

**10. STORM 11-13 OCTOBER 2000
FOLLOW-UP REPORT FOR FERRYMEAD WARD**

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The purpose of this report is to inform the Community Board of, and seek support for, flood damage reduction measures within the Ferrymead Ward following the extreme storm experienced on 11 to 13 October 2000. Many of the proposed measures identified in the storm report to the November 2000 meeting of the Board have been implemented and major capital works have been programmed for the 2001/02 financial year.

THE OCTOBER 2000 STORM

The October 2000 storm was an extreme event in terms of wind and rain depth and intensity falling in the south-east sector of the city. The wind generated a lot of debris which was available to block waterways at pipe inlets and gratings resulting in overflows.

The storm was an extreme event for hill waterways from Bowenvale Valley to Sumner. Elsewhere throughout the city rivers, waterways and the piped drainage system functioned generally satisfactorily.

The highest ever peak discharge of 6 cubic metres/second was recorded at the flume at Bowenvale Valley. Many hill waterways overtopped their banks which caused flooding, debris and sediment deposition on private property. The specific cause of overtopping was generally debris blockages at culvert and pipeline inlets, especially those with inlet gratings. Blockages with serious consequences occurred in Barnett Park, Redcliffs; Richmond Hill Road waterway at Nayland Street, Sumner; and Upper Sumnervale Drive, Sumner. Reports of water entering eight houses in Redcliffs and up to 12 houses and commercial premises in Sumner village resulted from these overflows.

The Contractors normal wet weather resources became overwhelmed by the quantity of debris building up on critical inlet grates. By the time it was realised that the problem areas were concentrated in Redcliffs and Sumner and additional men and machinery were diverted from elsewhere by City Care, some significant overflows had already occurred.

The rainfall recorded at the Bowenvale Avenue flume during the most intense 12-15 hours during the storm is assessed as a 2.5% AEP occurrence (ie 40 year rainfall event). The peak discharge measured was also assessed to have a similar probability of occurrence.

A total rainfall depth of over 150mm fell over much of Sumner and Redcliffs compared to the highest recorded depth of 190mm in the Bowenvale Valley just below the Summit Road.

Peak flood discharge along the Waimea / Eastern Terrace reach of the Heathcote River reached approximately 10% AEP (ie 10 year flood) magnitude. Unlike during the August 1992 snow storm peak river flood level did not coincide with an extreme high tide, therefore, flood damage sustained along the lower reaches of the River were minimal.

FLOOD DAMAGE REDUCTION MEASURES

During the October storm the waterways and drainage system suffered little damage necessitating renewals or replacements. However, many drainage improvements described below need to be made in the light of problems experienced during the October 2000 storm. Fortuitously the catchments where most of the flood damage occurred – Barnett Park/Rifle Range Drain, Redcliffs and Richmond Hill Road waterway, Sumner were already subject to drainage improvement planning and design. Both schemes have been reviewed in the light of information gathered during the October storm.

Additional capital works identified in this report can be funded by substitution during the 2001/02 financial year in place of other projects of lower priority.

(a) Richmond Hill Road Waterway and Pipeline Inlet

A new, much larger inlet grating will be installed for the Richmond Hill catchment pipeline which extends from Nayland Street to Cave Rock. The inlet replacement is part of the joint lower Richmond Hill Road improvements and waterway restoration project managed by City Streets and Parks and Waterways Units. Negotiations are underway with the Sumner Bowling Club to secure additional space at Richmond Hill Road / Nayland Street corner for the inlet structure and debris capture upstream in a naturalised open waterway.

Important ancillary drainage improvement works will include roadside sumps and pipeline connections from Wakefield Avenue west along Nayland Street to the Richmond Hill pipeline and roadside gratings and sumps of generous capacity in Nayland Street and Marriner Street to direct storm overflows back into the pipeline.

Total estimated cost is \$235,000 (not including waterway restoration upstream from the inlet).

(b) Richmond Hill Catchment Pipeline and Outlet

Debris blockage of the Richmond Hill catchment pipeline at the inlet was the major cause of flood overflows and flood damage during the October 2000 storm. The pipeline outlet at Cave Rock functioned satisfactorily despite sand build-up in front of the outlet flapgate. Nevertheless, outlet blockage resulting in storm overflows upstream is a possibility that cannot be ruled out.

An operation and maintenance programme of more frequent routine outlet inspections and regular operation of the jetting system at an additional annual cost of approximately \$5,000 has been introduced.

Improvements to the outlet mechanism comprising installation of a high pressure main and an overflow slot along the top of the pipeline near the outlet have been allowed for at an indicative capital cost of \$35,000. Works will be co-ordinated with the proposed landscaping between the Esplanade and Cave Rock programmed for this calendar year.

The design capacity of the pipeline is 5% AEP (ie 20 year return period) for full catchment development in accordance with present City Plan zoning rules. The issues of additional capacity and/or safe secondary flow paths for storm overflows are discussed under (f) below.

(c) Rifle Range Drain at Barnett Park

Operation and maintenance improvement works to the Rifle Range Drain diversion swale in Barnett Park behind the Scout Den are underway. The works comprising drive on access from the car park, safety fence modification and extension and raising of the inlet quoting are estimated to cost \$4,000.

Capital works comprising extra bunding between the inlet and the rear of Wakatu Avenue properties and formation of a shallow ponding area between the scout den and Main Road to detain storm overflows are programmed. Installation of a debris trap in Rifle Range Drain near the end of Bayview Road is also included for a total estimated cost of \$50,000.

(d) Audit of Inlet Gratings and Other Structures

All critical inlet structures, gratings and debris traps on hill waterways have been inspected and a schedule of improvement works prepared.

Within the Ferrymead ward minor operation and maintenance works underway and capital works programmed (but not already described under a, b, and c above) are:

- Butts Valley Drain: Scrub removal from waterway above debris cage.
- Bridle Path Stream, Port Hills Road: Modify inlet grating and install roadside sump.
- Mt Pleasant Stream, Aratoro Place: replace inlet grating.
- Sumnervale Stream, Wakefield Avenue: Install safety handrail and overhead light at inlet grating.
- Sumnervale Reserve: Install debris trap on perimeter cut-off drain and form overflow swale across the Reserve.
- Heberden Avenue / Arnold Street intersection: Sumps added to critical grating maintenance list and channel bend armoured opposite 50 Heberden Avenue.

Total estimated operation and maintenance costs are \$4,900 and capital costs \$15,000.

(e) Storm Emergency Procedures

City Care, our drainage contractor, has reviewed wet weather and storm response procedures for critical inlet structures, debris traps and grates on hill waterways. A draft storm response plan that clarifies lines of communication and other procedures has been prepared and discussed with asset managers in the Parks and Waterways Unit.

Adherence to the plan will ensure that during future major storms more staff and machinery will be directed earlier to initial inlet gratings to remove accumulated debris and thus reduce the incidence of blockage and storm overflows.

Local wardens have been appointed by the Parks and Waterways Unit to observe the inlet gratings in Barnett Park and at Richmond Hill Road / Nayland Street corner respectively to provide early warning of potential blockage during storms. A spare key for the Sumner Main Drain outlet tidegate is now available at the Sumner Fire Station for use in emergencies.

All personnel involved in the operation of the Woolston Tidal Barrage have been re-acquainted with the operating procedures for opening and closing the gates.

(f) A Floodplain Management Plan for Sumner

Although the suite of measures described above under a, b, d and e collectively deal with the specific problems which arose in Sumner during the October 2000 storm significant flood damage to private property will recur during extreme storms characterised by high intensity rainfall.

In Sumner urban development has occurred over existing stormwater outfall pipelines. Secondary flow paths to convey overflows safely to the sea generally do not exist. Well designed inlet structures can be engineered; well-organised storm emergency procedures can be put in place; but without safe secondary flow paths it is inevitable that significant flood damage will recur from time to time.

The Parks and Waterways Unit has embarked on a floodplain management study for Sumner due for completion next year. The study is likely to recommend a suite of planning and engineering measures to reduce future flood damage. Identification and provision of secondary flow paths will be an important part of this study.

One important specific issue is the prospect of an extension to the existing living zone on Richmond Hill. Recent computer modelling indicates that the Richmond Hill pipeline from Nayland Street to Cave Rock does not have spare design capacity.

Living zones should not be extended on Richmond Hill unless additional runoff can be conveyed safely to the sea. Any development should contribute towards the cost of conveying secondary flow safely downstream to the sea and meet the full cost of any additional primary drainage capacity required.

SUMMARY AND CONCLUSIONS

The October 2000 storm was an extreme event in the south-east sector of the city which includes the Ferrymead ward. Critical stormwater pipe inlet structures were blocked by debris causing overflows which resulted in water above floor level in some 20 dwellings and commercial premises in Redcliffs and Sumner.

The suite of remedial measures identified in this report address the problems which occurred during the October storm. The estimated cost of the operation and maintenance measures in Ferrymead ward is \$13,900 and capital works are estimated at \$335,000. Provision has been made in the 2001/02 Parks and Waterways draft budget to fund these works.

A floodplain management plan study for Sumner is underway which will identify long-term flood damage reduction measures.

Living zones should not be extended on Richmond Hill until issues associated with any additional storm runoff and safe secondary flow paths downstream have been resolved.

Recommendation: That the Community Board recommend to the City Services Committee:

1. Support the suite of measures described in this report to be implemented within the Ferrymead ward in response to the October 2000 storm.
2. Recommend that living zones not be extended on Richmond Hill until issues associated with any additional storm runoff and safe secondary flow paths downstream have been resolved.

Chairman's

Recommendation: For discussion