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Mangawhai Balance Tank

Risk of Increasing Flow at Thelma Rd (Outfall) Pump Station

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CONFIDENTIAL

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Revision Details

Revision	Details
Revision	Updated flow calculation on PS./ Source of rainwater in system added

Contents

Disclaimers and Limitations

This report ('**Report**') has been prepared by WSP exclusively for Kaipara District Council ('**Client**') in relation to understanding the risk associated with future peak flow ('**Purpose**') and in accordance with the email from Simon Ruddenklau dated 03/09/2021. The findings in this Report are based on and are subject to the assumptions specified in the Report. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

1 Project Background

Mangawhai Wastewater System was commissioned in 2009 to serve the community of Mangawhai and Mangawhai Heads. Prior to the construction of the system the entire community was using on site treatment, predominantly septic tanks and local soakaways. This caused seepage of poorly treated wastewater into the Mangawhai Harbour, deteriorating water quality, impacting on ecology and prohibiting the collection of kai. The construction of the wastewater system has seen > 90% connection of older properties in the community and all new properties have connected and the localised discharges removed. This has resulted in a clean, ecologically thriving harbour, home to safe kai and a key amenity feature of the community.

The Kaipara District Council (KDC) Spatial Plan of 2020 predicts that growth in the Mangawhai catchment will occur at a high rate with 6,000 connection by 2043, that is approx. 3 times the 2020 connected population. If growth were linear, that is an increase in properties of 174 per year. New connections have seen an increase of 70 to 100 per year since 2018.

The Mangawhai Central Development, that has been through a plan change process to intensify the density of housing, is expected to bring up to 1,000 connections, and developers have informed KDC that they anticipate the first phases to occur soon. This may result in 200 connections per year.

The growth across the catchment has been recognised by KDC in the long term plan and there is an overall strategy in place to manage the wastewater system. Key steps and dates are given below, based on 2,411 connections reported in February 2021.

2025/6 WWTP Treatment Capacity Reached

2022 Golf Course Effluent Reuse expected

2026 5,000 Connection upgrades expected

2028/29 Irrigation Field Capacity Reached

2033 Irrigation Field Capacity Reached if Reuse at Golf Course

Approx. 2030 Increased disposal capacity – more than 70l/s through plant

The current wastewater treatment plant (WWTP) is designed for a maximum flow of 70 l/s arriving at the inlet works and the CASS system is designed for a maximum inflow rate of 70l/s. After the effluent balance tank flow is pumped through sand filters at 28 l/s and then transferred to Browns Road for storage and disposal at 70 l/s. If flows are high, some flow bypasses the sand filters. The rising main to Browns Road is limited by the pipe pressure rating and is unable to increase the flow rate to the farm. The irrigation area is limited to 67.5 ha of usable land and is restricted by Resource Consent to 5,000 m^3/ha/year,

For the WWTP to treat a higher peak flow it is necessary to add more treatment capacity and to provide additional disposal capacity. Even with the planned 5,000 connection upgrade in 2025/6 no additional peak flow can be passed to the farm until the pipe is upgraded.

If in wet weather flow is increased to the WWTP above its capacity for a period of hours, then the treatment process will be compromised in quality and due to hydraulic constraints, partially treated wastewater will overflow the tanks, entering the local environment.

It has been recognised by KDC that the construction of the plant upgrades needs to progress, but as population increases, flow and load will also increase, and potentially will exceed the hydraulic and organic capacity of the plant.

In conjunction with the balance tank project and the effluent reuse there is an ongoing study of the wastewater network. This will produce a calibrated model which can be developed with known phasing of growth to provide a strategic plan for network development. Future flows will be greater than the 100 l/s discussed in this document and the network strategy will inform of what upgrades and when they are required to meet growth.

This report considers the short term hydraulic implications of this growth and the risk that this poses to KDC and the community of Mangawhai.

2 Flow and Rainfall

The following data demonstrates the daily average flow to the WWTP and the rainfall. Rainfall is measured by NRC at Hakaru, 5km from Mangawhai.

Table 1: Annual rainfall and significant rainfall events recorded since 2014 for Mangawhai. (NRC Data)

Year	Total Annual Rainfall mm	No. Days > 50mm	No Days > 75 mm	No Days > 100 mm	Max Rainfall mm/d
2014	1386	1	1	0	83
2015	983	0	0	0	36.5
2016	1600	4	2	0	99.4
2017	1684	4	2	1	150.2 *
2018	1784	8	4	0	95.8
2019	1123	2	0	0	73.5
2020	1055	1	0	0	51.5
2021 (to End Aug)	760	1	0	0	65

* Following Day had 26 mm of rainfall associated with same event.

The above table compares significant wet weather events since 2014. Although the banding of rainfall used are nominal, 50mm is considered a significant rainfall event. Only in very dry years do no events > 50mm occur, but 8 were noted in 2018, a significantly wetter year.

In 2017, March to April 3 cyclones hit Northland. These were designated as 18F, 19-21 March, Severe Cyclone Debbie, 23-30 March, and Severe Cyclone Cook 6-10 April. For the latter two events, these reached New Zealand about 4 days after the main cyclone. Rainfall associated with these three events was 76.4mm, 150.2 mm, and 57 mm respectively.

Therefore, although Mangawhai is usually dry, with only infrequent storms, occasionally multiple cyclone events will bring intense rainfall. These events may occur twice per year or more.

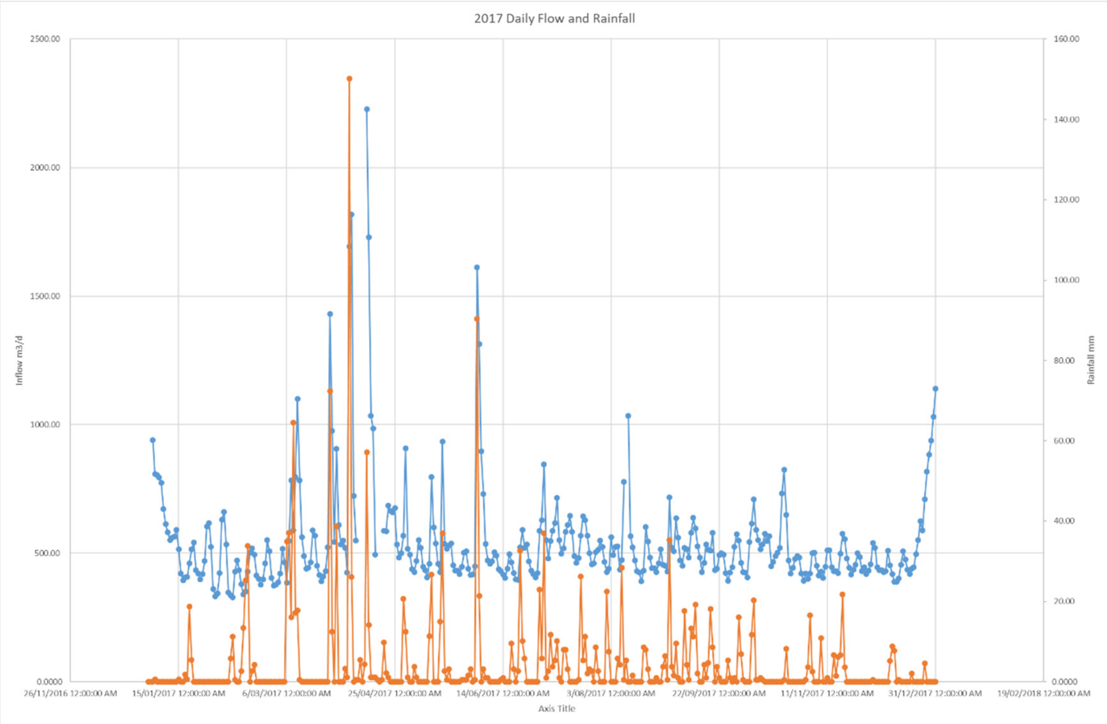

Figure 1: 2017 daily flow to WWTP and Daily rainfall.

The figure above shows the rainfall and daily works inflow for 2017 including the cyclonic events in March and April. Of note is that there are several rainfall events of around 30mm (16/2 (33.8mm), 30/8 (35mm) 8/10 (20 mm)) where the normal pattern of flows shows little change. There is a cycle of flow variation in normal conditions at Mangawhai as weekend population increases and the impact of rainfall is often within that variation. In summer, from late December through to early January flows increase significantly despite no rainfall, due to summer holiday population changes.

It is seen from this data that the network is largely, but not totally separated from storm water. However, it is of note that 150 mm was seen on 4 April and flows reached 1800 m^3/d, whereas a few days later, rainfall was only 57 mm and flows reached over 2200 m^3/d. It is understood that this is a result of roof runoff being captured in water tanks. In the first high rain event there was some storage provided in the catchment, but in the second, the tanks were full, so overflows from the tanks in some cases passed to sewer. Additionally, in the latter event soils will already be wet and saturated so greater runoff will occur. This means, that the actual effect of heavy rainfall will be influenced by preceding weather as well as contribution from the population, depending on time of year. Most significant storm events occur out of summer holiday season, although localised thunderstorms may occur with similar effect.

Rainwater can enter the Mangawhai system by a number of routes. These include;

- Overflows from water tanks
- Surface ground runoff to unsealed manholes
- Ingress through cracks and joints
- Combined flows (older catchment is known)
- Incorrect connections to private pump stations. (serving 1 or 2 properties)

This means it is impractical to remove all sources of rainwater sufficient to prevent a storm response under all conditions.

3 Pump Station Capacity and Storage

The Thelma Road PS, also known as Outfall PS, is a terminal pump station fed by 2 direct rising mains and a gravity pipeline. The gravity pipeline receives several smaller pump station feeds. These are summarised as

Jack Boyd Drive PS (K)	45 l/s
PS VA (Village)	40 l/s
Gravity from Mangawhai Heads.	Estimated 23 l/s.

Flow rates provided by Venita following drop tests in 2021 as part of the network modelling.

Originally Thelma Road PS was rated at 55 l/s pass forward rate, but pumps were uprated to 70l/s as duty standby configuration. PS VA was upgraded to 40 l/s from 25 l/s in 2019/20. It is estimated that the Mangawhai Heads gravity system serves approximately 1,300 properties, which assuming a peak flow of 5 x average flow is peak flow rate of approximately 23 l/s. This gives a potential inflow to the pump station of 108 l/s. This can occur when multiple sources are operating, but in most conditions, this is buffered by the volume of the wet well, with only prolonged events using the storage wells.

The pump station consists of 3 wells. The first is an operating wet well with duty standby pumps operating on VSD with 30m^3 volume. The second two connected wells are connected in series and provide additional volumetric storage in the event of pump station failure and peak wet weather. Each has the volume of 26 m^3 giving a total storage of approximately 65 m^3 above normal operating levels. A small additional volume is available above the incoming pipe, but it is not known whether the pump station will overflow, or backup the network, or both if this headroom is used.

Therefore, with the maximum current flow of 70 l/s to the WWTP, there is a potential 38 l/s entering the wet well from the different sources. In most conditions, if both pumped sources were to operate, these will pass forward the volume of wet well at the source pump station and stop. Only in prolonged wet weather will continuous operation occur.

The development of Mangawhai Central will result in over 1,000 properties connecting to the network. It is intended that this flow will enter the rising main from PS VA. It is intended to upgrade this pipeline for additional capacity. Available information indicates that the proposed upgrade will be suitable for approx. 40 l/s peak flow, and this is no greater than the current pump capacity from PS VA.

4 Risk of Overflow

In significant rain events, such as cyclones rainfall will usually occur in a short intense period. To demonstrate the risk, taking 4th April 2017, with flow to treatment for a wet weather event of 1,694 m^3/d with over 150 mm of rainfall. On this day 1,269 m^3 more was passed to treatment than the previous day. If this flow was received at the treatment works over 24 hours the effect would be a daily flow rate of 19.6 l/s well within the plant hydraulic capacity and the capacity of the Thelma Rd PS. The normal diurnal variation sees an average: Daily Peak factor of 2.4, with the peak occurring mid-morning.

The original design intent of the Thelma Rd PS was to pump all flows arriving to the WWTP. The 2 of 26 m^3 storage wells were intended as Emergency Storage. That is they would operate only when a critical failure of the pump station, such as loss of power, or total pump failure occurred to provide storage while the issue was resolved. The storage was not designed as wet weather and using it as wet weather storage means that Emergency storage is not available.

26 March 2017

By analysing historic flow data and level data it is has been possible to determine for a significant event of 26 March 2017 the effect of a high rainfall period.

The data is presented in the figure below.

All readings are the average over 15 minute periods and consider wet well level, recorded inflow to WWTP and derived flow to the pump station.

In this case flow was normal during most of the day, with a wet weather response being seen from 7:30 PM. As expected, as the wet well level increased the pumps, controlled on VSD increased their output. Excess flow was stored in the wet well. By 8:30 PM the wet well level was at the level of overflow to the storage tanks and continued to rise to a maximum level. This level, at 6.0m is above the incoming pipe at the wet well and will result in surcharging of the network. At this level all storage will have been full. Flows subsided after 3.5 hours indicating a short intense rainfall event.

The design point of these pumps has previously been advised to have been 55 l/s. This was reached at a 5m wet well level. With the surcharged wet well flow pumped out reached 68 l/s. Incoming flow is determined to have reached 96 l/s.

A spike in derived flow at the level of overflow to the storage wells, as the wells fill in series. For the well to reach a maximum level, this storage must have been filled.

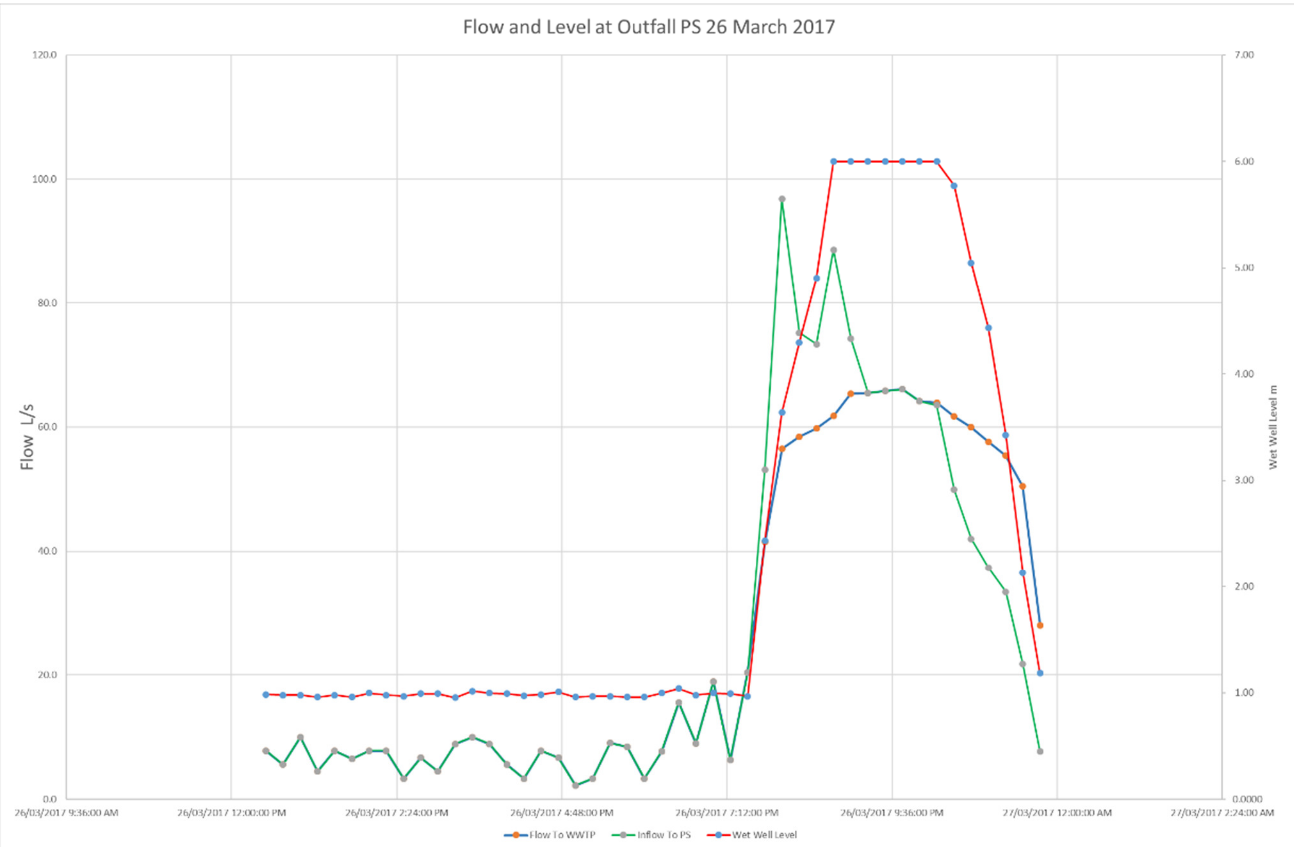

Figure 2: 26 March 2017 Thelma Rd PS well level, pumped and derived inflow.

Since this event the pumps at the Outfall PS have been uprated to 65 l/s, limited on VSD capacity but incoming flow rates have increased. These increases include an increase in flow rate from Jack Boyd Drive, (uncertain values, considered 10 l/s), and Pump Station VA, which has increased by 20l/s.

From this data it is seen that the wet weather event occurred from 7:30 and flows subsided after 3.4 hours. Flow is recorded daily at 1:00 so this event is captured in a daily flow of 1,432 m^3/d. The average flow over the preceding 3 days was 454 m^3/d, so this 5.5 hours of logged event contributed an additional 978 m^3. That is 178 m^3/hr, equivalent to an average flow of 49.4 l/s over this period. However, as shown in the graph above the peak was over 96 l/s to outfall PS.

It is noted that the flow on the following day, 5th April, was 1,819 m^3/d, indicating that the extra flow arising from the wet weather event was in excess of 2,663 m^3, over 2 days. This is likely to have been attenuated through the catchment, and occurred late in the day, a further 26 mm of rainfall occurred on the second day of the event.

Future Flows

KDC have expressed that any spill to the harbour will be unacceptable, as this will cause deterioration of water quality, put restrictions on harvesting kai and limit recreational use for several days. This will cause bad publicity and likely to reach national press coverage.

With an increase in future flows due to growth, by 2026, it is estimated that between 2,800 and 3,161 connections (depending on connection rate) will be on the wastewater system. The average flow is estimated to be 840-950 m^3/d. In 2018, a wet year the average daily flow was 580 m^3/d. Peak flow will also increase with larger catchment, increases infiltration and ingress, so the peak flow arriving at the Thelma Road PS will also increase over this time increasing any effect in wet weather. This is an expected increase of up to 75% more connections from the 2017 data.

Analysis of the peak flow at the time of the 4th April 2017 event indicates that the peak was 4 times the daily flow of the preceding day. Applying this peak factor, a similar wet weather event at 2,800 population could result in a daily flow of 3,360 m^3/d, approximately double the previous high.

Although no certainty can be provided on the frequency and duration of storm event that will cause the exceedance of Thelma Road PS storage capacity, it is certain that the likelihood will increase as population grows, and the consequence is unacceptable to KDC should a spill to harbour occur. Historic rainfall suggests within 5 years, a significant event or multiple rainfall event will occur that could, unless mitigated result in a spill of untreated sewage to the Mangawhai Harbour.

5 Balance Tank Solution

To reduce the risk of spills KDC has developed a solution to provide additional flow balancing at the WWTP. This enables a further upgrade at the Thelma Rd PS to increase the flow passed forward to lessen accumulation and so lower the risk of spill. This project consists of;

- Upgrade Thelma Rd PS to 100 l/s.
- New inlet screen to take upto 120 l/s incoming flow
- New flow control to limit flow to treatment to 70 l/s.
- New 900 m^3 Balance Tank for storage of peak flow.
- New odour control, tank cleaning and emptying systems.

Benefits of Balance Tank Solution.

Although initially intended to be a means of reduction in network spill risk there are other strategic benefits from the use of the balance tank. These include;

- Reduction in spill risk at Thelma Rd PS.
- Until long term disposal routes are upgraded, or additional routes are provided, the maximum flow through the treatment works will be restricted to the capacity of the rising main to Browns Road at 70 l/s. The balance tank provides peak flow buffering until this is resolved. This disposal upgrade is expected to be in place between 2025 -2028.
- Growth rates in Mangawhai are increasing and with expected rapid development in Mangawhai Central, growth may occur faster than treatment upgrades can progress. Due to the seasonal variation in population, Mangawhai WWTP only sees a peak population for a few weeks each year around Christmas. This means that for peak holiday period, should the growth have occurred faster than the capacity, the balance tank can be used to peak lop load arriving at the works and returned to treatment in the night when more capacity is available. For the rest of the year, the plant has adequate capacity for an increase in population. This approach will require careful operational management and may risk odour generation for short periods. Mitigations are possible to lessen this impact should odour be generated such as floating tank covers, mist sprays and odour suppressants.
- The assets installed at this time will be repurposed as part of the plant upgrades programme.
- Essential Maintenance. The existing treatment plant is 12 years old and several critical items of equipment are expected to be refurbished or replaced, including decanter arm seals, drives and other in-tank elements. Currently the plant is lightly loaded for many months each year, but failure of an asset at peak period will result in non-compliant effluent quality. The provision of a balance tank enables emergency reactive and proactive maintenance to be completed without compromise.

The network modelling, to be completed 2021, will be used to predict future flows and advise on suitable and timely network upgrades required, including future peak flows. This does not affect the use of this balance tank which will be used only in the short term, and then used as part of the treatment system.

6 Conclusion

Historic rainfall data shows that significant rainfall events that cause elevated flows to the WWTP works will occur between 0 and 4 times each year. This is often associated with cyclones which produce intense rainfall for a few hours only. This means that the period of high flows to the Thelma Rd PS that may exceed the capacity of storage may only last for a few hours in any year. The example given above for 26 March 2017 shows the wet well and storage were full within less than 1.5 hours from the start of the rainfall event. Excess flow backs up in the network and may spill locally from chambers and connections. Properties near low points in the network may be at risk of flooding from sewage.

Significant growth is occurring in the catchment and this increases the peak flow possible at the Thelma Road PS. Estimates of growth to 2026 when further upgrades will be in place, predict up to 75% more connections than 2017 with an associated increase in peak flow.

The actual flow to the treatment works is dependent on previous weather and population at the time of the event so will have variable impact. The network modelling will provide a better understanding of the risks and complements the strategy of flow balancing.

Any spill of raw sewage to the sensitive environment of Mangawhai Harbour will be unacceptable to KDC and the Community. Impacts include ecological impacts, loss of recreation, prohibition of harvesting kai and damage to reputation for KDC.

It is considered that the Balance Tank project will have the following benefits;

- Reduction in likelihood of spill from Thelma Rd PS
- Peak Flow buffer capacity until long term disposal upgrade is available
- Peak population load buffering should growth occur before plant upgrade.
- The balance tank can be repurposed to provide a 900m^3 treatment reactor and is required to meet future population demand.
- Improved operational flexibility.
- Assets constructed will be utilised long term

7 Recommendation

From the available information supporting high levels at Thelma Road PS and flows exceeding the pump station capacity, significant growth will continue to increase the flow to the pump station and increase the risk of overspill of sewage from the pump station and local network.

As part of the Mangawhai WW system programme the Balance Tank will provide robustness against peak flows for the next 5-8 years. The tank asset can be repurposed as part of the treatment system giving continued benefit for investment.

8 Assumptions and Risks

To date no known spills have occurred from Thelma Rd PS or adjacent network and the high flow events occur infrequently with variable effect. The event of 26 March 2017 demonstrates that flows do exceed the capacity of Thelma Rd PS and do fill the wet well with the result of water levels above the incoming pipe, so surcharging the network. The information presented in this report is therefore an estimate of conditions and the consequences and will not consider all scenarios.

Historic data used in this analysis has been supplied by third parties. WSP can hold no responsibility for the quality and accuracy of this data and have used information in good faith.

Daily flows and rainfall data are recorded for the preceding 24 hours, so little information is available for historic data that shows the duration of the significant rainfall events. Some rainfall events and consequential elevated WWTP flows may occur over two days, so may be underreported.

In this report an estimated likelihood is made based on historic data. WSP cannot be held responsible for the weather in future.

With estimates of peak flow, no allowance is made for diurnal variation. In the event of a significant event occurring approx. 7 AM diurnal peaking may increase the instantaneous flow. In the event of a significant event occurring at night, the instantaneous flow may be less, and the spill event not occur. Diurnal peaks may result in an increase in flow to 2.5 x daily average flow in dry conditions which may exacerbate peak flows.

APPENDIX : Historic Rainfall

Rainfall Intensity Predictions from NIWA

Rainfall intensities (mm/hr) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	60.8	43.1	34.9	23.9	16.0	8.10	5.13	3.17	1.92	1.42	1.14	0.957
2	0.500	67.1	47.5	38.5	26.3	17.6	8.93	5.65	3.50	2.12	1.56	1.25	1.05
5	0.200	88.8	62.9	50.9	34.8	23.3	11.8	7.46	4.61	2.79	2.06	1.65	1.39
10	0.100	105	74.4	60.2	41.1	27.5	13.9	8.80	5.44	3.29	2.43	1.95	1.64
20	0.050	122	86.1	69.6	47.6	31.8	16.1	10.2	6.28	3.80	2.80	2.25	1.89
30	0.033	132	93.1	75.3	51.5	34.4	17.4	11.0	6.78	4.10	3.02	2.43	2.04
40	0.025	139	98.1	79.3	54.2	36.2	18.3	11.6	7.14	4.32	3.18	2.55	2.15
50	0.020	144	102	82.5	56.4	37.7	19.0	12.0	7.42	4.49	3.31	2.65	2.23
60	0.017	149	105	85.1	58.1	38.8	19.6	12.4	7.65	4.62	3.41	2.73	2.30
80	0.012	156	110	89.1	60.9	40.7	20.5	13.0	8.01	4.84	3.57	2.86	2.40
100	0.010	161	114	92.3	63.0	42.1	21.3	13.4	8.29	5.01	3.69	2.96	2.49
250	0.004	184	130	105	71.6	47.8	24.1	15.2	9.39	5.67	4.18	3.35	2.82

2017 Rainfall Data source Mangawhaiweather.co,nz

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.0	0.0	0.0	0.3	0.3	0.0	40.1	0.3	1.2	12.0	0.0	0.6
2	0.0	0.0	3.6	1.5	0.0	104.6	8.4	18.5	10.8	3.2	0.0	0.2
3	0.0	0.2	0.0	0.5	0.0	24.4	30.4	9.7	0.0	0.2	1.0	1.8
4	0.2	0.0	0.0	129.8	2.5	0.0	0.0	0.0	0.2	0.0	6.2	0.2
5	0.0	0.0	0.0	30.0	0.8	3.8	3.6	0.0	0.0	0.0	6.6	0.0
6	0.0	0.0	0.0	1.0	0.0	0.8	0.0	0.0	17.0	0.0	0.0	0.0
7	0.0	0.0	62.6	1.3	0.0	0.5	20.4	8.9	3.0	8.4	0.0	0.0
8	0.0	4.8	44.0	0.3	0.0	0.5	7.4	10.2	0.6	15.6	9.8	0.0
9	0.0	13.2	---	5.1	0.0	0.0	12.2	25.1	11.4	0.0	0.0	1.6
10	0.0	0.0	---	0.3	1.5	0.0	1.3	0.3	9.8	0.0	0.0	4.2
11	0.0	0.0	---	6.6	24.4	0.0	1.8	5.3	12.8	1.1	1.6	5.2
12	0.0	0.2	---	143.0	30.5	0.3	11.9	0.0	2.6	1.0	0.0	1.8
13	1.0	0.0	---	16.5	0.0	0.8	13.5	2.5	0.0	0.0	0.0	---
14	0.0	0.8	---	4.8	0.0	0.0	6.6	0.3	0.0	0.0	0.4	---
15	0.5	16.2	---	2.0	0.0	0.0	0.0	0.3	3.4	0.2	3.4	---
16	0.2	28.6	---	8.4	21.6	0.0	0.0	0.0	0.0	0.0	8.2	---
17	0.0	16.4	---	0.5	34.8	0.3	0.0	0.0	7.2	0.0	8.2	0.0
18	0.0	0.8	---	0.3	1.5	13.0	0.3	7.6	14.8	0.0	24.0	0.0
19	2.7	0.8	---	0.3	0.0	3.0	1.5	17.8	9.6	0.0	3.6	0.0
20	0.7	4.0	---	2.8	1.8	0.0	29.5	2.0	0.0	0.0	0.0	1.0
21	15.6	0.0	---	5.6	0.0	2.3	5.6	0.3	4.2	0.0	0.0	0.0
22	15.8	0.0	---	7.4	0.0	2.3	8.1	0.3	1.0	0.4	0.0	0.2
23	0.0	0.0	0.0	2.6	0.0	11.4	1.5	0.3	0.0	7.4	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	2.8	2.5	0.5	1.0	0.2	0.0	0.0
25	0.2	0.0	0.0	0.0	0.0	0.3	3.0	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	115.5	0.0	1.5	0.0	0.3	2.0	5.0	0.0	0.0	3.0
27	0.0	0.0	12.0	0.0	2.0	0.0	10.9	2.8	2.4	0.0	0.0	0.4
28	0.0	0.0	0.4	0.0	2.8	0.5	1.3	5.4	0.0	0.0	0.0	0.0
29	0.0		32.7	37.1	0.3	0.3	0.0	0.0	0.2	0.0	0.0	0.0
30	0.0		0.0	21.6	1.5	0.0	0.0	32.0	1.8	---	0.0	0.0
31	0.0		0.3		4.3		0.0	2.2		---		0.0
Rain Days	9	11	8	25	16	18	23	23	21	11	11	12
Month Total	36.9 mm	86.0 mm	271.1 mm	429.6 mm	132.1 mm	171.9 mm	222.1 mm	154.6 mm	120.0 mm	49.7 mm	73.0 mm	20.2 mm
YTD Total	36.9 mm	122.9 mm	394.0 mm	823.6 mm	955.7 mm	1127.6 mm	1349.7 mm	1504.3 mm	1624.3 mm	1674.0 mm	1747.0 mm	1767.2 mm

Color Key												
< 1.0	1.0 - 2.0	2.0 - 3.0	3.0 - 4.0	4.0 - 5.0	5.0 - 6.0	6.0 - 7.0	7.0 - 8.0	8.0 - 9.0	9.0 - 10.0	10.0 - 11.0	11.0 - 12.0	12.0>

Script Developed by www.TNETWeather.com. Modified by Murry Conarroe of Wildwood Weather