Fraser Coast
REGIONAL COUNCIL

THE MARYBOROUGH CBD ACTION PLAN (FLOOD EVENT – TEMPORARY FLOOD BARRIERS)

March, 2019

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1.0 Preface

1.1 Flood History

The city of Maryborough is situated on the western bank of the Mary River and has a catchment area totalling 9,025 square kilometres along with 89 identified sub-catchments *(Source: BOM).*

The Maryborough CBD has been affected by floods on numerous occasions during the last 140 years and has suffered major flood related loss and damage more than 16 times since 1890. Since 2011, Maryborough has incurred approximately $42.77 million in estimated flood damage. Currently, Adelaide Street in Maryborough's CBD is inundated when the flood level reaches approximately 7 metres (5.6 AHD).

1.2 Purpose of Action Plan

This Action Plan will be used by the staff of the Fraser Coast Regional Council in the event of flooding of the Maryborough CBD. The plan has been prepared to provide a reference guide for managers to use in a flood event.

1.3 Links to Disaster Management Plan

This forms an attachment to the Fraser Coast Regional Council's Local Disaster Management Plan where reference is made to Maryborough CBD Flooding.

1.4 Limits of Action Plan

These procedures have been compiled to provide flood immunity to parts of the Maryborough CBD to a flood gauge height of 11.40m (10.0m AHD).

1.5 Height Datum

The height datum used in relation to Maryborough CBD Flooding is River Gauge datum. This is consistent with broadcasts by the Bureau of Meteorology (BOM) and the Police (QPS).

Any enquiries regarding the interpretation of flood levels between River Gauge heights and other level datum's (eg. Australian Height Datum (AHD), Fraser Coast Regional Council (FCRC) or State) should be referred to Council's Infrastructure Design Office.

2.0 Flood Gauges

2.1 Location of Flood Gauges

There are 94 manual flood gauges that have been installed throughout Maryborough. In addition there is an integrated system of electronic rainfall/river gauges, repeater stations and cameras that have been installed on the Mary River at strategic locations to remotely map and forecast potential flood events.

The official electronic reporting gauge used by the Bureau of Meteorology (BOM) is the "Portside Alert" which is located along the river behind the Bond Store at the end of Richmond St. The direct BOM link to the "Portside Alert" electronic gauge is located at: http://www.bom.gov.au/fwo/IDQ65390/IDQ65390.540708.plt.shtml the backup electronic gauge is located at the end of Churchill Street and reports on the BOM site at: http://www.bom.gov.au/fwo/IDQ65390/IDQ65390.540637.plt.shtml

3.0 Road Closures

Numerous road closures will occur throughout the CBD depending on the varying heights of the flood waters. A plan showing the indicative locations of these road closures is included in

Appendix 1. It is noted that not all closure locations will be in place at the same time in the event of a flood.

4.0 Maryborough CBD Flood Procedure Spreadsheet

Council's Flood Procedure Spreadsheet sets out the various actions to be undertaken in the event of flooding of the Maryborough CBD. This plan sits within the Procedure Spreadsheet as an individual action.

5.0 Temporary Flood Barriers

Removable Flood Barriers are required to be erected to provide a flood barrier along Adelaide St. The barrier will vary in height from 0.65m to 2.4 m high and shall be erected by Council work crews prior to the flood event reaching the CBD. A Diagram showing the flood levee profile is included as Appendix 2.

5.1 Anchoring

The temporary flood barriers do not require any permanent anchoring as the supports are designed to grip the pavement as flood waters load the barrier.

5.2 Prior to Erecting the Flood Barriers

Prior to erecting the flood barriers, a dilapidation survey should be undertaken that provides photographic evidence of the condition of the steps and grounds within the St Mary's Catholic Church, so that any remediation works can be completed to the original standard.

5.3 Operation of Portable Pump Station

A portable pump station will be established in the stormwater chamber located behind the area where the flood barrier system is to be installed. The portable pump station will operate to pump any leakage from the flood barrier system and any local rainfall from the catchment area behind the flood barrier system.

5.4 Erection of Flood Barriers

The flood barriers are to be erected strictly in accordance with the Operations and Maintenance Manual.

5.5 Notification and Exclusion Area – Flood Barriers

The following action is to be undertaken in the event of flooding in the Maryborough CBD with respect to notification and the inclusion of an exclusion area for the Maryborough CBD Flood Barrier System (Note all levels below are outlined in Flood Gauge Levels) Refer Appendix 3 for Flood Barrier Protection Area and Appendix 4 for listed Maryborough CBD Flood Procedure Action:-

- The flood barrier system will only be erected if the predicted flood level will exceed 9 metres (7.6AHD) – Refer prediction by BOM.
- Notification of erection and exclusion area of removable flood barrier system to landowners and tenants of impacted areas behind the Maryborough CBD flood barrier system – 7 metres (5.6AHD). Notification process to be in accordance with information dissemination methods outlined in Council's Local Disaster Management Plan and include but are not limited to:-
    - Radio/television;
    - Newspapers;
    - Newsletters;

- Notice boards;
- Community Radio;
- Door knocking;
- Emergency services public address vehicles;
- Emergency Alerts via SMS and Landline
- Facebook – http://www.facebook.com/FCRCdisaster
- Twitter - http://twitter.com/#!/FraserCoastRC
- Disaster Dashboard
- Telephone hotlines; and/or
- Internet and websites.

- Access by personal and landowners/tenants to behind the flood barrier system will be excluded at level 10.9 metres (9.5AHD)
- General members of the public will be excluded from the area immediately behind the flood barrier system as this area is considered by Council to be a "construction site" with Council staff monitoring and maintaining the use of the pump station.
- The flood barrier system provides immunity to a flood water level of 11.40 metres (10.0m AHD)

Based on the steepest part of the 1955 flood profile which rose at 300mm/hr, this will provide approximately 13 hours for landowners and tenants to remove any items from businesses from the notification period to the exclusion period.

5.6 Post Flooding Event

Post flood event, Council crews are to dismantle the barriers and inspect the various components for any damage that may have been caused by flood waters. Cleaning of the flood barriers should then be carried out in accordance with the Operations and Maintenance Manual requirements. Once cleaned the barriers shall be placed into their designated steel crates and then transferred back to the shipping containers which will be housed at Council's Moreton Street Depot for use in the next flood event.

An inspection of the road pavement, including the grounds of the Town Hall and St Mary's Catholic Church shall be undertaken and any damage caused by the flood barriers shall be rectified to the satisfaction of Council.

6.0 Flood Risk Assessment

6.1 Failure Scenarios

The change in flooding and consequent impact on property and people, caused by the failure of the flood barrier system, has been assessed under a number of flood barrier and pump failure scenarios.

6.2 Affected Population

For the purposes of the affected population assessment, the proposed flood barrier system will be referred to as a levee in accordance with the State Department guidelines. The affected population assessment has been conducted in accordance with the Guidelines for the construction or modification of category 2 and 3 levees (DNRM, 2014). As defined in the guideline, affected population, for a levee means the total number of persons occupying the building or building on which the levee has a significant impact.

A significant impact from a levee on a building means each of the following:

- An increase, caused by the levee, of more than 5 cm in the flow height of water over the floorboards of the building
- An increase, caused by the levee, of more than 0.2 m/s in the flow velocity of water over the height of the floorboards of the building

The aforementioned affected population triggers represent change in water level and velocity limits from pre levee to post levee conditions. The change from existing to design (pre levee to post levee) condition is termed afflux. For the purposes of this action plan, the pre levee condition is defined as the regional flood event to a flood gauge height of 11.4m (10m AHD). The water level and velocity afflux for the pre levee and post levee conditions is outlined in Section 6.3.

6.3 Afflux Assessment

The affected population under construction of the levee has been undertaken for afflux caused by the installation of the levee. The afflux comparison conducted is an assessment of the existing scenario (no levee) and proposed levee scenario (no pump). In both instances the tailwater level is assumed to be to a flood gauge high of 11.4m (10m AHD) to simulate a coincidental flooding condition.

There were no adverse impacts on water level due to the flood barrier, however a significant increase in flood velocity has been determined for multiple properties on the northern and southern sides of the levee. In reference to Figure A, properties that experience a velocity afflux greater than 0.2 m/s have been mapped.

It should be noted that the afflux caused by the failure scenarios is isolated to properties in close proximity to the levee. The afflux can largely be attributed to the initial wave of flow, caused by rapid failure to properties in close proximity. In addition, it should be noted that there is no provision of floor level for this assessment and or for the physical modelling of building walls, which may impact the velocity afflux results.

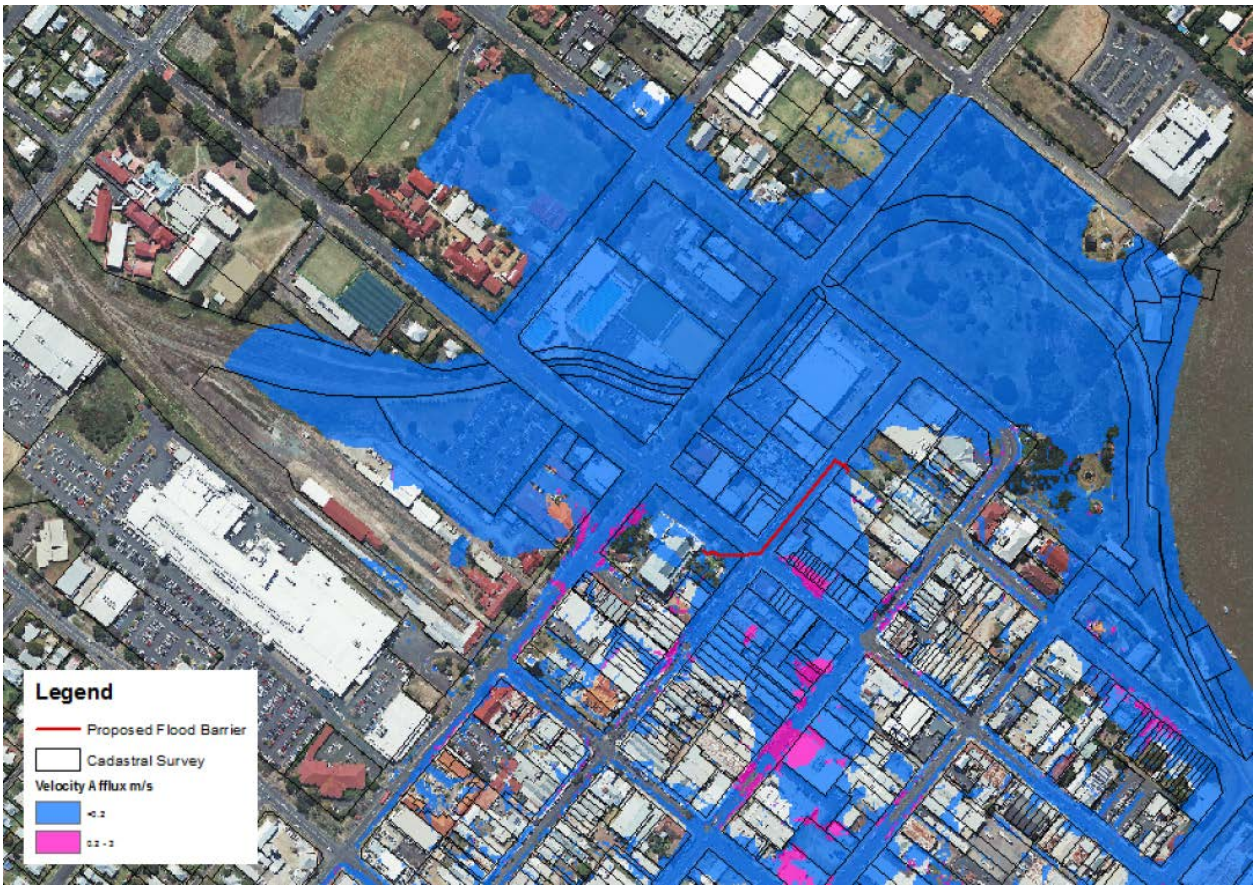


Figure A. Afflux velocity (m/s) for 100 Year ARI Design Event – Design Case

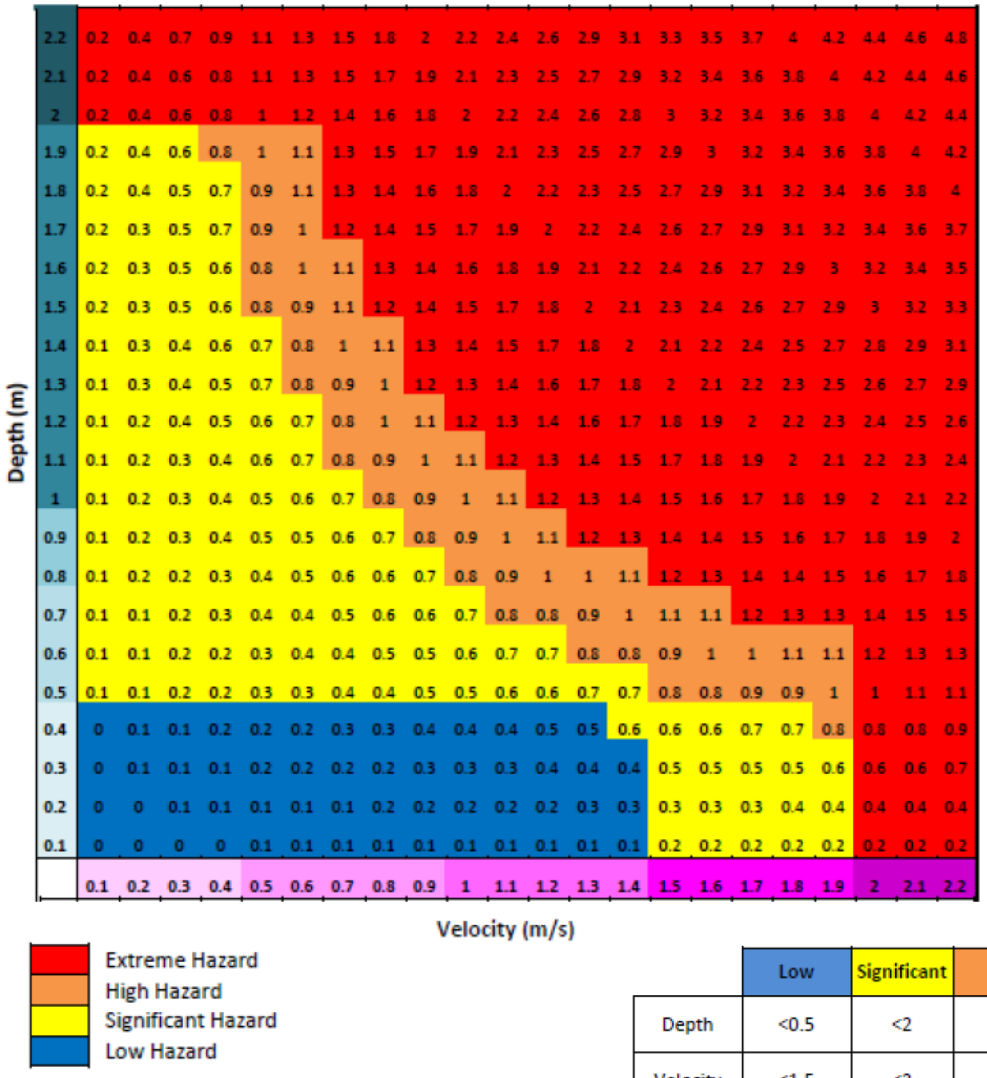
6.4 Levee Category Assessment

In accordance with the 'Guidelines for the construction or modification of category 2 and 3 levees' and the assessment in Section 6.3 it is estimated that more than 3 people will be affected, as such the temporary flood barrier system is deemed a Category 3 structure.

6.5 Flood Hazard Assessment

An assessment of hazard for the aforementioned scenarios has been conducted in accordance with the hazard categories provided by the Queensland Reconstruction Authority (QRA). Figure B illustrates the QRA flood hazard categories and the QRA provide the following definitions for each hazard category:

- **Low Hazard**: Self evacuation possible for adults and children, vehicle stability within tolerance for large 4WD;
- **Significant Hazard**: Working limit for trained safety workers, vehicle evacuation unsuitable, Building Code limitation;
- **High Hazard**: Limit of uncompromised stability for adults (dangerous to most); and
- **Extreme Hazard**: In excess of known stability limits.



	Low	Significant	High	Extreme
Depth	<0.5	<2	<2	2+
Velocity	<1.5	<2	<2	2+
DxV Product	<0.6	0.6 to <0.8	0.8 to <1.2	1.2 +

Figure B. QRA Flood Hazard Assessment Matrix

6.6 Flood Hazard Impact

The following hazard impact assessment has been conducted for the critical 'sunny-day' levee failure scenario (complete failure). The impact assessment indicates an increase in the number of properties under the extreme hazard level, largely due to the high velocity of flow from the flood barrier failure scenarios. Despite this result the levee still provides a reduction to the number of hazard affected properties.

Table 1 outlines the number of properties affected under each scenario for each QRA hazard category.

The impact assessment indicates an increase in the number of properties under the extreme hazard level, largely due to the high velocity of flow from the flood barrier failure scenarios. Despite this result the levee still provides a reduction to the number of hazard affected properties.

Table 1. Failure Hazard Impact Assessment

Failure Scenario	Hazard Level	Levee Failure Scenario - No. Properties Affected	Levee Failure Scenario - Total No. Properties Affected	Pre Levee - No. Properties Affected	Pre Levee - Total No. Properties Affected
Levee Failure	Extreme	144	255		274
	High	4		1	
	Significant	56		76	
	Low	52		76	

Appendices

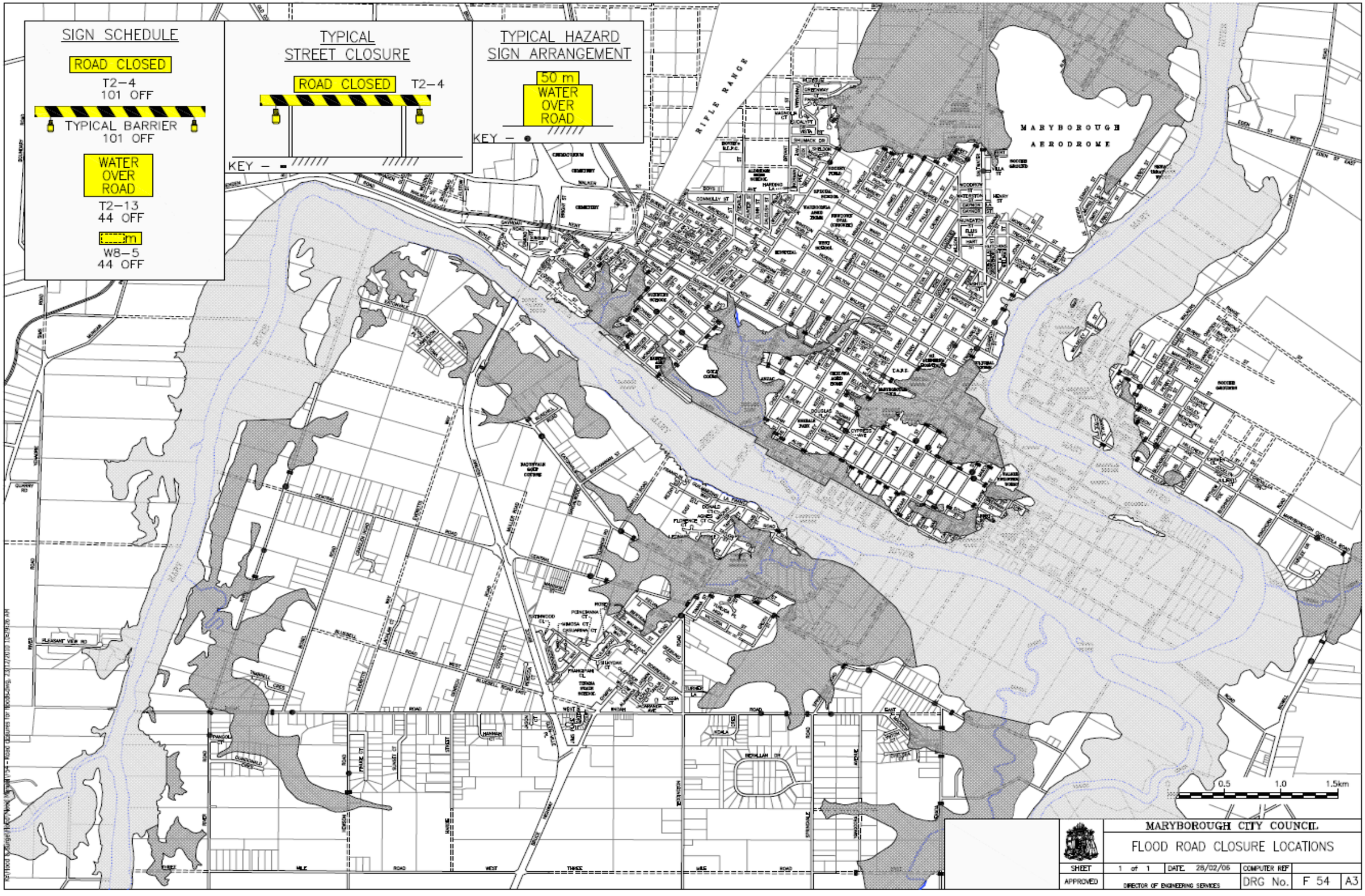
Appendix 1 - Flood Road Closure Map

Appendix 2 – Flood Levee Profile

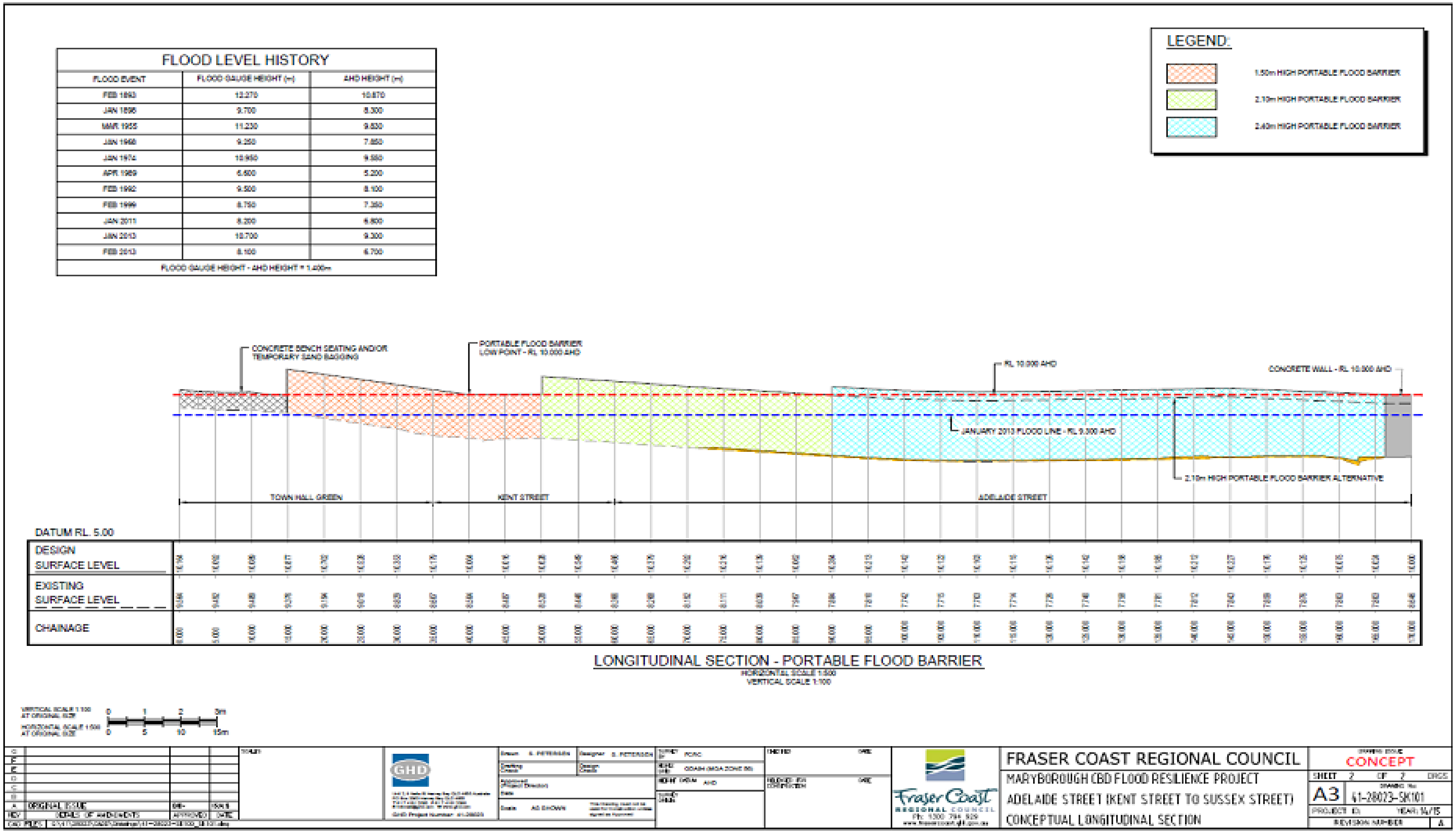
Appendix 3 – Levee Protection Area

Appendix 4 – Maryborough CBD Flood Procedure Action

Appendix 1 - Flood Road Closure Map



Appendix 2 – Flood Levee Profile

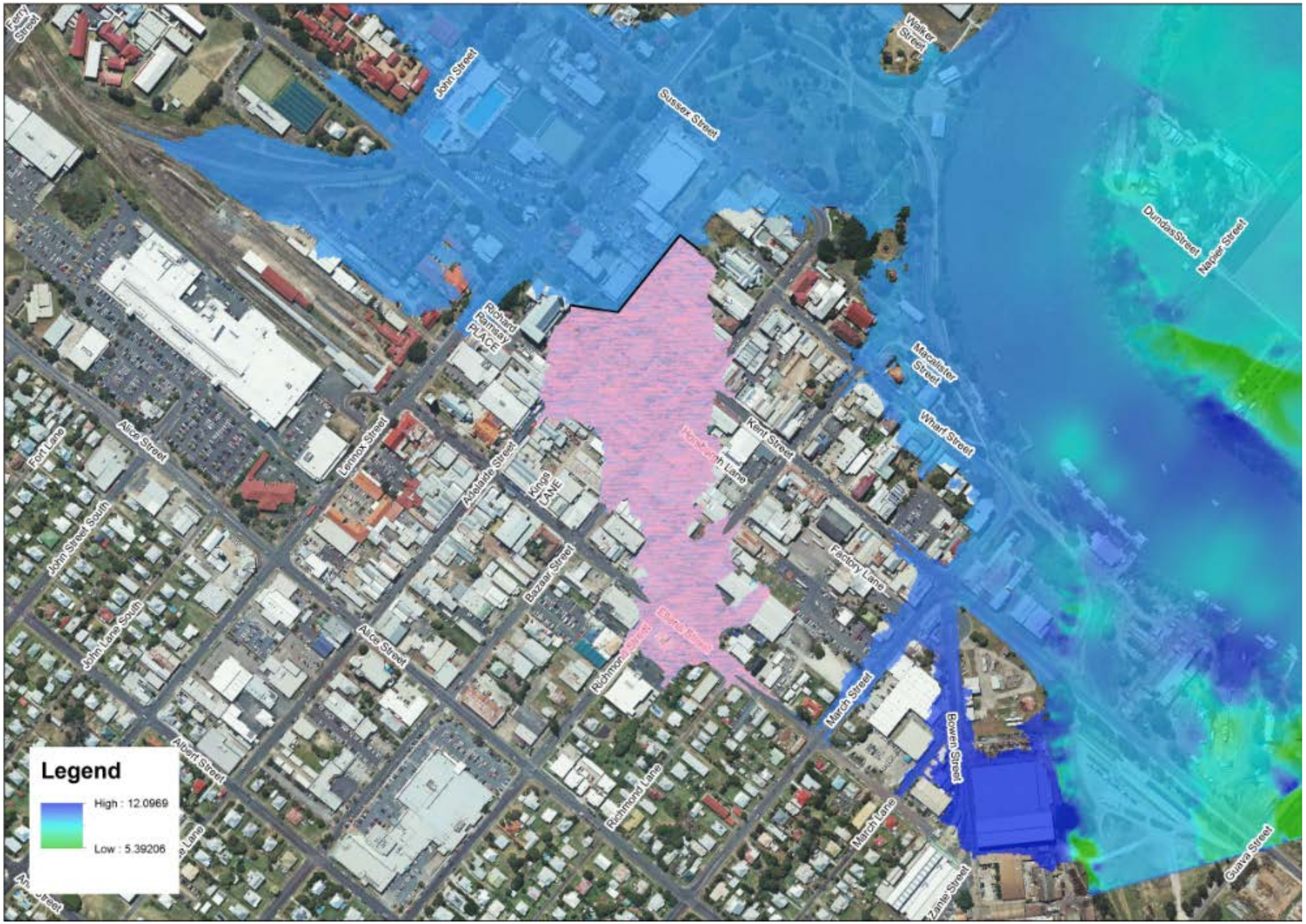


FLOOD LEVEL HISTORY

FLOOD EVENT	FLOOD GAUGE HEIGHT (m)	AHD HEIGHT (m)
FEB 1893	12.270	10.870
JAN 1898	9.700	8.300
MAR 1955	11.230	9.830
JAN 1968	9.250	7.850
JAN 1974	10.950	9.550
APR 1989	6.600	5.200
FEB 1992	9.500	8.100
FEB 1999	8.750	7.350
JAN 2011	8.200	6.800
JAN 2013	10.700	9.300
FEB 2013	8.100	6.700

FLOOD GAUGE HEIGHT - AHD HEIGHT = 1.400m

Appendix 3 – Levee Protection Area (highlighted in pink)



Appendix 4 – Maryborough CBD Flood Barrier Procedure Action

Steps	Item	Level of Inundation	Level when access is lost	Predicted flood > than	Commence action at	Action	Responsibility	Primary contact person/s	Ph No.	Mobile	Back up person	Ph No.	Mobile	Desktop Audit 2013	Commentary
1	Notification of erection of flood barriers and the inclusion of an exclusion area	9	10.9	9	7	Notify all businesses in Flood Barrier Protection Area that flood barriers have been erected and that exclusion from behind the flood barrier system will occur at level 10.9m in accordance with information dissemination methods outlined in Council's Local Disaster Management Plan which include but are not limited to:- ▪ Radio/television; ▪ Newspapers; ▪ Newsletters; ▪ Notice boards; ▪ Community Radio; ▪ Door knocking; ▪ Emergency services public address vehicles; ▪ Emergency Alerts via SMS and Landline ▪ Facebook – http://www.facebook.com/FCRCdisaster ▪ Twitter - http://twitter.com/#!/FraserCoastRC ▪ Disaster Dashboard ▪ Telephone hotlines; and/or ▪ Internet and websites.	FCRC/LDMG								
2	Exclusion Area immediately behind Flood Barrier System	9	10.9	9	7	Ensure that no members of the general public are permitted access to the area directly behind the flood barrier system as this area is considered to be a "construction site" with Council staff monitoring and maintaining the use of the pump station.	FCRC/LDMG								
3	Exclusion Area – Flood Barriers	10.9	11.4	9	7	Ensure that all personal and landowners/tenants have been removed from the area behind the flood barrier system once level reaches 10.9m	FCRC/LDMG								
		All flood levels in Flood Gauge (FG)	FG = 1.39 + AHD												