Memorandum

Date:	24/10/2019
From:	Jennifer Rankin – Project Manager
To:	Mayor, Councillors and Linwood/Central/Heathcote Community Board
Cc:	David Adamson – GM City Services Richard Osborne – Head of Transport Helen Beaumont – Head of 3Waters
Subject:	**Sumner 22-10-19 Flood Event**
Reference:	19/1245772

1. Purpose of this Memo

1.1 The purpose of this memo is to provide background and information on the flooding that occurred in Sumner Village on 22nd October 2019.

2. The Flood Event – 22nd October 2019

2.1 On Tuesday between 3-4pm City Care cleared the Burgess St, Marriner St, Hardwicke St and Stoke St beach outfalls to ensure they were operational for the forecast rain.

2.2 Forecasts leading up to Tuesday evening indicated up to 25mm of rain could fall on Banks Peninsula and possibly in the City. As such, the Cave Rock outfall was not considered for clearing to make it operational as per the Wet Weather Response Plan (detailed below in section 3).

2.3 City Care responded to a call from Council's Land Drainage Duty Officer to attend as flooding had been reported to Council's Call Centre in the Burgess St/Marriner St/Wakefield Ave area.

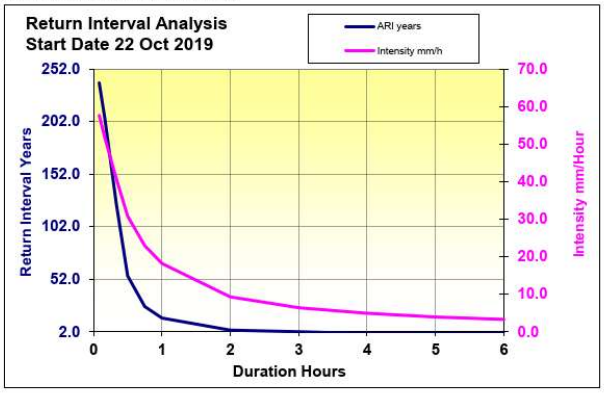
2.4 They were onsite at approx. 8:30pm and they checked the beach outfalls that had been cleared at 3-4pm and found them all clear and operational. Photos were taken but it was too dark to be able to clearly see the outfalls operating. City Care's comments provided to Council were that "they had never seen such a deluge in a short space of time."

2.5 While rain was forecast there was no indication that the intensity of the rainfall would be what was experienced. On Wednesday morning following the event staff were asked to assess the intensity of the rainfall event and they provided the analysis below:

Site 325711 Rainfall Van Asch St.Sumner

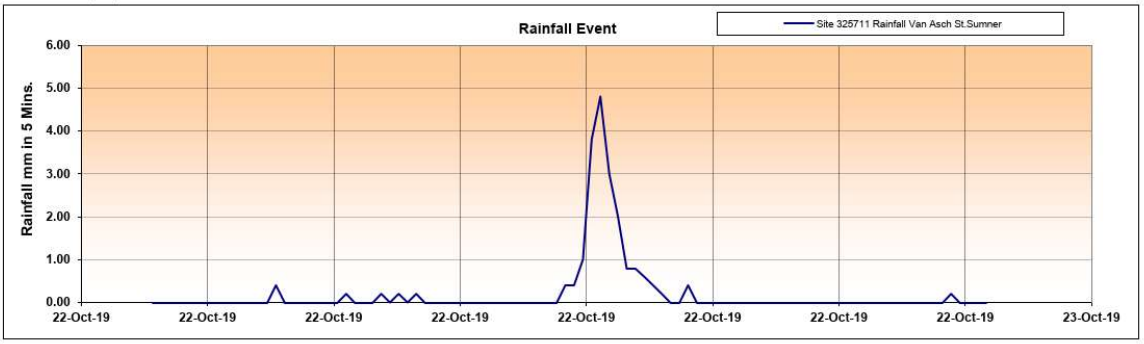
Period Start	Max depth mm	Duration Hours	Duration Mins	Intensity mm/h	ARI years
22/10/2019 19:20	4.80	0.08	5	57.60	238.7
22/10/2019 19:15	8.60	0.17	10	51.60	204.6
22/10/2019 19:15	13.60	0.33	20	40.80	124.0
22/10/2019 19:10	15.40	0.50	30	30.80	55.1
22/10/2019 19:05	17.20	0.75	45	22.93	26.0
22/10/2019 19:00	18.20	1.00	60	18.20	15.0
22/10/2019 18:15	18.60	2.00	120	9.30	3.6
22/10/2019 17:15	19.20	3.00	180	6.40	2.1
22/10/2019 16:15	19.80	4.00	240	4.95	< 2 yrs
22/10/2019 15:15	19.80	5.00	300	3.96	< 2 yrs
22/10/2019 15:05	19.80	6.00	360	3.30	< 2 yrs
	N/A	12.00	720		
	N/A	18.00	1080		
	N/A	24.00	1440		
	N/A	36.00	2160		
	N/A	48.00	2880		
	N/A	60.00	3600		
	N/A	72.00	4320		
	N/A	96.00	5760		

Analysis by G Harrington - NIWA HIRDS V4



Start Date = 22/10/2019 3:05:00 PM HIRDS V4 c d e f g h i Van Asch St

End Date = 22/10/2019 11:00:00 PM -0.0103 0.7154 -0.05373 0 0.329848 -0.01261 2.110161



2.6 This indicates that:

- the 1hr duration rainfall equated to a 1 in 15 year event
- the 30min duration rainfall equated to a 1 in 55 year event
- the 10min duration rainfall equated to a 1 in 204 year event

2.7 Council's storm water pipe network is not designed to cope with intense rainfall events such as this.

3. Post Event Observations

3.1 Following the event, the Sumner Village Centre Masterplan (P1.1) Construction Contracts Engineer and the Roading Network Supervisor (maintenance team) visited the site. They noted that all sumps, manholes and outlets were working well and draining away as per the roading design.

3.2 It was considered by them that the cause of the flooding to the businesses was as result of the extreme rainfall event where the outlet could not cope with a heavy outflow over such a short duration.

3.3 The low point in the road for Wakefield Avenue is between the zebra crossing and the Marriner Street/Wakefield intersection, this correlates to the Diary and Pizza shop receiving flooding.

3.4 It was observed in the day following the event that all the water had drained away and was not ponding in the project area. Therefore, it is considered that the stormwater system was operating as expected and was able to drain.

3.5 City Care returned to inspect the outfalls on Wednesday morning and found them to be clear and operational.

3.6 The pipe networks from the Burgess St/Marriner St/Wakefield Ave area is all connected to the Burgess St and the Cave Rock beach outfalls.

3.7 The Wet Weather & Tidal Flooding Emergency Response Plan (Response Plan) requires the Burgess St, Marriner St, and Hardwicke St beach outfalls to be checked and cleared of sand when any rain is forecast in a 24hr period. Clearing these outfalls is currently possible by hand (i.e. by shovel) but may require an excavator depending on the beach sand levels.

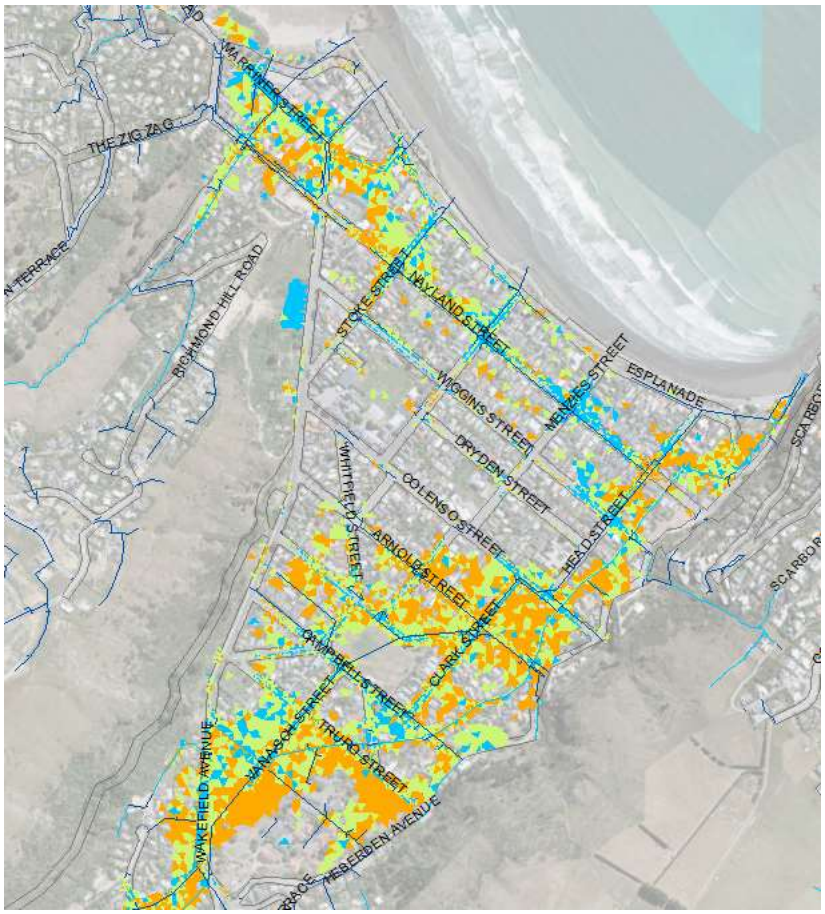
3.8 As per the Response Plan, the Cave Rock outfall, which does require an excavator to be cleared, is considered when there is >40mm of rain forecast in a 24 hr period. At this point an excavator is made available to deploy if required. When >60mm rain in a 24hr period is forecast, an excavator is deployed and the Cave Rock outfall must be cleared and operational. It is expected that under normal circumstances, there is sufficient capacity via the Burgess St network and beach outfall to cope with rainfall events up to 40mm in 24hrs. As this intensity of weather was not anticipated the Cave Rock Outfall was not cleared.

4. History

4.1 Parts of Sumner are susceptible to flooding, even in relatively frequent events. Much of the flood risk was present prior to the Canterbury Earthquake Sequence (CES), but during the CES there was uplift in upstream areas with some settlement closer to the coast. This resulted in an increased flood risk in some areas, with improved flood risk in other areas.

4.2 The City Wide Modelling project has completed the Sumner catchment model. A comparison of the pre- and post-earthquake results shows the variable change in flood risk across the catchment. The difference in flood depths between pre- and post-earthquake are shown below for the 2% annual exceedance probability (AEP) event (equivalent to a 50 year average return interval) with the present day climate and no sea level rise.

4.3 Blue colour indicates an increased flood depth post-earthquake and a reduction is shown in orange. Green indicates no change.



4.4 For the area affected by flooding on 22 October 2019, there has been a similarly variable change in flood risk, as shown in the image below for the same model scenario as above. There is an increase in flood depth along Marriner Street, but generally no change or a reduction away from that area.

4.5 In terms of modelled flood depth post-earthquake, for the 10% AEP event (with no climate change or sea level rise, and assuming that the network is not blocked) flooding up to 0.6m deep is predicted along Marriner Street. There are also other areas in Sumner which could have similar amounts of flooding.

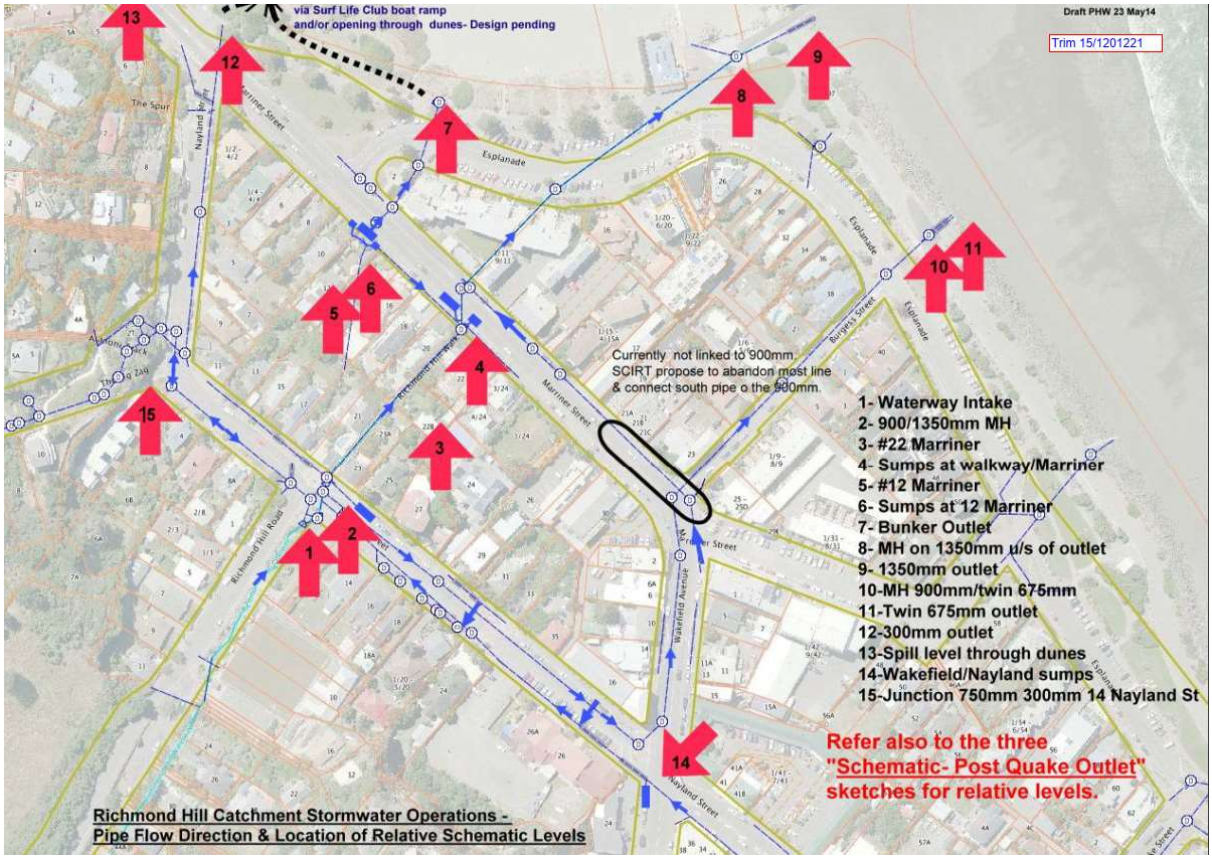
4.6 The Land Drainage Recovery Programme has a project (LDRP 505) for reducing flood risk in the Sumner and Richmond Hill catchments. This is currently programmed in the Long Term Plan for works in FY22 and FY23.

5. The Sumner Village Centre Masterplan Design

5.1 The design of the masterplan considered appropriate stormwater and roading design for the area. The stormwater system was designed to meet the 1 in 5 year stormwater event criteria as is normal for all roading projects.

5.2 The design took into consideration the current stormwater situation and its existing problems and it was designed so that there was no negative impact on the system.

5.3 The stormwater system outside the shops is connected to the existing 225 diameter pipe which feeds into the Cave Rock outfall. This is shown as arrows 8 and 9 on the plan below.



5.4 The roading design ensured that the new kerb levels were the same or lower than the existing kerb levels (existing = pre-construction) and the new carriageway was lower than existing.

5.5 Only at the 'build out' close to the new pedestrian crossing are kerb levels higher than existing, inter-path channel was provided here to mitigate the level difference, with new under-path piping to accommodate house drains at the build out area.

6. Conclusion

6.1 Sumner has an existing flooding problem. There are a number of factors which contributed to the severity of the flooding which impacted the shops in the Sumner Village Centre. This was an extreme and localised event, the stormwater system is not designed to cope with the intensity of the event.

6.2 The roading design for the Sumner Village Centre Masterplan (P1.1) project was completed to ensure there was no negative impact on the stormwater system.

6.3 A long term approach to reaching a solution is being managed by the Land Drainage Team, they have previously considered whether there are other operational options available to minimise the risk of flooding in the area.

6.4 At present, due to the high sand profile of the beach there are no other options that are either cost effective or practical than the current practice of constantly clearing the beach outfalls of sand.

6.5 Any other options will require a whole of catchment investigation and possibly capital investment to reduce the flood risk in Sumner. The Land Drainage Recovery Programme has a project (LDRP 505) for reducing flood risk in the Sumner and Richmond Hill catchments. This is currently programmed in the Long Term Plan for works in FY22 and FY23.

Attachments / Ngā Tāpirihanga

There are no attachments to this report.

Signatories / Ngā Kaiwaitohu

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