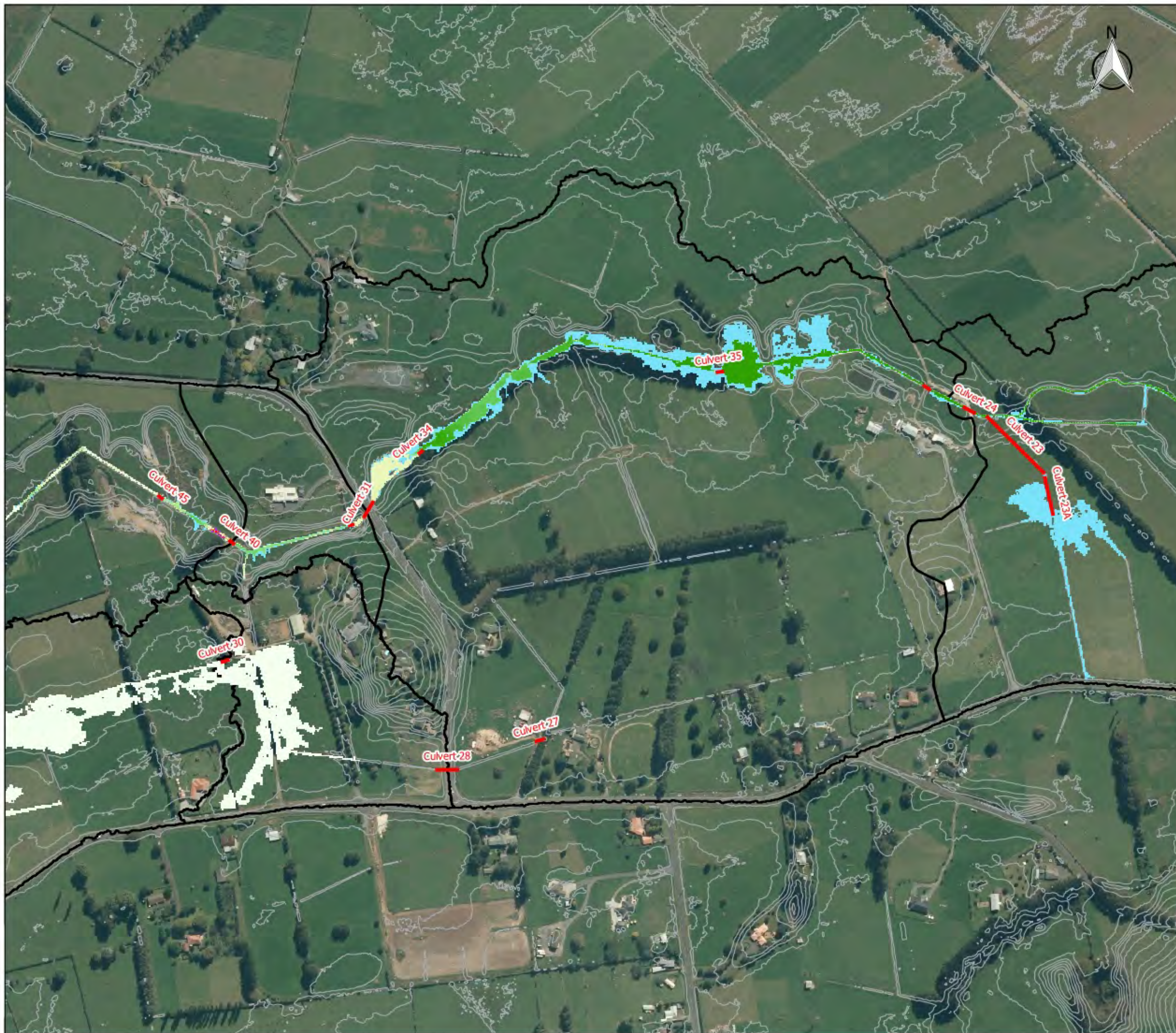
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Legend

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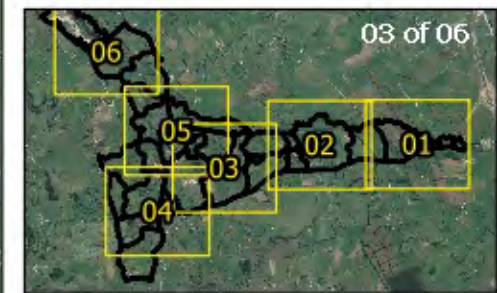
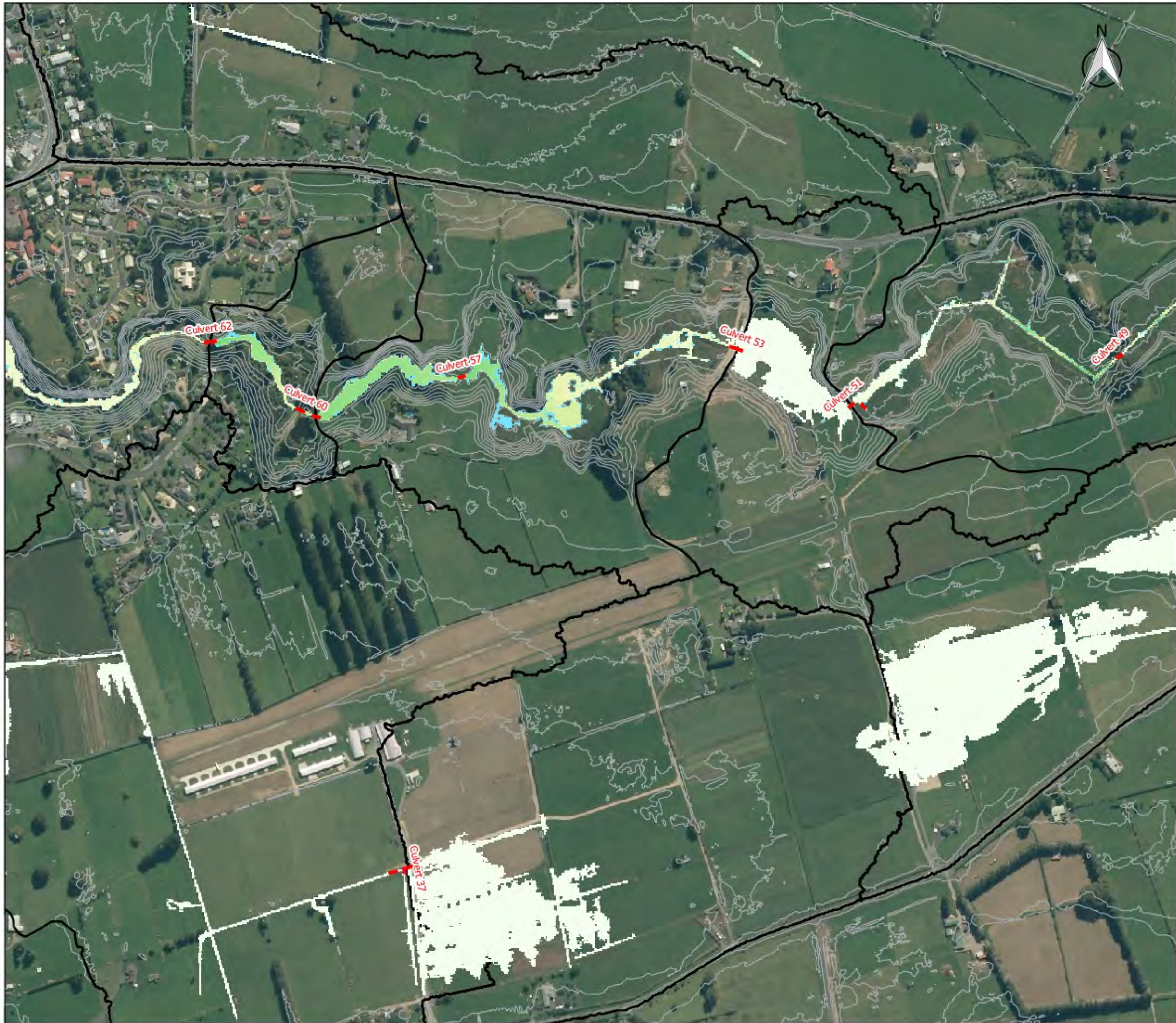
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Legend

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Project No:
3-39300.00 - Te Otamanui Stream

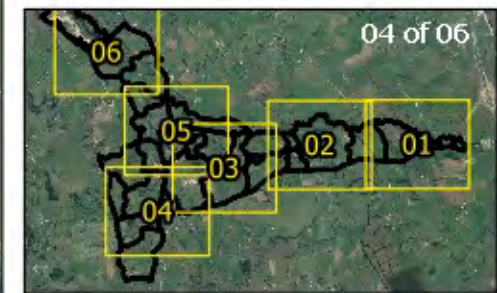
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10% AEP Event. Effect of
development in Water Depth

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Legend

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3-39300.00 - Te Otamanui Stream

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10% AEP Event, Effect of
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Map:
10-003

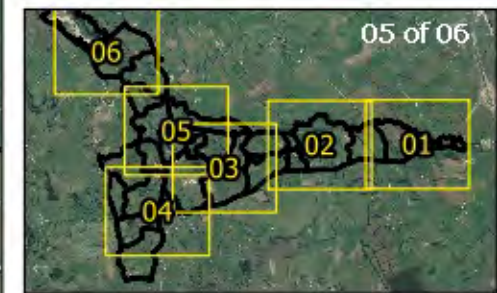
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10-003

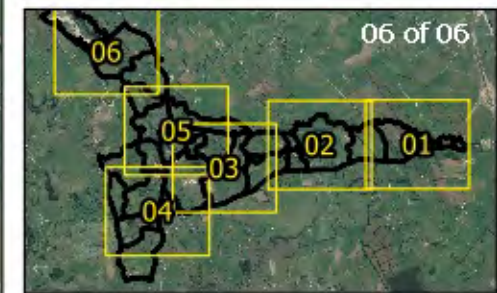
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10-003

Page Number:
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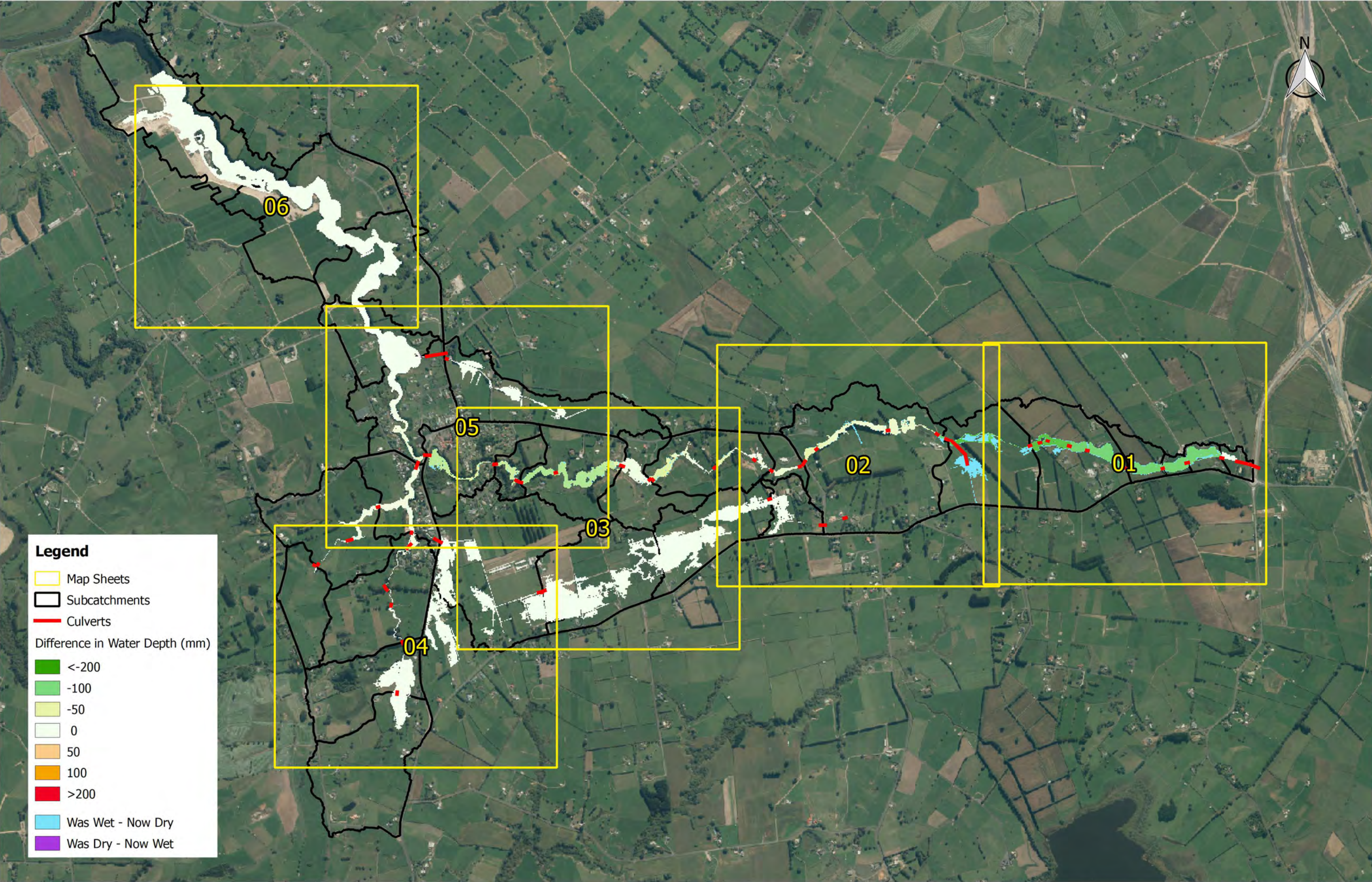
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Appendix C

Flood Assessment Results

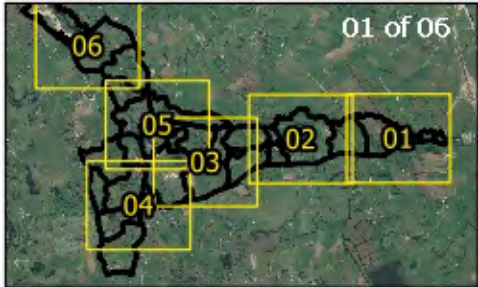
1% AEP - Effect of the RNDA inputs in the Te Otamanui Stream



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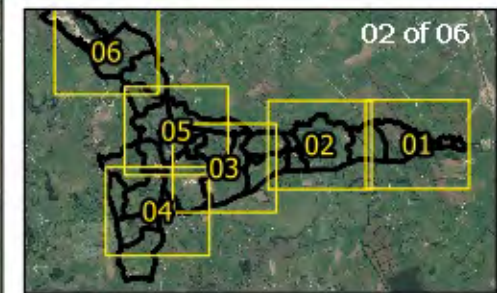
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Drawn: RJG	Verified: DA	Approved Date: 16/01/2019		



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- Was Dry - Now Wet

Project No: 3-39300.00 - Te Otamanui Stream		
Title: 1% AEP Event. Effect of development in Water Depth		
Map: 10-005	Page Number: 01 of 06	
		
Drawn: RJG	verified: DA	Approved Date: 16/01/2019
Scale: 1:5,000		Original Size: A3
Graphic Scale: 0 50 100 150 200 m 		



Legend

- 1m Contours
- Culverts
- Catchments

Difference in Water Depth (mm)

<-200
-100
-50
0
50
100
>200

Was Wet - Now Dry

Was Dry - Now Wet

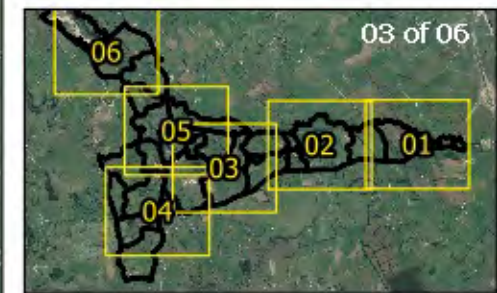
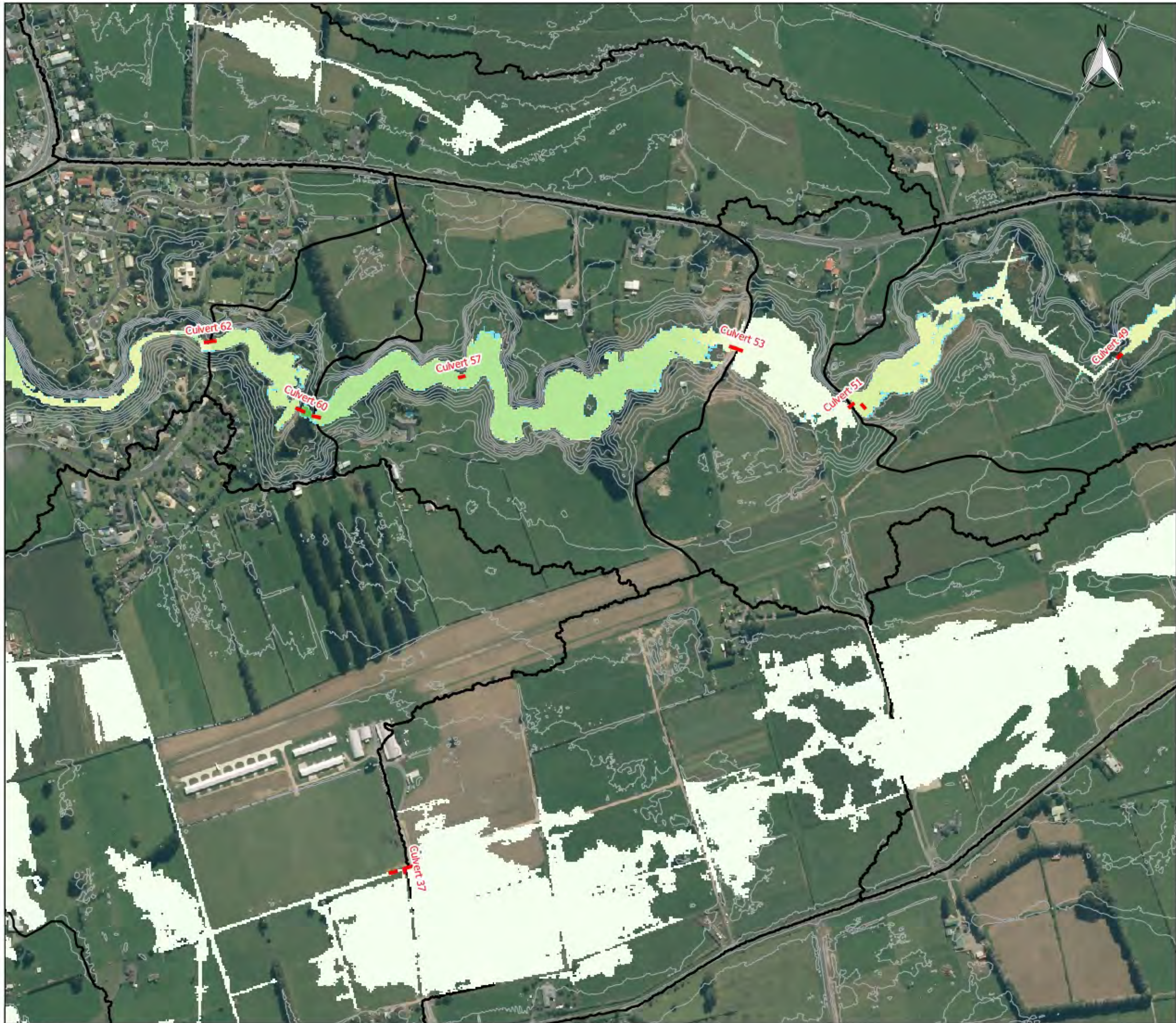
Project No: 3-39300.00 - Te Otamanui Stream

Title: 1% AEP Event. Effect of development in Water Depth

Map: 10-005 Page Number: 02 of 06

WSP | OPUS

Drawn: RJG	Verified: DA	Approved Date: 16/01/2019
Scale: 1:5,000	Original Size: A3	
Graphic Scale: 0 50 100 150 200 m		



Legend

- 1m Contours
- Culverts
- Catchments

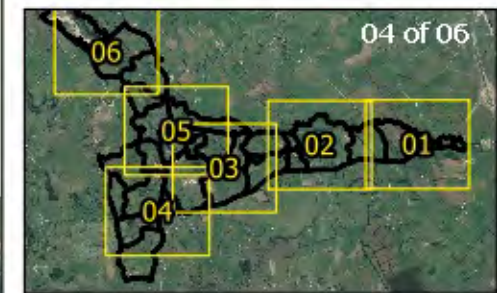
Difference in Water Depth (mm)

- <-200
- 100
- 50
- 0
- 50
- 100
- >200

Was Wet - Now Dry

Was Dry - Now Wet

Project No: 3-39300.00 - Te Otamanui Stream		
Title: 1% AEP Event. Effect of development in Water Depth		
Map: 10-005	Page Number: 03 of 06	
		
Drawn: RJG	verified: DA	Approved Date: 16/01/2019
Scale: 1:5,000	Original Size: A3	
Graphic Scale: 0 50 100 150 200 m 		



Legend

- 1m Contours
- Culverts
- Catchments

Difference in Water Depth (mm)

- <-200
- 100
- 50
- 0
- 50
- 100
- >200

Was Wet - Now Dry

Was Dry - Now Wet

Project No:
3-39300.00 - Te Otamanui Stream

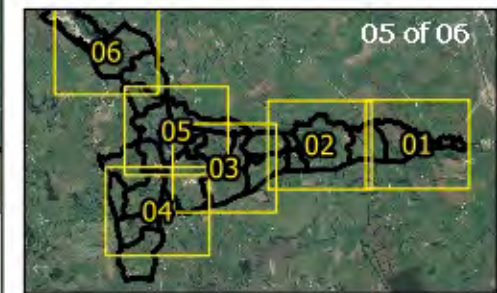
Title:
1% AEP Event. Effect of
development in Water Depth

Map:
10-005

Page Number:
04 of 06

WSP | **OPUS**

Drawn: RJG	Verified: DA	Approved Date: 16/01/2019
Scale: 1:5,000	Original Size: A3	
Graphic Scale: 0 50 100 150 200 m		



Legend

- 1m Contours
- Culverts
- Catchments

Difference in Water Depth (mm)

- <-200
- 100
- 50
- 0
- 50
- 100
- >200

Was Wet - Now Dry

Was Dry - Now Wet

Project No:
3-39300.00 - Te Otamanui Stream

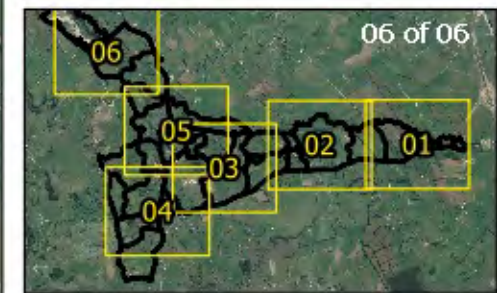
Title:
1% AEP Event. Effect of
development in Water Depth

Map:
10-005

Page Number:
05 of 06

WSP | OPUS

Drawn: RJG	Verified: DA	Approved Date: 16/01/2019
Scale: 1:5,000	Original Size: A3	
Graphic Scale: 0 50 100 150 200 m		



Legend

- 1m Contours
- Culverts
- Catchments

Difference in Water Depth (mm)

- <-200
- 100
- 50
- 0
- 50
- 100
- >200

Was Wet - Now Dry

Was Dry - Now Wet

Project No:
3-39300.00 - Te Otamanui Stream

Title:
1% AEP Event. Effect of
development in Water Depth

Map:
10-005

Page Number:
06 of 06

WSP | **OPUS**

Drawn: RJG	Verified: DA	Approved Date: 16/01/2019
Scale: 1:5,000		Original Size: A3
Graphic Scale: 0 50 100 150 200 m		

Appendix D

Hydrographs from RNDA Catchments

Hydrographs provided by McKenzie Engineering
Consultants

1% AEP Basecase Results

Te Ota (West)	Total	Weir	Culvert
Max	0.13	0.00	0.13
Min	0.00	0.00	0.00
Average	0.07	0.00	0.07
	Total	Weir	Culvert
1/01/2018 0:00	0	0	0
1/01/2018 0:10	0	0	0
1/01/2018 0:20	0	0	0
1/01/2018 0:30	0	0	0.0002
1/01/2018 0:40	0.002	0	0.0022
1/01/2018 0:50	0.004	0	0.0041
1/01/2018 1:00	0.006	0	0.0058
1/01/2018 1:10	0.007	0	0.0072
1/01/2018 1:20	0.008	0	0.0083
1/01/2018 1:30	0.009	0	0.0092
1/01/2018 1:40	0.01	0	0.0099
1/01/2018 1:50	0.01	0	0.0104
1/01/2018 2:00	0.011	0	0.0108
1/01/2018 2:10	0.011	0	0.0111
1/01/2018 2:20	0.011	0	0.0113
1/01/2018 2:30	0.012	0	0.0116
1/01/2018 2:40	0.012	0	0.0122
1/01/2018 2:50	0.013	0	0.0131
1/01/2018 3:00	0.014	0	0.0137
1/01/2018 3:10	0.014	0	0.0142
1/01/2018 3:20	0.015	0	0.0145
1/01/2018 3:30	0.015	0	0.0147
1/01/2018 3:40	0.015	0	0.0149
1/01/2018 3:50	0.015	0	0.0151
1/01/2018 4:00	0.015	0	0.0153
1/01/2018 4:10	0.015	0	0.0154
1/01/2018 4:20	0.016	0	0.0155
1/01/2018 4:30	0.016	0	0.0155
1/01/2018 4:40	0.016	0	0.0155
1/01/2018 4:50	0.016	0	0.0155
1/01/2018 5:00	0.016	0	0.0156
1/01/2018 5:10	0.016	0	0.0156
1/01/2018 5:20	0.016	0	0.0157
1/01/2018 5:30	0.016	0	0.0157
1/01/2018 5:40	0.016	0	0.0158
1/01/2018 5:50	0.016	0	0.0159
1/01/2018 6:00	0.016	0	0.0161
1/01/2018 6:10	0.018	0	0.0177
1/01/2018 6:20	0.02	0	0.0201
1/01/2018 6:30	0.022	0	0.0222
1/01/2018 6:40	0.024	0	0.0238
1/01/2018 6:50	0.025	0	0.0252
1/01/2018 7:00	0.026	0	0.026
1/01/2018 7:10	0.027	0	0.0265
1/01/2018 7:20	0.027	0	0.0267
1/01/2018 7:30	0.027	0	0.0269
1/01/2018 7:40	0.027	0	0.0271
1/01/2018 7:50	0.027	0	0.0272
1/01/2018 8:00	0.027	0	0.0273
1/01/2018 8:10	0.027	0	0.0274
1/01/2018 8:20	0.028	0	0.0275
1/01/2018 8:30	0.028	0	0.0276
1/01/2018 8:40	0.028	0	0.0277
1/01/2018 8:50	0.028	0	0.0278
1/01/2018 9:00	0.028	0	0.0281
1/01/2018 9:10	0.03	0	0.0295
1/01/2018 9:20	0.031	0	0.0314
1/01/2018 9:30	0.033	0	0.0329
1/01/2018 9:40	0.034	0	0.0341
1/01/2018 9:50	0.035	0	0.0347
1/01/2018 10:00	0.035	0	0.0351
1/01/2018 10:10	0.036	0	0.0356
1/01/2018 10:20	0.036	0	0.0359
1/01/2018 10:30	0.036	0	0.0358
1/01/2018 10:40	0.036	0	0.0358
1/01/2018 10:50	0.036	0	0.0361
1/01/2018 11:00	0.038	0	0.0375
1/01/2018 11:10	0.048	0	0.0478
1/01/2018 11:20	0.061	0	0.0611
1/01/2018 11:30	0.075	0	0.0754
1/01/2018 11:40	0.104	0	0.1035
1/01/2018 11:50	0.114	0	0.1142
1/01/2018 12:00	0.124	0	0.1239

Te Ota (West)	Total	Weir	Culvert
1/01/2018 12:10	0.129	0	0.1288
1/01/2018 12:20	0.13	0	0.1304
1/01/2018 12:30	0.132	0	0.1316
1/01/2018 12:40	0.132	0	0.1322
1/01/2018 12:50	0.133	0	0.1326
1/01/2018 13:00	0.133	0	0.1328
1/01/2018 13:10	0.133	0	0.1328
1/01/2018 13:20	0.133	0	0.1328
1/01/2018 13:30	0.133	0	0.1328
1/01/2018 13:40	0.133	0	0.1327
1/01/2018 13:50	0.133	0	0.1326
1/01/2018 14:00	0.133	0	0.1325
1/01/2018 14:10	0.133	0	0.1325
1/01/2018 14:20	0.132	0	0.1324
1/01/2018 14:30	0.132	0	0.1323
1/01/2018 14:40	0.132	0	0.1322
1/01/2018 14:50	0.132	0	0.1321
1/01/2018 15:00	0.132	0	0.132
1/01/2018 15:10	0.132	0	0.1319
1/01/2018 15:20	0.132	0	0.1317
1/01/2018 15:30	0.132	0	0.1316
1/01/2018 15:40	0.131	0	0.1314
1/01/2018 15:50	0.131	0	0.1313
1/01/2018 16:00	0.131	0	0.1311
1/01/2018 16:10	0.131	0	0.131
1/01/2018 16:20	0.131	0	0.1308
1/01/2018 16:30	0.131	0	0.1306
1/01/2018 16:40	0.13	0	0.1304
1/01/2018 16:50	0.13	0	0.1304
1/01/2018 17:00	0.131	0	0.1305
1/01/2018 17:10	0.13	0	0.1303
1/01/2018 17:20	0.13	0	0.1301
1/01/2018 17:30	0.13	0	0.1299
1/01/2018 17:40	0.13	0	0.1297
1/01/2018 17:50	0.13	0	0.1295
1/01/2018 18:00	0.129	0	0.1293
1/01/2018 18:10	0.129	0	0.129
1/01/2018 18:20	0.129	0	0.1288
1/01/2018 18:30	0.129	0	0.1286
1/01/2018 18:40	0.128	0	0.1283
1/01/2018 18:50	0.128	0	0.1281
1/01/2018 19:00	0.128	0	0.1278
1/01/2018 19:10	0.128	0	0.1275
1/01/2018 19:20	0.127	0	0.1273
1/01/2018 19:30	0.127	0	0.127
1/01/2018 19:40	0.127	0	0.1268
1/01/2018 19:50	0.127	0	0.1265
1/01/2018 20:00	0.126	0	0.1262
1/01/2018 20:10	0.126	0	0.126
1/01/2018 20:20	0.126	0	0.1257
1/01/2018 20:30	0.125	0	0.1254
1/01/2018 20:40	0.125	0	0.1251
1/01/2018 20:50	0.125	0	0.1249
1/01/2018 21:00	0.125	0	0.1246
1/01/2018 21:10	0.124	0	0.1243
1/01/2018 21:20	0.124	0	0.124
1/01/2018 21:30	0.124	0	0.1237
1/01/2018 21:40	0.123	0	0.1234
1/01/2018 21:50	0.123	0	0.1232
1/01/2018 22:00	0.123	0	0.1229
1/01/2018 22:10	0.123	0	0.1226
1/01/2018 22:20	0.123	0	0.1227
1/01/2018 22:30	0.123	0	0.1225
1/01/2018 22:40	0.122	0	0.1222
1/01/2018 22:50	0.122	0	0.1219
1/01/2018 23:00	0.122	0	0.1216
1/01/2018 23:10	0.121	0	0.1212
1/01/2018 23:20	0.121	0	0.1209

Te Ota (East)	Total	Weir	Culvert
Max	1.98	0.00	1.98
Min	0.00	0.00	0.00
Average	0.55	0.00	0.55
	Total	Weir	Culvert
1/01/2018 0:00	0	0	0
1/01/2018 0:10	0	0	0
1/01/2018 0:20	0	0	0.0001
1/01/2018 0:30	0	0	0
1/01/2018 0:40	0	0	0.0001
1/01/2018 0:50	0	0	0
1/01/2018 1:00	0.003	0	0.0025
1/01/2018 1:10	0.011	0	0.0112
1/01/2018 1:20	0.029	0	0.0288
1/01/2018 1:30	0.042	0	0.0415
1/01/2018 1:40	0.051	0	0.0512
1/01/2018 1:50	0.062	0	0.0615
1/01/2018 2:00	0.074	0	0.0743
1/01/2018 2:10	0.089	0	0.0891
1/01/2018 2:20	0.104	0	0.1035
1/01/2018 2:30	0.116	0	0.1157
1/01/2018 2:40	0.126	0	0.126
1/01/2018 2:50	0.134	0	0.1341
1/01/2018 3:00	0.14	0	0.1397
1/01/2018 3:10	0.143	0	0.1434
1/01/2018 3:20	0.147	0	0.1468
1/01/2018 3:30	0.149	0	0.1487
1/01/2018 3:40	0.151	0	0.1505
1/01/2018 3:50	0.152	0	0.152
1/01/2018 4:00	0.153	0	0.1527
1/01/2018 4:10	0.154	0	0.1537
1/01/2018 4:20	0.155	0	0.1546
1/01/2018 4:30	0.155	0	0.1551
1/01/2018 4:40	0.155	0	0.1554
1/01/2018 4:50	0.156	0	0.156
1/01/2018 5:00	0.156	0	0.1562
1/01/2018 5:10	0.156	0	0.1563
1/01/2018 5:20	0.157	0	0.1566
1/01/2018 5:30	0.157	0	0.1572
1/01/2018 5:40	0.157	0	0.1571
1/01/2018 5:50	0.158	0	0.1575
1/01/2018 6:00	0.159	0	0.1593
1/01/2018 6:10	0.164	0	0.1636
1/01/2018 6:20	0.173	0	0.1731
1/01/2018 6:30	0.186	0	0.1856
1/01/2018 6:40	0.202	0	0.2015
1/01/2018 6:50	0.219	0	0.2187
1/01/2018 7:00	0.234	0	0.2339
1/01/2018 7:10	0.246	0	0.2455
1/01/2018 7:20	0.255	0	0.255
1/01/2018 7:30	0.264	0	0.2638
1/01/2018 7:40	0.27	0	0.2696
1/01/2018 7:50	0.274	0	0.2736
1/01/2018 8:00	0.277	0	0.2774
1/01/2018 8:10	0.282	0	0.2817
1/01/2018 8:20	0.285	0	0.2849
1/01/2018 8:30	0.287	0	0.2867
1/01/2018 8:40	0.289	0	0.289
1/01/2018 8:50	0.292	0	0.2923
1/01/2018 9:00	0.295	0	0.2954
1/01/2018 9:10	0.302	0	0.3018
1/01/2018 9:20	0.315	0	0.3146
1/01/2018 9:30	0.333	0	0.3327
1/01/2018 9:40	0.353	0	0.3532
1/01/2018 9:50	0.374	0	0.3736
1/01/2018 10:00	0.391	0	0.3908
1/01/2018 10:10	0.41	0	0.4096
1/01/2018 10:20	0.424	0	0.424
1/01/2018 10:30	0.435	0	0.4353
1/01/2018 10:40	0.444	0	0.444
1/01/2018 10:50	0.451	0	0.4507
1/01/2018 11:00	0.458	0	0.4583
1/01/2018 11:10	0.501	0	0.5006
1/01/2018 11:20	0.587	0	0.5869
1/01/2018 11:30	0.712	0	0.712
1/01/2018 11:40	0.963	0	0.9632
1/01/2018 11:50	1.413	0	1.4131
1/01/2018 12:00	1.837	0	1.8368

Tea (East)	Total	Weir	Culvert
1/01/2018 12:10	1.924	0	1.9243
1/01/2018 12:20	1.954	0	1.9539
1/01/2018 12:30	1.964	0	1.9642
1/01/2018 12:40	1.97	0	1.9697
1/01/2018 12:50	1.974	0	1.974
1/01/2018 13:00	1.976	0	1.976
1/01/2018 13:10	1.973	0	1.9725
1/01/2018 13:20	1.966	0	1.9658
1/01/2018 13:30	1.96	0	1.9596
1/01/2018 13:40	1.95	0	1.9499
1/01/2018 13:50	1.941	0	1.9407
1/01/2018 14:00	1.929	0	1.9292
1/01/2018 14:10	1.919	0	1.9186
1/01/2018 14:20	1.906	0	1.9061
1/01/2018 14:30	1.89	0	1.8902
1/01/2018 14:40	1.874	0	1.8738
1/01/2018 14:50	1.853	0	1.8531
1/01/2018 15:00	1.827	0	1.8273
1/01/2018 15:10	1.785	0	1.7854
1/01/2018 15:20	1.734	0	1.7337
1/01/2018 15:30	1.662	0	1.6616
1/01/2018 15:40	1.556	0	1.5556
1/01/2018 15:50	1.381	0	1.3809
1/01/2018 16:00	1.126	0	1.1258
1/01/2018 16:10	0.879	0	0.8792
1/01/2018 16:20	0.702	0	0.7024
1/01/2018 16:30	0.58	0	0.58
1/01/2018 16:40	0.507	0	0.5072
1/01/2018 16:50	0.466	0	0.4655
1/01/2018 17:00	0.438	0	0.4376
1/01/2018 17:10	0.429	0	0.4285
1/01/2018 17:20	0.415	0	0.4152
1/01/2018 17:30	0.406	0	0.4059
1/01/2018 17:40	0.391	0	0.3912
1/01/2018 17:50	0.379	0	0.3788
1/01/2018 18:00	0.369	0	0.3693
1/01/2018 18:10	0.353	0	0.353
1/01/2018 18:20	0.34	0	0.3401
1/01/2018 18:30	0.331	0	0.3309
1/01/2018 18:40	0.322	0	0.3215
1/01/2018 18:50	0.313	0	0.3133
1/01/2018 19:00	0.303	0	0.3033
1/01/2018 19:10	0.3	0	0.2998
1/01/2018 19:20	0.294	0	0.2943
1/01/2018 19:30	0.29	0	0.2899
1/01/2018 19:40	0.286	0	0.2859
1/01/2018 19:50	0.283	0	0.2829
1/01/2018 20:00	0.28	0	0.2797
1/01/2018 20:10	0.277	0	0.2773
1/01/2018 20:20	0.276	0	0.2755
1/01/2018 20:30	0.274	0	0.2742
1/01/2018 20:40	0.271	0	0.2706
1/01/2018 20:50	0.27	0	0.2704
1/01/2018 21:00	0.268	0	0.268
1/01/2018 21:10	0.269	0	0.2687
1/01/2018 21:20	0.267	0	0.2674
1/01/2018 21:30	0.266	0	0.2662
1/01/2018 21:40	0.265	0	0.2654
1/01/2018 21:50	0.265	0	0.2647
1/01/2018 22:00	0.264	0	0.2643
1/01/2018 22:10	0.263	0	0.2632
1/01/2018 22:20	0.262	0	0.2624
1/01/2018 22:30	0.26	0	0.2596
1/01/2018 22:40	0.261	0	0.2613
1/01/2018 22:50	0.26	0	0.2604
1/01/2018 23:00	0.26	0	0.26
1/01/2018 23:10	0.26	0	0.2595
1/01/2018 23:20	0.258	0	0.2585

10% AEP Basecase Results

Te Ota (West)	Total	Weir	Culvert
Max	0.12	0.00	0.12
Min	0.00	0.00	0.00
Average	0.06	0.00	0.06
	Total	Weir	Culvert
1/01/2018 0:00	0	0	0
1/01/2018 0:10	0	0	0
1/01/2018 0:20	0	0	0
1/01/2018 0:30	0	0	0
1/01/2018 0:40	0	0	0
1/01/2018 0:50	0	0	0.0001
1/01/2018 1:00	0.001	0	0.0014
1/01/2018 1:10	0.002	0	0.0024
1/01/2018 1:20	0.003	0	0.003
1/01/2018 1:30	0.003	0	0.0034
1/01/2018 1:40	0.004	0	0.0038
1/01/2018 1:50	0.004	0	0.0041
1/01/2018 2:00	0.005	0	0.005
1/01/2018 2:10	0.006	0	0.0059
1/01/2018 2:20	0.007	0	0.0066
1/01/2018 2:30	0.007	0	0.0072
1/01/2018 2:40	0.008	0	0.0076
1/01/2018 2:50	0.008	0	0.008
1/01/2018 3:00	0.008	0	0.0082
1/01/2018 3:10	0.008	0	0.0082
1/01/2018 3:20	0.008	0	0.0083
1/01/2018 3:30	0.008	0	0.0084
1/01/2018 3:40	0.009	0	0.0085
1/01/2018 3:50	0.009	0	0.0085
1/01/2018 4:00	0.009	0	0.0086
1/01/2018 4:10	0.009	0	0.0085
1/01/2018 4:20	0.009	0	0.0085
1/01/2018 4:30	0.009	0	0.0086
1/01/2018 4:40	0.009	0	0.0086
1/01/2018 4:50	0.009	0	0.0086
1/01/2018 5:00	0.009	0	0.0086
1/01/2018 5:10	0.009	0	0.0086
1/01/2018 5:20	0.009	0	0.0086
1/01/2018 5:30	0.009	0	0.0086
1/01/2018 5:40	0.009	0	0.0086
1/01/2018 5:50	0.009	0	0.0086
1/01/2018 6:00	0.009	0	0.0087
1/01/2018 6:10	0.01	0	0.0096
1/01/2018 6:20	0.011	0	0.0113
1/01/2018 6:30	0.013	0	0.0127
1/01/2018 6:40	0.014	0	0.0142
1/01/2018 6:50	0.015	0	0.0151
1/01/2018 7:00	0.016	0	0.0158
1/01/2018 7:10	0.016	0	0.0161
1/01/2018 7:20	0.017	0	0.0166
1/01/2018 7:30	0.017	0	0.0169
1/01/2018 7:40	0.018	0	0.0175
1/01/2018 7:50	0.018	0	0.0178
1/01/2018 8:00	0.018	0	0.0182
1/01/2018 8:10	0.018	0	0.0184
1/01/2018 8:20	0.019	0	0.0186
1/01/2018 8:30	0.019	0	0.0186
1/01/2018 8:40	0.019	0	0.0187
1/01/2018 8:50	0.019	0	0.0187
1/01/2018 9:00	0.019	0	0.0189
1/01/2018 9:10	0.02	0	0.0204
1/01/2018 9:20	0.022	0	0.0223
1/01/2018 9:30	0.024	0	0.024
1/01/2018 9:40	0.025	0	0.025
1/01/2018 9:50	0.026	0	0.0259
1/01/2018 10:00	0.026	0	0.0263
1/01/2018 10:10	0.027	0	0.0267
1/01/2018 10:20	0.027	0	0.0269
1/01/2018 10:30	0.027	0	0.027
1/01/2018 10:40	0.027	0	0.0271
1/01/2018 10:50	0.027	0	0.0274
1/01/2018 11:00	0.028	0	0.0281
1/01/2018 11:10	0.036	0	0.0355
1/01/2018 11:20	0.044	0	0.0438
1/01/2018 11:30	0.055	0	0.0546
1/01/2018 11:40	0.075	0	0.0753
1/01/2018 11:50	0.106	0	0.1057
1/01/2018 12:00	0.113	0	0.1134

Te Ota (West)	Total	Weir	Culvert
1/01/2018 12:10	0.119	0	0.1187
1/01/2018 12:20	0.121	0	0.1211
1/01/2018 12:30	0.123	0	0.1225
1/01/2018 12:40	0.124	0	0.1235
1/01/2018 12:50	0.124	0	0.1238
1/01/2018 13:00	0.124	0	0.1239
1/01/2018 13:10	0.124	0	0.1239
1/01/2018 13:20	0.124	0	0.1239
1/01/2018 13:30	0.124	0	0.1238
1/01/2018 13:40	0.124	0	0.1237
1/01/2018 13:50	0.124	0	0.1236
1/01/2018 14:00	0.123	0	0.1234
1/01/2018 14:10	0.123	0	0.1233
1/01/2018 14:20	0.123	0	0.1231
1/01/2018 14:30	0.123	0	0.123
1/01/2018 14:40	0.123	0	0.1228
1/01/2018 14:50	0.123	0	0.1227
1/01/2018 15:00	0.123	0	0.123
1/01/2018 15:10	0.123	0	0.1228
1/01/2018 15:20	0.123	0	0.1226
1/01/2018 15:30	0.122	0	0.1223
1/01/2018 15:40	0.122	0	0.1221
1/01/2018 15:50	0.122	0	0.1218
1/01/2018 16:00	0.122	0	0.1215
1/01/2018 16:10	0.121	0	0.1213
1/01/2018 16:20	0.121	0	0.121
1/01/2018 16:30	0.121	0	0.1207
1/01/2018 16:40	0.121	0	0.1205
1/01/2018 16:50	0.12	0	0.1202
1/01/2018 17:00	0.12	0	0.1199
1/01/2018 17:10	0.12	0	0.1196
1/01/2018 17:20	0.119	0	0.1193
1/01/2018 17:30	0.119	0	0.119
1/01/2018 17:40	0.119	0	0.1186
1/01/2018 17:50	0.118	0	0.1183
1/01/2018 18:00	0.118	0	0.1178
1/01/2018 18:10	0.117	0	0.1174
1/01/2018 18:20	0.117	0	0.1169
1/01/2018 18:30	0.117	0	0.1169
1/01/2018 18:40	0.116	0	0.1163
1/01/2018 18:50	0.116	0	0.1156
1/01/2018 19:00	0.115	0	0.1148
1/01/2018 19:10	0.114	0	0.114
1/01/2018 19:20	0.113	0	0.113
1/01/2018 19:30	0.112	0	0.1118
1/01/2018 19:40	0.111	0	0.1106
1/01/2018 19:50	0.109	0	0.1091
1/01/2018 20:00	0.106	0	0.1056
1/01/2018 20:10	0.096	0	0.0956
1/01/2018 20:20	0.07	0	0.0697
1/01/2018 20:30	0.056	0	0.0563
1/01/2018 20:40	0.051	0	0.0507
1/01/2018 20:50	0.048	0	0.0476
1/01/2018 21:00	0.045	0	0.0453
1/01/2018 21:10	0.044	0	0.044
1/01/2018 21:20	0.043	0	0.0428
1/01/2018 21:30	0.042	0	0.0417
1/01/2018 21:40	0.041	0	0.0408
1/01/2018 21:50	0.04	0	0.04
1/01/2018 22:00	0.039	0	0.0393
1/01/2018 22:10	0.039	0	0.0387
1/01/2018 22:20	0.038	0	0.0381
1/01/2018 22:30	0.038	0	0.0375
1/01/2018 22:40	0.037	0	0.037
1/01/2018 22:50	0.037	0	0.0365
1/01/2018 23:00	0.036	0	0.0361
1/01/2018 23:10	0.036	0	0.0357
1/01/2018 23:20	0.035	0	0.0353

Te Ota (East)	Total	Weir	Culvert
Max	1.86	0.00	1.86
Min	0.00	0.00	0.00
Average	0.38	0.00	0.38
	Total	Weir	Culvert
1/01/2018 0:00	0	0	0
1/01/2018 0:10	0	0	0.0001
1/01/2018 0:20	0	0	0.0003
1/01/2018 0:30	0	0	0
1/01/2018 0:40	0	0	0.0002
1/01/2018 0:50	0	0	0.0002
1/01/2018 1:00	0	0	0
1/01/2018 1:10	0	0	0
1/01/2018 1:20	0	0	0.0001
1/01/2018 1:30	0	0	0
1/01/2018 1:40	0.003	0	0.0031
1/01/2018 1:50	0.009	0	0.0092
1/01/2018 2:00	0.017	0	0.0166
1/01/2018 2:10	0.025	0	0.0245
1/01/2018 2:20	0.03	0	0.0298
1/01/2018 2:30	0.034	0	0.0336
1/01/2018 2:40	0.037	0	0.0373
1/01/2018 2:50	0.04	0	0.0397
1/01/2018 3:00	0.042	0	0.0423
1/01/2018 3:10	0.046	0	0.0461
1/01/2018 3:20	0.05	0	0.0503
1/01/2018 3:30	0.055	0	0.0552
1/01/2018 3:40	0.062	0	0.0615
1/01/2018 3:50	0.067	0	0.0671
1/01/2018 4:00	0.071	0	0.0712
1/01/2018 4:10	0.075	0	0.0752
1/01/2018 4:20	0.079	0	0.0791
1/01/2018 4:30	0.082	0	0.0822
1/01/2018 4:40	0.086	0	0.0859
1/01/2018 4:50	0.089	0	0.0886
1/01/2018 5:00	0.09	0	0.0899
1/01/2018 5:10	0.092	0	0.0923
1/01/2018 5:20	0.094	0	0.0935
1/01/2018 5:30	0.096	0	0.0955
1/01/2018 5:40	0.096	0	0.0963
1/01/2018 5:50	0.098	0	0.0975
1/01/2018 6:00	0.099	0	0.0991
1/01/2018 6:10	0.102	0	0.1015
1/01/2018 6:20	0.108	0	0.1077
1/01/2018 6:30	0.116	0	0.1157
1/01/2018 6:40	0.124	0	0.1243
1/01/2018 6:50	0.133	0	0.1326
1/01/2018 7:00	0.145	0	0.1445
1/01/2018 7:10	0.152	0	0.1524
1/01/2018 7:20	0.161	0	0.1606
1/01/2018 7:30	0.165	0	0.1649
1/01/2018 7:40	0.171	0	0.1706
1/01/2018 7:50	0.175	0	0.1747
1/01/2018 8:00	0.181	0	0.181
1/01/2018 8:10	0.181	0	0.1809
1/01/2018 8:20	0.189	0	0.1886
1/01/2018 8:30	0.186	0	0.1859
1/01/2018 8:40	0.191	0	0.1913
1/01/2018 8:50	0.193	0	0.1929
1/01/2018 9:00	0.195	0	0.1948
1/01/2018 9:10	0.196	0	0.1963
1/01/2018 9:20	0.207	0	0.2069
1/01/2018 9:30	0.217	0	0.2165
1/01/2018 9:40	0.229	0	0.2291
1/01/2018 9:50	0.233	0	0.233
1/01/2018 10:00	0.251	0	0.2511
1/01/2018 10:10	0.26	0	0.2596
1/01/2018 10:20	0.259	0	0.2591
1/01/2018 10:30	0.272	0	0.2716
1/01/2018 10:40	0.277	0	0.2769
1/01/2018 10:50	0.281	0	0.2814
1/01/2018 11:00	0.283	0	0.2826
1/01/2018 11:10	0.307	0	0.3068
1/01/2018 11:20	0.353	0	0.3531
1/01/2018 11:30	0.416	0	0.4162
1/01/2018 11:40	0.573	0	0.5729
1/01/2018 11:50	0.881	0	0.8811
1/01/2018 12:00	1.555	0	1.5553

Te Ota (East)	Total	Weir	Culvert
1/01/2018 12:10	1.794	0	1.7937
1/01/2018 12:20	1.84	0	1.8396
1/01/2018 12:30	1.855	0	1.8546
1/01/2018 12:40	1.859	0	1.8592
1/01/2018 12:50	1.859	0	1.8588
1/01/2018 13:00	1.857	0	1.857
1/01/2018 13:10	1.845	0	1.845
1/01/2018 13:20	1.826	0	1.8264
1/01/2018 13:30	1.788	0	1.7878
1/01/2018 13:40	1.733	0	1.7332
1/01/2018 13:50	1.678	0	1.6781
1/01/2018 14:00	1.611	0	1.6112
1/01/2018 14:10	1.512	0	1.5119
1/01/2018 14:20	1.265	0	1.2648
1/01/2018 14:30	0.968	0	0.968
1/01/2018 14:40	0.773	0	0.7727
1/01/2018 14:50	0.664	0	0.6637
1/01/2018 15:00	0.598	0	0.5976
1/01/2018 15:10	0.546	0	0.5458
1/01/2018 15:20	0.504	0	0.5037
1/01/2018 15:30	0.469	0	0.4685
1/01/2018 15:40	0.439	0	0.4392
1/01/2018 15:50	0.42	0	0.4195

50% AEP Basecase Results

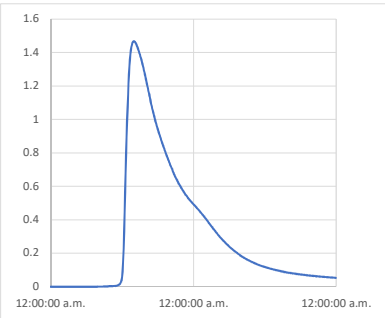
Te Ota (West)	Total	Weir	Culvert
Max	0.11	0.00	0.11
Min	0.00	0.00	0.00
Average	0.03	0.00	0.03
	Total	Weir	Culvert
1/01/2018 0:00	0	0	0
1/01/2018 0:10	0	0	0
1/01/2018 0:20	0	0	0
1/01/2018 0:30	0	0	0
1/01/2018 0:40	0	0	0
1/01/2018 0:50	0	0	0
1/01/2018 1:00	0	0	0
1/01/2018 1:10	0	0	0.0003
1/01/2018 1:20	0.001	0	0.0009
1/01/2018 1:30	0.002	0	0.0015
1/01/2018 1:40	0.002	0	0.0018
1/01/2018 1:50	0.002	0	0.002
1/01/2018 2:00	0.002	0	0.0022
1/01/2018 2:10	0.002	0	0.0023
1/01/2018 2:20	0.003	0	0.0025
1/01/2018 2:30	0.003	0	0.0026
1/01/2018 2:40	0.003	0	0.0028
1/01/2018 2:50	0.003	0	0.0032
1/01/2018 3:00	0.004	0	0.0038
1/01/2018 3:10	0.004	0	0.0042
1/01/2018 3:20	0.005	0	0.0046
1/01/2018 3:30	0.005	0	0.0048
1/01/2018 3:40	0.005	0	0.0049
1/01/2018 3:50	0.005	0	0.0052
1/01/2018 4:00	0.005	0	0.0053
1/01/2018 4:10	0.005	0	0.0053
1/01/2018 4:20	0.006	0	0.0055
1/01/2018 4:30	0.006	0	0.0055
1/01/2018 4:40	0.005	0	0.0054
1/01/2018 4:50	0.006	0	0.0055
1/01/2018 5:00	0.006	0	0.0055
1/01/2018 5:10	0.006	0	0.0055
1/01/2018 5:20	0.006	0	0.0056
1/01/2018 5:30	0.006	0	0.0056
1/01/2018 5:40	0.006	0	0.0055
1/01/2018 5:50	0.006	0	0.0056
1/01/2018 6:00	0.006	0	0.0057
1/01/2018 6:10	0.006	0	0.0062
1/01/2018 6:20	0.007	0	0.0071
1/01/2018 6:30	0.008	0	0.0083
1/01/2018 6:40	0.009	0	0.0092
1/01/2018 6:50	0.01	0	0.0097
1/01/2018 7:00	0.01	0	0.0102
1/01/2018 7:10	0.01	0	0.0103
1/01/2018 7:20	0.011	0	0.0106
1/01/2018 7:30	0.011	0	0.0106
1/01/2018 7:40	0.011	0	0.0107
1/01/2018 7:50	0.011	0	0.0108
1/01/2018 8:00	0.011	0	0.0108
1/01/2018 8:10	0.011	0	0.011
1/01/2018 8:20	0.011	0	0.011
1/01/2018 8:30	0.011	0	0.0111
1/01/2018 8:40	0.011	0	0.0112
1/01/2018 8:50	0.011	0	0.0113
1/01/2018 9:00	0.012	0	0.0116
1/01/2018 9:10	0.013	0	0.013
1/01/2018 9:20	0.016	0	0.0156
1/01/2018 9:30	0.017	0	0.0173
1/01/2018 9:40	0.019	0	0.0186
1/01/2018 9:50	0.02	0	0.0197
1/01/2018 10:00	0.021	0	0.0205
1/01/2018 10:10	0.021	0	0.0212
1/01/2018 10:20	0.022	0	0.0218
1/01/2018 10:30	0.022	0	0.022
1/01/2018 10:40	0.022	0	0.0224
1/01/2018 10:50	0.022	0	0.0223
1/01/2018 11:00	0.023	0	0.0228
1/01/2018 11:10	0.026	0	0.026
1/01/2018 11:20	0.031	0	0.0305
1/01/2018 11:30	0.035	0	0.0347
1/01/2018 11:40	0.044	0	0.0439
1/01/2018 11:50	0.071	0	0.0708
1/01/2018 12:00	0.108	0	0.1082

Te Ota (West)	Total	Weir	Culvert
1/01/2018 12:10	0.114	0	0.1136
1/01/2018 12:20	0.114	0	0.1141
1/01/2018 12:30	0.114	0	0.1138
1/01/2018 12:40	0.113	0	0.1127
1/01/2018 12:50	0.112	0	0.1115
1/01/2018 13:00	0.111	0	0.1108
1/01/2018 13:10	0.109	0	0.1089
1/01/2018 13:20	0.107	0	0.1067
1/01/2018 13:30	0.1	0	0.1001
1/01/2018 13:40	0.082	0	0.0817
1/01/2018 13:50	0.071	0	0.0708
1/01/2018 14:00	0.067	0	0.0665
1/01/2018 14:10	0.066	0	0.0657
1/01/2018 14:20	0.066	0	0.066
1/01/2018 14:30	0.066	0	0.0664
1/01/2018 14:40	0.067	0	0.067
1/01/2018 14:50	0.067	0	0.0671
1/01/2018 15:00	0.067	0	0.0669
1/01/2018 15:10	0.064	0	0.0644
1/01/2018 15:20	0.062	0	0.0615
1/01/2018 15:30	0.059	0	0.059
1/01/2018 15:40	0.057	0	0.0569
1/01/2018 15:50	0.055	0	0.0551
1/01/2018 16:00	0.054	0	0.0536
1/01/2018 16:10	0.052	0	0.0523
1/01/2018 16:20	0.051	0	0.0512
1/01/2018 16:30	0.05	0	0.0503
1/01/2018 16:40	0.049	0	0.0494
1/01/2018 16:50	0.049	0	0.0487
1/01/2018 17:00	0.048	0	0.048
1/01/2018 17:10	0.047	0	0.0473
1/01/2018 17:20	0.047	0	0.0467
1/01/2018 17:30	0.046	0	0.0462
1/01/2018 17:40	0.046	0	0.0457
1/01/2018 17:50	0.045	0	0.0453
1/01/2018 18:00	0.045	0	0.0446
1/01/2018 18:10	0.043	0	0.0428
1/01/2018 18:20	0.041	0	0.0406
1/01/2018 18:30	0.039	0	0.0386
1/01/2018 18:40	0.037	0	0.0369
1/01/2018 18:50	0.036	0	0.0355
1/01/2018 19:00	0.034	0	0.0342
1/01/2018 19:10	0.034	0	0.0335
1/01/2018 19:20	0.033	0	0.0327
1/01/2018 19:30	0.032	0	0.0317
1/01/2018 19:40	0.031	0	0.0309
1/01/2018 19:50	0.03	0	0.0302
1/01/2018 20:00	0.03	0	0.0296
1/01/2018 20:10	0.029	0	0.029
1/01/2018 20:20	0.028	0	0.0284
1/01/2018 20:30	0.028	0	0.0279
1/01/2018 20:40	0.028	0	0.0275
1/01/2018 20:50	0.027	0	0.0272
1/01/2018 21:00	0.027	0	0.0267
1/01/2018 21:10	0.026	0	0.0262
1/01/2018 21:20	0.026	0	0.0258
1/01/2018 21:30	0.025	0	0.0254
1/01/2018 21:40	0.025	0	0.0253
1/01/2018 21:50	0.025	0	0.0251
1/01/2018 22:00	0.025	0	0.0248
1/01/2018 22:10	0.025	0	0.0246
1/01/2018 22:20	0.024	0	0.0243
1/01/2018 22:30	0.024	0	0.0242
1/01/2018 22:40	0.024	0	0.0241
1/01/2018 22:50	0.024	0	0.0239
1/01/2018 23:00	0.024	0	0.0236
1/01/2018 23:10	0.024	0	0.0235
1/01/2018 23:20	0.023	0	0.0233

Te Ota (East)	Total	Weir	Culvert
Max	1.62	0.00	1.62
Min	0.00	0.00	0.00
Average	0.23	0.00	0.23
	Total	Weir	Culvert
1/01/2018 0:00	0	0	0
1/01/2018 0:10	0	0	0
1/01/2018 0:20	0	0	0.0002
1/01/2018 0:30	0	0	0.0001
1/01/2018 0:40	0	0	0.0001
1/01/2018 0:50	0	0	0.0001
1/01/2018 1:00	0	0	0
1/01/2018 1:10	0	0	0.0003
1/01/2018 1:20	0	0	0
1/01/2018 1:30	0	0	0
1/01/2018 1:40	0	0	0.0001
1/01/2018 1:50	0	0	0.0002
1/01/2018 2:00	0	0	0.0002
1/01/2018 2:10	0.003	0	0.0025
1/01/2018 2:20	0.006	0	0.0058
1/01/2018 2:30	0.009	0	0.0091
1/01/2018 2:40	0.013	0	0.0126
1/01/2018 2:50	0.016	0	0.0158
1/01/2018 3:00	0.019	0	0.0185
1/01/2018 3:10	0.021	0	0.0206
1/01/2018 3:20	0.023	0	0.0225
1/01/2018 3:30	0.024	0	0.0239
1/01/2018 3:40	0.025	0	0.0253
1/01/2018 3:50	0.027	0	0.0268
1/01/2018 4:00	0.029	0	0.0285
1/01/2018 4:10	0.03	0	0.03
1/01/2018 4:20	0.032	0	0.0316
1/01/2018 4:30	0.034	0	0.0335
1/01/2018 4:40	0.036	0	0.0359
1/01/2018 4:50	0.039	0	0.0385
1/01/2018 5:00	0.041	0	0.0411
1/01/2018 5:10	0.043	0	0.0434
1/01/2018 5:20	0.047	0	0.0465
1/01/2018 5:30	0.048	0	0.0477
1/01/2018 5:40	0.049	0	0.0493
1/01/2018 5:50	0.052	0	0.0515
1/01/2018 6:00	0.052	0	0.0522
1/01/2018 6:10	0.054	0	0.0543
1/01/2018 6:20	0.058	0	0.058
1/01/2018 6:30	0.062	0	0.0623
1/01/2018 6:40	0.068	0	0.0675
1/01/2018 6:50	0.074	0	0.0736
1/01/2018 7:00	0.08	0	0.0803
1/01/2018 7:10	0.087	0	0.0868
1/01/2018 7:20	0.094	0	0.0941
1/01/2018 7:30	0.098	0	0.0983
1/01/2018 7:40	0.103	0	0.1034
1/01/2018 7:50	0.107	0	0.1068
1/01/2018 8:00	0.111	0	0.111
1/01/2018 8:10	0.115	0	0.1154
1/01/2018 8:20	0.118	0	0.1178
1/01/2018 8:30	0.12	0	0.1204
1/01/2018 8:40	0.125	0	0.1253
1/01/2018 8:50	0.126	0	0.1258
1/01/2018 9:00	0.129	0	0.1288
1/01/2018 9:10	0.133	0	0.1325
1/01/2018 9:20	0.144	0	0.1438
1/01/2018 9:30	0.153	0	0.153
1/01/2018 9:40	0.166	0	0.1664
1/01/2018 9:50	0.184	0	0.1842
1/01/2018 10:00	0.193	0	0.1927
1/01/2018 10:10	0.207	0	0.2074
1/01/2018 10:20	0.213	0	0.2129
1/01/2018 10:30	0.228	0	0.2278
1/01/2018 10:40	0.223	0	0.2232
1/01/2018 10:50	0.239	0	0.2386
1/01/2018 11:00	0.235	0	0.2349
1/01/2018 11:10	0.246	0	0.2463
1/01/2018 11:20	0.269	0	0.2688
1/01/2018 11:30	0.291	0	0.2909
1/01/2018 11:40	0.339	0	0.3386
1/01/2018 11:50	0.432	0	0.4317
1/01/2018 12:00	0.823	0	0.8225

Tea (East)	Total	Weir	Culvert
1/01/2018 12:10	1.392	0	1.3922
1/01/2018 12:20	1.576	0	1.5764
1/01/2018 12:30	1.617	0	1.6174
1/01/2018 12:40	1.594	0	1.5944
1/01/2018 12:50	1.547	0	1.5467
1/01/2018 13:00	1.433	0	1.4329
1/01/2018 13:10	1.212	0	1.212
1/01/2018 13:20	0.975	0	0.9748
1/01/2018 13:30	0.792	0	0.792
1/01/2018 13:40	0.67	0	0.6703
1/01/2018 13:50	0.587	0	0.5872
1/01/2018 14:00	0.526	0	0.526
1/01/2018 14:10	0.481	0	0.481
1/01/2018 14:20	0.448	0	0.4475
1/01/2018 14:30	0.423	0	0.4228
1/01/2018 14:40	0.408	0	0.4079
1/01/2018 14:50	0.396	0	0.3958
1/01/2018 15:00	0.387	0	0.3865
1/01/2018 15:10	0.376	0	0.376
1/01/2018 15:20	0.36	0	0.3599
1/01/2018 15:30	0.341	0	0.3405
1/01/2018 15:40	0.322	0	0.3218
1/01/2018 15:50	0.304	0	0.3042
1/01/2018 16:00	0.29	0	0.2899
1/01/2018 16:10	0.278	0	0.278
1/01/2018 16:20	0.267	0	0.2674
1/01/2018 16:30	0.258	0	0.2584
1/01/2018 16:40	0.251	0	0.251
1/01/2018 16:50	0.245	0	0.2446
1/01/2018 17:00	0.238	0	0.2381
1/01/2018 17:10	0.235	0	0.2347
1/01/2018 17:20	0.231	0	0.2314
1/01/2018 17:30	0.229	0	0.2289
1/01/2018 17:40	0.226	0	0.2258
1/01/2018 17:50	0.224	0	0.2238
1/01/2018 18:00	0.222	0	0.2224
1/01/2018 18:10	0.218	0	0.2182
1/01/2018 18:20	0.211	0	0.2113
1/01/2018 18:30	0.202	0	0.2019
1/01/2018 18:40	0.192	0	0.1921
1/01/2018 18:50	0.183	0	0.1827
1/01/2018 19:00	0.175	0	0.1751
1/01/2018 19:10	0.172	0	0.1723
1/01/2018 19:20	0.166	0	0.1659
1/01/2018 19:30	0.16	0	0.1596
1/01/2018 19:40	0.154	0	0.1536
1/01/2018 19:50	0.149	0	0.1493
1/01/2018 20:00	0.143	0	0.1433
1/01/2018 20:10	0.14	0	0.1403
1/01/2018 20:20	0.14	0	0.1401
1/01/2018 20:30	0.133	0	0.1326
1/01/2018 20:40	0.131	0	0.1311
1/01/2018 20:50	0.132	0	0.1319
1/01/2018 21:00	0.126	0	0.1263
1/01/2018 21:10	0.126	0	0.1255
1/01/2018 21:20	0.126	0	0.1261
1/01/2018 21:30	0.122	0	0.1216
1/01/2018 21:40	0.121	0	0.121
1/01/2018 21:50	0.122	0	0.1224
1/01/2018 22:00	0.118	0	0.1176
1/01/2018 22:10	0.118	0	0.1178
1/01/2018 22:20	0.119	0	0.1192
1/01/2018 22:30	0.116	0	0.1156
1/01/2018 22:40	0.116	0	0.1156
1/01/2018 22:50	0.117	0	0.1171
1/01/2018 23:00	0.114	0	0.1135
1/01/2018 23:10	0.114	0	0.1139
1/01/2018 23:20	0.116	0	0.115

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10% AEP MPD

Te Ota (East)
Max
Min
Average
Date

Total

0.44
0.00
0.15

cu.m/sec

Date

cu.m/sec

Date

cu.m/sec

Date

cu.m/sec

Date

cu.m/sec

Date

cu.m/sec

Date

cu.m/sec

7/11/2018	0:00	07/11/2018 00:00:00	3.11E-05
7/11/2018	0:05	07/11/2018 00:05:00	2.97E-05
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7/11/2018	0:20	07/11/2018 00:20:00	2.57E-05
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