GREEN SEED CONSULTANTS LTD

Rotokauri North Sub-catchment ICMP

Stormwater System Report

23 July 2021

BLOXAM BURNETT & OLLIVER

Document control

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Job number/s	147090	
Job name	Rotokauri North Sub-Catchment ICMP	
Contract numbers	N/A	
Report name and number	Stormwater System Report	
Date / period ending	23 July 2021	
File path	C:\12dsynergy\data\10.7.120.14\147090 - Rotokauri North_5095\07 Water Resource\Reports\Subcatchment-ICMP\Rotokauri North Subcatchment ICMP Stormwater System Report-2.docx	

Report status			
Status	Name	Signature	Date
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Document history			
Version	Changes	Signature	Issue date
V1	First Draft		21 May 2021
V2	First Issue		18 June 2021
V3	Second Issue		23 July 2021

Table of contents

1. Introduction

Green Seed Consultants Limited ("GSCL") requests a private plan change to enable the re-zoning and future development of land located in Rotokuari North for medium density housing.

The private plan change (PPC) relates to approximately 140 hectares of land. The PPC area is bounded to the north by Te Kowhai Road (SH39) and to the west by Exelby Road. The majority (approximately 133 ha) of the area, falls within land holdings under the GSCL umbrella.

To align with catchment boundaries, the stormwater management planning also includes 63.5 hectares of land within Rotokauri falling outside of the PPC area.

A comprehensive outline and description of the site and its characteristics is provided in the Sub-Catchment ICMP Report (to which this document forms a technical appendix) prepared by Tollemache Consultants.

This report sets out the stormwater management planning for the Rotokauri North PPC area (and land falling in the wider catchment).

1.1 Project Overview

The Rotokauri North PPC comprises approximately 140ha of land proposed to be zoned for urban activities, specifically:

- 137.6 hectares is proposed as a Medium Density Residential zone ("MDRZ");
- 1.2 hectares is proposed as a Business 6 zone (Neighbourhood) ("B6Z");
- 0.5 hectares will retain its current zone as a Significant Natural Area ("SNA"), i.e. no change from the operative provisions.

Based on the PPC area, the development is expected to yield 1,600- 2,000 dwellings, however factors such as a future purchase of a sports park by HCC and purchase of land by the Ministry of Education for schooling (neither of which have been confirmed) may reduce this yield.

1.2 Purpose and Scope of this Report

The purpose of this report is to inform the stormwater opportunities, constrains and issues to inform a Best Practicable Option for stormwater management solutions for Rotokauri North.

Although some of the catchments extend beyond the HCC territorial boundary, this ICMP only covers land within the HCC territorial boundary (although some other technical assessments have covered the catchments as a whole).

As development at Rotokauri North has been anticipated and envisaged for some time, the land was included in the adopted Rotokauri Integrated Catchment Management Plan ("Rotokauri ICMP"), which covers the Rotokauri Structure Plan area identified in Chapter 3 of the HCDP (approximately 196 hectares) and within the Mangaheka ICMP (approximately 15 hectares identified as area "G" within the Mangaheka ICMP).

The Rotokauri North area, therefore, constitutes a "sub-catchment" within the wider Rotokauri area, and as such, this document is prepared as a "Sub-Catchment ICMP" to be read as part of the Rotokauri ICMP and the Mangaheka ICMP with its primary purpose of providing stormwater guidance and solutions to support the PPC request for Rotokauri North.

1.3 References

1. Beca Limited (2018) Rotokauri Greenway – Design Report
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6. Hamilton City Council (2019) Mangaheka – Integrated Catchment Management Plan. Hamilton, New Zealand
7. Kapitzke, R. (2010) Culvert Fishway Planning and Design Guidelines. School of Engineering and Physical Sciences, James Cook University, Townsville, Australia
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10. Natural Resources Conservation Service (2009) Part 630 Hydrology, National Engineering Handbook. USDoA
11. Rawls, W.J., Brakensiek, D.L. and Miller, N. (1983) Green-ampt Infiltration Parameters from Soils Data, Journal of Hydraulic Engineering, 109-1
12. Rossmann, L.A. (2015) Storm Water Management Model User's Manual Version 5.1. National Risk Management Research Laboratory, U.S. Environmental Protection Agency
13. Rotokauri North Tangata Whenua Working Group (2020) Rotokauri North Private Plan Change – Cultural Impact Assessment
14. Seehorn, M. (1992), R8-TP 16 - Stream Habitat Improvement Handbook, USDA US Forest Service
15. Waikato Local Authority Shared Services (2018) Regional Infrastructure Technical Specifications (RITS)
16. Waikato Regional Council (2014) Appropriate use of mussel spat ropes to facilitate passage for stream organisms – Technical Report 2014-29
17. Waikato Regional Council (2020) Waikato Stormwater Management Guidelines – Technical Report 2020-07
18. Yochum, S. (2016), TN102.2 - Guidance for Stream Restoration and Rehabilitation, USDA US Forest Service

2. Catchment Objectives, Constraints and Design Parameters

The objectives within the catchment are documented in Section 1.7 (Objectives and Targets) of the Rotokauri Integrated Catchment Management Plan (RICMP) (Hamilton City Council, 2017) and design parameters are documented in Section 5.4 of the RICMP, and in Section 3 of the Mangaheka Integrated Catchment Management Plan (MICMP) (Hamilton City Council, 2019) and design parameters in section 6.4. One of the primary objectives throughout the design process has been to incorporate the input provided by the Tangata Whenua Working Group through collaboration and the input documented in Section 14.0 of the Rotokauri North Private Plan Change - Cultural Impact Assessment (Rotokauri North Tangata Whenua Working Group, 2010).

Refinements to these were also identified in section 2.3, 5.4 and 8.3 of the RNSC-ICMP, although it is always intended that the higher standard (whether it be that identified in the RNSC-ICMP, the RICMP or the MICMP) be utilised for the respective catchment.

Key design parameters are:

- Water quality treatment compliant with RITS (Waikato Local Authority Shared Services, 2018) and WRC TR2020/07 (Waikato Regional Council, 2020) including pre-treatment for High Contaminant Load surfaces in all Sub-catchments.
- Quantity control for the extended detention volume, the 2yr ARI 24 hr, the 10yr ARI 24 hr and 100yr ARI 24 hr storm events within the Rotokauri North Sub-catchment

In addition, the standards in Table 2-1 have been applied for piped infrastructure that applies directly to The Rotokauri North development.

Table 2-1 – Drainage Design Criteria

Element	Design Event	Criteria
Piped drainage infrastructure	10yr ARI	HGL to be generally below pipe soffit level. In locations with high tailwater elevations, this may not be possible. In these cases, the HGL must not be higher than 1.0m below the finished carriageway level or, where pipe cover is 1.0m or less, ½ the distance between top of pipe and finished carriageway level.
Cross culverts	20yr ARI	Culvert must convey the design event without the flow reaching the soffit or obvert.
Cross culverts	100yr ARI	Must convey flow in a manner that does not result in increased flooding outside of the designation. Ponding behind the culvert embankment to be <1.0m above the soffit, or less if necessary, to prevent scour due to high water velocities around the culvert entrance and exit.

2.1 On-lot Measures

Rainfall re-use is proposed primarily for lots greater than 350m^2. The rain tanks will be integrated into the garage structure to hold a sufficient amount of water for toilet flushing as well as outdoor use. To account for the reduction in run-off, the impervious depression storage for that part of the sub-catchment covered by roofs of lots with rain tanks is increased by 5mm. This has no impact on the run-off during large storm-events as the rain tanks are expected to be full before peak rainfall intensity occurs.

Smaller lots will have a carpad instead of a garage which may not allow rain tanks of sufficient size to be installed safely on the property. Rain tanks will be implemented for lots with an area greater than 350m^2 where practicable. Overall rain tank implementation will be discussed and agreed to with HCC.

2.2 Soakage

Due to the high groundwater level throughout the Rotokauri North sub-catchment, using soakage to dispose of stormwater is not a viable option. Design of stormwater wetland for quality and floodplain volume for attenuation requirements have assumed that no soakage occurs.

3. Sub-catchment Layouts

3.1 Major Sub-catchments

For the purpose of locating treatment wetlands, the Rotokauri North Sub-catchment was divided further into 18 major Sub-catchments. The delineation of the major sub-catchments was based on existing topography, existing property boundaries and existing stormwater discharge location. It also took into account the proposed delineation of sub-catchment associated with the Rotokauri Arterial Designation where it impacted the Rotokauri North Sub-catchment.

The major Sub-catchments, devices, and stormwater discharge locations are shown in Figure 3-1. Ten major sub-catchments drain into the Ohote stream. The stream and its floodplains will be utilized for attenuation of the peak flows to meet the maximum discharge flow rate requirements. The Ohote discharge location is underneath Exelby Road. Three of the major sub-catchments (Ohote Upstream North, Ohote Upstream West and Ohote Upstream East) are not part of the Rotokauri North development by Green Seed Consultants Ltd, but as these do drain into the Ohote, their contributions are taken into account as part of this sub-catchment ICMP. During future developments, these major sub-catchments will require their own treatment and attenuation devices.

Five major sub-catchments drain into a tributary of the Te Otamanui stream. This includes the Significant Natural Area where the land will remain undeveloped and hence its run-off does not require treatment or attenuation. The Te Otamanui discharge location is under SH39. Two major sub-catchments drain directly into the Mangaheka which runs along the north-eastern boundary. The final major sub-catchments would have drained into the Rotokauri South drain, at the south-eastern corner, that ends in Lake Rotokauri. However, this area falls within the catchment of basin 3 as part of the Rotokauri Greenway (Beca Limited, 2018) and therefore should discharge into Wetland Pond 8. Design of this wetland is progressed as part of the Rotokauri Arterials design where the receiving wetland is denoted as G8.

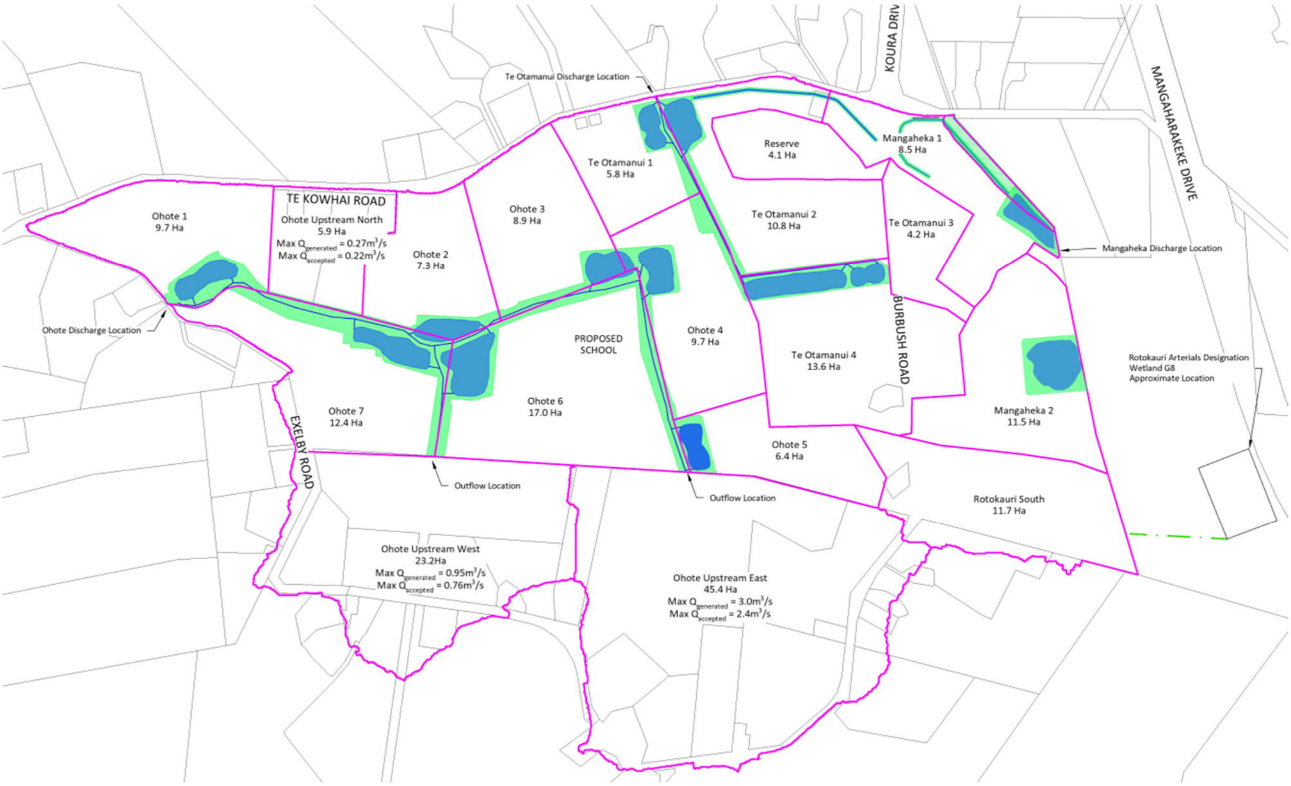

Figure 3-1 - Major Sub-Catchments Delineation

3.2 Minor Sub-catchments

Based on the approximate locations and sizes of the wetlands, obtained using the major sub-catchments, each major sub-catchment was divided further into 4 or 5 minor sub-catchments. The delineation of the minor sub-catchment was based on refined boundaries of the major sub-catchment, approximate locations of wetland and stream boundaries and a high-level lay out of the major and minor roads used as an indication of the reticulated stormwater network (Figure 3-2).

Each of the wetlands and stream sections form separate minor sub-catchments which allows appropriate infiltration and impervious parameters to be set which are different from the minor sub-catchments that are to be developed. In addition, the run-off from the wetland and stream minor sub-catchments do not contribute to the total water quality volume required for treatment. They do contribute to the total volume of stormwater to be attenuated.

A small part of the Mangaheka 1 major sub-catchment is part of the Mangaheka stream floodplain. Any run-off from minor sub-catchment Mangaheka Stream drains directly into the stream and therefore does not require treatment or attenuation.

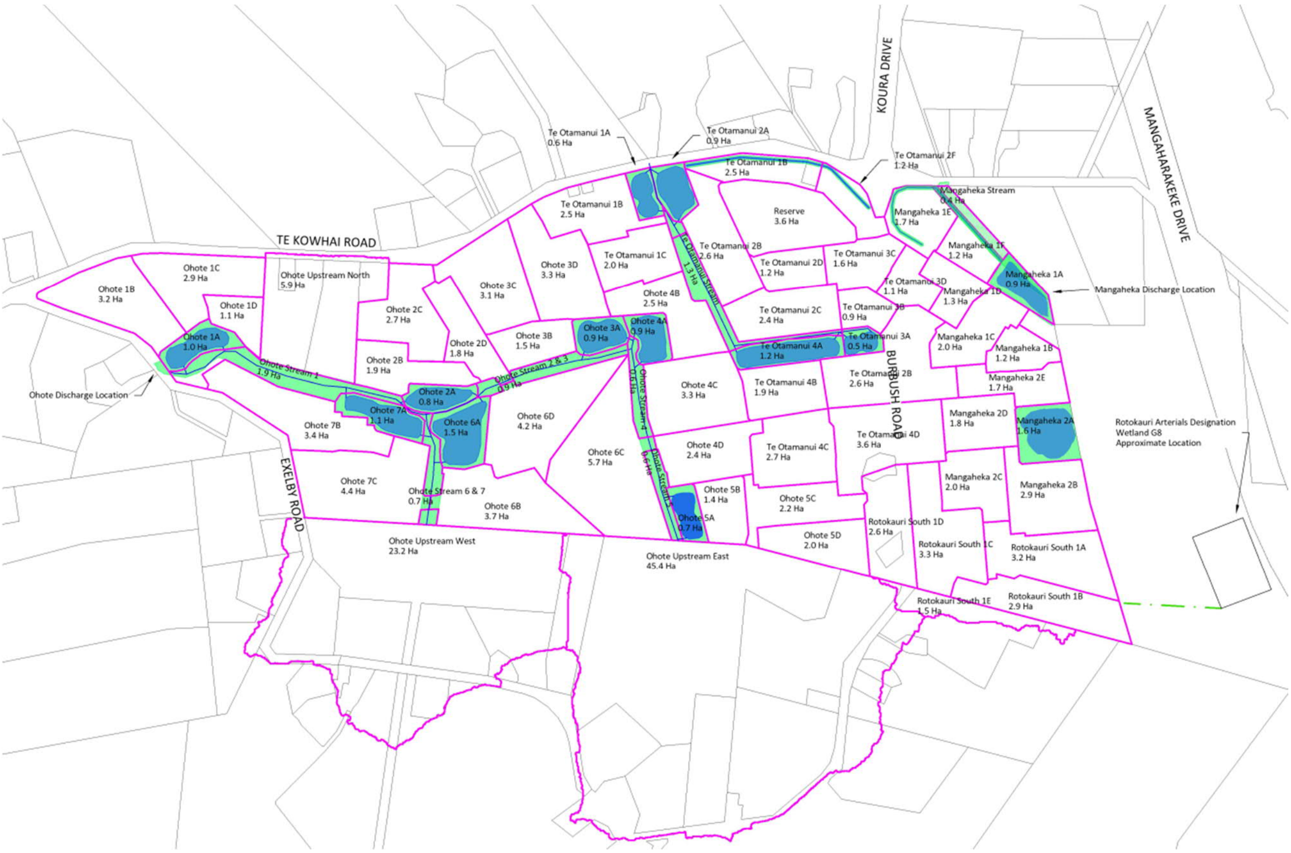

Figure 3-2 - Minor Sub-Catchments Delineation

4. Sub-catchment Device Design

4.1 General Design Principles

Wetlands and treatment swales were considered for various locations within Rotokauri North. It was decided that wetlands generally provided the best mix of water quality, ecological, maintenance, land and amenity outcomes, and wetlands can also be designed to provide attenuation as well as treatment, with very little additional area required. For these reasons, wetlands have been adopted in all the catchments as the preferred major sub-catchment stormwater device.

Swales have been implemented as a means to route stormwater in areas where it was difficult to pipe the stormwater to the wetland due to the local elevation relative to the wetland elevation. In addition, short swales have been implemented between the downstream ends of the stormwater reticulation networks and the inlet to the wetland and between the outlet of the wetland and the discharge location in the stream. The swales in combination with the wetland form a treatment train to meet the water quality requirements.

Due to agricultural practices, the level of phosphorus in the soil is high in the Rotokauri South major sub-catchment. While the proposed combined treatment wetland and treatment swales are a very suitable treatment method for the phosphorus that leaches out of the ground with stormwater run-off, and development would tend to reduce the amount of contaminated soil exposed to stormwater runoff, the primary mitigation approach will be through soil management during earthworks. These soil management techniques will include soil mixing to reduce phosphorus concentration, capping with impervious surfaces to prevent leaching of phosphorus into the receiving environment, and removal/disposal of phosphorous contaminated soils. When combined with the proposed stormwater treatment, the soil management should provide a very robust solution to the phosphorus contamination of these soils.

A large high-level hydrological routing model was developed for the Rotokauri North Sub-Catchment to design concept level wetlands for the ICMP. It also includes the redesigned Ohote and Te Otamanui tributary stream that in conjunction with the wetlands will meet the attenuation requirements. The attenuation was designed to serve the future developments within the Rotokauri North sub-catchment, to the extent as required by the Regional Infrastructure Technical Specifications (WLASS, 2018) and the Waikato Stormwater Management Guidelines (WRC, 2020).

The ICMP stormwater management design principles are focussed on general conformance with the Regional Infrastructure Technical Specifications (WLASS, 2018) and the Waikato Stormwater Management Guidelines WRC, 2020), with additional focus on contributing to ecological, amenity, and groundwater recharge objectives within the catchment.

On-lot stormwater devices provide a stormwater control function that can subsequently reduce sub-catchment stormwater device sizes. The on-lot rainwater use in Rotokauri North was accounted for by adding an impervious depression storage of 5mm for that part of the sub-catchment covered by roofs of lots with rain tanks.

Attenuation of the stormwater is primarily based on the re-establishment of the Ohote stream and the tributary of the Te Otamanui with functional floodplains. The streams will be designed to provide geomorphologically stable habitats. Depressed stream banks will be used to create areas of fringe wetlands, which will provide spawning habitats. Other portions of the floodplain will be riparian or open space for human habitat. Future upstream developments will be accommodated via stream extensions to points of discharge.

For the major sub-catchments that discharge to streams or drains outside of the sub-catchment ICMP, the attenuation of the stormwater will be accommodated in the associated wetlands.

4.2 Development Imperviousness Assumptions

The proposed Rotokauri North development includes areas of medium density housing, major and minor roads, a school and small commercial area, a number of small reserve and a large reserve around the protected trees, and the wetlands and streams.

The wetlands, streams and large reserve form separate minor sub-catchments and therefore have been given individual imperviousness percentages. The large reserve is assumed to remain undeveloped but may contain a number of unpaved paths. The imperviousness percentage has therefore been set to 5%. The stream minor sub-catchments will also include a number of pedestrian and cycle paths. In addition, the water-table will remain high relative to the invert level of the streams, hence the infiltration into the ground that forms the bottom of the streams will be small. The imperviousness percentage for the streams has therefore been set to 10%. The invert levels of the wetlands will be significantly below the existing ground level. In combination with the high-water table in the area, these means that relatively little water will infiltrate into ground underneath the permanent water level in the wetland. The remaining areas of the wetland minor sub-catchment are assumed to be largely covered in grasses. Hence the imperviousness percentage has been set to 50%.

The remaining minor sub-catchments are a combination of housing, roads, the school and commercial areas. The imperviousness percentage for these minor sub-catchments has been assumed to be 85%. This allows for conservatism in stormwater device sizing.

4.3 General Methodology for Hydrology and Overall System Design

Stormwater hydrology and hydraulics were modelled using EPA SWMM-5 (SWMM). SWMM develops sub-catchment runoff flows, based on imported rainfall patterns (synthetic design storms or continuous rainfall data), soil infiltration characteristics, and soil cover complexes. SWMM was used to route the stormwater flows, using the Dynamic Wave Method (application of the full Saint-Venant Equations). This allows hydraulic losses in manholes, bends or junctions to be accounted for and ponds with complex outlet structures to be modelled.

The storms modelled had a duration of 24 hours, using rainfall intensities from High Intensity Rainfall System (HIRDS). The 24-hour design storms modelled were Water Quality (2-year / 1-hour storm), 2-year, 10-year, and 100-year ARI storm events. Developed condition design storm events were adjusted to account for a 2.1°C temperature increase due to climate change.

Infiltration was estimated based on typical hydraulic characteristics for typical soil texture classes, taken from the EPA SWMM-5 Manual and Rawls et al. (1983). Soil textures from the site were derived from available geotechnical information, NZ Landcare Research S-Map Online, NZ Landcare Research LRIS Soils Portal, NZ National Soils Database and site observation. The predominant soil textures were loam soils, clay loam soils or clay soils, falling around the dividing line between hydrologic soil groups C and D (NRCS, 2009).

The infiltration method applied was the Horton's Infiltration Equation. Horton's Equation uses infiltration rates for typical soil types in the sub-catchment. This method uses an initial infiltration rate, adjusted for an appropriate antecedent moisture condition, and decreases it exponentially to a final infiltration rate for saturated soil conditions. The rate that the infiltration is decreased by is determined by a decay rate. Depression storage was input at 5mm for pervious areas and 2mm for impervious areas.

Figure 4.1 shows a typical plot of infiltration verses time, using Hortons Equation, highlighting that the infiltration rate reaches saturated soil conditions long before the peak of the 24-hour design storm events. This infiltration function only applies to pervious areas, and therefore has no impact on water quality treatment or the size of the road drainage reticulation.

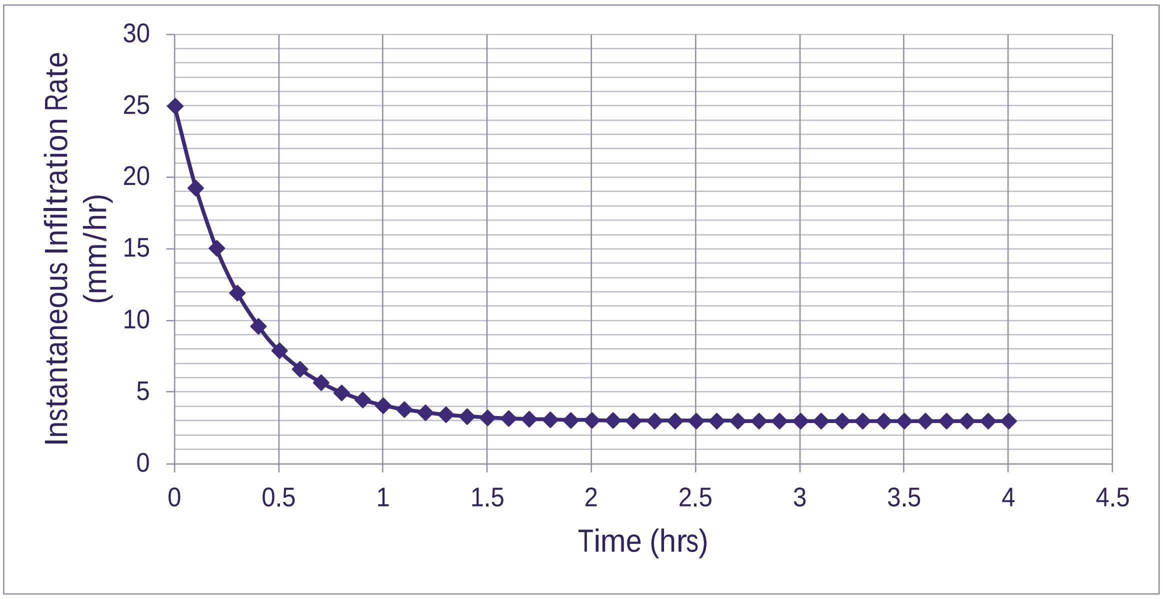

Figure 4-1 – Example Horton infiltration rate for sub-catchments contributing to Rotokauri North

Each of the minor sub-catchments (Figure 5.2) is defined within the model by these characteristics, as well as length, width, slope, and area. The minor sub-catchment input parameters used in the SWMM model are shown in Table 4.1

The output from the model included the peak flow estimates for the 2 year, 10 year and 100 year, 24-hour design storm events. The model was run for the existing condition, using current climate condition design rainfall curves and the developed condition rainfall, accounting for climate change resulting in a 2.1ºC temperature increase. In addition, the water quality simulation resulted in the total catchment runoff which corresponds to the total volume of stormwater that needs to be treated. SWMM model outputs are presented in Appendix A. For more details on SWMM see Rossman (2015).

4.4 Scheme Level Stormwater Device Design

Stormwater treatment devices were developed in accordance with the RITS (WLASS, 2018). Generally, treatment will be achieved through the use of constructed wetlands, with a small contribution from swales immediately upstream and downstream of the wetland inlets and outlets. Figure 3.2 shows the location of the constructed wetlands that were designed for the ICMP. Each wetland will be designed to include a fore bay, outlet pool and two intermediate pools. The ratio of wetland water depths will be designed to provide approximately 10% open water in the intermediate pools, in general conformance with the RITS.

All of the constructed wetlands were designed to provide extended detention volume (EDV) for the 2-year ARI, 24-hour design storm. The Mangaheka 1 and Mangaheka 2 wetlands also include EDV for the 10-year and 100-year ARI design storm. Discharge from these wetlands during the 10-year ARI storm matches the modelled existing condition 10-year ARI runoff (Table 4-2), while discharge from the wetland during the 100-year ARI storm matches 70% of the modelled existing condition to ensure adherence to the ICMP requirement for not increasing flood levels downstream of the sub-catchments.

Table 4-1 – Minor Sub-Catchment Characteristics

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Client :	Green Seed Consultants	By	GK
		Checked	EV
		Approved	
Project :	Rotokauri North	Revision	A
		Date	20/07/2021

Rotokauri North Sub-Catchment ICMP

Rotokauri North Catchment Characteristics

													Infiltration (Horton)		
ID	A	A	A_{imp}	A_{perv}	L_{fp}	Width (A/L_{fp})	Slope	Percent Impervious	n_{impwev}	n_{perv}	D-Store Imperv.	D-Store Perv.	f_i	f_o	Decay Const.
	m^2	ha	m^2	m^2	m	m	%	%			mm	mm			
Ohote_1A	9900	0.99	8415	1485	198	50	0.05	85	0.015	0.15	2	5	25.4	1	4
Ohote_1B	32100	3.21	27285	4815	459	70	0.10	85	0.015	0.15	2	5	25.4	1	4
Ohote_1C	28900	2.89	24565	4335	578	50	0.10	85	0.015	0.15	2	5	25.4	1	4
Ohote_1D	10700	1.07	9095	1605	357	30	0.10	85	0.015	0.15	2	5	25.4	1	4
Ohote_2A	8100	0.81	6885	1215	270	30	0.05	85	0.015	0.15	2	5	25.4	1	4
Ohote_2B	19400	1.94	16490	2910	485	40	0.05	85	0.015	0.15	2	5	25.4	1	4
Ohote_2C	27200	2.72	23120	4080	907	30	0.05	85	0.015	0.15	2	5	25.4	1	4
Ohote_2D	18300	1.83	15555	2745	458	40	0.05	85	0.015	0.15	2	5	25.4	1	4
Ohote_3A	8500	0.85	7225	1275	170	50	0.05	85	0.015	0.15	2	5	25.4	1	4
Ohote_3B	14700	1.47	12495	2205	196	75	0.05	85	0.015	0.15	2	5	25.4	1	4
Ohote_3C	31200	3.12	26520	4680	416	75	0.05	85	0.015	0.15	2	5	25.4	1	4
Ohote_3D	32800	3.28	27880	4920	437	75	0.05	85	0.015	0.15	2	5	25.4	1	4
Ohote_4A	8500	0.85	7225	1275	213	40	0.05	85	0.015	0.15	2	5	25.4	2.54	4
Ohote_4B	24800	2.48	21080	3720	248	100	0.05	85	0.015	0.15	2	5	25.4	2.54	4
Ohote_4C	32800	3.28	27880	4920	547	60	0.05	85	0.015	0.15	2	5	25.4	2.54	4
Ohote_4D	23500	2.35	19975	3525	224	105	0.05	85	0.015	0.15	2	5	25.4	2.54	4
Ohote_5A	7200	0.72	6120	1080	288	25	0.05	85	0.015	0.15	2	5	25.4	3.3	4
Ohote_5B	13800	1.38	11730	2070	173	80	0.05	85	0.015	0.15	2	5	25.4	3.3	4
Ohote_5C	22000	2.20	18700	3300	550	40	2.00	85	0.015	0.15	2	5	25.4	3.3	4
Ohote_5D	20400	2.04	17340	3060	340	60	2.00	85	0.015	0.15	2	5	25.4	3.3	4
Ohote_6A	15100	1.51	12835	2265	336	45	0.05	85	0.015	0.15	2	5	25.4	3.3	4
Ohote_6B	36800	3.68	31280	5520	491	75	0.05	85	0.015	0.15	2	5	25.4	3.3	4
Ohote_6C	56900	5.69	48365	8535	345	165	0.05	85	0.015	0.15	2	5	25.4	3.3	4
Ohote_6D	42000	4.20	35700	6300	323	130	0.05	85	0.015	0.15	2	5	25.4	3.3	4
Ohote_7A	11300	1.13	9605	1695	377	30	0.10	85	0.015	0.15	2	5	19.8	1.9	4
Ohote_7B	34400	3.44	29240	5160	573	60	2.00	85	0.015	0.15	2	5	19.8	1.9	4
Ohote_7C	43900	4.39	37315	6585	585	75	0.50	85	0.015	0.15	2	5	19.8	1.9	4
Ohote_Upstream_North	59000	5.90	2950	56050	369	160	0.50	5	0.015	0.15	2	5	25.4	1	4
Ohote_Upstream_West	232000	23.20	11600	220400	540	430	0.50	5	0.015	0.15	2	5	15.24	1.47	4
Ohote_Upstream_East_1	397000	39.70	19850	377150	726	547	0.50	5	0.015	0.15	2	5	14.82	1.4	4
Ohote_Upstream_East_2	57000	5.70	2850	54150	363	157	0.50	5	0.015	0.15	2	5	8.5	0.25	4
Ohote_Stream_1	18800	1.88	0	18800	940	20	0.01	0	0.015	0.15	2	5	25.4	1	4
Ohote_Stream_2	1700	0.17	0	1700	85	20	0.01	0	0.015	0.15	2	5	25.4	1	4
Ohote_Stream_3	7700	0.77	0	7700	385	20	0.01	0	0.015	0.15	2	5	25.4	1	4
Ohote_Stream_4	6200	0.62	0	6200	310	20	0.01	0	0.015	0.15	2	5	25.4	2.54	4
Ohote_Stream_5	5500	0.55	0	5500	275	20	0.01	0	0.015	0.15	2	5	25.4	3.3	4
Ohote_Stream_6	5500	0.55	0	5500	275	20	0.01	0	0.015	0.15	2	5	25.4	3.3	4
Ohote_Stream_7	1300	0.13	0	1300	65	20	0.01	0	0.015	0.15	2	5	25.4	3.3	4
Te_Otamanui_1A	11000	1.10	9350	1650	367	30	0.05	85	0.015	0.15	2	5	25.4	1	4
Te_Otamanui_1B	24600	2.46	20910	3690	328	75	0.05	85	0.015	0.15	2	5	25.4	1	4
Te_Otamanui_1C	19700	1.97	16745	2955	303	65	0.05	85	0.015	0.15	2	5	25.4	1	4
Te_Otamanui_2A	8600	0.86	7310	1290	287	30	0.05	85	0.015	0.15	2	5	25.4	1	4
Te_Otamanui_2B	25800	2.58	21930	3870	516	50	0.05	85	0.015	0.15	2	5	25.4	1	4
Te_Otamanui_2C	24100	2.41	20485	3615	482	50	0.05	85	0.015	0.15	2	5	25.4	1	4
Te_Otamanui_2D	12400	1.24	10540	1860	146	85	0.05	85	0.015	0.15	2	5	25.4	1	4
Te_Otamanui_2E	15400	1.54	13090	2310	513	30	0.10	85	0.015	0.15	2	5	25.4	1	4
Te_Otamanui_2F	11600	1.16	9860	1740	290	40	0.10	85	0.015	0.15	2	5	25.4	1	4
Te_Otamanui_3A	4700	0.47	3995	705	157	30	0.05	85	0.015	0.15	2	5	8.5	0.25	4
Te_Otamanui_3B	9300	0.93	7905	1395	266	35	0.10	85	0.015	0.15	2	5	8.5	0.25	4
Te_Otamanui_3C	15700	1.57	13345	2355	314	50	0.10	85	0.015	0.15	2	5	8.5	0.25	4
Te_Otamanui_3D	11100	1.11	9435	1665	252	44	0.10	85	0.015	0.15	2	5	8.5	0.25	4
Te_Otamanui_4A	12300	1.23	10455	1845	410	30	0.05	85	0.015	0.15	2	5	8.5	0.25	4
Te_Otamanui_4B	19300	1.93	16405	2895	203	95	0.05	85	0.015	0.15	2	5	8.5	0.25	4
Te_Otamanui_4C	26900	2.69	22865	4035	299	90	1.00	85	0.015	0.15	2	5	8.5	0.25	4
Te_Otamanui_4D	36200	3.62	30770	5430	426	85	2.00	85	0.015	0.15	2	5	8.5	0.25	4
Te_Otamanui_4E	39700	3.97	33745	5955	345	115	3.00	85	0.015	0.15	2	5	8.5	0.25	4
Te_Otamanui_Stream_1	13300	1.33	0	13300	665	20	3.00	0	0.015	0.15	2	5	25.4	1	4
Mangaheka_1A	9400	0.94	7990	1410	269	35	0.05	85	0.015	0.15	2	5	16.9	0.635	4
Mangaheka_1B	11500	1.15	9775	1725	288	40	2.00	85	0.015	0.15	2	5	16.9	0.635	4
Mangaheka_1C	20100	2.01	17085	3015	503	40	2.00	85	0.015	0.15	2	5	16.9	0.635	4
Mangaheka_1D	12600	1.26	10710	1890	210	60	0.05	85	0.015	0.15	2	5	16.9	0.635	4
Mangaheka_1E	16700	1.67	14195	2505	304	55	0.05	85	0.015	0.15	2	5	16.9	0.635	4
Mangaheka_1F	11500	1.15	9775	1725	230	50	0.05	85	0.015	0.15	2	5	16.9	0.635	4
Mangaheka_1G	4100	0.41	0	4100	137	30	0.50	0	0.015	0.15	2	5	16.9	0.635	4
Mangaheka_2A	16000	1.60	13600	2400	246	65	0.05	85	0.015	0.15	2	5	14.8	0.8	4
Mangaheka_2B	28600	2.86	24310	4290	333	86	0.05	85	0.015	0.15	2	5	14.8	0.8	4
Mangaheka_2C	19900	1.99	16915	2985	332	60	2.00	85	0.015	0.15	2	5	14.8	0.8	4
Mangaheka_2D	18300	1.83	15555	2745	183	100	2.00	85	0.015	0.15	2	5	14.8	0.8	4
Mangaheka_2E	16700	1.67	14195	2505	239	70	3.00	85	0.015	0.15	2	5	14.8	0.8	4
Mangaheka_Upstream	1468600	146.86	73430	1395170	4895	300	0.05	5	0.015	0.15	2	5	25.4	1	4
RotokauriSouth_1A	31500	3.15	26775	4725	630	50	0.50	85	0.015	0.15	2	5	12.7	1.016	4
RotokauriSouth_1B	28700	2.87	24395	4305	718	40	1.00	85	0.015	0.15	2	5	12.7	1.016	4
RotokauriSouth_1C	33400	3.34	28390	5010	418	80	3.00	85	0.015	0.15	2	5	12.7	1.016	4
RotokauriSouth_2D	25900	2.59	22015	3885	259	100	3.00	85	0.015	0.15	2	5	12.7	1.016	4
RotokauriSouth_1E	15000	1.50	12750	2250	45	330	3.00	85	0.015	0.15	2	5	12.7	1.016	4
TreePark_TeOtamanui	34000	3.40	12240	21760	270	126	0.10	36	0.015	0.15	2	5	25.4	1	4

GLOSSARY:

A: Catchment area

A_{imp}: Impervious area of a catchment

A_{per}: Pervious area of a catchment

L_{fp}: Length of overland flow

Slope: Average surface slope

n_{imperv}: Manning Number for impervious area

n_{perv}: Manning Number for pervious area

D-Store Imperv.: Depth of depression storage on impervious area

D-Store Perv.: Depth of depression storage on pervious area

f_i: Maximum rate on the Horton infiltration curve

f_o: Minimum rate on the Horton infiltration curve

Decay Const.: Decay constant for the Horton infiltration curve

The stormwater treatment wetlands were assumed to contain the full dead storage volume, for the purposes of stormwater modelling. This allows the permanent water level of the wetlands to be input into the SWMM model as the wetland invert. For the constructed wetlands along the Ohote and Te Otamanui tributary, the bund separating the wetland from the streams yields sufficient volume for the wetland to contain the 2-year ARI, 24-hour design storm. For the 10-year ARI and 100-year ARI 24-hour storms, storm water will spill over the bund into the stream. During these events, the wetlands forms part of the floodplain of the streams increasing the total attenuation volume. The attenuated developed condition discharge from the Ohote and Te Otamanui tributary streams match the modelled existing condition 10-year ARI runoff at the Exelby Road and SH 39 discharge locations respectively (Table 4-2). For the 100-year ARI event, the discharge at these points matches 80% of the modelled existing condition.

Table 4-2 – Modelled existing peak flow rates at pre-development discharge locations

Discharge Location	2 yr ARI (m^3/s)	10 yr ARI (m^3/s)	100 yr ARI (m^3/s)	80% of 100yr ARI (m^3/s)
Exelby Road (Ohote)	0.81	1.87	2.72	2.17
SH 39 (Te Otamanui tributary)	0.31	0.65	1.28	1.04*
Mangaheka	0.46	0.85	1.51	1.06**
Rotokauri South	0.26	0.53	0.97	0.78

* The Te Otamanui tributary minor sub-catchments include the Reserve. Run-off from the Reserve needs to be conveyed through the stream, but does not require attenuation.
** For the 100-year event, the discharge into Mangaheka will be 70% of the modelled existing condition as per Mangaheka ICMP (Hamilton City Council, 2019)

Flow bypasses will not be designed for the constructed wetlands. The wetlands will be designed to pass the developed condition design flows, with outflow either through the permanent water level outflow or over the wetland bund into the stream, without internal velocities exceeding 0.25m/s. This will prevent the resuspension of pollutants. The 2D unsteady flow modelling (Chapter 6) indicates that the water surface in the floodplain rises at a similar enough rate/time in comparison with the treatment wetlands to ensure that overtopping flows over the treatment wetland containment bunds result in velocities less than 0.8m/s. Regardless, the wetland outlet system will be designed to have a controlled shallow discharge capacity for the 100-year event. This will prevent potential differences between the modelled hydrologic routing and actual rainfall events from causing erosion in or around the treatment wetlands.

The stormwater run-off from major sub-catchment Rotokauri South 1 will be conveyed to wetland G8 that is part of the Rotokauri Arterials Designation. It is currently not known what the discharge flow rate from wetland G8 is as a large part of the catchment draining into the wetland as well as the details of the wetland itself remains unknown. It is assumed that the detailed design of wetland G8 will ensure that the contribution to the outflow from wetland G8 attributable to catchment Rotokauri South 1 meets the flow rate conditions as stated in Table 4.2. Should the timing of the Minor Arterial not allow the use of wetland G8, Green Seed Consultants will coordinate with Hamilton City Council to locate appropriate stormwater treatment and attenuation.

In SWMM, the wetlands are modelled as storage nodes with a particular storage curve, based on a depth area relationship. An example is presented in Figure 4-2. The invert level of the wetlands was at the permanent water level (see Table 4-3). The permanent water level area was related to the Water Quality volume (WQV) of the major sub-catchment. WQV was multiplied by a factor, based on the assumed average depth of the permanent wetland storage, to obtain a footprint area for the permanent water level area. The wetlands have side slopes of 1:4 (V:H). The maximum depth of the storage curves was 2m to ensure sufficient available volume for the 100yr ARI storm event. During detailed design, the storage curves will be refined.

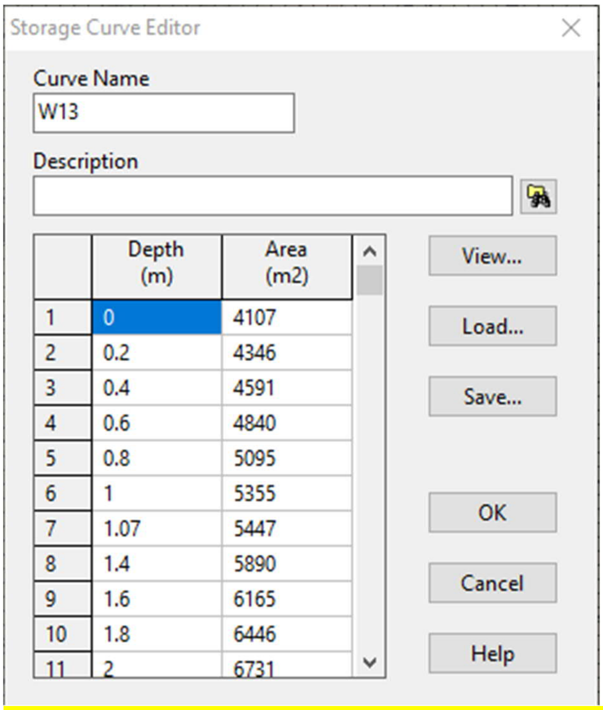


Figure 4-2 – Storage curve for wetland Mangaheka 2 (W13 in SWMM model).

Table 4-3 - Details of Rotokauri North Wetlands

Wetland	PWL (m RL)	PWL area (m²)	Bund level (m RL)	Max HGL 2yr ARI (m RL)	Max HGL 10yr ARI (m RL)	Max HGL 100yr ARI (m RL)	Max Vol 2yr ARI (m³)	Max Vol 10yr ARI (m³) *	Max Vol 100yr ARI (m³) *
Ohote 1	27.17	0.39	28.07	28.02	28.43	29.05	3701	5830	9433
Ohote 2	27.23	0.31	28.13	28.05	28.44	29.05	3022	4798	8019
Ohote 3	27.27	0.37	28.17	28.07	28.45	29.06	3290	5134	8472
Ohote 4	27.27	0.39	28.17	28.07	28.45	29.05	3464	5396	8881
Ohote 5	27.31	0.29	28.21	28.08	28.46	29.08	2613	4189	7178
Ohote 6	27.23	0.66	28.13	28.08	28.44	29.05	6032	9134	14639
Ohote 7	27.23	0.50	28.13	28.06	28.44	29.05	4573	7120	11509
Te Otamanui 1	28.17	0.24	28.97	28.88	29.1	29.39	1904	2599	3562
Te Otamanui 2	28.19	0.55	28.99	28.88	29.1	29.39	4226	5659	7668
Te Otamanui 3	28.48	0.19	29.28	28.89	29.11	29.39	2360	3774	5633
Te Otamanui 4	28.45	0.58	29.25	29.04	29.26	29.39	3824	5446	6493
Mangaheka 1	29.40	0.33	NA	30.01	30.23	30.93	2177	3092	6322
Mangaheka 2	29.40	0.41	NA	29.99	30.24	30.94	2622	3878	7830

* Indicative volumes only as 10yr and 100yr ARI storm event overtop the bund, therefore the 1:4 (V:H) side slope of the wetland above the bund as assumed in the storage curve, underestimates the volume available.

The outlets of the wetlands were designed as weirs. The invert level of the first weir matched the permanent water level. For the Ohote and Te Otamanui wetlands, the length of these weirs was 0.3m which allowed the outfall structures at Exelby Rd and SH39 to match the peak flow rates during the 2yr ARI storm event. The weir in the Mangaheka wetland directly controlled the peak flow rate during the 2yr ARI event and it was set to 0.2m.

The second weir at the Ohote and Te Otamanui wetlands was the bund between the wetland and the flood plain of the streams. For the Ohote wetlands, the invert elevation of the bunds was set 0.9m above the permanent water level and for the Te Otamanui wetlands, the invert elevation of the bunds was set 0.8m above the permanent water level (see Table 4-3). These bund levels ensure that the 2yr ARI storm event does not overtop the bund, while the 10yr ARI and 100yr ARI storm events do overtop the bund. The length of the bund was set equal to the side of the wetland along the stream. The second weir for the Mangaheka wetland was set 0.5m above the permanent water level and had a length of 1m. This ensured that during the 10yr ARI and 100yr ARI storm events, the peak flow rates from the wetland did not exceed 70% of the existing flow rate.

During detailed design, the weir parameters will be refined to better represent the wetland outflows.

The SWMM results confirmed that for the 2yr ARI storm event, all Ohote and Te Otamanui wetlands do not overtop the bund while for the 10yr and 100yr ARI events, the bunds do overtop (Table 4-3). The results all confirm that during the 100yr ARI event, the maximum depth of the water is less than 2m above the permanent water level.

4.5 Ecological and Amenity Value

The Ohote and Te Otamanui tributary stormwater management systems have been designed to provide habitat and amenity value, as well as provide stormwater attenuation volume and locations for stormwater treatment systems. The stream within the floodplain will be designed to mimic the geomorphology of natural streams in similar terrain. The streams will be designed with a sinuosity between 1.1 and 1.25 (stream channel length divided by straight-line distance). Bends in the stream will be designed with subtle bend apex pools and point bars to provide a stable cross-section shape and habitat variation that would be found in a healthy natural stream. The resulting variation in channel width, that the bend geometry will provide, also improves the amenity value of the stream.

Figure 4-2 shows an example engineered stream and floodplain, in a rural area. The bend apex cross-section provides additional area for wetland plant growth along the inside of the bend and a deep, low velocity area under normal flow conditions.

Figure 4-3 Example engineered stream and shallow floodplain. The stream has a low sinuosity and subtle bed apex geometry in the cross-section.

Figure 4-4 Example wetland fringe area. Note the use of wood habitat enhancement.

Figure 4-5 Wood habitat feature in a properly reinforced section of engineered stream channel.

Portions of the stream banks will be slightly depressed to create small areas of wetland habitat that provide ideal spawning opportunities for many native fish. These wetland areas along the stream will also provide potential habitat for mudfish. Figure 4-3 shows and example of a wetland associated with a depressed bank on the engineered stream in Figure 4-2.

Instream use of wood features provide additional habitat and aesthetic value. Figure 4-4 shows an example of a properly anchored wood habitat feature.

Wood habitat features in streams will cause scour. This can be an acceptable outcome in rural streams. Usually, as in the example in Figure 4-4, uncontrolled scour is not acceptable and the channel around the wood habitat feature must be reinforced. The example shown was reinforced with soil riprap (D_{50}=150mm) and planted. This approach resulted in additional variation in the normal flow channel, improving aesthetics and habitat value.

As Urban streams, the Ohote and Te Otamanui Tributary floodplain areas will have to provide other uses that provide opportunity for human habitat. These streams are intended to provide greenways that can also include shared paths and pedestrian paths, playgrounds, interactive bush areas, areas for community gardens, and other opportunities for small scale outdoor activities. These amenity areas will be placed appropriately, taking into account safety and operational considerations, with playground areas, exercise areas, primary paths etc. kept above the 5-year ARI flood level.

Constructed treatment wetlands will be shaped to provide a natural appearance. The shapes will be organic, providing small open water zones surrounded by larger areas of wetland vegetation that vary in height and appearance to enhance the overall amenity value of the floodplain corridors. This will be accomplished while meeting the design and performance requirements in the RITS. Stormwater treatment wetlands will not be intended to provide aquatic habitat.

The details of the re-established streams will be worked out as part of detailed design. The cross-sectional profiles used in the SWMM model were simplified approximations of the final cross-sections and therefore did not explicitly include the base flow. For the large storm-events modelled, the details of the permanent stream have little impact on the flow behavior.

5. Connections to Receiving Environments

The stormwater outfall locations from the Sub-Catchment ICMP (Figure 3.1) were determined based on the existing locations where stormwater leaves the Sub-Catchment. For the Ohote stream, there is an existing culvert crossing at Exelby Road while for the Te Otamanui tributary there is an existing culvert crossing underneath SH 39. The Mangaheka and Rotokauri South major sub-catchments currently drain into an existing stream and drain respectively that form the eastern boundaries of the sub-catchments. The stormwater outfall locations from these major sub-catchments will therefore be located along the eastern boundaries.

The outfalls of the constructed wetlands located within the redesigned Ohote stream and Te Otamanui tributary will be connected to short sections of swales before the stormwater is released into the stream. For storms up to the 2yr ARI design storm, all stormwater from the wetland will be conveyed through the wetland outfall. For storms larger than the 2yr ARI design storm, some of the stormwater will be conveyed across the bund between the wetland and the stream. In either case, the design will incorporate stream stability measures to ensure that the stormwater entering the stream will not cause erosion of the channel banks of the streams.

The discharge locations of the streams themselves, at Exelby Road and SH 39 respectively (Figure 3.1), will be designed to ensure compliance with the pre-development flow rates (Table 4.2) as well as the fish passage requirements that meet the National Environmental Standard for Freshwater (NES-F 2020). The stream stability at the discharge locations will be analysed and stream stability measures will be implemented if required.

Discharge from the Mangaheka 1 Wetland is directly into the existing Mangaheka stream via a short section of swale. Discharge from the Mangaheka 2 Wetland is piped from the wetland into the swale downstream of the Mangeheka 1 Wetland and therefore utilizes the same outfall. The outfall design will ensure the discharge from the wetland will not cause erosion of the channel banks of the existing stream.

The current discharge from the Rotokauri South major sub-catchments is into a drain that will no longer be present due to the construction of a new arterial road along the eastern boundary of the Rotokauri North. It is currently not known whether the arterial road will include a constructed swale to replace the existing drain. If a new swale is to be constructed as part of the road design, it will need to be large enough to enable the outflow from Wetland Rotokauri South 1 to be conveyed to the proposed green way to be constructed to the south-east of the Rotokauri North development. An alternative is that the outflow is piped to the discharge location into the green corridor. Stormwater collected in major sub-catchment Rotokauri South 1 is to be treated by Wetland G8 which is part of the Rotokauri Arterials Designation. A pipeline of minimum length of 330m is required to convey the flow from the sub-catchment to the wetland.

Flow rates or elevation data were not available to determine the tailwater conditions at any of the outfall locations. At Exelby Rd and SH39 crossings, a section of channel was added in the SWMM model that connected the culverts/weirs with the outfall node of the model. The tailwater conditions were obtained by giving the outfall node an appropriate invert level and assuming a normal flow at the outfall node based on the flow upstream of the node.

For the Mangaheka catchments, a part of the Mangaheka stream was included in the SWMM model to yield appropriate tailwater conditions. The size of the culvert crossing Te Kowhai Rd East was unknown, hence the model was calibrated using elevation data from the report “Mangaheka Integrated Catchment Management Plan – Stormwater 1D Modelling Report” which is an attachment to the Mangaheka ICMP (Hamilton City Council, 2019). For the Rotokauri South catchment, the water is conveyed to wetland G8 which is not part of the subcatchment ICMP and hence no tailwater modelling was carried out.

Stormwater hydrology and hydraulics model of the proposed stormwater layout yielded the maximum flow rates at each of connections to the receiving environments (Appendix A). The results are summarized in Table 5-1. A comparison with Table 4-2 indicates that these proposed peak flow rates match or are lower than the existing flow rates (or 80% of the existing flow rate for the 100yr ARI storm).

Table 5-1 – Modelled proposed peak flow rates at proposed discharge locations

Discharge Location	2 yr ARI (m^3/s)	10 yr ARI (m^3/s)	100 yr ARI (m^3/s)
Exelby Road (Ohote)	0.82	1.49	2.16
SH 39 (Te Otamanui tributary)	0.28	0.53	1.05
Mangaheka	0.26	0.47	0.82
Rotokauri South	NA	NA	NA

6. Stream routing and Attenuation Volume

Attenuation of the stormwater is primarily based on the re-establishment of the Ohote stream and the tributary of the Te Otamanui stream with functional floodplains. To model the routed flow in the streams and floodplains and carry out a secondary check of the attenuation volume and flood depths, a two-dimensional hydraulic model of the streams and floodplains has been generated in HEC-RAS. As the Mangaheka and Rotokauri South major sub-catchments discharge into a stream/drain outside of the Rotokauri North development, these have not been included into the two-dimensional model.

6.1 Two-Dimensional Hydraulic Model

The Hydrologic Engineering Center (HEC), which is part of the United States Army Corps of Engineers, released version 5.0 of the River Analysis System (RAS) in 2016. This version was the first version that included two-dimensional modelling. HEC-RAS is supported by the US Army Corps of Engineers and there are enthusiastically supported users' forums that offer sound advice on modelling techniques. HEC-RAS is the default software used by many government agencies and private consultants, particularly in the United States.

For each of the 2D flow area in the current model, the program solved the two-dimensional Saint Venant equations. HEC-RAS solved the 2D unsteady flow equations using an implicit finite volume method. This method allows for larger computational time steps than explicit methods and has improved stability and robustness over finite difference and finite elements methods. The finite volume method allows for subcritical, supercritical and mixed flow regimes and 2D flow areas that are wetted after starting completely dry.

The 2D computational mesh in HEC-RAS can be structured or unstructured. Cells can be any shape with a maximum of eight vertices. Because of their computational efficiency, the majority of the 2D areas of the model were covered with a hexagonal grid. To align the computational cell faces with the stream, break-lines were inserted along the stream centrelines. The break-lines were also used to increase cell-density along the stream centreline as it is the region with the largest expected velocity gradients.

Each cell and cell face use a high resolution sub-grid model to represent the geometric and hydraulic data at each cell and cell face, therefore the cell faces and edges not do not have to be straight lines at a single elevation and a cell can be partially wet. The flow moving across cell faces takes into account the sub-grid data.

To establish the geometric and hydraulic properties of the 2D cells and cell faces, HEC-RAS requires a terrain model. The terrain model (Figure 6-1) was based on elevation data from 2007-2008 Waikato Regional Council LiDAR data. The surface generated from the elevation data was modified, firstly, at locations where the results of the 1D SWMM model indicated that the existing ground elevation levels did not yield sufficient cover for the proposed buried stormwater infrastructure. Secondly, the surface was modified by inserting the proposed streams and wetlands.

HEC-RAS enables hydraulic structures, such as culverts and weirs, to be inserted into the 2D flow areas. It also enables internal boundary conditions to be defined as local sources or sinks as well as external boundary conditions along the edges of the two-dimensional area.

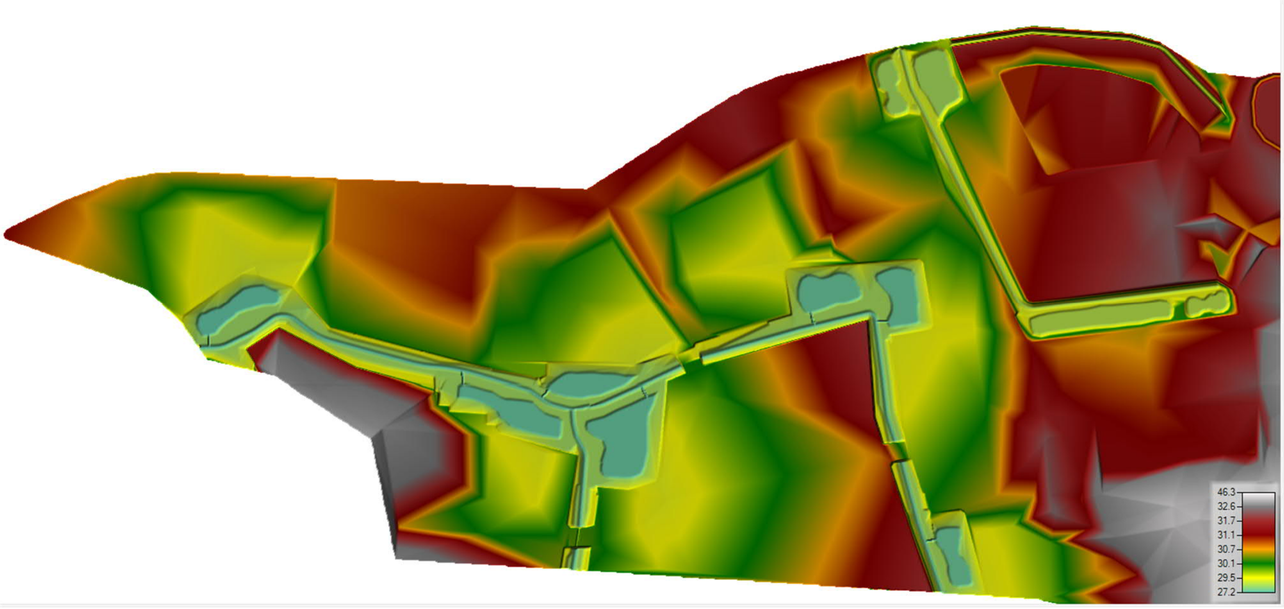


Figure 6-1 – Terrain model used for two-dimensional HEC-RAS model

6.1.1 Ohote 2D Area

The Ohote 2D area consisted of the re-established Ohote stream and floodplains and the seven wetlands that discharge into the stream (Figure 6-2). The Ohote stream has two upstream branches, the first one connects to the Ohote Upstream West area (Figure 3-1) and the second one connects to the Ohote Upstream East area. Break-lines were inserted along the Ohote stream resulting in $4m^2$ square cells that were aligned with the flow direction. The remaining 2D area was covered with $16m^2$ hexagonal cells. The total number of cells was 11,000.

The Manning's n was set to 0.035 throughout the 2D area. Note that the roughness parameter within the wetlands was not adjusted to take into account the effect of the wetland plants. The focus of the model has been to investigate flood conditions during which the impact of the wetland plants on the roughness parameter is estimated to be small.

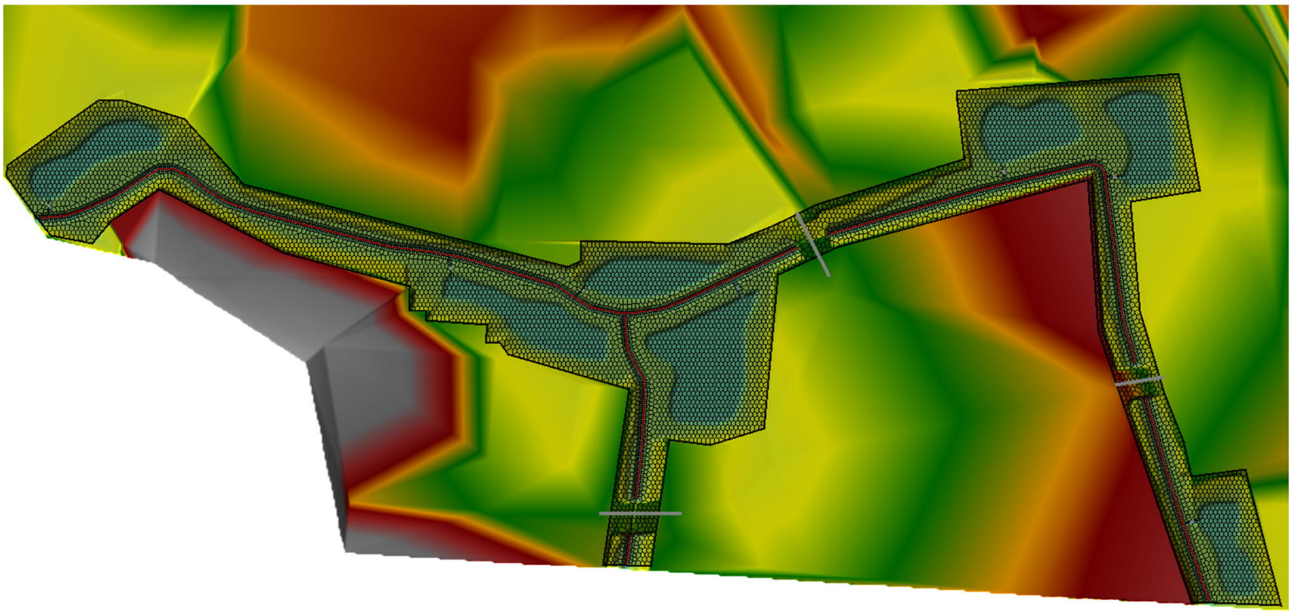


Figure 6-2 - Ohote 2D Area

The wetlands will be designed with an outlet structure that will allow water to drain from the wetland until the water surface in the wetland is at the permanent water level. This outlet structure will either be a weir or an orifice that connects the wetland to the discharge pipe. The downstream end of the discharge pipe will be in the stream. This outlet structure is recreated in the 2D flow area by firstly inserting a physical channel into the terrain model that connects the wetland to the stream. This channel had a width of 2m. A 2D area connection was created across this channel. A weir structure was assigned to the 2D area connection. The weir had a width of 0.3m and an invert elevation equal to the invert of the channel. These values are identical to those in the 1D SWMM model. The overflow computational method was set to the normal 2D equation domain, rather than the weir equation, because it also had to yield reasonable results when the flow depth is sufficiently deep that water can flow directly over the wetland bund, and therefore over the channel/weir, into the stream.

Major roads cross the Ohote stream at three locations. Culverts were inserted into the 2D area, via 2D area connections, at these locations. The upstream and downstream invert levels, the length, roughness parameters and diameter of the culverts were set equal to those in the 1D SWMM model. All three culverts had a diameter of 1.5m.

The inflow from the relevant minor sub-catchments were obtained from the 1D SWMM model and inserted into the 2D area as flow hydrographs through internal boundary conditions at the appropriate discharge locations of the sub-catchments. The flow hydrographs had time steps of 1 minute and a duration of 72 hours. There were 16 internal boundary conditions, seven wetlands, seven stream sections and two upstream areas. Sub-catchments Ohote Upstream North and Ohote Stream 1 discharge at approximately the same location and hence their hydrographs were combined.

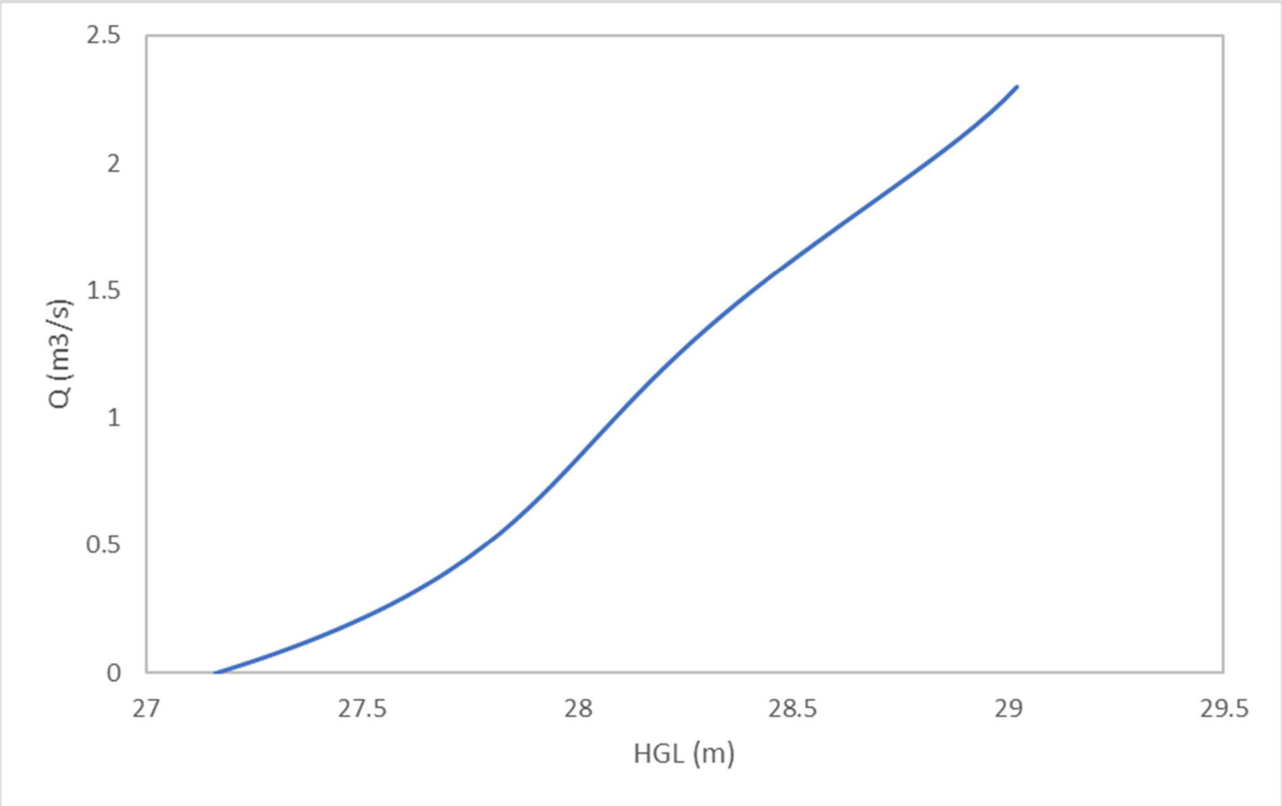


Figure 6-3 – Rating curve for Ohote 2D area outlet at Exelby Road

Exelby Road is the location of discharge of the Ohote Stream out of the sub-catchment. A set of weirs and/or culverts will form the outlet structure to ensure the flow rate matches the existing flow rates as shown in

Table 4-1. The flow rates time-series at the outlet as well as the HGL time-series were obtained from the 1D SWMM model. These time-series were combined to obtain the rating curve for the outlet (Figure 6-3). This rating curve was used as the outlet of the 2D area through an external boundary condition at the Exelby Road location.

6.1.2 Te Otamanui 2D Area

The Te Otamanui 2D area consisted of the re-established Te Otamanui tributary stream and floodplains and the four wetlands that discharge into the stream (Figure 6-4). Break-lines were inserted along the Te Otamanui tributary stream resulting in 2.25m^2 square cells that were aligned with the flow direction. The remaining 2D area was covered with 4m^2 hexagonal cells. The total number of cells was 16,600. The Manning's n was set to 0.035 throughout the 2D area.

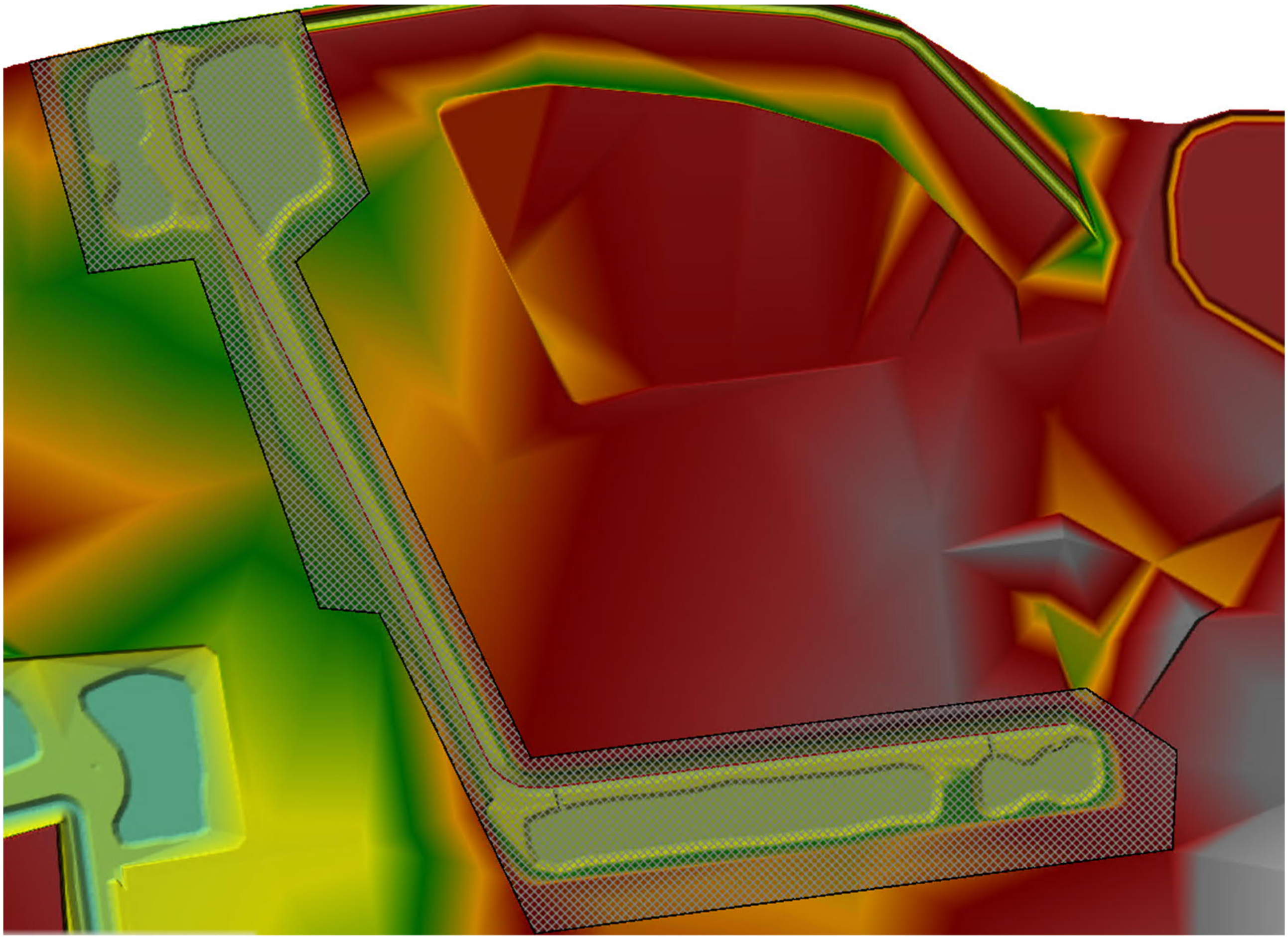


Figure 6-4 – Te Otamanui 2D Area

The outlet structures that connect the wetlands to the stream are the same as for the Ohote 2D area. There are no major roads that cross the stream, hence currently there are no culverts inserted in the 2D area.

There are seven internal boundary conditions to represent the inflow from the relevant sub-catchment. In addition to the inflow into the four wetlands and the Te Otamanui Stream, there is a separate inflow into Wetland Te Otamanui 2 from the swale running along SH39 and an inflow from the Reserve. The rating curve for the outlet of the Te Otamanui 2D area, which is at SH39, is shown in Figure 6-5.

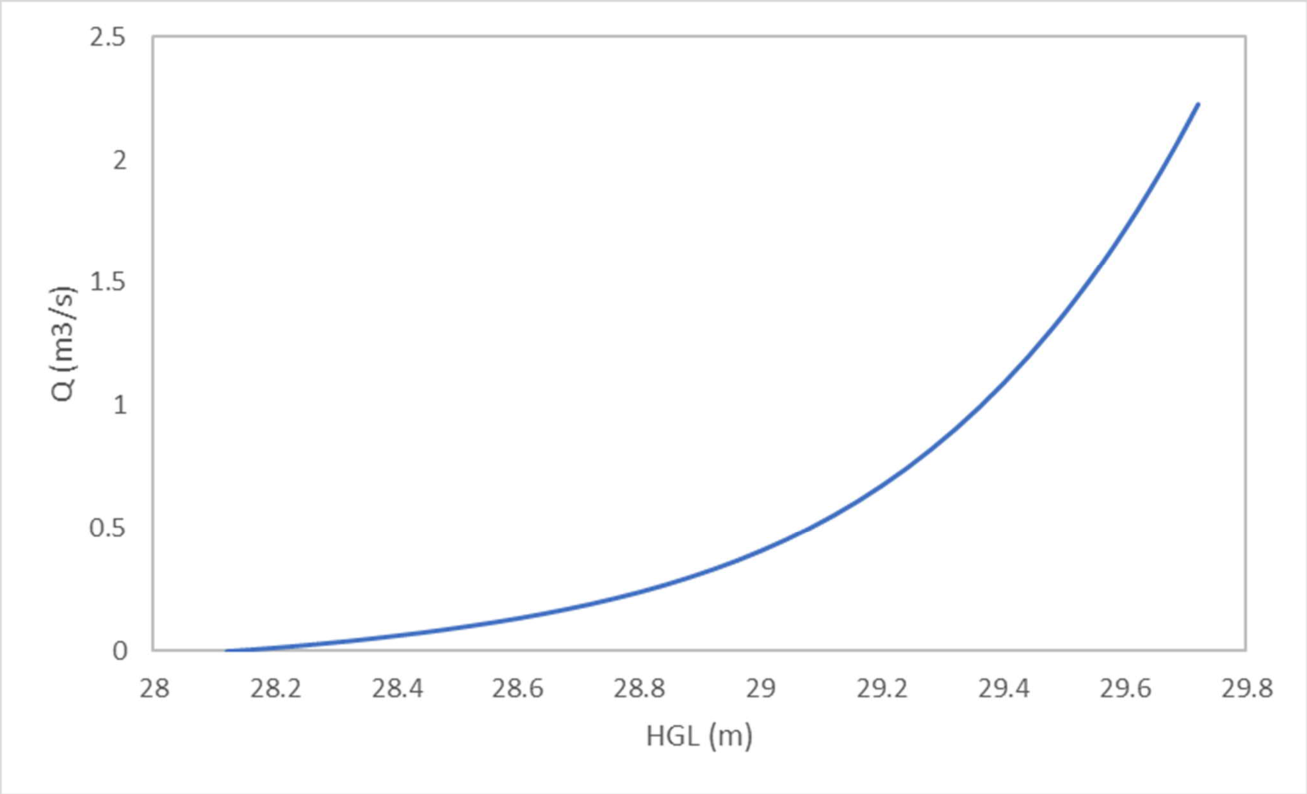


Figure 6-5 - Rating curve for Te Otamanui 2D area outlet at SH39

6.1.3 Model Verification

To confirm the suitability of the 2D HEC-RAS for flood routing and flood depth and volume checks, the results from the 2D HEC-RAS model were compared with those from the 1D-SWMM model. Example HGL timeseries at various wetland, comparing 2D model and 1D model results during the 100yr ARI design storm, are presented in Figures 6.6 to 6.9.

For the Te Otamanui tributary stream only a single time-series is shown. During the 100yr ARI design storm, the entire stream and floodplain are inundated and hence the system temporarily becomes a single large pond with minimal difference in HGL (approximately 5mm) between the most downstream and upstream locations. The culverts present along the Ohote stream result in slightly greater differences in maximum HGL during the 100yr ARI design (approximately 60mm). The example locations shown in Figures 6.6 to 6.8 are each separated by a culvert.

The comparison of the 1D SWMM and 2D HEC-RAS shows that the results are generally in reasonable agreement. This is particularly so when considering the methodology used to generate the 2D terrain which resulted in a relatively coarse representation of the 2D channels and when considering that the channels in the 1D model all have uniform cross-sections that do not take into account the variability in the available space in the floodplains.

The agreement between the data during the initial filling of the wetlands and the final discharge from the wetlands yields confidence in the general physics of the 2D model. The comparison shows that the 2D model results yield a lower maximum HGL for the Ohote stream (approximately 200mm) and a slightly higher maximum HGL for the Te Otamanui tributary stream (approximately 50mm). This indicates that the 1D model overestimates the volume available in the Ohote floodplain and slightly underestimates the volume in the Te Otamanui tributary floodplain.

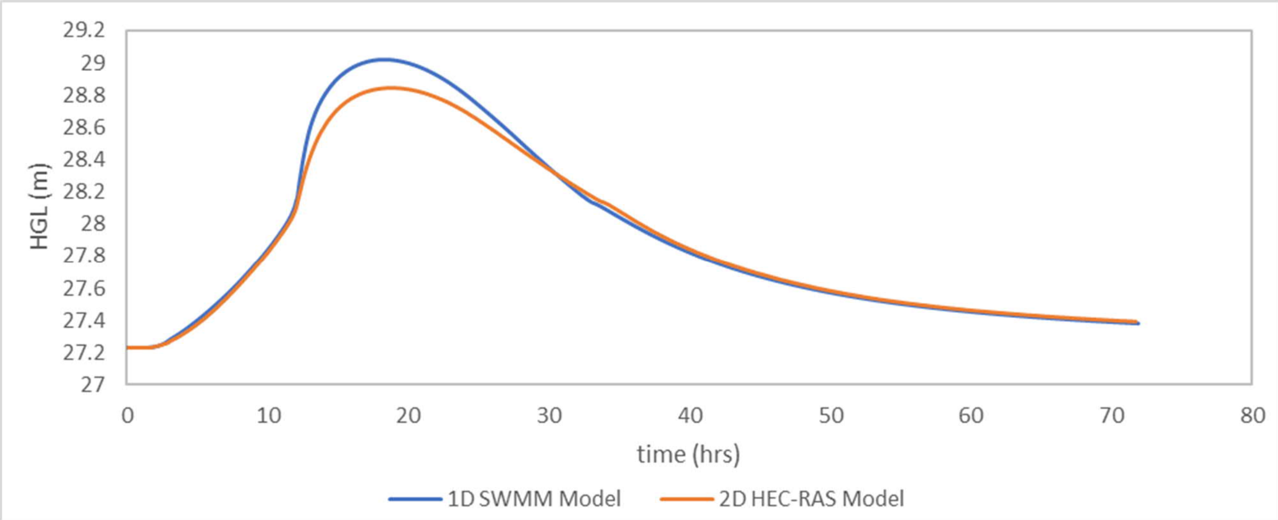


Figure 6-6 – HGL timeseries at Wetland Ohote 6 during 100yr ARI storm, comparing 1D and 2D model results.

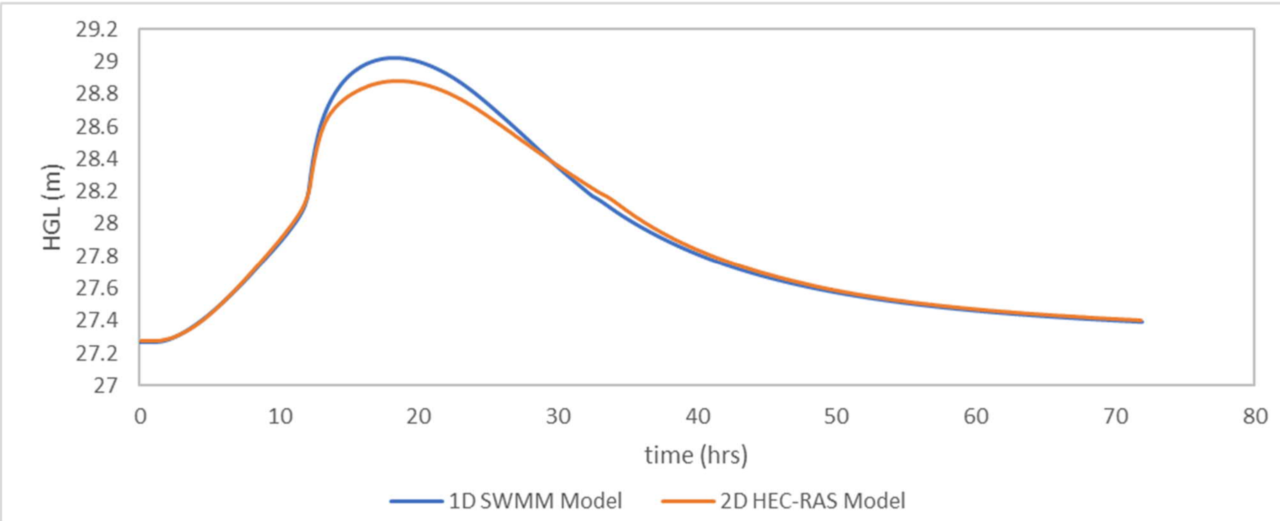


Figure 6-7 - HGL timeseries at Wetland Ohote 3 during 100yr ARI storm, comparing 1D and 2D model results.

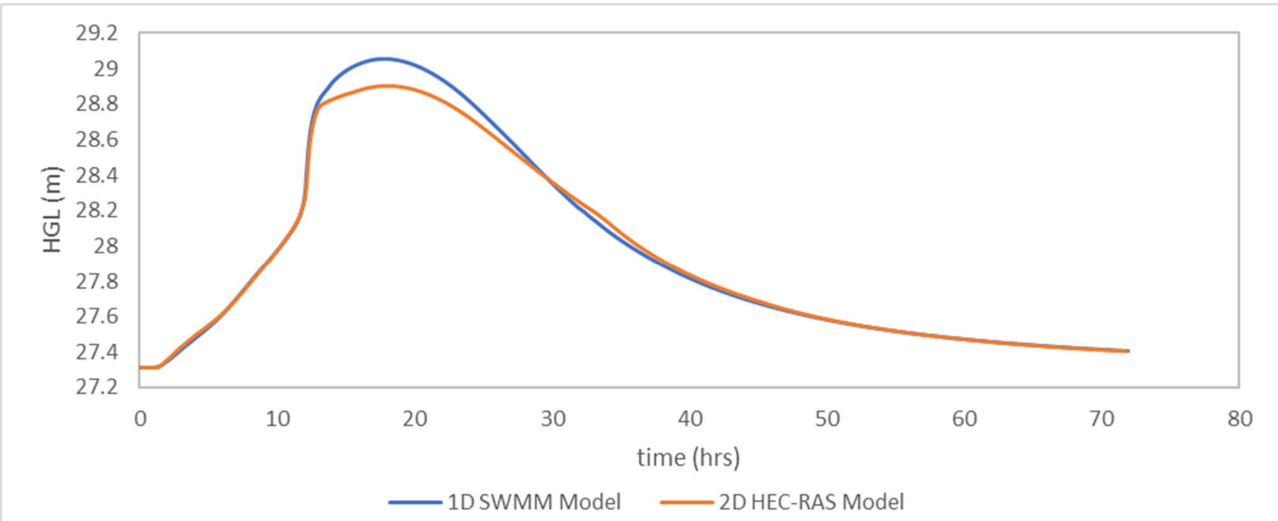


Figure 6-8 - HGL timeseries at Wetland Ohote 5 during 100yr ARI storm, comparing 1D and 2D model results.

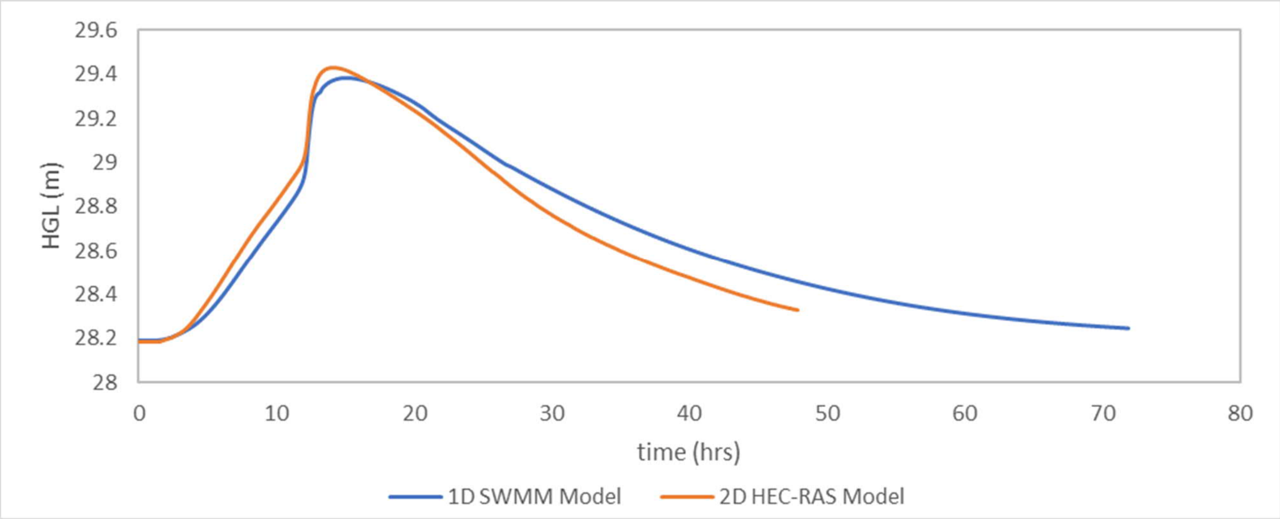


Figure 6-9 - HGL timeseries at Wetland Te Otamanui 2 during 100yr ARI storm, comparing 1D and 2D model results.

6.2 2D Model results

The model verification yielded some confidence in the use of the 2D model for flood routing and flood depth and volume checks. The results are firstly presented for the Ohote stream followed by the Te Otamanui tributary stream.

6.2.1 Ohote Stream

Figure 6-10 shows the maximum depth of water along the Ohote stream during the 100yr ARI design storm. The results show that at no point along the stream does the water level increase above the level of the edge of the floodplains, indicating that the available volume is sufficient to deal with the 100yr ARI design storm while also meeting the maximum discharge flow rates as set out in Table 4-2.

The maximum depth of the water varies from 1.67m near the outlet to 1.59m near the upstream connection with major sub-catchment Ohote Upstream East (alongside Wetland Ohote 5).

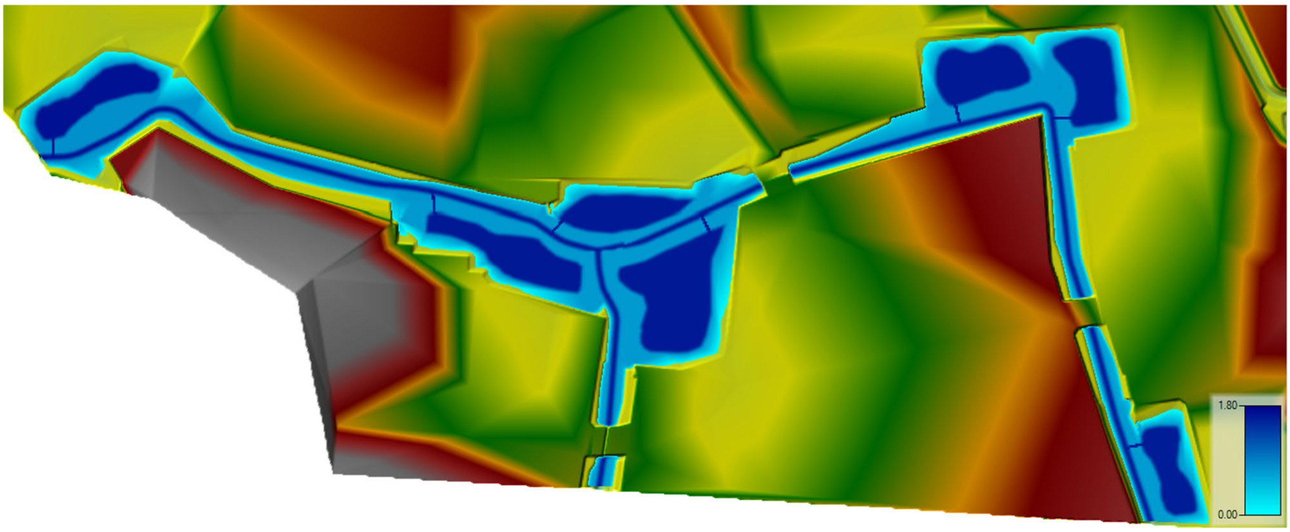


Figure 6-10 - Ohote stream 2D HEC-RAS model maximum depth results during 100yr ARI design storm

The maximum depth-averaged velocity results during the 100yr ARI design storm are presented in Figure 6-11. The highest depth-averaged velocities are found immediately downstream of the inflow points into the wetlands. The depth-averaged velocity does not increase above 1m/s at any other point along the stream.

Within a cross-section, the velocities are highest along the stream centreline as expected. The maximum velocities on the floodplains are about half that in along the stream centreline.

With the exception of the inflow points, the maximum velocities inside the wetlands are small. For most wetlands the maximum velocities are within the range of 0.03m/s to 0.05m/s. Maximum velocities in wetland Ohote 7 are slightly larger at 0.05m/s to 0.07m/s. Due to the shape and location of this wetland, it contributes more to the conveyance of the flood flow than the other wetlands which are further off-line. For all wetlands, the maximum velocities are much smaller than the 0.25 m/s maximum velocity used to ensure that resuspension of sediments does not occur.

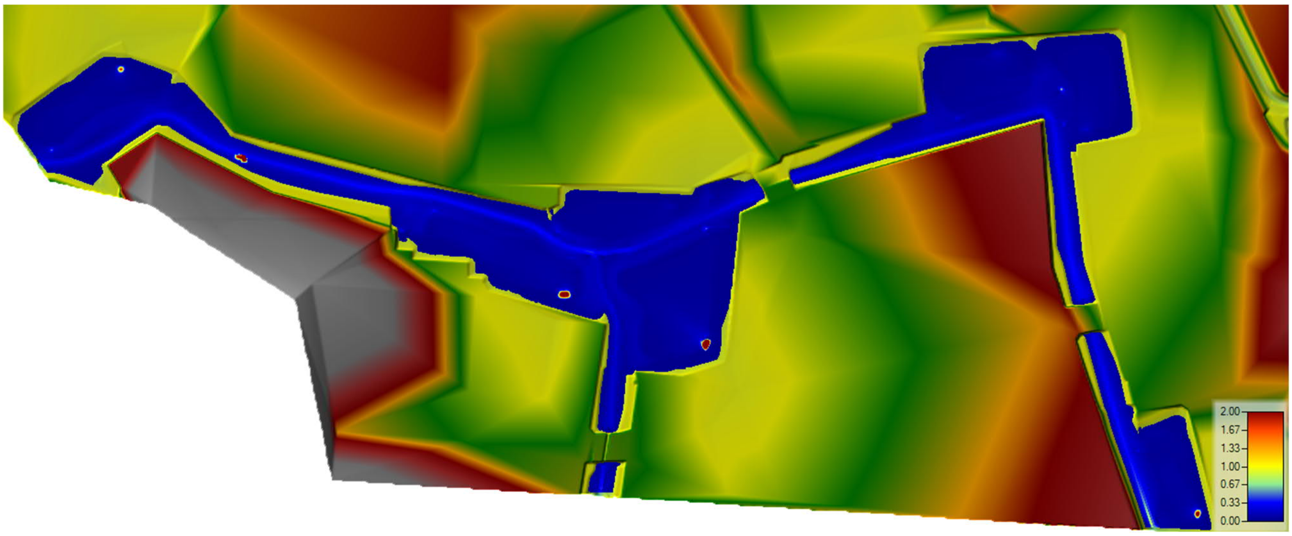


Figure 6-11 - Ohote stream 2D HEC-RAS model maximum velocity results during 100yr ARI design storm

6.2.2 Te Otamanui Tributary Stream

The Te Otamanui tributary stream maximum depth results during the 100yr ARI storm are presented in Figure 6-12. The results once again confirm that the available volume in the floodplain is sufficient to deal with the 100yr ARI design storm while also meeting the maximum discharge flow rates as set out in Table 4-2. The maximum depth of the water various from 1.31m near the outlet at SH39 to 0.96m at the furthest upstream location alongside Wetland Te Otamanui 3.

The maximum depth-averaged velocities during the 100yr ARI design storm are presented in Figure 6-13. Highest velocities are again to be found near the inflow locations. Higher velocities are also found at the end of the channels that connect the wetlands with the stream. Apart from these locations, the velocities are small. Along the stream centreline, the velocities are generally higher than along the Ohote due to greater slope of the stream. In the wetlands, away from the inflow locations, maximum velocities are generally in the range 0.05m/s to 0.08m/s, again well below the 0.25m/s resuspension velocity limit.

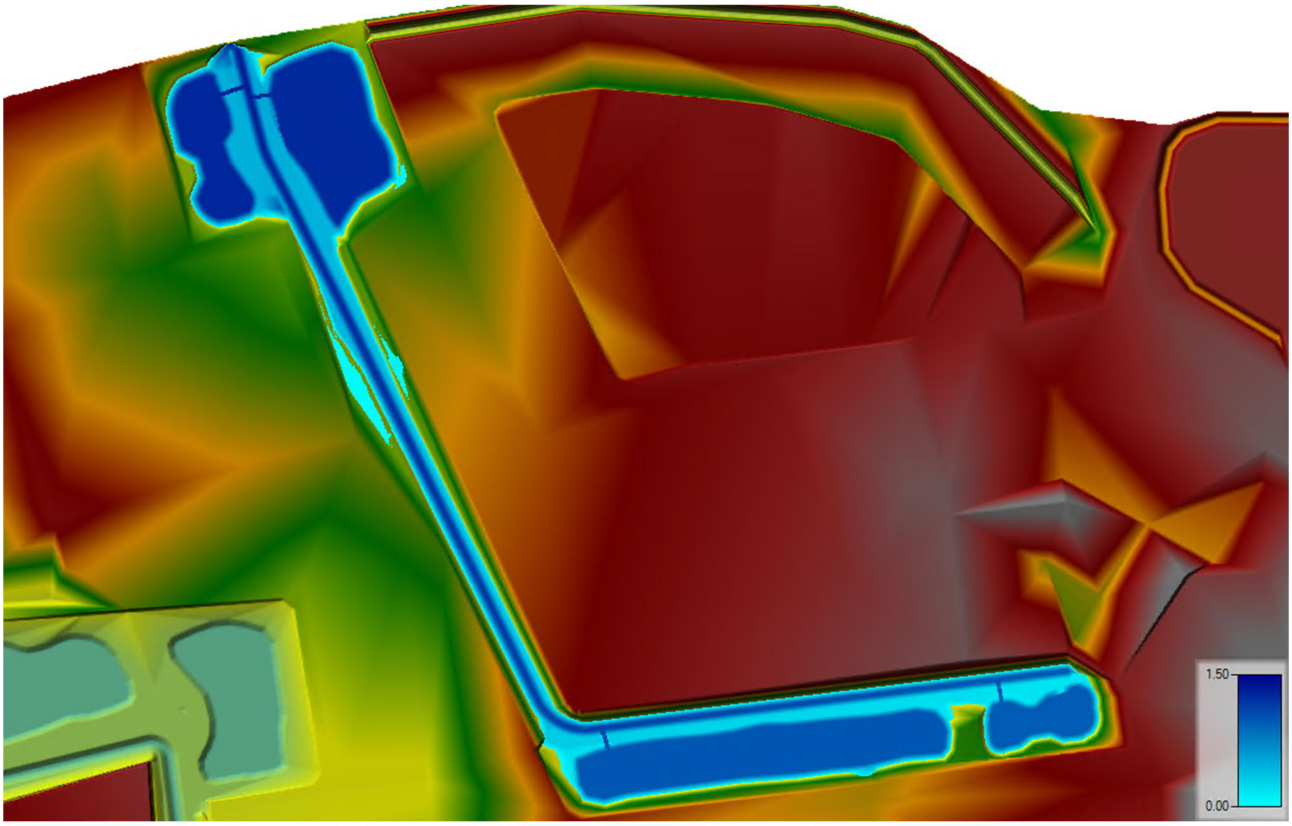


Figure 6-12 – Te Otamanui tributary stream 2D HEC-RAS model maximum depth results during 100yr ARI design storm

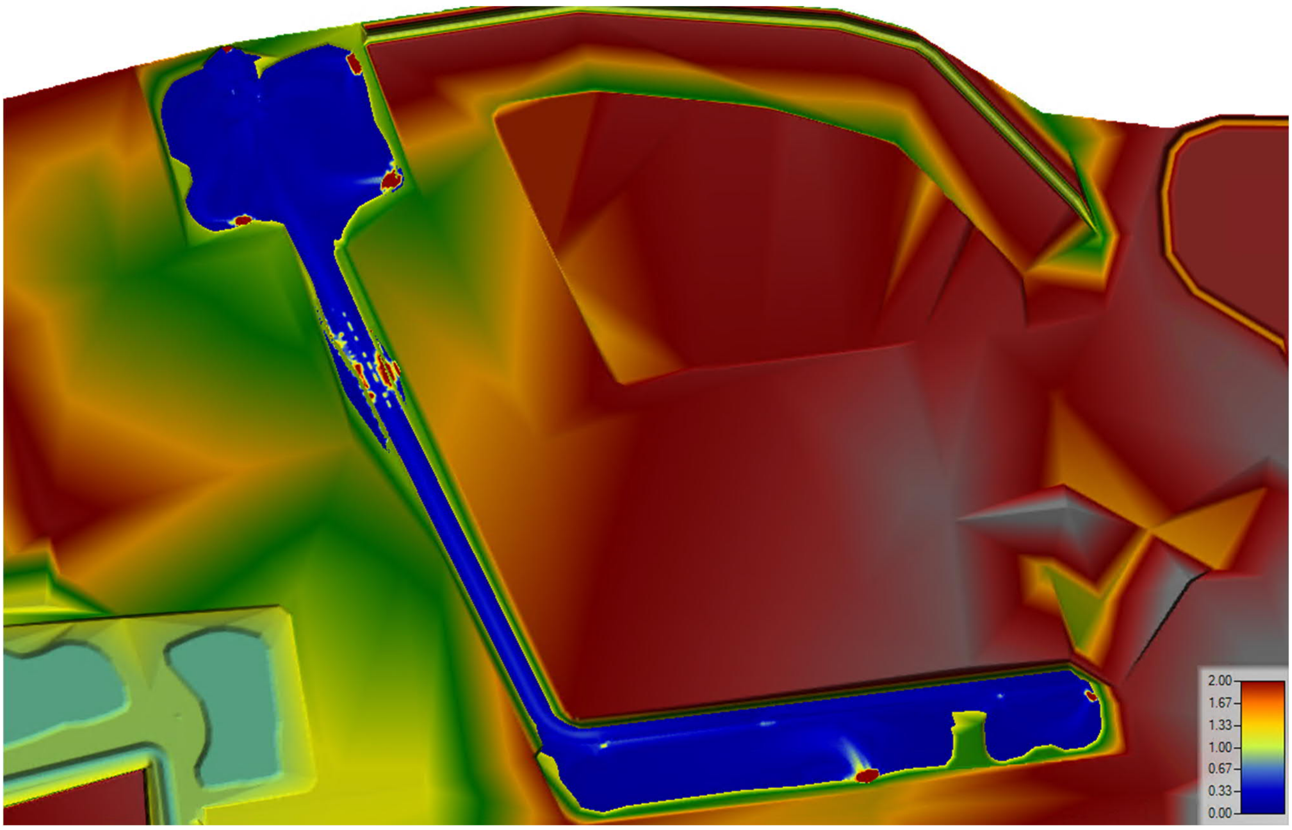


Figure 6-13 – Te Otamanui tributary stream 2D HEC-RAS model maximum velocity results during 100yr ARI design storm

7. Fish Passage

7.1 General Approach

The Ohote stream and Te Otamanui tributary streams will present a number of challenges associated with cross-drainage culverts and the preservation of aquatic habitat connectivity. There are currently three culverts included as part of the re-established Ohote stream to enable major road crossing. In addition, the existing discharge point of the Ohote and Te Otamanui tributary streams are culverts underneath Exelby Road and SH39 respectively. These culverts will have to be upgraded/replaced as these will function as the flow control points that ensure the maximum allowable discharge rates (Table 4.2) are not exceeded.

The National Environmental Standard for Freshwater (NES-F 2020) regulates the compliance of new culverts for fish passage. The main requirement of the regulations is for any new culvert to provide the same passage of fish upstream and downstream as would exist without the culvert.

The proposed approach for accommodating fish passage is roughly summarized by the following:

> Circular cross drainage culverts and large box culverts and associated aprons will be designed to flow at a maximum depth-average velocity less than 0.25 m/s and minimum flow depth of 0.15m for the approximately 100 to 150 mm closest to the culvert walls while conveying 50% of the 2-year ARI flow.

7.2 Culvert Hydraulics

Generally, the hydraulic calculations for channel or culvert flow velocity generate an estimated mean velocity. While this mean velocity may exceed the sustained or longer burst fish swimming velocities, flow velocities along the sides, bottom, and lower corners of a box culvert or the perimeter of a circular culvert will be less. Figure 7.1 shows Chow (1959) Figure 2-3, an example of the velocity distribution in a rectangular channel. In this example, the velocity along the bottom and sides of the culverts is 80% of the mean velocity or less. In addition to the shape of the channel, the velocity distribution also depends on wall/bed roughness, flow depth and the presence of bends.

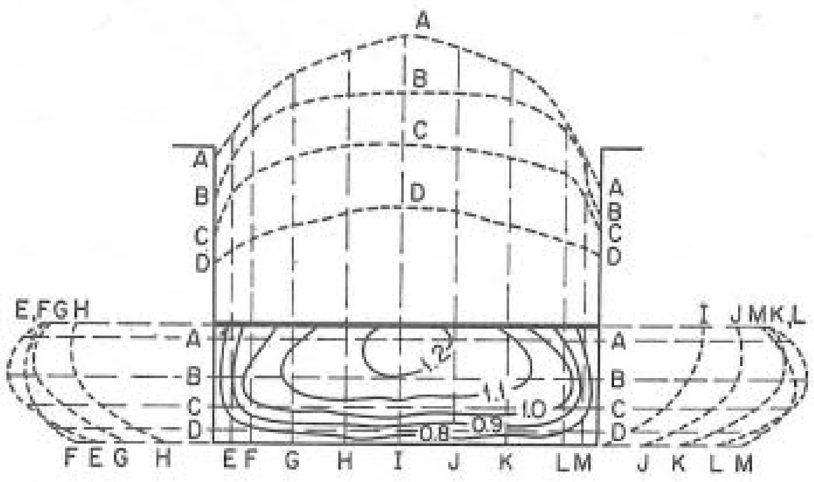


FIG. 2-3. Velocity distribution in a rectangular channel.

Figure 7-1 - Chow (1959) Figure 2-3

Therefore, rather than simply applying the estimated mean velocity, it is important to account for the reduced velocities around the wetted perimeter when assessing the ability of fish to pass upstream through the culvert. HY-8, the culvert evaluation software by USDoT FHWA, includes a Low Flow feature that uses the theoretical velocity distribution of the flow as well as the calculated mean velocity in the culvert to calculate depth-averaged velocities within a vertical slice of the culvert as a function of distance from the culvert wall. As input for its evaluation of fish passage, the software requires the minimum and maximum flow rates for which fish passage should be possible, the maximum threshold velocity for the flow within a vertical slice that allows fish to pass and the minimum threshold depth for the flow within a verical slice that allows fish to pass.

7.2.1 Flow rates for fish passage

For single cell culverts, the maximum flow rate for which fish passage should be possible will be set to half of the 2yr ARI storm. For New Zealand streams, half of the 2yr ARI event causes the stream to flow approximately at bank-full width. Based on information provided by Freshwater Biologists, native fish migration is likely to occur up to the bank-full flow. If the base flow rate for the stream is known, this can be used as the minimum flow rate for which fish passage should be possible. Using the base flow and the half of the 2yr ARI flow as the design events for fish passage means that the velocity inside the culvert is suitable whenever fish migration is likely. For the Ohote and Te Otamanui tributary streams, the base flow is not known. Instead a flow rate less than half of the 2yr ARI flow will be used for the minimum flow rate to confirm the range of flow rates for which fish passage is possible.

For multi-cell culverts, the procedure is more complicated, as fish passage may be possible in one of the side culverts, but not in the primary culverts or vice versa. If the multi-cell culvert is designed for fish passage to occur during low flows in the primary and in a side culvert during high flows, then it must be confirmed that there is a flow rate for which both the primary and side culvert yield suitable fish passage conditions. This guarantees that within the range of flows which require fish passage there is not a flow rate for which fish passage is not possible.

7.2.2 Depth and velocity thresholds

The minimum threshold depth for the flow within a vertical slice that allows fish to pass will be set to 150 mm. This is the recommended minimum depth for New Zealand native fish in the New Zealand Fish Passage Guidelines (Franklin et al., 2018). There is currently no minimum threshold for the width of the vertical slice that results in suitable fish passage. For the purpose of the Specimen Design, the approximate threshold used has been based on the minimum threshold for the depth of the flow.

The maximum threshold velocity for the flow within a vertical slice that allows fish to pass will be obtained from Figures 7-2 and 7-3. These are Table 2 and Figure 3 from Boubee et al. (1999) respectively. The figures present ranges of swimming velocities, covering burst velocity, sustained velocity and preferred velocity for NZ native and foreign fish species as well as durations at which fish species are able to maintain sustained and burst swimming velocities.

The swimming velocities enables a comparison to be made with the depth-averaged velocity of the flow near the walls of the culvert. The amount that the swimming velocities exceed the culvert flow velocities should be sufficiently large that when it is multiplied by the duration of the swimming speed, it results in a distance greater than the length of the culvert, including the aprons.

If a specific fish swimming speed cannot be identified, an initial generic maximum velocity threshold for the velocity in the culvert near the walls has been identified as 0.25m/s. Figure 7-3 shows that a culvert flow velocity of 0.25m/s yields an average velocity difference for the fish of 0.25m/s for 100s or 0.15m/s for 1000s. This results in swimming distances of 25 m to 150 m respectively.

Table 2. *Swimming speeds, migration rates and velocity preferences of indigenous New Zealand freshwater fish species, and comparison with some North American data for weak swimmers.*

	Species	Speed (m s^{-1})	Comments	Source
A	New Zealand data			
	inanga (whitebait)	0.007–0.18	upstream migration gain in the Waikato River	Stancliff et al. 1988
	inanga (whitebait)	0.07–0.39	migration speed based on release and capture times of marked fish in estuary	Boubée et al. 1992
	inanga (adult)	≈0.07	preferred velocities	Mitchell and Boubée 1995
		0.30–0.34	maximum water velocities in which the fish will swim freely	Mitchell and Boubée 1995
		<0.15	water velocity which fish select and can easily negotiate	Mitchell and Boubée 1995
	banded kokopu (whitebait)	0.05	upstream migration gain in the Waikato River	Stancliff et al. 1988
	elver (55–80 mm)	0.20 0.34	sustained speed steady speed (>30 s)	Mitchell 1989
	mullet (85–96 mm LCF)	0.12 0.20	sustained speed steady speed (>30 s)	Mitchell 1989
	mean NZ species[1] (excluding mullet) (47–63 mm LCF)	0.20 0.32	sustained speed steady speed (>30 s)	Mitchell 1989
B	North American data (Bell 1986)			
	elvers (100 mm)	0.0–0.15	sustained speed	
	mullet (13–69 mm)	0.14–0.46	burst speed	
	Arctic grayling (50–100 mm)	0.46–0.76	steady speed (minutes)	
	Arctic grayling (adult)	0.81–2.1	steady speed (minutes)	

[1] from observations obtained with juvenile shortfinned eel, common bully, common smelt, inanga, and banded kokopu

Figure 7-2 – Table 2 from Boubee et al. (1999)

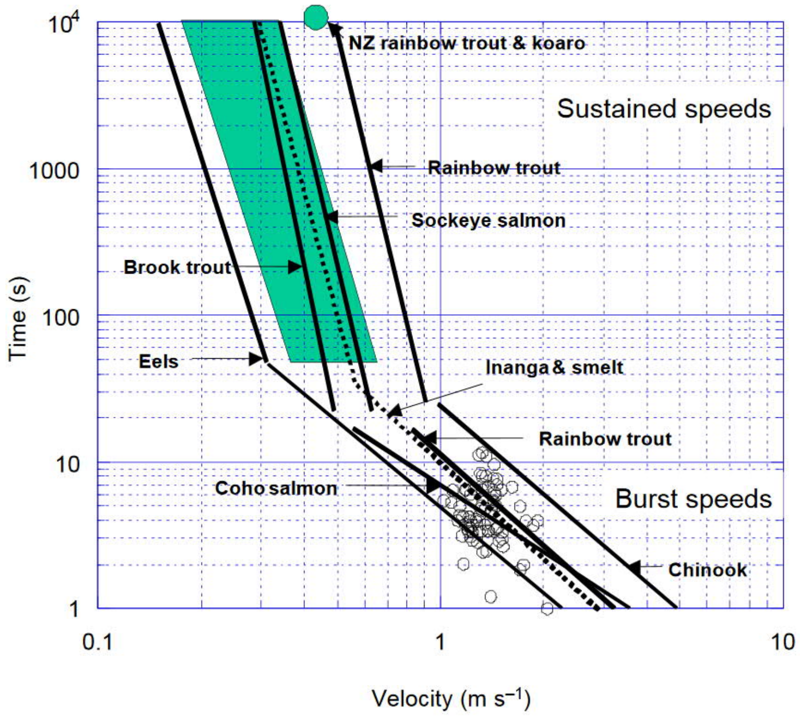


Figure 7-3 - Figure 3 from Boubee et al. (1999), Durations that NZ native and foreign fish species are able to maintain swimming velocities. The shaded area represents sustained speeds for common bully, shortfinned eels, smelt, banded kokopu and inanga with sizes between 40 and 70 mm. The circles show burst speeds for smelt and inanga with average size 70 mm.

7.2.3 HY-8 Low Flow Analysis

The input parameters for an example culvert design that follows the above approach are presented in Figure 7-4. As part of the discharge data, the minimum flow rate is set to the minimum flow rate at which fish passage is required or the base flow. The design flow rate is set equal to the maximum flow rate at which fishpassage must be facilitated or 50% of the flow rate generated by the 2yr 24hr ARI storm event. The maximum flow rate is the maximum flow rate for the culvert design, often the flow rate generated by the 100yr 24hr ARI storm event.

To carry out the low flow analysis for confirming the suitability of the culvert for fish passage, the minimum, design and maximum flow rate used as the discharge data are also used as the flows for AOP (Aquatic Organism Passage) as shown in Figure 7-5. In addition, the maximum threshold velocity was set to 0.25 m/s for this example and the minimum threshold depth to 150 mm.

The low flow hydraulics results for this particular example are shown in Figure 7-6. As the number of slices or division in flow half-span top width was set to 20 (Figure 7-5), each slice has a width of 37.5 mm. Starting at the wall of the culvert, the slice depth-averaged velocity is calculated and compared with the threshold velocity. Once the calculated velocity for a slice is greater than 0.25 m/s, the slice will be given the label 'Too Fast'. Secondly, the average slice depth is calculated. For the example, the depth is constant along the cross-section because a box culvert is used. The calculated depth is compared with the threshold depth. If the calculated depth for a slice is less than 150 mm, the slice will be given the label 'Too Shallow'. If the slice meets both thresholds, it is coloured green, otherwise it is coloured red. For the example culvert, Figure 7-6 shows that at the minimum flow rate that requires fish passage, the 0.30 m closed to wall meets the fish passage requirements. At the maximum flow rate that requires facilitation of fish passage, the 0.19 m closest to the culvert wall meets the fish passage requirements. Based on the assumption that fish passage is required within the 0.1 to 0.15 m closest to the culvert wall, this culvert design meets the design requirements.

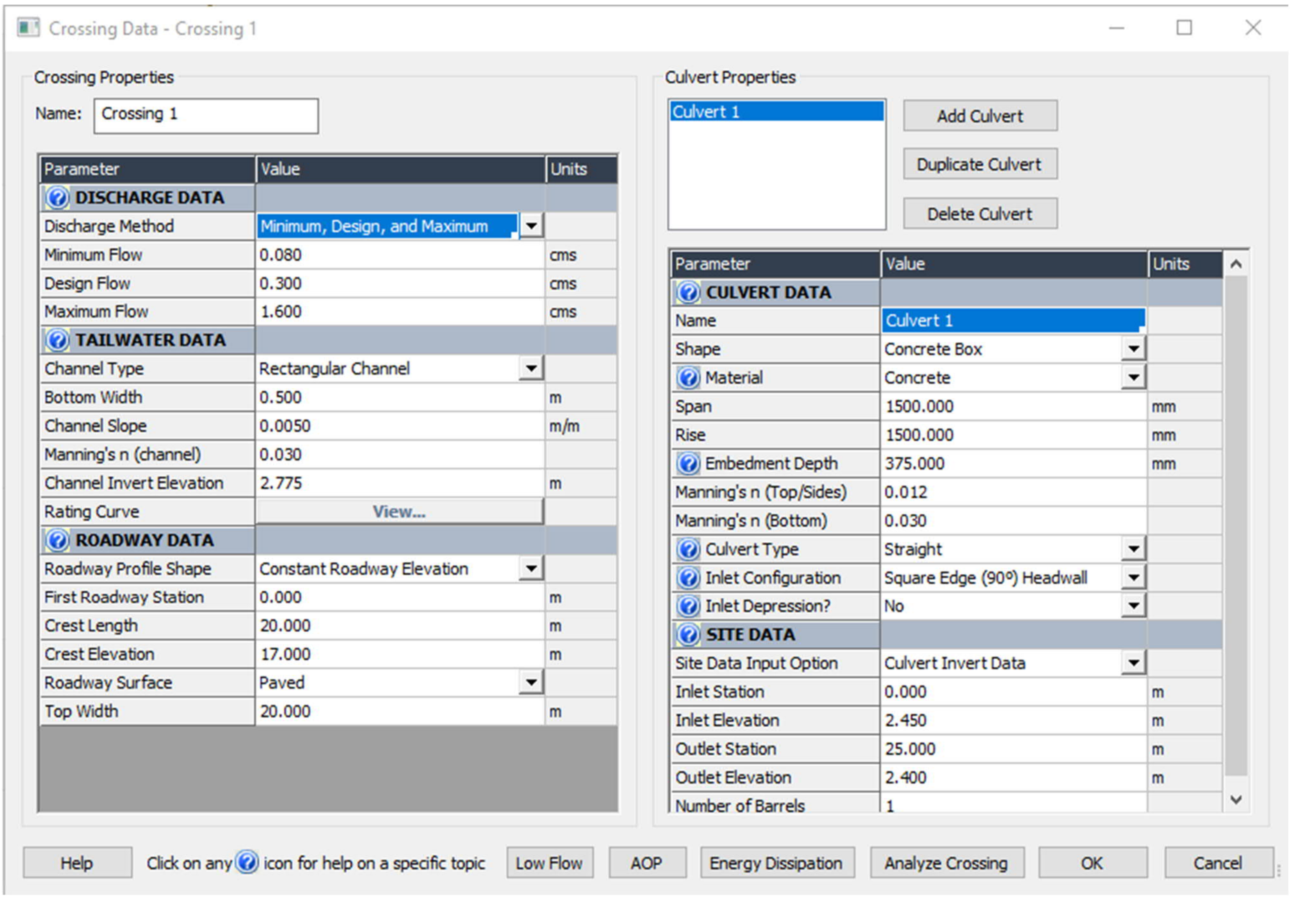


Figure 7-4 – HY-8 input parameters for evaluation of example culvert design including fish passage

Parameter	Value	U...	Notes
Flows for AOP			
Lowest Flow that still provides Aquatic Organism Passage	0.08 ...		
Highest Flow that still provides Aquatic Organism Passage	0.3 c...		
Peak Flow (Hydraulic Design Flow)	1.6 c...		
Threshold Values			
Maximum Threshold Velocity	0.25	m/s	maximum velocity of water allowed within culvert barrel
Minimum Threshold Depth	150.00	mm	minimum depth of water allowed within culvert barrel
Model Parameters			
Number of Divisions in Flow Half-Span Top Width	20		Half of the culvert span is divided by this number

Figure 7-5 -HY-8 Low Flow analysis input reach data

Parameter (units)	Value	Value	Value	Value	Value	Value	Value	Value	Value
Low Flow Results									
Distance from wall (m)	0.00 - 0.04	0.04 - 0.08	0.08 - 0.11	0.11 - 0.15	0.15 - 0.19	0.19 - 0.23	0.23 - 0.26	0.26 - 0.30	0.30 - 0.34
Slice Average Velocity (m/s)	0.02	0.05	0.13	0.18	0.20	0.22	0.24	0.25	0.26
Slice Depth (m)	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Threshold	Threshold Met	Threshold Met	Threshold Met	Threshold Met	Threshold Met	Threshold Met	Threshold Met	Threshold Met	Too Fast
High Flow Results									
Distance from wall (m)	0.00 - 0.04	0.04 - 0.08	0.08 - 0.11	0.11 - 0.15	0.15 - 0.19	0.19 - 0.23	0.23 - 0.26	0.26 - 0.30	0.30 - 0.34
Slice Average Velocity (m/s)	0.02	0.06	0.15	0.20	0.23	0.25	0.27	0.28	0.30
Slice Depth (m)	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Threshold	Threshold Met	Threshold Met	Threshold Met	Threshold Met	Threshold Met	Too Fast	Too Fast	Too Fast	Too Fast

Figure 7-6 - HY-8 Low Flow analysis results table

7.3 Embedment

In additional to fish passage, the NES-F (2020) also requires continuity of the geomorphic processes. It states that, for enclosed circular culverts, its inverts must be placed so that at least 25% of the culvert's diameter is below the level of the bed. This encourages sediments transported downstream by the flow to settle in the culvert and create an embedment layer. The gradation and roughness parameters of this layer are similar to streambed conditions encountered upstream. The NES-F (2020) also requires the embedment to be stable at the flow rate at or below which the water flows 80% of the time. During high flow rates, it is expected that embedment material is transported downstream out of the culvert, but this is replenished during low flow rates.

For any box culverts, the embedment will be set to 200mm irrespectively of height. The purpose of limiting the embedment depth in box culverts is to avoid subchannels eroding into the bed material in the box culvert. Subchannels might result in higher velocities during lower flow or base flow conditions that could be detrimental to fish passage. Subchannels eroded into the bed material within the box culvert could also result in that portion of the channel where the fish will pass, to not actually have any bed material along the bottom. The embedment depth will be set to 200mm to limit the depth of any channel forming inside the channel, while still enabling continuity of the geomorphic processes.

7.3.1 HY-8 Aquatic Organism Passage Analysis

HEC-26 (Kilgore et al., 2010) includes a methodology to determine whether the embedment material included in the culvert design is stable under various flow rates. The methodology is based on estimating the shear stress required to move the embedment material and the shear stress present because of the flow rate through the culvert. HY-8 has incorporated this methodology as its AOP (Aquatic Organism Passage) analysis feature.

Input data for AOP includes cross-sectional information obtained from the field describing the cross-sectional shape, thalweg elevation, slope (Figure 7-7) and bed gradation (Figure 7-8). Based on flow rates and the cross-sectional information, AOP computes Manning's n for each of the cross-sections and each of the flow rates, using four different methods. For each Manning's calculation AOP determines whether the input parameters met the criteria of the method. It is up to the user to determine the most suitable method to be used for the conditions investigated. Note that in the example results shown in Figure 7-8, the Manning's n values calculated using the Limerinos equation, yields a value of 0.03 for all flow rates investigated. Hence this was used as part of the input data for the culvert (Figure 7-5) for the downstream channel and the embedment layer along the bottom of the culvert.

The final input information obtained in the field will determine if the streambed is in dynamic equilibrium (Figure 7-8). If this is not the case, then it is not possible to carry out the AOP analysis and stream instability countermeasures may need to be carried out first.

Based on the hydraulic input parameters for the culvert and the upstream and downstream channels, the AOP function in HY-8 calculates the applied shear stress to the bed, the permissible shear stress to the culvert bed and the minimum and maximum shear stress applied to the channel (Figure 7-9). Calculations are carried out for both the high flow and peak design flows.

For the example presented, the culvert has a 375mm thick layer of embedment and the culvert is lowered by 375mm relative to the existing stream (Figure 7-5). The results show that the applied shear stress is much smaller than the permissible shear stress for both the minimum and maximum fish passable flow rates (Figure 7-9) and hence the culvert design is compliant. In addition, the stress applied to the reach is smaller than the permissible shear stress under high flow, indicating that no sediments are transported by the flow. However, under peak flow the applied shear stress is larger than the permissible shear stress and hence sediment is expected to move in the channel. As the applied shear stress in the culvert remains smaller than the permissible shear stress, it is possible than under peak flow sediments settle in the culvert, potentially resulting in blockages. Hence the culvert may need to be inspected after a peak flow event.

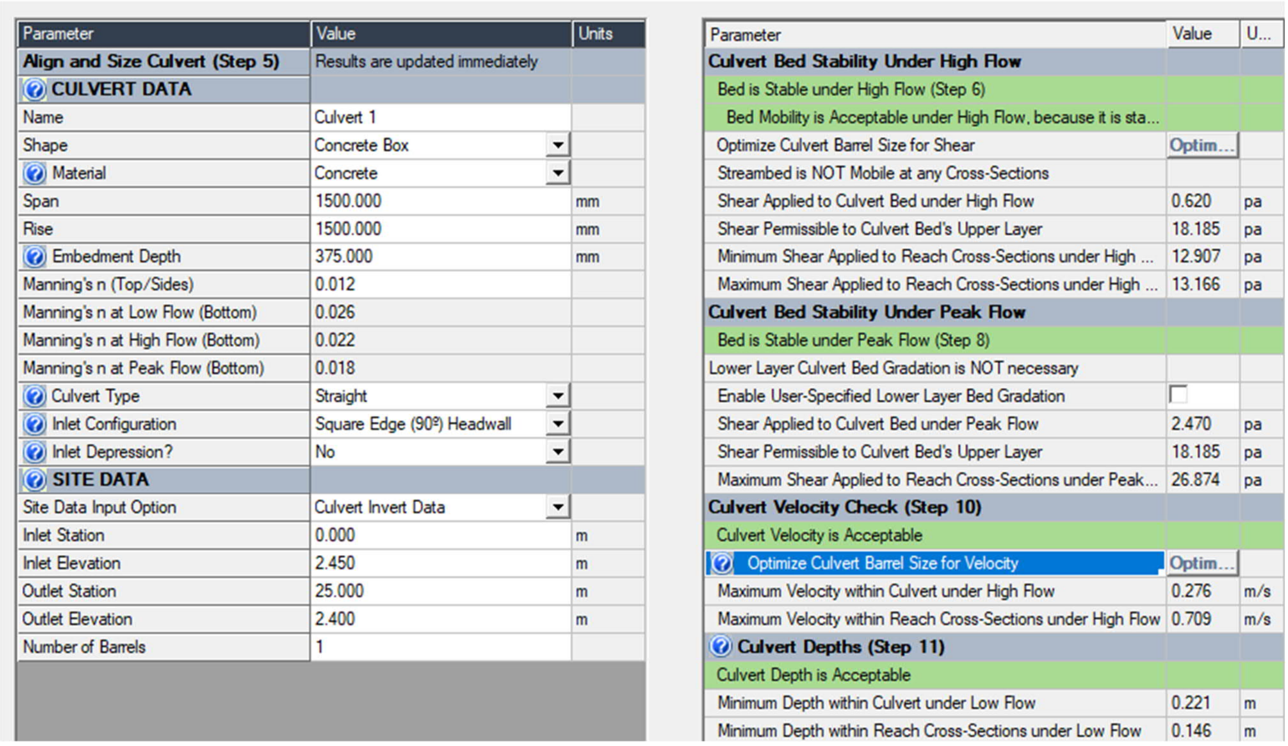
Parameter	Value	Units	Notes	
Flows for AOP (Step 1)				
Lowest Flow that still provides Aquatic Organism Passage	0.08 cms			
Highest Flow that still provides Aquatic Organism Passage	0.3 cms			
Peak Flow (Hydraulic Design Flow)	1.6 cms			
Cross-Sections (Step 2)				
Length that project should extend up and downstream	75.00	m		
Number of Cross-Sections Upstream of Crossing	3			
Number of Cross-Sections Downstream of Crossing	3			
Cross-Section Table				
Cross-Section Name	Station (m)	Define	Thalweg (m)	Slope (downstream) (m/m)
Upstream X-Sec	-120.00	Define...	3.42	0.0050
Upstream X-Sec	-80.00	Define...	3.22	0.0050
Upstream X-Sec	-40.00	Define...	3.02	0.0049
Culvert Inlet	0.00	NA	2.82	0.0020
Culvert Outlet	25.00	NA	2.77	<TW Channel>
Downstream X-Sec	65.00	Define...	2.57	0.0050
Downstream X-Sec	105.00	Define...	2.37	0.0050
Downstream X-Sec	145.00	Define...	2.17	0.0050

Figure 7-7 – HY-8 AOP Input Reach Data

Parameter	Value	Units	Notes	
Reach Channel Gradations (Step 2)				
Number of Gradations	1			
Gradation Table				
Gradation	Starts @ Station (...	Ends @ Station (m)	Define	D50 (mm)
Streambed Gradation	-36.58	44.20	Define...	18.00
Reach Channel Manning's n Method				
Manning's n Method for Reach Cross-Section	Blodgett		Method was selected by user	
Summary for Manning's n for Reach				
Criteria is met	18 out of 18 times			
Average Manning's n computed for reach cross sections	0.03			
Upstream Cross-Section	n @ Low Flow	n @ High Flow	n @ Peak Flow	
Upstream X-Sec	Criteria is met	Criteria is met	Criteria is met	
	0.03	0.03	0.03	
Upstream X-Sec	Criteria is met	Criteria is met	Criteria is met	
	0.03	0.03	0.03	
Upstream X-Sec	Criteria is met	Criteria is met	Criteria is met	
	0.03	0.03	0.03	

Reach Stability (Steps 3 & 4)			
Is Streambed in Dynamic Equilibrium?	Yes	This analysis needs to be performed in the field!	
Culvert Bed Gradations (Step 5)			
Upper Culvert Bed Gradation	View...	D50 = 18.00 mm	
Culvert Bed Manning's n Method			
Manning's n Method for Culvert Bed Gradation	Limerinos	Criteria is met for this method at all Flows	Method was selected by HY-8; Please review Sel...
Manning's n computed at Low Flow	0.0391	Criteria is met at this Flow	☑ Specify the Manning's n value
User-Specified Manning's n value at Low Flow	0.0259		This Manning's n value will be used at this flow!
Manning's n computed at High Flow	0.0347	Criteria is met at this Flow	☑ Specify the Manning's n value

Figure 7-8 - HY-8 AOP Gradation Input Data



Parameter	Value	Units
Align and Size Culvert (Step 5)	Results are updated immediately	
CULVERT DATA		
Name	Culvert 1	
Shape	Concrete Box	
Material	Concrete	
Span	1500.000	mm
Rise	1500.000	mm
Embedment Depth	375.000	mm
Manning's n (Top/Sides)	0.012	
Manning's n at Low Flow (Bottom)	0.026	
Manning's n at High Flow (Bottom)	0.022	
Manning's n at Peak Flow (Bottom)	0.018	
Culvert Type	Straight	
Inlet Configuration	Square Edge (90º) Headwall	
Inlet Depression?	No	
SITE DATA		
Site Data Input Option	Culvert Invert Data	
Inlet Station	0.000	m
Inlet Elevation	2.450	m
Outlet Station	25.000	m
Outlet Elevation	2.400	m
Number of Barrels	1	

Parameter	Value	U...
Culvert Bed Stability Under High Flow		
Bed is Stable under High Flow (Step 6)		
Bed Mobility is Acceptable under High Flow, because it is sta...		
Optimize Culvert Barrel Size for Shear	Optim...	
Streambed is NOT Mobile at any Cross-Sections		
Shear Applied to Culvert Bed under High Flow	0.620	pa
Shear Permissible to Culvert Bed's Upper Layer	18.185	pa
Minimum Shear Applied to Reach Cross-Sections under High ...	12.907	pa
Maximum Shear Applied to Reach Cross-Sections under High ...	13.166	pa
Culvert Bed Stability Under Peak Flow		
Bed is Stable under Peak Flow (Step 8)		
Lower Layer Culvert Bed Gradation is NOT necessary		
Enable User-Specified Lower Layer Bed Gradation	☐	
Shear Applied to Culvert Bed under Peak Flow	2.470	pa
Shear Permissible to Culvert Bed's Upper Layer	18.185	pa
Maximum Shear Applied to Reach Cross-Sections under Peak...	26.874	pa
Culvert Velocity Check (Step 10)		
Culvert Velocity is Acceptable		
Optimize Culvert Barrel Size for Velocity	Optim...	
Maximum Velocity within Culvert under High Flow	0.276	m/s
Maximum Velocity within Reach Cross-Sections under High Flow	0.709	m/s
Culvert Depths (Step 11)		
Culvert Depth is Acceptable		
Minimum Depth within Culvert under Low Flow	0.221	m
Minimum Depth within Reach Cross-Sections under Low Flow	0.146	m

Figure 7-9 - HY-8 AOP Align and Size Culvert

7.3.2 HY-8 Embedment Issues

When entering an embedment depth into HY-8 as part of the crossing characteristics of a circular culvert, HY-8 approximates the shape of the culvert using a fifth-order polynomial. In the latest version of HY-8 (7.60), the coefficients were updated. However, in conjunction with the low flow or AOP analyses, HY-8 is still not representing the culvert shape correctly. Until this is resolved, it is necessary to use the 'user defined' option to represent the shape of the culvert above the embedment layer.

A similar issue occurs when analysing multi-cell box culverts. For single-cell box culverts, no problems were observed during the analysis. However, the 'user defined' shape for a box is straightforward, hence throughout the culvert analyses for the Specimen Design, the 'user defined' shape was used for all culverts with embedment.

For multi-cell culvert crossings, it is likely that only the primary cell will have embedment. As a result, the Manning's n for the bottom of the culvert in the primary cell is estimated to be larger than that for the bottom of the other cells. However, a second issue with the current version of HY-8 is that for multi-cell culverts with embedment, the low flow analysis is carried out only on the bottom culvert as listed in the crossing characteristics (Figure 7-4). When HY-8 is carrying out the low flow analysis, it automatically updates the roughness information for the culvert based on the top culvert as listed in the crossing characteristic. To ensure correct results, it is therefore necessary to have the same Manning's n for the bottom of each cell of the multi-cell culvert.

8. Stream Re-establishment

Within the Rotokauri North development, the Ohote and Te Otamanui tributary streams have been turned into drains and therefore their natural character has been lost. The proposed methodology to re-establish the streams within an urban environment is described below.

8.1 Determination of Channel Forming Flow

Due to the highly modified nature of the streams within the Rotokauri North site, it will not be possible or relevant to use field methodologies to determine the channel forming discharge. During the design of the stream, the design flow of the stream will be based on the mean annual flood flow, which is typically the channel forming discharge for wadable streams. Based on various documents, including HEC-20 (Lagasse et al., 2012), this flow is usually close to half of the 2-year ARI flow. Therefore the primary stream channel will be designed to convey half of the 2-year flow with the water surface at the top of the bank.

To account for climate change to 2090, the channel design will be tested for flows with and without climate change adjustment. The banks will be configured the banks to be stable, while providing the habitat function for both conditions.

8.2 Methodology and Hydraulic Modelling

Generally, the re-established stream will need to be designed to safely convey the channel forming flow within the low flow channel and a design flood flow within the floodplain. The full cross-section of the re-established stream will be designed with the capacity to convey the 100-year ARI storm event.

To provide a reasonable level of habitat, the proposed re-establishment must be designed to provide stable low flow channels, with shapes that will mimic a natural stream with similar geomorphic and hydrologic conditions, with a minimum amount of riprap and minimal mechanical bank reinforcing. In addition to providing capacity to convey flood flows, proposed floodplain areas will be designed to add riparian floodplain habitat function.

For the new streams, channel stability is achieved through careful cross-section design and vertical grade control. This approach focuses on maintaining non-erosive channel velocities as well as providing a channel layout that anticipates a channel shape that would result from the hydraulic forces of the stream in a similar geomorphic environment to those of the stream in its natural state.

Due to variations in stream geomorphology, no two streams re-establishment will be the same. The general methodology applied will require the careful application of methods and practices described in the references listed in Section 1.3.

8.3 Hydraulic Design and Modelling

Stream re-establishment is most easily designed in a three-step process. First, cross-sections will be developed for conveying both the estimated channel forming flow and the design storm flood flow. A longitudinal grade will be selected that will maintain a reasonably non-erosive velocity and depths that are shallow enough to allow controlled transitions between the re-established streams and existing channels. The initial cross-section analysis will utilise simple normal flow calculations, using Manning's Equation.

Once reasonable cross-section geometry is identified for the proposed re-establishment, the second step will be to create 1-dimensional hydraulic models for the proposed watercourses. HEC-RAS 5.0.7 is an accepted software for the modelling. HEC-RAS accounts for backwater and allows proper hydraulic design of drop structures. Other 1-dimensional models that provide similar energy balance calculations may also be acceptable. The 1-dimensional model will allow the designer to establish the stable longitudinal grade, which will inform the required level of sinuosity for the stream realignment.

Once stable channel design is achieved in the HEC-RAS model, step three will involve the design of scour/erosion protection as well as the addition of aesthetic and habitat enhancements. The enhancements that can be added include additional sinuosity and bend apex pools. Once planting has had time to establish, the new stream channels will perform in the same manner as a stable natural stream. Additional habitat enhancements, such as root balls and artificial dens for eels and galaxiids, can be added in coordination with the Ecologist.

The general layout of proposed stream re-establishments will, as much as practically can be achieved, mimic the appearance, hydraulics, and habitat function of natural streams in similar environments. Stable streams with good habitat functionality with similar geomorphology and hydrology will be used for establishing a potential equilibrium sinuosity.

8.4 Channel Cross-Section

While natural channels may have significant variation in the width, it may be necessary to design the proposed stream channels with more consistent stream channel widths. Where the sections of re-established stream channel are short, this consistency will not cause an unnatural appearance. Where long open stretches of very flat low velocity stream channel realignment are proposed, small variations in side-slope and pool-like nodes can be added for variation. The heights of the banks can be designed with small depressed areas, to provide wet areas that promote fish spawning.

Straight portions of stream realignments will be designed as trapezoidal channels with subtle variations in width and side-slope. Channel bends will be designed as triangular sections (Figure 8-1) that simulate bend apex pools, with cut banks and point bars. This combination of sections is intended to mimic natural stream morphology as well as enhance the stability of the channel. The bend apex pools also provide opportunities for additional habitat enhancements (Figure 8-2 and 8-3), including root wads and constructed dens for Anguillids and Galaxiids.

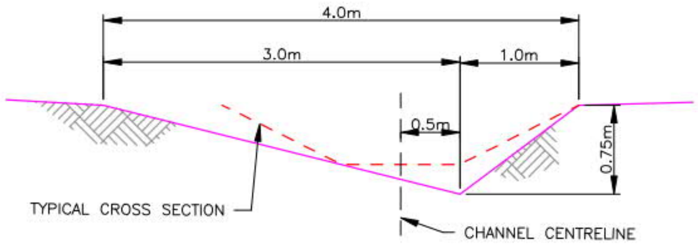


Figure 8-1 - Typical geometric shape of a bend apex pool cross-section in comparison to a normal trapezoidal section.

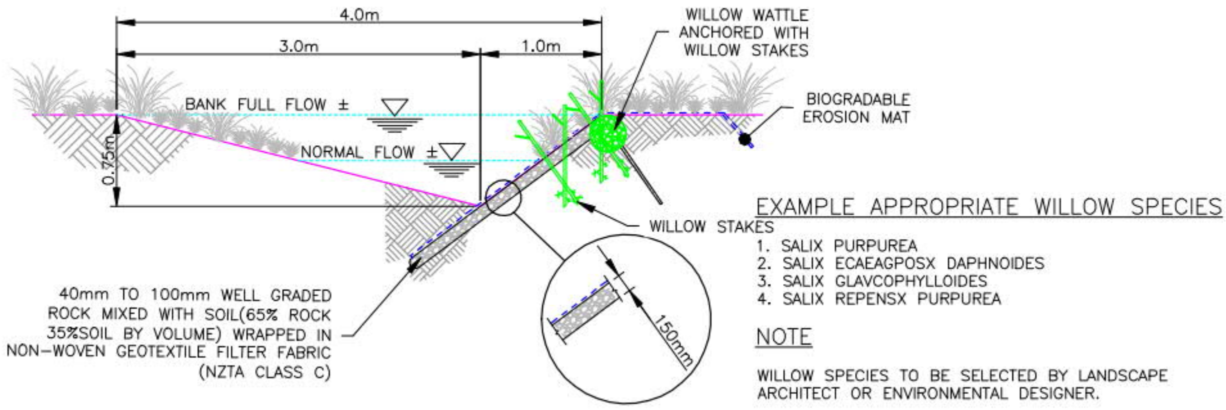


Figure 8-2 Typical detail of a bend apex pool cross-section. Filter fabric around soil riprap is optional for higher velocity areas. Erosion control mat is adequate for ordinary velocities.

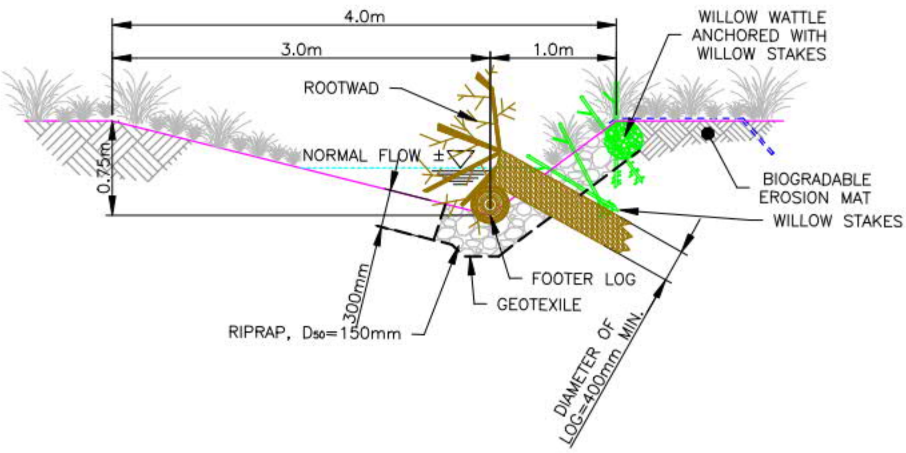


Figure 8-3 – Example of a bend apex pool detail with additional habitat enhancement.

8.5 Profile and Longitudinal Grade

There are two approaches for establishing a geomorphologically appropriate longitudinal grade that will be applied for stream re-establishment. A stable longitudinal grade can include small drop structures where necessary.

The first method focuses on the longitudinal grade of the channel bed to establish an acceptable hydraulic grade. Calculations or modelling will be required to demonstrate that the design supports a hydraulic grade line that is relatively close to parallel to the channel slope and any hydraulic jumps are contained within the protection of the drop structures. The second and preferred method uses structures inserted into a simple 1-dimensional model to flatten the hydraulic grade line, independent of the grade of the existing channel thalweg.

Figure 8-4 shows an example preliminary profile of a re-established portion of a stream, downstream of a culvert. The proposed re-establishment ties to the existing channel some distance downstream of the culvert outfall. The proposed re-establishment has mean channel flow velocities that vary from 0.40m/s to a maximum of 1.09m/s while conveying the 100-year ARI flow, adjusted for climate change. There is only one cross-section in the re-established reach that according to the model calculations has a mean velocity that is greater than or equal to 1m/s during the 100-year ARI flow. In the 50% of the 2-year ARI flow event, the mean channel flow velocities vary from 0.16 m/s to 0.77 m/s.

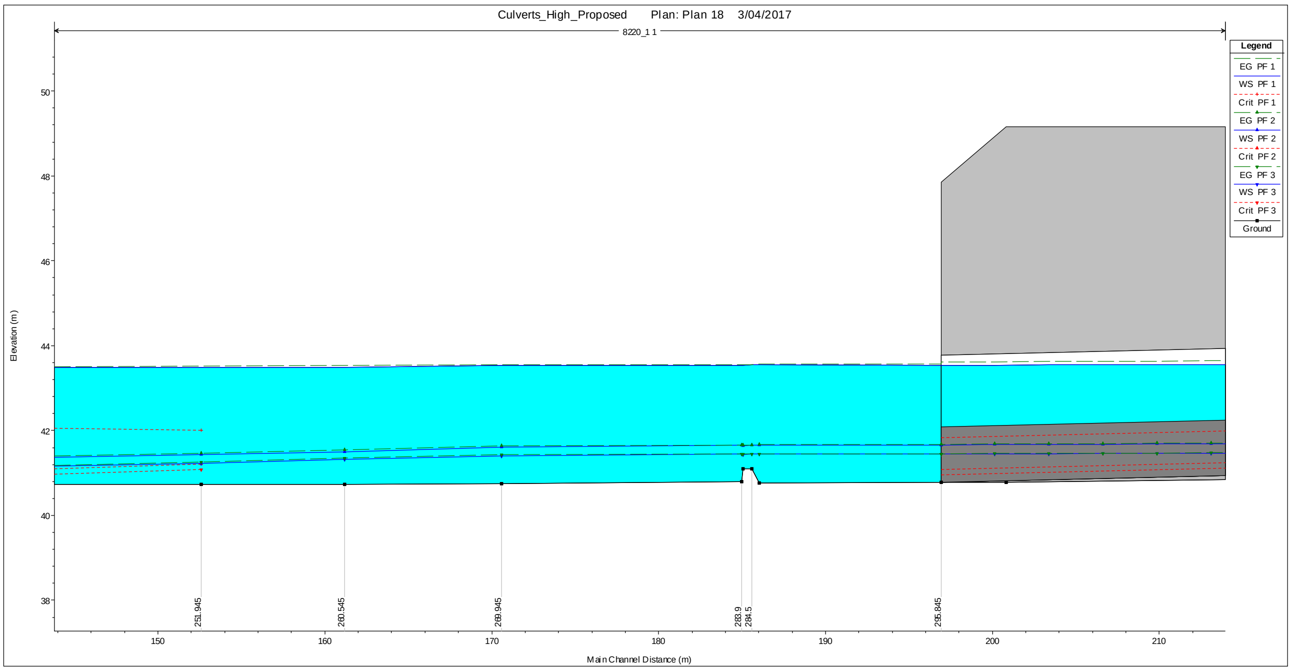


Figure 8-4 -1D HEC-RAS model, example re-establishment of stream downstream of a culvert

Both the high and low velocities in the model are outliers that may require adjustment in detailed design. The low velocity will tend to interrupt the bedload/sediment transport balance and must be corrected. The higher velocity indicates that a short reach of channel is influenced by downstream conditions from the existing reach of the river. This will only be corrected if the detailed design of the downstream reach adequately flattens the hydraulic grade.

The mean velocity indicates that fish will need to pass around the channel periphery in this section. If this velocity is not reduced by downstream reachn improvements, then some bank stabilisation will be required.

Figure 8-5 shows the water surface profile output from a 1-dimensional model for an example re-establishment of an irregular stream reach located between a culvert and a confluence with a tributary. Two hydraulic grade control structures have been added to the model that flatten the hydraulic grade and create two small controlled hydraulic jumps.

The modelled upstream structure is 0.5m high and the downstream model drop structure is 0.4 m high. These drop structures will have to be designed to maintain reasonable fish passage and once designed can add habitat function as well as hydraulic function. Short sections of bed and bank reinforcement (riprap is one option) will be needed upstream and downstream of these drop structures. Based on the model, the design of these drop structures for longitudinal grade control will require that at least one more small structure is located downstream of the confluence.

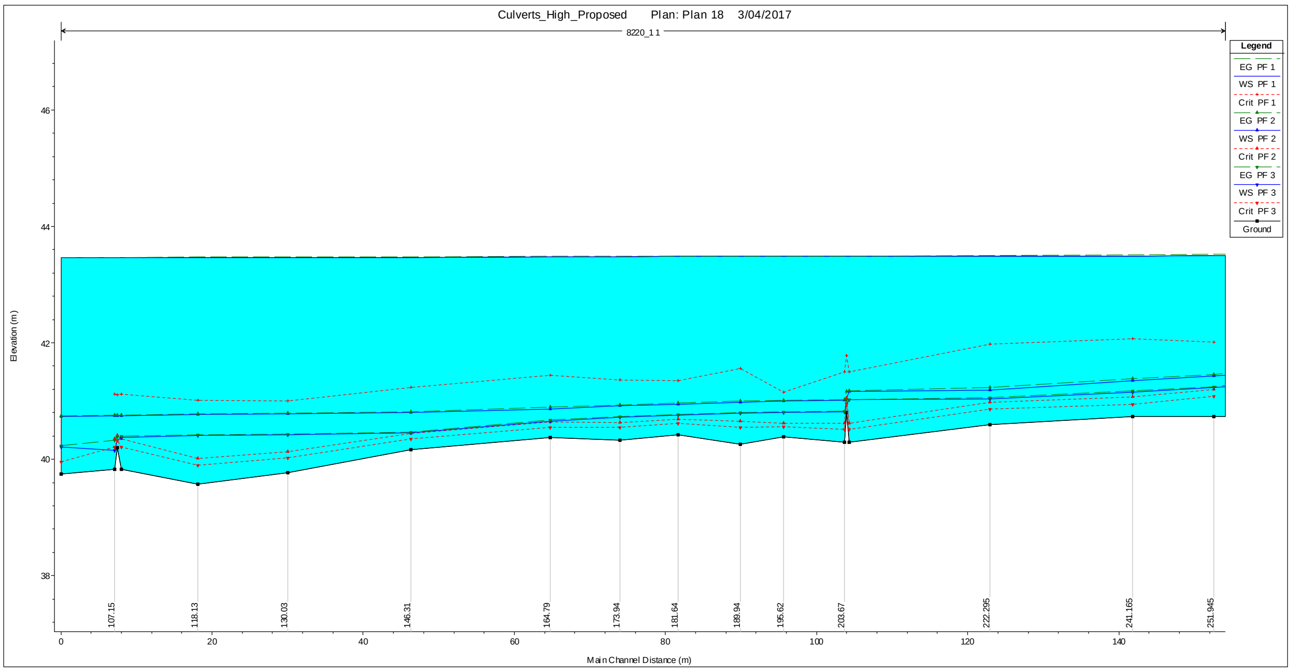


Figure 8-5 -1D HEC-RAS model, water surface profile for example stabilisation of an irregular stream reach

8.6 Habitat Function

The re-established reaches of the streams will be designed to enhance the aquatic habitat value of the stream. Approaches will be recommended for the detailed design phase, including methods described in the USDA Guidance for Stream Restoration and Rehabilitation (Yochum, 2016) and the USDA Stream Habitat Improvement Handbook (Seehorn, 1992).

Figure 8-6 provides an example option for aquatic habitat enhancement. Most of the habitat enhancements are intended to strategically initiate scour for additional habitat enhancement, so they cannot be blindly applied where bed and bank erosion are already a problem. Fortunately, most of the habitat enhancements in these documents can be reconfigured or modified to function in a manner that stabilizes the stream or river channel as well. Figures 8-6, 8-7, and 8-8 show several potential habitat enhancements that can be adapted to also enhance stability.

Implementation of these alternatives should be coordinated with the project ecologist. With the addition of the riparian planting on the floodplain and overbanks, as well as wetland plantings within the main channel, the re-established portions of streams will provide a significant overall improvement to the aquatic habitat value when compared to the existing streams.

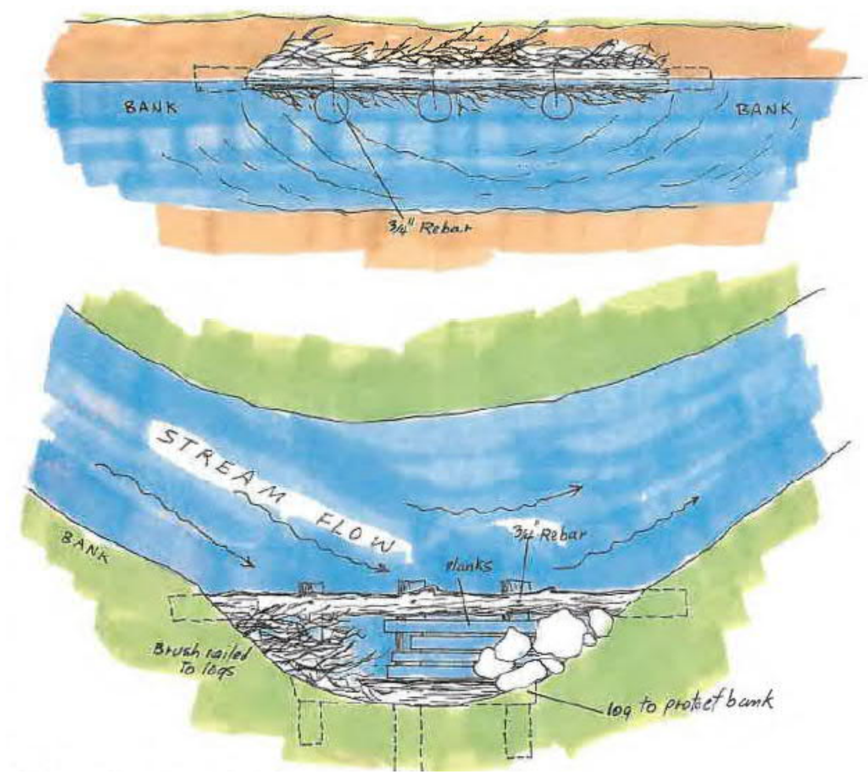


Figure 8-6 – Example bank stabilisation and habitat enhancement option from the Stream Habitat Improvement Handbook (Seehorn, 1992).

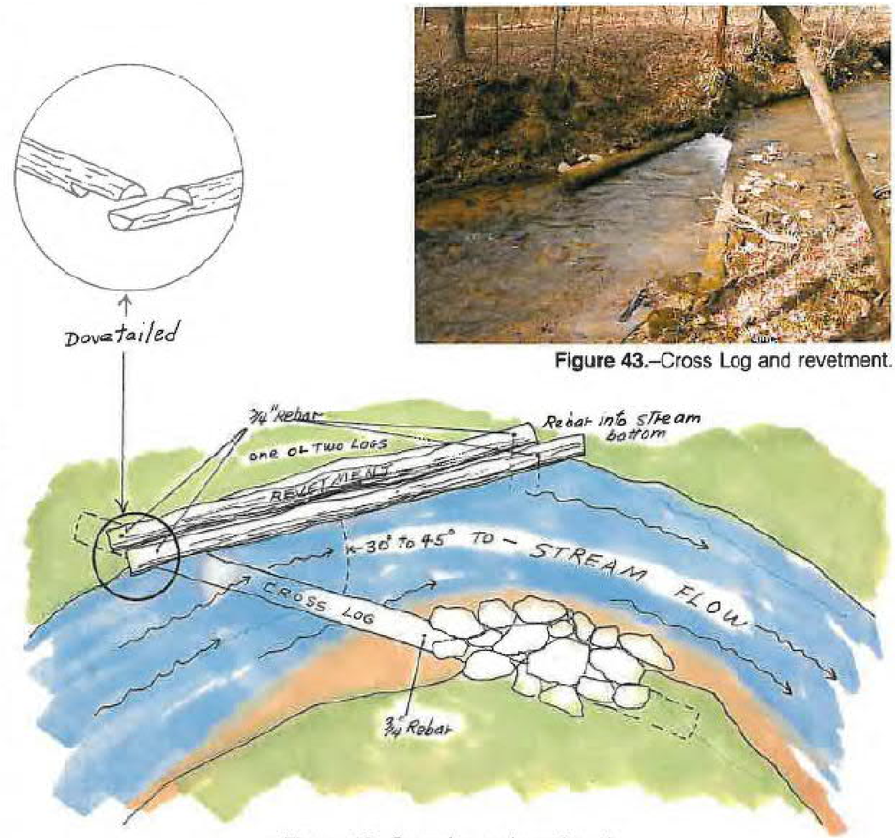


Figure 43.–Cross Log and revetment.

Figure 42.–Cross log and revetment.

Figure 8-7 - The cross log revetment. Figure taken from the Stream Habitat Improvement Handbook (Seehorn, 1992).

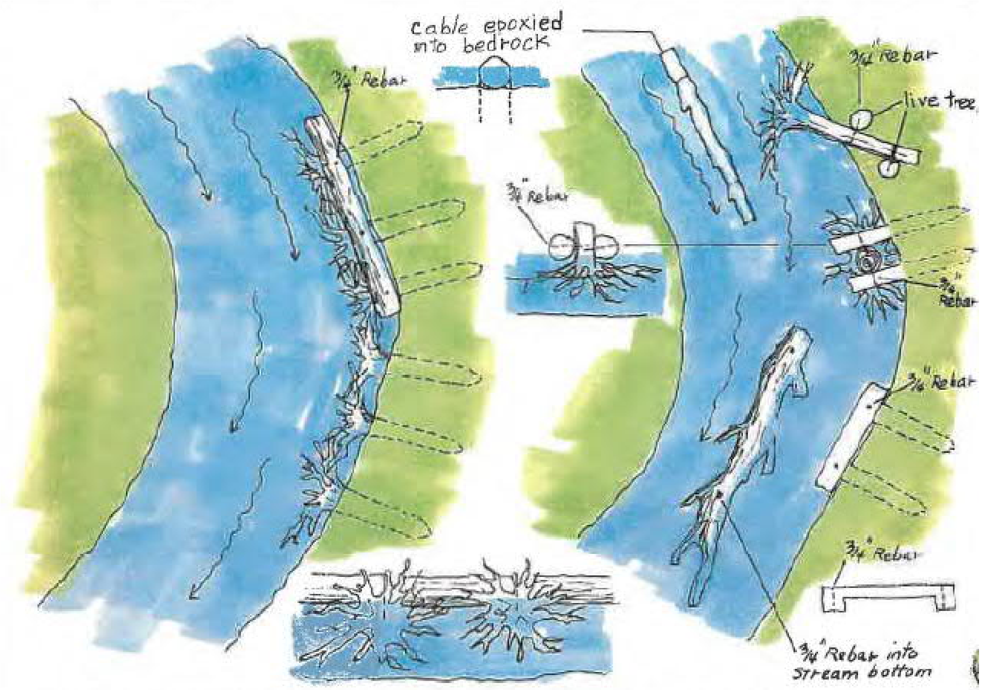


Figure 8-8 - Two more habitat enhancement options that can improve bank stability in bends from the Stream Habitat Improvement Handbook (Seehorn, 1992).

9. Conclusion

The proposed stormwater management approach re-establishes two natural stream corridors that have been highly modified through agricultural practices and provide stormwater treatment through the use of treatment wetlands and wetland swales. These corridors will provide natural and community greenspace in addition to stormwater management and will work toward meeting the key objective Ngaa Wai Ora, the protection and enhancement of freshwater, waterways, springs and wetlands, as set out in the Cultural Impact Assessment documentation for Rotokauri North.

As proposed, the systems in each of the catchments meet the requirements of the Waikato RITS and WRC Stormwater Guidelines, while keeping operational requirements of the systems fairly simple and cost efficient. The stormwater systems in the Ohote and Te Otomanui catchments will also provide a slight reduction in the very high groundwater levels, improving stability and durability for the road network within the development.

As proposed, Rotokauri North offers:

- A high level of environmental enhancement
- Re-establishment of stream and floodplain corridors
- Net increase in habitat value for freshwater fauna and flora
- Stormwater management that meets or exceeds regulatory requirements.

Concept design layout for the stormwater management is attached in Appendix B

Appendix A - SWMM Model

SWMM Stormwater Model

1. Overview

The catchment hydrology for the proposed stormwater management layout was modelled in SWMM. The model layout is presented in Figure 1.1. Input parameters and output results from SWMM are presented for the following scenarios:

- 50% of 2yr ARI event
- 2yr ARI event
- 10yr ARI event
- 100yr ARI event

Each of the scenarios is for the proposed condition and therefore includes the impact of climate change on the rainfall intensities.

Figure 1-1 – Rotokauri North ICMP - SWMM Model Layout

2. Scenario: 50% of 2yr ARI

2.1 Model Status Report

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
  --------------------------------------------------------------

  *********************************************************
  NOTE: The summary statistics displayed in this report are
  based on results found at every computational time step,
  not just on results from each reporting time step.
  *********************************************************

  ****************
  Analysis Options
  ****************
  Flow Units ............... CMS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Ponding Allowed ........ NO
    Water Quality .......... NO
  Infiltration Method ...... HORTON
  Flow Routing Method ...... DYNWAVE
  Surcharge Method ......... EXTRAN
  Starting Date ............ 10/14/2020 00:00:00
  Ending Date .............. 10/17/2020 00:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:01:00
  Wet Time Step ............ 00:00:01
  Dry Time Step ............ 00:00:01
  Routing Time Step ........ 1.00 sec
  Variable Time Step ....... YES
  Maximum Trials ........... 20
  Number of Threads ........ 8
  Head Tolerance ........... 0.000500 m


  **************************        Volume         Depth
  Runoff Quantity Continuity     hectare-m            mm
  **************************     ---------       -------
  Total Precipitation ......        13.141        35.757
  Evaporation Loss .........         0.000         0.000
  Infiltration Loss ........         6.347        17.272
  Surface Runoff ...........         6.493        17.669
  Final Storage ............         0.300         0.816
  Continuity Error (%) .....         0.000


  **************************        Volume        Volume
  Flow Routing Continuity        hectare-m      10^6 ltr
  **************************     ---------     ---------
  Dry Weather Inflow .......         0.000         0.000
  Wet Weather Inflow .......         6.494        64.938
```

```
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.001         0.011
External Outflow .........         6.183        61.835
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.002
Final Stored Volume ......         0.311         3.112
Continuity Error (%) .....         0.007


*************************
Highest Continuity Errors
*************************
Node W_Ohote_7_Out_US (2.01%)
Node W_Ohote_6_Out_US (1.29%)
Node J_O_Stream_08 (1.20%)


***************************
Time-Step Critical Elements
***************************
None


********************************
Highest Flow Instability Indexes
********************************
Link M_Culvert_01 (6)
Link M_Stream_01 (4)
Link M_Stream_02 (1)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.10 sec
Average Time Step           :     1.00 sec
Maximum Time Step           :     1.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.00
Percent Not Converging      :     0.00
Time Step Frequencies       :
    1.000 -  0.631 sec      :    99.98 %
    0.631 -  0.398 sec      :     0.01 %
    0.398 -  0.251 sec      :     0.01 %
    0.251 -  0.158 sec      :     0.00 %
    0.158 -  0.100 sec      :     0.00 %
```

2.2 Summary Results

```
***************************
Subcatchment Runoff Summary
***************************
```

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
Mangaheka_1A	36.76	0.00	0.00	3.24	29.94	2.27	32.21	0.30	0.02	0.876
Mangaheka_1B	36.76	0.00	0.00	3.08	29.97	2.43	32.40	0.37	0.05	0.881
Mangaheka_1C	36.76	0.00	0.00	3.11	29.97	2.41	32.37	0.65	0.07	0.881
Mangaheka_1D	36.76	0.00	0.00	3.20	29.95	2.31	32.26	0.41	0.03	0.878
Mangaheka_1E	36.76	0.00	0.00	3.27	29.93	2.25	32.18	0.54	0.03	0.875
Mangaheka_1F	36.76	0.00	0.00	3.22	29.94	2.30	32.24	0.37	0.02	0.877
Mangaheka_1G	36.76	0.00	0.00	21.70	0.00	15.06	15.06	0.06	0.00	0.410
Mangaheka_2A	36.76	0.00	0.00	3.57	29.94	1.94	31.88	0.51	0.03	0.867
Mangaheka_2B	36.76	0.00	0.00	3.63	29.92	1.88	31.81	0.91	0.05	0.865
Mangaheka_2C	36.76	0.00	0.00	3.43	29.97	2.09	32.05	0.64	0.08	0.872
Mangaheka_2D	36.76	0.00	0.00	3.41	29.97	2.11	32.08	0.59	0.09	0.873
Mangaheka_2E	36.76	0.00	0.00	3.41	29.97	2.10	32.07	0.54	0.08	0.873
Mangaheka_Upstream	36.76	0.00	0.00	23.01	12.33	0.63	12.96	19.03	0.47	0.353
Ohote_1A	36.76	0.00	0.00	4.03	29.95	1.49	31.43	0.31	0.02	0.855
Ohote_1B	36.76	0.00	0.00	4.11	29.93	1.40	31.33	1.01	0.06	0.852
Ohote_1C	36.76	0.00	0.00	4.17	29.91	1.35	31.26	0.90	0.05	0.850
Ohote_1D	36.76	0.00	0.00	4.07	29.94	1.45	31.39	0.34	0.02	0.854
Ohote_2A	36.76	0.00	0.00	4.08	29.94	1.44	31.37	0.25	0.02	0.853
Ohote_2B	36.76	0.00	0.00	4.21	29.89	1.30	31.19	0.61	0.03	0.849
Ohote_2C	36.76	0.00	0.00	4.41	29.78	1.11	30.88	0.84	0.03	0.840
Ohote_2D	36.76	0.00	0.00	4.19	29.90	1.32	31.22	0.57	0.03	0.849
Ohote_3A	36.76	0.00	0.00	4.01	29.95	1.51	31.46	0.27	0.02	0.856
Ohote_3B	36.76	0.00	0.00	4.03	29.95	1.49	31.44	0.46	0.03	0.855
Ohote_3C	36.76	0.00	0.00	4.17	29.91	1.34	31.25	0.97	0.05	0.850
Ohote_3D	36.76	0.00	0.00	4.18	29.90	1.33	31.23	1.02	0.05	0.850
Ohote_4A	36.76	0.00	0.00	5.39	29.95	0.13	30.07	0.26	0.02	0.818
Ohote_4B	36.76	0.00	0.00	5.40	29.94	0.12	30.06	0.75	0.05	0.818
Ohote_4C	36.76	0.00	0.00	5.45	29.87	0.07	29.94	0.98	0.05	0.815
Ohote_4D	36.76	0.00	0.00	5.39	29.94	0.12	30.07	0.71	0.05	0.818
Ohote_5A	36.76	0.00	0.00	5.50	29.93	0.01	29.95	0.22	0.01	0.815
Ohote_5B	36.76	0.00	0.00	5.49	29.95	0.02	29.97	0.41	0.03	0.815
Ohote_5C	36.76	0.00	0.00	5.48	29.96	0.03	30.00	0.66	0.07	0.816
Ohote_5D	36.76	0.00	0.00	5.47	29.97	0.05	30.02	0.61	0.07	0.817
Ohote_6A	36.76	0.00	0.00	5.50	29.92	0.01	29.93	0.45	0.03	0.814
Ohote_6B	36.76	0.00	0.00	5.51	29.88	0.01	29.89	1.10	0.05	0.813

Ohote_6C	36.76	0.00	0.00	5.50	29.92	0.01	29.93	1.70	0.10	0.814
Ohote_6D	36.76	0.00	0.00	5.50	29.93	0.01	29.94	1.26	0.07	0.814
Ohote_7A	36.76	0.00	0.00	5.14	29.94	0.38	30.31	0.34	0.02	0.825
Ohote_7B	36.76	0.00	0.00	5.02	29.96	0.50	30.46	1.05	0.10	0.829
Ohote_7C	36.76	0.00	0.00	5.25	29.87	0.26	30.13	1.32	0.06	0.820
Ohote_Stream_1	36.76	0.00	0.00	35.37	0.00	1.39	1.39	0.03	0.00	0.038
Ohote_Stream_2	36.76	0.00	0.00	30.22	0.00	6.54	6.54	0.01	0.00	0.178
Ohote_Stream_3	36.76	0.00	0.00	33.94	0.00	2.82	2.82	0.02	0.00	0.077
Ohote_Stream_4	36.76	0.00	0.00	36.69	0.00	0.07	0.07	0.00	0.00	0.002
Ohote_Stream_5	36.76	0.00	0.00	36.75	0.00	0.01	0.01	0.00	0.00	0.000
Ohote_Stream_6	36.76	0.00	0.00	36.75	0.00	0.01	0.01	0.00	0.00	0.000
Ohote_Stream_7	36.76	0.00	0.00	36.73	0.00	0.03	0.03	0.00	0.00	0.001
Ohote_Upstream_East_1	31.91	0.00	0.00	28.75	1.52	1.56	3.08	1.22	0.11	0.096
Ohote_Upstream_East_2	31.91	0.00	0.00	13.30	1.52	17.02	18.54	1.06	0.05	0.581
Ohote_Upstream_North	31.91	0.00	0.00	27.48	1.52	2.83	4.35	0.26	0.02	0.136
Ohote_Upstream_West	31.91	0.00	0.00	29.61	1.52	0.70	2.22	0.52	0.06	0.070
Rotokauri_South_1A	36.76	0.00	0.00	3.98	29.95	1.53	31.48	0.99	0.07	0.856
Rotokauri_South_1B	36.76	0.00	0.00	3.96	29.95	1.56	31.51	0.90	0.07	0.857
Rotokauri_South_1C	36.76	0.00	0.00	3.87	29.97	1.64	31.61	1.06	0.13	0.860
Rotokauri_South_1D	36.76	0.00	0.00	3.85	29.97	1.66	31.63	0.79	0.12	0.860
Rotokauri_South_1E	31.91	0.00	0.00	20.95	4.56	6.17	10.73	0.16	0.03	0.336
Rotokauri_South_1F	36.76	0.00	0.00	3.99	29.95	1.52	31.47	2.67	0.18	0.856
Te_Otamanui_1A	36.76	0.00	0.00	4.14	29.92	1.37	31.29	0.34	0.02	0.851
Te_Otamanui_1B	36.76	0.00	0.00	4.15	29.91	1.37	31.28	0.77	0.04	0.851
Te_Otamanui_1C	36.76	0.00	0.00	4.10	29.93	1.41	31.34	0.62	0.04	0.853
Te_Otamanui_2A	36.76	0.00	0.00	4.09	29.93	1.42	31.36	0.27	0.02	0.853
Te_Otamanui_2B	36.76	0.00	0.00	4.23	29.88	1.29	31.17	0.80	0.04	0.848
Te_Otamanui_2C	36.76	0.00	0.00	4.21	29.89	1.31	31.20	0.75	0.04	0.849
Te_Otamanui_2D	36.76	0.00	0.00	3.91	29.97	1.60	31.57	0.39	0.05	0.859
Te_Otamanui_2E	36.76	0.00	0.00	4.14	29.92	1.38	31.29	0.48	0.03	0.851
Te_Otamanui_2F	36.76	0.00	0.00	4.03	29.95	1.48	31.43	0.36	0.03	0.855
Te_Otamanui_3A	36.76	0.00	0.00	1.97	29.96	3.55	33.50	0.16	0.01	0.911
Te_Otamanui_3B	36.76	0.00	0.00	1.99	29.95	3.53	33.48	0.31	0.02	0.911
Te_Otamanui_3C	36.76	0.00	0.00	2.01	29.94	3.51	33.45	0.53	0.04	0.910
Te_Otamanui_3D	36.76	0.00	0.00	1.98	29.95	3.53	33.49	0.37	0.03	0.911
Te_Otamanui_4A	36.76	0.00	0.00	2.11	29.91	3.41	33.31	0.41	0.02	0.906
Te_Otamanui_4B	36.76	0.00	0.00	2.00	29.95	3.52	33.47	0.65	0.05	0.910
Te_Otamanui_4C	36.76	0.00	0.00	2.05	29.93	3.46	33.39	0.90	0.05	0.908
Te_Otamanui_4D	36.76	0.00	0.00	1.91	29.97	3.61	33.57	1.22	0.14	0.913
Te_Otamanui_4E	36.76	0.00	0.00	1.89	29.97	3.63	33.60	1.33	0.18	0.914
Te_Otamanui_Stream_1	36.76	0.00	0.00	34.91	0.00	1.85	1.85	0.02	0.00	0.050
Te_Otamanui_Tree_Park	36.76	0.00	0.00	28.58	1.74	6.35	8.08	0.27	0.01	0.220

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Node Depth Summary
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days	Time of Max Occurrence hr:min	Reported Max Depth Meters
Exelby_Culvert_DS	JUNCTION	0.12	0.28	27.29	0	19:42	0.28
Exelby_Culvert_US	JUNCTION	0.15	0.36	27.52	0	19:42	0.36
J_M_Stream_01	JUNCTION	0.25	0.94	29.19	0	13:37	0.94
J_M_Stream_02	JUNCTION	0.31	1.13	29.43	0	13:35	1.13
J_M_Stream_03	JUNCTION	0.28	1.13	29.53	0	13:33	1.13
J_O_Stream_01	JUNCTION	0.19	0.39	27.58	0	19:28	0.39
J_O_Stream_02	JUNCTION	0.19	0.40	27.62	0	19:04	0.40
J_O_Stream_03	JUNCTION	0.18	0.40	27.63	0	18:52	0.40
J_O_Stream_04	JUNCTION	0.18	0.39	27.64	0	18:30	0.39
J_O_Stream_05	JUNCTION	0.17	0.38	27.65	0	18:18	0.38
J_O_Stream_06	JUNCTION	0.16	0.37	27.65	0	18:13	0.37
J_O_Stream_07	JUNCTION	0.15	0.37	27.67	0	17:06	0.37
J_O_Stream_08	JUNCTION	0.18	0.40	27.62	0	19:04	0.40
J_O_Stream_09	JUNCTION	0.17	0.38	27.62	0	19:04	0.38
J_O_Stream_10	JUNCTION	0.17	0.38	27.65	0	18:18	0.38
J_O_Stream_14	JUNCTION	0.13	0.34	27.67	0	16:50	0.34
J_T_Stream_01	JUNCTION	0.13	0.38	28.58	0	19:22	0.38
J_T_Stream_02	JUNCTION	0.11	0.32	28.58	0	19:14	0.32
J_T_Stream_03	JUNCTION	0.10	0.31	28.59	0	19:10	0.31
J_T_Stream_04	JUNCTION	0.11	0.30	28.59	0	19:05	0.30
M_Culvert_1_DS	JUNCTION	0.24	1.01	28.96	0	13:39	1.01
M_Culvert_1_US	JUNCTION	0.17	0.81	29.01	0	13:38	0.81
M_Culvert_2_DS	JUNCTION	0.07	0.53	29.53	0	13:33	0.53
M_Culvert_2_US	JUNCTION	0.05	0.24	29.54	0	13:34	0.24
MH_M1_1	JUNCTION	0.01	0.14	31.03	0	12:10	0.14
MH_M1_10	JUNCTION	0.08	0.29	30.93	0	14:26	0.29
MH_M1_11	JUNCTION	0.09	0.30	30.92	0	14:22	0.30
MH_M1_12	JUNCTION	0.01	0.04	30.64	0	14:25	0.04
MH_M1_2	JUNCTION	0.01	0.12	30.52	0	12:11	0.12
MH_M1_3	JUNCTION	0.02	0.16	30.42	0	12:10	0.16
MH_M1_4	JUNCTION	0.02	0.22	29.99	0	12:13	0.22
MH_M1_5	JUNCTION	0.02	0.10	30.33	0	12:15	0.10
MH_M1_6	JUNCTION	0.03	0.24	29.81	0	12:14	0.24
MH_M1_7	JUNCTION	0.05	0.24	30.94	0	14:21	0.24
MH_M1_8	JUNCTION	0.06	0.26	30.94	0	14:21	0.26
MH_M1_9	JUNCTION	0.07	0.28	30.94	0	14:21	0.28
MH_M2_1	JUNCTION	0.02	0.13	30.93	0	12:15	0.13
MH_M2_2	JUNCTION	0.02	0.16	31.21	0	12:10	0.16
MH_M2_3	JUNCTION	0.02	0.17	30.28	0	12:10	0.17
MH_M2_4	JUNCTION	0.01	0.17	30.82	0	12:10	0.17
MH_M2_5	JUNCTION	0.01	0.16	30.31	0	12:11	0.16
MH_M2_6	JUNCTION	0.03	0.33	29.98	0	12:13	0.33
MH_M2_7	JUNCTION	0.03	0.19	30.44	0	12:13	0.19
MH_O1_1	JUNCTION	0.02	0.15	28.70	0	12:15	0.15
MH_O1_2	JUNCTION	0.02	0.15	27.93	0	12:17	0.15
MH_O1_3	JUNCTION	0.02	0.12	28.06	0	12:17	0.12
MH_O1_4	JUNCTION	0.04	0.23	27.65	0	12:19	0.23
MH_O1_5	JUNCTION	0.02	0.10	27.84	0	12:15	0.10
MH_O1_6	JUNCTION	0.07	0.24	27.55	0	12:18	0.24
MH_O2_1	JUNCTION	0.02	0.12	28.54	0	12:21	0.12
MH_O2_2	JUNCTION	0.12	0.32	27.62	0	19:11	0.32
MH_O2_3	JUNCTION	0.03	0.13	29.14	0	12:30	0.13
MH_O2_4	JUNCTION	0.03	0.12	28.84	0	12:31	0.12
MH_O2_5	JUNCTION	0.03	0.12	28.56	0	12:33	0.12
MH_O2_6	JUNCTION	0.02	0.11	28.56	0	12:20	0.11
MH_O2_7	JUNCTION	0.04	0.18	28.11	0	12:28	0.18
MH_O2_8	JUNCTION	0.03	0.15	27.83	0	12:29	0.15
MH_O2_9	JUNCTION	0.10	0.29	27.62	0	19:10	0.29
MH_O3_1	JUNCTION	0.03	0.15	29.01	0	12:15	0.15
MH_O3_2	JUNCTION	0.03	0.14	28.52	0	12:20	0.14
MH_O3_3	JUNCTION	0.02	0.13	29.06	0	12:12	0.13

MH_O3_4	JUNCTION	0.01	0.10	28.44	0	12:15	0.10
MH_O3_5	JUNCTION	0.03	0.23	27.92	0	12:19	0.23
MH_O3_6	JUNCTION	0.03	0.15	28.42	0	12:20	0.15
MH_O3_7	JUNCTION	0.04	0.21	27.82	0	12:20	0.21
MH_O3_8	JUNCTION	0.15	0.35	27.66	0	18:16	0.35
MH_O4_1	JUNCTION	0.02	0.14	28.41	0	12:15	0.14
MH_O4_2	JUNCTION	0.03	0.14	28.62	0	12:20	0.14
MH_O4_3	JUNCTION	0.03	0.14	28.05	0	12:26	0.14
MH_O4_4	JUNCTION	0.03	0.17	27.83	0	12:17	0.17
MH_O4_5	JUNCTION	0.02	0.15	29.25	0	12:11	0.15
MH_O4_6	JUNCTION	0.02	0.15	28.76	0	12:15	0.15
MH_O4_7	JUNCTION	0.02	0.13	27.98	0	12:17	0.13
MH_O4_8	JUNCTION	0.12	0.32	27.66	0	18:18	0.32
MH_O5_1	JUNCTION	0.02	0.13	28.31	0	12:10	0.13
MH_O5_2	JUNCTION	0.02	0.11	27.99	0	12:13	0.11
MH_O5_3	JUNCTION	0.02	0.17	28.95	0	12:10	0.17
MH_O5_4	JUNCTION	0.02	0.16	28.44	0	12:11	0.16
MH_O5_5	JUNCTION	0.02	0.17	28.82	0	12:10	0.17
MH_O5_6	JUNCTION	0.02	0.20	28.07	0	12:12	0.20
MH_O5_7	JUNCTION	0.07	0.27	27.69	0	12:14	0.27
MH_O6_1	JUNCTION	0.02	0.13	28.34	0	12:20	0.13
MH_O6_2	JUNCTION	0.03	0.15	28.10	0	12:20	0.15
MH_O6_3	JUNCTION	0.03	0.13	27.73	0	12:21	0.13
MH_O6_4	JUNCTION	0.03	0.19	29.68	0	12:15	0.19
MH_O6_5	JUNCTION	0.03	0.18	29.20	0	12:19	0.18
MH_O6_6	JUNCTION	0.10	0.33	27.69	0	12:24	0.33
MH_O6_7	JUNCTION	0.03	0.17	28.28	0	12:15	0.17
MH_O6_8	JUNCTION	0.03	0.15	27.97	0	12:16	0.15
MH_O6_9	JUNCTION	0.16	0.35	27.64	0	19:16	0.35
MH_O7_1	JUNCTION	0.02	0.20	29.28	0	12:10	0.20
MH_O7_2	JUNCTION	0.02	0.17	28.72	0	12:12	0.17
MH_O7_3	JUNCTION	0.02	0.18	27.93	0	12:14	0.18
MH_O7_4	JUNCTION	0.03	0.14	29.10	0	12:25	0.14
MH_O7_5	JUNCTION	0.03	0.15	28.45	0	12:25	0.15
MH_O7_6	JUNCTION	0.03	0.15	28.18	0	12:26	0.15
MH_O7_7	JUNCTION	0.03	0.14	27.81	0	12:27	0.14
MH_O7_8	JUNCTION	0.11	0.29	27.61	0	19:33	0.29
MH_S1_1	JUNCTION	0.02	0.17	31.73	0	12:12	0.17
MH_S1_2	JUNCTION	0.02	0.18	30.61	0	12:15	0.18
MH_S1_3	JUNCTION	0.02	0.17	30.40	0	12:15	0.17
MH_S1_4	JUNCTION	0.03	0.28	32.97	0	12:11	0.28
MH_S1_5	JUNCTION	0.02	0.19	33.50	0	12:10	0.19
MH_S1_6	JUNCTION	0.03	0.27	32.06	0	12:12	0.27
MH_S1_7	JUNCTION	0.03	0.29	31.36	0	12:14	0.29
MH_S1_8	JUNCTION	0.04	0.34	30.66	0	12:15	0.34
MH_S1_9	JUNCTION	0.01	0.17	30.22	0	12:17	0.17
MH_T1_1	JUNCTION	0.02	0.14	29.43	0	12:15	0.14
MH_T1_2	JUNCTION	0.02	0.14	29.08	0	12:16	0.14
MH_T1_3	JUNCTION	0.02	0.13	28.79	0	12:18	0.13
MH_T1_4	JUNCTION	0.02	0.13	29.26	0	12:15	0.13
MH_T1_5	JUNCTION	0.02	0.15	29.06	0	12:15	0.15
MH_T1_6	JUNCTION	0.02	0.13	28.97	0	12:16	0.13
MH_T1_7	JUNCTION	0.03	0.12	28.57	0	19:24	0.12
MH_T1_8	JUNCTION	0.10	0.33	28.57	0	19:25	0.33
MH_T2_1	JUNCTION	0.02	0.13	30.46	0	12:20	0.13
MH_T2_2	JUNCTION	0.02	0.12	29.78	0	12:22	0.12
MH_T2_3	JUNCTION	0.01	0.14	29.90	0	12:10	0.14
MH_T2_4	JUNCTION	0.03	0.20	29.30	0	12:14	0.20
MH_T2_5	JUNCTION	0.06	0.22	28.58	0	19:41	0.22
MH_T2_6	JUNCTION	0.00	0.00	30.76	0	00:00	0.00
MH_T2_7	JUNCTION	0.02	0.12	30.53	0	12:47	0.12
MH_T2_8	JUNCTION	0.04	0.23	29.54	0	13:17	0.23
MH_T2_9	JUNCTION	0.02	0.09	28.65	0	13:26	0.09
MH_T3_1	JUNCTION	0.01	0.07	28.96	0	12:11	0.07
MH_T3_2	JUNCTION	0.02	0.13	29.61	0	12:15	0.13
MH_T3_3	JUNCTION	0.02	0.12	29.37	0	12:15	0.12
MH_T3_4	JUNCTION	0.02	0.12	29.55	0	12:10	0.12
MH_T3_5	JUNCTION	0.01	0.08	29.26	0	12:12	0.08
MH_T3_6	JUNCTION	0.02	0.15	29.11	0	12:13	0.15
MH_T3_7	JUNCTION	0.02	0.20	28.91	0	12:15	0.20

MH_T3_8	JUNCTION	0.03	0.22	28.80	0	12:14	0.22
MH_T4_1	JUNCTION	0.02	0.14	29.62	0	12:10	0.14
MH_T4_2	JUNCTION	0.02	0.13	29.29	0	12:15	0.13
MH_T4_3	JUNCTION	0.02	0.15	30.25	0	12:15	0.15
MH_T4_4	JUNCTION	0.02	0.14	29.68	0	12:16	0.14
MH_T4_5	JUNCTION	0.02	0.23	30.59	0	12:10	0.23
MH_T4_6	JUNCTION	0.02	0.22	30.08	0	12:11	0.22
MH_T4_7	JUNCTION	0.03	0.23	29.31	0	12:14	0.23
MH_T4_8	JUNCTION	0.02	0.22	29.57	0	12:10	0.22
MH_T4_9	JUNCTION	0.07	0.41	28.93	0	12:14	0.41
O_Culvert_1_DS	JUNCTION	0.18	0.40	27.63	0	18:50	0.40
O_Culvert_1_US	JUNCTION	0.18	0.40	27.64	0	18:43	0.40
O_Culvert_2_DS	JUNCTION	0.15	0.37	27.65	0	18:04	0.37
O_Culvert_2_US	JUNCTION	0.16	0.37	27.67	0	17:16	0.37
O_Culvert_3_DS	JUNCTION	0.18	0.39	27.62	0	19:04	0.39
O_Culvert_3_US	JUNCTION	0.18	0.39	27.62	0	19:04	0.39
SH39_Culvert_DS	JUNCTION	0.09	0.19	28.08	0	19:26	0.19
SH39_Culvert_US	JUNCTION	0.19	0.45	28.57	0	19:26	0.45
W_G8_Out	JUNCTION	0.30	0.42	28.52	0	00:00	0.31
W_Mangaheka_1_Out	JUNCTION	0.03	0.23	29.53	0	13:33	0.23
W_Ohote_1_Out_DS	JUNCTION	0.16	0.37	27.53	0	19:41	0.37
W_Ohote_1_Out_US	JUNCTION	0.17	0.38	27.56	0	19:36	0.38
W_Ohote_2_Out_DS	JUNCTION	0.19	0.40	27.62	0	19:10	0.40
W_Ohote_2_Out_US	JUNCTION	0.18	0.40	27.63	0	18:55	0.40
W_Ohote_3_Out_DS	JUNCTION	0.17	0.39	27.65	0	18:27	0.39
W_Ohote_4_Out_US	JUNCTION	0.16	0.38	27.65	0	18:16	0.38
W_Ohote_5_Out_DS	JUNCTION	0.15	0.37	27.67	0	17:05	0.37
W_Ohote_5_Out_US	JUNCTION	0.15	0.36	27.67	0	16:57	0.36
W_Ohote_6_Out_DS	JUNCTION	0.18	0.40	27.63	0	18:54	0.40
W_Ohote_6_Out_US	JUNCTION	0.18	0.39	27.62	0	19:04	0.39
W_Ohote_7_Out_DS	JUNCTION	0.19	0.40	27.60	0	19:21	0.40
W_Ohote_7_Out_US	JUNCTION	0.19	0.40	27.62	0	19:04	0.40
W_Te_Otamanui_1_Out_US	JUNCTION	0.14	0.40	28.57	0	19:24	0.40
W_Te_Otamanui_2_Out_US	JUNCTION	0.13	0.39	28.57	0	19:23	0.39
W_Te_Otamanui_3_Out_DS	JUNCTION	0.04	0.15	28.60	0	18:53	0.15
W_Te_Otamanui_3_Out_US	JUNCTION	0.02	0.12	28.60	0	18:53	0.12
W_Te_Otamanui_4_Out_DS	JUNCTION	0.09	0.26	28.60	0	18:51	0.26
Mangaheka_Out	OUTFALL	0.24	1.01	28.93	0	13:39	1.01
Ohote_Out	OUTFALL	0.12	0.28	27.18	0	19:42	0.28
Rotokauri_South_2_Out	OUTFALL	0.40	0.40	28.40	0	00:00	0.40
Rotokauri_South_3_Out	OUTFALL	0.00	0.00	28.00	0	00:00	0.00
Te_Otamanui_Out	OUTFALL	0.09	0.19	27.84	0	19:26	0.19
W_G8	STORAGE	0.13	0.36	28.76	0	16:26	0.36
W_Mangaheka_1	STORAGE	0.08	0.28	29.68	0	15:37	0.28
W_Ohote_1	STORAGE	0.16	0.36	27.54	0	19:51	0.36
W_Ohote_2	STORAGE	0.18	0.39	27.62	0	19:12	0.39
W_Ohote_3	STORAGE	0.17	0.38	27.65	0	18:23	0.38
W_Ohote_4	STORAGE	0.17	0.38	27.66	0	18:22	0.38
W_Ohote_5	STORAGE	0.15	0.36	27.67	0	17:07	0.36
W_Ohote_6	STORAGE	0.19	0.41	27.64	0	19:26	0.41
W_Ohote_7	STORAGE	0.17	0.38	27.61	0	19:36	0.38
W_Mangaheka_2	STORAGE	0.05	0.24	29.64	0	13:41	0.24
W_Te_Otamanui_1	STORAGE	0.15	0.40	28.57	0	19:27	0.40
W_Te_Otamanui_2	STORAGE	0.14	0.39	28.58	0	19:43	0.39
W_Te_Otamanui_3	STORAGE	0.05	0.14	28.62	0	18:45	0.14
W_Te_Otamanui_4	STORAGE	0.09	0.32	28.77	0	14:56	0.32

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min		Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
Exelby_Culvert_DS	JUNCTION	0.000	0.242	0	19:42	0	20.1	0.003
Exelby_Culvert_US	JUNCTION	0.000	0.242	0	19:40	0	20.1	0.013
J_M_Stream_01	JUNCTION	0.004	0.573	0	13:30	0.0618	24.8	0.039
J_M_Stream_02	JUNCTION	0.000	0.571	0	13:20	0	24.8	0.060
J_M_Stream_03	JUNCTION	0.465	0.573	0	13:10	19	24.8	0.022
J_O_Stream_01	JUNCTION	0.016	0.222	0	18:40	0.283	17.8	0.189
J_O_Stream_02	JUNCTION	0.000	0.176	0	17:06	0	13.3	0.200
J_O_Stream_03	JUNCTION	0.000	0.135	0	16:06	0.0111	8.92	0.063
J_O_Stream_04	JUNCTION	0.001	0.138	0	15:45	0.0217	8.94	0.157
J_O_Stream_05	JUNCTION	0.000	0.111	0	15:04	0	6.45	0.208
J_O_Stream_06	JUNCTION	0.000	0.093	0	14:05	0.000418	4.03	0.272
J_O_Stream_07	JUNCTION	0.000	0.099	0	13:41	3.75e-05	4.05	0.148
J_O_Stream_08	JUNCTION	0.000	0.043	0	12:12	3.75e-05	0.498	1.214
J_O_Stream_09	JUNCTION	0.056	0.056	0	12:09	0.516	0.516	0.571
J_O_Stream_10	JUNCTION	0.000	0.030	0	19:18	0	2.44	0.057
J_O_Stream_14	JUNCTION	0.052	0.052	0	12:09	1.06	1.06	0.006
J_T_Stream_01	JUNCTION	0.000	0.091	0	15:00	0	5.76	0.063
J_T_Stream_02	JUNCTION	0.001	0.094	0	14:49	0.0246	5.76	0.039
J_T_Stream_03	JUNCTION	0.000	0.094	0	14:48	0	5.74	0.010
J_T_Stream_04	JUNCTION	0.000	0.095	0	14:45	0	5.74	0.074
M_Culvert_1_DS	JUNCTION	0.000	0.573	0	13:38	0	24.8	-0.030
M_Culvert_1_US	JUNCTION	0.000	0.573	0	13:36	0	24.8	0.047
M_Culvert_2_DS	JUNCTION	0.000	0.083	0	14:09	0	3.17	-0.002
M_Culvert_2_US	JUNCTION	0.000	0.083	0	14:05	0	3.17	-0.001
MH_M1_1	JUNCTION	0.050	0.050	0	12:09	0.373	0.373	-0.006
MH_M1_10	JUNCTION	0.000	0.013	0	13:52	0	0.54	0.325
MH_M1_11	JUNCTION	0.025	0.025	0	12:14	0.371	0.909	0.475
MH_M1_12	JUNCTION	0.000	0.022	0	14:22	0	0.902	0.026
MH_M1_2	JUNCTION	0.000	0.049	0	12:10	0	0.373	-0.005
MH_M1_3	JUNCTION	0.070	0.070	0	12:09	0.651	0.651	-0.002
MH_M1_4	JUNCTION	0.000	0.116	0	12:11	0	1.02	0.004
MH_M1_5	JUNCTION	0.028	0.028	0	12:14	0.406	0.406	0.016
MH_M1_6	JUNCTION	0.000	0.142	0	12:13	0	1.43	-0.026
MH_M1_7	JUNCTION	0.000	0.003	0	12:28	0	0.0203	0.298
MH_M1_8	JUNCTION	0.000	0.011	0	12:27	0	0.0964	0.453
MH_M1_9	JUNCTION	0.032	0.032	0	12:14	0.537	0.613	0.016
MH_M2_1	JUNCTION	0.052	0.052	0	12:14	0.91	0.91	0.006
MH_M2_2	JUNCTION	0.081	0.081	0	12:09	0.638	0.638	-0.028
MH_M2_3	JUNCTION	0.090	0.090	0	12:09	0.587	0.587	-0.020
MH_M2_4	JUNCTION	0.081	0.081	0	12:09	0.536	0.536	-0.006
MH_M2_5	JUNCTION	0.000	0.080	0	12:10	0	0.536	-0.007
MH_M2_6	JUNCTION	0.000	0.283	0	12:11	0	2.67	-0.016
MH_M2_7	JUNCTION	0.000	0.130	0	12:11	0	1.55	0.000
MH_O1_1	JUNCTION	0.058	0.058	0	12:14	1.01	1.01	-0.002
MH_O1_2	JUNCTION	0.000	0.058	0	12:16	0	1.01	-0.003
MH_O1_3	JUNCTION	0.047	0.047	0	12:14	0.903	0.903	-0.006
MH_O1_4	JUNCTION	0.000	0.104	0	12:17	0	1.91	0.003
MH_O1_5	JUNCTION	0.022	0.022	0	12:14	0.336	0.336	-0.037
MH_O1_6	JUNCTION	0.000	0.126	0	12:18	0	2.24	-0.002
MH_O2_1	JUNCTION	0.029	0.029	0	12:19	0.605	0.605	-0.129
MH_O2_2	JUNCTION	0.000	0.029	0	12:21	0	0.606	0.130
MH_O2_3	JUNCTION	0.031	0.031	0	12:30	0.84	0.84	0.001
MH_O2_4	JUNCTION	0.000	0.031	0	12:30	0	0.84	0.001
MH_O2_5	JUNCTION	0.000	0.031	0	12:31	0	0.84	0.004
MH_O2_6	JUNCTION	0.028	0.028	0	12:19	0.571	0.571	-0.006
MH_O2_7	JUNCTION	0.000	0.059	0	12:26	0	1.41	0.004
MH_O2_8	JUNCTION	0.000	0.059	0	12:28	0	1.41	-0.013
MH_O2_9	JUNCTION	0.000	0.059	0	12:29	0	1.41	0.005
MH_O3_1	JUNCTION	0.050	0.050	0	12:19	0.975	0.975	-0.001
MH_O3_2	JUNCTION	0.000	0.050	0	12:16	0	0.975	0.003
MH_O3_3	JUNCTION	0.033	0.033	0	12:14	0.462	0.462	-0.002
MH_O3_4	JUNCTION	0.000	0.033	0	12:15	0	0.462	-0.005
MH_O3_5	JUNCTION	0.000	0.083	0	12:16	0	1.44	0.001
MH_O3_6	JUNCTION	0.052	0.052	0	12:19	1.02	1.02	0.000
MH_O3_7	JUNCTION	0.000	0.134	0	12:19	0	2.46	-0.014
MH_O3_8	JUNCTION	0.000	0.134	0	12:20	0	2.46	0.019
MH_O4_1	JUNCTION	0.049	0.049	0	12:14	0.745	0.745	-0.007

MH_04_2	JUNCTION	0.046	0.046	0	12:19	0.982	0.982	-0.001
MH_04_3	JUNCTION	0.000	0.046	0	12:21	0	0.982	0.003
MH_04_4	JUNCTION	0.000	0.093	0	12:16	0	1.73	-0.016
MH_04_5	JUNCTION	0.048	0.048	0	12:14	0.707	0.707	-0.001
MH_04_6	JUNCTION	0.000	0.048	0	12:15	0	0.707	-0.001
MH_04_7	JUNCTION	0.000	0.048	0	12:16	0	0.707	-0.049
MH_04_8	JUNCTION	0.000	0.141	0	12:17	0	2.43	0.025
MH_05_1	JUNCTION	0.032	0.032	0	12:09	0.414	0.414	-0.001
MH_05_2	JUNCTION	0.000	0.032	0	12:11	0	0.414	-0.049
MH_05_3	JUNCTION	0.067	0.067	0	12:09	0.66	0.66	-0.003
MH_05_4	JUNCTION	0.000	0.067	0	12:10	0	0.66	0.003
MH_05_5	JUNCTION	0.075	0.075	0	12:09	0.612	0.612	-0.011
MH_05_6	JUNCTION	0.000	0.138	0	12:11	0	1.27	-0.038
MH_05_7	JUNCTION	0.000	0.166	0	12:12	0	1.69	0.034
MH_06_1	JUNCTION	0.053	0.053	0	12:19	1.1	1.1	0.000
MH_06_2	JUNCTION	0.000	0.053	0	12:20	0	1.1	0.000
MH_06_3	JUNCTION	0.000	0.053	0	12:20	0	1.1	-0.013
MH_06_4	JUNCTION	0.097	0.097	0	12:14	1.7	1.7	-0.001
MH_06_5	JUNCTION	0.000	0.097	0	12:15	0	1.7	-0.081
MH_06_6	JUNCTION	0.000	0.149	0	12:19	0	2.8	0.054
MH_06_7	JUNCTION	0.074	0.074	0	12:14	1.26	1.26	-0.000
MH_06_8	JUNCTION	0.000	0.073	0	12:15	0	1.26	-0.033
MH_06_9	JUNCTION	0.000	0.219	0	12:23	0	4.06	0.015
MH_07_1	JUNCTION	0.104	0.104	0	12:09	1.05	1.05	-0.002
MH_07_2	JUNCTION	0.000	0.103	0	12:10	0	1.05	-0.002
MH_07_3	JUNCTION	0.000	0.102	0	12:12	0	1.05	-0.036
MH_07_4	JUNCTION	0.060	0.060	0	12:24	1.32	1.32	-0.000
MH_07_5	JUNCTION	0.000	0.060	0	12:25	0	1.32	0.001
MH_07_6	JUNCTION	0.000	0.060	0	12:26	0	1.32	0.000
MH_07_7	JUNCTION	0.000	0.060	0	12:26	0	1.32	-0.016
MH_07_8	JUNCTION	0.000	0.157	0	12:15	0	2.37	0.019
MH_S1_1	JUNCTION	0.071	0.071	0	12:09	0.904	0.904	-0.005
MH_S1_2	JUNCTION	0.000	0.071	0	12:13	0	0.905	0.005
MH_S1_3	JUNCTION	0.000	0.070	0	12:16	0	0.904	0.001
MH_S1_4	JUNCTION	0.131	0.243	0	12:10	1.06	1.84	-0.003
MH_S1_5	JUNCTION	0.116	0.116	0	12:09	0.788	0.788	-0.007
MH_S1_6	JUNCTION	0.000	0.238	0	12:11	0	1.84	-0.002
MH_S1_7	JUNCTION	0.070	0.303	0	12:13	0.992	2.84	0.003
MH_S1_8	JUNCTION	0.000	0.302	0	12:14	0	2.84	0.001
MH_S1_9	JUNCTION	0.000	0.371	0	12:15	0	3.74	0.003
MH_T1_1	JUNCTION	0.041	0.041	0	12:14	0.77	0.77	-0.000
MH_T1_2	JUNCTION	0.000	0.041	0	12:15	0	0.77	0.000
MH_T1_3	JUNCTION	0.000	0.041	0	12:17	0	0.77	-0.036
MH_T1_4	JUNCTION	0.037	0.037	0	12:14	0.617	0.617	-0.000
MH_T1_5	JUNCTION	0.000	0.037	0	12:15	0	0.617	0.001
MH_T1_6	JUNCTION	0.000	0.037	0	12:15	0	0.617	-0.013
MH_T1_7	JUNCTION	0.000	0.037	0	12:16	0	0.618	-0.008
MH_T1_8	JUNCTION	0.000	0.078	0	12:17	0	1.39	0.025
MH_T2_1	JUNCTION	0.036	0.036	0	12:19	0.752	0.752	-0.001
MH_T2_2	JUNCTION	0.000	0.036	0	12:20	0	0.752	0.008
MH_T2_3	JUNCTION	0.051	0.051	0	12:09	0.392	0.392	-0.045
MH_T2_4	JUNCTION	0.038	0.118	0	12:12	0.804	1.95	-0.017
MH_T2_5	JUNCTION	0.000	0.117	0	12:14	0	1.95	0.016
MH_T2_6	JUNCTION	0.000	0.000	0	00:00	0	0	0.000
MH_T2_7	JUNCTION	0.025	0.025	0	12:14	0.365	0.365	-0.200
MH_T2_8	JUNCTION	0.026	0.042	0	12:33	0.482	0.847	0.191
MH_T2_9	JUNCTION	0.000	0.034	0	13:20	0	0.846	0.069
MH_T3_1	JUNCTION	0.023	0.023	0	12:09	0.311	0.311	-0.004
MH_T3_2	JUNCTION	0.036	0.036	0	12:14	0.525	0.525	-0.000
MH_T3_3	JUNCTION	0.000	0.036	0	12:15	0	0.525	0.001
MH_T3_4	JUNCTION	0.028	0.028	0	12:09	0.372	0.372	-0.000
MH_T3_5	JUNCTION	0.000	0.028	0	12:11	0	0.372	-0.002
MH_T3_6	JUNCTION	0.000	0.064	0	12:12	0	0.897	0.001
MH_T3_7	JUNCTION	0.000	0.087	0	12:14	0	1.21	0.004
MH_T3_8	JUNCTION	0.000	0.087	0	12:15	0	1.21	-0.012
MH_T4_1	JUNCTION	0.046	0.046	0	12:14	0.646	0.646	-0.001
MH_T4_2	JUNCTION	0.000	0.046	0	12:15	0	0.646	-0.009
MH_T4_3	JUNCTION	0.054	0.054	0	12:14	0.898	0.898	-0.001
MH_T4_4	JUNCTION	0.000	0.054	0	12:15	0	0.898	0.008
MH_T4_5	JUNCTION	0.139	0.139	0	12:09	1.22	1.22	-0.002
MH_T4_6	JUNCTION	0.000	0.138	0	12:10	0	1.22	-0.011
MH_T4_7	JUNCTION	0.000	0.187	0	12:12	0	2.11	-0.004
MH_T4_8	JUNCTION	0.176	0.176	0	12:09	1.33	1.33	-0.051
MH_T4_9	JUNCTION	0.000	0.388	0	12:12	0	4.09	0.019
O_Culvert_1_DS	JUNCTION	0.000	0.135	0	16:03	0	8.91	0.034
O_Culvert_1_US	JUNCTION	0.000	0.136	0	15:54	0	8.92	0.159
O_Culvert_2_DS	JUNCTION	0.000	0.096	0	13:54	0	4.04	0.156
O_Culvert_2_US	JUNCTION	0.000	0.097	0	13:47	0	4.04	0.183

O_Culvert_3_DS	JUNCTION	0.000	0.050	0	12:11	0	0.509	0.972
O_Culvert_3_US	JUNCTION	0.000	0.053	0	12:10	3.65e-05	0.513	0.700
SH39_Culvert_DS	JUNCTION	0.000	0.129	0	19:26	0	10.7	0.002
SH39_Culvert_US	JUNCTION	0.000	0.129	0	19:15	0	10.8	0.042
W_G8_Out	JUNCTION	0.000	0.146	0	00:00	0	6.13	0.036
W_Mangaheka_1_Out	JUNCTION	0.000	0.049	0	16:23	0	2.59	0.002
W_Ohote_1_Out_DS	JUNCTION	0.000	0.242	0	19:34	0	20.1	0.063
W_Ohote_1_Out_US	JUNCTION	0.000	0.222	0	18:54	0	17.8	0.148
W_Ohote_2_Out_DS	JUNCTION	0.000	0.198	0	17:38	0	15.3	0.146
W_Ohote_2_Out_US	JUNCTION	0.000	0.133	0	16:12	0	8.92	0.144
W_Ohote_3_Out_DS	JUNCTION	0.000	0.139	0	15:36	0	8.93	0.142
W_Ohote_4_Out_US	JUNCTION	0.000	0.090	0	14:19	0	4.02	0.159
W_Ohote_5_Out_DS	JUNCTION	0.000	0.116	0	12:11	0	4.1	0.150
W_Ohote_5_Out_US	JUNCTION	0.111	0.146	0	12:09	1.22	2.28	0.248
W_Ohote_6_Out_DS	JUNCTION	0.000	0.134	0	16:10	0	8.91	0.047
W_Ohote_6_Out_US	JUNCTION	0.000	0.046	0	12:11	0	0.504	1.304
W_Ohote_7_Out_DS	JUNCTION	0.000	0.217	0	18:38	0	17.6	0.187
W_Ohote_7_Out_US	JUNCTION	0.000	0.040	0	12:13	0	0.494	2.049
W_Te_Otamanui_1_Out_US	JUNCTION	0.000	0.095	0	15:23	0	6.03	0.037
W_Te_Otamanui_2_Out_US	JUNCTION	0.013	0.096	0	15:13	0.275	6.03	0.017
W_Te_Otamanui_3_Out_DS	JUNCTION	0.000	0.016	0	14:44	0	1.32	0.245
W_Te_Otamanui_3_Out_US	JUNCTION	0.000	0.001	0	12:52	0	0.00919	0.043
W_Te_Otamanui_4_Out_DS	JUNCTION	0.000	0.098	0	14:39	0	5.75	0.081
Mangaheka_Out	OUTFALL	0.000	0.573	0	13:39	0	24.8	0.000
Ohote_Out	OUTFALL	0.000	0.242	0	19:42	0	20.1	0.000
Rotokauri_South_2_Out	OUTFALL	0.000	0.146	0	00:00	0	6.14	0.000
Rotokauri_South_3_Out	OUTFALL	0.026	0.026	0	12:09	0.161	0.161	0.000
Te_Otamanui_Out	OUTFALL	0.000	0.129	0	19:26	0	10.7	0.000
W_G8	STORAGE	0.185	0.549	0	12:17	2.67	6.41	0.122
W_Mangaheka_1	STORAGE	0.019	0.170	0	12:14	0.303	2.63	0.013
W_Ohote_1	STORAGE	0.022	0.147	0	12:18	0.311	2.56	0.019
W_Ohote_2	STORAGE	0.016	0.103	0	12:24	0.254	2.27	0.027
W_Ohote_3	STORAGE	0.020	0.152	0	12:19	0.267	2.73	0.007
W_Ohote_4	STORAGE	0.018	0.158	0	12:17	0.256	2.69	0.008
W_Ohote_5	STORAGE	0.013	0.201	0	12:13	0.216	1.95	0.014
W_Ohote_6	STORAGE	0.026	0.244	0	12:23	0.452	4.51	0.015
W_Ohote_7	STORAGE	0.022	0.178	0	12:16	0.343	2.75	0.017
W_Mangaheka_2	STORAGE	0.033	0.309	0	12:13	0.51	3.18	0.014
W_Te_Otamanui_1	STORAGE	0.019	0.096	0	12:18	0.344	1.73	0.005
W_Te_Otamanui_2	STORAGE	0.016	0.152	0	12:16	0.27	3.15	-0.001
W_Te_Otamanui_3	STORAGE	0.013	0.099	0	12:15	0.157	1.37	0.009
W_Te_Otamanui_4	STORAGE	0.021	0.403	0	12:15	0.41	4.5	0.004

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Node Surcharge Summary
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No nodes were surcharged.

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Node Flooding Summary
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No nodes were flooded.

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Storage Volume Summary
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Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
W_G8	1.174	2	0	0	3.404	7	0 16:26	0.091
W_Mangaheka_1	0.263	1	0	0	0.955	4	0 15:37	0.049
W_Ohote_1	0.628	2	0	0	1.495	6	0 19:51	0.032
W_Ohote_2	0.584	2	0	0	1.330	5	0 19:12	0.025
W_Ohote_3	0.633	3	0	0	1.495	6	0 18:23	0.032
W_Ohote_4	0.671	3	0	0	1.580	6	0 18:22	0.030
W_Ohote_5	0.445	2	0	0	1.130	5	0 17:07	0.024
W_Ohote_6	1.271	3	0	0	2.820	7	0 19:26	0.044
W_Ohote_7	0.900	3	0	0	2.025	6	0 19:36	0.027
W_Mangaheka_2	0.190	1	0	0	1.040	4	0 13:41	0.083
W_Te_Otamanui_1	0.359	2	0	0	1.025	6	0 19:27	0.021
W_Te_Otamanui_2	0.818	2	0	0	2.275	7	0 19:43	0.033
W_Te_Otamanui_3	0.261	1	0	0	0.766	2	0 18:45	0.016
W_Te_Otamanui_4	0.541	1	0	0	1.972	5	0 14:56	0.084

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Outfall Loading Summary
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Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Mangaheka_Out	94.50	0.101	0.573	24.823
Ohote_Out	93.45	0.083	0.242	20.053
Rotokauri_South_2_Out	99.71	0.024	0.146	6.135
Rotokauri_South_3_Out	33.12	0.002	0.026	0.161
Te_Otamanui_Out	95.21	0.043	0.129	10.674
System	83.20	0.253	0.924	61.846

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Link Flow Summary
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Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
M_2_Stream_Out	CONDUIT	0.084	0 14:18	0.13	0.04	0.75
M_Culvert_01	CONDUIT	0.573	0 13:38	1.01	0.47	1.00
M_Culvert_02	CONDUIT	0.083	0 14:09	0.72	0.06	0.37
M_Stream_01	CHANNEL	0.573	0 13:39	0.23	0.00	0.28
M_Stream_02	CHANNEL	0.573	0 13:36	0.31	0.01	0.24
M_Stream_03	CHANNEL	0.570	0 13:31	0.28	0.01	0.28
M_Stream_04	CHANNEL	0.571	0 13:20	0.21	0.00	0.31
Manga_Swale_01_Pipe	CONDUIT	0.033	0 13:26	0.93	0.01	0.11
Manga_Swale_02_Pipe	CONDUIT	0.022	0 14:25	0.28	0.00	0.15
Manga_Swale_1A	CONDUIT	0.034	0 13:20	0.08	0.03	0.16
Manga_Swale_1B	CONDUIT	0.018	0 12:47	0.04	0.02	0.17
Manga_Swale_1C	CONDUIT	0.000	0 00:00	0.00	0.00	0.06
Manga_Swale_2A	CONDUIT	0.022	0 14:22	0.05	0.11	0.17
Manga_Swale_2B	CONDUIT	0.013	0 14:50	0.01	0.05	0.29
Manga_Swale_2C	CONDUIT	0.013	0 13:52	0.02	0.05	0.28
Manga_Swale_2D	CONDUIT	0.011	0 12:27	0.02	0.04	0.27
Manga_Swale_2E	CONDUIT	0.003	0 12:28	0.01	0.01	0.25
O_Culvert_01	CONDUIT	0.135	0 16:03	0.42	0.19	0.26
O_Culvert_02	CONDUIT	0.096	0 13:54	0.38	0.37	0.25

O_Culvert_03	CONDUIT	0.050	0	12:11	0.40	0.07	0.26
O_Stream_01	CHANNEL	0.242	0	19:40	0.19	0.03	0.18
O_Stream_02	CHANNEL	0.221	0	19:06	0.17	0.04	0.19
O_Stream_03	CHANNEL	0.222	0	18:54	0.16	0.03	0.19
O_Stream_04	CHANNEL	0.216	0	18:51	0.15	0.03	0.20
O_Stream_05	CHANNEL	0.197	0	17:49	0.15	0.03	0.20
O_Stream_06	CHANNEL	0.174	0	17:18	0.13	0.03	0.20
O_Stream_07	CHANNEL	0.132	0	16:20	0.11	0.02	0.20
O_Stream_08	CHANNEL	0.133	0	16:12	0.11	0.02	0.20
O_Stream_09	CHANNEL	0.134	0	16:10	0.11	0.02	0.20
O_Stream_10	CHANNEL	0.134	0	16:06	0.11	0.02	0.20
O_Stream_11	CHANNEL	0.136	0	15:54	0.11	0.02	0.20
O_Stream_12	CHANNEL	0.137	0	15:45	0.12	0.02	0.19
O_Stream_13	CHANNEL	0.108	0	15:16	0.10	0.02	0.19
O_Stream_14	CHANNEL	0.088	0	14:25	0.09	0.01	0.19
O_Stream_15	CHANNEL	0.090	0	14:19	0.10	0.01	0.19
O_Stream_16	CHANNEL	0.093	0	14:05	0.11	0.01	0.19
O_Stream_17	CHANNEL	0.097	0	13:47	0.09	0.01	0.19
O_Stream_18	CHANNEL	0.099	0	13:41	0.12	0.01	0.18
O_Stream_19	CHANNEL	0.116	0	12:11	0.16	0.02	0.18
O_Stream_20	CHANNEL	0.036	0	12:14	0.08	0.01	0.20
O_Stream_21	CHANNEL	0.040	0	12:13	0.08	0.01	0.20
O_Stream_22	CHANNEL	0.043	0	12:12	0.09	0.01	0.20
O_Stream_23	CHANNEL	0.046	0	12:11	0.10	0.01	0.20
O_Stream_24	CHANNEL	0.053	0	12:10	0.10	0.01	0.19
O_Stream_25	CHANNEL	0.030	0	19:22	0.04	0.00	0.19
O_Stream_Out	CONDUIT	0.242	0	19:42	0.47	0.04	0.17
Pipe_001	CONDUIT	0.058	0	12:16	1.05	0.13	0.25
Pipe_002	CONDUIT	0.058	0	12:17	0.76	0.13	0.31
Pipe_003	CONDUIT	0.047	0	12:17	0.78	0.12	0.33
Pipe_004	CONDUIT	0.104	0	12:19	0.89	0.13	0.31
Pipe_005	CONDUIT	0.021	0	12:15	0.42	0.11	0.37
Pipe_006	CONDUIT	0.126	0	12:19	1.37	0.16	0.40
Pipe_007	CONDUIT	0.029	0	12:21	0.81	0.14	0.42
Pipe_008	CONDUIT	0.029	0	12:24	0.61	0.16	0.79
Pipe_009	CONDUIT	0.031	0	12:30	0.85	0.16	0.28
Pipe_010	CONDUIT	0.031	0	12:31	0.89	0.15	0.27
Pipe_011	CONDUIT	0.031	0	12:33	0.68	0.15	0.33
Pipe_012	CONDUIT	0.028	0	12:20	0.66	0.14	0.32
Pipe_013	CONDUIT	0.059	0	12:28	0.96	0.16	0.27
Pipe_014	CONDUIT	0.059	0	12:29	1.01	0.11	0.30
Pipe_015	CONDUIT	0.059	0	12:29	0.81	0.08	0.45
Pipe_016	CONDUIT	0.050	0	12:16	1.02	0.16	0.28
Pipe_017	CONDUIT	0.050	0	12:20	0.73	0.16	0.36
Pipe_018	CONDUIT	0.033	0	12:15	1.02	0.16	0.26
Pipe_019	CONDUIT	0.033	0	12:15	0.58	0.08	0.32
Pipe_020	CONDUIT	0.082	0	12:19	0.87	0.19	0.37
Pipe_021	CONDUIT	0.052	0	12:20	0.83	0.17	0.34
Pipe_022	CONDUIT	0.134	0	12:20	1.08	0.17	0.33
Pipe_023	CONDUIT	0.133	0	12:20	1.19	0.21	0.49
Pipe_024	CONDUIT	0.041	0	12:15	0.91	0.14	0.26
Pipe_025	CONDUIT	0.041	0	12:17	0.94	0.14	0.26
Pipe_026	CONDUIT	0.041	0	12:18	0.68	0.14	0.37
Pipe_027	CONDUIT	0.037	0	12:15	0.79	0.12	0.27
Pipe_028	CONDUIT	0.037	0	12:15	0.79	0.12	0.27
Pipe_029	CONDUIT	0.037	0	12:16	0.92	0.12	0.24
Pipe_030	CONDUIT	0.036	0	12:17	0.62	0.12	0.44
Pipe_031	CONDUIT	0.077	0	12:18	1.05	0.17	0.61
Pipe_032	CONDUIT	0.036	0	12:20	0.93	0.12	0.24
Pipe_033	CONDUIT	0.036	0	12:22	0.68	0.12	0.31
Pipe_034	CONDUIT	0.049	0	12:10	0.78	0.11	0.28
Pipe_035	CONDUIT	0.117	0	12:14	1.17	0.15	0.28
Pipe_036	CONDUIT	0.117	0	12:16	1.52	0.11	0.41
Pipe_039	CONDUIT	0.087	0	12:15	0.87	0.11	0.28
Pipe_040	CONDUIT	0.028	0	12:11	0.99	0.09	0.19
Pipe_041	CONDUIT	0.036	0	12:15	0.88	0.12	0.24
Pipe_042	CONDUIT	0.064	0	12:14	0.84	0.08	0.23
Pipe_043	CONDUIT	0.087	0	12:16	1.45	0.11	0.19
Pipe_044	CONDUIT	0.053	0	12:20	1.13	0.13	0.27
Pipe_045	CONDUIT	0.053	0	12:20	1.04	0.12	0.24

Pipe_046	CONDUIT	0.053	0	12:21	0.50	0.07	0.31
Pipe_047	CONDUIT	0.097	0	12:15	1.19	0.12	0.24
Pipe_048	CONDUIT	0.096	0	12:19	0.77	0.12	0.34
Pipe_049	CONDUIT	0.148	0	12:24	0.69	0.18	0.37
Pipe_050	CONDUIT	0.073	0	12:15	1.06	0.09	0.21
Pipe_051	CONDUIT	0.073	0	12:16	0.64	0.09	0.32
Pipe_052	CONDUIT	0.219	0	12:23	1.45	0.25	0.42
Pipe_053	CONDUIT	0.103	0	12:10	1.26	0.13	0.24
Pipe_054	CONDUIT	0.102	0	12:12	1.33	0.10	0.23
Pipe_055	CONDUIT	0.101	0	12:14	0.94	0.13	0.30
Pipe_056	CONDUIT	0.060	0	12:25	0.99	0.07	0.19
Pipe_057	CONDUIT	0.060	0	12:26	0.97	0.07	0.20
Pipe_058	CONDUIT	0.060	0	12:26	1.00	0.08	0.19
Pipe_059	CONDUIT	0.060	0	12:27	0.69	0.08	0.27
Pipe_060	CONDUIT	0.157	0	12:16	1.44	0.13	0.37
Pipe_061	CONDUIT	0.049	0	12:15	0.91	0.16	0.30
Pipe_062	CONDUIT	0.046	0	12:21	0.97	0.15	0.27
Pipe_063	CONDUIT	0.046	0	12:22	0.84	0.15	0.30
Pipe_064	CONDUIT	0.093	0	12:17	0.93	0.12	0.28
Pipe_065	CONDUIT	0.048	0	12:15	0.98	0.16	0.28
Pipe_066	CONDUIT	0.048	0	12:16	1.04	0.16	0.27
Pipe_067	CONDUIT	0.048	0	12:17	0.62	0.11	0.32
Pipe_068	CONDUIT	0.140	0	12:17	1.22	0.10	0.39
Pipe_069	CONDUIT	0.032	0	12:11	0.93	0.16	0.27
Pipe_070	CONDUIT	0.031	0	12:13	0.45	0.10	0.37
Pipe_071	CONDUIT	0.067	0	12:10	1.08	0.15	0.27
Pipe_072	CONDUIT	0.066	0	12:12	0.94	0.15	0.30
Pipe_073	CONDUIT	0.073	0	12:11	1.03	0.17	0.30
Pipe_074	CONDUIT	0.135	0	12:12	1.04	0.11	0.26
Pipe_075	CONDUIT	0.164	0	12:13	1.19	0.13	0.34
Pipe_076	CONDUIT	0.046	0	12:15	0.97	0.11	0.23
Pipe_077	CONDUIT	0.046	0	12:15	0.40	0.11	0.45
Pipe_078	CONDUIT	0.054	0	12:15	1.02	0.12	0.24
Pipe_079	CONDUIT	0.054	0	12:16	0.79	0.12	0.31
Pipe_080	CONDUIT	0.138	0	12:10	1.26	0.17	0.30
Pipe_081	CONDUIT	0.135	0	12:12	1.24	0.17	0.30
Pipe_082	CONDUIT	0.184	0	12:14	0.90	0.14	0.36
Pipe_083	CONDUIT	0.172	0	12:10	0.92	0.13	0.35
Pipe_084	CONDUIT	0.382	0	12:15	1.83	0.20	0.29
Pipe_085	CONDUIT	0.069	0	12:10	0.93	0.16	0.32
Pipe_086	CONDUIT	0.049	0	12:10	1.05	0.11	0.22
Pipe_087	CONDUIT	0.047	0	12:11	0.63	0.06	0.23
Pipe_088	CONDUIT	0.114	0	12:13	1.01	0.14	0.30
Pipe_089	CONDUIT	0.141	0	12:14	1.41	0.11	0.22
Pipe_091	CONDUIT	0.079	0	12:11	1.03	0.10	0.23
Pipe_092	CONDUIT	0.088	0	12:10	0.73	0.12	0.33
Pipe_093	CONDUIT	0.080	0	12:10	1.12	0.10	0.22
Pipe_094	CONDUIT	0.077	0	12:11	0.64	0.10	0.32
Pipe_095	CONDUIT	0.125	0	12:13	0.89	0.10	0.29
Pipe_096	CONDUIT	0.276	0	12:13	1.83	0.14	0.23
Pipe_097	CONDUIT	0.071	0	12:13	1.06	0.16	0.29
Pipe_098	CONDUIT	0.070	0	12:16	1.01	0.16	0.29
Pipe_099	CONDUIT	0.070	0	12:16	0.99	0.09	0.23
Pipe_100	CONDUIT	0.238	0	12:11	1.46	0.19	0.30
Pipe_101	CONDUIT	0.113	0	12:10	0.97	0.14	0.31
Pipe_103	CONDUIT	0.233	0	12:13	1.36	0.18	0.31
Pipe_104	CONDUIT	0.302	0	12:14	1.37	0.16	0.30
Pipe_105	CONDUIT	0.302	0	12:15	1.87	0.16	0.24
Pipe_106	CONDUIT	0.367	0	12:17	1.32	0.10	0.21
Pipe_107	CONDUIT	0.036	0	12:15	0.81	0.12	0.26
Pipe_108	CONDUIT	0.028	0	12:12	0.46	0.01	0.07
Pipe_109	CONDUIT	0.023	0	12:11	0.32	0.00	0.09
Pipe_110	CONDUIT	0.028	0	12:15	0.53	0.07	0.28
Pipe_111	CONDUIT	0.052	0	12:15	0.82	0.07	0.21
Pipe_Diversion	CONDUIT	0.045	0	12:16	0.19	0.03	0.17
RS_1_Stream_Out	CONDUIT	0.146	0	00:00	0.73	0.11	0.45
T_Culvert_01	CONDUIT	0.094	0	14:48	0.65	0.15	0.29
T_Stream_01	CHANNEL	0.092	0	15:38	0.08	0.02	0.34
T_Stream_02	CHANNEL	0.095	0	15:23	0.10	0.02	0.32
T_Stream_03	CHANNEL	0.088	0	15:20	0.10	0.02	0.30

T_Stream_04	CHANNEL	0.091	0	15:00	0.12	0.01	0.28
T_Stream_05	CHANNEL	0.093	0	14:49	0.14	0.01	0.25
T_Stream_06	CHANNEL	0.095	0	14:45	0.14	0.02	0.23
T_Stream_07	CHANNEL	0.016	0	23:39	0.05	0.00	0.16
T_Stream_08	CHANNEL	0.001	0	12:52	0.01	0.00	0.11
Te_Otamanui_Stream_out	CONDUIT	0.129	0	19:26	0.61	0.02	0.15
W_Mangaheka_Stream_Out	CONDUIT	0.049	0	16:23	0.14	0.01	0.61
Exelby_Road	WEIR	0.000	0	00:00			0.00
Exelby_Weir_10yr	WEIR	0.000	0	00:00			0.00
Exelby_Weir_2yr	WEIR	0.242	0	19:42			0.36
SH39	WEIR	0.000	0	00:00			0.00
SH39_Weir_10yr	WEIR	0.000	0	00:00			0.00
SH39_Weir_2yr	WEIR	0.129	0	19:26			0.23
W_G8_100yr	WEIR	0.000	0	00:00			0.00
W_G8_10yr	WEIR	0.000	0	00:00			0.00
W_G8_PWL	WEIR	0.091	0	16:26			0.18
W_Mangaheka_1_10yr	WEIR	0.000	0	00:00			0.00
W_Mangaheka_1_PWL	WEIR	0.049	0	16:23			0.28
W_Ohote_1_PWL	WEIR	0.032	0	13:33			0.18
W_Ohote_1_Weir_Dn	WEIR	0.000	0	00:00			0.00
W_Ohote_1_Weir_Up	WEIR	0.000	0	00:00			0.00
W_Ohote_2_PWL	WEIR	0.025	0	19:56			0.20
W_Ohote_2_Weir_Dn	WEIR	0.000	0	00:00			0.00
W_Ohote_2_Weir_Up	WEIR	0.000	0	00:00			0.00
W_Ohote_3_PWL	WEIR	0.032	0	17:14			0.19
W_Ohote_3_Weir_Dn	WEIR	0.000	0	00:00			0.00
W_Ohote_3_Weir_Up	WEIR	0.000	0	00:00			0.00
W_Ohote_4_PWL	WEIR	0.030	0	19:18			0.19
W_Ohote_4_Weir_Dn	WEIR	0.000	0	00:00			0.00
W_Ohote_4_Weir_Up	WEIR	0.000	0	00:00			0.00
W_Ohote_5_PWL	WEIR	0.024	0	12:13			0.18
W_Ohote_5_Weir_Dn	WEIR	0.000	0	00:00			0.00
W_Ohote_5_Weir_Up	WEIR	0.000	0	00:00			0.00
W_Ohote_6_PWL	WEIR	0.044	0	21:07			0.20
W_Ohote_6_Weir_Dn	WEIR	0.000	0	00:00			0.00
W_Ohote_6_Weir_Up	WEIR	0.000	0	00:00			0.00
W_Ohote_7_PWL	WEIR	0.027	0	22:11			0.19
W_Ohote_7_Weir_Dn	WEIR	0.000	0	00:00			0.00
W_Ohote_7_Weir_Up	WEIR	0.000	0	00:00			0.00
W_Mangaheka_2_100yr	WEIR	0.000	0	00:00			0.00
W_Mangaheka_2_10yr	WEIR	0.000	0	00:00			0.00
W_Mangaheka_2_PWL	WEIR	0.083	0	14:05			0.12
W_Te_Otamanui_1_PWL	WEIR	0.021	0	12:55			0.20
W_Te_Otamanui_1_Weir_Dn	WEIR	0.000	0	00:00			0.00
W_Te_Otamanui_1_Weir_Up	WEIR	0.000	0	00:00			0.00
W_Te_Otamanui_2_PWL	WEIR	0.033	0	22:54			0.20
W_Te_Otamanui_2_Weir_Dn	WEIR	0.000	0	00:00			0.00
W_Te_Otamanui_2_Weir_Up	WEIR	0.000	0	00:00			0.00
W_Te_Otamanui_3_PWL	WEIR	0.016	0	14:44			0.07
W_Te_Otamanui_3_Weir_Dn	WEIR	0.000	0	00:00			0.00
W_Te_Otamanui_3_Weir_Up	WEIR	0.000	0	00:00			0.00
W_Te_Otamanui_4_PWL	WEIR	0.084	0	14:30			0.16
W_Te_Otamanui_4_Weir_Dn	WEIR	0.000	0	00:00			0.00
W_Te_Otamanui_4_Weir_Up	WEIR	0.000	0	00:00			0.00
Weir_TeKowhai	WEIR	0.000	0	00:00			0.00

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Flow Classification Summary
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	Adjusted	Fraction of Time in Flow Class								
Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
M_2_Stream_Out	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.85	0.00
M_Culvert_01	1.00	0.04	0.00	0.00	0.95	0.01	0.00	0.00	0.00	0.75
M_Culvert_02	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.08	0.00
M_Stream_01	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.18	0.00
M_Stream_02	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
M_Stream_03	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
M_Stream_04	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.41	0.00
Manga_Swale_01_Pipe	1.00	0.03	0.00	0.00	0.28	0.01	0.00	0.68	0.27	0.00
Manga_Swale_02_Pipe	1.00	0.01	0.02	0.00	0.97	0.00	0.00	0.00	0.97	0.00
Manga_Swale_1A	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.09	0.00
Manga_Swale_1B	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.94	0.00
Manga_Swale_1C	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manga_Swale_2A	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Manga_Swale_2B	1.00	0.00	0.03	0.00	0.97	0.00	0.00	0.00	0.18	0.00
Manga_Swale_2C	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.33	0.00
Manga_Swale_2D	1.00	0.00	0.05	0.00	0.95	0.00	0.00	0.00	0.40	0.00
Manga_Swale_2E	1.00	0.06	0.03	0.00	0.91	0.00	0.00	0.00	0.47	0.00
O_Culvert_01	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.00	0.00
O_Culvert_02	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
O_Culvert_03	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_01	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_02	1.00	0.01	0.02	0.00	0.97	0.00	0.00	0.00	0.05	0.00
O_Stream_03	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_04	1.00	0.00	0.03	0.00	0.97	0.00	0.00	0.00	0.06	0.00
O_Stream_05	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00
O_Stream_06	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.03	0.00
O_Stream_07	1.00	0.01	0.05	0.00	0.93	0.00	0.00	0.00	0.00	0.00
O_Stream_08	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.00	0.00
O_Stream_09	1.00	0.07	0.01	0.00	0.92	0.00	0.00	0.00	0.00	0.00
O_Stream_10	1.00	0.08	0.00	0.00	0.92	0.00	0.00	0.00	0.01	0.00
O_Stream_11	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00
O_Stream_12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_13	1.00	0.01	0.03	0.00	0.96	0.00	0.00	0.00	0.04	0.00
O_Stream_14	1.00	0.04	0.03	0.00	0.93	0.00	0.00	0.00	0.00	0.00
O_Stream_15	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.00	0.00
O_Stream_16	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
O_Stream_17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_18	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_19	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_20	1.00	0.01	0.02	0.00	0.96	0.00	0.00	0.00	0.00	0.00
O_Stream_21	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
O_Stream_22	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
O_Stream_23	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_24	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_25	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_Out	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.03	0.00
Pipe_001	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.62	0.00
Pipe_002	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_003	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_004	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.70	0.00
Pipe_005	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_006	1.00	0.00	0.00	0.00	0.88	0.12	0.00	0.00	0.41	0.00
Pipe_007	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
Pipe_008	1.00	0.00	0.00	0.00	0.90	0.09	0.00	0.00	0.03	0.00
Pipe_009	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Pipe_010	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.54	0.00
Pipe_011	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_012	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_013	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Pipe_014	1.00	0.00	0.00	0.00	0.95	0.05	0.00	0.00	0.75	0.00

Pipe_015	1.00	0.00	0.00	0.00	0.90	0.10	0.00	0.00	0.19	0.00
Pipe_016	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.63	0.00
Pipe_017	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.95	0.00
Pipe_018	1.00	0.00	0.00	0.00	0.77	0.23	0.00	0.00	0.00	0.00
Pipe_019	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_020	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.72	0.00
Pipe_021	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_022	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_023	1.00	0.00	0.00	0.00	0.94	0.06	0.00	0.00	0.00	0.00
Pipe_024	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.48	0.00
Pipe_025	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.52	0.00
Pipe_026	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_027	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.80	0.00
Pipe_028	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Pipe_029	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.79	0.00
Pipe_030	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.81	0.00
Pipe_031	1.00	0.00	0.00	0.00	0.90	0.09	0.00	0.00	0.32	0.00
Pipe_032	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.61	0.00
Pipe_033	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_034	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_035	1.00	0.00	0.00	0.00	0.94	0.06	0.00	0.00	0.40	0.00
Pipe_036	1.00	0.00	0.00	0.00	0.83	0.17	0.00	0.00	0.50	0.00
Pipe_039	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.53	0.00
Pipe_040	1.00	0.00	0.00	0.00	0.61	0.39	0.00	0.00	0.00	0.00
Pipe_041	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.56	0.00
Pipe_042	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_043	1.00	0.00	0.00	0.00	0.87	0.12	0.00	0.00	0.78	0.00
Pipe_044	1.00	0.00	0.00	0.00	0.69	0.31	0.00	0.00	0.99	0.00
Pipe_045	1.00	0.00	0.00	0.00	0.86	0.14	0.00	0.00	0.00	0.00
Pipe_046	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_047	1.00	0.00	0.00	0.00	0.92	0.08	0.00	0.00	0.62	0.00
Pipe_048	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_049	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.27	0.00
Pipe_050	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.54	0.00
Pipe_051	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_052	1.00	0.00	0.00	0.00	0.94	0.06	0.00	0.00	0.00	0.00
Pipe_053	1.00	0.00	0.00	0.00	0.75	0.25	0.00	0.00	0.00	0.00
Pipe_054	1.00	0.00	0.00	0.00	0.72	0.28	0.00	0.00	0.96	0.00
Pipe_055	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_056	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.00	0.00
Pipe_057	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.58	0.00
Pipe_058	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.58	0.00
Pipe_059	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.88	0.00
Pipe_060	1.00	0.00	0.00	0.00	0.90	0.09	0.00	0.00	0.11	0.00
Pipe_061	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
Pipe_062	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.45	0.00
Pipe_063	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.48	0.00
Pipe_064	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.96	0.00
Pipe_065	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.67	0.00
Pipe_066	1.00	0.00	0.00	0.00	0.95	0.05	0.00	0.00	0.00	0.00
Pipe_067	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_068	1.00	0.00	0.00	0.00	0.91	0.09	0.00	0.00	0.03	0.00
Pipe_069	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Pipe_070	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.64	0.00
Pipe_071	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.67	0.00
Pipe_072	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.45	0.00
Pipe_073	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
Pipe_074	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_075	1.00	0.00	0.00	0.00	0.93	0.07	0.00	0.00	0.39	0.00
Pipe_076	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.65	0.00
Pipe_077	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_078	1.00	0.00	0.00	0.00	0.98	0.02	0.00	0.00	0.63	0.00
Pipe_079	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.42	0.00
Pipe_080	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.67	0.00
Pipe_081	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.97	0.00
Pipe_082	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_083	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_084	1.00	0.00	0.00	0.00	0.92	0.08	0.00	0.00	0.52	0.00
Pipe_085	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.47	0.00
Pipe_086	1.00	0.00	0.00	0.00	0.98	0.02	0.00	0.00	0.00	0.00

Pipe_087	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_088	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.93	0.00
Pipe_089	1.00	0.00	0.00	0.00	0.89	0.11	0.00	0.00	0.74	0.00
Pipe_091	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
Pipe_092	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_093	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.40	0.00
Pipe_094	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_095	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.39	0.00
Pipe_096	1.00	0.00	0.00	0.00	0.84	0.16	0.00	0.00	0.82	0.00
Pipe_097	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.91	0.00
Pipe_098	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.68	0.00
Pipe_099	1.00	0.00	0.00	0.00	0.58	0.42	0.00	0.00	0.00	0.00
Pipe_100	1.00	0.00	0.00	0.00	0.85	0.15	0.00	0.00	0.64	0.00
Pipe_101	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_103	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.97	0.00
Pipe_104	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
Pipe_105	1.00	0.00	0.00	0.00	0.55	0.44	0.00	0.00	0.00	0.00
Pipe_106	1.00	0.00	0.00	0.00	0.92	0.07	0.00	0.00	0.91	0.00
Pipe_107	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.59	0.00
Pipe_108	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_109	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_110	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.53	0.00
Pipe_111	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.41	0.00
Pipe_Diversion	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.04	0.00
RS_1_Stream_Out	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
T_Culvert_01	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.00	0.00
T_Stream_01	1.00	0.01	0.03	0.00	0.95	0.00	0.00	0.00	0.20	0.00
T_Stream_02	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.17	0.00
T_Stream_03	1.00	0.04	0.04	0.00	0.91	0.00	0.00	0.00	0.16	0.00
T_Stream_04	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.15	0.00
T_Stream_05	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.16	0.00
T_Stream_06	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.47	0.00
T_Stream_07	1.00	0.01	0.02	0.00	0.97	0.00	0.00	0.00	0.75	0.00
T_Stream_08	1.00	0.03	0.29	0.00	0.68	0.00	0.00	0.00	0.47	0.00
Te_Otamanui_Stream_out	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.04	0.00
W_Mangaheka_Stream_Out	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.92	0.00

****
Conduit Surcharge Summary
****

Conduit	--------- Hours Full -------- Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
M_2_Stream_Out	0.01	0.01	3.14	0.01	0.01
M_Culvert_01	5.49	5.49	9.70	0.01	0.01
W_Mangaheka_Stream_Out	0.01	0.01	4.15	0.01	0.01

Analysis begun on: Wed Jun 16 13:52:28 2021
Analysis ended on: Wed Jun 16 13:54:38 2021
Total elapsed time: 00:02:10

3. Scenario: 2yr ARI

3.1 Model Status Report

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EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
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 *********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 10/14/2020 00:00:00
Ending Date .............. 10/17/2020 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:00:01
Dry Time Step ............ 00:00:01
Routing Time Step ........ 1.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 20
Number of Threads ........ 8
Head Tolerance ........... 0.000500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......        26.282        71.514
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         9.691        26.370
Surface Runoff ...........        16.289        44.321
Final Storage ............         0.302         0.823
Continuity Error (%) .....         0.000


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
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Wet Weather Inflow .......        16.288        162.885
Groundwater Inflow .......         0.000          0.000
RDII Inflow ..............         0.000          0.000
External Inflow ..........         0.001          0.011
External Outflow .........        15.879        158.797
Flooding Loss ............         0.000          0.000
Evaporation Loss .........         0.000          0.000
Exfiltration Loss ........         0.000          0.000
Initial Stored Volume ....         0.000          0.002
Final Stored Volume ......         0.410          4.098
Continuity Error (%) .....         0.002


***************************
Time-Step Critical Elements
***************************
None


********************************
Highest Flow Instability Indexes
********************************
Link M_Culvert_01 (7)
Link M_Stream_01 (5)
Link M_Stream_02 (1)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.26 sec
Average Time Step           :     1.00 sec
Maximum Time Step           :     1.00 sec
Percent in Steady State     :    -0.00
Average Iterations per Step :     2.00
Percent Not Converging      :     0.00
Time Step Frequencies       :
    1.000 -   0.631 sec     :    99.70 %
    0.631 -   0.398 sec     :     0.29 %
    0.398 -   0.251 sec     :     0.01 %
    0.251 -   0.158 sec     :     0.00 %
    0.158 -   0.100 sec     :     0.00 %
```

3.2 Summary Results

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**************************
Subcatchment Runoff Summary
**************************
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Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
Mangaheka_1A	73.52	0.00	0.00	3.60	61.18	7.43	68.61	0.64	0.05	0.933
Mangaheka_1B	73.52	0.00	0.00	3.39	61.22	7.63	68.85	0.79	0.12	0.936
Mangaheka_1C	73.52	0.00	0.00	3.43	61.21	7.60	68.81	1.38	0.17	0.936
Mangaheka_1D	73.52	0.00	0.00	3.55	61.19	7.48	68.67	0.87	0.07	0.934
Mangaheka_1E	73.52	0.00	0.00	3.63	61.18	7.40	68.57	1.15	0.08	0.933
Mangaheka_1F	73.52	0.00	0.00	3.57	61.19	7.46	68.65	0.79	0.06	0.934
Mangaheka_1G	73.52	0.00	0.00	24.12	0.00	49.40	49.40	0.20	0.02	0.672
Mangaheka_2A	73.52	0.00	0.00	4.02	61.19	7.01	68.20	1.09	0.09	0.928
Mangaheka_2B	73.52	0.00	0.00	4.09	61.17	6.94	68.10	1.95	0.13	0.926
Mangaheka_2C	73.52	0.00	0.00	3.83	61.21	7.19	68.41	1.36	0.19	0.930
Mangaheka_2D	73.52	0.00	0.00	3.81	61.22	7.22	68.44	1.25	0.21	0.931
Mangaheka_2E	73.52	0.00	0.00	3.81	61.22	7.22	68.44	1.14	0.18	0.931
Mangaheka_Upstream	73.52	0.00	0.00	38.51	25.44	8.77	34.21	50.24	1.27	0.465
Ohote_1A	73.52	0.00	0.00	4.73	61.20	6.30	67.50	0.67	0.06	0.918
Ohote_1B	73.52	0.00	0.00	4.84	61.17	6.19	67.36	2.16	0.15	0.916
Ohote_1C	73.52	0.00	0.00	4.91	61.15	6.12	67.27	1.94	0.12	0.915
Ohote_1D	73.52	0.00	0.00	4.78	61.19	6.25	67.44	0.72	0.06	0.917
Ohote_2A	73.52	0.00	0.00	4.79	61.18	6.24	67.42	0.55	0.04	0.917
Ohote_2B	73.52	0.00	0.00	4.98	61.13	6.05	67.19	1.30	0.08	0.914
Ohote_2C	73.52	0.00	0.00	5.29	61.01	5.74	66.75	1.82	0.08	0.908
Ohote_2D	73.52	0.00	0.00	4.95	61.14	6.08	67.22	1.23	0.07	0.914
Ohote_3A	73.52	0.00	0.00	4.70	61.20	6.33	67.53	0.57	0.05	0.918
Ohote_3B	73.52	0.00	0.00	4.73	61.20	6.30	67.50	0.99	0.09	0.918
Ohote_3C	73.52	0.00	0.00	4.92	61.15	6.11	67.26	2.10	0.13	0.915
Ohote_3D	73.52	0.00	0.00	4.94	61.15	6.09	67.24	2.21	0.14	0.915
Ohote_4A	73.52	0.00	0.00	8.03	61.19	3.00	64.19	0.55	0.05	0.873
Ohote_4B	73.52	0.00	0.00	8.07	61.19	2.96	64.15	1.59	0.13	0.873
Ohote_4C	73.52	0.00	0.00	8.34	61.12	2.68	63.80	2.09	0.12	0.868
Ohote_4D	73.52	0.00	0.00	8.04	61.19	2.99	64.18	1.51	0.12	0.873
Ohote_5A	73.52	0.00	0.00	9.04	61.18	1.99	63.17	0.45	0.03	0.859
Ohote_5B	73.52	0.00	0.00	8.91	61.20	2.12	63.32	0.87	0.08	0.861
Ohote_5C	73.52	0.00	0.00	8.80	61.21	2.23	63.44	1.40	0.17	0.863
Ohote_5D	73.52	0.00	0.00	8.75	61.21	2.27	63.49	1.30	0.19	0.864

Ohote_6A	73.52	0.00	0.00	9.08	61.17	1.94	63.11	0.95	0.07	0.858
Ohote_6B	73.52	0.00	0.00	9.24	61.13	1.78	62.91	2.32	0.13	0.856
Ohote_6C	73.52	0.00	0.00	9.09	61.17	1.93	63.10	3.59	0.24	0.858
Ohote_6D	73.52	0.00	0.00	9.07	61.17	1.96	63.13	2.65	0.19	0.859
Ohote_7A	73.52	0.00	0.00	6.89	61.18	4.14	65.32	0.74	0.06	0.888
Ohote_7B	73.52	0.00	0.00	6.71	61.21	4.31	65.52	2.25	0.28	0.891
Ohote_7C	73.52	0.00	0.00	7.17	61.11	3.86	64.96	2.85	0.15	0.884
Ohote_Stream_1	73.52	0.00	0.00	56.32	0.00	17.20	17.20	0.32	0.01	0.234
Ohote_Stream_2	73.52	0.00	0.00	36.90	0.00	36.62	36.62	0.06	0.00	0.498
Ohote_Stream_3	73.52	0.00	0.00	47.99	0.00	25.53	25.53	0.20	0.00	0.347
Ohote_Stream_4	73.52	0.00	0.00	65.42	0.00	8.10	8.10	0.05	0.00	0.110
Ohote_Stream_5	73.52	0.00	0.00	68.89	0.00	4.63	4.63	0.03	0.00	0.063
Ohote_Stream_6	73.52	0.00	0.00	68.89	0.00	4.63	4.63	0.03	0.00	0.063
Ohote_Stream_7	73.52	0.00	0.00	63.68	0.00	9.84	9.84	0.01	0.00	0.134
Ohote_Upstream_East_1	63.81	0.00	0.00	38.13	3.12	22.49	25.61	10.17	0.53	0.401
Ohote_Upstream_East_2	63.81	0.00	0.00	14.06	3.12	46.57	49.68	2.83	0.17	0.779
Ohote_Upstream_North	63.81	0.00	0.00	35.90	3.12	24.72	27.84	1.64	0.06	0.436
Ohote_Upstream_West	63.81	0.00	0.00	43.22	3.12	17.40	20.52	4.76	0.20	0.322
Rotokauri_South_1A	73.52	0.00	0.00	4.56	61.19	6.47	67.67	2.13	0.19	0.920
Rotokauri_South_1B	73.52	0.00	0.00	4.52	61.20	6.51	67.71	1.94	0.19	0.921
Rotokauri_South_1C	73.52	0.00	0.00	4.41	61.21	6.61	67.83	2.27	0.32	0.923
Rotokauri_South_1D	73.52	0.00	0.00	4.39	61.22	6.64	67.85	1.69	0.27	0.923
Rotokauri_South_1E	63.81	0.00	0.00	24.40	9.35	29.84	39.19	0.59	0.13	0.614
Rotokauri_South_1F	73.52	0.00	0.00	4.57	61.19	6.46	67.65	5.75	0.49	0.920
Te_Otamanui_1A	73.52	0.00	0.00	4.88	61.16	6.15	67.31	0.74	0.05	0.916
Te_Otamanui_1B	73.52	0.00	0.00	4.89	61.16	6.14	67.30	1.66	0.11	0.915
Te_Otamanui_1C	73.52	0.00	0.00	4.82	61.18	6.21	67.38	1.33	0.10	0.916
Te_Otamanui_2A	73.52	0.00	0.00	4.81	61.18	6.22	67.40	0.58	0.04	0.917
Te_Otamanui_2B	73.52	0.00	0.00	5.00	61.13	6.03	67.15	1.73	0.10	0.913
Te_Otamanui_2C	73.52	0.00	0.00	4.97	61.13	6.06	67.19	1.62	0.10	0.914
Te_Otamanui_2D	73.52	0.00	0.00	4.58	61.22	6.45	67.67	0.84	0.12	0.920
Te_Otamanui_2E	73.52	0.00	0.00	4.87	61.16	6.15	67.32	1.04	0.07	0.916
Te_Otamanui_2F	73.52	0.00	0.00	4.73	61.19	6.29	67.49	0.78	0.07	0.918
Te_Otamanui_3A	73.52	0.00	0.00	2.06	61.20	8.97	70.17	0.33	0.03	0.954
Te_Otamanui_3B	73.52	0.00	0.00	2.08	61.20	8.95	70.14	0.65	0.06	0.954
Te_Otamanui_3C	73.52	0.00	0.00	2.10	61.19	8.92	70.12	1.10	0.09	0.954
Te_Otamanui_3D	73.52	0.00	0.00	2.07	61.20	8.95	70.15	0.78	0.07	0.954
Te_Otamanui_4A	73.52	0.00	0.00	2.22	61.15	8.81	69.96	0.86	0.05	0.952
Te_Otamanui_4B	73.52	0.00	0.00	2.09	61.19	8.94	70.13	1.35	0.11	0.954
Te_Otamanui_4C	73.52	0.00	0.00	2.15	61.18	8.88	70.05	1.88	0.13	0.953
Te_Otamanui_4D	73.52	0.00	0.00	1.99	61.21	9.04	70.26	2.54	0.33	0.956
Te_Otamanui_4E	73.52	0.00	0.00	1.96	61.22	9.06	70.28	2.79	0.40	0.956
Te_Otamanui_Stream_1	73.52	0.00	0.00	53.10	0.00	20.42	20.42	0.27	0.00	0.278
Te_Otamanui_Tree_Park	73.52	0.00	0.00	34.79	3.58	35.06	38.63	1.31	0.06	0.525

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Node Depth Summary

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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
Exelby_Culvert_DS	JUNCTION	0.22	0.55	27.56	0 18:23	0.55
Exelby_Culvert_US	JUNCTION	0.30	0.85	28.01	0 18:23	0.85
J_M_Stream_01	JUNCTION	0.44	1.56	29.81	0 14:20	1.56
J_M_Stream_02	JUNCTION	0.52	1.65	29.95	0 13:59	1.65
J_M_Stream_03	JUNCTION	0.49	1.56	29.96	0 13:57	1.56
J_O_Stream_01	JUNCTION	0.33	0.84	28.03	0 18:20	0.84
J_O_Stream_02	JUNCTION	0.33	0.83	28.05	0 18:15	0.83
J_O_Stream_03	JUNCTION	0.32	0.82	28.05	0 18:13	0.82
J_O_Stream_04	JUNCTION	0.32	0.80	28.06	0 18:07	0.80
J_O_Stream_05	JUNCTION	0.31	0.79	28.06	0 18:04	0.79
J_O_Stream_06	JUNCTION	0.30	0.79	28.06	0 18:03	0.79
J_O_Stream_07	JUNCTION	0.29	0.78	28.08	0 17:30	0.78
J_O_Stream_08	JUNCTION	0.32	0.82	28.05	0 18:15	0.82
J_O_Stream_09	JUNCTION	0.31	0.81	28.05	0 18:15	0.81
J_O_Stream_10	JUNCTION	0.31	0.79	28.06	0 18:04	0.79
J_O_Stream_14	JUNCTION	0.26	0.75	28.08	0 17:26	0.75
J_T_Stream_01	JUNCTION	0.25	0.68	28.88	0 18:40	0.68
J_T_Stream_02	JUNCTION	0.22	0.62	28.88	0 18:40	0.62
J_T_Stream_03	JUNCTION	0.21	0.60	28.88	0 18:40	0.60
J_T_Stream_04	JUNCTION	0.22	0.60	28.88	0 18:39	0.60
M_Culvert_1_DS	JUNCTION	0.43	1.39	29.34	0 14:22	1.39
M_Culvert_1_US	JUNCTION	0.34	1.44	29.64	0 14:22	1.44
M_Culvert_2_DS	JUNCTION	0.19	0.96	29.96	0 14:00	0.96
M_Culvert_2_US	JUNCTION	0.13	0.67	29.97	0 14:03	0.67
MH_M1_1	JUNCTION	0.02	0.23	31.11	0 12:10	0.23
MH_M1_10	JUNCTION	0.11	0.44	31.08	0 13:33	0.44
MH_M1_11	JUNCTION	0.13	0.45	31.07	0 13:30	0.45
MH_M1_12	JUNCTION	0.02	0.07	30.67	0 13:32	0.07
MH_M1_2	JUNCTION	0.02	0.19	30.59	0 12:11	0.19
MH_M1_3	JUNCTION	0.03	0.26	30.52	0 12:10	0.26
MH_M1_4	JUNCTION	0.04	0.38	30.16	0 12:12	0.38
MH_M1_5	JUNCTION	0.02	0.17	30.39	0 12:11	0.17
MH_M1_6	JUNCTION	0.08	0.43	30.01	0 14:34	0.43
MH_M1_7	JUNCTION	0.08	0.40	31.10	0 13:30	0.40
MH_M1_8	JUNCTION	0.09	0.42	31.10	0 13:30	0.42
MH_M1_9	JUNCTION	0.10	0.44	31.10	0 13:30	0.44
MH_M2_1	JUNCTION	0.03	0.21	31.01	0 12:15	0.21
MH_M2_2	JUNCTION	0.02	0.26	31.31	0 12:10	0.26
MH_M2_3	JUNCTION	0.02	0.27	30.37	0 12:10	0.27
MH_M2_4	JUNCTION	0.02	0.27	30.92	0 12:10	0.27
MH_M2_5	JUNCTION	0.02	0.24	30.39	0 12:10	0.24
MH_M2_6	JUNCTION	0.06	0.52	30.17	0 12:11	0.52
MH_M2_7	JUNCTION	0.04	0.30	30.55	0 12:12	0.30
MH_O1_1	JUNCTION	0.03	0.26	28.81	0 12:11	0.26
MH_O1_2	JUNCTION	0.05	0.24	28.02	0 12:15	0.24
MH_O1_3	JUNCTION	0.03	0.20	28.14	0 12:15	0.20
MH_O1_4	JUNCTION	0.15	0.60	28.02	0 18:23	0.60
MH_O1_5	JUNCTION	0.05	0.28	28.02	0 18:23	0.28
MH_O1_6	JUNCTION	0.21	0.71	28.02	0 18:25	0.71
MH_O2_1	JUNCTION	0.03	0.19	28.61	0 12:16	0.19
MH_O2_2	JUNCTION	0.26	0.75	28.05	0 18:18	0.75
MH_O2_3	JUNCTION	0.04	0.22	29.23	0 12:25	0.22
MH_O2_4	JUNCTION	0.04	0.22	28.93	0 12:25	0.22
MH_O2_5	JUNCTION	0.04	0.20	28.64	0 12:26	0.20
MH_O2_6	JUNCTION	0.03	0.19	28.63	0 12:15	0.19
MH_O2_7	JUNCTION	0.05	0.31	28.24	0 12:19	0.31
MH_O2_8	JUNCTION	0.08	0.37	28.05	0 18:13	0.37
MH_O2_9	JUNCTION	0.23	0.71	28.05	0 18:18	0.71
MH_O3_1	JUNCTION	0.04	0.26	29.13	0 12:15	0.26
MH_O3_2	JUNCTION	0.04	0.24	28.62	0 12:16	0.24

MH_O3_3	JUNCTION	0.03	0.22	29.15	0	12:10	0.22
MH_O3_4	JUNCTION	0.02	0.17	28.50	0	12:12	0.17
MH_O3_5	JUNCTION	0.09	0.43	28.11	0	12:16	0.43
MH_O3_6	JUNCTION	0.04	0.25	28.52	0	12:15	0.25
MH_O3_7	JUNCTION	0.11	0.45	28.07	0	18:05	0.45
MH_O3_8	JUNCTION	0.29	0.76	28.07	0	18:06	0.76
MH_O4_1	JUNCTION	0.03	0.24	28.50	0	12:10	0.24
MH_O4_2	JUNCTION	0.04	0.24	28.71	0	12:15	0.24
MH_O4_3	JUNCTION	0.04	0.25	28.16	0	12:17	0.25
MH_O4_4	JUNCTION	0.10	0.42	28.07	0	18:03	0.42
MH_O4_5	JUNCTION	0.03	0.25	29.35	0	12:10	0.25
MH_O4_6	JUNCTION	0.03	0.25	28.87	0	12:12	0.25
MH_O4_7	JUNCTION	0.05	0.23	28.07	0	18:04	0.23
MH_O4_8	JUNCTION	0.26	0.73	28.07	0	18:06	0.73
MH_O5_1	JUNCTION	0.02	0.22	28.40	0	12:10	0.22
MH_O5_2	JUNCTION	0.04	0.21	28.08	0	17:29	0.21
MH_O5_3	JUNCTION	0.03	0.28	29.07	0	12:10	0.28
MH_O5_4	JUNCTION	0.03	0.28	28.55	0	12:11	0.28
MH_O5_5	JUNCTION	0.02	0.28	28.94	0	12:10	0.28
MH_O5_6	JUNCTION	0.05	0.32	28.19	0	12:12	0.32
MH_O5_7	JUNCTION	0.20	0.67	28.08	0	17:30	0.67
MH_O6_1	JUNCTION	0.03	0.21	28.43	0	12:15	0.21
MH_O6_2	JUNCTION	0.04	0.23	28.18	0	12:10	0.23
MH_O6_3	JUNCTION	0.11	0.47	28.07	0	18:21	0.47
MH_O6_4	JUNCTION	0.04	0.32	29.81	0	12:15	0.32
MH_O6_5	JUNCTION	0.04	0.29	29.30	0	12:16	0.29
MH_O6_6	JUNCTION	0.24	0.71	28.07	0	18:22	0.71
MH_O6_7	JUNCTION	0.04	0.28	28.40	0	12:15	0.28
MH_O6_8	JUNCTION	0.05	0.25	28.07	0	12:15	0.25
MH_O6_9	JUNCTION	0.30	0.77	28.06	0	18:25	0.77
MH_O7_1	JUNCTION	0.03	0.34	29.43	0	12:10	0.34
MH_O7_2	JUNCTION	0.03	0.29	28.84	0	12:11	0.29
MH_O7_3	JUNCTION	0.06	0.30	28.05	0	12:12	0.30
MH_O7_4	JUNCTION	0.04	0.23	29.20	0	12:15	0.23
MH_O7_5	JUNCTION	0.04	0.25	28.55	0	12:17	0.25
MH_O7_6	JUNCTION	0.04	0.25	28.29	0	12:18	0.25
MH_O7_7	JUNCTION	0.08	0.38	28.04	0	18:24	0.38
MH_O7_8	JUNCTION	0.25	0.73	28.04	0	18:26	0.73
MH_S1_1	JUNCTION	0.03	0.28	31.84	0	12:10	0.28
MH_S1_2	JUNCTION	0.03	0.33	30.76	0	12:13	0.33
MH_S1_3	JUNCTION	0.03	0.30	30.53	0	12:14	0.30
MH_S1_4	JUNCTION	0.04	0.46	33.16	0	12:10	0.46
MH_S1_5	JUNCTION	0.03	0.30	33.61	0	12:10	0.30
MH_S1_6	JUNCTION	0.04	0.46	32.25	0	12:12	0.46
MH_S1_7	JUNCTION	0.04	0.50	31.56	0	12:12	0.50
MH_S1_8	JUNCTION	0.05	0.56	30.88	0	12:13	0.56
MH_S1_9	JUNCTION	0.02	0.31	30.36	0	12:15	0.31
MH_T1_1	JUNCTION	0.03	0.24	29.53	0	12:15	0.24
MH_T1_2	JUNCTION	0.03	0.24	29.19	0	12:15	0.24
MH_T1_3	JUNCTION	0.05	0.23	28.88	0	18:30	0.23
MH_T1_4	JUNCTION	0.03	0.22	29.35	0	12:10	0.22
MH_T1_5	JUNCTION	0.03	0.27	29.18	0	12:11	0.27
MH_T1_6	JUNCTION	0.03	0.21	29.06	0	12:11	0.21
MH_T1_7	JUNCTION	0.11	0.43	28.88	0	18:34	0.43
MH_T1_8	JUNCTION	0.22	0.64	28.88	0	18:35	0.64
MH_T2_1	JUNCTION	0.03	0.21	30.55	0	12:15	0.21
MH_T2_2	JUNCTION	0.03	0.20	29.86	0	12:17	0.20
MH_T2_3	JUNCTION	0.02	0.22	29.98	0	12:10	0.22
MH_T2_4	JUNCTION	0.05	0.34	29.44	0	12:12	0.34
MH_T2_5	JUNCTION	0.16	0.53	28.89	0	18:41	0.53
MH_T2_6	JUNCTION	0.00	0.00	30.76	0	00:00	0.00
MH_T2_7	JUNCTION	0.03	0.20	30.61	0	12:35	0.20
MH_T2_8	JUNCTION	0.05	0.38	29.69	0	13:00	0.38
MH_T2_9	JUNCTION	0.07	0.33	28.89	0	18:43	0.33
MH_T3_1	JUNCTION	0.01	0.17	29.06	0	12:14	0.17
MH_T3_2	JUNCTION	0.03	0.22	29.70	0	12:10	0.22
MH_T3_3	JUNCTION	0.03	0.21	29.45	0	12:11	0.21
MH_T3_4	JUNCTION	0.02	0.19	29.63	0	12:10	0.19
MH_T3_5	JUNCTION	0.02	0.12	29.30	0	12:11	0.12
MH_T3_6	JUNCTION	0.03	0.25	29.21	0	12:12	0.25

MH_T3_7	JUNCTION	0.05	0.35	29.06	0	12:14	0.35
MH_T3_8	JUNCTION	0.09	0.34	28.92	0	12:14	0.34
MH_T4_1	JUNCTION	0.03	0.23	29.71	0	12:10	0.23
MH_T4_2	JUNCTION	0.03	0.21	29.37	0	12:12	0.21
MH_T4_3	JUNCTION	0.03	0.25	30.34	0	12:11	0.25
MH_T4_4	JUNCTION	0.03	0.23	29.77	0	12:14	0.23
MH_T4_5	JUNCTION	0.03	0.38	30.74	0	12:10	0.38
MH_T4_6	JUNCTION	0.03	0.36	30.21	0	12:11	0.36
MH_T4_7	JUNCTION	0.04	0.36	29.45	0	12:12	0.36
MH_T4_8	JUNCTION	0.03	0.34	29.69	0	12:10	0.34
MH_T4_9	JUNCTION	0.15	0.67	29.19	0	12:15	0.67
O_Culvert_1_DS	JUNCTION	0.32	0.81	28.05	0	18:12	0.81
O_Culvert_1_US	JUNCTION	0.32	0.81	28.06	0	18:10	0.81
O_Culvert_2_DS	JUNCTION	0.29	0.78	28.06	0	18:00	0.78
O_Culvert_2_US	JUNCTION	0.30	0.79	28.08	0	17:33	0.79
O_Culvert_3_DS	JUNCTION	0.32	0.81	28.05	0	18:15	0.81
O_Culvert_3_US	JUNCTION	0.32	0.81	28.05	0	18:15	0.81
SH39_Culvert_DS	JUNCTION	0.14	0.29	28.18	0	18:40	0.29
SH39_Culvert_US	JUNCTION	0.32	0.76	28.88	0	18:40	0.76
W_G8_Out	JUNCTION	0.31	0.42	28.52	0	00:00	0.38
W_Mangaheka_1_Out	JUNCTION	0.11	0.66	29.96	0	14:00	0.66
W_Ohote_1_Out_DS	JUNCTION	0.31	0.85	28.01	0	18:23	0.85
W_Ohote_1_Out_US	JUNCTION	0.32	0.85	28.02	0	18:22	0.85
W_Ohote_2_Out_DS	JUNCTION	0.33	0.83	28.05	0	18:17	0.83
W_Ohote_2_Out_US	JUNCTION	0.32	0.82	28.05	0	18:13	0.82
W_Ohote_3_Out_DS	JUNCTION	0.31	0.80	28.06	0	18:07	0.80
W_Ohote_4_Out_US	JUNCTION	0.30	0.79	28.06	0	18:03	0.79
W_Ohote_5_Out_DS	JUNCTION	0.29	0.78	28.08	0	17:29	0.78
W_Ohote_5_Out_US	JUNCTION	0.29	0.77	28.08	0	17:25	0.77
W_Ohote_6_Out_DS	JUNCTION	0.32	0.82	28.05	0	18:13	0.82
W_Ohote_6_Out_US	JUNCTION	0.32	0.82	28.05	0	18:15	0.82
W_Ohote_7_Out_DS	JUNCTION	0.33	0.84	28.04	0	18:19	0.84
W_Ohote_7_Out_US	JUNCTION	0.33	0.82	28.05	0	18:15	0.82
W_Te_Otamanui_1_Out_US	JUNCTION	0.27	0.71	28.88	0	18:40	0.71
W_Te_Otamanui_2_Out_US	JUNCTION	0.26	0.69	28.88	0	18:40	0.69
W_Te_Otamanui_3_Out_DS	JUNCTION	0.12	0.43	28.88	0	18:40	0.43
W_Te_Otamanui_3_Out_US	JUNCTION	0.10	0.40	28.88	0	18:40	0.40
W_Te_Otamanui_4_Out_DS	JUNCTION	0.18	0.55	28.88	0	18:39	0.55
Mangaheka_Out	OUTFALL	0.43	1.39	29.31	0	14:23	1.39
Ohote_Out	OUTFALL	0.22	0.55	27.45	0	18:23	0.55
Rotokauri_South_2_Out	OUTFALL	0.40	0.40	28.40	0	00:00	0.40
Rotokauri_South_3_Out	OUTFALL	0.00	0.00	28.00	0	00:00	0.00
Te_Otamanui_Out	OUTFALL	0.14	0.29	27.94	0	18:40	0.29
W_G8	STORAGE	0.21	0.68	29.08	0	14:57	0.68
W_Mangaheka_1	STORAGE	0.15	0.61	30.01	0	14:35	0.61
W_Ohote_1	STORAGE	0.31	0.84	28.02	0	18:28	0.84
W_Ohote_2	STORAGE	0.32	0.82	28.05	0	18:20	0.82
W_Ohote_3	STORAGE	0.31	0.80	28.07	0	18:09	0.80
W_Ohote_4	STORAGE	0.31	0.79	28.07	0	18:08	0.79
W_Ohote_5	STORAGE	0.29	0.77	28.08	0	17:31	0.77
W_Ohote_6	STORAGE	0.33	0.83	28.06	0	18:29	0.83
W_Ohote_7	STORAGE	0.32	0.82	28.04	0	18:27	0.82
W_Mangaheka_2	STORAGE	0.11	0.59	29.99	0	14:12	0.59
W_Te_Otamanui_1	STORAGE	0.28	0.71	28.88	0	18:39	0.71
W_Te_Otamanui_2	STORAGE	0.27	0.70	28.89	0	18:43	0.70
W_Te_Otamanui_3	STORAGE	0.13	0.40	28.89	0	19:00	0.40
W_Te_Otamanui_4	STORAGE	0.18	0.59	29.04	0	14:19	0.59

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Node Inflow Summary

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Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
Exelby_Culvert_DS	JUNCTION	0.000	0.817	0	18:23	0	58.3	0.001
Exelby_Culvert_US	JUNCTION	0.000	0.817	0	18:21	0	58.3	0.006
J_M_Stream_01	JUNCTION	0.016	1.366	0	13:49	0.203	62.8	0.041
J_M_Stream_02	JUNCTION	0.000	1.366	0	13:42	0	62.6	0.042
J_M_Stream_03	JUNCTION	1.272	1.402	0	12:44	50.2	62.6	-0.033
J_O_Stream_01	JUNCTION	0.064	0.770	0	17:09	1.97	53.2	0.079
J_O_Stream_02	JUNCTION	0.000	0.724	0	14:15	0	41.5	0.083
J_O_Stream_03	JUNCTION	0.002	0.576	0	13:57	0.0623	28	0.026
J_O_Stream_04	JUNCTION	0.004	0.598	0	14:02	0.197	28	0.065
J_O_Stream_05	JUNCTION	0.000	0.562	0	13:44	0	22.2	0.081
J_O_Stream_06	JUNCTION	0.002	0.541	0	13:23	0.0502	16.9	0.095
J_O_Stream_07	JUNCTION	0.001	0.567	0	13:11	0.0255	16.9	0.047
J_O_Stream_08	JUNCTION	0.001	0.168	0	12:11	0.0255	4.78	0.164
J_O_Stream_09	JUNCTION	0.198	0.198	0	12:10	4.76	4.76	0.083
J_O_Stream_10	JUNCTION	0.000	0.064	0	21:15	0	5.4	0.035
J_O_Stream_14	JUNCTION	0.169	0.169	0	12:10	2.83	2.83	0.032
J_T_Stream_01	JUNCTION	0.000	0.149	0	18:42	0	12.4	0.037
J_T_Stream_02	JUNCTION	0.005	0.150	0	17:40	0.272	12.4	0.027
J_T_Stream_03	JUNCTION	0.000	0.146	0	17:28	0	12.1	0.007
J_T_Stream_04	JUNCTION	0.000	0.147	0	17:11	0	12.1	0.044
M_Culvert_1_DS	JUNCTION	0.000	1.348	0	14:22	0	62.7	-0.013
M_Culvert_1_US	JUNCTION	0.000	1.349	0	14:17	0	62.8	0.021
M_Culvert_2_DS	JUNCTION	0.000	0.139	0	14:35	0	6.84	-0.001
M_Culvert_2_US	JUNCTION	0.000	0.139	0	14:35	0	6.82	-0.002
MH_M1_1	JUNCTION	0.116	0.116	0	12:10	0.792	0.792	-0.004
MH_M1_10	JUNCTION	0.000	0.035	0	13:11	0	1.15	0.190
MH_M1_11	JUNCTION	0.064	0.064	0	12:14	0.789	1.94	0.228
MH_M1_12	JUNCTION	0.000	0.057	0	13:30	0	1.93	0.013
MH_M1_2	JUNCTION	0.000	0.115	0	12:10	0	0.792	-0.022
MH_M1_3	JUNCTION	0.171	0.171	0	12:10	1.38	1.38	-0.009
MH_M1_4	JUNCTION	0.000	0.280	0	12:10	0	2.18	0.002
MH_M1_5	JUNCTION	0.073	0.073	0	12:10	0.865	0.865	-0.047
MH_M1_6	JUNCTION	0.000	0.342	0	12:12	0	3.04	0.009
MH_M1_7	JUNCTION	0.000	0.008	0	12:18	0	0.041	0.217
MH_M1_8	JUNCTION	0.000	0.029	0	12:17	0	0.191	0.295
MH_M1_9	JUNCTION	0.082	0.082	0	12:10	1.15	1.29	-0.015
MH_M2_1	JUNCTION	0.135	0.135	0	12:15	1.95	1.95	0.005
MH_M2_2	JUNCTION	0.193	0.193	0	12:10	1.36	1.36	-0.020
MH_M2_3	JUNCTION	0.205	0.205	0	12:10	1.25	1.25	-0.025
MH_M2_4	JUNCTION	0.185	0.185	0	12:10	1.14	1.14	-0.004
MH_M2_5	JUNCTION	0.000	0.183	0	12:10	0	1.14	-0.019
MH_M2_6	JUNCTION	0.000	0.678	0	12:10	0	5.71	-0.005
MH_M2_7	JUNCTION	0.000	0.323	0	12:10	0	3.31	0.000
MH_O1_1	JUNCTION	0.152	0.152	0	12:15	2.16	2.16	-0.017
MH_O1_2	JUNCTION	0.000	0.152	0	12:15	0	2.16	-0.003
MH_O1_3	JUNCTION	0.124	0.124	0	12:15	1.94	1.94	-0.023
MH_O1_4	JUNCTION	0.000	0.275	0	12:15	0	4.11	0.018
MH_O1_5	JUNCTION	0.057	0.057	0	12:10	0.722	0.722	-0.027
MH_O1_6	JUNCTION	0.000	0.330	0	12:15	0	4.83	0.001
MH_O2_1	JUNCTION	0.077	0.077	0	12:15	1.3	1.3	-0.055
MH_O2_2	JUNCTION	0.000	0.077	0	12:16	0	1.3	0.089
MH_O2_3	JUNCTION	0.081	0.081	0	12:25	1.82	1.82	0.000
MH_O2_4	JUNCTION	0.000	0.081	0	12:25	0	1.82	0.001
MH_O2_5	JUNCTION	0.000	0.081	0	12:25	0	1.82	0.003
MH_O2_6	JUNCTION	0.075	0.075	0	12:15	1.23	1.23	-0.003
MH_O2_7	JUNCTION	0.000	0.154	0	12:17	0	3.05	-0.010
MH_O2_8	JUNCTION	0.000	0.154	0	12:20	0	3.05	0.001
MH_O2_9	JUNCTION	0.000	0.154	0	12:21	0	3.05	0.006
MH_O3_1	JUNCTION	0.133	0.133	0	12:15	2.1	2.1	-0.001
MH_O3_2	JUNCTION	0.000	0.132	0	12:15	0	2.1	-0.020
MH_O3_3	JUNCTION	0.087	0.087	0	12:10	0.992	0.992	-0.001
MH_O3_4	JUNCTION	0.000	0.087	0	12:11	0	0.992	-0.022
MH_O3_5	JUNCTION	0.000	0.217	0	12:14	0	3.09	0.020
MH_O3_6	JUNCTION	0.136	0.136	0	12:15	2.21	2.21	-0.023
MH_O3_7	JUNCTION	0.000	0.352	0	12:15	0	5.3	0.002
MH_O3_8	JUNCTION	0.000	0.352	0	12:16	0	5.3	0.015

MH_04_1	JUNCTION	0.125	0.125	0	12:10	1.59	1.59	-0.035
MH_04_2	JUNCTION	0.117	0.117	0	12:15	2.09	2.09	-0.003
MH_04_3	JUNCTION	0.000	0.117	0	12:16	0	2.09	-0.006
MH_04_4	JUNCTION	0.000	0.239	0	12:15	0	3.68	0.007
MH_04_5	JUNCTION	0.125	0.125	0	12:10	1.51	1.51	-0.001
MH_04_6	JUNCTION	0.000	0.125	0	12:11	0	1.51	-0.022
MH_04_7	JUNCTION	0.000	0.124	0	12:13	0	1.51	-0.008
MH_04_8	JUNCTION	0.000	0.362	0	12:15	0	5.19	0.020
MH_05_1	JUNCTION	0.081	0.081	0	12:10	0.874	0.874	-0.014
MH_05_2	JUNCTION	0.000	0.080	0	12:10	0	0.874	-0.021
MH_05_3	JUNCTION	0.170	0.170	0	12:10	1.4	1.4	-0.002
MH_05_4	JUNCTION	0.000	0.169	0	12:10	0	1.4	-0.008
MH_05_5	JUNCTION	0.186	0.186	0	12:10	1.3	1.3	-0.029
MH_05_6	JUNCTION	0.000	0.347	0	12:11	0	2.69	-0.027
MH_05_7	JUNCTION	0.000	0.422	0	12:12	0	3.57	0.037
MH_06_1	JUNCTION	0.133	0.133	0	12:15	2.32	2.32	0.000
MH_06_2	JUNCTION	0.000	0.133	0	12:15	0	2.32	-0.021
MH_06_3	JUNCTION	0.000	0.133	0	12:11	0	2.32	0.012
MH_06_4	JUNCTION	0.244	0.244	0	12:15	3.59	3.59	-0.001
MH_06_5	JUNCTION	0.000	0.244	0	12:15	0	3.59	-0.072
MH_06_6	JUNCTION	0.000	0.372	0	12:17	0	5.91	0.047
MH_06_7	JUNCTION	0.185	0.185	0	12:15	2.65	2.65	-0.007
MH_06_8	JUNCTION	0.000	0.185	0	12:15	0	2.65	-0.019
MH_06_9	JUNCTION	0.000	0.547	0	12:18	0	8.56	0.017
MH_07_1	JUNCTION	0.275	0.275	0	12:10	2.25	2.25	-0.002
MH_07_2	JUNCTION	0.000	0.273	0	12:10	0	2.25	-0.033
MH_07_3	JUNCTION	0.000	0.270	0	12:11	0	2.25	-0.001
MH_07_4	JUNCTION	0.155	0.155	0	12:15	2.85	2.85	-0.001
MH_07_5	JUNCTION	0.000	0.155	0	12:16	0	2.85	0.001
MH_07_6	JUNCTION	0.000	0.155	0	12:17	0	2.85	-0.015
MH_07_7	JUNCTION	0.000	0.155	0	12:18	0	2.85	-0.001
MH_07_8	JUNCTION	0.000	0.415	0	12:13	0	5.11	0.021
MH_S1_1	JUNCTION	0.186	0.186	0	12:10	1.94	1.94	-0.003
MH_S1_2	JUNCTION	0.000	0.185	0	12:11	0	1.94	0.003
MH_S1_3	JUNCTION	0.000	0.180	0	12:13	0	1.94	0.001
MH_S1_4	JUNCTION	0.321	0.588	0	12:10	2.27	3.96	-0.001
MH_S1_5	JUNCTION	0.273	0.273	0	12:10	1.69	1.69	-0.005
MH_S1_6	JUNCTION	0.000	0.575	0	12:11	0	3.96	-0.002
MH_S1_7	JUNCTION	0.186	0.745	0	12:12	2.13	6.09	0.002
MH_S1_8	JUNCTION	0.000	0.742	0	12:13	0	6.09	0.000
MH_S1_9	JUNCTION	0.000	0.920	0	12:14	0	8.03	0.002
MH_T1_1	JUNCTION	0.109	0.109	0	12:15	1.66	1.66	0.000
MH_T1_2	JUNCTION	0.000	0.109	0	12:15	0	1.66	-0.009
MH_T1_3	JUNCTION	0.000	0.109	0	12:15	0	1.66	-0.010
MH_T1_4	JUNCTION	0.096	0.096	0	12:10	1.33	1.33	-0.000
MH_T1_5	JUNCTION	0.000	0.096	0	12:10	0	1.33	0.000
MH_T1_6	JUNCTION	0.000	0.096	0	12:12	0	1.33	-0.034
MH_T1_7	JUNCTION	0.000	0.097	0	12:12	0	1.33	0.024
MH_T1_8	JUNCTION	0.000	0.204	0	12:16	0	2.98	0.012
MH_T2_1	JUNCTION	0.096	0.096	0	12:15	1.62	1.62	-0.001
MH_T2_2	JUNCTION	0.000	0.096	0	12:15	0	1.62	0.006
MH_T2_3	JUNCTION	0.125	0.125	0	12:10	0.839	0.839	-0.030
MH_T2_4	JUNCTION	0.100	0.305	0	12:10	1.73	4.19	-0.030
MH_T2_5	JUNCTION	0.000	0.302	0	12:12	0	4.19	0.030
MH_T2_6	JUNCTION	0.000	0.000	0	00:00	0	0	0.000
MH_T2_7	JUNCTION	0.067	0.067	0	12:10	0.783	0.783	-0.112
MH_T2_8	JUNCTION	0.069	0.109	0	12:25	1.04	1.82	-0.428
MH_T2_9	JUNCTION	0.000	0.088	0	13:20	0	1.83	0.553
MH_T3_1	JUNCTION	0.057	0.057	0	12:10	0.652	0.652	-0.012
MH_T3_2	JUNCTION	0.089	0.089	0	12:10	1.1	1.1	-0.000
MH_T3_3	JUNCTION	0.000	0.089	0	12:10	0	1.1	0.000
MH_T3_4	JUNCTION	0.069	0.069	0	12:10	0.779	0.779	-0.000
MH_T3_5	JUNCTION	0.000	0.069	0	12:10	0	0.779	-0.002
MH_T3_6	JUNCTION	0.000	0.158	0	12:11	0	1.88	-0.004
MH_T3_7	JUNCTION	0.000	0.211	0	12:13	0	2.53	0.003
MH_T3_8	JUNCTION	0.000	0.211	0	12:14	0	2.53	-0.004
MH_T4_1	JUNCTION	0.114	0.114	0	12:10	1.35	1.35	-0.001
MH_T4_2	JUNCTION	0.000	0.114	0	12:10	0	1.35	-0.020
MH_T4_3	JUNCTION	0.134	0.134	0	12:10	1.88	1.88	-0.001
MH_T4_4	JUNCTION	0.000	0.134	0	12:11	0	1.88	0.005
MH_T4_5	JUNCTION	0.327	0.327	0	12:10	2.54	2.54	-0.001
MH_T4_6	JUNCTION	0.000	0.324	0	12:10	0	2.54	-0.008
MH_T4_7	JUNCTION	0.000	0.449	0	12:11	0	4.43	-0.014
MH_T4_8	JUNCTION	0.404	0.404	0	12:10	2.79	2.79	-0.052
MH_T4_9	JUNCTION	0.000	0.918	0	12:11	0	8.57	0.026
O_Culvert_1_DS	JUNCTION	0.000	0.576	0	14:04	0	27.9	0.015
O_Culvert_1_US	JUNCTION	0.000	0.586	0	14:03	0	27.9	0.069
O_Culvert_2_DS	JUNCTION	0.000	0.551	0	13:19	0	16.8	0.052

O_Culvert_2_US	JUNCTION	0.000	0.559	0	13:14	0	16.8	0.061
O_Culvert_3_DS	JUNCTION	0.000	0.185	0	12:10	0	4.76	0.138
O_Culvert_3_US	JUNCTION	0.001	0.191	0	12:10	0.0128	4.77	0.102
SH39_Culvert_DS	JUNCTION	0.000	0.278	0	18:40	0	23.7	0.001
SH39_Culvert_US	JUNCTION	0.000	0.278	0	18:27	0	23.8	0.032
W_G8_Out	JUNCTION	0.000	0.235	0	14:57	0	13.4	0.016
W_Mangaheka_1_Out	JUNCTION	0.000	0.121	0	14:58	0	5.6	0.001
W_Ohote_1_Out_DS	JUNCTION	0.000	0.818	0	18:14	0	58.4	0.027
W_Ohote_1_Out_US	JUNCTION	0.000	0.766	0	17:30	0	53.2	0.062
W_Ohote_2_Out_DS	JUNCTION	0.000	0.734	0	14:22	0	46	0.061
W_Ohote_2_Out_US	JUNCTION	0.000	0.568	0	14:06	0	28	0.059
W_Ohote_3_Out_DS	JUNCTION	0.000	0.604	0	13:57	0	27.8	0.063
W_Ohote_4_Out_US	JUNCTION	0.000	0.526	0	13:33	0	16.9	0.053
W_Ohote_5_Out_DS	JUNCTION	0.000	0.574	0	13:05	0	17.1	0.054
W_Ohote_5_Out_US	JUNCTION	0.535	0.658	0	12:10	10.2	13	0.064
W_Ohote_6_Out_DS	JUNCTION	0.000	0.571	0	14:05	0	28	0.020
W_Ohote_6_Out_US	JUNCTION	0.000	0.177	0	12:11	0	4.76	0.180
W_Ohote_7_Out_DS	JUNCTION	0.000	0.731	0	17:07	0	51.6	0.081
W_Ohote_7_Out_US	JUNCTION	0.000	0.160	0	12:11	0	4.77	0.270
W_Te_Otamanui_1_Out_US	JUNCTION	0.000	0.173	0	17:51	0	13.7	0.023
W_Te_Otamanui_2_Out_US	JUNCTION	0.059	0.174	0	17:40	1.31	13.7	0.010
W_Te_Otamanui_3_Out_DS	JUNCTION	0.000	0.045	0	14:12	0	3.52	0.146
W_Te_Otamanui_3_Out_US	JUNCTION	0.000	0.005	0	12:31	0	0.0455	0.013
W_Te_Otamanui_4_Out_DS	JUNCTION	0.000	0.191	0	13:23	0	12.5	0.047
Mangaheka_Out	OUTFALL	0.000	1.348	0	14:23	0	62.8	0.000
Ohote_Out	OUTFALL	0.000	0.817	0	18:23	0	58.3	0.000
Rotokauri_South_2_Out	OUTFALL	0.000	0.235	0	14:57	0	13.5	0.000
Rotokauri_South_3_Out	OUTFALL	0.126	0.126	0	12:10	0.588	0.588	0.000
Te_Otamanui_Out	OUTFALL	0.000	0.278	0	18:40	0	23.7	0.000
W_G8	STORAGE	0.487	1.380	0	12:15	5.75	13.8	0.066
W_Mangaheka_1	STORAGE	0.049	0.437	0	12:12	0.645	5.63	0.009
W_Ohote_1	STORAGE	0.059	0.384	0	12:15	0.668	5.62	0.012
W_Ohote_2	STORAGE	0.042	0.266	0	12:18	0.546	4.9	0.017
W_Ohote_3	STORAGE	0.054	0.400	0	12:16	0.574	5.87	0.005
W_Ohote_4	STORAGE	0.046	0.404	0	12:15	0.546	5.74	0.006
W_Ohote_5	STORAGE	0.033	0.546	0	12:13	0.455	4.25	0.009
W_Ohote_6	STORAGE	0.066	0.609	0	12:19	0.953	9.51	0.010
W_Ohote_7	STORAGE	0.057	0.468	0	12:14	0.738	6.14	0.011
W_Mangaheka_2	STORAGE	0.086	0.793	0	12:11	1.09	6.81	0.014
W_Te_Otamanui_1	STORAGE	0.049	0.252	0	12:16	0.74	3.72	0.003
W_Te_Otamanui_2	STORAGE	0.043	0.382	0	12:14	0.58	6.66	0.003
W_Te_Otamanui_3	STORAGE	0.031	0.240	0	12:14	0.33	3.13	0.007
W_Te_Otamanui_4	STORAGE	0.054	0.958	0	12:12	0.861	9.43	0.003

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Node Surcharge Summary
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Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
MH_O2_2	JUNCTION	16.20	0.295	10.705
MH_O3_8	JUNCTION	3.23	0.012	10.988
MH_T1_8	JUNCTION	7.09	0.040	10.960

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Node Flooding Summary
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No nodes were flooded.

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Storage Volume Summary
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Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
W_G8	1.965	4	0	0	6.642	13	0 14:57	0.235
W_Mangaheka_1	0.519	2	0	0	2.177	10	0 14:35	0.121
W_Ohote_1	1.292	5	0	0	3.701	14	0 18:28	0.064
W_Ohote_2	1.109	5	0	0	3.022	12	0 18:20	0.060
W_Ohote_3	1.211	5	0	0	3.290	13	0 18:09	0.066
W_Ohote_4	1.280	5	0	0	3.464	13	0 18:08	0.064
W_Ohote_5	0.919	4	0	0	2.613	12	0 17:31	0.054
W_Ohote_6	2.323	6	0	0	6.032	15	0 18:29	0.103
W_Ohote_7	1.702	5	0	0	4.573	14	0 18:27	0.072
W_Mangaheka_2	0.490	2	0	0	2.622	10	0 14:12	0.139
W_Te_Otamanui_1	0.709	4	0	0	1.904	11	0 18:39	0.064
W_Te_Otamanui_2	1.590	5	0	0	4.226	12	0 18:43	0.071
W_Te_Otamanui_3	0.725	2	0	0	2.360	7	0 19:00	0.038
W_Te_Otamanui_4	1.107	3	0	0	3.824	9	0 14:19	0.191

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Outfall Loading Summary
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Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Mangaheka_Out	95.96	0.255	1.348	62.755
Ohote_Out	95.33	0.237	0.817	58.287
Rotokauri_South_2_Out	99.89	0.052	0.235	13.452
Rotokauri_South_3_Out	33.51	0.007	0.126	0.588
Te_Otamanui_Out	96.53	0.095	0.278	23.726
System	84.24	0.647	2.510	158.807

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Link Flow Summary
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Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
M_2_Stream_Out	CONDUIT	0.139	0 14:37	0.16	0.07	0.96
M_Culvert_01	CONDUIT	1.348	0 14:22	2.38	1.10	1.00
M_Culvert_02	CONDUIT	0.139	0 14:35	0.75	0.10	0.78
M_Stream_01	CHANNEL	1.348	0 14:23	0.24	0.01	0.38
M_Stream_02	CHANNEL	1.349	0 14:17	0.31	0.02	0.42
M_Stream_03	CHANNEL	1.359	0 13:50	0.30	0.03	0.44
M_Stream_04	CHANNEL	1.366	0 13:42	0.23	0.01	0.44
Manga_Swale_01_Pipe	CONDUIT	0.082	0 12:59	0.85	0.03	0.40
Manga_Swale_02_Pipe	CONDUIT	0.057	0 13:32	0.27	0.01	0.32
Manga_Swale_1A	CONDUIT	0.088	0 13:20	0.11	0.07	0.27
Manga_Swale_1B	CONDUIT	0.047	0 12:35	0.06	0.04	0.29
Manga_Swale_1C	CONDUIT	0.000	0 00:00	0.00	0.00	0.10
Manga_Swale_2A	CONDUIT	0.057	0 13:30	0.07	0.28	0.26
Manga_Swale_2B	CONDUIT	0.035	0 13:49	0.02	0.13	0.45
Manga_Swale_2C	CONDUIT	0.035	0 13:11	0.03	0.14	0.44
Manga_Swale_2D	CONDUIT	0.029	0 12:17	0.03	0.10	0.43
Manga_Swale_2E	CONDUIT	0.008	0 12:18	0.01	0.03	0.41
O_Culvert_01	CONDUIT	0.576	0 14:04	0.76	0.82	0.54
O_Culvert_02	CONDUIT	0.551	0 13:19	0.74	2.11	0.52
O_Culvert_03	CONDUIT	0.185	0 12:10	0.53	0.26	0.54
O_Stream_01	CHANNEL	0.817	0 18:21	0.20	0.10	0.43
O_Stream_02	CHANNEL	0.764	0 17:46	0.21	0.12	0.42
O_Stream_03	CHANNEL	0.766	0 17:30	0.21	0.09	0.42
O_Stream_04	CHANNEL	0.727	0 17:28	0.20	0.09	0.42
O_Stream_05	CHANNEL	0.719	0 14:23	0.23	0.12	0.42
O_Stream_06	CHANNEL	0.705	0 14:18	0.23	0.11	0.41
O_Stream_07	CHANNEL	0.558	0 14:08	0.18	0.09	0.41
O_Stream_08	CHANNEL	0.568	0 14:06	0.19	0.09	0.41
O_Stream_09	CHANNEL	0.571	0 14:05	0.19	0.07	0.41
O_Stream_10	CHANNEL	0.574	0 13:57	0.19	0.07	0.41
O_Stream_11	CHANNEL	0.586	0 14:03	0.19	0.07	0.40
O_Stream_12	CHANNEL	0.595	0 14:02	0.20	0.07	0.40
O_Stream_13	CHANNEL	0.548	0 13:49	0.19	0.09	0.40
O_Stream_14	CHANNEL	0.518	0 13:31	0.19	0.08	0.40
O_Stream_15	CHANNEL	0.526	0 13:33	0.20	0.06	0.39
O_Stream_16	CHANNEL	0.540	0 13:23	0.21	0.07	0.39
O_Stream_17	CHANNEL	0.559	0 13:14	0.18	0.07	0.39
O_Stream_18	CHANNEL	0.566	0 13:11	0.21	0.07	0.39
O_Stream_19	CHANNEL	0.568	0 12:11	0.28	0.09	0.39
O_Stream_20	CHANNEL	0.147	0 12:12	0.11	0.02	0.41
O_Stream_21	CHANNEL	0.160	0 12:11	0.12	0.03	0.41
O_Stream_22	CHANNEL	0.167	0 12:11	0.13	0.03	0.41
O_Stream_23	CHANNEL	0.177	0 12:11	0.14	0.02	0.41
O_Stream_24	CHANNEL	0.191	0 12:10	0.14	0.02	0.40
O_Stream_25	CHANNEL	0.065	0 21:24	0.05	0.01	0.40
O_Stream_Out	CONDUIT	0.817	0 18:23	0.68	0.12	0.34
Pipe_001	CONDUIT	0.152	0 12:15	1.36	0.35	0.42
Pipe_002	CONDUIT	0.151	0 12:15	0.92	0.35	0.70
Pipe_003	CONDUIT	0.124	0 12:15	0.94	0.31	0.61
Pipe_004	CONDUIT	0.274	0 12:16	1.01	0.34	0.87
Pipe_005	CONDUIT	0.056	0 12:11	0.53	0.28	0.81
Pipe_006	CONDUIT	0.329	0 12:16	1.42	0.41	0.97

Pipe_007	CONDUIT	0.077	0	12:16	0.82	0.38	0.69
Pipe_008	CONDUIT	0.074	0	12:17	0.69	0.40	1.00
Pipe_009	CONDUIT	0.081	0	12:25	1.05	0.42	0.49
Pipe_010	CONDUIT	0.081	0	12:25	1.12	0.39	0.46
Pipe_011	CONDUIT	0.081	0	12:26	0.89	0.40	0.57
Pipe_012	CONDUIT	0.074	0	12:15	0.86	0.37	0.56
Pipe_013	CONDUIT	0.154	0	12:20	1.24	0.42	0.46
Pipe_014	CONDUIT	0.154	0	12:21	1.17	0.30	0.81
Pipe_015	CONDUIT	0.153	0	12:21	0.81	0.21	0.98
Pipe_016	CONDUIT	0.132	0	12:15	1.30	0.43	0.48
Pipe_017	CONDUIT	0.132	0	12:16	0.91	0.43	0.64
Pipe_018	CONDUIT	0.087	0	12:11	1.32	0.43	0.43
Pipe_019	CONDUIT	0.086	0	12:12	0.71	0.22	0.57
Pipe_020	CONDUIT	0.216	0	12:16	1.11	0.50	0.70
Pipe_021	CONDUIT	0.136	0	12:15	1.10	0.45	0.57
Pipe_022	CONDUIT	0.352	0	12:16	1.29	0.45	0.80
Pipe_023	CONDUIT	0.351	0	12:16	1.22	0.56	1.00
Pipe_024	CONDUIT	0.109	0	12:15	1.13	0.36	0.46
Pipe_025	CONDUIT	0.109	0	12:15	1.19	0.36	0.44
Pipe_026	CONDUIT	0.109	0	12:16	0.80	0.36	0.72
Pipe_027	CONDUIT	0.096	0	12:10	0.96	0.32	0.47
Pipe_028	CONDUIT	0.096	0	12:12	1.00	0.31	0.46
Pipe_029	CONDUIT	0.097	0	12:12	1.10	0.31	0.48
Pipe_030	CONDUIT	0.095	0	12:15	0.65	0.31	0.91
Pipe_031	CONDUIT	0.203	0	12:16	1.02	0.45	1.00
Pipe_032	CONDUIT	0.096	0	12:15	1.21	0.31	0.40
Pipe_033	CONDUIT	0.096	0	12:17	0.92	0.31	0.51
Pipe_034	CONDUIT	0.122	0	12:10	0.97	0.28	0.46
Pipe_035	CONDUIT	0.302	0	12:12	1.43	0.38	0.48
Pipe_036	CONDUIT	0.300	0	12:13	1.42	0.29	0.82
Pipe_039	CONDUIT	0.211	0	12:14	1.08	0.27	0.45
Pipe_040	CONDUIT	0.069	0	12:10	1.27	0.23	0.30
Pipe_041	CONDUIT	0.089	0	12:10	1.08	0.29	0.41
Pipe_042	CONDUIT	0.157	0	12:12	0.98	0.20	0.39
Pipe_043	CONDUIT	0.211	0	12:14	1.71	0.27	0.47
Pipe_044	CONDUIT	0.133	0	12:15	1.55	0.34	0.42
Pipe_045	CONDUIT	0.133	0	12:11	1.11	0.31	0.52
Pipe_046	CONDUIT	0.131	0	12:20	0.48	0.17	0.79
Pipe_047	CONDUIT	0.244	0	12:15	1.50	0.31	0.40
Pipe_048	CONDUIT	0.243	0	12:16	0.91	0.31	0.61
Pipe_049	CONDUIT	0.368	0	12:20	0.78	0.45	0.83
Pipe_050	CONDUIT	0.185	0	12:15	1.34	0.24	0.35
Pipe_051	CONDUIT	0.185	0	12:15	0.76	0.23	0.66
Pipe_052	CONDUIT	0.546	0	12:19	1.47	0.63	0.89
Pipe_053	CONDUIT	0.273	0	12:10	1.58	0.35	0.42
Pipe_054	CONDUIT	0.270	0	12:11	1.70	0.26	0.39
Pipe_055	CONDUIT	0.267	0	12:13	1.15	0.34	0.68
Pipe_056	CONDUIT	0.155	0	12:16	1.25	0.19	0.32
Pipe_057	CONDUIT	0.155	0	12:17	1.19	0.19	0.33
Pipe_058	CONDUIT	0.155	0	12:18	1.28	0.20	0.32
Pipe_059	CONDUIT	0.155	0	12:19	0.79	0.20	0.74
Pipe_060	CONDUIT	0.411	0	12:14	1.44	0.34	0.86
Pipe_061	CONDUIT	0.127	0	12:11	1.15	0.42	0.51
Pipe_062	CONDUIT	0.117	0	12:16	1.19	0.38	0.46
Pipe_063	CONDUIT	0.117	0	12:17	1.04	0.38	0.55
Pipe_064	CONDUIT	0.239	0	12:16	1.04	0.30	0.76
Pipe_065	CONDUIT	0.125	0	12:11	1.24	0.41	0.48
Pipe_066	CONDUIT	0.124	0	12:13	1.34	0.41	0.44
Pipe_067	CONDUIT	0.123	0	12:15	0.72	0.28	0.69
Pipe_068	CONDUIT	0.360	0	12:16	1.19	0.26	0.85
Pipe_069	CONDUIT	0.080	0	12:10	1.18	0.40	0.45
Pipe_070	CONDUIT	0.079	0	12:11	0.54	0.26	0.70
Pipe_071	CONDUIT	0.169	0	12:10	1.31	0.39	0.46

Pipe_072	CONDUIT	0.166	0	12:11	1.18	0.38	0.50
Pipe_073	CONDUIT	0.183	0	12:10	1.31	0.42	0.50
Pipe_074	CONDUIT	0.343	0	12:12	1.20	0.27	0.49
Pipe_075	CONDUIT	0.417	0	12:13	1.22	0.33	0.80
Pipe_076	CONDUIT	0.114	0	12:10	1.22	0.26	0.37
Pipe_077	CONDUIT	0.112	0	12:12	0.55	0.26	0.67
Pipe_078	CONDUIT	0.134	0	12:11	1.30	0.31	0.39
Pipe_079	CONDUIT	0.133	0	12:14	1.04	0.31	0.49
Pipe_080	CONDUIT	0.324	0	12:10	1.51	0.41	0.49
Pipe_081	CONDUIT	0.318	0	12:11	1.53	0.40	0.48
Pipe_082	CONDUIT	0.442	0	12:12	1.17	0.35	0.57
Pipe_083	CONDUIT	0.395	0	12:10	1.12	0.31	0.55
Pipe_084	CONDUIT	0.905	0	12:12	2.06	0.48	0.53
Pipe_085	CONDUIT	0.171	0	12:10	1.14	0.39	0.53
Pipe_086	CONDUIT	0.115	0	12:10	1.31	0.26	0.35
Pipe_087	CONDUIT	0.111	0	12:11	0.73	0.14	0.38
Pipe_088	CONDUIT	0.270	0	12:12	1.16	0.34	0.52
Pipe_089	CONDUIT	0.340	0	12:12	1.38	0.27	0.58
Pipe_091	CONDUIT	0.190	0	12:10	1.28	0.24	0.37
Pipe_092	CONDUIT	0.202	0	12:10	0.89	0.27	0.52
Pipe_093	CONDUIT	0.183	0	12:10	1.38	0.23	0.34
Pipe_094	CONDUIT	0.178	0	12:10	0.80	0.23	0.51
Pipe_095	CONDUIT	0.314	0	12:12	1.11	0.25	0.46
Pipe_096	CONDUIT	0.665	0	12:12	2.00	0.34	0.44
Pipe_097	CONDUIT	0.185	0	12:11	1.32	0.43	0.50
Pipe_098	CONDUIT	0.180	0	12:13	1.21	0.42	0.52
Pipe_099	CONDUIT	0.180	0	12:14	1.14	0.23	0.40
Pipe_100	CONDUIT	0.575	0	12:11	1.77	0.45	0.51
Pipe_101	CONDUIT	0.268	0	12:10	1.19	0.34	0.51
Pipe_103	CONDUIT	0.563	0	12:12	1.64	0.44	0.53
Pipe_104	CONDUIT	0.742	0	12:13	1.70	0.38	0.50
Pipe_105	CONDUIT	0.740	0	12:14	2.20	0.38	0.41
Pipe_106	CONDUIT	0.908	0	12:15	1.64	0.25	0.39
Pipe_107	CONDUIT	0.089	0	12:11	1.00	0.29	0.43
Pipe_108	CONDUIT	0.069	0	12:11	0.56	0.01	0.12
Pipe_109	CONDUIT	0.055	0	12:15	0.35	0.01	0.17
Pipe_110	CONDUIT	0.072	0	12:11	0.57	0.17	0.47
Pipe_111	CONDUIT	0.134	0	12:15	1.08	0.17	0.34
Pipe_Diversion	CONDUIT	0.145	0	12:13	0.22	0.09	0.38
RS_1_Stream_Out	CONDUIT	0.235	0	14:57	0.89	0.18	0.45
T_Culvert_01	CONDUIT	0.146	0	17:28	0.61	0.24	0.57
T_Stream_01	CHANNEL	0.173	0	18:15	0.08	0.04	0.59
T_Stream_02	CHANNEL	0.173	0	17:51	0.10	0.04	0.56
T_Stream_03	CHANNEL	0.150	0	19:37	0.10	0.03	0.55
T_Stream_04	CHANNEL	0.149	0	18:42	0.12	0.02	0.52
T_Stream_05	CHANNEL	0.146	0	17:40	0.13	0.02	0.49
T_Stream_06	CHANNEL	0.147	0	17:11	0.13	0.03	0.46
T_Stream_07	CHANNEL	0.045	0	14:12	0.06	0.01	0.39
T_Stream_08	CHANNEL	0.005	0	12:31	0.01	0.00	0.33
Te_Otamanui_Stream_out	CONDUIT	0.278	0	18:40	0.75	0.04	0.22
W_Mangaheka_Stream_Out	CONDUIT	0.121	0	14:58	0.17	0.02	0.83
Exelby_Road	WEIR	0.000	0	00:00			0.00
Exelby_Weir_10yr	WEIR	0.000	0	18:23			0.00
Exelby_Weir_2yr	WEIR	0.817	0	18:23			0.85
SH39	WEIR	0.000	0	00:00			0.00
SH39_Weir_10yr	WEIR	0.000	0	00:00			0.00
SH39_Weir_2yr	WEIR	0.278	0	18:40			0.38
W_G8_100yr	WEIR	0.000	0	00:00			0.00
W_G8_10yr	WEIR	0.000	0	00:00			0.00
W_G8_PWL	WEIR	0.235	0	14:57			0.34
W_Mangaheka_1_10yr	WEIR	0.049	0	14:47			0.11
W_Mangaheka_1_PWL	WEIR	0.074	0	19:49			0.61
W_Ohote_1_PWL	WEIR	0.064	0	21:54			0.42

W_Ohote_1_Weir_Dn	WEIR	0.000	0	00:00	0.00
W_Ohote_1_Weir_Up	WEIR	0.000	0	00:00	0.00
W_Ohote_2_PWL	WEIR	0.060	0	20:49	0.41
W_Ohote_2_Weir_Dn	WEIR	0.000	0	00:00	0.00
W_Ohote_2_Weir_Up	WEIR	0.000	0	00:00	0.00
W_Ohote_3_PWL	WEIR	0.066	0	20:02	0.40
W_Ohote_3_Weir_Dn	WEIR	0.000	0	00:00	0.00
W_Ohote_3_Weir_Up	WEIR	0.000	0	00:00	0.00
W_Ohote_4_PWL	WEIR	0.064	0	21:15	0.40
W_Ohote_4_Weir_Dn	WEIR	0.000	0	00:00	0.00
W_Ohote_4_Weir_Up	WEIR	0.000	0	00:00	0.00
W_Ohote_5_PWL	WEIR	0.097	0	12:15	0.39
W_Ohote_5_Weir_Dn	WEIR	0.000	0	00:00	0.00
W_Ohote_5_Weir_Up	WEIR	0.000	0	00:00	0.00
W_Ohote_6_PWL	WEIR	0.103	0	21:48	0.42
W_Ohote_6_Weir_Dn	WEIR	0.000	0	00:00	0.00
W_Ohote_6_Weir_Up	WEIR	0.000	0	00:00	0.00
W_Ohote_7_PWL	WEIR	0.072	0	23:10	0.41
W_Ohote_7_Weir_Dn	WEIR	0.000	0	00:00	0.00
W_Ohote_7_Weir_Up	WEIR	0.000	0	00:00	0.00
W_Mangaheka_2_100yr	WEIR	0.000	0	00:00	0.00
W_Mangaheka_2_10yr	WEIR	0.015	0	14:23	0.07
W_Mangaheka_2_PWL	WEIR	0.124	0	14:38	0.29
W_Te_Otamanui_1_PWL	WEIR	0.064	0	12:46	0.35
W_Te_Otamanui_1_Weir_Dn	WEIR	0.000	0	00:00	0.00
W_Te_Otamanui_1_Weir_Up	WEIR	0.000	0	00:00	0.00
W_Te_Otamanui_2_PWL	WEIR	0.071	0	15:17	0.35
W_Te_Otamanui_2_Weir_Dn	WEIR	0.000	0	00:00	0.00
W_Te_Otamanui_2_Weir_Up	WEIR	0.000	0	00:00	0.00
W_Te_Otamanui_3_PWL	WEIR	0.038	1	00:41	0.20
W_Te_Otamanui_3_Weir_Dn	WEIR	0.000	0	00:00	0.00
W_Te_Otamanui_3_Weir_Up	WEIR	0.000	0	00:00	0.00
W_Te_Otamanui_4_PWL	WEIR	0.191	0	13:23	0.29
W_Te_Otamanui_4_Weir_Dn	WEIR	0.000	0	00:00	0.00
W_Te_Otamanui_4_Weir_Up	WEIR	0.000	0	00:00	0.00
Weir_TeKowhai	WEIR	0.000	0	00:00	0.00

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Flow Classification Summary
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	Adjusted	---------- Fraction of Time in Flow Class ----------								
	/Actual		Up	Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
M_2_Stream_Out	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.72	0.00
M_Culvert_01	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.62
M_Culvert_02	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.08	0.00
M_Stream_01	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.14	0.00
M_Stream_02	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
M_Stream_03	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
M_Stream_04	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.32	0.00
Manga_Swale_01_Pipe	1.00	0.02	0.00	0.00	0.46	0.00	0.00	0.51	0.15	0.00
Manga_Swale_02_Pipe	1.00	0.01	0.02	0.00	0.98	0.00	0.00	0.00	0.98	0.00
Manga_Swale_1A	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.28	0.00
Manga_Swale_1B	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.96	0.00
Manga_Swale_1C	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manga_Swale_2A	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Manga_Swale_2B	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.14	0.00
Manga_Swale_2C	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.31	0.00
Manga_Swale_2D	1.00	0.00	0.03	0.00	0.97	0.00	0.00	0.00	0.38	0.00
Manga_Swale_2E	1.00	0.03	0.02	0.00	0.94	0.00	0.00	0.00	0.44	0.00
O_Culvert_01	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.00	0.00

O_Culvert_02	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
O_Culvert_03	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_01	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_02	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.03	0.00
O_Stream_03	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_04	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.03	0.00
O_Stream_05	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_06	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.02	0.00
O_Stream_07	1.00	0.01	0.03	0.00	0.95	0.00	0.00	0.00	0.00	0.00
O_Stream_08	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.00	0.00
O_Stream_09	1.00	0.05	0.01	0.00	0.94	0.00	0.00	0.00	0.00	0.00
O_Stream_10	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.00	0.00
O_Stream_11	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
O_Stream_12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_13	1.00	0.01	0.02	0.00	0.97	0.00	0.00	0.00	0.02	0.00
O_Stream_14	1.00	0.03	0.02	0.00	0.95	0.00	0.00	0.00	0.00	0.00
O_Stream_15	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00
O_Stream_16	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
O_Stream_17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_18	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_19	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_20	1.00	0.01	0.02	0.00	0.97	0.00	0.00	0.00	0.00	0.00
O_Stream_21	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
O_Stream_22	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_23	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_24	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_25	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_Out	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.02	0.00
Pipe_001	1.00	0.00	0.00	0.00	0.94	0.06	0.00	0.00	0.78	0.00
Pipe_002	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.83	0.00
Pipe_003	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.97	0.00
Pipe_004	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.49	0.00
Pipe_005	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.80	0.00
Pipe_006	1.00	0.00	0.00	0.00	0.93	0.07	0.00	0.00	0.25	0.00
Pipe_007	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
Pipe_008	1.00	0.00	0.00	0.00	0.93	0.07	0.00	0.00	0.01	0.00
Pipe_009	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Pipe_010	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.52	0.00
Pipe_011	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_012	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_013	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.17	0.00
Pipe_014	1.00	0.00	0.00	0.00	0.94	0.06	0.00	0.00	0.65	0.00
Pipe_015	1.00	0.00	0.00	0.00	0.93	0.07	0.00	0.00	0.04	0.00
Pipe_016	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.62	0.00
Pipe_017	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.94	0.00
Pipe_018	1.00	0.00	0.00	0.00	0.71	0.29	0.00	0.00	0.00	0.00
Pipe_019	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_020	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.59	0.00
Pipe_021	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_022	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.70	0.00
Pipe_023	1.00	0.00	0.00	0.00	0.95	0.04	0.00	0.00	0.00	0.00
Pipe_024	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.46	0.00
Pipe_025	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.72	0.00
Pipe_026	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.78	0.00
Pipe_027	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.70	0.00
Pipe_028	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Pipe_029	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.83	0.00
Pipe_030	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.62	0.00
Pipe_031	1.00	0.00	0.00	0.00	0.94	0.05	0.00	0.00	0.18	0.00
Pipe_032	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.60	0.00
Pipe_033	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_034	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_035	1.00	0.00	0.00	0.00	0.93	0.07	0.00	0.00	0.54	0.00
Pipe_036	1.00	0.00	0.00	0.00	0.92	0.07	0.00	0.00	0.36	0.00
Pipe_039	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.63	0.00
Pipe_040	1.00	0.00	0.00	0.00	0.59	0.41	0.00	0.00	0.00	0.00
Pipe_041	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.54	0.00
Pipe_042	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.95	0.00
Pipe_043	1.00	0.00	0.00	0.00	0.87	0.13	0.00	0.00	0.47	0.00
Pipe_044	1.00	0.00	0.00	0.00	0.68	0.32	0.00	0.00	0.98	0.00

Pipe_045	1.00	0.00	0.00	0.00	0.89	0.10	0.00	0.00	0.26	0.00
Pipe_046	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.67	0.00
Pipe_047	1.00	0.00	0.00	0.00	0.80	0.20	0.00	0.00	0.62	0.00
Pipe_048	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_049	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.10	0.00
Pipe_050	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.71	0.00
Pipe_051	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.82	0.00
Pipe_052	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.00	0.00
Pipe_053	1.00	0.00	0.00	0.00	0.70	0.30	0.00	0.00	0.00	0.00
Pipe_054	1.00	0.00	0.00	0.00	0.81	0.19	0.00	0.00	0.92	0.00
Pipe_055	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.79	0.00
Pipe_056	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.00	0.00
Pipe_057	1.00	0.00	0.00	0.00	0.92	0.08	0.00	0.00	0.54	0.00
Pipe_058	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.81	0.00
Pipe_059	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.75	0.00
Pipe_060	1.00	0.00	0.00	0.00	0.94	0.06	0.00	0.00	0.00	0.00
Pipe_061	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
Pipe_062	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.54	0.00
Pipe_063	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.40	0.00
Pipe_064	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.70	0.00
Pipe_065	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.64	0.00
Pipe_066	1.00	0.00	0.00	0.00	0.90	0.10	0.00	0.00	0.17	0.00
Pipe_067	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.83	0.00
Pipe_068	1.00	0.00	0.00	0.00	0.95	0.05	0.00	0.00	0.00	0.00
Pipe_069	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.00
Pipe_070	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.62	0.00
Pipe_071	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.67	0.00
Pipe_072	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.45	0.00
Pipe_073	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_074	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.82	0.00
Pipe_075	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.21	0.00
Pipe_076	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.64	0.00
Pipe_077	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_078	1.00	0.00	0.00	0.00	0.94	0.06	0.00	0.00	0.61	0.00
Pipe_079	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.42	0.00
Pipe_080	1.00	0.00	0.00	0.00	0.84	0.16	0.00	0.00	0.67	0.00
Pipe_081	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.97	0.00
Pipe_082	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_083	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_084	1.00	0.00	0.00	0.00	0.95	0.05	0.00	0.00	0.38	0.00
Pipe_085	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.47	0.00
Pipe_086	1.00	0.00	0.00	0.00	0.89	0.11	0.00	0.00	0.00	0.00
Pipe_087	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_088	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.76	0.00
Pipe_089	1.00	0.00	0.00	0.00	0.93	0.07	0.00	0.00	0.66	0.00
Pipe_091	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
Pipe_092	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_093	1.00	0.00	0.00	0.00	0.97	0.02	0.00	0.00	0.40	0.00
Pipe_094	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_095	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.40	0.00
Pipe_096	1.00	0.00	0.00	0.00	0.92	0.08	0.00	0.00	0.68	0.00
Pipe_097	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.93	0.00
Pipe_098	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.67	0.00
Pipe_099	1.00	0.00	0.00	0.00	0.56	0.44	0.00	0.00	0.00	0.00
Pipe_100	1.00	0.00	0.00	0.00	0.74	0.26	0.00	0.00	0.64	0.00
Pipe_101	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_103	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.96	0.00
Pipe_104	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.92	0.00
Pipe_105	1.00	0.00	0.00	0.00	0.54	0.46	0.00	0.00	0.00	0.00
Pipe_106	1.00	0.00	0.00	0.00	0.94	0.05	0.00	0.00	0.94	0.00
Pipe_107	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.57	0.00
Pipe_108	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_109	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_110	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.53	0.00
Pipe_111	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.40	0.00
Pipe_Diversion	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.02	0.00
RS_1_Stream_Out	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
T_Culvert_01	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00
T_Stream_01	1.00	0.01	0.02	0.00	0.97	0.00	0.00	0.00	0.03	0.00
T_Stream_02	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.04	0.00

T_Stream_03	1.00	0.02	0.01	0.00	0.97	0.00	0.00	0.00	0.03	0.00
T_Stream_04	1.00	0.03	0.02	0.00	0.94	0.00	0.00	0.00	0.15	0.00
T_Stream_05	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.02	0.00
T_Stream_06	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.31	0.00
T_Stream_07	1.00	0.01	0.02	0.00	0.98	0.00	0.00	0.00	0.58	0.00
T_Stream_08	1.00	0.02	0.08	0.00	0.90	0.00	0.00	0.00	0.30	0.00
Te_Otamanui_Stream_out	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00
W_Mangaheka_Stream_Out	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.80	0.00

****
Conduit Surcharge Summary
****

Conduit	--------- Hours Full Both Ends	Upstream	Dnstream --------	Hours Above Full Normal Flow	Hours Capacity Limited
M_2_Stream_Out	0.01	0.01	12.87	0.01	0.01
M_Culvert_01	14.63	14.63	19.53	2.29	2.29
O_Culvert_02	0.01	0.01	0.01	6.49	0.01
Pipe_003	0.01	0.01	7.47	0.01	0.01
Pipe_005	0.01	0.01	14.22	0.01	0.01
Pipe_006	0.01	0.01	8.32	0.01	0.01
Pipe_007	0.01	0.01	16.20	0.01	0.01
Pipe_008	16.20	16.20	19.08	0.01	0.01
Pipe_014	0.01	0.01	9.54	0.01	0.01
Pipe_015	0.01	0.01	7.30	0.01	0.01
Pipe_022	0.01	0.01	3.23	0.01	0.01
Pipe_023	3.23	3.23	6.28	0.01	0.01
Pipe_026	0.01	0.01	12.05	0.01	0.01
Pipe_030	0.01	0.01	12.05	0.01	0.01
Pipe_031	7.09	7.09	11.69	0.01	0.01
Pipe_051	0.01	0.01	4.54	0.01	0.01
Pipe_067	0.01	0.01	10.70	0.01	0.01
Pipe_070	0.01	0.01	11.53	0.01	0.01
Pipe_077	0.01	0.01	0.32	0.01	0.01
W_Mangaheka_Stream_Out	0.01	0.01	13.52	0.01	0.01

Analysis begun on: Wed Jun 16 13:55:36 2021
Analysis ended on: Wed Jun 16 13:58:08 2021
Total elapsed time: 00:02:32

4. Scenario: 10yr ARI

4.1 Model Status Report

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
  --------------------------------------------------------------


  *********************************************************
  NOTE: The summary statistics displayed in this report are
  based on results found at every computational time step,
  not just on results from each reporting time step.
  *********************************************************

  ****************
  Analysis Options
  ****************
  Flow Units ............... CMS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Ponding Allowed ........ NO
    Water Quality .......... NO
  Infiltration Method ...... HORTON
  Flow Routing Method ...... DYNWAVE
  Surcharge Method ......... EXTRAN
  Starting Date ............ 10/14/2020 00:00:00
  Ending Date .............. 10/17/2020 00:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:01:00
  Wet Time Step ............ 00:00:01
  Dry Time Step ............ 00:00:01
  Routing Time Step ........ 1.00 sec
  Variable Time Step ....... YES
  Maximum Trials ........... 20
  Number of Threads ........ 8
  Head Tolerance ........... 0.000500 m


  **************************        Volume         Depth
  Runoff Quantity Continuity     hectare-m            mm
  **************************     ---------       -------
  Total Precipitation ......        40.482       110.152
  Evaporation Loss .........         0.000         0.000
  Infiltration Loss ........        11.436        31.118
  Surface Runoff ...........        28.742        78.207
  Final Storage ............         0.304         0.826
  Continuity Error (%) .....         0.000


  **************************        Volume        Volume
  Flow Routing Continuity        hectare-m      10^6 ltr
  **************************     ---------     ---------
  Dry Weather Inflow .......         0.000         0.000
  Wet Weather Inflow .......        28.742       287.426
```

```
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.001         0.011
External Outflow .........        28.267       282.675
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.002
Final Stored Volume ......         0.477         4.774
Continuity Error (%) .....        -0.004


*************************
Highest Continuity Errors
*************************
Node W_Ohote_6 (-5.73%)
Node W_Ohote_6_Out_DS (3.34%)
Node W_Ohote_6_Out_US (-3.09%)
Node J_O_Stream_05 (2.67%)
Node W_Ohote_4 (2.15%)


***************************
Time-Step Critical Elements
***************************
Link Pipe_036 (1.63%)


********************************
Highest Flow Instability Indexes
********************************
Link W_Ohote_7_Weir_Up (21)
Link W_Ohote_7_PWL (19)
Link W_Ohote_2_Weir_Up (19)
Link O_Stream_04 (19)
Link W_Ohote_5_Weir_Dn (18)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.10 sec
Average Time Step           :     1.00 sec
Maximum Time Step           :     1.00 sec
Percent in Steady State     :    -0.00
Average Iterations per Step :     2.51
Percent Not Converging      :     0.19
Time Step Frequencies       :
    1.000 -  0.631 sec      :    99.69 %
    0.631 -  0.398 sec      :     0.17 %
    0.398 -  0.251 sec      :     0.09 %
    0.251 -  0.158 sec      :     0.04 %
    0.158 -  0.100 sec      :     0.01 %
```

4.2 Summary Results

```
***************************
Subcatchment Runoff Summary
***************************
```

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
Mangaheka_1A	113.56	0.00	0.00	3.76	95.22	13.27	108.49	1.02	0.09	0.955
Mangaheka_1B	113.56	0.00	0.00	3.52	95.25	13.51	108.76	1.25	0.19	0.958
Mangaheka_1C	113.56	0.00	0.00	3.57	95.25	13.47	108.72	2.19	0.29	0.957
Mangaheka_1D	113.56	0.00	0.00	3.71	95.23	13.33	108.56	1.37	0.13	0.956
Mangaheka_1E	113.56	0.00	0.00	3.80	95.21	13.24	108.45	1.81	0.14	0.955
Mangaheka_1F	113.56	0.00	0.00	3.73	95.23	13.31	108.53	1.25	0.11	0.956
Mangaheka_1G	113.56	0.00	0.00	25.21	0.00	88.36	88.36	0.36	0.03	0.778
Mangaheka_2A	113.56	0.00	0.00	4.21	95.22	12.82	108.04	1.73	0.15	0.951
Mangaheka_2B	113.56	0.00	0.00	4.30	95.21	12.74	107.94	3.09	0.24	0.950
Mangaheka_2C	113.56	0.00	0.00	4.00	95.25	13.04	108.29	2.15	0.32	0.954
Mangaheka_2D	113.56	0.00	0.00	3.96	95.25	13.07	108.32	1.98	0.33	0.954
Mangaheka_2E	113.56	0.00	0.00	3.97	95.25	13.07	108.32	1.81	0.30	0.954
Mangaheka_Upstream	113.56	0.00	0.00	47.52	39.73	25.50	65.23	95.79	2.35	0.574
Ohote_1A	113.56	0.00	0.00	5.03	95.23	12.00	107.23	1.06	0.10	0.944
Ohote_1B	113.56	0.00	0.00	5.16	95.21	11.87	107.08	3.44	0.27	0.943
Ohote_1C	113.56	0.00	0.00	5.24	95.19	11.79	106.98	3.09	0.22	0.942
Ohote_1D	113.56	0.00	0.00	5.09	95.22	11.95	107.17	1.15	0.10	0.944
Ohote_2A	113.56	0.00	0.00	5.11	95.22	11.93	107.15	0.87	0.07	0.943
Ohote_2B	113.56	0.00	0.00	5.31	95.17	11.72	106.89	2.07	0.14	0.941
Ohote_2C	113.56	0.00	0.00	5.67	95.05	11.37	106.41	2.89	0.15	0.937
Ohote_2D	113.56	0.00	0.00	5.29	95.18	11.75	106.92	1.96	0.13	0.942
Ohote_3A	113.56	0.00	0.00	5.00	95.24	12.03	107.27	0.91	0.09	0.945
Ohote_3B	113.56	0.00	0.00	5.03	95.23	12.00	107.24	1.58	0.15	0.944
Ohote_3C	113.56	0.00	0.00	5.25	95.19	11.78	106.97	3.34	0.23	0.942
Ohote_3D	113.56	0.00	0.00	5.27	95.18	11.76	106.95	3.51	0.24	0.942
Ohote_4A	113.56	0.00	0.00	9.16	95.23	7.88	103.11	0.88	0.08	0.908
Ohote_4B	113.56	0.00	0.00	9.20	95.22	7.84	103.06	2.56	0.23	0.907
Ohote_4C	113.56	0.00	0.00	9.51	95.15	7.52	102.67	3.37	0.21	0.904
Ohote_4D	113.56	0.00	0.00	9.17	95.23	7.86	103.09	2.42	0.23	0.908
Ohote_5A	113.56	0.00	0.00	10.91	95.21	6.12	101.34	0.73	0.06	0.892
Ohote_5B	113.56	0.00	0.00	10.78	95.24	6.26	101.49	1.40	0.15	0.894
Ohote_5C	113.56	0.00	0.00	10.67	95.25	6.36	101.61	2.24	0.31	0.895
Ohote_5D	113.56	0.00	0.00	10.63	95.25	6.41	101.66	2.07	0.33	0.895
Ohote_6A	113.56	0.00	0.00	10.97	95.20	6.07	101.27	1.53	0.12	0.892

Ohote_6B	113.56	0.00	0.00	11.16	95.16	5.87	101.04	3.72	0.24	0.890
Ohote_6C	113.56	0.00	0.00	10.98	95.20	6.06	101.26	5.76	0.45	0.892
Ohote_6D	113.56	0.00	0.00	10.95	95.21	6.08	101.29	4.25	0.34	0.892
Ohote_7A	113.56	0.00	0.00	7.55	95.22	9.49	104.71	1.18	0.10	0.922
Ohote_7B	113.56	0.00	0.00	7.35	95.25	9.69	104.93	3.61	0.48	0.924
Ohote_7C	113.56	0.00	0.00	7.87	95.14	9.16	104.30	4.58	0.28	0.918
Ohote_Stream_1	113.56	0.00	0.00	67.17	0.00	46.39	46.39	0.87	0.01	0.409
Ohote_Stream_2	113.56	0.00	0.00	39.64	0.00	73.93	73.93	0.13	0.01	0.651
Ohote_Stream_3	113.56	0.00	0.00	53.89	0.00	59.68	59.68	0.46	0.01	0.525
Ohote_Stream_4	113.56	0.00	0.00	80.82	0.00	32.74	32.74	0.20	0.01	0.288
Ohote_Stream_5	113.56	0.00	0.00	89.64	0.00	23.92	23.92	0.13	0.00	0.211
Ohote_Stream_6	113.56	0.00	0.00	89.64	0.00	23.92	23.92	0.13	0.00	0.211
Ohote_Stream_7	113.56	0.00	0.00	77.43	0.00	36.14	36.14	0.05	0.00	0.318
Ohote_Upstream_East_1	97.06	0.00	0.00	41.36	4.78	50.85	55.63	22.09	1.25	0.573
Ohote_Upstream_East_2	97.06	0.00	0.00	14.39	4.78	77.82	82.59	4.71	0.30	0.851
Ohote_Upstream_North	97.06	0.00	0.00	39.08	4.78	53.13	57.91	3.42	0.13	0.597
Ohote_Upstream_West	97.06	0.00	0.00	48.05	4.78	44.16	48.94	11.35	0.45	0.504
Rotokauri_South_1A	113.56	0.00	0.00	4.80	95.23	12.24	107.47	3.39	0.33	0.946
Rotokauri_South_1B	113.56	0.00	0.00	4.75	95.24	12.28	107.52	3.09	0.32	0.947
Rotokauri_South_1C	113.56	0.00	0.00	4.63	95.25	12.41	107.66	3.60	0.54	0.948
Rotokauri_South_1D	113.56	0.00	0.00	4.60	95.25	12.44	107.69	2.68	0.45	0.948
Rotokauri_South_1E	97.06	0.00	0.00	25.68	14.33	56.82	71.16	1.07	0.21	0.733
Rotokauri_South_1F	113.56	0.00	0.00	4.81	95.23	12.23	107.45	9.13	0.86	0.946
Te_Otamanui_1A	113.56	0.00	0.00	5.20	95.20	11.83	107.03	1.18	0.09	0.942
Te_Otamanui_1B	113.56	0.00	0.00	5.21	95.20	11.82	107.01	2.63	0.19	0.942
Te_Otamanui_1C	113.56	0.00	0.00	5.14	95.21	11.89	107.11	2.11	0.17	0.943
Te_Otamanui_2A	113.56	0.00	0.00	5.12	95.21	11.91	107.12	0.92	0.08	0.943
Te_Otamanui_2B	113.56	0.00	0.00	5.34	95.16	11.69	106.85	2.76	0.18	0.941
Te_Otamanui_2C	113.56	0.00	0.00	5.31	95.17	11.72	106.89	2.58	0.17	0.941
Te_Otamanui_2D	113.56	0.00	0.00	4.85	95.25	12.18	107.43	1.33	0.21	0.946
Te_Otamanui_2E	113.56	0.00	0.00	5.20	95.20	11.83	107.03	1.65	0.12	0.942
Te_Otamanui_2F	113.56	0.00	0.00	5.04	95.23	11.99	107.23	1.24	0.12	0.944
Te_Otamanui_3A	113.56	0.00	0.00	2.10	95.24	14.94	110.17	0.52	0.05	0.970
Te_Otamanui_3B	113.56	0.00	0.00	2.12	95.23	14.91	110.15	1.02	0.10	0.970
Te_Otamanui_3C	113.56	0.00	0.00	2.15	95.23	14.89	110.12	1.73	0.16	0.970
Te_Otamanui_3D	113.56	0.00	0.00	2.11	95.23	14.92	110.15	1.22	0.12	0.970
Te_Otamanui_4A	113.56	0.00	0.00	2.27	95.19	14.77	109.96	1.35	0.09	0.968
Te_Otamanui_4B	113.56	0.00	0.00	2.13	95.23	14.90	110.13	2.13	0.20	0.970
Te_Otamanui_4C	113.56	0.00	0.00	2.20	95.21	14.84	110.05	2.96	0.24	0.969
Te_Otamanui_4D	113.56	0.00	0.00	2.02	95.25	15.02	110.27	3.99	0.55	0.971
Te_Otamanui_4E	113.56	0.00	0.00	2.00	95.25	15.04	110.29	4.38	0.67	0.971
Te_Otamanui_Stream_1	113.56	0.00	0.00	61.68	0.00	51.89	51.89	0.69	0.01	0.457
Te_Otamanui_Tree_Park	113.56	0.00	0.00	37.34	5.58	70.54	76.12	2.59	0.13	0.670

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
Exelby_Culvert_DS	JUNCTION	0.30	0.75	27.76	0 17:57	0.75
Exelby_Culvert_US	JUNCTION	0.44	1.27	28.43	0 17:57	1.27
J_M_Stream_01	JUNCTION	0.63	1.93	30.18	0 14:32	1.93
J_M_Stream_02	JUNCTION	0.72	1.91	30.21	0 14:30	1.91
J_M_Stream_03	JUNCTION	0.68	1.81	30.21	0 14:29	1.81
J_O_Stream_01	JUNCTION	0.46	1.25	28.43	0 17:55	1.25
J_O_Stream_02	JUNCTION	0.46	1.22	28.44	0 17:57	1.22
J_O_Stream_03	JUNCTION	0.45	1.21	28.44	0 17:59	1.20
J_O_Stream_04	JUNCTION	0.45	1.19	28.45	0 17:51	1.19
J_O_Stream_05	JUNCTION	0.44	1.18	28.45	0 17:52	1.18
J_O_Stream_06	JUNCTION	0.43	1.17	28.45	0 17:53	1.17
J_O_Stream_07	JUNCTION	0.43	1.16	28.46	0 17:35	1.16
J_O_Stream_08	JUNCTION	0.46	1.21	28.44	0 17:55	1.21
J_O_Stream_09	JUNCTION	0.45	1.20	28.44	0 17:58	1.20
J_O_Stream_10	JUNCTION	0.43	1.18	28.45	0 17:51	1.18
J_O_Stream_14	JUNCTION	0.40	1.13	28.46	0 17:37	1.13
J_T_Stream_01	JUNCTION	0.34	0.90	29.10	0 16:54	0.90
J_T_Stream_02	JUNCTION	0.30	0.84	29.10	0 16:53	0.84
J_T_Stream_03	JUNCTION	0.29	0.82	29.10	0 16:54	0.82
J_T_Stream_04	JUNCTION	0.30	0.82	29.10	0 16:54	0.82
M_Culvert_1_DS	JUNCTION	0.59	1.41	29.36	0 14:32	1.41
M_Culvert_1_US	JUNCTION	0.53	1.97	30.17	0 14:32	1.97
M_Culvert_2_DS	JUNCTION	0.30	1.22	30.22	0 14:31	1.22
M_Culvert_2_US	JUNCTION	0.20	0.93	30.23	0 14:32	0.93
MH_M1_1	JUNCTION	0.02	0.31	31.19	0 12:10	0.31
MH_M1_10	JUNCTION	0.14	0.57	31.21	0 13:14	0.57
MH_M1_11	JUNCTION	0.15	0.57	31.19	0 13:11	0.57
MH_M1_12	JUNCTION	0.02	0.09	30.69	0 13:13	0.09
MH_M1_2	JUNCTION	0.02	0.25	30.64	0 12:10	0.25
MH_M1_3	JUNCTION	0.03	0.38	30.63	0 12:10	0.38
MH_M1_4	JUNCTION	0.07	0.58	30.35	0 12:11	0.58
MH_M1_5	JUNCTION	0.03	0.22	30.45	0 12:10	0.22
MH_M1_6	JUNCTION	0.13	0.66	30.23	0 14:34	0.66
MH_M1_7	JUNCTION	0.10	0.52	31.22	0 13:12	0.52
MH_M1_8	JUNCTION	0.11	0.54	31.22	0 13:12	0.54
MH_M1_9	JUNCTION	0.13	0.56	31.22	0 13:12	0.56
MH_M2_1	JUNCTION	0.04	0.28	31.08	0 12:11	0.28
MH_M2_2	JUNCTION	0.03	0.35	31.40	0 12:10	0.35
MH_M2_3	JUNCTION	0.03	0.41	30.51	0 12:10	0.40
MH_M2_4	JUNCTION	0.03	0.36	31.01	0 12:10	0.36
MH_M2_5	JUNCTION	0.03	0.35	30.50	0 12:11	0.34
MH_M2_6	JUNCTION	0.11	0.77	30.42	0 12:11	0.76
MH_M2_7	JUNCTION	0.05	0.41	30.66	0 12:11	0.41
MH_O1_1	JUNCTION	0.04	0.36	28.91	0 12:10	0.36
MH_O1_2	JUNCTION	0.14	0.66	28.44	0 17:35	0.66
MH_O1_3	JUNCTION	0.10	0.50	28.44	0 17:35	0.50
MH_O1_4	JUNCTION	0.28	1.03	28.45	0 17:37	1.02
MH_O1_5	JUNCTION	0.14	0.70	28.44	0 17:50	0.70
MH_O1_6	JUNCTION	0.34	1.13	28.44	0 17:34	1.12
MH_O2_1	JUNCTION	0.04	0.27	28.69	0 12:15	0.27
MH_O2_2	JUNCTION	0.39	1.14	28.45	0 17:44	1.14
MH_O2_3	JUNCTION	0.05	0.34	29.35	0 12:15	0.34
MH_O2_4	JUNCTION	0.05	0.33	29.04	0 12:20	0.33
MH_O2_5	JUNCTION	0.05	0.28	28.72	0 12:20	0.28
MH_O2_6	JUNCTION	0.04	0.27	28.71	0 12:15	0.27
MH_O2_7	JUNCTION	0.12	0.53	28.46	0 17:26	0.53
MH_O2_8	JUNCTION	0.18	0.77	28.46	0 17:30	0.77
MH_O2_9	JUNCTION	0.36	1.11	28.45	0 17:52	1.11
MH_O3_1	JUNCTION	0.05	0.39	29.26	0 12:10	0.39
MH_O3_2	JUNCTION	0.05	0.48	28.86	0 12:18	0.48

MH_O3_3	JUNCTION	0.03	0.33	29.25	0	12:10	0.33
MH_O3_4	JUNCTION	0.03	0.22	28.56	0	12:11	0.22
MH_O3_5	JUNCTION	0.19	0.78	28.47	0	17:47	0.78
MH_O3_6	JUNCTION	0.05	0.42	28.69	0	12:17	0.42
MH_O3_7	JUNCTION	0.21	0.84	28.45	0	17:50	0.84
MH_O3_8	JUNCTION	0.42	1.15	28.46	0	18:02	1.15
MH_O4_1	JUNCTION	0.05	0.34	28.60	0	12:10	0.34
MH_O4_2	JUNCTION	0.05	0.35	28.82	0	12:10	0.35
MH_O4_3	JUNCTION	0.12	0.55	28.46	0	17:32	0.55
MH_O4_4	JUNCTION	0.20	0.80	28.45	0	17:48	0.80
MH_O4_5	JUNCTION	0.04	0.39	29.49	0	12:10	0.39
MH_O4_6	JUNCTION	0.04	0.37	28.99	0	12:12	0.37
MH_O4_7	JUNCTION	0.13	0.61	28.45	0	17:48	0.61
MH_O4_8	JUNCTION	0.39	1.11	28.45	0	17:22	1.11
MH_O5_1	JUNCTION	0.05	0.34	28.52	0	12:13	0.33
MH_O5_2	JUNCTION	0.12	0.59	28.46	0	17:31	0.59
MH_O5_3	JUNCTION	0.03	0.42	29.20	0	12:10	0.42
MH_O5_4	JUNCTION	0.04	0.42	28.69	0	12:11	0.42
MH_O5_5	JUNCTION	0.03	0.41	29.06	0	12:10	0.40
MH_O5_6	JUNCTION	0.13	0.59	28.46	0	17:32	0.59
MH_O5_7	JUNCTION	0.33	1.05	28.46	0	17:17	1.05
MH_O6_1	JUNCTION	0.05	0.48	28.70	0	12:15	0.48
MH_O6_2	JUNCTION	0.11	0.68	28.63	0	12:14	0.66
MH_O6_3	JUNCTION	0.22	0.86	28.46	0	12:14	0.86
MH_O6_4	JUNCTION	0.05	0.48	29.96	0	12:10	0.47
MH_O6_5	JUNCTION	0.05	0.40	29.42	0	12:15	0.40
MH_O6_6	JUNCTION	0.37	1.09	28.45	0	17:43	1.09
MH_O6_7	JUNCTION	0.07	0.42	28.53	0	12:10	0.41
MH_O6_8	JUNCTION	0.14	0.63	28.45	0	17:40	0.63
MH_O6_9	JUNCTION	0.43	1.16	28.45	0	17:38	1.16
MH_O7_1	JUNCTION	0.04	0.49	29.57	0	12:10	0.48
MH_O7_2	JUNCTION	0.03	0.40	28.96	0	12:11	0.40
MH_O7_3	JUNCTION	0.15	0.70	28.44	0	17:55	0.70
MH_O7_4	JUNCTION	0.05	0.33	29.29	0	12:15	0.33
MH_O7_5	JUNCTION	0.05	0.37	28.67	0	12:16	0.37
MH_O7_6	JUNCTION	0.08	0.41	28.45	0	17:51	0.41
MH_O7_7	JUNCTION	0.18	0.78	28.44	0	17:50	0.78
MH_O7_8	JUNCTION	0.38	1.13	28.45	0	17:56	1.12
MH_S1_1	JUNCTION	0.04	0.39	31.95	0	12:10	0.39
MH_S1_2	JUNCTION	0.04	0.50	30.93	0	12:12	0.50
MH_S1_3	JUNCTION	0.04	0.43	30.66	0	12:13	0.43
MH_S1_4	JUNCTION	0.05	0.67	33.36	0	12:10	0.66
MH_S1_5	JUNCTION	0.03	0.40	33.71	0	12:10	0.40
MH_S1_6	JUNCTION	0.05	0.66	32.45	0	12:11	0.66
MH_S1_7	JUNCTION	0.06	0.72	31.78	0	12:12	0.71
MH_S1_8	JUNCTION	0.07	0.77	31.09	0	12:13	0.77
MH_S1_9	JUNCTION	0.03	0.44	30.49	0	12:14	0.44
MH_T1_1	JUNCTION	0.04	0.35	29.64	0	12:10	0.35
MH_T1_2	JUNCTION	0.05	0.36	29.30	0	12:16	0.36
MH_T1_3	JUNCTION	0.11	0.49	29.14	0	12:20	0.49
MH_T1_4	JUNCTION	0.04	0.34	29.47	0	12:10	0.34
MH_T1_5	JUNCTION	0.05	0.40	29.31	0	12:15	0.40
MH_T1_6	JUNCTION	0.06	0.34	29.19	0	12:17	0.34
MH_T1_7	JUNCTION	0.18	0.67	29.12	0	17:14	0.66
MH_T1_8	JUNCTION	0.32	0.87	29.11	0	17:16	0.87
MH_T2_1	JUNCTION	0.04	0.30	30.64	0	12:15	0.30
MH_T2_2	JUNCTION	0.04	0.28	29.94	0	12:15	0.28
MH_T2_3	JUNCTION	0.02	0.29	30.06	0	12:10	0.29
MH_T2_4	JUNCTION	0.06	0.48	29.58	0	12:11	0.48
MH_T2_5	JUNCTION	0.24	0.75	29.11	0	16:43	0.75
MH_T2_6	JUNCTION	0.00	0.00	30.76	0	00:00	0.00
MH_T2_7	JUNCTION	0.03	0.27	30.68	0	12:30	0.27
MH_T2_8	JUNCTION	0.06	0.45	29.75	0	12:39	0.45
MH_T2_9	JUNCTION	0.13	0.54	29.10	0	16:53	0.54
MH_T3_1	JUNCTION	0.04	0.32	29.21	0	12:13	0.32
MH_T3_2	JUNCTION	0.03	0.32	29.79	0	12:10	0.32
MH_T3_3	JUNCTION	0.03	0.30	29.54	0	12:11	0.30
MH_T3_4	JUNCTION	0.03	0.27	29.70	0	12:10	0.26
MH_T3_5	JUNCTION	0.02	0.17	29.34	0	12:12	0.17
MH_T3_6	JUNCTION	0.04	0.37	29.33	0	12:13	0.37

MH_T3_7	JUNCTION	0.10	0.50	29.21	0	12:14	0.50
MH_T3_8	JUNCTION	0.15	0.53	29.11	0	17:10	0.53
MH_T4_1	JUNCTION	0.03	0.32	29.79	0	12:10	0.32
MH_T4_2	JUNCTION	0.03	0.50	29.65	0	12:13	0.49
MH_T4_3	JUNCTION	0.04	0.35	30.45	0	12:10	0.35
MH_T4_4	JUNCTION	0.04	0.42	29.95	0	12:14	0.41
MH_T4_5	JUNCTION	0.04	0.55	30.91	0	12:10	0.55
MH_T4_6	JUNCTION	0.04	0.48	30.34	0	12:10	0.48
MH_T4_7	JUNCTION	0.05	0.71	29.79	0	12:13	0.71
MH_T4_8	JUNCTION	0.04	0.46	29.80	0	12:10	0.46
MH_T4_9	JUNCTION	0.22	1.03	29.55	0	12:13	1.03
O_Culvert_1_DS	JUNCTION	0.45	1.20	28.44	0	17:59	1.20
O_Culvert_1_US	JUNCTION	0.45	1.20	28.44	0	17:56	1.20
O_Culvert_2_DS	JUNCTION	0.42	1.16	28.45	0	17:54	1.16
O_Culvert_2_US	JUNCTION	0.43	1.17	28.46	0	17:36	1.17
O_Culvert_3_DS	JUNCTION	0.45	1.20	28.44	0	17:55	1.20
O_Culvert_3_US	JUNCTION	0.45	1.20	28.44	0	17:58	1.20
SH39_Culvert_DS	JUNCTION	0.18	0.40	28.29	0	16:54	0.40
SH39_Culvert_US	JUNCTION	0.41	0.98	29.10	0	16:53	0.98
W_G8_Out	JUNCTION	0.33	0.54	28.64	0	13:42	0.54
W_Mangaheka_1_Out	JUNCTION	0.19	0.91	30.21	0	14:30	0.91
W_Ohote_1_Out_DS	JUNCTION	0.45	1.26	28.43	0	17:57	1.26
W_Ohote_1_Out_US	JUNCTION	0.46	1.25	28.43	0	17:57	1.25
W_Ohote_2_Out_DS	JUNCTION	0.47	1.23	28.44	0	18:01	1.22
W_Ohote_2_Out_US	JUNCTION	0.46	1.21	28.44	0	17:56	1.21
W_Ohote_3_Out_DS	JUNCTION	0.44	1.19	28.45	0	18:10	1.19
W_Ohote_4_Out_US	JUNCTION	0.43	1.17	28.45	0	17:53	1.17
W_Ohote_5_Out_DS	JUNCTION	0.43	1.16	28.46	0	17:35	1.16
W_Ohote_5_Out_US	JUNCTION	0.42	1.15	28.46	0	17:35	1.15
W_Ohote_6_Out_DS	JUNCTION	0.45	1.21	28.44	0	17:57	1.21
W_Ohote_6_Out_US	JUNCTION	0.45	1.21	28.44	0	17:36	1.21
W_Ohote_7_Out_DS	JUNCTION	0.47	1.24	28.44	0	17:59	1.24
W_Ohote_7_Out_US	JUNCTION	0.46	1.22	28.44	0	18:07	1.21
W_Te_Otamanui_1_Out_US	JUNCTION	0.37	0.93	29.10	0	16:54	0.93
W_Te_Otamanui_2_Out_US	JUNCTION	0.35	0.91	29.10	0	16:57	0.91
W_Te_Otamanui_3_Out_DS	JUNCTION	0.19	0.65	29.10	0	16:55	0.65
W_Te_Otamanui_3_Out_US	JUNCTION	0.17	0.62	29.10	0	16:55	0.62
W_Te_Otamanui_4_Out_DS	JUNCTION	0.26	0.77	29.10	0	16:55	0.77
Mangaheka_Out	OUTFALL	0.59	1.41	29.33	0	14:32	1.41
Ohote_Out	OUTFALL	0.30	0.75	27.65	0	17:57	0.75
Rotokauri_South_2_Out	OUTFALL	0.40	0.40	28.40	0	00:00	0.40
Rotokauri_South_3_Out	OUTFALL	0.00	0.00	28.00	0	00:00	0.00
Te_Otamanui_Out	OUTFALL	0.18	0.40	28.05	0	16:54	0.40
W_G8	STORAGE	0.27	0.95	29.35	0	13:42	0.95
W_Mangaheka_1	STORAGE	0.21	0.83	30.23	0	14:35	0.83
W_Ohote_1	STORAGE	0.45	1.25	28.43	0	17:57	1.25
W_Ohote_2	STORAGE	0.45	1.21	28.44	0	17:57	1.21
W_Ohote_3	STORAGE	0.44	1.18	28.45	0	17:52	1.18
W_Ohote_4	STORAGE	0.44	1.17	28.45	0	17:54	1.17
W_Ohote_5	STORAGE	0.42	1.15	28.46	0	17:35	1.15
W_Ohote_6	STORAGE	0.46	1.21	28.44	0	17:57	1.21
W_Ohote_7	STORAGE	0.45	1.21	28.44	0	17:59	1.21
W_Mangaheka_2	STORAGE	0.18	0.84	30.24	0	14:35	0.84
W_Te_Otamanui_1	STORAGE	0.37	0.93	29.10	0	16:54	0.93
W_Te_Otamanui_2	STORAGE	0.36	0.91	29.10	0	16:53	0.91
W_Te_Otamanui_3	STORAGE	0.19	0.63	29.11	0	17:12	0.63
W_Te_Otamanui_4	STORAGE	0.26	0.81	29.26	0	12:55	0.81

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
Exelby_Culvert_DS	JUNCTION	0.000	1.485	0	17:57	0	106	0.001
Exelby_Culvert_US	JUNCTION	0.000	1.485	0	17:52	0	106	0.004
J_M_Stream_01	JUNCTION	0.028	2.487	0	12:46	0.362	116	0.028
J_M_Stream_02	JUNCTION	0.000	2.689	0	12:45	0	115	-0.005
J_M_Stream_03	JUNCTION	2.354	2.799	0	12:44	95.8	115	-0.005
J_O_Stream_01	JUNCTION	0.141	1.528	0	13:15	4.29	97.8	0.049
J_O_Stream_02	JUNCTION	0.000	1.485	0	13:01	0	46.4	0.095
J_O_Stream_03	JUNCTION	0.005	1.386	0	13:14	0.126	51.5	0.025
J_O_Stream_04	JUNCTION	0.009	1.406	0	13:14	0.46	51.5	0.040
J_O_Stream_05	JUNCTION	0.000	2.987	0	17:03	0	43.9	2.748
J_O_Stream_06	JUNCTION	0.006	1.209	0	13:01	0.203	33.3	0.062
J_O_Stream_07	JUNCTION	0.004	1.369	0	12:28	0.132	33.1	0.028
J_O_Stream_08	JUNCTION	0.004	0.718	0	13:10	0.132	20.4	0.032
J_O_Stream_09	JUNCTION	0.454	0.454	0	12:09	11.4	11.4	0.040
J_O_Stream_10	JUNCTION	0.000	0.943	0	16:45	0	10.9	-0.813
J_O_Stream_14	JUNCTION	0.298	0.298	0	12:09	4.71	4.71	0.038
J_T_Stream_01	JUNCTION	0.000	0.272	0	18:09	0	19.8	0.023
J_T_Stream_02	JUNCTION	0.012	0.272	0	12:58	0.69	19.8	0.023
J_T_Stream_03	JUNCTION	0.000	0.281	0	12:58	0	19.1	0.005
J_T_Stream_04	JUNCTION	0.000	0.311	0	12:57	0	19.1	0.031
M_Culvert_1_DS	JUNCTION	0.000	2.212	0	14:32	0	116	-0.007
M_Culvert_1_US	JUNCTION	0.000	2.220	0	14:02	0	116	0.022
M_Culvert_2_DS	JUNCTION	0.000	0.275	0	12:47	0	10.7	0.013
M_Culvert_2_US	JUNCTION	0.000	0.276	0	12:47	0	10.7	-0.004
MH_M1_1	JUNCTION	0.193	0.193	0	12:09	1.25	1.25	-0.003
MH_M1_10	JUNCTION	0.000	0.062	0	12:58	0	1.82	0.140
MH_M1_11	JUNCTION	0.113	0.114	0	12:12	1.25	3.06	0.144
MH_M1_12	JUNCTION	0.000	0.101	0	13:11	0	3.05	0.009
MH_M1_2	JUNCTION	0.000	0.191	0	12:10	0	1.25	-0.051
MH_M1_3	JUNCTION	0.291	0.291	0	12:09	2.19	2.19	-0.016
MH_M1_4	JUNCTION	0.000	0.472	0	12:10	0	3.44	0.023
MH_M1_5	JUNCTION	0.128	0.128	0	12:09	1.37	1.37	-0.029
MH_M1_6	JUNCTION	0.000	0.580	0	12:11	0	4.8	0.005
MH_M1_7	JUNCTION	0.000	0.014	0	12:15	0	0.0612	0.195
MH_M1_8	JUNCTION	0.000	0.050	0	12:15	0	0.283	0.242
MH_M1_9	JUNCTION	0.145	0.145	0	12:09	1.81	2.03	-0.025
MH_M2_1	JUNCTION	0.238	0.238	0	12:09	3.09	3.09	0.003
MH_M2_2	JUNCTION	0.323	0.323	0	12:09	2.16	2.16	-0.015
MH_M2_3	JUNCTION	0.334	0.334	0	12:09	1.98	1.98	-0.028
MH_M2_4	JUNCTION	0.302	0.302	0	12:09	1.81	1.81	-0.004
MH_M2_5	JUNCTION	0.000	0.299	0	12:10	0	1.81	-0.026
MH_M2_6	JUNCTION	0.000	1.104	0	12:10	0	9.04	0.010
MH_M2_7	JUNCTION	0.000	0.555	0	12:10	0	5.24	0.000
MH_O1_1	JUNCTION	0.269	0.269	0	12:09	3.44	3.44	-0.029
MH_O1_2	JUNCTION	0.000	0.278	0	12:11	0	3.44	0.018
MH_O1_3	JUNCTION	0.218	0.218	0	12:09	3.09	3.09	-0.014
MH_O1_4	JUNCTION	0.000	0.474	0	12:16	0	6.53	0.004
MH_O1_5	JUNCTION	0.100	0.100	0	12:09	1.15	1.15	-0.012
MH_O1_6	JUNCTION	0.000	0.566	0	12:16	0	7.68	-0.003
MH_O2_1	JUNCTION	0.136	0.136	0	12:14	2.07	2.07	-0.039
MH_O2_2	JUNCTION	0.000	0.136	0	12:15	0	2.07	0.080
MH_O2_3	JUNCTION	0.145	0.145	0	12:14	2.89	2.89	0.000
MH_O2_4	JUNCTION	0.000	0.145	0	12:16	0	2.89	0.000
MH_O2_5	JUNCTION	0.000	0.145	0	12:20	0	2.89	-0.002
MH_O2_6	JUNCTION	0.132	0.132	0	12:14	1.96	1.96	-0.008
MH_O2_7	JUNCTION	0.000	0.275	0	12:16	0	4.85	0.000
MH_O2_8	JUNCTION	0.000	0.275	0	12:17	0	4.85	0.001
MH_O2_9	JUNCTION	0.000	0.274	0	12:17	0	4.85	0.000
MH_O3_1	JUNCTION	0.234	0.234	0	12:14	3.34	3.34	0.003
MH_O3_2	JUNCTION	0.000	0.235	0	12:13	0	3.34	-0.015
MH_O3_3	JUNCTION	0.153	0.153	0	12:09	1.58	1.58	-0.003
MH_O3_4	JUNCTION	0.000	0.152	0	12:11	0	1.58	-0.015
MH_O3_5	JUNCTION	0.000	0.368	0	12:15	0	4.91	0.003
MH_O3_6	JUNCTION	0.241	0.241	0	12:14	3.51	3.51	-0.009
MH_O3_7	JUNCTION	0.000	0.604	0	12:15	0	8.42	-0.010
MH_O3_8	JUNCTION	0.000	0.600	0	12:16	0	8.42	0.010
MH_O4_1	JUNCTION	0.231	0.231	0	12:09	2.56	2.56	-0.015

MH_04_2	JUNCTION	0.214	0.214	0	12:14	3.37	3.37	-0.009
MH_04_3	JUNCTION	0.000	0.215	0	12:12	0	3.37	0.006
MH_04_4	JUNCTION	0.000	0.431	0	12:14	0	5.92	-0.005
MH_04_5	JUNCTION	0.229	0.229	0	12:09	2.42	2.42	0.000
MH_04_6	JUNCTION	0.000	0.228	0	12:10	0	2.42	-0.032
MH_04_7	JUNCTION	0.000	0.228	0	12:13	0	2.42	0.014
MH_04_8	JUNCTION	0.000	0.645	0	12:15	0	8.35	0.007
MH_05_1	JUNCTION	0.148	0.148	0	12:09	1.4	1.4	-0.009
MH_05_2	JUNCTION	0.000	0.147	0	12:10	0	1.4	-0.012
MH_05_3	JUNCTION	0.305	0.305	0	12:09	2.24	2.24	-0.005
MH_05_4	JUNCTION	0.000	0.302	0	12:10	0	2.24	-0.018
MH_05_5	JUNCTION	0.325	0.325	0	12:09	2.07	2.07	-0.050
MH_05_6	JUNCTION	0.000	0.615	0	12:10	0	4.31	0.014
MH_05_7	JUNCTION	0.000	0.725	0	12:11	0	5.71	0.018
MH_06_1	JUNCTION	0.243	0.243	0	12:14	3.72	3.72	-0.004
MH_06_2	JUNCTION	0.000	0.243	0	12:15	0	3.72	-0.014
MH_06_3	JUNCTION	0.000	0.243	0	12:15	0	3.72	-0.003
MH_06_4	JUNCTION	0.448	0.448	0	12:09	5.76	5.76	-0.001
MH_06_5	JUNCTION	0.000	0.448	0	12:10	0	5.76	-0.037
MH_06_6	JUNCTION	0.000	0.685	0	12:15	0	9.48	-0.006
MH_06_7	JUNCTION	0.341	0.341	0	12:09	4.25	4.25	-0.014
MH_06_8	JUNCTION	0.000	0.342	0	12:10	0	4.25	-0.000
MH_06_9	JUNCTION	0.000	1.013	0	12:15	0	13.7	0.013
MH_07_1	JUNCTION	0.475	0.475	0	12:09	3.61	3.61	-0.000
MH_07_2	JUNCTION	0.000	0.471	0	12:10	0	3.61	-0.053
MH_07_3	JUNCTION	0.000	0.468	0	12:11	0	3.61	0.038
MH_07_4	JUNCTION	0.282	0.282	0	12:14	4.58	4.58	-0.000
MH_07_5	JUNCTION	0.000	0.281	0	12:15	0	4.58	-0.005
MH_07_6	JUNCTION	0.000	0.281	0	12:16	0	4.58	-0.012
MH_07_7	JUNCTION	0.000	0.281	0	12:16	0	4.58	0.010
MH_07_8	JUNCTION	0.000	0.711	0	12:14	0	8.19	0.013
MH_S1_1	JUNCTION	0.325	0.325	0	12:09	3.09	3.09	0.001
MH_S1_2	JUNCTION	0.000	0.323	0	12:11	0	3.09	-0.001
MH_S1_3	JUNCTION	0.000	0.311	0	12:12	0	3.09	0.001
MH_S1_4	JUNCTION	0.537	0.976	0	12:09	3.6	6.28	0.002
MH_S1_5	JUNCTION	0.446	0.446	0	12:09	2.68	2.68	-0.002
MH_S1_6	JUNCTION	0.000	0.952	0	12:10	0	6.28	-0.003
MH_S1_7	JUNCTION	0.327	1.244	0	12:11	3.39	9.66	0.001
MH_S1_8	JUNCTION	0.000	1.235	0	12:12	0	9.66	-0.001
MH_S1_9	JUNCTION	0.000	1.542	0	12:13	0	12.7	0.001
MH_T1_1	JUNCTION	0.192	0.192	0	12:09	2.63	2.63	-0.001
MH_T1_2	JUNCTION	0.000	0.192	0	12:10	0	2.63	-0.007
MH_T1_3	JUNCTION	0.000	0.192	0	12:11	0	2.63	-0.003
MH_T1_4	JUNCTION	0.170	0.170	0	12:09	2.11	2.11	-0.002
MH_T1_5	JUNCTION	0.000	0.170	0	12:10	0	2.11	0.001
MH_T1_6	JUNCTION	0.000	0.169	0	12:10	0	2.11	-0.016
MH_T1_7	JUNCTION	0.000	0.166	0	12:10	0	2.11	0.008
MH_T1_8	JUNCTION	0.000	0.351	0	12:15	0	4.74	0.003
MH_T2_1	JUNCTION	0.170	0.170	0	12:14	2.58	2.58	-0.001
MH_T2_2	JUNCTION	0.000	0.170	0	12:15	0	2.58	0.002
MH_T2_3	JUNCTION	0.207	0.207	0	12:09	1.33	1.33	-0.020
MH_T2_4	JUNCTION	0.177	0.532	0	12:10	2.76	6.67	-0.014
MH_T2_5	JUNCTION	0.000	0.526	0	12:12	0	6.67	0.015
MH_T2_6	JUNCTION	0.000	0.000	0	00:00	0	0	0.000

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MH_T2_7	JUNCTION	0.119	0.119	0	12:09	1.24	1.24	0.022
MH_T2_8	JUNCTION	0.123	0.190	0	12:19	1.65	2.89	-0.743
MH_T2_9	JUNCTION	0.000	0.177	0	12:52	0	2.91	0.788
MH_T3_1	JUNCTION	0.099	0.099	0	12:09	1.02	1.02	-0.017
MH_T3_2	JUNCTION	0.156	0.156	0	12:09	1.73	1.73	-0.000
MH_T3_3	JUNCTION	0.000	0.156	0	12:10	0	1.73	-0.001
MH_T3_4	JUNCTION	0.121	0.121	0	12:09	1.22	1.22	-0.000
MH_T3_5	JUNCTION	0.000	0.121	0	12:10	0	1.22	-0.004
MH_T3_6	JUNCTION	0.000	0.274	0	12:10	0	2.95	-0.008
MH_T3_7	JUNCTION	0.000	0.361	0	12:12	0	3.98	0.009
MH_T3_8	JUNCTION	0.000	0.360	0	12:14	0	3.98	-0.002
MH_T4_1	JUNCTION	0.200	0.200	0	12:09	2.13	2.13	0.000
MH_T4_2	JUNCTION	0.000	0.201	0	12:10	0	2.13	-0.014
MH_T4_3	JUNCTION	0.236	0.236	0	12:09	2.96	2.96	-0.001
MH_T4_4	JUNCTION	0.000	0.238	0	12:12	0	2.96	0.002
MH_T4_5	JUNCTION	0.551	0.551	0	12:09	3.99	3.99	-0.001
MH_T4_6	JUNCTION	0.000	0.544	0	12:10	0	3.99	0.004
MH_T4_7	JUNCTION	0.000	0.758	0	12:10	0	6.95	-0.014
MH_T4_8	JUNCTION	0.669	0.669	0	12:09	4.38	4.38	-0.033
MH_T4_9	JUNCTION	0.000	1.462	0	12:11	0	13.5	0.016
O_Culvert_1_DS	JUNCTION	0.000	1.324	0	13:15	0	51.4	0.011
O_Culvert_1_US	JUNCTION	0.000	1.358	0	13:14	0	51.4	0.047
O_Culvert_2_DS	JUNCTION	0.000	1.240	0	12:59	0	33.1	0.028

O_Culvert_2_US	JUNCTION	0.000	1.271	0	12:55	0	33.1	0.041
O_Culvert_3_DS	JUNCTION	0.000	0.434	0	12:10	0	11.4	0.060
O_Culvert_3_US	JUNCTION	0.003	0.444	0	12:10	0.047	11.4	0.051
SH39_Culvert_DS	JUNCTION	0.000	0.533	0	16:54	0	38.4	0.001
SH39_Culvert_US	JUNCTION	0.000	1.226	0	17:26	0	38.2	-0.623
W_G8_Out	JUNCTION	0.000	0.492	0	13:42	0	21.5	0.010
W_Mangaheka_1_Out	JUNCTION	0.000	0.191	0	15:34	0	8.83	0.000
W_Ohote_1_Out_DS	JUNCTION	0.000	1.487	0	17:34	0	106	0.017
W_Ohote_1_Out_US	JUNCTION	0.000	1.412	0	16:15	0	97.7	0.040
W_Ohote_2_Out_DS	JUNCTION	0.000	3.083	0	17:54	0	54.3	-1.441
W_Ohote_2_Out_US	JUNCTION	0.000	2.789	0	17:56	0	49.4	1.824
W_Ohote_3_Out_DS	JUNCTION	0.000	3.644	0	18:44	0	52.3	-1.842
W_Ohote_4_Out_US	JUNCTION	0.000	1.174	0	12:57	0	34.8	-0.503
W_Ohote_5_Out_DS	JUNCTION	0.000	1.346	0	12:34	0	33.1	-0.520
W_Ohote_5_Out_US	JUNCTION	1.255	1.488	0	12:09	22.1	26.8	0.487
W_Ohote_6_Out_DS	JUNCTION	0.000	2.217	0	14:24	0	51.7	3.456
W_Ohote_6_Out_US	JUNCTION	0.000	3.701	0	17:54	0	21.7	-2.995
W_Ohote_7_Out_DS	JUNCTION	0.000	4.140	0	18:16	0	93.1	-0.661
W_Ohote_7_Out_US	JUNCTION	0.000	3.928	0	18:34	0	38	-0.613
W_Te_Otamanui_1_Out_US	JUNCTION	0.000	0.268	0	13:18	0	19.9	0.440
W_Te_Otamanui_2_Out_US	JUNCTION	0.126	0.321	0	17:28	2.59	22.5	1.251
W_Te_Otamanui_3_Out_DS	JUNCTION	0.000	0.199	0	12:51	0	6.29	0.097
W_Te_Otamanui_3_Out_US	JUNCTION	0.000	0.023	0	12:51	0	0.0879	0.010
W_Te_Otamanui_4_Out_DS	JUNCTION	0.000	0.420	0	12:54	0	19.9	0.035
Mangaheka_Out	OUTFALL	0.000	2.212	0	14:32	0	116	0.000
Ohote_Out	OUTFALL	0.000	1.485	0	17:57	0	106	0.000
Rotokauri_South_2_Out	OUTFALL	0.000	0.492	0	13:42	0	21.5	0.000
Rotokauri_South_3_Out	OUTFALL	0.207	0.207	0	12:09	1.07	1.07	0.000
Te_Otamanui_Out	OUTFALL	0.000	0.533	0	16:54	0	38.4	0.000
W_G8	STORAGE	0.858	2.337	0	12:14	9.13	21.9	0.044
W_Mangaheka_1	STORAGE	0.086	0.715	0	12:12	1.02	8.88	0.005
W_Ohote_1	STORAGE	0.103	1.093	0	16:31	1.06	46.2	0.001
W_Ohote_2	STORAGE	0.074	5.126	0	17:56	0.868	24.9	-0.061
W_Ohote_3	STORAGE	0.094	5.358	0	16:58	0.912	27.6	-0.556
W_Ohote_4	STORAGE	0.085	1.021	0	16:05	0.876	13.1	2.196
W_Ohote_5	STORAGE	0.062	0.934	0	12:12	0.73	18.6	0.347
W_Ohote_6	STORAGE	0.120	3.192	0	17:54	1.53	18.8	-5.418
W_Ohote_7	STORAGE	0.103	6.254	0	18:08	1.18	45.3	2.065
W_Mangaheka_2	STORAGE	0.152	1.236	0	12:11	1.73	10.8	0.008
W_Te_Otamanui_1	STORAGE	0.087	0.488	0	17:27	1.18	9.7	0.427
W_Te_Otamanui_2	STORAGE	0.076	0.659	0	12:13	0.921	12.8	-1.156
W_Te_Otamanui_3	STORAGE	0.054	0.409	0	12:13	0.518	5.2	0.005
W_Te_Otamanui_4	STORAGE	0.093	1.539	0	12:12	1.35	14.8	0.002

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Node Surcharge Summary
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Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
M_Culvert_2_DS	JUNCTION	5.99	0.169	8.781
MH_O1_2	JUNCTION	5.87	0.060	10.940
MH_O1_4	JUNCTION	11.85	0.275	10.725
MH_O1_5	JUNCTION	11.40	0.252	10.748
MH_O1_6	JUNCTION	14.13	0.382	10.618
MH_O2_2	JUNCTION	22.70	0.695	10.305
MH_O2_8	JUNCTION	9.79	0.173	10.827
MH_O2_9	JUNCTION	14.10	0.364	10.486
MH_O3_5	JUNCTION	11.30	0.182	10.818
MH_O3_7	JUNCTION	7.37	0.090	10.910
MH_O3_8	JUNCTION	15.51	0.403	10.597
MH_O4_3	JUNCTION	3.59	0.021	10.979
MH_O4_4	JUNCTION	5.42	0.049	10.951
MH_O4_7	JUNCTION	2.05	0.007	10.993
MH_O4_8	JUNCTION	11.11	0.214	10.786

MH_O5_2	JUNCTION	6.85	0.067	10.933
MH_O5_7	JUNCTION	10.22	0.146	10.854
MH_O6_2	JUNCTION	0.19	0.085	10.915
MH_O6_3	JUNCTION	8.31	0.112	10.888
MH_O6_6	JUNCTION	11.74	0.195	10.805
MH_O6_9	JUNCTION	12.82	0.264	10.736
MH_O7_7	JUNCTION	3.95	0.027	10.973
MH_O7_8	JUNCTION	11.10	0.229	10.771
MH_T1_7	JUNCTION	11.57	0.142	10.858
MH_T1_8	JUNCTION	15.96	0.273	10.727

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Node Flooding Summary
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No nodes were flooded.

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Storage Volume Summary
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Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
W_G8	2.569	5	0	0	9.519	19	0 13:42	0.492
W_Mangaheka_1	0.732	3	0	0	3.092	14	0 14:35	0.191
W_Ohote_1	1.950	8	0	0	5.828	22	0 17:57	1.076
W_Ohote_2	1.643	7	0	0	4.794	20	0 17:57	5.093
W_Ohote_3	1.785	7	0	0	5.132	21	0 17:52	5.139
W_Ohote_4	1.883	7	0	0	5.394	21	0 17:54	0.988
W_Ohote_5	1.404	6	0	0	4.189	19	0 17:35	0.950
W_Ohote_6	3.321	8	0	0	9.126	23	0 17:57	3.509
W_Ohote_7	2.497	8	0	0	7.120	22	0 17:59	5.883
W_Mangaheka_2	0.792	3	0	0	3.878	14	0 14:35	0.276
W_Te_Otamanui_1	0.977	6	0	0	2.599	15	0 16:54	0.549
W_Te_Otamanui_2	2.163	6	0	0	5.659	16	0 16:53	0.600
W_Te_Otamanui_3	1.137	3	0	0	3.774	11	0 17:12	0.062
W_Te_Otamanui_4	1.634	4	0	0	5.446	13	0 12:55	0.542

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Outfall Loading Summary
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Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Mangaheka_Out	96.73	0.469	2.212	115.691
Ohote_Out	96.23	0.429	1.485	106.020
Rotokauri_South_2_Out	99.93	0.085	0.492	21.532
Rotokauri_South_3_Out	33.73	0.013	0.207	1.067
Te_Otamanui_Out	97.25	0.154	0.533	38.375
System	84.78	1.148	4.588	282.685

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Link Flow Summary
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Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
M_2_Stream_Out	CONDUIT	0.274	0	12:48	0.32	0.14	1.00
M_Culvert_01	CONDUIT	2.212	0	14:32	3.91	1.80	1.00
M_Culvert_02	CONDUIT	0.275	0	12:47	0.76	0.20	0.94
M_Stream_01	CHANNEL	2.212	0	14:32	0.34	0.01	0.39
M_Stream_02	CHANNEL	2.220	0	14:02	0.32	0.03	0.54
M_Stream_03	CHANNEL	2.466	0	12:46	0.29	0.05	0.53
M_Stream_04	CHANNEL	2.689	0	12:45	0.21	0.02	0.51
Manga_Swale_01_Pipe	CONDUIT	0.155	0	12:54	0.88	0.06	0.60
Manga_Swale_02_Pipe	CONDUIT	0.101	0	13:13	0.30	0.02	0.44
Manga_Swale_1A	CONDUIT	0.177	0	12:52	0.13	0.15	0.40
Manga_Swale_1B	CONDUIT	0.081	0	12:30	0.07	0.07	0.36
Manga_Swale_1C	CONDUIT	0.000	0	00:00	0.00	0.00	0.14
Manga_Swale_2A	CONDUIT	0.101	0	13:11	0.09	0.50	0.33
Manga_Swale_2B	CONDUIT	0.062	0	13:27	0.03	0.23	0.57
Manga_Swale_2C	CONDUIT	0.062	0	12:58	0.03	0.25	0.56
Manga_Swale_2D	CONDUIT	0.050	0	12:15	0.03	0.17	0.55
Manga_Swale_2E	CONDUIT	0.014	0	12:15	0.01	0.05	0.53
O_Culvert_01	CONDUIT	1.324	0	13:15	1.12	1.89	0.80
O_Culvert_02	CONDUIT	1.240	0	12:59	1.05	4.74	0.78
O_Culvert_03	CONDUIT	0.434	0	12:10	0.65	0.61	0.80
O_Stream_01	CHANNEL	1.485	0	17:52	0.19	0.18	0.63
O_Stream_02	CHANNEL	1.024	0	13:04	0.21	0.17	0.63
O_Stream_03	CHANNEL	1.412	0	16:15	0.24	0.17	0.63
O_Stream_04	CHANNEL	1.408	0	13:15	0.24	0.17	0.62
O_Stream_05	CHANNEL	1.356	0	13:03	0.26	0.22	0.62
O_Stream_06	CHANNEL	1.411	0	13:02	0.28	0.23	0.61
O_Stream_07	CHANNEL	1.063	0	13:01	0.21	0.17	0.61
O_Stream_08	CHANNEL	1.214	0	13:05	0.24	0.20	0.60
O_Stream_09	CHANNEL	1.349	0	13:16	0.24	0.16	0.60
O_Stream_10	CHANNEL	1.381	0	13:14	0.25	0.17	0.60
O_Stream_11	CHANNEL	1.358	0	13:14	0.24	0.16	0.60
O_Stream_12	CHANNEL	1.397	0	13:14	0.25	0.17	0.60
O_Stream_13	CHANNEL	1.155	0	12:56	0.24	0.19	0.59
O_Stream_14	CHANNEL	1.146	0	12:57	0.25	0.19	0.59
O_Stream_15	CHANNEL	1.164	0	13:17	0.26	0.14	0.59
O_Stream_16	CHANNEL	1.204	0	13:01	0.27	0.15	0.58
O_Stream_17	CHANNEL	1.271	0	12:55	0.23	0.15	0.58
O_Stream_18	CHANNEL	1.365	0	12:28	0.25	0.17	0.58
O_Stream_19	CHANNEL	1.328	0	12:10	0.32	0.21	0.58
O_Stream_20	CHANNEL	0.462	0	17:04	0.13	0.08	0.61
O_Stream_21	CHANNEL	0.706	0	13:10	0.14	0.11	0.61
O_Stream_22	CHANNEL	0.714	0	13:10	0.15	0.12	0.60
O_Stream_23	CHANNEL	0.419	0	12:10	0.16	0.05	0.60
O_Stream_24	CHANNEL	0.442	0	12:10	0.16	0.05	0.60
O_Stream_25	CHANNEL	0.350	0	14:10	0.06	0.06	0.59
O_Stream_Out	CONDUIT	1.485	0	17:57	0.80	0.22	0.47
Pipe_001	CONDUIT	0.278	0	12:11	1.45	0.64	0.72
Pipe_002	CONDUIT	0.259	0	12:16	0.94	0.60	1.00
Pipe_003	CONDUIT	0.215	0	12:15	1.11	0.55	0.98
Pipe_004	CONDUIT	0.472	0	12:16	1.09	0.59	1.00
Pipe_005	CONDUIT	0.095	0	12:14	0.65	0.47	1.00
Pipe_006	CONDUIT	0.565	0	12:16	1.40	0.70	1.00
Pipe_007	CONDUIT	0.136	0	12:15	1.00	0.68	0.80

Pipe_008	CONDUIT	0.136	0	12:15	0.86	0.73	1.00
Pipe_009	CONDUIT	0.145	0	12:16	1.15	0.74	0.74
Pipe_010	CONDUIT	0.145	0	12:20	1.26	0.69	0.68
Pipe_011	CONDUIT	0.145	0	12:20	1.05	0.72	0.81
Pipe_012	CONDUIT	0.132	0	12:15	0.99	0.65	0.79
Pipe_013	CONDUIT	0.275	0	12:17	1.31	0.75	0.94
Pipe_014	CONDUIT	0.274	0	12:17	1.16	0.53	1.00
Pipe_015	CONDUIT	0.272	0	12:18	0.89	0.37	1.00
Pipe_016	CONDUIT	0.235	0	12:13	1.45	0.76	0.80
Pipe_017	CONDUIT	0.227	0	12:18	1.12	0.75	0.96
Pipe_018	CONDUIT	0.152	0	12:11	1.49	0.75	0.61
Pipe_019	CONDUIT	0.151	0	12:11	0.91	0.38	0.71
Pipe_020	CONDUIT	0.368	0	12:15	1.30	0.85	1.00
Pipe_021	CONDUIT	0.237	0	12:15	1.22	0.78	0.90
Pipe_022	CONDUIT	0.600	0	12:16	1.41	0.76	1.00
Pipe_023	CONDUIT	0.600	0	12:16	1.40	0.95	1.00
Pipe_024	CONDUIT	0.192	0	12:10	1.25	0.63	0.67
Pipe_025	CONDUIT	0.192	0	12:11	1.26	0.63	0.80
Pipe_026	CONDUIT	0.187	0	12:16	0.89	0.62	0.96
Pipe_027	CONDUIT	0.170	0	12:10	1.07	0.56	0.70
Pipe_028	CONDUIT	0.169	0	12:10	1.18	0.56	0.70
Pipe_029	CONDUIT	0.166	0	12:10	0.96	0.54	0.82
Pipe_030	CONDUIT	0.165	0	12:10	0.76	0.54	1.00
Pipe_031	CONDUIT	0.351	0	12:14	1.24	0.77	1.00
Pipe_032	CONDUIT	0.170	0	12:15	1.39	0.56	0.56
Pipe_033	CONDUIT	0.170	0	12:15	1.11	0.56	0.72
Pipe_034	CONDUIT	0.203	0	12:10	1.09	0.47	0.63
Pipe_035	CONDUIT	0.526	0	12:12	1.55	0.67	0.72
Pipe_036	CONDUIT	0.522	0	12:13	1.43	0.51	1.00
Pipe_039	CONDUIT	0.360	0	12:14	1.23	0.46	0.63
Pipe_040	CONDUIT	0.121	0	12:10	1.47	0.40	0.40
Pipe_041	CONDUIT	0.156	0	12:10	1.19	0.51	0.59
Pipe_042	CONDUIT	0.267	0	12:13	1.04	0.34	0.57
Pipe_043	CONDUIT	0.360	0	12:14	1.80	0.46	0.77
Pipe_044	CONDUIT	0.243	0	12:15	1.73	0.61	0.96
Pipe_045	CONDUIT	0.243	0	12:15	0.99	0.56	1.00
Pipe_046	CONDUIT	0.243	0	12:15	0.55	0.31	1.00
Pipe_047	CONDUIT	0.448	0	12:10	1.70	0.57	0.58
Pipe_048	CONDUIT	0.443	0	12:15	1.22	0.56	0.77
Pipe_049	CONDUIT	0.685	0	12:15	1.08	0.85	1.00
Pipe_050	CONDUIT	0.342	0	12:10	1.47	0.43	0.65
Pipe_051	CONDUIT	0.330	0	12:16	0.82	0.42	0.92
Pipe_052	CONDUIT	1.013	0	12:16	1.75	1.17	1.00
Pipe_053	CONDUIT	0.471	0	12:10	1.74	0.60	0.59
Pipe_054	CONDUIT	0.468	0	12:11	1.81	0.46	0.58
Pipe_055	CONDUIT	0.442	0	12:12	1.17	0.56	0.96
Pipe_056	CONDUIT	0.281	0	12:15	1.42	0.35	0.46
Pipe_057	CONDUIT	0.281	0	12:16	1.38	0.34	0.47
Pipe_058	CONDUIT	0.281	0	12:16	1.31	0.36	0.77
Pipe_059	CONDUIT	0.284	0	12:18	0.78	0.37	1.00
Pipe_060	CONDUIT	0.709	0	12:14	1.41	0.58	1.00
Pipe_061	CONDUIT	0.229	0	12:10	1.22	0.75	0.82
Pipe_062	CONDUIT	0.215	0	12:12	1.31	0.71	0.78
Pipe_063	CONDUIT	0.212	0	12:17	1.00	0.70	1.00
Pipe_064	CONDUIT	0.427	0	12:15	1.07	0.54	1.00
Pipe_065	CONDUIT	0.228	0	12:10	1.38	0.75	0.72
Pipe_066	CONDUIT	0.228	0	12:13	1.49	0.75	0.71
Pipe_067	CONDUIT	0.218	0	12:15	0.87	0.50	1.00
Pipe_068	CONDUIT	0.642	0	12:16	1.22	0.46	1.00
Pipe_069	CONDUIT	0.147	0	12:10	1.18	0.73	0.87
Pipe_070	CONDUIT	0.139	0	12:14	0.66	0.46	1.00
Pipe_071	CONDUIT	0.302	0	12:10	1.44	0.69	0.69
Pipe_072	CONDUIT	0.296	0	12:11	1.28	0.68	0.77

Pipe_073	CONDUIT	0.322	0	12:10	1.44	0.74	0.74
Pipe_074	CONDUIT	0.589	0	12:11	1.20	0.46	0.83
Pipe_075	CONDUIT	0.717	0	12:12	1.23	0.56	1.00
Pipe_076	CONDUIT	0.201	0	12:10	1.30	0.46	0.66
Pipe_077	CONDUIT	0.195	0	12:15	0.74	0.45	0.91
Pipe_078	CONDUIT	0.238	0	12:12	1.48	0.55	0.62
Pipe_079	CONDUIT	0.243	0	12:17	1.19	0.56	0.85
Pipe_080	CONDUIT	0.544	0	12:10	1.68	0.69	0.69
Pipe_081	CONDUIT	0.550	0	12:11	1.59	0.70	0.77
Pipe_082	CONDUIT	0.715	0	12:14	1.20	0.56	0.89
Pipe_083	CONDUIT	0.658	0	12:10	1.28	0.51	0.75
Pipe_084	CONDUIT	1.446	0	12:12	2.01	0.77	0.78
Pipe_085	CONDUIT	0.287	0	12:10	1.22	0.66	0.78
Pipe_086	CONDUIT	0.191	0	12:10	1.49	0.44	0.46
Pipe_087	CONDUIT	0.186	0	12:10	0.77	0.24	0.55
Pipe_088	CONDUIT	0.454	0	12:11	1.23	0.58	0.78
Pipe_089	CONDUIT	0.576	0	12:12	1.33	0.45	0.83
Pipe_091	CONDUIT	0.318	0	12:10	1.44	0.40	0.50
Pipe_092	CONDUIT	0.318	0	12:10	0.94	0.42	0.77
Pipe_093	CONDUIT	0.299	0	12:10	1.54	0.38	0.46
Pipe_094	CONDUIT	0.272	0	12:09	0.85	0.35	0.73
Pipe_095	CONDUIT	0.535	0	12:12	1.22	0.42	0.65
Pipe_096	CONDUIT	1.087	0	12:11	1.87	0.56	0.68
Pipe_097	CONDUIT	0.323	0	12:11	1.47	0.74	0.73
Pipe_098	CONDUIT	0.311	0	12:12	1.33	0.72	0.77
Pipe_099	CONDUIT	0.310	0	12:13	1.23	0.39	0.58
Pipe_100	CONDUIT	0.952	0	12:10	1.92	0.74	0.73
Pipe_101	CONDUIT	0.441	0	12:10	1.32	0.56	0.71
Pipe_103	CONDUIT	0.927	0	12:12	1.78	0.72	0.76
Pipe_104	CONDUIT	1.235	0	12:12	1.89	0.64	0.71
Pipe_105	CONDUIT	1.232	0	12:13	2.40	0.64	0.57
Pipe_106	CONDUIT	1.525	0	12:14	1.82	0.42	0.57
Pipe_107	CONDUIT	0.155	0	12:11	1.08	0.51	0.63
Pipe_108	CONDUIT	0.120	0	12:10	0.59	0.02	0.17
Pipe_109	CONDUIT	0.094	0	12:12	0.34	0.02	0.27
Pipe_110	CONDUIT	0.126	0	12:10	0.64	0.29	0.68
Pipe_111	CONDUIT	0.237	0	12:11	1.25	0.30	0.46
Pipe_Diversion	CONDUIT	0.260	0	12:25	0.21	0.17	0.57
RS_1_Stream_Out	CONDUIT	0.492	0	13:42	1.46	0.38	0.52
T_Culvert_01	CONDUIT	0.281	0	12:58	0.62	0.46	0.78
T_Stream_01	CHANNEL	0.242	0	23:51	0.08	0.05	0.77
T_Stream_02	CHANNEL	0.268	0	13:18	0.10	0.05	0.74
T_Stream_03	CHANNEL	0.277	0	18:32	0.11	0.05	0.73
T_Stream_04	CHANNEL	0.272	0	18:09	0.12	0.04	0.70
T_Stream_05	CHANNEL	0.263	0	12:58	0.13	0.04	0.67
T_Stream_06	CHANNEL	0.311	0	12:57	0.14	0.05	0.64
T_Stream_07	CHANNEL	0.111	0	12:49	0.06	0.02	0.57
T_Stream_08	CHANNEL	0.023	0	12:51	0.01	0.00	0.51
Te_Otamanui_Stream_out	CONDUIT	0.533	0	16:54	0.90	0.08	0.31
W_Mangaheka_Stream_Out	CONDUIT	0.191	0	15:35	0.25	0.04	0.96
Exelby_Road	WEIR	0.000	0	00:00			0.00
Exelby_Weir_10yr	WEIR	0.092	0	17:57			0.42
Exelby_Weir_2yr	WEIR	1.394	0	17:57			1.00
SH39	WEIR	0.000	0	00:00			0.00
SH39_Weir_10yr	WEIR	0.132	0	16:54			0.11
SH39_Weir_2yr	WEIR	0.401	0	16:54			0.49
W_G8_100yr	WEIR	0.000	0	00:00			0.00
W_G8_10yr	WEIR	0.116	0	13:42			0.26
W_G8_PWL	WEIR	0.376	0	13:42			0.48
W_Mangaheka_1_10yr	WEIR	0.121	0	15:16			0.33
W_Mangaheka_1_PWL	WEIR	0.077	0	12:48			0.83
W_Ohote_1_PWL	WEIR	0.081	1	03:07			0.63
W_Ohote_1_Weir_Dn	WEIR	1.048	0	18:01			0.18

W_Ohote_1_Weir_Up	WEIR	0.990	0	17:28	0.18
W_Ohote_2_PWL	WEIR	0.083	0	13:06	0.60
W_Ohote_2_Weir_Dn	WEIR	3.035	0	17:54	0.31
W_Ohote_2_Weir_Up	WEIR	2.873	0	17:56	0.15
W_Ohote_3_PWL	WEIR	0.091	0	12:56	0.59
W_Ohote_3_Weir_Dn	WEIR	3.326	0	18:44	0.14
W_Ohote_3_Weir_Up	WEIR	3.116	0	16:15	0.14
W_Ohote_4_PWL	WEIR	0.085	1	02:25	0.59
W_Ohote_4_Weir_Dn	WEIR	0.893	0	16:45	0.14
W_Ohote_4_Weir_Up	WEIR	0.424	0	15:36	0.14
W_Ohote_5_PWL	WEIR	0.156	0	12:12	0.58
W_Ohote_5_Weir_Dn	WEIR	0.913	0	15:30	0.13
W_Ohote_5_Weir_Up	WEIR	0.807	0	15:30	0.13
W_Ohote_6_PWL	WEIR	0.118	1	03:32	0.60
W_Ohote_6_Weir_Dn	WEIR	1.654	0	14:24	0.15
W_Ohote_6_Weir_Up	WEIR	3.474	0	17:54	0.15
W_Ohote_7_PWL	WEIR	0.103	0	13:02	0.61
W_Ohote_7_Weir_Dn	WEIR	3.662	0	18:16	0.16
W_Ohote_7_Weir_Up	WEIR	4.585	0	18:34	0.16
W_Mangaheka_2_100yr	WEIR	0.001	0	12:59	0.11
W_Mangaheka_2_10yr	WEIR	0.052	0	12:52	0.19
W_Mangaheka_2_PWL	WEIR	0.224	0	12:46	0.42
W_Te_Otamanui_1_PWL	WEIR	0.145	0	12:44	0.47
W_Te_Otamanui_1_Weir_Dn	WEIR	0.520	0	17:26	0.07
W_Te_Otamanui_1_Weir_Up	WEIR	0.419	0	17:27	0.07
W_Te_Otamanui_2_PWL	WEIR	0.103	0	12:51	0.46
W_Te_Otamanui_2_Weir_Dn	WEIR	0.574	0	17:29	0.06
W_Te_Otamanui_2_Weir_Up	WEIR	0.235	0	20:00	0.06
W_Te_Otamanui_3_PWL	WEIR	0.107	0	13:30	0.32
W_Te_Otamanui_3_Weir_Dn	WEIR	0.000	0	00:00	0.00
W_Te_Otamanui_3_Weir_Up	WEIR	0.000	0	00:00	0.00
W_Te_Otamanui_4_PWL	WEIR	0.304	0	12:48	0.40
W_Te_Otamanui_4_Weir_Dn	WEIR	0.123	0	12:55	0.01
W_Te_Otamanui_4_Weir_Up	WEIR	0.123	0	12:55	0.00
Weir_TeKowhai	WEIR	0.000	0	00:00	0.00

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Flow Classification Summary
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Conduit	Adjusted /Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
		---------- Fraction of Time in Flow Class ----------								
M_2_Stream_Out	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.58	0.00
M_Culvert_01	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.50
M_Culvert_02	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.12	0.00
M_Stream_01	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.20	0.00
M_Stream_02	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
M_Stream_03	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
M_Stream_04	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.17	0.00
Manga_Swale_01_Pipe	1.00	0.02	0.00	0.00	0.56	0.00	0.00	0.42	0.18	0.00
Manga_Swale_02_Pipe	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.98	0.00
Manga_Swale_1A	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.37	0.00
Manga_Swale_1B	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.96	0.00
Manga_Swale_1C	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manga_Swale_2A	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Manga_Swale_2B	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.12	0.00
Manga_Swale_2C	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.29	0.00
Manga_Swale_2D	1.00	0.00	0.02	0.00	0.97	0.00	0.00	0.00	0.36	0.00
Manga_Swale_2E	1.00	0.03	0.02	0.00	0.96	0.00	0.00	0.00	0.43	0.00
O_Culvert_01	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00
O_Culvert_02	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Culvert_03	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_01	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_02	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.03	0.00
O_Stream_03	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_04	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.01	0.00
O_Stream_05	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_06	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.02	0.00
O_Stream_07	1.00	0.01	0.03	0.00	0.97	0.00	0.00	0.00	0.00	0.00
O_Stream_08	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00
O_Stream_09	1.00	0.04	0.01	0.00	0.96	0.00	0.00	0.00	0.00	0.00
O_Stream_10	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00
O_Stream_11	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
O_Stream_12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_13	1.00	0.01	0.02	0.00	0.98	0.00	0.00	0.00	0.02	0.00
O_Stream_14	1.00	0.02	0.01	0.00	0.96	0.00	0.00	0.00	0.00	0.00
O_Stream_15	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
O_Stream_16	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
O_Stream_17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_18	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_19	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_20	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.00	0.00
O_Stream_21	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
O_Stream_22	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_23	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_24	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_25	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_Out	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.02	0.00
Pipe_001	1.00	0.00	0.00	0.00	0.91	0.09	0.00	0.00	0.83	0.00
Pipe_002	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.72	0.00
Pipe_003	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.76	0.00
Pipe_004	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.39	0.00
Pipe_005	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.70	0.00
Pipe_006	1.00	0.00	0.00	0.00	0.95	0.05	0.00	0.00	0.17	0.00
Pipe_007	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_008	1.00	0.00	0.00	0.00	0.94	0.06	0.00	0.00	0.00	0.00
Pipe_009	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Pipe_010	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.51	0.00
Pipe_011	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_012	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_013	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.10	0.00
Pipe_014	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.60	0.00

Pipe_015	1.00	0.00	0.00	0.00	0.95	0.04	0.00	0.00	0.00	0.00
Pipe_016	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.62	0.00
Pipe_017	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.93	0.00
Pipe_018	1.00	0.00	0.00	0.00	0.76	0.24	0.00	0.00	0.07	0.00
Pipe_019	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.91	0.00
Pipe_020	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.50	0.00
Pipe_021	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.88	0.00
Pipe_022	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.60	0.00
Pipe_023	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.00	0.00
Pipe_024	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.55	0.00
Pipe_025	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.69	0.00
Pipe_026	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.69	0.00
Pipe_027	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.78	0.00
Pipe_028	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.03	0.00
Pipe_029	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.64	0.00
Pipe_030	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.52	0.00
Pipe_031	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.11	0.00
Pipe_032	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.59	0.00
Pipe_033	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_034	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_035	1.00	0.00	0.00	0.00	0.94	0.06	0.00	0.00	0.62	0.00
Pipe_036	1.00	0.00	0.00	0.00	0.94	0.06	0.00	0.00	0.28	0.00
Pipe_039	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.56	0.00
Pipe_040	1.00	0.00	0.00	0.00	0.58	0.42	0.00	0.00	0.00	0.00
Pipe_041	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.54	0.00
Pipe_042	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.84	0.00
Pipe_043	1.00	0.00	0.00	0.00	0.91	0.09	0.00	0.00	0.40	0.00
Pipe_044	1.00	0.00	0.00	0.00	0.85	0.15	0.00	0.00	0.86	0.00
Pipe_045	1.00	0.00	0.00	0.00	0.89	0.11	0.00	0.00	0.18	0.00
Pipe_046	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.57	0.00
Pipe_047	1.00	0.00	0.00	0.00	0.76	0.24	0.00	0.00	0.61	0.00
Pipe_048	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_049	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.02	0.00
Pipe_050	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.65	0.00
Pipe_051	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.71	0.00
Pipe_052	1.00	0.00	0.00	0.00	0.96	0.03	0.00	0.00	0.00	0.00
Pipe_053	1.00	0.00	0.00	0.00	0.69	0.31	0.00	0.00	0.00	0.00
Pipe_054	1.00	0.00	0.00	0.00	0.83	0.17	0.00	0.00	0.88	0.00
Pipe_055	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.68	0.00
Pipe_056	1.00	0.00	0.00	0.00	0.85	0.15	0.00	0.00	0.03	0.00
Pipe_057	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.65	0.00
Pipe_058	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.63	0.00
Pipe_059	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.65	0.00
Pipe_060	1.00	0.00	0.00	0.00	0.95	0.05	0.00	0.00	0.00	0.00
Pipe_061	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.88	0.00
Pipe_062	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.67	0.00
Pipe_063	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.24	0.00
Pipe_064	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.62	0.00
Pipe_065	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.65	0.00
Pipe_066	1.00	0.00	0.00	0.00	0.88	0.12	0.00	0.00	0.28	0.00
Pipe_067	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.72	0.00
Pipe_068	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.00	0.00
Pipe_069	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.10	0.00
Pipe_070	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.60	0.00
Pipe_071	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.78	0.00
Pipe_072	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.34	0.00
Pipe_073	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_074	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.72	0.00
Pipe_075	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.13	0.00
Pipe_076	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.63	0.00
Pipe_077	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_078	1.00	0.00	0.00	0.00	0.87	0.13	0.00	0.00	0.60	0.00
Pipe_079	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.41	0.00
Pipe_080	1.00	0.00	0.00	0.00	0.77	0.23	0.00	0.00	0.67	0.00
Pipe_081	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.97	0.00
Pipe_082	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.93	0.00
Pipe_083	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_084	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.32	0.00
Pipe_085	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.46	0.00
Pipe_086	1.00	0.00	0.00	0.00	0.80	0.20	0.00	0.00	0.00	0.00

Pipe_087	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_088	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.69	0.00
Pipe_089	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.60	0.00
Pipe_091	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
Pipe_092	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.95	0.00
Pipe_093	1.00	0.00	0.00	0.00	0.91	0.09	0.00	0.00	0.40	0.00
Pipe_094	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_095	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.40	0.00
Pipe_096	1.00	0.00	0.00	0.00	0.94	0.06	0.00	0.00	0.64	0.00
Pipe_097	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.94	0.00
Pipe_098	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.66	0.00
Pipe_099	1.00	0.00	0.00	0.00	0.57	0.43	0.00	0.00	0.00	0.00
Pipe_100	1.00	0.00	0.00	0.00	0.71	0.29	0.00	0.00	0.64	0.00
Pipe_101	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_103	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.93	0.00
Pipe_104	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.84	0.00
Pipe_105	1.00	0.00	0.00	0.00	0.53	0.47	0.00	0.00	0.00	0.00
Pipe_106	1.00	0.00	0.00	0.00	0.95	0.04	0.00	0.00	0.95	0.00
Pipe_107	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.53	0.00
Pipe_108	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Pipe_109	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.79	0.00
Pipe_110	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.53	0.00
Pipe_111	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.39	0.00
Pipe_Diversion	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
RS_1_Stream_Out	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
T_Culvert_01	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
T_Stream_01	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.02	0.00
T_Stream_02	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00
T_Stream_03	1.00	0.02	0.01	0.00	0.98	0.00	0.00	0.00	0.00	0.00
T_Stream_04	1.00	0.02	0.02	0.00	0.95	0.00	0.00	0.00	0.15	0.00
T_Stream_05	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
T_Stream_06	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.24	0.00
T_Stream_07	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.48	0.00
T_Stream_08	1.00	0.02	0.06	0.00	0.92	0.00	0.00	0.00	0.23	0.00
Te_Otamanui_Stream_out	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.02	0.00
W_Mangaheka_Stream_Out	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.69	0.00

****
Conduit Surcharge Summary
****

Conduit	--------- Hours Full -------- Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
M_2_Stream_Out	5.99	5.99	20.41	0.01	0.01
M_Culvert_01	22.71	22.71	28.45	9.06	9.06
M_Culvert_02	0.01	0.01	5.99	0.01	0.01
O_Culvert_01	0.01	0.01	0.01	6.20	0.01
O_Culvert_02	0.01	0.01	0.01	11.01	0.01
Pipe_001	0.01	0.01	5.87	0.01	0.01
Pipe_002	5.87	5.87	15.51	0.01	0.01
Pipe_003	0.01	0.01	16.99	0.01	0.01
Pipe_004	11.85	11.85	14.13	0.01	0.01
Pipe_005	11.40	11.40	21.22	0.01	0.01
Pipe_006	14.13	14.13	16.88	0.01	0.01
Pipe_007	0.01	0.01	22.70	0.01	0.01
Pipe_008	22.70	22.70	25.81	0.01	0.39
Pipe_011	0.01	0.01	7.35	0.01	0.01
Pipe_012	0.01	0.01	7.35	0.01	0.01
Pipe_013	0.01	0.01	9.79	0.01	0.01
Pipe_014	9.79	9.79	17.53	0.01	0.01
Pipe_015	14.10	14.10	16.30	0.01	0.01
Pipe_017	0.01	0.01	12.65	0.01	0.01
Pipe_019	0.01	0.01	12.65	0.01	0.01
Pipe_020	11.26	11.30	12.49	0.01	0.65
Pipe_021	0.01	0.01	13.96	0.01	0.01

Pipe_022	7.37	7.37	15.51	0.01	0.01
Pipe_023	15.20	15.51	15.89	0.01	0.89
Pipe_026	0.01	0.01	18.53	0.01	0.01
Pipe_029	0.01	0.01	11.57	0.01	0.01
Pipe_030	11.57	11.57	18.53	0.01	0.01
Pipe_031	15.87	15.96	18.21	0.01	0.56
Pipe_036	0.01	0.01	12.31	0.01	0.01
Pipe_044	0.01	0.01	0.33	0.01	0.01
Pipe_045	0.19	0.19	12.80	0.01	0.01
Pipe_046	8.31	8.31	14.74	0.01	0.01
Pipe_048	0.01	0.01	14.74	0.01	0.01
Pipe_049	11.73	11.73	12.82	0.01	0.62
Pipe_051	0.01	0.01	16.08	0.01	0.01
Pipe_052	12.03	12.82	13.14	0.34	0.32
Pipe_055	0.01	0.01	14.48	0.01	0.01
Pipe_058	0.01	0.01	3.95	0.01	0.01
Pipe_059	3.95	3.95	14.48	0.01	0.01
Pipe_060	11.10	11.10	13.03	0.01	0.01
Pipe_061	0.01	0.01	13.15	0.01	0.01
Pipe_062	0.01	0.01	3.59	0.01	0.01
Pipe_063	3.59	3.59	13.15	0.01	0.01
Pipe_064	5.42	5.42	14.79	0.01	0.01
Pipe_066	0.01	0.01	6.97	0.01	0.01
Pipe_067	2.05	2.05	18.06	0.01	0.01
Pipe_068	11.11	11.11	12.56	0.01	0.01
Pipe_069	0.01	0.01	10.46	0.01	0.01
Pipe_070	6.85	6.85	18.11	0.01	0.01
Pipe_074	0.01	0.01	10.22	0.01	0.01
Pipe_075	10.22	10.22	12.43	0.01	0.01
Pipe_077	0.01	0.01	9.65	0.01	0.01
Pipe_079	0.01	0.01	0.14	0.01	0.01
Pipe_082	0.01	0.01	0.24	0.01	0.01
Pipe_083	0.01	0.01	0.24	0.01	0.01
Pipe_092	0.01	0.01	0.05	0.01	0.01
Pipe_094	0.01	0.01	0.05	0.01	0.01
Pipe_110	0.01	0.01	3.52	0.01	0.01
W_Mangaheka_Stream_Out	0.01	0.01	21.34	0.01	0.01

```
Analysis begun on:  Wed Jun 16 14:41:05 2021
Analysis ended on:  Wed Jun 16 14:44:00 2021
Total elapsed time: 00:02:55
```

5. Scenario: 100yr ARI

5.1 Model Status Report

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------


*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 10/14/2020 00:00:00
Ending Date .............. 10/17/2020 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:00:01
Dry Time Step ............ 00:00:01
Routing Time Step ........ 1.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 20
Number of Threads ........ 8
Head Tolerance ........... 0.000500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......        62.872       171.075
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........        12.003        32.659
Surface Runoff ...........        49.749       135.368
Final Storage ............         1.120         3.048
Continuity Error (%) .....         0.000


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
```

```
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......        49.749       497.496
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.001         0.011
External Outflow .........        49.167       491.671
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.002
Final Stored Volume ......         0.589         5.889
Continuity Error (%) .....        -0.010


*************************
Highest Continuity Errors
*************************
Node W_Ohote_6_Out_US (-10.12%)
Node J_O_Stream_10 (-5.29%)
Node W_Ohote_7_Out_US (5.21%)
Node W_Ohote_4 (4.37%)
Node W_Ohote_7 (-3.94%)


***************************
Time-Step Critical Elements
***************************
None


********************************
Highest Flow Instability Indexes
********************************
Link W_Ohote_7_Weir_Up (29)
Link Pipe_068 (28)
Link W_Ohote_7_PWL (28)
Link W_Ohote_7_Weir_Dn (28)
Link W_Ohote_5_Weir_Up (27)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :      0.10 sec
Average Time Step           :      0.99 sec
Maximum Time Step           :      1.00 sec
Percent in Steady State     :     -0.00
Average Iterations per Step :      6.16
Percent Not Converging      :     21.23
Time Step Frequencies       :
    1.000 -  0.631 sec      :     98.96 %
    0.631 -  0.398 sec      :      0.65 %
    0.398 -  0.251 sec      :      0.29 %
    0.251 -  0.158 sec      :      0.11 %
    0.158 -  0.100 sec      :      0.00 %
```

5.2 Summary Results

```
**************************
Subcatchment Runoff Summary
**************************
```

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
Mangaheka_1A	176.65	0.00	0.00	3.89	148.84	22.61	171.44	1.61	0.15	0.971
Mangaheka_1B	176.65	0.00	0.00	3.62	148.87	22.88	171.75	1.98	0.32	0.972
Mangaheka_1C	176.65	0.00	0.00	3.67	148.87	22.83	171.69	3.45	0.49	0.972
Mangaheka_1D	176.65	0.00	0.00	3.83	148.85	22.67	171.52	2.16	0.22	0.971
Mangaheka_1E	176.65	0.00	0.00	3.92	148.83	22.57	171.40	2.86	0.26	0.970
Mangaheka_1F	176.65	0.00	0.00	3.85	148.84	22.65	171.49	1.97	0.20	0.971
Mangaheka_1G	176.65	0.00	0.00	26.05	0.00	150.59	150.59	0.62	0.05	0.853
Mangaheka_2A	176.65	0.00	0.00	4.36	148.84	22.13	170.97	2.74	0.27	0.968
Mangaheka_2B	176.65	0.00	0.00	4.46	148.82	22.04	170.86	4.89	0.42	0.967
Mangaheka_2C	176.65	0.00	0.00	4.12	148.87	22.38	171.25	3.41	0.54	0.969
Mangaheka_2D	176.65	0.00	0.00	4.08	148.87	22.42	171.29	3.13	0.54	0.970
Mangaheka_2E	176.65	0.00	0.00	4.08	148.87	22.42	171.29	2.86	0.49	0.970
Mangaheka_Upstream	176.65	0.00	0.00	49.27	62.24	58.77	121.00	177.71	4.37	0.685
Ohote_1A	176.65	0.00	0.00	5.27	148.85	21.23	170.08	1.68	0.18	0.963
Ohote_1B	176.65	0.00	0.00	5.41	148.82	21.08	169.91	5.45	0.48	0.962
Ohote_1C	176.65	0.00	0.00	5.50	148.81	20.99	169.80	4.91	0.39	0.961
Ohote_1D	176.65	0.00	0.00	5.33	148.84	21.17	170.01	1.82	0.18	0.962
Ohote_2A	176.65	0.00	0.00	5.35	148.84	21.15	169.98	1.38	0.13	0.962
Ohote_2B	176.65	0.00	0.00	5.58	148.79	20.92	169.70	3.29	0.24	0.961
Ohote_2C	176.65	0.00	0.00	5.97	148.66	20.53	169.19	4.60	0.26	0.958
Ohote_2D	176.65	0.00	0.00	5.55	148.79	20.94	169.74	3.11	0.23	0.961
Ohote_3A	176.65	0.00	0.00	5.23	148.85	21.27	170.12	1.45	0.16	0.963
Ohote_3B	176.65	0.00	0.00	5.26	148.85	21.23	170.08	2.50	0.27	0.963
Ohote_3C	176.65	0.00	0.00	5.51	148.80	20.99	169.79	5.30	0.42	0.961
Ohote_3D	176.65	0.00	0.00	5.53	148.80	20.96	169.76	5.57	0.43	0.961
Ohote_4A	176.65	0.00	0.00	9.93	148.85	16.57	165.42	1.41	0.15	0.936
Ohote_4B	176.65	0.00	0.00	9.97	148.84	16.52	165.37	4.10	0.41	0.936
Ohote_4C	176.65	0.00	0.00	10.34	148.77	16.16	164.93	5.41	0.38	0.934
Ohote_4D	176.65	0.00	0.00	9.94	148.85	16.56	165.40	3.89	0.41	0.936
Ohote_5A	176.65	0.00	0.00	12.12	148.83	14.38	163.21	1.18	0.11	0.924
Ohote_5B	176.65	0.00	0.00	11.97	148.85	14.53	163.38	2.25	0.26	0.925
Ohote_5C	176.65	0.00	0.00	11.85	148.87	14.65	163.51	3.60	0.52	0.926
Ohote_5D	176.65	0.00	0.00	11.80	148.87	14.70	163.57	3.34	0.54	0.926

Ohote_6A	176.65	0.00	0.00	12.18	148.82	14.32	163.14	2.46	0.22	0.924
Ohote_6B	176.65	0.00	0.00	12.40	148.78	14.10	162.88	5.99	0.44	0.922
Ohote_6C	176.65	0.00	0.00	12.19	148.82	14.30	163.12	9.28	0.82	0.923
Ohote_6D	176.65	0.00	0.00	12.17	148.83	14.33	163.16	6.85	0.62	0.924
Ohote_7A	176.65	0.00	0.00	8.03	148.84	18.47	167.31	1.89	0.18	0.947
Ohote_7B	176.65	0.00	0.00	7.79	148.87	18.71	167.57	5.76	0.81	0.949
Ohote_7C	176.65	0.00	0.00	8.40	148.76	18.09	166.85	7.32	0.50	0.945
Ohote_Stream_1	176.65	0.00	0.00	75.46	0.00	101.19	101.19	1.90	0.03	0.573
Ohote_Stream_2	176.65	0.00	0.00	41.78	0.00	134.87	134.87	0.23	0.01	0.763
Ohote_Stream_3	176.65	0.00	0.00	58.14	0.00	118.50	118.50	0.91	0.02	0.671
Ohote_Stream_4	176.65	0.00	0.00	91.63	0.00	85.01	85.01	0.53	0.01	0.481
Ohote_Stream_5	176.65	0.00	0.00	104.16	0.00	72.48	72.48	0.40	0.01	0.410
Ohote_Stream_6	176.65	0.00	0.00	104.16	0.00	72.48	72.48	0.40	0.01	0.410
Ohote_Stream_7	176.65	0.00	0.00	86.21	0.00	90.43	90.43	0.12	0.01	0.512
Ohote_Upstream_East_1	149.71	0.00	0.00	43.86	7.41	98.36	105.77	41.99	2.48	0.707
Ohote_Upstream_East_2	149.71	0.00	0.00	14.67	7.41	127.56	134.97	7.69	0.52	0.902
Ohote_Upstream_North	149.71	0.00	0.00	41.52	7.41	100.70	108.11	6.38	0.27	0.722
Ohote_Upstream_West	149.71	0.00	0.00	51.55	7.41	90.67	98.08	22.76	0.95	0.655
Rotokauri_South_1A	176.65	0.00	0.00	4.97	148.85	21.52	170.37	5.37	0.57	0.964
Rotokauri_South_1B	176.65	0.00	0.00	4.92	148.86	21.57	170.43	4.89	0.57	0.965
Rotokauri_South_1C	176.65	0.00	0.00	4.77	148.87	21.72	170.59	5.70	0.89	0.966
Rotokauri_South_1D	176.65	0.00	0.00	4.74	148.87	21.76	170.63	4.25	0.73	0.966
Rotokauri_South_1E	149.71	0.00	0.00	26.59	22.23	100.66	122.89	1.84	0.34	0.821
Rotokauri_South_1F	176.65	0.00	0.00	4.99	148.85	21.51	170.35	14.48	1.51	0.964
Te_Otamanui_1A	176.65	0.00	0.00	5.46	148.82	21.04	169.85	1.87	0.16	0.962
Te_Otamanui_1B	176.65	0.00	0.00	5.47	148.81	21.03	169.84	4.18	0.34	0.961
Te_Otamanui_1C	176.65	0.00	0.00	5.39	148.83	21.11	169.94	3.35	0.30	0.962
Te_Otamanui_2A	176.65	0.00	0.00	5.37	148.83	21.13	169.96	1.46	0.14	0.962
Te_Otamanui_2B	176.65	0.00	0.00	5.61	148.78	20.88	169.66	4.38	0.31	0.960
Te_Otamanui_2C	176.65	0.00	0.00	5.58	148.79	20.92	169.71	4.09	0.30	0.961
Te_Otamanui_2D	176.65	0.00	0.00	5.05	148.87	21.44	170.31	2.11	0.34	0.964
Te_Otamanui_2E	176.65	0.00	0.00	5.46	148.82	21.04	169.86	2.62	0.22	0.962
Te_Otamanui_2F	176.65	0.00	0.00	5.27	148.85	21.22	170.07	1.97	0.21	0.963
Te_Otamanui_3A	176.65	0.00	0.00	2.13	148.86	24.37	173.22	0.81	0.09	0.981
Te_Otamanui_3B	176.65	0.00	0.00	2.15	148.85	24.34	173.19	1.61	0.17	0.980
Te_Otamanui_3C	176.65	0.00	0.00	2.18	148.85	24.32	173.16	2.72	0.27	0.980
Te_Otamanui_3D	176.65	0.00	0.00	2.15	148.85	24.35	173.20	1.92	0.21	0.981
Te_Otamanui_4A	176.65	0.00	0.00	2.31	148.81	24.19	173.00	2.13	0.17	0.979
Te_Otamanui_4B	176.65	0.00	0.00	2.17	148.85	24.33	173.18	3.34	0.35	0.980
Te_Otamanui_4C	176.65	0.00	0.00	2.23	148.83	24.26	173.09	4.66	0.42	0.980
Te_Otamanui_4D	176.65	0.00	0.00	2.04	148.87	24.45	173.32	6.27	0.92	0.981
Te_Otamanui_4E	176.65	0.00	0.00	2.02	148.87	24.48	173.35	6.88	1.10	0.981
Te_Otamanui_Stream_1	176.65	0.00	0.00	68.02	0.00	108.63	108.63	1.44	0.02	0.615
Te_Otamanui_Tree_Park	176.65	0.00	0.00	39.35	8.73	128.47	137.20	4.66	0.24	0.777

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Node Depth Summary
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
Exelby_Culvert_DS	JUNCTION	0.42	0.91	27.92	0 18:50	0.91
Exelby_Culvert_US	JUNCTION	0.70	1.88	29.04	0 18:50	1.88
J_M_Stream_01	JUNCTION	0.96	2.67	30.92	0 16:20	2.67
J_M_Stream_02	JUNCTION	1.05	2.62	30.92	0 16:21	2.62
J_M_Stream_03	JUNCTION	1.00	2.52	30.92	0 16:20	2.52
J_O_Stream_01	JUNCTION	0.72	1.86	29.05	0 18:48	1.86
J_O_Stream_02	JUNCTION	0.71	1.83	29.05	0 18:46	1.83
J_O_Stream_03	JUNCTION	0.70	1.82	29.06	0 18:17	1.82
J_O_Stream_04	JUNCTION	0.69	1.80	29.06	0 18:34	1.80
J_O_Stream_05	JUNCTION	0.68	1.79	29.06	0 18:30	1.79
J_O_Stream_06	JUNCTION	0.67	1.78	29.05	0 18:28	1.78
J_O_Stream_07	JUNCTION	0.68	1.78	29.08	0 18:13	1.78
J_O_Stream_08	JUNCTION	0.70	1.82	29.05	0 18:35	1.82
J_O_Stream_09	JUNCTION	0.69	1.81	29.05	0 18:49	1.81
J_O_Stream_10	JUNCTION	0.68	1.79	29.06	0 18:54	1.79
J_O_Stream_14	JUNCTION	0.65	1.74	29.08	0 18:21	1.74
J_T_Stream_01	JUNCTION	0.43	1.19	29.39	0 14:55	1.19
J_T_Stream_02	JUNCTION	0.39	1.13	29.39	0 15:05	1.12
J_T_Stream_03	JUNCTION	0.38	1.11	29.39	0 15:05	1.11
J_T_Stream_04	JUNCTION	0.38	1.11	29.39	0 15:10	1.11
M_Culvert_1_DS	JUNCTION	0.77	1.44	29.39	0 16:20	1.44
M_Culvert_1_US	JUNCTION	0.87	2.72	30.92	0 16:20	2.72
M_Culvert_2_DS	JUNCTION	0.54	1.94	30.94	0 16:26	1.93
M_Culvert_2_US	JUNCTION	0.40	1.64	30.94	0 16:31	1.64
MH_M1_1	JUNCTION	0.03	0.43	31.31	0 12:10	0.43
MH_M1_10	JUNCTION	0.16	0.71	31.35	0 13:01	0.71
MH_M1_11	JUNCTION	0.17	0.72	31.34	0 12:59	0.72
MH_M1_12	JUNCTION	0.04	0.33	30.93	0 16:22	0.33
MH_M1_2	JUNCTION	0.07	0.58	30.98	0 12:11	0.58
MH_M1_3	JUNCTION	0.11	1.97	32.23	0 12:05	1.44
MH_M1_4	JUNCTION	0.21	1.36	31.14	0 12:06	1.16
MH_M1_5	JUNCTION	0.10	0.71	30.94	0 16:13	0.71
MH_M1_6	JUNCTION	0.28	1.37	30.94	0 16:35	1.36
MH_M1_7	JUNCTION	0.12	0.67	31.37	0 13:00	0.67
MH_M1_8	JUNCTION	0.14	0.69	31.37	0 13:00	0.69
MH_M1_9	JUNCTION	0.15	0.71	31.37	0 13:00	0.71
MH_M2_1	JUNCTION	0.05	0.64	31.44	0 12:12	0.64
MH_M2_2	JUNCTION	0.04	0.49	31.54	0 12:11	0.49
MH_M2_3	JUNCTION	0.13	1.36	31.47	0 12:07	1.07
MH_M2_4	JUNCTION	0.05	0.65	31.30	0 12:10	0.63
MH_M2_5	JUNCTION	0.12	1.80	31.95	0 12:08	0.92
MH_M2_6	JUNCTION	0.26	1.30	30.95	0 16:29	1.30
MH_M2_7	JUNCTION	0.12	1.71	31.96	0 12:10	0.99
MH_O1_1	JUNCTION	0.12	6.66	35.21	0 12:05	2.54
MH_O1_2	JUNCTION	0.34	3.42	31.20	0 12:05	2.12
MH_O1_3	JUNCTION	0.28	2.08	30.02	0 12:10	2.07
MH_O1_4	JUNCTION	0.52	1.87	29.29	0 12:05	1.82
MH_O1_5	JUNCTION	0.34	1.51	29.25	0 12:09	1.50
MH_O1_6	JUNCTION	0.60	1.75	29.06	0 18:21	1.75
MH_O2_1	JUNCTION	0.15	7.05	35.47	0 12:06	1.88
MH_O2_2	JUNCTION	0.64	1.76	29.06	0 18:26	1.75
MH_O2_3	JUNCTION	0.10	5.63	34.64	0 12:05	3.00
MH_O2_4	JUNCTION	0.13	5.76	34.47	0 12:05	2.57
MH_O2_5	JUNCTION	0.17	4.48	32.92	0 12:05	2.22
MH_O2_6	JUNCTION	0.15	3.14	31.59	0 12:05	1.99
MH_O2_7	JUNCTION	0.30	2.49	30.42	0 12:05	1.68
MH_O2_8	JUNCTION	0.39	1.63	29.31	0 12:05	1.39
MH_O2_9	JUNCTION	0.61	1.72	29.06	0 18:46	1.72
MH_O3_1	JUNCTION	0.09	8.99	37.85	0 12:03	4.01
MH_O3_2	JUNCTION	0.18	6.73	35.10	0 12:03	3.32

MH_03_3	JUNCTION	0.06	6.12	35.05	0	12:04	2.88
MH_03_4	JUNCTION	0.16	2.95	31.29	0	12:04	2.18
MH_03_5	JUNCTION	0.41	2.42	30.10	0	12:10	2.41
MH_03_6	JUNCTION	0.20	2.83	31.10	0	12:10	2.82
MH_03_7	JUNCTION	0.43	1.86	29.47	0	12:09	1.85
MH_03_8	JUNCTION	0.67	1.77	29.07	0	18:32	1.76
MH_04_1	JUNCTION	0.19	2.72	30.99	0	12:03	2.28
MH_04_2	JUNCTION	0.15	5.93	34.40	0	12:03	2.47
MH_04_3	JUNCTION	0.30	2.53	30.45	0	12:03	1.89
MH_04_4	JUNCTION	0.41	1.87	29.52	0	12:03	1.49
MH_04_5	JUNCTION	0.06	7.40	36.50	0	12:06	2.88
MH_04_6	JUNCTION	0.10	6.26	34.88	0	12:06	2.22
MH_04_7	JUNCTION	0.31	2.75	30.60	0	12:06	1.33
MH_04_8	JUNCTION	0.63	1.73	29.07	0	18:30	1.72
MH_05_1	JUNCTION	0.21	1.92	30.10	0	12:10	1.91
MH_05_2	JUNCTION	0.31	1.55	29.42	0	12:06	1.48
MH_05_3	JUNCTION	0.07	4.09	32.88	0	12:06	3.16
MH_05_4	JUNCTION	0.18	3.98	32.26	0	12:06	3.19
MH_05_5	JUNCTION	0.09	4.89	33.54	0	12:05	3.28
MH_05_6	JUNCTION	0.31	3.21	31.08	0	12:06	3.17
MH_05_7	JUNCTION	0.58	1.73	29.15	0	12:06	1.67
MH_06_1	JUNCTION	0.21	3.74	31.95	0	12:08	2.44
MH_06_2	JUNCTION	0.29	3.55	31.50	0	12:08	2.36
MH_06_3	JUNCTION	0.44	3.50	31.09	0	12:08	2.16
MH_06_4	JUNCTION	0.08	17.36	46.85	0	12:08	2.98
MH_06_5	JUNCTION	0.08	14.95	43.97	0	12:08	2.67
MH_06_6	JUNCTION	0.63	3.56	30.92	0	12:08	2.24
MH_06_7	JUNCTION	0.23	2.38	30.49	0	12:08	1.85
MH_06_8	JUNCTION	0.33	2.31	30.13	0	12:08	1.80
MH_06_9	JUNCTION	0.68	2.40	29.69	0	12:08	1.85
MH_07_1	JUNCTION	0.05	8.82	37.91	0	12:09	1.77
MH_07_2	JUNCTION	0.10	7.19	35.75	0	12:09	1.47
MH_07_3	JUNCTION	0.35	3.94	31.69	0	12:09	1.54
MH_07_4	JUNCTION	0.06	0.59	29.55	0	12:16	0.59
MH_07_5	JUNCTION	0.17	2.87	31.18	0	12:11	2.43
MH_07_6	JUNCTION	0.25	2.62	30.66	0	12:11	2.25
MH_07_7	JUNCTION	0.39	2.02	29.69	0	12:11	1.82
MH_07_8	JUNCTION	0.63	1.74	29.06	0	18:31	1.74
MH_S1_1	JUNCTION	0.05	9.11	40.67	0	12:07	2.25
MH_S1_2	JUNCTION	0.06	1.94	32.37	0	12:07	1.14
MH_S1_3	JUNCTION	0.05	0.70	30.93	0	12:10	0.70
MH_S1_4	JUNCTION	0.06	5.87	38.56	0	12:07	4.54
MH_S1_5	JUNCTION	0.04	7.59	40.90	0	12:07	4.50
MH_S1_6	JUNCTION	0.06	6.62	38.41	0	12:07	4.08
MH_S1_7	JUNCTION	0.07	5.69	36.76	0	12:07	2.62
MH_S1_8	JUNCTION	0.09	3.63	33.94	0	12:08	1.46
MH_S1_9	JUNCTION	0.04	0.67	30.72	0	12:10	0.66
MH_T1_1	JUNCTION	0.07	2.74	32.03	0	12:04	2.18
MH_T1_2	JUNCTION	0.11	2.57	31.51	0	12:04	1.89
MH_T1_3	JUNCTION	0.18	2.10	30.75	0	12:04	1.61
MH_T1_4	JUNCTION	0.07	1.90	31.03	0	12:10	1.89
MH_T1_5	JUNCTION	0.11	1.75	30.65	0	12:10	1.75
MH_T1_6	JUNCTION	0.12	1.59	30.43	0	12:10	1.59
MH_T1_7	JUNCTION	0.27	1.45	29.90	0	12:09	1.45
MH_T1_8	JUNCTION	0.41	1.30	29.54	0	12:14	1.30
MH_T2_1	JUNCTION	0.06	14.46	44.80	0	12:09	2.17
MH_T2_2	JUNCTION	0.06	9.25	38.91	0	12:09	2.02
MH_T2_3	JUNCTION	0.03	8.58	38.34	0	12:09	1.72
MH_T2_4	JUNCTION	0.09	4.85	33.95	0	12:09	1.87
MH_T2_5	JUNCTION	0.33	1.49	29.85	0	12:09	1.14
MH_T2_6	JUNCTION	0.00	0.01	30.77	0	12:26	0.01
MH_T2_7	JUNCTION	0.04	0.36	30.77	0	12:25	0.36
MH_T2_8	JUNCTION	0.08	0.51	29.81	0	12:37	0.51
MH_T2_9	JUNCTION	0.20	0.83	29.39	0	15:04	0.83
MH_T3_1	JUNCTION	0.09	0.61	29.50	0	12:15	0.61
MH_T3_2	JUNCTION	0.04	1.39	30.87	0	12:09	0.73
MH_T3_3	JUNCTION	0.04	1.08	30.33	0	12:09	0.69
MH_T3_4	JUNCTION	0.03	0.39	29.83	0	12:10	0.39
MH_T3_5	JUNCTION	0.04	0.46	29.64	0	12:14	0.46
MH_T3_6	JUNCTION	0.09	0.67	29.64	0	12:15	0.67

MH_T3_7	JUNCTION	0.16	0.78	29.50	0	12:15	0.78
MH_T3_8	JUNCTION	0.22	0.82	29.40	0	15:00	0.82
MH_T4_1	JUNCTION	0.05	2.30	31.78	0	12:05	1.62
MH_T4_2	JUNCTION	0.05	2.13	31.29	0	12:05	1.61
MH_T4_3	JUNCTION	0.06	11.60	41.70	0	12:07	2.51
MH_T4_4	JUNCTION	0.05	7.13	36.67	0	12:07	2.37
MH_T4_5	JUNCTION	0.06	10.20	40.56	0	12:06	3.40
MH_T4_6	JUNCTION	0.05	10.70	40.55	0	12:06	2.87
MH_T4_7	JUNCTION	0.08	3.98	33.06	0	12:06	2.23
MH_T4_8	JUNCTION	0.05	5.13	34.48	0	12:06	1.84
MH_T4_9	JUNCTION	0.29	1.83	30.35	0	12:09	1.83
O_Culvert_1_DS	JUNCTION	0.70	1.82	29.06	0	18:36	1.82
O_Culvert_1_US	JUNCTION	0.70	1.81	29.05	0	18:37	1.81
O_Culvert_2_DS	JUNCTION	0.67	1.77	29.06	0	18:52	1.77
O_Culvert_2_US	JUNCTION	0.68	1.79	29.08	0	18:12	1.79
O_Culvert_3_DS	JUNCTION	0.70	1.82	29.05	0	18:19	1.82
O_Culvert_3_US	JUNCTION	0.70	1.81	29.05	0	18:49	1.81
SH39_Culvert_DS	JUNCTION	0.22	0.56	28.45	0	15:05	0.56
SH39_Culvert_US	JUNCTION	0.51	1.27	29.39	0	14:57	1.27
W_G8_Out	JUNCTION	0.36	0.91	29.01	0	13:08	0.91
W_Mangaheka_1_Out	JUNCTION	0.38	1.64	30.94	0	18:45	1.63
W_Ohote_1_Out_DS	JUNCTION	0.71	1.88	29.05	0	18:50	1.88
W_Ohote_1_Out_US	JUNCTION	0.71	1.87	29.05	0	18:50	1.87
W_Ohote_2_Out_DS	JUNCTION	0.71	1.83	29.05	0	18:45	1.83
W_Ohote_2_Out_US	JUNCTION	0.70	1.82	29.05	0	18:37	1.82
W_Ohote_3_Out_DS	JUNCTION	0.69	1.80	29.06	0	18:31	1.80
W_Ohote_4_Out_US	JUNCTION	0.68	1.78	29.06	0	18:28	1.78
W_Ohote_5_Out_DS	JUNCTION	0.68	1.78	29.08	0	18:26	1.78
W_Ohote_5_Out_US	JUNCTION	0.67	1.77	29.08	0	18:28	1.77
W_Ohote_6_Out_DS	JUNCTION	0.70	1.82	29.05	0	18:28	1.82
W_Ohote_6_Out_US	JUNCTION	0.70	1.82	29.05	0	18:13	1.82
W_Ohote_7_Out_DS	JUNCTION	0.72	1.85	29.05	0	18:43	1.85
W_Ohote_7_Out_US	JUNCTION	0.71	1.83	29.05	0	18:46	1.82
W_Te_Otamanui_1_Out_US	JUNCTION	0.46	1.22	29.39	0	14:58	1.22
W_Te_Otamanui_2_Out_US	JUNCTION	0.45	1.20	29.39	0	15:09	1.20
W_Te_Otamanui_3_Out_DS	JUNCTION	0.27	0.94	29.39	0	15:07	0.94
W_Te_Otamanui_3_Out_US	JUNCTION	0.24	0.91	29.39	0	15:07	0.91
W_Te_Otamanui_4_Out_DS	JUNCTION	0.35	1.06	29.39	0	15:07	1.06
Mangaheka_Out	OUTFALL	0.77	1.44	29.36	0	16:20	1.44
Ohote_Out	OUTFALL	0.42	0.91	27.81	0	18:50	0.91
Rotokauri_South_2_Out	OUTFALL	0.41	0.60	28.60	0	13:08	0.60
Rotokauri_South_3_Out	OUTFALL	0.00	0.00	28.00	0	00:00	0.00
Te_Otamanui_Out	OUTFALL	0.22	0.56	28.21	0	15:05	0.56
W_G8	STORAGE	0.33	1.32	29.72	0	13:08	1.32
W_Mangaheka_1	STORAGE	0.38	1.53	30.93	0	16:21	1.53
W_Ohote_1	STORAGE	0.71	1.87	29.04	0	18:49	1.87
W_Ohote_2	STORAGE	0.70	1.82	29.05	0	18:45	1.82
W_Ohote_3	STORAGE	0.68	1.79	29.06	0	18:32	1.79
W_Ohote_4	STORAGE	0.68	1.78	29.05	0	18:30	1.78
W_Ohote_5	STORAGE	0.67	1.77	29.08	0	18:25	1.77
W_Ohote_6	STORAGE	0.71	1.81	29.05	0	18:33	1.81
W_Ohote_7	STORAGE	0.70	1.82	29.05	0	18:46	1.82
W_Mangaheka_2	STORAGE	0.36	1.54	30.94	0	16:32	1.54
W_Te_Otamanui_1	STORAGE	0.46	1.22	29.39	0	15:09	1.22
W_Te_Otamanui_2	STORAGE	0.45	1.20	29.38	0	15:07	1.20
W_Te_Otamanui_3	STORAGE	0.27	0.91	29.39	0	15:08	0.91
W_Te_Otamanui_4	STORAGE	0.32	0.94	29.39	0	15:07	0.94

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days	Time of Max Occurrence hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
Exelby_Culvert_DS	JUNCTION	0.000	2.161	0	18:50	0	184	0.001
Exelby_Culvert_US	JUNCTION	0.000	2.269	0	18:14	0	184	0.003
J_M_Stream_01	JUNCTION	0.051	3.818	0	12:19	0.617	209	0.015
J_M_Stream_02	JUNCTION	0.000	4.685	0	12:24	0	209	0.007
J_M_Stream_03	JUNCTION	4.366	5.159	0	12:24	178	209	-0.000
J_O_Stream_01	JUNCTION	0.287	2.347	0	12:59	8.28	171	0.035
J_O_Stream_02	JUNCTION	0.000	1.458	0	18:06	0	83.4	0.054
J_O_Stream_03	JUNCTION	0.011	1.941	0	12:45	0.229	90.2	0.005
J_O_Stream_04	JUNCTION	0.020	2.199	0	12:40	0.912	90.1	0.029
J_O_Stream_05	JUNCTION	0.000	15.162	0	18:45	0	163	0.110
J_O_Stream_06	JUNCTION	0.015	2.185	0	12:45	0.527	60.6	0.044
J_O_Stream_07	JUNCTION	0.012	2.551	0	12:36	0.399	60.1	0.022
J_O_Stream_08	JUNCTION	0.012	1.684	0	15:06	0.399	50.3	0.063
J_O_Stream_09	JUNCTION	0.949	0.949	0	12:10	22.8	22.8	0.026
J_O_Stream_10	JUNCTION	0.000	4.933	0	18:50	0	41.1	-5.022
J_O_Stream_14	JUNCTION	0.523	0.523	0	12:10	7.69	7.69	0.050
J_T_Stream_01	JUNCTION	0.000	1.119	0	12:18	0	31.9	0.030
J_T_Stream_02	JUNCTION	0.025	1.436	0	12:19	1.44	31.7	0.004
J_T_Stream_03	JUNCTION	0.000	1.476	0	12:18	0	30.2	0.002
J_T_Stream_04	JUNCTION	0.000	1.592	0	12:16	0	30.2	0.031
M_Culvert_1_DS	JUNCTION	0.000	3.040	0	16:20	0	209	-0.003
M_Culvert_1_US	JUNCTION	0.000	3.097	0	14:53	0	209	0.011
M_Culvert_2_DS	JUNCTION	0.000	0.469	0	12:24	0	17	0.007
M_Culvert_2_US	JUNCTION	0.000	0.472	0	12:24	0	17	-0.004
MH_M1_1	JUNCTION	0.318	0.318	0	12:10	1.98	1.98	-0.006
MH_M1_10	JUNCTION	0.000	0.110	0	12:49	0	2.87	0.106
MH_M1_11	JUNCTION	0.198	0.201	0	12:12	1.97	4.84	-0.089
MH_M1_12	JUNCTION	0.000	0.178	0	12:59	0	4.84	0.181
MH_M1_2	JUNCTION	0.000	0.319	0	12:10	0	1.98	-0.045
MH_M1_3	JUNCTION	0.492	0.492	0	12:10	3.45	3.45	-0.015
MH_M1_4	JUNCTION	0.000	0.730	0	12:11	0	5.43	0.008
MH_M1_5	JUNCTION	0.225	0.225	0	12:10	2.16	2.16	-0.021
MH_M1_6	JUNCTION	0.000	0.939	0	12:11	0	7.59	-0.005
MH_M1_7	JUNCTION	0.000	0.025	0	12:13	0	0.0905	0.184
MH_M1_8	JUNCTION	0.000	0.088	0	12:13	0	0.415	0.210
MH_M1_9	JUNCTION	0.257	0.257	0	12:10	2.86	3.19	-0.024
MH_M2_1	JUNCTION	0.422	0.422	0	12:10	4.89	4.89	-0.012
MH_M2_2	JUNCTION	0.536	0.536	0	12:10	3.41	3.41	-0.023
MH_M2_3	JUNCTION	0.542	0.542	0	12:10	3.13	3.13	-0.024
MH_M2_4	JUNCTION	0.491	0.491	0	12:10	2.86	2.86	-0.031
MH_M2_5	JUNCTION	0.000	0.458	0	12:08	0	2.86	0.004
MH_M2_6	JUNCTION	0.000	1.739	0	12:10	0	14.3	0.003
MH_M2_7	JUNCTION	0.000	0.893	0	12:09	0	8.3	0.000
MH_O1_1	JUNCTION	0.479	0.479	0	12:10	5.45	5.45	-0.020
MH_O1_2	JUNCTION	0.000	0.479	0	12:10	0	5.46	0.007
MH_O1_3	JUNCTION	0.389	0.389	0	12:10	4.91	4.91	-0.009
MH_O1_4	JUNCTION	0.000	0.868	0	12:10	0	10.4	0.006
MH_O1_5	JUNCTION	0.177	0.177	0	12:10	1.82	1.82	-0.007
MH_O1_6	JUNCTION	0.000	1.045	0	12:10	0	12.2	-0.004
MH_O2_1	JUNCTION	0.242	0.242	0	12:10	3.29	3.29	-0.026
MH_O2_2	JUNCTION	0.000	0.242	0	12:10	0	3.29	0.083
MH_O2_3	JUNCTION	0.260	0.260	0	12:15	4.6	4.6	0.006
MH_O2_4	JUNCTION	0.000	0.260	0	12:15	0	4.6	-0.004
MH_O2_5	JUNCTION	0.000	0.260	0	12:15	0	4.6	-0.007
MH_O2_6	JUNCTION	0.234	0.234	0	12:10	3.11	3.11	-0.009
MH_O2_7	JUNCTION	0.000	0.491	0	12:15	0	7.71	-0.010
MH_O2_8	JUNCTION	0.000	0.491	0	12:15	0	7.71	0.001
MH_O2_9	JUNCTION	0.000	0.491	0	12:15	0	7.71	0.011
MH_O3_1	JUNCTION	0.417	0.417	0	12:10	5.3	5.3	-0.002
MH_O3_2	JUNCTION	0.000	0.417	0	12:10	0	5.3	-0.012
MH_O3_3	JUNCTION	0.269	0.269	0	12:10	2.5	2.5	-0.009
MH_O3_4	JUNCTION	0.000	0.269	0	12:10	0	2.5	-0.020
MH_O3_5	JUNCTION	0.000	0.686	0	12:10	0	7.8	0.012
MH_O3_6	JUNCTION	0.429	0.429	0	12:10	5.57	5.57	-0.012
MH_O3_7	JUNCTION	0.000	1.115	0	12:10	0	13.4	-0.001
MH_O3_8	JUNCTION	0.000	1.115	0	12:10	0	13.4	0.010
MH_O4_1	JUNCTION	0.411	0.411	0	12:10	4.1	4.1	-0.017

MH_04_2	JUNCTION	0.383	0.383	0	12:10	5.41	5.41	-0.009
MH_04_3	JUNCTION	0.000	0.383	0	12:10	0	5.41	0.003
MH_04_4	JUNCTION	0.000	0.794	0	12:10	0	9.51	-0.006
MH_04_5	JUNCTION	0.406	0.406	0	12:10	3.89	3.89	0.008
MH_04_6	JUNCTION	0.000	0.406	0	12:10	0	3.89	-0.031
MH_04_7	JUNCTION	0.000	0.406	0	12:10	0	3.89	-0.003
MH_04_8	JUNCTION	0.000	1.200	0	12:10	0	13.4	0.009
MH_05_1	JUNCTION	0.263	0.263	0	12:10	2.25	2.25	-0.012
MH_05_2	JUNCTION	0.000	0.263	0	12:10	0	2.25	-0.005
MH_05_3	JUNCTION	0.522	0.522	0	12:10	3.6	3.6	-0.011
MH_05_4	JUNCTION	0.000	0.523	0	12:10	0	3.6	-0.005
MH_05_5	JUNCTION	0.544	0.544	0	12:10	3.34	3.34	-0.034
MH_05_6	JUNCTION	0.000	1.066	0	12:10	0	6.94	-0.047
MH_05_7	JUNCTION	0.000	1.329	0	12:10	0	9.19	-0.001
MH_06_1	JUNCTION	0.441	0.441	0	12:10	5.99	5.99	-0.005
MH_06_2	JUNCTION	0.000	0.441	0	12:10	0	5.99	-0.004
MH_06_3	JUNCTION	0.000	0.441	0	12:10	0	5.99	0.001
MH_06_4	JUNCTION	0.816	0.816	0	12:10	9.28	9.28	0.015
MH_06_5	JUNCTION	0.000	0.816	0	12:10	0	9.28	-0.045
MH_06_6	JUNCTION	0.000	1.257	0	12:10	0	15.3	0.026
MH_06_7	JUNCTION	0.620	0.620	0	12:10	6.85	6.85	-0.008
MH_06_8	JUNCTION	0.000	0.620	0	12:10	0	6.85	-0.002
MH_06_9	JUNCTION	0.000	1.877	0	12:10	0	22.1	0.012
MH_07_1	JUNCTION	0.811	0.811	0	12:10	5.76	5.76	0.011
MH_07_2	JUNCTION	0.000	0.811	0	12:10	0	5.76	-0.047
MH_07_3	JUNCTION	0.000	0.811	0	12:10	0	5.77	0.017
MH_07_4	JUNCTION	0.501	0.501	0	12:15	7.32	7.32	-0.012
MH_07_5	JUNCTION	0.000	0.523	0	12:10	0	7.33	0.007
MH_07_6	JUNCTION	0.000	0.496	0	12:16	0	7.33	-0.007
MH_07_7	JUNCTION	0.000	0.496	0	12:15	0	7.33	0.002
MH_07_8	JUNCTION	0.000	1.220	0	12:11	0	13.1	0.011
MH_S1_1	JUNCTION	0.565	0.565	0	12:10	4.89	4.89	0.004
MH_S1_2	JUNCTION	0.000	0.565	0	12:10	0	4.89	-0.009
MH_S1_3	JUNCTION	0.000	0.565	0	12:10	0	4.89	0.001
MH_S1_4	JUNCTION	0.894	1.621	0	12:10	5.7	9.95	0.021
MH_S1_5	JUNCTION	0.727	0.727	0	12:10	4.25	4.25	-0.003
MH_S1_6	JUNCTION	0.000	1.621	0	12:10	0	9.94	-0.026
MH_S1_7	JUNCTION	0.573	2.194	0	12:10	5.37	15.3	0.001
MH_S1_8	JUNCTION	0.000	2.194	0	12:10	0	15.3	-0.011
MH_S1_9	JUNCTION	0.000	2.748	0	12:10	0	20.2	-0.000
MH_T1_1	JUNCTION	0.343	0.343	0	12:10	4.18	4.18	-0.001
MH_T1_2	JUNCTION	0.000	0.343	0	12:10	0	4.18	-0.006
MH_T1_3	JUNCTION	0.000	0.343	0	12:10	0	4.18	-0.001
MH_T1_4	JUNCTION	0.302	0.302	0	12:10	3.35	3.35	-0.003
MH_T1_5	JUNCTION	0.000	0.302	0	12:10	0	3.35	0.007
MH_T1_6	JUNCTION	0.000	0.302	0	12:10	0	3.35	-0.018
MH_T1_7	JUNCTION	0.000	0.302	0	12:10	0	3.35	0.018
MH_T1_8	JUNCTION	0.000	0.645	0	12:10	0	7.53	0.005
MH_T2_1	JUNCTION	0.301	0.301	0	12:10	4.09	4.09	0.008
MH_T2_2	JUNCTION	0.000	0.301	0	12:10	0	4.09	-0.011
MH_T2_3	JUNCTION	0.342	0.342	0	12:10	2.11	2.11	-0.015
MH_T2_4	JUNCTION	0.313	0.956	0	12:10	4.38	10.6	-0.012
MH_T2_5	JUNCTION	0.000	0.956	0	12:10	0	10.6	0.006
MH_T2_6	JUNCTION	0.000	0.003	0	12:20	0	0.00107	8.536
MH_T2_7	JUNCTION	0.209	0.209	0	12:10	1.97	1.97	-0.142
MH_T2_8	JUNCTION	0.219	0.333	0	12:16	2.62	4.59	-0.637
MH_T2_9	JUNCTION	0.000	0.275	0	12:37	0	4.62	0.736
MH_T3_1	JUNCTION	0.173	0.173	0	12:10	1.61	1.61	-0.011
MH_T3_2	JUNCTION	0.274	0.274	0	12:10	2.72	2.72	0.004
MH_T3_3	JUNCTION	0.000	0.274	0	12:10	0	2.72	-0.009
MH_T3_4	JUNCTION	0.211	0.211	0	12:10	1.92	1.92	-0.002
MH_T3_5	JUNCTION	0.000	0.210	0	12:10	0	1.92	-0.014
MH_T3_6	JUNCTION	0.000	0.459	0	12:11	0	4.64	0.000
MH_T3_7	JUNCTION	0.000	0.590	0	12:14	0	6.25	0.008
MH_T3_8	JUNCTION	0.000	0.588	0	12:14	0	6.25	-0.001
MH_T4_1	JUNCTION	0.349	0.349	0	12:10	3.34	3.34	-0.005
MH_T4_2	JUNCTION	0.000	0.349	0	12:10	0	3.34	-0.009
MH_T4_3	JUNCTION	0.417	0.417	0	12:10	4.66	4.66	-0.004
MH_T4_4	JUNCTION	0.000	0.417	0	12:10	0	4.66	-0.009
MH_T4_5	JUNCTION	0.925	0.925	0	12:10	6.27	6.27	0.022
MH_T4_6	JUNCTION	0.000	0.925	0	12:10	0	6.27	-0.030
MH_T4_7	JUNCTION	0.000	1.341	0	12:10	0	10.9	-0.006
MH_T4_8	JUNCTION	1.104	1.104	0	12:10	6.88	6.88	-0.027
MH_T4_9	JUNCTION	0.000	2.794	0	12:10	0	21.2	0.009
O_Culvert_1_DS	JUNCTION	0.000	1.899	0	12:42	0	90	0.008
O_Culvert_1_US	JUNCTION	0.000	2.028	0	12:40	0	90	0.033
O_Culvert_2_DS	JUNCTION	0.000	2.271	0	12:41	0	60.1	0.022
O_Culvert_2_US	JUNCTION	0.000	2.390	0	12:37	0	60.1	0.031

O_Culvert_3_DS	JUNCTION	0.000	0.860	0	12:10	0	22.9	0.107
O_Culvert_3_US	JUNCTION	0.008	0.909	0	12:10	0.118	22.9	0.033
SH39_Culvert_DS	JUNCTION	0.000	1.049	0	15:00	0	61.8	0.001
SH39_Culvert_US	JUNCTION	0.000	6.607	0	15:19	0	83.4	-0.125
W_G8_Out	JUNCTION	0.000	1.019	0	13:08	0	34.3	0.006
W_Mangaheka_1_Out	JUNCTION	0.000	0.728	0	18:45	0	14.2	0.513
W_Ohote_1_Out_DS	JUNCTION	0.000	7.037	0	17:20	0	188	-0.039
W_Ohote_1_Out_US	JUNCTION	0.000	5.502	0	19:10	0	173	0.051
W_Ohote_2_Out_DS	JUNCTION	0.000	12.653	0	18:06	0	115	-0.299
W_Ohote_2_Out_US	JUNCTION	0.000	11.829	0	17:32	0	106	0.497
W_Ohote_3_Out_DS	JUNCTION	0.000	15.183	0	16:55	0	162	-0.325
W_Ohote_4_Out_US	JUNCTION	0.000	4.219	0	17:22	0	68.8	-0.143
W_Ohote_5_Out_DS	JUNCTION	0.000	6.573	0	18:52	0	120	-0.164
W_Ohote_5_Out_US	JUNCTION	2.484	6.248	0	17:29	42	103	-0.159
W_Ohote_6_Out_DS	JUNCTION	0.000	19.339	0	18:00	0	140	3.126
W_Ohote_6_Out_US	JUNCTION	0.000	14.954	0	19:54	0	92	-9.188
W_Ohote_7_Out_DS	JUNCTION	0.000	15.568	0	18:23	0	203	-0.102
W_Ohote_7_Out_US	JUNCTION	0.000	15.530	0	18:41	0	160	5.501
W_Te_Otamanui_1_Out_US	JUNCTION	0.000	2.685	0	14:58	0	32.7	0.047
W_Te_Otamanui_2_Out_US	JUNCTION	0.243	3.748	0	16:20	4.66	40.5	0.024
W_Te_Otamanui_3_Out_DS	JUNCTION	0.000	1.220	0	12:11	0	11.6	0.060
W_Te_Otamanui_3_Out_US	JUNCTION	0.000	0.269	0	13:02	0	2.32	0.001
W_Te_Otamanui_4_Out_DS	JUNCTION	0.000	1.968	0	12:12	0	30.8	0.021
Mangaheka_Out	OUTFALL	0.000	3.040	0	16:20	0	209	0.000
Ohote_Out	OUTFALL	0.000	2.161	0	18:50	0	184	0.000
Rotokauri_South_2_Out	OUTFALL	0.000	1.019	0	13:08	0	34.3	0.000
Rotokauri_South_3_Out	OUTFALL	0.342	0.342	0	12:10	1.84	1.84	0.000
Te_Otamanui_Out	OUTFALL	0.000	1.046	0	15:05	0	61.8	0.000
W_G8	STORAGE	1.507	4.098	0	12:10	14.5	34.7	0.030
W_Mangaheka_1	STORAGE	0.152	1.188	0	12:11	1.61	14.1	-0.633
W_Ohote_1	STORAGE	0.180	8.459	0	18:57	1.68	85.3	0.068
W_Ohote_2	STORAGE	0.130	19.267	0	18:06	1.38	75.8	-0.186
W_Ohote_3	STORAGE	0.164	24.077	0	17:36	1.45	186	0.233
W_Ohote_4	STORAGE	0.150	7.028	0	19:49	1.41	51.7	4.573
W_Ohote_5	STORAGE	0.112	10.669	0	17:56	1.18	126	0.312
W_Ohote_6	STORAGE	0.219	29.623	0	19:54	2.46	134	3.931
W_Ohote_7	STORAGE	0.182	26.910	0	17:34	1.89	204	-3.795
W_Mangaheka_2	STORAGE	0.268	2.006	0	12:10	2.74	17	-0.002
W_Te_Otamanui_1	STORAGE	0.155	4.573	0	15:29	1.87	26.4	0.168
W_Te_Otamanui_2	STORAGE	0.135	6.190	0	15:45	1.46	39.1	0.145
W_Te_Otamanui_3	STORAGE	0.094	0.877	0	13:01	0.814	8.35	0.001
W_Te_Otamanui_4	STORAGE	0.166	2.960	0	12:10	2.13	24	-0.004

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Node Surcharge Summary
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Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
M_Culvert_2_DS	JUNCTION	13.91	0.890	8.060
MH_M1_3	JUNCTION	4.94	1.371	9.629
MH_M1_4	JUNCTION	9.80	0.614	10.386
MH_M1_5	JUNCTION	5.20	0.114	10.886
MH_M1_6	JUNCTION	10.06	0.467	10.533
MH_M2_3	JUNCTION	4.84	0.613	10.387
MH_M2_5	JUNCTION	3.45	1.049	9.951
MH_M2_6	JUNCTION	7.67	0.249	10.751
MH_M2_7	JUNCTION	0.07	0.807	10.193
MH_O1_1	JUNCTION	0.91	6.056	4.944
MH_O1_2	JUNCTION	18.25	2.817	8.183
MH_O1_3	JUNCTION	17.18	1.554	9.446
MH_O1_4	JUNCTION	21.06	1.115	9.885
MH_O1_5	JUNCTION	20.79	1.063	9.937
MH_O1_6	JUNCTION	22.90	1.001	9.999
MH_O2_1	JUNCTION	11.74	6.598	4.402

MH_O2_2	JUNCTION	32.88	1.306	9.694
MH_O2_3	JUNCTION	2.13	5.180	5.820
MH_O2_4	JUNCTION	5.69	5.309	5.691
MH_O2_5	JUNCTION	11.49	4.030	6.970
MH_O2_6	JUNCTION	11.36	2.690	8.310
MH_O2_7	JUNCTION	16.39	1.893	9.107
MH_O2_8	JUNCTION	19.61	1.029	9.971
MH_O2_9	JUNCTION	22.84	0.973	9.877
MH_O3_1	JUNCTION	1.21	8.461	2.539
MH_O3_2	JUNCTION	11.37	6.202	4.798
MH_O3_3	JUNCTION	0.72	5.673	5.327
MH_O3_4	JUNCTION	11.96	2.426	8.574
MH_O3_5	JUNCTION	19.84	1.817	9.183
MH_O3_6	JUNCTION	12.96	2.308	8.692
MH_O3_7	JUNCTION	18.66	1.109	9.891
MH_O3_8	JUNCTION	24.05	1.017	9.983
MH_O4_1	JUNCTION	13.02	2.197	8.803
MH_O4_2	JUNCTION	9.60	5.405	5.595
MH_O4_3	JUNCTION	17.69	2.008	8.992
MH_O4_4	JUNCTION	18.11	1.118	9.882
MH_O4_5	JUNCTION	0.50	6.874	4.126
MH_O4_6	JUNCTION	0.63	5.732	5.268
MH_O4_7	JUNCTION	17.56	2.153	8.847
MH_O4_8	JUNCTION	20.35	0.829	10.171
MH_O5_1	JUNCTION	15.20	1.468	9.532
MH_O5_2	JUNCTION	18.28	1.022	9.978
MH_O5_3	JUNCTION	0.28	3.495	7.505
MH_O5_4	JUNCTION	11.76	3.382	7.618
MH_O5_5	JUNCTION	0.24	4.287	6.713
MH_O5_6	JUNCTION	13.26	2.307	8.693
MH_O5_7	JUNCTION	19.36	0.833	10.167
MH_O6_1	JUNCTION	13.68	3.210	7.790
MH_O6_2	JUNCTION	16.22	2.949	8.051
MH_O6_3	JUNCTION	18.89	2.745	8.255
MH_O6_4	JUNCTION	0.49	16.608	4.392
MH_O6_5	JUNCTION	0.59	14.198	6.802
MH_O6_6	JUNCTION	20.15	2.663	8.337
MH_O6_7	JUNCTION	11.82	1.629	19.371
MH_O6_8	JUNCTION	15.91	1.555	9.445
MH_O6_9	JUNCTION	21.08	1.499	9.501
MH_O7_1	JUNCTION	0.12	8.069	2.931
MH_O7_2	JUNCTION	0.14	6.445	4.555
MH_O7_3	JUNCTION	16.81	3.189	7.811
MH_O7_5	JUNCTION	2.98	2.125	8.875
MH_O7_6	JUNCTION	12.89	1.870	9.130
MH_O7_7	JUNCTION	17.80	1.269	9.731
MH_O7_8	JUNCTION	20.54	0.842	10.158
MH_S1_1	JUNCTION	0.23	8.506	2.494
MH_S1_2	JUNCTION	0.31	1.335	9.665
MH_S1_4	JUNCTION	0.15	4.969	6.031
MH_S1_5	JUNCTION	0.12	6.836	4.164
MH_S1_6	JUNCTION	0.18	5.717	5.283
MH_S1_7	JUNCTION	0.12	4.641	6.359
MH_S1_8	JUNCTION	0.11	2.577	8.423
MH_T1_1	JUNCTION	0.98	2.214	8.786
MH_T1_2	JUNCTION	2.65	2.044	8.956
MH_T1_3	JUNCTION	10.16	1.573	9.427
MH_T1_4	JUNCTION	0.97	1.372	9.628
MH_T1_5	JUNCTION	3.46	1.225	9.775
MH_T1_6	JUNCTION	5.52	1.064	9.936

MH_T1_7	JUNCTION	15.16	0.926	10.074
MH_T1_8	JUNCTION	19.81	0.700	10.300
MH_T2_1	JUNCTION	0.43	13.938	7.062
MH_T2_2	JUNCTION	0.57	8.724	2.276
MH_T2_3	JUNCTION	0.18	7.976	3.024
MH_T2_4	JUNCTION	0.57	4.103	6.897
MH_T2_5	JUNCTION	11.84	0.745	10.255
MH_T3_2	JUNCTION	0.17	0.865	10.135
MH_T3_3	JUNCTION	0.20	0.559	10.441
MH_T3_8	JUNCTION	5.43	0.066	10.934
MH_T4_1	JUNCTION	0.27	1.702	9.298
MH_T4_2	JUNCTION	0.39	1.530	9.470
MH_T4_3	JUNCTION	0.32	11.000	0.000
MH_T4_4	JUNCTION	0.40	6.534	4.466
MH_T4_5	JUNCTION	0.19	9.451	1.549
MH_T4_6	JUNCTION	0.23	9.948	1.052
MH_T4_7	JUNCTION	0.31	3.082	7.918
MH_T4_8	JUNCTION	0.14	4.232	6.768
MH_T4_9	JUNCTION	0.42	0.780	10.220
W_Mangaheka_1_Out	JUNCTION	5.39	0.143	8.357

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Node Flooding Summary
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Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate CMS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 ltr	Maximum Ponded Depth Meters
MH_T4_3	0.01	0.084	0 12:07	0.000	0.000

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Storage Volume Summary
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Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
W_G8	3.251	6	0	0	13.556	27	0 13:08	1.019
W_Mangaheka_1	1.437	6	0	0	6.323	28	0 16:21	0.728
W_Ohote_1	3.276	13	0	0	9.430	36	0 18:49	8.314
W_Ohote_2	2.764	11	0	0	8.020	33	0 18:45	19.102
W_Ohote_3	2.971	12	0	0	8.473	34	0 18:32	24.488
W_Ohote_4	3.127	12	0	0	8.881	34	0 18:30	6.938
W_Ohote_5	2.440	11	0	0	7.174	32	0 18:25	10.355
W_Ohote_6	5.341	13	0	0	14.630	37	0 18:33	29.198
W_Ohote_7	4.096	13	0	0	11.495	36	0 18:46	26.379
W_Mangaheka_2	1.705	6	0	0	7.830	29	0 16:32	0.472
W_Te_Otamanui_1	1.256	7	0	0	3.562	20	0 15:09	4.530
W_Te_Otamanui_2	2.763	8	0	0	7.667	22	0 15:07	6.271
W_Te_Otamanui_3	1.612	5	0	0	5.633	16	0 15:08	0.355
W_Te_Otamanui_4	2.078	5	0	0	6.493	15	0 15:07	2.705

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Outfall Loading Summary

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Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Mangaheka_Out	97.40	0.843	3.040	209.266
Ohote_Out	96.96	0.742	2.161	184.486
Rotokauri_South_2_Out	99.96	0.136	1.019	34.319
Rotokauri_South_3_Out	33.97	0.022	0.342	1.843
Te_Otamanui_Out	97.86	0.248	1.046	61.765
System	85.23	1.990	6.902	491.679

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Link Flow Summary

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Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days	Time of Max Occurrence hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
M_2_Stream_Out	CONDUIT	0.469	0	12:24	0.54	0.24	1.00
M_Culvert_01	CONDUIT	3.040	0	16:20	5.38	2.48	1.00
M_Culvert_02	CONDUIT	0.469	0	12:24	0.76	0.34	1.00
M_Stream_01	CHANNEL	3.040	0	16:20	0.41	0.02	0.40
M_Stream_02	CHANNEL	3.097	0	14:53	0.31	0.04	0.75
M_Stream_03	CHANNEL	3.771	0	12:20	0.29	0.08	0.72
M_Stream_04	CHANNEL	4.685	0	12:24	0.21	0.03	0.71
Manga_Swale_01_Pipe	CONDUIT	0.241	0	12:51	0.94	0.10	0.87
Manga_Swale_02_Pipe	CONDUIT	0.178	0	13:01	0.36	0.03	0.66
Manga_Swale_1A	CONDUIT	0.275	0	12:37	0.11	0.23	0.62
Manga_Swale_1B	CONDUIT	0.139	0	12:25	0.09	0.12	0.43
Manga_Swale_1C	CONDUIT	0.003	0	12:20	0.01	0.00	0.19
Manga_Swale_2A	CONDUIT	0.178	0	12:59	0.12	0.88	0.44
Manga_Swale_2B	CONDUIT	0.110	0	13:13	0.04	0.41	0.72
Manga_Swale_2C	CONDUIT	0.110	0	12:49	0.04	0.44	0.71
Manga_Swale_2D	CONDUIT	0.088	0	12:13	0.04	0.30	0.70
Manga_Swale_2E	CONDUIT	0.025	0	12:13	0.01	0.08	0.68
O_Culvert_01	CONDUIT	1.899	0	12:42	1.22	2.71	1.00
O_Culvert_02	CONDUIT	2.271	0	12:41	1.38	8.68	1.00
O_Culvert_03	CONDUIT	0.860	0	12:10	0.71	1.21	1.00
O_Stream_01	CHANNEL	2.269	0	18:14	0.20	0.27	0.94
O_Stream_02	CHANNEL	1.245	0	16:55	0.20	0.20	0.94
O_Stream_03	CHANNEL	2.143	0	15:44	0.22	0.26	0.93
O_Stream_04	CHANNEL	2.096	0	13:00	0.24	0.25	0.93
O_Stream_05	CHANNEL	1.174	0	12:04	0.22	0.19	0.92
O_Stream_06	CHANNEL	1.214	0	12:03	0.23	0.20	0.92
O_Stream_07	CHANNEL	1.454	0	18:06	0.15	0.24	0.91
O_Stream_08	CHANNEL	2.093	0	18:07	0.22	0.34	0.91
O_Stream_09	CHANNEL	2.414	0	17:29	0.19	0.29	0.91
O_Stream_10	CHANNEL	1.930	0	12:45	0.20	0.23	0.91
O_Stream_11	CHANNEL	2.028	0	12:40	0.22	0.24	0.90
O_Stream_12	CHANNEL	2.181	0	12:40	0.25	0.26	0.90
O_Stream_13	CHANNEL	1.398	0	17:28	0.18	0.23	0.90
O_Stream_14	CHANNEL	1.378	0	17:24	0.20	0.22	0.89
O_Stream_15	CHANNEL	2.060	0	12:48	0.22	0.25	0.89
O_Stream_16	CHANNEL	2.171	0	12:45	0.24	0.26	0.89
O_Stream_17	CHANNEL	2.390	0	12:37	0.21	0.29	0.89
O_Stream_18	CHANNEL	2.539	0	12:36	0.25	0.32	0.89
O_Stream_19	CHANNEL	1.182	0	17:09	0.19	0.19	0.89
O_Stream_20	CHANNEL	0.676	0	12:40	0.09	0.11	0.91
O_Stream_21	CHANNEL	1.625	0	15:06	0.18	0.26	0.91

O_Stream_22	CHANNEL	1.672	0	15:06	0.19	0.27	0.91
O_Stream_23	CHANNEL	0.922	0	18:10	0.13	0.11	0.91
O_Stream_24	CHANNEL	0.902	0	12:10	0.15	0.11	0.90
O_Stream_25	CHANNEL	0.963	0	13:01	0.12	0.16	0.89
O_Stream_Out	CONDUIT	2.161	0	18:50	0.88	0.32	0.57
Pipe_001	CONDUIT	0.479	0	12:10	1.69	1.11	1.00
Pipe_002	CONDUIT	0.479	0	12:10	1.69	1.10	1.00
Pipe_003	CONDUIT	0.389	0	12:10	1.80	0.99	1.00
Pipe_004	CONDUIT	0.868	0	12:10	1.96	1.08	1.00
Pipe_005	CONDUIT	0.177	0	12:10	1.11	0.87	1.00
Pipe_006	CONDUIT	1.045	0	12:10	2.37	1.30	1.00
Pipe_007	CONDUIT	0.242	0	12:10	1.52	1.20	1.00
Pipe_008	CONDUIT	0.242	0	12:10	1.52	1.30	1.00
Pipe_009	CONDUIT	0.260	0	12:15	1.63	1.33	1.00
Pipe_010	CONDUIT	0.260	0	12:15	1.63	1.24	1.00
Pipe_011	CONDUIT	0.260	0	12:15	1.63	1.29	1.00
Pipe_012	CONDUIT	0.234	0	12:10	1.47	1.16	1.00
Pipe_013	CONDUIT	0.491	0	12:15	1.74	1.34	1.00
Pipe_014	CONDUIT	0.491	0	12:15	1.74	0.96	1.00
Pipe_015	CONDUIT	0.491	0	12:14	1.11	0.66	1.00
Pipe_016	CONDUIT	0.417	0	12:10	1.93	1.34	1.00
Pipe_017	CONDUIT	0.417	0	12:10	1.93	1.37	1.00
Pipe_018	CONDUIT	0.269	0	12:10	1.69	1.33	1.00
Pipe_019	CONDUIT	0.269	0	12:10	1.24	0.68	1.00
Pipe_020	CONDUIT	0.686	0	12:10	2.43	1.58	1.00
Pipe_021	CONDUIT	0.429	0	12:10	1.98	1.41	1.00
Pipe_022	CONDUIT	1.115	0	12:10	2.52	1.42	1.00
Pipe_023	CONDUIT	1.115	0	12:10	2.52	1.77	1.00
Pipe_024	CONDUIT	0.343	0	12:10	1.58	1.13	1.00
Pipe_025	CONDUIT	0.343	0	12:10	1.58	1.13	1.00
Pipe_026	CONDUIT	0.343	0	12:10	1.58	1.13	1.00
Pipe_027	CONDUIT	0.302	0	12:10	1.40	0.99	1.00
Pipe_028	CONDUIT	0.302	0	12:10	1.40	0.99	1.00
Pipe_029	CONDUIT	0.302	0	12:10	1.40	0.98	1.00
Pipe_030	CONDUIT	0.302	0	12:10	1.40	0.99	1.00
Pipe_031	CONDUIT	0.645	0	12:10	2.28	1.42	1.00
Pipe_032	CONDUIT	0.301	0	12:10	1.46	0.99	1.00
Pipe_033	CONDUIT	0.301	0	12:10	1.39	0.99	1.00
Pipe_034	CONDUIT	0.342	0	12:10	1.21	0.79	1.00
Pipe_035	CONDUIT	0.956	0	12:10	2.16	1.21	1.00
Pipe_036	CONDUIT	0.956	0	12:10	2.16	0.93	1.00
Pipe_039	CONDUIT	0.588	0	12:14	1.34	0.74	0.97
Pipe_040	CONDUIT	0.210	0	12:10	1.50	0.69	0.79
Pipe_041	CONDUIT	0.274	0	12:10	1.27	0.90	1.00
Pipe_042	CONDUIT	0.436	0	12:14	1.01	0.55	0.95
Pipe_043	CONDUIT	0.588	0	12:14	1.55	0.75	1.00
Pipe_044	CONDUIT	0.441	0	12:10	2.04	1.12	1.00
Pipe_045	CONDUIT	0.441	0	12:10	1.56	1.02	1.00
Pipe_046	CONDUIT	0.441	0	12:10	1.00	0.56	1.00
Pipe_047	CONDUIT	0.816	0	12:10	1.85	1.04	1.00
Pipe_048	CONDUIT	0.816	0	12:10	1.85	1.04	1.00
Pipe_049	CONDUIT	1.258	0	12:10	1.98	1.55	1.00
Pipe_050	CONDUIT	0.620	0	12:10	1.40	0.79	1.00
Pipe_051	CONDUIT	0.620	0	12:10	1.40	0.79	1.00
Pipe_052	CONDUIT	1.877	0	12:10	2.95	2.16	1.00
Pipe_053	CONDUIT	0.811	0	12:10	1.92	1.03	1.00
Pipe_054	CONDUIT	0.811	0	12:10	1.83	0.79	1.00
Pipe_055	CONDUIT	0.811	0	12:10	1.83	1.03	1.00
Pipe_056	CONDUIT	0.523	0	12:10	1.53	0.65	0.89
Pipe_057	CONDUIT	0.496	0	12:16	1.43	0.61	1.00
Pipe_058	CONDUIT	0.496	0	12:15	1.12	0.63	1.00
Pipe_059	CONDUIT	0.496	0	12:15	1.12	0.65	1.00
Pipe_060	CONDUIT	1.220	0	12:11	1.92	1.00	1.00
Pipe_061	CONDUIT	0.411	0	12:10	1.90	1.35	1.00
Pipe_062	CONDUIT	0.383	0	12:10	1.77	1.26	1.00
Pipe_063	CONDUIT	0.383	0	12:10	1.77	1.26	1.00
Pipe_064	CONDUIT	0.794	0	12:10	1.80	1.01	1.00
Pipe_065	CONDUIT	0.406	0	12:10	1.87	1.33	1.00
Pipe_066	CONDUIT	0.406	0	12:10	1.87	1.33	1.00
Pipe_067	CONDUIT	0.406	0	12:10	1.43	0.93	1.00

Pipe_068	CONDUIT	1.200	0	12:10	1.89	0.86	1.00
Pipe_069	CONDUIT	0.263	0	12:10	1.65	1.30	1.00
Pipe_070	CONDUIT	0.263	0	12:10	1.21	0.86	1.00
Pipe_071	CONDUIT	0.523	0	12:10	1.85	1.20	1.00
Pipe_072	CONDUIT	0.522	0	12:10	1.85	1.20	1.00
Pipe_073	CONDUIT	0.544	0	12:10	1.92	1.25	1.00
Pipe_074	CONDUIT	1.066	0	12:10	1.68	0.83	1.00
Pipe_075	CONDUIT	1.329	0	12:10	2.09	1.04	1.00
Pipe_076	CONDUIT	0.349	0	12:10	1.26	0.80	1.00
Pipe_077	CONDUIT	0.349	0	12:10	1.23	0.80	1.00
Pipe_078	CONDUIT	0.417	0	12:10	1.49	0.96	1.00
Pipe_079	CONDUIT	0.417	0	12:10	1.47	0.96	1.00
Pipe_080	CONDUIT	0.925	0	12:10	2.09	1.17	1.00
Pipe_081	CONDUIT	0.925	0	12:10	2.09	1.17	1.00
Pipe_082	CONDUIT	1.341	0	12:10	2.11	1.05	1.00
Pipe_083	CONDUIT	1.104	0	12:10	1.73	0.86	1.00
Pipe_084	CONDUIT	2.794	0	12:10	3.41	1.48	0.90
Pipe_085	CONDUIT	0.492	0	12:10	1.74	1.13	1.00
Pipe_086	CONDUIT	0.319	0	12:10	1.58	0.73	0.80
Pipe_087	CONDUIT	0.293	0	12:12	0.73	0.37	0.89
Pipe_088	CONDUIT	0.730	0	12:11	1.65	0.93	1.00
Pipe_089	CONDUIT	0.940	0	12:11	1.50	0.73	1.00
Pipe_091	CONDUIT	0.511	0	12:09	1.47	0.65	0.83
Pipe_092	CONDUIT	0.542	0	12:10	1.23	0.72	1.00
Pipe_093	CONDUIT	0.458	0	12:08	1.53	0.58	0.93
Pipe_094	CONDUIT	0.449	0	12:10	1.02	0.57	1.00
Pipe_095	CONDUIT	0.873	0	12:13	1.37	0.68	1.00
Pipe_096	CONDUIT	1.741	0	12:10	2.09	0.90	1.00
Pipe_097	CONDUIT	0.565	0	12:10	2.00	1.30	1.00
Pipe_098	CONDUIT	0.565	0	12:10	2.00	1.30	1.00
Pipe_099	CONDUIT	0.558	0	12:10	1.42	0.71	0.91
Pipe_100	CONDUIT	1.621	0	12:10	2.55	1.27	1.00
Pipe_101	CONDUIT	0.727	0	12:10	1.65	0.92	1.00
Pipe_103	CONDUIT	1.621	0	12:10	2.55	1.27	1.00
Pipe_104	CONDUIT	2.194	0	12:10	2.53	1.14	1.00
Pipe_105	CONDUIT	2.194	0	12:10	2.93	1.14	0.82
Pipe_106	CONDUIT	2.625	0	12:11	2.14	0.72	0.82
Pipe_107	CONDUIT	0.275	0	12:10	1.27	0.90	1.00
Pipe_108	CONDUIT	0.191	0	12:11	0.60	0.04	0.37
Pipe_109	CONDUIT	0.158	0	12:12	0.31	0.03	0.46
Pipe_110	CONDUIT	0.214	0	12:13	0.82	0.49	1.00
Pipe_111	CONDUIT	0.429	0	12:13	1.28	0.54	0.93
Pipe_Diversion	CONDUIT	0.455	0	12:10	0.25	0.30	0.88
RS_1_Stream_Out	CONDUIT	1.019	0	13:08	1.80	0.80	0.83
T_Culvert_01	CONDUIT	1.476	0	12:18	1.98	2.42	1.00
T_Stream_01	CHANNEL	0.429	0	17:36	0.09	0.09	0.99
T_Stream_02	CHANNEL	0.527	0	12:15	0.11	0.11	0.97
T_Stream_03	CHANNEL	0.834	0	12:14	0.17	0.14	0.95
T_Stream_04	CHANNEL	1.119	0	12:18	0.17	0.17	0.92
T_Stream_05	CHANNEL	1.418	0	12:19	0.23	0.22	0.89
T_Stream_06	CHANNEL	1.592	0	12:16	0.34	0.27	0.86
T_Stream_07	CHANNEL	0.635	0	12:18	0.15	0.13	0.80
T_Stream_08	CHANNEL	0.269	0	13:02	0.07	0.06	0.74
Te_Otamanui_Stream_out	CONDUIT	1.046	0	15:05	1.07	0.15	0.43
W_Mangaheka_Stream_Out	CONDUIT	0.377	0	18:51	0.48	0.07	1.00
Exelby_Road	WEIR	0.000	0	00:00			0.00
Exelby_Weir_10yr	WEIR	0.352	0	18:50			1.00
Exelby_Weir_2yr	WEIR	1.809	0	18:50			1.00
SH39	WEIR	0.000	0	00:00			0.00
SH39_Weir_10yr	WEIR	0.475	0	15:00			0.25
SH39_Weir_2yr	WEIR	0.573	0	15:00			0.63
W_G8_100yr	WEIR	0.037	0	13:08			0.36
W_G8_10yr	WEIR	0.425	0	13:08			0.63
W_G8_PWL	WEIR	0.557	0	13:08			0.66
W_Mangaheka_1_10yr	WEIR	0.614	0	18:45			1.00
W_Mangaheka_1_PWL	WEIR	0.115	0	12:19			1.00
W_Ohote_1_PWL	WEIR	0.083	1	10:50			0.94
W_Ohote_1_Weir_Dn	WEIR	5.765	0	17:20			0.49
W_Ohote_1_Weir_Up	WEIR	6.432	0	18:35			0.49
W_Ohote_2_PWL	WEIR	0.086	0	17:37			0.91

W_Ohote_2_Weir_Dn	WEIR	11.647	0	17:37	0.92
W_Ohote_2_Weir_Up	WEIR	11.334	0	21:48	0.46
W_Ohote_3_PWL	WEIR	0.100	0	12:02	0.89
W_Ohote_3_Weir_Dn	WEIR	13.871	0	16:55	0.44
W_Ohote_3_Weir_Up	WEIR	14.503	0	18:00	0.44
W_Ohote_4_PWL	WEIR	0.112	0	18:50	0.89
W_Ohote_4_Weir_Dn	WEIR	4.820	0	18:50	0.44
W_Ohote_4_Weir_Up	WEIR	3.372	0	18:50	0.44
W_Ohote_5_PWL	WEIR	0.086	0	18:52	0.88
W_Ohote_5_Weir_Dn	WEIR	5.811	0	18:52	0.43
W_Ohote_5_Weir_Up	WEIR	5.487	0	17:29	0.43
W_Ohote_6_PWL	WEIR	0.141	0	18:46	0.91
W_Ohote_6_Weir_Dn	WEIR	18.851	0	18:15	0.46
W_Ohote_6_Weir_Up	WEIR	14.786	0	19:54	0.46
W_Ohote_7_PWL	WEIR	0.102	1	10:44	0.91
W_Ohote_7_Weir_Dn	WEIR	14.697	0	18:23	0.46
W_Ohote_7_Weir_Up	WEIR	17.297	0	18:41	0.46
W_Mangaheka_2_100yr	WEIR	0.003	0	12:28	0.46
W_Mangaheka_2_10yr	WEIR	0.115	0	12:26	0.55
W_Mangaheka_2_PWL	WEIR	0.356	0	12:23	0.77
W_Te_Otamanui_1_PWL	WEIR	0.141	0	12:06	0.61
W_Te_Otamanui_1_Weir_Dn	WEIR	2.783	0	15:29	0.21
W_Te_Otamanui_1_Weir_Up	WEIR	2.432	0	15:08	0.21
W_Te_Otamanui_2_PWL	WEIR	0.122	0	12:06	0.60
W_Te_Otamanui_2_Weir_Dn	WEIR	3.556	0	15:04	0.20
W_Te_Otamanui_2_Weir_Up	WEIR	3.364	0	15:45	0.20
W_Te_Otamanui_3_PWL	WEIR	0.210	0	12:18	0.45
W_Te_Otamanui_3_Weir_Dn	WEIR	0.272	0	13:01	0.05
W_Te_Otamanui_3_Weir_Up	WEIR	0.263	0	13:02	0.05
W_Te_Otamanui_4_PWL	WEIR	0.295	0	12:07	0.47
W_Te_Otamanui_4_Weir_Dn	WEIR	1.220	0	12:11	0.14
W_Te_Otamanui_4_Weir_Up	WEIR	1.220	0	12:11	0.07
Weir_TeKowhai	WEIR	0.000	0	00:00	0.00

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Flow Classification Summary
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Conduit	Adjusted /Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
		---------- Fraction of Time in Flow Class ----------								
M_2_Stream_Out	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.44	0.00
M_Culvert_01	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.37
M_Culvert_02	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.13	0.00
M_Stream_01	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.19	0.00
M_Stream_02	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
M_Stream_03	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
M_Stream_04	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.04	0.00
Manga_Swale_01_Pipe	1.00	0.01	0.00	0.00	0.63	0.00	0.00	0.35	0.17	0.00
Manga_Swale_02_Pipe	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.88	0.00
Manga_Swale_1A	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.45	0.00
Manga_Swale_1B	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.97	0.00
Manga_Swale_1C	1.00	0.00	0.25	0.00	0.75	0.00	0.00	0.00	0.83	0.00
Manga_Swale_2A	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Manga_Swale_2B	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.11	0.00
Manga_Swale_2C	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.28	0.00
Manga_Swale_2D	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.35	0.00
Manga_Swale_2E	1.00	0.02	0.01	0.00	0.97	0.00	0.00	0.00	0.42	0.00
O_Culvert_01	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
O_Culvert_02	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Culvert_03	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_01	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_02	1.00	0.01	0.01	0.00	0.99	0.00	0.00	0.00	0.02	0.00
O_Stream_03	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_04	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.01	0.00
O_Stream_05	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.01	0.00
O_Stream_06	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.01	0.00

O_Stream_07	1.00	0.01	0.02	0.00	0.97	0.00	0.00	0.00	0.00	0.00
O_Stream_08	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
O_Stream_09	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
O_Stream_10	1.00	0.03	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00
O_Stream_11	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
O_Stream_12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_13	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.01	0.00
O_Stream_14	1.00	0.02	0.01	0.00	0.97	0.00	0.00	0.00	0.00	0.00
O_Stream_15	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
O_Stream_16	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_18	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_19	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_20	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.00	0.00
O_Stream_21	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_22	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_23	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_24	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
O_Stream_25	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
O_Stream_Out	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.09	0.00
Pipe_001	1.00	0.00	0.00	0.00	0.89	0.11	0.00	0.00	0.62	0.00
Pipe_002	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.60	0.00
Pipe_003	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.65	0.00
Pipe_004	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.27	0.00
Pipe_005	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.57	0.00
Pipe_006	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.07	0.00
Pipe_007	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.75	0.00
Pipe_008	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.00	0.00
Pipe_009	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.09	0.00
Pipe_010	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.55	0.00
Pipe_011	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.76	0.00
Pipe_012	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.75	0.00
Pipe_013	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.10	0.00
Pipe_014	1.00	0.00	0.00	0.00	0.98	0.02	0.00	0.00	0.47	0.00
Pipe_015	1.00	0.00	0.00	0.00	0.96	0.03	0.00	0.00	0.00	0.00
Pipe_016	1.00	0.00	0.00	0.00	0.98	0.02	0.00	0.00	0.69	0.00
Pipe_017	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.69	0.00
Pipe_018	1.00	0.00	0.00	0.00	0.85	0.15	0.00	0.00	0.16	0.00
Pipe_019	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.73	0.00
Pipe_020	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.39	0.00
Pipe_021	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.72	0.00
Pipe_022	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.46	0.00
Pipe_023	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.00	0.00
Pipe_024	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.59	0.00
Pipe_025	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.63	0.00
Pipe_026	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.63	0.00
Pipe_027	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.67	0.00
Pipe_028	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.03	0.00
Pipe_029	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.63	0.00
Pipe_030	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.45	0.00
Pipe_031	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.07	0.00
Pipe_032	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.58	0.00
Pipe_033	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_034	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
Pipe_035	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.57	0.00
Pipe_036	1.00	0.00	0.00	0.00	0.95	0.05	0.00	0.00	0.24	0.00
Pipe_039	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.51	0.00
Pipe_040	1.00	0.00	0.00	0.00	0.70	0.30	0.00	0.00	0.11	0.00
Pipe_041	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.55	0.00
Pipe_042	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.71	0.00
Pipe_043	1.00	0.00	0.00	0.00	0.94	0.06	0.00	0.00	0.36	0.00
Pipe_044	1.00	0.00	0.00	0.00	0.85	0.15	0.00	0.00	0.70	0.00
Pipe_045	1.00	0.00	0.00	0.00	0.93	0.07	0.00	0.00	0.22	0.00
Pipe_046	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.41	0.00
Pipe_047	1.00	0.00	0.00	0.00	0.73	0.27	0.00	0.00	0.60	0.00
Pipe_048	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
Pipe_049	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
Pipe_050	1.00	0.00	0.00	0.00	0.95	0.05	0.00	0.00	0.53	0.00
Pipe_051	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.58	0.00
Pipe_052	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.00	0.00

Pipe_053	1.00	0.00	0.00	0.00	0.82	0.18	0.00	0.00	0.20	0.00
Pipe_054	1.00	0.00	0.00	0.00	0.85	0.15	0.00	0.00	0.64	0.00
Pipe_055	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.56	0.00
Pipe_056	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.26	0.00
Pipe_057	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.57	0.00
Pipe_058	1.00	0.00	0.00	0.00	0.94	0.06	0.00	0.00	0.53	0.00
Pipe_059	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.52	0.00
Pipe_060	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.00	0.00
Pipe_061	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.72	0.00
Pipe_062	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.60	0.00
Pipe_063	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.20	0.00
Pipe_064	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.48	0.00
Pipe_065	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.82	0.00
Pipe_066	1.00	0.00	0.00	0.00	0.87	0.13	0.00	0.00	0.21	0.00
Pipe_067	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.59	0.00
Pipe_068	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.00	0.00
Pipe_069	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.12	0.00
Pipe_070	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.57	0.00
Pipe_071	1.00	0.00	0.00	0.00	0.93	0.07	0.00	0.00	0.67	0.00
Pipe_072	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.28	0.00
Pipe_073	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.79	0.00
Pipe_074	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.60	0.00
Pipe_075	1.00	0.00	0.00	0.00	0.98	0.02	0.00	0.00	0.03	0.00
Pipe_076	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.75	0.00
Pipe_077	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.85	0.00
Pipe_078	1.00	0.00	0.00	0.00	0.81	0.19	0.00	0.00	0.60	0.00
Pipe_079	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.42	0.00
Pipe_080	1.00	0.00	0.00	0.00	0.73	0.27	0.00	0.00	0.66	0.00
Pipe_081	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.96	0.00
Pipe_082	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.83	0.00
Pipe_083	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_084	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.28	0.00
Pipe_085	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.31	0.00
Pipe_086	1.00	0.00	0.00	0.00	0.85	0.15	0.00	0.00	0.16	0.00
Pipe_087	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.85	0.00
Pipe_088	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.62	0.00
Pipe_089	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.50	0.00
Pipe_091	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
Pipe_092	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.81	0.00
Pipe_093	1.00	0.00	0.00	0.00	0.90	0.10	0.00	0.00	0.46	0.00
Pipe_094	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.82	0.00
Pipe_095	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.30	0.00
Pipe_096	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.56	0.00
Pipe_097	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.94	0.00
Pipe_098	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.65	0.00
Pipe_099	1.00	0.00	0.00	0.00	0.61	0.39	0.00	0.00	0.00	0.00
Pipe_100	1.00	0.00	0.00	0.00	0.69	0.31	0.00	0.00	0.64	0.00
Pipe_101	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Pipe_103	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.80	0.00
Pipe_104	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.76	0.00
Pipe_105	1.00	0.00	0.00	0.00	0.53	0.47	0.00	0.00	0.00	0.00
Pipe_106	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.96	0.00
Pipe_107	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.44	0.00
Pipe_108	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.86	0.00
Pipe_109	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.74	0.00
Pipe_110	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.36	0.00
Pipe_111	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.38	0.00
Pipe_Diversion	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
RS_1_Stream_Out	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
T_Culvert_01	1.00	0.02	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
T_Stream_01	1.00	0.01	0.01	0.00	0.99	0.00	0.00	0.00	0.01	0.00
T_Stream_02	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
T_Stream_03	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.00	0.00
T_Stream_04	1.00	0.02	0.02	0.00	0.96	0.00	0.00	0.00	0.15	0.00
T_Stream_05	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
T_Stream_06	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.20	0.00
T_Stream_07	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.42	0.00
T_Stream_08	1.00	0.02	0.04	0.00	0.94	0.00	0.00	0.00	0.19	0.00
Te_Otamanui_Stream_out	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.04	0.00
W_Mangaheka_Stream_Out	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.55	0.00

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Conduit Surcharge Summary
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Conduit	Hours Full Both Ends	Hours Full Upstream	Hours Full Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
M_2_Stream_Out	13.91	13.91	29.84	0.01	0.01
M_Culvert_01	32.24	32.24	38.42	16.34	16.34
M_Culvert_02	11.43	11.43	13.91	0.01	0.01
Manga_Swale_02_Pipe	0.01	0.01	10.19	0.01	0.01
O_Culvert_01	12.07	12.14	12.08	14.18	8.16
O_Culvert_02	11.26	12.21	11.26	16.85	10.87
O_Culvert_03	12.07	12.07	12.13	1.37	2.35
Pipe_001	0.91	0.91	18.25	0.16	0.28
Pipe_002	18.25	18.25	23.80	0.15	0.39
Pipe_003	17.18	17.18	25.56	0.01	0.32
Pipe_004	21.06	21.06	22.90	0.14	0.90
Pipe_005	20.79	20.79	30.83	0.01	0.01
Pipe_006	22.90	22.90	25.90	0.35	0.99
Pipe_007	11.73	11.73	32.88	0.37	0.45
Pipe_008	32.88	32.88	36.09	0.48	1.14
Pipe_009	2.13	2.13	5.68	0.85	1.14
Pipe_010	5.68	5.68	11.49	0.70	1.08
Pipe_011	11.49	11.49	18.38	0.78	0.98
Pipe_012	11.36	11.36	18.38	0.31	0.46
Pipe_013	16.39	16.39	19.61	0.68	1.00
Pipe_014	19.61	19.61	26.64	0.01	0.56
Pipe_015	22.84	22.84	25.26	0.01	0.42
Pipe_016	1.21	1.21	11.37	0.47	0.65
Pipe_017	11.37	11.37	21.00	0.50	0.63
Pipe_018	0.72	0.72	13.06	0.25	0.32
Pipe_019	11.96	11.96	21.00	0.01	0.01
Pipe_020	19.84	19.84	20.84	0.53	1.43
Pipe_021	12.95	12.95	22.27	0.55	0.70
Pipe_022	18.65	18.65	24.04	0.47	0.47
Pipe_023	24.04	24.04	24.81	0.73	2.63
Pipe_024	0.98	0.98	2.64	0.21	0.44
Pipe_025	2.64	2.64	10.16	0.21	0.47
Pipe_026	10.16	10.16	23.11	0.21	0.41
Pipe_027	0.97	0.97	3.45	0.01	0.31
Pipe_028	3.45	3.45	5.52	0.01	0.69
Pipe_029	5.52	5.52	15.16	0.01	0.20
Pipe_030	15.16	15.16	23.11	0.01	0.33
Pipe_031	19.81	19.81	22.78	0.46	1.33
Pipe_032	0.43	0.43	0.57	0.01	0.21
Pipe_033	0.57	0.57	0.98	0.01	0.24
Pipe_034	0.18	0.18	0.84	0.01	0.01
Pipe_035	0.57	0.57	11.84	0.13	0.28
Pipe_036	11.84	11.84	16.27	0.01	0.58
Pipe_039	0.01	0.13	5.43	0.01	0.01
Pipe_041	0.17	0.17	0.20	0.01	0.12
Pipe_042	0.01	0.01	0.13	0.01	0.01
Pipe_043	5.43	5.43	8.78	0.01	0.01
Pipe_044	13.68	13.68	17.19	0.28	0.28
Pipe_045	16.22	16.22	21.11	0.10	0.45
Pipe_046	18.89	18.89	23.03	0.01	0.01
Pipe_047	0.48	0.49	0.59	0.08	0.29
Pipe_048	0.59	0.59	23.03	0.08	0.16
Pipe_049	20.15	20.15	21.08	0.63	1.42
Pipe_050	11.81	11.81	15.91	0.01	0.11
Pipe_051	15.91	15.91	24.52	0.01	0.01
Pipe_052	20.98	21.08	21.94	1.05	2.23
Pipe_053	0.10	0.12	0.14	0.02	0.07
Pipe_054	0.14	0.14	16.80	0.01	0.01
Pipe_055	16.80	16.80	23.31	0.02	0.09
Pipe_056	0.01	0.01	2.97	0.01	0.01

Pipe_057	2.97	2.97	12.88	0.01	0.01
Pipe_058	12.88	12.88	17.80	0.01	0.01
Pipe_059	17.80	17.80	23.31	0.01	0.01
Pipe_060	20.53	20.54	21.92	0.01	0.69
Pipe_061	13.01	13.01	21.44	0.31	0.42
Pipe_062	9.59	9.59	17.69	0.50	0.68
Pipe_063	17.69	17.69	21.44	0.50	0.85
Pipe_064	18.11	18.11	23.27	0.02	0.42
Pipe_065	0.49	0.50	0.63	0.27	0.35
Pipe_066	0.63	0.63	18.56	0.26	0.32
Pipe_067	17.56	17.56	27.41	0.01	0.10
Pipe_068	20.35	20.35	21.35	0.01	0.94
Pipe_069	15.20	15.20	19.33	0.21	0.34
Pipe_070	18.28	18.28	28.07	0.01	0.01
Pipe_071	0.28	0.28	11.76	0.10	0.17
Pipe_072	11.76	11.76	17.26	0.10	0.18
Pipe_073	0.24	0.24	17.26	0.11	0.14
Pipe_074	13.26	13.26	19.36	0.01	0.04
Pipe_075	19.36	19.36	21.00	0.02	0.38
Pipe_076	0.27	0.27	0.39	0.01	0.01
Pipe_077	0.39	0.39	13.55	0.01	0.01
Pipe_078	0.32	0.32	0.40	0.01	0.14
Pipe_079	0.40	0.40	0.53	0.01	0.17
Pipe_080	0.19	0.19	0.23	0.08	0.14
Pipe_081	0.23	0.23	0.41	0.08	0.12
Pipe_082	0.31	0.31	0.72	0.03	0.14
Pipe_083	0.14	0.14	0.72	0.01	0.01
Pipe_084	0.01	0.42	0.01	0.18	0.01
Pipe_085	4.94	4.94	11.43	0.07	0.15
Pipe_087	0.01	0.01	9.80	0.01	0.01
Pipe_088	9.80	9.80	11.75	0.01	0.19
Pipe_089	10.00	10.06	11.73	0.01	0.01
Pipe_091	0.01	0.01	0.15	0.01	0.01
Pipe_092	4.84	4.84	11.46	0.01	0.01
Pipe_093	0.01	0.01	3.45	0.01	0.01
Pipe_094	3.45	3.45	11.46	0.01	0.01
Pipe_095	0.07	0.07	10.23	0.01	0.01
Pipe_096	7.52	7.66	10.73	0.01	0.01
Pipe_097	0.23	0.23	0.31	0.18	0.21
Pipe_098	0.12	0.31	0.12	0.18	0.12
Pipe_100	0.14	0.15	0.18	0.08	0.11
Pipe_101	0.12	0.12	0.22	0.01	0.05
Pipe_103	0.18	0.18	0.20	0.08	0.13
Pipe_104	0.11	0.12	0.11	0.06	0.11
Pipe_105	0.01	0.11	0.01	0.05	0.01
Pipe_106	0.01	0.01	5.38	0.01	0.01
Pipe_107	0.20	0.20	0.28	0.01	0.10
Pipe_110	5.19	5.19	12.97	0.01	0.01
Pipe_111	0.01	0.01	0.15	0.01	0.01
RS_1_Stream_Out	0.01	0.58	0.01	0.01	0.01
T_Culvert_01	5.04	5.04	5.17	0.49	0.01
T_Stream_01	0.01	0.01	2.53	0.01	0.01
W_Mangaheka_Stream_Out	11.54	11.54	30.81	0.01	0.01

```
Analysis begun on:  Wed Jun 16 14:36:25 2021
Analysis ended on:  Wed Jun 16 14:40:32 2021
Total elapsed time: 00:04:07
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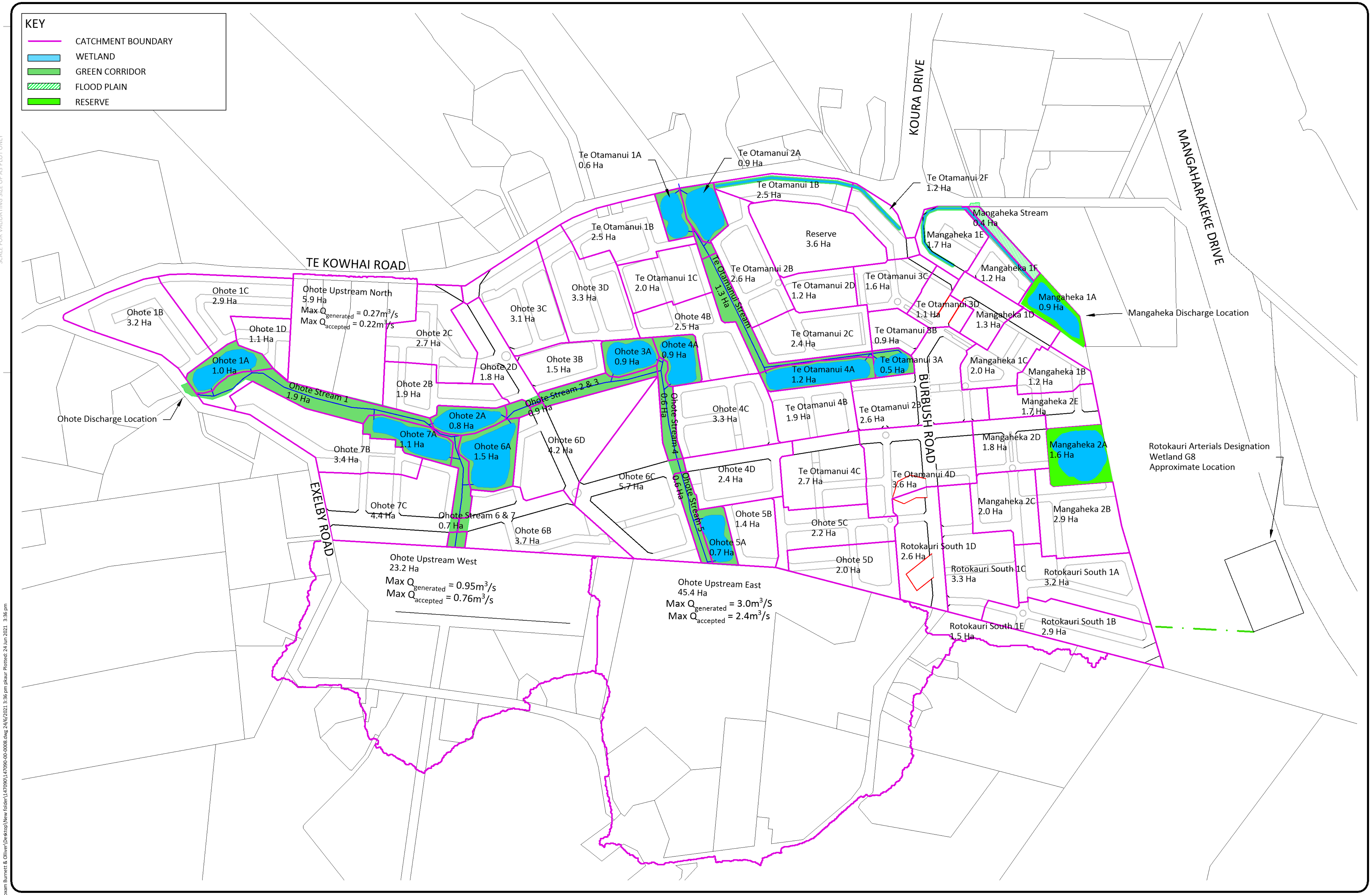
Appendix B – Concept Design Layout

The concept design drawings include the following:

- 147090-00-0008 – Concept Layout Plan – Flood Management and Stormwater Treatment



DESIGNED	CHECKED
GK/EV	-
DRAWN	APPROVED
GK	-

mx model version:

-	DATE	- ISSUE/REVISION DETAIL	- BY	- CHK	- APPR

BLOXAM BURNETT & OLLIVER

CLIENT

PROJECT
ROTOKAURI NORTH DEVELOPMENT

DRAWING
CONCEPT LAYOUT PLAN
FLOOD MANAGEMENT
STORMWATER TREATMENT

STATUS
SKETCH

DATE	SCALE (ORIGINAL SIZE A3)
03-05-2021	1:7500
DRAWING NUMBER	REVISION
147090-00-0008	-

Version 4.0 - March 2020