Bulimba Creek Flood Study

Volume 1 of 2

Flood Study Report

Prepared by Brisbane City Council's, City Projects Office

September 2021

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Executive Summary

Introduction

Brisbane City Council (BCC) periodically updates its flood studies to reflect the current conditions of the catchment and best practice flood modelling techniques. The most recent flood study of the Bulimba Creek Catchment was completed by CPO Flood Management in 2014.

Bulimba Creek Catchment is the predominant catchment in the south-east of the BCC region and extends from Stretton in the south to Murarrie in the north, where it flows into the Brisbane River. The catchment has a total area of 123.7 km^2 and is the second largest of the BCC creek catchments. The catchment has numerous tributaries, with the larger ones being Bulimba Creek, Bulimba Creek East, Tingalpa Channel, Hemmant Drain, Mimosa Creek and Salvin Creek.

Project Objectives

The primary objectives of the project are as follows:

- Update the Bulimba Creek flood models (hydrologic and hydraulic) with the latest topographical data and incorporate the most recent major development / infrastructure works as well as the current planning scheme (City Plan 2014).
- Adequately calibrate and verify the flood models to recent historical storm events to confirm that the models are suitable for the purposes of simulating design flood events.
- Estimate design and very rare / extreme flood hydrology in accordance with AR&R 2019, incorporating increased rainfall intensities due to projected climate variability effects.
- Determine flood levels for the design and very rare / extreme events, accounting for the effects of Minimum Riparian Corridor (MRC); floodplain development / filling in accordance with current planning policy and sea-level rise due to projected climate variability effects.
- Produce flood extent mapping for the selected range of design and very rare / extreme events.

Project Elements

The flood study consists of two main components, as follows:

Model Set-up and Calibration

Hydrologic and hydraulic models of the Bulimba Creek Catchment have been developed using the URBS and TUFLOW modelling software, respectively.

The hydrologic model simulates the catchment rainfall-runoff and runoff-routing processes. The hydrologic model also utilises high-level channel routing to simulate the flow of floodwater in the major waterways within the catchment. The URBS model incorporated 139 sub-catchments, with an average sub-catchment size was 0.89 km^2.

The hydraulic model uses more sophisticated channel routing to simulate the movement of floodwater in order to predict flood levels, flood discharges and velocities. The hydraulic model incorporates the effects of the channel / floodplain topography, downstream tailwater conditions and hydraulic structures. The hydraulic model consists largely of a 1d / 2d linked schematisation, with the 1d domain modelled in ESTRY and the 2d domain in TUFLOW. The model incorporated all the major tributaries within the catchment apart from Tingalpa Channel and Hemmant Drain, as they were recently modelled as separate studies in 2014 / 2015.

Calibration is the process of refining the model parameters to achieve a good agreement between the modelled results and the historical / observed data. Calibration is achieved when the model simulates the historical event to within specified tolerances. Verification is then undertaken on additional flooding event(s) to confirm the calibrated model is suitable for use in simulating synthetic design storm events.

Calibration of the URBS and TUFLOW models was undertaken utilising three historical storms; namely, 9th March 2001; 27th January 2013 and 1st May 2015. Verification of the URBS and TUFLOW models utilised the 30th March 2017 historical storm event. An acceptable correlation was achieved between the simulated and historical records for both calibration events. At the Maximum Height Gauges (MHGs), the simulated peak levels were generally within the specified tolerance of ± 0.3 m.

The verification was undertaken utilising the adopted parameters from the calibration process. Similar to the calibration, the verification achieved an acceptable correlation between the simulated and historical records. Given the results of the calibration and verification process were quite reasonable, the URBS and TUFLOW models were considered acceptable for use in the second part of the flood study, in which design flood levels were estimated.

Design and Extreme Event Modelling

The calibrated hydrologic and hydraulic models were used to simulate a range of synthetic design flood events. Design, very rare and extreme flood magnitudes were estimated for the full range of events from 2-yr ARI (50 % AEP) to PMF. These analyses assumed ultimate catchment hydrological conditions in accordance with BCC City Plan 2014. A fixed tidal boundary was used at the downstream model extent to represent the tidal conditions in the Brisbane River.

Three waterway scenarios were considered, as follows:

- Scenario 1 – Existing Waterway Conditions: Based on the current waterway conditions. Some minor modifications were made to the TUFLOW model developed as part of the calibration / verification.
- Scenario 2 – Minimum Riparian Corridor (MRC): Includes an allowance for a riparian corridor along the edge of the channel.
- Scenario 3 – Ultimate Conditions: Includes an allowance for the minimum riparian corridor (as per Scenario 2) and assumes development infill to the boundary of the “Modelled Flood Corridor” in order to simulate potential development.

The “Modelled Flood Corridor” is the greater extent of Flood Planning Areas (FPAs) 1, 2 and 3 and the Waterway Corridor.

The results from the TUFLOW modelling were used to determine / produce the following:

- Design flood discharges (Section 6.4.1)
- Design flood levels at 100 m intervals along the AMTD line (Appendices F, G, I and J)
- Scenario 1 design flood extent mapping (Volume 2 of 2)

Table of Contents

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List of Figures

List of Tables

Glossary of Terms

Term	Definition
2014 ALS Data	This dataset is part of the SEQ 2014 LiDAR capture project and covers an area of approximately 1392 km^2 over Brisbane City. This project was undertaken by Fugro Spatial Solutions Pty Ltd on behalf of the Queensland Government.
2019 ALS Data	This dataset is part of the Brisbane-Ipswich LiDAR 2019 Project, acquired by Aerometrex Pty Ltd on behalf of the Queensland Government.
AHD	Australian Height Datum (AHD) is the reference level for defining reduced levels adopted by the National Mapping Council of Australia. The level of 0.0 mAHD is approximately mean sea level.
Annual Exceedance Probability (AEP)	The probability that a given rainfall total or flood flow will be exceeded in any one year.
AR&R Data Hub	The Australian Rainfall and Runoff Data Hub is a tool that allows for easy access to the design inputs required to undertake flood estimation in Australia. Background on the development and use of this data can be found in Australian Rainfall and Runoff (2019).
Average Recurrence Interval (ARI)	The long-term average number of years between the occurrence of a flood as big as (or larger than) the selected event. For example, floods with a discharge as great as (or greater than) the 20-year ARI design flood will occur on average once every 20 years.
Brisbane Bar	Location at the mouth of the Brisbane River
Catchment	The area of land draining through the main stream (as well as tributary streams) to a particular site. It always relates to an area above a specific location.
Digital Elevation Model (DEM)	A three-dimensional model of the ground surface elevation.
Design Event, Design Storm	A hypothetical flood / storm representing a specific likelihood of occurrence (for example the 100-year ARI).
ESTRY	ESTRY is the 1d hydrodynamic solver used by TUFLOW.
Floodplain	Area of land subject to inundation by floods up to and including the Probable Maximum Flood (PMF) event.
Flood Classification (BOM Definition)	Minor - Causes inconvenience. Low-lying areas next to water courses are inundated. Minor roads may be closed and low-level bridges submerged. In urban areas inundation may affect some backyards and buildings below the floor level as well as bicycle and pedestrian paths. In rural areas removal of stock and equipment may be required. Moderate - In addition to the above, the area of inundation is more substantial. Main traffic routes may be affected. Some buildings may be affected above the floor level. Evacuation of flood affected areas may be required. In rural areas removal of stock is required.

Glossary of Terms (cont)

Term	Definition
	Major - In addition to the above, extensive rural areas and/or urban areas are inundated. Many buildings may be affected above the floor level. Properties and towns are likely to be isolated and major rail and traffic routes closed. Evacuation of flood affected areas may be required. Utility services may be impacted.
Flood Frequency Analysis (FFA)	Flood Frequency Analysis (FFA) refers to procedures that use recorded and related flood data to identify underlying probability model of flood peaks, at a particular location in the catchment.
Flood Planning Area (FPA)	Flood Overlay Code development control mechanism that recognises the susceptibility of flooding in terms of frequency, flow velocity and flood depth. There are five FPAs (1 to 5), where FPA1 is subject to the most stringent development assessment requirements.
HEC-RAS	Hydraulic modelling software package developed by USACE
Hydrograph	A graph showing how the discharge or stage / flood level at any particular location varies with time during a flood.
Manning's 'n'	The Gauckler–Manning coefficient, used to represent hydraulic roughness in 1d / 2d flow equations.
MIKE11	Hydraulic modelling software package developed by DHI
Minimum Riparian Corridor (MRC)	An area where future revegetation of the creek riparian zone has been assumed for modelling purposes. Modelled as dense vegetation (nominal Manning's n=0.15) and typically extending for a maximum of 15 m on either side of the low-flow channel.
Modelled Flood Corridor	The "Modelled Flood Corridor" is the greater extent of the Waterway Corridor (WC) and Flood Planning Areas (FPAs) 1, 2, 3 and represents a zone of assumed no filling.
Probable Maximum Flood (PMF)	An extreme flood deemed to be the largest flood that could conceivably occur at a specific location.
Probable Maximum Precipitation (PMP)	The theoretical greatest depth of precipitation that is physically possible over a particular catchment
Probable Maximum Precipitation Design Flood (PMPDF)	The flood derived from the PMP under "AEP neutral" assumptions.
TIN	Series of non-overlapping triangles from which the 3d vertices (x,y,z) are used as an approximation of the 3d surface.
TUFLOW	Hydraulic modelling software package developed by BMT
URBS	Hydrologic modelling software package developed by D.G. Carroll
WBNM	Hydrologic modelling software package developed M.J. Boyd

Adopted ARI to AEP Conversion

The use of the terms "*recurrence interval*" and "*return period*" has been criticised as leading to confusion in the minds of some decision-makers and members of the public. The recently updated AR&R 2019 utilises different terminology whereby for the larger flood magnitudes the term AEP (%) is now preferred to ARI.

The relationship between ARI and AEP can be expressed by the following equation:

AEP = 1 – exp (-1 / ARI)

Substituting the "Actual ARI" into this equation results in the "Actual AEP" as indicated in the table below. However, it is quite common within the industry to see *AEP = 1 / ARI (nominal)* used for simplicity.

Actual ARI (years)	Nominal ARI (years)	Actual AEP (%)
1.44	2	50
4.48	5	20
10	10	10
20	20	5
50	50	2
100	100	1
200	200	0.5
500	500	0.2
2000	2000	0.05

For the purpose of this study, the "Actual AEP" has been used in conjunction with the "Nominal ARI." The flood probability will be firstly expressed by the "Nominal ARI" and then secondly in brackets by the equivalent "Actual AEP."

List of Abbreviations

Abbreviation	Definition
1d	One dimensional, in the context of hydraulic modelling
2d	Two dimensional, in the context of hydraulic modelling
AMTD	Adopted Middle Thread Distance
ALS	Airborne Laser Scanning
AR&R 1987	Australian Rainfall and Runoff (1987)
AR&R 2019	Australian Rainfall and Runoff (2019)
BCC	Brisbane City Council
CBD	Central Business District
CL	Continuing rainfall loss (mm/hr)
DEA AR&R 1987	Design Event Approach Australian Rainfall and Runoff (1987)
DEA AR&R 2019	Design Event Approach Australian Rainfall and Runoff (2019)
DTMR	Department of Transport and Main Roads (Queensland)
FPA	Flood Planning Area
ICC	Ipswich City Council
IFD	Intensity Frequency Duration
IL	Initial rainfall loss (mm)
IL_s	Initial loss for the rainfall event (mm)
IL_b	Initial loss for the rainfall burst (mm)
IWL	Initial Water Level (mAHD)
LCC	Logan City Council
mAHD	metres above AHD
MBRC	Moreton Bay Regional Council
MHG	Maximum Height Gauge
MRC	Minimum Riparian Corridor
MSQ	Maritime Safety Queensland
POT	Peak Over Threshold
RCBC	Reinforced Concrete Box Culvert
RCP	Reinforced Concrete Pipe
RCP4.5	Representative Concentration Pathway 4.5
RCP8.5	Representative Concentration Pathway 8.5

Abbreviation	Definition
QUDM	Queensland Urban Drainage Manual
SQID	Stormwater Quality Improvement Device
TIN	Triangular Irregular Network
WC	Waterway Corridor
WQA	Water Quantity Assessment

1.0 Introduction

1.1 Catchment Overview

Bulimba Creek Catchment is the predominant catchment in the south-east of the Brisbane City Council (BCC) region and extends from Stretton in the south to Murarrie in the north, where it flows into the Brisbane River.

Figure 1.1 indicates the locality of the catchment as well as the local government boundaries.

The catchment has a total area of 123.7 km^2 and is the second largest of the BCC creek catchments. Virtually all the catchment is located within BCC, apart from a very small portion (1.1 %) which is located within Logan City Council (LCC). The catchment incorporates numerous suburbs including Stretton, Runcorn, Sunnybank, Eight Mile Plains, Rochedale, MacGregor, Wishart, Upper Mt Gravatt, Mt Gravatt, Mansfield, MacKenzie, Carindale, Belmont, Carina Heights, Carina, Tingalpa, Hemmant, Wynnum West and Murarrie.

The catchment has numerous tributaries, with the larger ones being Bulimba Creek, Bulimba Creek East, Tingalpa Channel, Hemmant Drain, Mimosa Creek and Salvin Creek. The catchment is largely developed with the current estimated impervious area accounting for 36 % of the total catchment area. The most prevalent catchment land-use is low-density residential development, which occurs throughout the catchment. Although the catchment is largely developed, there are a significant number of dedicated areas for environmental purposes (e.g. forests and wetlands), open space and recreational areas such as sporting fields.

1.2 Study Background

As part of BCC's Maintain and Enhance Program, flood studies are periodically updated to capture recent changes in the catchment; updates to planning and policy documents as well as the acquisition of more recent data.

The most recent BCC flood study of Bulimba Creek was completed in 2014.[1] For the purpose of this report, the previous flood study is termed the 2014 Flood Study.

The 2014 Flood Study utilised a 1d MIKE11 hydraulic model and only considered the major creeks of Bulimba Creek, Bulimba Creek East and Mimosa Creek as well as several minor tributaries in the upper catchment. This flood study used the Duration Independent Storm (DIS) method in lieu of AR&R 1987 for the design hydrology. The 2014 Flood Study report incorporated this study plus separate flood studies of Newnham Creek, Salvin Creek and Phillips Creek which were all undertaken (circa 2007) using the 1d HEC-RAS software. Many of the smaller tributaries such as Broadwater Road Drain, Warwick / Spring Creeks, Wecker Road Drain and Minnippi Creek were not included in the 2014 Flood Study.

[1] City Projects Office on behalf of Brisbane City Council – *Bulimba Creek Flood Study, October 2014*

Separate flood studies of the Tingalpa Channel [2] and Hemmant Drain [3] were completed in 2014 / 2015 and incorporated new 1d / 2d hydraulic models.

Since the completion of the 2014 Flood Study, there have been a number of significant changes / updates as follows:

- The M1 Pacific Motorway Upgrade - Sports Drive to Gateway Motorway project by the Department of Transport and Main Roads (DTMR).
- The Port of Brisbane Motorway project by DTMR.
- 2019 Airborne Laser Scanning (ALS) data, superseding older ALS data
- BCC City Plan 2014 superseding BCC City Plan 2000
- Australian Rainfall and Runoff 2019 (AR&R 2019)[4] superseding Australian Rainfall and Runoff 1987 (AR&R 1987)[5].
- Upgrades to several waterways and major hydraulic structures.

1.3 Scope of the Flood Study

The update of the Bulimba Creek Flood Study is in accordance with the current BCC Flood Study Procedure document[6] and incorporates best practice flood modelling techniques.

A summary of the proposed scope of the flood study is outlined below.

- Acquire data for use in the study including reports, flood models, hydrometric data, topographic data (LiDAR and field survey), hydraulic structure drawings and BCC base mapping / GIS layers.
- Develop a new URBS hydrologic model of the catchment, superseding the previous WBNM model. The URBS model will be compatible with the new extents of the updated hydraulic model; incorporate the latest major development / infrastructure works and make allowance for catchment development based on the current planning scheme (City Plan 2014).
- Develop a new 1d / 2d TUFLOW hydraulic model of the creek system to replace the existing 1d MIKE11 model. The TUFLOW model extents will be significantly larger than the previous MIKE11 model and will incorporate the major and minor tributaries throughout the catchment, apart from Tingalpa Channel and Hemmant Drain. The model will also incorporate recent major development / infrastructure works; the latest LiDAR dataset (2019 ALS) and field survey.
- Select historical storm events for the calibration and verification process. Adequately calibrate and verify the flood models to confirm that the models are suitable for the purposes of simulating design flood events.

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[2] City Projects Office on behalf of Brisbane City Council - *Tingalpa Flood Study, June 2015*

[3] BMTWBM on behalf of Brisbane City Council - *Hemmant-Lytton Flood Study, December 2014*

[4] Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors) - *Australian Rainfall and Runoff: A Guide to Flood Estimation, © Commonwealth of Australia (Geoscience Australia), 2019.*

[5] Institution of Engineers, Australia - *Australian Rainfall and Runoff: A Guide to Flood Estimation (Volume 1), 1987.*

[6] Brisbane City Council - *Creek Flood Study Procedure Document Version 8.2, 2020.*

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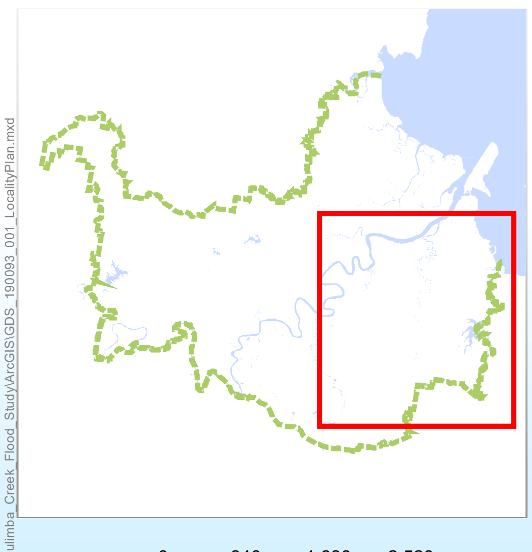

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Prepared : 089958
Checked : NC
Revision : 0
Publication Date : 09 Dec 2020
Project Number : 100001

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Legend

- Creek Centreline (Bulimba Creek Catchment)
- Bulimba Creek Catchment Area
- Railway Station
- Railway Line
- Freeway/Highway
- Major Road
- Street
- Brisbane City Boundary
- Suburb Boundary
- Park
- Creek

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Figure 1.1: Locality Plan

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- In accordance with AR&R 2019, estimate the design, very rare and extreme flood magnitudes for the full range of events from 2-yr ARI (50% AEP) to PMF. This will include an allowance for increased rainfall intensities due to projected climate variability effects.
- Utilise the calibrated flood models and the AR&R 2019 design hydrology to determine design flood levels for the design, very rare and extreme events. This will include an allowance for sea-level rise due to projected climate variability effects.
- Adjust the hydraulic model, incorporating both Minimum Riparian Corridor (MRC) and floodplain development / filling to determine design flood levels for the design and very rare events. This will include an allowance for sea-level rise due to projected climate variability effects.
- Produce flood extent mapping for the selected range of design and very rare / extreme events.
- Produce Hydraulic Structure Reference Sheets (HSRS) to capture the flooding and hydraulic characteristics of the major hydraulic structures.

1.4 Study Limitations

The results from this flood study are largely derived from the hydrologic and hydraulic models developed for this study. It is important to be aware of the limitations of these models, which include (but is not limited to) the following:

- The models have only been calibrated / verified at locations where Stream Gauge / Maximum Height Gauge (MHG) records exist. This should be considered when reviewing the accuracy of results outside the influence of the gauge locations. Refer to Figure 3.1 for the hydrometric gauge locations.
- These models are catchment scale and have been developed to simulate the flooding characteristics at a broad scale. As a result, smaller more localised flooding and drainage characteristics may not be apparent in the results.
- The 2019 ALS data has been used to represent the hydraulic model floodplain topography. Detailed checks have not been undertaken on the accuracy of the ALS data. It is assumed that the data is representative of the topography and "fit for purpose."
- The accuracy of the model results is directly linked to the following:
    - The accuracy limits of the data used to develop the model (e.g. ALS, survey information, bridge data, etc.).
    - The accuracy and quality of the hydrometric data used to calibrate / verify the models.
    - The number of observed records, including MHG readings throughout the catchment.

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2.0 Catchment Description

2.1 Catchment and Waterway Characteristics

2.1.1 General

Bulimba Creek Catchment has an area of approximately 123.7 km^2 and is the second largest of the BCC creek catchments after Oxley Creek. The catchment is quite elongated (approximately 4:1 length to width) and typically drains in a northerly direction towards its confluence with the Brisbane River, approximately 3.5 km downstream of the Gateway Motorway Bridge(s) at Murarrie. The catchment is bounded by Oxley Creek, Norman Creek and Perrin Creek catchments to the west; Tingalpa Creek, Lota Creek and Wynnum Creek catchments to the east; Scrubby Creek and Slacks Creek catchments to the south; and the Brisbane River to the north.

Bulimba Creek Catchment has a significant number of tributaries of which the largest is Bulimba Creek East, located in the upper catchment. Figure 2.1 indicates the major creeks and tributaries within the catchment. Many of the minor tributaries are un-named and have been given a nominal name for the purpose of this study. The catchment areas of the larger tributaries are indicated below.

- Bulimba Creek East (14.5 km^2)
- Tingalpa Channel (13.4 km^2)
- Hemmant Drain (6.8 km^2)
- Mimosa Creek (6.5 km^2)
- Salvin Creek (5.5 km^2)
- Warwick / Spring Creek (4.9 km^2)
- Landfill Drain (4.9 km^2)
- Phillips Creek (4.2 km^2)
- Broadwater Road Drain (4.0 km^2)
- Newnham Creek (4.0 km^2)

There are numerous significant transport links that traverse the catchment, with the most significant being the Gateway Motorway. The Gateway Motorway traverses almost the entire catchment in a north-south direction. The alignment of the motorway crosses many of the tributaries in the eastern section of the catchment, resulting in the need for culvert / bridge crossings. The most significant waterway crossing of the Gateway Motorway is on Bulimba Creek in the lower catchment, where there is a significant elevated bridge structure termed the Bulimba Creek Viaduct. The most significant transport links that traverse the catchment are as follows:

- Gateway Motorway
- Gold Coast Railway
- Pacific Motorway
- Mt Gravatt - Capalaba Road / Kessels Road
- Creek Road
- Old Cleveland Road
- Wynnum Road / Manly Road
- Cleveland Railway
- Port of Brisbane Motorway

The catchment can be nominally split into three areas: Upper, Middle and Lower. The Upper Catchment extends from the catchment headwaters to the confluence of Bulimba Creek and Bulimba Creek East, approximately 10 km downstream along Bulimba Creek. The Middle Catchment extends from this location to the confluence of Bulimba Creek and Phillips Creek, just downstream of Old Cleveland Road. The Lower Catchment extends from the Phillips Creek confluence to the mouth of the creek at the Brisbane River.

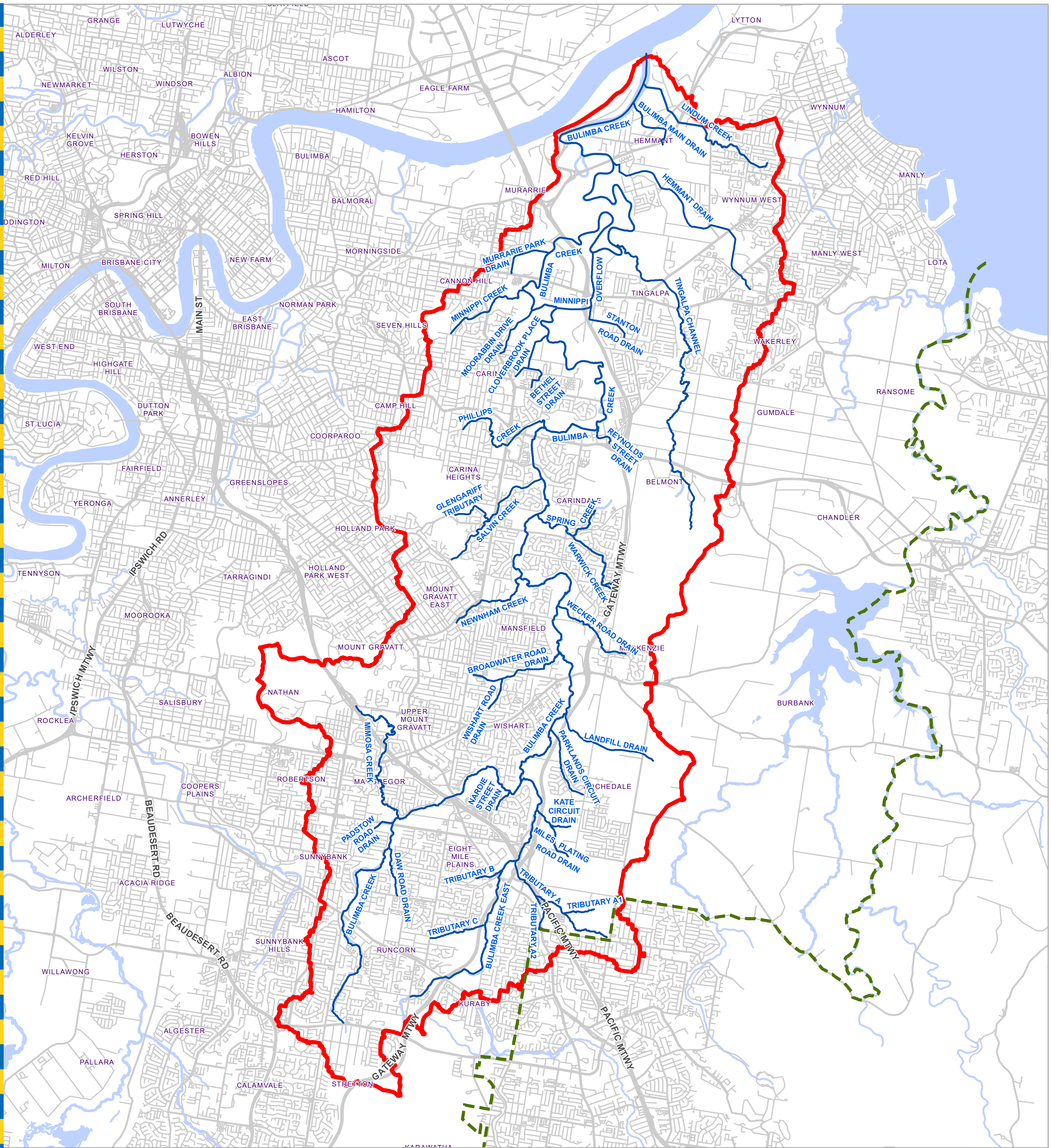
The Upper Catchment is significantly developed and is characterised by moderately steep slopes. The major waterways in the Upper Catchment include Bulimba Creek (Upper), Bulimba Creek East and Mimosa Creek. Surface elevations range from 192 mAHD in the catchment headwaters of Mimosa Creek (Mt Gravatt) to 18 mAHD at the confluence of Bulimba Creek and Bulimba Creek East. Much of the catchment area is utilised for residential purposes, with the most predominant category being low-density residential. A portion of the suburb of Rochedale is in the upper catchment and is characterised by large areas of Emerging Community. This section of the catchment contains the Garden City Shopping Centre and surrounding commercial areas, which represent the largest urban centre in the Bulimba Creek Catchment. There are major transport links which traverse this area of the catchment and include the Gateway Motorway, Gold Coast Railway, Pacific Motorway and Kessels Road.

The Middle Catchment is significantly developed, however it has more open space / forested areas then the Upper Catchment. The major waterways in the Middle Catchment include Bulimba Creek (Middle), Broadwater Road Drain, Newnham Creek, Salvin Creek, Phillips Creek and Warwick / Spring Creeks. Surface elevations range from 192 mAHD in the catchment headwaters of Newnham Creek (Mt Gravatt) to around 2 mAHD at the confluence of Bulimba Creek and Phillips Creek. The predominant land-use in this section of the catchment is low-density residential development. There are significant forested areas occurring east of the Gateway Motorway in the suburbs of Mackenzie and Belmont, where there are numerous rifle ranges / gun clubs. This section of the catchment contains the Carindale Shopping Centre and major transport links including the Gateway Motorway, Mt Gravatt - Capalaba Road, Creek Road and Old Cleveland Road.

The Lower Catchment is largely developed, however less than the Upper and Middle Catchments. The major waterways in the Lower Catchment include Bulimba Creek (Lower), Tingalpa Channel and Hemmant Drain. Many of the waterways in the lower catchment are subject to tidal interaction and there are expansive floodplain and wetland areas. Surface elevations range from 70 mAHD in the catchment headwaters of Minnippi Creek (Seven Hills Bushland Reserve) to around 1.5 mAHD in the lower lying floodplain areas. Significant areas of industrial development occur in the suburbs of Murarrie and Hemmant, downstream and to the north of the Cleveland Railway. There are major transport links which traverse this area of the catchment and include the Gateway Motorway, Cleveland Railway, Port of Brisbane Motorway and Wynnum Road / Manly Road.

2.1.2 Bulimba Creek

Bulimba Creek flows in a northerly direction through the entire catchment from the headwaters in Stretton to the confluence with the Brisbane River at Murarrie. The creek is approximately 42 km in length and originates from an elevation of approximately 70 mAHD in Stretton, northwest of the Gateway Motorway. It then flows through the suburbs of Runcorn, Sunnybank, MacGregor, Eight Mile Plains, Wishart, Mansfield, Carindale, Carina and Tingalpa before discharging into the Brisbane River at Murarrie.



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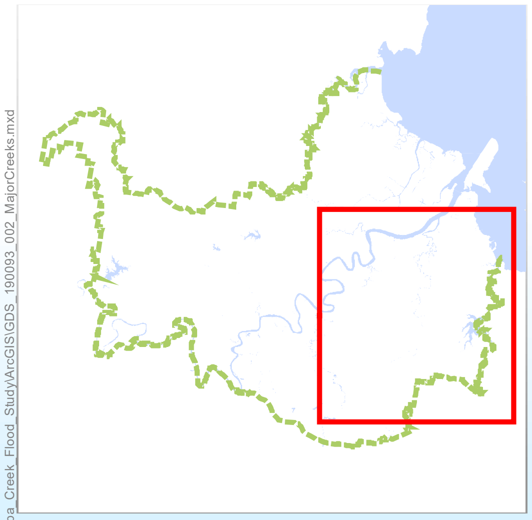

Legend

- Creek Centreline (Bulimba Creek Catchment)
- Bulimba Creek Catchment Area
- Brisbane City Boundary
- Road

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Metres

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Figure 2.1 - Major Creeks and Tributaries

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The creek is piped for the first 800 m of its length and then becomes an open waterway for the remainder. Most of the open waterway remains in a relatively natural state, with significant amounts of open space and parklands along the main creek corridor. There is significant meandering of the creek from downstream of the Gateway Motorway to the Port of Brisbane Motorway. The average bed slope over the entire length of open waterway is 0.15 % and for the upper 9.3 km section to the confluence with Bulimba Creek East is 0.4 %.

The waterway is characterised by regular bridge / culvert crossings along its entire length. Major crossings of the creek include Gold Coast Railway, Pacific Motorway, Mt Gravatt - Capalaba Road, Old Cleveland Road, Wynnum Road, Gateway Motorway, Cleveland Railway and the Port of Brisbane Motorway.

2.1.3 Bulimba Creek East

Bulimba Creek East is just over 7 km in length and flows in a northerly direction parallel to the Gateway Motorway (predominantly on the western side of the motorway) for its entire length. The creek is an open waterway for its entire length and has an average bed slope of 0.6 %. The open waterway commences at an elevation of 65 mAHD in Runcorn and flows through Eight Mile Plains before joining Bulimba Creek in the suburb of Wishart, approximately 2.4 km downstream of the Pacific Motorway. Most of the open waterway remains in a relatively natural state, with significant amounts of open space along the main creek corridor.

The tributaries connecting into Bulimba Creek East from upstream to downstream include Tributary C, Tributary B, Tributary A and the Miles Platting Road Drain. The creek has numerous major crossings including Gold Coast Railway / Beenleigh Road, Gateway Motorway #1, Gateway Motorway #2, Logan Road, Pacific Motorway and Miles Platting Road.

2.1.4 Mimosa Creek

Mimosa Creek commences in the Toohey Forest Park and flows through Upper Mt Gravatt and MacGregor before joining Bulimba Creek just downstream of Padstow Road. The catchment headwaters rise to an elevation of approximately 192 mAHD at Mt Gravatt and the creek flows in a south-eastern direction as an open waterway for its entire length. The average bed slope of the 4.2 km section of creek from the Pacific Motorway / Klumpp Road to the confluence with Bulimba Creek is 0.6 %. Most of the open waterway remains in a relatively natural state, however the creek appears to be tightly constrained by development in several areas. The creek has several major crossings including Pacific Motorway #1, Pacific Motorway #2 and Kessels Road.

2.1.5 Broadwater Road Drain

The Broadwater Road Drain is one of four similarly sized western tributaries located in the mid-catchment of Bulimba Creek; the other three being Newnham Creek, Salvin Creek and Phillips Creek. The Broadwater Road Drain is a highly modified waterway with a total length of approximately 4 km and an open waterway length of 2.2 km. The upper 1.8 km section from upstream of Logan Road to Newnham Road is largely piped. The catchment headwaters rise to an elevation of approximately 128 mAHD in the suburb of Upper Mt Gravatt and the waterway flows in a north-easterly direction before joining Bulimba Creek in the suburb of Mansfield. The waterway flows through two large educational facilities namely Brisbane Adventist College and Mansfield State High School.

Approximately 25 % of the open waterway downstream of Newnham Road is concrete-lined and approximately 10 % is piped, with the major piped section being within the grounds of Mansfield State High School. There are several drop structures in the section of concrete-lined channel within the grounds of Brisbane Adventist College.

The Wishart Road Drain is the largest tributary of the Broadwater Road Drain and joins the main waterway within the grounds of Brisbane Adventist College. The average bed slope for the open waterway section of the Broadwater Road Drain is 0.7 % and for the 0.7 km section of the Wishart Road Drain is 1.4 %

2.1.6 Newnham Creek

Newnham Creek is a highly modified creek with a total length of 3.3 km and an open waterway length of approximately 2 km. The upper 1.3 km from upstream of Logan Road to Fairland Street is largely piped. The catchment headwaters rise to an elevation of approximately 192 mAHD at Mt Gravatt and the average bed slope of the open waterway section is 1 %. The creek flows in a north-easterly direction from Mt Gravatt through Mt Gravatt East before joining Bulimba Creek in the suburb of Mansfield. Approximately 20 % of the open waterway is concrete-lined, with sections in the vicinity of the Greek Orthodox Church at (269 Creek Road) and just downstream of Newnham Road behind Bunning's Warehouse. There are also several drop structures in the section of concrete-lined channel upstream of Newnham Road and an online Stormwater Quality Improvement Device downstream of Secam Street. The creek has one major crossing at Newnham Road and several minor crossings including Devlan Street and Secam Street.

2.1.7 Salvin Creek

Salvin Creek commences in the suburb of Holland Park and flows through Mt Gravatt East before joining Bulimba Creek in the suburb of Carindale. The creek commences as piped drainage (upstream of Cavendish Road) prior to becoming an open waterway for a length of 2.9 km to the confluence with Bulimba Creek. Most of the open waterway remains in a relatively natural state, however there are sections where the channel has been concrete-lined. The creek has one major crossing at Creek Road and several minor crossings including Pine Mountain Road, Donnington Street #1 and Donnington Street #2.

The Glengariff Tributary is the largest tributary of Salvin Creek and joins the main creek approximately half-way along its length. The average bed slope for the 2.9 km section of Salvin Creek is 0.7 % and for the 1 km section of the Glengariff Tributary is 0.9 %.

2.1.8 Phillips Creek

Phillips Creek is a highly modified creek with a total length of approximately 5.6 km and an open waterway length of 2.8 km. The upper 2.8 km section from the catchment headwaters to Birdwood Road is largely piped. The catchment headwaters rise to an elevation of approximately 110 mAHD at Whites Hill Reserve in the suburb of Camp Hill and the waterway flows typically in an easterly direction before joining Bulimba Creek in the suburb of Carindale. The open waterway section from Birdwood Road to Bulimba Creek has an average bed slope of 0.5 %. The creek has two major crossings namely Creek Road and Old Cleveland Road.

The section of Phillips Creek immediately upstream of Creek Road within the Belmont Specialist Centre property was re-aligned in 1984, as part of a development approval. The creek was effectively straightened and was considerably shortened, increasing the gradient of the creek. The creek was further re-aligned in 1998, again as part of development within this property.

Immediately downstream of Creek Road the waterway is piped underneath the Carindale Shopping Centre in large box culverts for a length of 265 m. Flow exceeding the culvert capacity is routed through a designated overland flow path in the undercroft area of the shopping centre. Downstream of Old Cleveland Road, the waterway passes through an online Stormwater Quality Improvement Device and then on to Bulimba Creek, a further 0.7 km downstream.

2.1.9 Warwick / Spring Creek

Warwick Creek flows into Spring Creek just downstream of Greendale Way in the suburb of Carindale. The catchment headwaters of the larger Warwick Creek are steep and heavily forested and rise to an elevation of approximately 170 mAHD in the suburb of Belmont, east of the Gateway Motorway. The creek is open waterway for most of its length, apart from the 0.75 km section upstream of Greendale Way, which flows through parkland and incorporates a 1.2 to 1.5 m diameter low-flow pipe. The 1.8 km long section of open waterway from downstream of the Gateway Motorway to Spring Creek has an average bed slope of 0.7 %. The creek has one major crossing at the Gateway Motorway and several minor crossings including Greendale Way, Amersham Crescent and Cribb Street.

The Spring Creek catchment headwaters rise to an elevation of approximately 105 mAHD in the Belmont Bushland Reserve, west of the Gateway Motorway. Spring Creek is a relatively steep open waterway for approximately 1.7 km until it reaches the Pacific Golf Course, where it becomes a series of pipe linked ponds, before joining Bulimba Creek in the suburb of Carindale. The average bed slope from the limit of upstream development adjacent Ewer Street to the Pacific Golf Course is 2.2 %. The creek has one major crossing at Scrub Road and a minor pedestrian crossing further upstream.

2.2 Land Use

The Bulimba Creek Catchment is largely developed with the predominant land use zoning being Low-density Residential. Figure 2.2 provides a breakdown of the catchment land use by percentage and Appendix C provides a map indicating the distribution of the land use throughout the catchment. The percentage figures indicated are relative to the catchment area within BCC (98.9 % of the total catchment) and are based upon City Plan 2014.

Residential areas occupy approximately 30.4 % of the catchment area with the next largest being Environmental Management and Conservation (16.2 %) and then Recreation and Open Space (8.5 %). Large pervious areas include Toohey Forest Park, Mt Gravatt, Whites Hill Reserve, Hemmant Recreation Reserve and a significant proportion of the suburb of Belmont, which has large forested areas.

Emerging Community occupies approximately 8.2 % of the catchment area, with the greatest proportion being in the Rochedale area. The “Emerging Community” zone is typically for land that would become urban development in the future. The suburbs of Murarrie and Hemmant, towards the catchment outlet, contains most of the industrial area.

Urbanisation of the catchment typically results in more impervious area. These areas do not allow infiltration into the sub-surface layers and examples include buildings (e.g. residential, educational, commercial, industrial, etc.) and pavements (roads, carparks, hardstands, footpaths, etc.). Currently, it is estimated that impervious areas account for 36 % of the total catchment area. Based on City Plan 2014, it is estimated that the future impervious area will increase to 42 % of the total catchment area.

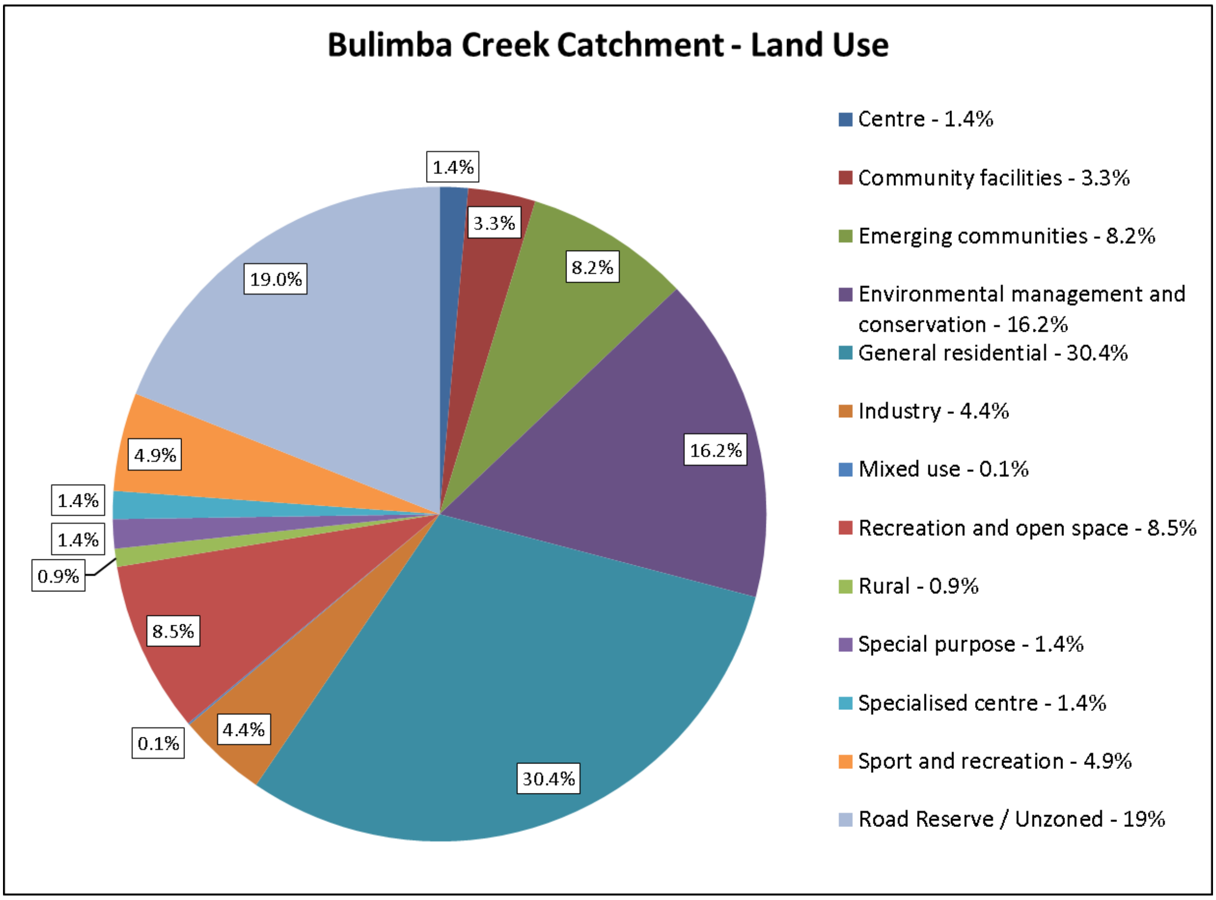


Figure 2.2: Bulimba Creek Catchment Land Use

3.0 Available Data

3.1 Previous Studies

3.1.1 General

Numerous flooding related studies have been previously undertaken in the Bulimba Creek Catchment. Some of these studies have focused on the entire catchment, others on specific sub-catchment(s) and others on a specific piece of infrastructure, for example a road / bridge upgrade project.

A selection of some of the more relevant studies that have been undertaken in recent years is provided below.

3.1.2 M1 Pacific Motorway Upgrade - Sports Drive to Gateway Motorway (2019)

This DTMR project involves the upgrade of the Pacific Motorway in the vicinity of the major intersection with the Gateway Motorway. The construction phase of this project is currently being undertaken. This project is relevant to this study because it involves changes to the waterways in the project area, which include Tributary A and Tributary A2. The hydraulic modelling was undertaken in the TUFLOW software utilising a 2m grid.

3.1.3 Bulimba Creek Flood Study (2014)

This 2014 Flood Study was undertaken by BCC and incorporated some of the larger creeks including Bulimba Creek, Bulimba Creek East, Mimosa Creek and minor Tributaries A, A1, A2, B and C. This study utilised WBNM for the hydrology and MIKE11 for the hydraulic modelling. The flood modelling used the Duration Independent Storm (DIS) method in lieu of AR&R 1987 for the design hydrology. The flood study report incorporated this study plus separate flood studies of Newnham Creek, Salvin Creek and Phillips Creek which were all undertaken using the 1d HEC-RAS software around 2007.

A significant amount of cross-sectional data from this 2014 study was utilised as part of this new study.

3.1.4 Hemmant-Lytton Flood Study (2014)

This study was undertaken by BMT Consultants on behalf of BCC and incorporated Hemmant Drain, Lindum Creek and the Bulimba Main Drain; in the lower catchment. The study utilised XP-RAFTS for the hydrology and TUFLOW for the hydraulic modelling. The TUFLOW model representation of both Lindum Creek and Bulimba Main Drain is largely from the Port of Brisbane Motorway TUFLOW Model (DTMR / GHD, 2012).

3.1.5 Port of Brisbane Motorway Flood Impact Assessment (2012)

This study was undertaken by GHD Consultants on behalf of DTMR to assess the flooding impacts of the proposed Port of Brisbane Motorway. The study extent incorporated Lower Bulimba Creek, Lindum Creek and the Bulimba Main Drain. The study utilised a combination of the existing BCC WBNM and XP-RAFTS models for the hydrology and developed a new TUFLOW model for the hydraulic modelling.

3.2 Topographic Survey Data

3.2.1 Field Survey

3.2.1.1 General

Topographic field survey data was acquired for use in this flood study from numerous sources. The following lists several of the sources, whereby the survey was not already part of an existing hydraulic model as indicated in Section 3.3.

3.2.1.2 Phillips Creek Survey (2020)

This data compromised detailed survey of the creek from Birdwood Road to Anzac Road in Carina Heights.

3.2.1.3 2019 Survey

Topographic field survey was undertaken in 2019 for the purpose of this study. This survey was intended to supplement the existing cross-sectional information and included the following:

- 222 x creek cross-sections
- 23 x detailed hydraulic structure surveys
- 13 x basic hydraulic structure surveys

3.2.1.4 DTMR Gateway Survey (June 2008)

This survey provided information on numerous cross drainage structures along the Gateway Motorway alignment between the Pacific Motorway and Mount Gravatt – Capalaba Road.

3.2.1.5 Broadwater Road Drain Survey (2006)

This data compromised detailed survey of the creek from Broadwater Road to Ham Road in Mansfield.

3.2.2 LiDAR

3.2.2.1 General

Airborne Laser Scanning (ALS) data from the Queensland Government was utilised for this project. Details of these ALS datasets are outlined below and their use is discussed further in Section 5.0.

3.2.2.2 2019 ALS

The 2019 ALS data was captured as part of the Brisbane-Ipswich LiDAR 2019 Project, undertaken by Aerometrex Pty Ltd on behalf of the Queensland Government. The ALS data was acquired between 11/06/2019 and 16/08/2019 from a fixed wing aircraft at a flying height of 1250 m above sea level.

Brisbane-Ipswich LiDAR 2019 Project's technical processes and specifications were designed to achieve the following data accuracies:

- Vertical data: 0.3 m @ 95 % threshold accuracy
- Horizontal data: 0.8 m @ 95 % threshold accuracy

3.2.2.3 2014 ALS

The 2014 ALS data was captured as part of the SEQ 2014 LiDAR Capture Project, undertaken by Fugro Spatial Solutions Pty Ltd on behalf of the Queensland Government. The ALS data was acquired from a fixed wing aircraft flying over Brisbane City on the 28th October 2014.

The SEQ 2014 LiDAR Capture Project's technical processes and specifications were designed to achieve the following data accuracies:

- Vertical data: 0.3 m @ 95 % threshold accuracy
- Horizontal data: 0.8 m @ 95 % threshold accuracy

3.2.3 Aerial Photography

The following sources of aerial imagery taken during different points in time were available to be used in this study:

- BCC aerial photography – 1997, 1999, 2001, 2005, 2007, 2009, 2011, 2012, 2013, 2015, 2016, 2017, 2018 and 2019
- NearMap® aerial imagery – 2009 to 2021

3.3 Existing Hydraulic Models

Data from numerous existing hydraulic models was used in the development of the Bulimba Creek TUFLOW model. These models are listed below in Table 3.1 and their use is discussed further in more detail in Section 5.0.

Table 3.1 – Hydraulic Models used in Model Development

Model	Waterway(s)	Type	Year	Model Developer
Bulimba Creek MIKE11 Model	Bulimba Creek Bulimba Creek East Mimosa Creek Tributary A, A1, A2, B and C Minnippi Overflow	1d	2014	BCC
M1 Pacific Motorway Upgrade - Sports Drive to Gateway Motorway TUFLOW Model	Tributary A and A2	2d	2019	DTMR / Jacobs
Mimosa Creek Bikeway HEC-RAS Model	Mimosa Creek	1d	2012	BCC
Miles Platting Road HEC-RAS Model	Mile Platting Road Drain	1d	2013	BCC
Scrub Road HEC-RAS Model	Wecker Road Drain	1d	2005	BCC
Newnham Creek HEC-RAS Model	Newnham Creek	1d	2007	BCC
Salvin Creek HEC-RAS Model	Salvin Creek	1d	2007	BCC

Model	Waterway(s)	Type	Year	Model Developer
Phillips Creek HEC-RAS Model	Phillips Creek (Upper / Middle)	1d	2007	BCC
Phillips Creek EPA-SWMM Model	Phillips Creek (Lower)	1d	2012	BCC
Todman Street HEC-RAS Model	Minnippi Creek	1d	2017	BCC
Hemmant Lytton TUFLOW Model	Bulimba Main Drain Lindum Creek	1d / 2d	2014	BCC / BMT
Port of Brisbane Motorway TUFLOW Model	Bulimba Creek Bulimba Main Drain Lindum Creek	1d / 2d	2012	DTMR / GHD

3.4 Hydrometric Data and Storm Selection

3.4.1 Selection of Historical Storm Events

Table 3.2 indicates the more significant flooding events that have occurred within the catchment over the previous 40 years. This table indicates the peak flood level in Bulimba Creek at MHG BM240 (D/S Wecker Road) and MHG BM150 (U/S Wynnum Road) as well as the approximate size of the event. MHG BM240 is located mid-catchment and MHG BM150 is in the lower catchment. The ranking of the largest ten events is indicated by the bracketed value.

Table 3.2 – Historical Peak Levels on Bulimba Creek

Event	Peak Flood Level (mAHD)		Approximate Size of Event	Number of Stream Gauge / MHG Records
	MHG BM240	MHG BM150		
November 1979	12.41	-	< 2-yr ARI (50% AEP)	14
May 1980	12.93	2.61	< 2-yr ARI (50% AEP) to 5-yr ARI (20% AEP)	22
December 1980	12.83	-	< 2-yr ARI (50% AEP)	13
March 1981	12.62	-	< 2-yr ARI (50% AEP)	10
November 1981	12.57	-	< 2-yr ARI (50% AEP)	12
January 1982	12.49	-	< 2-yr ARI (50% AEP)	11
May 1983	12.59	-	< 2-yr ARI (50% AEP)	13
June 1983	13.77 (6)	2.85 (8)	5-yr ARI (20% AEP) to 10-yr ARI (10% AEP)	31
April 1984	13.64 (8)	2.75 (9)	2-yr ARI (50% AEP) to 10-yr ARI (10% AEP)	24
July 1985	12.65	-	< 2-yr ARI (50% AEP)	5
April 1988	-	2.50	2-yr ARI (50% AEP) to 5-yr ARI (20% AEP)	24
July 1988	13.70 (7)	2.67	2-yr ARI (50% AEP) to 5-yr ARI (20% AEP)	27

Event	Peak Flood Level (mAHD)		Approximate Size of Event	Number of Stream Gauge / MHG Records
	MHG BM240	MHG BM150		
April 1989	13.78 (5)	3.00 (5)	5-yr ARI (20% AEP) to 10-yr ARI (10% AEP)	24
April 1990	13.27	2.51	2-yr ARI (50% AEP) to 5-yr ARI (20% AEP)	20
March 1992	13.17	2.66	<2-yr ARI (50% AEP) to 5-yr ARI (20% AEP)	25
January 1994	12.77	-	< 2-yr ARI (50% AEP)	16
May 1996	14.15 (4)	3.18 (=3)	5-yr ARI (20% AEP) to 20-yr ARI (5% AEP)	35
March 2001	15.44 (1)	3.26 (2)	20-yr ARI (5% AEP) to 100-yr ARI (1% AEP)	34
November 2004	14.50 (3)	2.52	2-yr ARI (50% AEP) to 10-yr ARI (10% AEP)	27
February 2008	13.14	-	< 2-yr ARI (50% AEP)	20
November 2008	13.09	-	< 2-yr ARI (50% AEP)	22
May 2009	12.97	2.70 (10)	< 2-yr ARI (50% AEP) to 5-yr ARI (20% AEP)	35
February 2010	12.97	-	< 2-yr ARI (50% AEP)	27
October 2010	-	2.27	2-yr ARI (50% AEP)	36
December 2010	12.87	2.03	< 2-yr ARI (50% AEP)	39
January 2013	13.41 (9)	2.89 (7)	2-yr ARI (50% AEP) to 10-yr ARI (10% AEP)	44
January 2015	12.97	-	< 2-yr ARI (50% AEP)	28
February 2015	13.06	2.90 (6)	< 2-yr ARI (50% AEP) to 10-yr ARI (10% AEP)	31
May 2015	14.68 (2)	3.73 (1)	20-yr ARI (5% AEP) to 100-yr ARI (1% AEP)	43
June 2016	13.01	-	< 2-yr ARI (50% AEP)	27
March 2017	13.33 (10)	3.18 (=3)	2-yr ARI (50% AEP) to 20-yr ARI (5% AEP)	38

The table indicates that there have been two significant events over the period of record. These events are 9th March 2001 and 1st May 2015 of which both have a significant number of available MHG records. Two recent small to medium sized events which have significant MHG records are 27th January 2013 and 30th March 2017. These four historical events were selected for the calibration and verification events as follows:

- Calibration
  - 9th March 2001
  - 27th January 2013
  - 1st May 2015
- Verification
  - 30th March 2017

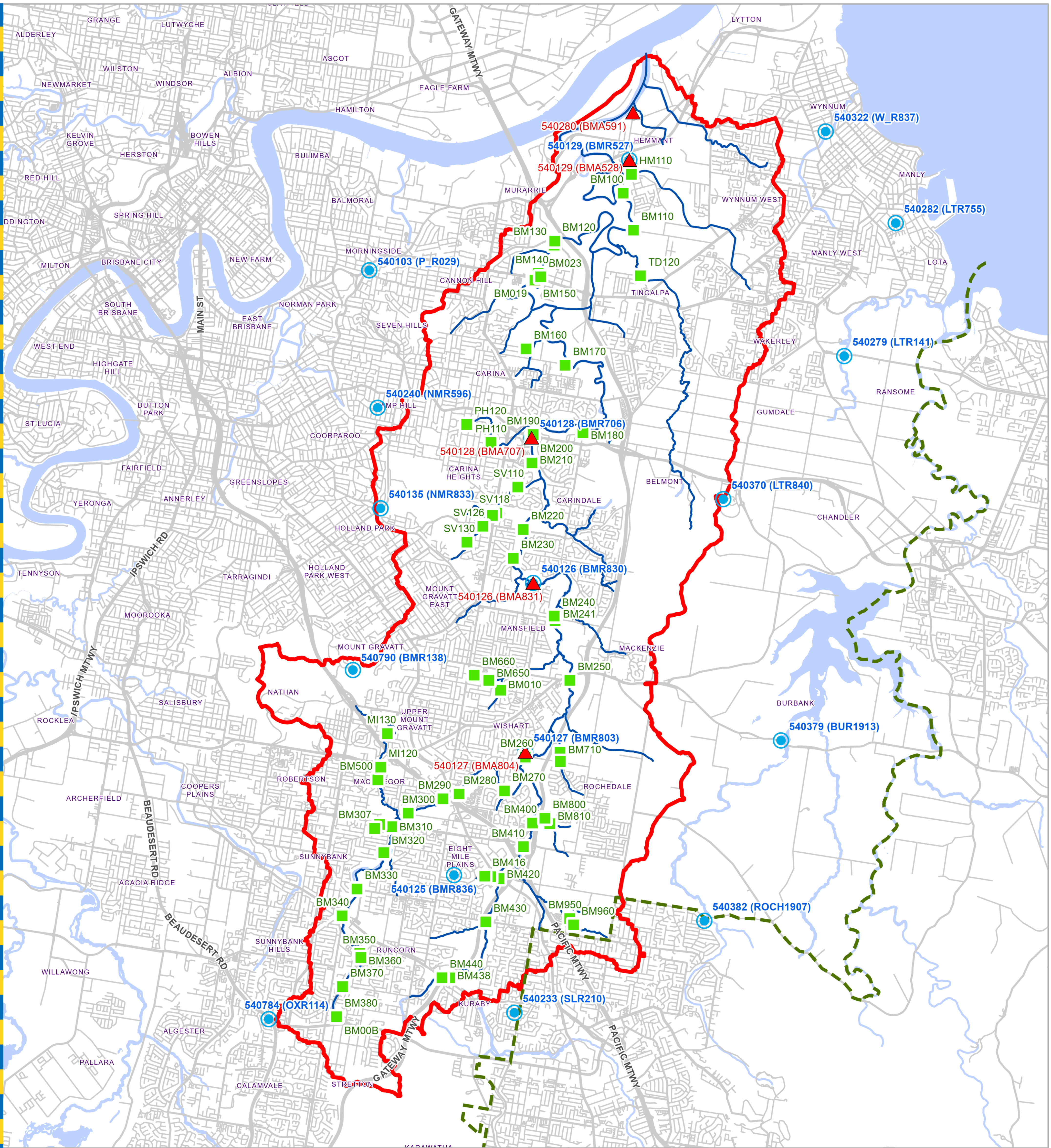
3.4.2 Availability of Historical Data for Selected Storms

3.4.2.1 Continuous Recording Rainfall Stations

Sixteen rainfall stations were utilised for the calibration and verification events. Figure 3.1 and Table 3.3 indicate the location, details and availability of the rainfall station data for each of the selected storm events.

Table 3.3 – Rainfall Station Records

Gauge ID	Old BCC ID	Location	Data Availability			
			March 2001	Jan 2013	May 2015	March 2017
540103	P_R029	Balmoral Works Depot Morningside	✓	×	×	×
540125	BMR836	Gagarra Street, Eight Mile Plains	✓	✓	✓	✓
540126	BMR830	Edwards Park, Carindale	✓	✓	✓	✓
540127	BMR803	Greenwood Street, Wishart	×	✓	✓	✓
540128	BMR706	Old Cleveland Road, Carindale	✓	✓	✓	✓
540129	BMR527	Doughboy Parade, Hemmant	✓	✓	✓	✓
540135	NMR833	Cavendish Road, Coorparoo	✓	×	×	×
540233	SLR210	Underwood Road, Underwood	✓	✓	✓	✓
540240	NMR596	Tarana Street, Camp Hill	✓	✓	✓	✓
540279	LTR141	Rickertt Road, Ransome	×	✓	✓	✓
540282	LTR755	Harman Recreation Reserve, Manly	✓	×	×	×
540322	W_R837	Wynnum Bowls Club, Wynnum	×	✓	✓	✓
540370	LTR840	Sleeman Centre, Chandler	×	✓	✓	✓
540379	BUR1913	Burbank Alert, Burbank	×	✓	✓	✓
540382	Roch1907	Rochdale South Alert, Rochdale	×	✓	✓	✓
540784	OXR114	Beaudesert Road, Calamvale	✓	✓	✓	✓
540790	BMR138	Griffith University, Mt Gravatt	✓	✓	✓	✓



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DATA INFORMATION

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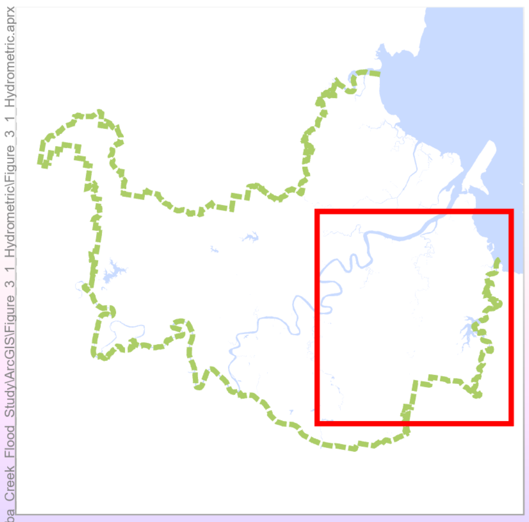
Legend

- Creek Centreline (Bulimba Creek Catchment)
- Bulimba Creek Catchment Area
- Maximum Height Gauge
- Pluviograph Station
- Continuous Recording Stream Gauge
- Brisbane City Boundary
- Road



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Bulimba Creek Flood Study

Figure 3.1 - Hydrometric Gauges

Prepared : 089958
Checked : NC
Revision : 0
Publication Date : 17 Jun 2021
Project Number : 100001

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3.4.2.2 Continuous Recording Stream Gauges

Continuous recording stream height gauges collect instantaneous water level information over time. They are important for calibration purposes as they provide important information on the timing of the flood peak as well as the total shape and volume of the flood hydrograph.

For the Bulimba Creek Catchment, there are currently four operational continuous recording stream gauges. Stream Gauge 540280 (BMA591) was only operational from March 1998 to May 2005. Table 3.4 indicates the location, details and availability of the stream gauge data for each of the selected storm events.

Table 3.4 – Stream Gauge Records

Gauge ID	Old BCC ID	Location	Data Availability			
			March 2001	January 2013	May 2015	March 2017
540126	BMA831	Edwards Park, Carindale	✓	✓	✓	✓
540127	BMA804	Greenwood Street, Wishart	×	✓	✓	✓
540128	BMA707	Old Cleveland Road, Carindale	✓	✓	✓	✓
540129	BMA528	Doughboy Parade, Hemmant	✓	✓	✓	✓
540280	BMA591	Aquarium Avenue, Hemmant	✓	×	×	×

3.4.2.3 Maximum Height Gauges (MHGs)

Maximum Height Gauges (MHGs) record the maximum water level experienced in a flooding event at the gauge location. MHG data is manually read by BCC staff following the flooding event. However, if the gauge has malfunctioned during the event and there is a nearby debris mark, then the recorded water level is typically based on this debris level.

There are currently 48 operational MHGs within the study area. The distribution of operational MHGs between the creeks / channels is as follows:

- Bulimba Creek – 30 x MHGs
- Bulimba Creek East – 6 x MHGs
- Mimosa Creek – 3 x MHGs
- Phillips Creek – 2 x MHGs
- Salvin Creek – 4 x MHGs
- Hemmant Drain (lower) – 1 x MHG
- Tingalpa Channel (lower) – 2 x MHGs

Table 3.5 indicates the location, details and availability of the MHG records for each of the selected storm events.

Table 3.5 – Maximum Height Gauge Records

Waterway	Gauge ID	Location	Data Availability			
			March 2001	January 2013	May 2015	March 2017
Bulimba Creek	BM100	Gross Avenue, Hemmant	✓	✓	✓	✓
	BM110	Fleming Road, Hemmant	✓	✓ (debris)	✓	✗
	BM120	d/s at Murarrie Road	✓	✓	✗	✓
	BM130	u/s at Murarrie Road	✓	✗	✓	✓
	BM140	d/s at Wynnum Road	✓	✓	✓	✓
	BM023	d/s at Wynnum Road	✗ (O/T)	✗	✗	✗
	BM020	u/s at Wynnum Road	✓	✗	✗	✗
	BM150	u/s at Wynnum Road	✗	✓	✓	✓
	BM019	u/s at Wynnum Road	✓	✗	✗	✗
	BM160	Wood Avenue, Carina	✓	✓	✓	✓
	BM170	Fursden Road, Carina	✓	✓	✓	✓
	BM180	Scrub Road, Carindale	✓	✗	✓	✗
	BM190	d/s at Old Cleveland Road	✗ (O/T)	✗	✗	✗
	BM200	u/s at Old Cleveland Road	✓	✓	✓	✓ (debris)
	BM210	d/s at Winstanley Street	✓ (debris)	✗	✗	✗
	BM220	d/s at Pine Mountain Road	✓ (debris)	✗	✓	✗
	BM230	Blackberry Street, Mansfield	✓ (debris)	✓	✗ (O/T)	✓
	BM240	d/s at Wecker Road	✓ (debris)	✓	✓	✓
	BM241	u/s at Wecker Road	✗	✗	✗	✗
	BM250	u/s at Mt Gravatt Capalaba Road	✓ (debris)	✗	✗ (dest)	✓
	BM260	Maibry Street, Wishart	✓ (debris)	✗	✓	✗
	BM270	Goorari Street, Eight Mile Plains	✓	✗	✓	✗
	BM280	d/s at Logan Road	✓ (debris)	✓	✗ (dest)	✓
	BM290	u/s at Pacific Motorway	✗	✗ (dest)	✓	✓
	BM300	Easby Road, Eight Mile Plains	✓ (debris)	✓	✓	✓
	BM310	u/s at Padstow Road	✓	✓	✓	✓
	BM320	Jacinda Street, Sunnybank	✓	✓	✓	✓ (debris)
	BM330	Daw Road, Runcorn	✓	✗	✓	✗
	BM340	u/s at Beenleigh Road	✓	✗	✓	✓ (debris)
	BM350	Susan Circuit, Runcorn	✗	✗	✓	✓
	BM360	Glenefer Street, Runcorn	✗	✓	✓	✓
	BM370	u/s at Nemies Road	✗	✓	✗ (dest)	✗
	BM380	Noraville Street, Runcorn	✗	✓	✓	✓
	BM00A/B	Noraville Street, Runcorn	✓	✗	✗	✗
Bulimba Creek East	BM400	Daydream Place, Eight Mile Plains	✓	✓	✓	✗
	BM410	u/s at Miles Platting Road	✓	✗	✓	✗

Waterway	Gauge ID	Location	Data Availability			
			March 2001	January 2013	May 2015	March 2017
	BM420	u/s at Logan Road	✓ (debris)	×	✓	×
	BM430	u/s at Underwood Road	✓	×	✓	×
	BM438	d/s at Beenleigh Road	×	✓	✓	✓
	BM440	u/s at Beenleigh Road	×	✓	✓	✓
Mimosa Creek	BM500	50 m d/s of Parkway Street	✓ (debris)	✓	✓	✓
	MI120	100 m d/s of Kessels Road	×	✓	✓	✓
	MI130	Larwood Street, Upper Mt Gravatt	×	✓	✓	✓
Phillips Creek	PH110	350 m u/s of Creek Road	×	✓	✓	✓
	PH120	100 m u/s of Anzac Road	×	✓	✓	✓
Salvin Creek	SV110	115 m u/s of Donnington Street	×	✓	✓	✓
	SV118	d/s at Creek Road	×	×	×	✓
	SV120	u/s at Creek Road	×	✓	× (dest)	×
	SV126	u/s at Pine Mountain Road	×	×	×	✓
	SV130	u/s at Bevan Street	×	✓	✓	✓
Broadwater Road Drain	BM650	Brisbane Adventist College, Mansfield	×	✓	×	×
	BM660	130 m d/s of Newnham Road	×	✓	×	×
Parklands Circuit Drain	BM700	200 m d/s of Prebble Street	×	✓	×	×
	BM710	d/s at Prebble Street	×	✓	×	×
Miles Platting Road Drain	BM800	100 m u/s of Gateway Motorway	×	×	×	×
	BM810	260 m u/s of Gateway Motorway	×	✓	×	×
Tributary A	BM950	309 Priestdale Road, Rochedale (downstream)	×	×	×	×
	BM960	309 Priestdale Road, Rochedale (upstream)	×	✓	×	×
Tributary B	BM415	100 m u/s of Logan Road	×	✓	×	×
	BM416	50 m d/s of Dance Crescent	×	✓	×	×
Hemmant	HM110	500 m u/s of Bulimba Creek confluence	×	✓	✓	✓
Tingalpa Channel	TD120	1 km u/s of Bulimba Creek confluence	×	✓	✓	✓
	BM1030	u/s at Wynnum Road	×	×	✓	✓
Wishart Road Drain	BM010	u/s at Wishart Road	✓	×	×	×
Padstow Road Drain	BM306	u/s at McCullough Street	×	✓	✓	×
	BM307	d/s at Delafield Street	×	✓	× (dest)	×

(O/T) MHG overtopped

(debris) Reading from debris mark

(dest) Gauge destroyed in flood event

The total number of MHGs available for each event is indicated below:

- March 2001 – 31 x MHGs
- January 2013 – 40 x MHGs
- May 2015 – 38 x MHGs
- March 2017 – 33 x MHGs

3.4.3 Characteristics of Historical Events

3.4.3.1 March 2001 event

This event was one of the largest on record since gauges were installed in the catchment. This event produced a flood level of 6.83 mAHD at 540128 (BMA707) Old Cleveland Road, Carindale, adjacent to the Carindale Shopping Centre. This flood level is the highest recorded at this gauge and is 0.3 m higher than the May 2015 event. Many of the MHG readings were from debris marks as a considerable number of the gauges were overtopped and / or destroyed.

Table 3.6 indicates the flooding classification at three of the stream gauges. The flooding classification relates to flooding impacts in lieu of flooding frequency. The flooding classification was moderate for two gauges and less than minor for one gauge.

Table 3.6 – Flooding Classification (March 2001 event)

Gauge ID	Old BCC ID	Location	Flooding Classification
540126	BMA831	Edwards Park, Carindale	Moderate
540128	BMA707	Old Cleveland Road, Carindale	Moderate
540129	BMA528	Doughboy Parade, Hemmant	Less than Minor

The event occurred as one intense burst over a 2.5 to 3 hour period in the afternoon of the 9th March. This burst produced up to 235 mm of rainfall across the catchment, with the more intense rainfall occurring towards the top of the catchment. Heavy rain started in the catchment headwaters around 3:30 pm and tracked down the catchment with a rainfall lag of approximately two hours from top to bottom. The lower catchment experienced considerably less rainfall than the upper catchment with 540282 (LTR755) Harman Recreation Reserve, Manly recording 38 mm and 540129 (BMR527) Doughboy Parade, Hemmant recording 81 mm. This high spatial variability of the rainfall is not ideal for calibration as it leads to significant uncertainty with regards to the rainfall that fell on the catchment. The cumulative rainfall plot for each rainfall station is presented in Appendix A.

Table 3.7 indicates the 4-day and 14-day antecedent rainfall as well as statistics on the burst rainfall at the 11 rainfall stations. The catchment experienced a small amount of rainfall (up to 19 mm) in the 14-day lead up to the event of which the majority occurred in the preceding four days.

Table 3.7 - Rainfall characteristics (March 2001 event)

Gauge ID	Old BCC ID	Location	Antecedent Rainfall (mm)		Burst Rainfall (mm)		
			14-day	4-day	Peak 1hr burst	Peak 6hr burst	Peak 12hr burst
540103	P_R029	Balmoral Works Depot Morningside	8	8	79	154	154
540125	BMR836	Gagarra Street, Eight Mile Plains	12	9	116	238	239
540126	BMR830	Edwards Park, Carindale	19	15	89	183	184
540128	BMR706	Old Cleveland Road, Carindale	16	15	95	170	175
540129	BMR527	Doughboy Parade, Hemmant	10	10	42	81	84
540135	NMR833	Cavendish Road, Coorparoo	9	7	110	184	187
540233	SLR210	Underwood Road, Underwood	14	11	78	209	209
540240	NMR596	Tarana Street, Camp Hill	10	8	101	165	167
540282	LTR755	Harman Recreation Reserve, Manly	6	6	19	38	38
540784	OXR114	Beaudesert Road, Calamvale	10	9	97	178	178
540790	BMR138	Griffith University, Mt Gravatt	8	7	129	217	217

Figure 3.2 provides a comparison of the IFD curve for five selected rainfall stations against the BCC 2020 IFD curve generated in the mid-catchment.

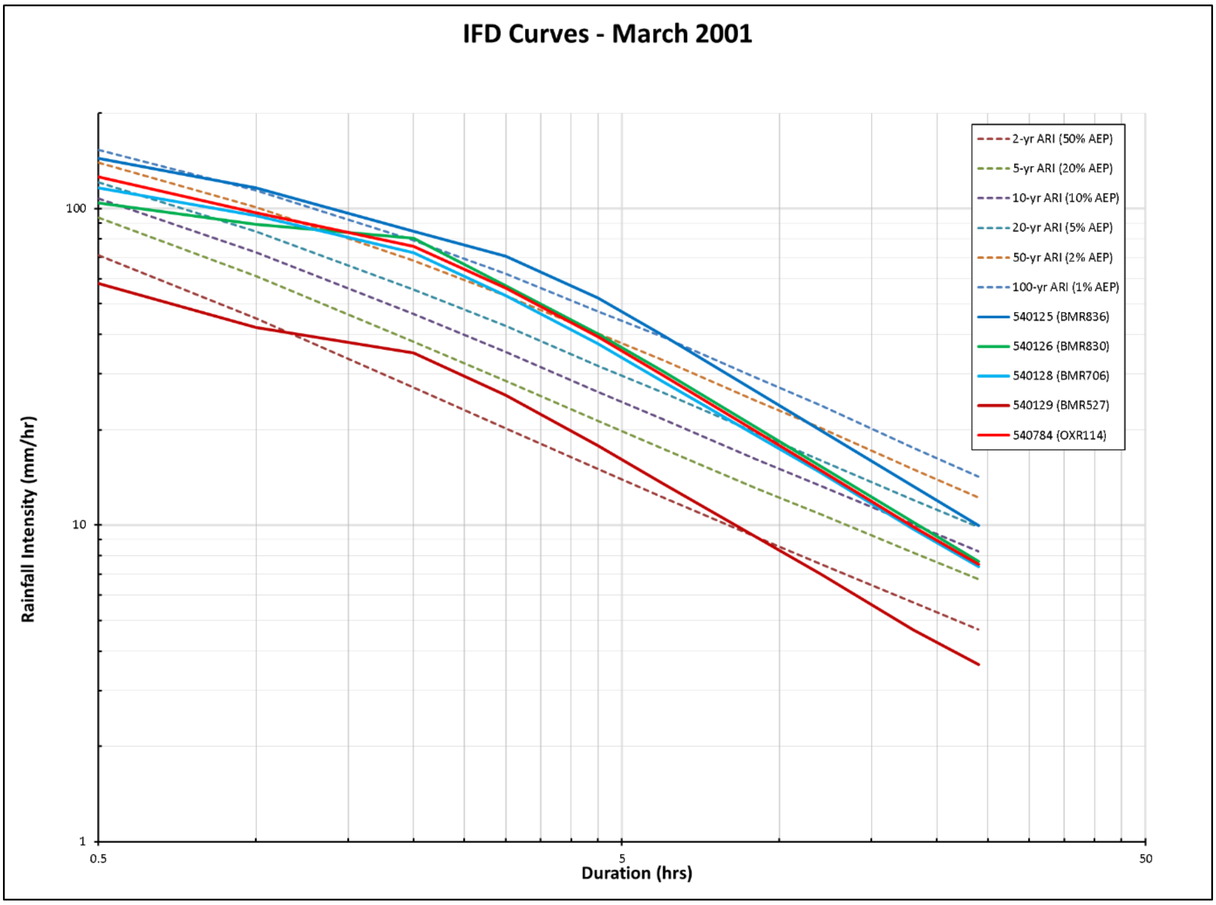


Figure 3.2: IFD Curve for March 2001 event.

The equivalent design rainfall ARI towards the middle of the catchment at Rainfall Station 540126 (BMR830) at Edwards Park, Carindale, would have been as follows:

- 1-hour rainfall: 20-yr ARI (5 % AEP) to 50-yr ARI (2 % AEP)
- 3-hour rainfall: 50-yr ARI (2 % AEP) to 100-yr ARI (1 % AEP)
- 6-hour rainfall: 20-yr ARI (5 % AEP) to 50-yr ARI (2 % AEP)
- 12-hour rainfall: 20-yr ARI (5 % AEP)

3.4.3.2 January 2013 event

This event was of minor magnitude and produced a flood level of 5.36 mAHD at 540128 (BMA707) Old Cleveland Road, Carindale, adjacent to the Carindale Shopping Centre. This flood level is approximately 1.5 m lower than the March 2001 event.

Table 3.8 indicates the flooding classification at the four stream gauges. The flooding classification relates to flooding impacts in lieu of flooding frequency. The flooding classification was minor for two gauges and less than minor for two gauges.

Table 3.8 – Flooding Classification (January 2013 event)

Gauge ID	Old BCC ID	Location	Flooding Classification
540126	BMA831	Edwards Park, Carindale	Minor
540127	BMA804	Greenwood Street, Wishart	Less than Minor
540128	BMA707	Old Cleveland Road, Carindale	Less than Minor
540129	BMA528	Doughboy Parade, Hemmant	Minor

This event produced between 205 mm and 296 mm of rainfall across the catchment over a period of four days. Steady lead up rainfall occurred for the first 2.5 days, where up to 130 mm of rain fell throughout the catchment. The most intense burst occurred over 6 hours between 12 noon and 6 pm on the 27th January, where up to 120 mm of rain fell across the catchment. This burst occurred approximately at the same time across the catchment as the weather system (Ex Tropical Cyclone Oswald) was very large. The most intense rainfall occurred in the middle to upper catchment and the least intense towards the catchment outlet. The cumulative rainfall plot for each rainfall station is presented in Appendix A.

Figure 3.3 provides a comparison of the IFD curve for five selected rainfall stations against the BCC 2020 IFD curve generated in the mid-catchment.

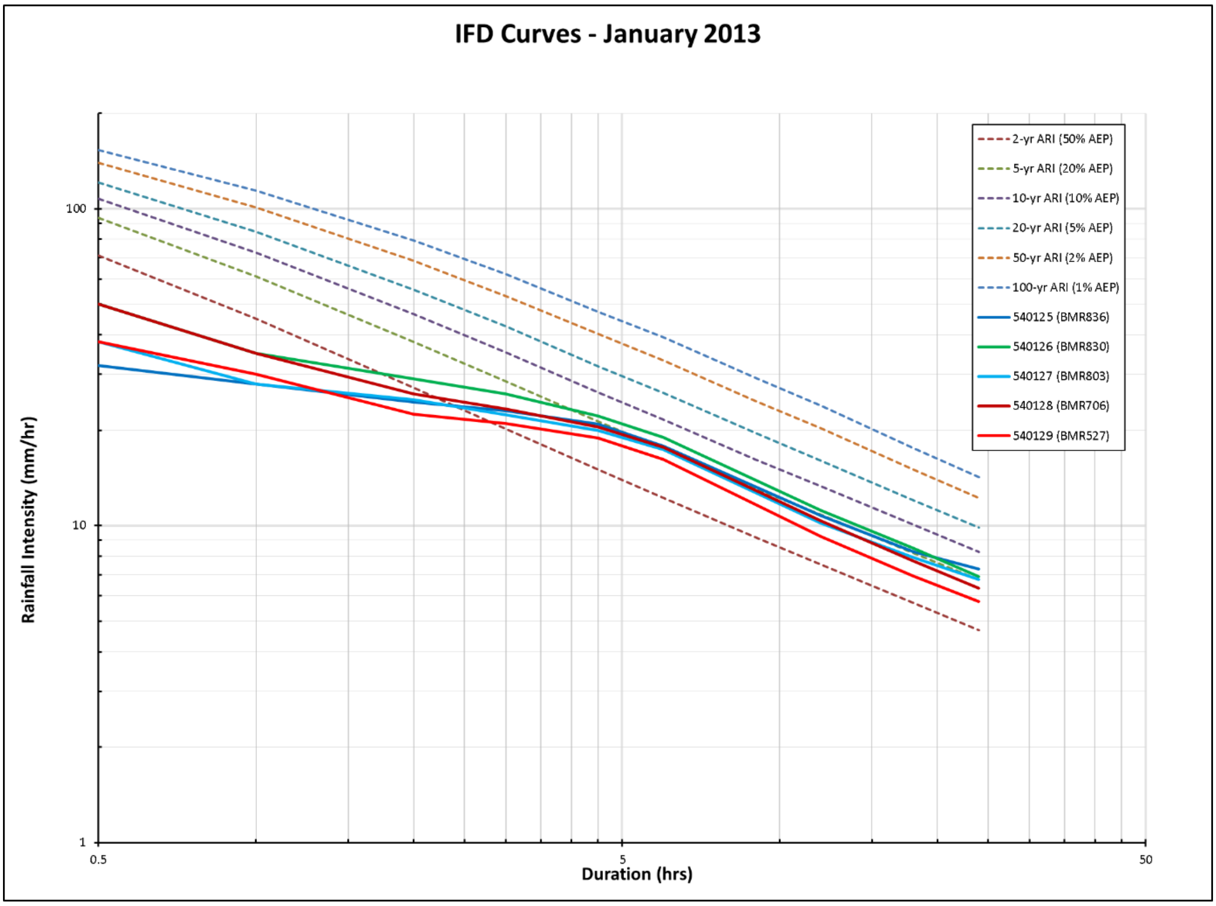


Figure 3.3: IFD Curve for January 2013 event.

The equivalent design rainfall ARI towards the middle of the catchment at Rainfall Station 540126 (BMR830) at Edwards Park, Carindale, would have been as follows:

- 1-hour rainfall: < 2-yr ARI (50 % AEP)
- 3-hour rainfall: 2-yr ARI (50 % AEP) to 5-yr ARI (20 % AEP)
- 6-hour rainfall: 5-yr ARI (20 % AEP) to 10-yr ARI (10 % AEP)
- 12-hour rainfall: 5-yr ARI (20 % AEP) to 10-yr ARI (10 % AEP)

Table 3.9 indicates the 4-day and 14-day antecedent rainfall as well as statistics on the burst rainfall at the 14 rainfall stations. The catchment experienced a small amount of rainfall (up to 24 mm) in the 14-day lead up to the event of which the majority occurred in the preceding four days.

Table 3.9 - Rainfall characteristics (January 2013 event)

Gauge ID	Old BCC ID	Location	Antecedent Rainfall (mm)		Burst Rainfall (mm)		
			14-day	4-day	Peak 1hr burst	Peak 6hr burst	Peak 12hr burst
540125	BMR836	Gagarra Street, Eight Mile Plains	16	15	28	107	129
540126	BMR830	Edwards Park, Carindale	7	7	35	114	134
540127	BMR803	Greenwood Street, Wishart	14	14	28	104	122
540128	BMR706	Old Cleveland Road, Carindale	8	7	35	106	124
540129	BMR527	Doughboy Parade, Hemmant	20	6	30	97	111
540233	SLR210	Underwood Road, Underwood	17	17	27	87	107
540240	NMR596	Tarana Street, Camp Hill	7	6	38	114	134
540279	LTR141	Rickertt Road, Ransome	20	7	31	119	139
540322	W_R837	Wynnum Bowls Club, Wynnum	12	6	29	96	109
540370	LTR840	Sleeman Centre, Chandler	6	5	24	85	99
540379	BUR1913	Burbank Alert, Burbank	17	17	31	100	117
540382	Roch1907	Rochdale South Alert, Rochdale	24	24	34	104	126
540784	OXR114	Beaudesert Road, Calamvale	13	13	26	98	123
540790	BMR138	Griffith University, Mt Gravatt	7	7	35	111	133

3.4.3.3 May 2015 event

This event was one of the largest on record since gauges were installed in the catchment. This event produced a flood level of 6.53 mAHD at 540128 (BMA707) Old Cleveland Road, Carindale, adjacent to the Carindale Shopping Centre. Table 3.10 indicates the flooding classification at the four stream gauges. The flooding classification relates to flooding impacts in lieu of flooding frequency. The flooding classification was moderate for one gauge, minor for two gauges and less than minor for one gauge.

Table 3.10 – Flooding Classification (May 2015 event)

Gauge ID	Old BCC ID	Location	Flooding Classification
540126	BMA831	Edwards Park, Carindale	Moderate
540127	BMA804	Greenwood Street, Wishart	Minor
540128	BMA707	Old Cleveland Road, Carindale	Minor
540129	BMA528	Doughboy Parade, Hemmant	Less than Minor

This event produced between 141 mm and 264 mm of rainfall across the catchment over a period of 36 hours. Steady lead up rainfall occurred for the first 30 hours, where up to 130 mm of rain fell throughout the catchment. The most intense burst occurred over 2.5 hours between 3:30 pm and 6 pm on the 1st May 2015, where up to 130 mm of rain fell across the catchment. The rainfall was typically more intense in the middle to upper catchment, with the most intense rainfall occurring at Mansfield in the mid-catchment. The cumulative rainfall plot for each rainfall station is presented in Appendix A.

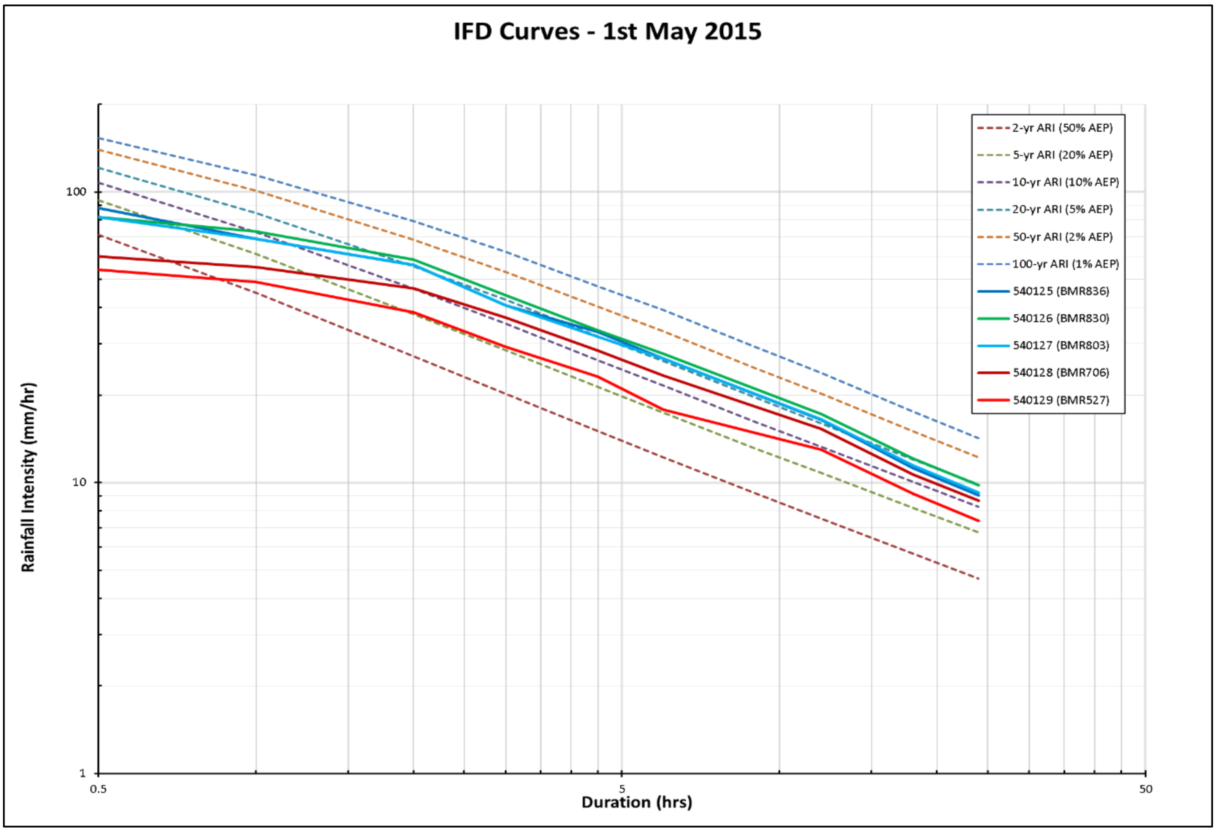


Figure 3.4: IFD Curve for May 2015 event.

Figure 3.4 provides a comparison of the IFD curve for five selected rainfall stations against the BCC 2020 IFD curve generated in the mid-catchment. The equivalent design rainfall ARI towards the middle of the catchment at Rainfall Station 540126 (BMR830) at Edwards Park, Carindale, would have been as follows:

- 1-hour rainfall: 10-yr ARI (10 % AEP)
- 3-hour rainfall: 20-yr ARI (5 % AEP) to 50-yr ARI (2 % AEP)
- 6-hour rainfall: 20-yr ARI (5 % AEP) to 50-yr ARI (2 % AEP)
- 12-hour rainfall: 20-yr ARI (5 % AEP) to 50-yr ARI (2 % AEP)

Table 3.11 indicates the 4-day and 14-day antecedent rainfall as well as statistics on the burst rainfall at the 14 rainfall stations. The catchment experienced between 10 and 61 mm of rainfall in the 14-day lead up to the event and between 5 and 19 mm of rainfall in the preceding four days.

Table 3.11 - Rainfall characteristics (May 2015 event)

Gauge ID	Old BCC ID	Location	Antecedent Rainfall (mm)		Burst Rainfall (mm)		
			14-day	4-day	Peak 1hr burst	Peak 6hr burst	Peak 12hr burst
540125	BMR836	Gagarra Street, Eight Mile Plains	12	6	69	160	197
540126	BMR830	Edwards Park, Carindale	24	10	73	166	207
540127	BMR803	Greenwood Street, Wishart	15	10	69	160	198
540128	BMR706	Old Cleveland Road, Carindale	16	9	55	140	184
540129	BMR527	Doughboy Parade, Hemmant	61	15	49	107	156
540233	SLR210	Underwood Road, Underwood	10	5	61	131	163
540240	NMR596	Tarana Street, Camp Hill	40	8	55	145	190
540279	LTR141	Rickertt Road, Ransome	29	19	36	97	141
540322	W_R837	Wynnum Bowls Club, Wynnum	46	16	25	64	101
540370	LTR840	Sleeman Centre, Chandler	20	15	55	127	164
540379	BUR1913	Burbank Alert, Burbank	18	13	49	124	166
540382	Roch1907	Rochdale South Alert, Rochdale	20	10	65	143	189
540784	OXR114	Beaudesert Road, Calamvale	13	5	65	159	190
540790	BMR138	Griffith University, Mt Gravatt	12	8	57	148	187

3.4.3.4 March 2017 event

This event was of minor magnitude and produced a flood level of 5.30 mAHD at 540128 (BMA707) Old Cleveland Road, Carindale, adjacent to the Carindale Shopping Centre. This flood level is of similar magnitude to the January 2013 event and is approximately 1.5 m lower than the March 2001 event. Table 3.12 indicates the flooding classification at the four stream gauges. The flooding classification relates to flooding impacts in lieu of flooding frequency. The flooding classification was minor for one gauge and less than minor for three gauges.

Table 3.12 – Flooding Classification (March 2017 event)

Gauge ID	Old BCC ID	Location	Flooding Classification
540126	BMA831	Edwards Park, Carindale	Minor
540127	BMA804	Greenwood Street, Wishart	Less than Minor
540128	BMA707	Old Cleveland Road, Carindale	Less than Minor
540129	BMA528	Doughboy Parade, Hemmant	Less than Minor

This event produced between 176 mm and 246 mm of rainfall across the catchment over a period of 36 hours. The most prolonged burst occurred over six hours between 5 am and 11 am on the 30th March, where up to 108 mm of rainfall was recorded. A second shorter burst occurred later that afternoon between 5:30 pm and 8 pm, which resulted in a double peaked hydrograph. This doubled peaked hydrograph is more pronounced in the upper catchment compared with the lower catchment, where it has somewhat dissipated. The cumulative rainfall plot for each rainfall station is presented in Appendix A.

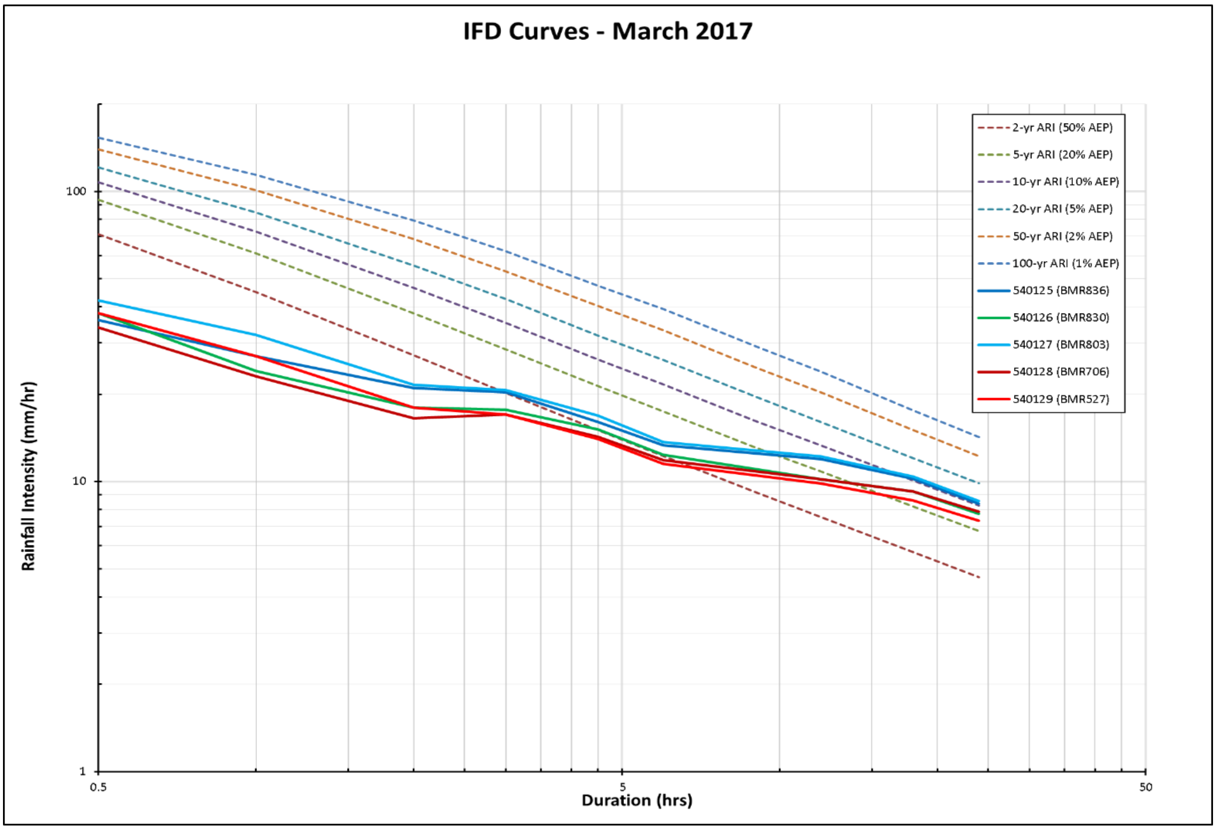


Figure 3.5: IFD Curve for March 2017 event.

Figure 3.5 provides a comparison of the IFD curve for five selected rainfall stations against the BCC 2020 IFD curve generated in the mid-catchment. The equivalent design rainfall ARI towards the middle of the catchment at Rainfall Station 540126 (BMR830) at Edwards Park, Carindale, would have been as follows:

- 1-hour rainfall: < 2-yr ARI (50 % AEP)
- 3-hour rainfall: < 2-yr ARI (50 % AEP)
- 6-hour rainfall: 2-yr ARI (50 % AEP)
- 12-hour rainfall: 2-yr ARI (50 % AEP) to 5-yr ARI (20 % AEP)

Table 3.13 indicates the 4-day and 14-day antecedent rainfall as well as statistics on the burst rainfall at the 14 rainfall stations. The catchment experienced a considerable amount of rainfall (between 82 and 144 mm) in the 14-day lead up to the event, of which effectively no rainfall occurred in the four days preceding the event.

Table 3.13 - Rainfall characteristics (March 2017 event)

Gauge ID	Old BCC ID	Location	Antecedent Rainfall (mm)		Burst Rainfall (mm)		
			14-day	4-day	Peak 1hr burst	Peak 6hr burst	Peak 12hr burst
540125	BMR836	Gagarra Street, Eight Mile Plains	106	1	27	80	143
540126	BMR830	Edwards Park, Carindale	93	0	24	74	122
540127	BMR803	Greenwood Street, Wishart	100	0	32	82	146
540128	BMR706	Old Cleveland Road, Carindale	112	0	23	71	122
540129	BMR527	Doughboy Parade, Hemmant	94	0	27	69	118
540233	SLR210	Underwood Road, Underwood	82	0	23	71	119
540240	NMR596	Tarana Street, Camp Hill	144	0	25	73	113
540279	LTR141	Rickertt Road, Ransome	136	0	43	88	152
540322	W_R837	Wynnum Bowls Club, Wynnum	115	0	37	83	135
540370	LTR840	Sleeman Centre, Chandler	106	0	48	104	168
540379	BUR1913	Burbank Alert, Burbank	139	0	33	83	128
540382	Roch1907	Rochdale South Alert, Rochdale	133	1	48	108	165
540784	OXR114	Beaudesert Road, Calamvale	87	1	29	93	145
540790	BMR138	Griffith University, Mt Gravatt	98	0	29	86	140

4.0 Hydrologic Model Development and Calibration

4.1 Overview

The hydrologic model simulates the rainfall-runoff-routing process within the catchment. A WBNM model was previously developed for the Bulimba Creek Catchment as part of the previous flood study. This model contained 76 sub-catchments and was developed to be used in conjunction with the previous MIKE11 hydraulic model, which only modelled the main creeks and not the tributaries. As this current study involves the hydraulic modelling of considerably more tributaries, the previous WBNM model was considered unsuitable, which necessitated the development of a new hydrologic model. The URBS software was chosen for use in this study to be consistent with the most recent BCC creek flood studies, which have utilised this hydrologic software.

Hydrologic modelling for this study was performed using the URBS (version 6.34) software. URBS allows the effects of development / urbanisation to be assessed, which makes it suitable for largely urbanised catchments such as Bulimba Creek. URBS also provides the option of modelling the sub-catchment and channel routing separately by selecting the “Split” modelling approach. This approach allows better compatibility with the hydraulic model, as the channel routing component can be matched to the hydraulic model, while varying the sub-catchment routing parameters to achieve calibration to recorded events.

Sub-catchment routing using the “Split” modelling approach is undertaken by routing through a non-linear reservoir, of which the storage-discharge relationship is based upon the following equation:

$$S_{catch} = \{\beta \sqrt{A}(1 + F)^2 / (1 + U)^2\}Q^m$$

where:

S_{catch} = catchment storage
β = catchment lag parameter
A = area of sub-catchment
U = fraction urbanisation of sub-catchment
F = fraction of sub-catchment forested
m = catchment non-linearity parameter
Q = outflow

Routing of all major open waterways and tributaries utilised the Muskingum methodology, which is based on the following equation:

$$S_{chnl} = \alpha f(\mathrm{n}L / \sqrt{S_c})(xQ_u + (1 - x)Q_d)^n$$

where:

S_{chnl} = channel storage
α = channel lag parameter
f = reach length factor
L = length of reach
S_c = slope of reach
Q_u = inflow at upstream end of the reach
Q_d = inflow at downstream end of the reach
x = Muskingum translation parameter
n = Muskingum non-linearity parameter
n = Manning’s ‘n’ or channel roughness

For further details on this modelling approach refer to the URBS User Manual.[7]

4.2 URBS Sub-catchment Data

4.2.1 General

This section describes the sub-catchment information used in the URBS model. URBS allows the user to define the sub-catchment with differing levels of detail depending on the type of catchment and requirements for the study.

For this study, the following URBS parameters were utilised:

Area:	Sub-catchment area (mandatory)
UL:	Low density urban fraction
UM:	Medium density urban fraction
UH:	High density urban fraction
UD:	Disturbed fraction (land with no cover and / or under development)
UR:	Rural fraction (rural land in urban area with good cover, cleared but not forested)
UF:	Forested fraction
I:	Impervious fraction

The adopted sub-catchment parameters for the calibration and verification events are presented in Appendix B. The same sub-catchment parameters have been used for the January 2013, May 2015 and March 2017 events because they are relatively close together. A separate set of parameters was used for the March 2001 event as there were significant changes in the catchment development when compared with the three more recent events.

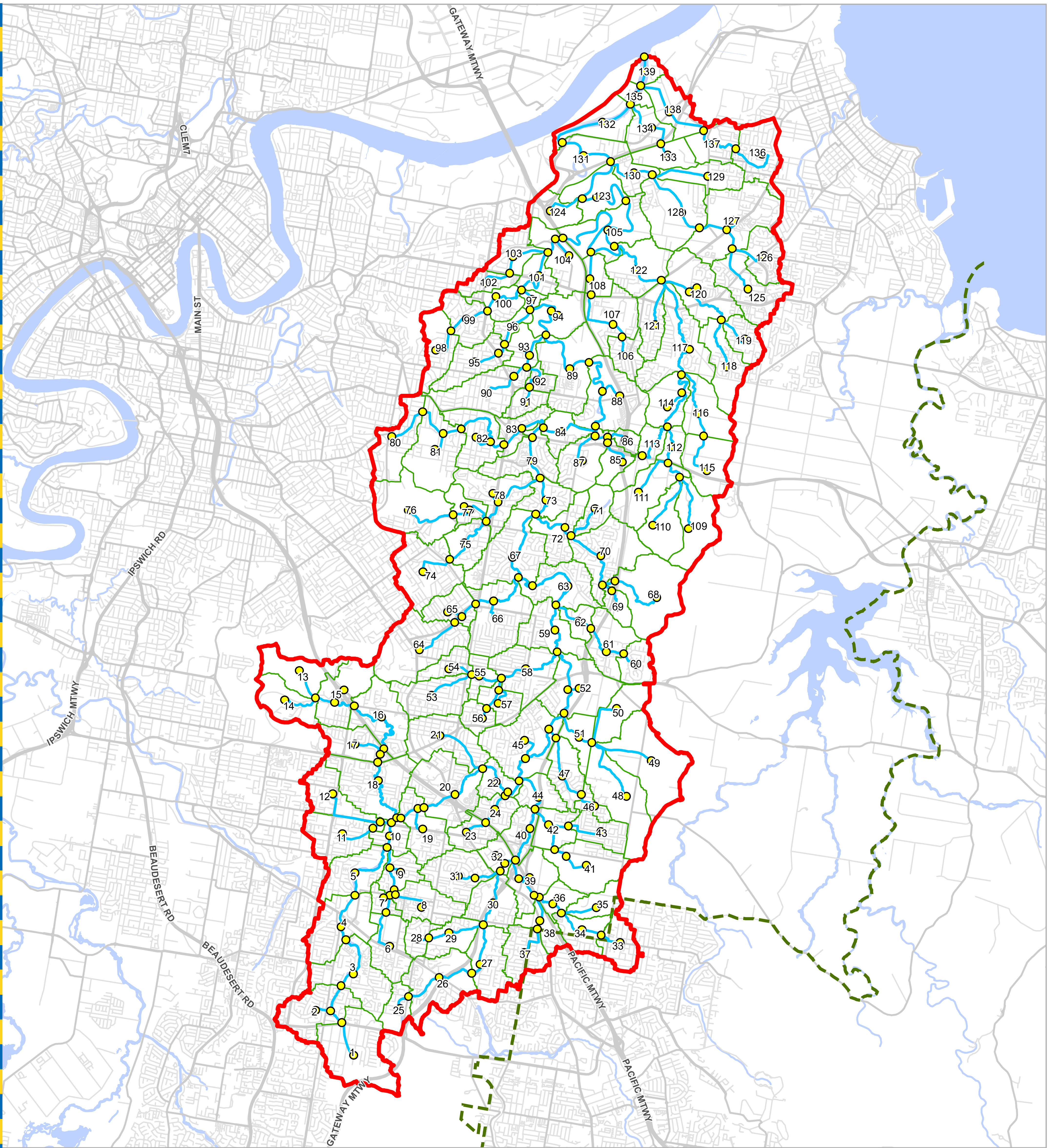
4.2.2 Sub-catchment Delineation

The URBS model was divided into 139 sub-catchments as indicated in Figure 4.1. Based on a total catchment area of 123.7 km^2, the average sub-catchment size was 0.89 km^2. The sub-catchment delineation was based upon the 2019 ALS contours and considered the location of hydraulic model inflows, major tributaries, hydrometric gauges and stormwater drainage, as well as man-made boundaries such as motorways and railways. Where possible, the sub-catchment delineation aimed to achieve the following:

- Similarly sized sub-catchments
- Limit excessively small / large and elongated / odd shaped sub-catchments
- Ensure there are at least 5 sub-catchments upstream of calibration points

.

[7] DG Carroll 2016 - *URBS A Rainfall Runoff Routing Model for Flood Forecasting and Design Version 6.00*



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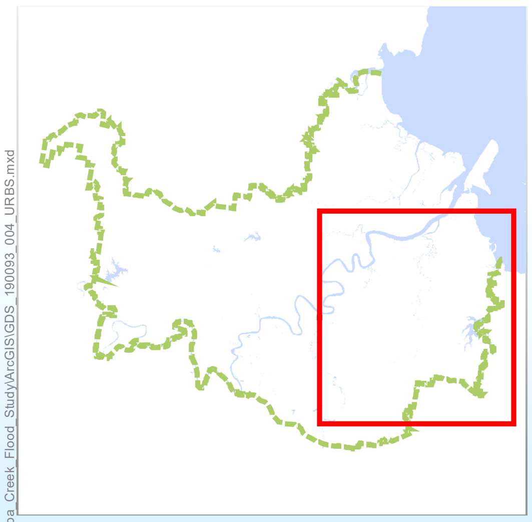

Legend

- URBS Link
- URBS Node
- URBS Subcatchment
- Bulimba Creek Catchment Area
- Brisbane City Boundary
- Road

0 840 1,680 2,520
Metres

N E S W

Prepared : 089958
Checked : NC
Revision : 0
Publication Date : 28 Jan 2021
Project Number : 100001

File : G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\ArcGIS\GDS_190093_004_URBS.mxd

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Figure 4.1 - URBS Model Schematisation

GDS - 190093 - 004

4.2.3 Land Use and Impervious Area

The effect of development / urbanisation is modelled in URBS using an Urbanisation Index (U) and Impervious Fraction (I). The Urbanisation Index (U) is used to determine the decrease in catchment lag and the Impervious Fraction (I) is used to determine the increase in runoff volume as a result of development. The Urbanisation Index (U) for each sub-catchment is determined with respect to the urbanisation indices; namely UL, UM, UH, UD, UR and UF for this study. These represent the fraction of the sub-catchment area occupied by that specific urbanisation index. For example, a value of UL = 0.1 equates to 10 % of the sub-catchment area being occupied by the Urban Low Density (UL) urbanisation index.

To determine the value of UL, UM, UH, UD, UR and UF for each sub-catchment, it was firstly required to adopt impervious fractions for each and secondly determine the total impervious area.

Impervious Fractions
The partly impervious urbanisation indices were assigned the following impervious fractions: UL = 0.15; UM = 0.5; and UH = 0.9. The threshold Urban Impervious Fraction (UI) was assigned the default value of 0.5. The pervious urbanisation indices of UD, UR and UF all adopt an impervious fraction of 0.0 by default.

Total Impervious Area
Using the catchment land use maps from BCC City Plan 2014 and the adopted land use percentage impervious (refer Appendix C); the total impervious area for the sub-catchment was able to be determined. The impervious fraction for the road reserve was assigned on a sub-catchment by sub-catchment basis to reflect the actual conditions. From this, the Impervious Fraction (I) for each sub-catchment was able to be determined.

Once the Impervious Fractions (I) were assigned and the Total Impervious Area determined, the following process was used to assign values to UL, UM, UH, UR and UF:

(i) Each BCC City Plan 2014 land use category within the catchment was assigned to the most appropriate urbanisation index (UL, UM, UH, UR or UF) and the respective area of each determined.
(ii) The impervious area for each sub-catchment was calculated using the adopted fraction impervious for each category.
(iii) This calculated impervious area was compared to the total impervious area for each sub-catchment.
(iv) The values of the urbanisation indices were adjusted (as required) so that this calculated impervious area matched the total impervious area for each sub-catchment.

As there were only small pockets of the UD category, these areas were digitised from aerial photography.

Effective Impervious Area
To make the distinction between those impervious areas that generate a rapid runoff response (typically those directly connected to the drainage system) and those impervious areas which do not (typically those not directly connected to the drainage system), a factor of 0.7 was applied. This is represented in URBS on the USES key line in the vector file as I*0.7.

4.2.4 Baseflow

Streamflow consists of two components, namely quickflow and baseflow. Flow from rainfall excess that enters the stream rapidly is termed as quickflow, whereas flow that takes longer to reach a river is termed as baseflow and is sourced primarily from groundwater discharge into the river. [8]

In consultation with the study peer reviewer (BMT), it was decided to include baseflow. Baseflow is included in the URBS model, based on the following equation:

$BF(t) = BF(t\text{-}1) \times BR + QF^{BM} \times BC$

where,

BF(t) = Baseflow at time t

BF(t-1) = Baseflow at previous time t-1

BR = Baseflow Recession Constant (Daily Value)

QF = Quick-flow component of the hydrograph

BC = Baseflow Constant (Daily Value)

BM = Baseflow exponent (1 for linear or < 1.0 for non-linear)

For the purpose of this analysis, a linear relationship between quickflow and baseflow was adopted (i.e. BM = 1). For BM = 1, the Baseflow Constant (BC) can be determined from the following equation:

$BC = BFI \times (1\text{-}BR) / (1\text{-}BFI)$

where, BFI = Baseflow Index

A Baseflow Index of 0.22 was initially adopted based on a baseflow separation analysis at Stream Gauge 540126 (BMA831) as part of a separate project. This analysis used the Lyne and Hollick method for a continuous flow record from 1971 to 2018. As part of the calibration, the BFI was varied from 0.1 to 0.25 to determine the best fit to the recession limb of the hydrograph.

A BR value of 0.5 was adopted based upon our review of the observed baseflow recession at the three stream gauges.

The default in URBS modelling (URBS_BASF=TRUE) is that the first ordinate of the recorded gauge level will be converted to flow and assumed as baseflow. For this study, URBS_BASF=FALSE was used as it is considered more realistic due to the unknown water level at the start of the simulation, due to the BCC lowest gauged level being considerably above the creek invert.

[8] Hill P, Nathan R, Brown R and Graszkiewicz Z, 2019, Baseflow Models, Book 5 Chapter 4 in Australian Rainfall and Runoff - A Guide to Flood Estimation, Commonwealth of Australia

4.3 URBS Channel Data

URBS allows the user to define the channel with differing levels of detail depending on the type of catchment and requirements for the study. For this study the following parameters were utilised:

- L: Channel length (mandatory)
- S_c: Channel slope

The channel length was determined using GIS software and the channel slope typically from channel survey or 2019 ALS (at locations where channel survey was not available). For channels where there where noticeable changes in grade, the equal area method was used to determine the slope.

4.4 Event Rainfall

4.4.1 Observed Rainfall

Recorded rainfall data from each calibration and verification event was incorporated into the URBS model at five-minute intervals, noting that the rainfall gauge only records information when 1 mm or more of rain has fallen.

Thiessen Polygons were utilised for each event to enable the gauged rainfall to be apportioned to each of the sub-catchments in the URBS model. Those sub-catchments which fell totally within a polygon were fully assigned to the respective rainfall station. Where sub-catchments bridged across two or more polygons, the total rainfall depth was adopted from the polygon (rain gauge) which contained the greater proportion of the sub-catchment area.

Figures indicating the Thiessen Polygon distribution for the four historical events are presented in Appendix A for reference. The distribution for the January 2013, May 2015 and March 2017 events was the same, whilst the March 2001 event had a unique distribution.

4.4.2 Rainfall Losses

The Initial Loss (IL) and Continuing Loss (CL) methodology was used to simulate the rainfall losses. For impervious areas, the URBS model assumes by default that there is no initial loss and 100 % runoff. Therefore, rainfall losses are only subtracted from the pervious portion of the sub-catchment.

The IL (mm) is known to be the amount of rainfall that occurs before the start of surface runoff. The initial loss comprises factors such as interception storage (e.g. tree leaves); depression storage (e.g. ditches, surface puddles, etc.) and the initial infiltration capacity of the soil, whereby a dry soil has a larger capacity than a saturated soil.

The CL (mm/hr) is assumed to be the average loss rate throughout the remainder of the rainfall event and is predominantly dependant on the underlying soil type and porosity.

4.5 Stream Gauge Rating Curve

In order to undertake the hydrological calibration, the following three stream gauges were utilised:

- 540126 (BMA831) – Bulimba Creek at Edwards Park, Carindale.
- 540127 (BMA804) – Bulimba Creek at Greenwood Street, Wishart.
- 540128 (BMA707) – Bulimba Creek at Old Cleveland Road, Carindale.

540129 (BMA528) at Doughboy Parade, Hemmant was not used for the hydrologic calibration because the location is within the tidal limits of the catchment.

To convert gauged water levels into discharge, it was necessary to utilise a rating curve at the three stream gauge locations. BCC Hydrometrics does not keep records of rating curves for stream gauges; therefore, it was required to generate a rating curve at each location. This was undertaken using the TUFLOW hydraulic model; for further discussions on the TUFLOW model refer to Section 5.

Figures 4.2 to 4.4 indicate the rating curve used at 540127 (BMA804), 540126 (BMA831) and 540128 (BMA707) respectively.

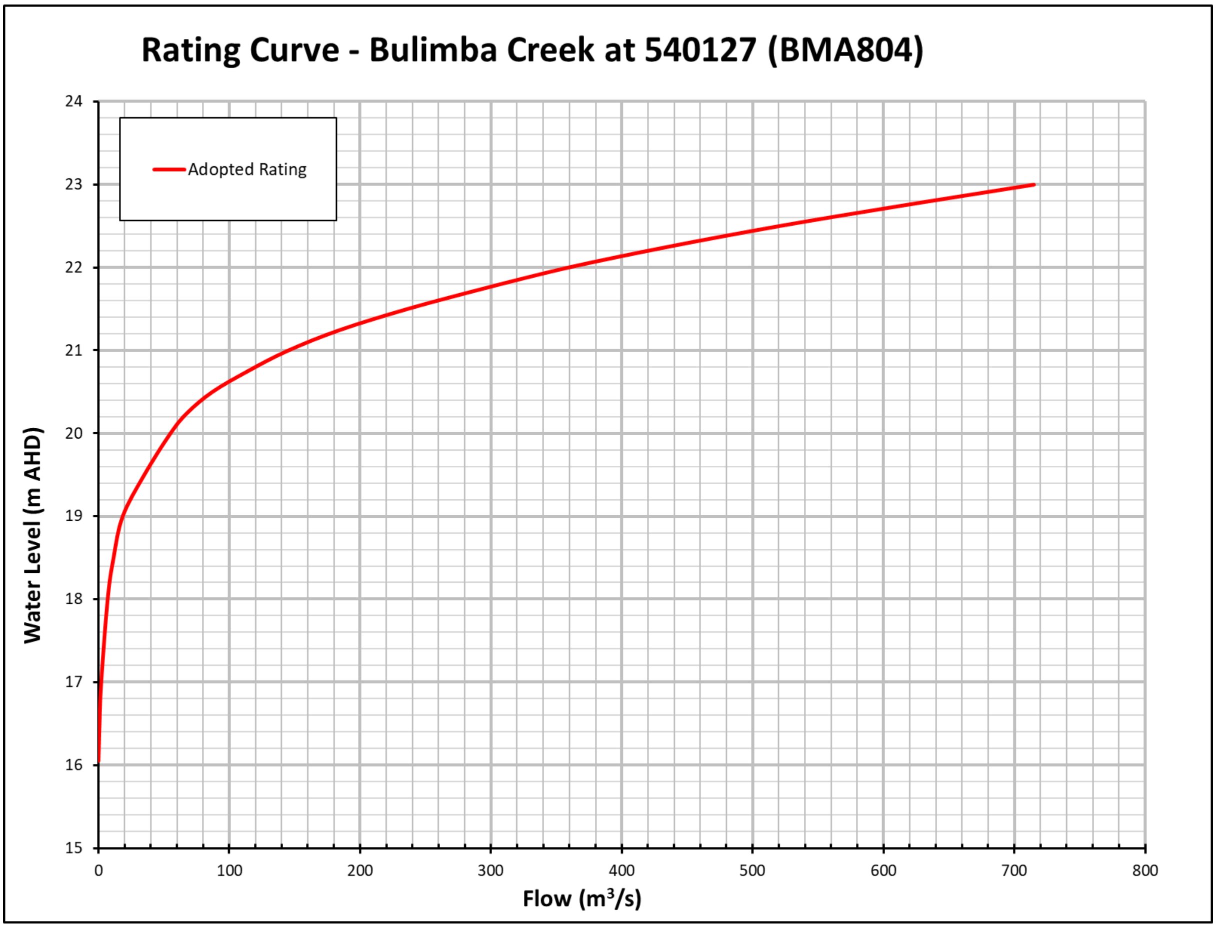

Figure 4.2: Rating Curve – Bulimba Creek at Greenwood Street, Wishart

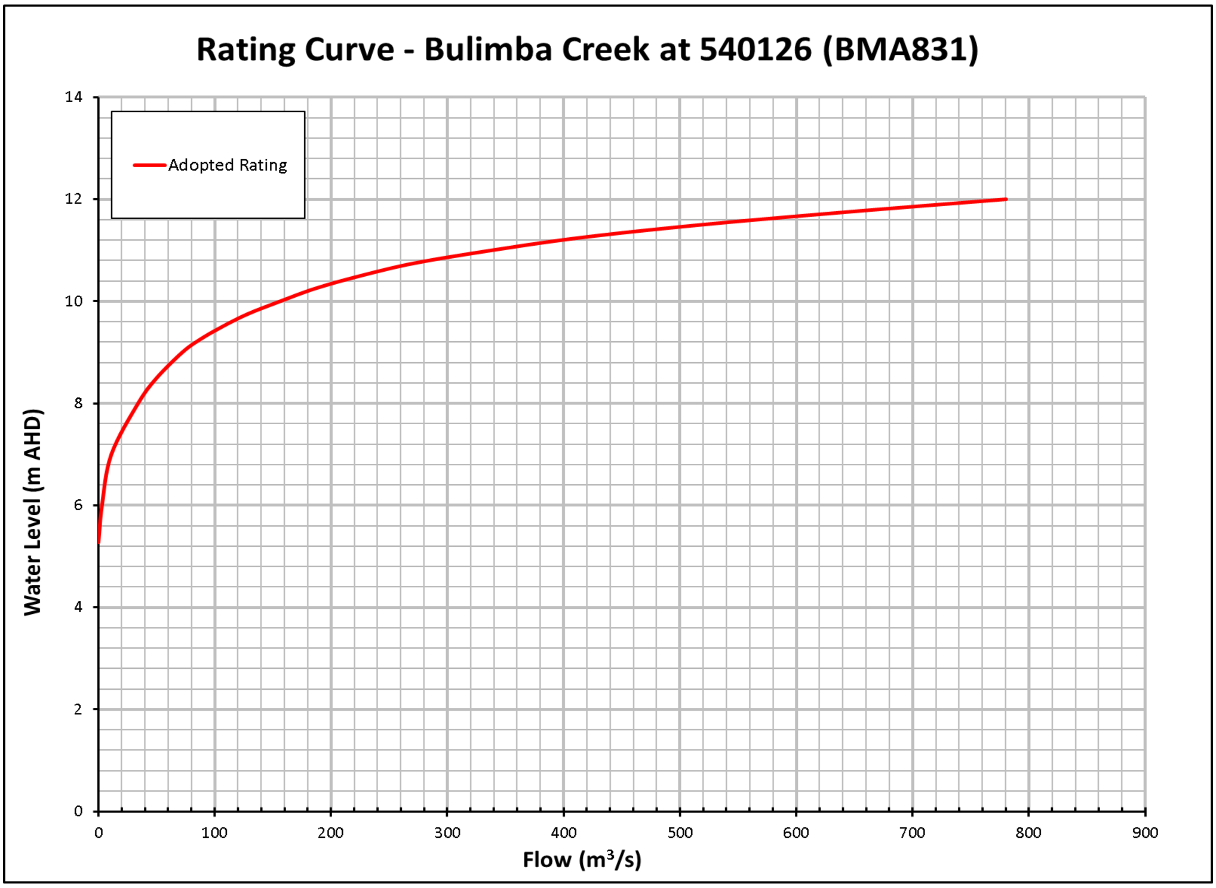

Figure 4.3: Rating Curve – Bulimba Creek at Edwards Park, Carindale

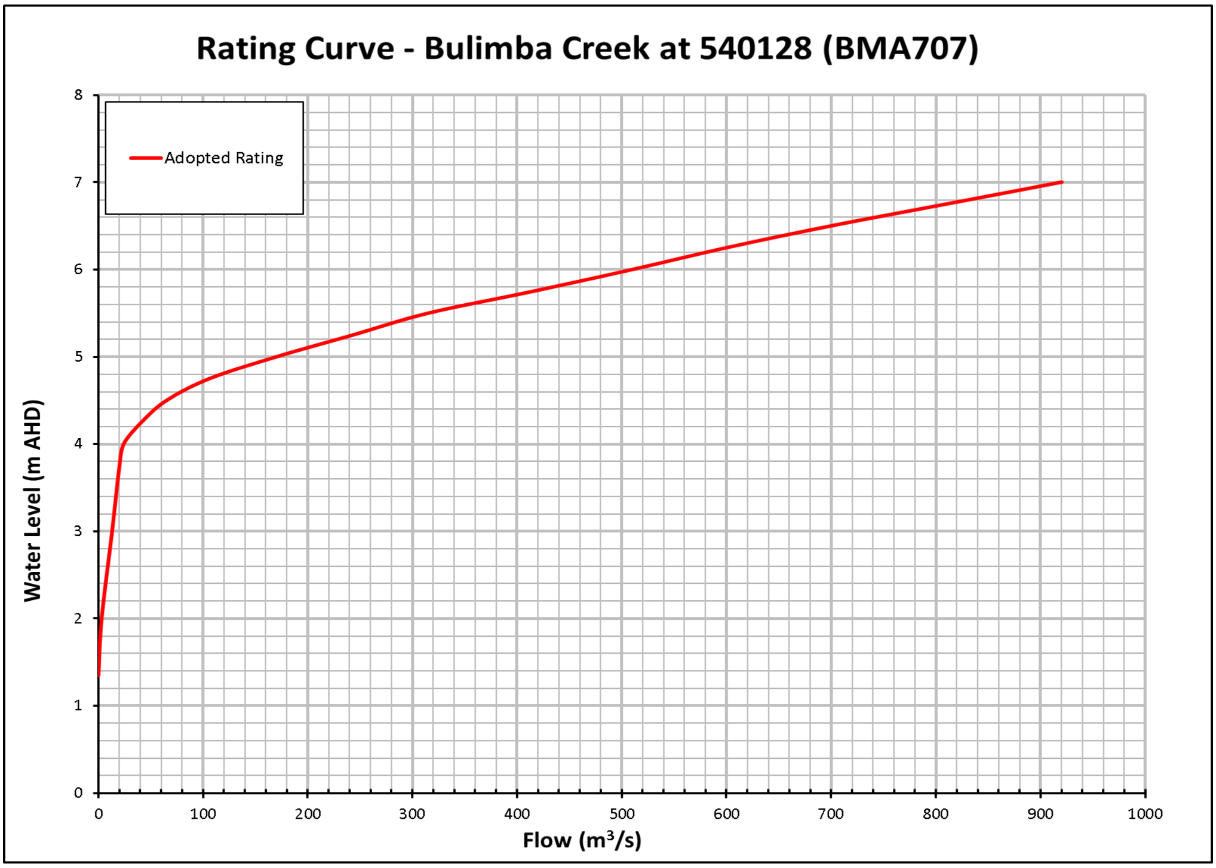

Figure 4.4: Rating Curve – Bulimba Creek at Old Cleveland Road, Carindale

4.6 Calibration and Verification Procedure

4.6.1 General

The calibration and verification process was adopted to suit the study objectives and requirements. The general requirements were to produce a hydrologic model sufficiently robust to accurately predict design discharges without the need to run the hydraulic model. This requirement meant that the approach adopted was to undertake a separate hydrologic calibration to ensure the URBS model was suitable to be used as a "standalone" model. The general approach adopted for the calibration and verification is indicated in Section 4.6.3.

4.6.2 Tolerances

The current BCC Flood Study Procedure document[6] is not prescriptive in relation to the ideal hydrologic calibration and verification tolerances. For the purposes of this study, the calibration and verification process has aimed to achieve the following tolerances: [9]

- Volume - within +20 % to -10 %
- Peak Flow - within +25 % to -15 %
- Good replication of the hydrograph shape (especially the rising limb)
- Good replication of the timing of peaks and troughs.

4.6.3 Methodology

The methodology applied to the calibration and verification of the URBS model was as follows:

1) Input the observed rainfall data and apportion the rainfall to each sub-catchment. This was undertaken using the Thiessen Polygon methodology as described in Section 4.4.
2) Using the TUFLOW model, establish an appropriate rating curve at the three stream gauges and convert the stage recordings to flow. This was detailed in Section 4.5.
3) Run the calibration events (i.e. March 2001, January 2013 and May 2015) through the URBS model and compare the simulated results against the observed (rated) flow records.
4) Iteratively adjust the model parameters (as required) and re-run the model to achieve the best possible fit with the observed data. The predominant model parameters adjusted included the IL (mm); CL (mm/hr); channel lag parameter (α); catchment lag parameter (β); catchment non-linearity parameter (m) and baseflow parameters (BFI / BC / BR)
5) Adopt a single set of model parameters [typically CL, α, β, m and baseflow parameters (BFI / BC / BR)] based on the calibration results.
6) Run the verification event (i.e. March 2017) through the calibrated URBS model and compare the simulated results against the observed (rated) flow records.
7) Adjust the initial loss (as required) to represent the event specific rainfall lost at the start of the verification event.
8) Repeat steps 2 to 7 (as necessary) following the results of the hydraulic model simulations. If required, adjust the reach length factor (f) to better replicate the results of the hydraulic model. Refer to Section 5 for more detail on the hydraulic modelling.

[9] CIWEM UDG (UK) – *Code of Practice for the Hydraulic Modelling of Urban Drainage Systems, 2017*

4.7 Simulation Parameters

Table 4.1 indicates the start and finish times of the hydrologic simulations as well as the time step used in the URBS model.

Table 4.1 – Hydrologic Simulation Parameters

Event	Start Time	Finish Time	Duration (hours)	Time Step (min)
March 2001	09/03/01 12:00	11/03/01 00:00	60	0.5
January 2013	25/01/13 00:00	30/01/13 00:00	120	0.5
May 2015	30/04/15 12:00	03/05/15 00:00	60	0.5
March 2017	29/03/17 12:00	01/04/17 00:00	60	0.5

4.8 Hydrologic Model Calibration Results

4.8.1 March 2001

Figure 4.5 and Figure 4.6 provide a comparison of the URBS results and the rated flow (established using the adopted rating curves) at two of the stream gauges. The results indicate a good fit to the peak flow at both stream gauges.

At 540126 (BMA831), the modelled peak flow is approximately 9 % higher than the rated observed peak flow and at 540128 (BMA707) the modelled peak flow is approximately 2 % lower than the rated observed peak flow. The timing of the modelled peak flow at 540126 (BMA831) is approximately 30-minutes before the observed peak flow.

At 540128 (BMA707), the timing of the modelled and observed peak flow matches very well. The modelled flood volume at 540126 (BMA831) is slightly lower than the rated observed volume and at 540128 (BMA707) is approximately 20% lower.

The adopted URBS parameters as part of the calibration of this event are as indicated below.

- Sub-catchment Routing
    - Catchment lag parameter (β) = 4
    - Catchment non-linearity parameter (m) = 0.65

- Channel Routing
    - Channel lag parameter (α) = 0.01
    - Muskingum non-linearity parameter (n) = 1
    - Muskingum translation parameter (x) = 0.25

- Rainfall Losses
    - Impervious Area: IL = 0 mm, CL = 0 mm/hr (URBS default)
    - Pervious Area: IL = 60 mm, CL = 2.5 mm/hr

- Baseflow
  - Baseflow Index (BFI) = 0.22
  - Minimum Persistent Baseflow Value (B0) = 0
  - Daily Baseflow Recession Factor (BR) = 0.5
  - Baseflow Constant applied to runoff (BC) = 0.141
  - Baseflow Exponent applied to runoff (BM) = 1

Further results from the calibration are provided in Section 5.4 and a discussion on the overall calibration / verification results is provided in Section 5.8.

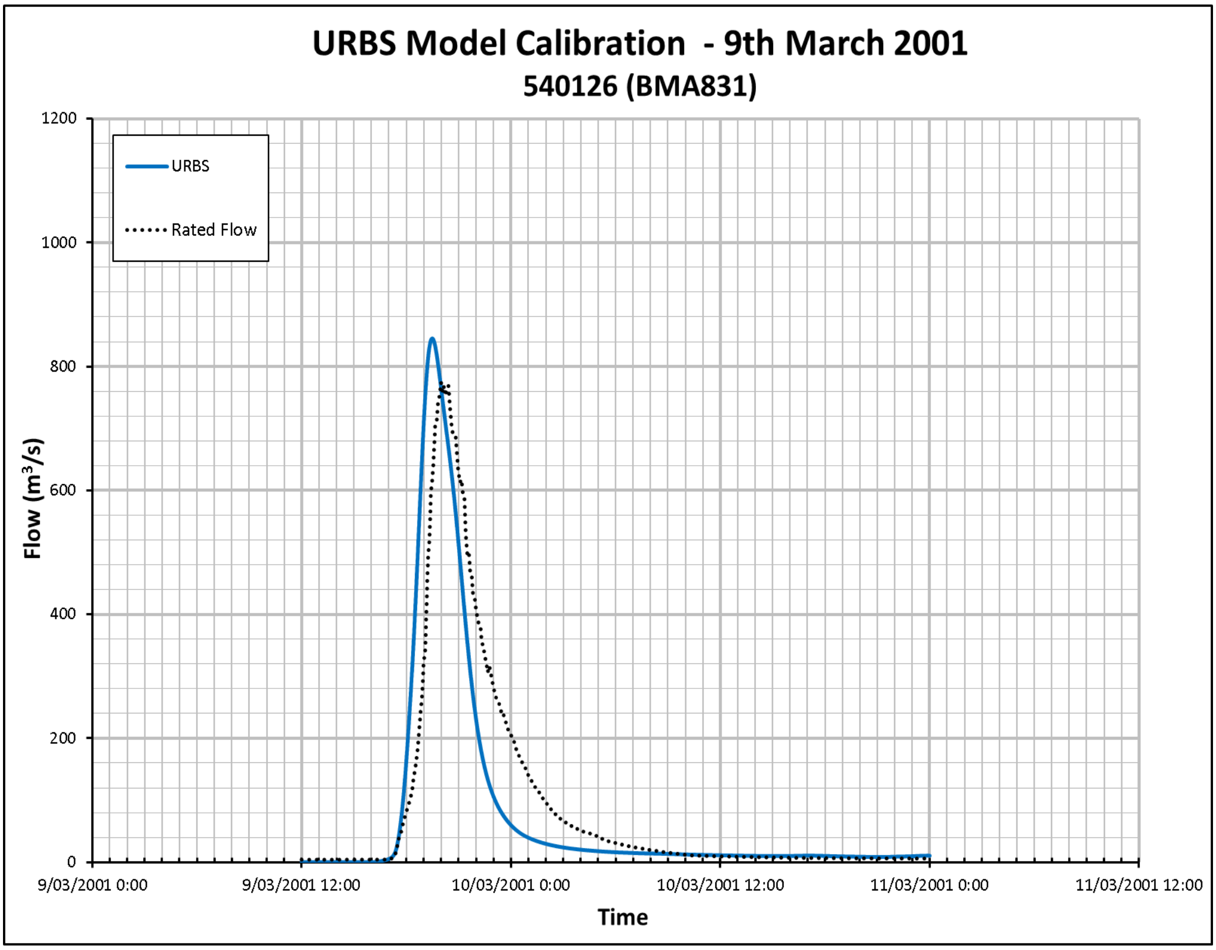

Figure 4.5: March 2001 URBS Model Calibration – Bulimba Creek at 540126 (BMA831)

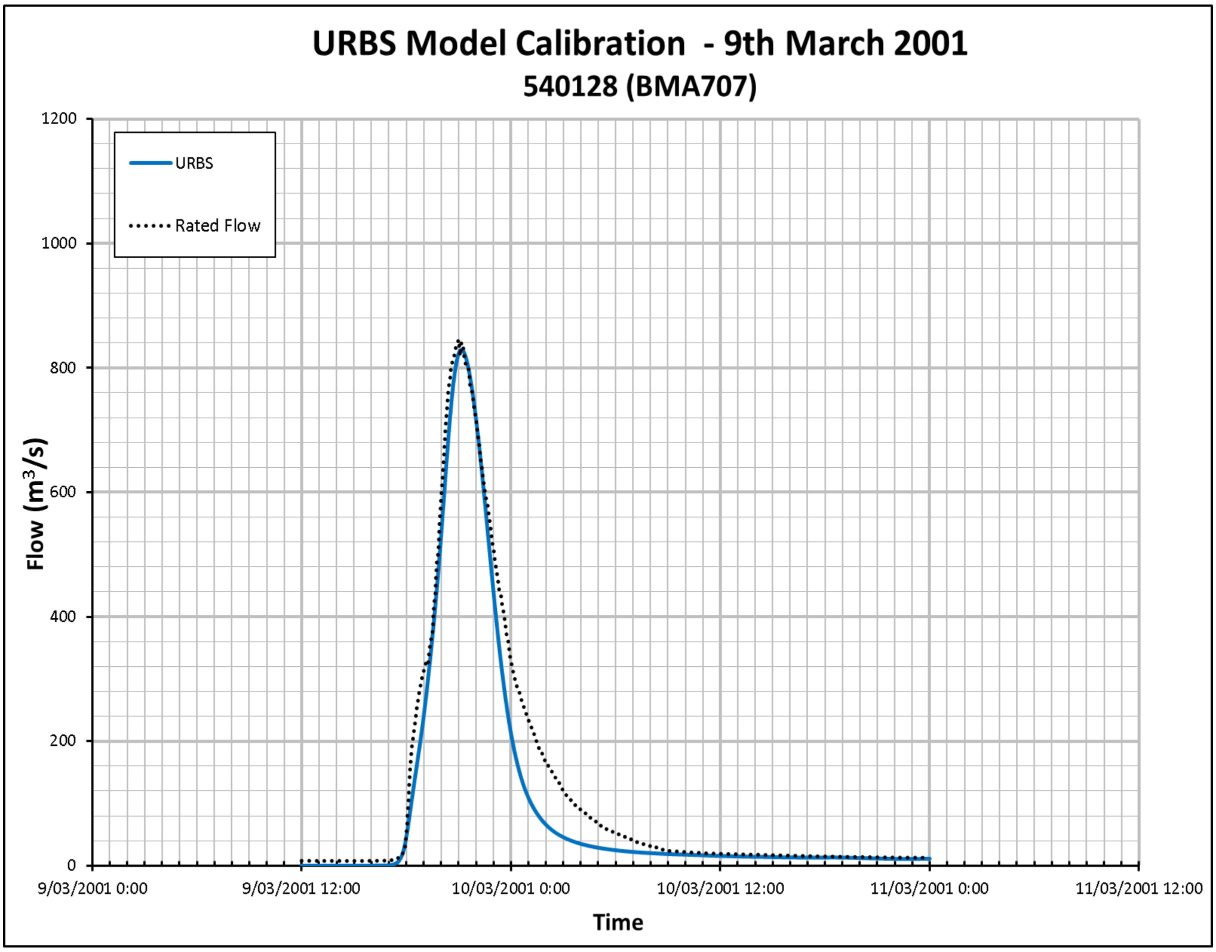

Figure 4.6: March 2001 URBS Model Calibration – Bulimba Creek at 540128 (BMA707)

4.8.2 January 2013

Figure 4.7 to Figure 4.9 provide a comparison of the URBS results and the rated flow (established using the adopted rating curve) at the three stream gauges. The results typically indicate a reasonable fit to the shape and timing of the peak flow at all three stream gauges.

At 540127 (BMA804), the modelled peak flow is approximately 16 % lower than the rated observed peak flow and occurs approximately 30-minutes before the observed.

At 540126 (BMA831), the modelled peak flow is approximately 14 % higher than the rated observed peak flow and occurs approximately 60-minutes before the observed.

At 540128 (BMA707), the modelled peak flow is approximately 30 % higher than the rated observed peak flow and occurs approximately 75-minutes before the observed.

Flood volumes vary between stream gauges with respect to the rated observed flood volume. The modelled flood volume is lower than the observed at 540127 (BMA804) and higher than the observed at 540128 (BMA707). At 540126 (BMA831), the modelled and rated observed flood volumes match very well.

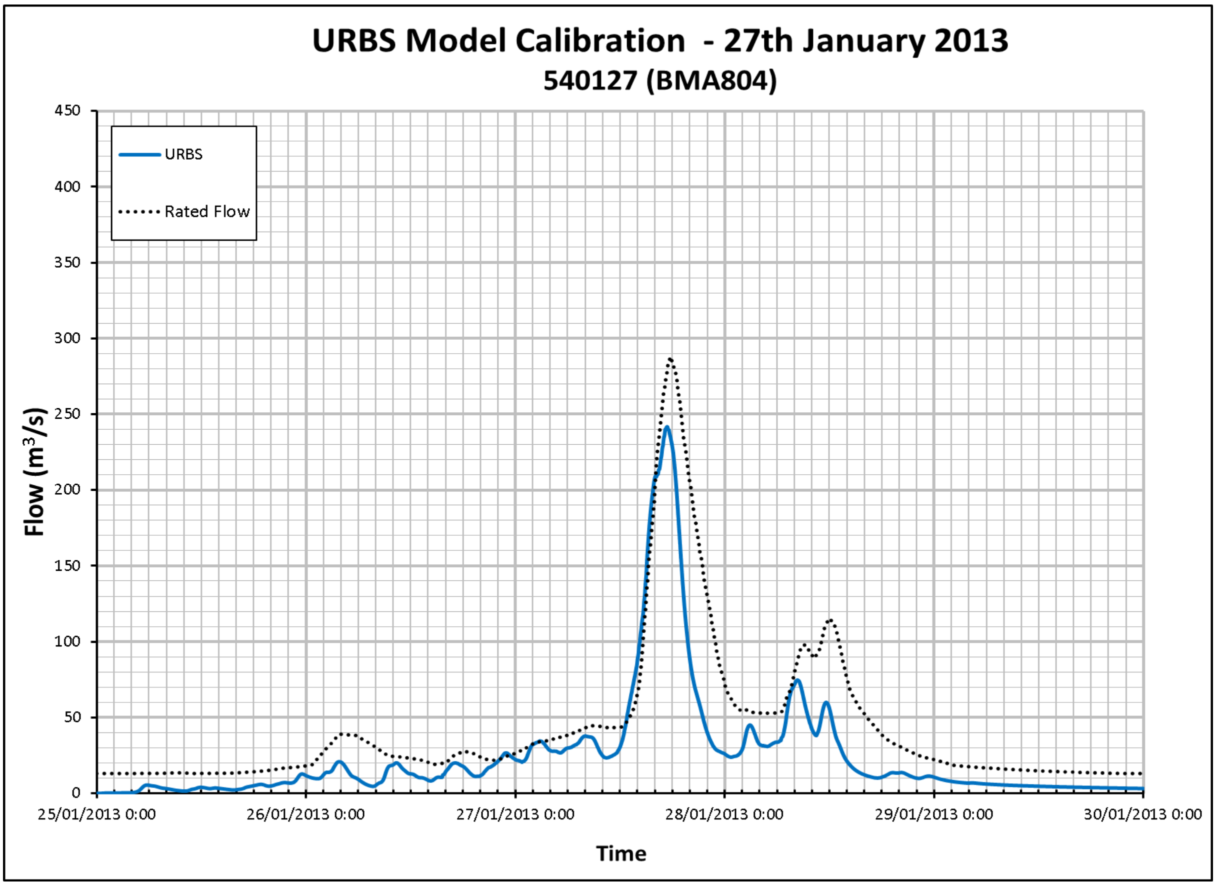

Figure 4.7: January 2013 URBS Model Calibration – Bulimba Creek at 540127 (BMA804)

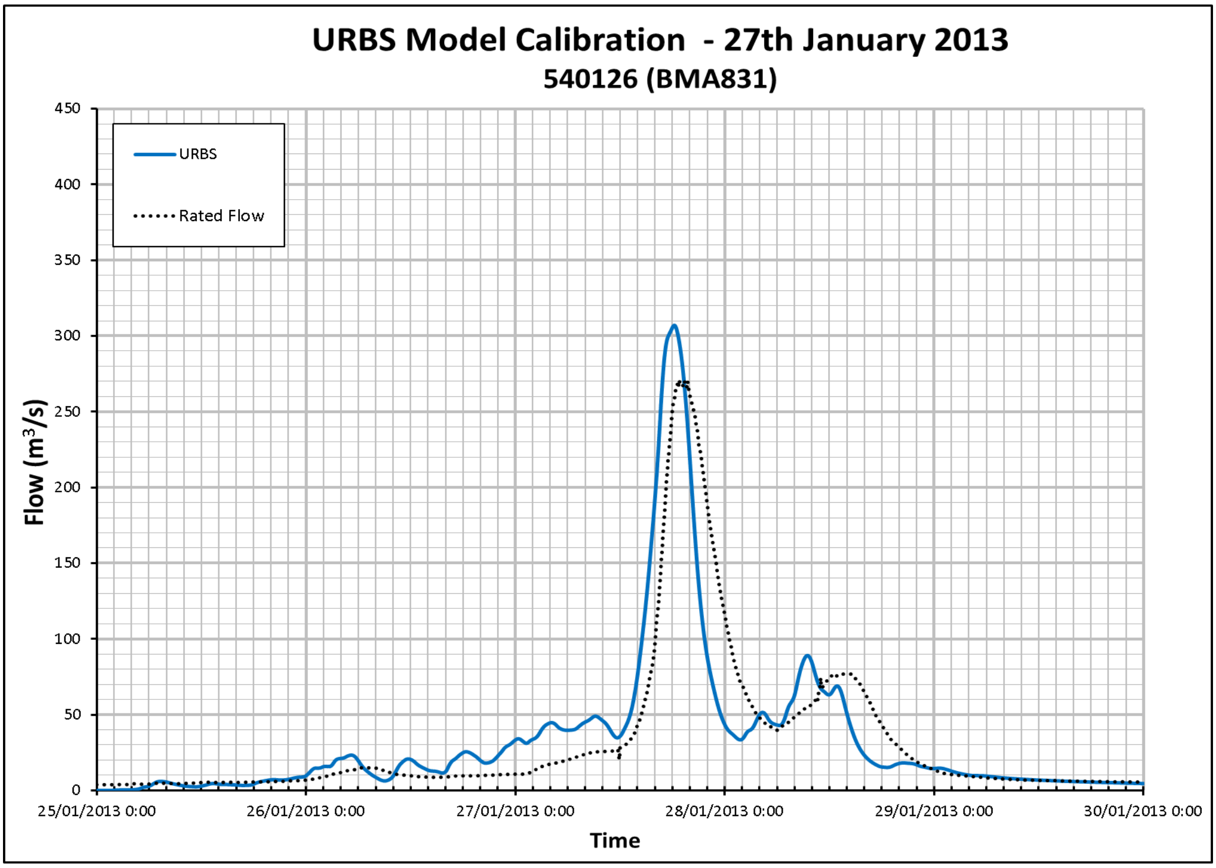

Figure 4.8: January 2013 URBS Model Calibration – Bulimba Creek at 540126 (BMA831)

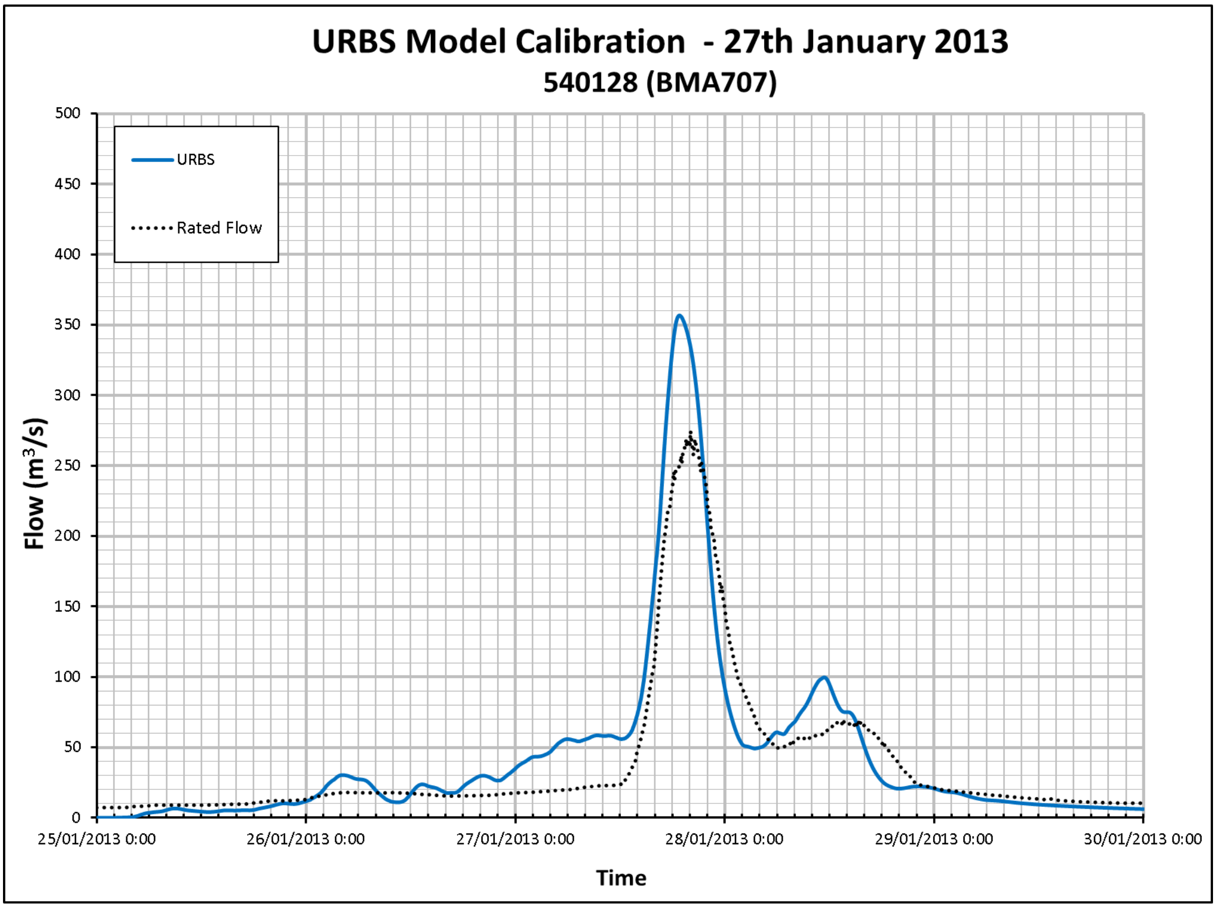

Figure 4.9: January 2013 URBS Model Calibration – Bulimba Creek at 540128 (BMA707)

The adopted URBS parameters as part of the calibration of this event are as indicated below.

- Sub-catchment Routing
  - Catchment lag parameter (*β*) = 4
  - Catchment non-linearity parameter (*m*) = 0.65

- Channel Routing
  - Channel lag parameter (*α*) = 0.01
  - Muskingum non-linearity parameter (*n*) = 1
  - Muskingum translation parameter (*x*) = 0.25

- Rainfall Losses
  - Impervious Area: IL = 0 mm, CL = 0 mm/hr (URBS default)
  - Pervious Area: IL = 50 mm, CL = 2.5 mm/hr

- Baseflow
  - Baseflow Index (BFI) = 0.22
  - Minimum Persistent Baseflow Value (B0) = 0
  - Daily Baseflow Recession Factor (BR) = 0.5
  - Baseflow Constant applied to runoff (BC) = 0.141
  - Baseflow Exponent applied to runoff (BM) = 1

4.8.3 May 2015

Figure 4.10 to Figure 4.12 provide a comparison of the URBS results and the rated flow (established using the adopted rating curve) at the three stream gauges. The results typically indicate a reasonable fit to the shape and timing of the peak flow at all three stream gauges.

At 540127 (BMA804), the modelled peak flow is approximately 6 % lower than the rated observed peak flow and occurs approximately 15-minutes before the observed.

At 540126 (BMA831), the modelled peak flow matched exactly with the rated observed peak flow and occurs approximately 15-minutes before the observed.

At 540128 (BMA707), the modelled peak flow is approximately 11 % lower than the rated observed peak flow and occurs approximately 30-minutes later than the observed.

Modelled flood volumes at each stream gauge are typically lower than the rated observed flood volume, with the largest difference occurring at 540127 (BMA804).

The adopted URBS parameters as part of the calibration of this event are as indicated below.

- Sub-catchment Routing
  - Catchment lag parameter (*β*) = 4
  - Catchment non-linearity parameter (*m*) = 0.65

- Channel Routing
  - Channel lag parameter (*α*) = 0.01
  - Muskingum non-linearity parameter (*n*) = 1
  - Muskingum translation parameter (*x*) = 0.25

- Rainfall Losses
  - Impervious Area: IL = 0 mm, CL = 0 mm/hr (URBS default)
  - Pervious Area: IL = 40 mm, CL = 2.5 mm/hr

- Baseflow
  - Baseflow Index (BFI) = 0.22
  - Minimum Persistent Baseflow Value (B0) = 0
  - Daily Baseflow Recession Factor (BR) = 0.5
  - Baseflow Constant applied to runoff (BC) = 0.141
  - Baseflow Exponent applied to runoff (BM) = 1

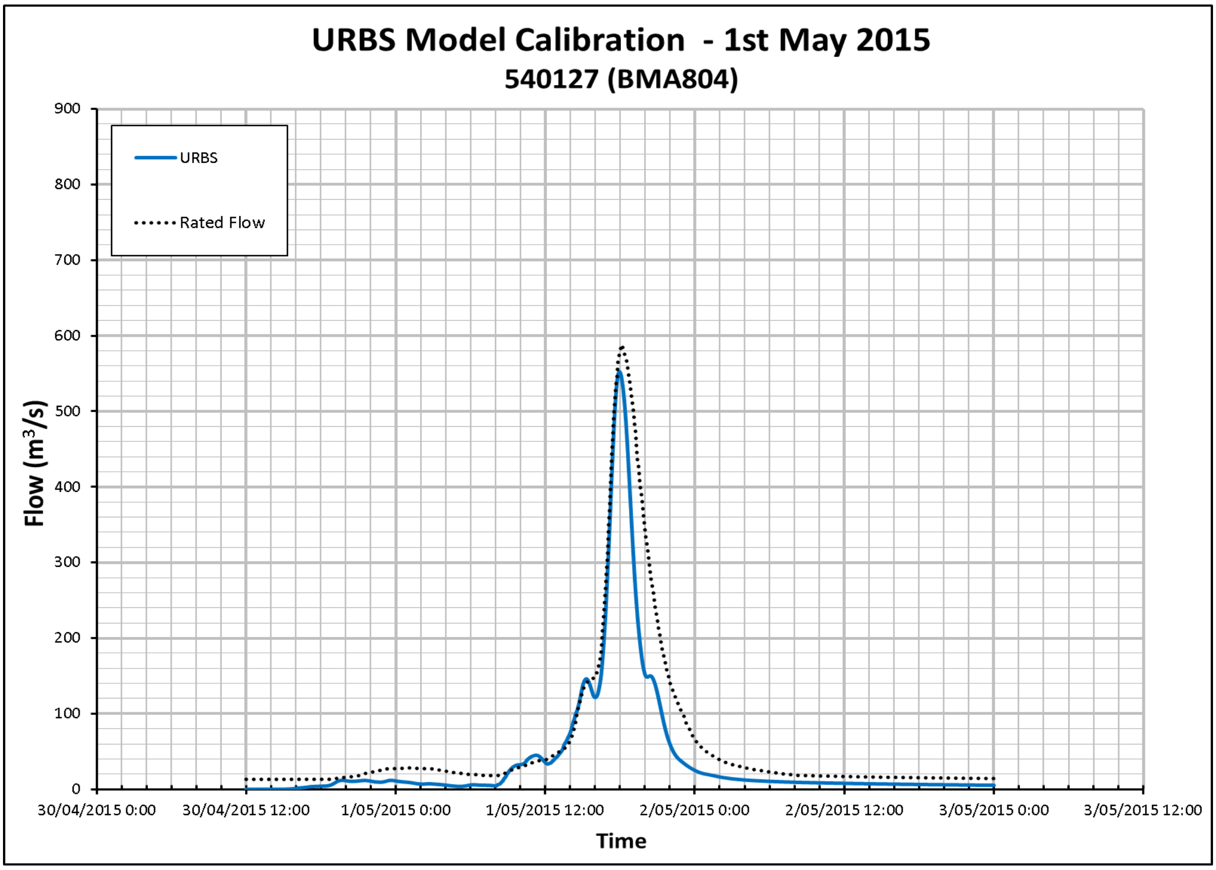

Figure 4.10: May 2015 URBS Model Calibration – Bulimba Creek at 540127 (BMA804)

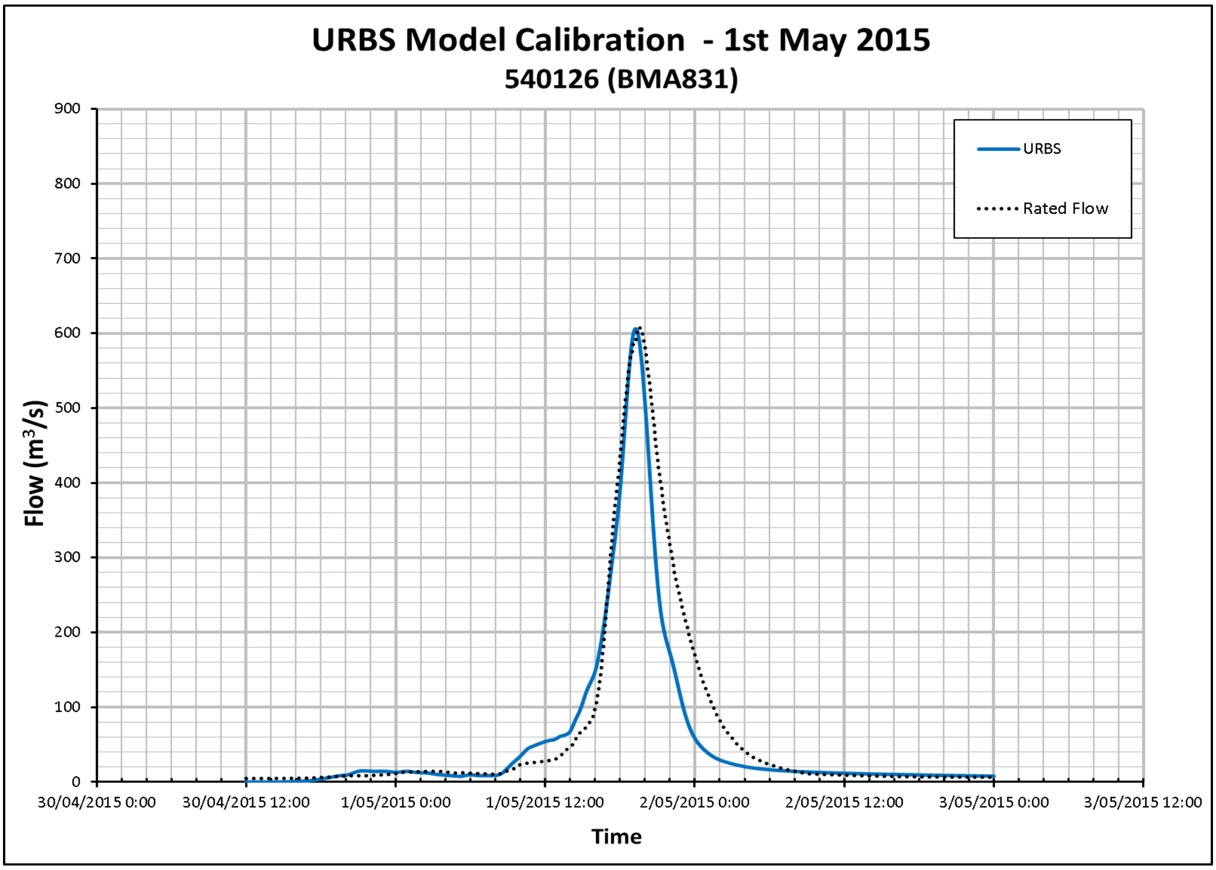

Figure 4.11: May 2015 URBS Model Calibration – Bulimba Creek at 540126 (BMA831)

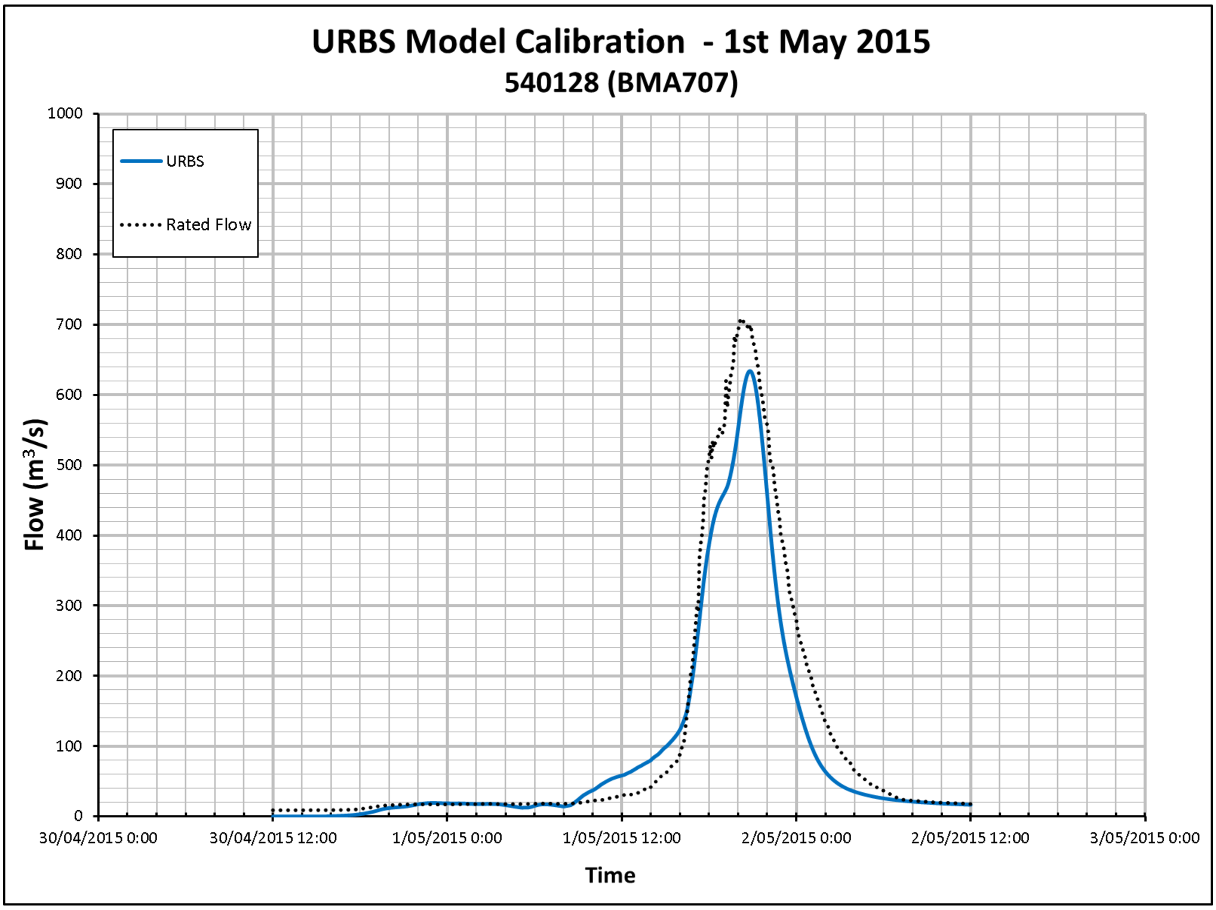

Figure 4.12: May 2015 URBS Model Calibration – Bulimba Creek at 540128 (BMA707)

4.9 Hydrologic Model Verification Results

Table 4.2 indicates the parameters adopted from the hydrologic calibration of the three historical events. These parameters were used to verify the URBS model to the one verification event (i.e. March 2017).

The adopted BFI of 0.22 resulted in the best fit for each of the calibration events. Given the large variation in event magnitude, this was somewhat unexpected as it would be anticipated that the BFI would decrease as the size of the event increases.

Using the adopted model parameters, the March 2017 event was simulated in URBS. Figure 4.13 to Figure 4.15 provide a comparison of the URBS results and the rated flows (established using the adopted rating curves) at the three stream gauges. The results typically indicate an acceptable fit to the overall hydrograph at all three stream gauges.

At 540127 (BMA804), the modelled peak flow is approximately 15 % lower than the rated observed peak flow (larger 2nd peak) and there is a good match between the timing of the first and second peaks when compared with the observed.

At 540126 (BMA831), the modelled peak flow is approximately 10 % lower than the rated observed peak flow (larger 2nd peak) and the timing of the first and second peaks is approximately 90-minutes before the observed.

Table 4.2 – Adopted URBS Parameters

Parameter	Description	Adopted Value
Imp CL	Impervious Area Continuing Loss (mm/hr)	0
Perv CL	Pervious Area Continuing Loss (mm/hr)	2.5
β	Catchment lag parameter	4
m	Catchment non-linearity parameter	0.65
α	Channel lag parameter	0.01
n	Muskingum non-linearity parameter	1.00
x	Muskingum translation parameter	0.25
BFI	Baseflow Index	0.22
B0	Minimum Persistent Baseflow Value	0
BR	Daily Baseflow Recession Factor	0.5
BC	Baseflow Constant applied to runoff	0.141
BM	Baseflow Exponent applied to runoff	1.0

At 540128 (BMA707), the modelled peak flow is approximately 1 % higher than the rated observed peak flow (larger 2nd peak) and the timing of the first peak is approximately 60-minutes early, whereas the second peak is approximately 45-minutes later than the observed.

Modelled flood volumes at each stream gauge are typically lower than the rated observed flood volume, with the largest difference occurring at 540127 (BMA804).

The adopted URBS rainfall loss parameters adopted for this simulation were as follows:

- Impervious Area: IL = 0 mm, CL = 0 mm/hr (URBS default)
- Pervious Area: IL = 55 mm, CL = 2.5 mm/hr

Further results from the calibration / verification are provided in Section 5.4 and a discussion on the overall calibration / verification results is provided in Section 5.8.

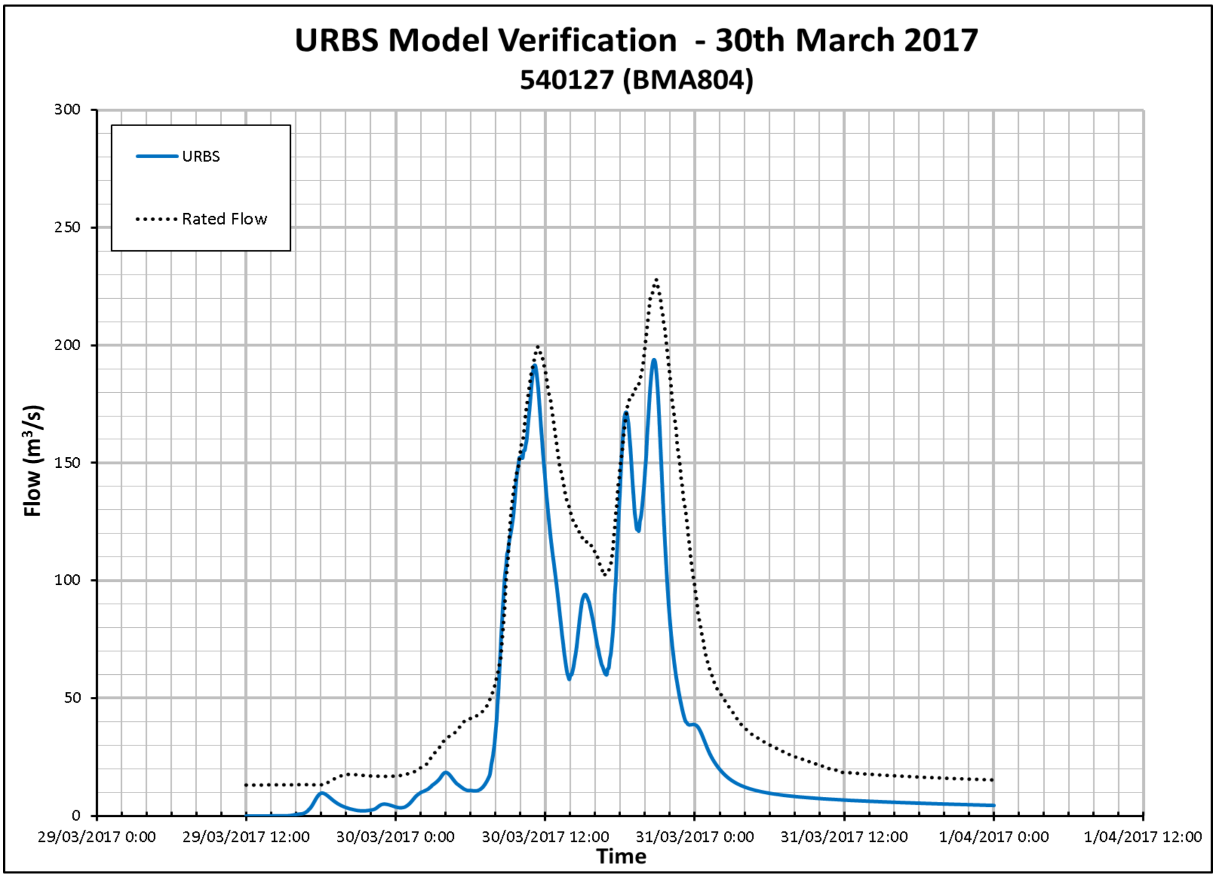

Figure 4.13: March 2017 URBS Model Verification – Bulimba Creek at 540127 (BMA804)

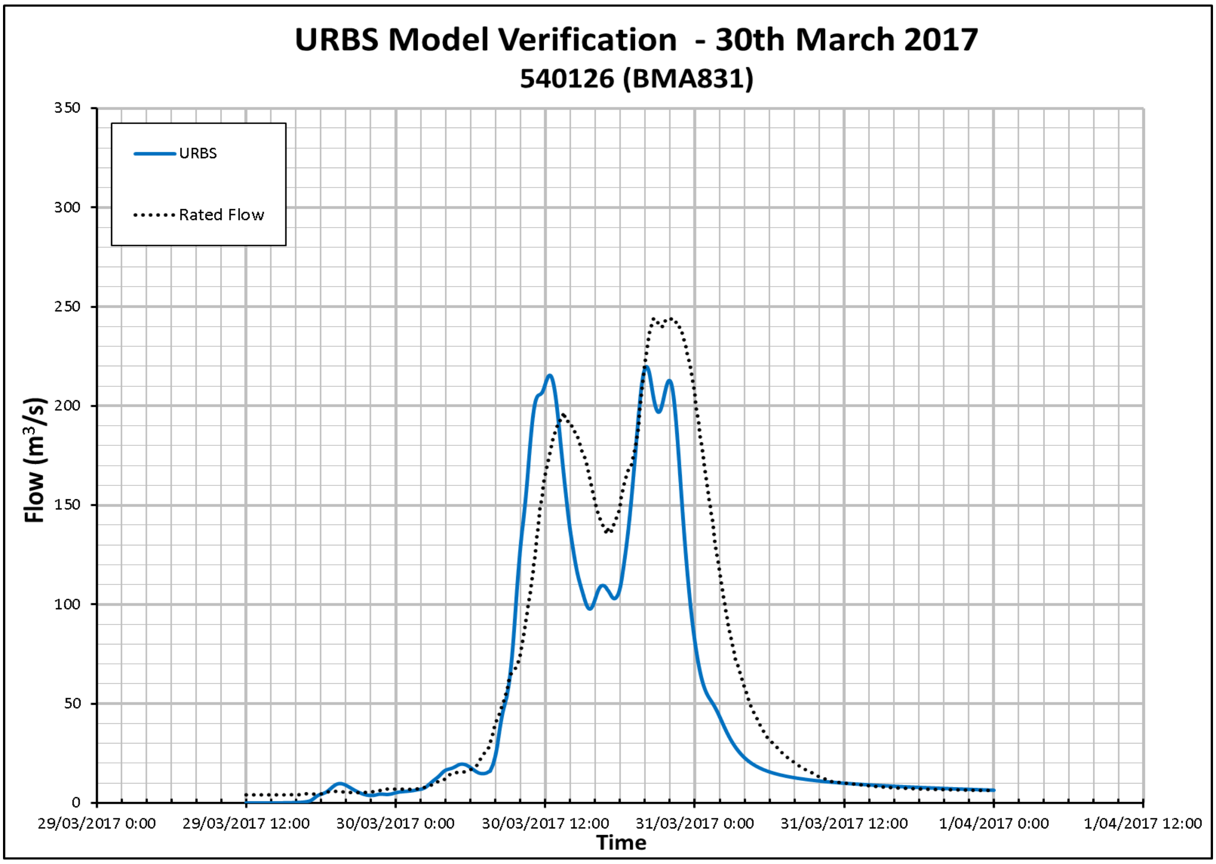

Figure 4.14: March 2017 URBS Model Verification – Bulimba Creek at 540126 (BMA831)

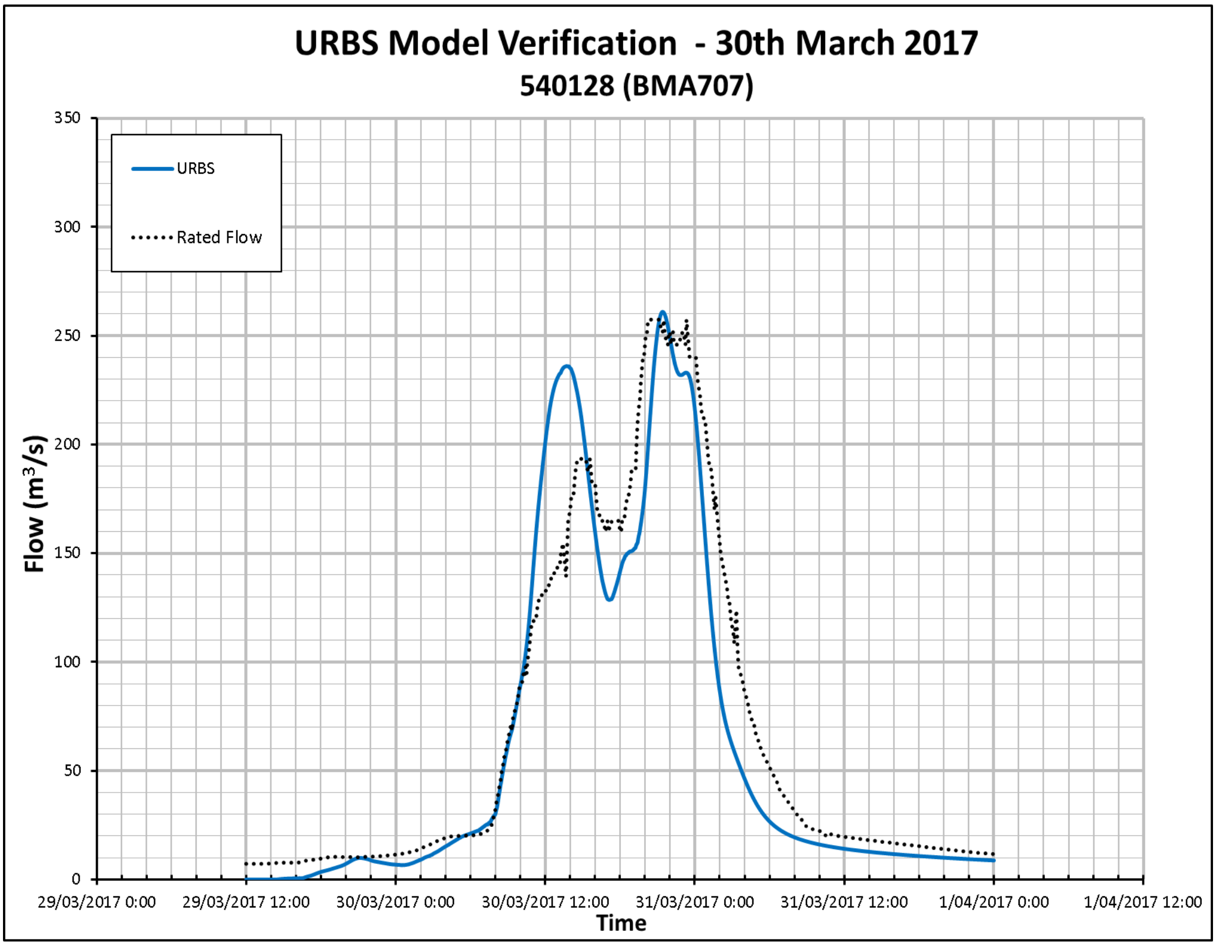

Figure 4.15: March 2017 URBS Model Verification - Bulimba Creek at 540128 (BMA707)

4.10 URBS Model Consistency Checks (Historical Events)

As noted previously, the results of the hydrologic – hydraulic model consistency checks are presented in Section 5.7. As part of these consistency checks, the URBS model channel routing was adjusted at selected locations in order to better replicate the shape and timing of the TUFLOW model hydrograph (where applicable).

This was undertaken by using one of the following means:

- Adjusting the reach length factor (*f*); or
- Using conceptual storage {Level-pool (reservoir) routing} in lieu of Muskingum channel routing.

There was one area for which conceptual storage was used in lieu of Muskingum channel routing to better represent the floodplain storage effects. For this area, the stage–storage relationship was derived using the 2019 ALS data and the stage–discharge relationship from the TUFLOW model results. The storage area fully incorporated URBS Sub-catchments 89, 93, 94, 96 and partly incorporated URBS Sub-catchment 97. The URBS reach length factor was decreased at locations downstream of Old Cleveland Road to better represent the short circuiting of the many meander bends once flows exceeded the channel capacity, noting that the URBS routing reach length has been digitised as the length of the meandering main channel.

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5.0 Hydraulic Model Development and Calibration

5.1 Overview

The previous hydraulic model of Bulimba Creek was a 1d MIKE11 model which only incorporated the major creeks, including Bulimba Creek, Bulimba Creek East and Mimosa Creek as well as several minor tributaries in the upper catchment. Most of the tributaries in the middle and lower catchments were not included in this model, however many had been modelled previously as part of separate smaller studies; typically, as 1d steady state HEC-RAS models. These tributaries included Newnham Creek, Salvin Creek, Phillips Creek, Wecker Road Drain, Miles Platting Road Drain and Minnippi Creek.

To achieve best practice, it was considered appropriate to combine all available model data into one comprehensive 1d / 2d TUFLOW model. This would provide a better representation of the floodplain characteristics in the middle to lower sections of the catchment as well as a more efficient tool to produce flood mapping products. The TUFLOW model developed for this study is a comprehensive 1d / 2d model which includes all major and minor creeks / tributaries, apart from Tingalpa Channel and Hemmant Drain, as they were recently modelled as separate studies in 2014 / 2015.

TUFLOW Classic (version 2020-01-AB-iSP-w64) has been used for this study.

5.2 Model Development

5.2.1 Model Extents

Figure 5.1 indicates the extent of the TUFLOW model, as well as the inflow locations and the hydraulic structures included in the model. The model consists largely of a 1d / 2d linked schematisation, with the 1d domain modelled in ESTRY and the 2d domain in TUFLOW.

5.2.2 Utilised Hydraulic Model Data

As previously detailed in Section 3.3, the following existing hydraulic models were utilised in developing the new TUFLOW model:

- Bulimba Creek MIKE11 model (2014)
- M1 Pacific Motorway Upgrade - Sports Drive to Gateway Motorway TUFLOW Model (2019)
- Mimosa Creek Bikeway HEC-RAS Model (2012)
- Miles Platting Road HEC-RAS Model (2013)
- Scrub Road HEC-RAS Model (2005)
- Newnham Creek HEC-RAS Model (2007)
- Salvin Creek HEC-RAS Model (2007)
- Phillips Creek HEC-RAS Model (2007)
- Phillips Creek EPA-SWMM Model (2012)
- Todman Street HEC-RAS Model (2017)
- Hemmant Lytton TUFLOW Model (2014)
- Port of Brisbane Motorway TUFLOW Model (2012)

5.2.3 Base Terrain Data

The base 2d terrain consisted of a 6 m grid which was created from a 1 m ASCII grid file (MGA Zone 56) of the 2019 ALS data. Details of this dataset are previously provided in Section 3.2.2. In the area of the M1 Pacific Motorway Upgrade (Sports Drive to Gateway Motorway), the base 2d terrain consisted of a 6 m grid created from the TUFLOW model developed by DTMR / Jacobs.

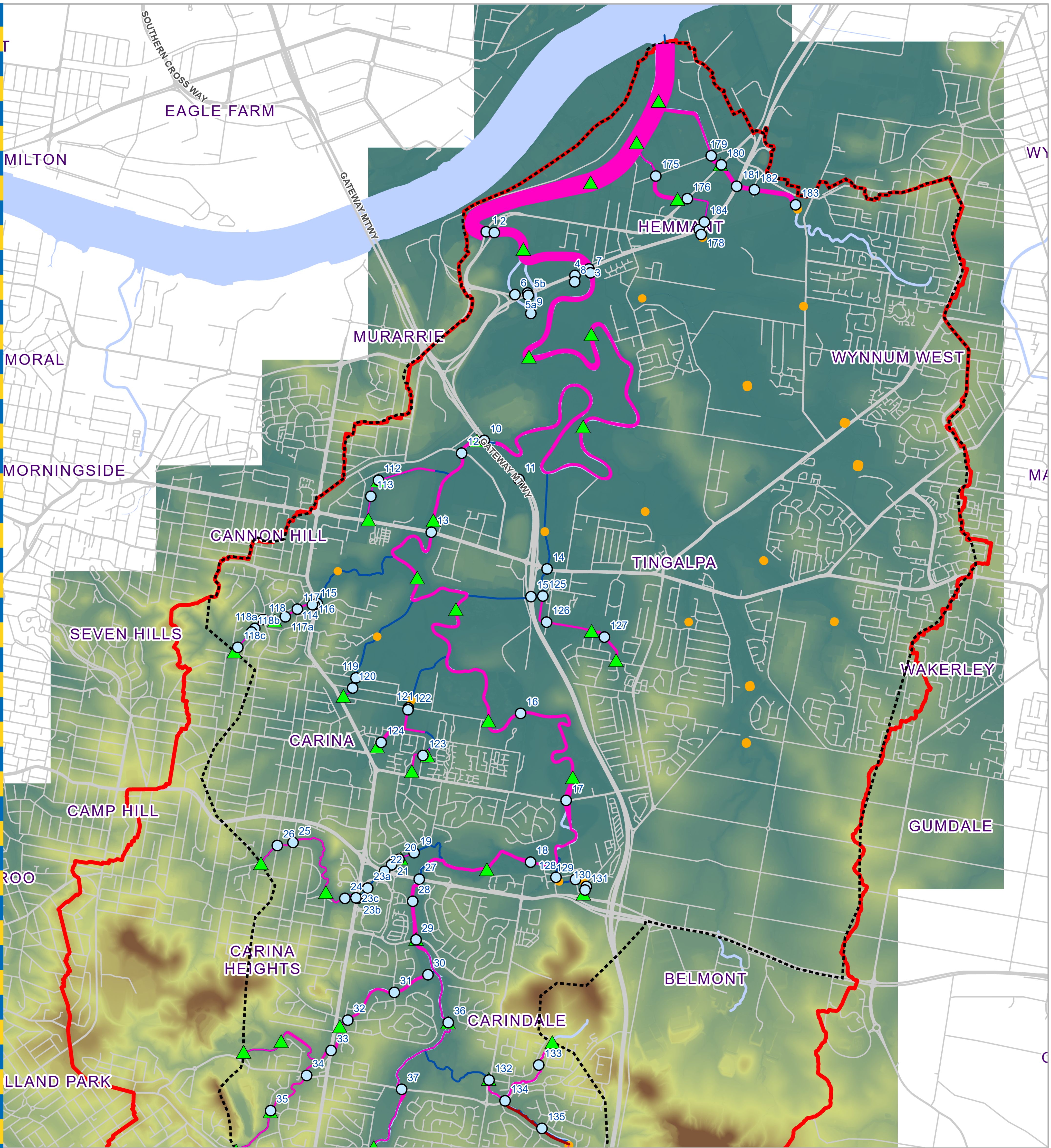
5.2.4 Waterways

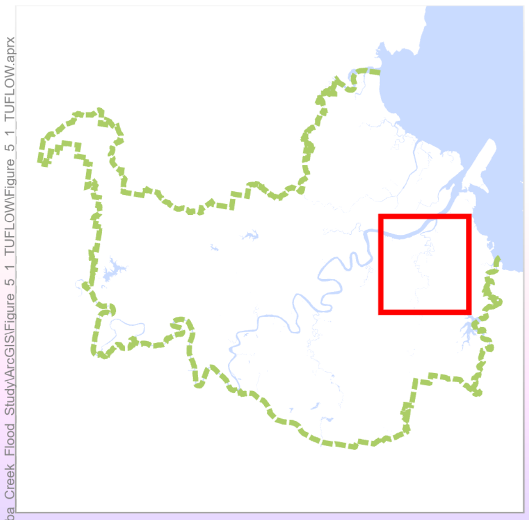
Table 5.1 indicates the waterways which have been included in the TUFLOW model as well as the modelled length, the downstream waterway and the major source(s) of data for the 1d channel element.

Tingalpa Channel and Hemmant Drain are shown as not being modelled; however, they were subsequently incorporated during the model calibration to ensure the flood routing for these creeks was accurate. This modelling is considered high-level and suitable for determining flood flows, but not flood levels.

Table 5.1 – Waterways included in the TUFLOW Model

Waterway	Modelled Length (km)	Downstream Confluence	Major Data Sources for 1d Channel
Bulimba Creek	41.3	Brisbane River	BCC Bulimba Creek MIKE11 Model, 2019 Field Survey, 2019 ALS and 2014 ALS
Daw Road Drain	1.1	Bulimba Creek	2019 Field Survey and 2019 ALS
Padstow Road Drain	0.4	Bulimba Creek	2019 Field Survey and 2014 ALS
Mimosa Creek	4.2	Bulimba Creek	BCC Bulimba Creek MIKE11 Model, BCC Mimosa Creek HEC-RAS Model, 2019 Field Survey, 2014 ALS
Nardie Street Drain	0.5	Bulimba Creek	2019 Field Survey and 2019 ALS
Bulimba Creek East	6.7	Bulimba Creek	BCC Bulimba Creek MIKE11 Model, 2019 Field Survey, 2019 ALS and 2014 ALS
Tributary C	1.2	Bulimba Creek	BCC Bulimba Creek MIKE11 Model
Tributary B	0.6	Bulimba Creek East	BCC Bulimba Creek MIKE11 Model, 2019 Field Survey and 2019 ALS
Tributary A	2.9	Bulimba Creek East	BCC Bulimba Creek MIKE11 Model, DTMR Survey - M1 Pacific Motorway Upgrade, DTMR Design TIN - M1 Pacific Motorway Upgrade and 2019 ALS
Tributary A1	0.7	Tributary A	BCC Bulimba Creek MIKE11 Model, 2019 ALS and 2014 ALS
Tributary A2	0.8	Tributary A	DTMR Design TIN - M1 Pacific Motorway Upgrade, 2019 Field Survey and 2019 ALS
Miles Platting Road Drain	1.3	Bulimba Creek East	BCC MPR Drain HEC-RAS Model, 2019 Field Survey, 2019 ALS and 2014 ALS
Kate Circuit Drain	0.4	Mile Platting Road Drain	2019 Field Survey and 2019 ALS





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Metres

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Prepared : 089958
Checked : NC
Revision : 0
Publication Date : 17 Jun 2021
Project Number : 100001

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SECURITY LABEL: FOR OFFICIAL USE ONLY

Legend

- Hydraulic Structure
- 1d inflow Location
- 1d Piped Drainage
- Creek Centreline (Bulimba Creek Catchment)
- 2d Inflow Locations
- Model Boundary
- 1d Channel
- Bulimba Creek Catchment Area
- Brisbane City Boundary
- Road

Elevation

200 m

0 m

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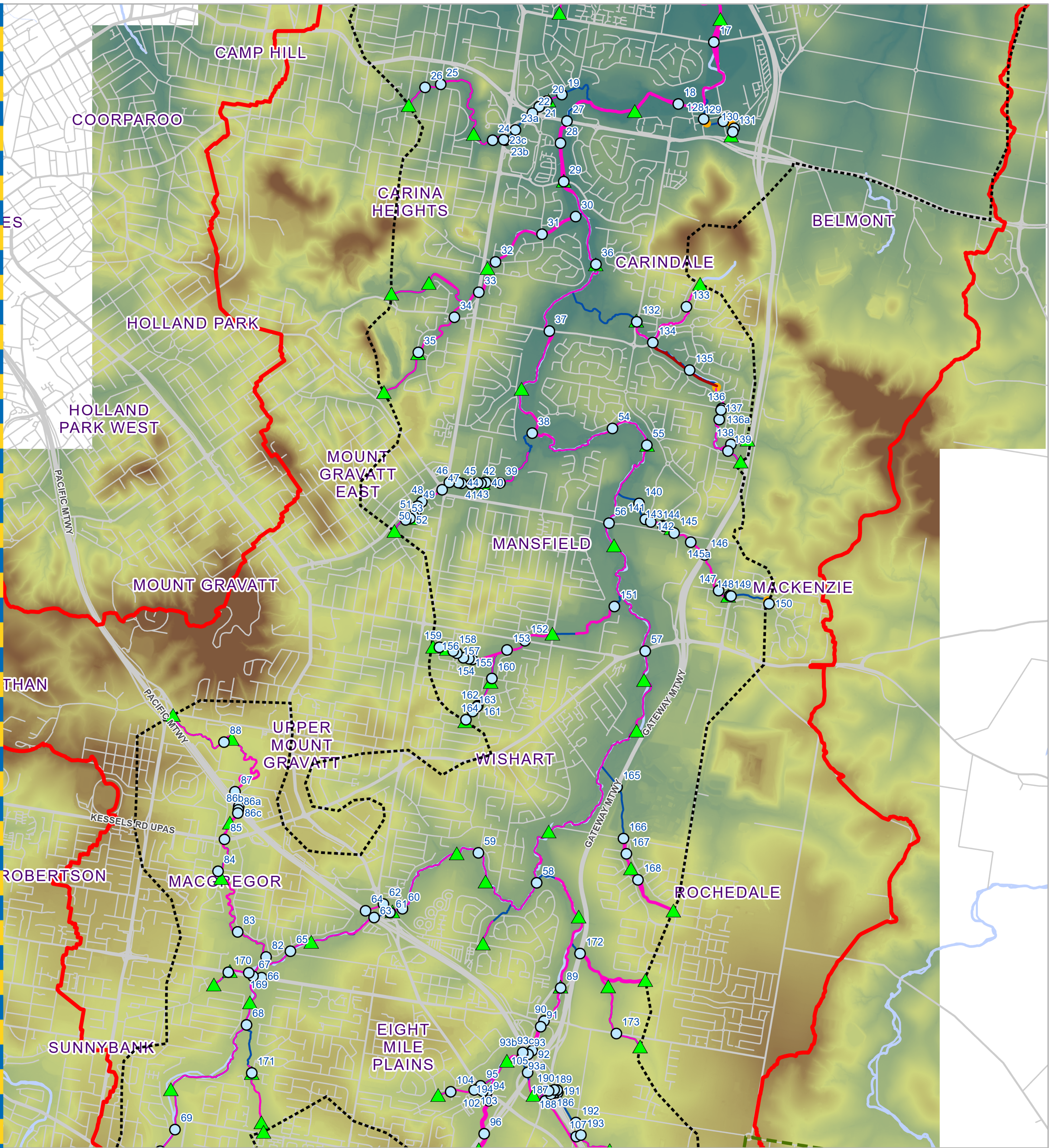
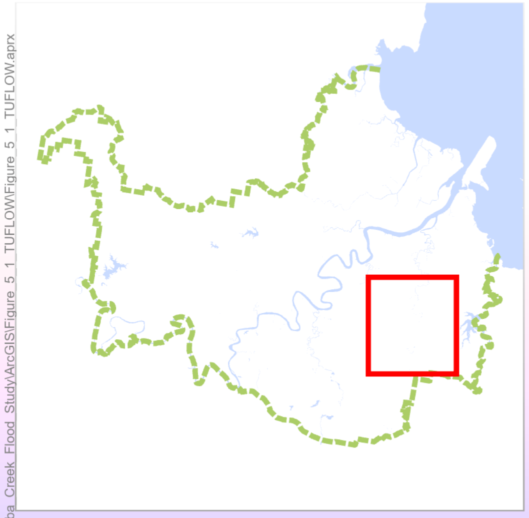
Bulimba Creek Flood Study

Figure 5.1a - TUFLOW Model Schematisation Bulimba Creek Flood Study

GDS - 190093 - 003





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Prepared : 089958
Checked : NC
Revision : 0
Publication Date : 17 Jun 2021
Project Number : 100001

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SECURITY LABEL: FOR OFFICIAL USE ONLY

Legend

- Hydraulic Structure
- 1d inflow Location
- 1d Piped Drainage
- Creek Centreline (Bulimba Creek Catchment)
- 2d Inflow Locations
- Model Boundary
- 1d Channel
- Bulimba Creek Catchment Area
- Brisbane City Boundary
- Road

Elevation

200 m

0 m

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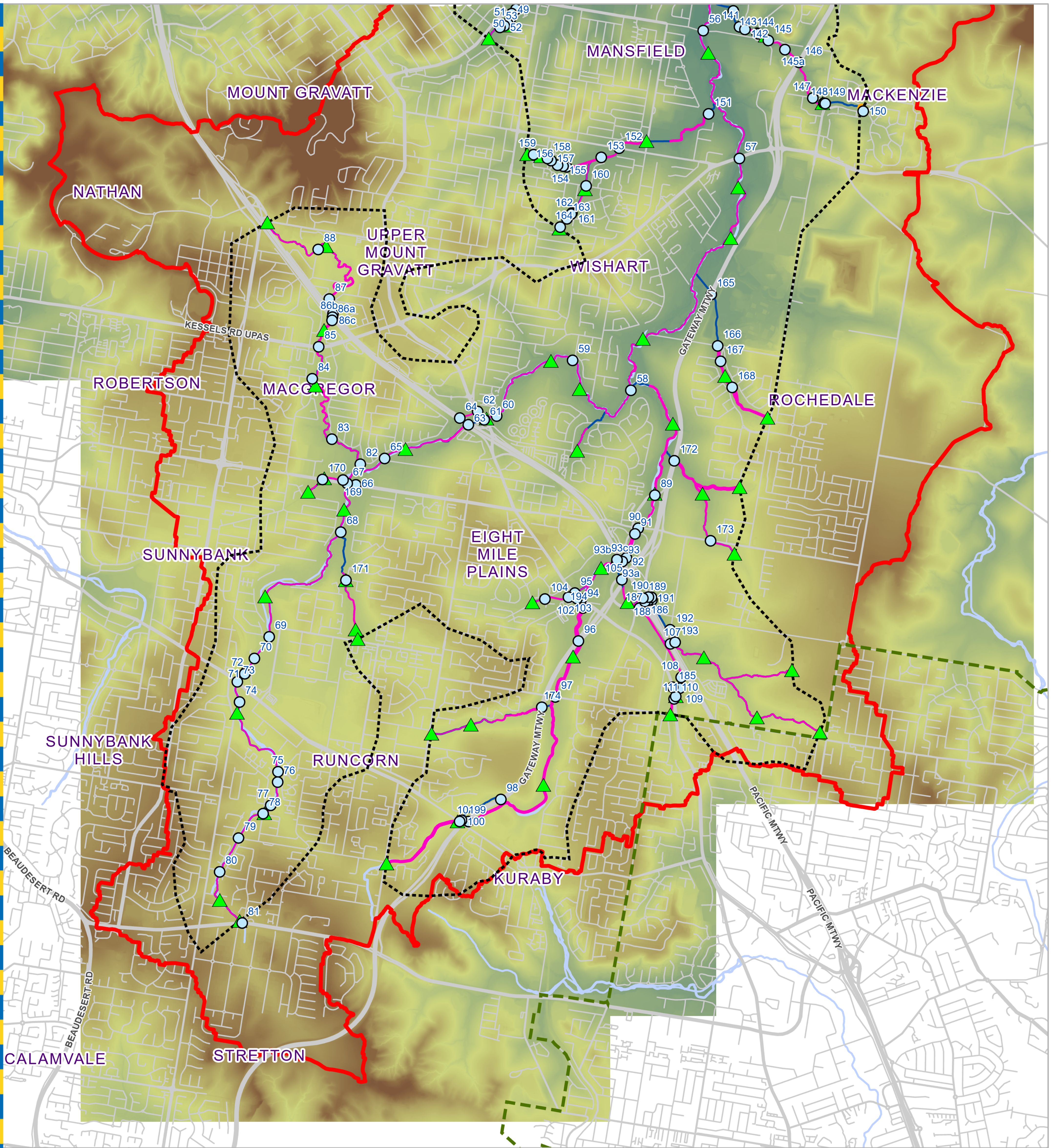
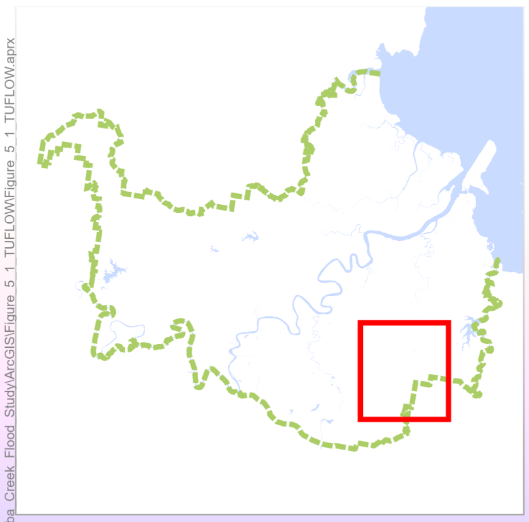
Bulimba Creek Flood Study

Figure 5.1b - TUFLOW Model Schematisation Bulimba Creek Flood Study

GDS - 190093 - 003





SECURITY LABEL: FOR OFFICIAL USE ONLY

Legend

- ○ Hydraulic Structure
- ▲ 1d inflow Location
- 1d Piped Drainage
- Creek Centreline (Bulimba Creek Catchment)
- 2d Inflow Locations
- Model Boundary
- 1d Channel
- Bulimba Creek Catchment Area
- Brisbane City Boundary
- Road

Elevation

200 m

0 m

0 380 760 1,140

Metres

N W E S

Prepared : 089958
Checked : NC
Revision : 0
Publication Date : 17 Jun 2021
Project Number : 100001

File : G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\ArcGIS\Figure_5_1_TUFLOW\Figure_5_1_TUFLOW.aprx

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Bulimba Creek Flood Study

Figure 5.1c - TUFLOW Model Schematisation Bulimba Creek Flood Study

GDS - 190093 - 003

Table 5.1 (continued)

Waterway	Modelled Length (km)	Downstream Confluence	Major Data Sources for 1d Channel
Parklands Circuit Drain	1.7	Bulimba Creek	2019 Field Survey and 2014 ALS
Landfill Drain	Not modelled	Bulimba Creek	Not modelled
Broadwater Road Drain	2.2	Bulimba Creek	2019 Field Survey, 2014 ALS, 2006 Field Survey and design drawings
Wishart Road Drain	0.7	Broadwater Road Drain	2019 Field Survey, 2014 ALS and design drawings
Wecker Road Drain	2.0	Bulimba Creek	2019 Field Survey, 2014 ALS, design drawings and site measurements
Newnham Creek	2.0	Bulimba Creek	BCC Newnham Creek HEC-RAS Model, 2019 ALS, 2014 ALS and design drawings
Warwick Creek	1.8	Spring Creek	2019 Field Survey, 2014 ALS and design drawings
Silky Oak Circuit Drain	0.3	Warwick Creek	2019 Field Survey and 2019 ALS
Spring Creek	2.0	Bulimba Creek	2019 Field Survey, 2019 ALS and 2014 ALS
Salvin Creek	2.9	Bulimba Creek	BCC Salvin Creek HEC-RAS Model, 2014 ALS and design drawings
Glengariff Tributary	1.0	Salvin Creek	BCC Salvin Creek HEC-RAS Model and 2014 ALS
Phillips Creek	2.8	Bulimba Creek	2020 Field Survey, BCC Phillips Creek HEC-RAS Model, 2014 ALS and 2012 Field Survey
Reynolds Street Drain	0.7	Bulimba Creek	2019 Field Survey, 2019 ALS, 2014 ALS and design drawings
Cloverbrook Place Drain	1.2	Bulimba Creek	2019 Field Survey, 2016 Field Survey and 2014 ALS
Bethel Street Drain	0.8	Cloverbrook Place Drain	2019 Field Survey and 2014 ALS
Moorabbin Drive Drain	1.2	Bulimba Creek	2019 Field Survey
Minnippi Creek	2.1	Bulimba Creek	BCC Todman Street HEC-RAS Model, 2019 Field Survey, 2014 ALS and design drawings
Murarrie Park Drain	1.1	Bulimba Creek	2019 Field Survey and design drawings
Minnippi Overflow	1.9	Bulimba Creek	N/A – represented as fully 2d
Stanton Road Drain	1.2	Minnippi Overflow	2019 Field Survey
Tingalpa Channel	Not modelled	Bulimba Creek	N/A – not modelled
Hemmant Drain	Not modelled	Bulimba Creek	N/A – not modelled
Bulimba Main Drain	1.4	Bulimba Creek	Port of Brisbane Motorway TUFLOW Model and 2019 ALS
Lindum Creek	1.8	Bulimba Creek	Port of Brisbane Motorway TUFLOW Model and 2019 ALS

It should be noted that 2014 ALS was used for some waterways (in lieu of 2019 ALS) because when the model development commenced, the 2019 ALS was not available to BCC.

Bend-losses have been added to the 1d channel to improve the calibration, typically where the bend exceeds 90 degrees. Bend-losses have been used in lieu of increasing the Manning 'n' value of the 1d channel. There is very little guidance on typical bend-loss values for a 1d channel / 2d floodplain model set-up and as a result we have used the Queensland Urban Drainage Manual [10] (QUDM) guidance, as outlined in Section 9.3.6.

The loss coefficient is a function of the bend radius and channel width as:

$$k_b = 2B/R_c$$

where,

k_b = bend loss coefficient

B = channel width

R_c = centreline radius of bend

The QUDM methodology is known to be conservative and as a result a maximum value of 3.0 has been adopted for the bend loss coefficient (k_b).

5.2.5 Land Use and Hydraulic Roughness

The Manning's 'n' roughness values shown in Table 5.2 were adopted within the 2d section of the TUFLOW model. The assignment of suitable roughness values to the land use / topographical feature was undertaken utilising a combination of aerial photography, BCC City Plan 2014, experience with similar studies and relevant hydraulic literature.

Table 5.2 – Adopted TUFLOW roughness parameters

Topographical feature / Land Use	**Adopted Manning's 'n'**
Land Use BCC City Plan 2014	
Low Density Residential	0.12
Character Residential	0.15
Low – Medium Density Residential	0.15
Medium Density Residential	0.15
High Density Residential	0.15
Neighbourhood Centre	0.10
Centre (District, Major, Principal)	0.15
Low Impact Industry	0.10
Industry (General Industry A, B and C)	0.15
Special Industry	0.15
Industry Investigation	0.06

[10] Institute of Public Works Engineering Australasia, QLD Division 2016 - *Queensland Urban Drainage Manual*

Topographical feature / Land Use	**Adopted Manning's 'n'**
Sport and Recreation	0.04
Open Space	0.04
Environmental Management and Conservation	0.08
Emerging Communities	0.12
Mixed Use	0.15
Rural	0.04
Rural Residential	0.06
Community Facilities (Major Health Care)	0.06
Community Facilities (Major Sports Venue)	0.06
Community Facilities (Cemetery)	0.04
Community Facilities (Community Purposes)	0.10
Community Facilities (Education Purposes)	0.06
Community Facilities (Emergency Services)	0.15
Community Facilities (Health Care Purposes)	0.15
Specialised Centre (Major Education and Research)	0.10
Specialised Centre (Entertainment and Conference)	0.12
Specialised Centre (Large Format Retail)	0.15
Specialised Centre (Mixed Industry and Business)	0.12
Specialised Centre (Marina)	0.04
Special Purpose (Transport Infrastructure)	0.04
Special Purpose (Utility Services)	0.04
Special Purpose (Port)	0.06
Additional Roughness	
Road pavement	0.02
Road verge	0.03
Channel – concrete lined	0.015
Vegetation – light to high density	0.035 to 0.15
Minimum Riparian Corridor (MRC)	0.15

In the 1d ESTRY section, the Manning's 'n' values ranged from 0.015 to 0.15, depending on the type of channel material and degree of vegetation. Typically, the Manning's 'n' values were varied horizontally across the 1d cross-section.

5.2.6 Hydraulic Structures

The major bridge and culvert structures within the model extents were included in the TUFLOW model. These structures generally consisted of the waterway crossing from motorways, railways, major roads, local roads, pedestrian / bikeway crossings and private access roads.

A full listing of the hydraulic structures included in the TUFLOW model is presented in Appendix L. This table indicates the location and details of the structures as well as the modelling approach used. The TUFLOW model incorporates 70 Bridges, 100 Culverts and 15 Weirs (including 2 x SQIDs).

As the M1 Pacific Motorway Upgrade (Sports Drive to Gateway Motorway) is currently being constructed, we have been unable to confirm the as-constructed dimensions for a number of structures within Tributary A / Tributary A Overflow. These include S106, S107, S186, S187, S188, S189, S190 and S191.

Bulimba Creek contains most of these structures, followed by Bulimba Creek East and then Newnham Creek. The waterways containing the most structures that were included in the TUFLOW model are as follows:

Table 5.3 – Waterways with the greatest number of modelled hydraulic structures

Waterway	Hydraulic Structures included in the TUFLOW Model			
	Bridge	Culvert	Weir / Other	Total
Bulimba Creek	36	11	1	48
Bulimba Creek East	7	8	1	16
Newnham Creek	6	5	4	15
Tributary A / Tributary A Overflow	0	10	1	11
Phillips Creek	3	5	1	9
Wecker Road Drain	3	6	0	9
Broadwater Road Drain	1	2	4	7
Mimosa Creek	3	4	0	7
Minnippi Creek	0	3	4	7

5.2.7 Piped Drainage

Although this flood study essentially analyses open channel / creek systems, it was considered necessary to include a section of piped drainage for Warwick Creek to determine flood levels more accurately. This pipework ranged in size from 1.2 m to 1.5 m diameter and extended from just downstream of Greendale Way, through the upstream park areas for a length of 765 m. The flow interchange between the 2d channel and the 1d pipe network was assumed to occur "freely" at the inlet pits. This assumes that the hydraulic control will be the limiting size of the pipe and not the size of the pit inlet.

5.2.8 V1 Veloway Structure

As part of the M1 Pacific Motorway Upgrade (Sports Drive to Gateway Motorway), there is a proposed new veloway structure on the western side of the motorway. This structure runs parallel to the M1 Motorway for a length of approximately 380 m, from the downstream side of the Tributary A culvert crossing of the motorway. This veloway structure is built on a suspended slab over a part of the Tributary A waterway; supported by 0.45 m diameter piers at 3 m spacings in the direction of flow. The suspended slab is approximately 3 m above the ground level and projects approximately 3 m into the Tributary A waterway, which has a total width of approximately 20 m. DTMR / Jacobs modelled this structure in considerable detail by utilising a fine scale 2 m grid TUFLOW model in conjunction with the 2d layered flow constriction (2d_lfcsh) function in TUFLOW. This hydraulic analysis considered several methods to best represent the losses due to the piers in the waterway.

As the Bulimba Creek TUFLOW model utilises a 6 m grid, it was not considered appropriate to model this reach of Tributary A as fully 2d, because the small number of grid cells across the channel would result in a lack of channel definition. As a result, this reach of Tributary A was modelled as 1d channel, with the pier losses accounted for by raising the Manning's 'n' roughness value. To verify that this methodology was producing accurate results, a comparison was undertaken against the results of the DTMR / Jacobs TUFLOW model and the results are presented in Section 0.

5.2.9 Boundary Conditions

Inflow Boundaries

Inflows to the TUFLOW hydraulic model were taken from the URBS hydrologic model. All inflows were represented as a discharge versus time (Q-T) relationship, with the inflow locations as indicated in Figure 5.1. The inflow locations were generally adopted to match the URBS model sub-catchment schematisation.

Downstream Boundary

A varying water level versus time (H-T) boundary was used to represent the downstream boundary conditions at the mouth of Bulimba Creek. As there is no stream gauge at the mouth of Bulimba Creek, the H-T boundary was derived based on interpolation between the closest upstream and downstream river gauges. The mouth of Bulimba Creek is located along the Brisbane River at AMTD 6.6 km, resulting in the closest upstream stream gauge being 540286 (B_A594) at Breakfast Creek AMTD 15.3 km and downstream 540495 (BNA747) at Whyte Island AMTD 2.7 km.

The downstream boundary for the March 2001 event was obtained from the Bulimba Creek MIKE11 model, as this event was modelled previously as part of the 2014 Flood Study.

5.2.10 Run Parameters

Time Step

The 1d ESTRY component was run using a 0.5 second time step and 2d TUFLOW component using a 1.5 second time step.

Eddy Viscosity

The Smagorinsky method was used for specifying the eddy viscosity in the 2d domain. This method is the default approach for TUFLOW Classic and is recommended in lieu of the Constant method. The method uses the Smagorinsky formula with a "Constant Coefficient" of 0.1 and "Smagorinsky Coefficient" of 0.2. This method has been successfully used on other similar BCC flood studies.

5.3 Calibration Procedure

5.3.1 Tolerances

BCC flood studies aim to achieve the following tolerances for the hydraulic model calibration / verification:

- Continuous recording stream gauges - within ± 0.15 m of the peak flood level
- MHGs - within ± 0.30 m of the peak flood level
- Debris marks - within ± 0.40 m of the peak flood level
- Good replication of the timing of peaks and troughs.

5.3.2 Methodology

The methodology applied to the calibration and verification of the TUFLOW model was as follows:

1) Run a large slowly increasing flow through the TUFLOW model to enable hydraulic structure head-loss checks to be undertaken against the HEC-RAS model(s).
2) Iteratively adjust the bridge loss parameters (as required) and re-run the model to establish a reasonable correlation with the HEC-RAS model(s).
3) Using the flow inputs from the URBS model, run the calibration events through the TUFLOW model and compare the simulated results against the observed flood levels at both the stream gauge and the MHGs.
4) Iteratively adjust the TUFLOW model parameters and re-run the model with the aim of achieving a good fit with the observed data. The predominant model parameters adjusted included Manning's 'n' and the hydraulic structure losses.
5) Adopt model parameters based on the calibration results.
6) Using the flow inputs from the URBS model, run the single verification event through the calibrated TUFLOW model and compare the simulated results against the observed flood levels at the stream gauge and the MHGs.

The exact same TUFLOW model set-up has been used for the historical events, apart from March 2001, where several waterway crossings were different. In most cases, the differences were due to the duplication of the hydraulic structure because of road widening. At these locations, the newer duplicated structure was removed from the TUFLOW model.

5.4 Hydraulic Model Calibration Results

5.4.1 March 2001

The March 2001 flood was simulated in TUFLOW for 29 hours from 12 noon on the 9th March 2001 to 5 pm on the 10th March 2001. Figure 5.2 to Figure 5.5 provide a comparison between the TUFLOW (and URBS) results and the gauged flood level at the four stream gauges which were operational. Table 5.4 provides a comparison between the TUFLOW results and the recorded peak flood levels at the MHGs. From review of the peak level / MHG results, it was apparent that at 15 out of 30 locations the desired peak flood level tolerance of ± 0.30 m was able to be achieved.

Within the main Bulimba Creek from MHG BM340 (Beenleigh Road) to MHG BM210 (Winstanley Street), the TUFLOW peak flood levels were typically within ± 0.30 m of the MHG records. From MHG BM200 (Old Cleveland Road) to 540129 (Doughboy Parade, Hemmant), the TUFLOW peak flood levels are on average 0.37 m higher than the observed peak flood levels. The waterway in the vicinity of MHG BM00A/B has been concrete lined since March 2001, which most likely explains the low TUFLOW peak flood level at this location, as the calibration model is typically set-up for the current conditions.

Within Bulimba Creek East, the TUFLOW peak flood levels were mostly lower than the observed, with a very low modelled peak flood level at MHG BM400. On closer inspection of the history of the model cross-section (BE_1300) at this location, it is apparent that the channel has scoured significantly (over 1 m) since March 2001, which most likely explains the low modelled peak flood level, as the calibration model is using the current cross-sectional shape.

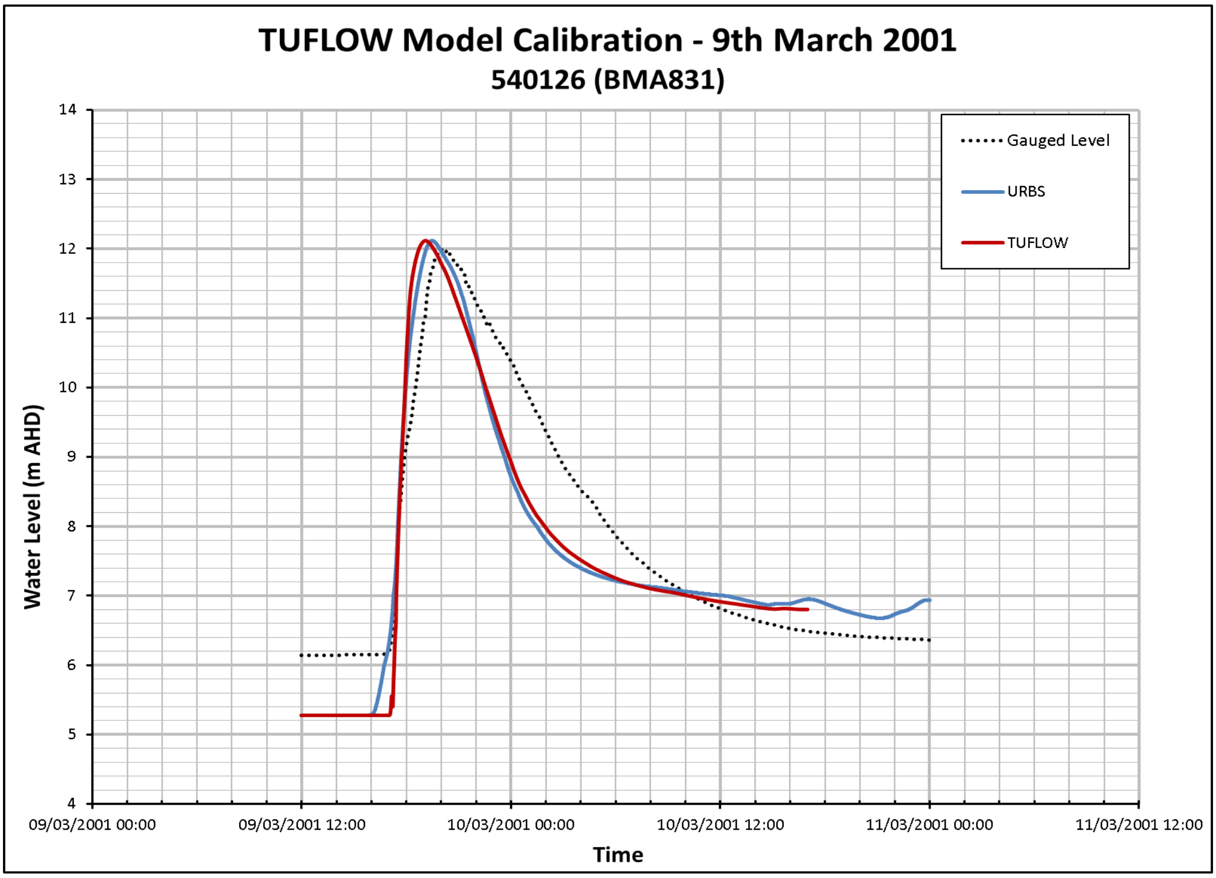


Figure 5.2: March 2001 TUFLOW Model Calibration – Bulimba Creek at 540126 (BMA831)

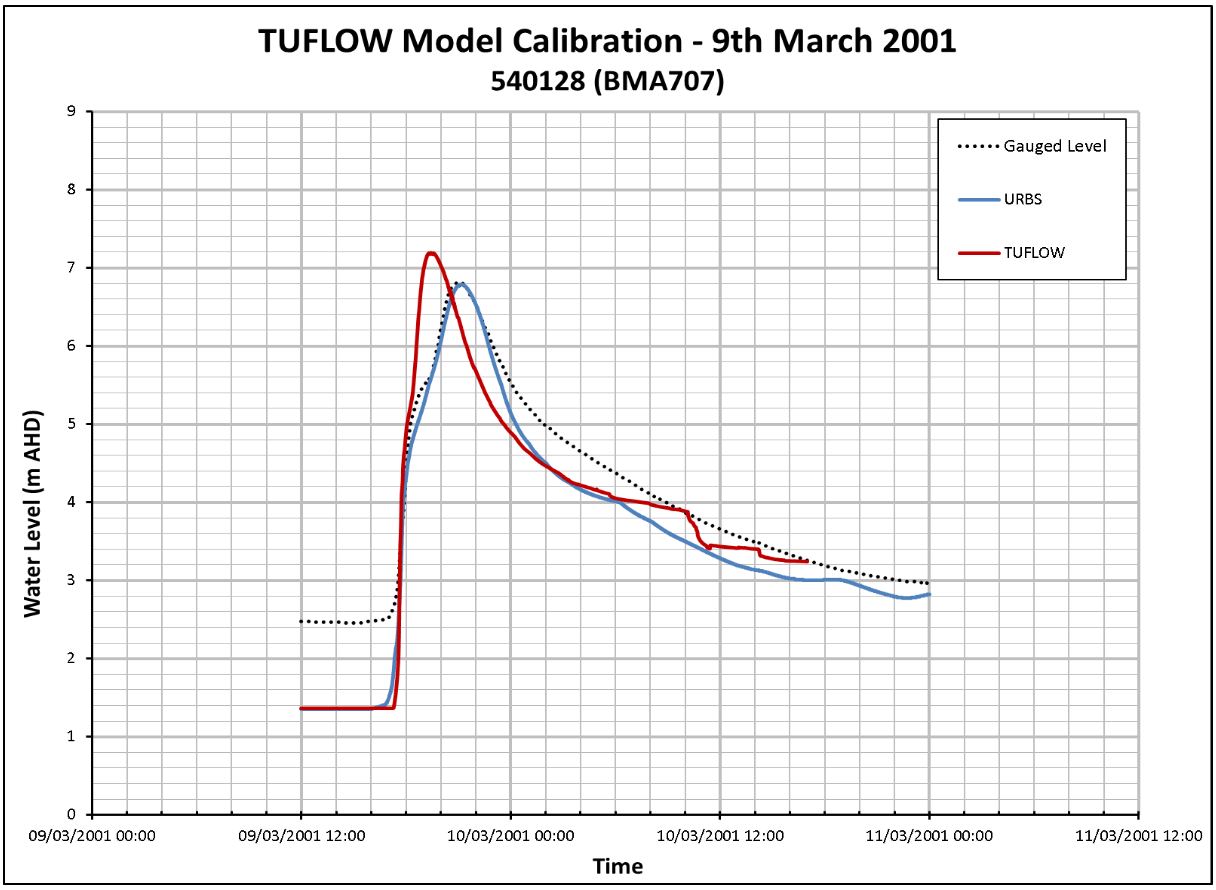


Figure 5.3: March 2001 TUFLOW Model Calibration – Bulimba Creek at 540128 (BMA707)

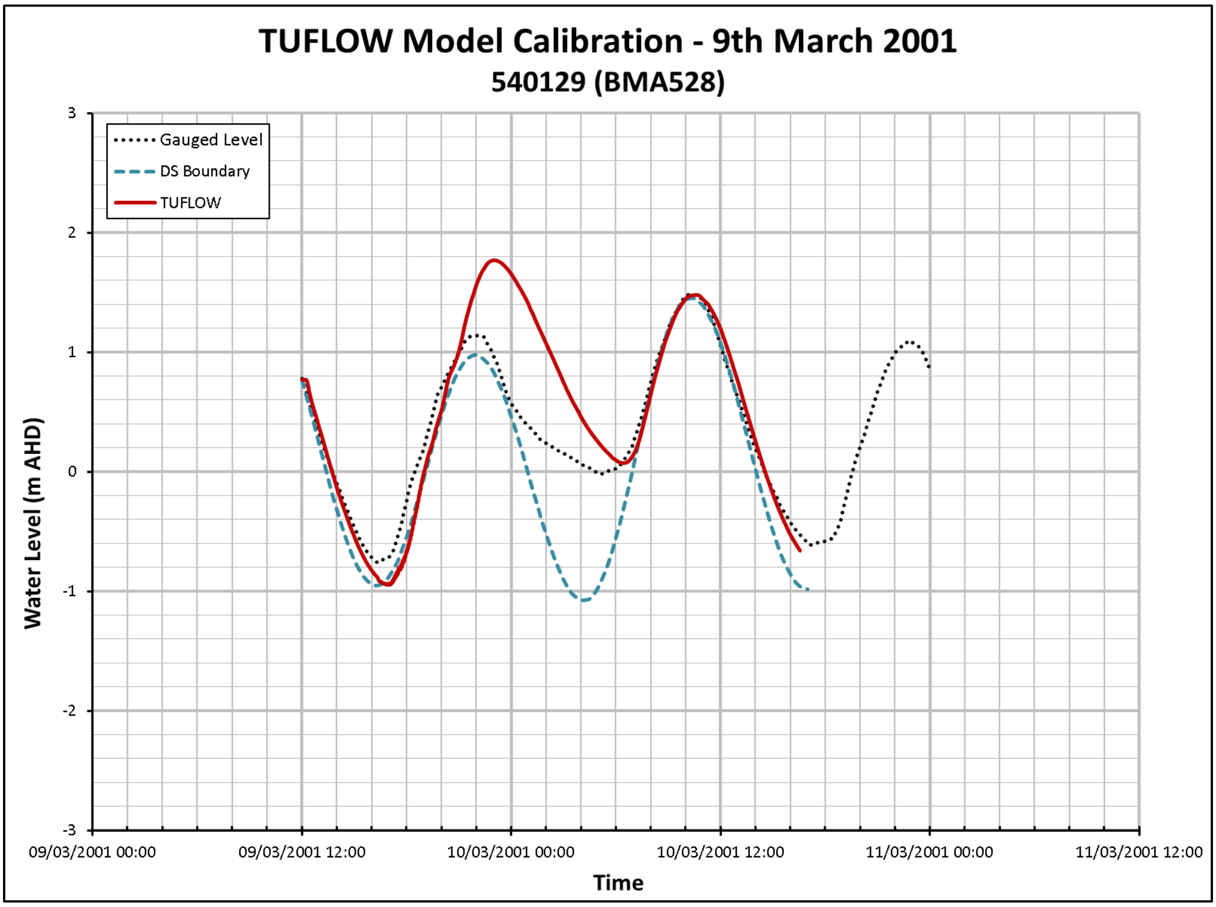


Figure 5.4: March 2001 TUFLOW Model Calibration – Bulimba Creek at 540129 (BMA528)

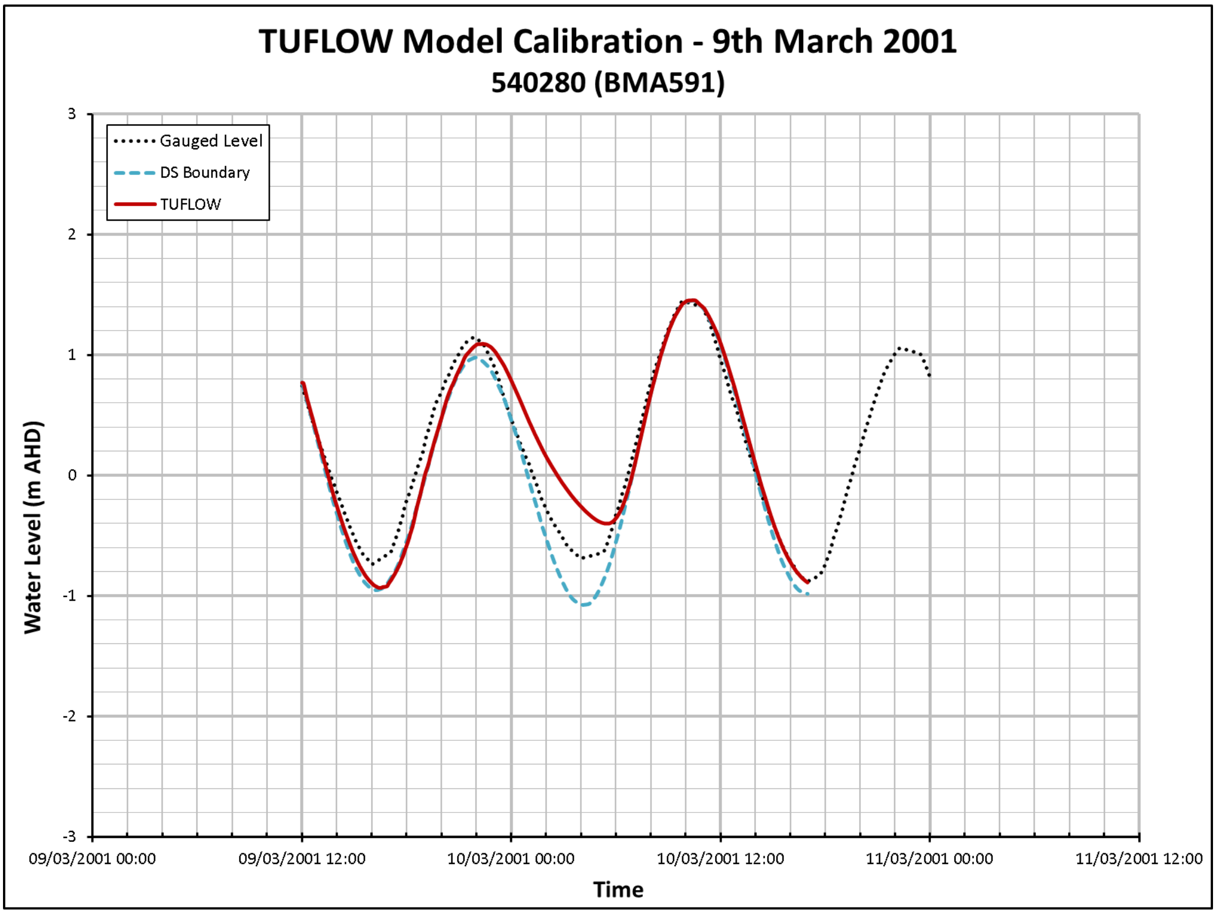


Figure 5.5: March 2001 TUFLOW Model Calibration – Bulimba Creek at 540280 (BMA591)

The reading at MHG BM500 in Mimosa Creek is from debris and appears in error, therefore has been discarded.

At Stream Gauge 540126 (Edwards Park, Carindale), the TUFLOW peak flood level was 0.13 m higher than the observed, which is within the desired ± 0.15 m tolerance. The TUFLOW flood peak occurred approximately 60-minutes before the observed. The shape of the TUFLOW and URBS hydrographs generally compared well to the observed.

At Stream Gauge 540128 (Old Cleveland Road, Carindale), the TUFLOW peak flood level was 0.35 m higher than the observed, which is outside the desired ± 0.15 m tolerance. The timing of the modelled peak of the flood was approximately 90-minutes before the observed for the TUFLOW model. The URBS model was able to better match the timing of the flood peak.

At Stream Gauge 540129 (Doughboy Parade, Hemmant), the TUFLOW peak flood level was 0.63 m higher than the observed, which is considerably outside the desired ± 0.15 m tolerance and is further discussed in Section 5.8. The modelled shape and timing of the tidal peaks and troughs (when not influenced by creek flows) achieved a good fit with the observed hydrograph.

At Stream Gauge 540280 (Aquarium Avenue, Hemmant), the TUFLOW peak flood level was 0.06 m lower than the observed, which is within the desired ± 0.15 m tolerance. The modelled shape and timing of the tidal peaks and troughs (when not influenced by creek flows) achieved a good fit with the observed hydrograph.

Table 5.4 – Calibration to Peak Flood Level Data (March 2001)

Waterway	Gauge ID	Location	Recorded Peak WL (mAHD)	Simulated Peak WL (mAHD)	Difference (m)
Bulimba Creek	540280	Stream Gauge	1.15 / 1.45	1.09 / 1.46	-0.06 / 0.01
	540129	Stream Gauge	1.14 / 1.49	1.77 / 1.48	0.63 / -0.01 #
	BM100	Gross Avenue, Hemmant	1.70	2.10	0.40
	BM110	Fleming Road, Hemmant	1.82	2.23	0.41
	BM120	d/s at Murarrie Road	2.67	3.04	0.37
	BM130	u/s at Murarrie Road	2.78	3.12	0.34
	BM140	d/s at Wynnum Road	3.10	3.32	0.22
	BM023	d/s at Wynnum Road	(O/T) > 3.03	3.33	-
	BM150	u/s at Wynnum Road	3.26	3.57	0.31
	BM020	u/s at Wynnum Road	3.42	3.93	0.51
	BM019	u/s at Wynnum Road	3.54	3.96	0.42
	BM160	Wood Avenue, Carina	3.70	4.21	0.51
	BM170	Fursden Road, Carina	4.11	4.47	0.36
	BM180	Scrub Road, Carindale	5.77	5.72	-0.05
	BM190	d/s at Old Cleveland Road	(O/T) > 6.58	6.53	-
	540128	Stream Gauge	6.83	7.18	0.35
	BM200	u/s at Old Cleveland Road	7.01	7.41	0.40
	BM210	d/s at Winstanley Street	8.00 (d)	7.89	-0.11
	BM220	d/s at Pine Mountain Road	10.09 (d)	9.82	-0.27
	BM230	Blackberry Street, Mansfield	10.70 (d)	10.98	0.28
	540126	Stream Gauge	11.99	12.12	0.13
	BM240	d/s at Wecker Road	15.44 (d)	15.40	-0.04
	BM241	u/s at Wecker Road	(N/R)	15.58	-
	BM250	u/s at Mt Gravatt Capalaba Road	18.19 (d)	18.41	0.22
	540127	Stream Gauge	(N/R)	22.95	-
	BM260	Maibry Street, Wishart	22.84 (d)	22.95	0.11
	BM270	Goorari Street, Eight Mile Plains	25.69	25.77	0.08
	BM280	d/s at Logan Road	29.22 (d)	29.27	0.05
	BM290	u/s at Pacific Motorway	(N/R)	32.61	-
	BM300	Easby Road, Eight Mile Plains	33.82 (d)	33.66	-0.16
	BM310	u/s at Padstow Road	(N/R)	34.94	-
	BM320	Jacinda Street, Sunnybank	37.72	37.54	-0.18
	BM330	Daw Road, Runcorn	44.53	44.13	-0.40
	BM340	u/s at Beenleigh Road	47.20	47.02	-0.18
	BM350	Susan Circuit, Runcorn	(N/R)	51.24	-
	BM360	Glenefer Street, Runcorn	(N/R)	51.92	-
	BM370	u/s at Nemies Road	(N/R)	56.28	-

Waterway	Gauge ID	Location	Recorded Peak WL (mAHD)	Simulated Peak WL (mAHD)	Difference (m)
	BM380	Noraville Street, Runcorn	(N/R)	60.34	-
	BM00A/B	Noraville Street, Runcorn	60.77	60.34	-0.43 ** #
Bulimba Creek East	BM400	Daydream Place, Eight Mile Plains	27.95	27.17	-0.78 ** #
	BM410	u/s at Miles Platting Road	29.78	29.41	-0.37 (B)
	BM420	u/s at Logan Road	33.99 (d)	34.19	0.20
	BM430	u/s at Underwood Road	39.04	38.82	-0.22
	BM438	d/s at Beenleigh Road	(N/R)	48.43	-
	BM440	u/s at Beenleigh Road	(N/R)	50.35	-
Mimosa Creek	BM500	50 m d/s of Parkway Street	40.37 (d)	39.21	~~-1.16~~ #
	MI120	100 m d/s of Kessels Road	(N/R)	40.69	-
	MI130	Larwood Street, Upper Mt Gravatt	(N/R)	45.38	-
Phillips Creek	PH110	350 m u/s of Creek Road	(N/R)	10.83	-
	PH120	100 m u/s of Anzac Road	(N/R)	17.35	-
Salvin Creek	SV110	115 m u/s of Donnington Street	(N/R)	9.08	-
	SV118	d/s at Creek Road	(N/R)	13.79	-
	SV120	u/s at Creek Road	(N/R)	14.11	-
	SV126	u/s at Pine Mountain Road	(N/R)	18.00	-
	SV130	u/s at Bevan Street	(N/R)	21.78	-
Broadwater Road Drain	BM650	Brisbane Adventist College, Mansfield	(N/R)	26.59	-
	BM660	130 m d/s of Newnham Road	(N/R)	29.14	-
Parklands Circuit Drain	BM700	200 m d/s of Prebble Street	(N/R)	25.21	-
	BM710	d/s at Prebble Street	(N/R)	27.41	-
Miles Platting Road Drain	BM800	100 m u/s of Gateway Motorway	(N/R)	27.79	-
	BM810	260 m u/s of Gateway Motorway	(N/R)	29.19	-
Tributary A	BM950	309 Priestdale Road, Rochedale (downstream)	(N/R)	41.97	-
	BM960	309 Priestdale Road, Rochedale (upstream)	(N/R)	43.06	-
Tributary B	BM415	100 m u/s of Logan Road	(N/R)	34.09	-
	BM416	50 m d/s of Dance Crescent	(N/R)	35.16	-
Hemmant	HM110	500 m u/s of Bulimba Creek confluence	(N/R)	1.66	-
Tingalpa Channel	TD120	1 km u/s of Bulimba Creek confluence	(N/R)	2.38	-
Wishart Road Drain	BM010	u/s at Wishart Road	26.39	27.32	0.93
Padstow Road Drain	BM306	u/s at McCullough Street	(N/R)	37.55	-
	BM307	d/s at Delafield Street	(N/R)	38.97	-

(d) Reading from debris mark
** Waterway has changed in this area, the hydraulic model is representing the current conditions
(B) Result potentially influenced by structure blockage
Refer to commentary provided in report

5.4.2 January 2013

The January 2013 flood was simulated in TUFLOW for 120 hours from 12 am on the 25th January 2013 to 12 am on the 30th January 2013. Figure 5.6 to Figure 5.9 provide a comparison between the TUFLOW (and URBS) results and the gauged flood level at the four stream gauges which were operational.

Table 5.5 provides a comparison between the TUFLOW results and the recorded peak flood levels at the MHGs. From review of the peak level / MHG results, it was apparent that at 26 out of 40 locations the desired peak flood level tolerance of ± 0.30 m was able to be achieved.

Within the main Bulimba Creek, the TUFLOW peak flood levels were both higher and lower than the observed, with no trend apparent. From MHG BM380 (Noraville Street, Runcorn) to 540129 (BMA528) the TUFLOW peak flood levels are on average 0.12 m higher than the observed peak flood levels.

Within Bulimba Creek East, the TUFLOW peak flood levels were both higher and lower than the observed, with no trend apparent. At MHG BM400, the TUFLOW peak flood level is considerably lower than the observed, however, as previously noted, can be explained by the significant channel scour which has occurred since January 2013.

At MHG MI120, the TUFLOW peak flood level is considerably higher than the observed. The Kessels Road Bridge (upstream of MHG MI120) was upgraded into what appears to be a larger structure around 2014, which could potentially the large difference, as the calibration TUFLOW model is typically set-up for the current conditions.

At Stream Gauge 540127 (Greenwood Street, Wishart), the TUFLOW peak flood level was slightly lower than the observed, but within the desired ± 0.15 m tolerance. The overall shape of the TUFLOW and URBS hydrographs and the timing of the flood peak achieved a reasonable fit with the observed.

At Stream Gauge 540126 (Edwards Park, Carindale), the TUFLOW peak flood level was 0.23 m higher than the observed, which is outside the desired ± 0.15 m tolerance. The TUFLOW flood peak occurred approximately 90-minutes before the observed. The shape of the TUFLOW and URBS hydrographs achieved a reasonable fit with the observed.

At Stream Gauge 540128 (Old Cleveland Road, Carindale), the TUFLOW peak flood level was 0.45 m higher than the observed, which is outside the desired ± 0.15 m tolerance. The timing of the TUFLOW flood peak was approximately 120-minutes before the observed. The URBS model was able to better match the timing of the flood peak.

At Stream Gauge 540129 (Doughboy Parade, Hemmant), the TUFLOW peak flood level was 0.19 m higher than the observed, which is just outside the desired ± 0.15 m tolerance. The timing of the modelled peak and troughs achieved a good fit with the observed hydrograph.

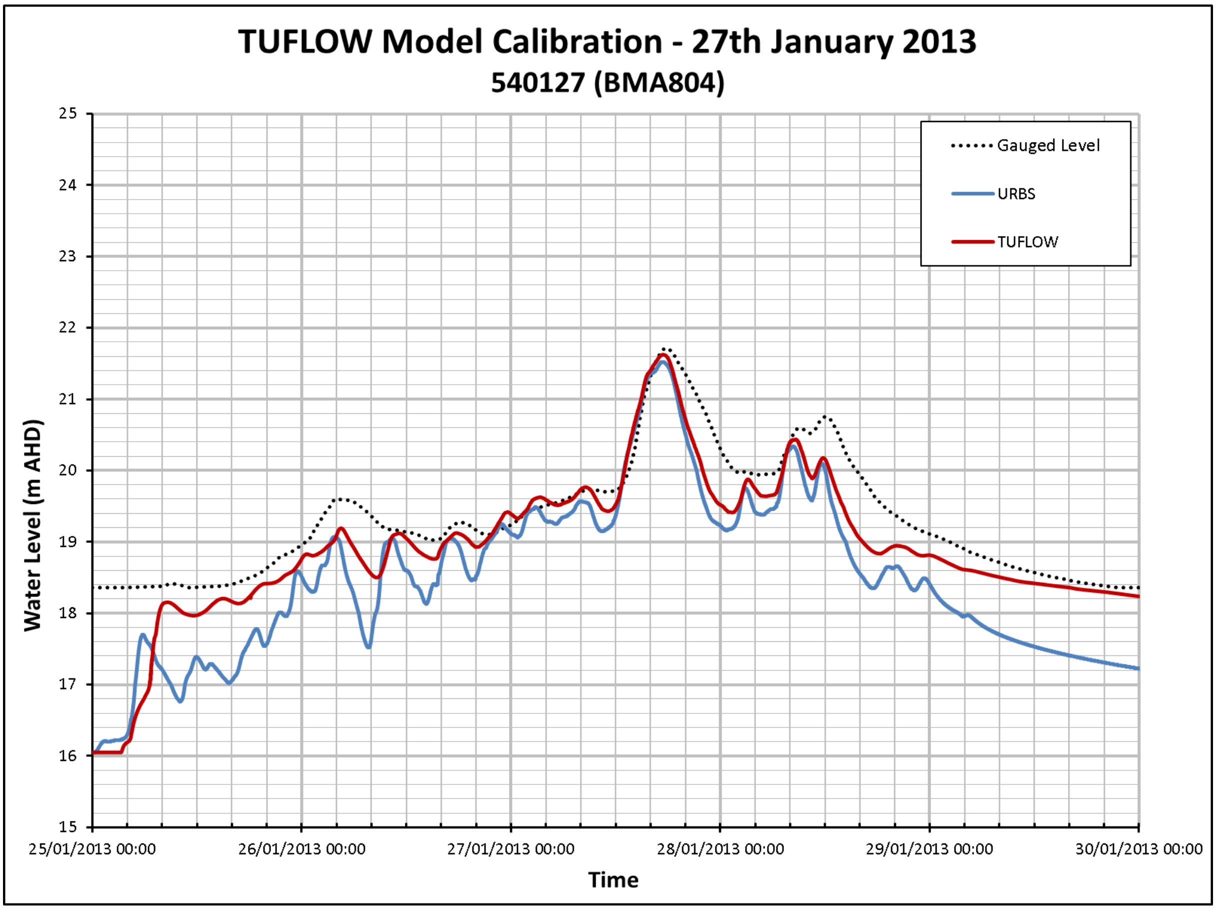


Figure 5.6: January 2013 TUFLOW Model Calibration – Bulimba Creek at 540127 (BMA804)

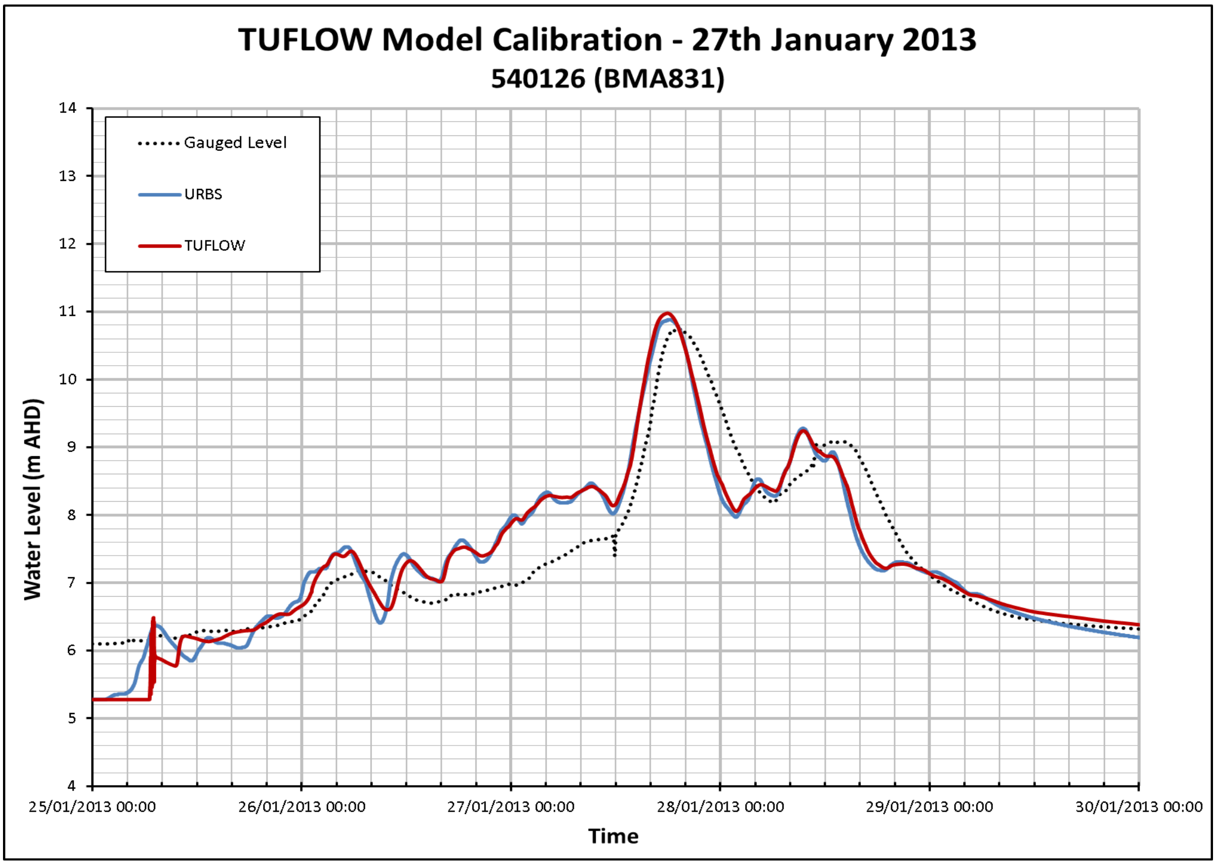


Figure 5.7: January 2013 TUFLOW Model Calibration - Bulimba Creek at 540126 (BMA831)

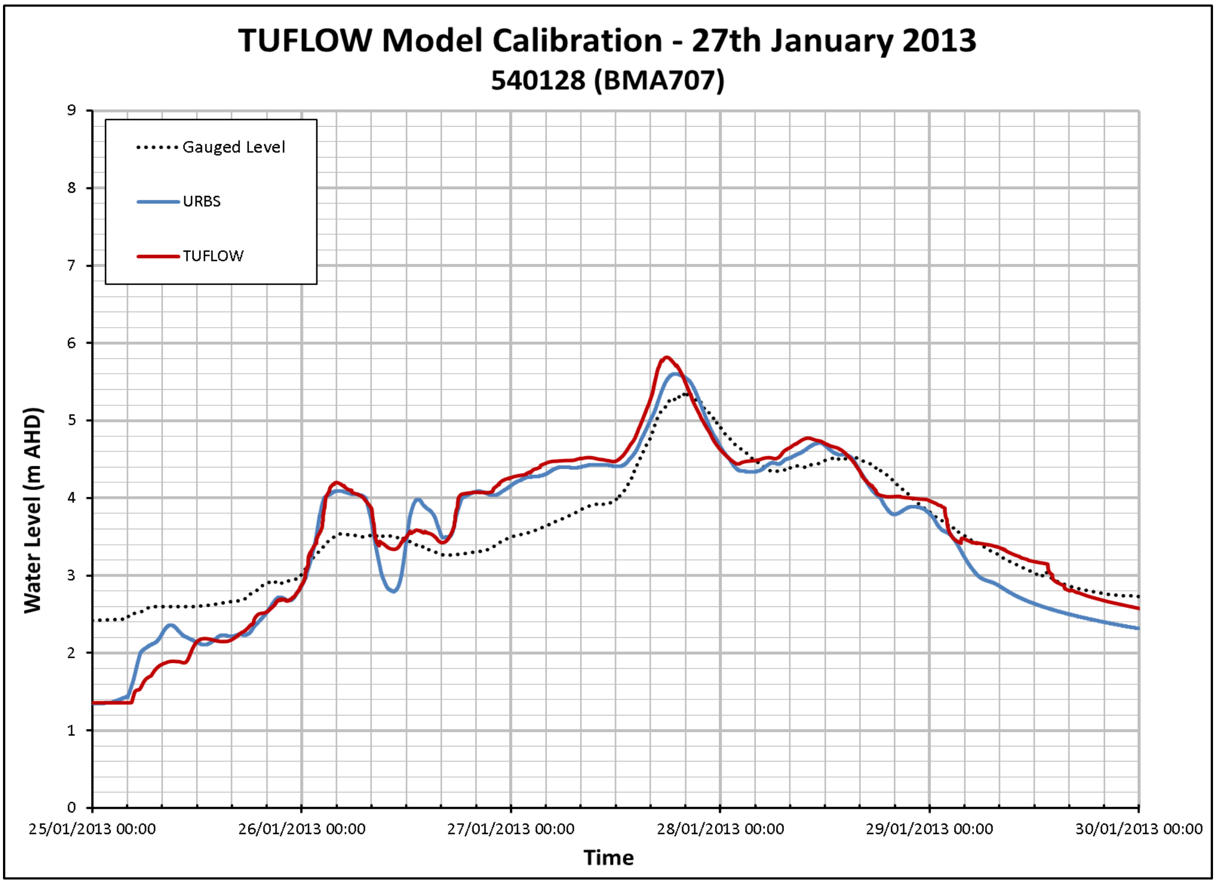


Figure 5.8: January 2013 TUFLOW Model Calibration – Bulimba Creek at 540128 (BMA707)

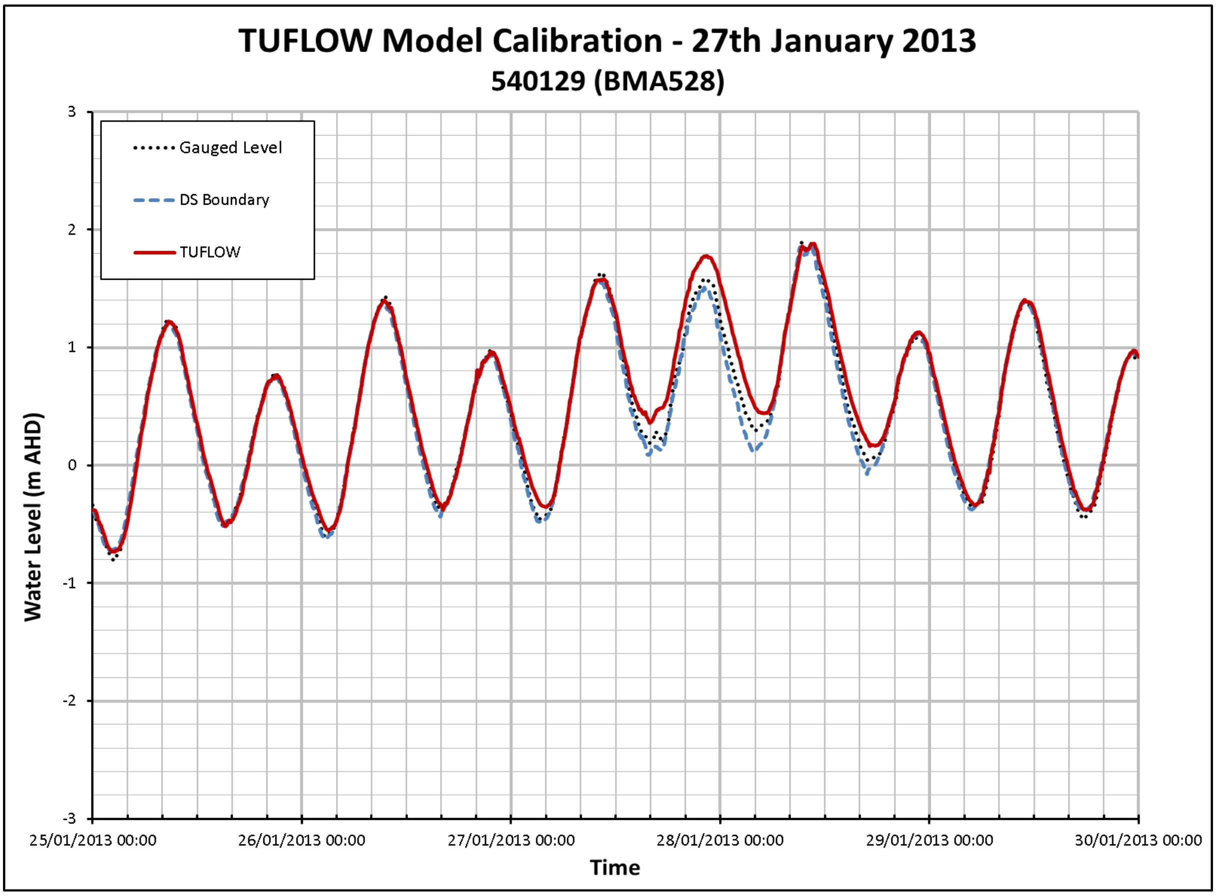


Figure 5.9: January 2013 TUFLOW Model Calibration – Bulimba Creek at 540129 (BMA528)

Table 5.5 – Calibration to Peak Flood Level Data (January 2013)

Waterway	Gauge ID	Location	Recorded Peak WL (mAHD)	Simulated Peak WL (mAHD)	Difference (m)
Bulimba Creek	540129	Stream Gauge	1.59 / 1.89	1.78 / 1.88	0.19 / -0.01
	BM100	Gross Avenue, Hemmant	1.98	1.94	-0.04
	BM110	Fleming Road, Hemmant	2.16 (d)	2.03	-0.13
	BM120	d/s at Murarrie Road	2.40	2.60	0.20
	BM130	u/s at Murarrie Road	(N/R)	2.66	-
	BM140	d/s at Wynnum Road	2.66	2.81	0.15
	BM023	d/s at Wynnum Road	(N/R)	2.82	-
	BM020	u/s at Wynnum Road	(N/R)	3.28	-
	BM150	u/s at Wynnum Road	2.89	3.29	0.40
	BM019	u/s at Wynnum Road	(N/R)	3.31	-
	BM160	Wood Avenue, Carina	3.15	3.51	0.36
	BM170	Fursden Road, Carina	3.63	3.82	0.19
	BM180	Scrub Road, Carindale	(N/R)	4.62	-
	BM190	d/s at Old Cleveland Road	(N/R)	5.31	-
	540128	Stream Gauge	5.36	5.81	0.45
	BM200	u/s at Old Cleveland Road	5.54	5.96	0.42
	BM210	d/s at Winstanley Street	(N/R)	6.53	-
	BM220	d/s at Pine Mountain Road	(N/R)	8.46	-
	BM230	Blackberry Street, Mansfield	9.44	9.70	0.26
	540126	Stream Gauge	10.75	10.98	0.23
	BM240	d/s at Wecker Road	13.41	13.70	0.29
	BM241	u/s at Wecker Road	(N/R)	13.88	-
	BM250	u/s at Mt Gravatt Capalaba Road	(N/R)	16.84	-
	540127	Stream Gauge	21.72	21.63	-0.09
	BM260	Maibry Street, Wishart	(N/R)	21.64	-
	BM270	Goorari Street, Eight Mile Plains	(N/R)	24.15	-
	BM280	d/s at Logan Road	28.25	28.37	0.12
	BM290	u/s at Pacific Motorway	(Destroyed)	29.80	-
	BM300	Easby Road, Eight Mile Plains	32.29	32.30	0.01
	BM310	u/s at Padstow Road	34.08	33.64	-0.44 (B)
	BM320	Jacinda Street, Sunnybank	37.11	36.48	-0.63
	BM330	Daw Road, Runcorn	(N/R)	43.62	-
	BM340	u/s at Beenleigh Road	(N/R)	46.24	-
	BM350	Susan Circuit, Runcorn	(N/R)	50.78	-
	BM360	Glenefer Street, Runcorn	51.32	51.48	0.16
	BM370	u/s at Nemies Road	55.00	54.94	-0.06
	BM380	Noraville Street, Runcorn	60.20	60.06	-0.14

Waterway	Gauge ID	Location	Recorded Peak WL (mAHD)	Simulated Peak WL (mAHD)	Difference (m)
	BM00A/B	Noraville Street, Runcorn	(N/R)	60.05	-
Bulimba Creek East	BM400	Daydream Place, Eight Mile Plains	26.92	26.26	-0.66 ** #
	BM410	u/s at Miles Platting Road	(N/R)	28.27	-
	BM420	u/s at Logan Road	(N/R)	32.76	-
	BM430	u/s at Underwood Road	(N/R)	37.14	-
	BM438	d/s at Beenleigh Road	47.99	47.77	-0.22
	BM440	u/s at Beenleigh Road	49.47	49.91	0.44
Mimosa Creek	BM500	50 m d/s of Parkway Street	38.12	38.44	0.32
	MI120	100 m d/s of Kessels Road	39.41	39.90	0.49 ** #
	MI130	Larwood Street, Upper Mt Gravatt	44.26	44.17	-0.09
Phillips Creek	PH110	350 m u/s of Creek Road	9.70	10.10	0.40
	PH120	100 m u/s of Anzac Road	16.05	16.45	0.40
Salvin Creek	SV110	115 m u/s of Donnington Street	7.56	8.04	0.48
	SV118	d/s at Creek Road	(N/R)	13.14	-
	SV120	u/s at Creek Road	13.46	13.42	-0.04
	SV126	u/s at Pine Mountain Road	(N/R)	17.13	-
	SV130	u/s at Bevan Street	21.18	21.19	0.01
Broadwater Road Drain	BM650	Brisbane Adventist College, Mansfield	25.17	25.85	0.68
	BM660	130 m d/s of Newnham Road	27.92	27.76	-0.16
Parklands Circuit Drain	BM700	200 m d/s of Prebble Street	24.83	24.60	-0.23
	BM710	d/s at Prebble Street	27.13	27.10	-0.03
Miles Platting Road Drain	BM800	100 m u/s of Gateway Motorway	(N/R)	27.43	-
	BM810	260 m u/s of Gateway Motorway	28.94	28.73	-0.21
Tributary A	BM950	309 Priestdale Road, Rochedale (downstream)	(N/R)	41.42	-
	BM960	309 Priestdale Road, Rochedale (upstream)	42.45	42.59	0.14
Tributary B	BM415	100 m u/s of Logan Road	33.80	33.15	-0.65 (B)
	BM416	50 m d/s of Dance Crescent	34.46	34.25	-0.21
Hemmant	HM110	500 m u/s of Bulimba Creek confluence	1.68	1.85	0.17
Tingalpa Channel	TD120	1 km u/s of Bulimba Creek confluence	2.26	2.29	0.03
Wishart Road Drain	BM010	u/s at Wishart Road	(N/R)	26.47	-
Padstow Road Drain	BM306	u/s at McCullough Street	36.22	36.43	0.21
	BM307	d/s at Delafield Street	38.01	37.79	-0.22

(d) Reading from debris mark
** Waterway has changed in this area, the hydraulic model is representing the current conditions
(B) Result potentially influenced by structure blockage
Refer to commentary provided in report

5.4.3 May 2015

The May 2015 flood was simulated in TUFLOW for 60 hours from 12 noon on the 30th April 2015 to 12 am on the 3rd May 2015. Figure 5.10 to Figure 5.13 provide a comparison between the TUFLOW (and URBS) results and the gauged flood level at the four stream gauges which were operational. Table 5.5 provides a comparison between the TUFLOW results and the recorded peak flood levels at the MHGs for which records were available. From review of the peak level / MHG results, it was apparent that at 24 out of 38 locations the desired peak flood level tolerance of ± 0.30 m was able to be achieved.

Within the main Bulimba Creek, the TUFLOW peak flood levels were both higher and lower than the observed. Upstream of MHG BM290 (Pacific Motorway), the TUFLOW peak flood levels were typically lower than the observed, with an average difference of 0.29 m. From downstream of the Pacific Motorway to Old Cleveland Road in the mid-catchment area, the peak flood levels at the MHGs and stream gauges were within the desirable peak flood level tolerances.

Within Bulimba Creek East, the TUFLOW peak flood levels at most MHGs were lower than the observed, with an average difference of 0.23 m. At MHG BM400, the TUFLOW peak flood level is considerably lower than the observed, however, as previously noted, can be explained by the significant channel scour which has occurred during / since the event occurred. The TUFLOW peak flood level at MHG BM430 is also considerably lower than the observed, which can be most likely attributed to partial blockages in the culvert at Underwood Road, which is located directly downstream.

MHG PH120 is located within Phillips Creek, between Birdwood Road and Anzac Road. A comparison within this reach, between 2007 and 2020 surveyed cross-sections, revealed scouring of the bed by up to 0.8 m in places. Whilst it is not definitive when this scouring occurred, the considerably low TUFLOW peak flood level at this location could be potentially attributed to the increase in channel conveyance because of these changes to the channel shape. Also, the location of the MHG is 100 m upstream of a culvert, which may have been partly blocked during the event.

At Stream Gauge 540127 (Greenwood Street, Wishart), the TUFLOW peak flood level was slightly lower than the observed, but within the desired ± 0.15 m tolerance. The overall shape of the TUFLOW / URBS hydrographs and the timing of the flood peak achieved a reasonable fit with the observed.

At Stream Gauge 540126 (Edwards Park, Carindale), the TUFLOW peak flood level was 0.04 m higher than the observed, which is within the desired ± 0.15 m tolerance. The modelled flood peak occurred approximately 60-minutes before the observed for the TUFLOW model. The URBS model was able to better match the timing of the flood peak. The shape of the TUFLOW and URBS hydrographs achieved a reasonable fit with the observed.

At Stream Gauge 540128 (Old Cleveland Road, Carindale), the TUFLOW peak flood level was 0.09 m higher than the observed, which is within the desired ± 0.15 m tolerance. The timing of the modelled peak of the flood was approximately 90-minutes before the observed for the TUFLOW model. The URBS model was able to better match the timing of the flood peak.

At Stream Gauge 540129 (Doughboy Parade, Hemmant), the TUFLOW peak flood level was 0.54 m higher than the observed, which is considerably outside the desired ± 0.15 m tolerance and is further discussed in Section 5.8. The modelled shape and timing of the tidal peaks and troughs (when not influenced by creek flows) achieved a good fit with the observed hydrograph.

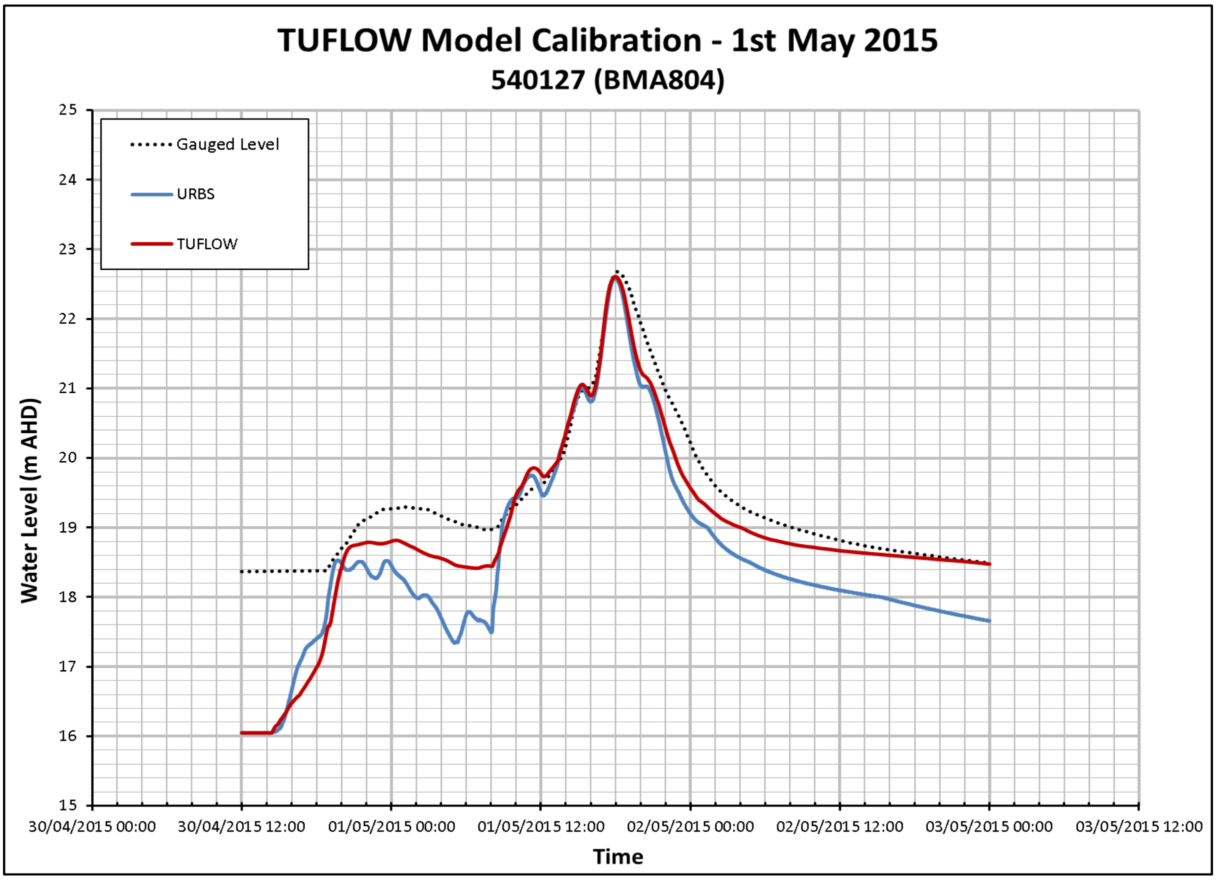


Figure 5.10: May 2015 TUFLOW Model Calibration – Bulimba Creek at 540127 (BMA804)

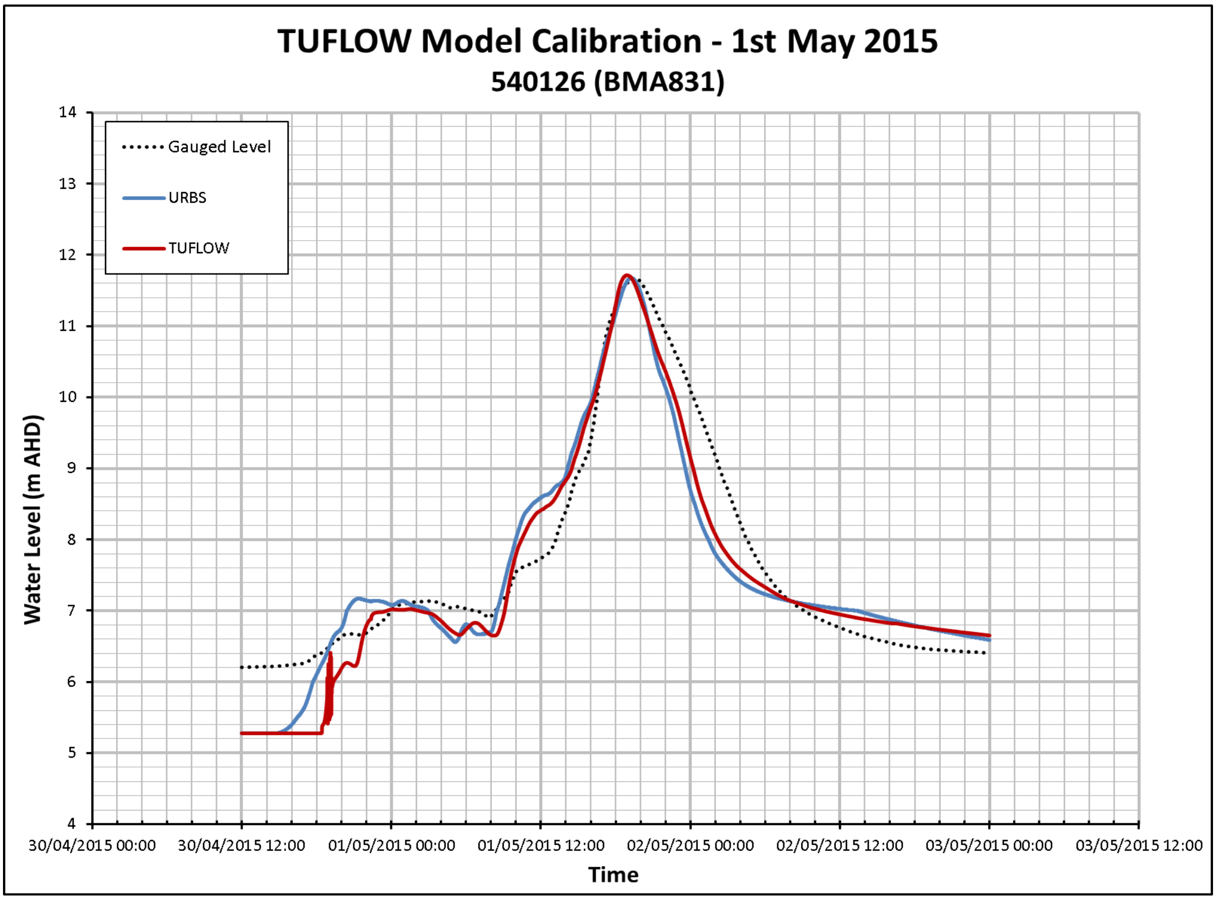


Figure 5.11: May 2015 TUFLOW Model Calibration – Bulimba Creek at 540126 (BMA831)

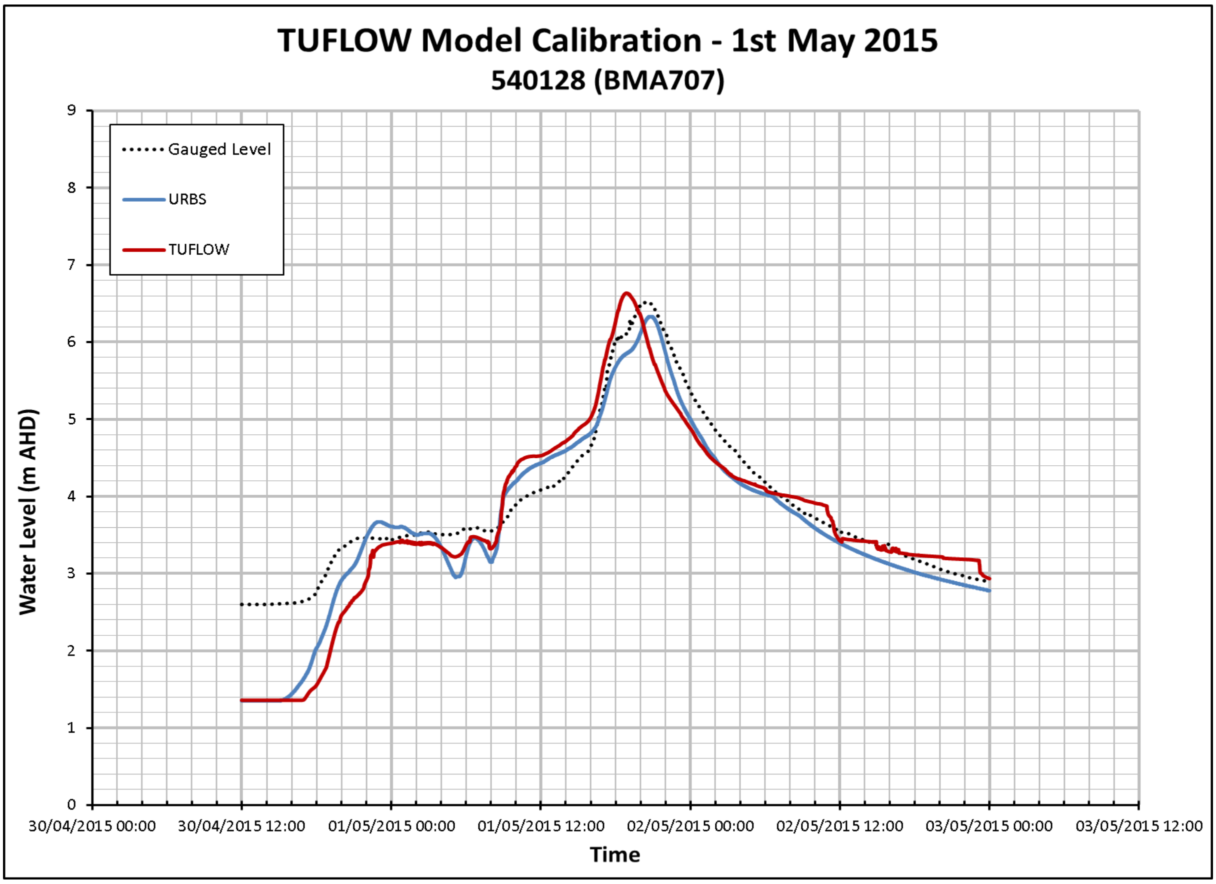


Figure 5.12: May 2015 TUFLOW Model Calibration – Bulimba Creek at 540128 (BMA707)

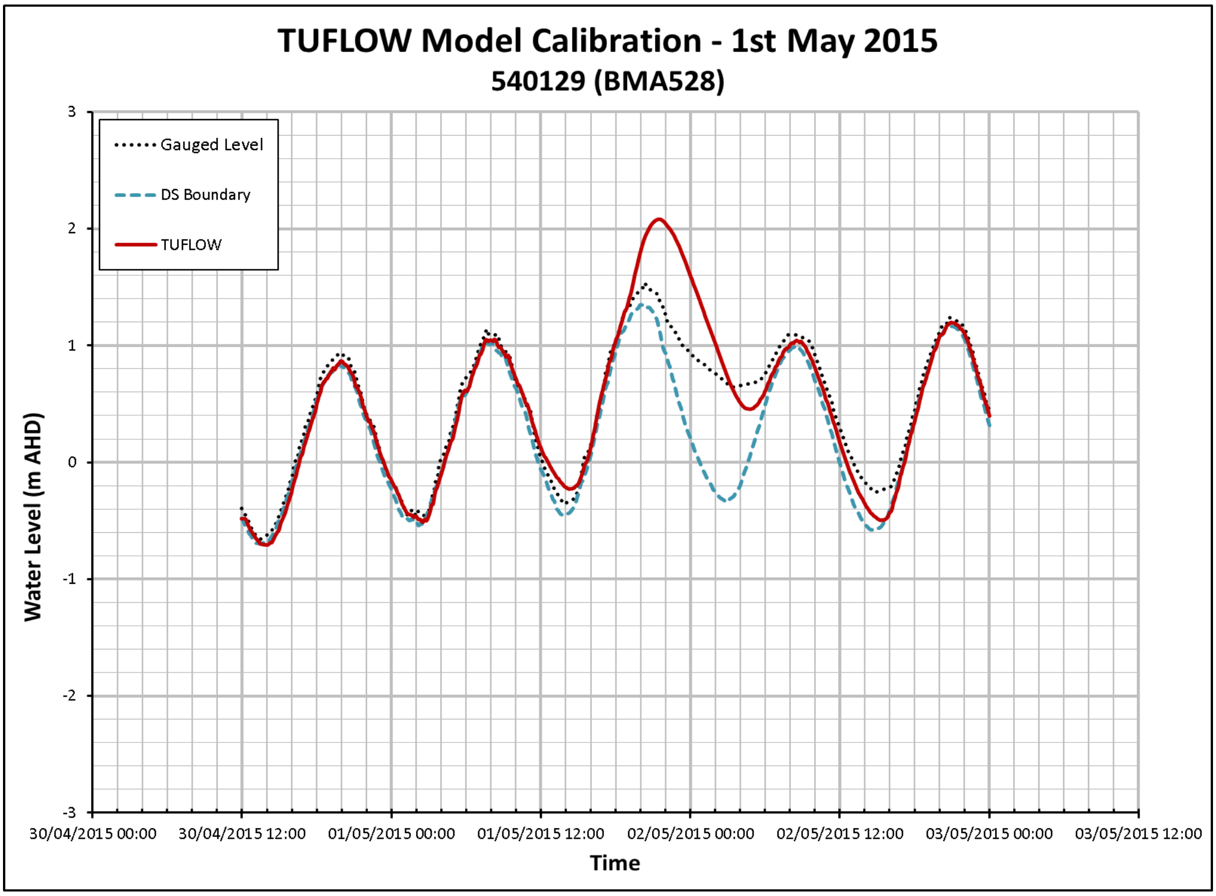


Figure 5.13: May 2015 TUFLOW Model Calibration – Bulimba Creek at 540129 (BMA528)

Table 5.6 – Calibration to Peak Flood Level Data (May 2015)

Waterway	Gauge ID	Location	Recorded Peak WL (mAHD)	Simulated Peak WL (mAHD)	Difference (m)
Bulimba Creek	540129	Stream Gauge	1.54	2.08	0.54 #
	BM100	Gross Avenue, Hemmant	1.74	2.31	0.57
	BM110	Fleming Road, Hemmant	2.09	2.40	0.31
	BM120	d/s at Murarrie Road	(N/R)	3.10	-
	BM130	u/s at Murarrie Road	3.15	3.17	0.02
	BM140	d/s at Wynnum Road	3.47	3.35	-0.12
	BM023	d/s at Wynnum Road	(N/R)	3.37	-
	BM020	u/s at Wynnum Road	(N/R)	3.93	-
	BM150	u/s at Wynnum Road	3.73	3.95	0.22
	BM019	u/s at Wynnum Road	(N/R)	3.93	-
	BM160	Wood Avenue, Carina	4.29	4.20	-0.09
	BM170	Fursden Road, Carina	4.77	4.43	-0.34
	BM180	Scrub Road, Carindale	5.72	5.33	-0.39
	BM190	d/s at Old Cleveland Road	(N/R)	5.85	-
	540128	Stream Gauge	6.53	6.62	0.09
	BM200	u/s at Old Cleveland Road	6.91	6.84	-0.07
	BM210	d/s at Winstanley Street	(N/R)	7.36	-
	BM220	d/s at Pine Mountain Road	9.08	9.30	0.22
	BM230	Blackberry Street, Mansfield	(O/T) > 9. 57	10.49	-
	540126	Stream Gauge	11.68	11.72	0.04
	BM240	d/s at Wecker Road	14.68	14.85	0.17
	BM241	u/s at Wecker Road	(N/R)	15.04	-
	BM250	u/s at Mt Gravatt Capalaba Road	(Destroyed)	18.11	-
	540127	Stream Gauge	22.68	22.61	-0.07
	BM260	Maibry Street, Wishart	22.67	22.62	-0.05
	BM270	Goorari Street, Eight Mile Plains	25.06	25.17	0.11
	BM280	d/s at Logan Road	(Destroyed)	29.11	-
	BM290	u/s at Pacific Motorway	30.31	30.86	0.55
	BM300	Easby Road, Eight Mile Plains	33.09	33.05	-0.04
	BM310	u/s at Padstow Road	34.68	34.31	-0.37 (B)
	BM320	Jacinda Street, Sunnybank	37.91	37.22	-0.69
	BM330	Daw Road, Runcorn	44.09	43.99	-0.10
	BM340	u/s at Beenleigh Road	47.10	46.91	-0.19
	BM350	Susan Circuit, Runcorn	51.68	51.19	-0.49
	BM360	Glenefer Street, Runcorn	52.04	51.88	-0.16
	BM370	u/s at Nemies Road	(Destroyed)	55.97	-
	BM380	Noraville Street, Runcorn	60.60	60.32	-0.28

Waterway	Gauge ID	Location	Recorded Peak WL (mAHD)	Simulated Peak WL (mAHD)	Difference (m)
	BM00A/B	Noraville Street, Runcorn	(N/R)	60.32	-
Bulimba Creek East	BM400	Daydream Place, Eight Mile Plains	27.45	26.97	-0.48 ** #
	BM410	u/s at Miles Platting Road	29.36	29.13	-0.23
	BM420	u/s at Logan Road	33.53	33.65	0.12
	BM430	u/s at Underwood Road	38.98	38.27	-0.71 (B) #
	BM438	d/s at Beenleigh Road	48.39	48.26	-0.13
	BM440	u/s at Beenleigh Road	50.20	50.23	0.03
Mimosa Creek	BM500	50 m d/s of Parkway Street	39.02	38.76	-0.26
	MI120	100 m d/s of Kessels Road	40.52	40.23	-0.29
	MI130	Larwood Street, Upper Mt Gravatt	45.06	44.75	-0.31
Phillips Creek	PH110	350 m u/s of Creek Road	10.87	10.67	-0.20
	PH120	100 m u/s of Anzac Road	17.60	17.00	-0.60 (B) ** #
Salvin Creek	SV110	115 m u/s of Donnington Street	8.21	8.85	0.64
	SV118	d/s at Creek Road	(N/R)	13.81	-
	SV120	u/s at Creek Road	(Destroyed)	14.13	-
	SV126	u/s at Pine Mountain Road	(N/R)	17.82	-
	SV130	u/s at Bevan Street	21.54	21.66	0.12
Broadwater Road Drain	BM650	Brisbane Adventist College, Mansfield	(N/R)	26.23	-
	BM660	130 m d/s of Newnham Road	(N/R)	28.39	-
Parklands Circuit Drain	BM700	200 m d/s of Prebble Street	(N/R)	25.26	-
	BM710	d/s at Prebble Street	(N/R)	27.45	-
Miles Platting Road Drain	BM800	100 m u/s of Gateway Motorway	(N/R)	27.75	-
	BM810	260 m u/s of Gateway Motorway	(N/R)	29.15	-
Tributary A	BM950	309 Priestdale Road, Rochedale (downstream)	(N/R)	41.75	-
	BM960	309 Priestdale Road, Rochedale (upstream)	(N/R)	42.90	-
Tributary B	BM415	100 m u/s of Logan Road	(N/R)	33.83	-
	BM416	50 m d/s of Dance Crescent	(N/R)	34.83	-
Hemmant	HM110	500 m u/s of Bulimba Creek confluence	1.88	2.08	0.20
Tingalpa Channel	TD120	1 km u/s of Bulimba Creek confluence	2.58	2.52	-0.06
Wishart Road Drain	BM010	u/s at Wishart Road	(N/R)	27.21	-
Padstow Road Drain	BM306	u/s at McCullough Street	36.75	37.17	0.42
	BM307	d/s at Delafield Street	(Destroyed)	38.49	-

(d) Reading from debris mark

** Waterway has changed in this area, the hydraulic model is representing the current conditions

(B) Result potentially influenced by structure blockage

Refer to commentary provided in report

5.5 Hydraulic Model Verification Results

5.5.1 March 2017

The March 2017 flood was simulated in TUFLOW for 60 hours from 12 am on the 29th March 2017 to 12 am on the 1st April 2017. Figure 5.14 to Figure 5.17 provide a comparison between the TUFLOW (and URBS) results and the gauged flood level at the four stream gauges which were operational.

Table 5.7 provides a comparison of the TUFLOW results and the recorded peak flood levels at the MHGs for which records were available. From review of the peak level / MHG results, it was apparent that at 26 out of 33 locations the desired peak flood level tolerance of ± 0.30 m was able to be achieved.

Within the main Bulimba Creek, the TUFLOW peak flood levels were both higher and lower than the observed, with no trend apparent. From MHG BM380 (Noraville Street, Runcorn) to 540129 (BMA528) the TUFLOW peak flood levels are on average 0.08 m lower than the observed peak flood levels.

The TUFLOW peak flood level at MHG PH120 is considerably lower than the observed. As mentioned previously, this could be attributed to the changes in the channel shape due to scour and / or the proximity of the downstream culvert at Anzac Road, which may have been partially blocked during the event.

At Stream Gauge 540127 (Greenwood Street, Wishart), the TUFLOW peak flood level for the larger second peak was 0.13 m lower than the observed, which is within the desired ± 0.15 m tolerance. The overall shape of the TUFLOW and URBS hydrographs was reasonable with a good match between the timing of both peaks.

At Stream Gauge 540126 (Edwards Park, Carindale), the TUFLOW peak flood level for the larger second peak was 0.07 m lower than the observed, which is within the desired ± 0.15 m tolerance. The modelled first flood peak occurred approximately 90-minutes before the observed and for the second flood peak occurred approximately 30-minutes before the observed.

At Stream Gauge 540128 (Old Cleveland Road, Carindale), the TUFLOW peak flood level for the larger second peak was 0.17 m higher than the observed, which just outside the desired ± 0.15 m tolerance. The modelled first flood peak occurred approximately 120-minutes before the observed and the second flood peak matched the timing of the observed flood peak for the TUFLOW results.

At Stream Gauge 540129 (Doughboy Parade, Hemmant), the TUFLOW peak flood level was 0.22 m higher than the observed, which is just outside the desired ± 0.15 m tolerance. The timing of the modelled peak and troughs achieved a good fit with the observed hydrograph.

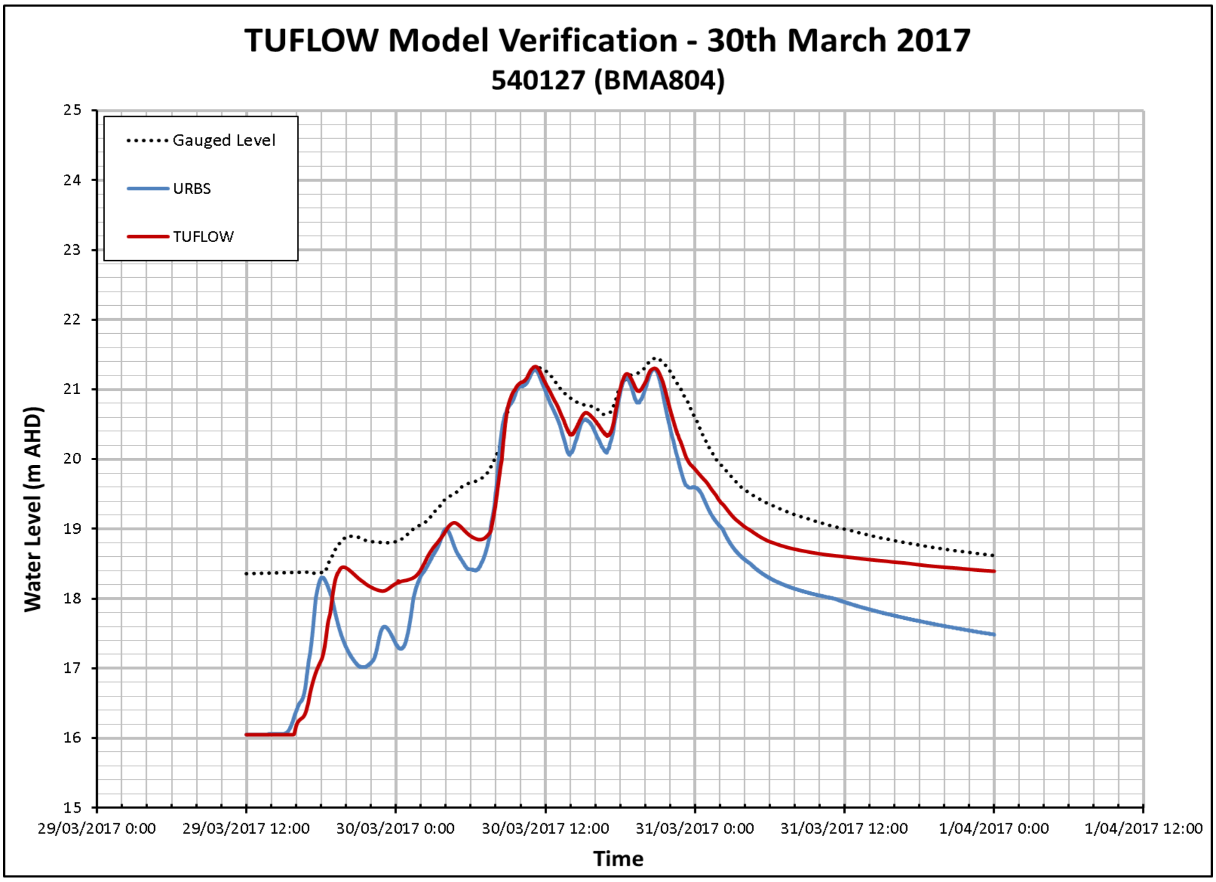


Figure 5.14: March 2017 TUFLOW Model Calibration – Bulimba Creek at 540127 (BMA804)

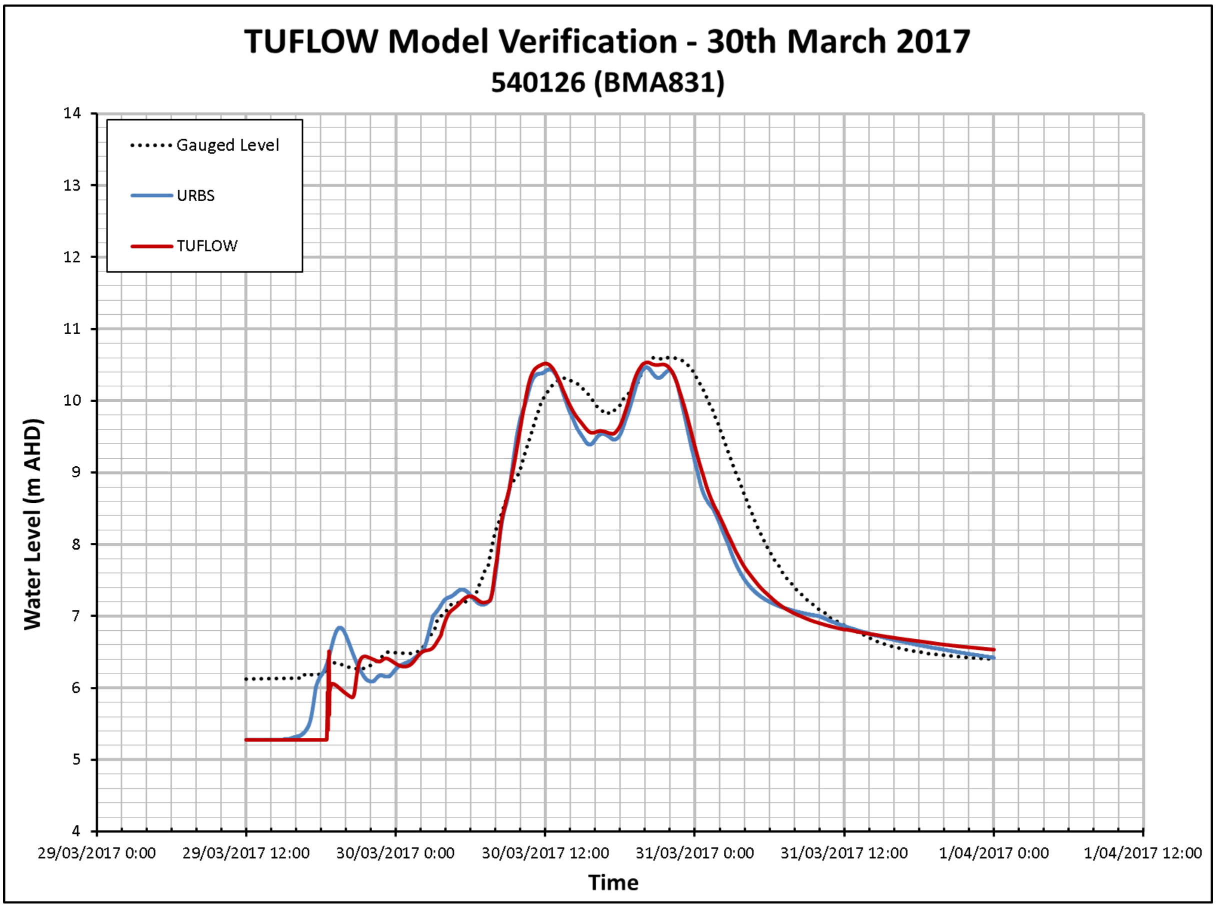


Figure 5.15: March 2017 TUFLOW Model Calibration – Bulimba Creek at 540126 (BMA831)

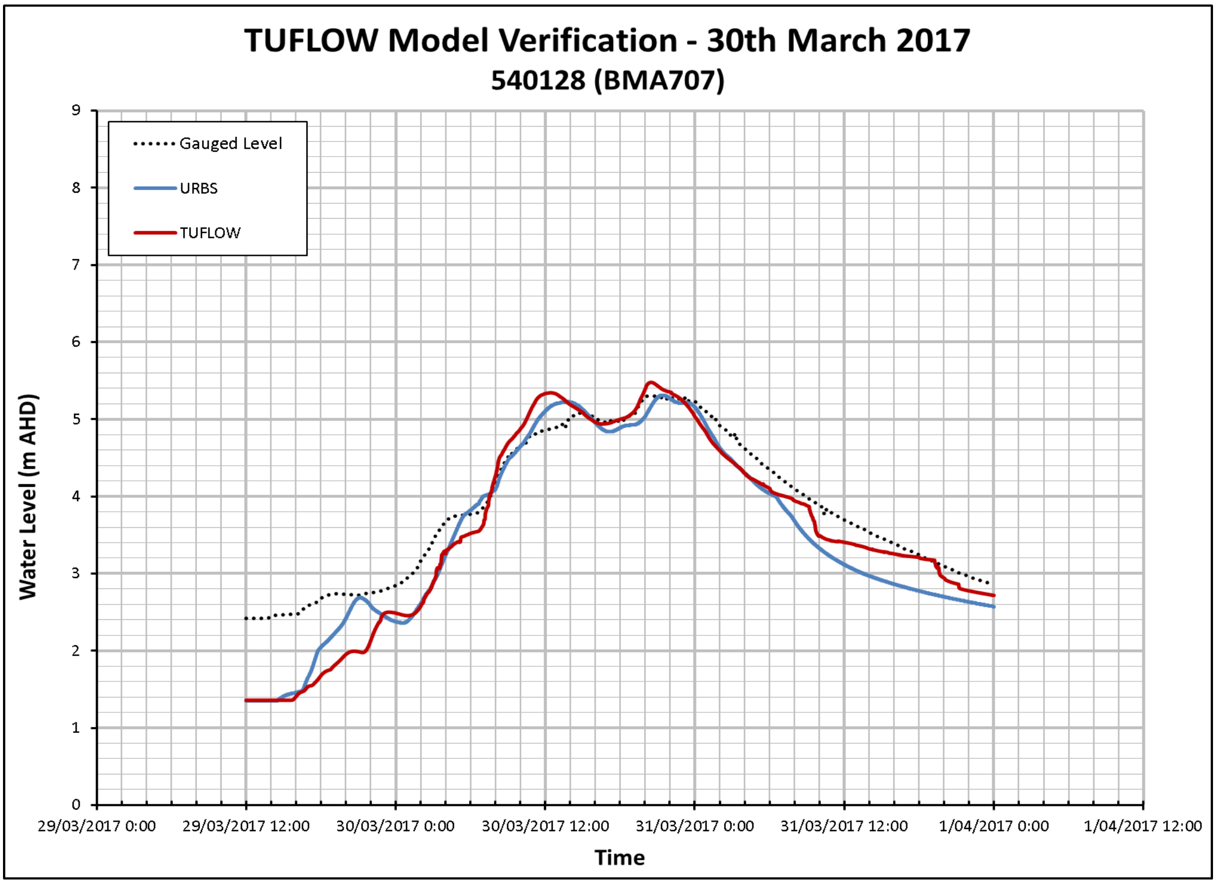


Figure 5.16: March 2017 TUFLOW Model Calibration – Bulimba Creek at 540128 (BMA707)

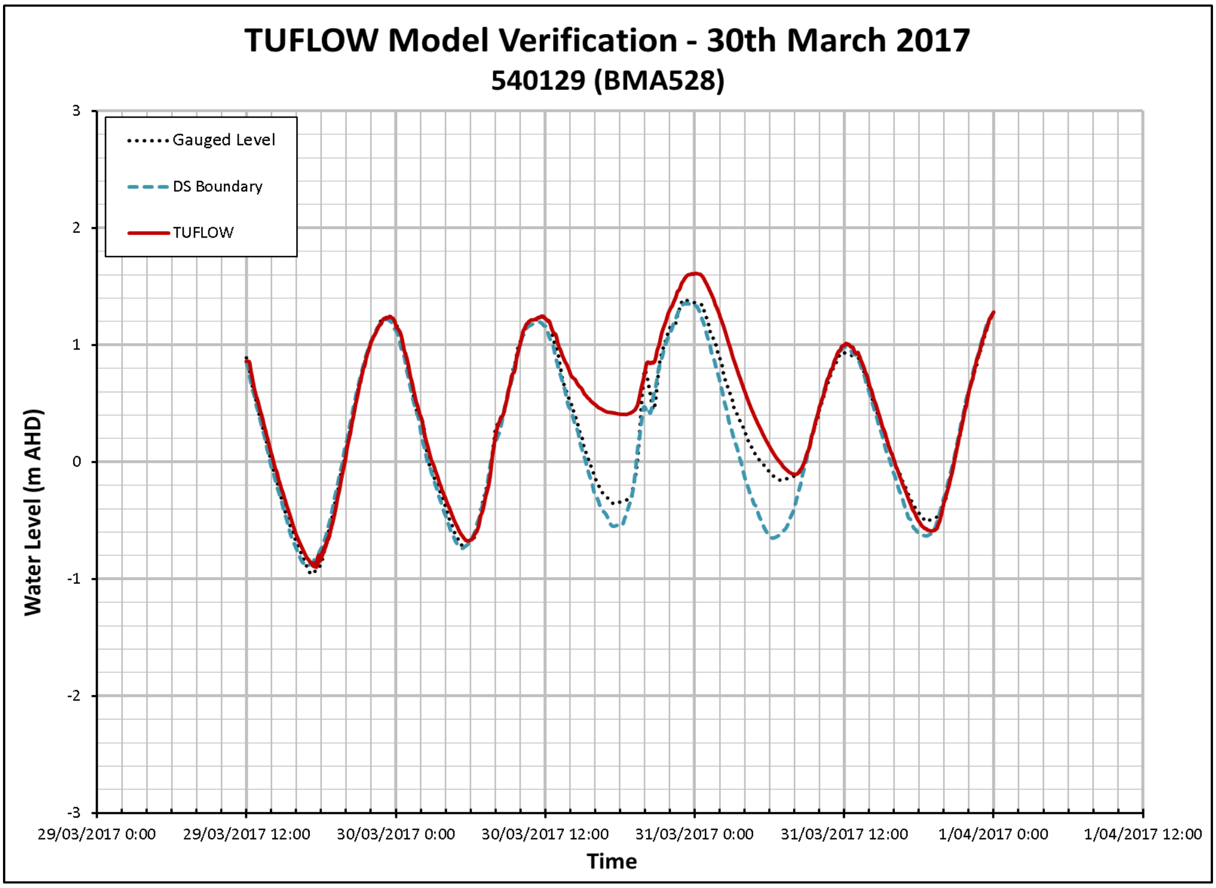


Figure 5.17: March 2017 TUFLOW Model Calibration – Bulimba Creek at 540129 (BMA528)

Table 5.7 – Calibration to Peak Flood Level Data (March 2017)

Waterway	Gauge ID	Location	Recorded Peak WL (mAHD)	Simulated Peak WL (mAHD)	Difference (m)
Bulimba Creek	540129	Stream Gauge	1.24 / 1.39	1.25 / 1.61	0.01 / 0.22
	BM100	Gross Avenue, Hemmant	1.63	1.80	0.17
	BM110	Fleming Road, Hemmant	(N/R)	1.89	-
	BM120	d/s at Murarrie Road	2.61	2.44	-0.17
	BM130	u/s at Murarrie Road	2.73	2.49	-0.24
	BM140	d/s at Wynnum Road	2.92	2.61	-0.31
	BM023	d/s at Wynnum Road	(N/R)	2.62	-
	BM020	u/s at Wynnum Road	(N/R)	3.01	-
	BM150	u/s at Wynnum Road	3.18	3.02	-0.16
	BM019	u/s at Wynnum Road	(N/R)	3.03	-
	BM160	Wood Avenue, Carina	3.50	3.23	-0.27
	BM170	Fursden Road, Carina	3.85	3.55	-0.30
	BM180	Scrub Road, Carindale	(N/R)	4.25	-
	BM190	d/s at Old Cleveland Road	(N/R)	5.16	-
	540128	Stream Gauge	5.30	5.47	0.17
	BM200	u/s at Old Cleveland Road	5.37 (d)	5.57	0.20
	BM210	d/s at Winstanley Street	(N/R)	6.12	-
	BM220	d/s at Pine Mountain Road	(N/R)	8.12	-
	BM230	Blackberry Street, Mansfield	9.33	9.31	-0.02
	540126	Stream Gauge	10.61	10.54	-0.07
	BM240	d/s at Wecker Road	13.33	13.18	-0.15
	BM241	u/s at Wecker Road	(N/R)	13.37	-
	BM250	u/s at Mt Gravatt Capalaba Road	16.28	16.34	0.06
	540127	Stream Gauge	21.46	21.33	-0.13
	BM260	Maibry Street, Wishart	(N/R)	21.34	-
	BM270	Goorari Street, Eight Mile Plains	(N/R)	24.00	-
	BM280	d/s at Logan Road	28.14	28.13	-0.01
	BM290	u/s at Pacific Motorway	28.95	29.45	0.50
	BM300	Easby Road, Eight Mile Plains	32.17	32.08	-0.09
	BM310	u/s at Padstow Road	33.80	33.53	-0.27
	BM320	Jacinda Street, Sunnybank	36.94 (d)	36.45	-0.49
	BM330	Daw Road, Runcorn	(N/R)	43.61	-
	BM340	u/s at Beenleigh Road	46.22 (d)	46.19	-0.03
	BM350	Susan Circuit, Runcorn	51.14	50.78	-0.36
	BM360	Glenefer Street, Runcorn	51.39	51.48	0.09
	BM370	u/s at Nemies Road	(N/R)	54.96	-
	BM380	Noraville Street, Runcorn	60.24	60.06	-0.18

Waterway	Gauge ID	Location	Recorded Peak WL (mAHD)	Simulated Peak WL (mAHD)	Difference (m)
	BM00A/B	Noraville Street, Runcorn	(N/R)	60.06	-
Bulimba Creek East	BM400	Daydream Place, Eight Mile Plains	(N/R)	26.18	-
	BM410	u/s at Miles Platting Road	(N/R)	28.17	-
	BM420	u/s at Logan Road	(N/R)	32.64	-
	BM430	u/s at Underwood Road	(N/R)	36.99	-
	BM438	d/s at Beenleigh Road	47.90	47.71	-0.19
	BM440	u/s at Beenleigh Road	49.60	49.89	0.29
Mimosa Creek	BM500	50 m d/s of Parkway Street	38.35	38.19	-0.16
	MI120	100 m d/s of Kessels Road	40.00	39.67	-0.33
	MI130	Larwood Street, Upper Mt Gravatt	43.94	43.78	-0.16
Phillips Creek	PH110	350 m u/s of Creek Road	10.35	9.84	-0.51
	PH120	100 m u/s of Anzac Road	16.96	16.11	-0.85 ** (B) #
Salvin Creek	SV110	115 m u/s of Donnington Street	7.84	7.66	-0.18
	SV118	d/s at Creek Road	13.10	12.88	-0.22
	SV120	u/s at Creek Road	(N/R)	13.15	-
	SV126	u/s at Pine Mountain Road	16.98	16.99	0.01
	SV130	u/s at Bevan Street	21.19	21.09	-0.10
Broadwater Road Drain	BM650	Brisbane Adventist College, Mansfield	(N/R)	25.86	-
	BM660	130 m d/s of Newnham Road	(N/R)	27.79	-
Parklands Circuit Drain	BM700	200 m d/s of Prebble Street	(N/R)	24.59	-
	BM710	d/s at Prebble Street	(N/R)	27.10	-
Miles Platting Road Drain	BM800	100 m u/s of Gateway Motorway	(N/R)	27.40	-
	BM810	260 m u/s of Gateway Motorway	(N/R)	28.67	-
Tributary A	BM950	309 Priestdale Road, Rochedale (downstream)	(N/R)	41.53	-
	BM960	309 Priestdale Road, Rochedale (upstream)	(N/R)	42.71	-
Tributary B	BM415	100 m u/s of Logan Road	(N/R)	33.22	-
	BM416	50 m d/s of Dance Crescent	(N/R)	34.32	-
Hemmant	HM110	500 m u/s of Bulimba Creek confluence	1.77	1.79	0.02
Tingalpa Channel	TD120	1 km u/s of Bulimba Creek confluence	2.42	2.29	-0.13
Wishart Road Drain	BM010	u/s at Wishart Road	(N/R)	26.61	-
Padstow Road Drain	BM306	u/s at McCullough Street	(N/R)	36.47	-
	BM307	d/s at Delafield Street	(N/R)	37.86	-

(d) Reading from debris mark
** Waterway has changed in this area, the hydraulic model is representing the current conditions
(B) Result potentially influenced by structure blockage
Refer to commentary provided in report

5.6 Hydraulic Structure Verification

5.6.1 Bridge Head-loss Checks

The TUFLOW manual recommends confirming the head-loss across hydraulic structures as follows:

It is strongly recommended that the losses through a structure be validated through:

- *Calibration to recorded information (if available).*
- *Cross-checked using desktop calculations based on theory and/or standard publications (e.g. Hydraulics of Bridge Waterways, US FHA 1973).*
- *Cross-checked with results using other hydraulic software.*

It is common practice in BCC flood studies to cross-check structure head-losses against results from the HEC-RAS hydraulic modelling software. Generally, HEC-RAS is regarded as one of the better hydraulic modelling packages when it comes to more accurately representing hydraulic structures such as bridges. Most of the hydraulic structures within the catchment(s) are culverts, for which the TUFLOW and HEC-RAS algorithms would be reasonably similar. Therefore, it was considered more important to check the head-loss at bridge structures. The bridge structures where HEC-RAS checks were undertaken include:

- Structures 1 and 2 – Lytton Road Bridges (Bulimba Creek)
- Structures 3 and 7 – PoB Motorway Bridge + Cleveland Rail Bridge (Bulimba Creek)
- Structure 10 – Gateway Motorway (Bulimba Creek)
- Structure 12 – Murarrie Road Bridge (Bulimba Creek)
- Structure 13 – Wynnum Road Bridges (Bulimba Creek)
- Structure 14 – Wynnum Road Bridge (Minnippi Overflow)
- Structure 17 – Meadowlands Road Bridge (Bulimba Creek)
- Structure 23 – Creek Road Bridges (Phillips Creek)
- Structure 27 – Old Cleveland Road Bridges (Bulimba Creek)
- Structure 29 – Winstanley Street Bridge (Bulimba Creek)
- Structure 33 – Creek Road Bridges (Salvin Creek)
- Structure 37 – Pine Mountain Road Bridge (Bulimba Creek)
- Structure 52 – Access Road Arch Bridge (Newnham Creek)
- Structure 56 – Wecker Road Bridge (Bulimba Creek)
- Structure 57 – Mt Gravatt – Capalaba Road Bridges (Bulimba Creek)
- Structures 71 and 72 – Gold Coast Rail Bridges (Bulimba Creek)
- Structure 84 – Parkway Street Bridge (Mimosa Creek)
- Structure 85 – Kessels Road Bridge (Mimosa Creek)
- Structure 87 – Nagle Street Bridge (Mimosa Creek)
- Structure 89 – Gateway Motorway On / Off Ramp Bridges (Bulimba Creek East)
- Structure 90 – Miles Platting Road Bridge (Bulimba Creek East)
- Structure 96 – Gateway Motorway Bridge (Bulimba Creek East)
- Structure 132 – Scrub Road Bridge (Spring Creek)
- Structure 134 – Greendale Way Bridge (Warwick Creek)
- Structure 143 – Scrub Road Bridge (Wecker Road Drain)

Table 5.8 provides a comparison of the head-loss across the structure between TUFLOW and the HEC-RAS model. Generally, the TUFLOW head-losses for those bridge structures checked were within ± 0.3 m of the HEC-RAS values for the full range of flows considered. This is considered a good result and gives credence to the TUFLOW results.

Table 5.8 – HEC-RAS Bridge Head-loss Checks

Flow (m^3/s)	HEC-RAS Head-loss (m)	TUFLOW Head-loss (m)	Difference (m)
Structures 1 and 2 – Lytton Road Bridges (Bulimba Creek)			
100	0.01	0.01	0.00
200	0.04	0.02	-0.02
400	0.12	0.06	-0.06
600	0.21	0.10	-0.11
800	0.30	0.15	-0.15
1000	0.37	0.19	-0.18
Structures 3 and 7 – PoB Motorway Bridge + Cleveland Rail Bridge (Bulimba Creek)			
100	0.01	0.01	0.00
200	0.02	0.03	0.01
300	0.05	0.06	0.01
500	0.14	0.11	-0.03
650	0.21	0.15	-0.06
800	0.30	0.16	-0.14
Structure 10 – Gateway Motorway (Bulimba Creek)			
50	0.02	0.02	0.00
100	0.07	0.06	-0.01
200	0.12	0.11	-0.01
300	0.13	0.17	0.04
400	0.16	0.24	0.08
500	0.18	0.31	0.13
600	0.20	0.38	0.18
Structure 12 – Murarrie Road Bridge (Bulimba Creek)			
25	0.00	0.00	0.00
50	0.00	0.00	0.00
100	0.00	0.01	0.01
200	0.00	0.02	0.02
400	0.00	0.02	0.02
600	0.00	0.01	0.01
Structure 13 – Wynnum Road Bridges (Bulimba Creek)			
100	0.04	0.04	0.00
200	0.10	0.08	-0.02
300	0.15	0.12	-0.03
400	0.19	0.18	-0.01

Flow (m³/s)	HEC-RAS Head-loss (m)	TUFLOW Head-loss (m)	Difference (m)
500	0.23	0.21	-0.02
600	0.23	0.19	-0.04
700	0.25	0.20	-0.05
Structure 14 – Wynnum Road Bridge (Minnippi Overflow)			
10	0.01	0.01	0.00
20	0.03	0.03	0.00
30	0.04	0.05	0.01
40	0.06	0.08	0.02
50	0.28	0.32	0.04
60	0.37	0.46	0.09
Structure 17 – Meadowlands Road Bridge (Bulimba Creek)			
100	0.01	0.01	0.00
300	0.02	0.02	0.00
500	0.07	0.04	-0.03
700	0.15	0.07	-0.08
900	0.25	0.12	-0.13
1100	0.28	0.27	-0.01
Structure 23 – Creek Road Bridges (Phillips Creek)			
25	0.09	0.08	-0.01
50	0.21	0.19	-0.02
75	0.47	0.33	-0.14
100	0.21	0.19	-0.02
125	0.14	0.15	0.01
150	0.17	0.12	-0.05
Structure 27 – Old Cleveland Road Bridges (Bulimba Creek)			
100	0.06	0.04	-0.02
200	0.11	0.02	-0.09
300	0.15	0.04	-0.11
500	0.23	0.08	-0.15
700	0.30	0.19	-0.11
900	0.35	0.25	-0.10
1100	0.41	0.31	-0.10
Structure 29 – Winstanley Street Bridge (Bulimba Creek)			
50	0.01	0.01	0.00
100	0.01	0.01	0.00
150	0.02	0.01	-0.01
200	0.04	0.01	-0.03
250	0.05	0.01	-0.04
300	0.07	0.02	-0.05

Flow (m^3/s)	HEC-RAS Head-loss (m)	TUFLOW Head-loss (m)	Difference (m)
350	0.08	0.07	-0.01
Structure 33 – Creek Road Bridges (Salvin Creek)			
20	0.03	0.01	-0.02
40	0.05	0.02	-0.03
60	0.19	0.07	-0.12
80	0.53	0.15	-0.38
100	0.55	0.27	-0.28
120	0.51	0.43	-0.08
Structure 37 – Pine Mountain Road Bridge (Bulimba Creek)			
200	0.30	0.37	0.07
400	0.32	0.46	0.14
600	0.34	0.46	0.12
800	0.35	0.44	0.09
1000	0.35	0.43	0.08
1200	0.44	0.45	0.01
Structure 52 – Access Road Arch Bridge (Newnham Creek)			
10	0.41	0.31	-0.10
20	0.62	0.42	-0.20
30	0.72	0.57	-0.15
40	0.91	0.93	0.02
Structure 56 – Wecker Road Bridge (Bulimba Creek)			
100	0.51	0.32	-0.19
300	0.11	0.20	0.09
500	0.11	0.23	0.12
700	0.14	0.24	0.10
900	0.10	0.25	0.15
1100	0.13	0.29	0.16
Structure 57 – Mt Gravatt – Capalaba Road Bridges (Bulimba Creek)			
200	0.19	0.25	0.06
400	0.32	0.36	0.04
600	0.47	0.50	0.03
800	0.73	0.69	-0.04
1000	0.94	0.91	-0.03
Structures 71 and 72 – Gold Coast Rail Bridges (Bulimba Creek)			
20	0.26	0.27	0.01
40	0.18	0.15	-0.03
80	0.18	0.18	0.00
120	0.25	0.24	-0.01
170	0.36	0.31	-0.05

Flow (m^3/s)	HEC-RAS Head-loss (m)	TUFLOW Head-loss (m)	Difference (m)
220	0.47	0.38	-0.09
Structure 84 – Parkway Street Bridge (Mimosa Creek)			
25	0.11	0.04	-0.07
50	0.15	0.08	-0.07
75	0.20	0.11	-0.09
100	0.25	0.15	-0.10
150	0.36	0.23	-0.13
200	0.41	0.25	-0.16
Structure 85 – Kessels Road Bridge (Mimosa Creek)			
25	0.19	0.08	-0.11
50	0.25	0.13	-0.12
75	0.14	0.12	-0.02
100	0.16	0.15	-0.01
150	0.69	0.92	0.23
200	0.79	1.13	0.34
Structure 87 – Nagle Street Bridge (Mimosa Creek)			
25	0.04	0.01	-0.03
50	0.08	0.03	-0.05
100	0.50	0.39	-0.11
150	0.01	0.22	0.21
200	0.00	0.15	0.15
250	0.01	0.15	0.14
Structure 89 – Gateway Motorway On / Off Ramp Bridges (Bulimba Creek East)			
50	0.07	0.05	-0.02
100	0.14	0.11	-0.03
150	0.22	0.19	-0.03
200	0.31	0.28	-0.03
275	0.49	0.43	-0.06
350	0.70	0.61	-0.09
Structure 90 – Miles Platting Road Bridge (Bulimba Creek East)			
50	0.02	0.03	0.01
100	0.03	0.06	0.03
150	0.05	0.11	0.06
200	0.07	0.15	0.08
275	0.11	0.22	0.11
350	0.17	0.29	0.12
Structure 96 – Gateway Motorway Bridge (Bulimba Creek East)			
25	0.04	0.03	-0.01
50	0.06	0.05	-0.01

Flow (m^3/s)	HEC-RAS Head-loss (m)	TUFLOW Head-loss (m)	Difference (m)
75	0.07	0.06	-0.01
100	0.08	0.08	0.00
150	0.10	0.12	0.02
200	0.13	0.16	0.03
Structure 132 – Scrub Road Bridge (Spring Creek)			
20	0.05	0.04	-0.01
50	0.06	0.06	0.00
90	0.09	0.10	0.01
130	0.15	0.13	-0.02
190	0.59	0.84	0.25
240	0.61	0.90	0.29
Structure 134 – Greendale Way Bridge (Warwick Creek)			
20	0.60	0.53	-0.07
40	0.88	0.90	0.02
60	1.05	0.91	-0.14
80	1.12	0.96	-0.16
100	1.29	1.22	-0.07
120	1.43	1.37	-0.06
Structure 143 – Scrub Road Bridge (Wecker Road Drain)			
5	0.38	0.46	0.08
20	0.41	0.36	-0.05
35	0.03	0.05	0.02
50	0.03	0.07	0.04
65	0.05	0.09	0.04
80	0.08	0.11	0.03

5.6.2 V1 Veloway Check

The proposed V1 Veloway structure is discussed previously in Section 5.2.8. A comparison was undertaken to confirm the simplified method used to model the proposed V1 Veloway structure was producing sensible flood level results. This involved running the same discharges through both the BCC Bulimba Creek TUFLOW model and the DTMR / Jacobs TUFLOW model for the M1 Pacific Motorway Upgrade (Sports Drive to Gateway Motorway). A stepped hydrograph (with constant discharges of 25, 50 and 100 m^3/s) was run through both models and the flood levels compared at selected locations.

Table 5.9 indicates the flood level results at two locations along the length of the veloway structure. The results indicate that the BCC Bulimba Creek TUFLOW model is able to replicate the flood level results of the finer scale DTMR / Jacobs TUFLOW model within a reasonable tolerance.

Table 5.9 – V1 Veloway Flood Level Comparison

Flow (m³/s)	Flood Level (mAHD)		Difference (m)
	BCC Bulimba Creek TUFLOW Model	DTMR / Jacobs M1 Merge TUFLOW Model	
Cross-section TA_757 (Tributary A)			
25	33.26	33.12	0.14
50	33.89	33.80	0.09
100	34.71	34.67	0.04
Cross-section TA2_14 (Tributary A2)			
25	34.25	34.28	-0.03
50	34.78	34.89	-0.11
100	35.51	35.73	-0.22

5.7 Hydrologic-Hydraulic Model Consistency Checks (Historical Events)

Comparison checks were undertaken between the URBS and TUFLOW models to understand how closely the hydrologic and hydraulic models were matching and as a means of confirming whether the URBS model was adequately calibrated.

The locations where comparative plots were undertaken were upstream of Old Cleveland Road and included the following:

(i) Bulimba Creek – Gold Coast Railway
(ii) Bulimba Creek – Pacific Motorway
(iii) Bulimba Creek – Mount Gravatt - Capalaba Road (MHG BM250)
(iv) Bulimba Creek – MHG BM230
(v) Mimosa Creek – Kessels Road
(vi) Bulimba Creek East – Underwood Road (MHG BM430)
(vii) Bulimba Creek East – Miles Platting Road Drain Confluence
(viii) Newnham Creek – Secam Road
(ix) Spring Creek – Scrub Road
(x) Salvin Creek – Donnington Street
(xi) Phillips Creek – Creek Road

Figure 5.18 to Figure 5.25 provide comparative plots for the four historical events at (i) Gold Coast Railway (Bulimba Creek) and (ii) MHG BM230 (Bulimba Creek). The remainder of the comparative plots are provided in Appendix D. Table 5.10 provides a comparison of the peak flows at these 11 locations.

The results of the comparison indicate that the URBS and TUFLOW models show a good correlation with peak flow and hydrograph timing / shape at most locations. Typically, the URBS peak flow is within ±10 % of the TUFLOW peak flow, apart from some localised areas. On Bulimba Creek at the Pacific Motorway, the March 2001 URBS peak flow is 24 % higher than the TUFLOW peak flow and on Bulimba Creek East at the Miles Platting Road Drain Confluence, the March 2001 URBS peak flow is 33 % higher than the TUFLOW peak flow. Both these differences are likely to be a result of the attenuation effects created by the Pacific Motorway, which has not been replicated as accurately in the URBS model.

At MHG BM230, the URBS model peaks after the TUFLOW model, however this is considered closer to the observed flood peak, based on the calibration results at Stream Gauges 540126 and 540128.

Table 5.10 – Peak Flow Comparison, URBS and TUFLOW

Location	Model	Peak Flow (m^3/s)			
		March 2001	January 2013	May 2015	March 2017
Bulimba Creek at Gold Coast Railway	URBS	120.8	39.3	93.9	37.9
	TUFLOW	121.8	36.7	95.0	34.8
Bulimba Creek at Pacific Motorway	URBS	426.8	129.7	289.2	110.1
	TUFLOW	343.4	117.2	246.5	93.8
Bulimba Creek at MHG BM250	URBS	824.2	278.7	609.5	211.0
	TUFLOW	739	278.0	582.3	200.1
Bulimba Creek at MHG BM230	URBS	827.6	319.7	606.6	234.8
	TUFLOW	826.2	314.7	601.2	222.0
Mimosa Creek at Kessels Road	URBS	82.0	32.3	50.0	24.2
	TUFLOW	80.9	31.9	50.6	22.8
Bulimba Creek East at MHG BM430	URBS	100.6	26.8	70.3	25.3
	TUFLOW	94.3	26.2	67.9	22.5
Bulimba Creek East at Miles Platting Road Drain Confluence	URBS	311.9	89.7	228.6	79.1
	TUFLOW	234.1	85.6	197.2	73.4
Newnham Creek at Secam Road	URBS	63.3	19.6	38.4	18.3
	TUFLOW	59.8	19.6	37.8	18.4
Spring Creek at Scrub Road	URBS	40.3	23.5	44.0	16.8
	TUFLOW	39.6	23.1	43.4	17.3
Salvin Creek at Donnington Street	URBS	82.9	42.6	76.1	30.5
	TUFLOW	80.2	41.8	74.7	28.9
Phillips Creek at Creek Road	URBS	58.1	27.4	46.4	19.1
	TUFLOW	56.3	27.2	46.5	19.3

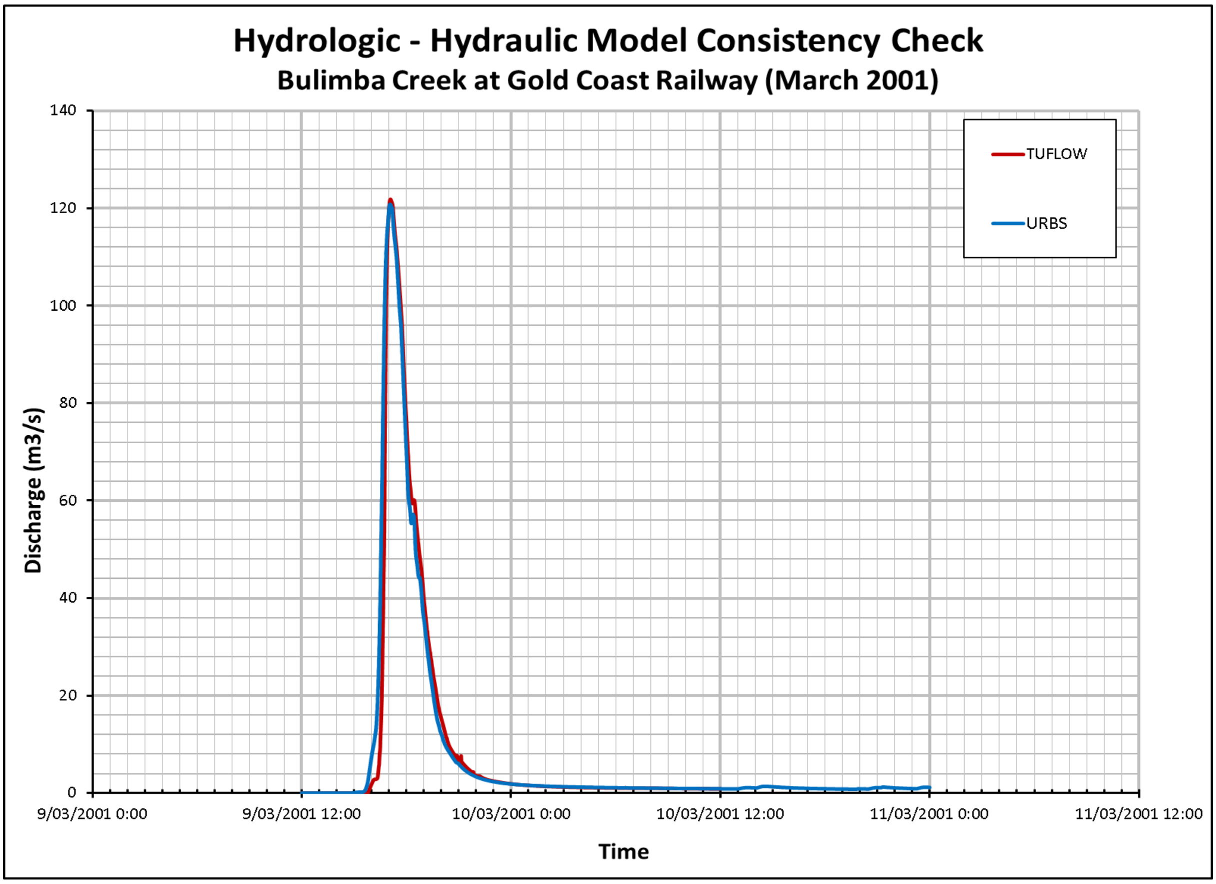


Figure 5.18: Model Comparison for March 2001 – Bulimba Creek at Gold Coast Railway

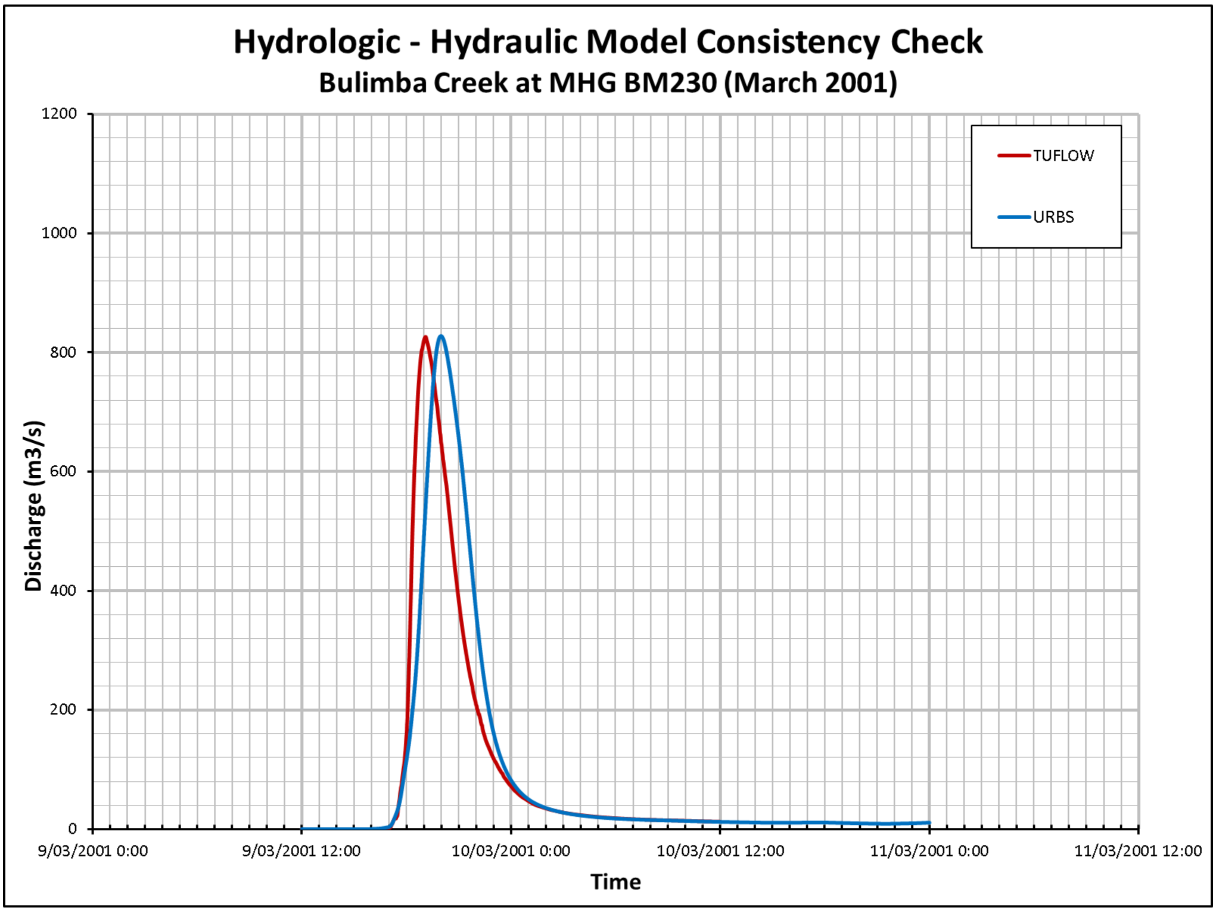


Figure 5.19: Model Comparison for March 2001 – Bulimba Creek at MHG BM230

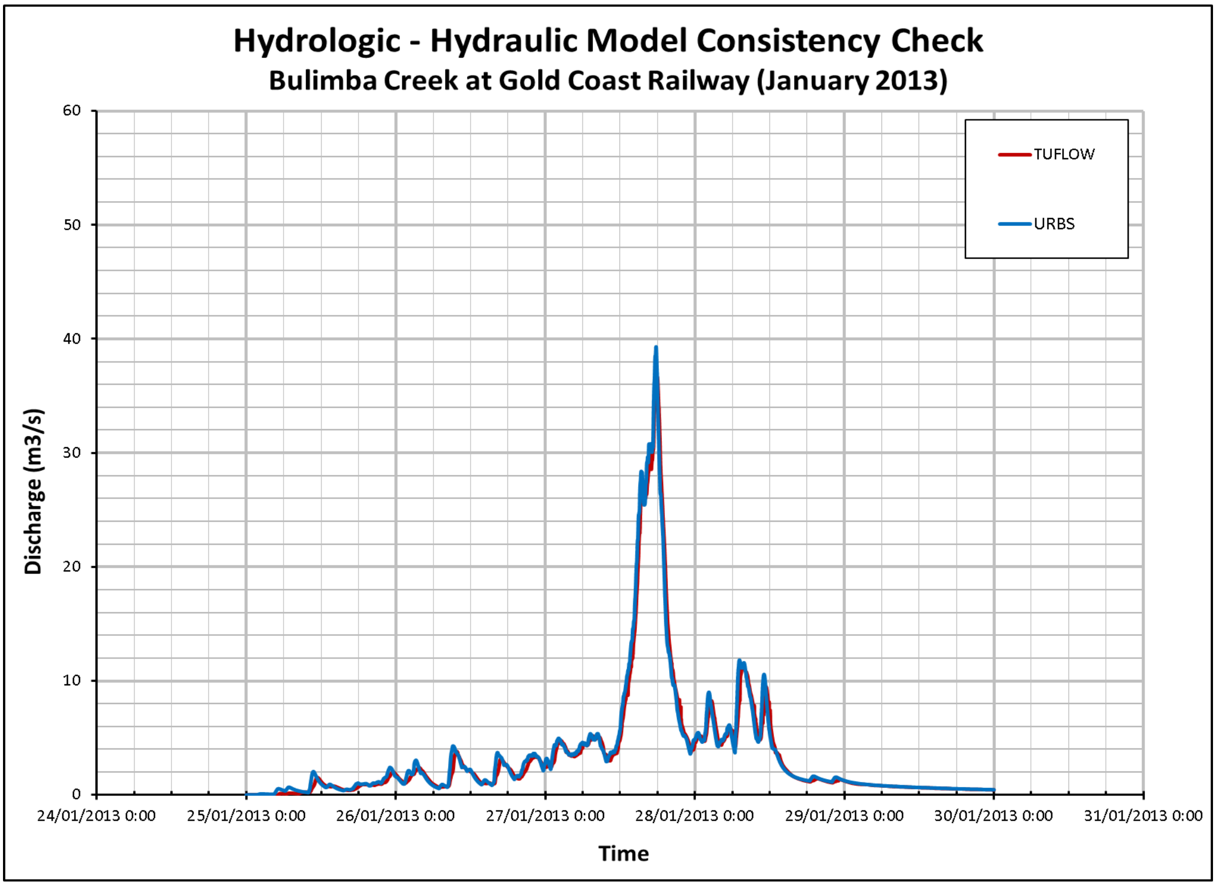


Figure 5.20: Model Comparison for January 2013 - Bulimba Creek at Gold Coast Railway

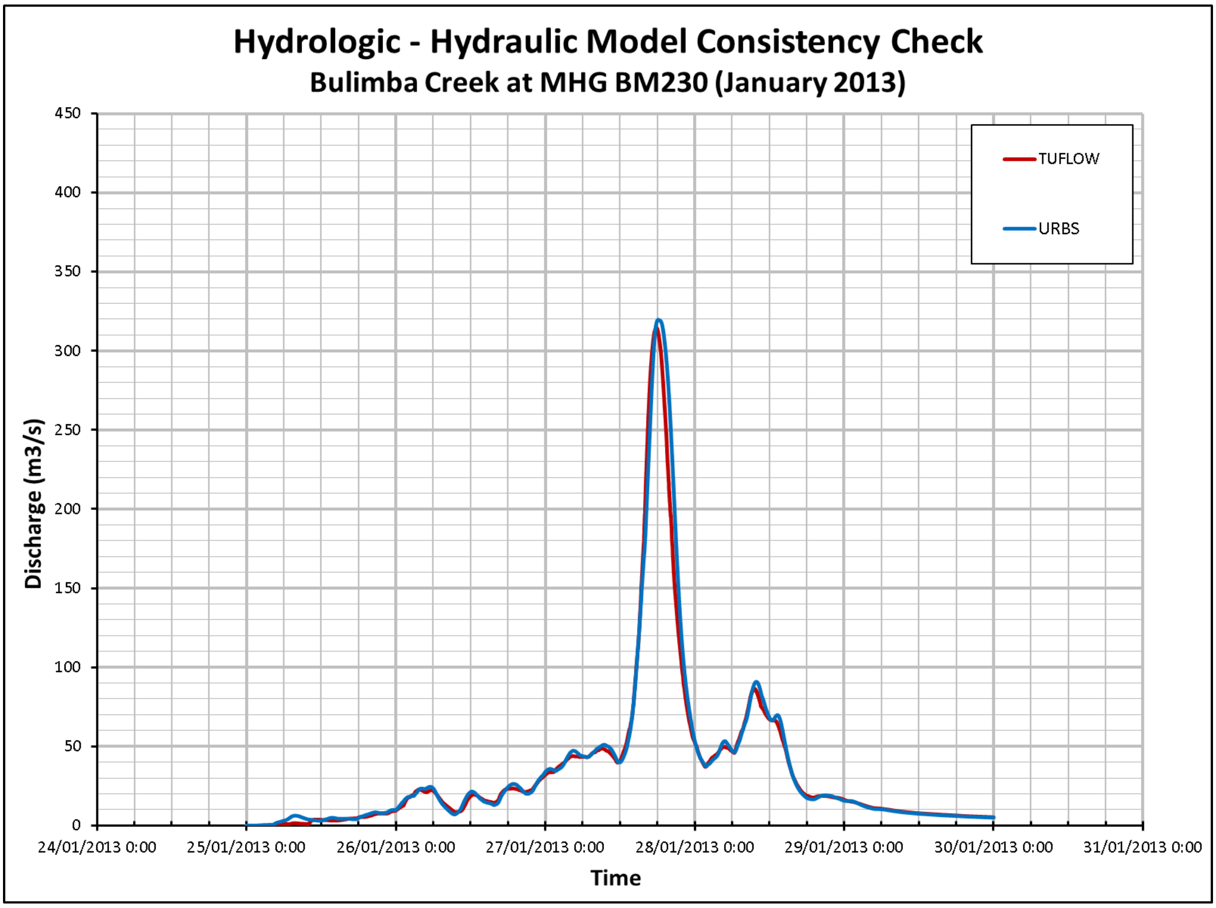


Figure 5.21: Model Comparison for January 2013 - Bulimba Creek at MHG BM230

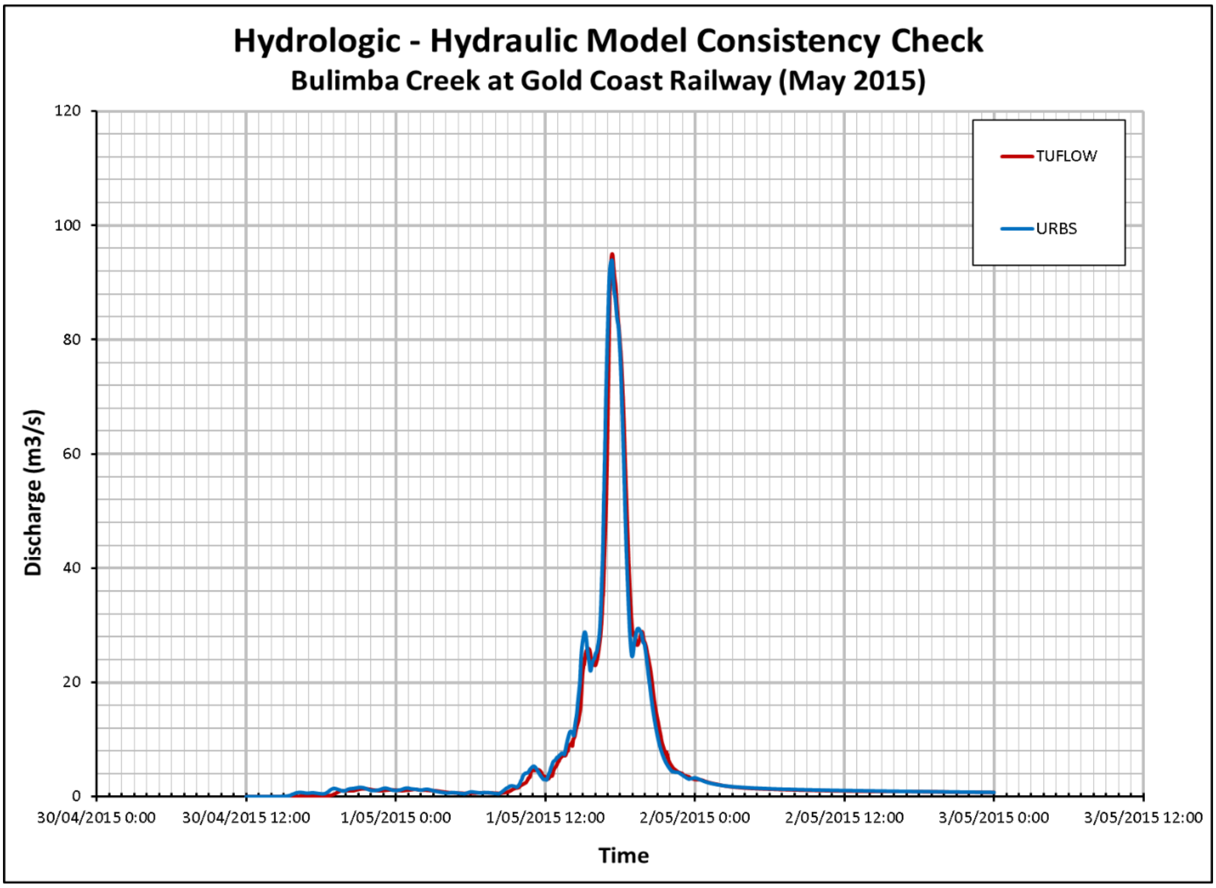


Figure 5.22: Model Comparison for May 2015 - Bulimba Creek at Gold Coast Railway

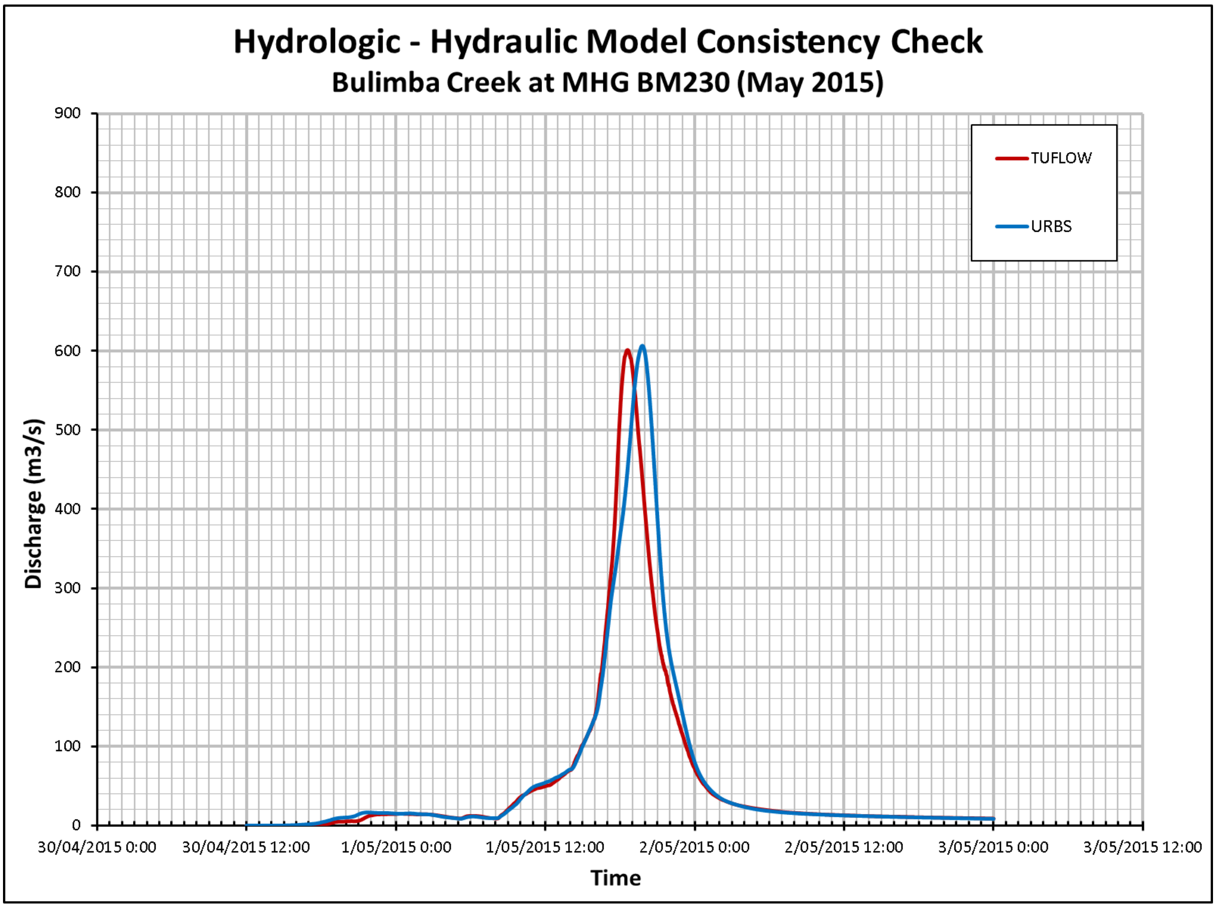


Figure 5.23: Model Comparison for May 2015 - Bulimba Creek at MHG BM230

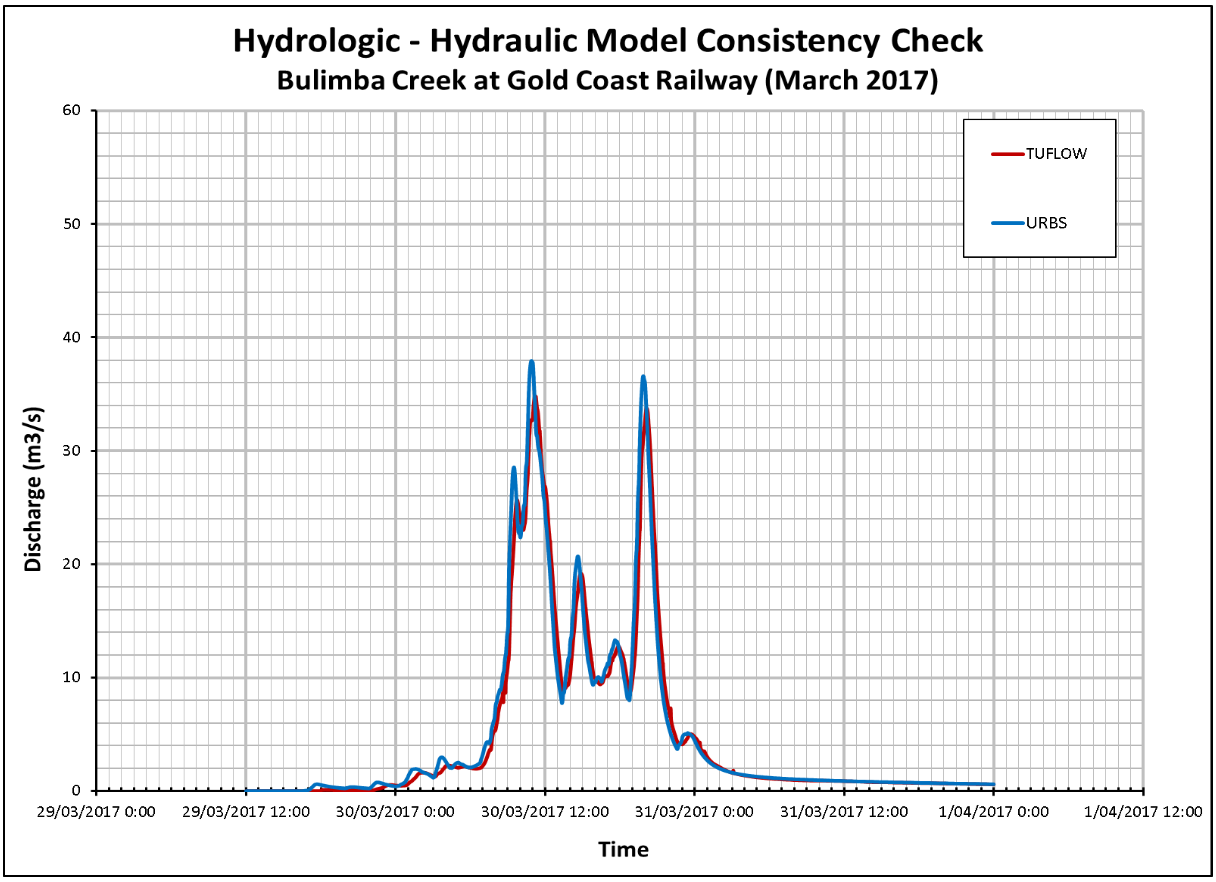


Figure 5.24: Model Comparison for March 2017 - Bulimba Creek at Gold Coast Railway

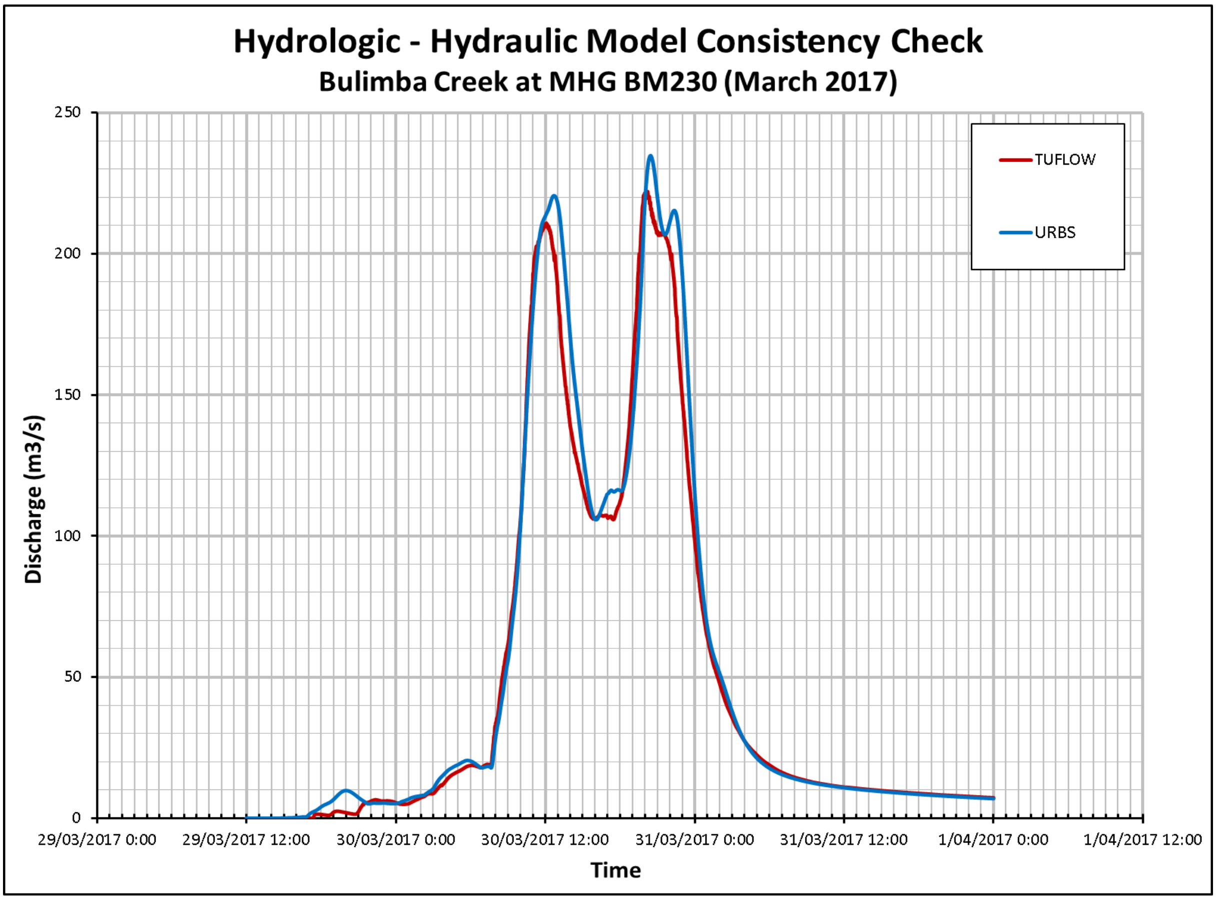


Figure 5.25: Model Comparison for March 2017 - Bulimba Creek at MHG BM230

5.8 Discussion on Calibration and Verification

The results of the calibration and verification are quite reasonable at most locations throughout the catchment. The replication of peak flood levels to within the desired tolerance at the MHGs was acceptable with the following being achieved:

- March 2001 – successful replication at 15 out of 30 MHGs (50%)
- January 2013 – successful replication at 26 out of 40 MHGs (65%)
- May 2015 – successful replication at 24 out of 38 MHGs (63%)
- March 2017 – successful replication at 26 out of 33 MHGs (79%)

The March 2001 event was the least successful in terms of the replication of peak flood levels to within the desired tolerance at the MHGs. Typically, the modelled results had low peak flood levels in the upper catchment, good peak flood levels in the middle catchment and high peak flood levels in the lower catchment, when compared with the observed peak flood levels. This made calibration challenging and limited increasing peak flows (through hydrological refinements) in the upper catchment as this had a knock-on effect of increasing flows in the middle / lower catchments, which already had good / high flood levels. Increasing flood levels in the upper catchment areas was therefore limited to increasing Manning's 'n' roughness values in the TUFLOW model.

In the two larger events (i.e. March 2001 and May 2015), a good calibration was not able to be achieved in the lower catchment at the stream gauge 540129 (BMA528) and MHG BM100, approximately 2.5 km upstream. In the March 2001 event, the modelled peak was 0.63 m above the observed and in the May 2015 event the modelled peak was 0.54 m above the observed at 540129 (BMA528).

An investigation was undertaken to ascertain why these flood peaks were considerably above the observed flood peaks for these two events. The investigation considered the following potential issues, which are each discussed separately:

- Insufficient channel conveyance in Bulimba Creek downstream of the Cleveland Railway / Port of Brisbane Motorway.
- Flows higher than the observed in the lower catchment.
- Timing issues between the peak flood in Bulimba Creek and the peak flood in Tingalpa Channel / Hemmant Drain.
- Timing issues between the peak flood in Bulimba Creek and the observed tidal peak.

Channel Conveyance downstream of Cleveland Railway / Port of Brisbane Motorway

The four historical floods considered in this study are largely contained within the main channel from downstream of the Cleveland Railway / Port of Brisbane Motorway to the mouth of Bulimba Creek (4.2 km length). This reach is represented in TUFLOW as 1d channel / 2d floodplain, with the channel cross-sections sourced primarily from the BCC Bulimba Creek MIKE11 model. A typical Manning's 'n' of 0.02 was used for the hydraulic roughness of the 1d channel in the lower catchment.

There is uncertainty regarding when the survey was undertaken to source these MIKE11 cross-sections, however it is thought to be in 1980s / 1990s. As part of the Port of Brisbane Motorway Flood Impact Assessment (2012), survey checks were undertaken at selected MIKE11 model cross-section locations to confirm they still provided an accurate representation of the channel bathymetry.

A 8.2 km long reach of the creek was checked from approximately 4 km upstream of the Cleveland Railway to the creek mouth. The survey check confirmed that in the Aquarium Passage reach (2.6 km section upstream of the creek mouth), the channel cross-sectional bathymetry was representative. The survey check also confirmed that the channel cross-sectional bathymetry was representative in the 4 km reach upstream of the Cleveland Railway. Some siltation (approximately 10% of waterway area) was observed between the Cleveland Railway and the major creek meander, just downstream of Lytton Road. As part of this flood study, an additional surveyed channel cross-section was obtained at both Lytton Road and the Cleveland Railway / Port of Brisbane Motorway.

The modelled peak flood level of the smaller two events (January 2013 and March 2017) is within ± 0.30 m at both 540129 (BMA528) and MHG BM100. Given these two good calibration results and the strong likelihood that the modelled channel bathymetry appears representative, it is considered unlikely that there is insufficient channel conveyance in the channel downstream of the Cleveland Railway / Port of Brisbane Motorway.

Flows higher than the observed in the lower catchment.

The 8 km length of Bulimba Creek between the Gateway Motorway and the Cleveland Railway / Port of Brisbane Motorway is highly sinuous and a significant flood storage area. Modelled peak flood levels results at the MHGs in the vicinity of the Gateway Motorway (BM120 and BM130) are all within ± 0.30 m for January 2013, May 2015 and March 2017. In the March 2001 event, the modelled peak flood level is 0.37 m too high at BM120 and 0.34 m too high at BM130. This suggests that for 3 out of 4 of the historical events, the modelled flows are of similar magnitude to the observed flows. Modelled peak flood levels for the March 2001 event are consistently above the observed from 540128 (BMA707) to 540129 (BMA528), which suggests the modelled flows are slightly higher than the observed.

Timing issues between the peak flood in Bulimba Creek and the peak flood in Tingalpa Channel / Hemmant

Tingalpa Channel and Hemmant Drain are two of the larger tributaries within the Bulimba Creek Catchment. These tributaries join Bulimba Creek between the Gateway Motorway and Cleveland Railway. Both tributaries were modelled hydrologically in URBS but not hydraulically in TUFLOW.

It was considered, that as there are no stream gauges on these waterways (to check the flood hydrograph / flood routing) there may be a possibility that the URBS routing was not representative and may be contributing to the high modelled peak flood levels. This was tested by changing the URBS and TUFLOW model set-ups and modelling the majority of these two tributaries in the TUFLOW model, which has superior routing to URBS. The results indicated no changes in peak flood level at 540129 (BMA528).

A further sensitivity test to establish the influence of these two tributaries on flood levels at 540129 (BMA528) was undertaken which involved simulating the March 2001 and May 2015 events without flows coming from either of these tributaries. The results indicated only minor changes to the peak flood level and hydrograph shape for both events, as shown in Figure 5.26 and Figure 5.27.

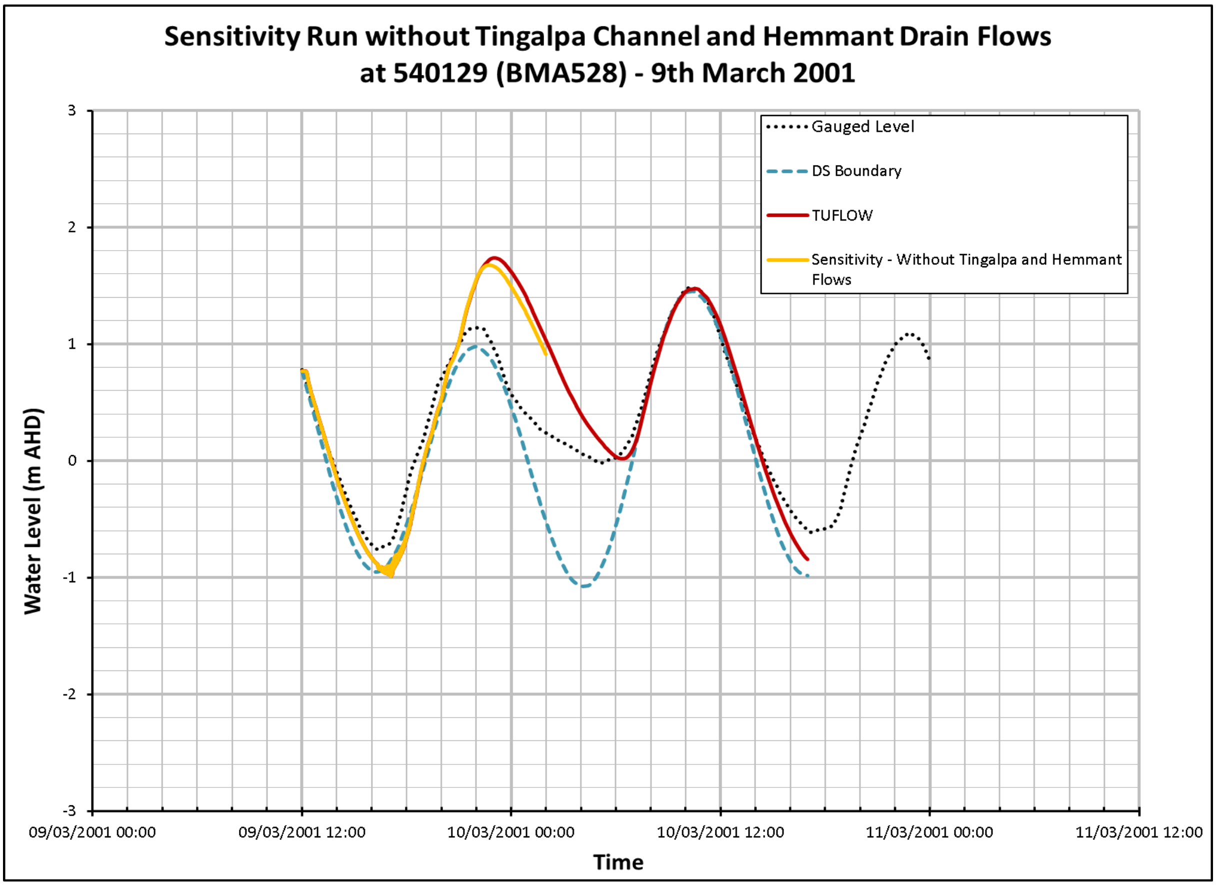


Figure 5.26: Sensitivity Run without Tingalpa Channel and Hemmant Drain Flows – March 2001

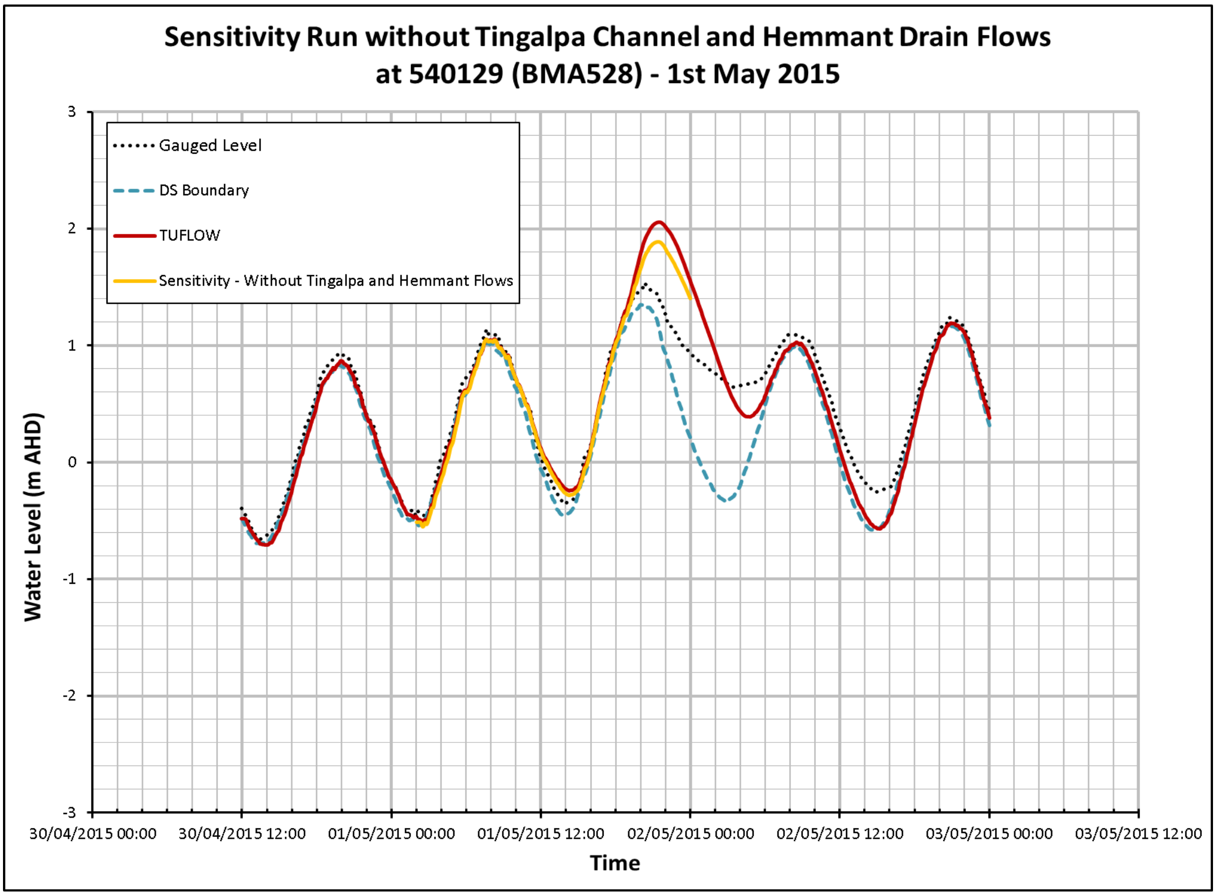


Figure 5.27: Sensitivity Run without Tingalpa Channel and Hemmant Drain Flows – May 2015

Timing issues between the peak flood in Bulimba Creek and the observed tidal peak

Peak flood levels can be considerably different in the lower areas of tidal catchments depending on whether the fluvial flood peak arrives in conjunction with the high tide or the low tide.

Table 5.11 indicates that for both the March 2001 and May 2015 events, the modelled flood peak occurred approximately 90-minutes before the observed flood peak at 540128 (Old Cleveland Road, Carindale). The timing of the observed flood peak at 540128 (BMA707) was one hour before the tidal peak at the downstream boundary for the March 2001 event and was at the same time for the May 2015 event. This resulted in the observed flood peak arriving approximately 2.5 hours after the tidal peak for March 2001 and approximately 2.75 hours after the tidal peak for May 2015. Because of the 90-minute timing difference between the modelled and observed flood peaks, when the modelled flood peak arrives at 540129 (BMA528) it coincides a lot closer to the tidal peak for both March 2001 (1 hour after) and May 2015 (1.25 hours after), thus amplifying the peak flood level.

Table 5.11 – Timing of Flood Peak and Tidal Peak

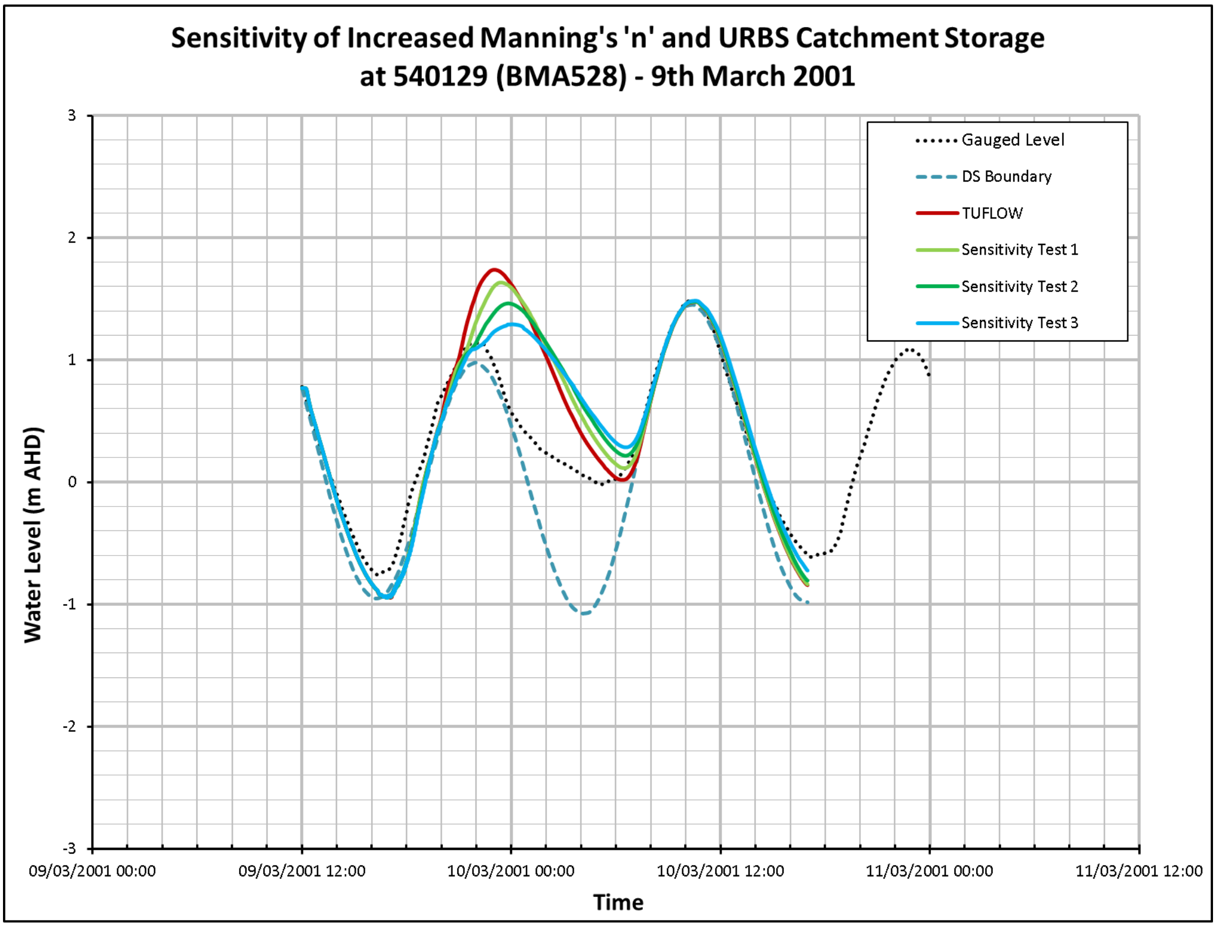
Event	Time of Flood Peak at 540128 (BMA707)		Projected Time of Flood Peak at 540129 (BMA528)		Actual Time of High Tide
	TUFLOW	Actual	TUFLOW	Actual	
March 2001	9th March 19:30	9th March 21:00	9th March 23:00	10th March 00:30	9th March 22:00
May 2015	1st May 18:45	1st May 20:15	1st May 21:30	1st May 23:00	1st May 20:15

To ascertain how sensitive the timing of the lower catchment hydrograph was to the selection of (i) Manning's 'n' values and (ii) URBS Catchment parameters (β) and (m), three sensitivity tests were undertaken as follows:

- Sensitivity Test 1 - Increasing 1d and 2d Manning's 'n' values by a factor of 1.5 upstream of Old Cleveland Road using URBS β = 4 and m = 0.80.
- Sensitivity Test 2 - Increasing 1d and 2d Manning's 'n' values by a factor of 1.5 upstream of Old Cleveland Road using URBS β = 5 and m = 0.80.
- Sensitivity Test 3 - Increasing 1d and 2d Manning's 'n' values by a factor of 1.5 upstream of Old Cleveland Road using URBS β = 7 and m = 0.80.

The Manning's 'n' values used are considered unrealistically high and are just used for comparative purposes. Figure 5.28 and Figure 5.29 indicate that increasing the upstream Manning's 'n' and URBS β value will reduce the flood level at 540129 (BMA528). As the URBS β value increases, the flood level at 540129 (BMA528) decreases and the timing of the modelled flood peak moves further away from the observed peak.

Although not shown, increasing the URBS β value will reduce peak flood levels throughout the catchment, not just in the lower catchment. As previously mentioned, this is an issue as peak flood levels are typically on the low side in the upper catchment.



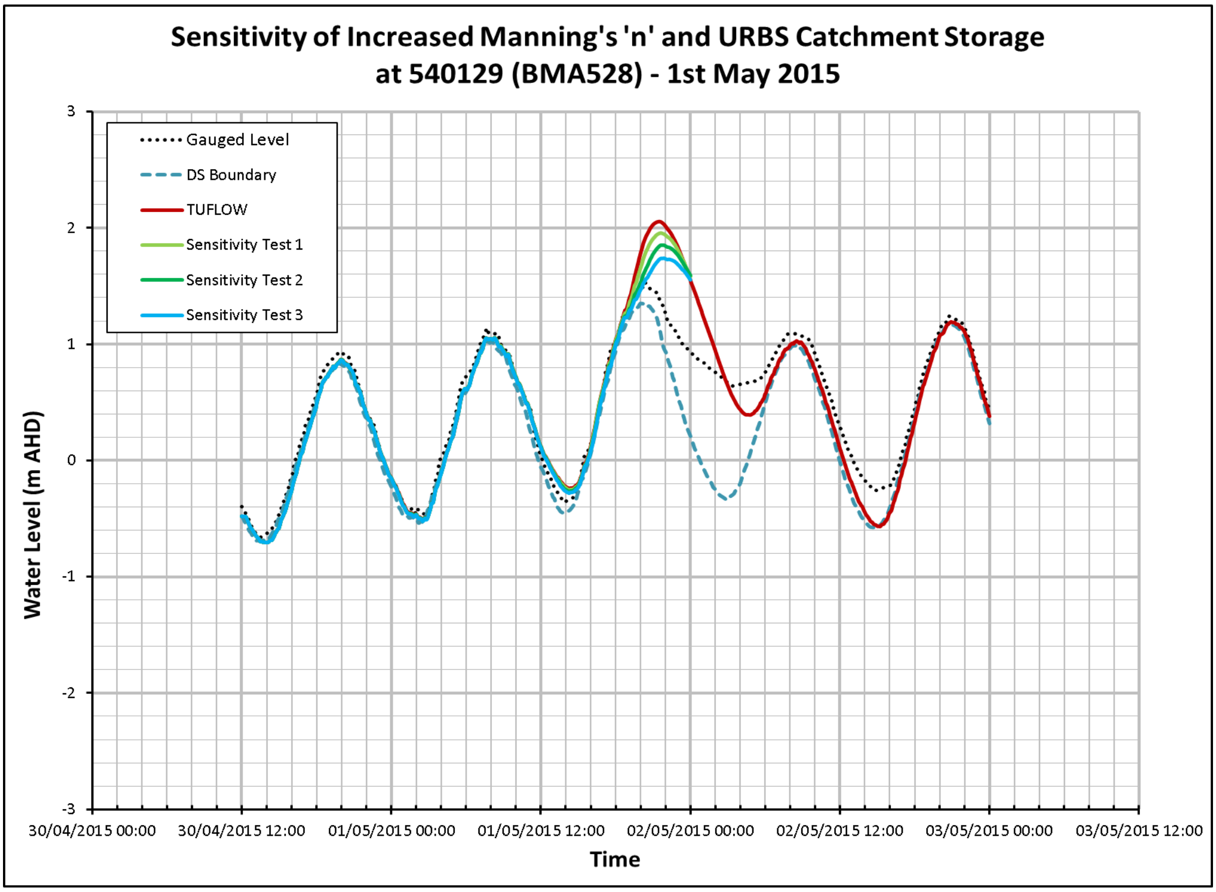


Figure 5.29: Sensitivity of Increased Manning’s ‘n’ and URBS Catchment Storage – May 2015

In summary, it appears that the primary reason for large difference in peak flood level at 540129 (Doughboy Parade, Hemmant) in the March 2001 and May 2015 events is because the modelled flood peak coincides closer to the peak of the tide then what was observed. This has the effect of amplifying the flood peak, as the flood level is very sensitive to the tidal level in this downstream area. In the March 2001 event, another contributing factor would appear to be that peak flows in the lower catchment are slightly above the observed.

This shouldn't present any issues for the design event modelling as the downstream model boundary used is a static level, typically representative of MHWS or HAT. The use of a static downstream model boundary negates any issues of flood amplification, resulting from timing differences between the fluvial flood peak and the tidal peak. On this basis, it is considered that the URBS and TUFLOW models are suitably accurate for the estimation of design flood levels throughout the catchment.

6.0 Design Event Analysis

6.1 Design Event Scenarios

Table 6.1 indicates the three scenarios utilised in the modelling of the design events, noting that all design event scenarios were modelled using ultimate catchment hydrological conditions.

For the purpose of this report, the term “design events” refers to the following events:

- Frequent: 2-yr ARI (50 % AEP) and 5-yr ARI (20 % AEP), and
- Intermediate: 10-yr ARI (10 % AEP) and 20-yr ARI (5 % AEP), and
- Rare: 50-yr ARI (2 % AEP) and 100-yr ARI (1 % AEP)

Table 6.1 – Design Event Scenarios

Event	Scenario 1	Scenario 2	Scenario 3
2-yr ARI (50 % AEP)	✓	✗	✓
5-yr ARI (20 % AEP)	✓	✗	✓
10-yr ARI (10 % AEP)	✓	✗	✓
20-yr ARI (5 % AEP)	✓	✗	✓
50-yr ARI (2 % AEP)	✓	✗	✓
100-yr ARI (1 % AEP)	✓	✓	✓

The following describes the design event scenarios:

Scenario 1: Existing Waterway Conditions
Scenario 1 is based on the current waterway conditions. Some minor modifications were made to the TUFLOW model developed as part of the calibration / verification; refer to Section 6.3 for further details.

Scenario 2: Minimum Riparian Corridor (MRC)
Scenario 2 includes an allowance for a riparian corridor along the edge of the channel. This involved firstly reviewing the existing vegetation and land-use adjacent to the channel to determine an appropriate Manning’s ‘n’ roughness value for the riparian corridor. In most locations the default value of n = 0.15 was used, however where the existing Manning’s ‘n’ is higher than n = 0.15, the Manning’s ‘n’ was left unchanged.

A 30 m wide corridor (15m wide each side from the low flow channel) was defined by changing the Manning’s ‘n’ roughness of the 1d cross sections (as applicable) and a new 2d materials layer within the TUFLOW model. In areas where the 15 m width was not available, the MRC was set to the maximum possible width (i.e. up to 15 m) up to the boundary of the “Modelled Flood Corridor.”

Scenario 3: Filling to the Modelled Flood Corridor + Minimum Riparian Corridor (MRC)
The "Modelled Flood Corridor" is the greater extent of the Waterway Corridor (WC) and Flood Planning Areas (FPAs) 1, 2 and 3. Figure 6.1 indicates the "Modelled Flood Corridor" for all creeks within the catchment. Scenario 3 assumes filling to the "Modelled Flood Corridor" boundary to represent potential development. In the design events, 2-yr ARI (50 % AEP) to 100-yr ARI (1 % AEP), the filling acts as a barrier and the "Modelled Flood Corridor" can be modelled simplistically as a glass-wall of infinite height. This is a simple and conservative assumption used to develop design planning levels. It does not necessarily reflect allowable development assumptions under BCC City Plan.

6.2 Design Event Hydrology

6.2.1 Background

The recent update of Australian Rainfall and Runoff (AR&R 2019) has resulted in significant changes with respect to the hydrological methods when compared to the previous version (AR&R 1987). This study utilises the AR&R 2019 approach for design flood estimation, which is detailed in the following sections.

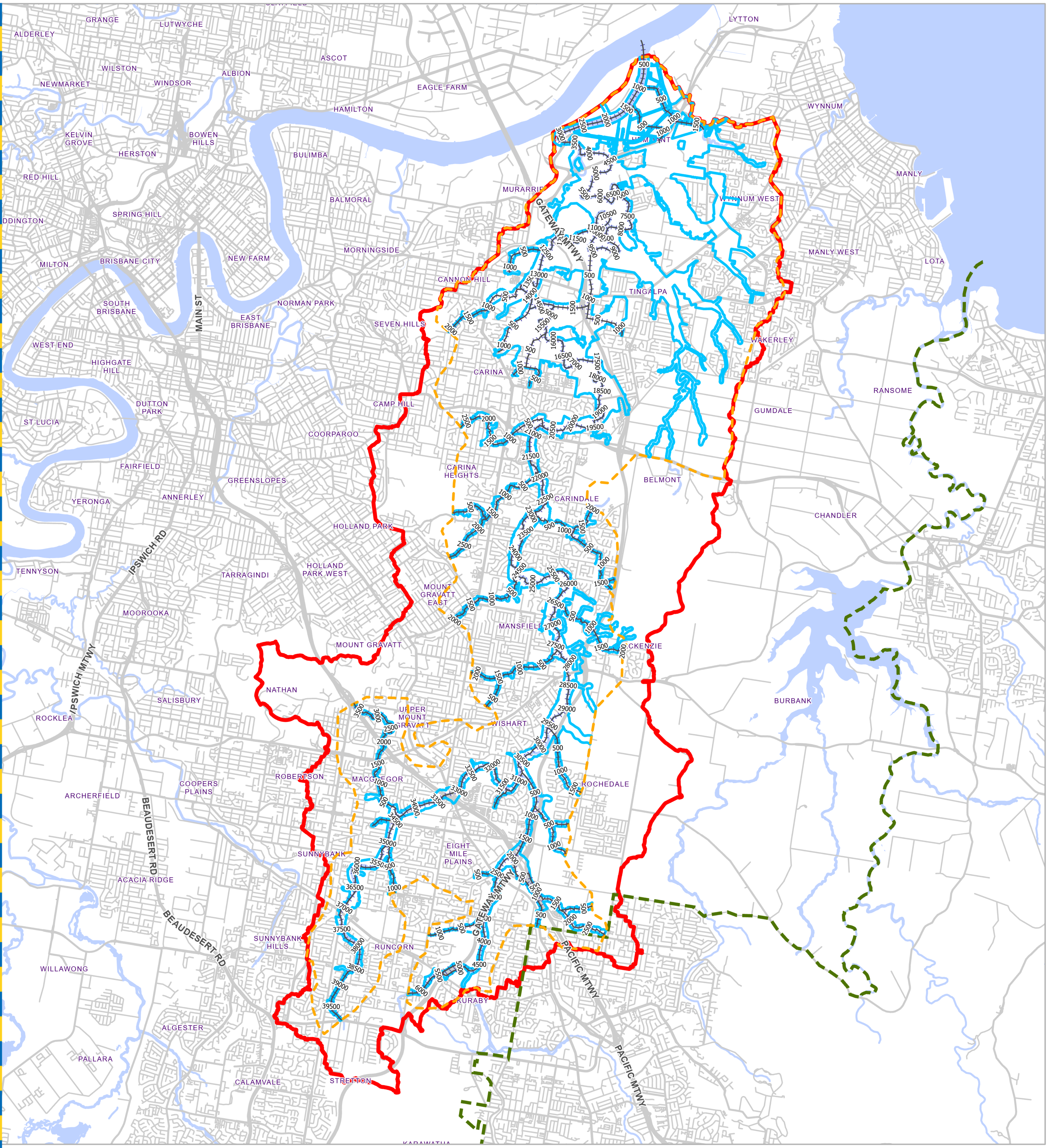
6.2.2 Suitability of Flood Frequency Analysis

At-site Flood Frequency Analysis
Design flood estimation is generally best determined by undertaking some form of flood frequency analysis (FFA) of annual maximum and / or peak over threshold (POT) series from observed long-term stream flow records. If FFA is not suitable, then the other established method used to estimate the design flood is the rainfall (event) based design storm concept, common to both AR&R 1987 and AR&R 2019.

The first continuous stream height gauge was installed on Bulimba Creek in 1971, approximately 1km downstream of Wecker Road. This gauge was operated by the then Water Resources Commission (WRC) until 1996. Stream Gauge 540126 (BMA831) was installed on the opposite side of Bulimba Creek by BCC in February 1994. The records from these two gauges provide the longest continuing stream height record for Bulimba Creek of approximately 50 years. BCC installed continuous stream height gauges 540127, 540128 and 540129 in 1994.

A requirement of FFA is that the catchment is homogeneous and has not undergone change, for example development / urbanisation. From review of the historical aerial photography, it is apparent that the catchment urbanisation has been steadily increasing from 1971 to date. Whilst there is likely to have been some statutory development controls applied to the catchment development to reduce the urbanised runoff (e.g. detention basins), it is considered that if the same storm occurred in 1971 and 2021, that the resultant flooding would not be the same due to the degree of urbanisation which has taken place within this period.

For this reason, it was not considered suitable to undertake FFA based on recorded floods within the catchment. The MHG records are not suitable for statistical analysis due to the random nature of the sampling interval, which could range from numerous times a year during a wet year to many years apart during times of drought. Manual reading at each MHG is also discretionary and not dependent on, for example, exceeding a nominated flood level.



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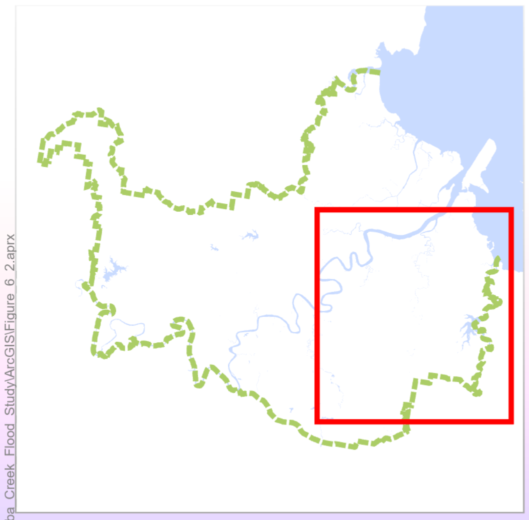
Legend

- AMTD
- Brisbane City Boundary
- Road
- Flood Corridor
- Model Boundary
- Bulimba Creek Catchment Area
- AMTD_Transects
- AMTD



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Revision : 0
Publication Date : 21 Jun 2021
Project Number : 100001

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Figure 6.1 - Modelled Flood Corridor

GDS - 190093 - 003

Regional Flood Frequency Estimation

Regional Flood Frequency Estimation (RFFE) is a data-driven approach, which attempts to transfer flood characteristics from a group of gauged catchments to ungauged locations of interest (where design floods need to be estimated).[11] The Regional Flood Frequency Estimation Model (https://rffe.arr-software.org/), developed as part of AR&R 2019, was not considered suitable for this study because of the high degree of urbanisation in the catchment. The RFFE Model cannot be applied to urban catchments with more than 10% of the catchment affected by residential or urban development.

6.2.3 Rainfall (Event) Based Flood Estimation

The use of event-based approaches to derive design floods is common to both AR&R 1987 and AR&R 2019 and most overseas countries. A major difference between AR&R 1987 and AR&R 2019 is the move away from a 'simple' event based approach to the more complex 'ensemble' and 'monte-carlo' methods. Figure 6.2 (from AR&R 2019) illustrates the major differences between these approaches.

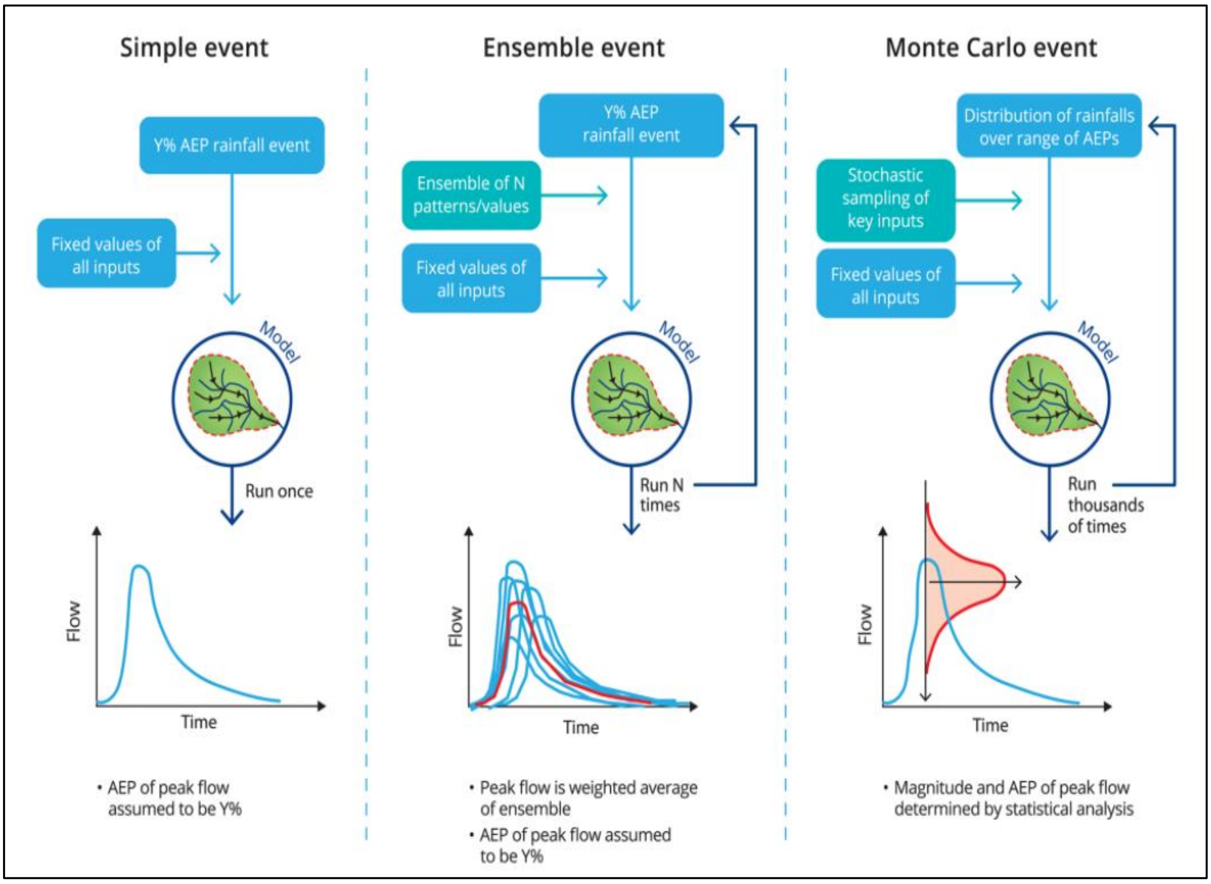

Figure 6.2: Differing Hydrological Methods

For the purpose of this flood study, the AR&R 2019 Ensemble Design Event Approach (DEA AR&R 2019) was adopted for use. This is consistent with the current BCC Flood Study Procedure document.[6]

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[11] Rahman A, Haddad K, Kuczera G and Weinmann E, 2019, Regional Flood Methods, Book 3 Chapter 3 in Australian Rainfall and Runoff - A Guide to Flood Estimation, Commonwealth of Australia

6.2.4 Major Differences between DEA AR&R 2019 and AR&R 1987

The DEA AR&R 2019 represents a significant change from the DEA AR&R 1987 with the move from a single event to an ensemble event approach. The major changes are listed below:

- Pre-burst Rainfall – new as part of AR&R 2019 and used to reduce the Storm Burst Initial Loss (IL_b) to account for pre-burst rainfall occurring prior to the main storm burst.
- Temporal Patterns – updated as part of AR&R 2019 with the most significant change being that there are now 10 patterns (ensembles) per duration for each of the four temporal pattern ranges; namely frequent, intermediate, rare and very rare. AR&R 1987 used one temporal pattern per duration for ARI ≤ 30 years and one temporal pattern per duration for ARI > 30 years.
- Areal Reduction Factor (ARF) – updated as part of AR&R 2019 with the recommendation to apply to catchments greater than 1 km^2. AR&R 1987 advocated the use of ARFs, however there was little supporting practitioner guidance.
- Rainfall Losses – updated as part of AR&R 2019 with distinction now provided between the Storm Event Initial Loss (IL_s) and the Burst Initial Loss (IL_b). Generic values for the IL_s and the Continuing Loss (CL) are now provided for most geographic regions in Australia (refer to AR&R Data Hub: http://data.arr-software.org/). However, the AR&R Data Hub states that these loss values are only for rural use and not for use in urban areas.
- Baseflow – updated as part of AR&R 2019 with the recommendation to consider the inclusion of baseflow for rural catchments. AR&R 1987 guidance was non-prescriptive with regard to the inclusion of baseflow.
- IFD Data – new IFD data was released as part of AR&R 2019. This data supersedes both the 2013 Interim and AR&R 1987 IFD data.

6.2.5 Adopted Methodology for the DEA AR&R 2019

AR&R 2019 (Book 1, Table 1.3.2) recommends the use of a simple average (or median value) to represent the flood magnitude at a location within the catchment. AR&R 2019 (Book 2, Section 5.9.2) also advises that "*it is not recommended that the temporal pattern that represents the worst (or best) case be used itself for design*." The selection of the design temporal pattern and design flow was undertaken using the TUFLOW model and is discussed further in Section 6.3.2.

Ten storm durations (30 minutes, 1 hour, 2 hours, 3 hours, 4.5 hours, 6 hours, 9 hours, 12 hours, 18 hours and 24 hours) were used for the DEA AR&R 2019 hydrologic modelling. The methodology used for undertaking the design hydrology for this study is as follows:

- Obtain the relevant URBS input data from the AR&R Data Hub, using the catchment centroid coordinates
- Populate the URBS model from the AR&R Data Hub information. This is an automated process undertaken within URBS. Refer to Section 6.2.6 for further details on the URBS parameters used.
- Run the ten temporal patterns (ensembles) in URBS for durations 30 minutes to 24 hours and ARIs (AEPs) 2-yr (50 %) to 100-yr (1 %) to create inflow hydrographs for the TUFLOW model. A total of 100 simulations per ARI (AEP).

- Use the URBS design hydrographs as input for the TUFLOW design event modelling.

6.2.6 URBS Model Set-up

The calibrated URBS model was used to simulate the design storm rainfall-runoff and sub-catchment routing process. The following describes the parameters used and the adjustments made to the calibration model in order to simulate the design events.

Catchment Development

The design events were modelled using ultimate catchment hydrological conditions. These conditions assume that the state of development within the catchment is at its ultimate condition, with reference to the current adopted planning scheme. Depending on the developed state of the catchment, an increase in development will typically increase the impervious land use factors. The ultimate catchment hydrological conditions assume negligible attenuation effects resulting from any statutory development controls applied to catchment development to reduce the urbanised runoff (e.g. detention basins).

Appendix B presents the URBS catchment parameters that were adopted for the design event modelling scenarios. The current adopted version of BCC City Plan (2014) was used to establish the ultimate catchment hydrological conditions.

The adopted land use for the ultimate catchment development is shown on a catchment map in Appendix C.

Design IFD Data

WMA Water on behalf of South-east Queensland (SEQ) Local Councils has recently completed a study to determine new IFD values for South-east QLD. These new IFD values have been used in lieu of the Bureau of Meteorology (BOM) values. A review of these IFD values for the Bulimba Creek Catchment revealed that there is considerable variation from the top of the catchment to the bottom. For this reason, the catchment was divided into upper, middle and lower (in lieu of total catchment centroid) to allow more representative IFD values to be used.

Following the release of AR&R 2019, there is now a recommendation to consider whether it is applicable to incorporate the effects of climate change into the design rainfall. The decision on whether to include climate change effects into the design rainfall is based on a six-step process, which is detailed in AR&R 2019 (Book1, Chapter 6). This analysis was undertaken as a separate exercise to this flood study and concluded that increased rainfall intensities should be incorporated into the design rainfall.

Table 6.2 indicates the adopted design IFD values, based on the new BCC IFD data. The values in the table do not include the 9.8 % increase in rainfall intensity due to projected climate variability effects. The 9.8 % factor is representative of RCP4.5 at Climate Future Year 2100. At present, the AR&R Data Hub only provides guidance on rainfall intensity increases as far as Year 2090, therefore to obtain a value for Year 2100, a linear extrapolation was undertaken based on the values of Year 2080 and Year 2090.

Table 6.2 – Adopted Design Event IFD Data

Duration (hrs)	Rainfall Intensity (mm/hr) (1)					
	2-yr ARI (50 % AEP)	5-yr ARI (20 % AEP)	10-yr ARI (10 % AEP)	20-yr ARI (5 % AEP)	50-yr ARI (2 % AEP)	100-yr ARI (1 % AEP)
Upper Catchment						
0.5	70.19	90.38	104.07	118.00	138.72	155.50
1	44.37	58.34	69.10	80.71	97.85	112.59
2	26.81	35.82	43.31	51.70	64.12	75.18
3	19.90	26.74	32.52	39.06	48.84	57.62
4.5	14.84	20.02	24.32	29.25	36.59	43.29
6	12.11	16.39	19.91	23.90	30.01	35.49
9	9.14	12.45	15.07	17.91	22.45	26.50
12	7.53	10.30	12.43	14.78	18.46	21.68
18	5.74	7.91	9.57	11.32	14.04	16.42
24	4.71	6.60	7.97	9.42	11.64	13.51
Middle Catchment						
0.5	70.97	93.47	107.56	120.86	139.33	153.28
1	44.93	61.13	72.72	84.54	100.88	114.05
2	27.19	37.96	46.39	55.50	68.33	79.20
3	20.17	28.45	35.10	42.43	52.98	62.09
4.5	15.01	21.27	26.27	31.83	40.23	47.24
6	12.23	17.41	21.58	26.20	33.15	39.24
9	9.19	13.07	16.15	19.59	24.71	29.21
12	7.54	10.80	13.30	16.01	20.22	23.86
18	5.69	8.17	10.05	12.02	15.02	17.58
24	4.67	6.76	8.26	9.84	12.24	14.24
Lower Catchment						
0.5	67.49	87.97	101.28	113.91	130.11	142.25
1	42.96	56.81	66.33	75.75	88.37	98.07
2	26.31	35.19	41.46	47.78	56.41	63.14
3	19.69	26.49	31.28	36.10	42.67	47.83
4.5	14.80	20.07	23.56	27.25	32.05	35.90
6	12.14	16.48	19.46	22.41	26.35	29.43
9	9.22	12.57	14.92	17.10	20.03	22.25
12	7.61	10.47	12.36	14.18	16.55	18.37
18	5.78	8.07	9.58	10.98	12.82	14.18
24	4.78	6.72	7.98	9.17	10.70	11.85

(1) The values presented do not include the 9.8 % increase in rainfall intensity due to projected climate variability effects.

Burst Initial Loss (IL_b)

The burst initial loss (IL_b) is the portion of the storm initial loss (IL_s), which occurs within the burst, where the IL_s is assumed to be the depth of rainfall prior to the commencement of surface runoff.

The Burst Initial Loss (IL_b) = Storm Initial Loss (IL_s) – pre-burst rainfall.

- IL_b (impervious area) – a value of 0 mm was adopted for the impervious areas within the catchment, which is the URBS default value.
- IL_b (pervious areas) – AR&R Data Hub provides a Storm Event Initial Loss (IL_s) value of 14 mm as being representative for the geographical region in which this catchment is located. However, the AR&R Data Hub advises that this loss value is "*only for rural use and not for direct use in urban areas*." AR&R 2019 (Book 5, Section 3.5.3.3) recommends adopting the losses for urban pervious areas from the loss values for rural catchments, taken from the AR&R Data Hub in the absence of better information. As there is some uncertainty regarding the appropriate IL_b (pervious) value to use, a comparative analysis was undertaken to understand the sensitivity of this selection on the results; which is presented in Section 6.2.7.

Continuing Loss (CL)

The following values were adopted for the Continuing Loss:

- CL (impervious area) – a value of 0 mm/hr was adopted for the impervious areas within the catchment, which is the URBS default value.
- CL (pervious area) – AR&R Data Hub provides a CL (pervious) value of 1.7 mm/hr as being representative for the geographical region in which this catchment is located. However, this was replaced by a value of 2.5 mm/hr from the results of the calibration and verification process.

Areal Reduction Factor (ARF)

The Areal Reduction Factor (ARF) is the ratio between the design values of areal average rainfall and point rainfall, computed for the same duration and Annual Exceedance Probability (AEP). The ARF is used to convert the point design rainfalls (from IFD data) to average catchment design rainfalls, allowing for the fact that larger catchments are less likely than smaller catchments to experience high intensity storms simultaneously over the whole of the catchment area.[12] The advice from AR&R 2019 is that ARFs should be considered for catchments with an area of at least 1 km^2. The following formula is appropriate for catchments between 10 km^2 and 1000 km^2.

$$\begin{aligned} ARF &= Min\Big[1, 1 - 0.287\left(Area^{0.265} - 0.439\log_{10}(Duration)\right).Duration^{-0.36} + 2.26 \times 10^{-3} \times Area^{0.226} \\ &\quad .Duration^{0.125}\,(0.3 + \log_{10}(AEP)) \\ &\quad + 0.0141 \times Area^{0.213} \times 10^{-0.021\frac{(Duration-180)^2}{1440}}\,(0.3 + \log_{10}(AEP))\Big] \end{aligned}$$

[12] Jordan P, Nathan R, Podger S, Babister M, Stensmyr P and Green J, 2019, Areal Reduction Factors, Book 2 Chapter 4 in Australian Rainfall and Runoff - A Guide to Flood Estimation, Commonwealth of Australia

The determination of ARFs is primarily a function of catchment area, storm event duration and to a lesser extent, ARI (AEP). The issue with ARFs for catchments such as Bulimba Creek (where a significant proportion of the catchment is the study area and there are numerous tributaries of various sizes) is that there is not a single catchment area that can be applied for calculating an ARF that is representative over the entire study area. For this reason and for simplicity, BCC has chosen to adopt an ARF of 1, as documented in the current version of the BCC Flood Study Procedure document.[6]

Baseflow

Baseflow was included in the design hydrology from the results of the calibration using the following parameters for all design events:

- Baseflow Index (BFI) = 0.22
- Minimum Persistent Baseflow Value (B0) = 0
- Daily Baseflow Recession Factor (BR) = 0.5
- Baseflow Constant applied to runoff (BC) = 0.141
- Baseflow Exponent applied to runoff (BM) = 1

Based on the results of the calibration, a BFI of 0.22 was used for all the design events. The calibration results indicated that using a BFI of 0.22 resulted in the best fit for the full range of historical flood magnitudes modelled. These results are contrary to baseflow theory which suggests that the proportion of baseflow decreases as the size of the flood event increases.

Equating BC = (1-BR) x BFVF [13] and BC = BFI x (1-BR) / (1-BFI) [14], gives the equation:

BFVF = BFI / (1-BFI)

Using this equation, a BFI of 0.22 equates to a Baseflow Volume Factor (BFVF) of 0.2821. This is considerably above the generic value of 0.1247 obtained from the AR&R 2019 Data Hub, however, is considered applicable as it has been derived from calibration.

URBS uses the Baseflow Volume Factor (BFVF) to adjust the Baseflow Constant (BC) based on the following equation:

$BC = (1-BR) \times BFVF \times BFVF^{AEP}$

where $BFVF^{AEP}$ is obtained from Table 6.3, which originates from AR&R 2019 (Book 5, Table 5.4.1).

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[13] DG Carroll 2016 - *URBS A Rainfall Runoff Routing Model for Flood Forecasting and Design Version 6.00*, Section 4.2.

[14] DG Carroll 2016 - *URBS A Rainfall Runoff Routing Model for Flood Forecasting and Design Version 6.00*, Section 9.15.2.

Table 6.3 – BFVF for Design Event Maginitude

ARI (AEP)	$BFVF^{AEP}$
2-yr (50 %)	1.6
5-yr (20 %)	1.2
10-yr (10 %)	1.0
20-yr (5 %)	0.8
50-yr (2 %)	0.7
100-yr (1 %)	0.6

To enable the BFVF to remain constant at 0.2821 for all design events an adjustment was required to the BFVF that was used in the URBS model as indicated in Table 6.4.

Table 6.4 – Adjusted URBS BFVF

ARI (AEP)	BFVF (unadjusted)	$BFVF^{AEP}$	BFVF (adjusted)
2-yr (50 %)	0.2821	1.6	0.1763
5-yr (20 %)	0.2821	1.2	0.2350
10-yr (10 %)	0.2821	1.0	0.2821
20-yr (5 %)	0.2821	0.8	0.3526
50-yr (2 %)	0.2821	0.7	0.4029
100-yr (1 %)	0.2821	0.6	0.4701

6.2.7 Sensitivity of IL_b (Pervious) Value

Historically, many BCC flood studies have typically adopted an IL_b of 0 mm for both the impervious and pervious areas of the catchment, with the understanding that the IL_b (pervious) value is conservative, especially for the smaller design events. The AR&R Data Hub provides a Storm Event Initial Loss (IL_s) value of 14 mm, with the caveat that it is only applicable for rural use and not for direct use in urban areas. The AR&R Data Hub also provides pre-burst rainfall loss values to account for the rainfall lost before the main storm burst.

To understand how sensitive the URBS peak flow values are to the selection of the IL_b (pervious) value, a comparative analysis was undertaken considering two IL options:

- Option 1 – IL_b (pervious) = 0 mm
- Option 2 – IL_b (pervious) = IL_s (pervious) minus the AR&R 2019 pre-burst rainfall, where IL_s (pervious) = 14 mm.

Table 6.5 indicates the differences in peak flow when using the two initial loss options. The results indicate that at most locations the peak flows are very similar / identical when considering events between 5-yr ARI (20 % AEP) and 100-yr ARI (1 % AEP). However, in the 2-yr ARI (50 % AEP)

Table 6.5 – Sensitivity of Initial Loss Selection

Location	Initial Loss Option	URBS Design Flow (m³/s) (1)					
		ARI (AEP)					
		2-yr (50 %)	5-yr (20 %)	10-yr (10 %)	20-yr (5 %)	50-yr (2 %)	100-yr (1 %)
Bulimba Creek							
Gold Coast Railway (MHG BM340)	1	51.0	70.9	85.2	102.2	127.5	149.5
	2	44.9	69.3	80.8	99.0	124.8	147.0
Pacific Motorway (MHG BM280/290)	1	137.6	189.7	231.1	276.0	341.3	409.7
	2	121.9	184.8	222.3	270.4	331.7	409.7
Mount Gravatt - Capalaba Road (MHG BM250)	1	259.9	350.2	433.1	524.9	648.5	823.0
	2	235.9	342.4	433.1	524.9	648.5	823.0
MHG BM170	1	249.9	347.3	427.1	520.9	668.3	813.9
	2	234.1	347.3	427.1	520.9	668.3	813.9
Gateway Motorway (MHG BM120)	1	193.5	279.4	342.0	421.7	534.1	683.8
	2	183.0	279.4	342.0	421.7	534.1	683.8
Cleveland Railway {540129 (BMA528)}	1	202.1	296.1	380.3	466.6	567.6	700.6
	2	194.1	296.1	380.3	466.6	567.6	700.6
Bulimba Creek East							
Underwood Road (MHG BM430)	1	39.8	55.3	63.8	74.8	93.8	109.9
	2	34.8	53.2	59.8	72.5	92.1	108.4
Miles Platting Road (MHG BM410)	1	107.5	148.4	170.5	203.2	254.3	297.2
	2	95.1	144.4	163.5	198.3	249.9	293.2
Mimosa Creek							
Kessels Road	1	26.8	37.7	45.9	56.8	68.3	80.8
	2	22.0	35.2	45.9	53.6	66.7	80.2
Newnham Creek							
Secam Street	1	24.6	35.4	40.7	47.2	58.2	65.8
	2	21.0	33.8	37.8	46.3	56.1	64.9
Spring Creek							
Scrub Road	1	19.0	28.7	36.0	45.0	51.7	60.3
	2	15.0	26.7	36.0	45.0	51.7	60.3
Salvin Creek							
Donnington Street (Upper)	1	44.1	64.5	75.6	90.4	112.2	129.6
	2	38.0	63.4	72.2	88.6	109.6	127.1
Phillips Creek							
Creek Road	1	30.3	44.3	53.3	63.7	78.5	90.4
	2	26.2	43.7	50.5	61.7	76.8	88.9
Minnippi Creek							
Creek Road	1	16.9	24.2	27.7	32.2	40.0	45.0
	2	14.4	22.6	25.3	30.5	38.3	43.4

(1) Does not Include increased design rainfall due to projected climate variability effects.

event, Option 1 results in peak flows up to 27% (average 14 %) higher than Option 2. This is not considered a major issue as the 2-yr ARI (50 % AEP) event is considered one of the less important of the six design ARIs (AEPs) with respect to flood risk / flood planning. Also, the design hydrology now includes further conservatism and uncertainty due to increasing the rainfall intensity to allow for future projected climate variability. On this basis, it was decided to adopt the Option 1 approach (i.e. IL_b (pervious) = 0 mm) for this study. It is considered that using this approach maintains some consistency with historical BCC flood studies and provides a somewhat standardised approach that can be adopted for future flood studies.

6.3 Design Event Hydraulic Modelling

6.3.1 Overview

The TUFLOW model was used to determine design flows and flood levels for those scenarios as detailed in Table 6.1 for the 2-yr ARI (50 % AEP) to the 100-yr ARI (1 % AEP) events. These events were simulated for storm durations from 30 minutes to 24 hours using the DEA AR&R 2019 as discussed in the previous section.

6.3.2 Methodology

Each storm duration from 30 minutes to 24 hours was modelled with the ten ensembles (E1 to E10), which resulted in a total of 100 simulations per ARI (AEP). The total number of TUFLOW simulations required to complete the design event modelling was 1900, comprising the following:

- Scenario 1 (with and without climate change) – 1200 simulations
- Scenario 2 (inclusive of climate change) – 100 simulations
- Scenario 3 (inclusive of climate change) – 600 simulations

To select the median design temporal pattern (ensemble), critical duration, design flow and design flood level the following procedure was undertaken:

- For each design ARI (AEP), the median flood level for all locations within the TUFLOW model extents was determined for each of the ten storm durations (30 minutes to 24 hours). This is undertaken using TUFLOW post processing tools and produces a design flood level surface (grid) of the median flood level for each duration, a total of ten median flood level surfaces are produced. A separate grid of the median design temporal pattern (ensemble) for each duration is also produced from which the median design temporal pattern at any location within the model can be determined by GIS inspection.
- A single design flood level surface is then produced for each design ARI (AEP) using TUFLOW post processing tools by extracting the peak flood level of the ten median flood level surfaces. A separate grid of the critical duration is also produced from which the critical duration at any location within the model can be determined by GIS inspection.
- The design flow for each ARI (AEP) at any location in the model can then be determined from the TUFLOW time varying results with respect to the critical duration and the median ensemble.

6.3.3 TUFLOW Model Set-up

TUFLOW model extents

The Scenario 1, 2 and 3 TUFLOW model extents were the same as the TUFLOW model developed for the calibration and verification events.

TUFLOW model roughness

The hydraulic roughness in the calibrated TUFLOW model was updated (as required) to represent the ultimate catchment conditions, which included MRC for Scenarios 2 and 3.

TUFLOW model boundaries

Design Inflows

The design inflow (Q-T) boundaries to the TUFLOW model were taken from the URBS model for each ARI (AEP) and duration. The inflow locations were typically the same as for the TUFLOW model developed for the calibration and verification events.

Design Tailwater Boundary

The design event TUFLOW model utilised a fixed water level (H-T) boundary as the downstream model boundary as follows:

- Current Conditions: MHWS = 0.98 mAHD
- Future Climate Change (Year 2100): MHWS + 0.8 m = 1.78 mAHD

6.4 Results and Mapping

6.4.1 Design Discharge Results

A full range of durations (30 minutes to 24 hours) were simulated for the 2-yr ARI (50 % AEP) to 100-yr ARI (1 % AEP) events. Table 6.6 provides design flow results at selected major waterway crossings for the Scenario 1 conditions. This information is from the TUFLOW hydraulic model.

Table 6.6 – Design Discharge at Selected Major Waterway Crossings (Scenario 1)

Location	Design Discharge (m^3/s) [1]					
	2-yr ARI (50 % AEP)	5-yr ARI (20 % AEP)	10-yr ARI (10 % AEP)	20-yr ARI (5 % AEP)	50-yr ARI (2 % AEP)	100-yr ARI (1 % AEP)
Bulimba Creek						
Gold Coast Railway (S71&72)	54	79	96	117	144	169
Pacific Motorway (S63&64)	121	174	217	264	307	351
Mt Gravatt Capalaba Road (S57)	269	383	490	588	711	818
Pine Mountain Road (S37)	275	404	534	657	793	912

Location	Design Discharge (m³/s) (1)					
	2-yr ARI (50 % AEP)	5-yr ARI (20 % AEP)	10-yr ARI (10 % AEP)	20-yr ARI (5 % AEP)	50-yr ARI (2 % AEP)	100-yr ARI (1 % AEP)
Old Cleveland Road (S27)	290	435	574	722	884	1049
Wynnum Road (S13)	196	279	369	463	594	737
Gateway Motorway (S10)	194	267	330	402	506	632
Cleveland Railway (S7)	228	344	435	525	635	741
Bulimba Creek East						
Gold Coast Railway (S100)	21	31	35	43	53	61
Gateway Motorway (S96)	44	61	74	89	113	134
Pacific Motorway (S93)	102	144	156	176	204	232
Mimosa Creek						
Pacific Motorway (S86)	23	33	42	51	62	74
Kessels Road (S85)	27	40	50	62	76	90
Broadwater Road Drain						
Broadwater Road (S152)	45	59	68	79	96	110
Newnham Creek						
Newnham Road (S47)	28	40	45	53	64	72
Spring Creek						
Scrub Road (S132)	21	31	40	50	57	68
Salvin Creek						
Pine Mountain Road (S34)	30	42	51	58	69	78
Creek Road (S33)	39	57	65	79	99	106
Phillips Creek						
Creek Road (S23b&S23c)	34	49	56	65	79	90
Minnippi Creek						
Creek Road (S114&S115)	17	23	26	31	39	45

(1) Includes increased design rainfall due to projected climate variability effects.

6.4.2 Design Flood Levels

Tabulated design flood level results for the 2-yr ARI (50 % AEP) to 100-yr ARI (1 % AEP) events are provided for all the modelled waterways within the Bulimba Creek Catchment, in the following appendices:

- Scenario 1: 2-yr ARI (50 % AEP) to 100-yr ARI (1 % AEP) events – Appendix E
- Scenario 3: 2-yr ARI (50 % AEP) to 100-yr ARI (1 % AEP) events – Appendix F

The design flood levels are extracted along the current AMTD line for all creeks, using the methodology discussed previously in Section 6.3. Where there was no AMTD line, an assumed line was drawn to enable flood levels to be extracted. At some locations, the current AMTD line did not intersect the flood surface, which resulted in a null value (indicated by N/R). The critical storm duration and median ensemble for each tabulated location is provided in Appendix I.

6.4.3 Return Periods of Historic Events

Table 6.7 indicates the estimated magnitude of the calibration / verification events (expressed as ARI / AEP) at selected locations within the catchment. The estimated magnitude was obtained from the flood frequency curves as indicated in Figure 6.3 to Figure 6.5. These flood frequency curves indicate the line of best fit and are based on the results of the Scenario 1 modelling using present day design rainfall (i.e. no future climate variability allowance).

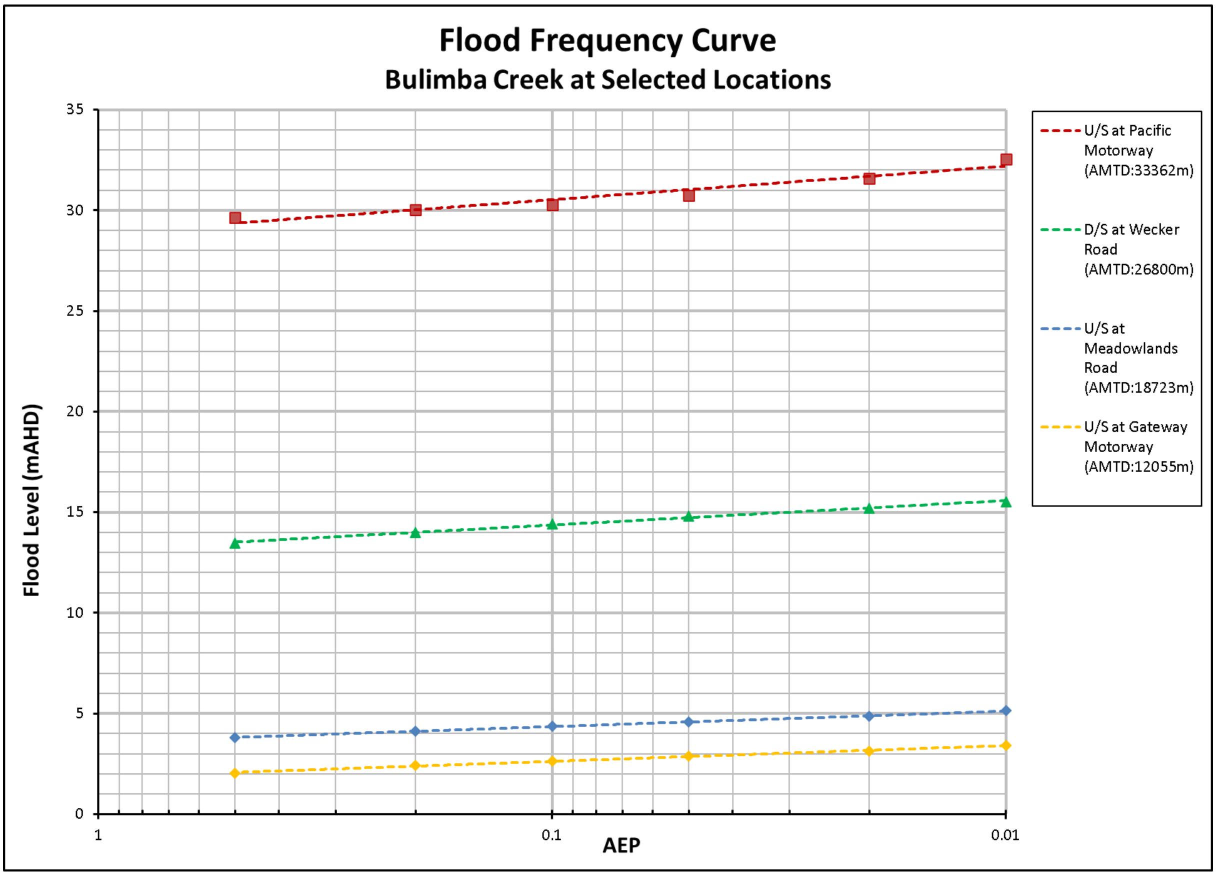

Figure 6.3: Flood Frequency Curves at Selected Locations on Bulimba Creek

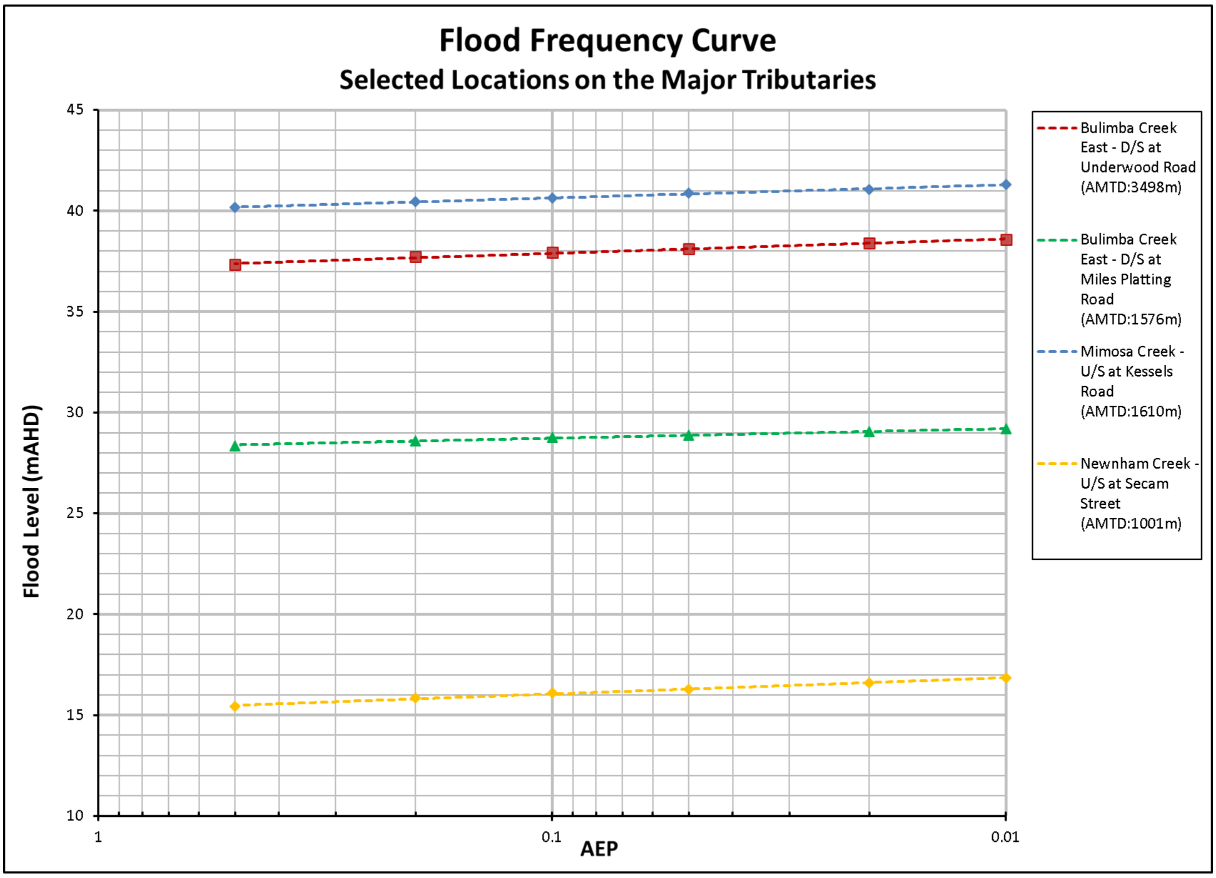

Figure 6.4: Flood Frequency Curves at Selected Locations on the Major Tributaries

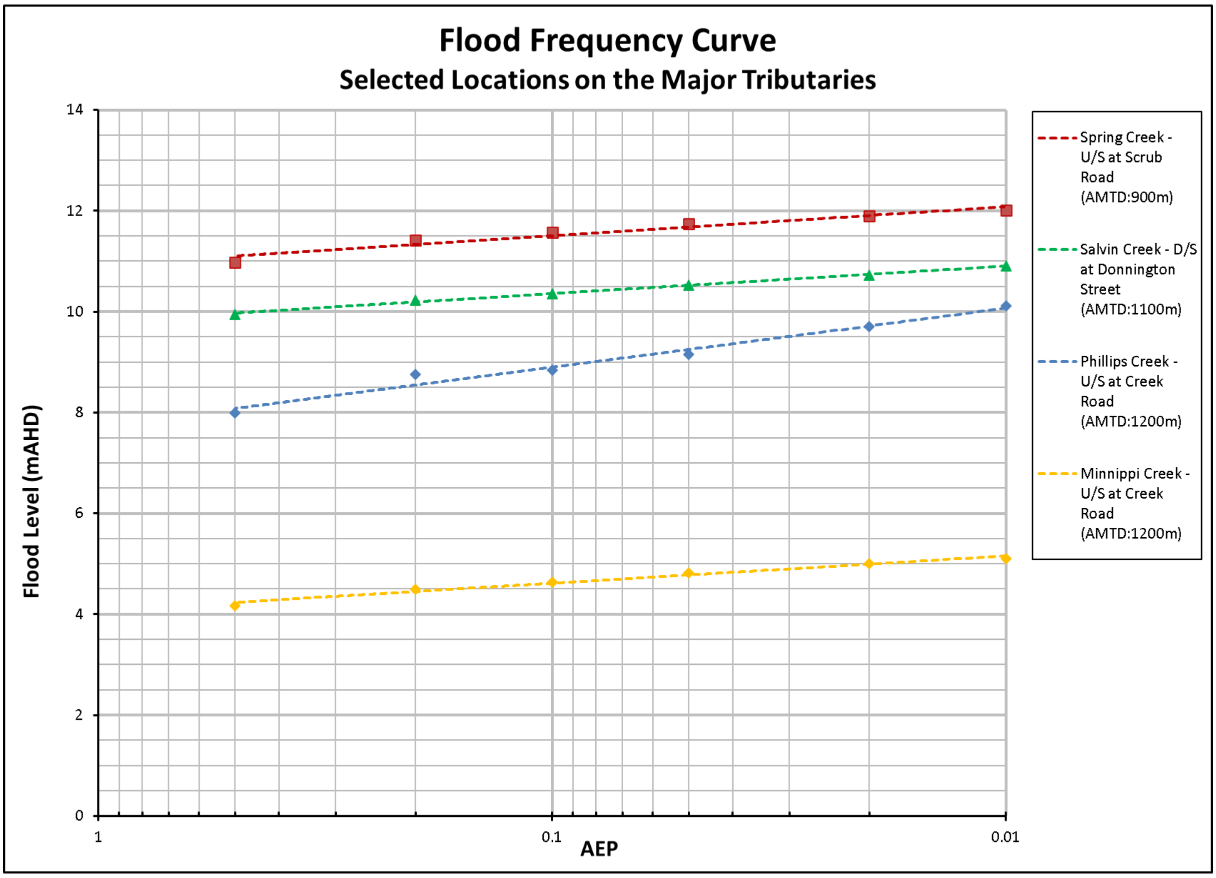

Figure 6.5: Flood Frequency Curves at Selected Locations on the Major Tributaries

Table 6.7 – Estimated Magnitude of Historical Events

Location	Event Magnitude			
	March 2001	January 2013	May 2015	March 2017
Bulimba Creek				
Pacific Motorway AMTD 33362m	> 100-yr ARI (1% AEP)	2-yr to 5-yr ARI (50% to 20% AEP)	20-yr to 50-yr ARI (5% to 2% AEP)	< 2-yr ARI (50% AEP)
Wecker Road AMTD 26800m	50-yr to 100-yr ARI (2% to 1% AEP)	2-yr to 5-yr ARI (50% to 20% AEP)	20-yr to 50-yr ARI (5% to 2% AEP)	< 2-yr ARI (50% AEP)
Meadowlands Road AMTD 18723m	50-yr to 100-yr ARI (2% to 1% AEP)	5-yr to 10-yr ARI (20% to 10% AEP)	50-yr ARI (2% AEP)	2-yr to 5-yr ARI (50% to 20% AEP)
Gateway Motorway AMTD 12055m	20-yr to 50-yr ARI (5% to 2% AEP)	5-yr to 10-yr ARI (20% to 10% AEP)	20-yr to 50-yr ARI (5% to 2% AEP)	5-yr to 10-yr ARI (20% to 10% AEP)
Bulimba Creek East				
Underwood Road AMTD 3498m	50-yr to 100-yr ARI (2% to 1% AEP)	< 2-yr ARI (50% AEP)	20-yr ARI (5% AEP)	< 2-yr ARI (50% AEP)
Miles Platting Road AMTD 1576m	> 100-yr ARI (1% AEP)	< 2-yr ARI (50% AEP)	20-yr to 50-yr ARI (5% to 2% AEP)	< 2-yr ARI (50% AEP)
Mimosa Creek				
Kessels Road AMTD 1610m	100-yr ARI (1% AEP)	2-yr to 5-yr ARI (50% to 20% AEP)	10-yr to 20-yr ARI (10% to 5% AEP)	< 2-yr ARI (50% AEP)
Newnham Creek				
Secam Street AMTD 1001m	50-yr ARI (2% AEP)	< 2-yr ARI (50% AEP)	5-yr to 10-yr ARI (20% to 10% AEP)	< 2-yr ARI (50% AEP)
Spring Creek				
Scrub Road AMTD 900m	10-yr to 20-yr ARI (10% to 5% AEP)	2-yr to 5-yr ARI (50% to 20% AEP)	20-yr ARI (5% AEP)	< 2-yr ARI (50% AEP)
Salvin Creek				
Donnington Street AMTD 1100m	10-yr to 20-yr ARI (10% to 5% AEP)	< 2-yr ARI (50% AEP)	10-yr ARI (10% AEP)	< 2-yr ARI (50% AEP)
Phillips Creek				
Creek Road AMTD 1200m	10-yr to 20-yr ARI (10% to 5% AEP)	< 2-yr ARI (50% AEP)	5-yr to 10-yr ARI (20% to 10% AEP)	< 2-yr ARI (50% AEP)
Minnippi Creek				
Creek Road AMTD 1200m	2-yr to 5-yr ARI (50% to 20% AEP)	< 2-yr ARI (50% AEP)	5-yr to 10-yr ARI (20% to 10% AEP)	< 2-yr ARI (50% AEP)

6.4.4 Rating Curves

Rating curves (H-Q) have been derived at a number of locations within the catchment and are provided in Appendix K. These locations are generally in the vicinity of hydraulic structures and include:

- Gold Coast Railway (S71/72) – Bulimba Creek
- Pacific Motorway (S63/64) – Bulimba Creek
- Mount Gravatt - Capalaba Road (S57) – Bulimba Creek
- Wecker Road (S56) – Bulimba Creek

- Pine Mountain Road (S37) – Bulimba Creek
- Winstanley Street (S29) – Bulimba Creek
- Gateway Motorway (S96) – Bulimba Creek East
- Pacific Motorway (S93) – Bulimba Creek East
- Pacific Motorway (S86) – Mimosa Creek
- Kessels Road (S85) – Mimosa Creek
- Newnham Road (S47) – Newnham Creek
- Creek Road (S33) – Salvin Creek
- Creek Road (S23b/c) – Phillips Creek

The rating curves were developed using the 2000-yr ARI (0.05% AEP) simulation, with a constant tailwater level of HAT (1.55 mAHD) at the downstream model boundary. Typically, the adopted rating curve lies between the rising limb rating curve and the falling limb rating curve of the hydrograph. In the lower reaches of the catchment, care should be taken if utilising the rating curves, as they have the potential to change depending on the tidal conditions.

6.4.5 Hydrologic-Hydraulic Model Consistency Check (Design Events)

Comparison checks on flow were undertaken between the URBS and TUFLOW models for the 5-yr ARI (20 % AEP), 20-yr ARI (5 % AEP) and 100-yr ARI (1 % AEP) events at selected locations to understand how closely the hydrologic and hydraulic models were matching. The comparison TUFLOW simulations were modelled with a fixed MHWS downstream boundary. Comparisons were undertaken for the 360-minute duration storm utilising Ensemble #1. The 360-minute storm duration was chosen as it is considered a mid-range storm suitable for comparative checking at multiple locations across the catchment.

The locations where comparative plots were undertaken are as follows:

(i) Bulimba Creek – Gold Coast Railway
(ii) Bulimba Creek – Pacific Motorway
(iii) Bulimba Creek – Mount Gravatt - Capalaba Road (MHG BM250)
(iv) Bulimba Creek – MHG BM230
(v) Bulimba Creek – Moorabbin Drive Drain Confluence
(vi) Bulimba Creek – Cleveland Railway
(vii) Bulimba Creek – Catchment Outlet
(viii) Mimosa Creek – Kessels Road
(ix) Bulimba Creek East – Underwood Road (MHG BM430)
(x) Bulimba Creek East – Miles Platting Road Drain Confluence
(xi) Newnham Creek – Secam Road
(xii) Spring Creek – Scrub Road
(xiii) Salvin Creek – Donnington Street
(xiv) Phillips Creek – Creek Road

Figure 6.6 to Figure 6.11 provide comparative plots at 6 of the 14 locations. The remainder of the comparative plots are provided in Appendix D. Table 6.8 provides a comparison of the peak flows at these 14 locations.

Table 6.8 – Peak Flow Comparison, URBS and TUFLOW

Location	Model	360-minute Duration - Ensemble #1 Peak Flow (m³/s)		
		5-yr ARI (20 % AEP)	20-yr ARI (5 % AEP)	100-yr ARI (1 % AEP)
Bulimba Creek at Gold Coast Railway	URBS	42	102	187
	TUFLOW	39	102	191
Bulimba Creek at Pacific Motorway	URBS	135	289	510
	TUFLOW	118	243	386
Bulimba Creek at MHG BM250	URBS	283	566	967
	TUFLOW	285	548	864
Bulimba Creek at MHG BM230	URBS	301	567	887
	TUFLOW	304	570	892
Bulimba Creek at Moorabbin Drive Drain Confluence	URBS	281	472	738
	TUFLOW	252	407	600
Bulimba Creek at Cleveland Railway	URBS	296	488	779
	TUFLOW	276	484	678
Bulimba Creek at Catchment Outlet	URBS	295	485	771
	TUFLOW	280	494	697
Mimosa Creek at Kessels Road	URBS	27	58	99
	TUFLOW	26	57	101
Bulimba Creek East at MHG BM430	URBS	30	74	143
	TUFLOW	29	68	133
Bulimba Creek East at Miles Platting Road Drain Confluence	URBS	100	246	455
	TUFLOW	95	196	314
Newnham Creek at Secam Road	URBS	20	49	95
	TUFLOW	20	49	89
Spring Creek at Scrub Road	URBS	20	46	84
	TUFLOW	20	46	83
Salvin Creek at Donnington Street (Upper)	URBS	40	98	184
	TUFLOW	39	94	180
Phillips Creek at Creek Road	URBS	27	68	126
	TUFLOW	27	62	110

At most locations, there is a reasonably good comparison between the URBS and TUFLOW models.

In the upper sections of the catchment and for the tributaries, there is typically a very good comparison between the URBS and TUFLOW hydrographs for all three events. There are two exceptions, namely: (i) Bulimba Creek at the Pacific Motorway and (ii) Bulimba Creek East at Miles Platting Road Drain Confluence. At these two locations, the URBS peak flow results are considerably higher than the TUFLOW peak flow results for the larger 20-yr ARI (5% AEP) and 100-yr ARI (1% AEP) events; refer to Appendix D. These differences can be attributed to the storage / attenuation effects of the Pacific and Gateway Motorways being represented more accurately in the hydraulic model.

Within Bulimba Creek from the mid-catchment to lower catchment areas, the differences between the URBS and TUFLOW hydrographs tend to increase. In these areas, there are significant storage effects due to the wide expansive floodplain areas and the URBS peak flow typically exceeds the TUFLOW peak flow. A number of these large floodplain storage areas on Bulimba Creek have multiple outlets, which are difficult to accurately represent in a hydrologic model. An example of this is between AMTD 18 km and AMTD 14 km, where excess flows are diverted to the Minnippi Overflow once the floodplain storage reaches a certain flood level; refer to Figure 6.8. Another example is between the Gateway Motorway AMTD 12 km and Cleveland Railway AMTD 4.5 km, where in larger events, the outflow from this large floodplain storage area includes Bulimba Creek, Bulimba Main Drain and Lindum Creek; refer to Appendix D.

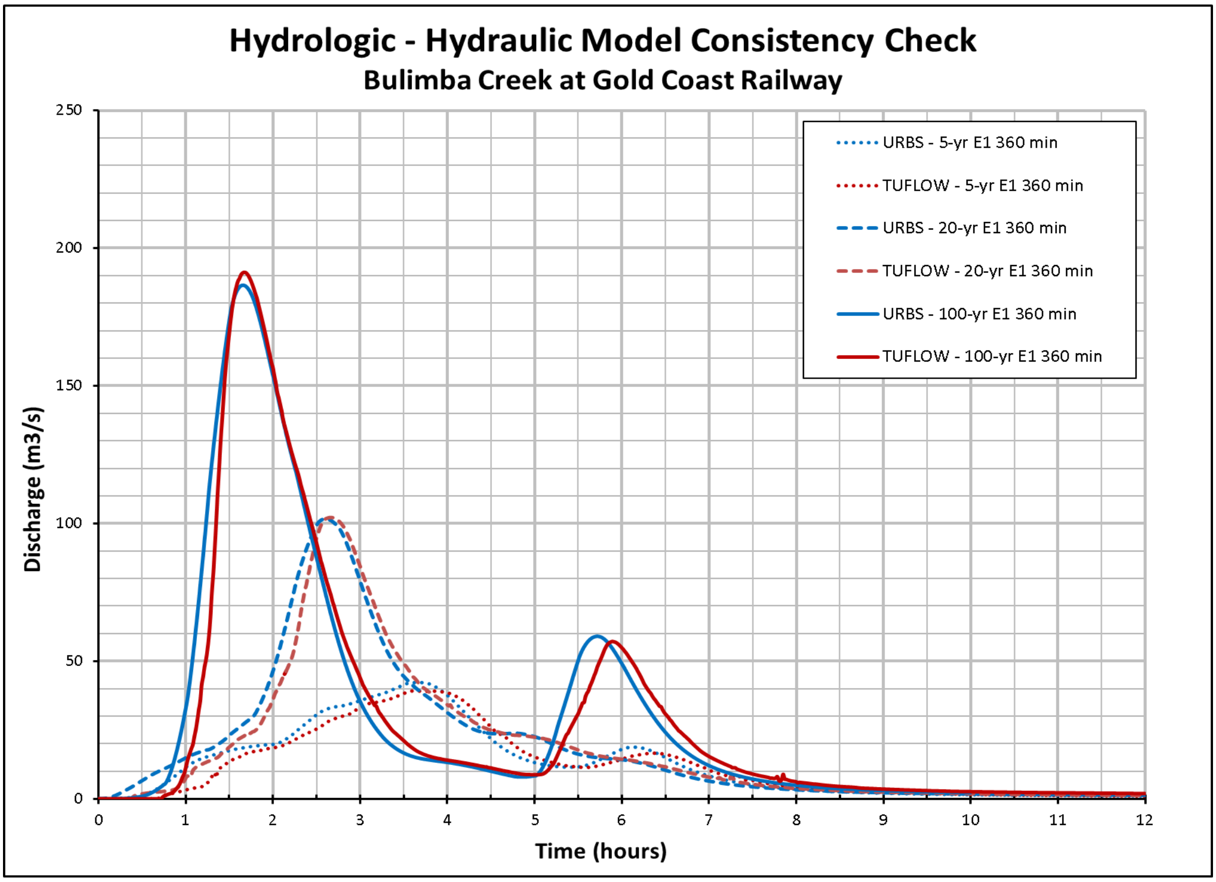

Figure 6.6: Model Comparison for Design Events - Bulimba Creek at Gold Coast Railway

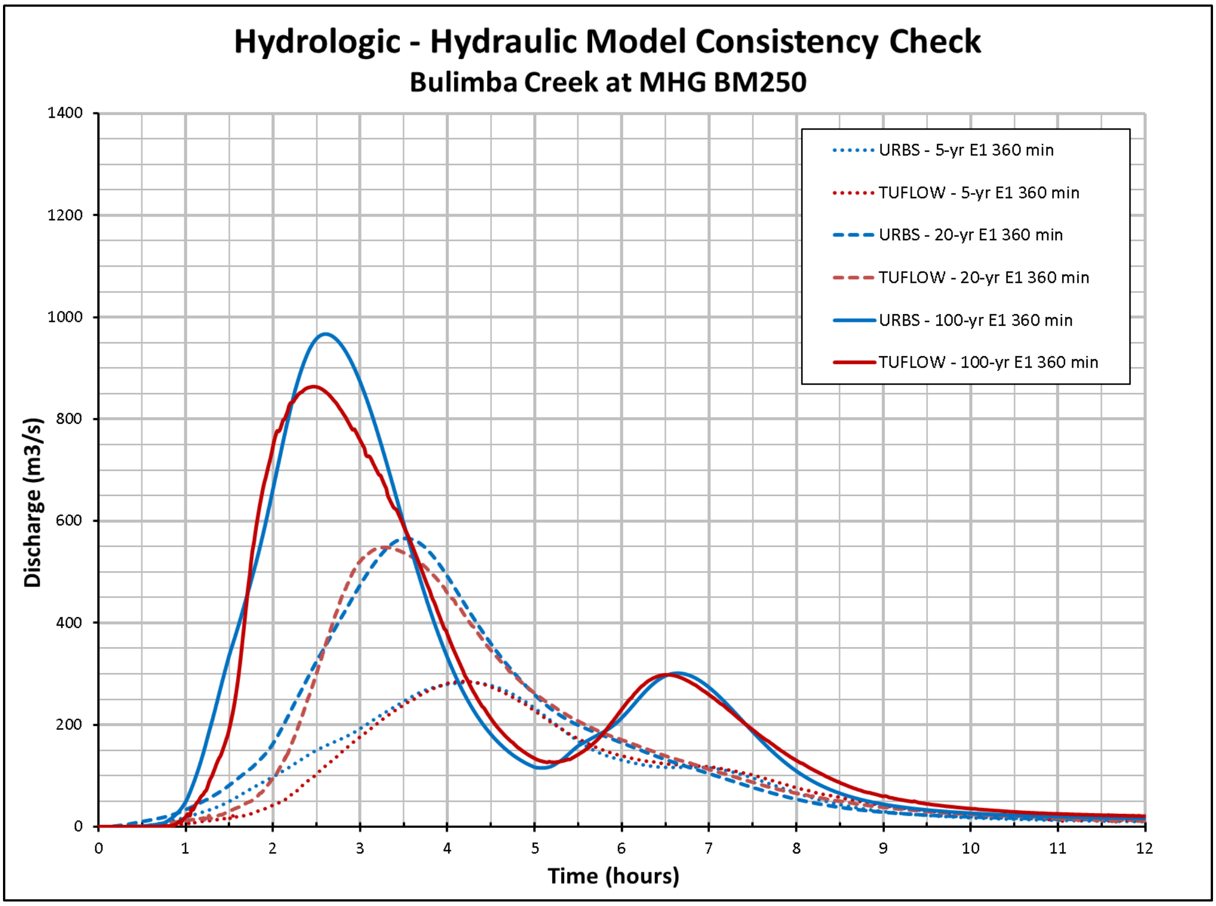

Figure 6.7: Model Comparison for Design Events - Bulimba Creek at MHG BM250

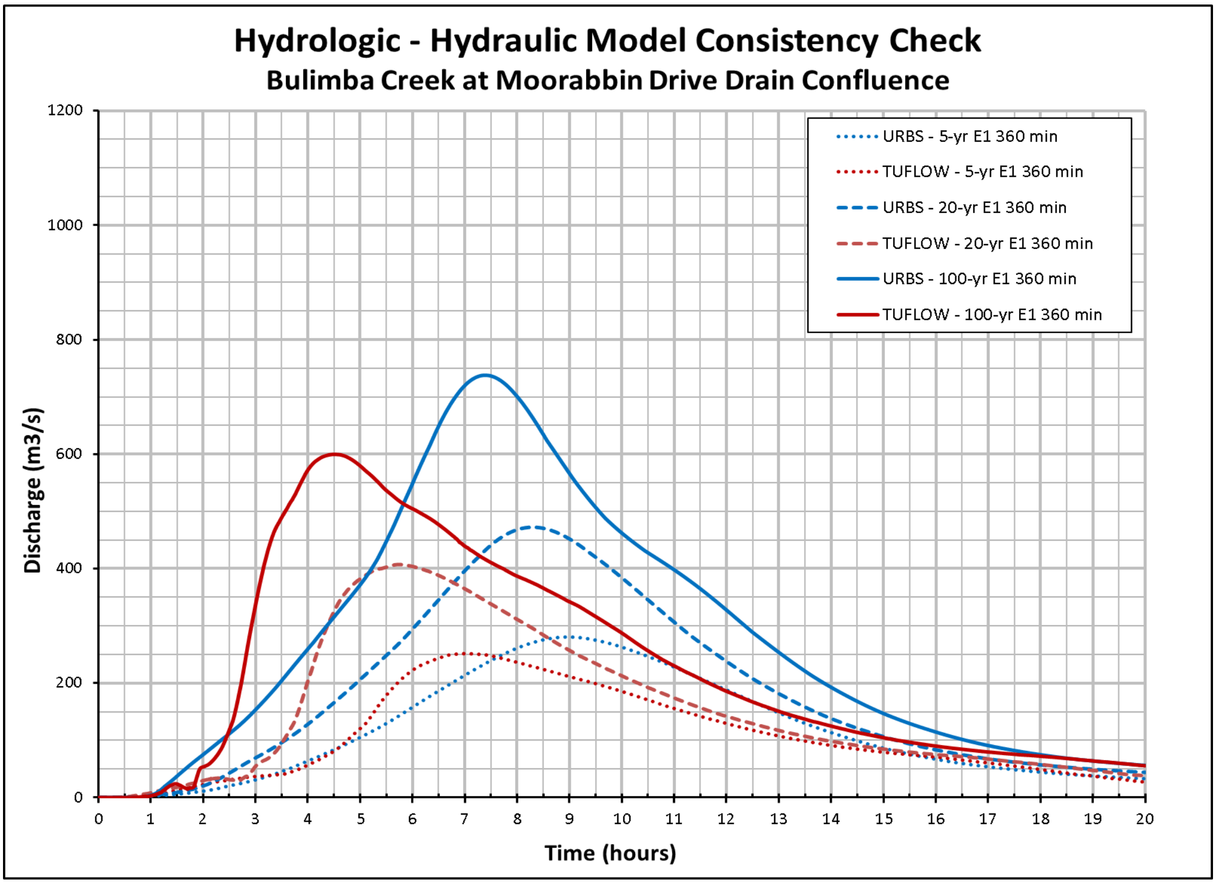

Figure 6.8: Model Comparison for Design Events – Bulimba Creek at Moorabbin Drive Drain

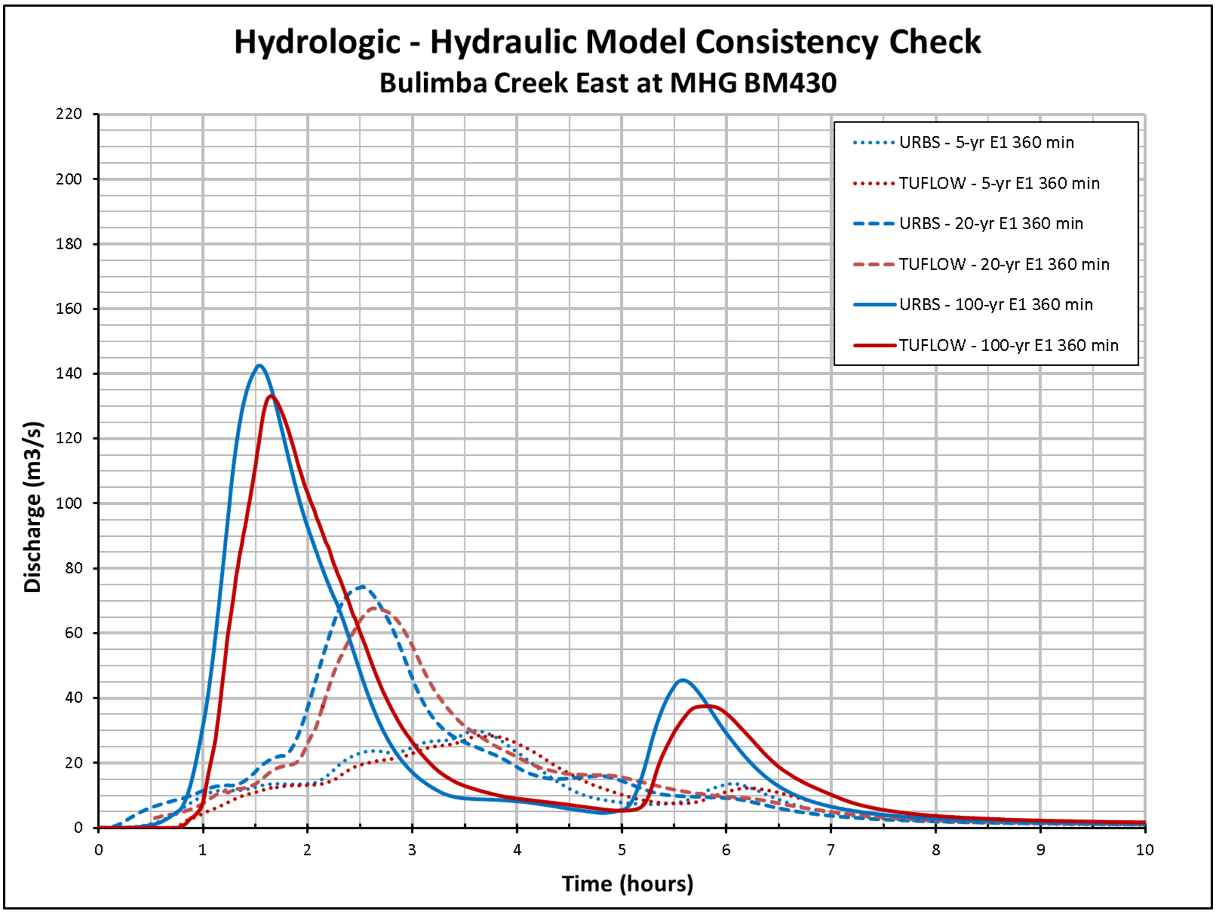

Figure 6.9: Model Comparison for Design Events – Bulimba Creek East at MHG BM430

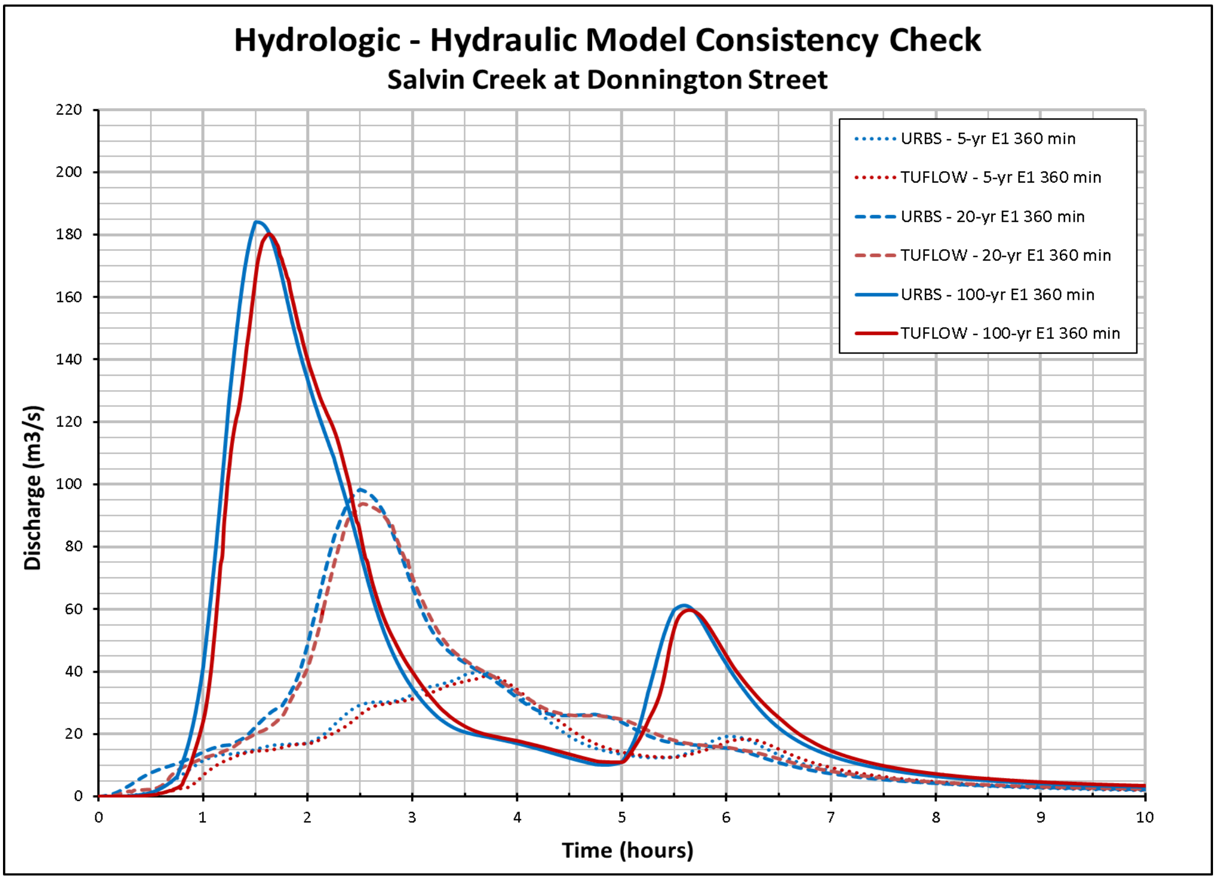

Figure 6.10: Model Comparison for Design Events – Salvin Creek at Donnington Street (Upper)

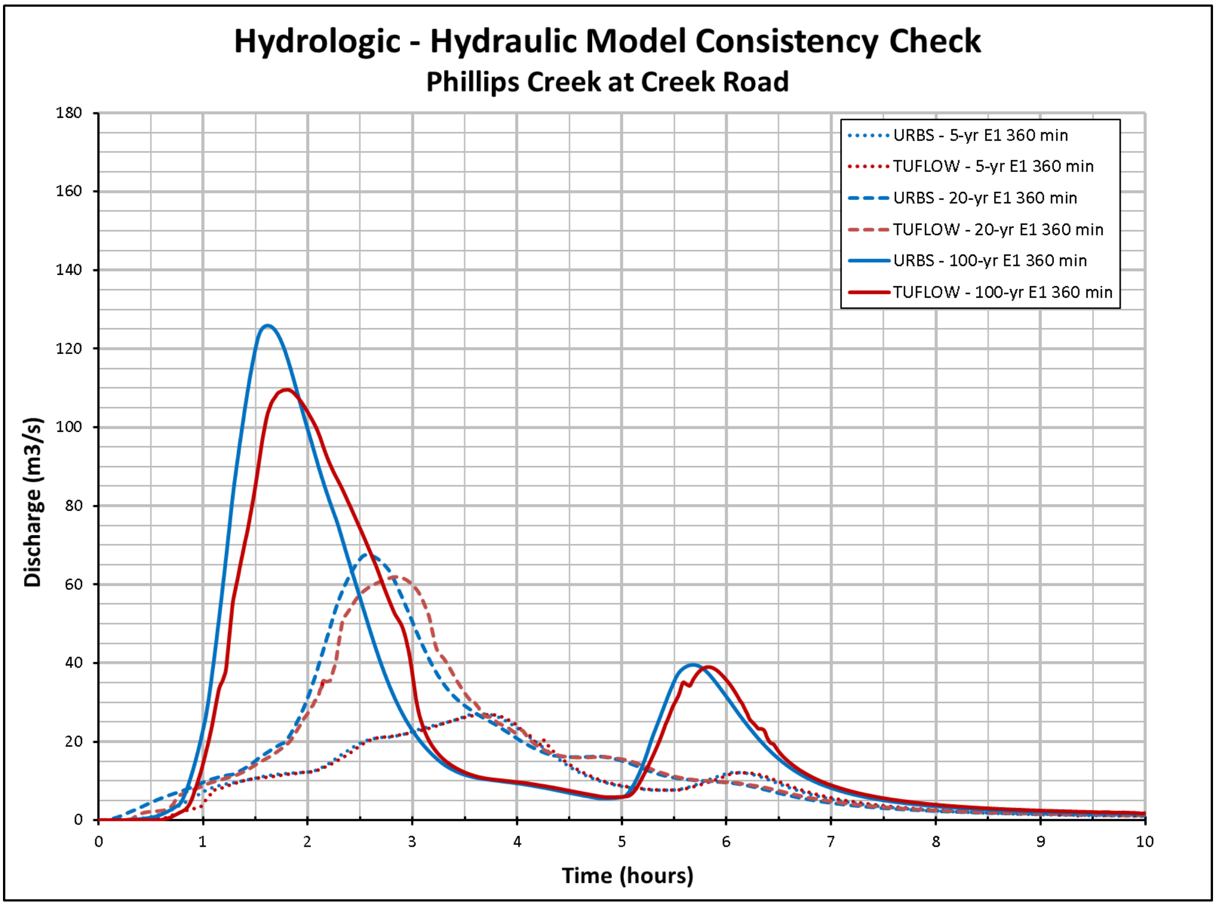

Figure 6.11: Model Comparison for Design Events – Phillips Creek at Creek Road

6.4.6 Hydraulic Structure Reference Sheets

Details of flood level and flow data derived for the hydraulic structure crossings modelled are summarised in the Hydraulic Structure Reference Sheets and included in Appendix L. The flood levels and flow values are representative of present day conditions and as such do not include increases in rainfall intensity and sea-level rise due to projected climate variability effects.

6.4.7 Flood Mapping

The flood mapping products are provided in Volume 2 and include the following:

- Scenario 1
  - Flood Extent Mapping: 2-yr ARI (50 % AEP) to 100-yr ARI (1 % AEP)

The flood extents for the Tingalpa Channel and Hemmant Drain have been truncated to reflect that the high-level modelling of these creeks was for flood routing purposes and the results are considered suitable for determining flood flows, but not flood levels.

7.0 Very Rare and Extreme Event Analysis

7.1 Very Rare and Extreme Event Scenarios

Table 7.1 indicates the events and scenarios modelled as part of the Very Rare and Extreme event analysis. These scenarios have been previously described in Section 6.1. All Very Rare and Extreme event modelling was undertaken using ultimate hydrological conditions.

Table 7.1 – Very Rare and Extreme Event Scenarios

Event	Scenario 1	Scenario 2	Scenario 3
200-yr ARI (0.5 % AEP)	✓	✗	✓
500-yr ARI (0.2 % AEP)	✓	✗	✓
2000-yr ARI (0.05 % AEP)	✓	✗	✗
PMF	✓	✗	✗

For the modelling of the Scenario 3 events, the fill height outside of the "Modelled Flood Corridor" is set to the Scenario 3 100-yr ARI (1 % AEP) flood level plus an additional height allowance of 0.3 m. The "100-yr ARI (1 % AEP) plus 0.3 m flood surface" is stretched to represent a developed floodplain consistent with City Plan requirements. Refer to Section 7.3 for further details on the stretching methodology.

7.2 Extreme Event Terminology

For the purpose of the Extreme Event analysis, the term Probable Maximum Flood (PMF) has been used to define the flood event which is produced through the modelling of the Probable Maximum Precipitation (PMP) hyetographs; whereby the PMP hyetographs are derived using the BOM Generalised Short Duration Method (GSDM) and BOM Revised Generalised Tropical Storm Method (GTSMR). This methodology is considered more aligned with the Probable Maximum Precipitation Design Flood (PMPDF); however, the conservative values adopted for the rainfall losses (refer Section 7.5) are unlikely to be considered "probability neutral" and the most appropriate definition of this event most likely lies between the PMPDF and the PMF. The use of "PMF" also provides consistency with the terminology used in recent BCC flood studies and City Plan 2014.

7.3 Flood Extent Stretching Process

With the move to two-dimensional flood models, the production of flood surfaces (e.g. level, depth, velocity and depth-velocity product) is inherent in simulating a model, i.e. a flood map is a direct output from a model simulation removing the requirement to apply a separate map creation process. For the Scenario 1 "existing" simulations, the model is run and the direct output is able to be mapped or referenced in a GIS environment. In order to simulate the "ultimate" scenario, the model topography must be modified to represent filling associated with development. This in turn affects the resultant flood mapping with the flood extent limited to the edge of the filled floodplain. Post processing of the model output is required to represent the modelled flood levels against the current floodplain conditions.

In order to create the "stretched" flood surface(s), the Scenario 3 "ultimate" flood level surfaces were firstly required to be generated. As previously discussed in Section 6.1, the ultimate scenario involves modifying the flood model topography to represent a fully developed (filled) floodplain in accordance with BCC City Plan 2014 and in most instances making further allowances for a riparian corridor.

The WaterRIDE™ Flood Manager software was utilised for the purpose of stretching the Scenario 3 "ultimate" case results and producing the "stretched" flood surface(s). The WaterRIDE™ 'buffer width' tool was used, whereby the surface is extended by an equal number of grid cells (or TIN triangles) as a buffer around the current wet cells. A minimum depth threshold is used to determine what surrounding cells (within the buffer width) are considered 'available' for stretching. For this purpose, a value of 500 was used for the buffer width and -5 for the minimum depth threshold. Using these high values / tolerances ensured the flood surface was initially stretched far beyond the realistic limit of stretching. The stretched flood surface was then mapped onto the ground surface terrain grid to produce the mapped flood extents of the stretched flood surface.

From experience to date, it is known that there are inherent anomalies with the automated stretching process and some degree of manual intervention is typically required by an experienced / skilled practitioner to produce a more realistic stretched flood surface. To facilitate this process, a comparison of the mapped extent against the "existing" flooding extents (including larger events) was undertaken. In areas where there were obvious anomalies, some minor adjustments were made to the mapped extents of the stretched flood surface.

7.4 Very Rare Event Hydrology

The DEA AR&R 2019 was used for the 200-yr ARI (0.5 % AEP), 500-yr ARI (0.2 % AEP) and 2000-yr ARI (0.05 % AEP) events, similar to previously detailed in Section 6.2.

7.4.1 Design IFD Data

The BCC IFD data does not include design rainfall for storms larger than the 100-yr ARI (1 % AEP) and therefore could not be used for the 200-yr ARI (0.5 % AEP) to 2000-yr ARI (0.05 % AEP) events.

The 2000-yr ARI (0.05 % AEP) IFD values were adopted from the Bureau of Meteorology (BOM) website. To determine the 200-yr ARI (0.5 % AEP) and 500-yr ARI (0.2 % AEP) IFD values, interpolation was undertaken between the 100-yr ARI (1 % AEP) BCC IFD values and the 2000-yr ARI (0.05 % AEP) BOM IFD values.

Table 7.2 indicates the adopted design rainfall intensities for the upper, middle and lower catchments with comparison to the adopted 100-yr ARI (1 % AEP) values. The values in the table do not include the 9.8 % increase in rainfall intensity due to projected climate variability effects, as previously discussed in Section 6.2.6.

7.4.2 Baseflow

In consultation with the study peer reviewer (BMT), it was decided to not to include baseflow in the design hydrology for the 200-yr ARI (0.5 % AEP) to 2000-yr ARI (0.05 % AEP) events. It was considered that the approach used for the design events (refer to Section 6.2.6) of adopting a constant BFI of 0.22 would be overly conservative for these very rare events, especially considering it could not be confirmed through calibration, as the largest historical event magnitude was approximately 50-yr ARI (2 % AEP) to 100-yr ARI (1 % AEP).

Table 7.2 – Adopted Rare and Very Rare Event IFD Data

Duration (hrs)	Rainfall Intensity (mm/hr) (1)			
	100-yr ARI (1 % AEP)	200-yr ARI (0.5 % AEP)	500-yr ARI (0.2 % AEP)	2000-yr ARI (0.05 % AEP)
Upper Catchment				
0.5	155.50	172.32	197.02	238.00
1	112.59	122.07	136.48	160.00
2	75.18	80.75	89.09	103.00
3	57.62	61.85	68.19	79.00
4.5	43.29	46.62	51.95	60.44
6	35.49	38.48	42.91	50.33
9	26.50	28.99	32.81	39.11
12	21.68	23.96	27.38	33.00
18	16.42	18.40	21.38	26.28
24	13.51	15.36	18.04	22.58
Middle Catchment				
0.5	153.28	171.10	197.83	242.00
1	114.05	124.12	138.60	163.00
2	79.20	84.20	91.69	104.50
3	62.09	65.60	71.05	80.00
4.5	47.24	50.08	54.40	61.56
6	39.24	41.61	45.20	51.17
9	29.21	31.37	34.65	40.00
12	23.86	25.89	28.91	33.83
18	17.58	19.49	22.37	27.11
24	14.24	16.05	18.79	23.38
Lower Catchment				
0.5	142.25	163.13	194.23	246.00
1	98.07	111.66	131.51	166.00
2	63.14	72.02	85.07	107.00
3	47.83	54.66	64.73	82.00
4.5	35.90	41.15	49.41	62.67
6	29.43	34.06	40.80	52.17
9	22.25	25.88	31.53	40.67
12	18.37	21.48	26.35	34.33
18	14.18	16.80	20.75	27.39
24	11.85	14.20	17.67	23.50

(1) The values presented do not include the 9.8 % increase in rainfall intensity due to projected climate variability effects.

7.5 Extreme Event Hydrology

7.5.1 General

The Probable Maximum Precipitation (PMP) Generalised Short Duration Method (GSDM) [15] and Revised Generalised Tropical Storm Method (GTSMR) [16] were used to determine the design hyetographs for the extreme event modelling. The PMP GSDM was used for storm durations ranging from 0.5 hours to 6 hours and the GTSMR for storm durations of 24 hours and over. For storm durations between 6 hours and 24 hours (i.e. 9 hours, 12 hours and 18 hours), the PMP rainfall depth was interpolated between 6 hours and 24 hours and the GTSMR temporal pattern applied.

7.5.2 Generalised Short Duration Method (GSDM)

The PMP GSDM was used to determine the design hyetographs for storm durations ranging from 0.5 hours to 6 hours. The six storm durations utilised is consistent with the design and very rare events. Table 7.3 indicates the initial PMP estimate based on the values of the Terrain Category, Elevation Adjustment Factor and Moisture Adjustment Factor, as indicated below.

- Terrain Category - Smooth: 0.01 / Rough: 0.99
- Elevation Adjustment Factor (EAF) - 1.00
- Moisture Adjustment Factor (MAF) - 0.84

Table 7.3 – GSDM Initial PMP Estimate

Duration (hours)	Initial Depth (mm)		PMP Estimate (mm)	
	Smooth (D_S)	Rough (D_R)	Initial	Rounded
0.5	240	240	202	200
1	370	370	311	310
2	480	550	461	460
3	545	675	566	570
4.5	635 (1)	794 (1)	666 (1)	670 (1)
6	700	885	742	740

(1) Interpolated values

The PMP rainfall is spatially distributed across the catchment by overlaying a series of ellipses onto the catchment, using GIS techniques.

Figure 7.1 indicates the location of the Bulimba Creek Catchment with respect to the GSDM ellipses. Table 7.4 provides the average rainfall depth between each successive ellipse for the six storm durations.

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[15] Bureau of Meteorology – *The Estimation of Probable Maximum Precipitation in Australia: Generalised Short-Duration Method (June 2003)*

[16] Bureau of Meteorology – *Revision of the Generalised Tropical Storm Method for Estimating Probable Maximum Precipitation (August 2003)*

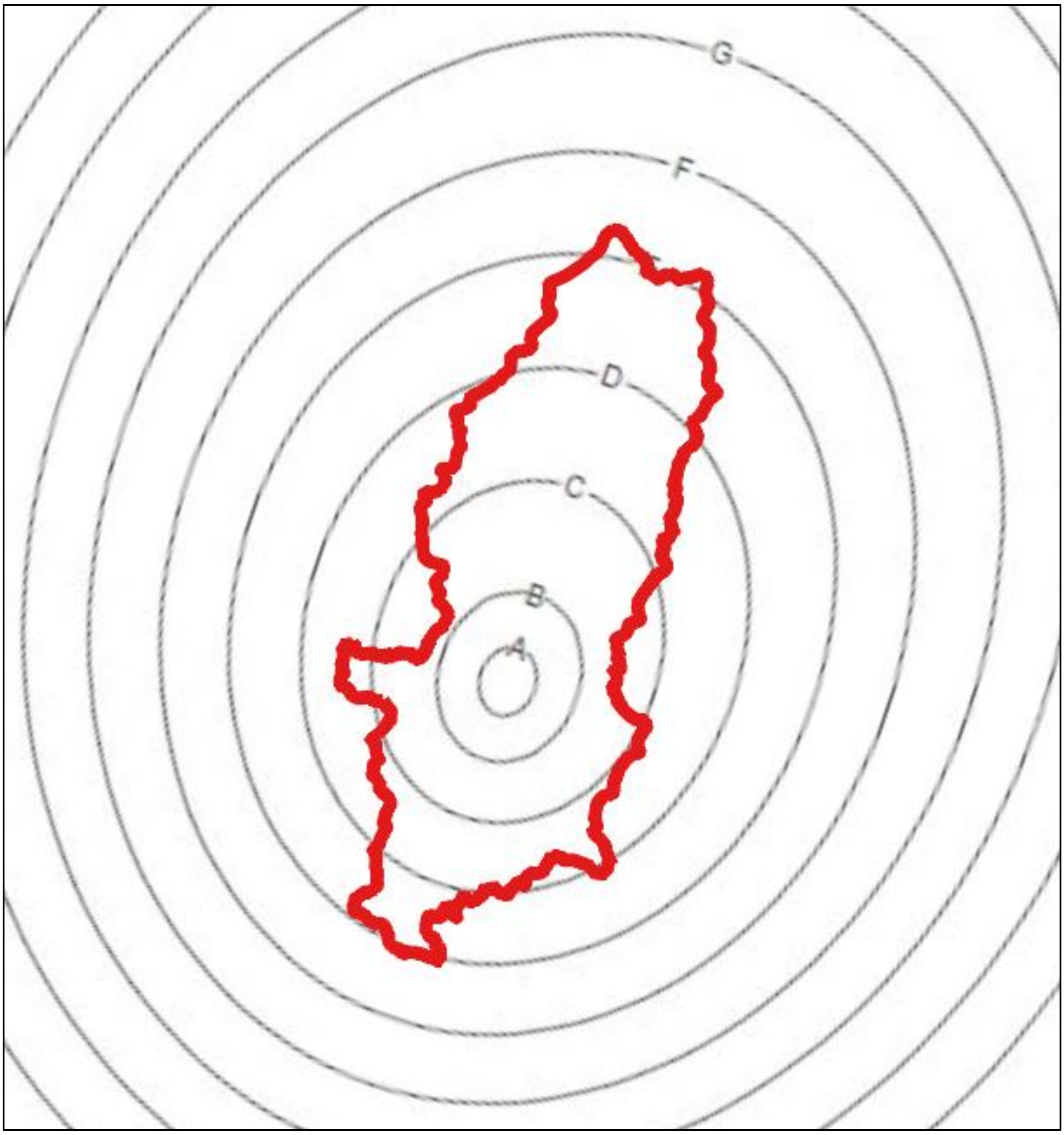

Figure 7.1: GSDM – Spatial Distribution

Table 7.4 – GSDM Mean Rainfall Depth Between Ellipses

Ellipse	Mean Rainfall Depth Between Ellipses (mm)					
	0.5 hr	1 hr	2 hr	3 hr	4.5 hr	6 hr
A (centre)	280	410	620	760	910 (1)	1010
B	250	370	550	660	800 (1)	890
C	210	320	470	580	680 (1)	770
D	180	290	430	520	610 (1)	680
E	160	240	360	450	530 (1)	580
F	100	210	260	360	460 (1)	530

(1) Interpolated values

7.5.3 Generalised Tropical Storm Method Revised (GTSMR)

The PMP GTSMR was used to determine the design hyetographs for storm durations of 24 hours and over. The summer scenario was used in lieu of the winter scenario, as it produced higher rainfall depths. Between 6 hours and 24 hours, the PMP rainfall depth was determined by interpolating between the GSDM 6 hr and the GTSMR 24 hr values.

Table 7.5 indicates the initial PMP estimate based on the values of the Decay Amplitude Factor, Topographic Adjustment Factor and Moisture Adjustment Factor as indicated below.

- Catchment Area - 123.7 ha
- Decay Amplitude Factor - 0.98
- Topographic Adjustment Factor (TAF) - 1.22
- Moisture Adjustment Factor (MAF) - 0.726

Table 7.5 – Initial PMP Estimate

Duration (hours)	Initial Depth (mm)	PMP Estimate (mm)	Preliminary PMP Estimate (nearest 10 mm)	Final PMP Estimate (nearest 10 mm)
9	n/a	n/a	n/a	800 (1)
12	n/a	n/a	n/a	860 (1)
18	n/a	n/a	n/a	1000 (1)
24	1340	1169.5	1170	1170
36	1640	1431.4	1430	1430

(1) Interpolated values

7.5.4 Rainfall Losses for PMF

The following rainfall losses were adopted for the URBS modelling of the PMF.

- Impervious Area: IL = 0 mm, CL = 0 mm/hr (URBS default)
- Pervious Area: IL = 0 mm, CL = 0 mm/hr

7.6 Very Rare and Extreme Event Hydraulic Modelling

7.6.1 General

The TUFLOW model was used to simulate the scenarios as detailed in Section 7.1 to enable design flood levels and flood mapping products to be determined / produced.

7.6.2 Methodology

Very Rare Events

The methodology used is similar to that discussed previously in Sections 6.3.2 and 6.3.3. The total number of TUFLOW simulations required to complete the very rare event modelling was 800, comprising of the following:

- Scenario 1 (with and without climate change) – 600 simulations
- Scenario 3 (inclusive of climate change) – 200 simulations

Extreme Events
The TUFLOW modelling of the PMF consisted of simulating the six GSDM PMP hyetographs (0.5hr, 1hr, 2hr, 3hr, 4.5hr and 6hr) and four GTSMR PMP hyetographs (9hr, 12hr, 18hr and 24hr) in the TUFLOW model. The GTSMR 36 hour event was only simulated in URBS and not TUFLOW, as it was established from the URBS modelling that it was not a critical duration and hence did not contribute to the design flood level.

The PMF design flood surface was obtained by extracting the peak flood level of the ten flood level surfaces. A separate grid of the critical duration is also produced from which the critical duration at any location within the model can be determined by GIS inspection.

7.6.3 TUFLOW Model Set-up

TUFLOW model extents
No changes were made from the design event TUFLOW model(s).

TUFLOW model roughness
No changes were made from the design event TUFLOW model(s).

TUFLOW channel representation
No changes were made from the design event TUFLOW model(s).

TUFLOW model boundaries

Design Inflows
The Very Rare and Extreme event inflow (Q-T) boundaries to the TUFLOW model were taken from the results of the URBS model for each ARI (AEP) and duration. The inflow locations did not change from the design event TUFLOW model(s).

Design Tailwater Boundary
The Very Rare and Extreme event TUFLOW model utilised a fixed water level (H-T) boundary as the downstream model boundary as indicated below.

- Current Conditions: HAT = 1.55 mAHD
- Future Climate Change (Year 2100): HAT+0.8 m = 2.35 mAHD

7.6.4 Hydraulic Structures

The Very Rare and Extreme event TUFLOW model utilised the same hydraulic structures as the design event TUFLOW model(s).

7.7 Results and Mapping

7.7.1 Design Discharge Results

A full range of durations (30 minutes to 24 hours) were simulated for the 200-yr ARI (0.5 % AEP) to PMF events. Table 7.6 provides design flow results at selected major waterway crossings for the Scenario 1 conditions. This information is from the TUFLOW hydraulic model.

Table 7.6 – Design Discharge at Selected Major Waterway Crossings (Scenario 1)

Location	Design Discharge (m^3/s) (1)			
	200-yr ARI (0.5 % AEP)	500-yr ARI (0.2 % AEP)	2000-yr ARI (0.05 % AEP)	PMF
Bulimba Creek				
Gold Coast Railway (S71&72)	184	208	247	383
Pacific Motorway (S63&64)	379	419	483	1092
Mt Gravatt Capalaba Road (S57)	874	966	1149	2665
Pine Mountain Road (S37)	994	1108	1277	3147
Old Cleveland Road (S27)	1112	1209	1410	3487
Wynnum Road (S13)	814	916	1044	2438
Gateway Motorway (S10)	786	881	1062	2401
Cleveland Railway (S7)	814	951	1209	2487
Bulimba Creek East				
Gold Coast Railway (S100)	68	80	103	154
Gateway Motorway (S96)	151	175	213	395
Pacific Motorway (S93)	269	315	390	766
Mimosa Creek				
Pacific Motorway (S86)	82	94	111	244
Kessels Road (S85)	99	113	132	295
Broadwater Road Drain				
Broadwater Road (S152)	125	148	184	415
Newnham Creek				

Location	Design Discharge (m^3/s) (1)			
	200-yr ARI (0.5 % AEP)	500-yr ARI (0.2 % AEP)	2000-yr ARI (0.05 % AEP)	PMF
Newnham Road (S47)	78	90	117	262
Spring Creek				
Scrub Road (S132)	74	84	103	203
Salvin Creek				
Pine Mountain Road (S34)	86	102	130	232
Creek Road (S33)	115	126	159	299
Phillips Creek				
Creek Road (S23b&S23c)	99	110	133	284
Minnippi Creek				
Creek Road (S114&S115)	51	60	80	87(b)

(1) Includes increased design rainfall due to projected climate variability effects for the 200-yr (0.5 % AEP) to 2000-yr ARI (0.05 % AEP) events
(b) Subject to backwater from Bulimba Creek

7.7.2 Design Flood Levels

Tabulated design flood level results for the Very Rare events are provided for all of the modelled waterways within the Bulimba Creek Catchment, in the following appendices:

- Scenario 1: 200-yr ARI (0.5 % AEP) to 2000-yr ARI (0.05 % AEP) events – Appendix G
- Scenario 3: 200-yr ARI (0.5 % AEP) and 500-yr ARI (0.2 % AEP) events – Appendix H

The critical storm duration and median ensemble for each tabulated location is provided in Appendix J.

7.7.3 Flood Mapping

The flood mapping products are provided in Volume 2 and include the following:

- Scenario 1
  - Flood Extent Mapping: 200-yr ARI (0.5 % AEP), 500-yr ARI (0.2 % AEP) and 2000-yr ARI (0.05 % AEP)

The flood extents for the Tingalpa Channel and Hemmant Drain have been truncated to reflect that the high-level modelling of these creeks was for flood routing purposes and the results are considered suitable for determining flood flows, but not flood levels.

8.0 Summary of Study Findings

This flood study report details the calibration and verification, design and very rare / extreme events for the Bulimba Creek Catchment. The major tributaries of Bulimba Creek, Bulimba Creek East, Mimosa Creek, Newnham Creek, Warwick / Spring Creeks, Salvin Creek, Phillips Creek and Minnippi Creek as well as numerous other minor tributaries are included. New hydrologic and hydraulic models have been developed for the study using the URBS and TUFLOW modelling software, respectively.

Hydrometric information was sourced from the available rainfall, stream and maximum height gauge records. Calibration of the URBS and TUFLOW models was undertaken for the 9th March 2001, 27th January 2013 and 1st May 2015 events. Verification of the URBS and TUFLOW models was undertaken for the 30th March 2017 event.

Cross-checks of the TUFLOW hydraulic structure head-losses were undertaken at selected structures using the HEC-RAS software, from which it was confirmed that the model was representing the structures adequately.

The results of the hydraulic calibration and verification indicated that the URBS and TUFLOW models were able to adequately replicate the historical flooding events to within the specified tolerances for the majority of areas. On this basis, it was concluded that the URBS and TUFLOW models were sufficiently robust to be used to accurately simulate the synthetic design flood events.

Flood magnitudes were estimated for the full range of events from 2-yr ARI (50 % AEP) to PMF. These analyses assumed ultimate catchment development conditions in accordance with BCC City Plan 2014 and utilised the recently released AR&R 2019 methodologies. The design rainfall intensities included an allowance for increased rainfall intensity due to projected climate variability effects. A fixed tidal boundary was used at the downstream model extent with an allowance of 0.8 m for projected climate variability effects.

Three waterway scenarios were considered as follows:

- Scenario 1 is based on the current waterway conditions. Minor modifications were made to the TUFLOW model developed as part of the calibration / verification phase.
- Scenario 2 includes an allowance for a riparian corridor along the edge of the channel.
- Scenario 3 includes an allowance for the riparian corridor (as per Scenario 2) and also assumes filling to the "Modelled Flood Corridor" boundary to simulate potential development in accordance with City Plan 2014.

The results from the TUFLOW modelling were used to produce the following:

- Peak flood discharges at selected locations
- Peak flood levels at 100 m intervals along the AMTD line
- Peak flood extent mapping (Scenario 1 only)
- Hydraulic structure flood immunity data

Hydraulic Structure Reference Sheets (HSRS) for all major crossings within the TUFLOW model area were also prepared. The HSRS provide data for each hydraulic structure and include data relating to the structure description, location, hydraulic performance and history.

APPENDICES

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Appendix A: Rainfall Distribution

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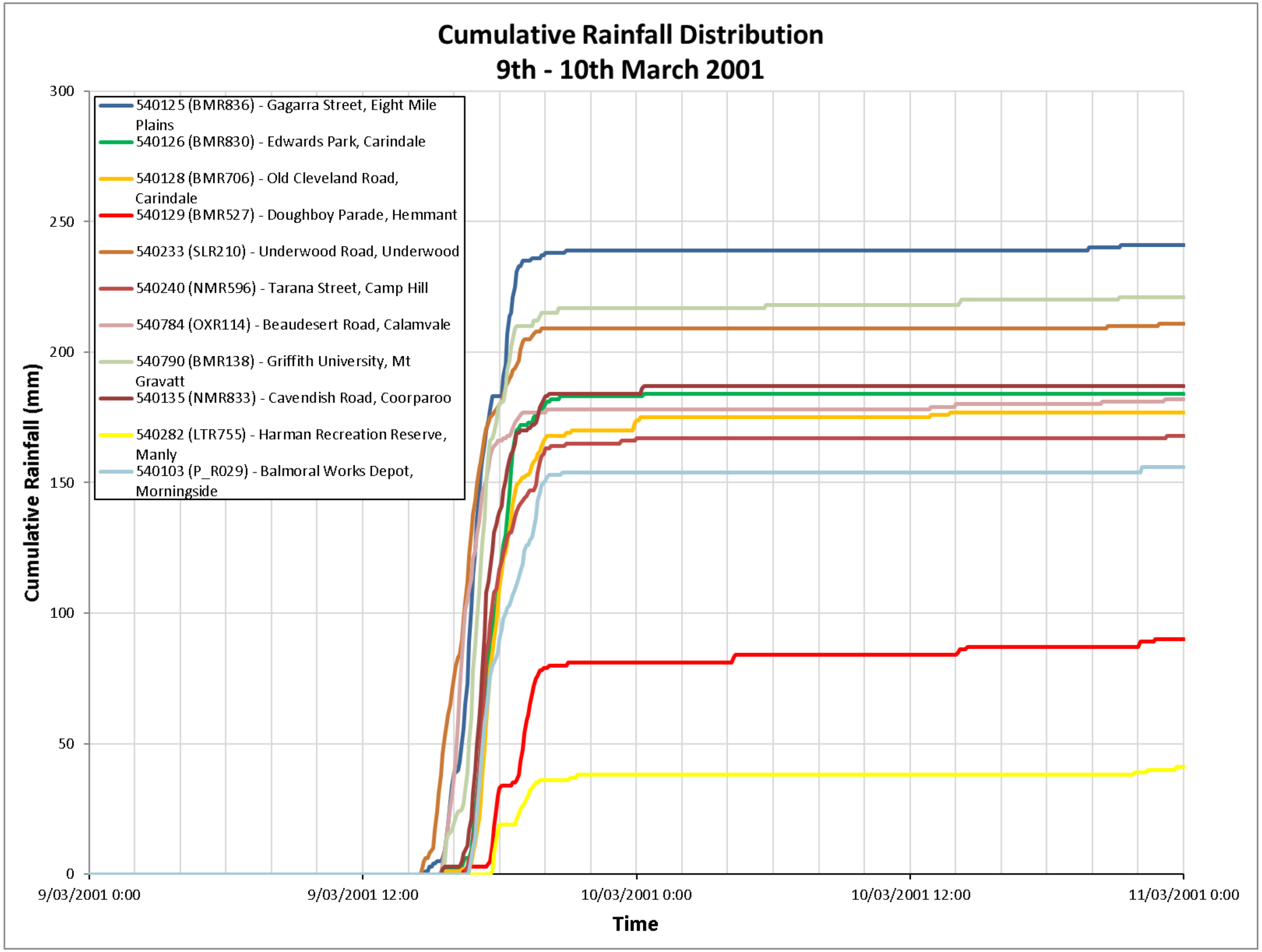
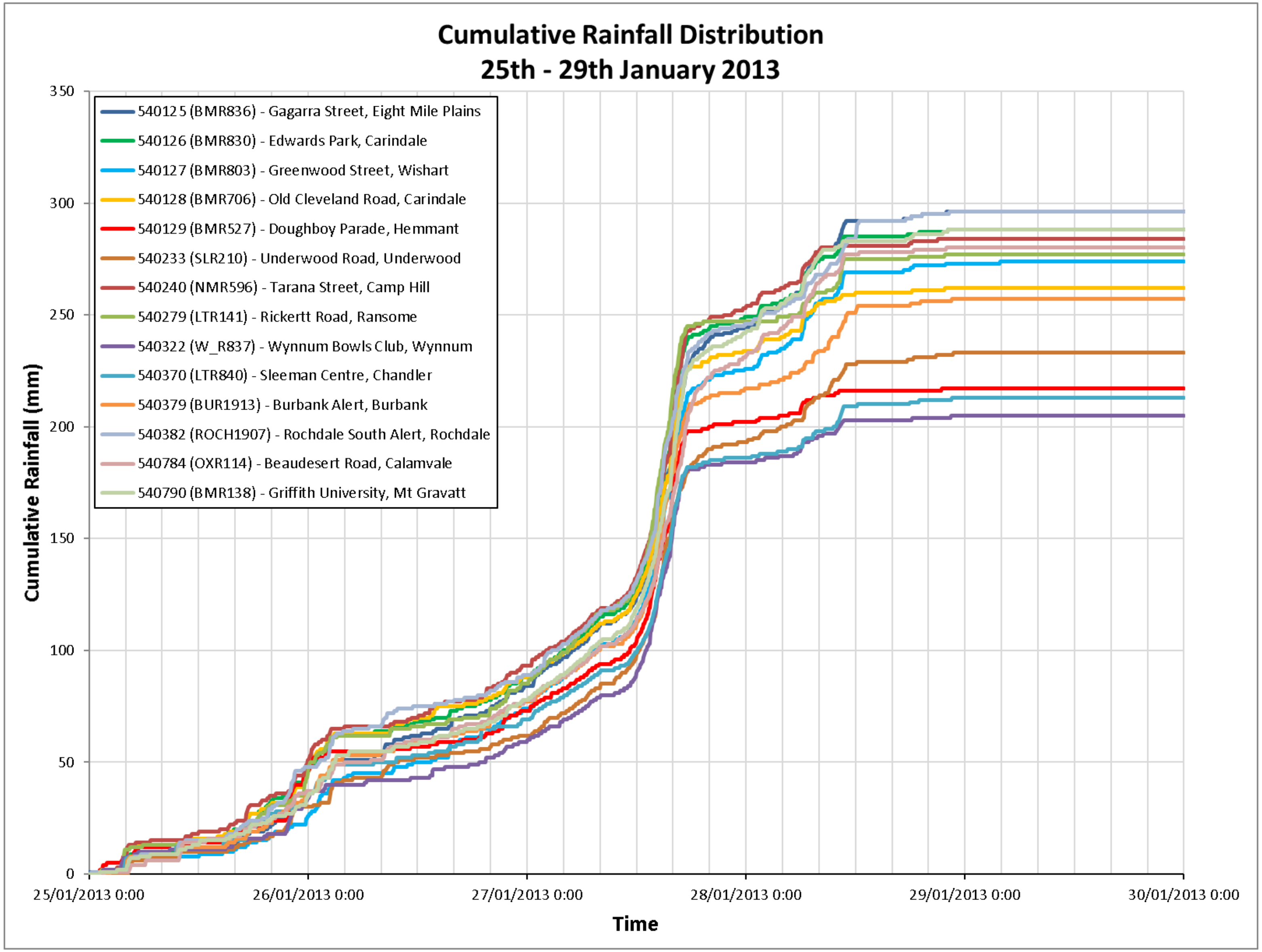
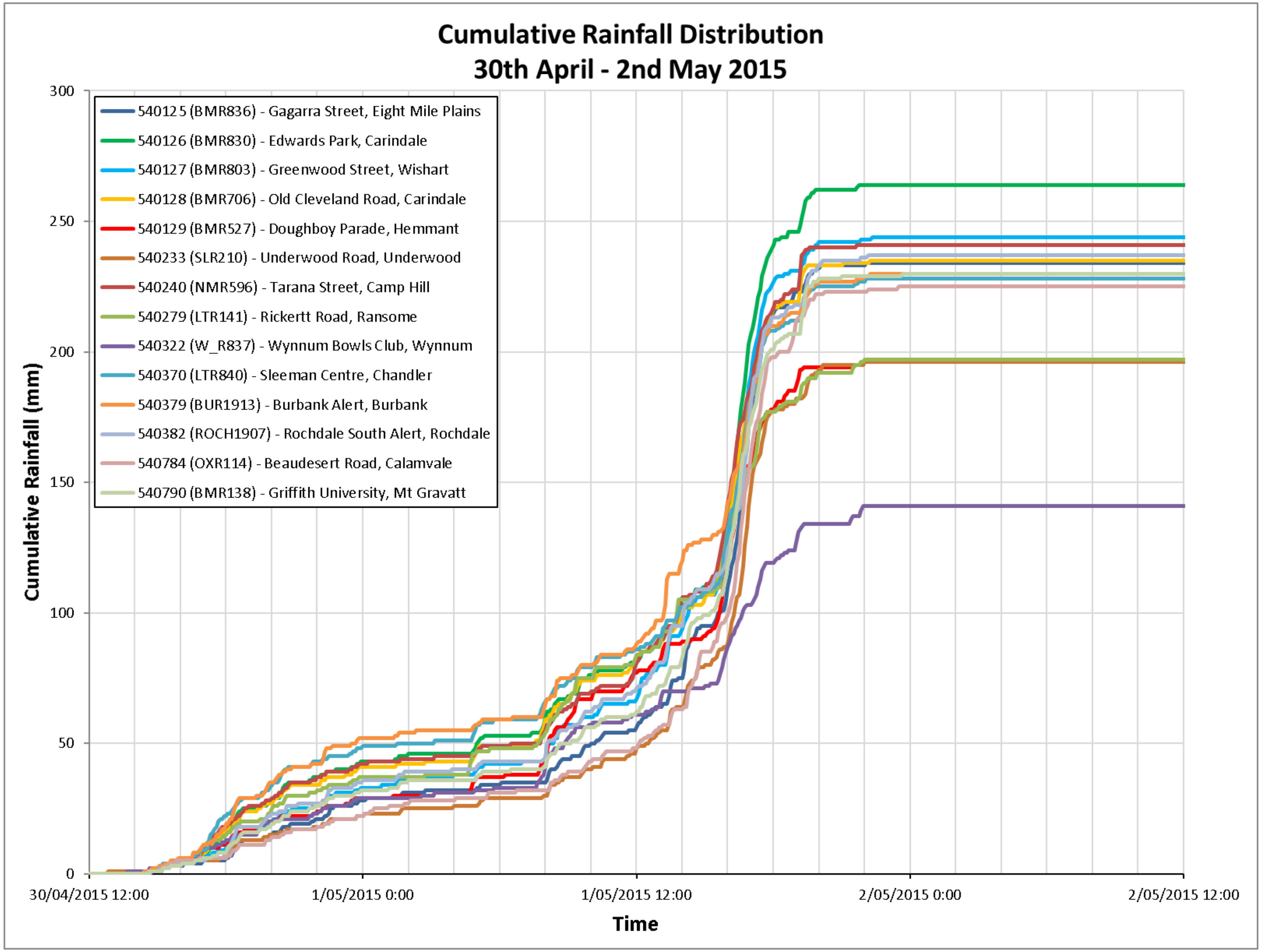
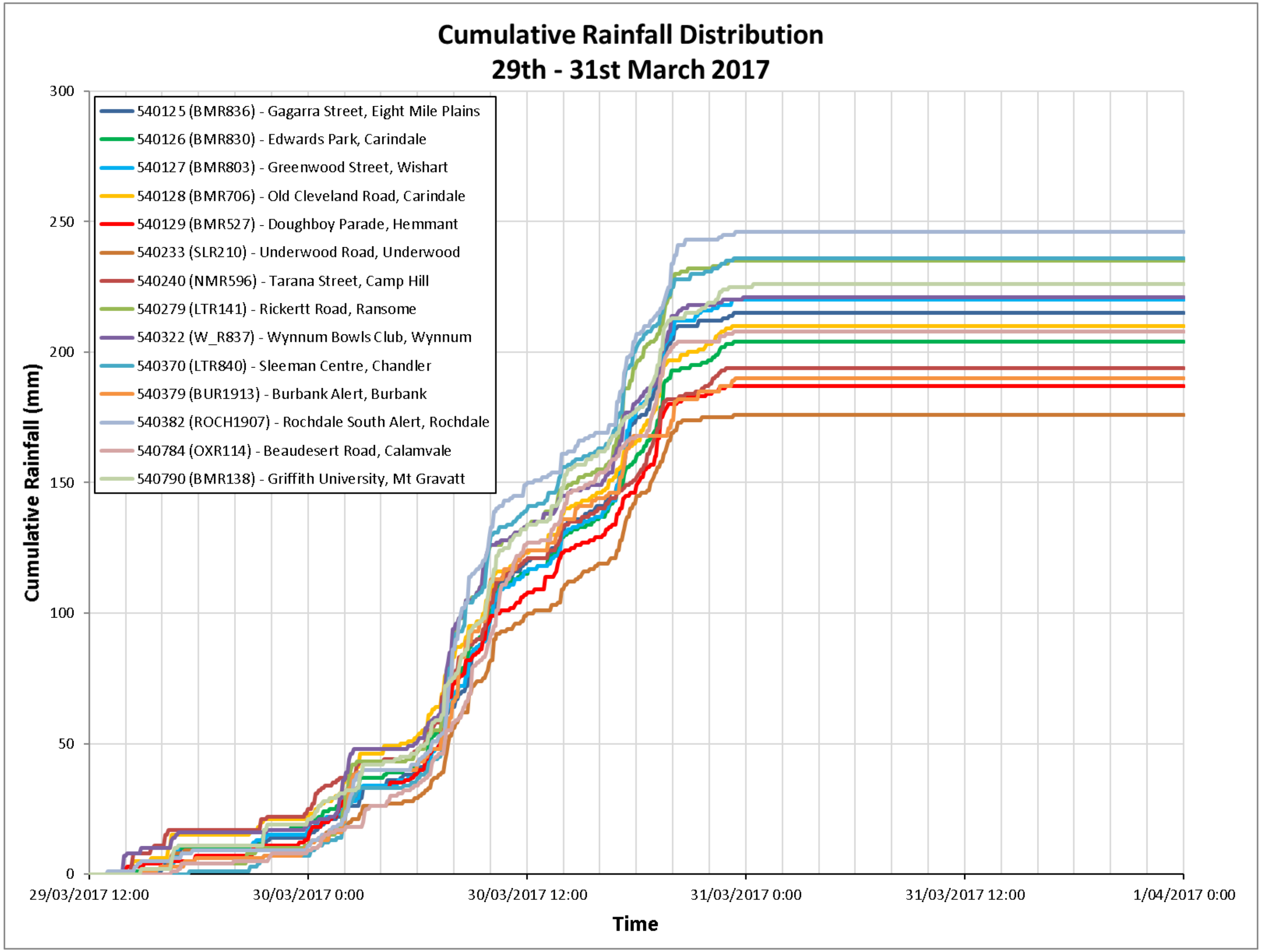

Cumulative Rainfall Distribution
9th - 10th March 2001
Cumulative Rainfall (mm)
Time
300
250
200
150
100
50
0
9/03/2001 0:00
9/03/2001 12:00
10/03/2001 0:00
10/03/2001 12:00
11/03/2001 0:00
540125 (BMR836) - Gagarra Street, Eight Mile Plains
540126 (BMR830) - Edwards Park, Carindale
540128 (BMR706) - Old Cleveland Road, Carindale
540129 (BMR527) - Doughboy Parade, Hemmant
540233 (SLR210) - Underwood Road, Underwood
540240 (NMR596) - Tarana Street, Camp Hill
540784 (OXR114) - Beaudesert Road, Calamvale
540790 (BMR138) - Griffith University, Mt Gravatt
540135 (NMR833) - Cavendish Road, Coorparoo
540282 (LTR755) - Harman Recreation Reserve, Manly
540103 (P_R029) - Balmoral Works Depot, Morningside


Cumulative Rainfall Distribution
25th - 29th January 2013
540125 (BMR836) - Gagarra Street, Eight Mile Plains
540126 (BMR830) - Edwards Park, Carindale
540127 (BMR803) - Greenwood Street, Wishart
540128 (BMR706) - Old Cleveland Road, Carindale
540129 (BMR527) - Doughboy Parade, Hemmant
540233 (SLR210) - Underwood Road, Underwood
540240 (NMR596) - Tarana Street, Camp Hill
540279 (LTR141) - Rickertt Road, Ransome
540322 (W_R837) - Wynnum Bowls Club, Wynnum
540370 (LTR840) - Sleeman Centre, Chandler
540379 (BUR1913) - Burbank Alert, Burbank
540382 (ROCH1907) - Rochdale South Alert, Rochdale
540784 (OXR114) - Beaudesert Road, Calamvale
540790 (BMR138) - Griffith University, Mt Gravatt
Cumulative Rainfall (mm)
0
50
100
150
200
250
300
350
25/01/2013 0:00
26/01/2013 0:00
27/01/2013 0:00
28/01/2013 0:00
29/01/2013 0:00
30/01/2013 0:00
Time


Cumulative Rainfall Distribution
30th April - 2nd May 2015
540125 (BMR836) - Gagarra Street, Eight Mile Plains
540126 (BMR830) - Edwards Park, Carindale
540127 (BMR803) - Greenwood Street, Wishart
540128 (BMR706) - Old Cleveland Road, Carindale
540129 (BMR527) - Doughboy Parade, Hemmant
540233 (SLR210) - Underwood Road, Underwood
540240 (NMR596) - Tarana Street, Camp Hill
540279 (LTR141) - Rickertt Road, Ransome
540322 (W_R837) - Wynnum Bowls Club, Wynnum
540370 (LTR840) - Sleeman Centre, Chandler
540379 (BUR1913) - Burbank Alert, Burbank
540382 (ROCH1907) - Rochdale South Alert, Rochdale
540784 (OXR114) - Beaudesert Road, Calamvale
540790 (BMR138) - Griffith University, Mt Gravatt
Cumulative Rainfall (mm)
300
250
200
150
100
50
0
30/04/2015 12:00
1/05/2015 0:00
1/05/2015 12:00
2/05/2015 0:00
2/05/2015 12:00
Time



Cumulative Rainfall Distribution
29th - 31st March 2017
540125 (BMR836) - Gagarra Street, Eight Mile Plains
540126 (BMR830) - Edwards Park, Carindale
540127 (BMR803) - Greenwood Street, Wishart
540128 (BMR706) - Old Cleveland Road, Carindale
540129 (BMR527) - Doughboy Parade, Hemmant
540233 (SLR210) - Underwood Road, Underwood
540240 (NMR596) - Tarana Street, Camp Hill
540279 (LTR141) - Rickertt Road, Ransome
540322 (W_R837) - Wynnum Bowls Club, Wynnum
540370 (LTR840) - Sleeman Centre, Chandler
540379 (BUR1913) - Burbank Alert, Burbank
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300
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150
100
50
0
29/03/2017 12:00
30/03/2017 0:00
30/03/2017 12:00
31/03/2017 0:00
31/03/2017 12:00
1/04/2017 0:00
Time

Figure A-1: Thiessen Polygons for Historical Events

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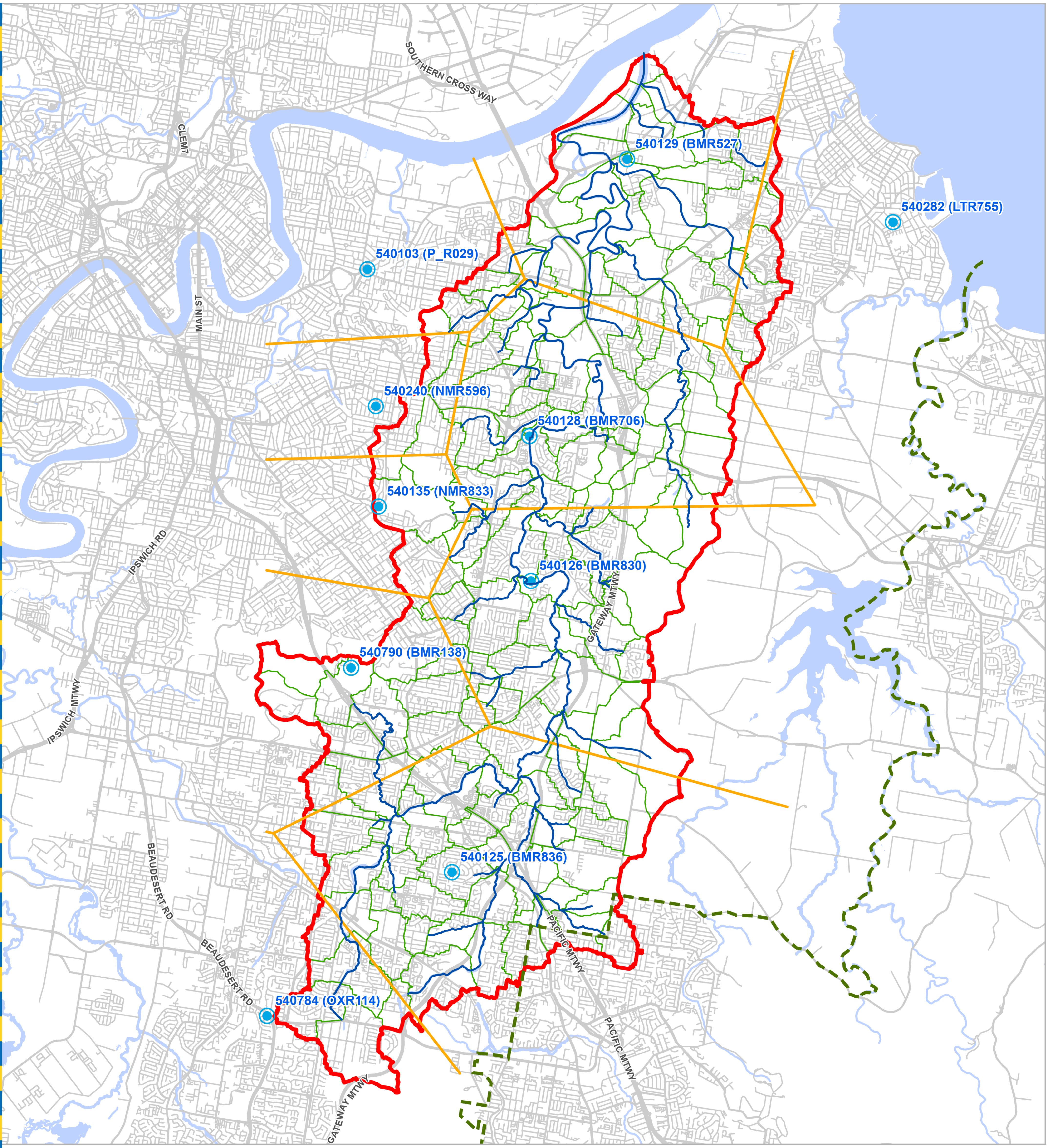

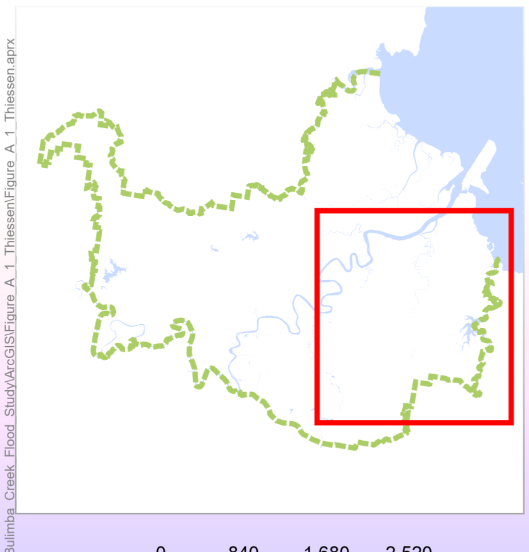

SECURITY LABEL: FOR OFFICIAL USE ONLY

Legend

- Pluviograph Station
- Thiessen Polygons
- Creek Centreline (Bulimba Creek Catchment)
- Bulimba Creek Catchment Area
- Subcatchments
- Brisbane City Boundary
- Road

0 840 1,680 2,520
Metres

N S W E

Prepared : 089958
Checked : NC
Revision : 0
Publication Date : 30 Jul 2021
Project Number : 100001

File : G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\ArcGIS\Figure_A_1_Thiessen\Figure_A_1_Thiessen.aprx

Brisbane City Council
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Brisbane Qld 4001

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Figure A.1 - Thiessen Polygons for March 2001 event

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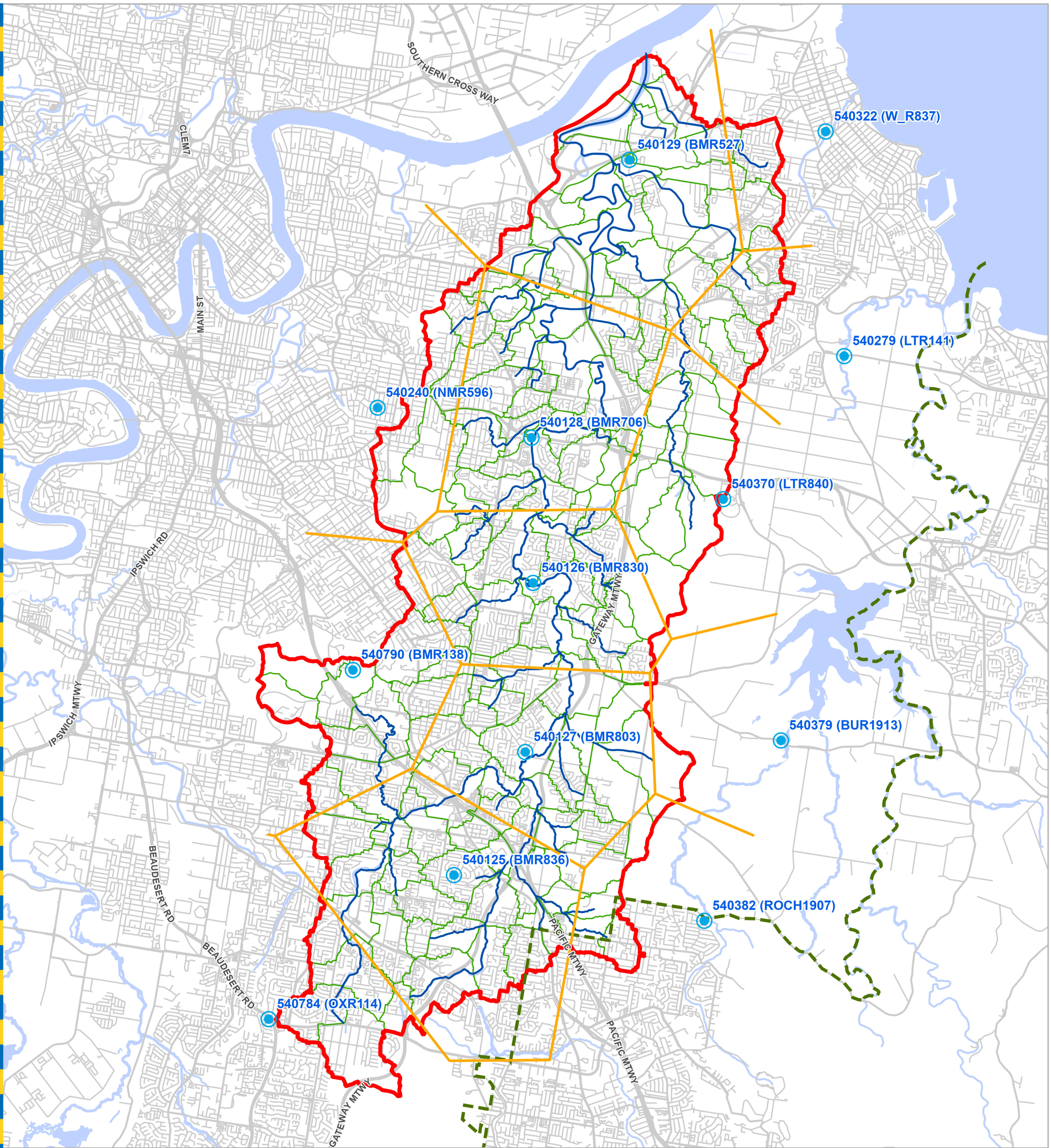

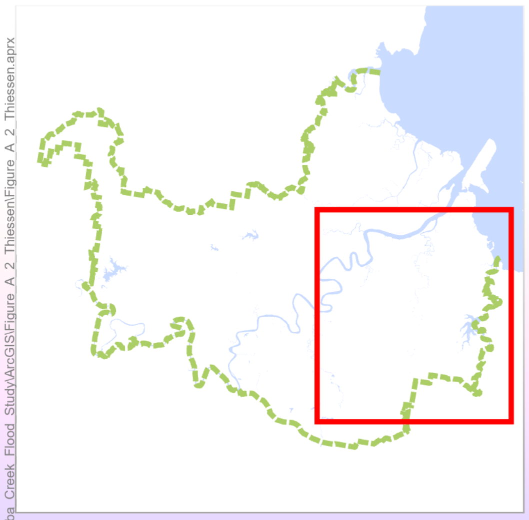

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0 840 1,680 2,520
Metres

N W E S

Prepared : 089958
Checked : NC
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Project Number : 100001

File : G:\BICD\proj\19\190093_Bulimba_Creek_Flood_Study\ArcGIS\Figure_A_2_Thiessen\Figure_A_2_Thiessen.aprx

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Figure A.2 - Thiessen Polygons for January 2013, May 2015 and March 2017 events

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Appendix B: URBS Model Parameters

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URBS Sub-catchment Parameters – January 2013 / May 2015 / March 2017								
S/C	**Area (km2)**	**UL**	**UM**	**UH**	**UR**	**UD**	**F**	**I**
1	1.873	0.108	0.542	0.098	0.062	0.000	0.189	0.375
2	1.226	0.000	0.545	0.365	0.089	0.000	0.001	0.601
3	1.449	0.041	0.549	0.227	0.165	0.000	0.018	0.485
4	1.379	0.003	0.647	0.142	0.208	0.000	0.000	0.452
5	1.025	0.002	0.485	0.211	0.099	0.000	0.202	0.433
6	0.938	0.081	0.715	0.107	0.097	0.000	0.000	0.466
7	0.268	0.000	0.585	0.235	0.181	0.000	0.000	0.503
8	0.904	0.000	0.651	0.292	0.057	0.000	0.000	0.588
9	0.537	0.049	0.449	0.231	0.145	0.000	0.126	0.440
10	0.430	0.024	0.554	0.104	0.301	0.000	0.017	0.374
11	1.126	0.009	0.587	0.372	0.031	0.000	0.000	0.630
12	0.855	0.085	0.501	0.413	0.001	0.000	0.000	0.635
13	0.946	0.033	0.112	0.001	0.000	0.000	0.855	0.061
14	0.851	0.789	0.000	0.003	0.047	0.000	0.161	0.121
15	1.067	0.669	0.007	0.049	0.007	0.000	0.268	0.148
16	1.257	0.063	0.633	0.162	0.042	0.000	0.100	0.471
17	0.745	0.008	0.445	0.381	0.165	0.000	0.000	0.567
18	1.610	0.055	0.479	0.361	0.067	0.000	0.037	0.573
19	0.981	0.212	0.461	0.271	0.057	0.000	0.000	0.506
20	1.614	0.056	0.339	0.468	0.086	0.000	0.051	0.599
21	1.308	0.000	0.426	0.533	0.022	0.000	0.018	0.693
22	0.464	0.107	0.320	0.079	0.494	0.000	0.000	0.247
23	0.517	0.085	0.631	0.245	0.040	0.000	0.000	0.548
24	0.500	0.000	0.559	0.362	0.079	0.000	0.000	0.606
25	0.471	0.222	0.249	0.144	0.385	0.000	0.000	0.288
26	1.498	0.012	0.522	0.100	0.303	0.000	0.064	0.352
27	1.013	0.021	0.476	0.198	0.305	0.000	0.000	0.419
28	0.382	0.000	0.657	0.331	0.012	0.000	0.000	0.626
29	0.635	0.000	0.227	0.152	0.621	0.000	0.000	0.250
30	0.905	0.223	0.448	0.101	0.126	0.000	0.103	0.348
31	1.094	0.018	0.612	0.313	0.057	0.000	0.000	0.590
32	0.366	0.000	0.191	0.665	0.144	0.000	0.000	0.694
33	0.676	0.051	0.705	0.244	0.000	0.000	0.000	0.580
34	0.669	0.517	0.223	0.164	0.096	0.000	0.000	0.337
35	0.538	0.576	0.242	0.002	0.181	0.000	0.000	0.209

URBS Sub-catchment Parameters – January 2013 / May 2015 / March 2017								
S/C	Area (km2)	UL	UM	UH	UR	UD	F	I
36	0.400	0.221	0.375	0.001	0.403	0.000	0.000	0.222
37	0.819	0.012	0.784	0.128	0.076	0.000	0.000	0.509
38	0.488	0.262	0.441	0.223	0.073	0.000	0.000	0.461
39	0.899	0.359	0.145	0.081	0.379	0.000	0.036	0.199
40	0.560	0.389	0.440	0.064	0.108	0.000	0.000	0.335
41	1.282	0.507	0.000	0.028	0.465	0.000	0.000	0.102
42	0.645	0.000	0.183	0.095	0.409	0.000	0.313	0.177
43	0.646	0.395	0.355	0.046	0.178	0.000	0.026	0.278
44	0.560	0.233	0.264	0.101	0.316	0.000	0.086	0.258
45	1.746	0.160	0.481	0.100	0.260	0.000	0.000	0.354
46	0.258	0.454	0.000	0.096	0.450	0.000	0.000	0.154
47	0.768	0.121	0.272	0.179	0.253	0.176	0.000	0.315
48	1.636	0.109	0.000	0.034	0.856	0.000	0.000	0.047
49	1.972	0.060	0.006	0.066	0.867	0.000	0.000	0.072
50	0.787	0.349	0.000	0.000	0.293	0.291	0.066	0.052
51	0.539	0.000	0.665	0.000	0.068	0.268	0.000	0.332
52	1.469	0.005	0.436	0.000	0.559	0.000	0.000	0.219
53	1.104	0.009	0.637	0.333	0.021	0.000	0.000	0.620
54	0.459	0.000	0.679	0.273	0.048	0.000	0.000	0.585
55	0.366	0.232	0.472	0.279	0.017	0.000	0.000	0.522
56	0.387	0.009	0.613	0.328	0.000	0.000	0.050	0.603
57	0.529	0.101	0.620	0.151	0.128	0.000	0.000	0.461
58	1.184	0.048	0.746	0.159	0.046	0.000	0.000	0.524
59	1.011	0.148	0.494	0.006	0.341	0.000	0.011	0.274
60	0.547	0.000	0.941	0.002	0.043	0.000	0.013	0.473
61	0.925	0.216	0.234	0.059	0.438	0.000	0.053	0.202
62	0.368	0.136	0.568	0.030	0.093	0.000	0.173	0.331
63	1.118	0.197	0.488	0.008	0.145	0.000	0.161	0.281
64	1.818	0.045	0.500	0.237	0.012	0.000	0.205	0.470
65	0.636	0.000	0.786	0.178	0.035	0.000	0.000	0.554
66	1.572	0.005	0.459	0.452	0.083	0.000	0.002	0.637
67	1.646	0.078	0.640	0.101	0.181	0.000	0.000	0.422
68	1.731	0.000	0.025	0.004	0.077	0.000	0.893	0.016
69	0.334	0.090	0.320	0.000	0.111	0.000	0.481	0.173
70	1.468	0.004	0.604	0.000	0.207	0.000	0.185	0.302

URBS Sub-catchment Parameters – January 2013 / May 2015 / March 2017								
S/C	**Area (km2)**	**UL**	**UM**	**UH**	**UR**	**UD**	**F**	**I**
71	0.510	0.000	0.210	0.136	0.057	0.000	0.597	0.227
72	0.844	0.002	0.523	0.030	0.353	0.000	0.093	0.288
73	0.648	0.000	0.619	0.062	0.294	0.000	0.024	0.365
74	1.533	0.017	0.592	0.302	0.089	0.000	0.000	0.571
75	0.688	0.000	0.365	0.172	0.385	0.063	0.015	0.337
76	1.704	0.128	0.151	0.091	0.230	0.104	0.296	0.177
77	0.426	0.018	0.008	0.162	0.167	0.089	0.555	0.153
78	1.152	0.000	0.486	0.275	0.144	0.000	0.096	0.490
79	0.983	0.009	0.416	0.387	0.188	0.000	0.001	0.557
80	1.040	0.000	0.653	0.173	0.094	0.000	0.080	0.482
81	1.532	0.000	0.540	0.120	0.047	0.000	0.293	0.379
82	1.024	0.035	0.594	0.217	0.129	0.000	0.026	0.497
83	0.556	0.000	0.610	0.225	0.161	0.000	0.004	0.508
84	0.542	0.000	0.336	0.089	0.575	0.000	0.000	0.248
85	0.420	0.000	0.273	0.000	0.205	0.000	0.522	0.136
86	0.226	0.130	0.438	0.000	0.432	0.000	0.000	0.239
87	0.951	0.000	0.529	0.096	0.041	0.000	0.333	0.351
88	1.631	0.089	0.405	0.000	0.507	0.000	0.000	0.216
89	1.564	0.008	0.428	0.004	0.560	0.000	0.000	0.219
90	1.269	0.029	0.740	0.157	0.075	0.000	0.000	0.515
91	0.369	0.000	0.909	0.076	0.015	0.000	0.000	0.523
92	0.252	0.061	0.558	0.195	0.186	0.000	0.000	0.463
93	0.481	0.000	0.177	0.040	0.784	0.000	0.000	0.124
94	0.870	0.000	0.111	0.159	0.730	0.000	0.000	0.199
95	0.935	0.054	0.744	0.186	0.017	0.000	0.000	0.547
96	0.271	0.000	0.298	0.019	0.683	0.000	0.000	0.166
97	0.145	0.000	0.324	0.001	0.435	0.000	0.240	0.163
98	0.841	0.000	0.559	0.121	0.031	0.000	0.288	0.389
99	0.834	0.000	0.721	0.153	0.044	0.000	0.082	0.498
100	0.540	0.000	0.217	0.016	0.294	0.000	0.474	0.122
101	0.488	0.000	0.461	0.000	0.534	0.000	0.005	0.231
102	0.409	0.003	0.332	0.624	0.004	0.000	0.036	0.728
103	0.684	0.000	0.449	0.277	0.274	0.000	0.000	0.474
104	0.964	0.004	0.363	0.237	0.262	0.000	0.134	0.395
105	1.437	0.000	0.361	0.000	0.296	0.000	0.343	0.181

URBS Sub-catchment Parameters – January 2013 / May 2015 / March 2017								
S/C	**Area (km2)**	**UL**	**UM**	**UH**	**UR**	**UD**	**F**	**I**
106	0.497	0.000	0.737	0.216	0.047	0.000	0.000	0.563
107	1.059	0.067	0.468	0.112	0.352	0.000	0.000	0.345
108	0.413	0.000	0.458	0.000	0.522	0.000	0.020	0.229
109	1.145	0.012	0.000	0.000	0.137	0.000	0.851	0.002
110	0.940	0.141	0.000	0.000	0.030	0.000	0.828	0.021
111	1.117	0.000	0.174	0.000	0.475	0.000	0.351	0.087
112	0.323	0.808	0.032	0.000	0.160	0.000	0.000	0.137
113	0.636	0.375	0.000	0.099	0.414	0.000	0.111	0.146
114	0.809	0.923	0.000	0.000	0.077	0.000	0.000	0.138
115	1.061	0.874	0.076	0.000	0.050	0.000	0.000	0.169
116	0.963	0.896	0.000	0.000	0.104	0.000	0.000	0.134
117	1.658	0.036	0.591	0.051	0.085	0.000	0.237	0.347
118	1.020	0.286	0.461	0.182	0.070	0.000	0.000	0.437
119	0.574	0.118	0.395	0.228	0.260	0.000	0.000	0.420
120	1.370	0.044	0.442	0.083	0.256	0.000	0.175	0.302
121	0.719	0.000	0.557	0.295	0.071	0.000	0.077	0.544
122	1.099	0.023	0.213	0.065	0.448	0.000	0.251	0.168
123	0.920	0.234	0.040	0.001	0.499	0.000	0.226	0.055
124	0.610	0.000	0.626	0.244	0.130	0.000	0.000	0.533
125	1.227	0.012	0.673	0.154	0.128	0.000	0.033	0.477
126	0.735	0.039	0.651	0.220	0.090	0.000	0.000	0.529
127	2.011	0.080	0.481	0.052	0.329	0.000	0.059	0.299
128	1.600	0.368	0.186	0.048	0.373	0.000	0.025	0.192
129	0.740	0.035	0.381	0.038	0.548	0.000	0.000	0.229
130	0.458	0.257	0.168	0.037	0.512	0.000	0.027	0.156
131	1.129	0.503	0.100	0.158	0.202	0.000	0.037	0.268
132	0.874	0.515	0.057	0.340	0.002	0.000	0.086	0.412
133	0.599	0.001	0.149	0.000	0.806	0.000	0.044	0.075
134	0.659	0.000	0.325	0.675	0.000	0.000	0.000	0.770
135	0.243	0.000	0.973	0.028	0.000	0.000	0.000	0.511
136	1.047	0.049	0.719	0.164	0.066	0.000	0.003	0.514
137	0.703	0.111	0.488	0.030	0.006	0.000	0.365	0.287
138	0.870	0.006	0.674	0.304	0.016	0.000	0.000	0.612
139	0.310	0.000	0.966	0.034	0.000	0.000	0.000	0.514

URBS Sub-catchment Parameters – March 2001								
S/C	**Area (km2)**	**UL**	**UM**	**UH**	**UR**	**UD**	**F**	**I**
1	1.873	0.105	0.527	0.095	0.083	0.000	0.189	0.365
2	1.226	0.000	0.526	0.352	0.120	0.000	0.001	0.580
3	1.449	0.040	0.531	0.220	0.190	0.000	0.018	0.470
4	1.379	0.003	0.630	0.139	0.229	0.000	0.000	0.440
5	1.025	0.002	0.476	0.207	0.113	0.000	0.202	0.425
6	0.938	0.080	0.706	0.106	0.109	0.000	0.000	0.460
7	0.268	0.000	0.585	0.235	0.181	0.000	0.000	0.503
8	0.904	0.000	0.531	0.238	0.231	0.000	0.000	0.480
9	0.537	0.040	0.367	0.189	0.278	0.000	0.126	0.360
10	0.430	0.024	0.554	0.104	0.301	0.000	0.017	0.374
11	1.126	0.009	0.578	0.366	0.047	0.000	0.000	0.620
12	0.855	0.083	0.489	0.403	0.025	0.000	0.000	0.620
13	0.946	0.033	0.112	0.001	0.000	0.000	0.855	0.061
14	0.851	0.747	0.000	0.003	0.088	0.000	0.161	0.115
15	1.067	0.647	0.007	0.047	0.030	0.000	0.268	0.143
16	1.257	0.062	0.624	0.160	0.054	0.000	0.100	0.465
17	0.745	0.008	0.440	0.377	0.175	0.000	0.000	0.560
18	1.610	0.055	0.475	0.358	0.075	0.000	0.037	0.568
19	0.981	0.209	0.455	0.268	0.068	0.000	0.000	0.500
20	1.614	0.052	0.312	0.429	0.156	0.000	0.051	0.550
21	1.308	0.000	0.400	0.500	0.082	0.000	0.018	0.650
22	0.464	0.065	0.194	0.048	0.693	0.000	0.000	0.150
23	0.517	0.054	0.403	0.156	0.387	0.000	0.000	0.350
24	0.500	0.000	0.517	0.335	0.148	0.000	0.000	0.560
25	0.471	0.077	0.087	0.050	0.786	0.000	0.000	0.100
26	1.498	0.009	0.400	0.076	0.451	0.000	0.064	0.270
27	1.013	0.017	0.397	0.165	0.420	0.000	0.000	0.350
28	0.382	0.000	0.577	0.290	0.132	0.000	0.000	0.550
29	0.635	0.000	0.209	0.140	0.652	0.000	0.000	0.230
30	0.905	0.090	0.180	0.041	0.587	0.000	0.103	0.140
31	1.094	0.014	0.477	0.244	0.266	0.000	0.000	0.460
32	0.366	0.000	0.061	0.211	0.729	0.000	0.000	0.220
33	0.676	0.048	0.657	0.227	0.068	0.000	0.000	0.540
34	0.669	0.492	0.212	0.156	0.140	0.000	0.000	0.320
35	0.538	0.552	0.232	0.001	0.215	0.000	0.000	0.200

URBS Sub-catchment Parameters – March 2001								
S/C	**Area (km2)**	**UL**	**UM**	**UH**	**UR**	**UD**	**F**	**I**
36	0.400	0.210	0.355	0.001	0.434	0.000	0.000	0.210
37	0.819	0.002	0.154	0.025	0.818	0.000	0.000	0.100
38	0.488	0.171	0.287	0.145	0.397	0.000	0.000	0.300
39	0.899	0.270	0.109	0.061	0.524	0.000	0.036	0.150
40	0.560	0.313	0.354	0.051	0.282	0.000	0.000	0.270
41	1.282	0.399	0.000	0.022	0.578	0.000	0.000	0.080
42	0.645	0.000	0.052	0.027	0.609	0.000	0.313	0.050
43	0.646	0.043	0.038	0.005	0.888	0.000	0.026	0.030
44	0.560	0.163	0.184	0.071	0.497	0.000	0.086	0.180
45	1.746	0.149	0.448	0.093	0.310	0.000	0.000	0.330
46	0.258	0.088	0.000	0.019	0.893	0.000	0.000	0.030
47	0.768	0.008	0.017	0.011	0.788	0.176	0.000	0.020
48	1.636	0.046	0.000	0.015	0.939	0.000	0.000	0.020
49	1.972	0.025	0.002	0.028	0.944	0.000	0.000	0.030
50	0.787	0.349	0.000	0.000	0.293	0.291	0.066	0.052
51	0.539	0.000	0.500	0.000	0.232	0.268	0.000	0.250
52	1.469	0.002	0.199	0.000	0.798	0.000	0.000	0.100
53	1.104	0.007	0.534	0.280	0.179	0.000	0.000	0.520
54	0.459	0.000	0.604	0.242	0.154	0.000	0.000	0.520
55	0.366	0.196	0.398	0.235	0.171	0.000	0.000	0.440
56	0.387	0.009	0.579	0.310	0.052	0.000	0.050	0.570
57	0.529	0.083	0.511	0.125	0.281	0.000	0.000	0.380
58	1.184	0.043	0.669	0.143	0.144	0.000	0.000	0.470
59	1.011	0.130	0.432	0.005	0.422	0.000	0.011	0.240
60	0.547	0.000	0.876	0.002	0.108	0.000	0.013	0.440
61	0.925	0.086	0.092	0.023	0.745	0.000	0.053	0.080
62	0.368	0.062	0.257	0.013	0.495	0.000	0.173	0.150
63	1.118	0.154	0.382	0.007	0.296	0.000	0.161	0.220
64	1.818	0.040	0.447	0.212	0.096	0.000	0.205	0.420
65	0.636	0.000	0.724	0.164	0.111	0.000	0.000	0.510
66	1.572	0.004	0.396	0.390	0.208	0.000	0.002	0.550
67	1.646	0.076	0.621	0.098	0.205	0.000	0.000	0.410
68	1.731	0.000	0.025	0.004	0.077	0.000	0.893	0.016
69	0.334	0.072	0.258	0.000	0.189	0.000	0.481	0.140
70	1.468	0.003	0.439	0.000	0.373	0.000	0.185	0.220

URBS Sub-catchment Parameters – March 2001								
S/C	**Area (km2)**	**UL**	**UM**	**UH**	**UR**	**UD**	**F**	**I**
71	0.510	0.000	0.092	0.060	0.251	0.000	0.597	0.100
72	0.844	0.002	0.399	0.023	0.484	0.000	0.093	0.220
73	0.648	0.000	0.559	0.056	0.360	0.000	0.024	0.330
74	1.533	0.016	0.550	0.281	0.153	0.000	0.000	0.530
75	0.688	0.000	0.324	0.153	0.445	0.063	0.015	0.300
76	1.704	0.116	0.136	0.083	0.265	0.104	0.296	0.160
77	0.426	0.012	0.005	0.106	0.233	0.089	0.555	0.100
78	1.152	0.000	0.456	0.258	0.191	0.000	0.096	0.460
79	0.983	0.008	0.358	0.333	0.300	0.000	0.001	0.480
80	1.040	0.000	0.623	0.165	0.133	0.000	0.080	0.460
81	1.532	0.000	0.500	0.111	0.096	0.000	0.293	0.350
82	1.024	0.033	0.561	0.205	0.175	0.000	0.026	0.470
83	0.556	0.000	0.600	0.222	0.173	0.000	0.004	0.500
84	0.542	0.000	0.331	0.088	0.581	0.000	0.000	0.245
85	0.420	0.000	0.260	0.000	0.218	0.000	0.522	0.130
86	0.226	0.055	0.183	0.000	0.762	0.000	0.000	0.100
87	0.951	0.000	0.422	0.077	0.168	0.000	0.333	0.280
88	1.631	0.062	0.281	0.000	0.657	0.000	0.000	0.150
89	1.564	0.005	0.293	0.003	0.698	0.000	0.000	0.150
90	1.269	0.025	0.632	0.134	0.210	0.000	0.000	0.440
91	0.369	0.000	0.851	0.071	0.077	0.000	0.000	0.490
92	0.252	0.050	0.458	0.160	0.333	0.000	0.000	0.380
93	0.481	0.000	0.114	0.026	0.861	0.000	0.000	0.080
94	0.870	0.000	0.101	0.144	0.755	0.000	0.000	0.180
95	0.935	0.047	0.652	0.163	0.137	0.000	0.000	0.480
96	0.271	0.000	0.287	0.019	0.695	0.000	0.000	0.160
97	0.145	0.000	0.299	0.001	0.461	0.000	0.240	0.150
98	0.841	0.000	0.532	0.115	0.064	0.000	0.288	0.370
99	0.834	0.000	0.666	0.141	0.110	0.000	0.082	0.460
100	0.540	0.000	0.142	0.010	0.374	0.000	0.474	0.080
101	0.488	0.000	0.450	0.000	0.545	0.000	0.005	0.225
102	0.409	0.003	0.297	0.557	0.107	0.000	0.036	0.650
103	0.684	0.000	0.426	0.263	0.310	0.000	0.000	0.450
104	0.964	0.003	0.275	0.180	0.407	0.000	0.134	0.300
105	1.437	0.000	0.361	0.000	0.296	0.000	0.343	0.181

URBS Sub-catchment Parameters – March 2001								
S/C	**Area (km2)**	**UL**	**UM**	**UH**	**UR**	**UD**	**F**	**I**
106	0.497	0.000	0.681	0.199	0.119	0.000	0.000	0.520
107	1.059	0.062	0.434	0.104	0.400	0.000	0.000	0.320
108	0.413	0.000	0.380	0.000	0.600	0.000	0.020	0.190
109	1.145	0.012	0.000	0.000	0.137	0.000	0.851	0.002
110	0.940	0.141	0.000	0.000	0.030	0.000	0.828	0.021
111	1.117	0.000	0.140	0.000	0.509	0.000	0.351	0.070
112	0.323	0.707	0.028	0.000	0.265	0.000	0.000	0.120
113	0.636	0.335	0.000	0.089	0.465	0.000	0.111	0.130
114	0.809	0.867	0.000	0.000	0.133	0.000	0.000	0.130
115	1.061	0.774	0.068	0.000	0.158	0.000	0.000	0.150
116	0.963	0.834	0.000	0.000	0.166	0.000	0.000	0.125
117	1.658	0.023	0.375	0.032	0.333	0.000	0.237	0.220
118	1.020	0.183	0.295	0.117	0.405	0.000	0.000	0.280
119	0.574	0.008	0.028	0.016	0.947	0.000	0.000	0.030
120	1.370	0.025	0.249	0.047	0.505	0.000	0.175	0.170
121	0.719	0.000	0.481	0.255	0.187	0.000	0.077	0.470
122	1.099	0.021	0.190	0.058	0.480	0.000	0.251	0.150
123	0.920	0.148	0.025	0.000	0.601	0.000	0.226	0.035
124	0.610	0.000	0.411	0.160	0.428	0.000	0.000	0.350
125	1.227	0.003	0.169	0.039	0.756	0.000	0.033	0.120
126	0.735	0.027	0.443	0.149	0.381	0.000	0.000	0.360
127	2.011	0.043	0.257	0.028	0.613	0.000	0.059	0.160
128	1.600	0.288	0.146	0.038	0.504	0.000	0.025	0.150
129	0.740	0.027	0.299	0.029	0.645	0.000	0.000	0.180
130	0.458	0.215	0.140	0.031	0.588	0.000	0.027	0.130
131	1.129	0.338	0.067	0.106	0.451	0.000	0.037	0.180
132	0.874	0.438	0.049	0.289	0.139	0.000	0.086	0.350
133	0.599	0.000	0.060	0.000	0.896	0.000	0.044	0.030
134	0.659	0.000	0.253	0.526	0.221	0.000	0.000	0.600
135	0.243	0.000	0.856	0.024	0.120	0.000	0.000	0.450
136	1.047	0.043	0.629	0.143	0.182	0.000	0.003	0.450
137	0.703	0.089	0.390	0.024	0.132	0.000	0.365	0.230
138	0.870	0.003	0.386	0.174	0.437	0.000	0.000	0.350
139	0.310	0.000	0.470	0.017	0.513	0.000	0.000	0.250

URBS Sub-catchment Parameters – Design Events								
S/C	**Area (km2)**	**UL**	**UM**	**UH**	**UR**	**UD**	**F**	**I**
1	1.873	0.005	0.513	0.230	0.062	0.000	0.189	0.464
2	1.226	0.000	0.538	0.372	0.089	0.000	0.001	0.604
3	1.449	0.000	0.577	0.298	0.122	0.000	0.003	0.556
4	1.379	0.134	0.540	0.282	0.045	0.000	0.000	0.543
5	1.025	0.014	0.475	0.221	0.087	0.000	0.202	0.439
6	0.938	0.065	0.726	0.194	0.015	0.000	0.000	0.548
7	0.268	0.140	0.568	0.252	0.041	0.000	0.000	0.532
8	0.904	0.000	0.663	0.307	0.031	0.000	0.000	0.607
9	0.537	0.000	0.437	0.292	0.271	0.000	0.000	0.481
10	0.430	0.057	0.525	0.132	0.268	0.000	0.017	0.390
11	1.126	0.002	0.584	0.383	0.031	0.000	0.000	0.637
12	0.855	0.048	0.515	0.436	0.001	0.000	0.000	0.657
13	0.946	0.033	0.112	0.001	0.000	0.000	0.855	0.061
14	0.851	0.835	0.000	0.003	0.000	0.000	0.161	0.128
15	1.067	0.657	0.007	0.068	0.000	0.000	0.268	0.163
16	1.257	0.048	0.548	0.278	0.026	0.000	0.100	0.531
17	0.745	0.174	0.387	0.440	0.000	0.000	0.000	0.615
18	1.610	0.055	0.472	0.368	0.067	0.000	0.037	0.576
19	0.981	0.000	0.574	0.389	0.036	0.000	0.000	0.637
20	1.614	0.000	0.314	0.549	0.086	0.000	0.051	0.651
21	1.308	0.000	0.426	0.533	0.022	0.000	0.018	0.693
22	0.464	0.081	0.320	0.105	0.494	0.000	0.000	0.267
23	0.517	0.000	0.670	0.290	0.040	0.000	0.000	0.596
24	0.500	0.000	0.583	0.384	0.034	0.000	0.000	0.637
25	0.471	0.000	0.549	0.435	0.016	0.000	0.000	0.666
26	1.498	0.144	0.511	0.171	0.110	0.000	0.064	0.431
27	1.013	0.065	0.440	0.234	0.260	0.000	0.000	0.440
28	0.382	0.000	0.661	0.335	0.003	0.000	0.000	0.632
29	0.635	0.135	0.377	0.334	0.153	0.000	0.000	0.510
30	0.905	0.000	0.652	0.122	0.226	0.000	0.000	0.435
31	1.094	0.000	0.592	0.350	0.057	0.000	0.000	0.612
32	0.366	0.000	0.176	0.680	0.144	0.000	0.000	0.700
33	0.676	0.000	0.737	0.263	0.000	0.000	0.000	0.605
34	0.669	0.073	0.551	0.376	0.000	0.000	0.000	0.625
35	0.538	0.174	0.421	0.398	0.007	0.000	0.000	0.595

URBS Sub-catchment Parameters – Design Events								
S/C	**Area (km2)**	**UL**	**UM**	**UH**	**UR**	**UD**	**F**	**I**
36	0.400	0.081	0.889	0.030	0.000	0.000	0.000	0.483
37	0.819	0.000	0.671	0.253	0.076	0.000	0.000	0.563
38	0.488	0.108	0.584	0.308	0.000	0.000	0.000	0.585
39	0.899	0.275	0.446	0.161	0.118	0.000	0.000	0.409
40	0.560	0.386	0.418	0.092	0.104	0.000	0.000	0.350
41	1.282	0.000	0.593	0.365	0.043	0.000	0.000	0.624
42	0.645	0.000	0.378	0.256	0.160	0.000	0.206	0.419
43	0.646	0.000	0.807	0.148	0.019	0.000	0.026	0.537
44	0.560	0.218	0.283	0.130	0.283	0.000	0.086	0.291
45	1.746	0.041	0.707	0.033	0.218	0.000	0.000	0.390
46	0.258	0.000	0.718	0.271	0.010	0.000	0.000	0.603
47	0.768	0.121	0.383	0.227	0.216	0.053	0.000	0.414
48	1.636	0.000	0.492	0.440	0.068	0.000	0.000	0.642
49	1.972	0.021	0.288	0.218	0.473	0.000	0.000	0.343
50	0.787	0.000	0.319	0.000	0.323	0.291	0.066	0.160
51	0.539	0.000	0.742	0.031	0.019	0.209	0.000	0.399
52	1.469	0.055	0.612	0.000	0.333	0.000	0.000	0.314
53	1.104	0.015	0.576	0.402	0.006	0.000	0.000	0.653
54	0.459	0.000	0.613	0.338	0.048	0.000	0.000	0.611
55	0.366	0.000	0.618	0.366	0.017	0.000	0.000	0.638
56	0.387	0.000	0.602	0.348	0.000	0.000	0.050	0.614
57	0.529	0.000	0.760	0.203	0.037	0.000	0.000	0.563
58	1.184	0.000	0.670	0.292	0.038	0.000	0.000	0.598
59	1.011	0.201	0.548	0.010	0.229	0.000	0.011	0.313
60	0.547	0.000	0.952	0.016	0.018	0.000	0.013	0.491
61	0.925	0.188	0.530	0.029	0.200	0.000	0.053	0.319
62	0.368	0.083	0.786	0.123	0.007	0.000	0.000	0.517
63	1.118	0.000	0.635	0.000	0.204	0.000	0.161	0.317
64	1.818	0.034	0.484	0.264	0.012	0.000	0.205	0.485
65	0.636	0.000	0.789	0.202	0.009	0.000	0.000	0.576
66	1.572	0.001	0.435	0.482	0.081	0.000	0.002	0.651
67	1.646	0.099	0.583	0.160	0.158	0.000	0.000	0.450
68	1.731	0.000	0.025	0.004	0.077	0.000	0.893	0.016
69	0.334	0.000	0.459	0.042	0.019	0.000	0.481	0.267
70	1.468	0.000	0.654	0.000	0.160	0.000	0.185	0.327

URBS Sub-catchment Parameters – Design Events								
S/C	Area (km2)	UL	UM	UH	UR	UD	F	I
71	0.510	0.000	0.219	0.136	0.048	0.000	0.597	0.232
72	0.844	0.000	0.524	0.050	0.333	0.000	0.093	0.307
73	0.648	0.000	0.604	0.078	0.294	0.000	0.024	0.372
74	1.533	0.016	0.571	0.324	0.089	0.000	0.000	0.579
75	0.688	0.108	0.511	0.201	0.165	0.000	0.015	0.453
76	1.704	0.187	0.323	0.023	0.171	0.000	0.296	0.210
77	0.426	0.021	0.188	0.093	0.143	0.000	0.555	0.180
78	1.152	0.023	0.468	0.293	0.121	0.000	0.096	0.501
79	0.983	0.000	0.401	0.410	0.188	0.000	0.001	0.570
80	1.040	0.075	0.604	0.222	0.019	0.000	0.080	0.513
81	1.532	0.000	0.544	0.149	0.015	0.000	0.293	0.406
82	1.024	0.035	0.581	0.229	0.129	0.000	0.026	0.502
83	0.556	0.000	0.593	0.241	0.161	0.000	0.004	0.514
84	0.542	0.000	0.277	0.147	0.575	0.000	0.000	0.271
85	0.420	0.000	0.306	0.000	0.173	0.000	0.522	0.153
86	0.226	0.130	0.561	0.000	0.308	0.000	0.000	0.300
87	0.951	0.000	0.505	0.120	0.041	0.000	0.333	0.361
88	1.631	0.107	0.496	0.000	0.397	0.000	0.000	0.264
89	1.564	0.192	0.361	0.078	0.368	0.000	0.000	0.280
90	1.269	0.029	0.732	0.169	0.070	0.000	0.000	0.523
91	0.369	0.000	0.894	0.095	0.011	0.000	0.000	0.533
92	0.252	0.000	0.707	0.278	0.014	0.000	0.000	0.604
93	0.481	0.000	0.307	0.081	0.612	0.000	0.000	0.226
94	0.870	0.000	0.059	0.211	0.730	0.000	0.000	0.219
95	0.935	0.000	0.798	0.185	0.017	0.000	0.000	0.565
96	0.271	0.000	0.248	0.099	0.653	0.000	0.000	0.213
97	0.145	0.000	0.324	0.001	0.435	0.000	0.240	0.163
98	0.841	0.000	0.540	0.143	0.029	0.000	0.288	0.399
99	0.834	0.000	0.705	0.168	0.044	0.000	0.082	0.504
100	0.540	0.000	0.247	0.111	0.169	0.000	0.474	0.223
101	0.488	0.346	0.480	0.030	0.139	0.000	0.005	0.319
102	0.409	0.003	0.319	0.637	0.004	0.000	0.036	0.733
103	0.684	0.274	0.327	0.399	0.001	0.000	0.000	0.563
104	0.964	0.114	0.368	0.289	0.094	0.000	0.134	0.461
105	1.437	0.000	0.525	0.009	0.124	0.000	0.343	0.270

URBS Sub-catchment Parameters – Design Events								
S/C	**Area (km2)**	**UL**	**UM**	**UH**	**UR**	**UD**	**F**	**I**
106	0.497	0.000	0.732	0.221	0.047	0.000	0.000	0.565
107	1.059	0.258	0.464	0.178	0.100	0.000	0.000	0.431
108	0.413	0.457	0.443	0.080	0.001	0.000	0.020	0.362
109	1.145	0.012	0.000	0.000	0.137	0.000	0.851	0.002
110	0.940	0.141	0.000	0.000	0.030	0.000	0.828	0.021
111	1.117	0.000	0.174	0.000	0.475	0.000	0.351	0.087
112	0.323	0.808	0.032	0.000	0.160	0.000	0.000	0.137
113	0.636	0.375	0.000	0.099	0.414	0.000	0.111	0.146
114	0.809	0.923	0.003	0.000	0.074	0.000	0.000	0.140
115	1.061	0.883	0.076	0.000	0.040	0.000	0.000	0.171
116	0.963	0.896	0.000	0.000	0.104	0.000	0.000	0.134
117	1.658	0.015	0.585	0.093	0.071	0.000	0.237	0.378
118	1.020	0.286	0.359	0.294	0.061	0.000	0.000	0.487
119	0.574	0.069	0.454	0.360	0.117	0.000	0.000	0.562
120	1.370	0.121	0.331	0.227	0.146	0.000	0.175	0.388
121	0.719	0.000	0.545	0.312	0.066	0.000	0.077	0.553
122	1.099	0.140	0.311	0.188	0.109	0.000	0.251	0.346
123	0.920	0.138	0.047	0.106	0.484	0.000	0.226	0.139
124	0.610	0.000	0.321	0.549	0.130	0.000	0.000	0.655
125	1.227	0.002	0.644	0.234	0.088	0.000	0.033	0.532
126	0.735	0.000	0.619	0.292	0.089	0.000	0.000	0.572
127	2.011	0.076	0.545	0.130	0.190	0.000	0.059	0.401
128	1.600	0.097	0.462	0.044	0.373	0.000	0.025	0.285
129	0.740	0.003	0.388	0.076	0.534	0.000	0.000	0.263
130	0.458	0.094	0.390	0.101	0.389	0.000	0.027	0.300
131	1.129	0.000	0.746	0.015	0.202	0.000	0.037	0.386
132	0.874	0.000	0.742	0.169	0.002	0.000	0.086	0.523
133	0.599	0.276	0.084	0.091	0.505	0.000	0.044	0.165
134	0.659	0.000	0.325	0.675	0.000	0.000	0.000	0.770
135	0.243	0.000	0.629	0.370	0.000	0.000	0.000	0.648
136	1.047	0.000	0.736	0.205	0.057	0.000	0.003	0.552
137	0.703	0.089	0.460	0.079	0.006	0.000	0.365	0.314
138	0.870	0.000	0.362	0.638	0.000	0.000	0.000	0.755
139	0.310	0.000	0.966	0.034	0.000	0.000	0.000	0.514

Appendix C: Adopted Land Use

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Figure C-1: BCC City Plan 2014 Zones

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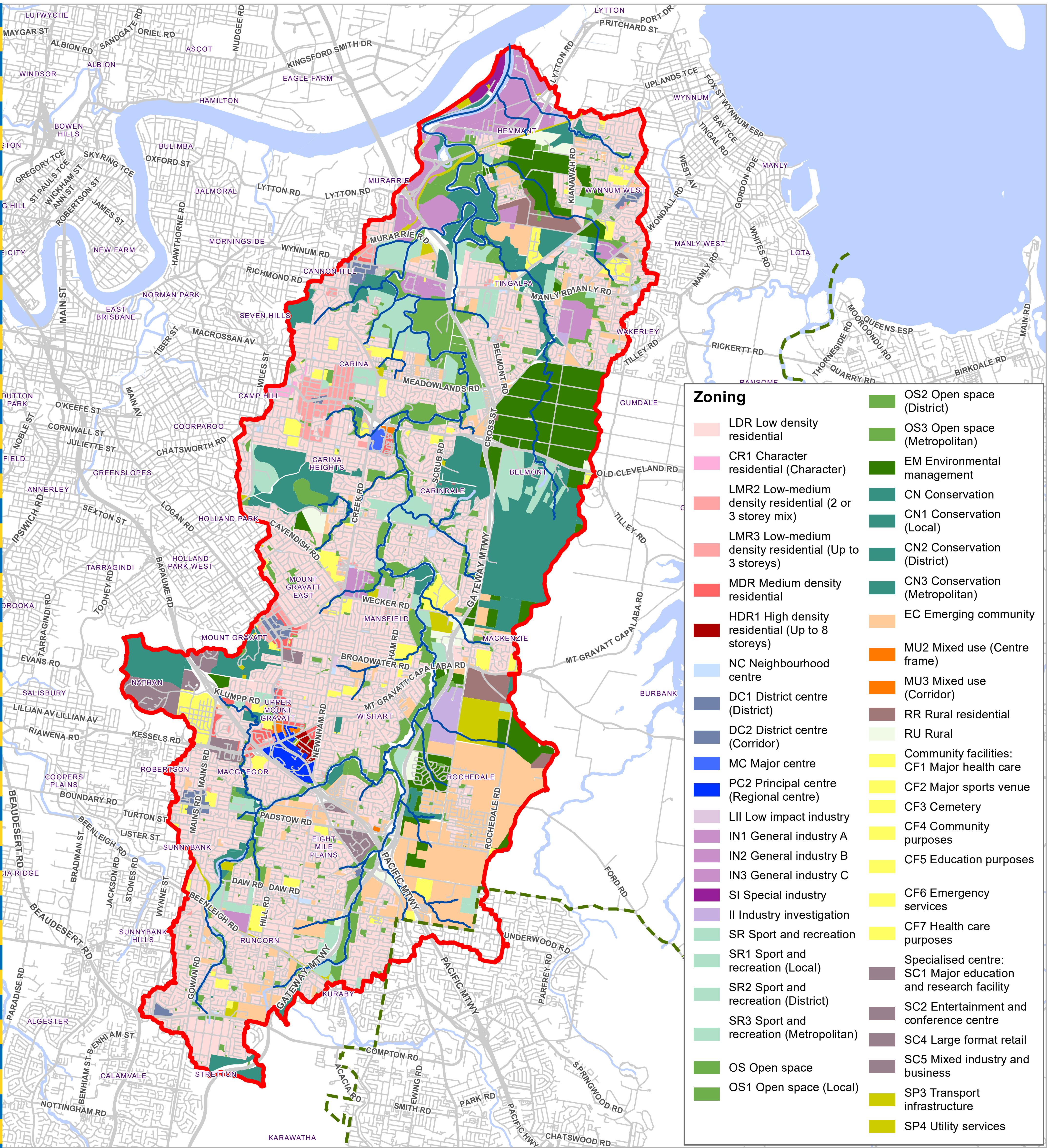

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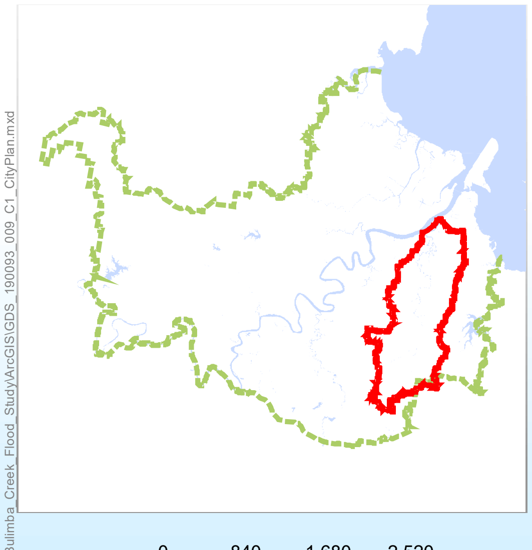

Legend

- Creek Centreline (Bulimba Creek Catchment)
- Bulimba Creek Catchment Area
- Brisbane City Boundary
- Road

0 840 1,680 2,520
Metres

Prepared : 089958
Checked : NC
Revision : 0
Publication Date : 28 Jan 2021
Project Number : 100001

File : G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\ArcGIS\GDS_190093_009_C1_CityPlan.mxd

DATA INFORMATION

Brisbane City Council
City Projects Office
GPO Box 1434
Brisbane Qld 4001

For more information
visit www.brisbane.qld.gov.au
or call (07) 3403 8888

BRISBANE CITY

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Bulimba Creek Flood Study

Figure C.1 - City Plan 2014 Landuse Zones

GDS - 190093 - 009

Figure C-2: May 2019 Aerial Photo

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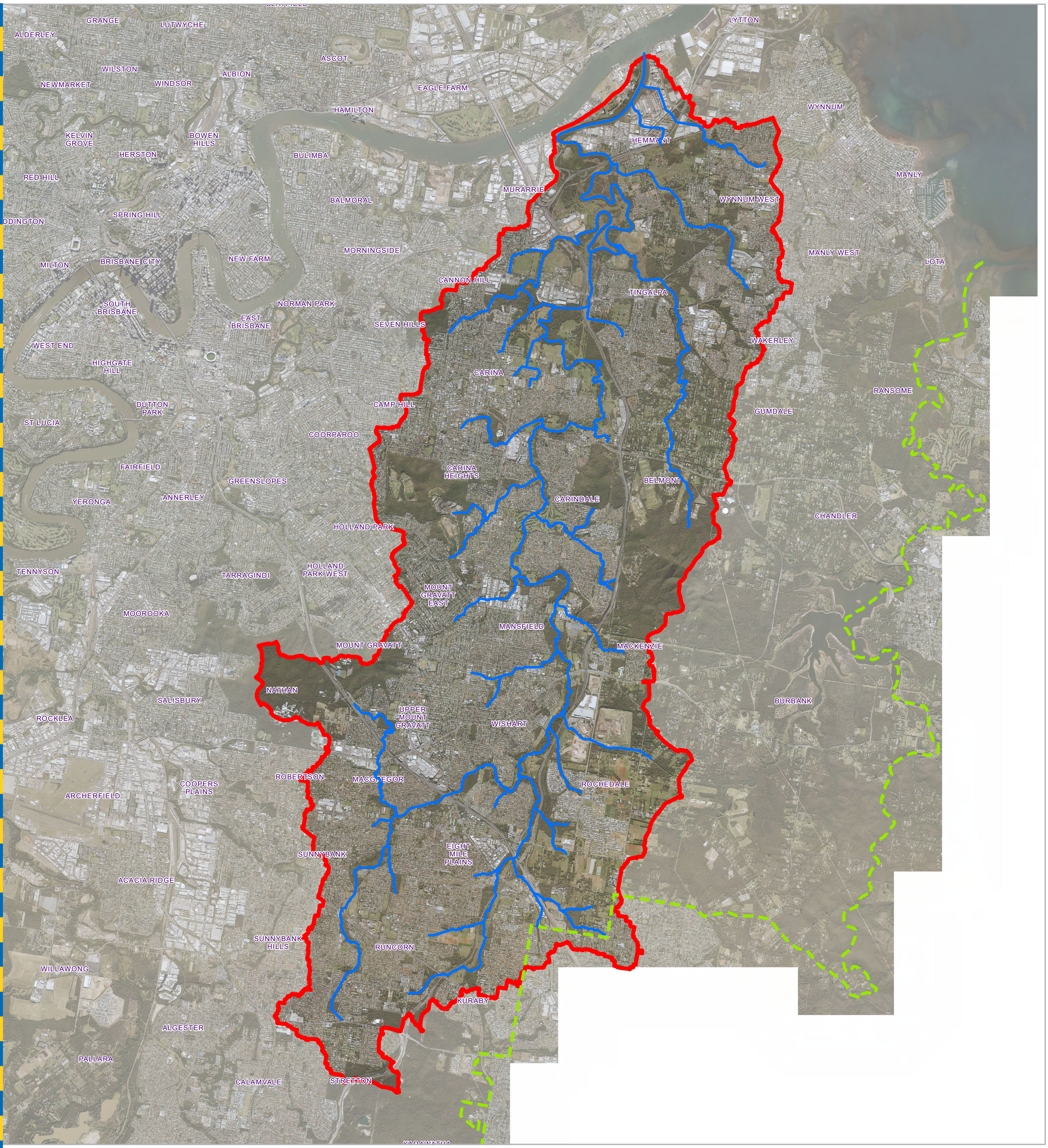

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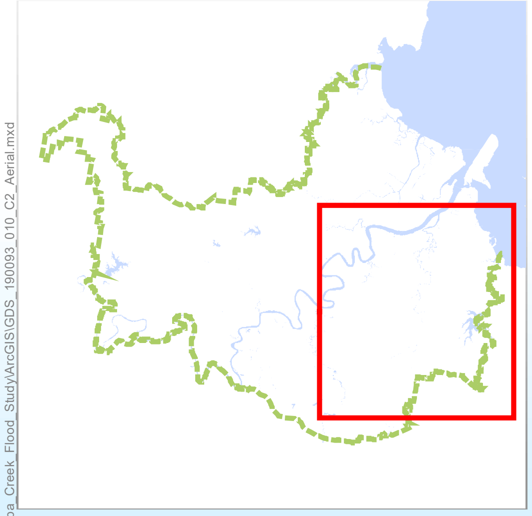

Legend

- Creek Centreline (Bulimba Creek Catchment)
- Mask_BulimbaC...
- Bulimba Creek Catchment Area
- Brisbane City Boundary

0 840 1,680 2,520
Metres

N W E S

Prepared : 089958
Checked : NC
Revision : 0
Publication Date : 28 Jan 2021
Project Number : 100001

File : G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\ArcGIS\GDS_190093_010_C2_Aerial.mxd

DATA INFORMATION

Brisbane City Council
City Projects Office
GPO Box 1434
Brisbane Qld 4001

For more information
visit www.brisbane.qld.gov.au
or call (07) 3403 8888

BRISBANE CITY

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Figure C.2 - 2019 Aerial Imagery

GDS - 190093 - 010

Land Use Type	% Impervious
Low density residential	60
Character residential (Character)	70
Character residential (Infill housing)	70
Low-medium density residential (2 storey mix)	70
Low-medium density residential (2 or 3 storey mix)	70
Low-medium density residential (Up to 3 storeys)	70
Medium density residential	80
High density residential (Up to 8 storeys)	90
High density residential (Up to 15 storeys)	90
Tourist accommodation	80
Neighbourhood centre	90
District centre (District)	90
District centre (Corridor)	90
Major centre	90
Principal centre (City centre)	90
Principal centre (Regional centre)	90
Low impact industry	90
Industry (General industry A)	90
Industry (General industry B)	90
Industry (General industry C)	90
Special industry	90
Industry investigation	90
Sport and recreation	20
Sport and recreation (Local)	20
Sport and recreation (District)	20
Sport and recreation (Metropolitan)	20
Open space	5
Open space (Local)	5
Open space (District)	5
Open space (Metropolitan)	5
Environmental management	5
Conservation	0
Conservation (Local)	0
Conservation (District)	0
Conservation (Metropolitan)	0

Land Use Type	% Impervious
Emerging community	70
Extractive industry	5
Mixed use (Inner city)	90
Mixed use (Centre frame)	90
Mixed use (Corridor)	90
Rural	5
Rural residential	30
Township	80
Community facilities (Major health care)	50
Community facilities (Major sports venue)	60
Community facilities (Cemetery)	20
Community facilities (Community purposes)	70
Community facilities (Education purposes)	70
Community facilities (Emergency services)	70
Community facilities (Health care purposes)	50
Specialised centre (Major education and research facility)	50
Specialised centre (Entertainment and conference centre)	90
Specialised centre (Brisbane Markets)	90
Specialised centre (Large format retail)	90
Specialised centre (Mixed industry and business)	90
Specialised centre (Marina)	80
Special purpose (Defence)	80
Special purpose (Detention facility)	50
Special purpose (Transport infrastructure)	75
Special purpose (Utility services)	50
Special purpose (Airport)	60
Special purpose (Port)	60

Appendix D: URBS – TUFLOW Comparative Plots

For further information on the hydrologic – hydraulic model consistency checks refer to the following sections:

Calibration Events – Section 5.7

Design Events – Section 6.4.5

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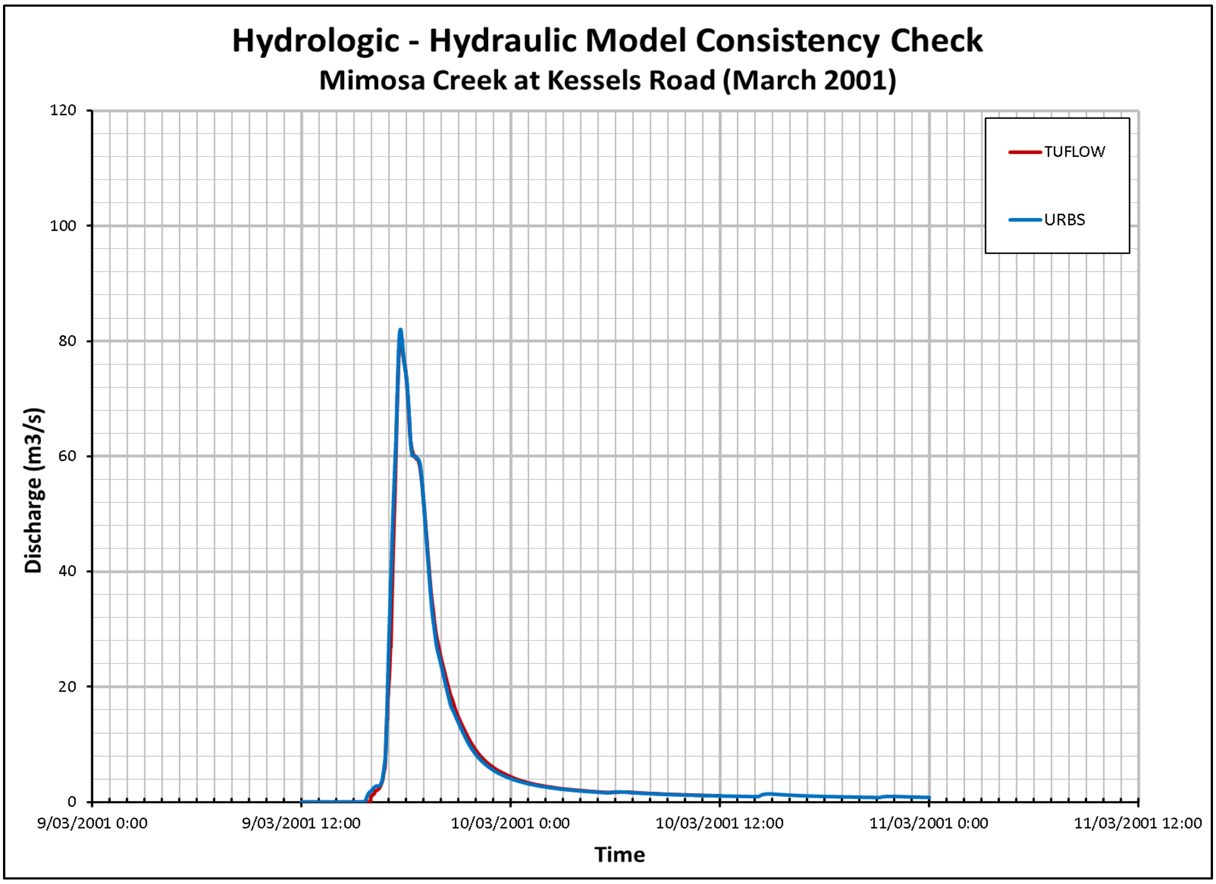
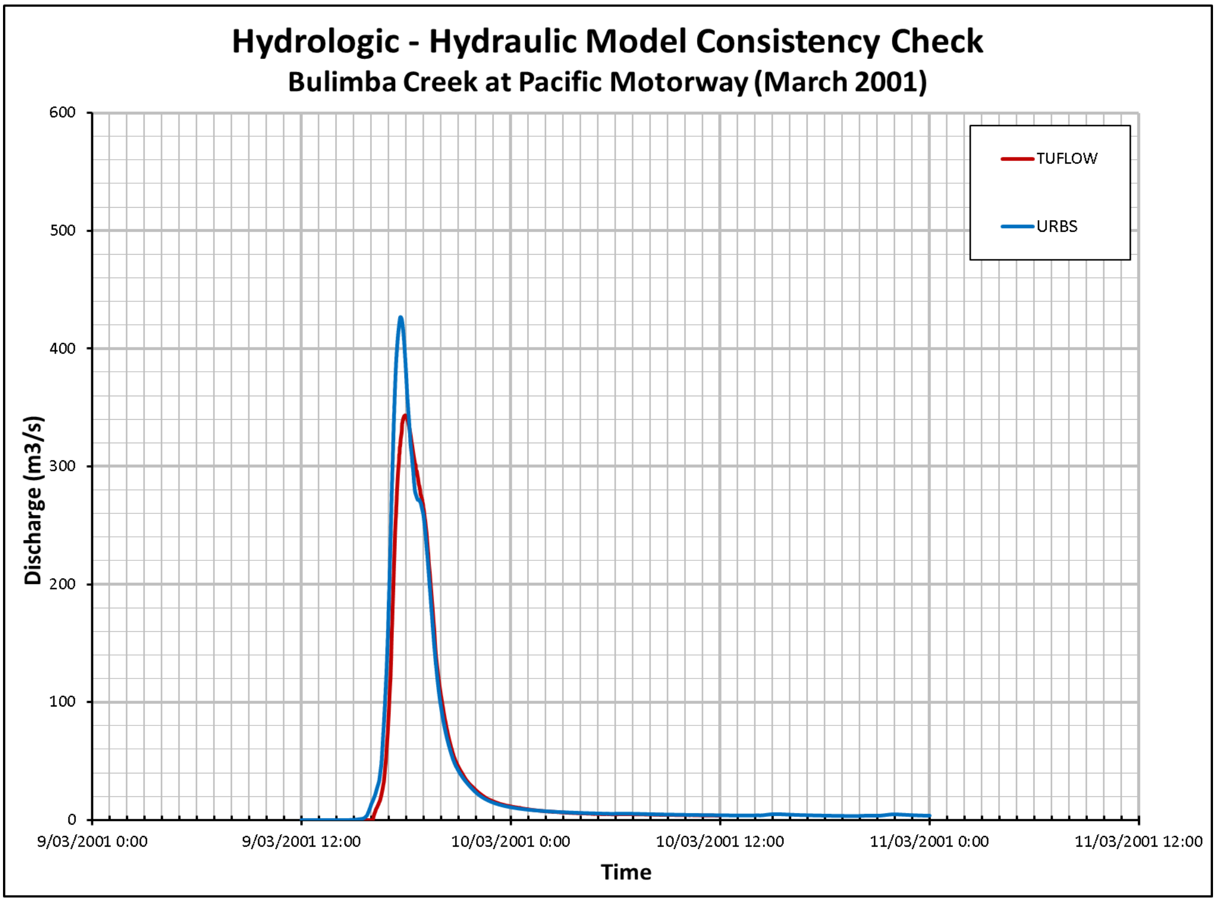
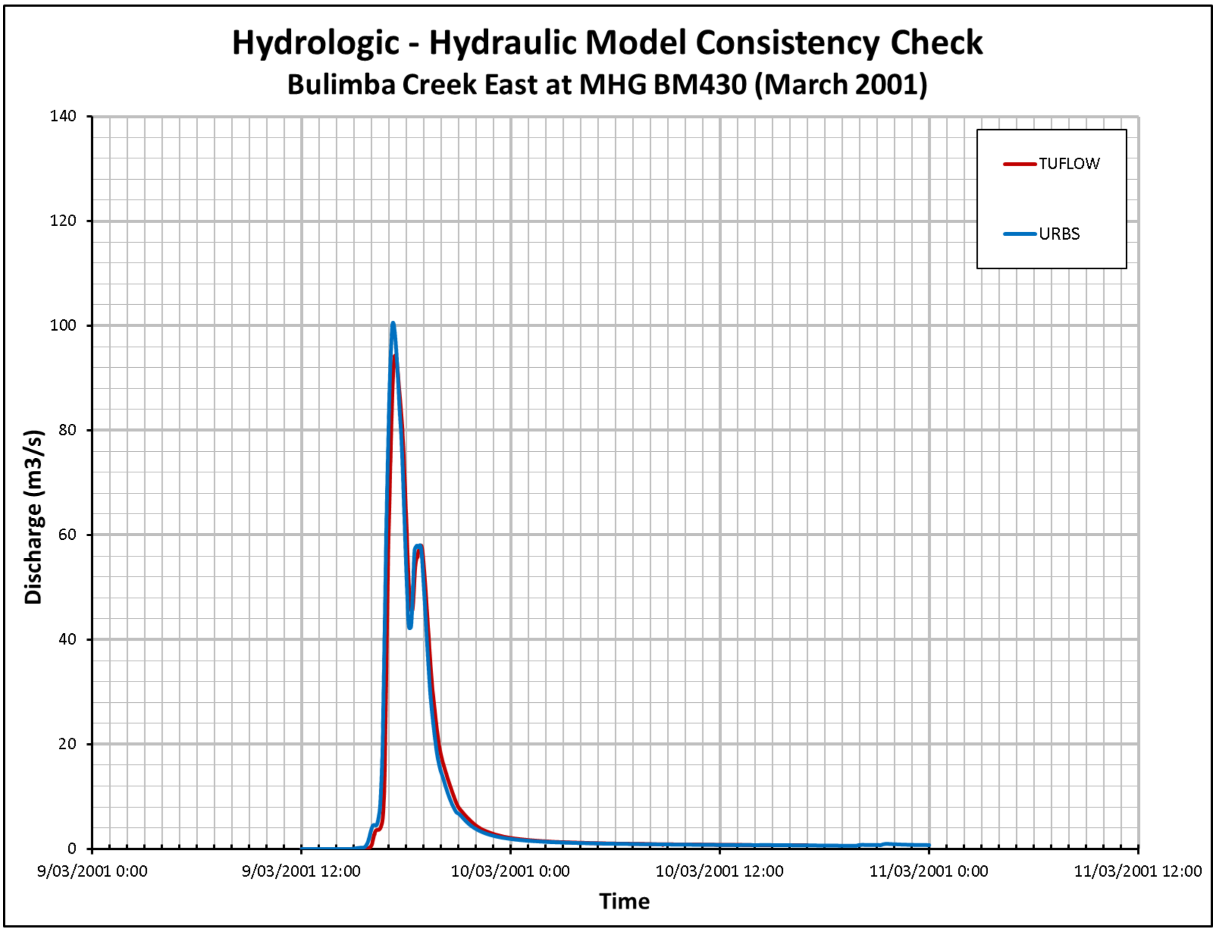
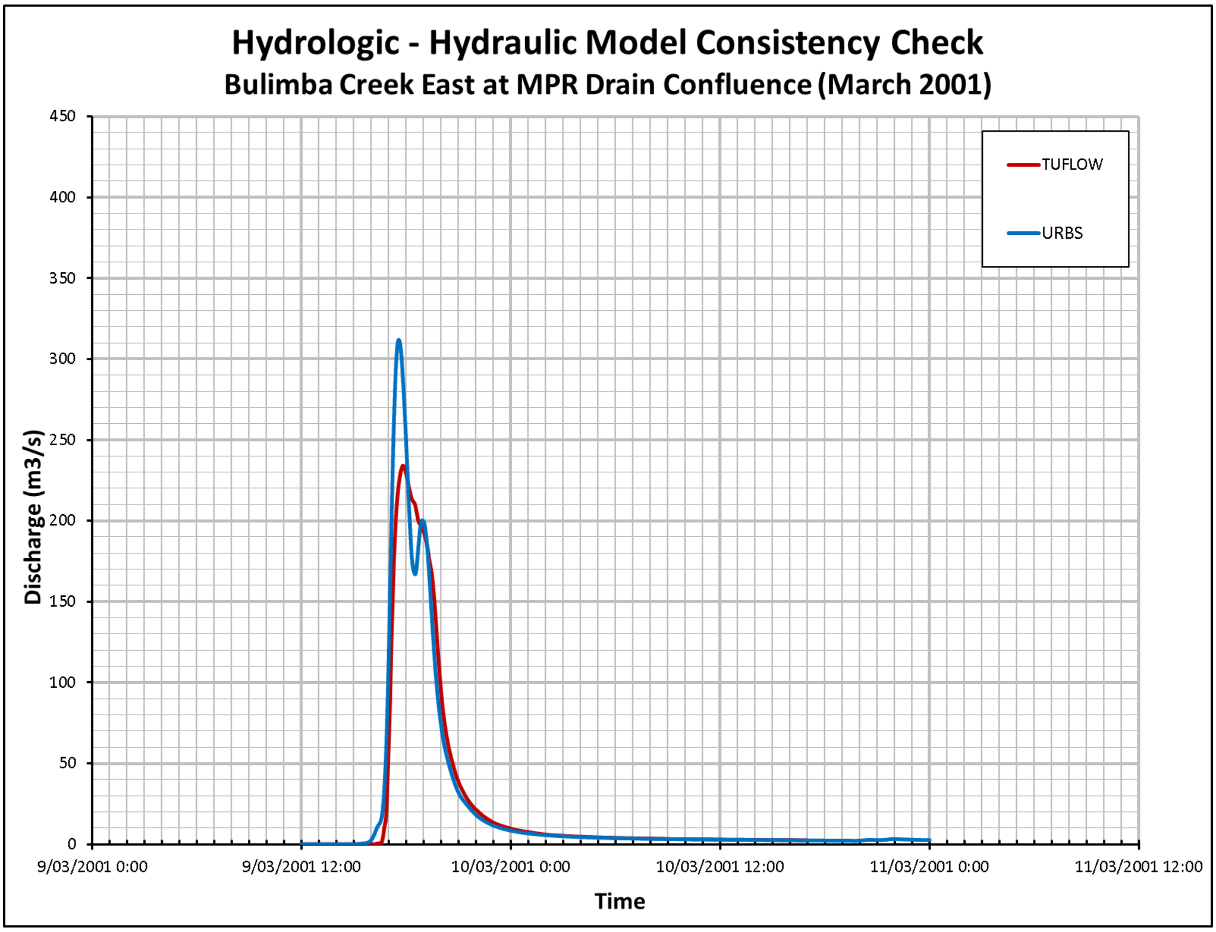
<u>Calibration Events</u>



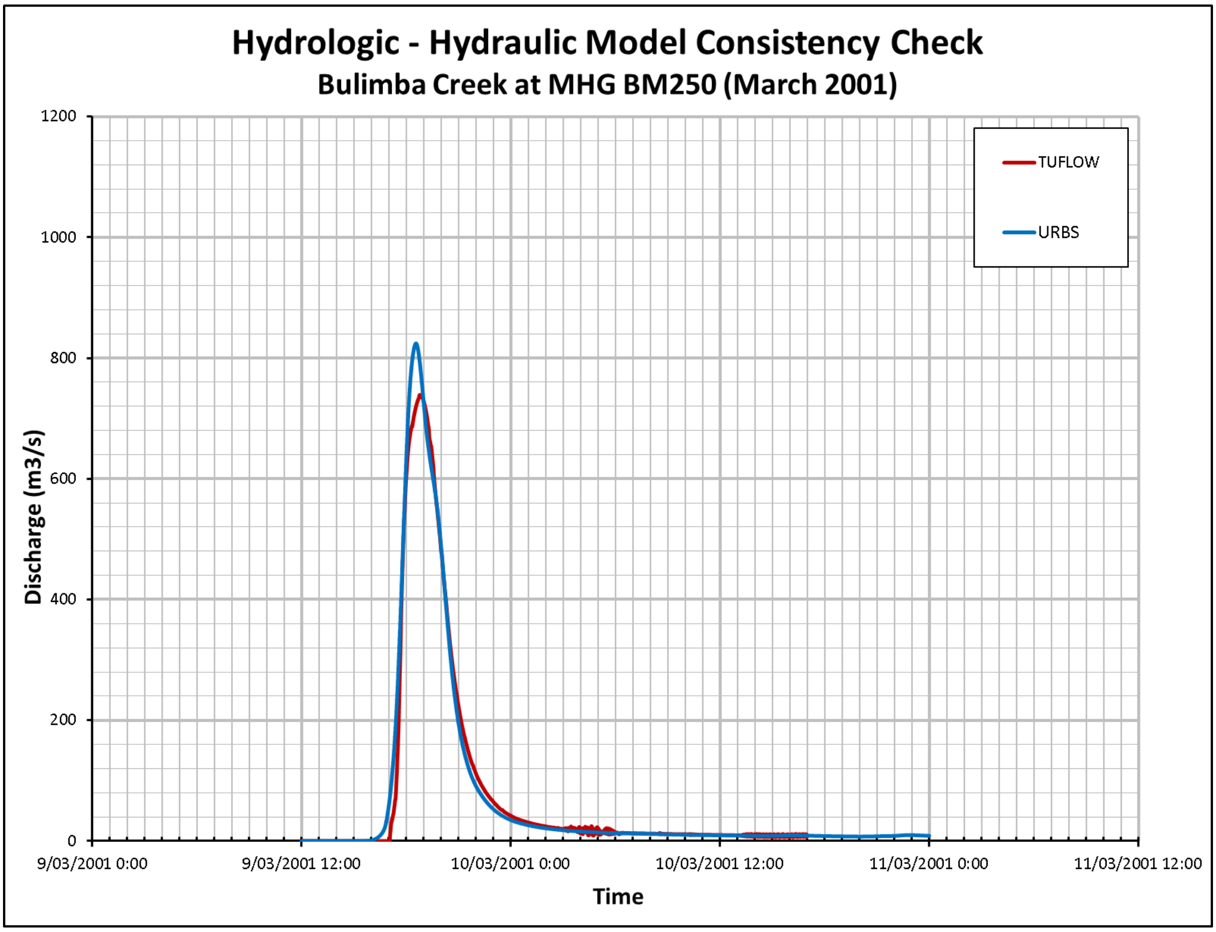


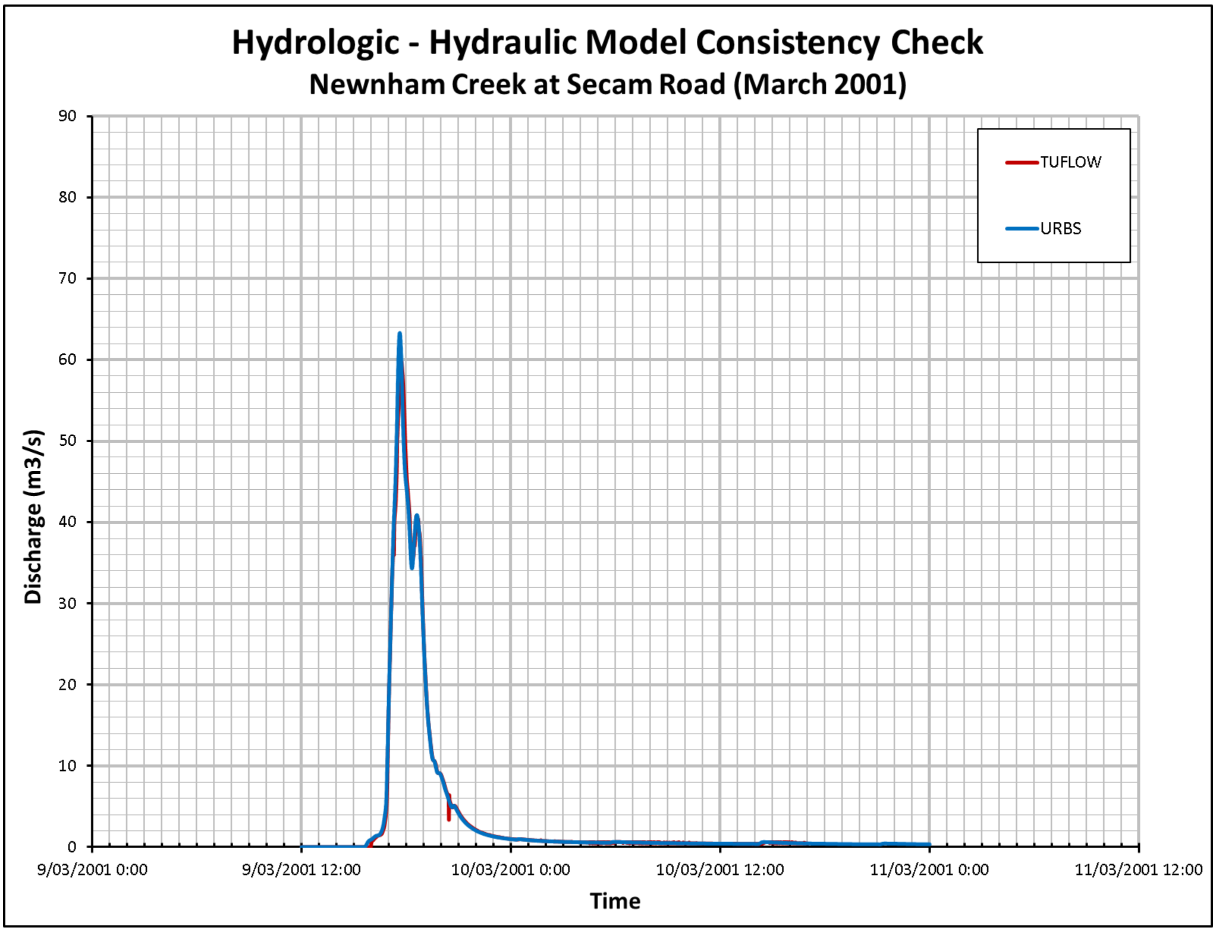


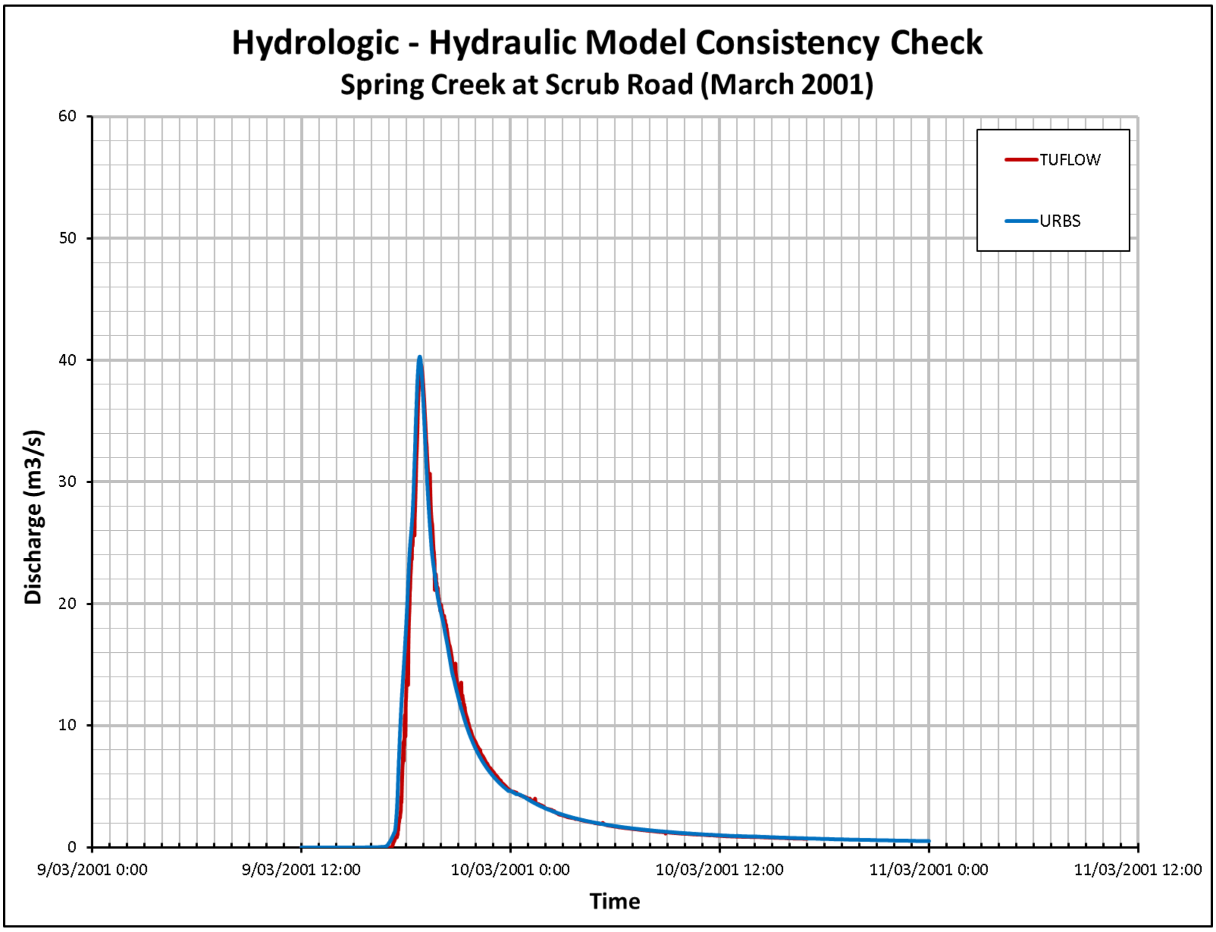
Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek East at MHG BM430 (March 2001)
TUFLOW
URBS
Discharge (m3/s)
0
20
40
60
80
100
120
140
9/03/2001 0:00
9/03/2001 12:00
10/03/2001 0:00
10/03/2001 12:00
11/03/2001 0:00
11/03/2001 12:00
Time

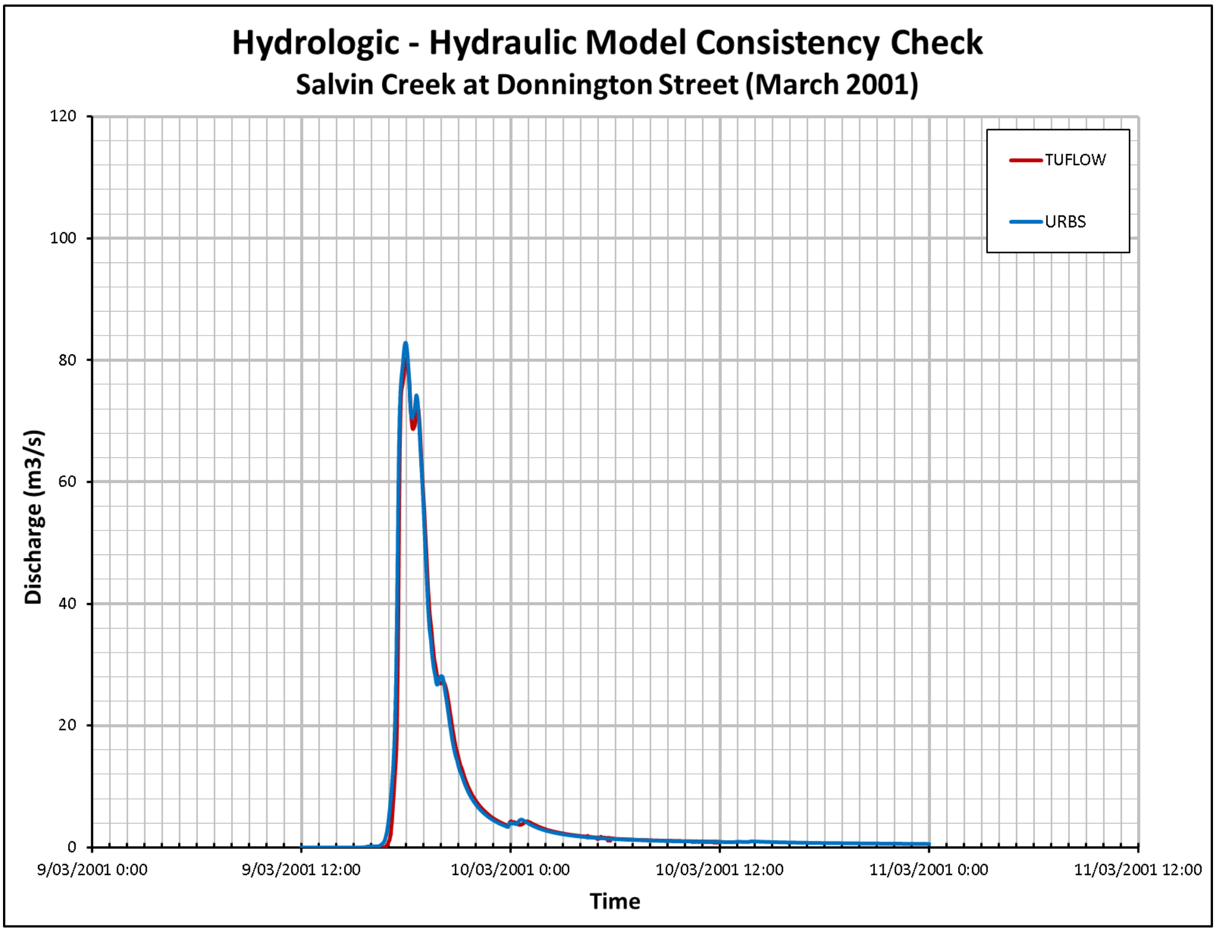


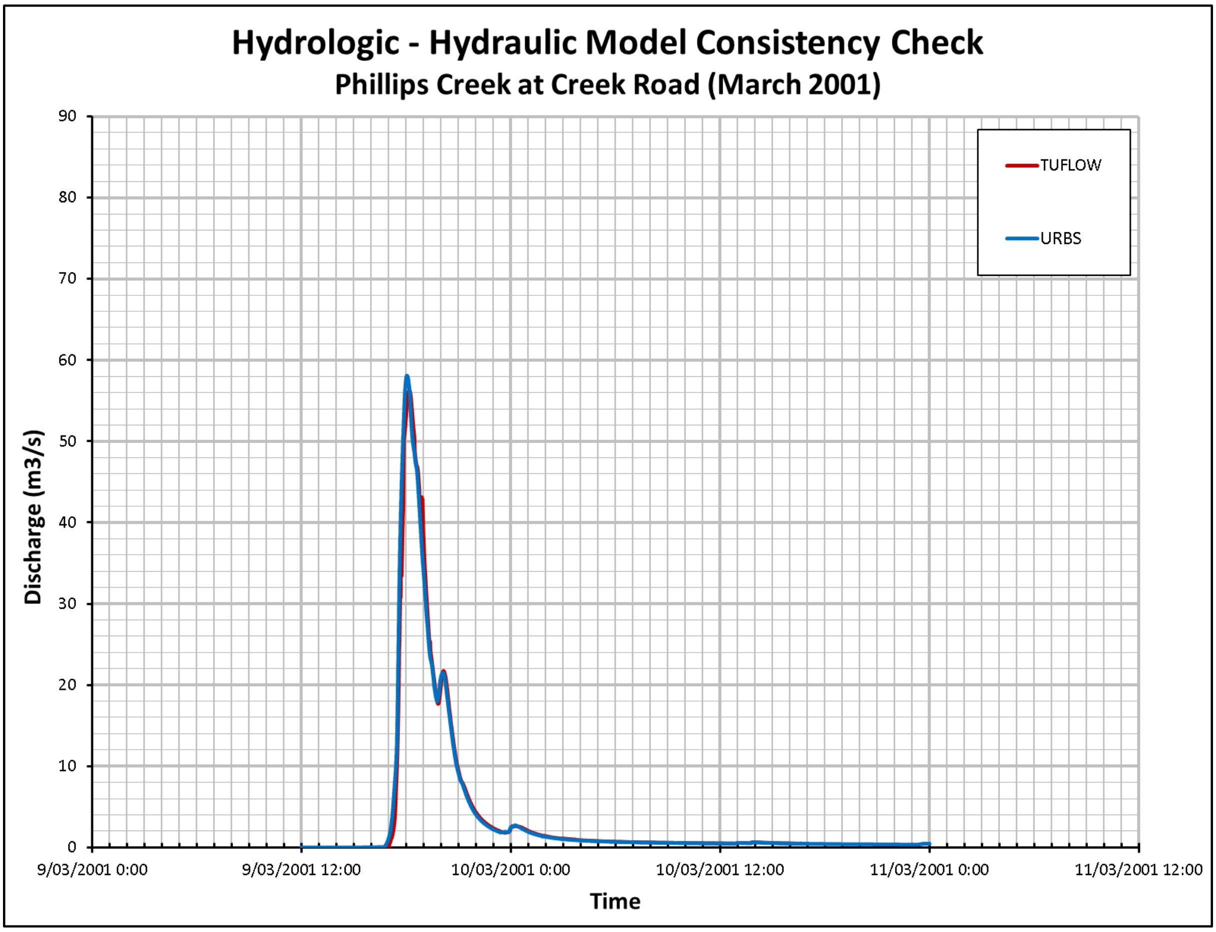
Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek East at MPR Drain Confluence (March 2001)
TUFLOW
URBS
Discharge (m3/s)
0
50
100
150
200
250
300
350
400
450
9/03/2001 0:00
9/03/2001 12:00
10/03/2001 0:00
10/03/2001 12:00
11/03/2001 0:00
11/03/2001 12:00
Time

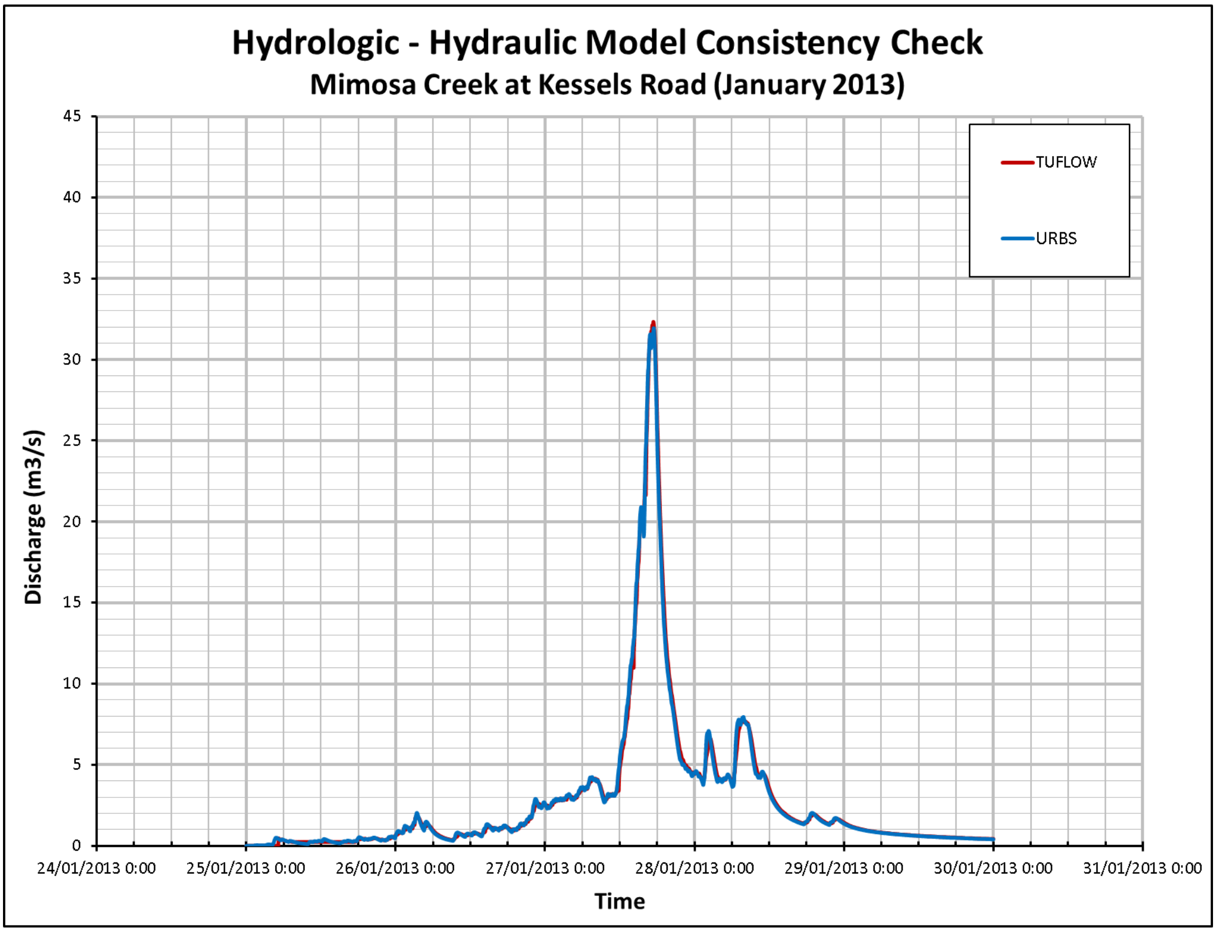

Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek at MHG BM250 (March 2001)
Discharge (m3/s)
Time
TUFLOW
URBS
0
200
400
600
800
1000
1200
9/03/2001 0:00
9/03/2001 12:00
10/03/2001 0:00
10/03/2001 12:00
11/03/2001 0:00
11/03/2001 12:00

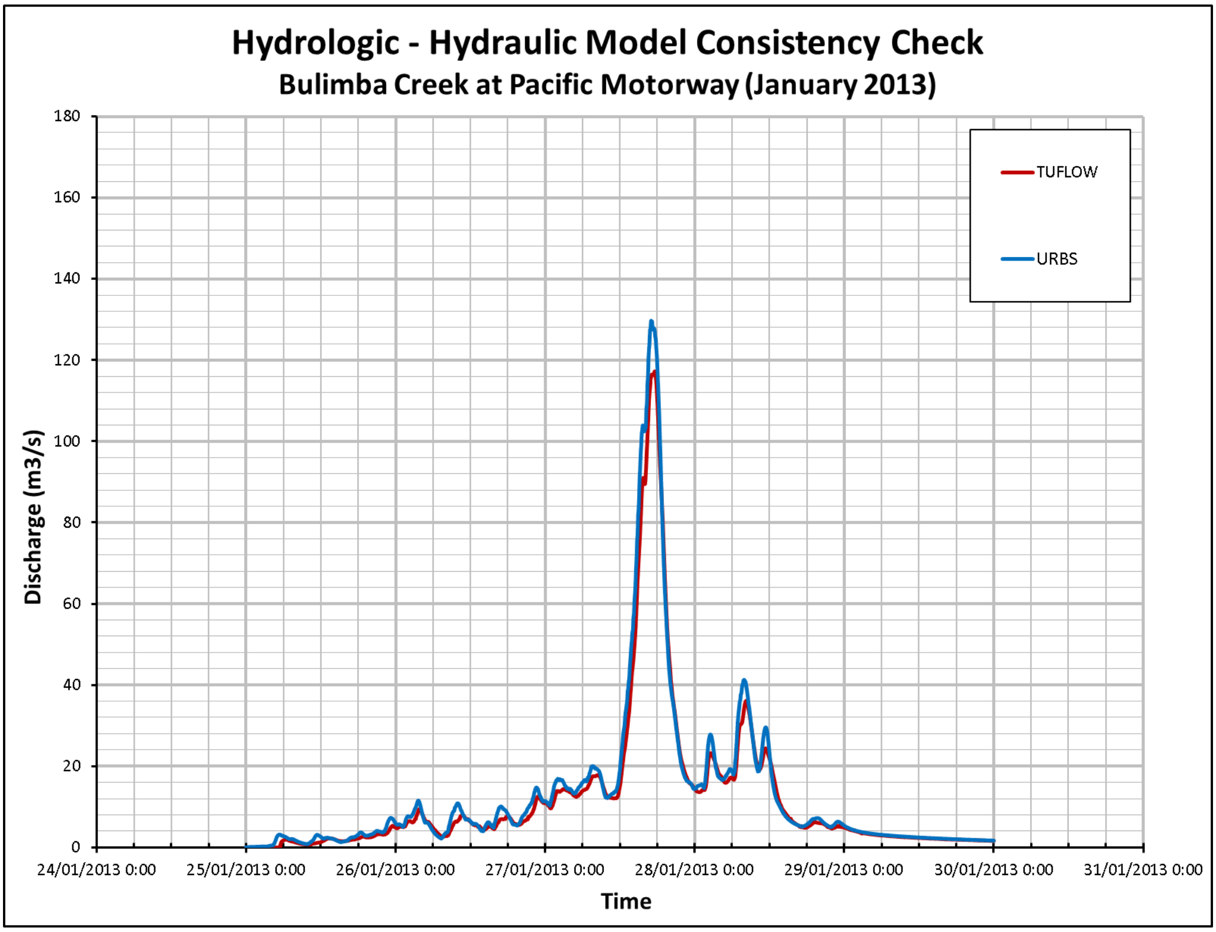

Hydrologic - Hydraulic Model Consistency Check
Newnham Creek at Secam Road (March 2001)
Discharge (m3/s)
Time
TUFLOW
URBS
0
10
20
30
40
50
60
70
80
90
9/03/2001 0:00
9/03/2001 12:00
10/03/2001 0:00
10/03/2001 12:00
11/03/2001 0:00
11/03/2001 12:00

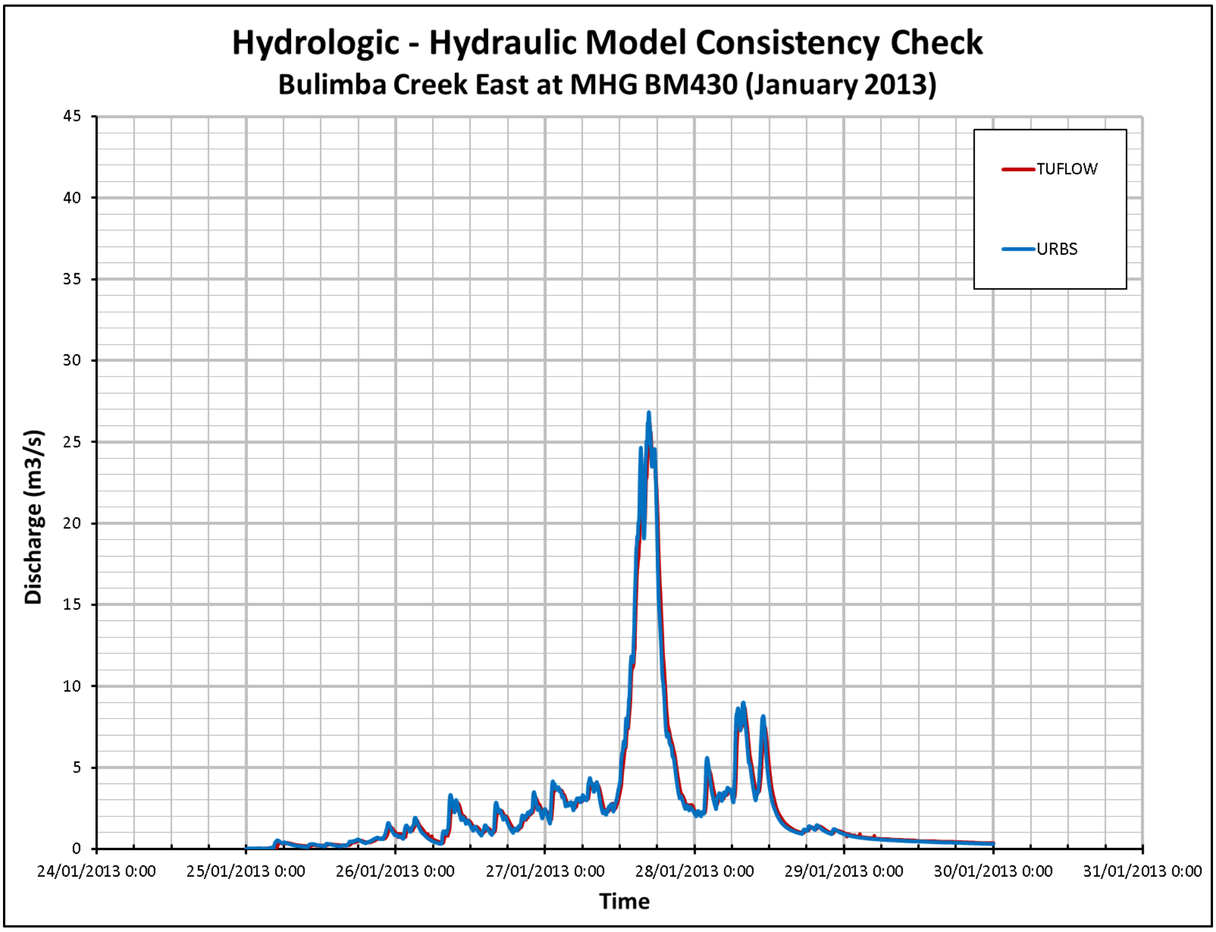

Hydrologic - Hydraulic Model Consistency Check
Spring Creek at Scrub Road (March 2001)
Discharge (m3/s)
Time
TUFLOW
URBS
0
10
20
30
40
50
60
9/03/2001 0:00
9/03/2001 12:00
10/03/2001 0:00
10/03/2001 12:00
11/03/2001 0:00
11/03/2001 12:00

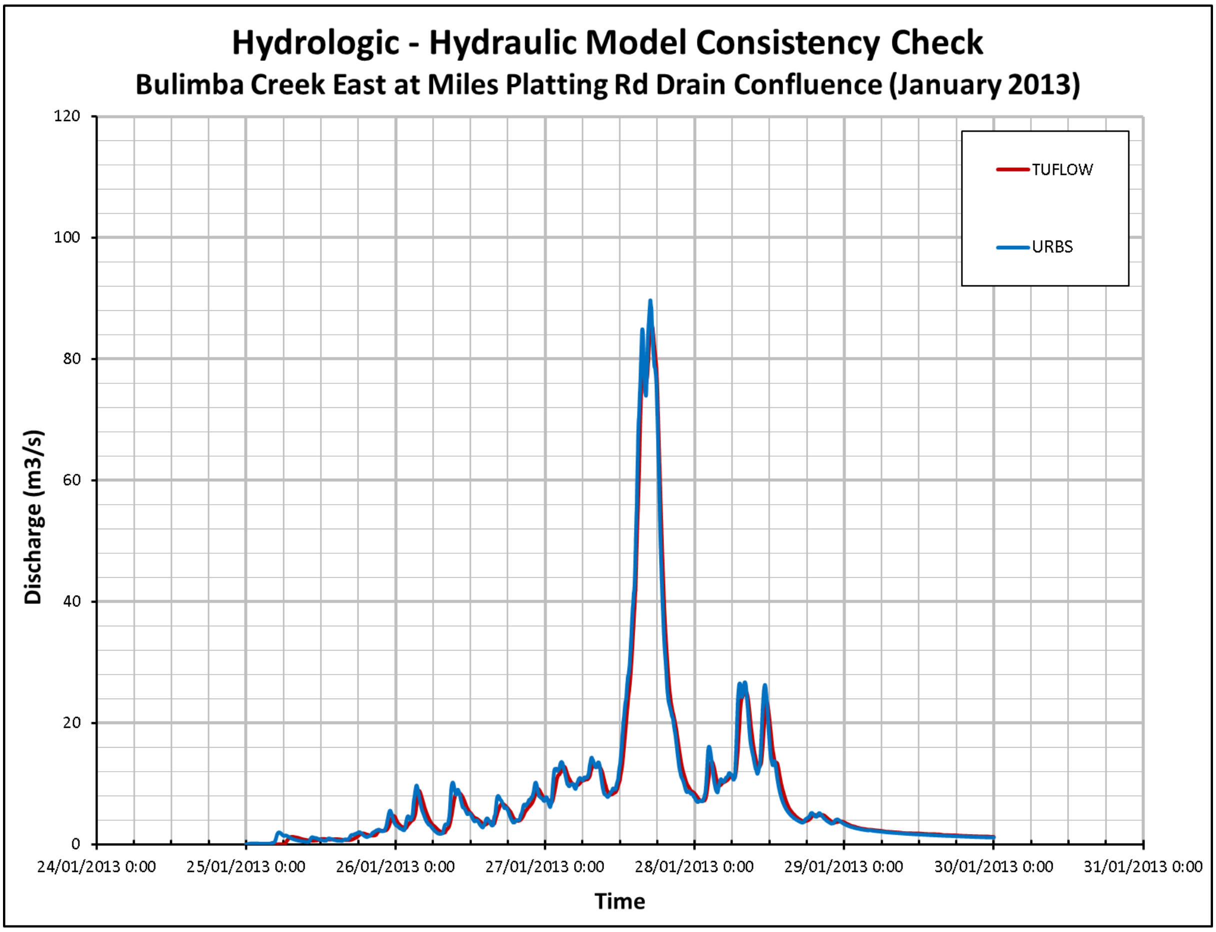

Hydrologic - Hydraulic Model Consistency Check
Salvin Creek at Donnington Street (March 2001)
Discharge (m3/s)
Time
TUFLOW
URBS
0
20
40
60
80
100
120
9/03/2001 0:00
9/03/2001 12:00
10/03/2001 0:00
10/03/2001 12:00
11/03/2001 0:00
11/03/2001 12:00


Hydrologic - Hydraulic Model Consistency Check
Phillips Creek at Creek Road (March 2001)
Discharge (m3/s)
Time
TUFLOW
URBS
9/03/2001 0:00
9/03/2001 12:00
10/03/2001 0:00
10/03/2001 12:00
11/03/2001 0:00
11/03/2001 12:00

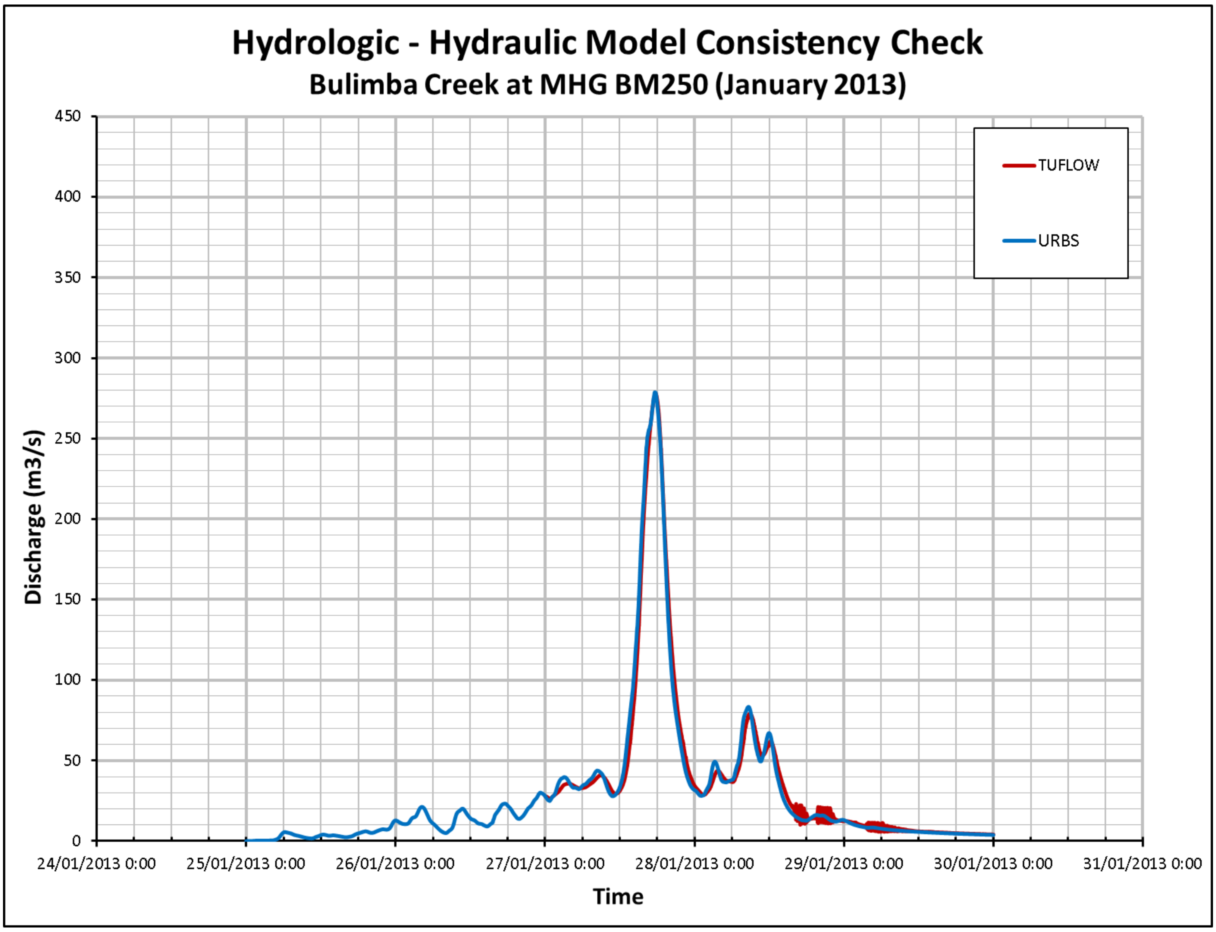

Hydrologic - Hydraulic Model Consistency Check
Mimosa Creek at Kessels Road (January 2013)
Discharge (m3/s)
Time
TUFLOW
URBS
24/01/2013 0:00
25/01/2013 0:00
26/01/2013 0:00
27/01/2013 0:00
28/01/2013 0:00
29/01/2013 0:00
30/01/2013 0:00
31/01/2013 0:00


Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek at Pacific Motorway (January 2013)
Discharge (m3/s)
Time
TUFLOW
URBS
0
20
40
60
80
100
120
140
160
180
24/01/2013 0:00
25/01/2013 0:00
26/01/2013 0:00
27/01/2013 0:00
28/01/2013 0:00
29/01/2013 0:00
30/01/2013 0:00
31/01/2013 0:00

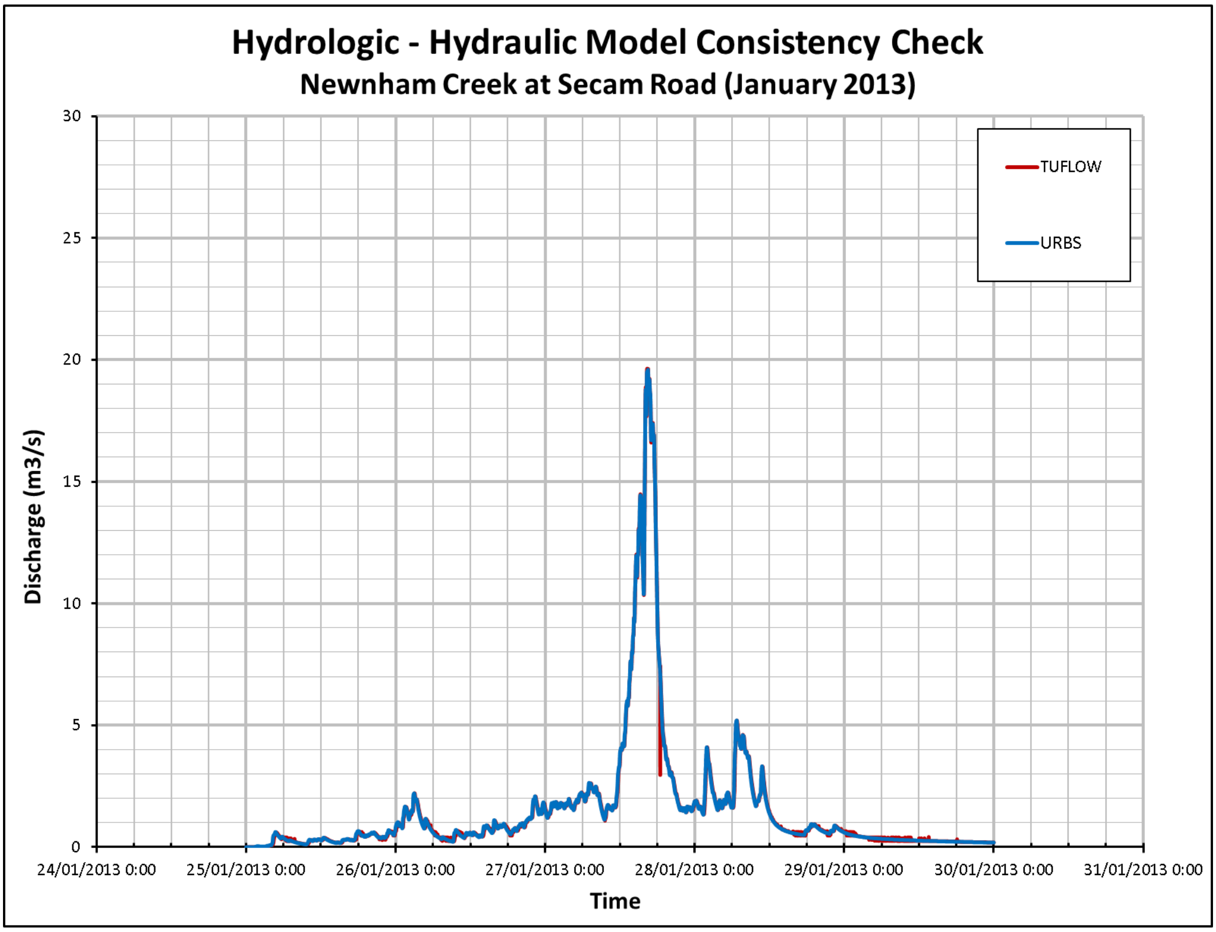

Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek East at MHG BM430 (January 2013)
Discharge (m3/s)
Time
TUFLOW
URBS
0
5
10
15
20
25
30
35
40
45
24/01/2013 0:00
25/01/2013 0:00
26/01/2013 0:00
27/01/2013 0:00
28/01/2013 0:00
29/01/2013 0:00
30/01/2013 0:00
31/01/2013 0:00

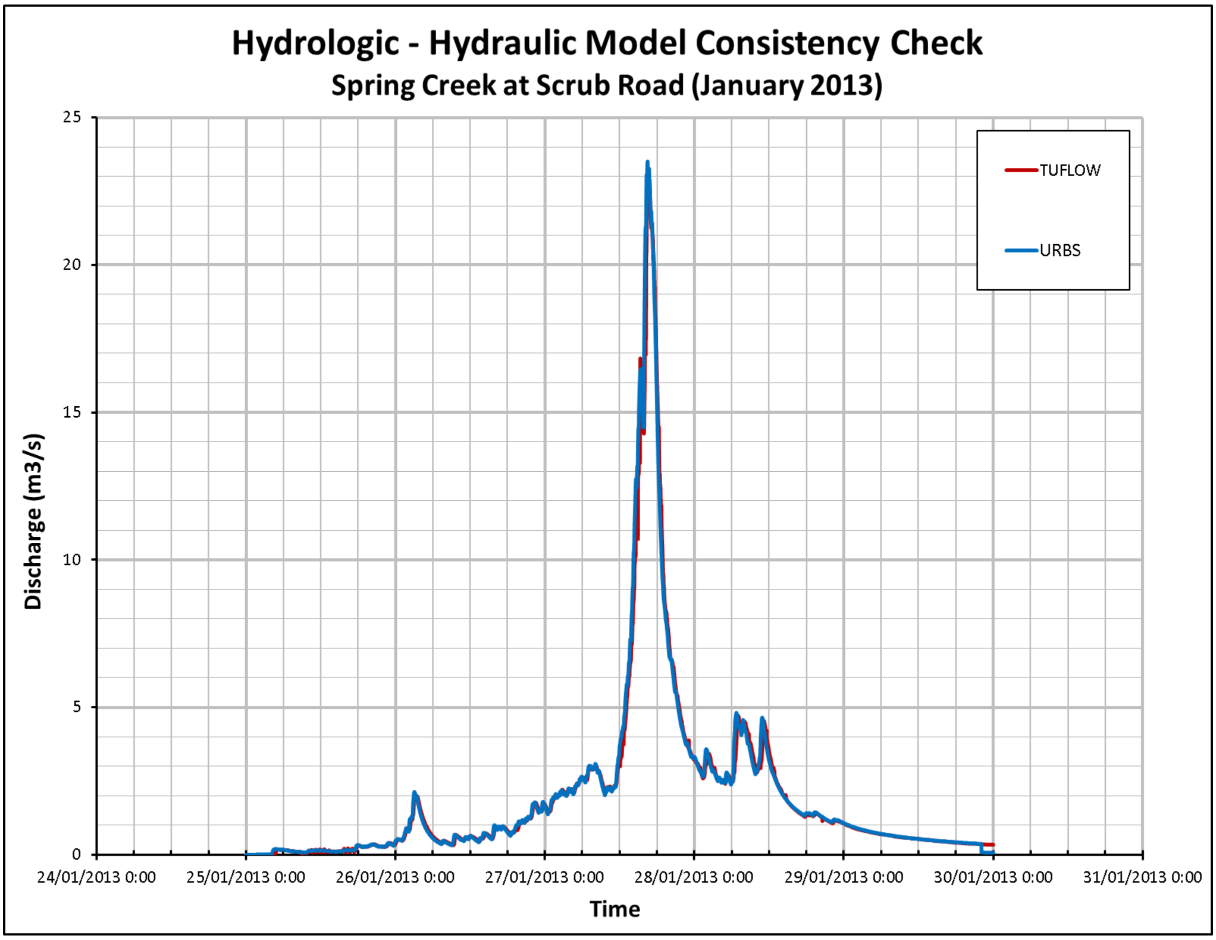


Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek East at Miles Platting Rd Drain Confluence (January 2013)
TUFLOW
URBS
Discharge (m3/s)
120
100
80
60
40
20
0
24/01/2013 0:00
25/01/2013 0:00
26/01/2013 0:00
27/01/2013 0:00
28/01/2013 0:00
29/01/2013 0:00
30/01/2013 0:00
31/01/2013 0:00
Time



Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek at MHG BM250 (January 2013)
TUFLOW
URBS
Discharge (m3/s)
450
400
350
300
250
200
150
100
50
0
24/01/2013 0:00
25/01/2013 0:00
26/01/2013 0:00
27/01/2013 0:00
28/01/2013 0:00
29/01/2013 0:00
30/01/2013 0:00
31/01/2013 0:00
Time


Hydrologic - Hydraulic Model Consistency Check
Newnham Creek at Secam Road (January 2013)
Discharge (m3/s)
Time
TUFLOW
URBS
0
5
10
15
20
25
30
24/01/2013 0:00
25/01/2013 0:00
26/01/2013 0:00
27/01/2013 0:00
28/01/2013 0:00
29/01/2013 0:00
30/01/2013 0:00
31/01/2013 0:00


Hydrologic - Hydraulic Model Consistency Check
Spring Creek at Scrub Road (January 2013)
Discharge (m3/s)
Time
TUFLOW
URBS
0
5
10
15
20
25
24/01/2013 0:00
25/01/2013 0:00
26/01/2013 0:00
27/01/2013 0:00
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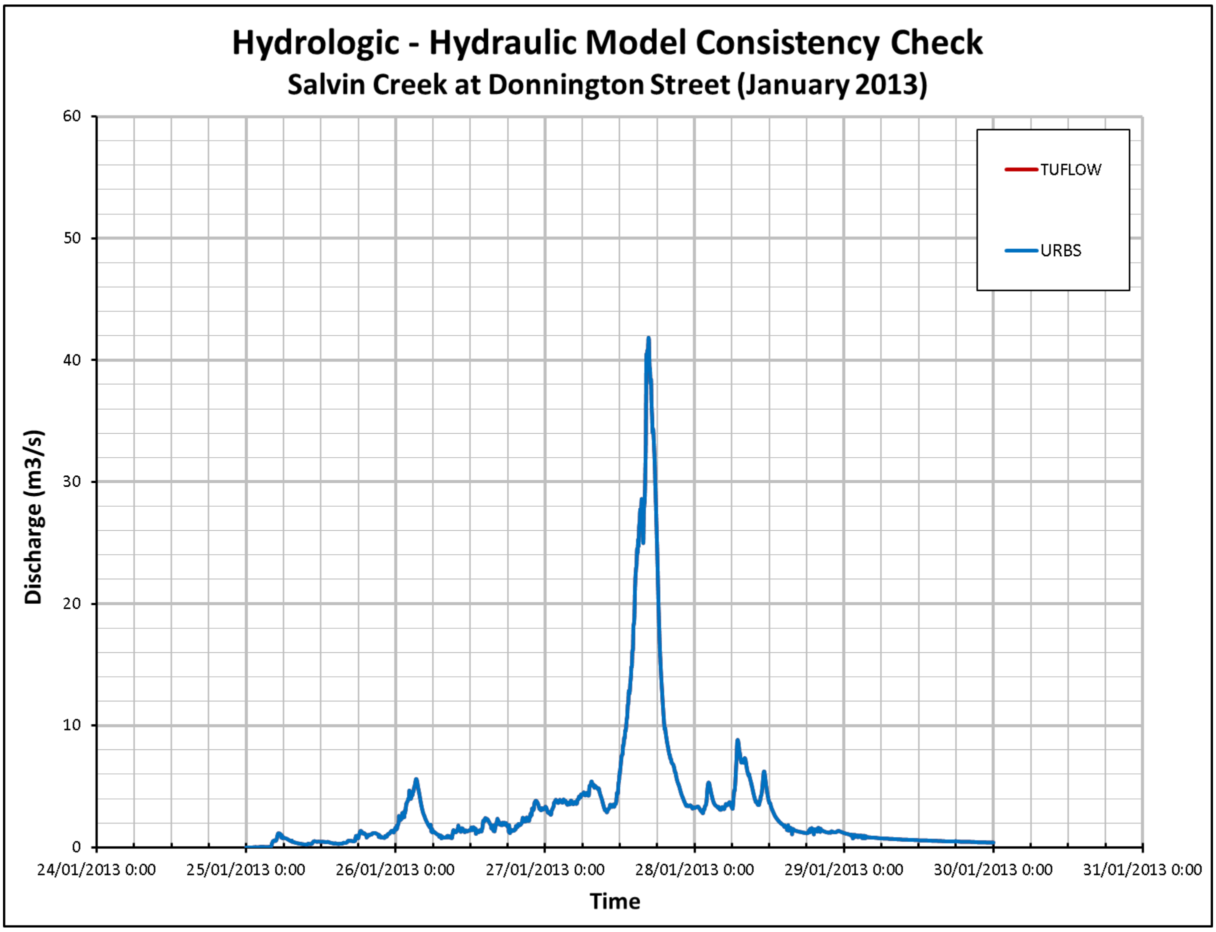
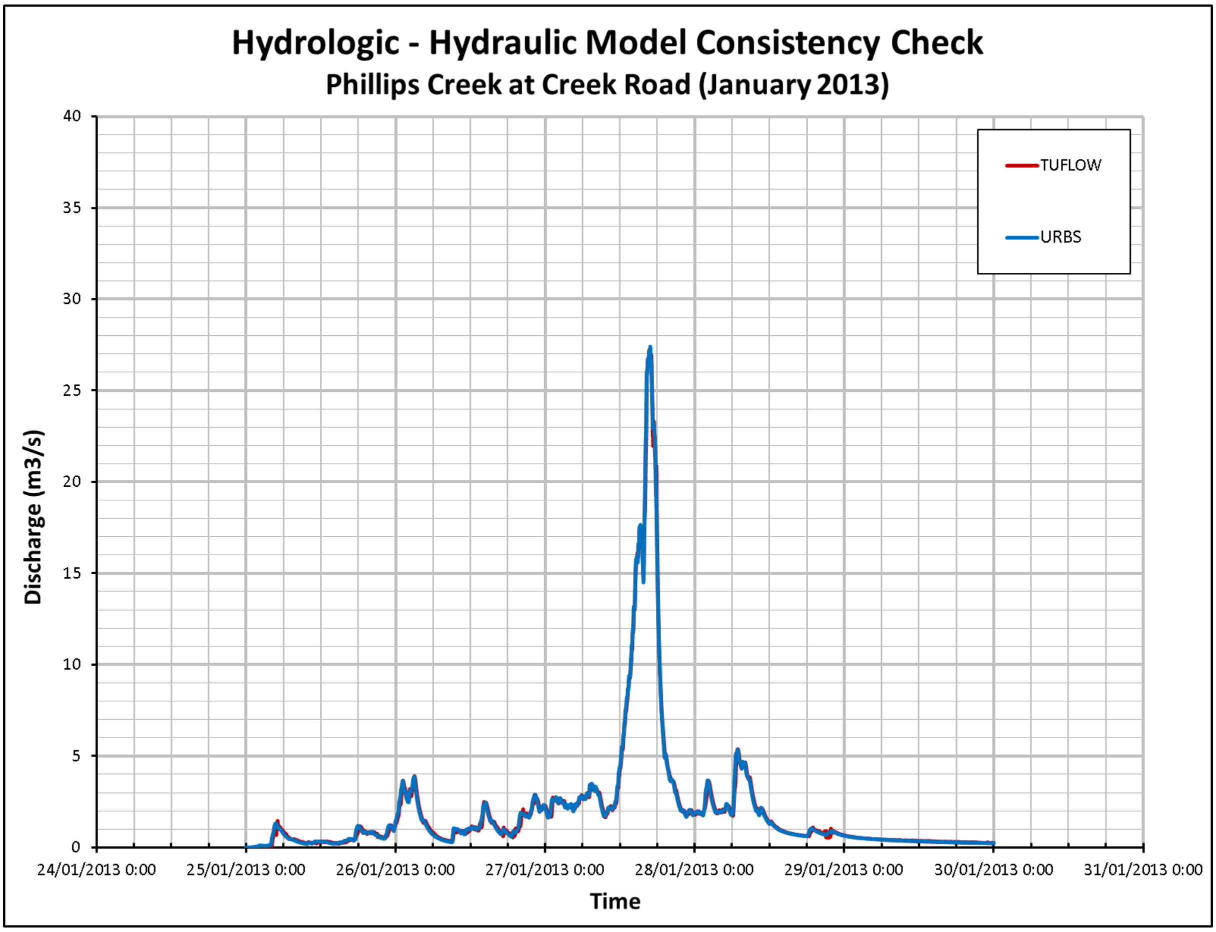
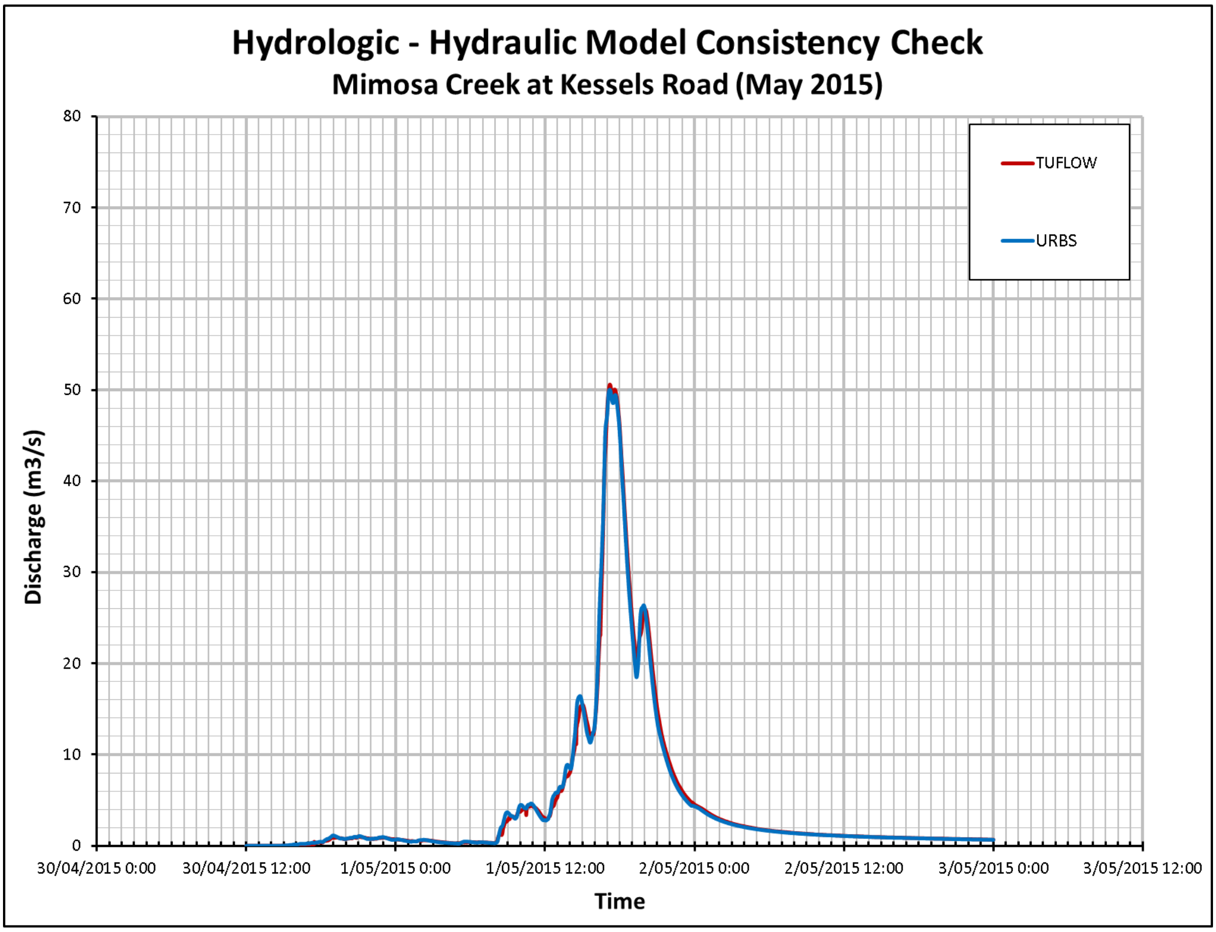
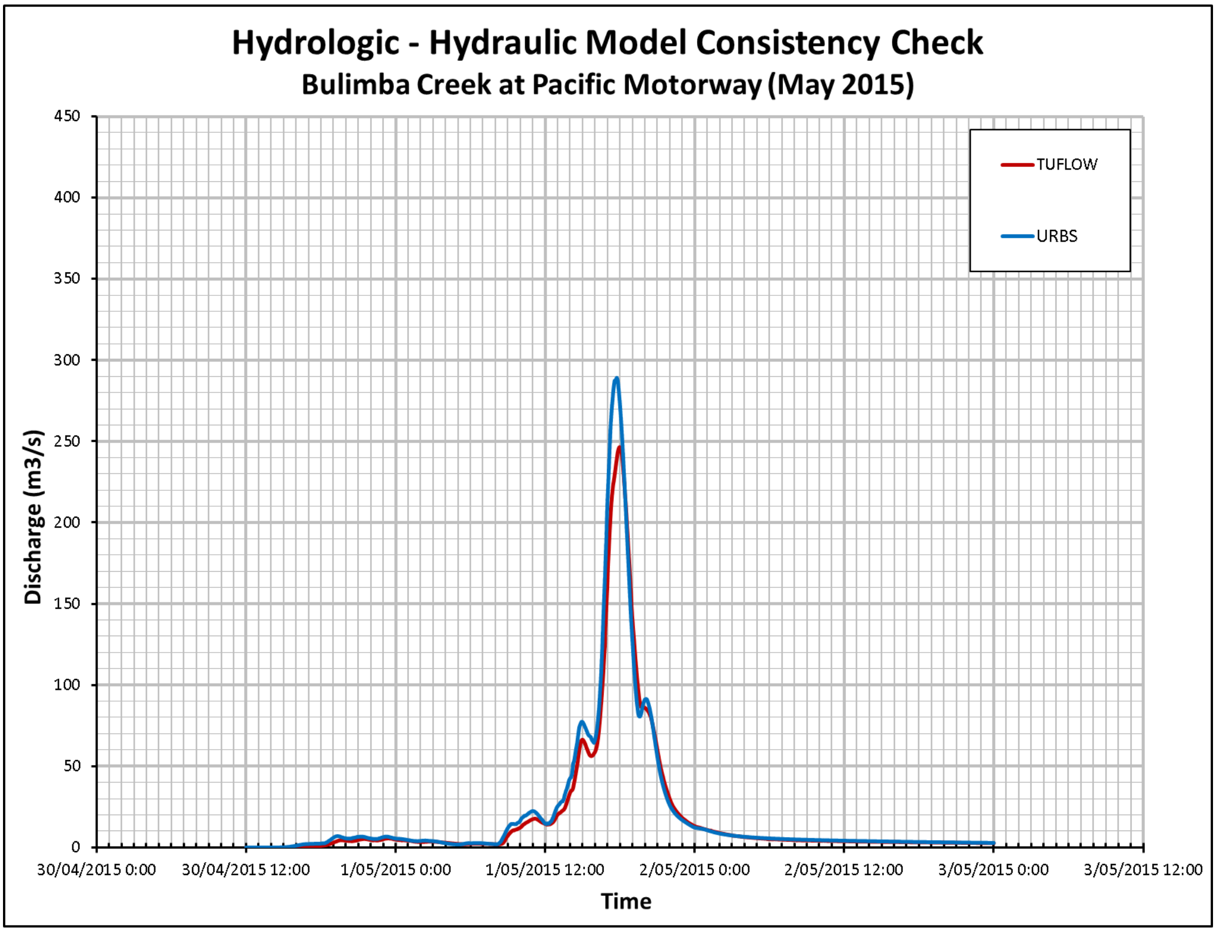
31/01/2013 0:00

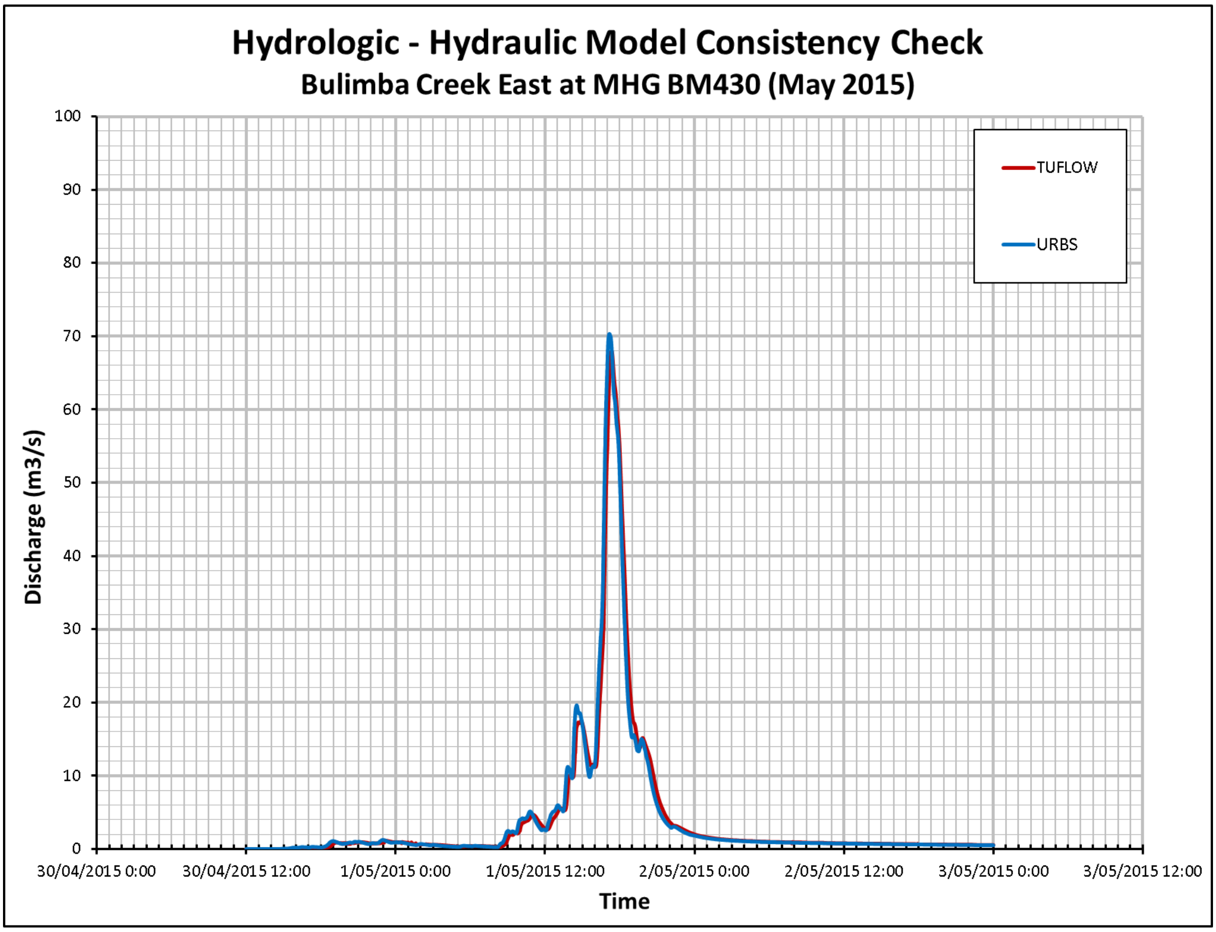

Hydrologic - Hydraulic Model Consistency Check
Salvin Creek at Donnington Street (January 2013)
TUFLOW
URBS
Discharge (m3/s)
0
10
20
30
40
50
60
24/01/2013 0:00
25/01/2013 0:00
26/01/2013 0:00
27/01/2013 0:00
28/01/2013 0:00
29/01/2013 0:00
30/01/2013 0:00
31/01/2013 0:00
Time


Hydrologic - Hydraulic Model Consistency Check
Phillips Creek at Creek Road (January 2013)
TUFLOW
URBS
Discharge (m3/s)
0
5
10
15
20
25
30
35
40
24/01/2013 0:00
25/01/2013 0:00
26/01/2013 0:00
27/01/2013 0:00
28/01/2013 0:00
29/01/2013 0:00
30/01/2013 0:00
31/01/2013 0:00
Time

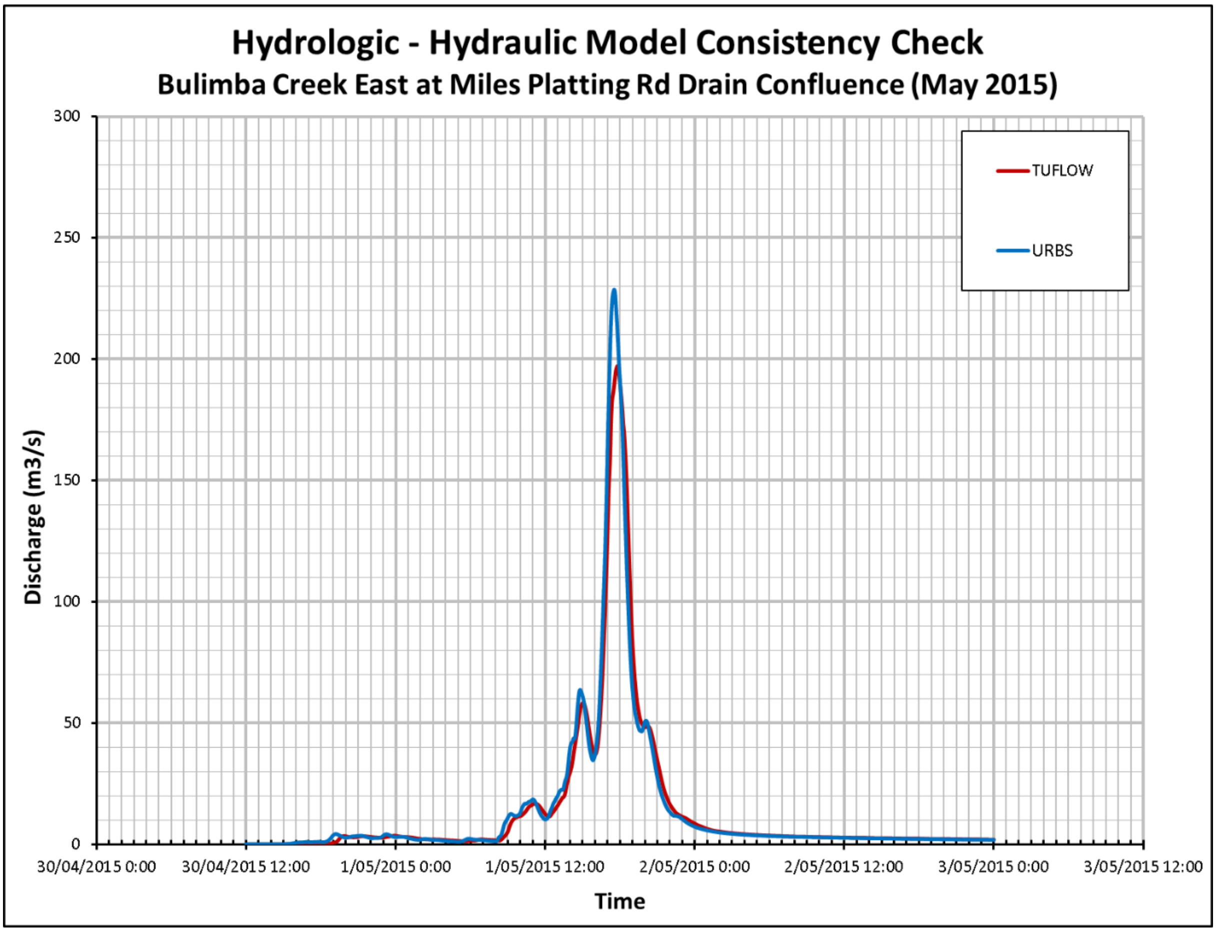




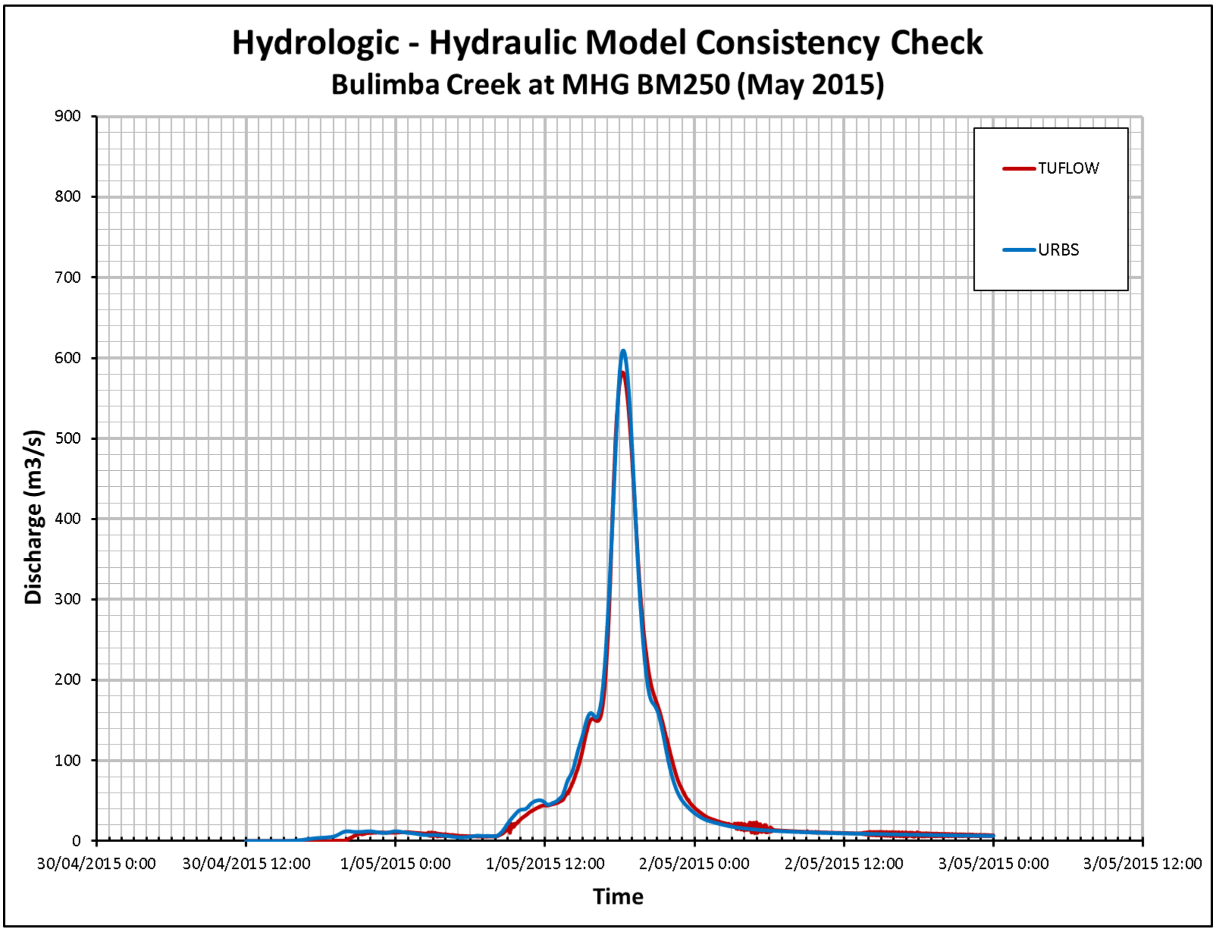
For Information Only – Not Council Policy



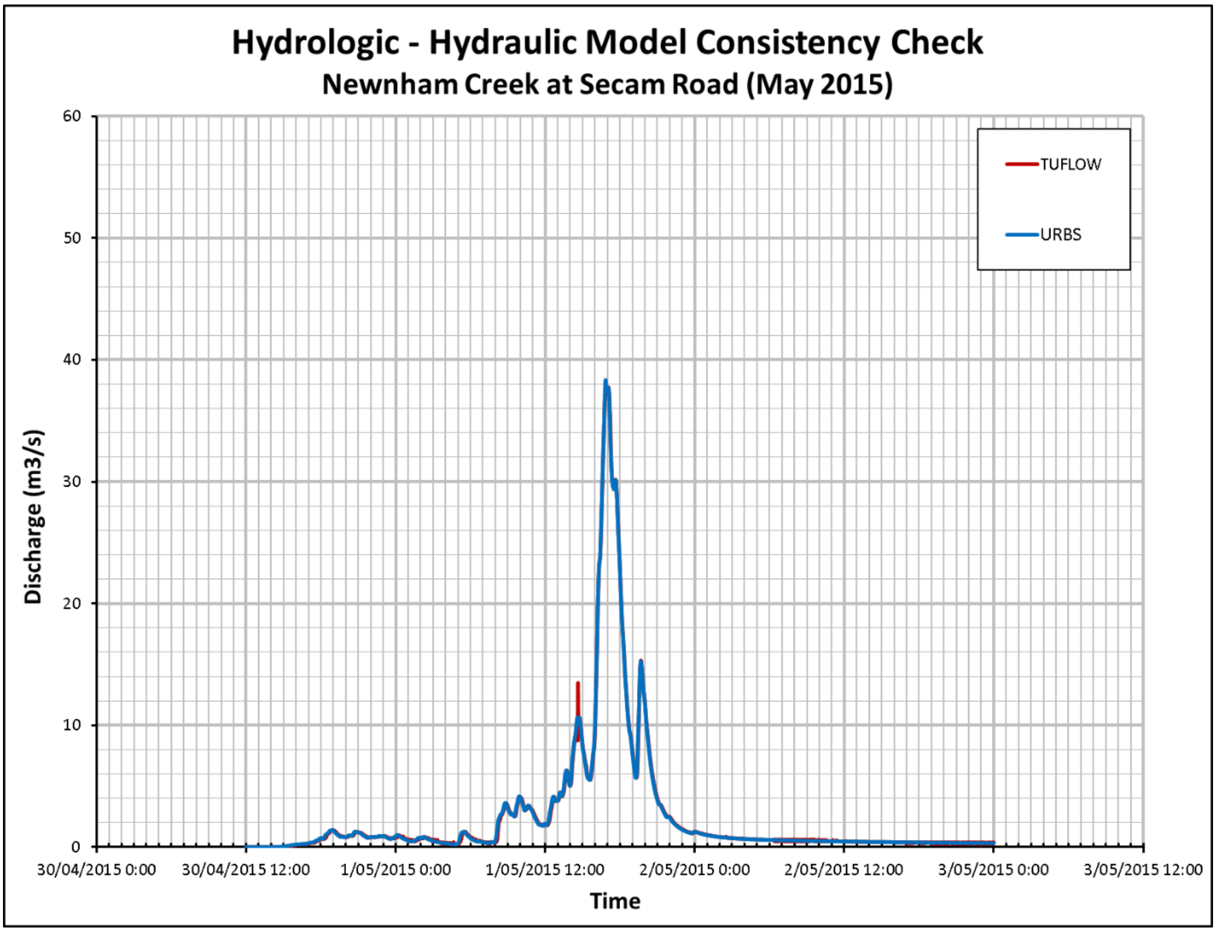
Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek East at MHG BM430 (May 2015)
Discharge (m3/s)
Time
TUFLOW
URBS
100
90
80
70
60
50
40
30
20
10
0
30/04/2015 0:00
30/04/2015 12:00
1/05/2015 0:00
1/05/2015 12:00
2/05/2015 0:00
2/05/2015 12:00
3/05/2015 0:00
3/05/2015 12:00



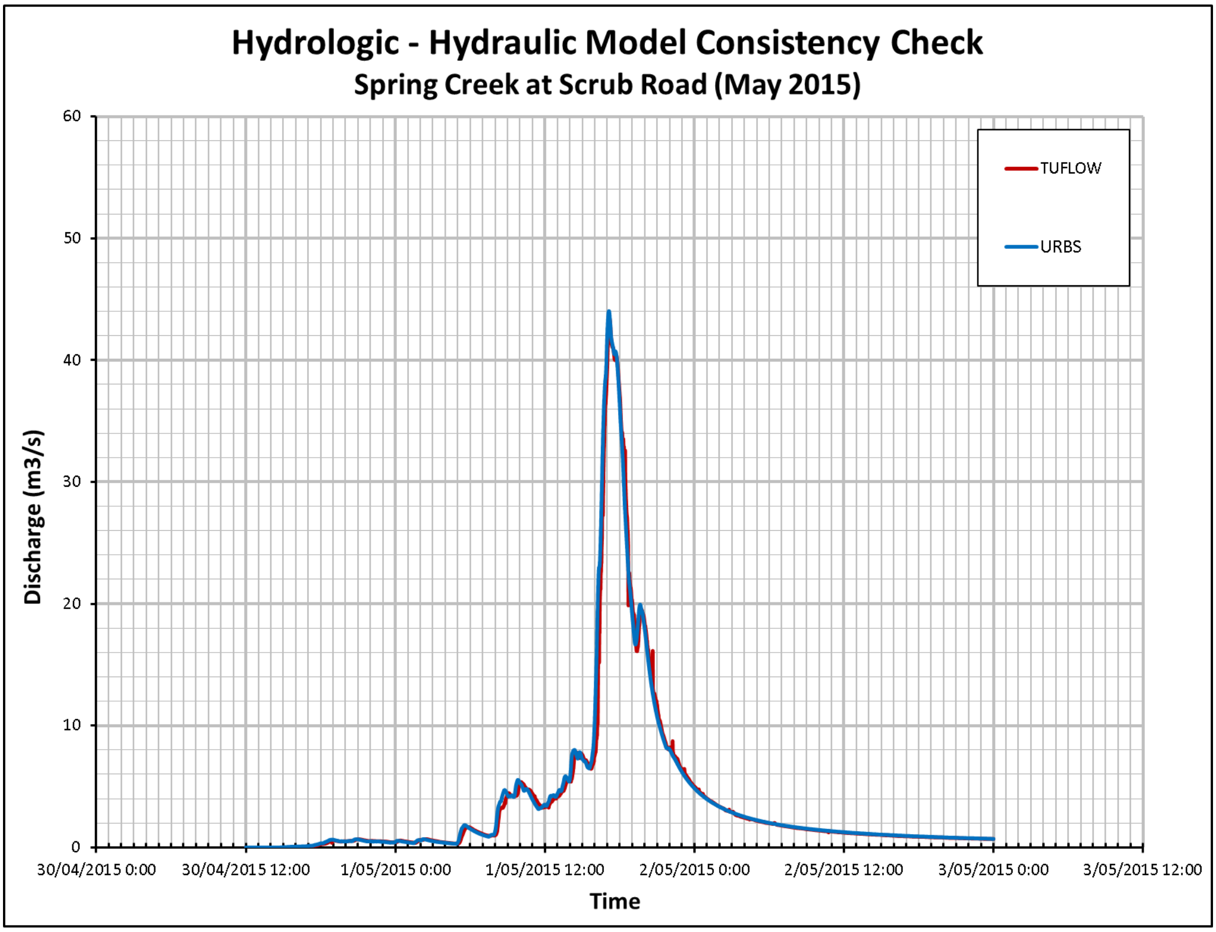
Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek East at Miles Platting Rd Drain Confluence (May 2015)
Discharge (m3/s)
Time
TUFLOW
URBS
300
250
200
150
100
50
0
30/04/2015 0:00
30/04/2015 12:00
1/05/2015 0:00
1/05/2015 12:00
2/05/2015 0:00
2/05/2015 12:00
3/05/2015 0:00
3/05/2015 12:00



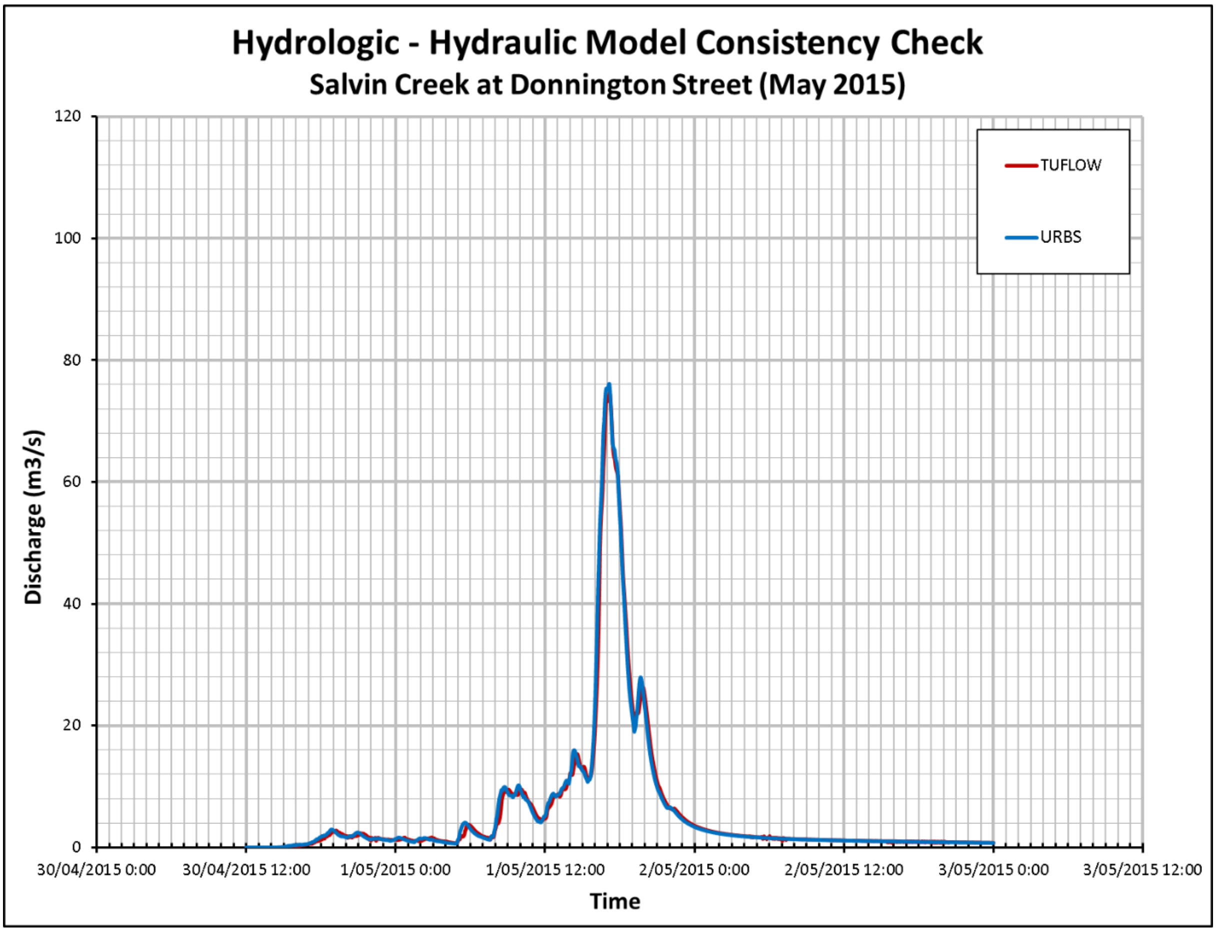
Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek at MHG BM250 (May 2015)
TUFLOW
URBS
Discharge (m3/s)
900
800
700
600
500
400
300
200
100
0
30/04/2015 0:00
30/04/2015 12:00
1/05/2015 0:00
1/05/2015 12:00
2/05/2015 0:00
2/05/2015 12:00
3/05/2015 0:00
3/05/2015 12:00
Time



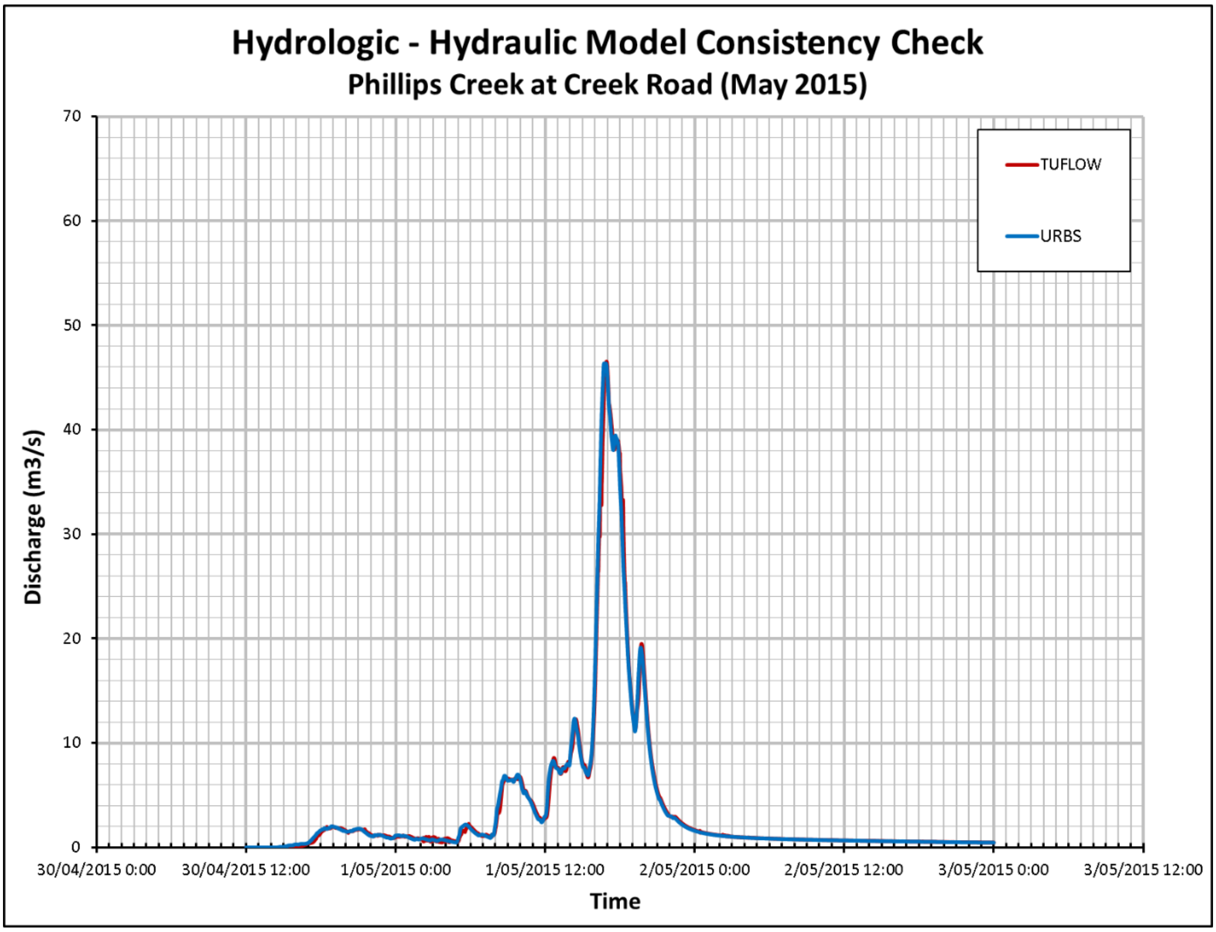
Hydrologic - Hydraulic Model Consistency Check
Newnham Creek at Secam Road (May 2015)
TUFLOW
URBS
Discharge (m3/s)
60
50
40
30
20
10
0
30/04/2015 0:00
30/04/2015 12:00
1/05/2015 0:00
1/05/2015 12:00
2/05/2015 0:00
2/05/2015 12:00
3/05/2015 0:00
3/05/2015 12:00
Time

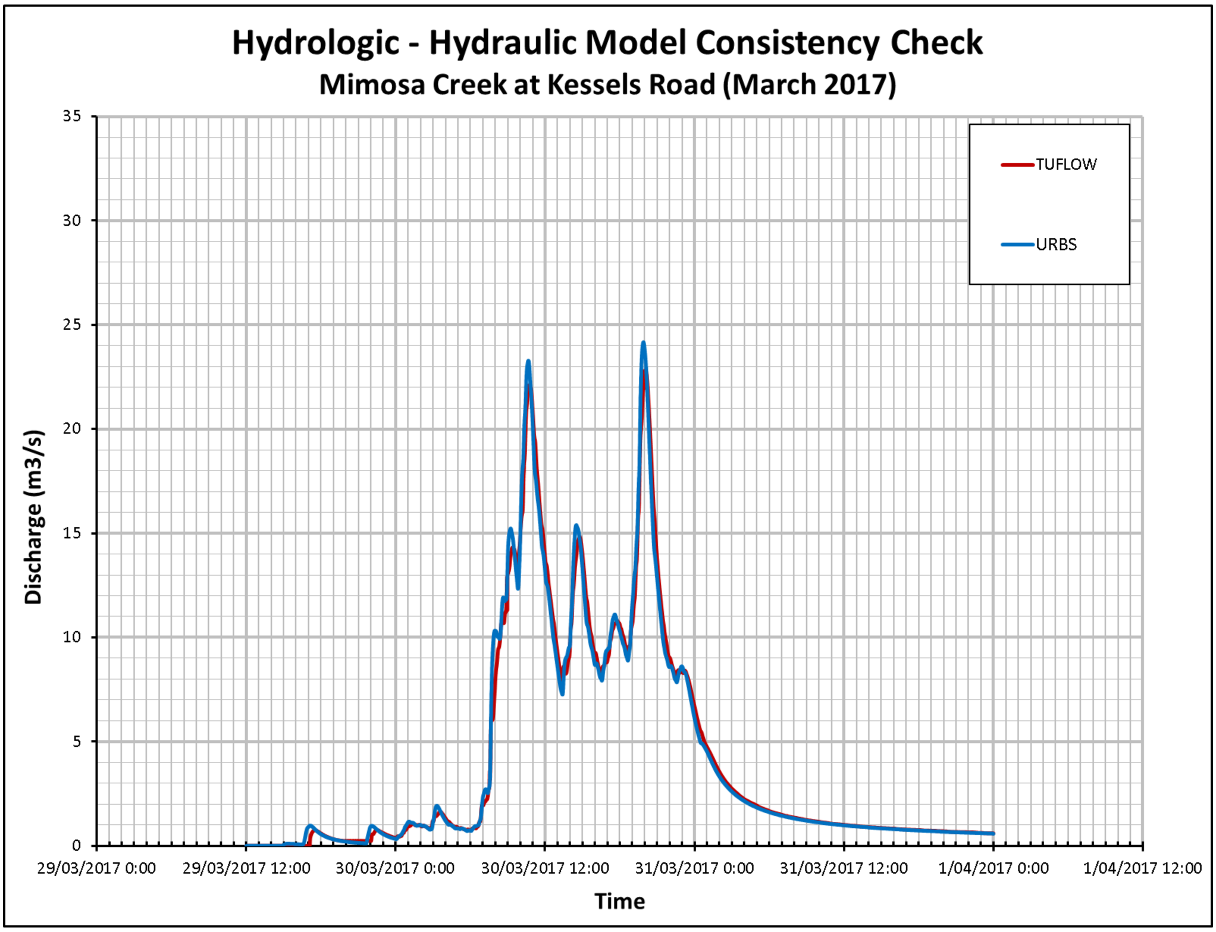


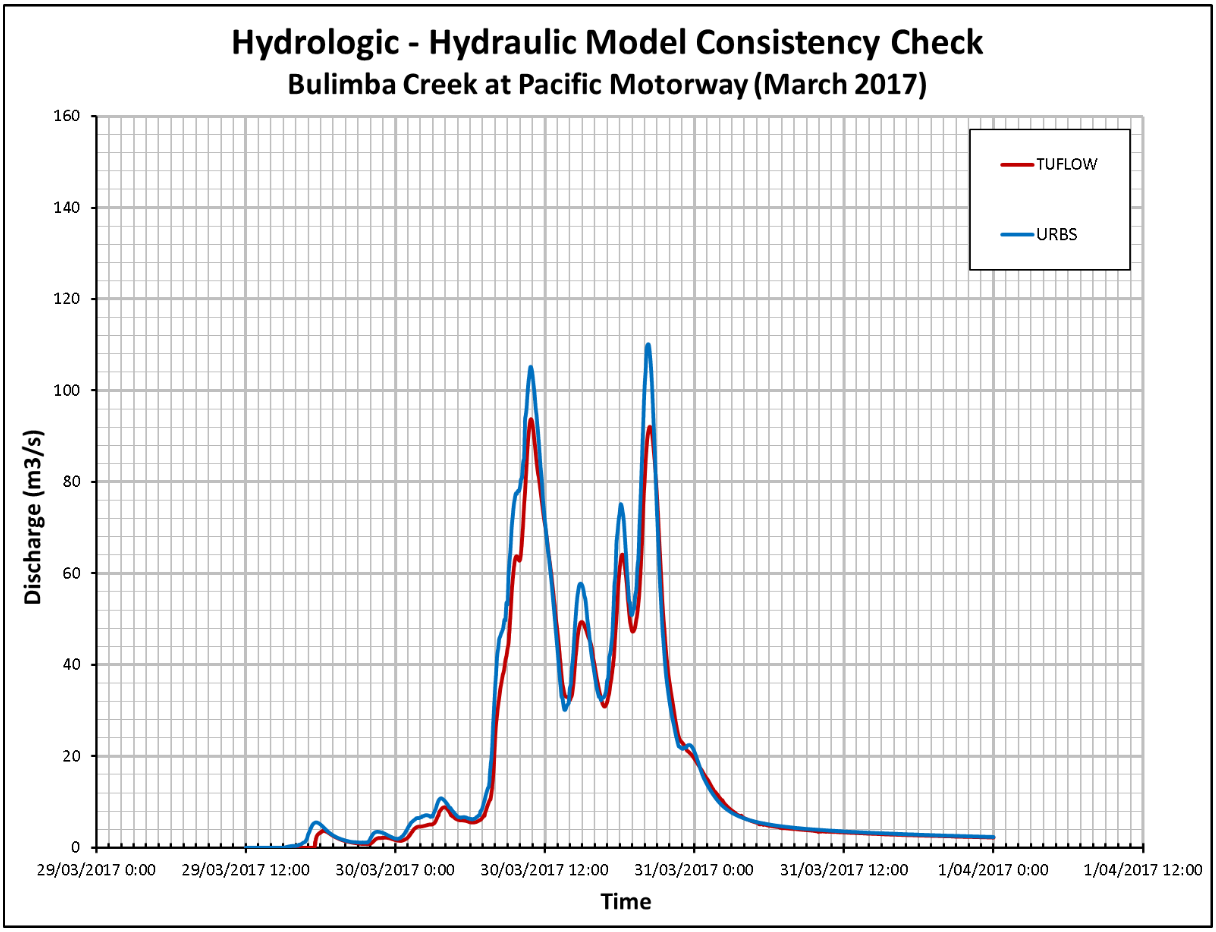
Hydrologic - Hydraulic Model Consistency Check
Spring Creek at Scrub Road (May 2015)
Discharge (m3/s)
60
50
40
30
20
10
0
30/04/2015 0:00
30/04/2015 12:00
1/05/2015 0:00
1/05/2015 12:00
2/05/2015 0:00
2/05/2015 12:00
3/05/2015 0:00
3/05/2015 12:00
Time
TUFLOW
URBS



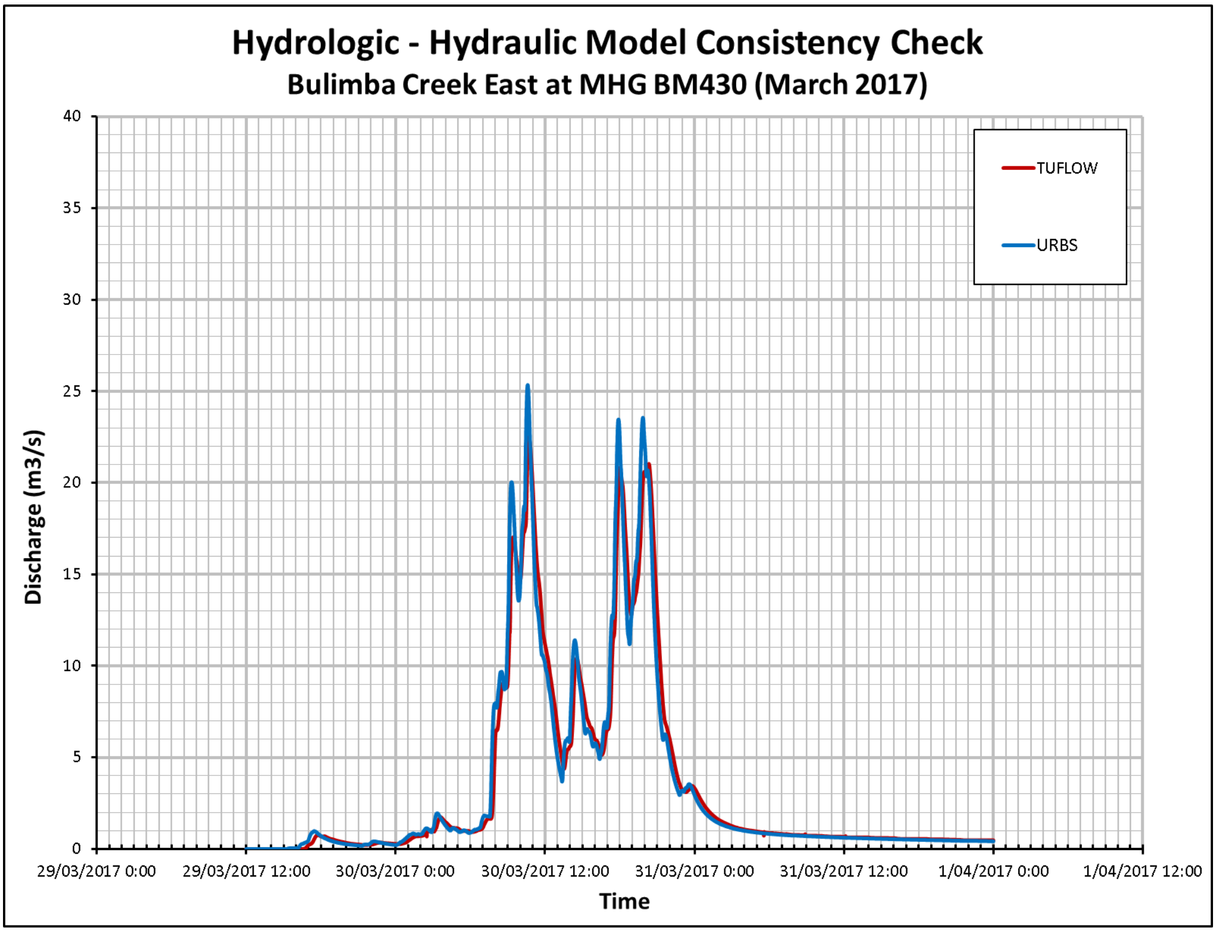
Hydrologic - Hydraulic Model Consistency Check
Salvin Creek at Donnington Street (May 2015)
Discharge (m3/s)
120
100
80
60
40
20
0
30/04/2015 0:00
30/04/2015 12:00
1/05/2015 0:00
1/05/2015 12:00
2/05/2015 0:00
2/05/2015 12:00
3/05/2015 0:00
3/05/2015 12:00
Time
TUFLOW
URBS


Hydrologic - Hydraulic Model Consistency Check
Phillips Creek at Creek Road (May 2015)
TUFLOW
URBS
Discharge (m3/s)
70
60
50
40
30
20
10
0
30/04/2015 0:00
30/04/2015 12:00
1/05/2015 0:00
1/05/2015 12:00
2/05/2015 0:00
2/05/2015 12:00
3/05/2015 0:00
3/05/2015 12:00
Time

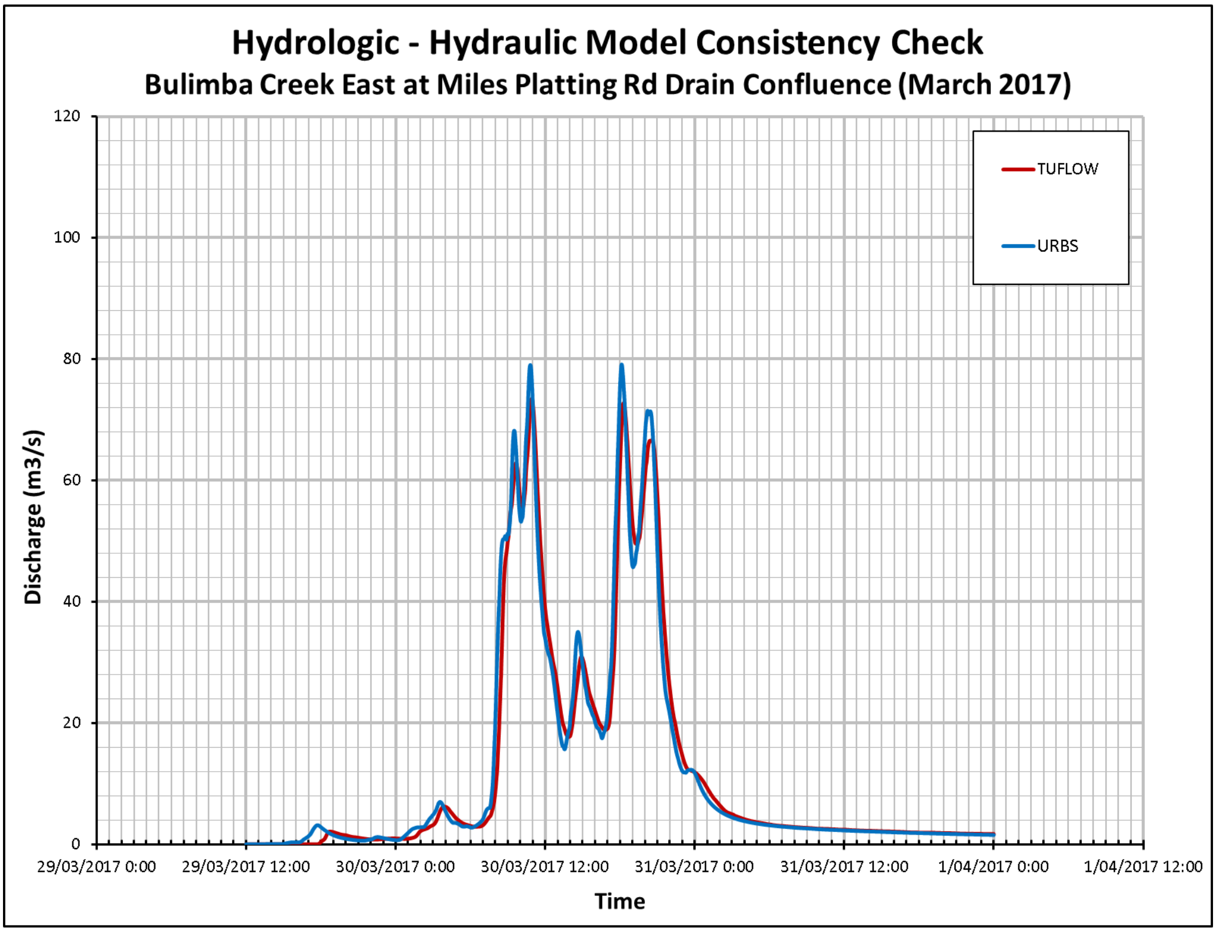

Hydrologic - Hydraulic Model Consistency Check
Mimosa Creek at Kessels Road (March 2017)
TUFLOW
URBS
Discharge (m3/s)
35
30
25
20
15
10
5
0
29/03/2017 0:00
29/03/2017 12:00
30/03/2017 0:00
30/03/2017 12:00
31/03/2017 0:00
31/03/2017 12:00
1/04/2017 0:00
1/04/2017 12:00
Time



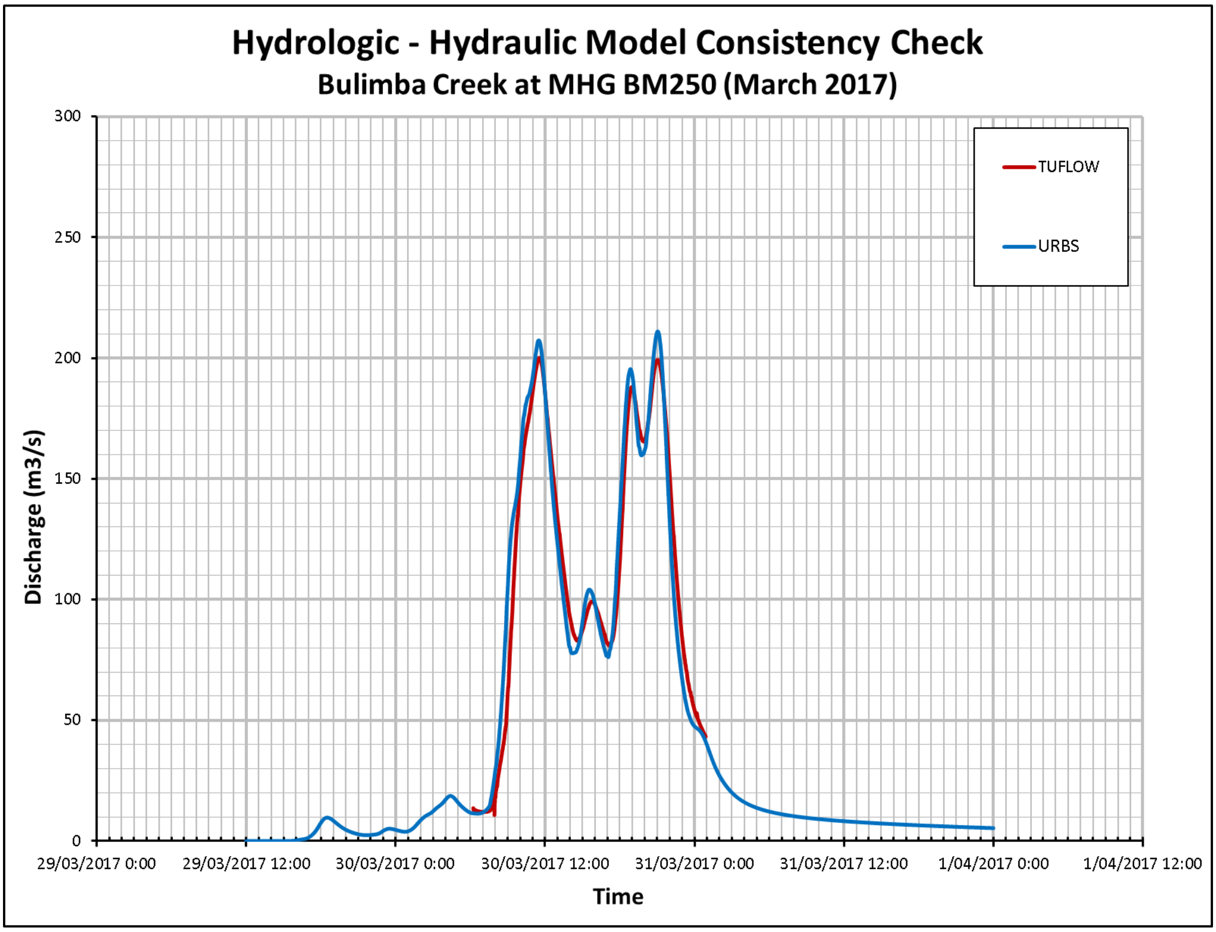
Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek at Pacific Motorway (March 2017)
160
140
120
100
80
60
40
20
0
Discharge (m3/s)
TUFLOW
URBS
29/03/2017 0:00
29/03/2017 12:00
30/03/2017 0:00
30/03/2017 12:00
31/03/2017 0:00
31/03/2017 12:00
1/04/2017 0:00
1/04/2017 12:00
Time



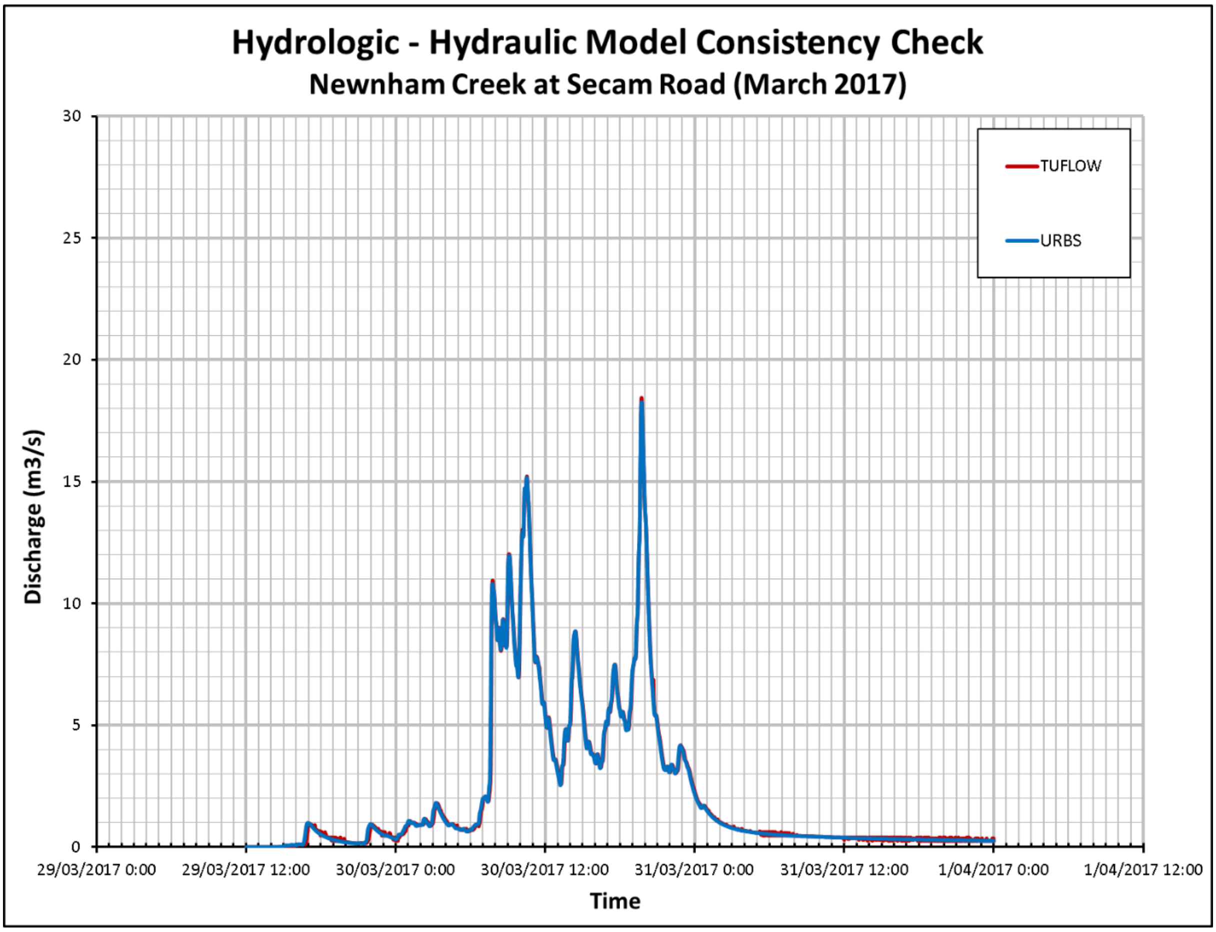
Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek East at MHG BM430 (March 2017)
40
35
30
25
20
15
10
5
0
Discharge (m3/s)
TUFLOW
URBS
29/03/2017 0:00
29/03/2017 12:00
30/03/2017 0:00
30/03/2017 12:00
31/03/2017 0:00
31/03/2017 12:00
1/04/2017 0:00
1/04/2017 12:00
Time

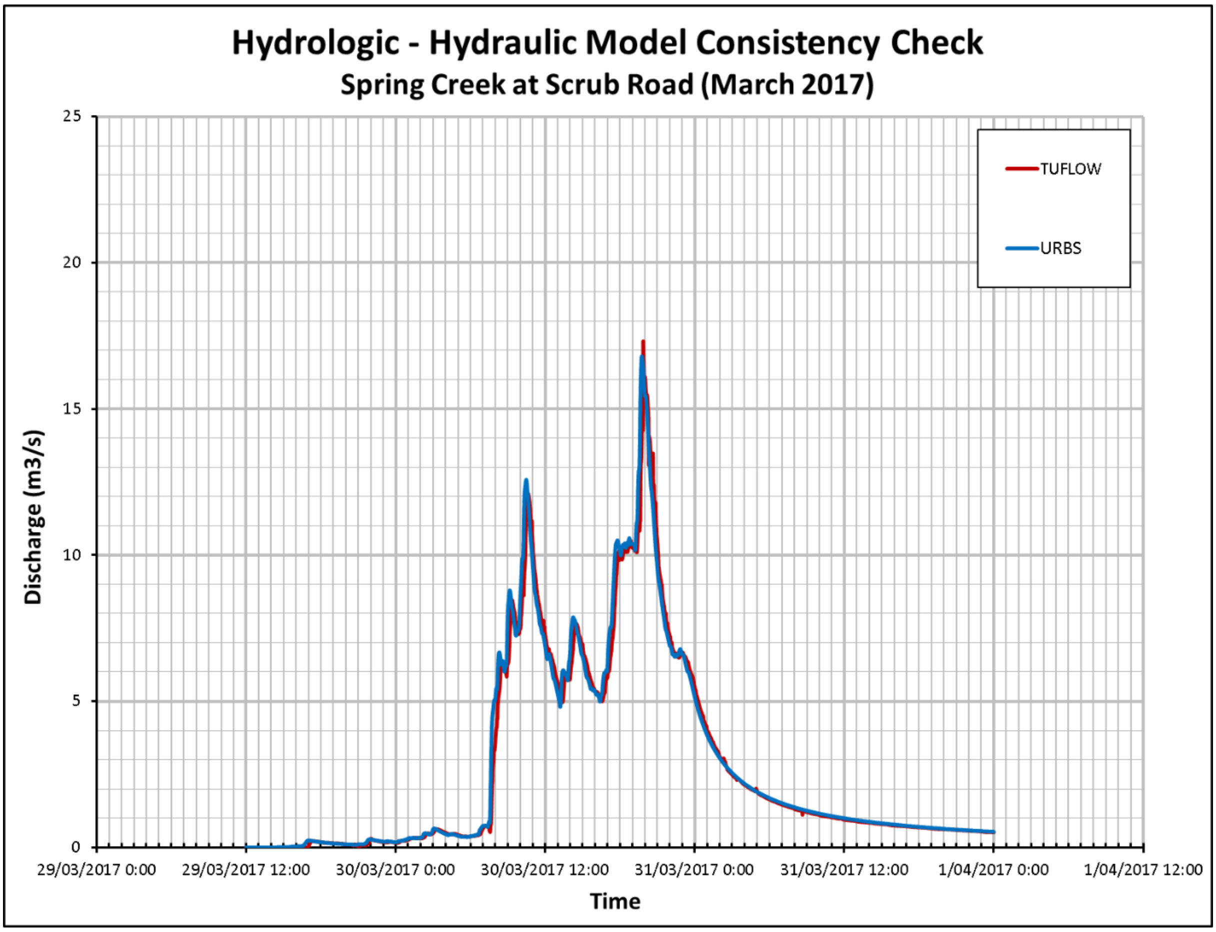


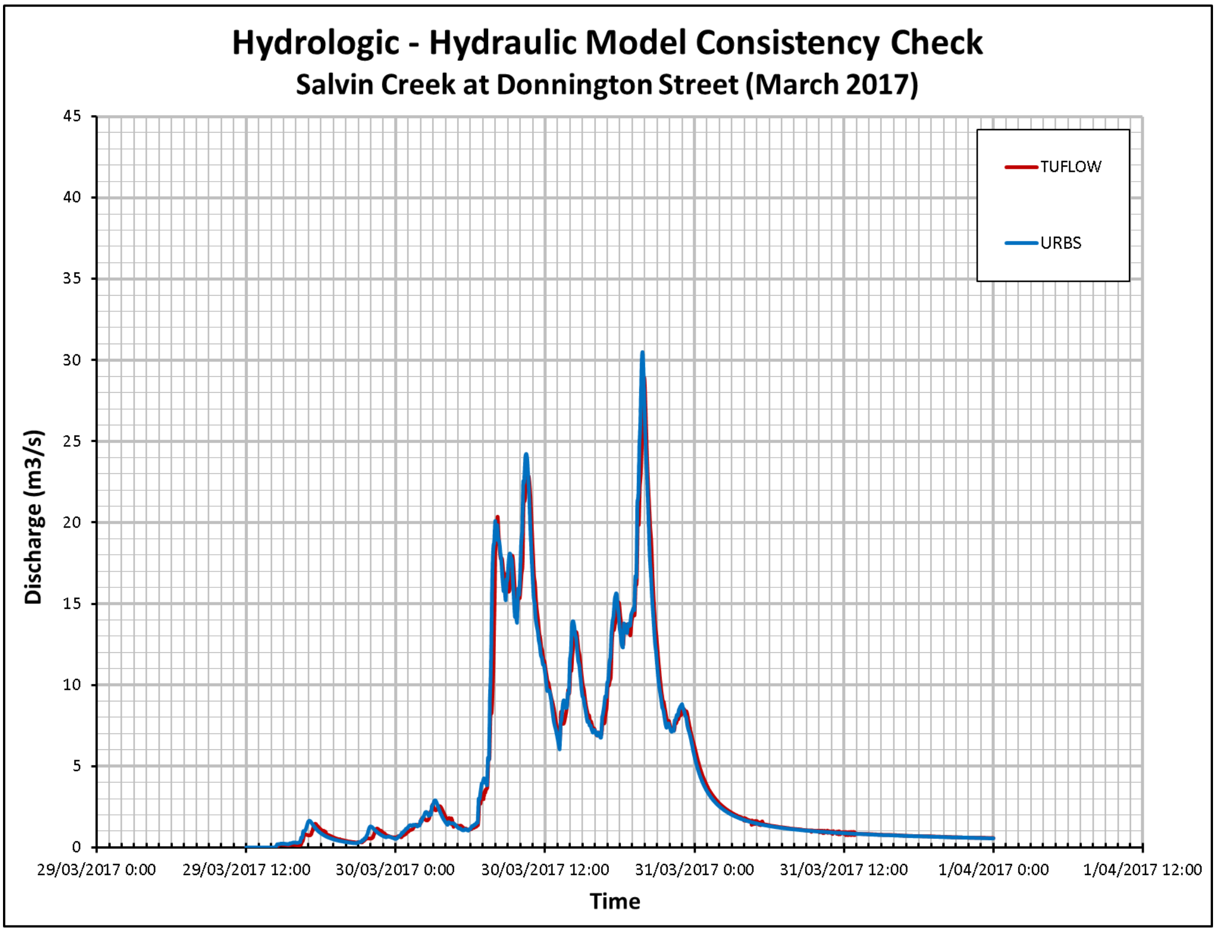
Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek East at Miles Platting Rd Drain Confluence (March 2017)
Discharge (m3/s)
120
100
80
60
40
20
0
TUFLOW
URBS
29/03/2017 0:00
29/03/2017 12:00
30/03/2017 0:00
30/03/2017 12:00
31/03/2017 0:00
31/03/2017 12:00
1/04/2017 0:00
1/04/2017 12:00
Time

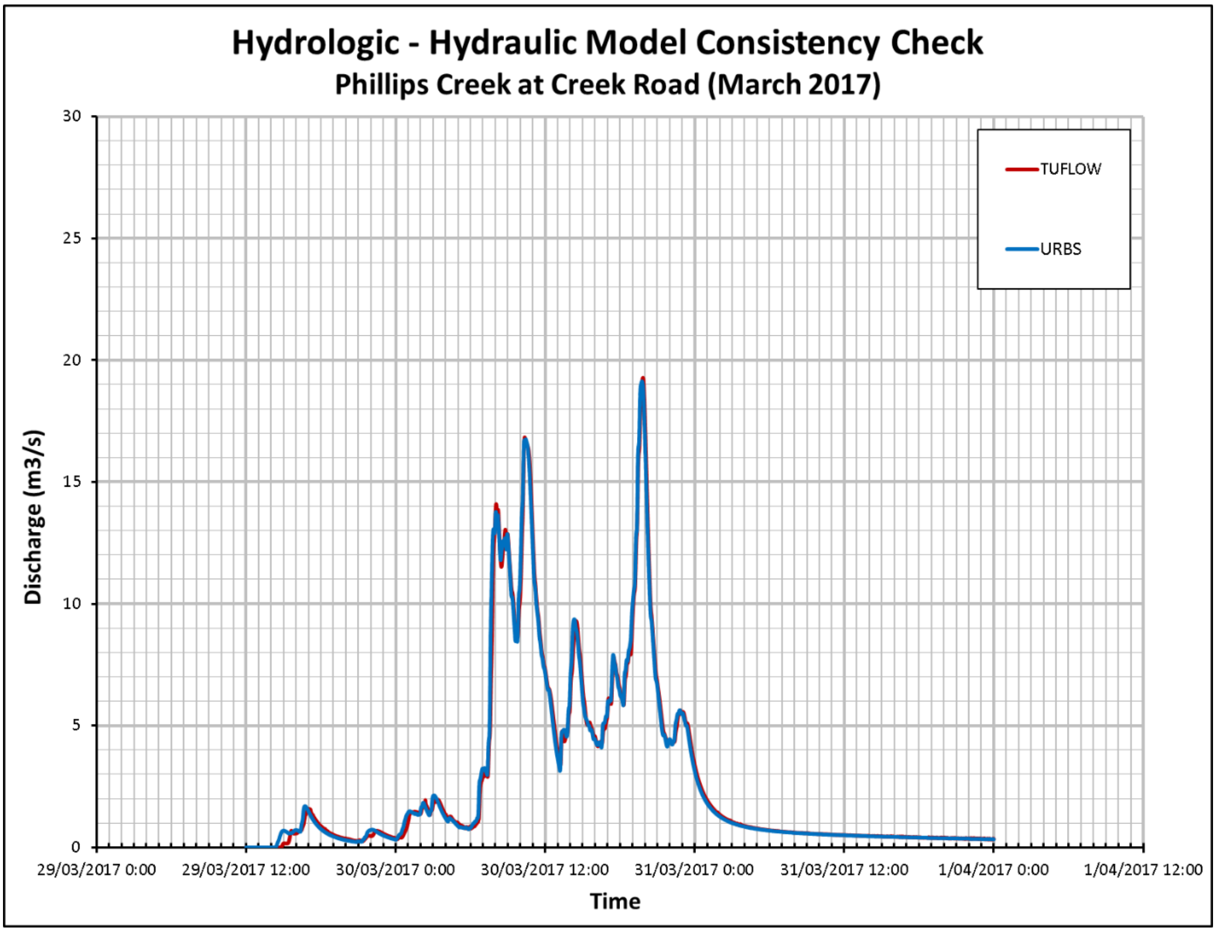


Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek at MHG BM250 (March 2017)
Discharge (m3/s)
300
250
200
150
100
50
0
TUFLOW
URBS
29/03/2017 0:00
29/03/2017 12:00
30/03/2017 0:00
30/03/2017 12:00
31/03/2017 0:00
31/03/2017 12:00
1/04/2017 0:00
1/04/2017 12:00
Time

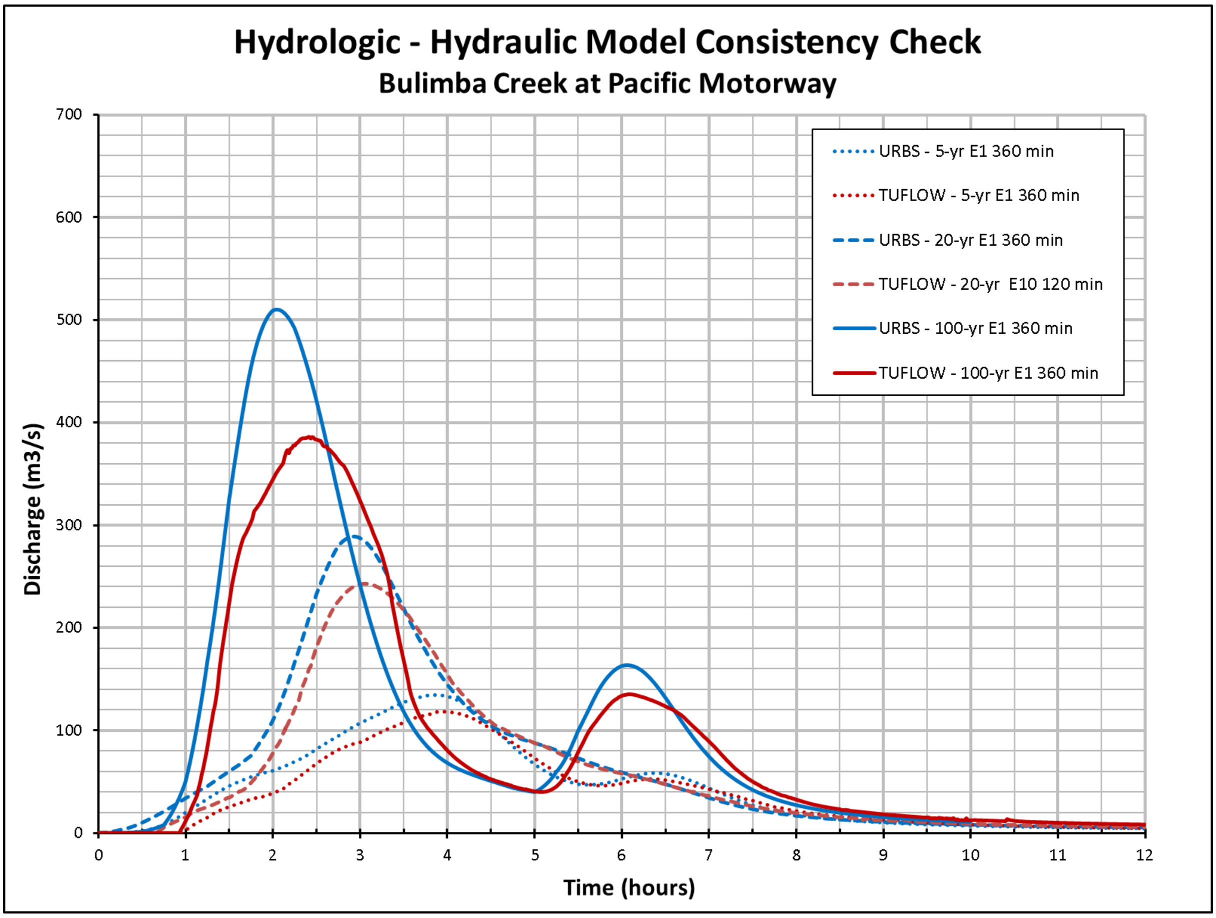

Hydrologic - Hydraulic Model Consistency Check
Newnham Creek at Secam Road (March 2017)
Discharge (m3/s)
Time
TUFLOW
URBS
29/03/2017 0:00
29/03/2017 12:00
30/03/2017 0:00
30/03/2017 12:00
31/03/2017 0:00
31/03/2017 12:00
1/04/2017 0:00
1/04/2017 12:00

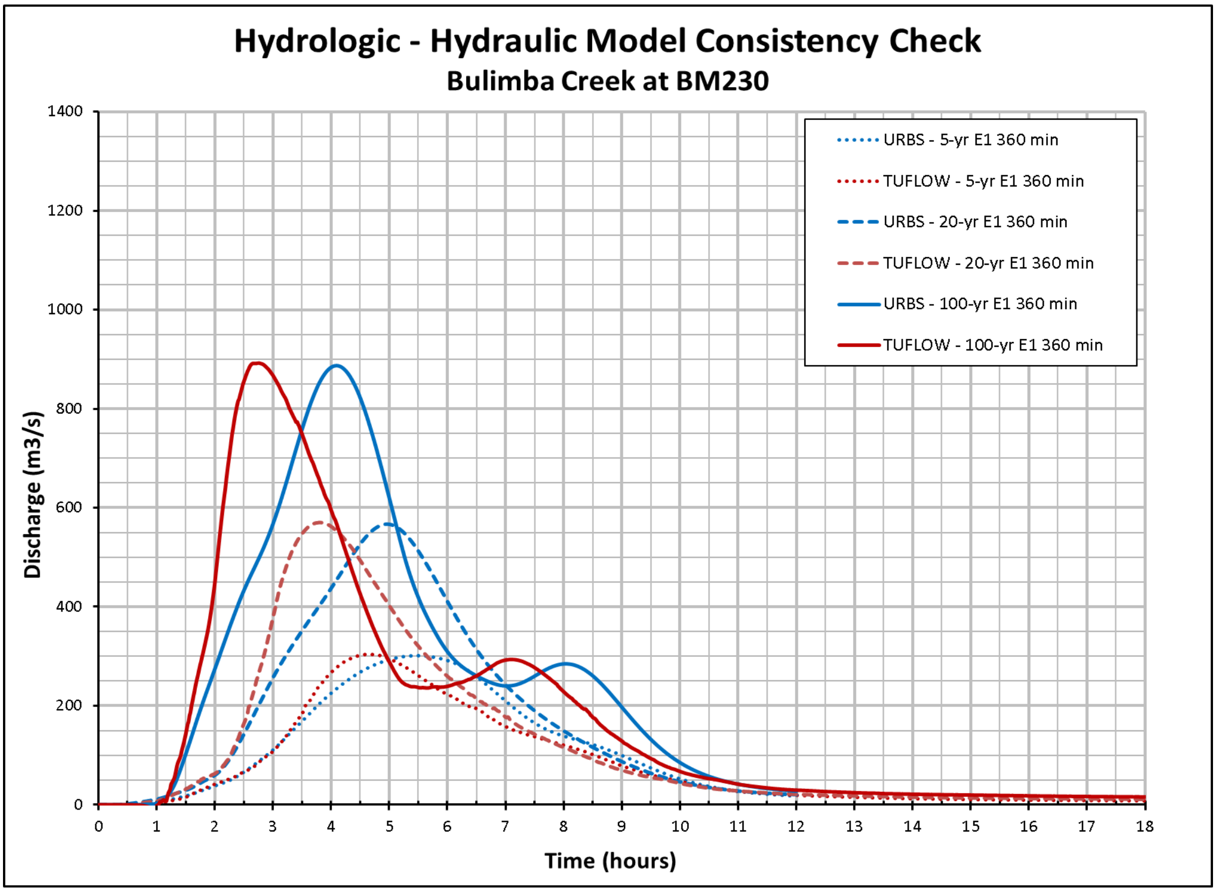

Hydrologic - Hydraulic Model Consistency Check
Spring Creek at Scrub Road (March 2017)
Discharge (m3/s)
Time
TUFLOW
URBS
29/03/2017 0:00
29/03/2017 12:00
30/03/2017 0:00
30/03/2017 12:00
31/03/2017 0:00
31/03/2017 12:00
1/04/2017 0:00
1/04/2017 12:00

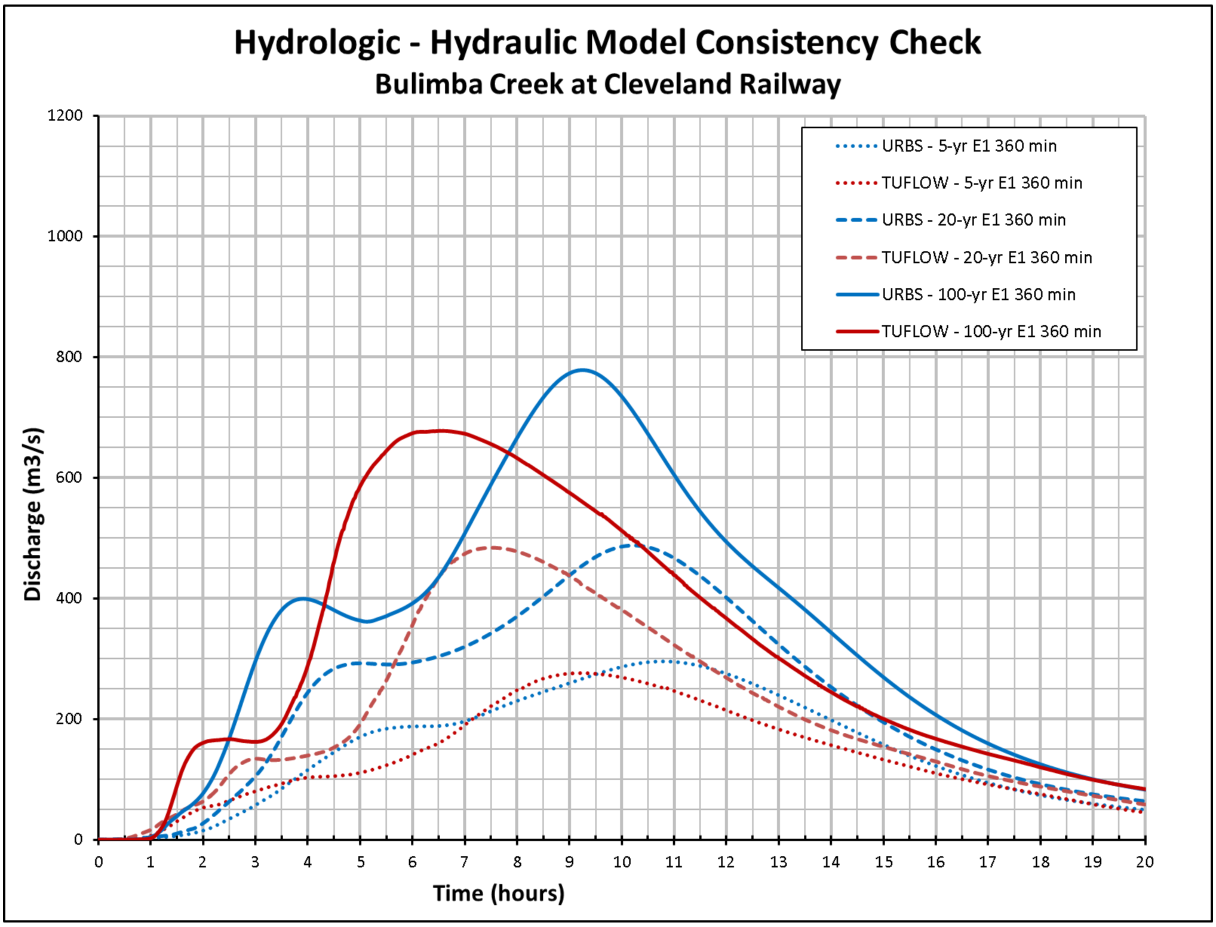

Hydrologic - Hydraulic Model Consistency Check
Salvin Creek at Donnington Street (March 2017)
Discharge (m3/s)
45
40
35
30
25
20
15
10
5
0
29/03/2017 0:00
29/03/2017 12:00
30/03/2017 0:00
30/03/2017 12:00
31/03/2017 0:00
31/03/2017 12:00
1/04/2017 0:00
1/04/2017 12:00
Time
TUFLOW
URBS

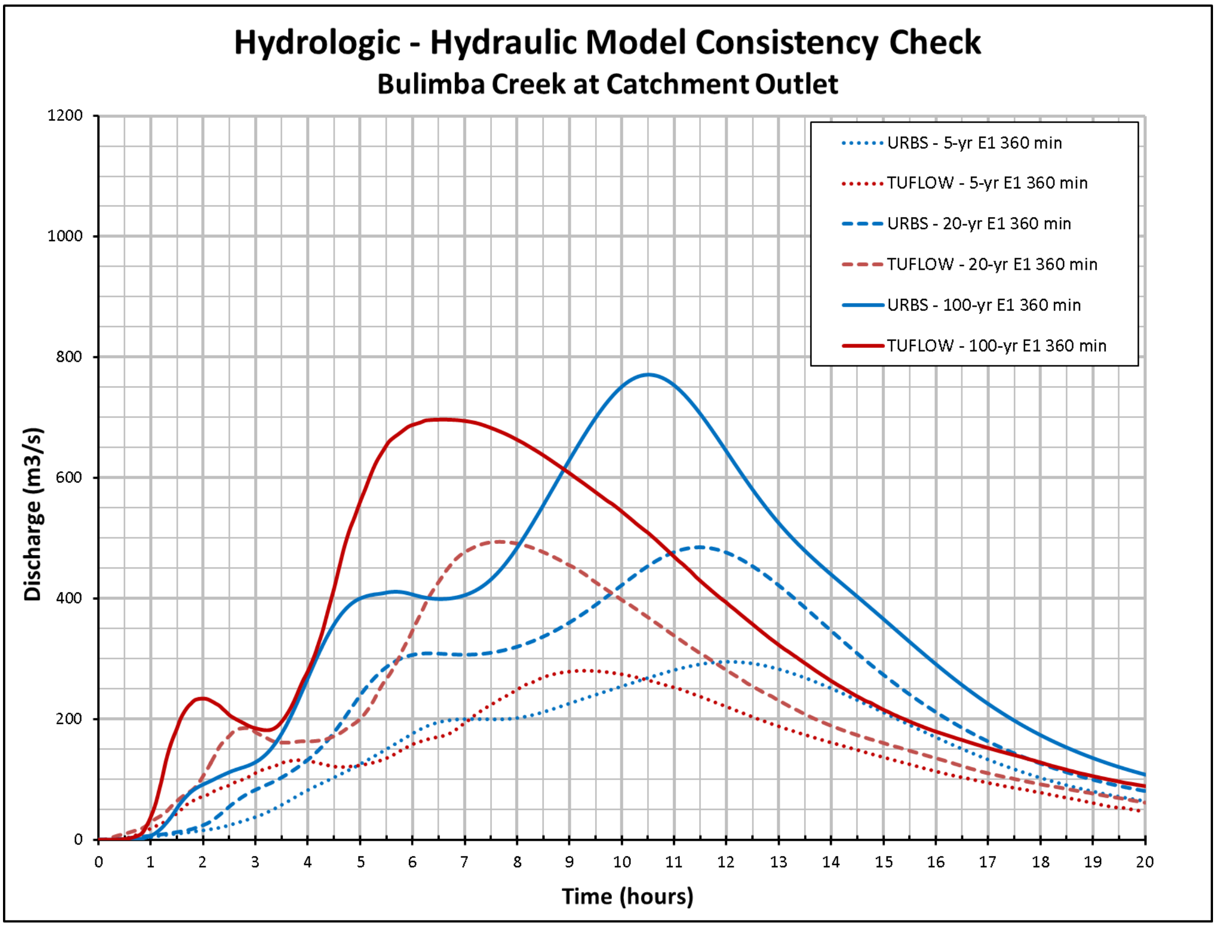

Hydrologic - Hydraulic Model Consistency Check
Phillips Creek at Creek Road (March 2017)
Discharge (m3/s)
30
25
20
15
10
5
0
29/03/2017 0:00
29/03/2017 12:00
30/03/2017 0:00
30/03/2017 12:00
31/03/2017 0:00
31/03/2017 12:00
1/04/2017 0:00
1/04/2017 12:00
Time
TUFLOW
URBS

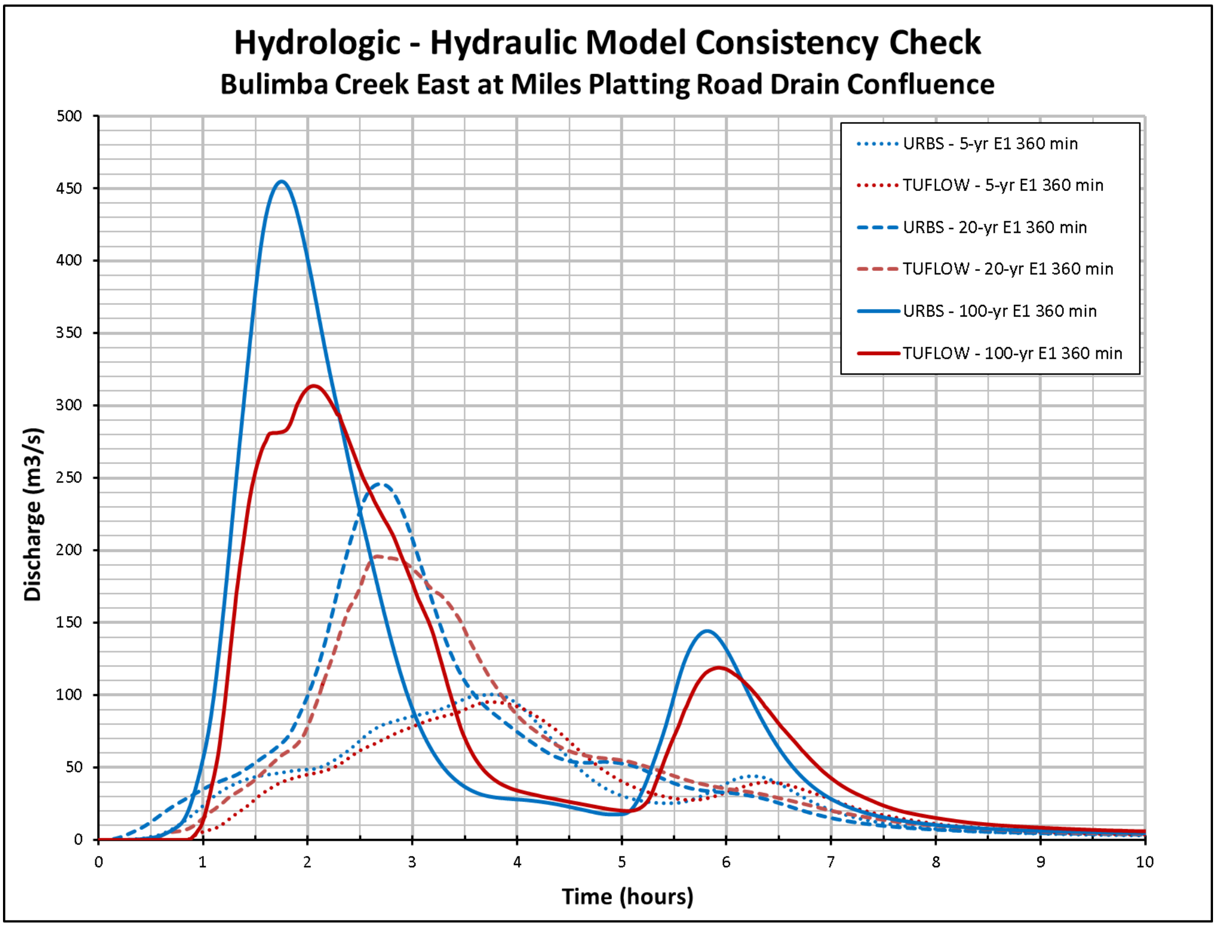
Design Events

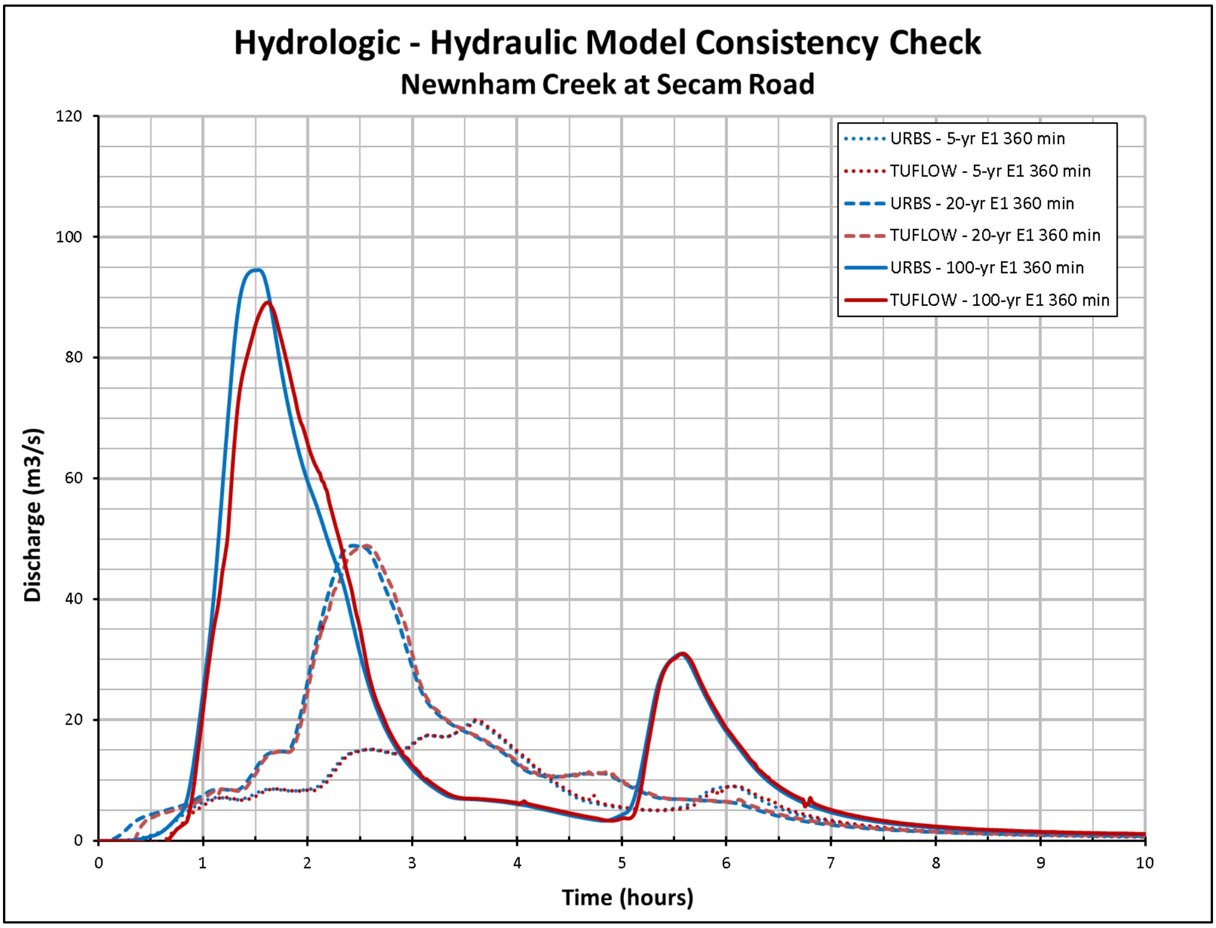





Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek at Cleveland Railway
Discharge (m3/s)
Time (hours)
URBS - 5-yr E1 360 min
TUFLOW - 5-yr E1 360 min
URBS - 20-yr E1 360 min
TUFLOW - 20-yr E1 360 min
URBS - 100-yr E1 360 min
TUFLOW - 100-yr E1 360 min
0
200
400
600
800
1000
1200
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20


Hydrologic - Hydraulic Model Consistency Check
Bulimba Creek at Catchment Outlet
Discharge (m3/s)
Time (hours)
URBS - 5-yr E1 360 min
TUFLOW - 5-yr E1 360 min
URBS - 20-yr E1 360 min
TUFLOW - 20-yr E1 360 min
URBS - 100-yr E1 360 min
TUFLOW - 100-yr E1 360 min
0
200
400
600
800
1000
1200
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20





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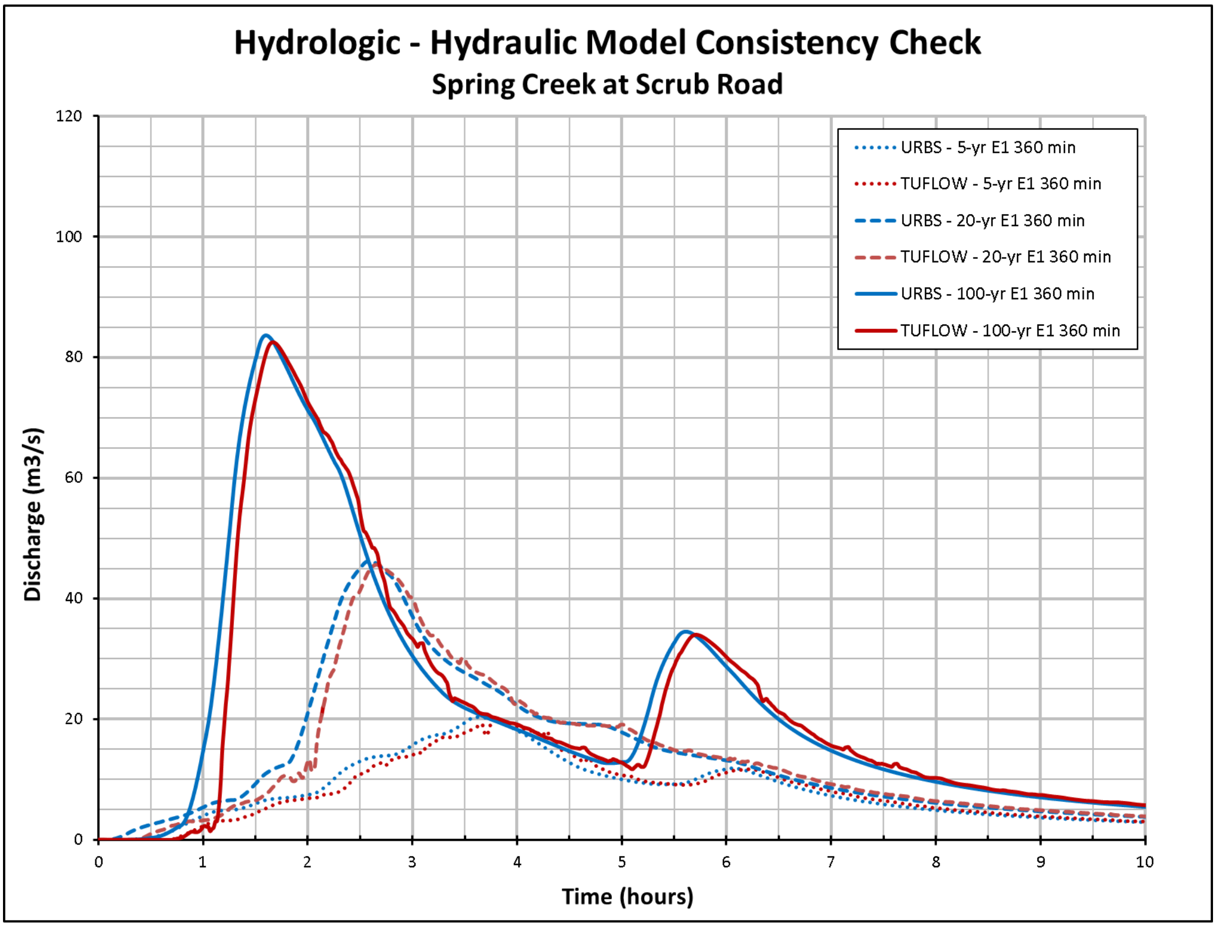
Hydrologic - Hydraulic Model Consistency Check
Spring Creek at Scrub Road
URBS - 5-yr E1 360 min
TUFLOW - 5-yr E1 360 min
URBS - 20-yr E1 360 min
TUFLOW - 20-yr E1 360 min
URBS - 100-yr E1 360 min
TUFLOW - 100-yr E1 360 min
Discharge (m3/s)
Time (hours)
0
20
40
60
80
100
120
0
1
2
3
4
5
6
7
8
9
10

Appendix E: Design Events (Scenario 1) - Peak Flood Levels

The flood level data presented in this Appendix has been extracted (in part) from the results of a 2-dimensional flood model. Levels presented have been extracted generally at selected points along the centreline of the waterway with the intent of demonstrating general flood characteristics. The applicability of this data to locations on the floodplains adjacent should be determined by a suitably qualified professional. It is recommended for any detailed assessment of flood risk associated with the waterway that complete flood model results be accessed and interrogated.

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AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
Bulimba Creek						
348	1.78	1.78	1.78	1.78	1.78	1.78
400	1.78	1.78	1.78	1.78	1.78	1.79
500	1.78	1.78	1.79	1.79	1.79	1.80
600	1.78	1.79	1.79	1.80	1.80	1.81
700	1.78	1.79	1.80	1.80	1.82	1.83
800	1.79	1.79	1.80	1.81	1.82	1.84
900	1.79	1.80	1.80	1.82	1.84	1.86
1000	1.79	1.80	1.81	1.82	1.85	1.87
1100	1.79	1.80	1.81	1.83	1.86	1.88
1200	1.79	1.80	1.82	1.84	1.87	1.90
1300	1.79	1.81	1.82	1.85	1.88	1.91
1400	1.79	1.81	1.83	1.86	1.89	1.93
1500	1.80	1.82	1.84	1.86	1.90	1.95
1600	1.80	1.82	1.84	1.87	1.92	1.97
1700	1.80	1.83	1.85	1.88	1.93	1.99
1800	1.80	1.83	1.86	1.89	1.95	2.01
1900	1.80	1.83	1.86	1.90	1.96	2.02
2000	1.81	1.84	1.87	1.92	1.98	2.04
2100	1.81	1.84	1.88	1.93	1.99	2.06
2200	1.81	1.85	1.89	1.94	2.01	2.08
2300	1.81	1.85	1.89	1.95	2.02	2.10
2400	1.82	1.86	1.90	1.96	2.04	2.12
2500	1.82	1.86	1.91	1.97	2.05	2.14
2600	1.82	1.87	1.92	1.98	2.07	2.16
2700	1.82	1.87	1.93	1.99	2.09	2.19
2800	1.83	1.88	1.94	2.01	2.11	2.21
2900	1.83	1.89	1.95	2.02	2.13	2.23
3000	1.83	1.89	1.96	2.04	2.15	2.26
3100	1.83	1.90	1.97	2.05	2.17	2.29
3200	1.84	1.91	1.98	2.07	2.19	2.31
Structure S1 – Lytton Road (Eastbound)						
3300	1.85	1.92	2.00	2.09	2.23	2.36
Structure S2 – Lytton Road (Westbound)						
3400	1.86	1.95	2.03	2.14	2.30	2.45
3500	1.86	1.95	2.04	2.15	2.31	2.47
3600	1.86	1.96	2.05	2.16	2.32	2.48
3700	1.87	1.96	2.05	2.17	2.34	2.50

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
3800	1.87	1.97	2.06	2.18	2.35	2.52
3900	1.87	1.97	2.07	2.19	2.36	2.53
4000	1.87	1.98	2.08	2.20	2.37	2.54
4100	1.88	1.98	2.08	2.21	2.39	2.56
4200	1.88	1.98	2.09	2.22	2.40	2.57
Structure S3 – Port of Brisbane Motorway						
Structure S7 – Cleveland Railway						
4300	1.88	1.99	2.10	2.23	2.41	2.59
4400	1.88	2.00	2.10	2.24	2.42	2.60
4515	1.90	2.04	2.17	2.32	2.52	2.71
4600	1.91	2.04	2.17	2.33	2.54	2.73
4700	1.91	2.05	2.18	2.34	2.54	2.74
4800	1.91	2.05	2.19	2.35	2.55	2.75
4900	1.91	2.06	2.20	2.36	2.56	2.76
5000	1.92	2.06	2.20	2.36	2.57	2.77
5100	1.92	2.07	2.21	2.37	2.58	2.78
5200	1.92	2.08	2.22	2.38	2.59	2.79
5300	1.93	2.08	2.22	2.39	2.60	2.79
5400	1.93	2.09	2.23	2.40	2.61	2.80
5500	1.93	2.09	2.24	2.40	2.62	2.81
5600	1.94	2.10	2.24	2.41	2.62	2.82
5700	1.94	2.10	2.25	2.42	2.63	2.83
5800	1.94	2.10	2.25	2.42	2.63	2.83
5900	1.95	2.11	2.26	2.42	2.63	2.83
6000	1.95	2.11	2.26	2.43	2.64	2.83
6100	1.95	2.12	2.26	2.43	2.64	2.84
6200	1.95	2.12	2.27	2.43	2.64	2.84
6300	1.96	2.12	2.27	2.44	2.64	2.84
6400	1.96	2.13	2.28	2.44	2.65	2.84
6500	1.96	2.13	2.28	2.44	2.65	2.84
6600	1.97	2.13	2.28	2.45	2.65	2.84
6700	1.97	2.14	2.29	2.45	2.65	2.85
6800	1.97	2.14	2.29	2.45	2.66	2.85
6900	1.98	2.15	2.30	2.46	2.66	2.85
7000	1.98	2.15	2.30	2.46	2.67	2.86
7100	1.99	2.16	2.31	2.47	2.67	2.87
7200	1.99	2.17	2.32	2.48	2.68	2.87
7300	1.99	2.17	2.32	2.48	2.69	2.88

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
7400	2.00	2.18	2.33	2.49	2.69	2.89
7500	2.00	2.19	2.34	2.50	2.70	2.89
7600	2.01	2.19	2.35	2.50	2.71	2.90
7700	2.02	2.20	2.35	2.51	2.71	2.90
7800	2.02	2.21	2.36	2.52	2.72	2.91
7900	2.03	2.22	2.37	2.52	2.72	2.91
8000	2.04	2.22	2.37	2.53	2.73	2.92
8100	2.04	2.23	2.38	2.54	2.73	2.92
8200	2.05	2.24	2.39	2.54	2.74	2.93
8300	2.06	2.25	2.40	2.55	2.75	2.94
8400	2.06	2.25	2.40	2.55	2.75	2.94
8500	2.06	2.25	2.40	2.55	2.75	2.94
8600	2.06	2.25	2.40	2.55	2.75	2.94
8700	2.06	2.25	2.40	2.56	2.75	2.94
8800	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)
8900	2.07	2.26	2.40	2.56	2.76	2.95
9000	2.07	2.26	2.41	2.56	2.76	2.95
9100	2.07	2.26	2.41	2.56	2.76	2.95
9200	2.07	2.26	2.41	2.56	2.76	2.95
9300	2.07	2.26	2.41	2.56	2.76	2.95
9400	2.07	2.26	2.41	2.56	2.76	2.95
9500	2.08	2.26	2.41	2.56	2.76	2.95
9600	2.08	2.26	2.41	2.56	2.76	2.95
9700	2.08	2.26	2.41	2.56	2.76	2.95
9800	2.08	2.26	2.41	2.56	2.76	2.95
9900	2.08	2.26	2.41	2.56	2.76	2.95
10000	2.08	2.26	2.41	2.56	2.76	2.95
10100	2.08	2.26	2.40	2.55	2.75	2.94
10200	2.08	2.26	2.40	2.55	2.74	2.93
10300	2.08	2.26	2.40	2.55	2.74	2.93
10400	2.09	2.26	2.40	2.55	2.74	2.93
10500	2.09	2.26	2.40	2.55	2.74	2.93
10600	2.09	2.26	2.40	2.55	2.74	2.93
10700	2.09	2.26	2.40	2.55	2.74	2.93
10800	2.09	2.26	2.40	2.55	2.74	2.93
10900	2.10	2.27	2.40	2.55	2.74	2.93
11000	2.10	2.27	2.41	2.56	2.75	2.94
11100	2.11	2.28	2.42	2.57	2.76	2.95

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
11200	2.11	2.29	2.43	2.58	2.77	2.96
11300	2.14	2.33	2.48	2.63	2.84	3.03
11400	2.18	2.38	2.53	2.69	2.90	3.10
11500	2.22	2.43	2.59	2.76	2.97	3.18
11600	2.26	2.47	2.65	2.82	3.04	3.25
11700	2.27	2.48	2.66	2.84	3.06	3.28
11800	2.27	2.49	2.67	2.85	3.08	3.31
11900	2.28	2.52	2.71	2.91	3.18	3.45
Structure S10 – Gateway Motorway						
12055	2.36	2.63	2.85	3.08	3.37	3.69
12100	2.36	2.63	2.85	3.08	3.38	3.69
12200	2.37	2.64	2.86	3.09	3.38	3.70
Structure S12 – Murarrie Road						
12300	2.40	2.70	2.93	3.16	3.45	3.76
12400	2.41	2.71	2.94	3.17	3.46	3.78
12500	2.42	2.72	2.96	3.19	3.48	3.80
12600	2.43	2.74	2.97	3.21	3.50	3.82
12700	2.45	2.76	3.00	3.23	3.53	3.85
12800	2.46	2.78	3.02	3.26	3.56	3.88
12900	2.48	2.80	3.05	3.29	3.60	3.92
13000	2.49	2.82	3.08	3.33	3.65	3.97
Structure S13 – Wynnum Road						
13100	2.54	2.90	3.22	3.52	3.87	4.19
13200	2.65	3.06	3.41	3.74	4.09	4.40
13300	2.72	3.13	3.49	3.81	4.14	4.44
13400	2.80	3.22	3.57	3.87	4.20	4.48
13500	2.82	3.24	3.58	3.89	4.22	4.50
13600	2.84	3.26	3.61	3.91	4.24	4.53
13700	2.86	3.28	3.63	3.94	4.27	4.56
13800	2.88	3.30	3.65	3.96	4.29	4.59
13900	2.89	3.31	3.66	3.97	4.31	4.61
14000	2.90	3.32	3.67	3.99	4.33	4.63
14100	2.91	3.33	3.69	4.00	4.35	4.66
14200	2.92	3.35	3.70	4.02	4.37	4.68
14300	2.94	3.37	3.73	4.05	4.40	4.72
14400	2.97	3.40	3.75	4.08	4.43	4.75
14500	2.97	3.40	3.76	4.08	4.43	4.76
14600	2.97	3.40	3.76	4.08	4.44	4.76

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
14700	2.97	3.40	3.76	4.09	4.44	4.77
14800	2.97	3.40	3.76	4.09	4.44	4.77
14900	2.97	3.40	3.76	4.09	4.44	4.77
15000	2.97	3.40	3.76	4.09	4.44	4.77
15100	2.97	3.40	3.76	4.09	4.44	4.77
15200	2.98	3.40	3.76	4.09	4.44	4.76
15300	2.98	3.41	3.76	4.09	4.44	4.76
15400	2.98	3.41	3.77	4.09	4.44	4.76
15500	2.99	3.42	3.78	4.10	4.45	4.77
15600	3.00	3.43	3.78	4.11	4.46	4.78
15700	3.01	3.44	3.79	4.11	4.47	4.78
15800	3.04	3.46	3.81	4.13	4.48	4.80
15900	3.10	3.52	3.86	4.18	4.52	4.84
16000	3.16	3.57	3.91	4.22	4.56	4.87
16100	3.22	3.63	3.96	4.26	4.60	4.90
16200	3.27	3.67	4.00	4.30	4.63	4.93
16300	3.30	3.69	4.01	4.31	4.64	4.94
16400	3.33	3.71	4.03	4.32	4.65	4.95
16500	3.37	3.73	4.04	4.33	4.66	4.96
16600	3.39	3.76	4.06	4.35	4.67	4.97
16700	3.42	3.77	4.07	4.36	4.68	4.97
16800	3.43	3.78	4.08	4.36	4.68	4.97
16900	3.44	3.79	4.08	4.36	4.68	4.98
17000	3.46	3.80	4.09	4.37	4.69	4.98
17100	3.47	3.80	4.09	4.38	4.69	4.98
17200	3.51	3.84	4.12	4.41	4.72	5.01
17300	3.54	3.87	4.15	4.44	4.75	5.05
17400	3.58	3.91	4.18	4.47	4.78	5.08
17500	3.62	3.94	4.20	4.48	4.78	5.07
17600	3.65	3.96	4.21	4.49	4.78	5.05
17700	3.69	3.99	4.22	4.49	4.78	5.04
17800	3.73	4.01	4.24	4.50	4.78	5.02
17900	3.76	4.03	4.25	4.51	4.78	5.01
18000	3.78	4.05	4.26	4.52	4.78	5.01
18100	3.80	4.07	4.27	4.52	4.77	5.02
18200	3.82	4.08	4.28	4.54	4.79	5.03
18300	3.82	4.09	4.30	4.55	4.80	5.05
18400	3.83	4.10	4.31	4.55	4.81	5.07

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
18500	3.84	4.13	4.33	4.57	4.84	5.09
18600	3.87	4.16	4.38	4.62	4.88	5.14
Structure S17 - Meadowlands Road						
18723	3.90	4.23	4.47	4.72	5.03	5.32
18800	3.92	4.26	4.51	4.76	5.08	5.37
18900	3.93	4.28	4.54	4.81	5.12	5.41
19000	3.96	4.33	4.61	4.89	5.22	5.51
19100	3.96	4.32	4.59	4.87	5.19	5.48
19200	3.98	4.35	4.63	4.90	5.22	5.51
19300	4.01	4.38	4.67	4.94	5.25	5.54
19400	4.05	4.44	4.74	5.02	5.34	5.64
19500	4.08	4.48	4.79	5.07	5.41	5.71
19600	4.09	4.50	4.81	5.09	5.43	5.73
19700	4.11	4.52	4.83	5.11	5.44	5.74
Structure S18 – Scrub Road Pedestrian Bridge						
19800	4.15	4.57	4.90	5.22	5.58	5.90
19900	4.18	4.61	4.93	5.25	5.61	5.93
20000	4.22	4.65	4.97	5.30	5.65	5.97
20100	4.26	4.69	5.02	5.35	5.72	6.04
20200	4.29	4.73	5.07	5.40	5.78	6.10
20300	4.32	4.77	5.12	5.45	5.84	6.16
20400	4.34	4.80	5.15	5.49	5.88	6.21
20500	4.37	4.84	5.19	5.54	5.93	6.26
20600	4.43	4.91	5.27	5.62	6.01	6.33
20700	4.50	4.98	5.34	5.69	6.06	6.38
20800	4.59	5.06	5.41	5.75	6.11	6.41
20900	4.83	5.27	5.61	5.94	6.30	6.63
21000	5.03	5.25	5.45	5.67	5.94	6.20
Structure S27 – Old Cleveland Road						
21100	5.63	6.10	6.50	6.91	7.29	7.65
21200	5.77	6.24	6.64	7.03	7.43	7.79
21300	5.95	6.41	6.80	7.18	7.57	7.93
21400	6.07	6.53	6.92	7.29	7.68	8.02
21500	6.12	6.59	6.99	7.36	7.73	8.07
21600	6.18	6.66	7.05	7.41	7.77	8.10
Structure S29 – Winstanley Street						
21700	6.23	6.81	7.24	7.64	8.05	8.43
21800	6.30	6.89	7.33	7.74	8.15	8.53

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
21900	6.36	6.96	7.42	7.83	8.25	8.64
22000	6.46	7.06	7.52	7.94	8.36	8.75
22100	6.55	7.16	7.63	8.05	8.47	8.86
22200	6.64	7.24	7.72	8.15	8.57	8.96
22300	6.71	7.32	7.80	8.23	8.65	9.04
22400	6.82	7.42	7.91	8.34	8.76	9.15
22500	6.91	7.51	7.99	8.43	8.84	9.24
Structure S36 – Meadowbank Street Pedestrian Bridge						
22600	7.13	7.69	8.15	8.56	8.96	9.33
22700	7.28	7.85	8.32	8.73	9.11	9.48
22800	7.43	7.99	8.47	8.87	9.25	9.61
22900	7.56	8.12	8.59	8.99	9.37	9.73
23000	7.66	8.21	8.68	9.08	9.46	9.82
23100	7.73	8.25	8.71	9.11	9.48	9.85
23200	7.83	8.31	8.76	9.15	9.52	9.88
23300	8.06	8.47	8.86	9.24	9.58	9.92
23400	8.30	8.70	9.08	9.43	9.76	10.09
Structure S37 – Pine Mountain Road						
23500	8.69	9.12	9.50	9.82	10.15	10.47
23600	8.77	9.18	9.56	9.87	10.20	10.52
23700	8.90	9.30	9.66	9.97	10.29	10.60
23800	9.09	9.49	9.84	10.14	10.45	10.75
23900	9.22	9.62	9.97	10.27	10.57	10.87
24000	9.35	9.76	10.11	10.40	10.70	10.99
24100	9.45	9.87	10.21	10.50	10.79	11.07
24200	9.62	10.05	10.38	10.67	10.95	11.24
24300	9.79	10.24	10.59	10.89	11.17	11.46
24400	9.91	10.35	10.71	11.00	11.28	11.57
24500	10.06	10.45	10.79	11.09	11.40	11.68
24600	10.10	10.48	10.82	11.11	11.40	11.69
24700	10.20	10.56	10.89	11.18	11.48	11.77
24800	10.41	10.76	11.05	11.32	11.60	11.88
24900	10.63	11.00	11.28	11.52	11.78	12.03
25000	10.81	11.22	11.51	11.74	11.99	12.22
25100	11.00	11.45	11.76	12.01	12.26	12.48
25200	11.16	11.64	11.96	12.22	12.47	12.69
25300	11.27	11.77	12.10	12.38	12.66	12.90
25400	11.51	12.03	12.38	12.70	13.01	13.27

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
25500	11.75	12.30	12.67	13.01	13.35	13.64
25600	11.97	12.52	12.90	13.25	13.57	13.86
25700	12.10	12.66	13.04	13.38	13.71	13.99
25800	12.23	12.80	13.18	13.51	13.84	14.12
25900	12.34	12.91	13.30	13.62	13.95	14.22
Structure S55 – Oakley Street Pedestrian Bridge						
26000	12.49	13.07	13.45	13.82	14.17	14.45
26100	12.60	13.19	13.58	13.94	14.28	14.57
26200	12.69	13.27	13.66	14.02	14.36	14.65
26300	12.83	13.41	13.81	14.18	14.53	14.82
26400	13.11	13.72	14.14	14.53	14.91	15.24
26500	13.29	13.91	14.35	14.75	15.15	15.50
26600	13.40	14.01	14.44	14.86	15.26	15.60
26700	13.49	14.07	14.50	14.91	15.31	15.65
26800	13.61	14.18	14.60	15.01	15.40	15.73
Structure S56 – Wecker Road						
26900	13.82	14.38	14.79	15.20	15.57	15.90
27000	14.02	14.56	14.97	15.37	15.74	16.07
27100	14.28	14.83	15.24	15.64	16.01	16.34
27200	14.49	15.05	15.46	15.86	16.25	16.58
27300	14.60	15.15	15.57	15.97	16.36	16.70
27400	14.72	15.24	15.65	16.04	16.43	16.77
27500	14.88	15.37	15.76	16.14	16.53	16.87
27600	15.03	15.51	15.89	16.26	16.64	16.97
27700	15.20	15.65	16.02	16.38	16.75	17.07
27800	15.43	15.86	16.20	16.53	16.88	17.19
27900	15.69	16.09	16.42	16.72	17.05	17.33
28000	15.94	16.35	16.67	16.95	17.28	17.55
28100	16.14	16.57	16.90	17.19	17.50	17.77
28200	16.34	16.82	17.17	17.48	17.79	18.09
S57 - Mount Gravatt Capalaba Road						
28300	16.69	17.24	17.67	18.03	18.44	18.79
28400	16.91	17.46	17.90	18.27	18.69	19.05
28500	17.10	17.65	18.09	18.47	18.89	19.23
28600	17.34	17.85	18.27	18.64	19.04	19.37
28700	17.64	18.10	18.49	18.83	19.20	19.50
28800	17.91	18.36	18.74	19.06	19.40	19.69
28900	18.13	18.58	18.95	19.26	19.60	19.88

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
29000	18.21	18.68	19.05	19.37	19.71	20.00
29100	18.32	18.80	19.18	19.50	19.85	20.14
29200	18.42	18.91	19.30	19.63	19.99	20.27
29300	18.54	19.02	19.41	19.75	20.10	20.39
29400	18.81	19.27	19.64	19.95	20.28	20.55
29500	19.07	19.51	19.86	20.15	20.45	20.71
29600	19.33	19.76	20.08	20.34	20.62	20.87
29700	19.59	19.99	20.30	20.54	20.79	21.02
29800	19.85	20.25	20.54	20.77	21.01	21.23
29900	20.02	20.44	20.76	20.99	21.24	21.46
30000	20.46	20.81	21.07	21.29	21.51	21.72
30100	20.83	21.17	21.40	21.58	21.81	22.00
30200	21.13	21.48	21.76	21.98	22.18	22.36
30300	21.42	21.78	22.07	22.29	22.51	22.69
30400	21.60	22.00	22.29	22.54	22.77	22.96
30500	21.71	22.12	22.43	22.67	22.91	23.10
30600	21.92	22.33	22.64	22.88	23.11	23.32
30700	22.02	22.43	22.74	22.97	23.22	23.42
30800	22.12	22.53	22.85	23.08	23.32	23.53
30900	22.28	22.66	22.96	23.20	23.43	23.63
S58 - Sherwood Place Pedestrian Bridge						
31000	22.82	23.25	23.53	23.77	24.00	24.19
31100	23.02	23.47	23.77	24.02	24.27	24.47
31200	23.26	23.73	24.07	24.34	24.60	24.82
31300	23.53	24.04	24.40	24.70	24.97	25.20
31400	23.81	24.30	24.64	24.94	25.21	25.44
31500	24.12	24.55	24.85	25.14	25.40	25.62
31600	24.25	24.69	24.99	25.29	25.55	25.77
31700	24.37	24.81	25.11	25.40	25.66	25.89
31800	24.56	25.01	25.30	25.58	25.82	26.04
31900	24.72	25.17	25.45	25.73	25.97	26.19
S59 - Craig Street Pedestrian Bridge						
32000	25.19	25.61	25.91	26.07	26.27	26.47
32100	25.57	25.95	26.17	26.40	26.56	26.73
32200	25.68	26.08	26.31	26.53	26.70	26.88
32300	25.77	26.19	26.43	26.66	26.83	27.01
32400	25.88	26.31	26.55	26.79	26.97	27.16
32500	26.00	26.45	26.71	26.95	27.14	27.34

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
32600	26.22	26.68	26.95	27.20	27.41	27.61
32700	26.53	27.00	27.27	27.53	27.74	27.94
32800	26.87	27.35	27.64	27.90	28.12	28.33
32900	27.53	27.96	28.24	28.50	28.74	28.96
33000	27.84	28.25	28.51	28.75	28.98	29.20
S60 - D/S of Logan Road Pedestrian Bridge						
33100	28.43	28.80	29.02	29.23	29.45	29.66
S61 - Logan Road						
33200	28.58	29.03	29.38	29.97	30.62	31.02
S63 - Pacific Motorway						
33362	29.77	30.14	30.49	31.07	32.17	33.12
33400	29.83	30.19	30.54	31.09	32.18	33.13
33500	30.01	30.37	30.69	31.19	32.21	33.15
33600	30.18	30.56	30.86	31.31	32.25	33.17
33700	30.30	30.69	30.99	31.42	32.29	33.20
33800	30.54	30.96	31.25	31.63	32.39	33.25
33900	30.80	31.24	31.53	31.87	32.52	33.32
34000	31.34	31.72	32.00	32.29	32.76	33.44
34100	31.82	32.20	32.46	32.73	33.08	33.62
34200	32.29	32.65	32.91	33.16	33.44	33.85
34300	32.57	32.92	33.18	33.43	33.70	34.07
34400	32.86	33.21	33.47	33.72	33.97	34.29
34500	33.17	33.44	33.66	33.90	34.13	34.42
S66 - Padstow Road						
34600	33.87	34.24	34.43	34.65	34.94	35.14
34700	34.17	34.42	34.58	34.77	35.00	35.19
34800	34.85	35.08	35.21	35.32	35.44	35.56
34900	35.34	35.57	35.71	35.84	35.95	36.07
35000	35.72	35.96	36.12	36.27	36.40	36.54
S68 - Malbon Street Pedestrian Bridge						
35100	36.16	36.43	36.62	36.80	36.97	37.15
35200	36.63	36.87	37.03	37.20	37.37	37.54
35300	37.35	37.53	37.65	37.78	37.92	38.07
35400	37.99	38.18	38.30	38.43	38.58	38.74
35500	38.48	38.70	38.84	38.99	39.16	39.34
35600	39.15	39.44	39.63	39.80	40.00	40.19
35700	39.90	40.27	40.48	40.68	40.90	41.09
35800	40.45	40.78	40.99	41.19	41.40	41.59

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
35900	40.97	41.29	41.46	41.62	41.80	41.97
36000	41.56	41.80	41.94	42.07	42.23	42.39
36100	42.13	42.31	42.42	42.54	42.67	42.82
36200	42.56	42.71	42.81	42.92	43.05	43.19
36300	42.95	43.11	43.21	43.32	43.45	43.59
36400	43.33	43.51	43.61	43.73	43.86	44.00
36500	43.76	43.93	44.04	44.15	44.29	44.42
S69 - Altandi Street Pedestrian Bridge						
36600	44.01	44.25	44.39	44.53	44.72	44.85
36700	44.21	44.40	44.51	44.64	44.81	44.94
36800	44.55	44.67	44.74	44.82	44.93	45.03
S70 - D/S Gold Coast Railway Pedestrian Bridge						
36900	45.17	45.27	45.33	45.38	45.44	45.48
36985	45.86	46.03	46.11	46.20	46.30	46.39
S71 and S72 - Gold Coast Railway						
37100	46.32	46.52	46.62	46.74	46.88	47.00
S73 - Beenleigh Road						
37200	46.74	46.94	47.03	47.12	47.22	47.31
37300	46.97	47.16	47.26	47.37	47.49	47.59
S74 - Gowan Road Pedestrian Culvert						
37400	47.37	47.50	47.59	47.68	47.79	47.89
37500	47.92	48.06	48.14	48.24	48.36	48.46
37600	48.51	48.69	48.78	48.89	49.02	49.12
37700	48.91	49.09	49.19	49.31	49.44	49.55
37800	49.27	49.42	49.51	49.61	49.73	49.83
37900	49.78	49.89	49.96	50.04	50.12	50.20
38000	50.28	50.41	50.47	50.55	50.63	50.71
38100	50.78	50.94	51.01	51.10	51.29	51.36
S75 - Energy Dissipator						
38200	51.65	51.82	51.90	52.01	52.14	52.26
38300	51.77	51.94	52.03	52.15	52.28	52.41
38400	52.03	52.21	52.29	52.41	52.54	52.67
S77 - Glenefer Street Pedestrian Bridge						
38500	52.71	52.89	52.97	53.06	53.16	53.26
38574	53.32	53.48	53.56	53.63	53.73	53.82
S78 - Brandon Road						
38700	54.05	54.23	54.34	54.43	54.56	54.67
38800	54.45	54.66	54.80	54.87	54.99	55.11

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
38900	54.65	54.98	55.12	55.19	55.27	55.40
S79 - Nemies Road						
39000	55.79	56.01	56.34	56.62	56.99	57.17
39100	56.40	56.58	56.77	56.92	57.22	57.40
39200	57.00	57.16	57.27	57.36	57.58	57.72
39300	57.60	57.77	57.88	57.99	58.13	58.24
S80 - Calliope Street Bikeway						
39400	58.44	58.61	58.71	58.80	58.94	59.04
39500	58.92	59.08	59.17	59.27	59.40	59.50
39600	59.93	60.04	60.11	60.18	60.27	60.35
39700	60.22	60.33	60.39	60.46	60.56	60.63
39800	60.47	60.59	60.65	60.72	60.83	60.92
39888	60.60	60.76	60.82	60.91	61.05	61.15
Daw Road Drain						
0	36.00	36.29	36.48	36.66	36.83	37.00
100	36.72	36.81	36.85	36.88	36.99	37.13
200	37.97	38.03	38.06	38.09	38.14	38.18
300	38.70	38.82	38.87	38.91	38.97	39.03
400	39.72	39.83	39.89	39.95	40.03	40.10
500	39.98	40.11	40.18	40.25	40.35	40.43
600	40.46	40.61	40.68	40.77	40.88	40.96
700	40.99	41.13	41.19	41.27	41.38	41.47
800	41.56	41.69	41.74	41.81	41.91	41.99
900	42.11	42.25	42.32	42.37	42.46	42.53
1000	42.60	42.74	42.80	42.88	42.97	43.02
1095	42.67	42.83	42.90	42.99	43.09	43.16
Padstow Road Drain						
0	33.45	33.72	33.89	34.09	34.32	34.56
S169 - McCullough Street Pedestrian Bridge						
100	34.86	35.13	35.26	35.36	35.46	35.52
200	36.25	36.55	36.69	36.80	36.92	36.99
S170 - McCullough Street						
300	36.93	37.22	37.35	37.46	37.56	37.63
400	37.85	38.03	38.13	38.23	38.36	38.45
441	N/R (1)	N/R (1)	N/R (1)	N/R (1)	38.78	39.13
Mimosa Creek						
0	32.85	33.20	33.46	33.71	33.96	34.28
100	33.12	33.43	33.67	33.90	34.12	34.40

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) [(2)]					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
S82 - Turnmill Street Pedestrian Culvert						
200	33.50	33.78	33.99	34.19	34.40	34.61
300	33.79	34.10	34.31	34.52	34.74	34.95
400	34.05	34.38	34.60	34.82	35.07	35.28
500	34.54	34.96	35.21	35.47	35.70	35.92
S83 - Springfield Street Pedestrian Culvert						
600	35.04	35.38	35.62	35.85	36.09	36.29
700	35.61	35.96	36.18	36.39	36.57	36.73
800	36.13	36.47	36.68	36.88	37.06	37.22
900	36.57	36.90	37.10	37.30	37.49	37.67
1000	37.24	37.48	37.59	37.72	37.86	38.00
1100	37.91	38.15	38.27	38.39	38.53	38.66
1200	38.46	38.74	38.93	39.11	39.30	39.46
S84 - Parkway Street						
1300	38.91	39.20	39.42	39.64	39.86	40.07
1400	39.48	39.71	39.90	40.09	40.30	40.50
1500	39.98	40.22	40.43	40.61	40.81	41.01
S85 - Kessels Road						
1610	40.26	40.55	40.77	40.98	41.21	41.43
1700	N/R [(1)]	N/R [(1)]	N/R [(1)]	41.44	41.71	41.96
1800	41.08	41.44	41.70	41.95	42.21	42.44
S86(a)(b)(c) - Pacific Motorway						
1944	41.75	42.14	42.42	42.73	43.05	43.38
2000	42.28	42.64	42.84	43.07	43.30	43.56
S87 - Nagle Street						
2100	43.05	43.40	43.54	43.69	43.85	44.19
2200	43.59	44.06	44.31	44.57	44.81	45.06
2300	44.16	44.62	44.90	45.22	45.49	45.71
2400	44.62	45.02	45.28	45.58	45.84	46.07
2500	45.49	45.83	46.07	46.35	46.60	46.82
2600	45.74	45.96	46.17	46.42	46.66	46.88
2700	46.89	47.01	47.07	47.16	47.28	47.40
2800	47.38	47.57	47.69	47.83	47.95	48.08
2900	47.96	48.18	48.30	48.44	48.57	48.70
3000	48.73	48.85	48.95	49.08	49.24	49.33
S88 - Hibiscus Place Pedestrian Culvert						
3100	49.43	49.60	49.71	49.80	49.91	50.01
3200	49.99	50.27	50.43	50.57	50.71	50.83

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
3300	50.62	50.93	51.13	51.31	51.48	51.61
3400	51.31	51.61	51.82	52.02	52.21	52.35
3500	N/R (1)	N/R (1)	N/R (1)	52.83	53.05	53.27
3600	53.42	53.57	53.68	53.80	53.93	54.07
3674	54.31	54.43	54.51	54.58	54.67	54.75
Nardie Street Drain						
0	23.73	24.23	24.58	24.89	25.16	25.39
100	23.71	24.23	24.61	24.94	25.23	25.48
200	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)	25.82
300	24.96	25.31	25.53	25.80	26.22	26.52
400	25.57	25.79	25.93	26.11	26.41	26.66
496	26.42	26.69	26.83	26.98	27.19	27.37
Bulimba Creek East						
0	22.16	22.57	22.89	23.13	23.36	23.57
100	22.41	22.71	22.99	23.20	23.43	23.63
200	22.87	23.14	23.34	23.53	23.73	23.92
300	23.26	23.49	23.65	23.79	23.98	24.16
400	23.58	23.85	24.01	24.13	24.30	24.46
500	23.82	24.12	24.29	24.41	24.59	24.76
600	N/R (1)	24.35	24.53	24.66	24.84	25.00
700	24.44	24.74	24.94	25.07	25.25	25.40
800	24.88	25.22	25.44	25.59	25.80	25.95
900	25.72	26.04	26.20	26.32	26.48	26.61
1000	26.25	26.55	26.67	26.78	26.91	27.02
1100	26.43	26.72	26.83	26.94	27.08	27.20
1200	26.72	27.00	27.12	27.24	27.39	27.52
S89 - Gateway Motorway - On / Off Ramp						
1300	27.07	27.43	27.57	27.73	27.94	28.13
1400	27.77	28.01	28.09	28.20	28.38	28.54
1500	28.21	28.47	28.56	28.68	28.84	28.99
1576	28.44	28.73	28.83	28.96	29.13	29.28
S90 - Miles Platting Road						
S91 - South East Busway Loop						
1700	28.78	29.13	29.25	29.42	29.63	29.82
1800	29.16	29.50	29.62	29.79	29.99	30.18
1881	29.50	29.85	29.97	30.13	30.32	30.50
S92 - South East Busway						
S93 - Pacific Motorway						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
2000	30.17	30.92	31.25	31.82	32.46	33.00
S93(a)(b)(c) - V1 Veloway						
2100	30.31	31.02	31.35	31.88	32.51	33.03
2200	30.47	31.10	31.41	31.91	32.53	33.04
2300	30.81	31.27	31.53	31.96	32.55	33.06
2400	31.24	31.63	31.85	32.16	32.64	33.10
2500	31.52	31.90	32.12	32.40	32.79	33.18
S94 - Logan Road						
2597	33.10	33.40	33.62	33.85	34.28	34.42
S194 - Glen Hotel Weir						
2700	33.82	34.06	34.20	34.36	34.61	34.75
2800	34.44	34.74	34.92	35.09	35.24	35.35
2880	34.71	35.04	35.22	35.40	35.58	35.72
S96 - Gateway Motorway						
3000	35.08	35.40	35.60	35.78	36.00	36.16
3100	35.56	35.89	36.07	36.26	36.48	36.62
3200	35.93	36.29	36.49	36.69	36.93	37.10
3300	N/R (1)	36.73	36.94	37.15	37.42	37.63
3400	37.16	37.54	37.72	37.92	38.19	38.38
3498	37.46	37.85	38.04	38.25	38.52	38.73
S97 - Underwood Road						
3600	37.93	38.29	38.50	38.74	39.05	39.24
3700	38.68	38.95	39.11	39.27	39.45	39.57
3800	39.95	40.07	40.15	40.18	40.24	40.30
3900	40.54	40.67	40.75	40.84	40.97	41.05
4000	41.22	41.34	41.41	41.49	41.59	41.67
4100	41.80	41.96	42.05	42.16	42.29	42.40
4200	42.31	42.52	42.63	42.76	42.92	43.03
4300	42.87	43.12	43.24	43.40	43.60	43.73
4400	43.46	43.67	43.79	43.95	44.13	44.27
4500	N/R (1)	44.16	44.25	44.38	44.55	44.67
4600	44.45	44.59	44.66	44.77	44.90	45.00
4700	45.11	45.22	45.27	45.35	45.43	45.50
4800	45.57	45.69	45.74	45.81	45.90	45.96
4900	45.96	46.11	46.17	46.26	46.36	46.42
5000	46.60	46.74	46.79	46.86	46.95	47.02
5100	47.31	47.47	47.52	47.60	47.69	47.77
5200	47.74	47.92	47.97	48.06	48.14	48.21

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) [(2)]					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
5300	48.03	48.19	48.24	48.32	48.40	48.47
S99 - Gateway Motorway						
5400	48.53	48.68	48.73	48.80	48.88	48.95
S100 - Gold Coast Railway						
S101 - Beenleigh Road						
5500	50.20	50.35	50.42	50.49	50.55	50.60
5600	50.22	50.36	50.44	50.50	50.57	50.62
5700	50.88	51.01	51.07	51.13	51.19	51.24
5800	51.76	51.85	51.90	51.96	52.02	52.08
5900	52.45	52.55	52.60	52.66	52.74	52.79
6000	53.31	53.40	53.43	53.48	53.54	53.59
6100	54.17	54.26	54.31	54.36	54.42	54.45
6200	55.23	55.32	55.37	55.41	55.49	55.55
6296	56.19	56.31	56.37	56.44	56.53	56.60
Bulimba Creek East Railway Bypass						
0	46.45	46.60	46.64	46.73	46.83	46.89
100	N/R [(1)]	46.98	47.23	47.45	47.67	47.81
200	N/R [(1)]	47.60	47.70	47.76	47.84	47.94
300	N/R [(1)]	47.70	47.89	48.03	48.17	48.31
400	N/R [(1)]	48.40	48.52	48.62	48.73	48.82
460	N/R [(1)]	48.80	48.82	48.86	49.01	49.03
Tributary C						
0	37.89	38.26	38.47	38.72	39.03	39.22
56	38.08	38.44	38.69	38.99	39.17	39.35
S174 - Gateway Motorway						
200	40.27	40.39	40.44	40.51	40.60	40.67
300	41.51	41.63	41.69	41.75	41.83	41.90
400	42.76	42.87	42.93	42.99	43.07	43.13
500	43.93	44.05	44.10	44.16	44.24	44.31
600	44.94	45.07	45.12	45.18	45.26	45.32
700	45.76	45.90	45.95	46.00	46.09	46.15
800	46.42	46.54	46.60	46.66	46.75	46.81
900	46.94	47.05	47.10	47.16	47.24	47.30
1000	47.31	47.38	47.42	47.46	47.51	47.55
1100	47.90	47.97	48.00	48.04	48.08	48.12
1200	48.56	48.65	48.70	48.75	48.79	48.83
1246	48.87	48.96	49.01	49.07	49.11	49.15
Tributary B						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) [(2)]					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
0	31.17	31.56	31.78	32.11	32.61	33.08
100	31.26	31.62	31.86	32.16	32.64	33.11
S95 - Logan Road						
200	32.93	33.17	33.28	33.45	33.81	34.12
300	33.78	34.01	34.13	34.22	34.32	34.39
400	34.61	34.84	34.98	35.09	35.23	35.33
S104 - Dance Crescent						
500	36.20	36.42	36.54	36.66	36.79	36.89
584	36.72	36.88	36.95	37.03	37.14	37.23
Tributary A						
0	30.17	30.92	31.24	31.82	32.46	33.00
100	30.20	30.93	31.25	31.84	32.49	33.01
S105 - Gateway Motorway						
241	30.41	31.13	31.47	32.11	32.78	33.30
300	31.01	31.42	31.66	32.19	32.81	33.31
400	32.08	32.28	32.36	32.46	32.90	33.34
500	32.43	32.68	32.78	32.88	33.07	33.41
S106 - Pacific Motorway Off Ramp						
600	33.09	33.45	33.60	33.78	33.99	34.08
700	33.44	33.76	33.90	34.07	34.28	34.40
800	33.76	34.05	34.18	34.33	34.55	34.68
900	34.34	34.59	34.70	34.83	35.03	35.16
S107 - Pacific Motorway						
1038	34.63	34.89	35.01	35.19	35.44	35.62
1100	35.34	35.63	35.76	35.85	35.97	36.07
1200	35.78	36.01	36.11	36.20	36.31	36.40
1300	36.60	36.73	36.79	36.88	36.99	37.08
1400	37.44	37.60	37.66	37.73	37.84	37.92
1500	38.09	38.24	38.30	38.38	38.51	38.59
1600	39.00	39.17	39.25	39.34	39.48	39.58
1700	40.20	40.40	40.49	40.59	40.76	40.86
1800	41.02	41.19	41.27	41.36	41.52	41.61
1900	41.74	41.87	41.93	42.00	42.12	42.19
2000	42.48	42.57	42.61	42.66	42.74	42.79
2100	43.15	43.29	43.35	43.42	43.51	43.58
2200	43.85	44.04	44.12	44.21	44.33	44.40
2300	44.33	44.51	44.60	44.70	44.79	44.87
2400	45.34	45.43	45.47	45.53	45.61	45.66

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
2500	46.40	46.48	46.53	46.58	46.65	46.70
2600	47.51	47.62	47.68	47.74	47.81	47.87
2700	48.58	48.69	48.75	48.81	48.90	48.97
2800	49.64	49.75	49.81	49.87	49.97	50.04
2900	50.63	50.75	50.81	50.88	50.97	51.04
2915	50.76	50.88	50.95	51.02	51.11	51.17
Tributary A1						
0	40.42	40.62	40.72	40.82	40.99	41.10
100	42.37	42.43	42.47	42.50	42.54	42.58
200	43.96	44.09	44.16	44.22	44.30	44.36
300	45.33	45.60	45.71	45.84	46.03	46.16
400	46.91	47.03	47.13	47.26	47.44	47.56
500	48.85	49.01	49.12	49.19	49.30	49.38
600	53.18	53.33	53.40	53.46	53.54	53.60
689	56.99	57.11	57.16	57.20	57.26	57.31
Tributary A Overflow						
0	32.32	32.55	32.63	32.73	32.97	33.37
71	32.40	32.63	32.72	32.83	33.03	33.39
S186 and S189 - Pacific Motorway						
S187 and S190 - Pacific Motorway On Ramp						
S188 and S191 - Busway						
200	32.45	32.72	32.87	33.02	33.24	33.57
300	32.72	33.00	33.21	33.32	33.48	33.67
400	33.39	33.59	33.77	33.88	34.05	34.25
500	34.03	34.24	34.41	34.62	34.76	34.97
S192 - School Road						
600	34.43	34.74	34.88	35.07	35.27	35.46
S193 - Diversion Weir						
700	34.66	34.93	35.04	35.22	35.47	35.64
703	34.67	34.94	35.06	35.23	35.47	35.65
Tributary A2						
0	34.52	34.78	34.89	35.02	35.20	35.34
100	35.62	35.81	35.92	36.03	36.21	36.34
200	36.87	37.07	37.17	37.28	37.41	37.54
300	37.77	38.00	38.12	38.24	38.37	38.51
S108 - Freeway Office Park Weir						
410	40.11	40.30	40.40	40.51	40.74	40.82
S109 - Freeway Office Park Internal Road						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
505	40.19	40.40	40.48	40.60	40.81	40.93
S110 and S111 - Logan Road						
628	41.24	41.47	41.61	41.75	41.90	42.00
700	41.60	41.75	41.86	41.97	42.10	42.20
760	42.34	42.44	42.51	42.57	42.65	42.73
Miles Platting Road Drain						
0	24.92	25.25	25.48	25.63	25.84	25.99
100	26.45	26.58	26.65	26.74	26.85	26.96
S172 - Gateway Motorway						
200	27.31	27.53	27.67	27.82	28.03	28.26
300	28.06	28.23	28.33	28.46	28.61	28.77
400	28.78	28.96	29.06	29.16	29.30	29.41
500	30.27	30.49	30.58	30.67	30.78	30.86
600	31.86	32.05	32.13	32.23	32.34	32.42
700	32.98	33.08	33.16	33.24	33.34	33.40
800	34.12	34.34	34.46	34.59	34.74	34.87
900	36.01	36.21	36.33	36.44	36.60	36.72
1000	39.16	39.27	39.34	39.40	39.49	39.57
S173 - Miles Platting Road						
1100	40.27	40.44	40.53	40.63	40.76	40.83
1200	42.48	42.53	42.56	42.59	42.63	42.67
1300	43.92	44.02	44.08	44.14	44.23	44.29
1328	44.17	44.29	44.37	44.44	44.55	44.63
Kate Circuit Drain						
0	29.70	29.90	29.99	30.09	30.23	30.33
100	32.35	32.39	32.42	32.44	32.49	32.51
200	34.38	34.47	34.53	34.59	34.65	34.71
300	36.92	36.99	37.04	37.09	37.13	37.18
400	38.81	38.93	39.01	39.09	39.20	39.28
437	N/R (1)	N/R (1)	39.71	39.81	39.94	40.03
Parklands Circuit Drain						
0	19.24	19.67	20.00	20.28	20.56	20.81
100	19.35	19.76	20.08	20.34	20.62	20.87
200	19.82	20.05	20.34	20.57	20.82	21.05
S165 - Gateway Motorway						
300	21.28	21.44	21.91	21.95	22.00	22.03
400	22.34	22.52	22.60	22.66	22.72	22.75
500	24.53	24.86	25.00	25.09	25.27	25.48

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
600	25.76	25.95	26.05	26.16	26.31	26.43
700	27.03	27.15	27.22	27.29	27.39	27.46
S166 - Prebble Street						
800	27.85	27.97	28.03	28.09	28.17	28.24
900	28.15	28.29	28.37	28.45	28.56	28.63
S167 - Kyeema Street						
1000	29.80	30.01	30.09	30.17	30.28	30.37
1100	32.27	32.38	32.42	32.49	32.58	32.64
S168 - Echidna Street						
1206	33.20	33.30	33.35	33.40	33.47	33.54
1300	34.24	34.31	34.35	34.38	34.43	34.47
1400	36.71	36.78	36.82	36.86	36.91	36.96
1500	39.36	39.42	39.44	39.47	39.50	39.53
1600	42.52	42.57	42.59	42.61	42.65	42.68
1675	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)	45.00
Broadwater Road Drain						
0	15.03	15.51	15.89	16.26	16.64	16.97
100	15.10	15.58	15.97	16.34	16.72	17.05
200	15.11	15.59	15.97	16.34	16.73	17.06
300	15.30	15.59	15.98	16.35	16.73	17.06
400	16.03	16.18	16.29	16.47	16.78	17.10
500	16.61	16.74	16.83	16.93	17.06	17.23
600	16.97	17.12	17.25	17.38	17.56	17.71
700	N/R (1)	18.90	19.06	19.19	19.33	19.44
800	N/R (1)	19.10	19.32	19.48	19.64	19.79
900	18.95	19.48	19.64	19.78	19.92	20.08
1000	19.36	19.75	19.90	20.04	20.21	20.35
1100	19.87	20.15	20.27	20.40	20.58	20.72
S152 - Broadwater Road						
1200	21.19	21.86	21.98	22.11	22.27	22.40
1300	21.38	22.03	22.16	22.31	22.50	22.64
S153 - Brisbane Adventist College Drop Structure						
1400	22.49	22.68	22.76	22.86	23.18	23.33
1500	23.12	23.29	23.38	23.46	23.56	23.64
1600	24.02	24.20	24.29	24.38	24.48	24.57
1700	24.86	25.04	25.14	25.22	25.33	25.41
S155 - Brisbane Adventist College Pedestrian Bridge						
S156 - Brisbane Adventist College Drop Structure						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
1800	26.25	26.49	26.61	26.73	26.87	26.98
S157 - 16 Rowe Close Drop Structure						
1897	26.80	27.02	27.14	27.26	27.40	27.50
S158 - 16 Rowe Close Drop Structure						
2000	27.68	27.95	28.10	28.23	28.40	28.52
S159 - 226 Wishart Road - Internal Road						
2100	28.25	28.59	28.79	28.99	29.25	29.47
2113	28.25	28.59	28.79	28.99	29.25	29.47
Wishart Road Drain						
0	22.90	23.08	23.16	23.24	23.37	23.46
100	24.83	24.94	24.98	25.04	25.12	25.18
200	26.10	26.27	26.32	26.38	26.45	26.50
S160 - Wishart Road						
300	27.31	27.48	27.55	27.64	27.73	27.80
400	28.94	28.99	29.02	29.05	29.08	29.11
497	29.67	29.76	29.81	29.86	29.93	29.99
S161 - Access Bridge to 10 St.George Circuit						
S162 - Access Bridge to 10 St.George Circuit						
600	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)
700	32.64	32.79	32.86	32.93	33.03	33.09
S164 - 35 Avenell Street Access Road						
723	32.68	32.84	32.92	33.00	33.10	33.17
Wecker Road Drain						
0	13.30	13.91	14.35	14.76	15.16	15.50
100	13.57	13.92	14.34	14.73	15.13	15.48
200	14.91	15.14	15.22	15.31	15.41	15.58
300	15.20	15.40	15.47	15.57	15.68	15.74
383	15.82	16.10	16.25	16.48	16.62	16.69
S141 - Christian College Access Road						
S142 - Christian College Access Road						
500	16.60	17.26	17.57	17.81	17.97	18.07
S143 and S144 - Scrub Road						
608	17.27	17.50	17.71	17.92	18.09	18.19
700	18.02	18.22	18.32	18.42	18.52	18.58
S145 - Wecker Road						
800	19.48	19.62	19.69	19.76	19.91	19.95
900	20.34	20.56	20.68	20.80	20.90	20.99
1000	20.68	20.88	20.98	21.09	21.19	21.28

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) [(2)]					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
1093	N/R [(1)]	N/R [(1)]	N/R [(1)]	N/R [(1)]	N/R [(1)]	N/R [(1)]
S146 - Gateway Motorway						
1200	23.67	24.05	24.27	24.59	24.99	25.38
1300	23.80	24.15	24.35	24.65	25.02	25.40
1400	24.55	24.73	24.84	24.99	25.23	25.52
1500	25.58	25.75	25.82	25.90	26.00	26.07
S147 - Weedon Street East						
1600	26.97	27.10	27.15	27.21	27.30	27.36
S148 and S149 - Mount Petrie Road						
1700	28.06	28.19	28.26	28.33	28.43	28.50
1800	28.07	28.21	28.28	28.35	28.44	28.51
1900	30.01	30.10	30.14	30.18	30.24	30.28
2000	30.45	30.54	30.58	30.62	30.69	30.72
2016	30.58	30.69	30.76	30.81	30.89	30.94
Newnham Creek						
0	10.11	10.49	10.82	11.11	11.41	11.70
100	10.01	10.45	10.82	11.13	11.43	11.73
200	10.05	10.48	10.83	11.13	11.43	11.73
300	10.10	10.50	10.85	11.15	11.44	11.74
400	10.63	10.94	11.20	11.43	11.65	11.87
500	11.25	11.49	11.64	11.78	11.91	12.04
600	11.88	12.12	12.24	12.35	12.47	12.60
700	12.41	12.62	12.72	12.82	12.94	13.07
S39 - Access Road to 100 Wecker Road						
800	13.70	15.23	15.45	15.57	15.70	15.80
867	13.86	15.24	15.46	15.59	15.71	15.81
S40 - Stormwater Quality Improvement Device						
S41 - Secam Street						
S42 - Access Road to 33 Secam Street						
1001	15.55	16.00	16.21	16.49	16.75	16.93
S43 - Devlan Street						
1100	16.36	16.89	17.00	17.42	17.76	17.92
S44 - Bunnings Access #3						
S45 - Bunnings Access #2						
1200	16.78	17.20	17.33	17.66	17.97	18.14
S46 - Bunnings Access #1						
1300	16.95	17.32	17.45	17.75	18.05	18.22
S47 - Newnham Road						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
1400	18.75	19.46	19.76	19.96	20.11	20.23
1500	19.10	19.68	19.94	20.14	20.31	20.43
1597	19.63	20.10	20.32	20.50	20.69	20.81
S48 - Access Road to 285 Creek Road						
S49 - Drop Structure #3						
1700	20.55	20.96	21.18	21.34	21.53	21.70
S50 - Drop Structure #2						
S51 - Drop Structure #1						
1800	22.87	23.23	23.44	23.60	23.79	23.96
S52 - Internal Road for 215 Creek Road						
S53 - 215 Creek Road Pedestrian Bridge						
1900	24.05	24.33	24.43	24.58	24.98	25.28
2000	25.09	25.35	25.44	25.56	25.72	25.84
2012	25.19	25.46	25.56	25.67	25.81	25.91
Spring Creek						
0	7.57	8.13	8.60	9.00	9.38	9.74
100	7.61	8.16	8.62	9.02	9.40	9.76
200	7.78	8.15	8.58	8.97	9.32	9.69
300	8.26	8.64	8.70	8.97	9.33	9.69
400	9.54	9.70	9.78	9.93	10.01	10.11
500	9.83	10.03	10.11	10.23	10.31	10.42
600	10.13	10.27	10.38	10.46	10.53	10.60
700	10.35	10.62	10.75	10.87	11.00	11.13
800	10.79	11.16	11.39	11.46	11.51	11.67
S132 - Scrub Road						
900	11.18	11.45	11.68	11.85	11.96	12.12
1000	11.44	11.67	11.85	12.01	12.12	12.27
1100	11.78	11.98	12.11	12.26	12.37	12.52
1200	12.48	12.61	12.73	12.84	12.92	13.05
1300	15.24	15.32	15.39	15.44	15.49	15.54
1400	16.98	17.07	17.13	17.19	17.24	17.29
1500	18.65	18.73	18.79	18.84	18.88	18.92
1600	20.52	20.65	20.73	20.82	20.89	20.96
1700	26.77	26.87	26.94	27.01	27.06	27.13
S133 - Woodland Street Pedestrian Bridge						
1800	29.59	29.76	29.88	30.00	30.08	30.18
1900	33.61	33.74	33.84	33.94	34.01	34.09
2000	36.26	36.41	36.52	36.63	36.70	36.79

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
2006	36.39	36.54	36.66	36.76	36.84	36.93
Warwick Creek						
0	12.10	12.26	12.35	12.48	12.58	12.72
S134 - Greendale Way						
100	12.88	13.06	13.21	13.37	13.47	13.58
200	13.31	13.50	13.61	13.76	13.87	14.01
300	13.93	14.09	14.16	14.23	14.29	14.37
400	14.87	14.99	15.07	15.18	15.24	15.39
S135 - Amersham Crescent						
500	15.41	15.70	15.92	16.15	16.32	16.57
600	16.71	16.84	16.94	17.03	17.12	17.21
700	17.38	17.56	17.69	17.80	17.88	17.99
800	18.06	18.29	18.36	18.45	18.54	18.63
900	18.50	18.67	18.77	18.88	19.01	19.12
1000	18.80	19.05	19.20	19.34	19.49	19.59
S136 - Cribb Road						
1100	18.90	19.15	19.30	19.44	19.61	19.73
1200	19.88	20.15	20.32	20.49	20.67	20.82
1300	20.67	20.89	21.02	21.17	21.34	21.48
1400	21.15	21.38	21.52	21.67	21.84	21.99
1500	21.42	21.72	21.89	22.06	22.25	22.39
1600	21.84	22.12	22.31	22.50	22.70	22.84
S138 - Oakley Street						
1700	22.55	22.72	22.83	22.96	23.11	23.24
1800	23.80	23.94	24.01	24.08	24.15	24.22
1817	24.09	24.20	24.28	24.36	24.45	24.54
Silky Oak Circuit Drain						
0	21.50	21.81	21.99	22.17	22.35	22.49
S139 - Oakley Street						
100	22.91	23.07	23.16	23.27	23.41	23.58
200	24.73	24.84	24.89	24.94	25.00	25.06
246	25.67	25.75	25.80	25.86	25.91	25.96
Salvin Creek						
0	6.40	7.00	7.46	7.87	8.29	8.68
100	6.40	7.01	7.46	7.87	8.30	8.68
200	6.49	7.11	7.57	7.98	8.39	8.78
300	6.50	7.11	7.57	7.98	8.39	8.78
400	6.59	7.14	7.57	7.98	8.40	8.78

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
500	6.91	7.20	7.58	7.99	8.41	8.80
S31 - Donnington Street (Lower)						
600	N/R (1)	N/R (1)	N/R (1)	N/R (1)	10.13	10.76
700	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)	10.77
800	8.43	8.91	9.24	9.55	10.22	10.81
900	8.60	9.06	9.35	9.65	10.27	10.84
1000	9.08	9.45	9.66	9.91	10.42	10.95
1100	10.03	10.32	10.46	10.63	10.87	11.31
S32 - Donnington Street (Upper)						
1200	11.53	11.96	12.24	12.63	13.41	13.96
1300	12.44	12.79	12.96	13.21	13.73	14.14
1400	13.14	13.54	13.67	13.85	14.10	14.36
S33 - Creek Road						
1515	13.43	13.90	14.06	14.30	14.67	15.03
1600	13.77	14.20	14.36	14.60	14.94	15.28
1700	14.95	15.24	15.36	15.51	15.70	15.92
1800	16.08	16.39	16.55	16.69	16.87	16.99
S34 - Pine Mountain Road						
1900	17.47	17.83	18.04	18.24	18.56	18.85
2000	18.22	18.52	18.64	18.76	18.94	19.13
2100	19.17	19.38	19.45	19.53	19.63	19.73
2200	N/R (1)	19.82	19.89	19.96	20.05	20.12
2300	20.47	20.58	20.61	20.65	20.72	20.75
S35 - Bevan Street						
2400	N/R (1)	21.76	21.86	21.97	22.08	22.26
2500	22.38	22.62	22.76	22.88	23.02	23.14
2600	23.49	23.72	23.84	23.94	24.05	24.12
2700	25.03	25.29	25.35	25.39	25.45	25.50
2800	25.60	25.86	25.93	25.98	26.05	26.11
2900	25.83	26.09	26.21	26.29	26.39	26.48
2926	25.88	26.14	26.27	26.36	26.47	26.57
Glengariff Tributary						
0	14.88	15.18	15.29	15.44	15.64	15.88
100	15.59	15.85	16.05	16.28	16.43	16.61
200	N/R (1)	16.74	16.84	17.00	17.11	17.26
300	17.01	17.21	17.36	17.53	17.66	17.80
400	N/R (1)	N/R (1)	N/R (1)	N/R (1)	19.41	19.42
500	19.56	19.85	20.06	20.25	20.33	20.42

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
600	N/R (1)	20.90	21.11	21.26	21.33	21.40
700	21.56	21.76	21.87	21.98	22.02	22.09
800	22.53	22.73	22.83	22.93	22.99	23.07
900	23.65	23.89	24.04	24.15	24.24	24.34
925	23.91	24.16	24.33	24.44	24.53	24.64
Phillips Creek						
0	4.49	4.96	5.33	5.68	6.05	6.37
100	4.63	5.13	5.50	5.86	6.26	6.62
200	4.69	5.22	5.61	6.01	6.43	6.80
300	4.69	5.22	5.61	6.01	6.43	6.80
400	4.72	5.25	5.64	6.03	6.44	6.81
500	4.79	5.32	5.69	6.05	6.45	6.81
600	4.82	5.34	5.69	6.05	6.45	6.81
S20 - Old Cleveland Access Road						
671	5.09	5.47	5.77	6.39	7.03	7.29
S21 - Stormwater Quality Improvement Device						
S22 - Old Cleveland Road						
842	N/R (1)	N/R (1)	N/R (1)	N/R (1)	7.57	8.38
900	5.82	6.22	6.42	6.72	7.58	8.38
1000	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)
1100	N/R (1)	N/R (1)	N/R (1)	9.06	9.91	10.38
S23(b)(c) - Creek Road						
1200	8.14	8.77	9.00	9.48	10.00	10.46
S24 - Pedestrian Bridge U/S Creek Road						
1300	8.89	9.38	9.52	9.77	10.14	10.54
1400	9.60	9.98	10.10	10.28	10.55	10.82
1500	10.41	10.71	10.82	10.97	11.16	11.32
1600	10.79	11.10	11.18	11.32	11.49	11.63
1700	11.44	11.74	11.83	11.95	12.10	12.20
1800	11.95	12.23	12.33	12.46	12.61	12.72
1900	12.48	12.74	12.85	13.00	13.18	13.31
2000	13.12	13.40	13.51	13.69	13.90	14.02
2100	13.63	13.93	14.04	14.23	14.45	14.57
2200	14.44	14.74	14.82	14.95	15.11	15.23
2286	15.16	15.46	15.53	15.64	15.78	15.89
S25 - Gallipoli Road						
2400	16.16	16.70	16.85	17.03	17.25	17.38
S26 - Anzac Road						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
2500	16.56	17.15	17.45	17.76	17.95	18.06
2600	16.81	17.34	17.60	17.89	18.08	18.19
2685	17.28	17.71	17.93	18.18	18.39	18.52
Cloverbrook Place Drain						
0	3.01	3.44	3.79	4.11	4.47	4.78
100	3.01	3.44	3.79	4.11	4.47	4.79
200	3.01	3.44	3.80	4.13	4.48	4.80
300	3.00	3.43	3.79	4.12	4.48	4.80
400	3.00	3.43	3.79	4.12	4.47	4.80
500	3.00	3.43	3.79	4.12	4.48	4.80
600	3.00	3.43	3.79	4.12	4.48	4.80
S121 - Fursden Road						
700	3.00	3.43	3.79	4.12	4.48	4.80
800	3.00	3.43	3.79	4.12	4.48	4.80
900	3.00	3.43	3.79	4.12	4.48	4.80
1000	3.00	3.43	3.79	4.12	4.48	4.80
1100	3.07	3.43	3.79	4.12	4.48	4.80
1200	3.31	3.50	3.79	4.12	4.48	4.80
1213	3.33	3.52	3.79	4.12	4.48	4.80
Bethel Street Drain						
0	3.00	3.43	3.79	4.12	4.48	4.80
100	3.00	3.43	3.79	4.12	4.48	4.80
200	3.00	3.43	3.79	4.12	4.48	4.80
300	3.17	3.44	3.79	4.12	4.48	4.80
400	3.37	3.61	3.79	4.12	4.48	4.80
500	3.59	3.81	3.90	4.12	4.48	4.80
S123 - Bethel Street						
600	3.80	4.10	4.27	4.44	4.67	4.83
700	3.98	4.24	4.39	4.54	4.75	4.89
773	4.03	4.29	4.43	4.57	4.77	4.91
Minnippi Overflow						
0	2.08	2.26	2.41	2.56	2.76	2.95
100	2.08	2.27	2.42	2.57	2.77	2.96
200	2.08	2.27	2.42	2.58	2.77	2.97
300	2.08	2.27	2.43	2.58	2.78	2.97
400	2.08	2.27	2.43	2.59	2.79	2.98
500	2.08	2.27	2.43	2.59	2.79	2.98
600	2.08	2.28	2.44	2.60	2.80	2.99

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
700	2.08	2.29	2.46	2.62	2.81	3.00
800	2.08	2.30	2.47	2.63	2.82	3.01
884	2.08	2.36	2.57	2.74	2.91	3.07
S14 - Wynnum Road						
1000	2.10	2.70	2.97	3.39	3.77	4.07
1100	2.12	2.83	3.12	3.47	3.82	4.11
1200	2.42	3.16	3.43	3.65	3.93	4.16
S15 - Gateway Motorway						
1344	2.93	3.26	3.64	3.99	4.37	4.72
1400	2.96	3.35	3.72	4.05	4.42	4.76
1500	2.96	3.36	3.73	4.06	4.43	4.76
1600	2.96	3.36	3.73	4.06	4.43	4.76
1700	2.96	3.37	3.74	4.07	4.43	4.76
1800	2.96	3.39	3.75	4.08	4.44	4.77
1884	2.97	3.40	3.76	4.09	4.44	4.77
Stanton Road Drain						
0	2.12	2.92	3.24	3.56	3.88	4.16
S125 - Access Road						
100	2.20	2.96	3.24	3.49	3.81	4.04
200	2.22	2.96	3.24	3.49	3.81	4.04
300	2.27	2.96	3.24	3.49	3.81	4.04
S126 - Stanton Road						
400	2.48	2.96	3.24	3.49	3.81	4.04
500	2.51	2.96	3.24	3.50	3.81	4.04
600	2.55	2.96	3.24	3.50	3.81	4.04
700	2.59	2.96	3.24	3.50	3.81	4.04
800	2.60	2.97	3.24	3.50	3.81	4.04
900	2.60	2.97	3.24	3.50	3.81	4.04
1000	2.60	2.97	3.25	3.50	3.81	4.04
1100	2.61	2.97	3.25	3.50	3.81	4.04
1187	2.64	3.11	3.44	3.72	4.01	4.16
Moorabbin Drive Drain						
0	2.93	3.36	3.72	4.04	4.39	4.71
100	2.97	3.40	3.75	4.07	4.43	4.75
200	2.98	3.41	3.77	4.09	4.45	4.77
300	2.99	3.42	3.78	4.10	4.46	4.78
400	2.99	3.43	3.78	4.11	4.47	4.79
500	2.99	3.43	3.78	4.11	4.47	4.79

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
600	3.00	3.43	3.79	4.11	4.47	4.79
700	3.00	3.43	3.79	4.11	4.47	4.79
800	3.00	3.43	3.79	4.11	4.47	4.79
900	3.00	3.43	3.79	4.11	4.47	4.79
S119 - Billan Street						
1000	3.00	3.43	3.79	4.11	4.47	4.79
S120 - Gray Street						
1100	3.00	3.43	3.79	4.11	4.47	4.79
1200	3.01	3.43	3.79	4.11	4.47	4.79
Minnippi Creek						
0	2.88	3.29	3.64	3.95	4.29	4.59
100	2.88	3.30	3.65	3.96	4.30	4.60
200	2.88	3.30	3.65	3.97	4.30	4.60
300	2.88	3.30	3.65	3.97	4.30	4.61
400	2.88	3.30	3.65	3.97	4.30	4.61
500	2.88	3.30	3.65	3.97	4.30	4.61
600	2.88	3.30	3.65	3.97	4.30	4.61
700	2.89	3.30	3.65	3.97	4.30	4.61
800	3.01	3.31	3.65	3.97	4.30	4.61
900	3.37	3.52	3.65	3.97	4.30	4.61
1000	3.65	3.83	3.91	4.01	4.30	4.61
S114 - Creek Road (Southbound)						
1105	4.12	4.51	4.68	4.88	5.05	5.16
S115 - Creek Road (Northbound)						
1200	4.26	4.61	4.76	4.93	5.09	5.19
S117 - Pedestrian bridge						
1300	4.48	4.76	4.89	5.04	5.20	5.30
1400	5.33	5.52	5.62	5.70	5.79	5.89
S117a - Drop Structure #4						
1500	6.19	6.40	6.51	6.59	6.68	6.77
1600	6.70	6.91	7.00	7.07	7.23	7.33
S118 - Todman Street						
1700	8.81	9.50	9.77	10.31	10.63	10.77
S118a - Drop Structure #3						
1800	9.40	9.72	9.91	10.31	10.64	10.80
S118b - Drop Structure #2						
1900	10.20	10.43	10.53	10.64	11.03	11.18
2000	11.13	11.38	11.48	11.59	11.75	11.87

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
S118c - Drop Structure #1						
2076	12.44	12.73	12.85	12.99	13.19	13.33
Murarrie Park Drain						
0	2.42	2.72	2.95	3.18	3.48	3.79
100	2.42	2.73	2.96	3.20	3.50	3.82
200	2.42	2.73	2.97	3.21	3.51	3.82
300	2.42	2.73	2.97	3.21	3.51	3.82
400	2.42	2.73	2.97	3.21	3.51	3.82
500	2.42	2.73	2.97	3.21	3.51	3.82
600	2.42	2.73	2.97	3.21	3.51	3.82
700	2.42	2.73	2.97	3.21	3.51	3.82
S112 - Park Access Culvert						
800	2.42	2.73	2.97	3.21	3.51	3.82
S113 - Park Access Bridge						
900	2.42	2.73	2.97	3.21	3.51	3.82
1000	2.42	2.73	2.97	3.21	3.51	3.82
1100	2.43	2.73	2.97	3.21	3.51	3.82
1116	2.43	2.74	2.97	3.21	3.51	3.82

(1) N/R = no result, typically because the AMTD line does not intersect the flood surface.

(2) Flood levels are inclusive of a 9.8% increase in rainfall intensity and a 0.8m increase above MHWS, due to projected climate variability effects.

Appendix F: Design Events (Scenario 3) - Peak Flood Levels

The flood level data presented in this Appendix has been extracted (in part) from the results of a 2-dimensional flood model. Levels presented have been extracted generally at selected points along the centreline of the waterway with the intent of demonstrating general flood characteristics. The applicability of this data to locations on the floodplains adjacent should be determined by a suitably qualified professional. It is recommended for any detailed assessment of flood risk associated with the waterway that complete flood model results be accessed and interrogated.

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AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) [(2)]					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
Bulimba Creek						
348	1.78	1.78	1.78	1.78	1.78	1.78
400	1.78	1.78	1.78	1.78	1.78	1.79
500	1.78	1.78	1.79	1.79	1.79	1.80
600	1.78	1.79	1.79	1.79	1.80	1.81
700	1.78	1.79	1.79	1.80	1.81	1.82
800	1.78	1.79	1.80	1.80	1.82	1.84
900	1.79	1.79	1.80	1.81	1.83	1.85
1000	1.79	1.80	1.80	1.82	1.84	1.86
1100	1.79	1.80	1.81	1.82	1.85	1.87
1200	1.79	1.80	1.81	1.83	1.86	1.89
1300	1.79	1.80	1.82	1.84	1.87	1.90
1400	1.79	1.81	1.82	1.84	1.88	1.91
1500	1.79	1.81	1.83	1.85	1.89	1.93
1600	1.79	1.81	1.83	1.86	1.90	1.95
1700	1.80	1.82	1.84	1.87	1.92	1.97
1800	1.80	1.82	1.85	1.88	1.93	1.98
1900	1.80	1.83	1.85	1.89	1.94	2.00
2000	1.80	1.83	1.86	1.90	1.96	2.02
2100	1.80	1.83	1.87	1.91	1.97	2.04
2200	1.80	1.84	1.87	1.91	1.99	2.05
2300	1.81	1.84	1.88	1.92	2.00	2.07
2400	1.81	1.85	1.88	1.93	2.01	2.09
2500	1.81	1.85	1.89	1.94	2.03	2.11
2600	1.81	1.86	1.90	1.95	2.04	2.13
2700	1.82	1.86	1.90	1.97	2.06	2.15
2800	1.82	1.87	1.91	1.98	2.08	2.17
2900	1.82	1.87	1.92	1.99	2.09	2.19
3000	1.82	1.88	1.93	2.00	2.11	2.22
3100	1.83	1.88	1.94	2.01	2.13	2.24
3200	1.83	1.89	1.95	2.03	2.15	2.27
Structure S1 – Lytton Road (Eastbound)						
3300	1.84	1.90	1.97	2.05	2.18	2.31
Structure S2 – Lytton Road (Westbound)						
3400	1.85	1.92	2.00	2.10	2.25	2.39
3500	1.85	1.93	2.00	2.10	2.26	2.41
3600	1.85	1.93	2.01	2.11	2.27	2.42
3700	1.85	1.94	2.02	2.12	2.28	2.44

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) [(2)]					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
3800	1.86	1.94	2.02	2.13	2.30	2.45
3900	1.86	1.95	2.03	2.14	2.31	2.47
4000	1.86	1.95	2.04	2.15	2.32	2.48
4100	1.86	1.95	2.04	2.16	2.33	2.49
4200	1.86	1.96	2.05	2.16	2.34	2.51
Structure S3 – Port of Brisbane Motorway						
Structure S7 – Cleveland Railway						
4300	1.87	1.96	2.05	2.17	2.35	2.52
4400	1.87	1.97	2.06	2.18	2.37	2.54
4515	1.89	2.01	2.12	2.26	2.46	2.64
4600	1.89	2.01	2.12	2.27	2.47	2.66
4700	1.89	2.02	2.13	2.28	2.48	2.67
4800	1.89	2.02	2.14	2.28	2.49	2.68
4900	1.90	2.03	2.14	2.29	2.50	2.69
5000	1.90	2.03	2.15	2.30	2.51	2.70
5100	1.90	2.04	2.16	2.31	2.52	2.71
5200	1.90	2.04	2.16	2.32	2.53	2.72
5300	1.91	2.05	2.17	2.33	2.54	2.73
5400	1.91	2.05	2.18	2.33	2.54	2.74
5500	1.91	2.06	2.18	2.34	2.55	2.75
5600	1.91	2.06	2.19	2.35	2.56	2.76
5700	1.92	2.07	2.20	2.36	2.57	2.77
5800	1.92	2.07	2.20	2.36	2.57	2.78
5900	1.92	2.08	2.21	2.37	2.58	2.78
6000	1.93	2.08	2.21	2.37	2.58	2.78
6100	1.93	2.09	2.22	2.38	2.59	2.79
6200	1.93	2.09	2.22	2.38	2.59	2.79
6300	1.94	2.09	2.23	2.39	2.60	2.80
6400	1.94	2.10	2.23	2.39	2.60	2.80
6500	1.94	2.10	2.24	2.40	2.61	2.81
6600	1.95	2.11	2.24	2.40	2.61	2.81
6700	1.95	2.11	2.25	2.41	2.62	2.82
6800	1.95	2.12	2.25	2.41	2.62	2.82
6900	1.96	2.12	2.26	2.42	2.62	2.82
7000	1.96	2.13	2.27	2.42	2.63	2.83
7100	1.96	2.13	2.27	2.43	2.64	2.84
7200	1.97	2.14	2.28	2.44	2.65	2.85
7300	1.97	2.15	2.29	2.44	2.65	2.86

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
7400	1.98	2.15	2.29	2.45	2.66	2.86
7500	1.98	2.16	2.30	2.46	2.67	2.87
7600	1.99	2.17	2.31	2.47	2.68	2.88
7700	1.99	2.18	2.32	2.48	2.68	2.88
7800	2.00	2.18	2.33	2.49	2.69	2.89
7900	2.01	2.19	2.34	2.49	2.70	2.90
8000	2.01	2.20	2.34	2.50	2.71	2.91
8100	2.02	2.21	2.35	2.51	2.71	2.91
8200	2.02	2.22	2.36	2.52	2.72	2.92
8300	2.03	2.22	2.37	2.53	2.73	2.93
8400	2.03	2.23	2.37	2.53	2.73	2.93
8500	2.04	2.23	2.37	2.53	2.74	2.94
8600	2.04	2.23	2.38	2.53	2.74	2.94
8700	2.04	2.24	2.38	2.54	2.74	2.94
8800	2.04	2.24	2.38	2.54	2.74	2.94
8900	2.05	2.24	2.38	2.54	2.74	2.95
9000	2.05	2.24	2.39	2.54	2.75	2.95
9100	2.05	2.25	2.39	2.55	2.75	2.95
9200	2.05	2.25	2.39	2.55	2.75	2.95
9300	2.06	2.25	2.39	2.55	2.75	2.95
9400	2.06	2.25	2.39	2.55	2.75	2.95
9500	2.06	2.25	2.39	2.55	2.75	2.95
9600	2.06	2.25	2.39	2.55	2.75	2.95
9700	2.07	2.26	2.39	2.55	2.75	2.95
9800	2.07	2.26	2.39	2.55	2.75	2.95
9900	2.07	2.26	2.39	2.55	2.75	2.95
10000	2.07	2.26	2.39	2.55	2.75	2.95
10100	2.07	2.26	2.39	2.55	2.74	2.94
10200	2.07	2.26	2.39	2.55	2.74	2.94
10300	2.08	2.26	2.39	2.55	2.74	2.94
10400	2.08	2.26	2.39	2.55	2.74	2.94
10500	2.08	2.26	2.40	2.55	2.74	2.93
10600	2.09	2.26	2.40	2.55	2.74	2.93
10700	2.09	2.27	2.40	2.55	2.74	2.93
10800	2.09	2.27	2.40	2.55	2.74	2.93
10900	2.09	2.27	2.40	2.55	2.74	2.93
11000	2.10	2.27	2.41	2.55	2.75	2.94
11100	2.11	2.28	2.42	2.57	2.76	2.96

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
11200	2.11	2.29	2.42	2.58	2.77	2.97
11300	2.14	2.33	2.47	2.63	2.84	3.04
11400	2.18	2.38	2.53	2.70	2.91	3.12
11500	2.21	2.43	2.59	2.76	2.98	3.20
11600	2.25	2.47	2.64	2.83	3.06	3.28
11700	2.26	2.48	2.65	2.84	3.07	3.30
11800	2.26	2.49	2.66	2.85	3.09	3.32
11900	2.28	2.52	2.71	2.93	3.20	3.49
Structure S10 – Gateway Motorway						
12055	2.35	2.62	2.84	3.08	3.38	3.71
12100	2.35	2.63	2.84	3.08	3.38	3.71
12200	2.36	2.63	2.85	3.09	3.39	3.71
Structure S12 – Murarrie Road						
12300	2.38	2.68	2.90	3.14	3.45	3.77
12400	2.39	2.69	2.92	3.16	3.46	3.78
12500	2.40	2.71	2.93	3.17	3.48	3.80
12600	2.42	2.72	2.95	3.19	3.49	3.82
12700	2.43	2.74	2.97	3.22	3.53	3.85
12800	2.45	2.76	3.00	3.25	3.56	3.89
12900	2.46	2.78	3.03	3.28	3.60	3.93
13000	2.47	2.80	3.05	3.31	3.64	3.98
Structure S13 – Wynnum Road						
13100	2.52	2.87	3.17	3.48	3.82	4.14
13200	2.62	3.03	3.37	3.69	4.04	4.35
13300	2.70	3.12	3.47	3.79	4.12	4.42
13400	2.78	3.21	3.57	3.88	4.20	4.49
13500	2.80	3.23	3.59	3.90	4.22	4.51
13600	2.82	3.25	3.61	3.92	4.24	4.54
13700	2.84	3.27	3.63	3.95	4.27	4.57
13800	2.86	3.29	3.65	3.97	4.30	4.60
13900	2.87	3.30	3.66	3.98	4.31	4.62
14000	2.88	3.31	3.67	3.99	4.33	4.64
14100	2.88	3.32	3.68	4.01	4.34	4.65
14200	2.89	3.33	3.70	4.02	4.36	4.68
14300	2.91	3.36	3.72	4.05	4.40	4.72
14400	2.94	3.38	3.75	4.09	4.43	4.76
14500	2.95	3.39	3.76	4.09	4.44	4.76
14600	2.95	3.39	3.76	4.09	4.44	4.77

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
14700	2.95	3.39	3.76	4.09	4.44	4.77
14800	2.95	3.39	3.76	4.09	4.44	4.77
14900	2.95	3.39	3.76	4.10	4.44	4.77
15000	2.95	3.39	3.77	4.10	4.44	4.77
15100	2.95	3.39	3.77	4.10	4.45	4.77
15200	2.96	3.40	3.77	4.10	4.45	4.78
15300	2.96	3.40	3.77	4.10	4.45	4.78
15400	2.97	3.41	3.78	4.11	4.46	4.78
15500	2.98	3.42	3.79	4.12	4.47	4.79
15600	2.99	3.43	3.80	4.13	4.48	4.80
15700	3.00	3.44	3.81	4.14	4.49	4.81
15800	3.02	3.46	3.83	4.16	4.50	4.82
15900	3.07	3.50	3.87	4.19	4.54	4.86
16000	3.12	3.55	3.91	4.23	4.57	4.89
16100	3.18	3.60	3.95	4.27	4.61	4.93
16200	3.23	3.64	3.99	4.30	4.64	4.95
16300	3.26	3.66	4.01	4.32	4.65	4.97
16400	3.29	3.68	4.02	4.33	4.66	4.97
16500	3.32	3.71	4.04	4.34	4.67	4.99
16600	3.36	3.73	4.06	4.36	4.68	5.00
16700	3.38	3.75	4.07	4.37	4.69	5.01
16800	3.40	3.77	4.09	4.38	4.71	5.02
16900	3.42	3.78	4.10	4.39	4.72	5.03
17000	3.44	3.80	4.12	4.41	4.73	5.04
17100	3.46	3.82	4.13	4.42	4.74	5.06
17200	3.50	3.85	4.15	4.44	4.76	5.07
17300	3.53	3.87	4.17	4.45	4.77	5.08
17400	3.56	3.90	4.19	4.47	4.79	5.09
17500	3.61	3.93	4.22	4.49	4.80	5.11
17600	3.65	3.97	4.24	4.51	4.82	5.12
17700	3.69	4.00	4.27	4.53	4.84	5.14
17800	3.74	4.04	4.29	4.55	4.85	5.15
17900	3.78	4.08	4.32	4.57	4.87	5.16
18000	3.83	4.12	4.36	4.60	4.89	5.18
18100	3.88	4.18	4.41	4.64	4.93	5.20
18200	3.89	4.20	4.43	4.66	4.94	5.22
18300	3.90	4.21	4.44	4.67	4.95	5.23
18400	3.91	4.22	4.45	4.68	4.97	5.24

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) [2]					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
18500	3.92	4.24	4.47	4.70	4.99	5.27
18600	3.94	4.27	4.51	4.74	5.04	5.31
Structure S17 - Meadowlands Road						
18723	3.97	4.32	4.58	4.83	5.17	5.49
18800	3.99	4.34	4.61	4.87	5.20	5.52
18900	4.00	4.37	4.64	4.90	5.24	5.55
19000	4.03	4.41	4.70	4.97	5.32	5.63
19100	4.03	4.41	4.70	4.97	5.32	5.63
19200	4.08	4.48	4.78	5.06	5.42	5.74
19300	4.13	4.55	4.87	5.16	5.53	5.86
19400	4.20	4.64	4.97	5.28	5.67	6.00
19500	4.24	4.70	5.03	5.36	5.74	6.08
19600	4.26	4.72	5.06	5.39	5.78	6.12
19700	4.28	4.74	5.08	5.41	5.80	6.14
Structure S18 – Scrub Road Pedestrian Bridge						
19800	4.30	4.78	5.14	5.48	5.89	6.24
19900	4.33	4.81	5.17	5.51	5.93	6.28
20000	4.36	4.84	5.21	5.55	5.97	6.33
20100	4.39	4.88	5.26	5.61	6.04	6.39
20200	4.43	4.92	5.30	5.67	6.10	6.46
20300	4.46	4.96	5.35	5.72	6.16	6.52
20400	4.47	4.98	5.37	5.74	6.18	6.55
20500	4.50	5.01	5.41	5.78	6.22	6.59
20600	4.57	5.08	5.47	5.85	6.29	6.66
20700	4.65	5.15	5.55	5.92	6.36	6.73
20800	4.75	5.24	5.63	6.00	6.44	6.81
20900	5.02	5.49	5.88	6.25	6.69	7.08
21000	5.39	5.83	6.19	6.54	6.98	7.35
Structure S27 – Old Cleveland Road						
21100	5.84	6.32	6.72	7.10	7.55	7.95
21200	5.97	6.45	6.85	7.23	7.69	8.09
21300	6.10	6.58	6.99	7.36	7.81	8.20
21400	6.20	6.68	7.08	7.46	7.90	8.29
21500	6.25	6.74	7.14	7.51	7.95	8.33
21600	6.30	6.79	7.19	7.56	7.99	8.37
Structure S29 – Winstanley Street						
21700	6.35	6.91	7.34	7.75	8.23	8.65
21800	6.40	6.98	7.42	7.84	8.33	8.76

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
21900	6.47	7.06	7.51	7.93	8.43	8.86
22000	6.56	7.16	7.62	8.05	8.55	8.98
22100	6.66	7.26	7.74	8.17	8.66	9.09
22200	6.74	7.36	7.84	8.28	8.77	9.20
22300	6.82	7.44	7.93	8.37	8.86	9.29
22400	6.92	7.55	8.04	8.49	8.98	9.41
22500	7.01	7.64	8.13	8.57	9.06	9.49
Structure S36 – Meadowbank Street Pedestrian Bridge						
22600	7.22	7.84	8.35	8.81	9.29	9.73
22700	7.35	7.98	8.50	8.94	9.42	9.86
22800	7.47	8.10	8.62	9.06	9.53	9.96
22900	7.59	8.20	8.71	9.15	9.61	10.05
23000	7.68	8.27	8.78	9.22	9.68	10.11
23100	7.73	8.30	8.80	9.24	9.70	10.12
23200	7.82	8.35	8.83	9.27	9.72	10.14
23300	8.03	8.46	8.91	9.32	9.75	10.17
23400	8.27	8.71	9.13	9.52	9.92	10.33
Structure S37 – Pine Mountain Road						
23500	8.68	9.12	9.52	9.86	10.24	10.63
23600	8.76	9.18	9.57	9.91	10.28	10.66
23700	8.89	9.30	9.68	10.01	10.37	10.74
23800	9.07	9.48	9.85	10.16	10.51	10.87
23900	9.21	9.64	10.01	10.32	10.67	11.02
24000	9.34	9.79	10.18	10.49	10.83	11.18
24100	9.45	9.91	10.28	10.60	10.93	11.27
24200	9.63	10.12	10.51	10.83	11.16	11.50
24300	9.79	10.29	10.69	11.02	11.35	11.69
24400	9.94	10.43	10.84	11.17	11.50	11.85
24500	10.12	10.58	10.98	11.31	11.64	11.99
24600	10.17	10.62	11.02	11.35	11.68	12.02
24700	10.26	10.69	11.08	11.41	11.73	12.07
24800	10.44	10.85	11.20	11.51	11.82	12.15
24900	10.65	11.06	11.39	11.67	11.95	12.25
25000	10.81	11.24	11.58	11.84	12.10	12.38
25100	11.00	11.46	11.81	12.07	12.33	12.59
25200	11.15	11.66	12.02	12.29	12.55	12.81
25300	11.28	11.80	12.18	12.48	12.77	13.04
25400	11.52	12.06	12.46	12.77	13.08	13.38

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
25500	11.75	12.31	12.73	13.06	13.39	13.71
25600	11.96	12.53	12.94	13.28	13.61	13.93
25700	12.11	12.68	13.09	13.43	13.76	14.07
25800	12.25	12.82	13.24	13.57	13.90	14.20
25900	12.36	12.94	13.36	13.68	14.00	14.31
Structure S55 – Oakley Street Pedestrian Bridge						
26000	12.50	13.09	13.51	13.87	14.20	14.51
26100	12.61	13.20	13.62	13.97	14.31	14.62
26200	12.70	13.28	13.70	14.06	14.40	14.72
26300	12.85	13.44	13.88	14.24	14.59	14.92
26400	13.13	13.75	14.22	14.61	14.99	15.35
26500	13.33	13.95	14.44	14.84	15.24	15.61
26600	13.44	14.06	14.54	14.95	15.35	15.71
26700	13.55	14.15	14.63	15.02	15.42	15.78
26800	13.68	14.26	14.73	15.11	15.50	15.86
Structure S56 – Wecker Road						
26900	14.04	14.59	15.02	15.37	15.73	16.07
27000	14.21	14.76	15.19	15.55	15.91	16.25
27100	14.44	15.00	15.44	15.80	16.17	16.52
27200	14.63	15.19	15.64	16.00	16.39	16.74
27300	14.72	15.29	15.74	16.11	16.51	16.86
27400	14.81	15.36	15.81	16.19	16.58	16.94
27500	14.96	15.48	15.92	16.28	16.67	17.03
27600	15.12	15.61	16.04	16.39	16.78	17.13
27700	15.28	15.76	16.16	16.51	16.89	17.24
27800	15.49	15.94	16.33	16.66	17.02	17.35
27900	15.74	16.17	16.53	16.85	17.21	17.52
28000	15.99	16.43	16.78	17.09	17.44	17.74
28100	16.22	16.70	17.07	17.38	17.75	18.03
28200	16.42	16.92	17.32	17.66	18.04	18.33
S57 - Mount Gravatt Capalaba Road						
28300	16.78	17.33	17.76	18.13	18.59	18.91
28400	17.01	17.57	18.01	18.39	18.85	19.18
28500	17.19	17.75	18.19	18.58	19.04	19.37
28600	17.42	17.94	18.36	18.74	19.19	19.51
28700	17.69	18.17	18.55	18.90	19.32	19.62
28800	17.96	18.42	18.79	19.13	19.52	19.81
28900	18.19	18.65	19.02	19.35	19.74	20.02

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
29000	18.27	18.75	19.13	19.47	19.86	20.14
29100	18.39	18.88	19.26	19.61	20.00	20.29
29200	18.48	18.99	19.39	19.74	20.14	20.43
29300	18.60	19.11	19.51	19.87	20.28	20.57
29400	18.86	19.34	19.72	20.06	20.45	20.73
29500	19.11	19.57	19.93	20.25	20.62	20.88
29600	19.36	19.80	20.14	20.44	20.79	21.04
29700	19.61	20.02	20.35	20.63	20.96	21.20
29800	19.86	20.27	20.59	20.86	21.19	21.42
29900	20.03	20.45	20.79	21.06	21.43	21.67
30000	20.47	20.82	21.08	21.32	21.60	21.94
30100	20.83	21.17	21.40	21.62	21.87	22.18
30200	21.14	21.49	21.77	22.01	22.24	22.50
30300	21.46	21.82	22.11	22.35	22.60	22.84
30400	21.63	22.03	22.33	22.59	22.86	23.11
30500	21.83	22.25	22.56	22.83	23.09	23.33
30600	22.07	22.50	22.81	23.08	23.34	23.59
30700	22.18	22.62	22.93	23.22	23.48	23.73
30800	22.27	22.72	23.04	23.32	23.59	23.84
30900	22.48	22.86	23.17	23.44	23.71	23.96
S58 - Sherwood Place Pedestrian Bridge						
31000	22.91	23.37	23.68	23.95	24.22	24.46
31100	23.10	23.57	23.90	24.18	24.47	24.72
31200	23.32	23.82	24.17	24.48	24.78	25.04
31300	23.59	24.13	24.51	24.84	25.16	25.42
31400	23.95	24.48	24.85	25.17	25.49	25.74
31500	24.28	24.76	25.11	25.43	25.74	25.98
31600	24.40	24.89	25.25	25.57	25.88	26.12
31700	24.52	25.01	25.36	25.68	26.00	26.24
31800	24.67	25.16	25.50	25.82	26.13	26.37
31900	24.80	25.28	25.62	25.93	26.23	26.47
S59 - Craig Street Pedestrian Bridge						
32000	25.45	25.81	26.06	26.29	26.53	26.73
32100	25.83	26.19	26.41	26.63	26.84	27.03
32200	25.92	26.30	26.54	26.77	26.99	27.18
32300	25.99	26.38	26.63	26.87	27.09	27.30
32400	26.06	26.47	26.73	26.98	27.21	27.43
32500	26.16	26.59	26.86	27.13	27.36	27.59

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
32600	26.33	26.78	27.06	27.34	27.58	27.82
32700	26.58	27.05	27.35	27.64	27.87	28.13
32800	26.90	27.39	27.70	28.01	28.25	28.53
32900	27.53	27.99	28.30	28.60	28.85	29.13
33000	27.85	28.30	28.60	28.90	29.13	29.41
S60 - D/S of Logan Road Pedestrian Bridge						
33100	28.49	28.87	29.12	29.38	29.61	29.85
S61 - Logan Road						
33200	28.62	29.08	29.43	29.90	30.67	31.09
S63 - Pacific Motorway						
33362	29.70	30.06	30.36	30.87	32.02	33.05
33400	29.78	30.13	30.42	30.92	32.03	33.06
33500	29.98	30.34	30.62	31.06	32.06	33.08
33600	30.15	30.53	30.80	31.20	32.11	33.11
33700	30.27	30.66	30.94	31.33	32.17	33.14
33800	30.52	30.94	31.23	31.58	32.30	33.21
33900	30.80	31.24	31.53	31.87	32.46	33.30
34000	31.36	31.73	32.01	32.31	32.73	33.43
34100	31.82	32.19	32.45	32.73	33.08	33.63
34200	32.31	32.66	32.91	33.17	33.47	33.88
34300	32.62	32.97	33.22	33.48	33.77	34.13
34400	32.94	33.29	33.55	33.81	34.09	34.40
34500	33.17	33.49	33.74	33.99	34.26	34.55
S66 - Padstow Road						
34600	33.65	34.09	34.32	34.61	34.97	35.19
34700	34.03	34.30	34.47	34.71	35.02	35.23
34800	34.87	35.08	35.22	35.35	35.51	35.66
34900	35.35	35.56	35.71	35.85	36.01	36.14
35000	35.73	35.96	36.12	36.28	36.45	36.59
S68 - Malbon Street Pedestrian Bridge						
35100	36.16	36.44	36.64	36.84	37.06	37.23
35200	36.60	36.85	37.03	37.22	37.42	37.58
35300	37.28	37.50	37.63	37.78	37.96	38.11
35400	37.94	38.16	38.29	38.44	38.63	38.80
35500	38.47	38.69	38.85	39.01	39.23	39.41
35600	39.10	39.41	39.61	39.81	40.05	40.24
35700	39.80	40.20	40.43	40.66	40.93	41.12
35800	40.35	40.72	40.95	41.17	41.44	41.61

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
35900	40.85	41.23	41.41	41.58	41.81	41.97
36000	41.52	41.77	41.92	42.06	42.24	42.39
36100	42.11	42.28	42.40	42.52	42.68	42.82
36200	42.55	42.70	42.80	42.92	43.08	43.21
36300	42.96	43.12	43.22	43.33	43.49	43.62
36400	43.33	43.51	43.62	43.74	43.91	44.04
36500	43.78	43.97	44.09	44.21	44.38	44.52
S69 - Altandi Street Pedestrian Bridge						
36600	44.12	44.39	44.56	44.73	44.95	45.11
36700	44.28	44.50	44.66	44.82	45.03	45.20
36800	44.61	44.76	44.86	44.97	45.14	45.28
S70 - D/S Gold Coast Railway Pedestrian Bridge						
36900	45.21	45.38	45.48	45.56	45.68	45.77
36985	45.84	46.03	46.15	46.26	46.39	46.50
S71 and S72 - Gold Coast Railway						
37100	46.29	46.52	46.64	46.77	46.92	47.06
S73 - Beenleigh Road						
37200	46.69	46.92	47.02	47.12	47.23	47.34
37300	46.94	47.16	47.28	47.39	47.52	47.63
S74 - Gowan Road Pedestrian Culvert						
37400	47.40	47.55	47.65	47.76	47.88	47.99
37500	47.93	48.09	48.18	48.29	48.42	48.53
37600	48.49	48.68	48.77	48.89	49.03	49.15
37700	48.90	49.10	49.19	49.32	49.46	49.58
37800	49.28	49.45	49.53	49.65	49.78	49.90
37900	49.89	50.03	50.09	50.19	50.28	50.37
38000	50.37	50.52	50.59	50.69	50.79	50.87
38100	50.82	50.99	51.10	51.23	51.32	51.43
S75 - Energy Dissipator						
38200	51.72	51.91	52.00	52.11	52.24	52.37
38300	51.86	52.06	52.16	52.29	52.44	52.57
38400	52.08	52.30	52.41	52.55	52.70	52.83
S77 - Glenefer Street Pedestrian Bridge						
38500	52.77	52.98	53.08	53.21	53.34	53.46
38574	53.35	53.53	53.60	53.71	53.84	53.95
S78 - Brandon Road						
38700	54.07	54.27	54.38	54.49	54.64	54.77
38800	54.51	54.67	54.84	54.94	55.08	55.22

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
38900	54.78	54.95	55.14	55.24	55.35	55.50
S79 - Nemies Road						
39000	55.77	55.98	56.27	56.58	57.00	57.22
39100	56.41	56.61	56.79	56.98	57.29	57.49
39200	57.02	57.22	57.33	57.44	57.66	57.83
39300	57.60	57.79	57.90	58.01	58.17	58.28
S80 - Calliope Street Bikeway						
39400	58.49	58.70	58.81	58.93	59.09	59.21
39500	58.94	59.12	59.22	59.33	59.48	59.60
39600	59.93	60.04	60.12	60.20	60.31	60.39
39700	60.27	60.40	60.46	60.54	60.64	60.72
39800	60.48	60.61	60.67	60.75	60.86	60.95
39888	60.61	60.77	60.84	60.93	61.08	61.20
Daw Road Drain						
0	36.01	36.30	36.51	36.71	36.94	37.10
100	36.72	36.81	36.85	36.92	37.05	37.22
200	37.98	38.07	38.11	38.17	38.22	38.28
300	38.70	38.87	38.93	39.02	39.12	39.21
400	39.87	40.03	40.11	40.21	40.33	40.42
500	40.10	40.28	40.38	40.50	40.64	40.75
600	40.50	40.67	40.76	40.88	41.03	41.15
700	41.00	41.15	41.23	41.33	41.48	41.59
800	41.59	41.72	41.79	41.88	42.01	42.11
900	42.15	42.31	42.37	42.45	42.56	42.65
1000	42.62	42.77	42.84	42.92	43.02	43.10
1095	42.69	42.86	42.94	43.02	43.13	43.21
Padstow Road Drain						
0	33.55	33.82	34.01	34.24	34.49	34.74
S169 - McCullough Street Pedestrian Bridge						
100	34.85	35.13	35.28	35.44	35.60	35.71
200	36.24	36.56	36.72	36.89	37.09	37.21
S170 - McCullough Street						
300	36.93	37.23	37.39	37.58	37.80	37.94
400	37.85	38.05	38.17	38.29	38.46	38.58
441	38.24	38.50	38.66	38.80	38.97	39.10
Mimosa Creek						
0	32.92	33.28	33.54	33.80	34.08	34.39
100	33.24	33.56	33.79	34.02	34.28	34.56

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) [(2)]					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
S82 - Turnmill Street Pedestrian Culvert						
200	33.61	33.90	34.13	34.33	34.56	34.77
300	33.86	34.19	34.44	34.68	34.89	35.10
400	34.10	34.46	34.72	34.98	35.21	35.40
500	34.55	34.97	35.26	35.54	35.78	36.00
S83 - Springfield Street Pedestrian Culvert						
600	35.05	35.41	35.69	35.94	36.17	36.38
700	35.63	36.00	36.26	36.47	36.65	36.82
800	36.13	36.48	36.71	36.92	37.10	37.27
900	36.56	36.89	37.11	37.32	37.51	37.70
1000	37.24	37.50	37.63	37.78	37.92	38.07
1100	37.94	38.22	38.36	38.51	38.66	38.81
1200	38.48	38.81	39.02	39.23	39.44	39.63
S84 - Parkway Street						
1300	38.91	39.24	39.48	39.70	39.94	40.15
1400	39.50	39.79	40.00	40.22	40.45	40.65
1500	39.99	40.30	40.53	40.75	40.98	41.19
S85 - Kessels Road						
1610	40.26	40.58	40.83	41.07	41.31	41.55
1700	N/R [(1)]	N/R [(1)]	N/R [(1)]	41.49	41.76	42.01
1800	41.07	41.44	41.71	41.97	42.23	42.46
S86(a)(b)(c) - Pacific Motorway						
1944	41.74	42.13	42.42	42.72	43.03	43.36
2000	42.26	42.63	42.84	43.06	43.29	43.55
S87 - Nagle Street						
2100	43.04	43.39	43.54	43.69	43.84	44.17
2200	43.58	44.04	44.30	44.56	44.79	45.05
2300	44.14	44.60	44.90	45.21	45.47	45.71
2400	44.61	45.01	45.28	45.57	45.82	46.06
2500	45.48	45.82	46.08	46.36	46.61	46.84
2600	45.74	45.96	46.18	46.44	46.67	46.90
2700	46.89	47.01	47.08	47.17	47.28	47.42
2800	47.39	47.59	47.72	47.86	47.99	48.12
2900	47.95	48.18	48.31	48.44	48.57	48.69
3000	48.81	49.01	49.16	49.30	49.45	49.58
S88 - Hibiscus Place Pedestrian Culvert						
3100	49.48	49.66	49.78	49.90	50.02	50.13
3200	50.00	50.27	50.44	50.58	50.73	50.85

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
3300	50.62	50.93	51.13	51.33	51.51	51.68
3400	51.30	51.60	51.82	52.04	52.26	52.44
3500	N/R (1)	N/R (1)	N/R (1)	52.84	53.05	53.27
3600	53.43	53.58	53.71	53.83	53.98	54.12
3674	54.33	54.48	54.58	54.67	54.78	54.89
Nardie Street Drain						
0	23.81	24.35	24.74	25.06	25.38	25.64
100	23.82	24.38	24.79	25.15	25.50	25.78
200	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)	25.87
300	24.96	25.31	25.52	25.80	26.23	26.62
400	25.57	25.79	25.93	26.11	26.43	26.71
496	26.42	26.69	26.83	26.98	27.19	27.39
Bulimba Creek East						
0	22.31	22.75	23.07	23.36	23.63	23.88
100	22.70	23.02	23.27	23.53	23.78	24.02
200	23.08	23.38	23.60	23.84	24.08	24.31
300	23.36	23.62	23.80	24.02	24.24	24.47
400	23.65	23.93	24.07	24.27	24.48	24.71
500	23.89	24.18	24.34	24.52	24.74	24.96
600	N/R (1)	24.40	24.57	24.74	24.96	25.18
700	24.49	24.80	24.98	25.15	25.35	25.55
800	24.94	25.30	25.50	25.69	25.91	26.08
900	25.75	26.07	26.24	26.39	26.56	26.72
1000	26.28	26.57	26.71	26.84	26.99	27.17
1100	26.49	26.76	26.90	27.02	27.17	27.34
1200	26.74	27.02	27.16	27.28	27.44	27.62
S89 - Gateway Motorway - On / Off Ramp						
1300	27.11	27.46	27.63	27.79	28.00	28.25
1400	27.75	28.02	28.16	28.30	28.48	28.70
1500	28.26	28.53	28.65	28.77	28.94	29.14
1576	28.52	28.82	28.95	29.08	29.26	29.48
S90 - Miles Platting Road						
S91 - South East Busway Loop						
1700	28.83	29.18	29.34	29.49	29.71	29.97
1800	29.22	29.56	29.71	29.87	30.08	30.33
1881	29.56	29.90	30.06	30.23	30.43	30.69
S92 - South East Busway						
S93 - Pacific Motorway						

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
2000	30.18	30.86	31.32	31.83	32.50	33.04
S93(a)(b)(c) - V1 Veloway						
2100	30.33	30.98	31.42	31.89	32.55	33.08
2200	30.50	31.08	31.48	31.92	32.57	33.09
2300	30.85	31.28	31.59	31.99	32.60	33.10
2400	31.28	31.67	31.91	32.21	32.70	33.16
2500	31.54	31.95	32.19	32.48	32.85	33.26
S94 - Logan Road						
2597	33.09	33.41	33.61	33.86	34.26	34.45
S194 - Glen Hotel Weir						
2700	33.83	34.08	34.22	34.40	34.67	34.84
2800	34.44	34.75	34.92	35.10	35.26	35.37
2880	34.71	35.04	35.22	35.42	35.62	35.78
S96 - Gateway Motorway						
3000	35.08	35.41	35.59	35.80	36.03	36.21
3100	35.56	35.90	36.08	36.28	36.52	36.67
3200	35.93	36.29	36.48	36.70	36.96	37.15
3300	36.41	36.73	36.94	37.17	37.45	37.68
3400	37.16	37.54	37.73	37.95	38.24	38.46
3498	37.46	37.85	38.05	38.28	38.57	38.79
S97 - Underwood Road						
3600	37.94	38.30	38.51	38.77	39.10	39.31
3700	38.69	38.95	39.12	39.29	39.49	39.63
3800	39.96	40.07	40.16	40.20	40.26	40.33
3900	40.54	40.67	40.75	40.86	40.99	41.08
4000	41.23	41.35	41.43	41.52	41.64	41.74
4100	41.81	41.97	42.07	42.20	42.34	42.46
4200	42.34	42.55	42.68	42.83	43.00	43.14
4300	42.89	43.14	43.29	43.47	43.67	43.83
4400	43.47	43.69	43.84	44.00	44.21	44.36
4500	N/R (1)	44.17	44.26	44.40	44.58	44.70
4600	44.44	44.59	44.66	44.78	44.93	45.04
4700	45.11	45.23	45.28	45.37	45.47	45.55
4800	45.57	45.70	45.76	45.85	45.95	46.02
4900	45.96	46.14	46.21	46.33	46.43	46.52
5000	46.60	46.75	46.80	46.89	47.00	47.09
5100	47.30	47.48	47.53	47.63	47.74	47.83
5200	47.76	47.95	48.01	48.12	48.23	48.33

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
5300	48.04	48.22	48.27	48.37	48.49	48.59
S99 - Gateway Motorway						
5400	48.53	48.69	48.74	48.83	48.94	49.03
S100 - Gold Coast Railway						
S101 - Beenleigh Road						
5500	50.22	50.36	50.44	50.50	50.56	50.62
5600	50.23	50.37	50.45	50.52	50.58	50.64
5700	50.89	51.01	51.07	51.13	51.20	51.25
5800	51.76	51.86	51.91	51.96	52.03	52.08
5900	52.45	52.55	52.60	52.66	52.74	52.79
6000	53.31	53.40	53.43	53.48	53.54	53.59
6100	54.17	54.26	54.31	54.36	54.42	54.45
6200	55.23	55.32	55.37	55.42	55.49	55.55
6296	56.19	56.31	56.37	56.44	56.53	56.60
Bulimba Creek East Railway Bypass						
0	46.45	46.61	46.67	46.78	46.88	46.98
100	N/R (1)	47.01	47.20	47.35	47.53	47.62
200	N/R (1)	47.61	47.68	47.74	47.78	47.81
300	N/R (1)	47.71	47.85	47.99	48.07	48.13
400	N/R (1)	48.47	48.58	48.67	48.76	48.84
460	N/R (1)	48.85	48.94	49.03	49.10	49.17
Tributary C						
0	37.90	38.26	38.47	38.74	39.08	39.30
56	38.09	38.45	38.70	39.04	39.22	39.40
S174 - Gateway Motorway						
200	40.28	40.41	40.48	40.55	40.64	40.72
300	41.53	41.66	41.73	41.80	41.90	41.97
400	42.77	42.91	42.98	43.05	43.14	43.21
500	43.94	44.07	44.13	44.19	44.26	44.33
600	44.97	45.12	45.17	45.23	45.32	45.39
700	45.82	45.99	46.06	46.13	46.24	46.32
800	46.46	46.61	46.69	46.77	46.87	46.96
900	47.01	47.14	47.21	47.28	47.38	47.47
1000	47.45	47.53	47.58	47.64	47.73	47.80
1100	47.99	48.08	48.13	48.19	48.27	48.33
1200	48.56	48.68	48.73	48.80	48.89	48.94
1246	48.83	48.95	49.01	49.07	49.17	49.22
Tributary B						

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
0	31.21	31.60	31.84	32.15	32.67	33.15
100	31.33	31.69	31.91	32.20	32.70	33.17
S95 - Logan Road						
200	33.22	33.46	33.58	33.68	33.87	34.17
300	33.80	34.04	34.16	34.27	34.39	34.48
400	34.61	34.84	34.98	35.10	35.24	35.36
S104 - Dance Crescent						
500	36.20	36.42	36.54	36.66	36.81	36.92
584	36.73	36.90	37.00	37.09	37.22	37.31
Tributary A						
0	30.17	30.86	31.31	31.83	32.50	33.04
100	30.24	30.89	31.33	31.85	32.53	33.06
S105 - Gateway Motorway						
241	30.44	31.13	31.55	32.11	32.80	33.35
300	31.00	31.43	31.71	32.19	32.83	33.36
400	32.08	32.30	32.38	32.50	32.93	33.39
500	32.51	32.76	32.86	32.98	33.17	33.50
S106 - Pacific Motorway Off Ramp						
600	33.14	33.50	33.64	33.83	34.03	34.17
700	33.47	33.79	33.93	34.10	34.31	34.45
800	33.77	34.07	34.20	34.35	34.56	34.71
900	34.35	34.60	34.72	34.85	35.04	35.18
S107 - Pacific Motorway						
1038	34.63	34.90	35.02	35.20	35.45	35.63
1100	35.33	35.63	35.76	35.85	35.97	36.08
1200	35.78	36.01	36.11	36.21	36.33	36.43
1300	36.61	36.74	36.81	36.89	37.01	37.10
1400	37.44	37.60	37.66	37.73	37.84	37.93
1500	38.08	38.24	38.31	38.39	38.52	38.61
1600	39.00	39.18	39.26	39.35	39.50	39.60
1700	40.19	40.40	40.49	40.59	40.76	40.87
1800	41.02	41.19	41.27	41.36	41.52	41.62
1900	41.74	41.87	41.94	42.01	42.13	42.21
2000	42.49	42.58	42.62	42.67	42.76	42.81
2100	43.16	43.30	43.36	43.43	43.53	43.60
2200	43.85	44.05	44.13	44.22	44.34	44.41
2300	44.33	44.51	44.61	44.70	44.80	44.88
2400	45.34	45.43	45.47	45.53	45.61	45.66

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
2500	46.40	46.49	46.53	46.58	46.65	46.70
2600	47.51	47.63	47.69	47.74	47.82	47.88
2700	48.58	48.69	48.75	48.81	48.90	48.97
2800	49.64	49.74	49.80	49.87	49.97	50.04
2900	50.63	50.75	50.81	50.88	50.97	51.04
2915	50.76	50.88	50.95	51.02	51.11	51.18
Tributary A1						
0	40.42	40.62	40.71	40.81	40.99	41.10
100	42.38	42.44	42.47	42.51	42.55	42.58
200	43.97	44.10	44.16	44.22	44.31	44.37
300	45.33	45.60	45.71	45.84	46.03	46.16
400	46.91	47.04	47.13	47.26	47.44	47.56
500	48.85	49.01	49.12	49.19	49.30	49.37
600	53.18	53.33	53.40	53.46	53.54	53.60
689	56.99	57.10	57.16	57.20	57.26	57.31
Tributary A Overflow						
0	32.34	32.56	32.65	32.76	33.02	33.42
71	32.40	32.64	32.74	32.86	33.09	33.45
S186 and S189 - Pacific Motorway						
S187 and S190 - Pacific Motorway On Ramp						
S188 and S191 - Busway						
200	32.46	32.73	32.88	33.06	33.31	33.64
300	32.70	32.99	33.21	33.32	33.51	33.74
400	33.37	33.58	33.75	33.87	34.05	34.23
500	34.02	34.19	34.39	34.61	34.75	34.97
S192 - School Road						
600	34.42	34.70	34.85	35.04	35.26	35.45
S193 - Diversion Weir						
700	34.66	34.93	35.06	35.23	35.47	35.65
703	34.67	34.94	35.07	35.24	35.48	35.65
Tributary A2						
0	34.53	34.78	34.90	35.03	35.21	35.35
100	35.62	35.82	35.92	36.04	36.22	36.35
200	36.87	37.07	37.17	37.29	37.42	37.55
300	37.77	38.00	38.12	38.25	38.38	38.52
S108 - Freeway Office Park Weir						
410	40.11	40.29	40.40	40.52	40.75	40.82
S109 - Freeway Office Park Internal Road						

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
505	40.19	40.39	40.48	40.64	40.82	40.93
S110 and S111 - Logan Road						
628	41.24	41.47	41.61	41.75	41.90	42.00
700	41.60	41.75	41.86	41.97	42.10	42.20
760	42.34	42.44	42.51	42.57	42.65	42.73
Miles Platting Road Drain						
0	24.97	25.33	25.54	25.74	25.95	26.12
100	26.56	26.72	26.81	26.92	27.06	27.15
S172 - Gateway Motorway						
200	27.32	27.55	27.69	27.85	28.07	28.28
300	28.11	28.30	28.41	28.53	28.70	28.86
400	28.86	29.07	29.17	29.29	29.44	29.56
500	30.29	30.49	30.58	30.68	30.80	30.88
600	31.88	32.06	32.14	32.24	32.35	32.44
700	32.99	33.09	33.17	33.26	33.36	33.43
800	34.11	34.33	34.45	34.58	34.73	34.87
900	36.00	36.21	36.32	36.44	36.60	36.72
1000	39.16	39.27	39.33	39.40	39.49	39.57
S173 - Miles Platting Road						
1100	40.27	40.43	40.52	40.63	40.76	40.85
1200	42.49	42.53	42.57	42.60	42.64	42.68
1300	43.94	44.04	44.10	44.17	44.25	44.31
1328	44.19	44.32	44.40	44.48	44.58	44.65
Kate Circuit Drain						
0	29.72	29.92	30.02	30.14	30.28	30.40
100	32.35	32.39	32.42	32.44	32.48	32.52
200	34.39	34.48	34.54	34.60	34.66	34.72
300	36.92	37.00	37.04	37.09	37.13	37.17
400	38.81	38.94	39.01	39.10	39.21	39.29
437	39.44	39.59	39.72	39.82	39.95	40.04
Parklands Circuit Drain						
0	19.28	19.72	20.07	20.38	20.73	20.99
100	19.39	19.81	20.15	20.46	20.81	21.06
200	19.87	20.05	20.37	20.65	20.96	21.21
S165 - Gateway Motorway						
300	21.28	21.44	21.94	22.03	22.10	22.15
400	22.34	22.52	22.63	22.73	22.84	22.91
500	24.53	24.86	25.00	25.10	25.28	25.48

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
600	25.76	25.94	26.05	26.16	26.31	26.43
700	27.03	27.16	27.23	27.31	27.41	27.49
S166 - Prebble Street						
800	27.85	27.97	28.03	28.09	28.18	28.25
900	28.16	28.32	28.40	28.49	28.60	28.67
S167 - Kyeema Street						
1000	29.80	30.00	30.09	30.17	30.29	30.37
1100	32.27	32.38	32.43	32.49	32.58	32.65
S168 - Echidna Street						
1206	33.20	33.30	33.35	33.41	33.49	33.55
1300	34.24	34.31	34.35	34.39	34.44	34.48
1400	36.71	36.78	36.82	36.87	36.92	36.97
1500	39.36	39.42	39.44	39.47	39.51	39.54
1600	42.52	42.57	42.59	42.62	42.66	42.68
1675	44.79	44.84	44.86	44.88	44.92	45.01
Broadwater Road Drain						
0	15.12	15.61	16.04	16.39	16.78	17.13
100	15.17	15.68	16.11	16.47	16.86	17.22
200	15.17	15.68	16.12	16.48	16.87	17.23
300	15.33	15.69	16.12	16.48	16.87	17.23
400	16.06	16.23	16.35	16.57	16.91	17.26
500	16.70	16.83	16.92	17.03	17.20	17.36
600	17.01	17.17	17.30	17.44	17.65	17.79
700	N/R (1)	18.92	19.10	19.28	19.48	19.65
800	N/R (1)	19.14	19.35	19.55	19.76	19.94
900	18.96	19.52	19.68	19.83	20.02	20.18
1000	19.37	19.79	19.94	20.09	20.29	20.45
1100	19.88	20.18	20.32	20.48	20.70	20.85
S152 - Broadwater Road						
1200	21.20	21.87	22.00	22.14	22.31	22.43
1300	21.39	22.04	22.18	22.34	22.54	22.69
S153 - Brisbane Adventist College Drop Structure						
1400	22.50	22.68	22.77	22.88	23.21	23.37
1500	23.12	23.29	23.38	23.47	23.57	23.64
1600	24.02	24.20	24.29	24.38	24.48	24.57
1700	24.86	25.04	25.13	25.23	25.33	25.41
S155 - Brisbane Adventist College Pedestrian Bridge						
S156 - Brisbane Adventist College Drop Structure						

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
1800	26.25	26.50	26.62	26.74	26.91	27.01
S157 - 16 Rowe Close Drop Structure						
1897	26.80	27.02	27.14	27.26	27.40	27.50
S158 - 16 Rowe Close Drop Structure						
2000	27.68	27.95	28.10	28.23	28.40	28.53
S159 - 226 Wishart Road - Internal Road						
2100	28.25	28.59	28.79	28.99	29.25	29.47
2113	28.25	28.59	28.79	28.99	29.25	29.47
Wishart Road Drain						
0	22.90	23.08	23.16	23.26	23.38	23.48
100	24.84	24.97	25.04	25.15	25.25	25.33
200	26.11	26.28	26.35	26.44	26.65	26.72
S160 - Wishart Road						
300	27.32	27.51	27.61	27.71	27.82	27.90
400	28.95	29.00	29.03	29.06	29.11	29.12
497	29.67	29.76	29.81	29.86	29.94	29.99
S161 - Access Bridge to 10 St.George Circuit						
S162 - Access Bridge to 10 St.George Circuit						
600	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)
700	32.64	32.79	32.86	32.94	33.04	33.11
S164 - 35 Avenell Street Access Road						
723	32.68	32.84	32.92	33.00	33.11	33.19
Wecker Road Drain						
0	13.33	13.96	14.44	14.85	15.25	15.62
100	13.57	13.94	14.41	14.81	15.21	15.59
200	14.91	15.13	15.22	15.31	15.41	15.67
300	15.19	15.39	15.47	15.57	15.67	15.74
383	15.81	16.10	16.24	16.49	16.64	16.72
S141 - Christian College Access Road						
S142 - Christian College Access Road						
500	16.59	17.25	17.57	17.81	17.98	18.08
S143 and S144 - Scrub Road						
608	17.26	17.49	17.70	17.92	18.08	18.19
700	18.02	18.23	18.33	18.43	18.53	18.61
S145 - Wecker Road						
800	19.47	19.61	19.69	19.77	19.85	19.90
900	20.34	20.57	20.68	20.81	20.92	21.02
1000	20.70	20.90	21.00	21.12	21.23	21.31

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
1093	22.53	22.74	22.82	22.94	23.07	23.16
S146 - Gateway Motorway						
1200	23.65	24.03	24.25	24.58	24.98	25.37
1300	23.79	24.14	24.34	24.64	25.01	25.40
1400	24.53	24.72	24.84	24.99	25.24	25.54
1500	25.57	25.75	25.82	25.89	26.00	26.07
S147 - Weedon Street East						
1600	27.01	27.15	27.22	27.28	27.37	27.43
S148 and S149 - Mount Petrie Road						
1700	28.07	28.21	28.28	28.35	28.45	28.52
1800	28.08	28.23	28.29	28.36	28.46	28.53
1900	30.07	30.20	30.25	30.31	30.39	30.44
2000	30.58	30.76	30.82	30.87	30.95	31.01
2016	30.68	30.87	30.93	30.99	31.08	31.15
Newnham Creek						
0	10.18	10.63	11.02	11.35	11.68	12.02
100	10.10	10.56	10.97	11.31	11.65	12.00
200	10.15	10.62	11.02	11.35	11.69	12.03
300	10.24	10.68	11.05	11.38	11.73	12.07
400	10.75	11.02	11.30	11.56	11.80	12.12
500	11.22	11.48	11.61	11.77	11.96	12.18
600	11.93	12.19	12.30	12.43	12.60	12.72
700	12.50	12.75	12.86	12.99	13.15	13.27
S39 - Access Road to 100 Wecker Road						
800	13.67	15.25	15.46	15.60	15.76	15.87
867	13.85	15.28	15.49	15.63	15.80	15.91
S40 - Stormwater Quality Improvement Device						
S41 - Secam Street						
S42 - Access Road to 33 Secam Street						
1001	15.55	16.11	16.38	16.68	16.91	17.07
S43 - Devlan Street						
1100	16.36	16.86	17.06	17.56	17.83	17.97
S44 - Bunnings Access #3						
S45 - Bunnings Access #2						
1200	16.78	17.18	17.36	17.76	18.02	18.17
S46 - Bunnings Access #1						
1300	16.95	17.32	17.47	17.84	18.10	18.25
S47 - Newnham Road						

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
1400	18.75	19.45	19.77	20.01	20.21	20.36
1500	19.10	19.68	19.95	20.18	20.38	20.53
1597	19.63	20.10	20.32	20.52	20.71	20.85
S48 - Access Road to 285 Creek Road						
S49 - Drop Structure #3						
1700	20.55	20.96	21.18	21.35	21.54	21.71
S50 - Drop Structure #2						
S51 - Drop Structure #1						
1800	22.87	23.23	23.44	23.61	23.80	23.98
S52 - Internal Road for 215 Creek Road						
S53 - 215 Creek Road Pedestrian Bridge						
1900	24.05	24.33	24.44	24.58	24.99	25.31
2000	25.09	25.35	25.44	25.56	25.74	25.87
2012	25.19	25.46	25.56	25.67	25.83	25.93
Spring Creek						
0	7.60	8.20	8.72	9.16	9.62	10.05
100	7.64	8.23	8.73	9.17	9.64	10.07
200	7.76	8.21	8.69	9.11	9.57	10.01
300	8.24	8.63	8.71	9.11	9.57	10.01
400	9.53	9.69	9.77	9.90	10.01	10.11
500	9.82	10.02	10.12	10.25	10.34	10.47
600	10.12	10.30	10.38	10.47	10.56	10.66
700	10.34	10.62	10.74	10.89	11.01	11.11
800	10.75	11.15	11.37	11.45	11.51	11.64
S132 - Scrub Road						
900	11.16	11.46	11.66	11.84	11.96	12.09
1000	11.46	11.70	11.87	12.04	12.15	12.30
1100	11.83	12.04	12.19	12.34	12.45	12.61
1200	12.52	12.69	12.81	12.97	13.06	13.21
1300	15.25	15.32	15.39	15.44	15.49	15.53
1400	16.98	17.07	17.13	17.19	17.24	17.29
1500	18.65	18.74	18.80	18.86	18.90	18.96
1600	20.52	20.65	20.73	20.82	20.88	20.95
1700	26.77	26.87	26.94	27.01	27.07	27.13
S133 - Woodland Street Pedestrian Bridge						
1800	29.59	29.76	29.88	30.00	30.08	30.18
1900	33.61	33.74	33.84	33.94	34.01	34.09
2000	36.26	36.41	36.52	36.63	36.70	36.79

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
2006	36.39	36.54	36.66	36.76	36.84	36.93
Warwick Creek						
0	12.17	12.36	12.49	12.64	12.74	12.92
S134 - Greendale Way						
100	12.93	13.16	13.33	13.51	13.64	13.80
200	13.40	13.66	13.83	14.02	14.14	14.26
300	14.02	14.23	14.37	14.53	14.67	14.83
400	14.89	15.10	15.23	15.39	15.55	15.73
S135 - Amersham Crescent						
500	15.45	15.83	16.03	16.28	16.50	16.77
600	16.77	17.00	17.16	17.33	17.45	17.63
700	17.44	17.74	17.88	18.06	18.18	18.35
800	18.12	18.40	18.53	18.69	18.82	18.98
900	18.54	18.74	18.87	19.03	19.15	19.28
1000	18.81	19.07	19.23	19.38	19.54	19.66
S136 - Cribb Road						
1100	18.91	19.16	19.32	19.48	19.65	19.78
1200	19.88	20.15	20.33	20.51	20.70	20.87
1300	20.68	20.89	21.03	21.18	21.35	21.51
1400	21.15	21.38	21.52	21.68	21.85	22.00
1500	21.42	21.72	21.89	22.07	22.25	22.40
1600	21.85	22.13	22.32	22.50	22.71	22.85
S138 - Oakley Street						
1700	22.55	22.72	22.83	22.96	23.12	23.26
1800	23.80	23.96	24.02	24.10	24.19	24.24
1817	24.09	24.21	24.28	24.37	24.47	24.55
Silky Oak Circuit Drain						
0	21.50	21.81	22.00	22.17	22.36	22.50
S139 - Oakley Street						
100	22.91	23.07	23.16	23.27	23.41	23.58
200	24.73	24.84	24.89	24.94	25.00	25.06
246	25.67	25.75	25.80	25.86	25.91	25.96
Salvin Creek						
0	6.50	7.09	7.55	7.97	8.47	8.90
100	6.48	7.08	7.53	7.96	8.45	8.89
200	6.58	7.21	7.67	8.10	8.59	9.02
300	6.59	7.22	7.68	8.10	8.59	9.03
400	6.63	7.23	7.68	8.10	8.60	9.03

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) [(2)]					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
500	6.91	7.25	7.69	8.11	8.60	9.04
S31 - Donnington Street (Lower)						
600	N/R (1)	N/R (1)	N/R (1)	N/R (1)	10.13	10.81
700	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)
800	8.45	8.94	9.27	9.58	10.23	10.86
900	8.62	9.07	9.37	9.67	10.29	10.90
1000	9.09	9.46	9.68	9.93	10.44	10.99
1100	10.03	10.32	10.46	10.63	10.87	11.36
S32 - Donnington Street (Upper)						
1200	11.56	12.03	12.29	12.69	13.43	13.99
1300	12.46	12.85	13.04	13.31	13.81	14.23
1400	13.15	13.54	13.69	13.94	14.24	14.51
S33 - Creek Road						
1515	13.44	13.90	14.07	14.38	14.80	15.14
1600	13.78	14.20	14.37	14.65	15.03	15.34
1700	14.95	15.25	15.37	15.52	15.73	15.99
1800	16.07	16.41	16.57	16.73	16.91	17.04
S34 - Pine Mountain Road						
1900	17.47	17.84	18.03	18.23	18.56	18.85
2000	18.22	18.52	18.63	18.75	18.95	19.15
2100	19.21	19.44	19.52	19.60	19.71	19.82
2200	N/R (1)	19.92	20.01	20.09	20.19	20.27
2300	20.52	20.65	20.73	20.81	20.89	20.94
S35 - Bevan Street						
2400	N/R (1)	21.74	21.84	22.00	22.11	22.31
2500	22.39	22.64	22.79	22.91	23.05	23.18
2600	23.50	23.73	23.86	23.96	24.08	24.16
2700	25.04	25.28	25.34	25.39	25.45	25.50
2800	25.60	25.85	25.92	25.98	26.05	26.11
2900	25.83	26.09	26.21	26.29	26.40	26.49
2926	25.88	26.15	26.27	26.37	26.48	26.57
Glengariff Tributary						
0	14.88	15.18	15.30	15.46	15.66	15.95
100	15.59	15.86	16.06	16.31	16.46	16.67
200	N/R (1)	16.73	16.88	17.09	17.21	17.35
300	17.01	17.21	17.37	17.57	17.70	17.84
400	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)
500	19.56	19.85	20.06	20.26	20.36	20.45

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
600	20.64	20.91	21.11	21.28	21.35	21.43
700	21.56	21.76	21.87	21.98	22.03	22.11
800	22.53	22.73	22.84	22.94	23.00	23.09
900	23.65	23.89	24.04	24.17	24.26	24.37
925	23.91	24.16	24.32	24.45	24.55	24.67
Phillips Creek						
0	4.63	5.14	5.53	5.91	6.35	6.72
100	4.79	5.28	5.66	6.03	6.48	6.85
200	4.85	5.37	5.77	6.16	6.64	7.04
300	4.86	5.38	5.78	6.17	6.65	7.06
400	4.90	5.43	5.84	6.24	6.72	7.14
500	5.01	5.56	5.99	6.39	6.85	7.25
600	5.05	5.60	6.01	6.40	6.86	7.25
S20 - Old Cleveland Access Road						
671	5.20	5.62	6.04	6.55	7.21	7.39
S21 - Stormwater Quality Improvement Device						
S22 - Old Cleveland Road						
842	N/R (1)	N/R (1)	N/R (1)	N/R (1)	7.73	8.45
900	5.91	6.32	6.52	6.96	7.75	8.45
1000	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)
1100	N/R (1)	N/R (1)	N/R (1)	9.04	9.92	10.48
S23(b)(c) - Creek Road						
1200	8.14	8.77	9.00	9.48	10.03	10.56
S24 - Pedestrian Bridge U/S Creek Road						
1300	8.91	9.46	9.61	9.85	10.21	10.65
1400	9.60	10.01	10.15	10.33	10.60	10.93
1500	10.40	10.73	10.85	11.00	11.20	11.41
1600	10.79	11.11	11.20	11.35	11.53	11.71
1700	11.44	11.74	11.83	11.97	12.14	12.27
1800	11.95	12.23	12.33	12.47	12.64	12.79
1900	12.50	12.76	12.86	13.02	13.21	13.37
2000	13.12	13.41	13.52	13.70	13.91	14.06
2100	13.63	13.93	14.05	14.24	14.46	14.61
2200	14.44	14.75	14.82	14.95	15.13	15.32
2286	15.16	15.46	15.53	15.64	15.79	16.00
S25 - Gallipoli Road						
2400	16.16	16.70	16.85	17.04	17.27	17.40
S26 - Anzac Road						

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
2500	16.56	17.15	17.45	17.78	17.99	18.11
2600	16.81	17.34	17.60	17.91	18.14	18.28
2685	17.28	17.71	17.93	18.21	18.45	18.61
Cloverbrook Place Drain						
0	3.01	3.44	3.81	4.14	4.49	4.81
100	3.00	3.44	3.81	4.14	4.49	4.81
200	3.00	3.44	3.82	4.15	4.50	4.82
300	2.99	3.43	3.81	4.14	4.49	4.82
400	2.98	3.43	3.80	4.14	4.49	4.82
500	2.98	3.42	3.80	4.14	4.49	4.83
600	2.98	3.42	3.80	4.14	4.50	4.83
S121 - Fursden Road						
700	2.98	3.42	3.80	4.14	4.50	4.83
800	2.98	3.42	3.80	4.14	4.50	4.83
900	2.98	3.42	3.80	4.14	4.50	4.83
1000	2.98	3.43	3.80	4.14	4.50	4.83
1100	3.08	3.43	3.80	4.14	4.50	4.84
1200	3.34	3.56	3.81	4.14	4.51	4.86
1213	3.36	3.58	3.81	4.14	4.51	4.86
Bethel Street Drain						
0	2.98	3.42	3.80	4.14	4.50	4.83
100	2.98	3.42	3.80	4.14	4.50	4.83
200	2.98	3.42	3.80	4.14	4.50	4.83
300	3.25	3.43	3.80	4.14	4.50	4.83
400	3.40	3.68	3.80	4.14	4.50	4.84
500	3.61	3.85	3.94	4.14	4.50	4.83
S123 - Bethel Street						
600	3.81	4.13	4.30	4.47	4.72	4.91
700	3.98	4.26	4.41	4.56	4.79	4.96
773	4.04	4.30	4.44	4.59	4.81	4.97
Minnippi Overflow						
0	2.06	2.25	2.39	2.55	2.75	2.95
100	2.06	2.26	2.41	2.57	2.78	2.98
200	2.06	2.26	2.41	2.57	2.78	2.98
300	2.06	2.27	2.42	2.58	2.78	2.99
400	2.06	2.27	2.42	2.58	2.79	2.99
500	2.06	2.27	2.42	2.59	2.80	3.00
600	2.06	2.28	2.44	2.61	2.81	3.01

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
700	2.07	2.29	2.45	2.62	2.82	3.02
800	2.07	2.30	2.47	2.64	2.84	3.04
884	2.07	2.39	2.64	2.83	3.00	3.16
S14 - Wynnum Road						
1000	2.08	2.69	2.96	3.37	3.76	4.06
1100	2.09	2.84	3.15	3.49	3.86	4.14
1200	2.39	3.23	3.53	3.79	4.06	4.29
S15 - Gateway Motorway						
1344	2.92	3.30	3.68	4.03	4.39	4.72
1400	2.94	3.36	3.73	4.07	4.43	4.76
1500	2.94	3.36	3.74	4.08	4.43	4.76
1600	2.94	3.36	3.74	4.08	4.43	4.77
1700	2.94	3.37	3.75	4.08	4.44	4.77
1800	2.94	3.38	3.76	4.09	4.44	4.77
1884	2.95	3.39	3.76	4.09	4.44	4.77
Stanton Road Drain						
0	2.10	2.92	3.27	3.60	3.94	4.21
S125 - Access Road						
100	2.22	2.95	3.28	3.56	3.90	4.15
200	2.24	2.95	3.28	3.56	3.90	4.15
300	2.29	2.95	3.28	3.56	3.90	4.15
S126 - Stanton Road						
400	2.49	2.95	3.28	3.56	3.90	4.15
500	2.53	2.95	3.28	3.56	3.90	4.15
600	2.57	2.95	3.28	3.56	3.90	4.15
700	2.61	2.95	3.28	3.56	3.90	4.15
800	2.63	2.95	3.28	3.56	3.90	4.15
900	2.63	2.95	3.28	3.56	3.90	4.15
1000	2.63	2.95	3.28	3.56	3.90	4.15
1100	2.63	2.95	3.28	3.56	3.90	4.15
1187	2.63	2.95	3.28	3.56	3.90	4.15
Moorabbin Drive Drain						
0	2.91	3.35	3.71	4.04	4.38	4.70
100	2.95	3.39	3.76	4.09	4.44	4.76
200	2.97	3.41	3.78	4.11	4.46	4.78
300	2.98	3.42	3.79	4.12	4.47	4.80
400	2.98	3.42	3.80	4.13	4.48	4.81
500	2.98	3.42	3.80	4.13	4.48	4.81

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
600	2.98	3.42	3.80	4.13	4.48	4.81
700	2.98	3.42	3.80	4.13	4.48	4.81
800	2.98	3.42	3.80	4.13	4.48	4.81
900	2.98	3.42	3.80	4.13	4.48	4.81
S119 - Billan Street						
1000	2.98	3.42	3.80	4.13	4.48	4.81
S120 - Gray Street						
1100	2.98	3.42	3.80	4.13	4.48	4.81
1200	2.99	3.42	3.80	4.13	4.48	4.81
Minnippi Creek						
0	2.85	3.29	3.64	3.96	4.29	4.59
100	2.86	3.29	3.65	3.97	4.30	4.61
200	2.86	3.30	3.65	3.97	4.30	4.61
300	2.86	3.30	3.66	3.98	4.31	4.61
400	2.86	3.30	3.66	3.98	4.31	4.61
500	2.86	3.30	3.66	3.98	4.31	4.61
600	2.86	3.30	3.66	3.98	4.31	4.61
700	2.86	3.30	3.66	3.98	4.31	4.61
800	3.03	3.31	3.66	3.98	4.31	4.61
900	3.39	3.55	3.66	3.98	4.31	4.61
1000	3.66	3.87	3.95	4.09	4.31	4.61
S114 - Creek Road (Southbound)						
1105	4.11	4.53	4.72	4.91	5.10	5.23
S115 - Creek Road (Northbound)						
1200	4.34	4.68	4.82	4.98	5.14	5.27
S117 - Pedestrian bridge						
1300	4.52	4.82	4.94	5.09	5.27	5.39
1400	5.33	5.52	5.61	5.70	5.81	5.92
S117a - Drop Structure #4						
1500	6.19	6.40	6.51	6.60	6.71	6.81
1600	6.70	6.91	7.00	7.08	7.25	7.36
S118 - Todman Street						
1700	8.81	9.50	9.77	10.31	10.63	10.80
S118a - Drop Structure #3						
1800	9.40	9.72	9.91	10.32	10.64	10.78
S118b - Drop Structure #2						
1900	10.20	10.43	10.53	10.69	11.03	11.18
2000	11.13	11.38	11.48	11.59	11.75	11.87

AMTD (m)	Design Events – Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)					
	2-yr ARI (50% AEP)	5-yr ARI (20% AEP)	10-yr ARI (10% AEP)	20-yr ARI (5% AEP)	50-yr ARI (2% AEP)	100-yr ARI (1% AEP)
S118c - Drop Structure #1						
2076	12.44	12.73	12.85	12.99	13.19	13.33
Murarrie Park Drain						
0	2.40	2.70	2.93	3.17	3.47	3.80
100	2.40	2.71	2.94	3.18	3.49	3.81
200	2.40	2.71	2.94	3.18	3.49	3.82
300	2.40	2.71	2.94	3.18	3.49	3.82
400	2.40	2.71	2.94	3.18	3.49	3.82
500	2.40	2.71	2.94	3.18	3.49	3.82
600	2.40	2.71	2.94	3.18	3.49	3.82
700	2.40	2.71	2.94	3.18	3.49	3.82
S112 - Park Access Culvert						
800	2.41	2.71	2.94	3.19	3.49	3.82
S113 - Park Access Bridge						
900	2.41	2.71	2.94	3.19	3.50	3.82
1000	2.41	2.71	2.94	3.19	3.50	3.82
1100	2.41	2.71	2.94	3.19	3.50	3.82
1116	2.41	2.71	2.94	3.19	3.50	3.82

(1) N/R = no result, typically because the AMTD line does not intersect the flood surface.

(2) Flood levels are inclusive of a 9.8% increase in rainfall intensity and a 0.8m increase above MHWS, due to projected climate variability effects.

Appendix G: Very Rare Events (Scenario 1) - Peak Flood Levels

The flood level data presented in this Appendix has been extracted (in part) from the results of a 2-dimensional flood model. Levels presented have been extracted generally at selected points along the centreline of the waterway with the intent of demonstrating general flood characteristics. The applicability of this data to locations on the floodplains adjacent should be determined by a suitably qualified professional. It is recommended for any detailed assessment of flood risk associated with the waterway that complete flood model results be accessed and interrogated.

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AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
Bulimba Creek			
348	2.35	2.35	2.35
400	2.36	2.36	2.36
500	2.36	2.37	2.38
600	2.37	2.38	2.40
700	2.38	2.39	2.42
800	2.39	2.40	2.44
900	2.40	2.42	2.46
1000	2.41	2.43	2.48
1100	2.42	2.44	2.49
1200	2.43	2.45	2.51
1300	2.44	2.47	2.53
1400	2.45	2.48	2.55
1500	2.46	2.49	2.57
1600	2.47	2.51	2.60
1700	2.48	2.53	2.62
1800	2.50	2.54	2.64
1900	2.51	2.56	2.67
2000	2.52	2.58	2.69
2100	2.53	2.59	2.71
2200	2.55	2.61	2.73
2300	2.56	2.62	2.75
2400	2.57	2.64	2.77
2500	2.59	2.65	2.79
2600	2.60	2.67	2.81
2700	2.61	2.69	2.84
2800	2.63	2.71	2.86
2900	2.65	2.73	2.88
3000	2.66	2.75	2.91
3100	2.68	2.77	2.93
3200	2.70	2.79	2.96
Structure S1 – Lytton Road (Eastbound)			
3300	2.85	2.99	3.22
Structure S2 – Lytton Road (Westbound)			
3400	2.96	3.15	3.45
3500	2.97	3.16	3.46
3600	2.98	3.17	3.48
3700	2.99	3.18	3.49

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
3800	3.00	3.19	3.50
3900	3.01	3.20	3.51
4000	3.02	3.21	3.52
4100	3.03	3.22	3.53
4200	3.03	3.23	3.54
Structure S3 – Port of Brisbane Motorway			
Structure S7 – Cleveland Railway			
4300	3.04	3.24	3.55
4400	3.05	3.25	3.56
4515	3.13	3.35	3.69
4600	3.14	3.36	3.71
4700	3.15	3.37	3.71
4800	3.15	3.38	3.72
4900	3.16	3.38	3.73
5000	3.17	3.39	3.73
5100	3.17	3.39	3.74
5200	3.18	3.40	3.75
5300	3.18	3.41	3.75
5400	3.19	3.41	3.76
5500	3.20	3.42	3.77
5600	3.20	3.43	3.77
5700	3.20	3.43	3.77
5800	3.20	3.43	3.77
5900	3.21	3.43	3.77
6000	3.21	3.43	3.77
6100	3.21	3.43	3.77
6200	3.21	3.43	3.77
6300	3.21	3.43	3.77
6400	3.21	3.43	3.77
6500	3.21	3.43	3.78
6600	3.21	3.43	3.77
6700	3.21	3.43	3.78
6800	3.21	3.43	3.78
6900	3.21	3.43	3.78
7000	3.22	3.44	3.78
7100	3.22	3.44	3.79
7200	3.23	3.45	3.79
7300	3.23	3.45	3.80

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
7400	3.24	3.46	3.80
7500	3.24	3.46	3.81
7600	3.24	3.46	3.81
7700	3.24	3.47	3.81
7800	3.25	3.47	3.82
7900	3.25	3.47	3.82
8000	3.25	3.47	3.82
8100	3.26	3.48	3.82
8200	3.26	3.48	3.83
8300	3.26	3.48	3.83
8400	3.27	3.49	3.83
8500	3.27	3.49	3.83
8600	3.27	3.49	3.84
8700	3.27	3.49	3.84
8800	N/R (1)	N/R (1)	N/R (1)
8900	3.27	3.49	3.84
9000	3.27	3.50	3.85
9100	3.28	3.50	3.85
9200	3.28	3.50	3.85
9300	3.28	3.50	3.85
9400	3.28	3.50	3.85
9500	3.28	3.50	3.85
9600	3.28	3.50	3.85
9700	3.28	3.50	3.85
9800	3.28	3.50	3.85
9900	3.28	3.50	3.85
10000	3.27	3.49	3.84
10100	3.26	3.48	3.83
10200	3.26	3.48	3.82
10300	3.26	3.48	3.82
10400	3.26	3.48	3.82
10500	3.26	3.48	3.82
10600	3.26	3.48	3.82
10700	3.26	3.47	3.82
10800	3.26	3.47	3.82
10900	3.26	3.47	3.81
11000	3.26	3.48	3.82
11100	3.27	3.49	3.83

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
11200	3.28	3.50	3.84
11300	3.33	3.54	3.89
11400	3.38	3.59	3.93
11500	3.44	3.64	3.98
11600	3.50	3.69	4.03
11700	3.53	3.72	4.07
11800	3.56	3.74	4.11
11900	3.72	3.91	4.36
Structure S10 – Gateway Motorway			
12055	3.97	4.20	4.68
12100	3.97	4.20	4.68
12200	3.97	4.20	4.68
Structure S12 – Murarrie Road			
12300	4.02	4.25	4.72
12400	4.04	4.26	4.74
12500	4.05	4.28	4.75
12600	4.07	4.30	4.77
12700	4.10	4.32	4.79
12800	4.12	4.35	4.81
12900	4.17	4.39	4.84
13000	4.21	4.43	4.88
Structure S13 – Wynnum Road			
13100	4.39	4.61	5.05
13200	4.58	4.78	5.17
13300	4.61	4.80	5.19
13400	4.64	4.83	5.20
13500	4.66	4.85	5.22
13600	4.69	4.88	5.25
13700	4.72	4.91	5.28
13800	4.76	4.95	5.31
13900	4.78	4.97	5.34
14000	4.80	4.99	5.36
14100	4.82	5.02	5.39
14200	4.85	5.05	5.42
14300	4.89	5.09	5.46
14400	4.92	5.13	5.49
14500	4.93	5.13	5.50
14600	4.94	5.14	5.51

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
14700	4.94	5.15	5.51
14800	4.94	5.15	5.51
14900	4.94	5.15	5.51
15000	4.95	5.15	5.52
15100	4.94	5.15	5.51
15200	4.94	5.14	5.51
15300	4.93	5.14	5.50
15400	4.93	5.14	5.50
15500	4.94	5.14	5.51
15600	4.95	5.15	5.51
15700	4.96	5.16	5.52
15800	4.97	5.17	5.53
15900	5.00	5.20	5.55
16000	5.03	5.23	5.57
16100	5.07	5.26	5.59
16200	5.09	5.28	5.61
16300	5.10	5.29	5.61
16400	5.11	5.30	5.62
16500	5.11	5.30	5.62
16600	5.12	5.31	5.62
16700	5.12	5.31	5.63
16800	5.13	5.31	5.63
16900	5.13	5.31	5.63
17000	5.13	5.31	5.63
17100	5.13	5.32	5.63
17200	5.17	5.35	5.66
17300	5.20	5.39	5.69
17400	5.24	5.42	5.72
17500	5.21	5.39	5.67
17600	5.19	5.35	5.61
17700	5.16	5.30	5.54
17800	5.13	5.26	5.49
17900	5.11	5.24	5.45
18000	5.13	5.26	5.48
18100	5.14	5.28	5.53
18200	5.16	5.30	5.56
18300	5.18	5.32	5.59
18400	5.19	5.34	5.61

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
18500	5.22	5.37	5.63
18600	5.25	5.40	5.65
Structure S17 - Meadowlands Road			
18723	5.48	5.72	6.01
18800	5.52	5.76	6.05
18900	5.55	5.78	6.06
19000	5.66	5.89	6.17
19100	5.63	5.85	6.14
19200	5.65	5.87	6.16
19300	5.67	5.89	6.19
19400	5.76	5.99	6.29
19500	5.82	6.05	6.35
19600	5.84	6.06	6.36
19700	5.86	6.07	6.37
Structure S18 – Scrub Road Pedestrian Bridge			
19800	6.02	6.23	6.54
19900	6.05	6.26	6.56
20000	6.09	6.29	6.60
20100	6.15	6.36	6.67
20200	6.22	6.42	6.73
20300	6.28	6.48	6.79
20400	6.32	6.53	6.84
20500	6.38	6.58	6.89
20600	6.44	6.63	6.94
20700	6.48	6.67	6.97
20800	6.52	6.70	6.99
20900	6.75	6.94	7.26
21000	6.30	6.44	6.70
Structure S27 – Old Cleveland Road			
21100	7.82	7.99	8.41
21200	7.94	8.13	8.56
21300	8.06	8.26	8.67
21400	8.16	8.35	8.76
21500	8.20	8.39	8.80
21600	8.23	8.42	8.82
Structure S29 – Winstanley Street			
21700	8.56	8.78	9.19
21800	8.67	8.89	9.30

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
21900	8.77	9.00	9.41
22000	8.88	9.11	9.52
22100	8.99	9.22	9.63
22200	9.09	9.32	9.73
22300	9.16	9.40	9.81
22400	9.27	9.52	9.94
22500	9.37	9.62	10.04
Structure S36 – Meadowbank Street Pedestrian Bridge			
22600	9.45	9.71	10.11
22700	9.60	9.86	10.26
22800	9.74	10.00	10.39
22900	9.86	10.12	10.51
23000	9.95	10.21	10.60
23100	9.98	10.24	10.63
23200	10.01	10.27	10.66
23300	10.06	10.30	10.69
23400	10.23	10.47	10.84
Structure S37 – Pine Mountain Road			
23500	10.61	10.84	11.21
23600	10.66	10.89	11.26
23700	10.74	10.96	11.32
23800	10.88	11.10	11.45
23900	11.00	11.22	11.56
24000	11.13	11.34	11.68
24100	11.20	11.41	11.74
24200	11.37	11.57	11.90
24300	11.59	11.79	12.11
24400	11.70	11.91	12.22
24500	11.81	12.01	12.32
24600	11.83	12.04	12.36
24700	11.90	12.12	12.43
24800	12.00	12.22	12.53
24900	12.14	12.33	12.63
25000	12.33	12.50	12.78
25100	12.58	12.74	13.01
25200	12.78	12.94	13.20
25300	13.00	13.17	13.45
25400	13.37	13.58	13.88

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
25500	13.74	13.98	14.31
25600	14.00	14.25	14.59
25700	14.12	14.34	14.68
25800	14.25	14.46	14.80
25900	14.34	14.55	14.88
Structure S55 – Oakley Street Pedestrian Bridge			
26000	14.57	14.79	15.12
26100	14.69	14.90	15.24
26200	14.77	14.99	15.32
26300	14.95	15.17	15.51
26400	15.37	15.61	15.97
26500	15.64	15.88	16.26
26600	15.74	15.99	16.37
26700	15.78	16.02	16.41
26800	15.86	16.10	16.47
Structure S56 – Wecker Road			
26900	16.02	16.25	16.62
27000	16.19	16.42	16.79
27100	16.47	16.70	17.07
27200	16.72	16.95	17.33
27300	16.84	17.07	17.44
27400	16.91	17.14	17.51
27500	17.00	17.24	17.61
27600	17.10	17.33	17.70
27700	17.20	17.43	17.79
27800	17.31	17.53	17.88
27900	17.46	17.67	18.01
28000	17.67	17.88	18.21
28100	17.89	18.09	18.42
28200	18.22	18.42	18.79
S57 - Mount Gravatt Capalaba Road			
28300	18.96	19.24	19.86
28400	19.23	19.52	20.09
28500	19.41	19.68	20.22
28600	19.53	19.79	20.30
28700	19.66	19.91	20.40
28800	19.84	20.07	20.54
28900	20.02	20.24	20.68

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
29000	20.13	20.35	20.77
29100	20.27	20.47	20.87
29200	20.41	20.61	20.99
29300	20.53	20.74	21.10
29400	20.69	20.89	21.25
29500	20.84	21.04	21.39
29600	21.00	21.19	21.53
29700	21.15	21.33	21.66
29800	21.35	21.53	21.88
29900	21.58	21.77	22.18
30000	21.83	22.02	22.34
30100	22.10	22.27	22.56
30200	22.46	22.64	22.91
30300	22.80	22.97	23.25
30400	23.07	23.25	23.54
30500	23.21	23.38	23.67
30600	23.42	23.61	23.92
30700	23.53	23.72	24.05
30800	23.64	23.82	24.17
30900	23.74	23.92	24.25
S58 - Sherwood Place Pedestrian Bridge			
31000	24.28	24.44	24.72
31100	24.57	24.73	25.01
31200	24.92	25.09	25.37
31300	25.30	25.47	25.74
31400	25.55	25.71	25.98
31500	25.73	25.89	26.17
31600	25.88	26.05	26.33
31700	25.99	26.17	26.46
31800	26.15	26.33	26.62
31900	26.29	26.48	26.76
S59 - Craig Street Pedestrian Bridge			
32000	26.56	26.72	26.98
32100	26.81	26.96	27.18
32200	26.96	27.10	27.32
32300	27.09	27.25	27.48
32400	27.24	27.41	27.65
32500	27.43	27.60	27.86

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) [(2)]		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
32600	27.71	27.89	28.15
32700	28.04	28.22	28.48
32800	28.44	28.61	28.90
32900	29.07	29.26	29.56
33000	29.31	29.49	29.79
S60 - D/S of Logan Road Pedestrian Bridge			
33100	29.75	29.92	30.19
S61 - Logan Road			
33200	31.15	31.31	31.46
S63 - Pacific Motorway			
33362	33.45	33.93	34.60
33400	33.46	33.94	34.60
33500	33.48	33.95	34.62
33600	33.49	33.97	34.63
33700	33.52	33.99	34.65
33800	33.56	34.03	34.69
33900	33.63	34.13	34.82
34000	33.72	34.16	34.80
34100	33.87	34.25	34.84
34200	34.06	34.40	34.94
34300	34.26	34.56	35.06
34400	34.45	34.72	35.17
34500	34.56	34.80	35.23
S66 - Padstow Road			
34600	35.22	35.35	35.58
34700	35.27	35.40	35.64
34800	35.63	35.75	35.94
34900	36.14	36.24	36.42
35000	36.61	36.71	36.88
S68 - Malbon Street Pedestrian Bridge			
35100	37.24	37.36	37.55
35200	37.63	37.75	37.94
35300	38.14	38.25	38.41
35400	38.81	38.92	39.10
35500	39.43	39.56	39.75
35600	40.28	40.39	40.57
35700	41.17	41.27	41.42
35800	41.67	41.78	41.96

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
35900	42.05	42.16	42.33
36000	42.46	42.57	42.74
36100	42.90	43.00	43.17
36200	43.26	43.36	43.52
36300	43.66	43.76	43.91
36400	44.07	44.16	44.32
36500	44.49	44.58	44.74
S69 - Altandi Street Pedestrian Bridge			
36600	44.92	45.04	45.18
36700	45.00	45.12	45.26
36800	45.08	45.18	45.31
S70 - D/S Gold Coast Railway Pedestrian Bridge			
36900	45.51	45.55	45.61
36985	46.44	46.51	46.62
S71 and S72 - Gold Coast Railway			
37100	47.08	47.20	47.40
S73 - Beenleigh Road			
37200	47.38	47.49	47.67
37300	47.65	47.76	47.92
S74 - Gowan Road Pedestrian Culvert			
37400	47.95	48.05	48.19
37500	48.52	48.61	48.74
37600	49.18	49.27	49.44
37700	49.61	49.71	49.88
37800	49.89	49.99	50.16
37900	50.24	50.32	50.46
38000	50.75	50.82	50.95
38100	51.38	51.41	51.55
S75 - Energy Dissipator			
38200	52.33	52.44	52.67
38300	52.48	52.60	52.83
38400	52.73	52.85	53.07
S77 - Glenefer Street Pedestrian Bridge			
38500	53.30	53.38	53.53
38574	53.87	53.96	54.14
S78 - Brandon Road			
38700	54.77	54.90	55.08
38800	55.21	55.33	55.54

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
38900	55.51	55.65	55.88
S79 - Nemies Road			
39000	57.30	57.47	57.71
39100	57.52	57.68	57.91
39200	57.84	57.99	58.22
39300	58.33	58.47	58.69
S80 - Calliope Street Bikeway			
39400	59.13	59.26	59.48
39500	59.60	59.73	59.94
39600	60.42	60.54	60.75
39700	60.69	60.78	60.96
39800	60.97	61.08	61.25
39888	61.23	61.37	61.64
Daw Road Drain			
0	37.09	37.21	37.40
100	37.21	37.33	37.52
200	38.21	38.26	38.33
300	39.08	39.15	39.25
400	40.15	40.23	40.33
500	40.51	40.60	40.74
600	41.05	41.16	41.32
700	41.55	41.66	41.83
800	42.06	42.16	42.31
900	42.59	42.68	42.82
1000	43.08	43.17	43.29
1095	43.22	43.31	43.44
Padstow Road Drain			
0	34.67	34.88	35.27
S169 - McCullough Street Pedestrian Bridge			
100	35.57	35.65	35.83
200	37.05	37.13	37.26
S170 - McCullough Street			
300	37.68	37.76	37.87
400	38.53	38.62	38.74
441	39.24	39.35	39.48
Mimosa Creek			
0	34.44	34.71	35.17
100	34.54	34.78	35.22

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
S82 - Turnmill Street Pedestrian Culvert			
200	34.72	34.91	35.28
300	35.04	35.19	35.47
400	35.38	35.49	35.67
500	36.03	36.20	36.38
S83 - Springfield Street Pedestrian Culvert			
600	36.39	36.54	36.72
700	36.82	36.94	37.12
800	37.31	37.44	37.62
900	37.77	37.92	38.13
1000	38.09	38.22	38.41
1100	38.74	38.85	39.02
1200	39.55	39.67	39.86
S84 - Parkway Street			
1300	40.17	40.30	40.53
1400	40.60	40.75	40.95
1500	41.10	41.28	41.46
S85 - Kessels Road			
1610	41.55	42.10	42.47
1700	42.09	42.44	42.74
1800	42.56	42.82	43.05
S86(a)(b)(c) - Pacific Motorway			
1944	43.59	44.03	44.85
2000	43.73	44.12	44.88
S87 - Nagle Street			
2100	44.34	44.69	45.32
2200	45.21	45.42	45.75
2300	45.83	45.99	46.20
2400	46.19	46.33	46.53
2500	46.92	47.06	47.22
2600	46.98	47.12	47.29
2700	47.48	47.60	47.77
2800	48.15	48.25	48.40
2900	48.77	48.88	49.04
3000	49.37	49.46	49.58
S88 - Hibiscus Place Pedestrian Culvert			
3100	50.05	50.11	50.22
3200	50.88	50.96	51.09

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
3300	51.66	51.76	51.91
3400	52.41	52.51	52.68
3500	53.35	53.49	53.71
3600	54.13	54.22	54.37
3674	54.79	54.86	54.98
Nardie Street Drain			
0	25.49	25.65	25.93
100	25.59	25.76	26.06
200	25.88	26.00	26.12
300	26.77	27.01	27.24
400	26.88	27.11	27.36
496	27.55	27.77	28.04
Bulimba Creek East			
0	23.68	23.86	24.23
100	23.74	23.91	24.21
200	24.02	24.20	24.49
300	24.27	24.43	24.76
400	24.57	24.73	25.09
500	24.86	25.05	25.43
600	25.11	25.31	25.70
700	25.50	25.71	26.10
800	26.04	26.25	26.62
900	26.72	26.94	27.27
1000	27.16	27.39	27.69
1100	27.35	27.58	27.89
1200	27.67	27.89	28.19
S89 - Gateway Motorway - On / Off Ramp			
1300	28.35	28.71	29.24
1400	28.74	29.05	29.52
1500	29.16	29.44	29.86
1576	29.47	29.76	30.18
S90 - Miles Platting Road			
S91 - South East Busway Loop			
1700	30.05	30.42	30.93
1800	30.39	30.75	31.20
1881	30.69	31.03	31.44
S92 - South East Busway			
S93 - Pacific Motorway			

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
2000	33.19	33.41	33.65
S93(a)(b)(c) - V1 Veloway			
2100	33.22	33.44	33.69
2200	33.23	33.46	33.71
2300	33.25	33.47	33.72
2400	33.29	33.51	33.77
2500	33.37	33.57	33.83
S94 - Logan Road			
2597	34.52	34.64	34.80
S194 - Glen Hotel Weir			
2700	34.83	34.95	35.10
2800	35.42	35.51	35.66
2880	35.82	35.95	36.13
S96 - Gateway Motorway			
3000	36.27	36.43	36.65
3100	36.72	36.85	37.05
3200	37.23	37.39	37.64
3300	37.77	37.96	38.25
3400	38.51	38.66	38.90
3498	38.86	39.02	39.25
S97 - Underwood Road			
3600	39.33	39.43	39.60
3700	39.64	39.73	39.87
3800	40.34	40.40	40.50
3900	41.10	41.16	41.26
4000	41.72	41.78	41.89
4100	42.46	42.54	42.66
4200	43.10	43.20	43.35
4300	43.81	43.92	44.09
4400	44.35	44.46	44.63
4500	44.73	44.82	45.01
4600	45.06	45.15	45.33
4700	45.54	45.61	45.76
4800	45.99	46.06	46.19
4900	46.46	46.53	46.67
5000	47.06	47.16	47.29
5100	47.82	47.92	48.06
5200	48.26	48.36	48.49

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
5300	48.52	48.62	48.75
S99 - Gateway Motorway			
5400	49.00	49.09	49.21
S100 - Gold Coast Railway			
S101 - Beenleigh Road			
5500	50.64	50.70	50.78
5600	50.66	50.72	50.81
5700	51.28	51.34	51.42
5800	52.12	52.19	52.28
5900	52.84	52.91	53.01
6000	53.63	53.70	53.78
6100	54.48	54.52	54.59
6200	55.61	55.65	55.71
6296	56.65	56.74	56.87
Bulimba Creek East Railway Bypass			
0	46.92	47.03	47.15
100	47.91	48.13	48.38
200	48.00	48.18	48.43
300	48.40	48.50	48.67
400	48.91	49.03	49.20
460	49.07	49.15	49.27
Tributary C			
0	39.31	39.42	39.59
56	39.42	39.51	39.67
S174 - Gateway Motorway			
200	40.72	40.80	40.94
300	41.95	42.02	42.13
400	43.18	43.24	43.35
500	44.36	44.43	44.55
600	45.38	45.45	45.60
700	46.20	46.28	46.46
800	46.87	46.95	47.11
900	47.35	47.43	47.58
1000	47.59	47.67	47.80
1100	48.16	48.23	48.33
1200	48.87	48.93	48.99
1246	49.19	49.24	49.28
Tributary B			

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
0	33.28	33.50	33.76
100	33.30	33.53	33.79
S95 - Logan Road			
200	34.29	34.46	34.63
300	34.45	34.54	34.70
400	35.42	35.60	35.70
S104 - Dance Crescent			
500	36.96	37.07	37.21
584	37.30	37.39	37.51
Tributary A			
0	33.19	33.41	33.66
100	33.20	33.43	33.67
S105 - Gateway Motorway			
241	33.59	33.83	34.02
300	33.60	33.84	34.03
400	33.61	33.85	34.05
500	33.66	33.90	34.10
S106 - Pacific Motorway Off Ramp			
600	34.18	34.38	34.66
700	34.53	34.71	34.92
800	34.82	35.00	35.18
900	35.29	35.46	35.63
S107 - Pacific Motorway			
1038	35.82	36.10	36.80
1100	36.18	36.38	36.82
1200	36.49	36.66	36.97
1300	37.15	37.27	37.48
1400	37.99	38.09	38.25
1500	38.67	38.78	38.95
1600	39.66	39.79	39.97
1700	40.96	41.10	41.29
1800	41.71	41.86	42.07
1900	42.26	42.38	42.54
2000	42.84	42.92	43.04
2100	43.64	43.73	43.85
2200	44.47	44.56	44.70
2300	44.94	45.04	45.18
2400	45.72	45.79	45.91

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
2500	46.75	46.82	46.93
2600	47.92	48.00	48.11
2700	49.04	49.13	49.26
2800	50.11	50.21	50.35
2900	51.10	51.19	51.32
2915	51.24	51.32	51.45
Tributary A1			
0	41.20	41.34	41.54
100	42.60	42.64	42.69
200	44.41	44.44	44.48
300	46.24	46.30	46.36
400	47.64	47.75	47.83
500	49.44	49.51	49.71
600	53.65	53.72	53.86
689	57.35	57.41	57.50
Tributary A Overflow			
0	33.62	33.86	34.05
71	33.64	33.88	34.07
S186 and S189 - Pacific Motorway			
S187 and S190 - Pacific Motorway On Ramp			
S188 and S191 - Busway			
200	33.83	34.13	34.43
300	33.92	34.21	34.55
400	34.32	34.51	35.16
500	35.24	35.37	35.65
S192 - School Road			
600	35.74	35.98	36.48
S193 - Diversion Weir			
700	35.84	36.11	36.80
703	35.84	36.12	36.80
Tributary A2			
0	35.47	35.63	35.80
100	36.45	36.62	36.79
200	37.65	37.82	37.99
300	38.63	38.82	39.02
S108 - Freeway Office Park Weir			
410	40.88	40.97	41.08
S109 - Freeway Office Park Internal Road			

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
505	41.02	41.18	41.40
S110 and S111 - Logan Road			
628	42.10	42.26	42.53
700	42.29	42.44	42.67
760	42.81	42.91	43.08
Miles Platting Road Drain			
0	26.08	26.29	26.66
100	27.04	27.15	27.31
S172 - Gateway Motorway			
200	28.47	28.75	29.36
300	28.92	29.15	29.61
400	29.52	29.68	29.97
500	30.93	31.02	31.13
600	32.49	32.59	32.74
700	33.47	33.55	33.69
800	35.00	35.15	35.41
900	36.83	36.98	37.21
1000	39.64	39.74	39.89
S173 - Miles Platting Road			
1100	40.90	40.99	41.13
1200	42.69	42.73	42.78
1300	44.35	44.42	44.53
1328	44.70	44.79	44.93
Kate Circuit Drain			
0	30.42	30.55	30.76
100	32.54	32.59	32.66
200	34.76	34.83	34.94
300	37.23	37.29	37.41
400	39.35	39.44	39.59
437	40.11	40.22	40.38
Parklands Circuit Drain			
0	20.94	21.14	21.48
100	21.00	21.19	21.53
200	21.17	21.35	21.67
S165 - Gateway Motorway			
300	22.05	22.08	22.11
400	22.78	22.83	22.90
500	25.58	25.73	25.91

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
600	26.53	26.69	26.89
700	27.54	27.65	27.78
S166 - Prebble Street			
800	28.29	28.37	28.46
900	28.69	28.78	28.90
S167 - Kyeema Street			
1000	30.45	30.56	30.61
1100	32.71	32.78	32.88
S168 - Echidna Street			
1206	33.60	33.70	33.80
1300	34.52	34.57	34.64
1400	37.01	37.07	37.15
1500	39.56	39.59	39.64
1600	42.70	42.73	42.79
1675	45.02	45.06	45.10
Broadwater Road Drain			
0	17.10	17.33	17.70
100	17.19	17.42	17.78
200	17.19	17.43	17.79
300	17.20	17.43	17.79
400	17.23	17.45	17.79
500	17.34	17.53	17.83
600	17.83	18.03	18.29
700	19.54	19.68	19.88
800	19.90	20.07	20.31
900	20.20	20.38	20.64
1000	20.49	20.68	20.95
1100	20.86	21.04	21.29
S152 - Broadwater Road			
1200	22.51	22.65	22.86
1300	22.78	22.94	23.17
S153 - Brisbane Adventist College Drop Structure			
1400	23.47	23.63	23.85
1500	23.71	23.83	24.00
1600	24.64	24.76	24.90
1700	25.49	25.60	25.69
S155 - Brisbane Adventist College Pedestrian Bridge			
S156 - Brisbane Adventist College Drop Structure			

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) [(2)]		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
1800	27.11	27.25	27.47
S157 - 16 Rowe Close Drop Structure			
1897	27.62	27.78	28.01
S158 - 16 Rowe Close Drop Structure			
2000	28.65	28.82	29.04
S159 - 226 Wishart Road - Internal Road			
2100	29.70	30.06	30.38
2113	29.70	30.06	30.38
Wishart Road Drain			
0	23.55	23.69	23.89
100	25.22	25.28	25.38
200	26.55	26.61	26.71
S160 - Wishart Road			
300	27.85	27.93	28.08
400	29.13	29.16	29.21
497	30.04	30.10	30.18
S161 - Access Bridge to 10 St.George Circuit			
S162 - Access Bridge to 10 St.George Circuit			
600	N/R [(1)]	N/R [(1)]	32.15
700	33.15	33.23	33.33
S164 - 35 Avenell Street Access Road			
723	33.24	33.33	33.58
Wecker Road Drain			
0	15.64	15.89	16.27
100	15.62	15.86	16.25
200	15.71	15.92	16.29
300	15.78	15.96	16.31
383	16.74	16.87	17.10
S141 - Christian College Access Road			
S142 - Christian College Access Road			
500	18.13	18.26	18.44
S143 and S144 - Scrub Road			
608	18.25	18.40	18.60
700	18.63	18.74	18.92
S145 - Wecker Road			
800	19.98	20.06	20.24
900	21.05	21.15	21.33
1000	21.34	21.44	21.63

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
1093	N/R (1)	N/R (1)	N/R (1)
S146 - Gateway Motorway			
1200	25.69	25.99	26.37
1300	25.71	26.01	26.38
1400	25.78	26.06	26.42
1500	26.14	26.28	26.57
S147 - Weedon Street East			
1600	27.41	27.50	27.62
S148 and S149 - Mount Petrie Road			
1700	28.59	28.72	28.88
1800	28.60	28.72	28.88
1900	30.33	30.41	30.52
2000	30.78	30.86	30.93
2016	31.01	31.10	31.27
Newnham Creek			
0	11.83	12.05	12.36
100	11.86	12.08	12.40
200	11.86	12.07	12.40
300	11.87	12.09	12.40
400	11.96	12.10	12.41
500	12.13	12.26	12.42
600	12.67	12.81	13.02
700	13.14	13.28	13.50
S39 - Access Road to 100 Wecker Road			
800	15.87	15.99	16.15
867	15.88	16.01	16.17
S40 - Stormwater Quality Improvement Device			
S41 - Secam Street			
S42 - Access Road to 33 Secam Street			
1001	17.00	17.12	17.33
S43 - Devlan Street			
1100	18.00	18.11	18.35
S44 - Bunnings Access #3			
S45 - Bunnings Access #2			
1200	18.23	18.36	19.13
S46 - Bunnings Access #1			
1300	18.31	18.45	19.18
S47 - Newnham Road			

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) [2]		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
1400	20.30	20.42	20.62
1500	20.50	20.62	20.83
1597	20.89	21.01	21.25
S48 - Access Road to 285 Creek Road			
S49 - Drop Structure #3			
1700	21.81	22.00	22.45
S50 - Drop Structure #2			
S51 - Drop Structure #1			
1800	24.07	24.22	24.52
S52 - Internal Road for 215 Creek Road			
S53 - 215 Creek Road Pedestrian Bridge			
1900	25.48	25.74	26.07
2000	25.93	26.09	26.37
2012	25.98	26.13	26.41
Spring Creek			
0	9.87	10.13	10.52
100	9.89	10.15	10.54
200	9.82	10.09	10.48
300	9.82	10.09	10.48
400	10.16	10.24	10.50
500	10.48	10.56	10.67
600	10.65	10.72	10.85
700	11.21	11.35	11.53
800	11.71	11.81	11.99
S132 - Scrub Road			
900	12.19	12.33	12.57
1000	12.35	12.48	12.71
1100	12.57	12.69	12.90
1200	13.09	13.19	13.32
1300	15.56	15.60	15.67
1400	17.31	17.36	17.43
1500	18.94	18.98	19.05
1600	20.99	21.05	21.14
1700	27.15	27.20	27.28
S133 - Woodland Street Pedestrian Bridge			
1800	30.22	30.30	30.42
1900	34.12	34.19	34.30
2000	36.83	36.90	37.00

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
2006	36.96	37.04	37.14
Warwick Creek			
0	12.76	12.86	13.07
S134 - Greendale Way			
100	13.64	13.80	14.00
200	14.07	14.15	14.30
300	14.41	14.49	14.62
400	15.43	15.50	15.67
S135 - Amersham Crescent			
500	16.68	16.89	17.32
600	17.27	17.35	17.53
700	18.03	18.13	18.27
800	18.68	18.75	18.89
900	19.16	19.23	19.37
1000	19.64	19.70	19.79
S136 - Cribb Road			
1100	19.78	19.85	19.96
1200	20.88	20.96	21.09
1300	21.53	21.61	21.73
1400	22.05	22.13	22.26
1500	22.45	22.54	22.69
1600	22.88	22.94	23.05
S138 - Oakley Street			
1700	23.28	23.35	23.47
1800	24.24	24.28	24.34
1817	24.56	24.60	24.66
Silky Oak Circuit Drain			
0	22.55	22.63	22.77
S139 - Oakley Street			
100	23.64	23.78	24.14
200	25.08	25.13	25.21
246	25.99	26.01	26.06
Salvin Creek			
0	8.81	9.04	9.45
100	8.81	9.04	9.46
200	8.91	9.13	9.55
300	8.91	9.14	9.55
400	8.91	9.13	9.55

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
500	8.93	9.14	9.55
S31 - Donnington Street (Lower)			
600	11.07	11.31	11.54
700	11.08	11.33	11.56
800	11.12	11.37	11.60
900	11.14	11.40	11.64
1000	11.22	11.48	11.74
1100	11.52	11.76	12.01
S32 - Donnington Street (Upper)			
1200	14.19	14.44	14.71
1300	14.34	14.56	14.83
1400	14.52	14.71	14.97
S33 - Creek Road			
1515	15.19	15.49	15.91
1600	15.39	15.66	16.06
1700	16.03	16.22	16.54
1800	17.09	17.27	17.52
S34 - Pine Mountain Road			
1900	19.15	19.48	19.90
2000	19.35	19.66	20.06
2100	19.86	20.09	20.41
2200	20.20	20.36	20.63
2300	20.80	20.87	21.03
S35 - Bevan Street			
2400	22.48	22.75	23.08
2500	23.25	23.40	23.63
2600	24.17	24.26	24.42
2700	25.57	25.68	25.82
2800	26.19	26.32	26.49
2900	26.58	26.72	26.93
2926	26.67	26.82	27.03
Glengariff Tributary			
0	15.99	16.18	16.51
100	16.70	16.83	17.02
200	17.30	17.39	17.57
300	17.85	17.96	18.16
400	19.42	19.43	19.45
500	20.45	20.51	20.61

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
600	21.42	21.48	21.57
700	22.12	22.18	22.28
800	23.10	23.17	23.30
900	24.38	24.46	24.60
925	24.68	24.76	24.91
Phillips Creek			
0	6.48	6.66	6.96
100	6.74	6.96	7.30
200	6.93	7.15	7.50
300	6.93	7.15	7.50
400	6.94	7.15	7.50
500	6.94	7.15	7.50
600	6.94	7.15	7.50
S20 - Old Cleveland Access Road			
671	7.36	7.46	7.61
S21 - Stormwater Quality Improvement Device			
S22 - Old Cleveland Road			
842	8.68	9.27	9.73
900	8.68	9.27	9.73
1000	N/R (1)	N/R (1)	N/R (1)
1100	10.72	11.09	11.56
S23(b)(c) - Creek Road			
1200	10.81	11.17	11.64
S24 - Pedestrian Bridge U/S Creek Road			
1300	10.86	11.22	11.68
1400	11.06	11.36	11.79
1500	11.45	11.64	11.99
1600	11.73	11.88	12.17
1700	12.28	12.38	12.58
1800	12.80	12.90	13.10
1900	13.40	13.50	13.73
2000	14.10	14.19	14.38
2100	14.65	14.74	14.94
2200	15.35	15.44	15.70
2286	16.03	16.14	16.42
S25 - Gallipoli Road			
2400	17.43	17.55	17.80
S26 - Anzac Road			

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
2500	18.11	18.21	18.38
2600	18.26	18.36	18.55
2685	18.61	18.75	18.98
Cloverbrook Place Drain			
0	4.96	5.16	5.52
100	4.96	5.16	5.52
200	4.97	5.17	5.53
300	4.97	5.17	5.53
400	4.97	5.18	5.54
500	4.97	5.18	5.54
600	4.98	5.18	5.54
S121 - Fursden Road			
700	4.98	5.18	5.54
800	4.98	5.18	5.54
900	4.98	5.18	5.54
1000	4.98	5.18	5.54
1100	4.98	5.18	5.54
1200	4.98	5.18	5.54
1213	4.98	5.18	5.54
Bethel Street Drain			
0	4.98	5.18	5.54
100	4.98	5.18	5.54
200	4.98	5.18	5.54
300	4.98	5.18	5.54
400	4.98	5.18	5.54
500	4.98	5.18	5.55
S123 - Bethel Street			
600	4.98	5.18	5.55
700	5.02	5.19	5.55
773	5.04	5.19	5.55
Minnippi Overflow			
0	3.28	3.50	3.85
100	3.29	3.51	3.87
200	3.29	3.52	3.87
300	3.29	3.52	3.87
400	3.29	3.52	3.87
500	3.30	3.53	3.88
600	3.30	3.53	3.88

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
700	3.31	3.54	3.89
800	3.32	3.55	3.90
884	3.35	3.58	3.91
S14 - Wynnum Road			
1000	4.20	4.31	4.45
1100	4.24	4.35	4.49
1200	4.28	4.39	4.52
S15 - Gateway Motorway			
1344	4.90	5.10	5.48
1400	4.93	5.14	5.51
1500	4.94	5.15	5.51
1600	4.94	5.15	5.51
1700	4.94	5.15	5.51
1800	4.94	5.15	5.51
1884	4.94	5.15	5.51
Stanton Road Drain			
0	4.28	4.39	4.55
S125 - Access Road			
100	4.22	4.36	4.51
200	4.22	4.36	4.51
300	4.22	4.36	4.51
S126 - Stanton Road			
400	4.22	4.36	4.51
500	4.22	4.36	4.51
600	4.22	4.36	4.51
700	4.22	4.36	4.51
800	4.22	4.36	4.51
900	4.22	4.36	4.51
1000	4.22	4.36	4.51
1100	4.22	4.36	4.51
1187	4.30	4.38	4.53
Moorabbin Drive Drain			
0	4.88	5.08	5.45
100	4.92	5.12	5.49
200	4.94	5.14	5.50
300	4.95	5.16	5.52
400	4.96	5.16	5.53
500	4.96	5.17	5.53

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
600	4.96	5.17	5.53
700	4.96	5.17	5.53
800	4.96	5.17	5.53
900	4.96	5.17	5.53
S119 - Billan Street			
1000	4.96	5.17	5.53
S120 - Gray Street			
1100	4.96	5.17	5.53
1200	4.96	5.17	5.53
Minnippi Creek			
0	4.75	4.94	5.31
100	4.76	4.96	5.33
200	4.77	4.96	5.33
300	4.77	4.96	5.33
400	4.77	4.96	5.33
500	4.77	4.96	5.33
600	4.77	4.96	5.33
700	4.77	4.96	5.33
800	4.77	4.96	5.33
900	4.77	4.96	5.33
1000	4.77	4.96	5.34
S114 - Creek Road (Southbound)			
1105	5.25	5.39	5.69
S115 - Creek Road (Northbound)			
1200	5.28	5.41	5.72
S117 - Pedestrian bridge			
1300	5.40	5.53	5.81
1400	5.98	6.14	6.33
S117a - Drop Structure #4			
1500	6.84	6.94	7.11
1600	7.41	7.52	7.72
S118 - Todman Street			
1700	10.87	11.00	11.21
S118a - Drop Structure #3			
1800	10.91	11.04	11.25
S118b - Drop Structure #2			
1900	11.29	11.44	11.69
2000	11.95	12.09	12.34

AMTD (m)	Scenario 1 (Existing Waterway Conditions) Peak Water Levels (mAHD) (2)		
	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)	2000-yr ARI (0.05% AEP)
S118c - Drop Structure #1			
2076	13.43	13.59	13.79
Murarrie Park Drain			
0	4.05	4.28	4.75
100	4.07	4.30	4.76
200	4.07	4.30	4.76
300	4.07	4.30	4.76
400	4.07	4.30	4.76
500	4.07	4.30	4.76
600	4.07	4.30	4.76
700	4.07	4.30	4.76
S112 - Park Access Culvert			
800	4.07	4.30	4.77
S113 - Park Access Bridge			
900	4.07	4.30	4.77
1000	4.07	4.30	4.77
1100	4.07	4.30	4.77
1116	4.07	4.30	4.77

(1) N/R = no result, typically because the AMTD line does not intersect the flood surface

(2) Flood levels are inclusive of a 9.8% increase in rainfall intensity and a 0.8m increase above HAT, due to projected climate variability effects.

Appendix H: Very Rare Events (Scenario 3) - Peak Flood Levels

The flood level data presented in this Appendix has been extracted (in part) from the results of a 2-dimensional flood model. Levels presented have been extracted generally at selected points along the centreline of the waterway with the intent of demonstrating general flood characteristics. The applicability of this data to locations on the floodplains adjacent should be determined by a suitably qualified professional. It is recommended for any detailed assessment of flood risk associated with the waterway that complete flood model results be accessed and interrogated.

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AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
Bulimba Creek			
348	1.78	2.35	2.35
400	1.79	2.35	2.36
500	1.80	2.36	2.37
600	1.81	2.37	2.38
700	1.82	2.38	2.39
800	1.84	2.39	2.40
900	1.85	2.40	2.41
1000	1.86	2.40	2.42
1100	1.87	2.41	2.43
1200	1.89	2.42	2.45
1300	1.90	2.43	2.46
1400	1.91	2.44	2.47
1500	1.93	2.45	2.48
1600	1.95	2.46	2.50
1700	1.97	2.47	2.51
1800	1.98	2.48	2.53
1900	2.00	2.50	2.54
2000	2.02	2.51	2.56
2100	2.04	2.52	2.58
2200	2.05	2.54	2.59
2300	2.07	2.55	2.61
2400	2.09	2.56	2.62
2500	2.11	2.57	2.64
2600	2.13	2.59	2.66
2700	2.15	2.60	2.68
2800	2.17	2.62	2.70
2900	2.19	2.64	2.72
3000	2.22	2.65	2.74
3100	2.24	2.67	2.76
3200	2.27	2.69	2.78
Structure S1 – Lytton Road (Eastbound)			
3300	2.31	2.85	2.98
Structure S2 – Lytton Road (Westbound)			
3400	2.39	2.95	3.14
3500	2.41	2.96	3.15
3600	2.42	2.98	3.17
3700	2.44	2.99	3.18

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
3800	2.45	3.00	3.19
3900	2.47	3.01	3.20
4000	2.48	3.01	3.21
4100	2.49	3.02	3.22
4200	2.51	3.03	3.23
Structure S3 – Port of Brisbane Motorway			
Structure S7 – Cleveland Railway			
4300	2.52	3.04	3.24
4400	2.54	3.05	3.25
4515	2.64	3.13	3.34
4600	2.66	3.13	3.35
4700	2.67	3.14	3.36
4800	2.68	3.15	3.36
4900	2.69	3.15	3.37
5000	2.70	3.16	3.38
5100	2.71	3.17	3.38
5200	2.72	3.17	3.39
5300	2.73	3.18	3.40
5400	2.74	3.18	3.40
5500	2.75	3.19	3.41
5600	2.76	3.20	3.42
5700	2.77	3.20	3.42
5800	2.78	3.20	3.42
5900	2.78	3.20	3.43
6000	2.78	3.21	3.43
6100	2.79	3.21	3.43
6200	2.79	3.21	3.43
6300	2.80	3.21	3.43
6400	2.80	3.21	3.43
6500	2.81	3.22	3.44
6600	2.81	3.22	3.44
6700	2.82	3.22	3.44
6800	2.82	3.22	3.44
6900	2.82	3.23	3.45
7000	2.83	3.23	3.45
7100	2.84	3.23	3.46
7200	2.85	3.24	3.46
7300	2.86	3.24	3.47

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
7400	2.86	3.25	3.47
7500	2.87	3.25	3.47
7600	2.88	3.26	3.48
7700	2.88	3.26	3.48
7800	2.89	3.27	3.49
7900	2.90	3.27	3.49
8000	2.91	3.27	3.50
8100	2.91	3.28	3.50
8200	2.92	3.28	3.51
8300	2.93	3.29	3.51
8400	2.93	3.29	3.51
8500	2.94	3.29	3.52
8600	2.94	3.29	3.52
8700	2.94	3.29	3.52
8800	2.94	3.29	3.52
8900	2.95	3.30	3.52
9000	2.95	3.30	3.53
9100	2.95	3.30	3.53
9200	2.95	3.30	3.53
9300	2.95	3.30	3.53
9400	2.95	3.30	3.53
9500	2.95	3.30	3.53
9600	2.95	3.30	3.53
9700	2.95	3.30	3.53
9800	2.95	3.30	3.53
9900	2.95	3.30	3.53
10000	2.95	3.29	3.52
10100	2.94	3.29	3.51
10200	2.94	3.28	3.51
10300	2.94	3.28	3.51
10400	2.94	3.28	3.51
10500	2.93	3.28	3.51
10600	2.93	3.28	3.51
10700	2.93	3.28	3.51
10800	2.93	3.28	3.50
10900	2.93	3.28	3.50
11000	2.94	3.29	3.51
11100	2.96	3.30	3.52

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
11200	2.97	3.30	3.53
11300	3.04	3.35	3.58
11400	3.12	3.41	3.64
11500	3.20	3.47	3.70
11600	3.28	3.53	3.76
11700	3.30	3.55	3.78
11800	3.32	3.57	3.80
11900	3.49	3.75	4.01
Structure S10 – Gateway Motorway			
12055	3.71	3.97	4.23
12100	3.71	3.97	4.24
12200	3.71	3.97	4.24
Structure S12 – Murarrie Road			
12300	3.77	4.02	4.28
12400	3.78	4.03	4.29
12500	3.80	4.05	4.31
12600	3.82	4.07	4.32
12700	3.85	4.10	4.35
12800	3.89	4.13	4.38
12900	3.93	4.17	4.42
13000	3.98	4.21	4.45
Structure S13 – Wynnum Road			
13100	4.14	4.36	4.58
13200	4.35	4.53	4.73
13300	4.42	4.59	4.78
13400	4.49	4.65	4.83
13500	4.51	4.67	4.85
13600	4.54	4.70	4.89
13700	4.57	4.73	4.92
13800	4.60	4.76	4.95
13900	4.62	4.78	4.98
14000	4.64	4.80	5.00
14100	4.65	4.82	5.02
14200	4.68	4.85	5.05
14300	4.72	4.89	5.09
14400	4.76	4.93	5.13
14500	4.76	4.93	5.14
14600	4.77	4.94	5.14

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
14700	4.77	4.94	5.14
14800	4.77	4.94	5.15
14900	4.77	4.94	5.15
15000	4.77	4.94	5.15
15100	4.77	4.94	5.15
15200	4.78	4.95	5.15
15300	4.78	4.95	5.15
15400	4.78	4.96	5.16
15500	4.79	4.96	5.17
15600	4.80	4.97	5.18
15700	4.81	4.98	5.18
15800	4.82	4.99	5.20
15900	4.86	5.03	5.23
16000	4.89	5.06	5.26
16100	4.93	5.09	5.29
16200	4.95	5.12	5.32
16300	4.97	5.13	5.33
16400	4.97	5.14	5.34
16500	4.99	5.15	5.35
16600	5.00	5.16	5.36
16700	5.01	5.17	5.37
16800	5.02	5.18	5.38
16900	5.03	5.19	5.39
17000	5.04	5.20	5.40
17100	5.06	5.21	5.41
17200	5.07	5.23	5.43
17300	5.08	5.24	5.44
17400	5.09	5.25	5.45
17500	5.11	5.26	5.46
17600	5.12	5.28	5.48
17700	5.14	5.29	5.49
17800	5.15	5.30	5.50
17900	5.16	5.32	5.51
18000	5.18	5.33	5.53
18100	5.20	5.35	5.54
18200	5.22	5.36	5.56
18300	5.23	5.38	5.57
18400	5.24	5.39	5.59

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
18500	5.27	5.41	5.61
18600	5.31	5.45	5.64
Structure S17 - Meadowlands Road			
18723	5.49	5.67	5.89
18800	5.52	5.70	5.92
18900	5.55	5.72	5.93
19000	5.63	5.80	6.01
19100	5.63	5.80	6.01
19200	5.74	5.90	6.12
19300	5.86	6.01	6.23
19400	6.00	6.15	6.37
19500	6.08	6.23	6.46
19600	6.12	6.26	6.49
19700	6.14	6.28	6.51
Structure S18 – Scrub Road Pedestrian Bridge			
19800	6.24	6.38	6.62
19900	6.28	6.42	6.66
20000	6.33	6.47	6.70
20100	6.39	6.53	6.77
20200	6.46	6.60	6.83
20300	6.52	6.66	6.89
20400	6.55	6.69	6.92
20500	6.59	6.73	6.96
20600	6.66	6.80	7.02
20700	6.73	6.86	7.09
20800	6.81	6.93	7.16
20900	7.08	7.19	7.42
21000	7.35	7.48	7.70
Structure S27 – Old Cleveland Road			
21100	7.95	8.15	8.36
21200	8.09	8.28	8.49
21300	8.20	8.39	8.60
21400	8.29	8.47	8.68
21500	8.33	8.51	8.72
21600	8.37	8.55	8.76
Structure S29 – Winstanley Street			
21700	8.65	8.84	9.07
21800	8.76	8.94	9.17

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
21900	8.86	9.04	9.28
22000	8.98	9.15	9.39
22100	9.09	9.27	9.50
22200	9.20	9.37	9.61
22300	9.29	9.46	9.70
22400	9.41	9.57	9.82
22500	9.49	9.65	9.90
Structure S36 – Meadowbank Street Pedestrian Bridge			
22600	9.73	9.90	10.14
22700	9.86	10.02	10.27
22800	9.96	10.12	10.37
22900	10.05	10.20	10.45
23000	10.11	10.26	10.51
23100	10.12	10.28	10.53
23200	10.14	10.29	10.55
23300	10.17	10.31	10.56
23400	10.33	10.46	10.71
Structure S37 – Pine Mountain Road			
23500	10.63	10.74	10.98
23600	10.66	10.78	11.02
23700	10.74	10.86	11.09
23800	10.87	10.98	11.21
23900	11.02	11.13	11.35
24000	11.18	11.29	11.51
24100	11.27	11.38	11.59
24200	11.50	11.61	11.83
24300	11.69	11.80	12.03
24400	11.85	11.96	12.18
24500	11.99	12.10	12.32
24600	12.02	12.14	12.36
24700	12.07	12.20	12.42
24800	12.15	12.28	12.49
24900	12.25	12.38	12.58
25000	12.38	12.50	12.69
25100	12.59	12.71	12.89
25200	12.81	12.93	13.11
25300	13.04	13.17	13.36
25400	13.38	13.51	13.70

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
25500	13.71	13.85	14.05
25600	13.93	14.07	14.28
25700	14.07	14.21	14.42
25800	14.20	14.34	14.54
25900	14.31	14.44	14.64
Structure S55 – Oakley Street Pedestrian Bridge			
26000	14.51	14.64	14.85
26100	14.62	14.76	14.96
26200	14.72	14.85	15.06
26300	14.92	15.06	15.28
26400	15.35	15.50	15.73
26500	15.61	15.77	16.00
26600	15.71	15.87	16.10
26700	15.78	15.93	16.17
26800	15.86	16.01	16.25
Structure S56 – Wecker Road			
26900	16.07	16.21	16.44
27000	16.25	16.40	16.62
27100	16.52	16.67	16.90
27200	16.74	16.89	17.13
27300	16.86	17.01	17.25
27400	16.94	17.09	17.33
27500	17.03	17.18	17.42
27600	17.13	17.28	17.52
27700	17.24	17.39	17.62
27800	17.35	17.50	17.72
27900	17.52	17.66	17.89
28000	17.74	17.88	18.11
28100	18.03	18.18	18.41
28200	18.33	18.49	18.74
S57 - Mount Gravatt Capalaba Road			
28300	18.91	19.09	19.51
28400	19.18	19.37	19.74
28500	19.37	19.56	19.90
28600	19.51	19.68	20.01
28700	19.62	19.79	20.10
28800	19.81	19.96	20.26
28900	20.02	20.16	20.42

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
29000	20.14	20.27	20.52
29100	20.29	20.41	20.65
29200	20.43	20.55	20.78
29300	20.57	20.69	20.91
29400	20.73	20.85	21.07
29500	20.88	21.00	21.22
29600	21.04	21.16	21.37
29700	21.20	21.31	21.52
29800	21.42	21.55	21.73
29900	21.67	21.79	21.94
30000	21.94	22.06	22.25
30100	22.18	22.29	22.48
30200	22.50	22.62	22.82
30300	22.84	22.96	23.16
30400	23.11	23.22	23.43
30500	23.33	23.43	23.65
30600	23.59	23.71	23.92
30700	23.73	23.85	24.07
30800	23.84	23.97	24.19
30900	23.96	24.08	24.29
S58 - Sherwood Place Pedestrian Bridge			
31000	24.46	24.56	24.77
31100	24.72	24.82	25.02
31200	25.04	25.15	25.36
31300	25.42	25.53	25.73
31400	25.74	25.86	26.06
31500	25.98	26.10	26.33
31600	26.12	26.24	26.48
31700	26.24	26.37	26.61
31800	26.37	26.50	26.74
31900	26.47	26.60	26.85
S59 - Craig Street Pedestrian Bridge			
32000	26.73	26.84	27.06
32100	27.03	27.13	27.33
32200	27.18	27.29	27.49
32300	27.30	27.41	27.62
32400	27.43	27.54	27.75
32500	27.59	27.71	27.93

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
32600	27.82	27.94	28.16
32700	28.13	28.25	28.48
32800	28.53	28.65	28.88
32900	29.13	29.25	29.50
33000	29.41	29.53	29.77
S60 - D/S of Logan Road Pedestrian Bridge			
33100	29.85	29.97	30.18
S61 - Logan Road			
33200	31.09	31.22	31.37
S63 - Pacific Motorway			
33362	33.05	33.40	33.88
33400	33.06	33.41	33.89
33500	33.08	33.44	33.92
33600	33.11	33.46	33.94
33700	33.14	33.49	33.97
33800	33.21	33.55	34.02
33900	33.30	33.63	34.14
34000	33.43	33.74	34.17
34100	33.63	33.90	34.28
34200	33.88	34.11	34.44
34300	34.13	34.33	34.64
34400	34.40	34.56	34.87
34500	34.55	34.70	34.99
S66 - Padstow Road			
34600	35.19	35.28	35.44
34700	35.23	35.33	35.48
34800	35.66	35.73	35.85
34900	36.14	36.21	36.30
35000	36.59	36.65	36.75
S68 - Malbon Street Pedestrian Bridge			
35100	37.23	37.30	37.43
35200	37.58	37.67	37.81
35300	38.11	38.20	38.33
35400	38.80	38.90	39.03
35500	39.41	39.52	39.66
35600	40.24	40.35	40.48
35700	41.12	41.22	41.33
35800	41.61	41.70	41.83

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
35900	41.97	42.06	42.18
36000	42.39	42.48	42.60
36100	42.82	42.91	43.03
36200	43.21	43.29	43.40
36300	43.62	43.70	43.81
36400	44.04	44.12	44.22
36500	44.52	44.60	44.72
S69 - Altandi Street Pedestrian Bridge			
36600	45.11	45.19	45.32
36700	45.20	45.27	45.40
36800	45.28	45.35	45.48
S70 - D/S Gold Coast Railway Pedestrian Bridge			
36900	45.77	45.82	45.90
36985	46.50	46.56	46.65
S71 and S72 - Gold Coast Railway			
37100	47.06	47.16	47.29
S73 - Beenleigh Road			
37200	47.34	47.44	47.55
37300	47.63	47.72	47.83
S74 - Gowan Road Pedestrian Culvert			
37400	47.99	48.06	48.16
37500	48.53	48.59	48.69
37600	49.15	49.21	49.30
37700	49.58	49.65	49.74
37800	49.90	49.96	50.06
37900	50.37	50.43	50.50
38000	50.87	50.93	51.00
38100	51.43	51.47	51.56
S75 - Energy Dissipator			
38200	52.37	52.43	52.53
38300	52.57	52.65	52.76
38400	52.83	52.91	53.03
S77 - Glenefer Street Pedestrian Bridge			
38500	53.46	53.53	53.62
38574	53.95	54.02	54.13
S78 - Brandon Road			
38700	54.77	54.86	55.01
38800	55.22	55.32	55.47

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
38900	55.50	55.60	55.77
S79 - Nemies Road			
39000	57.22	57.35	57.54
39100	57.49	57.62	57.80
39200	57.83	57.95	58.12
39300	58.28	58.39	58.54
S80 - Calliope Street Bikeway			
39400	59.21	59.33	59.48
39500	59.60	59.70	59.86
39600	60.39	60.48	60.67
39700	60.72	60.78	60.94
39800	60.95	61.01	61.15
39888	61.20	61.28	61.46
Daw Road Drain			
0	37.10	37.17	37.29
100	37.22	37.28	37.39
200	38.28	38.36	38.42
300	39.21	39.28	39.40
400	40.42	40.49	40.59
500	40.75	40.83	40.95
600	41.15	41.25	41.38
700	41.59	41.68	41.81
800	42.11	42.17	42.30
900	42.65	42.72	42.84
1000	43.10	43.16	43.27
1095	43.21	43.28	43.39
Padstow Road Drain			
0	34.74	34.85	35.08
S169 - McCullough Street Pedestrian Bridge			
100	35.71	35.62	35.72
200	37.21	37.10	37.20
S170 - McCullough Street			
300	37.94	37.76	37.85
400	38.58	38.60	38.71
441	39.10	39.23	39.37
Mimosa Creek			
0	34.39	34.56	34.86
100	34.56	34.70	34.95

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
S82 - Turnmill Street Pedestrian Culvert			
200	34.77	34.88	35.10
300	35.10	35.19	35.37
400	35.40	35.49	35.63
500	36.00	36.11	36.26
S83 - Springfield Street Pedestrian Culvert			
600	36.38	36.49	36.63
700	36.82	36.92	37.05
800	37.27	37.37	37.51
900	37.70	37.81	37.96
1000	38.07	38.17	38.30
1100	38.81	38.90	39.03
1200	39.63	39.73	39.88
S84 - Parkway Street			
1300	40.15	40.25	40.44
1400	40.65	40.76	40.94
1500	41.19	41.31	41.49
S85 - Kessels Road			
1610	41.55	41.94	42.25
1700	42.01	42.28	42.52
1800	42.46	42.66	42.86
S86(a)(b)(c) - Pacific Motorway			
1944	43.36	43.57	44.03
2000	43.55	43.71	44.12
S87 - Nagle Street			
2100	44.17	44.32	44.68
2200	45.05	45.19	45.42
2300	45.71	45.83	45.99
2400	46.06	46.18	46.33
2500	46.84	46.95	47.09
2600	46.90	47.01	47.15
2700	47.42	47.50	47.63
2800	48.12	48.19	48.29
2900	48.69	48.77	48.88
3000	49.58	49.64	49.72
S88 - Hibiscus Place Pedestrian Culvert			
3100	50.13	50.18	50.26
3200	50.85	50.91	50.99

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
3300	51.68	51.75	51.85
3400	52.44	52.53	52.65
3500	53.27	53.35	53.49
3600	54.12	54.18	54.28
3674	54.89	54.93	55.01
Nardie Street Drain			
0	25.64	25.75	25.95
100	25.78	25.90	26.10
200	25.87	25.97	26.13
300	26.62	26.82	27.11
400	26.71	26.94	27.21
496	27.39	27.57	27.81
Bulimba Creek East			
0	23.88	24.00	24.22
100	24.02	24.14	24.35
200	24.31	24.43	24.65
300	24.47	24.59	24.81
400	24.71	24.82	25.03
500	24.96	25.06	25.30
600	25.18	25.28	25.53
700	25.55	25.64	25.90
800	26.08	26.16	26.42
900	26.72	26.85	27.10
1000	27.17	27.31	27.56
1100	27.34	27.48	27.73
1200	27.62	27.76	28.01
S89 - Gateway Motorway - On / Off Ramp			
1300	28.25	28.45	28.82
1400	28.70	28.87	29.20
1500	29.14	29.30	29.59
1576	29.48	29.65	29.96
S90 - Miles Platting Road			
S91 - South East Busway Loop			
1700	29.97	30.16	30.53
1800	30.33	30.52	30.87
1881	30.69	30.88	31.22
S92 - South East Busway			
S93 - Pacific Motorway			

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
2000	33.04	33.23	33.44
S93(a)(b)(c) - V1 Veloway			
2100	33.08	33.26	33.47
2200	33.09	33.27	33.48
2300	33.10	33.29	33.50
2400	33.16	33.34	33.56
2500	33.26	33.43	33.63
S94 - Logan Road			
2597	34.45	34.56	34.70
S194 - Glen Hotel Weir			
2700	34.84	34.93	35.06
2800	35.37	35.45	35.56
2880	35.78	35.89	36.04
S96 - Gateway Motorway			
3000	36.21	36.33	36.49
3100	36.67	36.78	36.92
3200	37.15	37.28	37.44
3300	37.68	37.82	38.01
3400	38.46	38.59	38.75
3498	38.79	38.93	39.09
S97 - Underwood Road			
3600	39.31	39.41	39.53
3700	39.63	39.71	39.81
3800	40.33	40.37	40.44
3900	41.08	41.14	41.21
4000	41.74	41.79	41.87
4100	42.46	42.53	42.60
4200	43.14	43.22	43.31
4300	43.83	43.91	44.03
4400	44.36	44.44	44.56
4500	44.70	44.78	44.88
4600	45.04	45.10	45.21
4700	45.55	45.59	45.69
4800	46.02	46.07	46.17
4900	46.52	46.57	46.67
5000	47.09	47.18	47.29
5100	47.83	47.95	48.07
5200	48.33	48.44	48.57

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
5300	48.59	48.70	48.84
S99 - Gateway Motorway			
5400	49.03	49.13	49.24
S100 - Gold Coast Railway			
S101 - Beenleigh Road			
5500	50.62	50.66	50.73
5600	50.64	50.68	50.75
5700	51.25	51.29	51.35
5800	52.08	52.13	52.19
5900	52.79	52.84	52.91
6000	53.59	53.63	53.70
6100	54.45	54.48	54.52
6200	55.55	55.61	55.65
6296	56.60	56.65	56.74
Bulimba Creek East Railway Bypass			
0	46.98	47.06	47.17
100	47.62	47.62	47.66
200	47.81	47.82	47.85
300	48.13	48.15	48.20
400	48.84	48.92	49.06
460	49.17	49.26	49.35
Tributary C			
0	39.30	39.40	39.52
56	39.40	39.47	39.60
S174 - Gateway Motorway			
200	40.72	40.79	40.88
300	41.97	42.04	42.11
400	43.21	43.27	43.34
500	44.33	44.39	44.48
600	45.39	45.45	45.55
700	46.32	46.39	46.50
800	46.96	47.04	47.15
900	47.47	47.55	47.66
1000	47.80	47.87	47.97
1100	48.33	48.39	48.48
1200	48.94	48.99	49.07
1246	49.22	49.27	49.34
Tributary B			

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
0	33.15	33.33	33.54
100	33.17	33.35	33.57
S95 - Logan Road			
200	34.17	34.33	34.47
300	34.48	34.56	34.66
400	35.36	35.47	35.60
S104 - Dance Crescent			
500	36.92	37.01	37.12
584	37.31	37.40	37.51
Tributary A			
0	33.04	33.23	33.43
100	33.06	33.24	33.45
S105 - Gateway Motorway			
241	33.35	33.63	33.84
300	33.36	33.64	33.85
400	33.39	33.66	33.88
500	33.50	33.74	33.96
S106 - Pacific Motorway Off Ramp			
600	34.17	34.32	34.53
700	34.45	34.61	34.81
800	34.71	34.87	35.06
900	35.18	35.32	35.51
S107 - Pacific Motorway			
1038	35.63	35.83	36.13
1100	36.08	36.19	36.40
1200	36.43	36.53	36.70
1300	37.10	37.18	37.30
1400	37.93	38.00	38.10
1500	38.61	38.69	38.81
1600	39.60	39.68	39.81
1700	40.87	40.96	41.11
1800	41.62	41.71	41.87
1900	42.21	42.28	42.40
2000	42.81	42.87	42.95
2100	43.60	43.66	43.75
2200	44.41	44.48	44.58
2300	44.88	44.95	45.05
2400	45.66	45.72	45.79

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
2500	46.70	46.75	46.83
2600	47.88	47.94	48.02
2700	48.97	49.04	49.13
2800	50.04	50.11	50.20
2900	51.04	51.11	51.20
2915	51.18	51.24	51.33
Tributary A1			
0	41.10	41.20	41.35
100	42.58	42.61	42.65
200	44.37	44.41	44.45
300	46.16	46.24	46.30
400	47.56	47.64	47.75
500	49.37	49.44	49.51
600	53.60	53.65	53.72
689	57.31	57.35	57.41
Tributary A Overflow			
0	33.42	33.68	33.90
71	33.45	33.70	33.92
S186 and S189 - Pacific Motorway			
S187 and S190 - Pacific Motorway On Ramp			
S188 and S191 - Busway			
200	33.64	33.89	34.17
300	33.74	33.96	34.23
400	34.23	34.32	34.72
500	34.97	35.11	35.38
S192 - School Road			
600	35.45	35.66	35.99
S193 - Diversion Weir			
700	35.65	35.85	36.14
703	35.65	35.85	36.15
Tributary A2			
0	35.35	35.50	35.68
100	36.35	36.47	36.64
200	37.55	37.67	37.83
300	38.52	38.65	38.83
S108 - Freeway Office Park Weir			
410	40.82	40.89	40.98
S109 - Freeway Office Park Internal Road			

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
505	40.93	41.03	41.20
S110 and S111 - Logan Road			
628	42.00	42.11	42.27
700	42.20	42.30	42.45
760	42.73	42.81	42.91
Miles Platting Road Drain			
0	26.12	26.20	26.45
100	27.15	27.25	27.37
S172 - Gateway Motorway			
200	28.28	28.48	28.77
300	28.86	29.01	29.24
400	29.56	29.67	29.84
500	30.88	30.96	31.05
600	32.44	32.51	32.62
700	33.43	33.49	33.58
800	34.87	35.00	35.15
900	36.72	36.83	36.98
1000	39.57	39.64	39.74
S173 - Miles Platting Road			
1100	40.85	40.92	41.01
1200	42.68	42.70	42.74
1300	44.31	44.37	44.44
1328	44.65	44.72	44.82
Kate Circuit Drain			
0	30.40	30.50	30.65
100	32.52	32.55	32.60
200	34.72	34.78	34.85
300	37.17	37.22	37.29
400	39.29	39.36	39.46
437	40.04	40.08	40.18
Parklands Circuit Drain			
0	20.99	21.10	21.32
100	21.06	21.17	21.39
200	21.21	21.32	21.52
S165 - Gateway Motorway			
300	22.15	22.19	22.25
400	22.91	23.00	23.10
500	25.48	25.58	25.72

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
600	26.43	26.53	26.68
700	27.49	27.56	27.67
S166 - Prebble Street			
800	28.25	28.31	28.39
900	28.67	28.73	28.83
S167 - Kyeema Street			
1000	30.37	30.45	30.54
1100	32.65	32.71	32.79
S168 - Echidna Street			
1206	33.55	33.60	33.66
1300	34.48	34.52	34.57
1400	36.97	37.01	37.08
1500	39.54	39.57	39.61
1600	42.68	42.71	42.75
1675	45.01	45.03	45.07
Broadwater Road Drain			
0	17.13	17.28	17.52
100	17.22	17.37	17.60
200	17.23	17.38	17.61
300	17.23	17.38	17.61
400	17.26	17.41	17.62
500	17.36	17.49	17.71
600	17.79	17.92	18.10
700	19.65	19.80	20.00
800	19.94	20.09	20.30
900	20.18	20.32	20.53
1000	20.45	20.60	20.81
1100	20.85	21.00	21.19
S152 - Broadwater Road			
1200	22.43	22.56	22.72
1300	22.69	22.83	23.00
S153 - Brisbane Adventist College Drop Structure			
1400	23.37	23.51	23.72
1500	23.64	23.72	23.91
1600	24.57	24.65	24.76
1700	25.41	25.49	25.60
S155 - Brisbane Adventist College Pedestrian Bridge			
S156 - Brisbane Adventist College Drop Structure			

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) [(2)]		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
1800	27.01	27.13	27.30
S157 - 16 Rowe Close Drop Structure			
1897	27.50	27.62	27.78
S158 - 16 Rowe Close Drop Structure			
2000	28.53	28.66	28.83
S159 - 226 Wishart Road - Internal Road			
2100	29.47	29.70	30.06
2113	29.47	29.70	30.06
Wishart Road Drain			
0	23.48	23.58	23.84
100	25.33	25.40	25.50
200	26.72	26.80	26.92
S160 - Wishart Road			
300	27.90	27.97	28.10
400	29.12	29.14	29.18
497	29.99	30.03	30.09
S161 - Access Bridge to 10 St.George Circuit			
S162 - Access Bridge to 10 St.George Circuit			
600	N/R [(1)]	N/R [(1)]	N/R [(1)]
700	33.11	33.18	33.27
S164 - 35 Avenell Street Access Road			
723	33.19	33.27	33.37
Wecker Road Drain			
0	15.62	15.77	16.01
100	15.59	15.75	15.99
200	15.67	15.81	16.03
300	15.74	15.86	16.06
383	16.72	16.77	16.90
S141 - Christian College Access Road			
S142 - Christian College Access Road			
500	18.08	18.14	18.27
S143 and S144 - Scrub Road			
608	18.19	18.25	18.39
700	18.61	18.65	18.76
S145 - Wecker Road			
800	19.90	19.94	20.11
900	21.02	21.08	21.20
1000	21.31	21.37	21.49

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) [(2)]		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
1093	23.15	23.21	23.34
S146 - Gateway Motorway			
1200	25.37	25.68	25.99
1300	25.40	25.70	26.01
1400	25.54	25.79	26.07
1500	26.07	26.14	26.30
S147 - Weedon Street East			
1600	27.43	27.49	27.58
S148 and S149 - Mount Petrie Road			
1700	28.52	28.62	28.75
1800	28.53	28.62	28.76
1900	30.44	30.51	30.60
2000	31.01	31.10	31.19
2016	31.15	31.24	31.38
Newnham Creek			
0	12.02	12.15	12.37
100	12.00	12.12	12.35
200	12.03	12.15	12.38
300	12.07	12.18	12.40
400	12.12	12.23	12.42
500	12.18	12.28	12.48
600	12.72	12.81	13.00
700	13.27	13.36	13.56
S39 - Access Road to 100 Wecker Road			
800	15.87	15.93	16.06
867	15.91	15.98	16.12
S40 - Stormwater Quality Improvement Device			
S41 - Secam Street			
S42 - Access Road to 33 Secam Street			
1001	17.07	17.18	17.34
S43 - Devlan Street			
1100	17.97	18.04	18.16
S44 - Bunnings Access #3			
S45 - Bunnings Access #2			
1200	18.17	18.26	18.40
S46 - Bunnings Access #1			
1300	18.25	18.35	18.48
S47 - Newnham Road			

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) [2]		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
1400	20.36	20.45	20.56
1500	20.53	20.62	20.73
1597	20.85	20.93	21.05
S48 - Access Road to 285 Creek Road			
S49 - Drop Structure #3			
1700	21.71	21.82	21.99
S50 - Drop Structure #2			
S51 - Drop Structure #1			
1800	23.98	24.10	24.29
S52 - Internal Road for 215 Creek Road			
S53 - 215 Creek Road Pedestrian Bridge			
1900	25.31	25.54	25.82
2000	25.87	25.98	26.17
2012	25.93	26.03	26.21
Spring Creek			
0	10.05	10.21	10.46
100	10.07	10.22	10.47
200	10.01	10.17	10.43
300	10.01	10.17	10.43
400	10.11	10.24	10.47
500	10.47	10.53	10.61
600	10.66	10.73	10.87
700	11.11	11.21	11.40
800	11.64	11.71	11.83
S132 - Scrub Road			
900	12.09	12.19	12.33
1000	12.30	12.38	12.52
1100	12.61	12.65	12.78
1200	13.21	13.22	13.30
1300	15.53	15.56	15.59
1400	17.29	17.31	17.35
1500	18.96	18.98	19.02
1600	20.95	20.98	21.03
1700	27.13	27.15	27.20
S133 - Woodland Street Pedestrian Bridge			
1800	30.18	30.22	30.30
1900	34.09	34.12	34.19
2000	36.79	36.83	36.90

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
2006	36.93	36.96	37.03
Warwick Creek			
0	12.92	12.94	13.04
S134 - Greendale Way			
100	13.80	13.82	13.96
200	14.26	14.31	14.40
300	14.83	14.88	14.98
400	15.73	15.78	15.94
S135 - Amersham Crescent			
500	16.77	16.88	17.13
600	17.63	17.69	17.84
700	18.35	18.42	18.56
800	18.98	19.05	19.19
900	19.28	19.35	19.46
1000	19.66	19.72	19.79
S136 - Cribb Road			
1100	19.78	19.84	19.92
1200	20.87	20.93	21.03
1300	21.51	21.57	21.65
1400	22.00	22.06	22.15
1500	22.40	22.46	22.56
1600	22.85	22.90	22.97
S138 - Oakley Street			
1700	23.26	23.30	23.38
1800	24.24	24.27	24.31
1817	24.55	24.58	24.62
Silky Oak Circuit Drain			
0	22.50	22.56	22.65
S139 - Oakley Street			
100	23.58	23.64	23.78
200	25.06	25.08	25.13
246	25.96	25.99	26.01
Salvin Creek			
0	8.90	9.08	9.32
100	8.89	9.07	9.31
200	9.02	9.20	9.44
300	9.03	9.20	9.44
400	9.03	9.21	9.45

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) [(2)]		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
500	9.04	9.21	9.45
S31 - Donnington Street (Lower)			
600	10.81	11.13	11.35
700	N/R [(1)]	11.14	11.37
800	10.86	11.19	11.41
900	10.90	11.22	11.44
1000	10.99	11.30	11.53
1100	11.36	11.59	11.82
S32 - Donnington Street (Upper)			
1200	13.99	14.22	14.46
1300	14.23	14.42	14.64
1400	14.51	14.65	14.85
S33 - Creek Road			
1515	15.14	15.30	15.59
1600	15.34	15.48	15.75
1700	15.99	16.10	16.30
1800	17.04	17.14	17.35
S34 - Pine Mountain Road			
1900	18.85	19.15	19.50
2000	19.15	19.38	19.69
2100	19.82	19.96	20.19
2200	20.27	20.36	20.55
2300	20.94	21.02	21.11
S35 - Bevan Street			
2400	22.31	22.52	22.80
2500	23.18	23.29	23.45
2600	24.16	24.20	24.29
2700	25.50	25.56	25.67
2800	26.11	26.18	26.31
2900	26.49	26.58	26.73
2926	26.57	26.67	26.83
Glengariff Tributary			
0	15.95	16.05	16.26
100	16.67	16.75	16.90
200	17.35	17.39	17.51
300	17.84	17.89	18.02
400	N/R [(1)]	N/R [(1)]	N/R [(1)]
500	20.45	20.49	20.57

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
600	21.43	21.46	21.52
700	22.11	22.14	22.21
800	23.09	23.12	23.20
900	24.37	24.41	24.50
925	24.67	24.68	24.78
Phillips Creek			
0	6.72	6.85	7.07
100	6.85	6.98	7.21
200	7.04	7.18	7.42
300	7.06	7.20	7.44
400	7.14	7.28	7.53
500	7.25	7.37	7.60
600	7.25	7.37	7.60
S20 - Old Cleveland Access Road			
671	7.39	7.47	7.64
S21 - Stormwater Quality Improvement Device			
S22 - Old Cleveland Road			
842	8.45	8.73	9.29
900	8.45	8.73	9.29
1000	N/R (1)	N/R (1)	N/R (1)
1100	10.48	10.82	11.19
S23(b)(c) - Creek Road			
1200	10.56	10.89	11.26
S24 - Pedestrian Bridge U/S Creek Road			
1300	10.65	10.96	11.32
1400	10.93	11.15	11.47
1500	11.41	11.52	11.73
1600	11.71	11.79	11.97
1700	12.27	12.34	12.46
1800	12.79	12.86	12.97
1900	13.37	13.44	13.55
2000	14.06	14.12	14.21
2100	14.61	14.67	14.76
2200	15.32	15.37	15.48
2286	16.00	16.05	16.17
S25 - Gallipoli Road			
2400	17.40	17.45	17.59
S26 - Anzac Road			

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
2500	18.11	18.17	18.28
2600	18.28	18.35	18.48
2685	18.61	18.70	18.88
Cloverbrook Place Drain			
0	4.81	4.98	5.18
100	4.81	4.98	5.19
200	4.82	4.99	5.20
300	4.82	4.99	5.20
400	4.82	5.00	5.20
500	4.83	5.00	5.21
600	4.83	5.00	5.21
S121 - Fursden Road			
700	4.83	5.00	5.21
800	4.83	5.00	5.21
900	4.83	5.00	5.21
1000	4.83	5.01	5.21
1100	4.84	5.01	5.21
1200	4.86	5.03	5.21
1213	4.86	5.04	5.21
Bethel Street Drain			
0	4.83	5.00	5.21
100	4.83	5.00	5.21
200	4.83	5.01	5.21
300	4.83	5.00	5.21
400	4.84	5.01	5.21
500	4.83	5.00	5.21
S123 - Bethel Street			
600	4.91	5.07	5.23
700	4.96	5.12	5.29
773	4.97	5.13	5.30
Minnippi Overflow			
0	2.95	3.30	3.53
100	2.98	3.32	3.56
200	2.98	3.32	3.56
300	2.99	3.33	3.56
400	2.99	3.33	3.57
500	3.00	3.33	3.57
600	3.01	3.34	3.58

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
700	3.02	3.35	3.59
800	3.04	3.36	3.60
884	3.16	3.42	3.64
S14 - Wynnum Road			
1000	4.06	4.19	4.34
1100	4.14	4.27	4.43
1200	4.29	4.41	4.57
S15 - Gateway Motorway			
1344	4.72	4.90	5.10
1400	4.76	4.93	5.14
1500	4.76	4.94	5.14
1600	4.77	4.94	5.14
1700	4.77	4.94	5.14
1800	4.77	4.94	5.15
1884	4.77	4.94	5.15
Stanton Road Drain			
0	4.21	4.33	4.51
S125 - Access Road			
100	4.15	4.37	4.55
200	4.15	4.37	4.55
300	4.15	4.37	4.55
S126 - Stanton Road			
400	4.15	4.37	4.55
500	4.15	4.37	4.55
600	4.15	4.37	4.55
700	4.15	4.37	4.55
800	4.15	4.37	4.55
900	4.15	4.37	4.55
1000	4.15	4.37	4.55
1100	4.15	4.37	4.55
1187	4.15	4.37	4.55
Moorabbin Drive Drain			
0	4.70	4.87	5.07
100	4.76	4.93	5.13
200	4.78	4.95	5.16
300	4.80	4.97	5.18
400	4.81	4.98	5.19
500	4.81	4.98	5.19

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
600	4.81	4.98	5.19
700	4.81	4.98	5.19
800	4.81	4.98	5.19
900	4.81	4.98	5.19
S119 - Billan Street			
1000	4.81	4.98	5.19
S120 - Gray Street			
1100	4.81	4.98	5.19
1200	4.81	4.98	5.19
Minnippi Creek			
0	4.59	4.76	4.95
100	4.61	4.77	4.96
200	4.61	4.78	4.97
300	4.61	4.78	4.97
400	4.61	4.78	4.97
500	4.61	4.78	4.97
600	4.61	4.78	4.97
700	4.61	4.78	4.97
800	4.61	4.78	4.97
900	4.61	4.78	4.97
1000	4.61	4.78	4.97
S114 - Creek Road (Southbound)			
1105	5.23	5.34	5.49
S115 - Creek Road (Northbound)			
1200	5.27	5.38	5.52
S117 - Pedestrian bridge			
1300	5.39	5.50	5.64
1400	5.92	6.01	6.18
S117a - Drop Structure #4			
1500	6.81	6.89	7.02
1600	7.36	7.45	7.58
S118 - Todman Street			
1700	10.80	10.93	11.09
S118a - Drop Structure #3			
1800	10.78	10.90	11.09
S118b - Drop Structure #2			
1900	11.18	11.28	11.46
2000	11.87	11.95	12.09

AMTD (m)	Scenario 3 (Ultimate Waterway Conditions) Peak Water Levels (mAHD) (2)		
	100-yr ARI (1% AEP)	200-yr ARI (0.5% AEP)	500-yr ARI (0.2% AEP)
S118c - Drop Structure #1			
2076	13.33	13.43	13.59
Murarrie Park Drain			
0	3.80	4.04	4.30
100	3.81	4.06	4.32
200	3.82	4.07	4.32
300	3.82	4.07	4.32
400	3.82	4.07	4.32
500	3.82	4.07	4.32
600	3.82	4.07	4.32
700	3.82	4.07	4.32
S112 - Park Access Culvert			
800	3.82	4.07	4.32
S113 - Park Access Bridge			
900	3.82	4.07	4.32
1000	3.82	4.07	4.32
1100	3.82	4.07	4.32
1116	3.82	4.07	4.32

(1) N/R = no result, typically because the AMTD line does not intersect the flood surface.

(2) Flood levels are inclusive of a 9.8% increase in rainfall intensity and a 0.8m increase above HAT, due to projected climate variability effects.

Appendix I: Design Events (Scenario 1) – Critical Duration and Median Ensemble

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AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
Bulimba Creek						
800	540m	E1	540m	E4	360m	E7
900	540m	E4	540m	E4	360m	E10
1000	270m	E6	540m	E6	360m	E10
1100	540m	E4	540m	E6	360m	E10
1200	540m	E6	540m	E6	360m	E10
1300	270m	E7	540m	E6	360m	E10
1400	540m	E7	540m	E6	360m	E10
1500	540m	E6	540m	E6	360m	E10
1600	540m	E6	540m	E6	360m	E10
1700	540m	E6	540m	E6	360m	E10
1800	540m	E6	540m	E6	360m	E10
1900	540m	E7	540m	E6	360m	E10
2000	540m	E7	540m	E6	360m	E10
2100	540m	E7	540m	E6	360m	E10
2200	540m	E6	540m	E6	360m	E10
2300	540m	E6	540m	E6	360m	E10
2400	540m	E7	540m	E6	360m	E10
2500	540m	E7	540m	E6	360m	E10
2600	540m	E7	540m	E6	360m	E10
2700	540m	E7	540m	E6	360m	E10
2800	540m	E7	540m	E6	360m	E10
2900	540m	E7	540m	E6	360m	E10
3000	540m	E7	540m	E6	360m	E10
3100	540m	E7	540m	E6	360m	E10
3200	540m	E7	540m	E6	360m	E10
Structure S1 – Lytton Road (Eastbound)						
3300	540m	E7	540m	E6	360m	E10
Structure S2 – Lytton Road (Westbound)						
3400	540m	E7	540m	E6	360m	E10
3500	540m	E7	540m	E6	360m	E10
3600	540m	E7	540m	E6	360m	E10
3700	540m	E9	540m	E6	360m	E10
3800	540m	E7	540m	E6	360m	E10
3900	540m	E7	540m	E6	360m	E10
4000	540m	E7	540m	E6	360m	E10
4100	540m	E7	540m	E6	360m	E10

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
4200	540m	E7	540m	E6	360m	E10
Structure S3 – Port of Brisbane Motorway						
Structure S7 – Cleveland Railway						
4300	540m	E7	540m	E6	360m	E10
4400	540m	E7	540m	E6	360m	E10
4515	540m	E7	540m	E6	360m	E10
4600	540m	E7	540m	E6	360m	E10
4700	540m	E7	540m	E6	360m	E10
4800	540m	E7	540m	E6	360m	E10
4900	540m	E7	540m	E6	360m	E10
5000	540m	E7	540m	E6	360m	E10
5100	540m	E7	540m	E6	360m	E10
5200	540m	E7	540m	E6	360m	E10
5300	540m	E7	540m	E6	360m	E10
5400	540m	E7	540m	E6	360m	E10
5500	540m	E7	540m	E6	360m	E10
5600	540m	E7	540m	E6	360m	E10
5700	540m	E7	540m	E6	360m	E10
5800	540m	E7	540m	E6	360m	E10
5900	540m	E7	540m	E6	360m	E10
6000	540m	E7	540m	E6	360m	E10
6100	540m	E7	540m	E6	360m	E10
6200	540m	E7	540m	E6	360m	E10
6300	540m	E7	540m	E6	360m	E10
6400	540m	E7	540m	E6	360m	E10
6500	540m	E7	540m	E6	360m	E10
6600	540m	E7	540m	E6	360m	E10
6700	540m	E7	540m	E6	360m	E10
6800	540m	E7	540m	E6	360m	E10
6900	540m	E6	540m	E6	360m	E10
7000	540m	E7	540m	E6	360m	E10
7100	540m	E7	540m	E6	360m	E10
7200	540m	E7	540m	E6	360m	E10
7300	540m	E7	540m	E6	360m	E10
7400	540m	E7	540m	E6	360m	E10
7500	540m	E7	540m	E6	360m	E10
7600	540m	E7	540m	E6	360m	E10

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
7700	540m	E6	540m	E6	360m	E10
7800	540m	E7	540m	E6	360m	E10
7900	540m	E6	540m	E6	360m	E10
8000	540m	E6	540m	E6	360m	E10
8100	540m	E7	540m	E6	360m	E10
8200	540m	E6	540m	E6	360m	E10
8300	540m	E6	540m	E6	360m	E10
8400	540m	E6	540m	E6	360m	E10
8500	540m	E7	540m	E6	360m	E10
8600	540m	E6	540m	E6	360m	E10
8700	540m	E6	540m	E6	360m	E10
8800	540m	E6	540m	E6	360m	E10
8900	540m	E7	540m	E6	360m	E10
9000	540m	E6	540m	E6	360m	E10
9100	540m	E6	540m	E6	360m	E10
9200	540m	E6	540m	E6	360m	E10
9300	540m	E6	540m	E6	360m	E10
9400	540m	E6	540m	E6	360m	E10
9500	540m	E6	540m	E6	360m	E10
9600	540m	E6	540m	E6	360m	E10
9700	540m	E6	540m	E6	360m	E10
9800	540m	E6	540m	E6	360m	E10
9900	540m	E6	540m	E6	360m	E10
10000	540m	E6	540m	E6	360m	E10
10100	540m	E6	540m	E6	360m	E10
10200	540m	E6	540m	E6	360m	E10
10300	540m	E6	540m	E6	360m	E10
10400	540m	E6	540m	E6	360m	E10
10500	540m	E6	540m	E6	360m	E10
10600	540m	E6	540m	E6	360m	E10
10700	540m	E6	540m	E6	360m	E10
10800	540m	E6	540m	E6	360m	E10
10900	540m	E6	540m	E6	360m	E10
11000	540m	E6	540m	E6	360m	E10
11100	540m	E6	540m	E6	360m	E10
11200	540m	E6	540m	E6	360m	E10
11300	540m	E6	540m	E6	360m	E10

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
11400	540m	E6	540m	E6	360m	E10
11500	540m	E6	540m	E6	360m	E10
11600	540m	E6	540m	E6	360m	E10
11700	540m	E6	540m	E6	360m	E10
11800	540m	E6	540m	E6	360m	E10
11900	540m	E6	540m	E6	360m	E10
Structure S10 – Gateway Motorway						
12055	540m	E6	540m	E6	360m	E10
12100	540m	E6	540m	E6	360m	E10
12200	540m	E6	540m	E6	360m	E10
Structure S12 – Murarrie Road						
12300	540m	E6	540m	E6	360m	E10
12400	540m	E6	540m	E6	360m	E10
12500	540m	E6	540m	E6	360m	E10
12600	540m	E6	540m	E6	360m	E10
12700	540m	E6	540m	E6	360m	E10
12800	540m	E6	540m	E6	360m	E10
12900	540m	E6	540m	E6	360m	E10
13000	540m	E6	540m	E6	360m	E10
Structure S13 – Wynnum Road						
13100	540m	E6	540m	E6	360m	E10
13200	540m	E6	540m	E6	360m	E10
13300	540m	E6	270m	E9	360m	E10
13400	270m	E9	270m	E9	360m	E10
13500	270m	E9	270m	E9	360m	E10
13600	270m	E9	270m	E9	360m	E10
13700	270m	E9	270m	E9	360m	E10
13800	270m	E9	270m	E9	360m	E10
13900	270m	E9	270m	E9	360m	E10
14000	270m	E9	270m	E9	360m	E10
14100	270m	E9	270m	E9	360m	E10
14200	270m	E9	270m	E9	360m	E10
14300	270m	E9	270m	E9	360m	E10
14400	270m	E9	270m	E9	360m	E10
14500	270m	E9	270m	E9	360m	E10
14600	270m	E9	270m	E9	360m	E10
14700	270m	E9	270m	E9	360m	E10

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
14800	270m	E9	270m	E9	360m	E10
14900	270m	E9	270m	E9	360m	E10
15000	270m	E9	270m	E9	360m	E10
15100	270m	E9	270m	E9	360m	E10
15200	270m	E9	270m	E9	360m	E10
15300	270m	E9	270m	E9	360m	E10
15400	270m	E9	270m	E9	360m	E10
15500	270m	E9	270m	E9	360m	E10
15600	270m	E9	270m	E9	360m	E10
15700	270m	E9	270m	E9	360m	E10
15800	270m	E9	270m	E9	360m	E10
15900	270m	E9	270m	E9	360m	E10
16000	270m	E9	270m	E9	360m	E10
16100	270m	E9	270m	E9	360m	E10
16200	270m	E9	270m	E9	360m	E10
16300	270m	E9	270m	E9	360m	E10
16400	270m	E9	270m	E9	360m	E10
16500	270m	E9	270m	E9	360m	E10
16600	270m	E9	270m	E9	360m	E10
16700	270m	E9	270m	E9	360m	E10
16800	270m	E9	270m	E9	360m	E10
16900	270m	E9	270m	E9	360m	E10
17000	270m	E9	270m	E9	360m	E10
17100	270m	E9	270m	E9	360m	E10
17200	270m	E9	270m	E9	360m	E10
17300	180m	E7	270m	E9	360m	E10
17400	180m	E7	180m	E1	360m	E10
17500	180m	E7	180m	E1	360m	E10
17600	180m	E7	180m	E1	360m	E10
17700	180m	E7	180m	E1	360m	E10
17800	180m	E7	180m	E1	360m	E10
17900	180m	E7	180m	E1	360m	E10
18000	180m	E7	180m	E1	180m	E4
18100	180m	E7	180m	E1	180m	E4
18200	180m	E7	180m	E1	180m	E4
18300	180m	E7	180m	E1	180m	E4
18400	180m	E7	180m	E1	180m	E4

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
18500	180m	E7	180m	E1	180m	E4
18600	180m	E7	180m	E1	180m	E4
Structure S17 - Meadowlands Road						
18723	180m	E7	180m	E1	180m	E4
18800	180m	E7	180m	E1	180m	E4
18900	180m	E7	180m	E1	180m	E4
19000	180m	E7	180m	E1	180m	E4
19100	180m	E7	180m	E1	180m	E4
19200	180m	E7	180m	E1	180m	E4
19300	180m	E7	180m	E1	180m	E4
19400	180m	E7	180m	E1	180m	E4
19500	180m	E7	180m	E1	180m	E4
19600	180m	E1	180m	E1	180m	E4
19700	180m	E1	180m	E1	180m	E4
Structure S18 – Scrub Road Pedestrian Bridge						
19800	180m	E1	180m	E1	180m	E4
19900	180m	E1	180m	E1	180m	E4
20000	180m	E1	180m	E1	180m	E4
20100	180m	E1	180m	E1	180m	E4
20200	180m	E1	180m	E1	180m	E4
20300	180m	E1	180m	E1	180m	E4
20400	180m	E1	180m	E1	180m	E4
20500	180m	E1	180m	E1	180m	E4
20600	180m	E1	180m	E1	180m	E4
20700	180m	E1	180m	E1	180m	E4
20800	180m	E1	180m	E1	180m	E4
20900	180m	E1	180m	E1	180m	E4
21000	180m	E1	180m	E1	180m	E4
Structure S27 – Old Cleveland Road						
21100	180m	E1	180m	E1	180m	E4
21200	180m	E1	180m	E1	180m	E4
21300	180m	E1	180m	E1	180m	E4
21400	180m	E1	180m	E1	180m	E4
21500	180m	E1	180m	E1	180m	E4
21600	180m	E1	180m	E1	180m	E4
Structure S29 – Winstanley Street						
21700	180m	E1	180m	E1	180m	E4

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
21800	180m	E1	180m	E1	180m	E4
21900	180m	E1	180m	E1	180m	E4
22000	180m	E1	180m	E1	180m	E4
22100	180m	E1	180m	E1	180m	E4
22200	180m	E1	180m	E1	180m	E4
22300	180m	E1	180m	E1	180m	E4
22400	180m	E1	180m	E1	180m	E4
22500	180m	E1	180m	E1	180m	E4
Structure S36 – Meadowbank Street Pedestrian Bridge						
22600	180m	E1	180m	E1	180m	E4
22700	180m	E1	180m	E1	180m	E4
22800	180m	E1	180m	E1	180m	E4
22900	120m	E7	180m	E1	180m	E4
23000	120m	E7	180m	E1	180m	E4
23100	120m	E7	180m	E1	180m	E4
23200	120m	E7	180m	E1	180m	E4
23300	120m	E7	120m	E7	180m	E4
23400	120m	E7	120m	E7	180m	E4
Structure S37 – Pine Mountain Road						
23500	120m	E7	120m	E7	180m	E4
23600	120m	E7	120m	E7	180m	E4
23700	120m	E7	120m	E7	180m	E4
23800	120m	E7	120m	E7	180m	E4
23900	120m	E7	120m	E7	180m	E4
24000	120m	E7	120m	E7	180m	E4
24100	120m	E7	120m	E7	180m	E4
24200	120m	E7	120m	E7	180m	E4
24300	120m	E7	120m	E7	180m	E4
24400	120m	E7	120m	E7	180m	E4
24500	120m	E7	120m	E7	180m	E4
24600	120m	E7	120m	E7	180m	E4
24700	120m	E7	120m	E7	180m	E4
24800	120m	E7	120m	E7	180m	E4
24900	120m	E7	120m	E7	180m	E4
25000	120m	E7	120m	E7	180m	E4
25100	120m	E7	120m	E7	180m	E4
25200	120m	E7	120m	E7	180m	E4

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
25300	120m	E7	120m	E7	180m	E4
25400	120m	E7	120m	E7	180m	E4
25500	120m	E7	120m	E7	180m	E4
25600	120m	E7	120m	E7	180m	E4
25700	120m	E7	120m	E7	180m	E4
25800	120m	E7	120m	E7	180m	E4
25900	120m	E7	120m	E7	180m	E4
Structure S55 – Oakley Street Pedestrian Bridge						
26000	120m	E7	120m	E7	180m	E4
26100	120m	E7	120m	E7	180m	E4
26200	120m	E7	120m	E7	180m	E4
26300	120m	E7	120m	E7	180m	E4
26400	120m	E7	120m	E7	180m	E4
26500	120m	E7	120m	E7	180m	E4
26600	120m	E7	120m	E7	180m	E4
26700	120m	E7	120m	E7	180m	E4
26800	120m	E7	120m	E7	180m	E4
Structure S56 – Wecker Road						
26900	120m	E8	120m	E7	180m	E4
27000	120m	E8	120m	E7	180m	E4
27100	120m	E8	120m	E7	180m	E4
27200	120m	E8	120m	E7	180m	E4
27300	120m	E8	120m	E7	180m	E4
27400	120m	E8	120m	E7	180m	E4
27500	120m	E8	120m	E7	180m	E4
27600	120m	E8	120m	E7	120m	E6
27700	120m	E8	120m	E7	120m	E6
27800	120m	E8	120m	E7	120m	E6
27900	120m	E8	120m	E7	120m	E8
28000	120m	E8	120m	E7	120m	E8
28100	120m	E8	120m	E8	120m	E8
28200	120m	E8	120m	E8	120m	E8
S57 - Mount Gravatt Capalaba Road						
28300	120m	E8	120m	E8	120m	E8
28400	120m	E8	120m	E8	120m	E8
28500	120m	E8	120m	E8	120m	E8
28600	120m	E8	120m	E8	120m	E8

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
28700	120m	E8	120m	E8	120m	E8
28800	120m	E8	120m	E8	120m	E8
28900	120m	E8	120m	E8	120m	E8
29000	120m	E8	120m	E8	120m	E8
29100	120m	E8	120m	E8	120m	E8
29200	120m	E8	120m	E8	120m	E8
29300	120m	E8	120m	E8	120m	E8
29400	120m	E8	120m	E8	120m	E8
29500	120m	E8	120m	E8	120m	E8
29600	120m	E8	120m	E8	120m	E8
29700	120m	E8	120m	E8	120m	E8
29800	120m	E8	120m	E8	120m	E8
29900	120m	E8	120m	E8	120m	E8
30000	120m	E8	120m	E8	120m	E8
30100	120m	E8	120m	E8	120m	E8
30200	120m	E8	120m	E8	120m	E8
30300	120m	E8	120m	E8	120m	E8
30400	120m	E8	120m	E8	120m	E8
30500	120m	E8	120m	E8	120m	E8
30600	120m	E8	120m	E8	120m	E9
30700	120m	E8	120m	E8	120m	E9
30800	120m	E8	120m	E8	120m	E9
30900	120m	E8	120m	E8	120m	E9
S58 - Sherwood Place Pedestrian Bridge						
31000	120m	E7	120m	E7	120m	E9
31100	120m	E7	120m	E7	120m	E9
31200	120m	E7	120m	E7	120m	E9
31300	120m	E7	120m	E7	120m	E9
31400	120m	E7	120m	E7	120m	E9
31500	120m	E7	120m	E7	120m	E9
31600	120m	E7	120m	E7	120m	E10
31700	120m	E7	120m	E7	120m	E10
31800	120m	E7	120m	E7	120m	E10
31900	120m	E7	120m	E7	120m	E10
S59 - Craig Street Pedestrian Bridge						
32000	120m	E7	120m	E7	120m	E10
32100	120m	E7	120m	E7	120m	E10

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
32200	120m	E7	120m	E7	120m	E10
32300	120m	E7	120m	E7	120m	E10
32400	120m	E7	120m	E7	120m	E10
32500	120m	E7	120m	E7	120m	E10
32600	120m	E7	120m	E4	120m	E10
32700	120m	E7	120m	E4	120m	E10
32800	120m	E7	120m	E4	120m	E10
32900	120m	E7	120m	E4	120m	E10
33000	120m	E7	120m	E4	120m	E10
S60 - D/S of Logan Road Pedestrian Bridge						
33100	120m	E7	120m	E4	120m	E10
S61 - Logan Road						
33200	120m	E7	120m	E4	120m	E10
S63 - Pacific Motorway						
33362	120m	E7	120m	E4	120m	E10
33400	120m	E7	120m	E4	120m	E10
33500	120m	E7	120m	E4	120m	E10
33600	120m	E7	120m	E4	120m	E10
33700	120m	E7	120m	E4	120m	E10
33800	120m	E7	120m	E4	120m	E10
33900	120m	E7	120m	E4	120m	E10
34000	120m	E7	120m	E4	120m	E10
34100	120m	E7	120m	E4	120m	E10
34200	120m	E7	120m	E4	120m	E10
34300	120m	E7	120m	E4	120m	E10
34400	120m	E7	120m	E4	120m	E10
34500	120m	E7	120m	E4	120m	E10
S66 - Padstow Road						
34600	120m	E7	120m	E7	120m	E10
34700	120m	E7	120m	E7	120m	E10
34800	120m	E7	120m	E7	120m	E10
34900	120m	E7	120m	E7	120m	E10
35000	060m	E8	120m	E7	120m	E8
S68 - Malbon Street Pedestrian Bridge						
35100	060m	E8	060m	E4	120m	E8
35200	060m	E8	060m	E4	060m	E9
35300	060m	E8	060m	E4	060m	E9

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [(2)]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
35400	060m	E4	060m	E4	060m	E9
35500	060m	E4	060m	E4	060m	E9
35600	060m	E4	060m	E4	060m	E9
35700	060m	E4	060m	E4	060m	E9
35800	060m	E4	060m	E4	060m	E9
35900	060m	E4	060m	E4	060m	E9
36000	060m	E4	060m	E4	060m	E9
36100	060m	E4	060m	E4	060m	E9
36200	060m	E4	060m	E4	060m	E9
36300	060m	E4	060m	E9	060m	E9
36400	060m	E4	060m	E9	060m	E9
36500	060m	E4	060m	E9	060m	E9
S69 - Altandi Street Pedestrian Bridge						
36600	060m	E4	060m	E9	060m	E9
36700	060m	E4	060m	E9	060m	E9
36800	060m	E4	060m	E9	060m	E9
S70 - D/S Gold Coast Railway Pedestrian Bridge						
36900	060m	E9	060m	E5	060m	E9
36985	060m	E9	060m	E5	060m	E9
S71 and S72 - Gold Coast Railway						
37100	060m	E9	060m	E5	060m	E9
S73 - Beenleigh Road						
37200	060m	E9	060m	E5	060m	E9
37300	060m	E9	060m	E5	060m	E9
S74 - Gowan Road Pedestrian Culvert						
37400	060m	E5	060m	E5	060m	E9
37500	060m	E5	060m	E5	060m	E9
37600	060m	E7	060m	E7	060m	E3
37700	060m	E5	060m	E5	060m	E3
37800	060m	E5	060m	E5	060m	E3
37900	060m	E5	060m	E5	060m	E3
38000	060m	E5	060m	E7	060m	E3
38100	060m	E5	060m	E7	060m	E3
S75 - Energy Dissipator						
38200	060m	E5	060m	E7	060m	E3
38300	060m	E5	060m	E7	060m	E3
38400	060m	E5	060m	E7	060m	E3

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
S77 - Glenefer Street Pedestrian Bridge						
38500	060m	E5	060m	E7	060m	E3
38574	060m	E7	060m	E7	030m	E6
S78 - Brandon Road						
38700	030m	E9	030m	E8	030m	E3
38800	030m	E8	030m	E8	030m	E3
38900	030m	E8	030m	E8	030m	E3
S79 - Nemies Road						
39000	030m	E8	030m	E8	030m	E3
39100	030m	E8	030m	E8	030m	E3
39200	030m	E8	030m	E8	030m	E3
39300	030m	E8	030m	E8	030m	E3
S80 - Calliope Street Bikeway						
39400	030m	E8	030m	E8	030m	E3
39500	030m	E8	030m	E8	030m	E3
39600	030m	E8	030m	E8	030m	E3
39700	060m	E4	060m	E7	030m	E3
39800	060m	E4	060m	E7	030m	E3
39888	060m	E4	060m	E1	030m	E3
Daw Road Drain						
0	060m	E8	180m	E1	120m	E8
100	030m	E9	030m	E9	030m	E6
200	030m	E9	030m	E9	030m	E6
300	030m	E9	030m	E9	030m	E6
400	030m	E9	030m	E9	030m	E6
500	030m	E9	030m	E9	030m	E6
600	030m	E9	030m	E9	030m	E6
700	030m	E9	030m	E9	030m	E6
800	030m	E9	030m	E9	030m	E6
900	030m	E9	030m	E9	030m	E6
1000	030m	E8	030m	E8	030m	E3
1095	030m	E8	030m	E8	030m	E3
Padstow Road Drain						
0	120m	E4	120m	E4	120m	E5
S169 - McCullough Street Pedestrian Bridge						
100	030m	E8	030m	E9	030m	E3
200	030m	E8	030m	E9	030m	E3

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
S170 - McCullough Street						
300	030m	E8	030m	E9	030m	E3
400	030m	E8	030m	E9	030m	E8
441	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]
Mimosa Creek						
0	120m	E7	120m	E4	120m	E10
100	120m	E4	120m	E4	120m	E10
S82 - Turnmill Street Pedestrian Culvert						
200	120m	E4	060m	E5	120m	E5
300	060m	E4	060m	E5	120m	E5
400	060m	E4	060m	E5	120m	E10
500	060m	E4	060m	E5	120m	E10
S83 - Springfield Street Pedestrian Culvert						
600	060m	E5	060m	E7	120m	E10
700	060m	E4	060m	E5	120m	E10
800	060m	E4	060m	E5	120m	E10
900	060m	E4	060m	E5	120m	E10
1000	060m	E1	060m	E5	120m	E10
1100	060m	E7	060m	E5	120m	E10
1200	060m	E4	060m	E4	120m	E10
S84 - Parkway Street						
1300	060m	E4	060m	E4	120m	E10
1400	060m	E4	060m	E4	120m	E10
1500	060m	E4	060m	E4	120m	E10
S85 - Kessels Road						
1610	060m	E4	060m	E4	120m	E10
1700	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]
1800	060m	E4	060m	E9	120m	E10
S86(a)(b)(c) - Pacific Motorway						
1944	060m	E9	060m	E5	120m	E5
2000	060m	E5	060m	E5	120m	E5
S87 - Nagle Street						
2100	060m	E5	060m	E5	120m	E5
2200	060m	E9	060m	E5	120m	E5
2300	060m	E9	060m	E5	120m	E5
2400	060m	E9	060m	E5	120m	E5
2500	060m	E9	060m	E9	120m	E5

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
2600	060m	E7	060m	E9	120m	E5
2700	060m	E5	060m	E4	120m	E10
2800	060m	E1	060m	E5	120m	E10
2900	060m	E5	060m	E5	120m	E10
3000	060m	E5	060m	E4	120m	E7
S88 - Hibiscus Place Pedestrian Culvert						
3100	060m	E4	060m	E4	120m	E7
3200	060m	E4	060m	E4	120m	E7
3300	060m	E4	060m	E4	120m	E7
3400	060m	E4	060m	E4	120m	E7
3500	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)
3600	060m	E4	060m	E4	120m	E7
3674	060m	E4	060m	E4	120m	E7
Nardie Street Drain						
0	120m	E7	120m	E7	120m	E9
100	120m	E7	120m	E7	120m	E9
200	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)
300	030m	E8	030m	E9	030m	E8
400	030m	E8	030m	E9	030m	E8
496	030m	E8	030m	E9	030m	E8
Bulimba Creek East						
0	120m	E8	120m	E8	120m	E9
100	060m	E4	060m	E4	120m	E9
200	060m	E4	060m	E9	120m	E9
300	060m	E4	060m	E9	060m	E9
400	060m	E4	060m	E9	060m	E9
500	060m	E4	060m	E9	060m	E9
600	N/R (1)	N/R (1)	060m	E9	060m	E9
700	060m	E4	060m	E9	060m	E9
800	060m	E4	060m	E9	060m	E9
900	060m	E9	060m	E9	060m	E5
1000	060m	E5	060m	E5	060m	E5
1100	060m	E5	060m	E5	060m	E5
1200	060m	E5	060m	E5	060m	E5
S89 - Gateway Motorway - On / Off Ramp						
1300	060m	E5	060m	E5	060m	E6
1400	060m	E4	060m	E5	060m	E6

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
1500	060m	E5	060m	E5	060m	E9
1576	060m	E5	060m	E5	060m	E9
S90 - Miles Platting Road						
S91 - South East Busway Loop						
1700	060m	E5	060m	E5	060m	E9
1800	060m	E5	060m	E5	060m	E9
1881	060m	E5	060m	E5	060m	E9
S92 - South East Busway						
S93 - Pacific Motorway						
2000	060m	E5	060m	E5	060m	E5
S93(a)(b)(c) - V1 Veloway						
2100	060m	E5	060m	E5	060m	E5
2200	060m	E5	060m	E5	060m	E5
2300	060m	E4	060m	E9	060m	E5
2400	060m	E4	060m	E4	060m	E9
2500	060m	E4	060m	E4	060m	E9
S94 - Logan Road						
2597	060m	E5	060m	E5	060m	E5
S194 - Glen Hotel Weir						
2700	060m	E5	060m	E5	060m	E5
2800	060m	E5	060m	E5	060m	E5
2880	060m	E5	060m	E5	060m	E5
S96 - Gateway Motorway						
3000	060m	E5	060m	E5	060m	E5
3100	060m	E5	060m	E5	060m	E5
3200	060m	E5	060m	E5	060m	E5
3300	N/R (1)	N/R (1)	060m	E5	060m	E5
3400	060m	E5	060m	E5	060m	E5
3498	060m	E5	060m	E5	060m	E5
S97 - Underwood Road						
3600	060m	E5	060m	E5	060m	E5
3700	060m	E9	060m	E4	060m	E5
3800	060m	E7	060m	E5	060m	E3
3900	060m	E8	060m	E8	060m	E8
4000	060m	E8	060m	E8	060m	E8
4100	060m	E8	060m	E8	060m	E8
4200	060m	E8	060m	E8	060m	E8

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
4300	060m	E8	060m	E8	060m	E8
4400	060m	E8	060m	E8	060m	E6
4500	N/R [1]	N/R [1]	060m	E5	060m	E3
4600	060m	E5	060m	E5	060m	E3
4700	060m	E5	060m	E5	060m	E3
4800	060m	E5	060m	E7	060m	E3
4900	060m	E5	060m	E5	060m	E3
5000	060m	E5	060m	E7	060m	E3
5100	060m	E5	060m	E7	060m	E9
5200	060m	E5	060m	E7	060m	E9
5300	060m	E5	060m	E7	060m	E9
S99 - Gateway Motorway						
5400	060m	E5	060m	E7	060m	E9
S100 - Gold Coast Railway						
S101 - Beenleigh Road						
5500	060m	E7	060m	E7	060m	E3
5600	060m	E7	060m	E7	030m	E6
5700	030m	E9	030m	E9	030m	E3
5800	030m	E9	030m	E9	030m	E3
5900	030m	E9	030m	E9	030m	E8
6000	030m	E8	030m	E9	030m	E8
6100	030m	E9	030m	E9	030m	E8
6200	030m	E8	030m	E9	030m	E8
6296	030m	E9	030m	E9	030m	E8
Bulimba Creek East Railway Bypass						
0	060m	E5	060m	E7	060m	E5
100	N/R [1]	N/R [1]	060m	E5	060m	E3
200	N/R [1]	N/R [1]	060m	E5	060m	E3
300	N/R [1]	N/R [1]	060m	E7	060m	E3
400	N/R [1]	N/R [1]	060m	E7	060m	E3
460	N/R [1]	N/R [1]	060m	E7	060m	E3
Tributary C						
0	060m	E5	060m	E5	060m	E5
56	060m	E7	060m	E7	060m	E5
S174 - Gateway Motorway						
200	030m	E9	030m	E9	030m	E6
300	030m	E9	030m	E9	030m	E6

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
400	030m	E9	030m	E9	030m	E6
500	030m	E9	030m	E9	030m	E6
600	030m	E9	030m	E9	030m	E6
700	030m	E9	030m	E9	030m	E3
800	030m	E9	030m	E9	030m	E6
900	030m	E9	030m	E9	030m	E6
1000	030m	E9	030m	E9	030m	E8
1100	030m	E9	030m	E9	030m	E2
1200	030m	E9	030m	E9	030m	E2
1246	030m	E9	030m	E9	030m	E2
Tributary B						
0	060m	E4	060m	E4	060m	E9
100	060m	E4	060m	E4	060m	E9
S95 - Logan Road						
200	030m	E8	030m	E8	030m	E3
300	030m	E8	030m	E8	030m	E8
400	030m	E8	030m	E8	030m	E8
S104 - Dance Crescent						
500	030m	E8	030m	E8	030m	E8
584	030m	E5	030m	E8	030m	E8
Tributary A						
0	060m	E5	060m	E5	060m	E5
100	060m	E5	060m	E5	060m	E5
S105 - Gateway Motorway						
241	060m	E5	060m	E5	060m	E5
300	030m	E9	060m	E5	060m	E5
400	030m	E9	030m	E9	030m	E6
500	030m	E9	030m	E9	030m	E6
S106 - Pacific Motorway Off Ramp						
600	030m	E9	030m	E9	030m	E6
700	030m	E9	030m	E9	030m	E6
800	030m	E9	030m	E9	030m	E6
900	030m	E9	030m	E9	030m	E6
S107 - Pacific Motorway						
1038	030m	E9	030m	E9	030m	E6
1100	030m	E9	030m	E9	030m	E6
1200	030m	E9	030m	E9	030m	E6

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
1300	030m	E9	030m	E9	030m	E6
1400	030m	E9	030m	E9	030m	E6
1500	030m	E9	030m	E9	030m	E3
1600	030m	E9	030m	E9	030m	E3
1700	030m	E9	030m	E9	030m	E3
1800	030m	E9	030m	E9	030m	E3
1900	030m	E9	030m	E9	030m	E3
2000	030m	E9	030m	E9	030m	E3
2100	030m	E9	030m	E9	030m	E3
2200	030m	E9	030m	E9	030m	E3
2300	030m	E8	030m	E9	030m	E3
2400	030m	E9	030m	E9	030m	E8
2500	030m	E9	030m	E9	030m	E8
2600	030m	E8	030m	E9	030m	E8
2700	030m	E8	030m	E9	030m	E8
2800	030m	E9	030m	E9	030m	E8
2900	030m	E9	030m	E8	030m	E8
2915	030m	E9	030m	E8	030m	E8
Tributary A1						
0	030m	E9	030m	E9	030m	E3
100	030m	E5	030m	E5	030m	E5
200	030m	E5	030m	E9	030m	E7
300	030m	E9	030m	E8	030m	E3
400	030m	E9	030m	E9	030m	E2
500	030m	E8	030m	E8	030m	E3
600	030m	E8	030m	E8	030m	E8
689	030m	E8	030m	E9	030m	E8
Tributary A Overflow						
0	030m	E9	030m	E9	030m	E6
71	030m	E9	030m	E9	030m	E6
S186 and S189 - Pacific Motorway						
S187 and S190 - Pacific Motorway On Ramp						
S188 and S191 - Busway						
200	030m	E9	030m	E9	030m	E6
300	030m	E9	030m	E9	030m	E6
400	030m	E9	030m	E9	030m	E6
500	030m	E9	030m	E9	030m	E6

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
S192 - School Road						
600	030m	E9	030m	E9	030m	E6
S193 - Diversion Weir						
700	030m	E9	030m	E9	030m	E6
703	030m	E9	030m	E9	030m	E6
Tributary A2						
0	030m	E9	030m	E9	030m	E6
100	030m	E9	030m	E9	030m	E3
200	030m	E9	030m	E8	030m	E3
300	030m	E8	030m	E8	030m	E3
S108 - Freeway Office Park Weir						
410	030m	E8	030m	E8	030m	E3
S109 - Freeway Office Park Internal Road						
505	030m	E8	030m	E8	030m	E8
S110 and S111 - Logan Road						
628	030m	E8	030m	E8	030m	E8
700	030m	E8	030m	E8	030m	E8
760	030m	E5	030m	E8	030m	E8
Miles Platting Road Drain						
0	060m	E4	060m	E9	060m	E9
100	030m	E8	030m	E8	030m	E8
S172 - Gateway Motorway						
200	030m	E8	030m	E8	030m	E8
300	030m	E8	030m	E8	030m	E8
400	030m	E8	030m	E8	030m	E8
500	030m	E8	030m	E8	030m	E8
600	030m	E8	030m	E8	030m	E8
700	030m	E8	030m	E9	030m	E8
800	030m	E8	030m	E8	030m	E8
900	030m	E8	030m	E8	030m	E8
1000	030m	E8	030m	E8	030m	E8
S173 - Miles Platting Road						
1100	030m	E8	030m	E8	030m	E8
1200	030m	E9	030m	E9	030m	E8
1300	030m	E8	030m	E9	030m	E8
1328	030m	E5	030m	E8	030m	E8
Kate Circuit Drain						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
0	030m	E8	030m	E8	030m	E8
100	030m	E6	030m	E5	030m	E8
200	030m	E10	030m	E9	030m	E8
300	030m	E9	030m	E9	030m	E10
400	030m	E7	030m	E8	030m	E3
437	N/R [1]	N/R [1]	N/R [1]	N/R [1]	030m	E3
Parklands Circuit Drain						
0	120m	E8	120m	E8	120m	E8
100	120m	E8	120m	E8	120m	E8
200	030m	E9	120m	E8	120m	E8
S165 - Gateway Motorway						
300	030m	E9	030m	E5	030m	E6
400	030m	E9	030m	E8	030m	E6
500	030m	E9	030m	E9	030m	E6
600	030m	E9	030m	E9	030m	E6
700	030m	E9	030m	E9	030m	E6
S166 - Prebble Street						
800	030m	E9	030m	E9	030m	E6
900	030m	E9	030m	E9	030m	E6
S167 - Kyeema Street						
1000	030m	E9	030m	E9	030m	E4
1100	030m	E9	030m	E9	030m	E3
S168 - Echidna Street						
1206	030m	E8	030m	E9	030m	E3
1300	030m	E9	030m	E9	030m	E8
1400	030m	E9	030m	E9	030m	E8
1500	030m	E9	030m	E9	030m	E8
1600	030m	E9	030m	E9	030m	E8
1675	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]
Broadwater Road Drain						
0	120m	E8	120m	E7	120m	E6
100	120m	E8	120m	E7	180m	E4
200	120m	E8	120m	E7	180m	E4
300	030m	E9	120m	E7	180m	E4
400	030m	E9	030m	E9	030m	E6
500	030m	E9	030m	E9	030m	E6
600	030m	E9	030m	E9	030m	E6

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
700	N/R [1]	N/R [1]	030m	E9	030m	E6
800	N/R [1]	N/R [1]	030m	E9	030m	E6
900	030m	E9	030m	E9	030m	E6
1000	030m	E9	030m	E9	030m	E6
1100	030m	E9	030m	E9	030m	E3
S152 - Broadwater Road						
1200	030m	E8	030m	E9	030m	E3
1300	030m	E8	030m	E9	030m	E3
S153 - Brisbane Adventist College Drop Structure						
1400	030m	E8	030m	E8	030m	E3
1500	030m	E8	030m	E8	030m	E3
1600	030m	E8	030m	E8	030m	E8
1700	030m	E8	030m	E8	030m	E3
S155 - Brisbane Adventist College Pedestrian Bridge						
S156 - Brisbane Adventist College Drop Structure						
1800	030m	E8	030m	E8	030m	E3
S157 - 16 Rowe Close Drop Structure						
1897	030m	E8	030m	E8	030m	E3
S158 - 16 Rowe Close Drop Structure						
2000	030m	E8	030m	E8	030m	E3
S159 - 226 Wishart Road - Internal Road						
2100	030m	E8	030m	E8	030m	E3
2113	030m	E8	030m	E8	030m	E3
Wishart Road Drain						
0	030m	E8	030m	E8	030m	E3
100	030m	E8	030m	E9	030m	E3
200	030m	E8	030m	E9	030m	E3
S160 - Wishart Road						
300	030m	E8	030m	E8	030m	E3
400	030m	E8	030m	E8	030m	E8
497	030m	E8	030m	E9	030m	E8
S161 - Access Bridge to 10 St.George Circuit						
S162 - Access Bridge to 10 St.George Circuit						
600	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]
700	030m	E9	030m	E9	030m	E8
S164 - 35 Avenell Street Access Road						
723	030m	E9	030m	E9	030m	E8

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
Wecker Road Drain						
0	120m	E7	120m	E7	180m	E4
100	060m	E5	120m	E7	180m	E4
200	060m	E5	060m	E5	060m	E3
300	060m	E5	060m	E5	060m	E3
383	060m	E5	060m	E5	060m	E3
S141 - Christian College Access Road						
S142 - Christian College Access Road						
500	060m	E5	060m	E5	060m	E3
S143 and S144 - Scrub Road						
608	060m	E5	060m	E5	060m	E3
700	060m	E5	060m	E5	060m	E3
S145 - Wecker Road						
800	030m	E9	030m	E9	030m	E6
900	030m	E9	030m	E9	030m	E6
1000	030m	E9	030m	E9	030m	E6
1093	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]
S146 - Gateway Motorway						
1200	030m	E9	030m	E9	030m	E6
1300	030m	E9	030m	E9	030m	E6
1400	030m	E8	030m	E8	030m	E6
1500	030m	E9	030m	E9	030m	E6
S147 - Weedon Street East						
1600	030m	E9	030m	E8	030m	E6
S148 and S149 - Mount Petrie Road						
1700	030m	E8	030m	E8	030m	E3
1800	030m	E8	030m	E8	030m	E3
1900	030m	E8	030m	E9	030m	E8
2000	030m	E8	030m	E9	030m	E8
2016	030m	E8	030m	E9	030m	E8
Newnham Creek						
0	120m	E7	120m	E7	180m	E4
100	120m	E7	120m	E7	180m	E4
200	120m	E7	120m	E7	180m	E4
300	180m	E1	120m	E7	180m	E4
400	030m	E9	180m	E9	180m	E4
500	030m	E9	060m	E5	060m	E3

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
600	030m	E9	060m	E5	030m	E6
700	030m	E9	060m	E7	030m	E6
S39 - Access Road to 100 Wecker Road						
800	030m	E9	060m	E7	030m	E6
867	030m	E8	060m	E7	030m	E6
S40 - Stormwater Quality Improvement Device						
S41 - Secam Street						
S42 - Access Road to 33 Secam Street						
1001	030m	E8	030m	E8	030m	E3
S43 - Devlan Street						
1100	030m	E8	030m	E8	030m	E3
S44 - Bunnings Access #3						
S45 - Bunnings Access #2						
1200	030m	E8	030m	E8	030m	E3
S46 - Bunnings Access #1						
1300	030m	E8	030m	E8	030m	E3
S47 - Newnham Road						
1400	030m	E8	030m	E8	030m	E3
1500	030m	E8	030m	E8	030m	E3
1597	030m	E8	030m	E8	030m	E3
S48 - Access Road to 285 Creek Road						
S49 - Drop Structure #3						
1700	030m	E8	030m	E8	030m	E3
S50 - Drop Structure #2						
S51 - Drop Structure #1						
1800	030m	E8	030m	E8	030m	E3
S52 - Internal Road for 215 Creek Road						
S53 - 215 Creek Road Pedestrian Bridge						
1900	060m	E4	060m	E7	030m	E3
2000	060m	E4	060m	E7	030m	E3
2012	060m	E4	060m	E7	030m	E3
Spring Creek						
0	120m	E7	180m	E1	180m	E4
100	180m	E1	180m	E1	180m	E4
200	060m	E7	180m	E7	180m	E4
300	060m	E4	060m	E7	120m	E10
400	060m	E4	060m	E7	120m	E8

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
500	060m	E4	060m	E7	120m	E8
600	060m	E4	060m	E4	120m	E8
700	060m	E4	060m	E4	120m	E10
800	060m	E5	060m	E4	120m	E10
S132 - Scrub Road						
900	060m	E4	060m	E4	120m	E8
1000	060m	E7	060m	E4	120m	E8
1100	060m	E7	060m	E4	120m	E8
1200	060m	E4	060m	E4	120m	E8
1300	060m	E4	060m	E4	120m	E5
1400	060m	E4	060m	E4	120m	E2
1500	060m	E4	060m	E4	120m	E2
1600	060m	E4	060m	E4	120m	E5
1700	060m	E4	060m	E4	120m	E5
S133 - Woodland Street Pedestrian Bridge						
1800	060m	E4	060m	E4	120m	E5
1900	060m	E4	060m	E4	120m	E5
2000	060m	E4	060m	E4	120m	E5
2006	060m	E4	060m	E4	120m	E5
Warwick Creek						
0	060m	E4	060m	E4	120m	E8
S134 - Greendale Way						
100	060m	E4	060m	E4	120m	E8
200	060m	E4	060m	E4	120m	E8
300	060m	E5	060m	E4	120m	E5
400	060m	E4	060m	E4	120m	E2
S135 - Amersham Crescent						
500	060m	E4	060m	E4	120m	E2
600	060m	E5	060m	E4	120m	E2
700	060m	E4	060m	E4	120m	E2
800	060m	E4	060m	E4	120m	E2
900	060m	E5	060m	E5	120m	E7
1000	060m	E4	180m	E6	120m	E7
S136 - Cribb Road						
1100	120m	E6	180m	E6	120m	E7
1200	180m	E6	180m	E6	120m	E7
1300	180m	E6	180m	E6	120m	E7

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
1400	180m	E6	180m	E6	120m	E7
1500	180m	E6	180m	E6	120m	E7
1600	270m	E10	270m	E10	180m	E6
S138 - Oakley Street						
1700	270m	E10	270m	E1	180m	E8
1800	270m	E10	270m	E5	180m	E8
1817	270m	E10	270m	E10	180m	E8
Silky Oak Circuit Drain						
0	180m	E6	180m	E6	120m	E7
S139 - Oakley Street						
100	060m	E4	060m	E4	060m	E8
200	060m	E4	060m	E4	060m	E8
246	060m	E4	060m	E4	060m	E8
Salvin Creek						
0	180m	E1	180m	E1	180m	E4
100	180m	E1	180m	E1	180m	E4
200	180m	E1	180m	E1	180m	E4
300	180m	E1	180m	E1	180m	E4
400	060m	E5	180m	E1	180m	E4
500	060m	E5	180m	E9	180m	E4
S31 - Donnington Street (Lower)						
600	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]
700	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]
800	060m	E5	060m	E5	060m	E9
900	060m	E5	060m	E5	060m	E9
1000	060m	E5	060m	E5	060m	E9
1100	060m	E5	060m	E5	060m	E3
S32 - Donnington Street (Upper)						
1200	060m	E5	060m	E5	060m	E3
1300	060m	E7	060m	E5	060m	E3
1400	060m	E7	060m	E7	030m	E6
S33 - Creek Road						
1515	060m	E7	060m	E7	030m	E6
1600	060m	E7	060m	E7	030m	E6
1700	030m	E9	060m	E7	030m	E3
1800	030m	E9	030m	E9	030m	E3
S34 - Pine Mountain Road						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
1900	030m	E9	030m	E9	030m	E3
2000	030m	E9	030m	E9	030m	E3
2100	030m	E9	030m	E9	030m	E3
2200	N/R [1]	N/R [1]	030m	E9	030m	E3
2300	030m	E5	030m	E5	030m	E9
S35 - Bevan Street						
2400	N/R [1]	N/R [1]	030m	E9	030m	E3
2500	030m	E8	030m	E8	030m	E8
2600	030m	E8	030m	E8	030m	E8
2700	030m	E8	030m	E8	030m	E8
2800	030m	E8	030m	E8	030m	E8
2900	030m	E8	030m	E8	030m	E8
2926	030m	E8	030m	E8	030m	E8
Glengariff Tributary						
0	030m	E9	060m	E7	030m	E3
100	060m	E4	180m	E1	120m	E5
200	N/R [1]	N/R [1]	180m	E1	120m	E5
300	060m	E4	180m	E1	120m	E5
400	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]
500	060m	E4	180m	E1	120m	E5
600	N/R [1]	N/R [1]	060m	E4	120m	E5
700	060m	E4	060m	E4	120m	E5
800	060m	E4	060m	E4	120m	E5
900	060m	E4	060m	E4	120m	E5
925	060m	E4	060m	E4	120m	E5
Phillips Creek						
0	180m	E1	180m	E1	180m	E4
100	180m	E1	180m	E1	180m	E4
200	180m	E1	180m	E1	180m	E4
300	180m	E1	180m	E1	180m	E4
400	180m	E1	180m	E1	180m	E4
500	180m	E1	180m	E1	180m	E4
600	180m	E1	180m	E1	180m	E4
S20 - Old Cleveland Access Road						
671	060m	E9	060m	E8	180m	E3
S21 - Stormwater Quality Improvement Device						
S22 - Old Cleveland Road						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [(2)]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
842	N/R [(1)]	N/R [(1)]	N/R [(1)]	N/R [(1)]	N/R [(1)]	N/R [(1)]
900	060m	E5	060m	E8	060m	E9
1000	N/R [(1)]	N/R [(1)]	N/R [(1)]	N/R [(1)]	N/R [(1)]	N/R [(1)]
1100	N/R [(1)]	N/R [(1)]	N/R [(1)]	N/R [(1)]	N/R [(1)]	N/R [(1)]
S23(b)(c) - Creek Road						
1200	060m	E5	060m	E8	060m	E9
S24 - Pedestrian Bridge U/S Creek Road						
1300	060m	E5	060m	E8	060m	E9
1400	060m	E5	060m	E4	060m	E9
1500	060m	E5	060m	E4	060m	E9
1600	060m	E7	060m	E9	060m	E3
1700	060m	E1	060m	E1	060m	E9
1800	060m	E1	060m	E1	060m	E9
1900	060m	E7	060m	E1	060m	E9
2000	060m	E7	060m	E1	060m	E9
2100	060m	E7	060m	E1	060m	E9
2200	060m	E7	060m	E4	060m	E9
2286	060m	E7	060m	E7	060m	E3
S25 - Gallipoli Road						
2400	060m	E7	060m	E7	060m	E3
S26 - Anzac Road						
2500	060m	E7	060m	E7	060m	E3
2600	060m	E7	060m	E7	060m	E3
2685	060m	E7	060m	E7	060m	E3
Cloverbrook Place Drain						
0	270m	E9	270m	E9	360m	E10
100	270m	E9	270m	E9	360m	E10
200	270m	E9	270m	E9	360m	E10
300	270m	E9	270m	E9	360m	E10
400	270m	E9	270m	E9	360m	E10
500	270m	E9	270m	E9	360m	E10
600	270m	E9	270m	E9	360m	E10
S121 - Fursden Road						
700	270m	E9	270m	E9	360m	E10
800	270m	E9	270m	E9	360m	E10
900	270m	E9	270m	E9	360m	E10
1000	270m	E9	270m	E9	360m	E10

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
1100	030m	E9	270m	E9	360m	E10
1200	030m	E9	030m	E9	360m	E10
1213	030m	E9	030m	E9	360m	E10
Bethel Street Drain						
0	270m	E9	270m	E9	360m	E10
100	270m	E9	270m	E9	360m	E10
200	270m	E9	270m	E9	360m	E10
300	030m	E9	540m	E9	360m	E10
400	030m	E9	030m	E9	360m	E10
500	030m	E9	030m	E9	030m	E3
S123 - Bethel Street						
600	030m	E8	030m	E8	030m	E3
700	030m	E8	030m	E8	030m	E3
773	030m	E8	030m	E8	030m	E3
Minnippi Overflow						
0	540m	E6	540m	E6	360m	E10
100	540m	E6	540m	E6	360m	E10
200	540m	E6	540m	E6	360m	E10
300	540m	E6	540m	E6	360m	E10
400	540m	E7	540m	E6	360m	E10
500	540m	E7	540m	E6	360m	E10
600	540m	E7	540m	E6	360m	E10
700	540m	E7	540m	E6	360m	E10
800	540m	E7	540m	E6	360m	E10
884	540m	E7	540m	E6	360m	E10
S14 - Wynnum Road						
1000	540m	E7	1080m	E2	360m	E10
1100	540m	E9	1080m	E2	360m	E10
1200	360m	E6	270m	E9	360m	E10
S15 - Gateway Motorway						
1344	360m	E6	270m	E9	360m	E10
1400	270m	E6	270m	E9	360m	E10
1500	270m	E6	270m	E9	360m	E10
1600	360m	E6	270m	E9	360m	E10
1700	360m	E6	270m	E9	360m	E10
1800	270m	E6	270m	E9	360m	E10
1884	270m	E9	270m	E9	360m	E10

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
Stanton Road Drain						
0	540m	E9	1080m	E2	360m	E10
S125 - Access Road						
100	120m	E7	1080m	E6	1080m	E6
200	120m	E7	1080m	E6	1080m	E6
300	120m	E7	1080m	E6	1080m	E6
S126 - Stanton Road						
400	120m	E7	1080m	E6	1080m	E6
500	060m	E4	1080m	E6	1080m	E6
600	060m	E7	1080m	E6	1080m	E6
700	060m	E4	1080m	E6	1080m	E6
800	060m	E4	1080m	E6	1080m	E6
900	060m	E7	1080m	E6	1080m	E6
1000	060m	E7	1080m	E6	1080m	E6
1100	060m	E7	1080m	E6	1080m	E6
1187	120m	E8	1080m	E6	1080m	E6
Moorabbin Drive Drain						
0	270m	E9	270m	E9	360m	E10
100	270m	E9	270m	E9	360m	E10
200	270m	E9	270m	E9	360m	E10
300	270m	E9	270m	E9	360m	E10
400	270m	E9	270m	E9	360m	E10
500	270m	E9	270m	E9	360m	E10
600	270m	E9	270m	E9	360m	E10
700	270m	E9	270m	E9	360m	E10
800	270m	E9	270m	E9	360m	E10
900	270m	E9	270m	E9	360m	E10
S119 - Billan Street						
1000	270m	E9	270m	E9	360m	E10
S120 - Gray Street						
1100	270m	E9	270m	E9	360m	E10
1200	270m	E9	270m	E9	360m	E10
Minnippi Creek						
0	270m	E9	270m	E9	360m	E10
100	270m	E9	270m	E9	360m	E10
200	270m	E9	270m	E9	360m	E10
300	270m	E9	270m	E9	360m	E10

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
400	270m	E9	270m	E9	360m	E10
500	270m	E9	270m	E9	360m	E10
600	270m	E9	270m	E9	360m	E10
700	540m	E6	270m	E9	360m	E10
800	060m	E1	540m	E6	360m	E10
900	060m	E4	060m	E7	360m	E10
1000	060m	E4	060m	E7	060m	E5
S114 - Creek Road (Southbound)						
1105	060m	E4	060m	E7	060m	E5
S115 - Creek Road (Northbound)						
1200	060m	E4	060m	E7	060m	E5
S117 - Pedestrian bridge						
1300	060m	E1	060m	E7	060m	E5
1400	030m	E8	030m	E8	030m	E3
S117a - Drop Structure #4						
1500	030m	E8	030m	E8	030m	E3
1600	030m	E8	030m	E9	030m	E3
S118 - Todman Street						
1700	060m	E4	060m	E1	060m	E8
S118a - Drop Structure #3						
1800	060m	E4	060m	E1	060m	E8
S118b - Drop Structure #2						
1900	060m	E4	060m	E1	030m	E3
2000	060m	E4	060m	E1	030m	E3
S118c - Drop Structure #1						
2076	060m	E4	060m	E1	030m	E3
Murarrie Park Drain						
0	540m	E6	540m	E6	360m	E10
100	540m	E6	540m	E6	360m	E10
200	540m	E6	540m	E6	360m	E10
300	540m	E6	540m	E6	360m	E10
400	540m	E6	540m	E6	360m	E10
500	540m	E6	540m	E6	360m	E10
600	540m	E6	540m	E6	360m	E10
700	540m	E6	540m	E6	360m	E10
S112 - Park Access Culvert						
800	540m	E6	540m	E9	360m	E10

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	2-yr ARI (50% AEP)		5-yr ARI (20% AEP)		10-yr ARI (10% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
S113 - Park Access Bridge						
900	540m	E6	540m	E9	360m	E10
1000	540m	E6	540m	E9	360m	E10
1100	540m	E6	540m	E9	360m	E10
1116	540m	E6	540m	E9	360m	E10

(1) N/R = no result, typically because the AMTD line does not intersect the flood surface.
(2) Inclusive of a 9.8% increase in rainfall intensity and a 0.8m increase above HAT, due to projected climate variability effects.

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
Bulimba Creek						
348	030m	E6	030m	E6	030m	E6
400	180m	E6	270m	E6	270m	E6
500	360m	E5	270m	E1	270m	E9
600	360m	E1	360m	E6	360m	E6
700	360m	E10	360m	E6	360m	E6
800	360m	E5	360m	E10	360m	E6
900	360m	E5	360m	E6	360m	E6
1000	360m	E10	360m	E10	360m	E10
1100	360m	E10	360m	E10	360m	E10
1200	360m	E10	360m	E6	360m	E10
1300	360m	E10	360m	E6	360m	E10
1400	360m	E10	360m	E10	360m	E10
1500	360m	E10	360m	E10	360m	E10
1600	360m	E10	360m	E6	360m	E10
1700	360m	E10	360m	E10	360m	E10
1800	360m	E10	360m	E6	360m	E10
1900	360m	E10	360m	E10	360m	E10
2000	360m	E10	360m	E10	360m	E10
2100	360m	E10	360m	E10	360m	E10
2200	360m	E10	360m	E10	360m	E10
2300	360m	E10	360m	E10	360m	E10
2400	360m	E10	360m	E10	360m	E10
2500	360m	E10	360m	E10	360m	E10
2600	360m	E10	360m	E10	360m	E10
2700	360m	E10	360m	E10	360m	E10
2800	360m	E10	360m	E10	360m	E10
2900	360m	E10	360m	E10	360m	E10
3000	360m	E10	360m	E10	360m	E10
3100	360m	E10	360m	E10	360m	E10
3200	360m	E10	360m	E10	360m	E10
Structure S1 – Lytton Road (Eastbound)						
3300	360m	E10	360m	E10	360m	E10
Structure S2 – Lytton Road (Westbound)						
3400	360m	E10	360m	E10	360m	E10
3500	360m	E10	360m	E10	360m	E10
3600	360m	E10	360m	E10	360m	E10

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
3700	360m	E10	360m	E10	360m	E10
3800	360m	E10	360m	E10	360m	E10
3900	360m	E10	360m	E10	360m	E10
4000	360m	E10	360m	E10	360m	E10
4100	360m	E10	360m	E10	360m	E10
4200	360m	E10	360m	E10	360m	E10
Structure S3 – Port of Brisbane Motorway						
Structure S7 – Cleveland Railway						
4300	360m	E10	360m	E10	360m	E10
4400	360m	E10	360m	E10	360m	E10
4515	360m	E10	360m	E10	360m	E10
4600	360m	E10	360m	E10	360m	E10
4700	360m	E10	360m	E10	360m	E10
4800	360m	E10	360m	E10	360m	E10
4900	360m	E10	360m	E10	360m	E10
5000	360m	E10	360m	E10	360m	E10
5100	360m	E10	360m	E10	360m	E10
5200	360m	E10	360m	E10	360m	E10
5300	360m	E10	360m	E10	360m	E10
5400	360m	E10	360m	E10	360m	E10
5500	360m	E10	360m	E10	360m	E10
5600	360m	E10	360m	E10	360m	E10
5700	360m	E10	360m	E10	360m	E10
5800	360m	E10	360m	E10	360m	E10
5900	360m	E10	360m	E10	360m	E10
6000	360m	E10	360m	E10	360m	E10
6100	360m	E10	360m	E10	360m	E10
6200	360m	E10	360m	E10	360m	E10
6300	360m	E10	360m	E10	360m	E10
6400	360m	E10	360m	E10	360m	E10
6500	360m	E10	360m	E10	360m	E10
6600	360m	E10	360m	E10	360m	E10
6700	360m	E10	360m	E10	360m	E10
6800	360m	E10	360m	E10	360m	E10
6900	360m	E10	360m	E10	360m	E10
7000	360m	E10	360m	E10	360m	E10
7100	360m	E10	360m	E10	360m	E10

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
7200	360m	E10	360m	E10	360m	E10
7300	360m	E10	360m	E10	360m	E10
7400	360m	E10	360m	E10	360m	E10
7500	360m	E10	360m	E10	360m	E10
7600	360m	E10	360m	E10	360m	E10
7700	360m	E10	360m	E10	360m	E10
7800	360m	E10	360m	E10	360m	E10
7900	360m	E10	360m	E10	360m	E10
8000	360m	E10	360m	E10	360m	E10
8100	360m	E10	360m	E10	360m	E10
8200	360m	E10	360m	E10	360m	E10
8300	360m	E10	360m	E10	360m	E10
8400	360m	E10	360m	E10	360m	E10
8500	360m	E10	360m	E10	360m	E10
8600	360m	E10	360m	E10	360m	E10
8700	360m	E10	360m	E10	360m	E10
8800	360m	E10	360m	E10	360m	E10
8900	360m	E10	360m	E10	360m	E10
9000	360m	E10	360m	E10	360m	E10
9100	360m	E10	360m	E10	360m	E10
9200	360m	E10	360m	E10	360m	E10
9300	360m	E10	360m	E10	360m	E10
9400	360m	E10	360m	E10	360m	E10
9500	360m	E10	360m	E10	360m	E10
9600	360m	E10	360m	E10	360m	E10
9700	360m	E10	360m	E10	360m	E10
9800	360m	E10	360m	E10	360m	E10
9900	360m	E10	360m	E10	360m	E10
10000	360m	E10	360m	E10	360m	E10
10100	360m	E10	360m	E10	360m	E10
10200	360m	E10	360m	E10	360m	E10
10300	360m	E10	360m	E10	360m	E10
10400	360m	E10	360m	E10	360m	E10
10500	360m	E10	360m	E10	360m	E10
10600	360m	E10	360m	E10	360m	E10
10700	360m	E10	360m	E10	360m	E10
10800	360m	E10	360m	E10	360m	E10

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
10900	360m	E10	360m	E10	360m	E10
11000	360m	E10	360m	E10	360m	E10
11100	360m	E10	360m	E10	360m	E10
11200	360m	E10	360m	E10	360m	E10
11300	360m	E10	360m	E10	360m	E10
11400	360m	E10	360m	E6	360m	E10
11500	360m	E10	360m	E6	360m	E10
11600	360m	E10	360m	E6	360m	E10
11700	360m	E10	360m	E6	360m	E10
11800	360m	E10	360m	E6	360m	E10
11900	360m	E10	270m	E3	270m	E3
Structure S10 – Gateway Motorway						
12055	360m	E10	270m	E3	270m	E3
12100	360m	E10	270m	E3	270m	E3
12200	360m	E10	270m	E3	270m	E3
Structure S12 – Murarrie Road						
12300	360m	E10	270m	E3	270m	E3
12400	360m	E10	270m	E3	270m	E3
12500	360m	E10	270m	E3	270m	E3
12600	360m	E10	270m	E3	270m	E3
12700	360m	E10	270m	E3	270m	E3
12800	360m	E10	270m	E3	270m	E3
12900	360m	E10	270m	E3	270m	E3
13000	360m	E10	270m	E3	270m	E3
Structure S13 – Wynnum Road						
13100	360m	E10	270m	E3	270m	E3
13200	360m	E10	270m	E3	270m	E3
13300	360m	E10	270m	E3	270m	E3
13400	360m	E10	270m	E3	270m	E3
13500	360m	E10	270m	E3	270m	E3
13600	360m	E10	270m	E3	270m	E3
13700	360m	E10	270m	E3	270m	E3
13800	360m	E10	270m	E3	270m	E3
13900	360m	E10	270m	E3	270m	E3
14000	360m	E10	270m	E3	270m	E3
14100	360m	E10	270m	E3	270m	E3
14200	360m	E10	270m	E3	270m	E3

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
14300	360m	E10	270m	E3	270m	E3
14400	360m	E10	270m	E3	270m	E3
14500	360m	E10	270m	E3	270m	E3
14600	360m	E10	270m	E3	270m	E3
14700	360m	E10	270m	E3	270m	E3
14800	360m	E10	270m	E3	270m	E3
14900	360m	E10	270m	E3	270m	E3
15000	360m	E10	270m	E3	270m	E3
15100	360m	E10	270m	E3	270m	E3
15200	360m	E10	270m	E3	270m	E3
15300	360m	E10	270m	E3	270m	E3
15400	360m	E10	270m	E3	270m	E3
15500	360m	E10	270m	E3	270m	E3
15600	360m	E10	270m	E3	270m	E3
15700	360m	E10	270m	E3	270m	E3
15800	360m	E10	270m	E3	270m	E3
15900	360m	E10	270m	E3	270m	E3
16000	360m	E10	270m	E3	270m	E3
16100	360m	E10	270m	E3	270m	E3
16200	360m	E10	270m	E3	270m	E3
16300	360m	E10	270m	E3	270m	E3
16400	360m	E10	270m	E3	270m	E3
16500	360m	E10	270m	E3	270m	E3
16600	360m	E10	270m	E3	270m	E3
16700	360m	E10	270m	E3	270m	E3
16800	360m	E10	270m	E3	270m	E3
16900	360m	E10	270m	E3	270m	E3
17000	360m	E10	270m	E3	270m	E3
17100	360m	E10	270m	E3	270m	E3
17200	360m	E10	270m	E3	270m	E3
17300	360m	E10	270m	E3	270m	E3
17400	360m	E5	270m	E3	270m	E3
17500	360m	E5	270m	E3	270m	E3
17600	360m	E5	270m	E3	270m	E3
17700	360m	E5	270m	E3	270m	E3
17800	360m	E5	270m	E3	270m	E3
17900	360m	E5	270m	E3	270m	E3

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
18000	360m	E5	270m	E3	270m	E3
18100	360m	E1	270m	E3	270m	E3
18200	360m	E1	270m	E3	270m	E3
18300	360m	E5	270m	E3	270m	E3
18400	360m	E5	270m	E3	270m	E3
18500	360m	E5	270m	E3	270m	E3
18600	360m	E10	270m	E3	270m	E3
Structure S17 - Meadowlands Road						
18723	360m	E10	270m	E3	270m	E3
18800	180m	E8	270m	E3	270m	E3
18900	180m	E8	180m	E9	270m	E3
19000	180m	E4	180m	E9	180m	E9
19100	180m	E4	180m	E9	270m	E3
19200	180m	E8	180m	E9	180m	E7
19300	180m	E8	180m	E9	180m	E7
19400	180m	E8	180m	E9	180m	E7
19500	180m	E8	180m	E7	180m	E7
19600	180m	E8	180m	E7	180m	E7
19700	180m	E8	180m	E7	180m	E7
Structure S18 – Scrub Road Pedestrian Bridge						
19800	180m	E8	180m	E7	180m	E7
19900	180m	E8	180m	E7	180m	E7
20000	180m	E8	180m	E7	180m	E7
20100	180m	E8	180m	E7	180m	E7
20200	180m	E8	180m	E7	180m	E7
20300	180m	E8	180m	E7	180m	E7
20400	180m	E8	180m	E7	180m	E7
20500	180m	E8	180m	E7	180m	E7
20600	180m	E8	180m	E7	180m	E7
20700	180m	E4	180m	E7	180m	E7
20800	180m	E4	180m	E7	180m	E7
20900	180m	E8	180m	E7	180m	E7
21000	180m	E8	180m	E7	180m	E7
Structure S27 – Old Cleveland Road						
21100	180m	E4	180m	E9	180m	E7
21200	180m	E4	180m	E9	180m	E7
21300	180m	E8	180m	E9	180m	E7

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
21400	180m	E8	180m	E9	180m	E7
21500	180m	E8	180m	E9	180m	E7
21600	180m	E8	180m	E9	180m	E7
Structure S29 – Winstanley Street						
21700	180m	E8	180m	E9	180m	E7
21800	180m	E4	180m	E9	180m	E7
21900	180m	E8	180m	E9	180m	E7
22000	180m	E8	180m	E9	180m	E7
22100	180m	E8	180m	E9	180m	E7
22200	180m	E8	180m	E9	180m	E7
22300	180m	E4	180m	E9	180m	E9
22400	180m	E8	180m	E9	180m	E9
22500	180m	E4	180m	E9	180m	E9
Structure S36 – Meadowbank Street Pedestrian Bridge						
22600	180m	E8	180m	E9	180m	E9
22700	180m	E8	180m	E9	180m	E9
22800	180m	E8	180m	E9	180m	E9
22900	180m	E8	180m	E9	180m	E9
23000	180m	E8	180m	E9	180m	E9
23100	180m	E8	180m	E9	180m	E9
23200	180m	E8	180m	E9	180m	E9
23300	180m	E8	180m	E9	180m	E9
23400	180m	E8	180m	E9	180m	E9
Structure S37 – Pine Mountain Road						
23500	180m	E8	120m	E3	120m	E6
23600	180m	E8	120m	E3	120m	E6
23700	180m	E8	120m	E3	120m	E6
23800	180m	E8	120m	E3	120m	E6
23900	180m	E8	120m	E3	120m	E6
24000	180m	E8	120m	E3	120m	E6
24100	180m	E8	120m	E3	120m	E6
24200	180m	E8	120m	E3	120m	E6
24300	180m	E8	120m	E3	120m	E6
24400	180m	E8	120m	E3	120m	E6
24500	180m	E8	120m	E3	120m	E6
24600	180m	E8	120m	E3	120m	E6
24700	180m	E8	120m	E3	120m	E6

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
24800	180m	E4	120m	E9	120m	E6
24900	180m	E4	120m	E9	120m	E6
25000	180m	E4	120m	E9	120m	E6
25100	180m	E4	120m	E5	120m	E6
25200	180m	E4	120m	E5	120m	E6
25300	180m	E4	120m	E5	120m	E6
25400	180m	E4	120m	E5	120m	E6
25500	180m	E4	120m	E5	120m	E6
25600	180m	E4	120m	E5	120m	E6
25700	180m	E4	120m	E5	120m	E6
25800	180m	E4	120m	E5	120m	E6
25900	180m	E4	120m	E5	120m	E6
Structure S55 – Oakley Street Pedestrian Bridge						
26000	180m	E4	120m	E5	120m	E6
26100	180m	E4	120m	E5	120m	E6
26200	180m	E4	120m	E5	120m	E6
26300	180m	E4	120m	E5	120m	E6
26400	180m	E4	120m	E5	120m	E6
26500	180m	E4	120m	E5	120m	E6
26600	180m	E4	120m	E5	120m	E6
26700	180m	E4	120m	E5	120m	E6
26800	180m	E4	120m	E5	120m	E6
Structure S56 – Wecker Road						
26900	180m	E4	120m	E5	120m	E6
27000	180m	E4	120m	E5	120m	E6
27100	180m	E4	120m	E5	120m	E6
27200	180m	E4	120m	E5	120m	E6
27300	180m	E4	120m	E5	120m	E6
27400	180m	E4	120m	E5	120m	E6
27500	180m	E4	120m	E5	120m	E6
27600	180m	E4	120m	E5	120m	E6
27700	180m	E4	120m	E5	120m	E6
27800	180m	E4	120m	E5	120m	E6
27900	180m	E4	120m	E5	120m	E6
28000	180m	E4	120m	E5	120m	E6
28100	120m	E8	120m	E5	120m	E6
28200	120m	E8	120m	E5	120m	E6

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
S57 - Mount Gravatt Capalaba Road						
28300	120m	E8	120m	E5	120m	E6
28400	120m	E8	120m	E5	120m	E6
28500	120m	E8	120m	E5	120m	E6
28600	120m	E8	120m	E5	120m	E6
28700	120m	E8	120m	E5	120m	E6
28800	120m	E8	120m	E5	120m	E6
28900	120m	E8	120m	E5	120m	E6
29000	120m	E8	120m	E5	120m	E6
29100	120m	E8	120m	E5	120m	E6
29200	120m	E8	120m	E5	120m	E6
29300	120m	E8	120m	E5	120m	E6
29400	120m	E8	120m	E5	120m	E5
29500	120m	E8	120m	E5	120m	E5
29600	120m	E8	120m	E5	120m	E5
29700	120m	E8	120m	E5	120m	E5
29800	120m	E8	120m	E5	120m	E5
29900	120m	E8	120m	E5	120m	E5
30000	120m	E8	120m	E5	120m	E5
30100	120m	E8	120m	E5	120m	E5
30200	120m	E8	120m	E5	120m	E5
30300	120m	E8	120m	E5	120m	E5
30400	120m	E8	120m	E5	120m	E5
30500	120m	E8	120m	E5	120m	E5
30600	120m	E8	120m	E5	120m	E5
30700	120m	E8	120m	E5	120m	E5
30800	120m	E8	120m	E5	120m	E5
30900	120m	E8	120m	E5	120m	E5
S58 - Sherwood Place Pedestrian Bridge						
31000	120m	E8	120m	E3	120m	E9
31100	120m	E6	120m	E3	120m	E8
31200	120m	E6	120m	E8	120m	E8
31300	120m	E6	120m	E8	120m	E8
31400	120m	E1	120m	E5	120m	E8
31500	120m	E1	120m	E5	120m	E1
31600	120m	E1	120m	E9	120m	E1
31700	120m	E1	120m	E9	120m	E1

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
31800	120m	E1	120m	E8	120m	E1
31900	120m	E1	120m	E8	120m	E1
S59 - Craig Street Pedestrian Bridge						
32000	120m	E6	120m	E8	120m	E9
32100	120m	E6	120m	E8	120m	E9
32200	120m	E6	120m	E8	120m	E9
32300	120m	E6	120m	E8	120m	E8
32400	120m	E6	120m	E8	120m	E8
32500	120m	E6	120m	E8	120m	E8
32600	120m	E9	120m	E1	120m	E1
32700	120m	E10	120m	E1	120m	E1
32800	120m	E6	120m	E1	120m	E1
32900	120m	E10	120m	E1	120m	E1
33000	120m	E10	120m	E1	120m	E1
S60 - D/S of Logan Road Pedestrian Bridge						
33100	120m	E10	120m	E1	120m	E1
S61 - Logan Road						
33200	120m	E9	120m	E1	120m	E1
S63 - Pacific Motorway						
33362	120m	E10	120m	E1	120m	E1
33400	120m	E10	120m	E1	120m	E1
33500	120m	E10	120m	E1	120m	E1
33600	120m	E10	120m	E1	120m	E1
33700	120m	E10	120m	E1	120m	E1
33800	120m	E10	120m	E1	120m	E1
33900	120m	E10	120m	E1	120m	E1
34000	120m	E10	120m	E1	120m	E1
34100	120m	E10	120m	E5	120m	E1
34200	120m	E10	120m	E8	120m	E1
34300	120m	E5	120m	E8	120m	E5
34400	120m	E5	120m	E5	120m	E5
34500	120m	E5	120m	E5	120m	E5
S66 - Padstow Road						
34600	120m	E10	120m	E1	120m	E1
34700	120m	E10	120m	E1	120m	E1
34800	120m	E8	120m	E1	120m	E1
34900	120m	E8	120m	E1	060m	E8

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
35000	120m	E8	120m	E1	060m	E8
S68 - Malbon Street Pedestrian Bridge						
35100	120m	E8	060m	E8	060m	E8
35200	120m	E8	060m	E2	060m	E8
35300	060m	E3	060m	E5	060m	E9
35400	060m	E9	060m	E5	060m	E5
35500	060m	E9	060m	E5	060m	E5
35600	060m	E9	060m	E5	060m	E5
35700	060m	E9	060m	E5	060m	E5
35800	060m	E9	060m	E5	060m	E5
35900	060m	E9	060m	E5	060m	E5
36000	060m	E9	060m	E5	060m	E5
36100	060m	E9	060m	E5	060m	E5
36200	060m	E9	060m	E5	060m	E5
36300	060m	E9	060m	E5	060m	E5
36400	060m	E9	060m	E5	060m	E5
36500	060m	E9	060m	E5	060m	E5
S69 - Altandi Street Pedestrian Bridge						
36600	060m	E9	060m	E5	060m	E5
36700	060m	E9	060m	E5	060m	E5
36800	060m	E9	060m	E5	060m	E5
S70 - D/S Gold Coast Railway Pedestrian Bridge						
36900	060m	E9	060m	E5	060m	E5
36985	060m	E9	060m	E5	060m	E5
S71 and S72 - Gold Coast Railway						
37100	060m	E9	060m	E5	060m	E5
S73 - Beenleigh Road						
37200	060m	E9	060m	E5	060m	E5
37300	060m	E9	060m	E5	060m	E5
S74 - Gowan Road Pedestrian Culvert						
37400	060m	E9	060m	E5	060m	E5
37500	060m	E3	060m	E5	060m	E5
37600	060m	E3	060m	E5	060m	E5
37700	060m	E3	060m	E5	060m	E5
37800	060m	E3	060m	E5	060m	E5
37900	060m	E3	060m	E5	060m	E5
38000	060m	E3	060m	E5	060m	E5

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
38100	060m	E3	060m	E5	060m	E4
S75 - Energy Dissipator						
38200	060m	E3	060m	E5	060m	E5
38300	060m	E3	060m	E5	060m	E5
38400	060m	E3	060m	E5	060m	E5
S77 - Glenefer Street Pedestrian Bridge						
38500	060m	E3	060m	E5	060m	E5
38574	060m	E3	060m	E5	060m	E5
S78 - Brandon Road						
38700	030m	E3	030m	E7	060m	E4
38800	030m	E3	060m	E4	060m	E4
38900	030m	E3	030m	E7	060m	E4
S79 - Nemies Road						
39000	030m	E3	030m	E7	060m	E4
39100	030m	E3	030m	E7	060m	E4
39200	030m	E3	030m	E7	060m	E4
39300	030m	E3	030m	E2	030m	E7
S80 - Calliope Street Bikeway						
39400	030m	E3	030m	E2	030m	E2
39500	030m	E3	030m	E2	030m	E2
39600	030m	E3	030m	E2	030m	E2
39700	030m	E3	060m	E4	060m	E4
39800	030m	E3	060m	E4	060m	E4
39888	030m	E3	060m	E4	060m	E4
Daw Road Drain						
0	120m	E8	120m	E1	060m	E8
100	030m	E6	120m	E5	120m	E1
200	060m	E3	030m	E7	060m	E9
300	060m	E3	030m	E7	060m	E9
400	060m	E3	030m	E7	060m	E9
500	060m	E3	030m	E7	060m	E9
600	030m	E6	030m	E7	030m	E7
700	030m	E6	030m	E7	030m	E7
800	030m	E6	030m	E7	030m	E7
900	030m	E6	030m	E7	030m	E7
1000	030m	E3	030m	E7	030m	E7
1095	030m	E3	030m	E7	030m	E7

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
Padstow Road Drain						
0	120m	E5	120m	E5	120m	E5
S169 - McCullough Street Pedestrian Bridge						
100	030m	E3	030m	E7	030m	E7
200	030m	E3	030m	E7	030m	E7
S170 - McCullough Street						
300	030m	E3	030m	E7	030m	E2
400	030m	E3	030m	E2	030m	E2
441	N/R [1]	N/R [1]	030m	E2	030m	E2
Mimosa Creek						
0	120m	E5	120m	E8	120m	E5
100	120m	E5	120m	E5	120m	E5
S82 - Turnmill Street Pedestrian Culvert						
200	120m	E5	120m	E8	120m	E8
300	120m	E10	120m	E8	120m	E8
400	120m	E10	060m	E5	060m	E5
500	120m	E10	060m	E5	060m	E5
S83 - Springfield Street Pedestrian Culvert						
600	120m	E10	060m	E5	060m	E5
700	120m	E10	060m	E5	060m	E10
800	120m	E10	060m	E5	060m	E10
900	120m	E10	060m	E5	060m	E10
1000	120m	E10	060m	E5	060m	E10
1100	120m	E10	060m	E10	060m	E10
1200	120m	E10	060m	E5	060m	E5
S84 - Parkway Street						
1300	120m	E10	060m	E5	060m	E5
1400	120m	E10	060m	E5	060m	E5
1500	120m	E10	060m	E5	060m	E5
S85 - Kessels Road						
1610	120m	E10	060m	E5	060m	E5
1700	120m	E10	060m	E5	060m	E5
1800	120m	E10	060m	E5	120m	E3
S86(a)(b)(c) - Pacific Motorway						
1944	120m	E10	060m	E5	120m	E3
2000	120m	E10	060m	E5	120m	E3
S87 - Nagle Street						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
2100	120m	E10	060m	E5	120m	E3
2200	120m	E5	060m	E5	120m	E3
2300	120m	E10	060m	E5	120m	E3
2400	120m	E5	060m	E5	060m	E5
2500	120m	E5	060m	E5	060m	E5
2600	120m	E5	060m	E5	060m	E5
2700	120m	E10	060m	E6	060m	E3
2800	120m	E10	060m	E6	060m	E5
2900	120m	E10	060m	E10	060m	E10
3000	120m	E7	120m	E2	120m	E2
S88 - Hibiscus Place Pedestrian Culvert						
3100	120m	E5	120m	E8	120m	E8
3200	120m	E5	120m	E2	120m	E2
3300	120m	E5	120m	E2	120m	E2
3400	120m	E5	120m	E2	120m	E2
3500	120m	E5	120m	E2	120m	E2
3600	120m	E5	120m	E2	120m	E2
3674	120m	E5	120m	E2	120m	E2
Nardie Street Drain						
0	120m	E1	120m	E8	120m	E8
100	120m	E1	120m	E8	120m	E8
200	N/R [1]	N/R [1]	N/R [1]	N/R [1]	030m	E7
300	030m	E8	030m	E7	030m	E7
400	030m	E8	030m	E7	030m	E7
496	030m	E8	030m	E2	030m	E2
Bulimba Creek East						
0	120m	E8	120m	E5	120m	E5
100	120m	E8	120m	E5	120m	E5
200	120m	E8	120m	E5	120m	E5
300	120m	E9	120m	E3	120m	E8
400	120m	E10	120m	E3	120m	E3
500	120m	E8	120m	E3	120m	E3
600	060m	E8	120m	E3	120m	E3
700	060m	E8	060m	E9	120m	E3
800	060m	E8	060m	E9	120m	E3
900	060m	E9	060m	E9	120m	E1
1000	060m	E9	060m	E1	060m	E5

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
1100	060m	E9	060m	E5	060m	E5
1200	060m	E9	060m	E5	060m	E5
S89 - Gateway Motorway - On / Off Ramp						
1300	060m	E9	060m	E5	060m	E5
1400	060m	E9	060m	E5	060m	E5
1500	060m	E9	060m	E5	060m	E5
1576	060m	E9	060m	E5	060m	E5
S90 - Miles Platting Road						
S91 - South East Busway Loop						
1700	060m	E9	060m	E5	060m	E5
1800	060m	E9	060m	E5	060m	E5
1881	060m	E9	060m	E5	060m	E5
S92 - South East Busway						
S93 - Pacific Motorway						
2000	060m	E5	060m	E5	060m	E5
S93(a)(b)(c) - V1 Veloway						
2100	060m	E5	060m	E5	060m	E5
2200	060m	E5	060m	E5	060m	E5
2300	060m	E9	060m	E5	060m	E5
2400	060m	E9	060m	E5	060m	E5
2500	060m	E9	060m	E5	060m	E5
S94 - Logan Road						
2597	060m	E5	060m	E5	060m	E5
S194 - Glen Hotel Weir						
2700	060m	E5	060m	E5	060m	E5
2800	060m	E5	060m	E5	060m	E5
2880	060m	E5	060m	E5	060m	E5
S96 - Gateway Motorway						
3000	060m	E9	060m	E5	060m	E5
3100	060m	E5	060m	E5	060m	E5
3200	060m	E5	060m	E5	060m	E5
3300	060m	E5	060m	E5	060m	E5
3400	060m	E5	060m	E5	060m	E5
3498	060m	E5	060m	E5	060m	E5
S97 - Underwood Road						
3600	060m	E5	060m	E5	060m	E5
3700	060m	E5	060m	E5	060m	E5

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
3800	060m	E6	060m	E5	060m	E5
3900	060m	E5	060m	E5	060m	E5
4000	060m	E5	060m	E5	060m	E5
4100	060m	E5	060m	E5	060m	E5
4200	060m	E5	060m	E5	060m	E5
4300	060m	E5	060m	E5	060m	E5
4400	060m	E6	060m	E5	060m	E5
4500	060m	E3	060m	E5	060m	E5
4600	060m	E3	060m	E5	060m	E5
4700	060m	E3	060m	E5	060m	E5
4800	060m	E3	060m	E5	060m	E5
4900	060m	E3	060m	E5	060m	E5
5000	060m	E3	060m	E5	060m	E5
5100	060m	E3	060m	E5	060m	E5
5200	060m	E3	060m	E5	060m	E5
5300	060m	E3	060m	E5	060m	E5
S99 - Gateway Motorway						
5400	060m	E3	030m	E10	030m	E7
S100 - Gold Coast Railway						
S101 - Beenleigh Road						
5500	060m	E3	030m	E10	030m	E7
5600	030m	E6	030m	E10	030m	E10
5700	030m	E3	030m	E7	030m	E7
5800	030m	E3	030m	E7	030m	E7
5900	030m	E8	030m	E2	030m	E2
6000	030m	E8	030m	E2	030m	E2
6100	030m	E8	030m	E2	030m	E2
6200	030m	E8	030m	E2	030m	E2
6296	030m	E8	030m	E2	030m	E2
Bulimba Creek East Railway Bypass						
0	060m	E3	060m	E5	060m	E5
100	060m	E3	060m	E5	060m	E5
200	060m	E3	060m	E5	060m	E5
300	060m	E3	060m	E5	060m	E9
400	060m	E3	060m	E4	060m	E9
460	060m	E3	030m	E9	030m	E7
Tributary C						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
0	060m	E5	060m	E5	060m	E5
56	060m	E8	060m	E5	060m	E5
S174 - Gateway Motorway						
200	030m	E6	030m	E7	030m	E7
300	030m	E3	030m	E7	030m	E7
400	030m	E3	030m	E7	030m	E7
500	030m	E6	030m	E7	030m	E7
600	030m	E6	030m	E7	030m	E7
700	030m	E6	030m	E7	030m	E7
800	030m	E6	030m	E7	030m	E7
900	030m	E6	030m	E7	030m	E7
1000	030m	E3	030m	E2	030m	E2
1100	030m	E2	030m	E2	030m	E2
1200	030m	E2	030m	E7	030m	E7
1246	030m	E2	030m	E7	030m	E7
Tributary B						
0	060m	E9	060m	E5	060m	E5
100	060m	E9	060m	E5	060m	E5
S95 - Logan Road						
200	060m	E8	060m	E5	060m	E1
300	030m	E8	030m	E2	030m	E2
400	030m	E8	030m	E2	030m	E2
S104 - Dance Crescent						
500	030m	E8	030m	E2	030m	E2
584	030m	E8	030m	E2	030m	E2
Tributary A						
0	060m	E5	060m	E5	060m	E5
100	060m	E5	060m	E5	060m	E5
S105 - Gateway Motorway						
241	060m	E5	060m	E5	060m	E5
300	060m	E5	060m	E5	060m	E5
400	060m	E9	060m	E5	060m	E5
500	030m	E6	060m	E5	060m	E5
S106 - Pacific Motorway Off Ramp						
600	030m	E6	030m	E7	030m	E7
700	030m	E6	030m	E7	030m	E7
800	030m	E6	030m	E7	030m	E7

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
900	030m	E6	030m	E7	030m	E7
S107 - Pacific Motorway						
1038	030m	E6	030m	E7	030m	E7
1100	030m	E6	030m	E7	030m	E7
1200	030m	E6	030m	E7	030m	E7
1300	030m	E6	030m	E7	030m	E7
1400	030m	E6	030m	E7	030m	E7
1500	030m	E6	030m	E7	030m	E7
1600	030m	E3	030m	E7	030m	E7
1700	030m	E3	030m	E7	030m	E7
1800	030m	E3	030m	E7	030m	E7
1900	030m	E3	030m	E7	030m	E7
2000	030m	E3	030m	E7	030m	E7
2100	030m	E3	030m	E7	030m	E7
2200	030m	E3	030m	E7	030m	E7
2300	030m	E3	030m	E7	030m	E7
2400	030m	E8	030m	E2	030m	E7
2500	030m	E8	030m	E2	030m	E2
2600	030m	E8	030m	E2	030m	E2
2700	030m	E8	030m	E2	030m	E2
2800	030m	E8	030m	E2	030m	E2
2900	030m	E8	030m	E2	030m	E2
2915	030m	E8	030m	E2	030m	E2
Tributary A1						
0	030m	E3	030m	E7	030m	E7
100	030m	E5	030m	E4	030m	E5
200	030m	E7	030m	E7	030m	E7
300	030m	E3	030m	E7	030m	E2
400	030m	E8	030m	E2	030m	E2
500	030m	E8	030m	E2	030m	E1
600	030m	E4	030m	E2	030m	E1
689	030m	E8	030m	E2	030m	E2
Tributary A Overflow						
0	030m	E6	060m	E5	060m	E5
71	030m	E6	060m	E5	060m	E5
S186 and S189 - Pacific Motorway						
S187 and S190 - Pacific Motorway On Ramp						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [(2)]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
S188 and S191 - Busway						
200	030m	E6	030m	E7	060m	E5
300	030m	E6	030m	E7	060m	E5
400	030m	E6	030m	E7	030m	E7
500	030m	E6	030m	E7	030m	E7
S192 - School Road						
600	030m	E6	030m	E7	030m	E7
S193 - Diversion Weir						
700	030m	E6	030m	E7	030m	E7
703	030m	E6	030m	E7	030m	E7
Tributary A2						
0	030m	E6	030m	E7	030m	E7
100	030m	E6	030m	E7	030m	E7
200	030m	E3	030m	E7	030m	E7
300	030m	E3	030m	E7	030m	E7
S108 - Freeway Office Park Weir						
410	030m	E3	030m	E7	030m	E7
S109 - Freeway Office Park Internal Road						
505	030m	E4	030m	E7	030m	E7
S110 and S111 - Logan Road						
628	030m	E8	030m	E2	030m	E2
700	030m	E8	030m	E2	030m	E2
760	030m	E8	030m	E2	030m	E2
Miles Platting Road Drain						
0	060m	E5	060m	E9	120m	E3
100	030m	E8	030m	E7	030m	E7
S172 - Gateway Motorway						
200	030m	E8	030m	E7	030m	E7
300	030m	E8	030m	E7	030m	E7
400	030m	E8	030m	E7	030m	E2
500	030m	E8	030m	E7	030m	E2
600	030m	E8	030m	E2	030m	E2
700	030m	E8	030m	E2	030m	E2
800	030m	E8	030m	E2	030m	E2
900	030m	E8	030m	E2	030m	E2
1000	030m	E8	030m	E2	030m	E2
S173 - Miles Platting Road						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
1100	030m	E8	030m	E2	030m	E2
1200	030m	E10	030m	E3	030m	E8
1300	030m	E8	030m	E2	030m	E2
1328	030m	E8	030m	E2	030m	E2
Kate Circuit Drain						
0	030m	E8	030m	E7	030m	E2
100	030m	E7	030m	E2	030m	E8
200	030m	E8	030m	E7	030m	E7
300	030m	E10	030m	E7	030m	E7
400	030m	E3	030m	E2	030m	E2
437	030m	E3	030m	E2	030m	E2
Parklands Circuit Drain						
0	120m	E8	120m	E5	120m	E5
100	120m	E8	120m	E5	120m	E5
200	120m	E8	120m	E5	120m	E5
S165 - Gateway Motorway						
300	030m	E6	030m	E7	030m	E7
400	030m	E6	030m	E7	030m	E5
500	030m	E6	030m	E7	030m	E7
600	030m	E6	030m	E7	030m	E7
700	030m	E6	030m	E7	030m	E7
S166 - Prebble Street						
800	030m	E6	030m	E7	030m	E7
900	030m	E6	030m	E7	030m	E7
S167 - Kyeema Street						
1000	030m	E4	030m	E8	030m	E8
1100	030m	E3	030m	E8	030m	E7
S168 - Echidna Street						
1206	030m	E3	030m	E7	030m	E7
1300	030m	E8	030m	E7	030m	E7
1400	030m	E8	030m	E7	030m	E7
1500	030m	E8	030m	E2	030m	E2
1600	030m	E8	030m	E2	030m	E2
1675	N/R (1)	N/R (1)	N/R (1)	N/R (1)	030m	E6
Broadwater Road Drain						
0	180m	E4	120m	E5	120m	E6
100	180m	E4	120m	E5	120m	E6

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
200	180m	E4	120m	E5	120m	E6
300	180m	E4	120m	E5	120m	E6
400	180m	E9	120m	E9	120m	E8
500	060m	E3	030m	E10	120m	E5
600	060m	E3	030m	E10	060m	E9
700	060m	E3	030m	E10	060m	E9
800	060m	E3	030m	E10	060m	E9
900	030m	E6	030m	E10	060m	E9
1000	030m	E6	030m	E7	030m	E7
1100	030m	E3	030m	E7	030m	E7
S152 - Broadwater Road						
1200	030m	E3	030m	E7	030m	E7
1300	030m	E3	030m	E7	030m	E7
S153 - Brisbane Adventist College Drop Structure						
1400	030m	E3	030m	E7	030m	E7
1500	030m	E3	030m	E2	030m	E7
1600	030m	E3	030m	E2	030m	E2
1700	030m	E3	030m	E2	030m	E2
S155 - Brisbane Adventist College Pedestrian Bridge						
S156 - Brisbane Adventist College Drop Structure						
1800	030m	E3	030m	E2	030m	E2
S157 - 16 Rowe Close Drop Structure						
1897	030m	E3	030m	E2	030m	E2
S158 - 16 Rowe Close Drop Structure						
2000	030m	E3	030m	E2	030m	E2
S159 - 226 Wishart Road - Internal Road						
2100	030m	E3	030m	E2	030m	E2
2113	030m	E3	030m	E2	030m	E2
Wishart Road Drain						
0	030m	E3	030m	E7	030m	E7
100	030m	E3	030m	E7	030m	E7
200	030m	E3	030m	E7	030m	E7
S160 - Wishart Road						
300	030m	E3	030m	E7	030m	E7
400	030m	E8	030m	E2	030m	E2
497	030m	E8	030m	E2	030m	E2
S161 - Access Bridge to 10 St.George Circuit						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
S162 - Access Bridge to 10 St.George Circuit						
600	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]
700	030m	E8	030m	E2	030m	E2
S164 - 35 Avenell Street Access Road						
723	030m	E8	030m	E2	030m	E2
Wecker Road Drain						
0	180m	E4	120m	E5	120m	E6
100	180m	E4	120m	E5	120m	E6
200	060m	E9	060m	E5	120m	E8
300	060m	E9	060m	E5	060m	E5
383	060m	E3	060m	E5	060m	E5
S141 - Christian College Access Road						
S142 - Christian College Access Road						
500	060m	E3	060m	E5	060m	E5
S143 and S144 - Scrub Road						
608	060m	E3	060m	E5	060m	E5
700	060m	E3	060m	E5	060m	E5
S145 - Wecker Road						
800	060m	E3	060m	E5	060m	E5
900	060m	E3	060m	E5	060m	E5
1000	060m	E3	060m	E5	060m	E5
1093	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]
S146 - Gateway Motorway						
1200	060m	E3	060m	E5	060m	E5
1300	060m	E3	060m	E5	060m	E5
1400	060m	E3	060m	E5	060m	E5
1500	030m	E3	030m	E7	060m	E9
S147 - Weedon Street East						
1600	030m	E3	030m	E7	060m	E9
S148 and S149 - Mount Petrie Road						
1700	030m	E3	030m	E2	030m	E7
1800	030m	E3	030m	E7	030m	E7
1900	030m	E8	030m	E2	030m	E2
2000	030m	E8	030m	E2	030m	E2
2016	030m	E8	030m	E2	030m	E2
Newnham Creek						
0	180m	E8	120m	E3	120m	E6

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
100	180m	E4	120m	E3	120m	E6
200	180m	E4	120m	E3	120m	E6
300	180m	E4	120m	E3	120m	E6
400	180m	E9	120m	E1	120m	E3
500	060m	E3	060m	E5	060m	E4
600	060m	E3	060m	E5	060m	E4
700	060m	E3	060m	E5	060m	E4
S39 - Access Road to 100 Wecker Road						
800	060m	E3	060m	E5	060m	E4
867	060m	E3	060m	E4	060m	E4
S40 - Stormwater Quality Improvement Device						
S41 - Secam Street						
S42 - Access Road to 33 Secam Street						
1001	060m	E3	060m	E4	060m	E4
S43 - Devlan Street						
1100	060m	E3	060m	E4	060m	E4
S44 - Bunnings Access #3						
S45 - Bunnings Access #2						
1200	060m	E3	060m	E4	060m	E4
S46 - Bunnings Access #1						
1300	060m	E3	060m	E4	060m	E4
S47 - Newnham Road						
1400	060m	E3	060m	E4	060m	E4
1500	060m	E3	060m	E4	060m	E4
1597	030m	E3	060m	E4	060m	E4
S48 - Access Road to 285 Creek Road						
S49 - Drop Structure #3						
1700	030m	E3	060m	E4	060m	E4
S50 - Drop Structure #2						
S51 - Drop Structure #1						
1800	030m	E3	060m	E4	060m	E4
S52 - Internal Road for 215 Creek Road						
S53 - 215 Creek Road Pedestrian Bridge						
1900	060m	E8	060m	E4	060m	E4
2000	060m	E8	060m	E4	060m	E4
2012	060m	E8	060m	E4	060m	E4
Spring Creek						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
0	180m	E8	180m	E9	180m	E9
100	180m	E4	180m	E9	180m	E9
200	180m	E8	180m	E9	180m	E9
300	180m	E8	180m	E9	180m	E9
400	120m	E8	060m	E5	120m	E5
500	120m	E8	060m	E5	120m	E2
600	120m	E8	060m	E5	120m	E5
700	120m	E8	060m	E5	120m	E5
800	120m	E8	060m	E9	120m	E5
S132 - Scrub Road						
900	120m	E8	060m	E5	120m	E5
1000	120m	E8	120m	E2	120m	E5
1100	120m	E8	120m	E2	120m	E2
1200	120m	E8	120m	E2	120m	E2
1300	120m	E5	120m	E2	120m	E2
1400	120m	E8	120m	E2	120m	E2
1500	120m	E8	120m	E4	120m	E4
1600	120m	E5	120m	E2	120m	E2
1700	120m	E2	120m	E2	120m	E2
S133 - Woodland Street Pedestrian Bridge						
1800	120m	E2	120m	E2	120m	E2
1900	120m	E2	120m	E2	120m	E2
2000	120m	E2	120m	E2	120m	E2
2006	120m	E2	120m	E2	120m	E2
Warwick Creek						
0	120m	E8	120m	E2	120m	E2
S134 - Greendale Way						
100	120m	E8	120m	E2	120m	E5
200	120m	E8	120m	E2	120m	E2
300	120m	E2	120m	E2	120m	E2
400	120m	E2	120m	E2	120m	E2
S135 - Amersham Crescent						
500	120m	E2	120m	E2	120m	E2
600	120m	E2	120m	E2	120m	E2
700	120m	E2	120m	E2	120m	E2
800	120m	E2	060m	E10	120m	E5
900	120m	E5	120m	E2	120m	E2

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
1000	120m	E7	120m	E2	120m	E2
S136 - Cribb Road						
1100	120m	E7	120m	E2	120m	E2
1200	180m	E6	120m	E2	120m	E2
1300	180m	E6	120m	E2	120m	E2
1400	180m	E6	120m	E2	120m	E2
1500	180m	E6	120m	E2	120m	E2
1600	180m	E6	360m	E10	360m	E10
S138 - Oakley Street						
1700	180m	E8	360m	E8	360m	E8
1800	180m	E8	360m	E8	360m	E8
1817	180m	E8	360m	E8	360m	E8
Silky Oak Circuit Drain						
0	180m	E6	120m	E2	120m	E2
S139 - Oakley Street						
100	120m	E2	060m	E7	120m	E5
200	120m	E2	060m	E7	120m	E5
246	120m	E2	060m	E7	120m	E5
Salvin Creek						
0	180m	E8	180m	E9	180m	E7
100	180m	E8	180m	E9	180m	E7
200	180m	E8	180m	E9	180m	E7
300	180m	E8	180m	E9	180m	E7
400	180m	E8	180m	E9	180m	E7
500	180m	E8	180m	E9	180m	E7
S31 - Donnington Street (Lower)						
600	N/R (1)	N/R (1)	060m	E5	060m	E5
700	N/R (1)	N/R (1)	N/R (1)	N/R (1)	060m	E5
800	060m	E9	060m	E5	060m	E5
900	060m	E9	060m	E5	060m	E5
1000	060m	E9	060m	E5	060m	E5
1100	060m	E3	060m	E5	060m	E5
S32 - Donnington Street (Upper)						
1200	060m	E3	060m	E5	060m	E5
1300	060m	E3	060m	E5	060m	E5
1400	120m	E2	060m	E5	060m	E5
S33 - Creek Road						

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
1515	120m	E2	120m	E6	120m	E6
1600	120m	E10	120m	E6	120m	E6
1700	120m	E2	120m	E6	120m	E6
1800	030m	E3	030m	E7	060m	E9
S34 - Pine Mountain Road						
1900	030m	E3	030m	E7	060m	E9
2000	030m	E3	030m	E7	060m	E9
2100	030m	E3	030m	E7	060m	E9
2200	030m	E3	030m	E7	060m	E9
2300	060m	E5	030m	E8	030m	E8
S35 - Bevan Street						
2400	030m	E3	030m	E7	060m	E9
2500	030m	E8	030m	E2	060m	E9
2600	030m	E8	030m	E2	060m	E9
2700	030m	E8	030m	E2	030m	E8
2800	030m	E8	030m	E2	060m	E9
2900	030m	E8	030m	E2	060m	E9
2926	030m	E8	030m	E2	060m	E9
Glengariff Tributary						
0	120m	E2	120m	E6	120m	E6
100	120m	E5	120m	E2	120m	E5
200	120m	E5	120m	E2	120m	E2
300	120m	E5	120m	E2	120m	E2
400	N/R [1]	N/R [1]	120m	E2	120m	E8
500	120m	E5	120m	E2	120m	E2
600	120m	E8	120m	E2	120m	E2
700	120m	E8	120m	E2	120m	E2
800	120m	E8	120m	E2	120m	E2
900	120m	E8	120m	E2	120m	E2
925	120m	E8	120m	E2	120m	E2
Phillips Creek						
0	180m	E8	180m	E7	180m	E7
100	180m	E8	180m	E7	180m	E7
200	180m	E8	180m	E7	180m	E7
300	180m	E8	180m	E7	180m	E7
400	180m	E4	180m	E7	180m	E7
500	180m	E8	180m	E7	180m	E7

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
600	180m	E8	180m	E7	180m	E7
S20 - Old Cleveland Access Road						
671	180m	E5	180m	E2	120m	E8
S21 - Stormwater Quality Improvement Device						
S22 - Old Cleveland Road						
842	N/R [1]	N/R [1]	120m	E3	120m	E1
900	180m	E8	120m	E3	120m	E1
1000	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]
1100	060m	E6	060m	E5	060m	E5
S23(b)(c) - Creek Road						
1200	060m	E9	060m	E5	060m	E5
S24 - Pedestrian Bridge U/S Creek Road						
1300	060m	E9	060m	E5	060m	E5
1400	060m	E9	060m	E5	060m	E5
1500	060m	E9	060m	E9	060m	E5
1600	060m	E3	060m	E5	060m	E5
1700	060m	E9	060m	E5	060m	E5
1800	060m	E3	060m	E5	060m	E5
1900	060m	E3	060m	E5	060m	E4
2000	060m	E3	060m	E5	060m	E4
2100	060m	E3	060m	E5	060m	E4
2200	060m	E3	060m	E5	060m	E4
2286	060m	E3	060m	E4	060m	E4
S25 - Gallipoli Road						
2400	060m	E3	060m	E4	060m	E4
S26 - Anzac Road						
2500	060m	E3	060m	E4	060m	E4
2600	060m	E3	060m	E4	060m	E4
2685	060m	E3	060m	E4	060m	E4
Cloverbrook Place Drain						
0	360m	E10	270m	E3	270m	E3
100	360m	E10	270m	E3	270m	E3
200	360m	E10	270m	E3	270m	E3
300	360m	E10	270m	E3	270m	E3
400	360m	E10	270m	E3	270m	E3
500	360m	E10	270m	E3	270m	E3
600	360m	E10	270m	E3	270m	E3

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
S121 - Fursden Road						
700	360m	E10	270m	E3	270m	E3
800	360m	E10	270m	E3	270m	E3
900	360m	E10	270m	E3	270m	E3
1000	360m	E10	270m	E3	270m	E3
1100	360m	E10	270m	E3	270m	E3
1200	360m	E10	270m	E3	270m	E3
1213	360m	E10	270m	E3	270m	E3
Bethel Street Drain						
0	360m	E10	270m	E3	270m	E3
100	360m	E10	270m	E3	270m	E3
200	360m	E10	270m	E3	270m	E3
300	360m	E10	270m	E3	270m	E3
400	360m	E10	270m	E3	270m	E3
500	360m	E10	270m	E3	270m	E3
S123 - Bethel Street						
600	030m	E3	030m	E7	060m	E9
700	030m	E3	030m	E7	060m	E9
773	030m	E3	030m	E7	060m	E9
Minnippi Overflow						
0	360m	E10	360m	E10	360m	E10
100	360m	E10	360m	E10	360m	E10
200	360m	E10	360m	E10	360m	E10
300	360m	E10	360m	E10	360m	E10
400	360m	E10	360m	E10	360m	E10
500	360m	E10	360m	E10	360m	E10
600	360m	E10	360m	E10	360m	E10
700	360m	E10	360m	E10	360m	E10
800	360m	E10	360m	E10	360m	E10
884	360m	E10	360m	E6	360m	E10
S14 - Wynnum Road						
1000	360m	E10	360m	E6	360m	E6
1100	360m	E10	360m	E6	360m	E6
1200	360m	E10	270m	E3	360m	E6
S15 - Gateway Motorway						
1344	360m	E10	270m	E3	270m	E3
1400	360m	E10	270m	E3	270m	E3

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) [2]					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
1500	360m	E10	270m	E3	270m	E3
1600	360m	E10	270m	E3	270m	E3
1700	360m	E10	270m	E3	270m	E3
1800	360m	E10	270m	E3	270m	E3
1884	360m	E10	270m	E3	270m	E3
Stanton Road Drain						
0	360m	E10	360m	E6	360m	E6
S125 - Access Road						
100	1080m	E6	1080m	E10	1080m	E10
200	1080m	E6	1080m	E10	1080m	E10
300	1080m	E6	1080m	E10	1080m	E10
S126 - Stanton Road						
400	1080m	E6	1080m	E10	1080m	E10
500	1080m	E6	1080m	E10	1080m	E10
600	1080m	E6	1080m	E10	1080m	E10
700	1080m	E6	1080m	E10	1080m	E10
800	1080m	E6	1080m	E10	1080m	E10
900	1080m	E6	1080m	E10	1080m	E10
1000	1080m	E6	1080m	E10	1080m	E10
1100	1080m	E6	1080m	E10	1080m	E10
1187	1080m	E6	1080m	E10	1080m	E10
Moorabbin Drive Drain						
0	360m	E10	270m	E3	270m	E3
100	360m	E10	270m	E3	270m	E3
200	360m	E10	270m	E3	270m	E3
300	360m	E10	270m	E3	270m	E3
400	360m	E10	270m	E3	270m	E3
500	360m	E10	270m	E3	270m	E3
600	360m	E10	270m	E3	270m	E3
700	360m	E10	270m	E3	270m	E3
800	360m	E10	270m	E3	270m	E3
900	360m	E10	270m	E3	270m	E3
S119 - Billan Street						
1000	360m	E10	270m	E3	270m	E3
S120 - Gray Street						
1100	360m	E10	270m	E3	270m	E3
1200	360m	E10	270m	E3	270m	E3

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
Minnippi Creek						
0	360m	E10	270m	E3	270m	E3
100	360m	E10	270m	E3	270m	E3
200	360m	E10	270m	E3	270m	E3
300	360m	E10	270m	E3	270m	E3
400	360m	E10	270m	E3	270m	E3
500	360m	E10	270m	E3	270m	E3
600	360m	E10	270m	E3	270m	E3
700	360m	E10	270m	E3	270m	E3
800	360m	E10	270m	E3	270m	E3
900	360m	E10	270m	E3	270m	E3
1000	060m	E5	270m	E3	270m	E3
S114 - Creek Road (Southbound)						
1105	060m	E5	060m	E5	060m	E4
S115 - Creek Road (Northbound)						
1200	060m	E5	060m	E5	060m	E4
S117 - Pedestrian bridge						
1300	060m	E5	060m	E5	060m	E4
1400	030m	E3	060m	E4	060m	E4
S117a - Drop Structure #4						
1500	030m	E3	030m	E8	060m	E4
1600	030m	E3	060m	E4	060m	E4
S118 - Todman Street						
1700	060m	E5	060m	E4	060m	E4
S118a - Drop Structure #3						
1800	060m	E5	060m	E4	060m	E4
S118b - Drop Structure #2						
1900	030m	E3	060m	E4	060m	E4
2000	030m	E3	060m	E4	060m	E4
S118c - Drop Structure #1						
2076	030m	E3	060m	E4	060m	E4
Murarrie Park Drain						
0	360m	E10	270m	E3	270m	E3
100	360m	E10	270m	E3	270m	E3
200	360m	E10	270m	E3	270m	E3
300	360m	E10	270m	E3	270m	E3
400	360m	E10	270m	E3	270m	E3

AMTD (m)	Design Events – Scenario 1 (Existing Waterway Conditions) (2)					
	20-yr ARI (5% AEP)		50-yr ARI (2% AEP)		100-yr ARI (1% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
500	360m	E10	270m	E3	270m	E3
600	360m	E10	270m	E3	270m	E3
700	360m	E10	270m	E3	270m	E3
S112 - Park Access Culvert						
800	360m	E10	270m	E3	270m	E3
S113 - Park Access Bridge						
900	360m	E10	270m	E3	270m	E3
1000	360m	E10	270m	E3	270m	E3
1100	360m	E10	270m	E3	270m	E3
1116	360m	E10	270m	E3	270m	E3

(1) N/R = no result, typically because the AMTD line does not intersect the flood surface.
(2) Inclusive of a 9.8% increase in rainfall intensity and a 0.8m increase above HAT, due to projected climate variability effects.

Appendix J: Very Rare Events (Scenario 1) – Critical Duration and Median Ensemble

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AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) [2]					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
Bulimba Creek						
500	1080m	E1	1080m	E1	1440m	E10
600	1080m	E1	1080m	E1	1440m	E10
700	1080m	E1	1080m	E2	1440m	E10
800	1080m	E1	1080m	E2	1440m	E10
900	1080m	E1	1440m	E10	1440m	E10
1000	360m	E4	1080m	E2	1440m	E10
1100	1080m	E1	1440m	E10	1440m	E10
1200	1080m	E2	1080m	E2	1440m	E10
1300	1080m	E2	1440m	E10	1440m	E10
1400	1080m	E1	1440m	E10	1440m	E10
1500	1080m	E2	1440m	E10	1440m	E10
1600	1080m	E2	1440m	E10	1440m	E10
1700	1080m	E2	1440m	E10	1440m	E10
1800	1080m	E2	1440m	E10	1440m	E10
1900	1080m	E2	1440m	E10	1440m	E10
2000	360m	E4	1440m	E10	1440m	E10
2100	1080m	E2	1440m	E10	1440m	E10
2200	360m	E4	1440m	E10	1440m	E10
2300	360m	E4	1440m	E10	1440m	E10
2400	360m	E4	1440m	E10	1440m	E10
2500	360m	E4	1440m	E10	1440m	E10
2600	360m	E4	1440m	E10	1440m	E10
2700	360m	E4	1440m	E10	1440m	E10
2800	360m	E4	1440m	E10	1440m	E10
2900	360m	E4	1440m	E10	1440m	E10
3000	360m	E4	1440m	E10	1440m	E10
3100	360m	E4	1440m	E10	1440m	E10
3200	360m	E4	1440m	E10	1440m	E10
Structure S1 – Lytton Road (Eastbound)						
3300	360m	E4	1440m	E10	1440m	E10
Structure S2 – Lytton Road (Westbound)						
3400	360m	E4	1440m	E10	1440m	E10
3500	360m	E4	1440m	E10	1440m	E10
3600	360m	E4	1440m	E10	1440m	E10
3700	360m	E4	1440m	E10	1440m	E10
3800	360m	E4	1440m	E10	1440m	E10

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
3900	360m	E4	1440m	E10	1440m	E10
4000	360m	E4	1440m	E10	1440m	E10
4100	360m	E4	1440m	E10	1440m	E10
4200	360m	E4	1440m	E10	1440m	E10
Structure S3 – Port of Brisbane Motorway						
Structure S7 – Cleveland Railway						
4300	360m	E4	1440m	E10	1440m	E10
4400	360m	E4	1440m	E10	1440m	E10
4515	360m	E4	1440m	E10	1440m	E10
4600	360m	E4	1440m	E10	1440m	E10
4700	360m	E4	1440m	E10	1440m	E10
4800	360m	E4	1440m	E10	1440m	E10
4900	360m	E4	1440m	E10	1440m	E10
5000	360m	E4	1440m	E10	1440m	E10
5100	360m	E4	1440m	E10	1440m	E10
5200	360m	E4	1440m	E10	1440m	E10
5300	360m	E4	1440m	E10	1440m	E10
5400	360m	E4	1440m	E10	1440m	E6
5500	360m	E4	1440m	E10	1440m	E10
5600	360m	E4	1440m	E10	1440m	E6
5700	360m	E4	1440m	E10	1440m	E6
5800	360m	E4	1440m	E10	1440m	E6
5900	360m	E4	1440m	E10	1440m	E6
6000	360m	E4	1440m	E10	1440m	E6
6100	360m	E4	1440m	E10	1440m	E6
6200	360m	E4	1440m	E10	1440m	E6
6300	360m	E4	1440m	E10	1440m	E6
6400	360m	E4	1440m	E10	1440m	E6
6500	360m	E4	1440m	E10	1440m	E6
6600	360m	E4	1440m	E10	1440m	E6
6700	360m	E4	1440m	E10	1440m	E6
6800	360m	E4	1440m	E10	1440m	E6
6900	360m	E4	1440m	E10	1440m	E6
7000	360m	E4	1440m	E10	1440m	E6
7100	360m	E4	1440m	E10	1440m	E6
7200	360m	E4	1440m	E10	1440m	E6
7300	360m	E4	1440m	E10	1440m	E6

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
7400	360m	E4	1440m	E10	1440m	E6
7500	360m	E4	1440m	E10	1440m	E6
7600	360m	E4	1440m	E10	1440m	E6
7700	360m	E4	1440m	E10	1440m	E6
7800	360m	E4	1440m	E10	1440m	E6
7900	360m	E4	1440m	E10	1440m	E6
8000	360m	E4	1440m	E10	1440m	E6
8100	360m	E4	1440m	E10	1440m	E6
8200	360m	E4	1440m	E10	1440m	E6
8300	360m	E4	1440m	E10	1440m	E6
8400	360m	E4	1440m	E10	1440m	E6
8500	360m	E10	1440m	E10	1440m	E6
8600	360m	E10	1440m	E10	1440m	E6
8700	360m	E4	1440m	E10	1440m	E6
8800	360m	E10	1440m	E10	1440m	E6
8900	360m	E10	1440m	E10	1440m	E6
9000	360m	E4	1440m	E10	1440m	E6
9100	360m	E10	1440m	E10	1440m	E6
9200	360m	E4	1440m	E10	1440m	E6
9300	360m	E4	1440m	E10	1440m	E6
9400	360m	E4	1440m	E10	1440m	E6
9500	360m	E10	1440m	E10	1440m	E6
9600	360m	E10	1440m	E10	1440m	E6
9700	360m	E10	1440m	E10	1440m	E6
9800	360m	E10	1440m	E10	1440m	E6
9900	360m	E10	1440m	E10	1440m	E6
10000	360m	E10	1440m	E10	1440m	E6
10100	360m	E4	1440m	E10	1440m	E6
10200	360m	E4	1440m	E10	1440m	E6
10300	360m	E4	1440m	E10	1440m	E6
10400	360m	E10	1440m	E10	1440m	E6
10500	360m	E10	1440m	E10	1440m	E6
10600	360m	E4	1440m	E10	1440m	E6
10700	360m	E4	1440m	E10	1440m	E6
10800	360m	E10	1440m	E10	1440m	E6
10900	360m	E4	1440m	E10	1440m	E6
11000	360m	E10	1440m	E10	1440m	E6

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
11100	360m	E10	1440m	E10	1440m	E6
11200	360m	E10	1440m	E10	1440m	E6
11300	360m	E10	1440m	E10	1440m	E6
11400	270m	E3	1440m	E6	1440m	E6
11500	270m	E3	1440m	E6	1440m	E6
11600	270m	E3	1440m	E6	1440m	E6
11700	270m	E3	1440m	E6	1440m	E6
11800	270m	E3	1440m	E6	1440m	E6
11900	270m	E3	270m	E3	1440m	E6
Structure S10 – Gateway Motorway						
12055	270m	E3	270m	E3	1440m	E6
12100	270m	E3	270m	E3	1440m	E6
12200	270m	E3	270m	E3	1440m	E6
Structure S12 – Murarrie Road						
12300	270m	E3	270m	E3	1440m	E6
12400	270m	E3	270m	E3	1440m	E6
12500	270m	E3	270m	E3	1440m	E6
12600	270m	E3	270m	E3	1440m	E6
12700	270m	E3	270m	E3	1440m	E6
12800	270m	E3	270m	E3	1440m	E6
12900	270m	E3	270m	E3	1440m	E6
13000	270m	E3	270m	E3	1440m	E6
Structure S13 – Wynnum Road						
13100	270m	E3	270m	E3	1440m	E6
13200	270m	E3	270m	E3	1440m	E6
13300	270m	E3	270m	E3	1440m	E6
13400	270m	E3	270m	E3	1440m	E6
13500	270m	E3	270m	E3	1440m	E6
13600	270m	E3	270m	E3	1440m	E6
13700	270m	E3	270m	E3	1440m	E6
13800	270m	E3	270m	E3	1440m	E6
13900	270m	E3	270m	E3	1440m	E6
14000	270m	E3	270m	E3	1440m	E6
14100	270m	E3	270m	E3	1440m	E6
14200	270m	E3	270m	E3	1440m	E6
14300	270m	E3	270m	E3	1440m	E6
14400	270m	E3	270m	E3	1440m	E6

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
14500	270m	E3	270m	E3	1440m	E6
14600	270m	E3	270m	E3	1440m	E6
14700	270m	E3	270m	E3	1440m	E6
14800	270m	E3	270m	E3	1440m	E6
14900	270m	E3	270m	E3	1440m	E6
15000	270m	E3	270m	E3	1440m	E6
15100	270m	E3	270m	E3	1440m	E6
15200	270m	E3	270m	E3	1440m	E6
15300	270m	E3	270m	E3	1440m	E6
15400	270m	E3	270m	E3	1440m	E6
15500	270m	E3	270m	E3	1440m	E6
15600	270m	E3	270m	E3	1440m	E6
15700	270m	E3	270m	E3	1440m	E6
15800	270m	E3	270m	E3	1440m	E6
15900	270m	E3	270m	E3	1440m	E6
16000	270m	E3	270m	E3	1440m	E6
16100	270m	E3	270m	E3	1440m	E6
16200	270m	E3	270m	E3	1440m	E6
16300	270m	E3	270m	E3	1440m	E6
16400	270m	E3	270m	E3	1440m	E6
16500	270m	E3	270m	E3	1440m	E6
16600	270m	E3	270m	E3	1440m	E6
16700	270m	E3	270m	E3	1440m	E1
16800	270m	E3	270m	E3	1440m	E6
16900	270m	E3	270m	E3	1440m	E1
17000	270m	E3	270m	E3	1440m	E1
17100	270m	E3	270m	E3	1440m	E1
17200	270m	E3	270m	E3	1440m	E1
17300	270m	E3	270m	E3	1440m	E1
17400	270m	E3	270m	E3	1440m	E1
17500	270m	E3	270m	E3	1440m	E1
17600	270m	E3	270m	E3	270m	E3
17700	270m	E3	270m	E3	270m	E3
17800	270m	E3	270m	E3	270m	E3
17900	270m	E3	270m	E3	270m	E3
18000	270m	E3	270m	E3	270m	E3
18100	270m	E3	270m	E3	1440m	E1

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
18200	270m	E3	270m	E3	1440m	E1
18300	270m	E3	270m	E3	1440m	E1
18400	270m	E3	270m	E3	1440m	E1
18500	270m	E3	270m	E3	1440m	E1
18600	270m	E3	270m	E3	270m	E3
Structure S17 - Meadowlands Road						
18723	270m	E3	270m	E3	270m	E9
18800	270m	E3	270m	E3	270m	E9
18900	270m	E3	270m	E3	270m	E9
19000	270m	E3	270m	E9	270m	E9
19100	270m	E3	270m	E3	270m	E9
19200	270m	E3	270m	E9	270m	E9
19300	270m	E3	270m	E9	270m	E9
19400	270m	E3	270m	E9	270m	E9
19500	180m	E7	270m	E9	270m	E9
19600	180m	E7	270m	E9	270m	E9
19700	180m	E7	270m	E9	270m	E9
Structure S18 – Scrub Road Pedestrian Bridge						
19800	180m	E7	180m	E7	270m	E9
19900	180m	E4	180m	E7	180m	E9
20000	180m	E4	180m	E7	180m	E9
20100	180m	E4	180m	E7	180m	E9
20200	180m	E4	180m	E7	180m	E9
20300	180m	E4	180m	E7	180m	E9
20400	180m	E4	180m	E7	180m	E9
20500	180m	E4	180m	E7	180m	E9
20600	180m	E4	180m	E7	180m	E9
20700	180m	E4	180m	E7	180m	E9
20800	180m	E4	180m	E7	180m	E9
20900	180m	E4	180m	E7	180m	E9
21000	180m	E4	180m	E7	120m	E8
Structure S27 – Old Cleveland Road						
21100	180m	E7	180m	E7	120m	E9
21200	180m	E7	180m	E7	120m	E9
21300	180m	E7	180m	E7	120m	E9
21400	180m	E7	180m	E7	120m	E9
21500	180m	E7	120m	E3	120m	E9

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) [2]					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
21600	180m	E7	180m	E7	120m	E9
Structure S29 – Winstanley Street						
21700	180m	E7	120m	E3	120m	E9
21800	180m	E7	120m	E3	120m	E9
21900	180m	E7	120m	E3	120m	E9
22000	180m	E7	120m	E3	120m	E9
22100	180m	E7	120m	E3	120m	E9
22200	180m	E7	120m	E8	120m	E9
22300	180m	E7	120m	E8	120m	E9
22400	180m	E7	120m	E8	120m	E9
22500	180m	E7	120m	E8	120m	E9
Structure S36 – Meadowbank Street Pedestrian Bridge						
22600	180m	E7	120m	E5	120m	E9
22700	180m	E7	120m	E5	120m	E9
22800	120m	E8	120m	E5	120m	E9
22900	120m	E6	120m	E5	120m	E9
23000	120m	E6	120m	E5	120m	E9
23100	120m	E5	120m	E5	120m	E9
23200	120m	E5	120m	E5	120m	E9
23300	120m	E5	120m	E5	120m	E9
23400	120m	E8	120m	E5	120m	E9
Structure S37 – Pine Mountain Road						
23500	120m	E3	120m	E9	120m	E9
23600	120m	E3	120m	E9	120m	E9
23700	120m	E3	120m	E9	120m	E9
23800	120m	E3	120m	E9	120m	E9
23900	120m	E3	120m	E9	120m	E9
24000	120m	E3	120m	E9	120m	E9
24100	120m	E3	120m	E9	120m	E9
24200	120m	E3	120m	E9	120m	E9
24300	120m	E3	120m	E9	120m	E9
24400	120m	E3	120m	E3	120m	E9
24500	120m	E3	120m	E3	120m	E9
24600	120m	E3	120m	E3	120m	E9
24700	120m	E3	120m	E3	120m	E9
24800	120m	E3	120m	E3	120m	E9
24900	120m	E8	120m	E3	120m	E9

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) [2]					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
25000	120m	E8	120m	E3	120m	E9
25100	120m	E5	120m	E3	120m	E9
25200	120m	E5	120m	E3	120m	E9
25300	120m	E5	120m	E3	120m	E9
25400	120m	E5	120m	E8	120m	E9
25500	120m	E5	120m	E5	120m	E9
25600	120m	E8	120m	E3	120m	E9
25700	120m	E8	120m	E3	120m	E9
25800	120m	E4	120m	E3	120m	E9
25900	120m	E4	120m	E3	120m	E9
Structure S55 – Oakley Street Pedestrian Bridge						
26000	120m	E5	120m	E3	120m	E5
26100	120m	E5	120m	E3	120m	E5
26200	120m	E6	120m	E8	120m	E5
26300	120m	E6	120m	E8	120m	E5
26400	120m	E6	120m	E8	120m	E5
26500	120m	E6	120m	E8	120m	E5
26600	120m	E6	120m	E8	120m	E5
26700	120m	E6	120m	E8	120m	E5
26800	120m	E5	120m	E8	120m	E5
Structure S56 – Wecker Road						
26900	120m	E5	120m	E3	120m	E5
27000	120m	E5	120m	E3	120m	E5
27100	120m	E5	120m	E3	120m	E5
27200	120m	E5	120m	E3	120m	E5
27300	120m	E5	120m	E3	120m	E5
27400	120m	E5	120m	E3	120m	E5
27500	120m	E5	120m	E3	120m	E5
27600	120m	E5	120m	E3	120m	E5
27700	120m	E5	120m	E8	120m	E9
27800	120m	E5	120m	E8	120m	E5
27900	120m	E5	120m	E8	120m	E5
28000	120m	E5	120m	E8	120m	E3
28100	120m	E5	120m	E8	120m	E3
28200	120m	E5	120m	E8	120m	E8
S57 - Mount Gravatt Capalaba Road						
28300	120m	E5	120m	E8	120m	E3

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) [2]					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
28400	120m	E5	120m	E8	120m	E5
28500	120m	E5	120m	E8	120m	E3
28600	120m	E5	120m	E8	120m	E3
28700	120m	E5	120m	E8	120m	E3
28800	120m	E5	120m	E8	120m	E3
28900	120m	E5	120m	E8	120m	E3
29000	120m	E5	120m	E5	120m	E3
29100	120m	E5	120m	E5	120m	E3
29200	120m	E5	120m	E5	120m	E3
29300	120m	E5	120m	E5	120m	E3
29400	120m	E5	120m	E5	120m	E3
29500	120m	E5	120m	E5	120m	E3
29600	120m	E8	120m	E5	120m	E3
29700	120m	E8	120m	E5	120m	E3
29800	120m	E8	120m	E5	120m	E3
29900	120m	E8	120m	E5	120m	E3
30000	120m	E3	120m	E5	120m	E3
30100	120m	E3	120m	E5	120m	E3
30200	120m	E8	120m	E5	120m	E3
30300	120m	E8	120m	E5	120m	E3
30400	120m	E8	120m	E5	120m	E3
30500	120m	E8	120m	E5	120m	E3
30600	120m	E8	120m	E5	120m	E3
30700	120m	E8	120m	E5	120m	E3
30800	120m	E8	120m	E5	120m	E3
30900	120m	E8	120m	E5	120m	E3
S58 - Sherwood Place Pedestrian Bridge						
31000	120m	E8	120m	E8	120m	E3
31100	120m	E8	120m	E8	120m	E1
31200	120m	E8	120m	E8	120m	E1
31300	120m	E8	120m	E8	120m	E1
31400	120m	E8	120m	E8	120m	E1
31500	120m	E1	120m	E1	120m	E1
31600	120m	E1	120m	E1	120m	E1
31700	120m	E1	120m	E1	120m	E1
31800	120m	E1	120m	E9	120m	E1
31900	120m	E1	120m	E9	120m	E1

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
S59 - Craig Street Pedestrian Bridge						
32000	120m	E9	120m	E9	120m	E1
32100	120m	E8	120m	E8	120m	E1
32200	120m	E8	120m	E8	120m	E9
32300	120m	E8	120m	E8	120m	E9
32400	120m	E8	120m	E8	120m	E9
32500	120m	E8	120m	E8	120m	E8
32600	120m	E1	120m	E8	120m	E8
32700	120m	E1	120m	E8	120m	E8
32800	120m	E1	120m	E8	120m	E8
32900	120m	E1	120m	E8	120m	E8
33000	120m	E1	120m	E8	120m	E8
S60 - D/S of Logan Road Pedestrian Bridge						
33100	120m	E1	120m	E8	120m	E8
S61 - Logan Road						
33200	120m	E1	120m	E1	120m	E1
S63 - Pacific Motorway						
33362	120m	E1	120m	E1	120m	E1
33400	120m	E1	120m	E1	120m	E1
33500	120m	E1	120m	E1	120m	E1
33600	120m	E1	120m	E1	120m	E1
33700	120m	E1	120m	E1	120m	E1
33800	120m	E1	120m	E1	120m	E1
33900	120m	E1	120m	E1	120m	E1
34000	120m	E1	120m	E1	120m	E1
34100	120m	E1	120m	E1	120m	E1
34200	120m	E1	120m	E1	120m	E1
34300	120m	E5	120m	E1	120m	E1
34400	120m	E5	120m	E5	120m	E1
34500	120m	E5	120m	E5	120m	E5
S66 - Padstow Road						
34600	120m	E1	120m	E5	060m	E5
34700	120m	E1	060m	E5	060m	E5
34800	060m	E8	060m	E5	060m	E5
34900	060m	E8	060m	E2	060m	E5
35000	060m	E8	060m	E8	060m	E5
S68 - Malbon Street Pedestrian Bridge						

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
35100	060m	E8	060m	E8	060m	E5
35200	060m	E8	060m	E8	060m	E5
35300	060m	E8	060m	E2	060m	E2
35400	060m	E9	060m	E1	060m	E1
35500	060m	E1	060m	E5	060m	E5
35600	060m	E5	060m	E5	060m	E5
35700	060m	E1	060m	E5	060m	E5
35800	060m	E1	060m	E5	060m	E5
35900	060m	E1	060m	E5	060m	E5
36000	060m	E1	060m	E5	060m	E5
36100	060m	E1	060m	E5	060m	E5
36200	060m	E1	060m	E5	060m	E5
36300	060m	E5	060m	E5	060m	E5
36400	060m	E5	060m	E5	060m	E5
36500	060m	E5	060m	E5	060m	E5
S69 - Altandi Street Pedestrian Bridge						
36600	060m	E5	060m	E5	060m	E5
36700	060m	E5	060m	E5	060m	E5
36800	060m	E5	060m	E5	060m	E5
S70 - D/S Gold Coast Railway Pedestrian Bridge						
36900	060m	E5	060m	E5	060m	E5
36985	060m	E5	060m	E5	060m	E5
S71 and S72 - Gold Coast Railway						
37100	060m	E5	060m	E5	060m	E5
S73 - Beenleigh Road						
37200	060m	E5	060m	E5	060m	E5
37300	060m	E5	060m	E5	060m	E5
S74 - Gowan Road Pedestrian Culvert						
37400	060m	E5	060m	E5	060m	E5
37500	060m	E5	060m	E5	060m	E5
37600	060m	E5	030m	E7	030m	E7
37700	060m	E5	060m	E5	030m	E7
37800	060m	E5	060m	E5	030m	E7
37900	060m	E5	060m	E5	030m	E10
38000	060m	E5	030m	E10	030m	E10
38100	060m	E3	030m	E10	030m	E10
S75 - Energy Dissipator						

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) [2]					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
38200	060m	E5	030m	E10	030m	E10
38300	060m	E5	030m	E10	030m	E10
38400	060m	E5	030m	E10	030m	E10
S77 - Glenefer Street Pedestrian Bridge						
38500	060m	E5	030m	E10	030m	E10
38574	060m	E5	030m	E9	030m	E9
S78 - Brandon Road						
38700	030m	E7	030m	E7	030m	E7
38800	030m	E7	030m	E7	030m	E7
38900	030m	E7	030m	E7	030m	E7
S79 - Nemies Road						
39000	030m	E7	030m	E7	030m	E7
39100	030m	E7	030m	E7	030m	E7
39200	030m	E7	030m	E7	030m	E7
39300	030m	E7	030m	E7	030m	E7
S80 - Calliope Street Bikeway						
39400	030m	E7	030m	E2	030m	E2
39500	030m	E2	030m	E2	030m	E2
39600	030m	E2	030m	E2	030m	E2
39700	030m	E2	030m	E2	030m	E2
39800	030m	E2	030m	E2	030m	E2
39888	030m	E2	030m	E2	030m	E2
Daw Road Drain						
0	060m	E8	060m	E8	060m	E5
100	060m	E8	060m	E8	060m	E5
200	030m	E7	030m	E7	030m	E7
300	030m	E7	030m	E7	030m	E7
400	030m	E7	030m	E7	030m	E7
500	030m	E7	030m	E7	030m	E7
600	030m	E7	030m	E7	030m	E7
700	030m	E7	030m	E7	030m	E7
800	030m	E7	030m	E7	030m	E7
900	030m	E7	030m	E7	030m	E7
1000	030m	E7	030m	E7	030m	E7
1095	030m	E7	030m	E7	030m	E7
Padstow Road Drain						
0	120m	E5	120m	E5	120m	E5

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
S169 - McCullough Street Pedestrian Bridge						
100	030m	E7	030m	E2	060m	E9
200	030m	E7	030m	E7	030m	E7
S170 - McCullough Street						
300	030m	E2	030m	E2	030m	E7
400	030m	E2	030m	E2	030m	E2
441	030m	E2	030m	E2	030m	E2
Mimosa Creek						
0	120m	E5	120m	E5	120m	E1
100	120m	E5	120m	E5	120m	E5
S82 - Turnmill Street Pedestrian Culvert						
200	120m	E5	120m	E5	120m	E5
300	120m	E8	120m	E8	120m	E8
400	060m	E5	060m	E10	060m	E5
500	060m	E5	060m	E10	060m	E10
S83 - Springfield Street Pedestrian Culvert						
600	060m	E5	060m	E10	060m	E10
700	060m	E5	060m	E10	060m	E10
800	060m	E10	060m	E10	060m	E10
900	060m	E10	060m	E10	060m	E10
1000	060m	E10	060m	E10	060m	E10
1100	060m	E10	060m	E10	060m	E10
1200	060m	E5	060m	E10	060m	E10
S84 - Parkway Street						
1300	060m	E5	060m	E5	060m	E5
1400	060m	E5	060m	E5	060m	E5
1500	060m	E5	060m	E5	060m	E5
S85 - Kessels Road						
1610	060m	E5	060m	E5	060m	E5
1700	060m	E5	060m	E5	060m	E5
1800	060m	E5	060m	E5	060m	E5
S86(a)(b)(c) - Pacific Motorway						
1944	060m	E5	060m	E5	060m	E5
2000	060m	E5	060m	E5	060m	E5
S87 - Nagle Street						
2100	060m	E5	060m	E5	060m	E5
2200	060m	E5	060m	E5	060m	E5

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) [2]					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
2300	060m	E5	060m	E5	060m	E5
2400	060m	E5	060m	E5	060m	E5
2500	060m	E5	060m	E10	060m	E10
2600	060m	E5	060m	E5	060m	E10
2700	060m	E5	060m	E5	060m	E5
2800	060m	E3	060m	E5	060m	E5
2900	060m	E10	060m	E10	060m	E10
3000	120m	E2	120m	E2	060m	E5
S88 - Hibiscus Place Pedestrian Culvert						
3100	120m	E8	120m	E2	060m	E5
3200	120m	E2	120m	E2	060m	E5
3300	120m	E2	120m	E2	060m	E5
3400	120m	E2	120m	E2	060m	E5
3500	120m	E2	120m	E2	060m	E5
3600	120m	E2	120m	E2	060m	E5
3674	120m	E2	120m	E2	060m	E5
Nardie Street Drain						
0	120m	E8	120m	E8	120m	E1
100	120m	E8	120m	E8	120m	E1
200	030m	E7	030m	E7	030m	E7
300	030m	E7	030m	E7	030m	E7
400	030m	E7	030m	E7	030m	E7
496	030m	E2	030m	E2	030m	E2
Bulimba Creek East						
0	120m	E8	120m	E5	120m	E3
100	120m	E8	120m	E5	120m	E3
200	120m	E3	120m	E1	120m	E8
300	120m	E1	120m	E1	060m	E8
400	120m	E1	060m	E9	060m	E8
500	120m	E1	060m	E9	060m	E8
600	120m	E1	060m	E9	060m	E8
700	120m	E1	060m	E9	060m	E8
800	120m	E1	060m	E9	060m	E8
900	060m	E5	060m	E1	060m	E9
1000	060m	E1	060m	E1	060m	E1
1100	060m	E1	060m	E1	060m	E1
1200	060m	E1	060m	E5	060m	E5

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
S89 - Gateway Motorway - On / Off Ramp						
1300	060m	E5	060m	E5	060m	E5
1400	060m	E5	060m	E5	060m	E5
1500	060m	E5	060m	E5	060m	E5
1576	060m	E5	060m	E5	060m	E5
S90 - Miles Platting Road						
S91 - South East Busway Loop						
1700	060m	E5	060m	E5	060m	E5
1800	060m	E5	060m	E5	060m	E5
1881	060m	E5	060m	E5	060m	E5
S92 - South East Busway						
S93 - Pacific Motorway						
2000	060m	E5	060m	E5	060m	E5
S93(a)(b)(c) - V1 Veloway						
2100	060m	E5	060m	E5	060m	E5
2200	060m	E5	060m	E5	060m	E5
2300	060m	E5	060m	E5	060m	E5
2400	060m	E5	060m	E5	060m	E5
2500	060m	E5	060m	E5	060m	E5
S94 - Logan Road						
2597	060m	E5	060m	E5	060m	E5
S194 - Glen Hotel Weir						
2700	060m	E5	060m	E5	060m	E5
2800	060m	E5	060m	E5	060m	E5
2880	060m	E5	060m	E5	060m	E5
S96 - Gateway Motorway						
3000	060m	E5	060m	E5	060m	E5
3100	060m	E5	060m	E5	060m	E5
3200	060m	E5	060m	E5	060m	E5
3300	060m	E5	060m	E5	060m	E5
3400	060m	E5	060m	E5	060m	E5
3498	060m	E5	060m	E5	060m	E5
S97 - Underwood Road						
3600	060m	E5	060m	E5	060m	E5
3700	060m	E5	060m	E5	060m	E5
3800	060m	E5	060m	E5	060m	E5
3900	060m	E5	060m	E5	060m	E5

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
4000	060m	E5	060m	E5	060m	E5
4100	060m	E5	060m	E5	060m	E5
4200	060m	E5	060m	E5	060m	E5
4300	060m	E5	060m	E5	060m	E5
4400	060m	E5	060m	E5	060m	E5
4500	060m	E5	060m	E5	030m	E7
4600	060m	E5	030m	E7	030m	E7
4700	060m	E5	030m	E7	030m	E7
4800	060m	E5	030m	E7	030m	E7
4900	060m	E5	030m	E7	030m	E7
5000	030m	E10	030m	E7	030m	E7
5100	030m	E10	030m	E7	030m	E7
5200	030m	E10	030m	E7	030m	E7
5300	030m	E10	030m	E7	030m	E7
S99 - Gateway Motorway						
5400	030m	E7	030m	E7	030m	E7
S100 - Gold Coast Railway						
S101 - Beenleigh Road						
5500	030m	E7	030m	E7	030m	E7
5600	030m	E7	030m	E7	030m	E7
5700	030m	E7	030m	E7	030m	E7
5800	030m	E7	030m	E7	030m	E7
5900	030m	E7	030m	E2	030m	E7
6000	030m	E2	030m	E2	030m	E2
6100	030m	E2	030m	E2	030m	E2
6200	030m	E2	030m	E2	030m	E2
6296	030m	E2	030m	E2	030m	E2
Bulimba Creek East Railway Bypass						
0	030m	E10	030m	E7	030m	E7
100	030m	E7	030m	E7	030m	E7
200	030m	E7	030m	E7	030m	E7
300	030m	E7	030m	E7	030m	E7
400	030m	E7	030m	E7	030m	E7
460	030m	E7	030m	E7	030m	E7
Tributary C						
0	060m	E5	060m	E5	060m	E5
56	060m	E4	060m	E4	060m	E5

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) [2]					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
S174 - Gateway Motorway						
200	030m	E7	030m	E7	030m	E7
300	030m	E7	030m	E7	030m	E7
400	030m	E7	030m	E7	030m	E7
500	030m	E7	030m	E7	030m	E7
600	030m	E7	030m	E7	030m	E7
700	030m	E7	030m	E7	030m	E7
800	030m	E7	030m	E7	030m	E7
900	030m	E7	030m	E7	030m	E7
1000	030m	E7	030m	E7	030m	E7
1100	030m	E7	030m	E7	030m	E7
1200	030m	E7	030m	E2	030m	E8
1246	030m	E7	030m	E2	030m	E10
Tributary B						
0	060m	E5	060m	E5	060m	E5
100	060m	E5	060m	E5	060m	E5
S95 - Logan Road						
200	060m	E1	060m	E9	060m	E9
300	030m	E2	030m	E2	060m	E9
400	030m	E2	030m	E9	030m	E7
S104 - Dance Crescent						
500	030m	E2	030m	E7	030m	E2
584	030m	E2	030m	E2	030m	E2
Tributary A						
0	060m	E5	060m	E5	060m	E5
100	060m	E5	060m	E5	060m	E5
S105 - Gateway Motorway						
241	060m	E5	060m	E5	060m	E5
300	060m	E5	060m	E5	060m	E5
400	060m	E5	060m	E5	060m	E5
500	060m	E5	060m	E5	060m	E5
S106 - Pacific Motorway Off Ramp						
600	030m	E7	060m	E5	060m	E4
700	030m	E7	030m	E7	030m	E10
800	030m	E7	030m	E7	030m	E7
900	030m	E7	030m	E7	030m	E7
S107 - Pacific Motorway						

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) [2]					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
1038	030m	E7	030m	E7	030m	E8
1100	030m	E7	030m	E7	030m	E9
1200	030m	E7	030m	E7	030m	E7
1300	030m	E7	030m	E7	030m	E7
1400	030m	E7	030m	E7	030m	E7
1500	030m	E7	030m	E7	030m	E7
1600	030m	E7	030m	E7	030m	E7
1700	030m	E7	030m	E7	030m	E7
1800	030m	E7	030m	E7	030m	E7
1900	030m	E7	030m	E7	030m	E7
2000	030m	E7	030m	E7	030m	E7
2100	030m	E7	030m	E7	030m	E7
2200	030m	E7	030m	E7	030m	E7
2300	030m	E7	030m	E7	030m	E7
2400	030m	E7	030m	E7	030m	E7
2500	030m	E2	030m	E7	030m	E7
2600	030m	E2	030m	E7	030m	E2
2700	030m	E2	030m	E2	030m	E2
2800	030m	E2	030m	E2	030m	E2
2900	030m	E2	030m	E2	030m	E2
2915	030m	E2	030m	E2	030m	E2
Tributary A1						
0	030m	E7	030m	E7	030m	E7
100	030m	E4	030m	E4	030m	E2
200	030m	E7	030m	E7	030m	E6
300	030m	E2	030m	E2	030m	E10
400	030m	E2	030m	E2	030m	E10
500	030m	E1	030m	E2	030m	E2
600	030m	E1	030m	E2	030m	E2
689	030m	E2	030m	E2	030m	E2
Tributary A Overflow						
0	060m	E5	060m	E5	060m	E5
71	060m	E5	060m	E5	060m	E5
S186 and S189 - Pacific Motorway						
S187 and S190 - Pacific Motorway On Ramp						
S188 and S191 - Busway						
200	060m	E5	060m	E5	060m	E5

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) [2]					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
300	060m	E5	060m	E10	030m	E7
400	060m	E9	030m	E7	030m	E7
500	030m	E7	030m	E7	030m	E7
S192 - School Road						
600	030m	E7	030m	E7	030m	E7
S193 - Diversion Weir						
700	030m	E7	030m	E7	030m	E8
703	030m	E7	030m	E7	030m	E8
Tributary A2						
0	030m	E7	030m	E7	030m	E7
100	030m	E7	030m	E7	030m	E7
200	030m	E7	030m	E7	030m	E7
300	030m	E7	030m	E7	030m	E7
S108 - Freeway Office Park Weir						
410	030m	E7	030m	E7	030m	E7
S109 - Freeway Office Park Internal Road						
505	030m	E7	030m	E7	030m	E7
S110 and S111 - Logan Road						
628	030m	E2	030m	E2	030m	E7
700	030m	E2	030m	E2	030m	E7
760	030m	E2	030m	E2	030m	E2
Miles Platting Road Drain						
0	120m	E1	060m	E9	060m	E8
100	030m	E7	030m	E7	030m	E7
S172 - Gateway Motorway						
200	030m	E7	030m	E7	030m	E7
300	030m	E7	030m	E7	030m	E7
400	030m	E2	030m	E7	030m	E7
500	030m	E2	030m	E2	030m	E7
600	030m	E2	030m	E2	030m	E2
700	030m	E2	030m	E2	030m	E2
800	030m	E2	030m	E2	030m	E2
900	030m	E2	030m	E2	030m	E2
1000	030m	E2	030m	E2	030m	E2
S173 - Miles Platting Road						
1100	030m	E2	030m	E2	030m	E2
1200	030m	E2	030m	E8	030m	E8

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
1300	030m	E2	030m	E2	030m	E2
1328	030m	E2	030m	E2	030m	E2
Kate Circuit Drain						
0	030m	E2	030m	E2	030m	E7
100	030m	E8	030m	E9	030m	E5
200	030m	E2	030m	E2	030m	E2
300	030m	E7	030m	E2	030m	E2
400	030m	E2	030m	E2	030m	E2
437	030m	E2	030m	E2	030m	E2
Parklands Circuit Drain						
0	120m	E5	120m	E5	120m	E3
100	120m	E8	120m	E5	120m	E3
200	120m	E8	120m	E5	120m	E3
S165 - Gateway Motorway						
300	030m	E7	030m	E7	030m	E7
400	030m	E7	030m	E7	030m	E7
500	030m	E7	030m	E7	030m	E7
600	030m	E7	030m	E7	030m	E7
700	030m	E7	030m	E7	030m	E7
S166 - Prebble Street						
800	030m	E7	030m	E8	030m	E2
900	030m	E7	030m	E2	030m	E8
S167 - Kyeema Street						
1000	030m	E8	030m	E2	030m	E2
1100	030m	E7	030m	E2	030m	E2
S168 - Echidna Street						
1206	030m	E7	030m	E7	030m	E2
1300	030m	E7	030m	E7	030m	E7
1400	030m	E7	030m	E2	030m	E7
1500	030m	E2	030m	E2	030m	E2
1600	030m	E2	030m	E2	030m	E7
1675	030m	E7	030m	E7	030m	E7
Broadwater Road Drain						
0	120m	E5	120m	E3	120m	E5
100	120m	E5	120m	E8	120m	E9
200	120m	E5	120m	E3	120m	E9
300	120m	E5	120m	E3	120m	E9

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) [(2)]					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
400	120m	E8	120m	E3	120m	E9
500	120m	E5	120m	E6	120m	E3
600	030m	E10	030m	E10	030m	E10
700	030m	E10	030m	E10	030m	E10
800	030m	E10	030m	E10	030m	E10
900	030m	E7	030m	E7	030m	E10
1000	030m	E7	030m	E7	030m	E7
1100	030m	E7	030m	E7	030m	E7
S152 - Broadwater Road						
1200	030m	E7	030m	E7	030m	E7
1300	030m	E7	030m	E7	030m	E7
S153 - Brisbane Adventist College Drop Structure						
1400	030m	E7	030m	E7	030m	E7
1500	030m	E7	030m	E7	030m	E7
1600	030m	E2	030m	E2	030m	E7
1700	030m	E2	030m	E7	030m	E7
S155 - Brisbane Adventist College Pedestrian Bridge						
S156 - Brisbane Adventist College Drop Structure						
1800	030m	E2	030m	E2	030m	E7
S157 - 16 Rowe Close Drop Structure						
1897	030m	E2	030m	E2	030m	E2
S158 - 16 Rowe Close Drop Structure						
2000	030m	E2	030m	E2	030m	E2
S159 - 226 Wishart Road - Internal Road						
2100	030m	E2	030m	E2	030m	E2
2113	030m	E2	030m	E2	030m	E2
Wishart Road Drain						
0	030m	E7	030m	E7	030m	E7
100	030m	E7	030m	E7	030m	E7
200	030m	E7	030m	E7	030m	E7
S160 - Wishart Road						
300	030m	E7	030m	E7	030m	E7
400	030m	E7	030m	E2	030m	E2
497	030m	E2	030m	E2	030m	E2
S161 - Access Bridge to 10 St.George Circuit						
S162 - Access Bridge to 10 St.George Circuit						
600	N/R [(1)]	N/R [(1)]	N/R [(1)]	N/R [(1)]	030m	E2

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) [2]					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
700	030m	E2	030m	E2	030m	E2
S164 - 35 Avenell Street Access Road						
723	030m	E2	030m	E2	030m	E2
Wecker Road Drain						
0	120m	E6	120m	E8	120m	E5
100	120m	E6	120m	E8	120m	E5
200	120m	E8	120m	E6	120m	E5
300	120m	E5	120m	E8	120m	E5
383	060m	E5	060m	E5	060m	E5
S141 - Christian College Access Road						
S142 - Christian College Access Road						
500	060m	E5	060m	E5	060m	E5
S143 and S144 - Scrub Road						
608	060m	E5	060m	E5	060m	E4
700	060m	E5	060m	E5	060m	E4
S145 - Wecker Road						
800	060m	E5	060m	E5	030m	E7
900	060m	E5	060m	E5	030m	E7
1000	060m	E5	060m	E5	030m	E7
1093	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]	N/R [1]
S146 - Gateway Motorway						
1200	060m	E5	060m	E5	030m	E7
1300	060m	E5	060m	E5	030m	E7
1400	060m	E5	060m	E5	030m	E7
1500	030m	E8	060m	E4	030m	E7
S147 - Weedon Street East						
1600	030m	E8	030m	E2	030m	E2
S148 and S149 - Mount Petrie Road						
1700	030m	E7	030m	E7	030m	E7
1800	030m	E7	030m	E7	030m	E7
1900	030m	E2	030m	E2	030m	E2
2000	030m	E2	030m	E2	030m	E2
2016	030m	E2	030m	E2	030m	E2
Newnham Creek						
0	120m	E3	120m	E3	120m	E9
100	120m	E3	120m	E3	120m	E9
200	120m	E3	120m	E3	120m	E9

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
300	120m	E3	120m	E3	120m	E9
400	120m	E1	120m	E1	120m	E9
500	060m	E4	060m	E4	120m	E9
600	060m	E4	030m	E7	030m	E7
700	060m	E4	030m	E7	030m	E7
S39 - Access Road to 100 Wecker Road						
800	060m	E4	030m	E8	030m	E8
867	060m	E4	030m	E8	030m	E8
S40 - Stormwater Quality Improvement Device						
S41 - Secam Street						
S42 - Access Road to 33 Secam Street						
1001	060m	E5	060m	E4	030m	E10
S43 - Devlan Street						
1100	060m	E4	060m	E4	030m	E7
S44 - Bunnings Access #3						
S45 - Bunnings Access #2						
1200	060m	E4	060m	E4	030m	E7
S46 - Bunnings Access #1						
1300	060m	E4	060m	E4	030m	E7
S47 - Newnham Road						
1400	060m	E4	030m	E7	030m	E7
1500	060m	E4	030m	E7	030m	E7
1597	060m	E4	030m	E7	030m	E7
S48 - Access Road to 285 Creek Road						
S49 - Drop Structure #3						
1700	060m	E4	030m	E7	030m	E7
S50 - Drop Structure #2						
S51 - Drop Structure #1						
1800	030m	E7	030m	E7	030m	E2
S52 - Internal Road for 215 Creek Road						
S53 - 215 Creek Road Pedestrian Bridge						
1900	060m	E4	030m	E7	030m	E7
2000	060m	E4	030m	E7	030m	E7
2012	060m	E4	030m	E7	030m	E7
Spring Creek						
0	120m	E6	120m	E5	120m	E9
100	120m	E6	120m	E5	120m	E9

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
200	120m	E6	120m	E5	120m	E9
300	120m	E6	120m	E5	120m	E9
400	060m	E5	060m	E5	120m	E9
500	060m	E5	060m	E5	060m	E5
600	060m	E5	060m	E5	060m	E5
700	060m	E5	060m	E5	060m	E5
800	060m	E5	060m	E5	060m	E5
S132 - Scrub Road						
900	060m	E5	060m	E5	060m	E5
1000	060m	E5	060m	E5	060m	E5
1100	060m	E5	060m	E5	060m	E5
1200	120m	E2	060m	E10	060m	E5
1300	120m	E2	060m	E7	060m	E7
1400	120m	E2	060m	E3	060m	E3
1500	120m	E4	060m	E6	060m	E10
1600	120m	E2	060m	E10	060m	E3
1700	120m	E2	060m	E10	060m	E10
S133 - Woodland Street Pedestrian Bridge						
1800	120m	E2	060m	E10	060m	E10
1900	120m	E2	060m	E10	060m	E10
2000	120m	E2	060m	E10	060m	E10
2006	120m	E2	060m	E10	060m	E10
Warwick Creek						
0	120m	E2	060m	E5	060m	E5
S134 - Greendale Way						
100	120m	E2	060m	E10	060m	E10
200	120m	E2	060m	E10	060m	E10
300	060m	E10	060m	E10	060m	E10
400	060m	E10	060m	E10	060m	E10
S135 - Amersham Crescent						
500	060m	E10	060m	E10	060m	E10
600	060m	E10	060m	E10	060m	E10
700	060m	E10	060m	E10	060m	E10
800	060m	E10	060m	E7	030m	E2
900	120m	E2	120m	E2	060m	E10
1000	120m	E2	120m	E2	120m	E2
S136 - Cribb Road						

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) [(2)]					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
1100	120m	E2	120m	E2	120m	E2
1200	120m	E2	120m	E2	120m	E2
1300	120m	E2	120m	E2	120m	E2
1400	120m	E2	120m	E2	120m	E2
1500	120m	E2	120m	E2	120m	E2
1600	360m	E10	360m	E6	360m	E10
S138 - Oakley Street						
1700	360m	E6	360m	E6	360m	E10
1800	360m	E10	360m	E6	360m	E6
1817	360m	E8	360m	E6	360m	E6
Silky Oak Circuit Drain						
0	120m	E2	120m	E2	120m	E2
S139 - Oakley Street						
100	120m	E6	060m	E4	030m	E2
200	120m	E6	060m	E4	030m	E8
246	060m	E4	060m	E4	030m	E8
Salvin Creek						
0	180m	E7	120m	E3	120m	E9
100	180m	E7	120m	E3	120m	E9
200	180m	E7	120m	E3	120m	E9
300	180m	E7	120m	E3	120m	E9
400	180m	E7	120m	E3	120m	E9
500	180m	E7	120m	E6	120m	E9
S31 - Donnington Street (Lower)						
600	060m	E5	060m	E5	060m	E5
700	060m	E5	060m	E5	060m	E5
800	060m	E5	060m	E5	060m	E5
900	060m	E5	060m	E5	060m	E5
1000	060m	E5	060m	E5	060m	E5
1100	060m	E5	060m	E5	060m	E5
S32 - Donnington Street (Upper)						
1200	060m	E5	060m	E5	060m	E5
1300	060m	E5	060m	E5	060m	E5
1400	060m	E5	060m	E5	030m	E7
S33 - Creek Road						
1515	060m	E4	060m	E4	030m	E7
1600	060m	E4	060m	E4	030m	E7

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
1700	060m	E4	060m	E4	030m	E7
1800	030m	E7	030m	E7	030m	E7
S34 - Pine Mountain Road						
1900	030m	E7	030m	E7	030m	E7
2000	030m	E7	030m	E7	030m	E7
2100	030m	E7	030m	E7	030m	E7
2200	030m	E7	030m	E7	030m	E7
2300	030m	E9	030m	E9	030m	E7
S35 - Bevan Street						
2400	030m	E7	030m	E7	030m	E7
2500	030m	E2	030m	E2	030m	E2
2600	030m	E2	030m	E2	030m	E2
2700	030m	E8	030m	E6	030m	E2
2800	030m	E2	030m	E2	030m	E2
2900	030m	E2	030m	E2	030m	E2
2926	030m	E2	030m	E2	030m	E2
Glengariff Tributary						
0	060m	E4	060m	E4	030m	E7
100	120m	E5	060m	E5	060m	E4
200	120m	E2	060m	E5	060m	E5
300	120m	E2	060m	E5	060m	E5
400	120m	E2	060m	E10	060m	E10
500	120m	E2	060m	E10	060m	E10
600	120m	E2	060m	E10	060m	E10
700	060m	E10	060m	E10	060m	E10
800	060m	E10	060m	E10	060m	E10
900	060m	E10	060m	E10	060m	E10
925	060m	E10	060m	E10	060m	E10
Phillips Creek						
0	180m	E4	180m	E7	180m	E9
100	180m	E4	180m	E7	180m	E9
200	180m	E4	180m	E7	180m	E9
300	180m	E4	180m	E7	180m	E9
400	180m	E4	180m	E7	180m	E9
500	180m	E4	180m	E7	180m	E9
600	180m	E4	180m	E7	180m	E9
S20 - Old Cleveland Access Road						

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
671	120m	E8	120m	E8	120m	E8
S21 - Stormwater Quality Improvement Device						
S22 - Old Cleveland Road						
842	060m	E1	060m	E5	060m	E5
900	060m	E1	060m	E5	060m	E5
1000	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)	N/R (1)
1100	060m	E5	060m	E5	060m	E5
S23(b)(c) - Creek Road						
1200	060m	E5	060m	E5	060m	E5
S24 - Pedestrian Bridge U/S Creek Road						
1300	060m	E5	060m	E5	060m	E5
1400	060m	E5	060m	E5	060m	E5
1500	060m	E5	060m	E5	060m	E5
1600	060m	E5	060m	E5	060m	E5
1700	060m	E4	060m	E5	060m	E5
1800	060m	E4	060m	E4	030m	E7
1900	060m	E4	060m	E4	030m	E7
2000	060m	E4	060m	E4	030m	E7
2100	060m	E4	030m	E7	030m	E7
2200	060m	E4	030m	E7	030m	E7
2286	060m	E4	030m	E7	030m	E7
S25 - Gallipoli Road						
2400	060m	E9	030m	E7	030m	E7
S26 - Anzac Road						
2500	060m	E4	030m	E7	030m	E7
2600	060m	E4	030m	E7	030m	E7
2685	060m	E4	030m	E7	030m	E7
Cloverbrook Place Drain						
0	270m	E3	270m	E3	1440m	E6
100	270m	E3	270m	E3	1440m	E6
200	270m	E3	270m	E3	1440m	E6
300	270m	E3	270m	E3	1440m	E6
400	270m	E3	270m	E3	1440m	E6
500	270m	E3	270m	E3	1440m	E6
600	270m	E3	270m	E3	1440m	E6
S121 - Fursden Road						
700	270m	E3	270m	E3	1440m	E6

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
800	270m	E3	270m	E3	1440m	E6
900	270m	E3	270m	E3	1440m	E6
1000	270m	E3	270m	E3	1440m	E6
1100	270m	E3	270m	E3	1440m	E6
1200	270m	E3	270m	E3	1440m	E6
1213	270m	E3	270m	E3	1440m	E6
Bethel Street Drain						
0	270m	E3	270m	E3	1440m	E6
100	270m	E3	270m	E3	1440m	E6
200	270m	E3	270m	E3	1440m	E6
300	270m	E3	270m	E3	1440m	E6
400	270m	E3	270m	E3	1440m	E6
500	270m	E3	270m	E3	1440m	E6
S123 - Bethel Street						
600	270m	E3	270m	E3	1440m	E6
700	030m	E7	270m	E3	1440m	E6
773	030m	E7	270m	E3	1440m	E6
Minnippi Overflow						
0	360m	E10	1440m	E10	1440m	E6
100	360m	E10	1440m	E10	1440m	E6
200	360m	E10	1440m	E10	1440m	E6
300	360m	E10	1440m	E10	1440m	E6
400	360m	E10	1440m	E10	1440m	E6
500	360m	E10	1440m	E10	1440m	E6
600	360m	E10	1440m	E10	1440m	E6
700	360m	E10	1440m	E10	1440m	E6
800	360m	E10	1440m	E6	1440m	E6
884	360m	E10	1440m	E10	1440m	E6
S14 - Wynnum Road						
1000	270m	E3	1080m	E1	1440m	E6
1100	270m	E3	1080m	E1	1440m	E6
1200	360m	E10	1080m	E1	1440m	E6
S15 - Gateway Motorway						
1344	270m	E3	270m	E3	1440m	E6
1400	270m	E3	270m	E3	1440m	E6
1500	270m	E3	270m	E3	1440m	E6
1600	270m	E3	270m	E3	1440m	E6

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
1700	270m	E3	270m	E3	1440m	E6
1800	270m	E3	270m	E3	1440m	E6
1884	270m	E3	270m	E3	1440m	E6
Stanton Road Drain						
0	270m	E3	1080m	E1	1440m	E6
S125 - Access Road						
100	1080m	E6	1080m	E2	1440m	E6
200	1080m	E6	1080m	E2	1440m	E6
300	1080m	E6	1080m	E2	1440m	E6
S126 - Stanton Road						
400	1080m	E6	1080m	E2	1440m	E6
500	1080m	E6	1080m	E2	1440m	E6
600	1080m	E6	1080m	E2	1440m	E6
700	1080m	E6	1080m	E2	1440m	E6
800	1080m	E6	1080m	E2	1440m	E6
900	1080m	E6	1080m	E2	1440m	E6
1000	1080m	E6	1080m	E2	1440m	E6
1100	1080m	E6	1080m	E2	1440m	E6
1187	1080m	E6	1080m	E2	1440m	E6
Moorabbin Drive Drain						
0	270m	E3	270m	E3	1440m	E6
100	270m	E3	270m	E3	1440m	E6
200	270m	E3	270m	E3	1440m	E6
300	270m	E3	270m	E3	1440m	E6
400	270m	E3	270m	E3	1440m	E6
500	270m	E3	270m	E3	1440m	E6
600	270m	E3	270m	E3	1440m	E6
700	270m	E3	270m	E3	1440m	E6
800	270m	E3	270m	E3	1440m	E6
900	270m	E3	270m	E3	1440m	E6
S119 - Billan Street						
1000	270m	E3	270m	E3	1440m	E6
S120 - Gray Street						
1100	270m	E3	270m	E3	1440m	E6
1200	270m	E3	270m	E3	1440m	E6
Minnippi Creek						
0	270m	E3	270m	E3	1440m	E6

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) [2]					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
100	270m	E3	270m	E3	1440m	E6
200	270m	E3	270m	E3	1440m	E6
300	270m	E3	270m	E3	1440m	E6
400	270m	E3	270m	E3	1440m	E6
500	270m	E3	270m	E3	1440m	E6
600	270m	E3	270m	E3	1440m	E6
700	270m	E3	270m	E3	1440m	E6
800	270m	E3	270m	E3	1440m	E6
900	270m	E3	270m	E3	1440m	E6
1000	270m	E3	270m	E3	1440m	E6
S114 - Creek Road (Southbound)						
1105	060m	E4	060m	E4	030m	E7
S115 - Creek Road (Northbound)						
1200	060m	E4	060m	E4	030m	E7
S117 - Pedestrian bridge						
1300	060m	E4	060m	E4	030m	E7
1400	030m	E7	030m	E8	030m	E8
S117a - Drop Structure #4						
1500	030m	E7	030m	E8	030m	E8
1600	060m	E4	060m	E4	030m	E2
S118 - Todman Street						
1700	060m	E4	060m	E4	030m	E2
S118a - Drop Structure #3						
1800	060m	E4	060m	E4	030m	E2
S118b - Drop Structure #2						
1900	060m	E4	030m	E7	030m	E2
2000	060m	E4	030m	E2	030m	E2
S118c - Drop Structure #1						
2076	060m	E4	030m	E2	030m	E2
Murarrie Park Drain						
0	270m	E3	270m	E3	1440m	E6
100	270m	E3	270m	E3	1440m	E6
200	270m	E3	270m	E3	1440m	E6
300	270m	E3	270m	E3	1440m	E6
400	270m	E3	270m	E3	1440m	E6
500	270m	E3	270m	E3	1440m	E6
600	270m	E3	270m	E3	1440m	E6

AMTD (m)	Very Rare Events – Scenario 1 (Existing Waterway Conditions) (2)					
	200-yr ARI (0.5% AEP)		500-yr ARI (0.2% AEP)		2000-yr ARI (0.05% AEP)	
	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble	Critical Duration	Median Ensemble
700	270m	E3	270m	E3	1440m	E6
S112 - Park Access Culvert						
800	270m	E3	270m	E3	1440m	E6
S113 - Park Access Bridge						
900	270m	E3	270m	E3	1440m	E6
1000	270m	E3	270m	E3	1440m	E6
1100	270m	E3	270m	E3	1440m	E6
1116	270m	E3	270m	E3	1440m	E6

(1) N/R = no result, typically because the AMTD line does not intersect the flood surface.
(2) Inclusive of a 9.8% increase in rainfall intensity and a 0.8m increase above HAT, due to projected climate variability effects.

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Appendix K: Rating Curves

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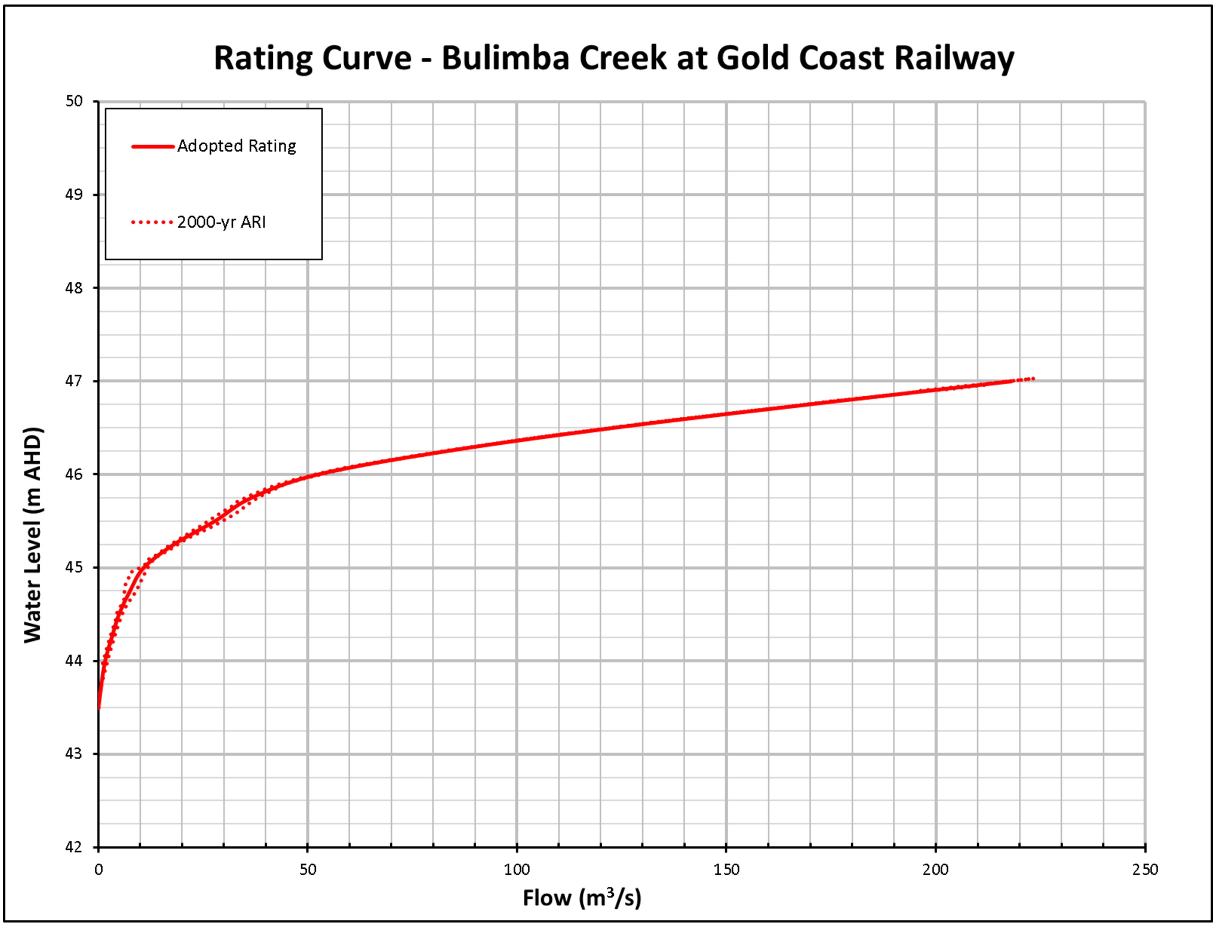
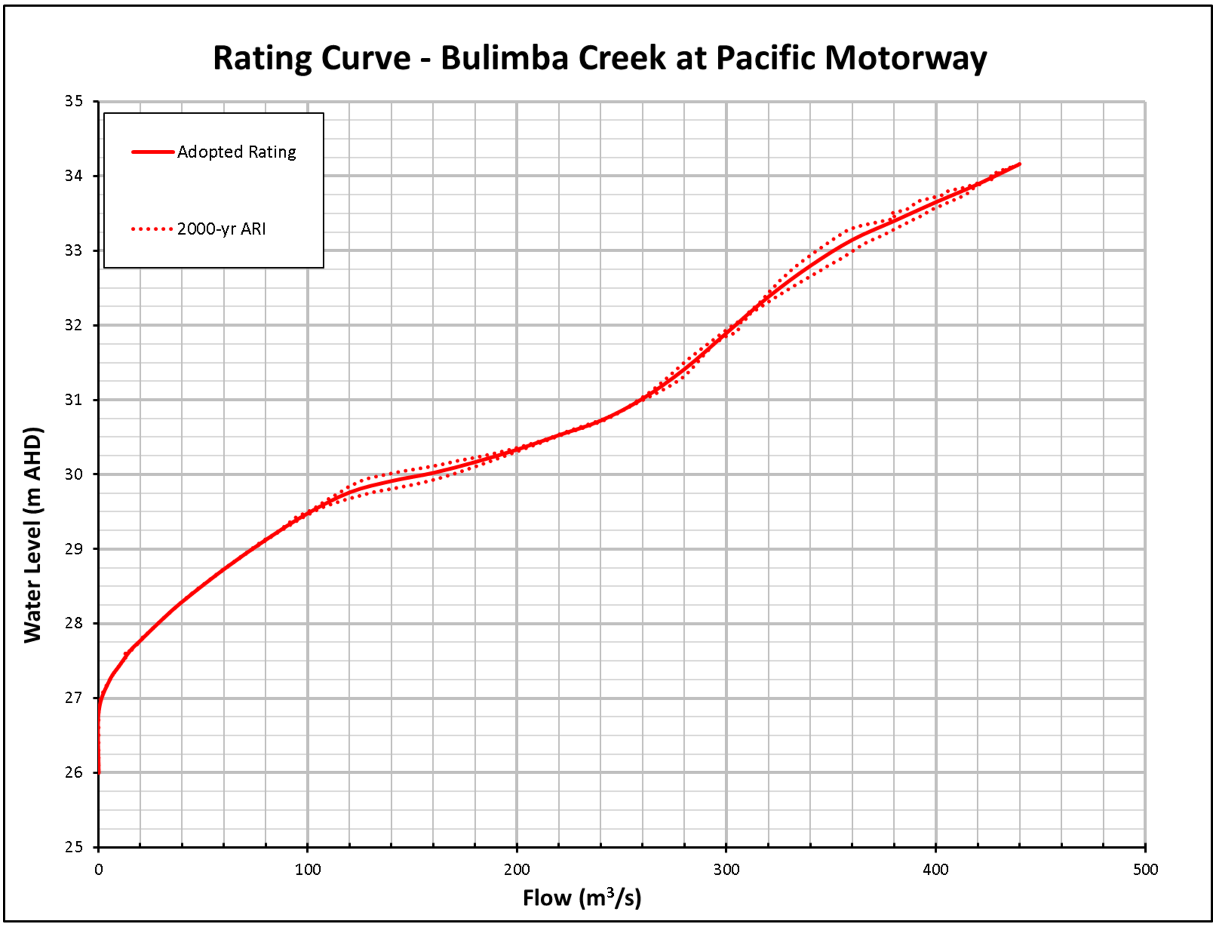
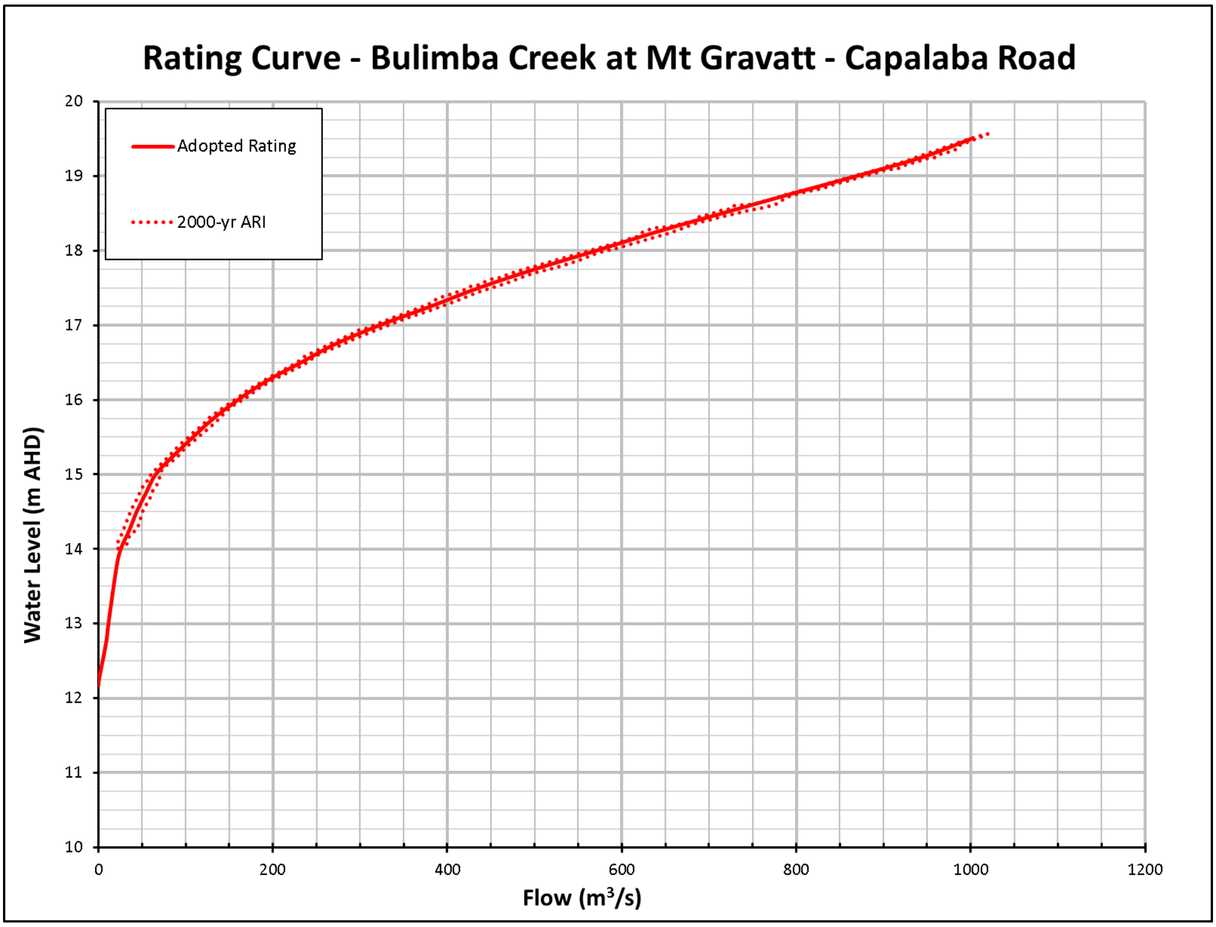
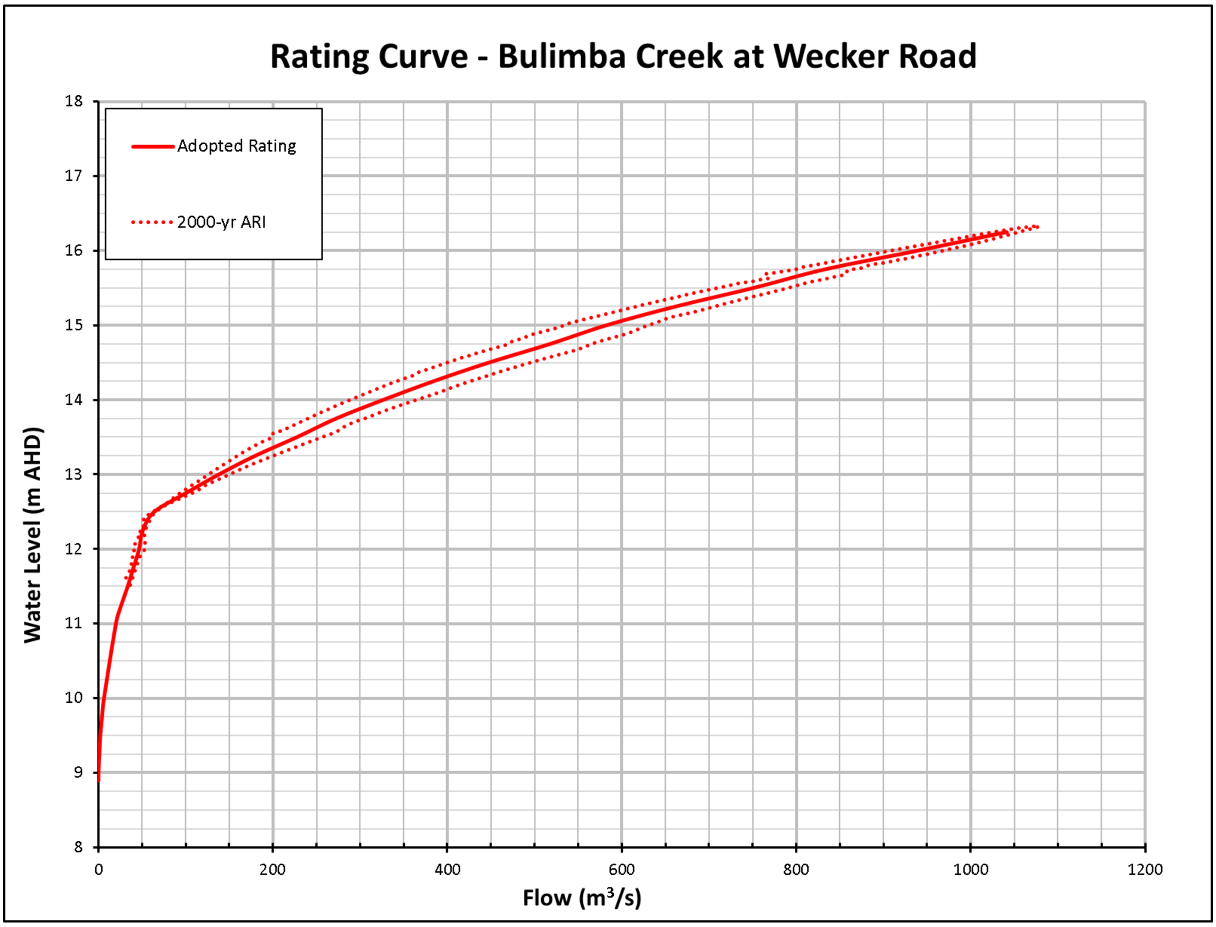
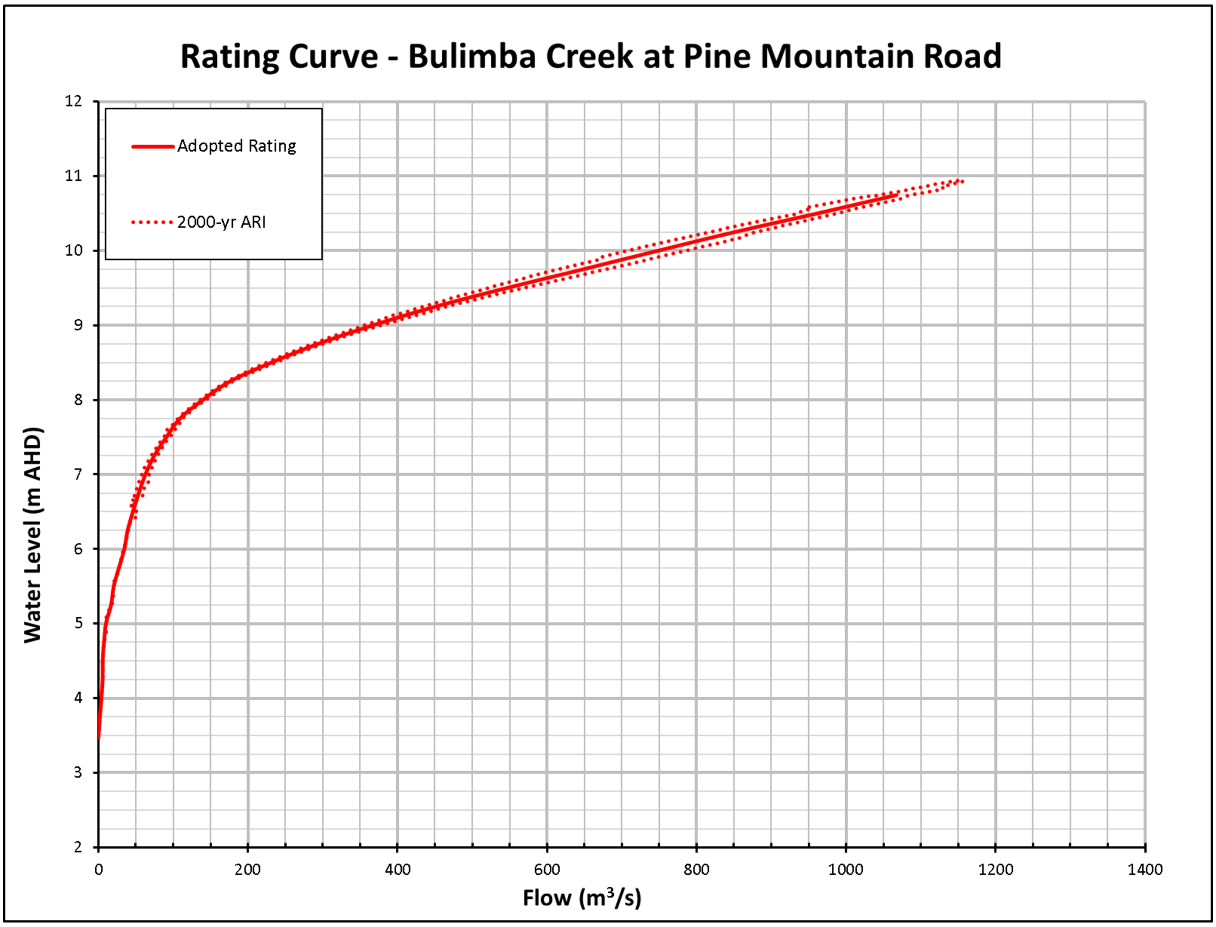
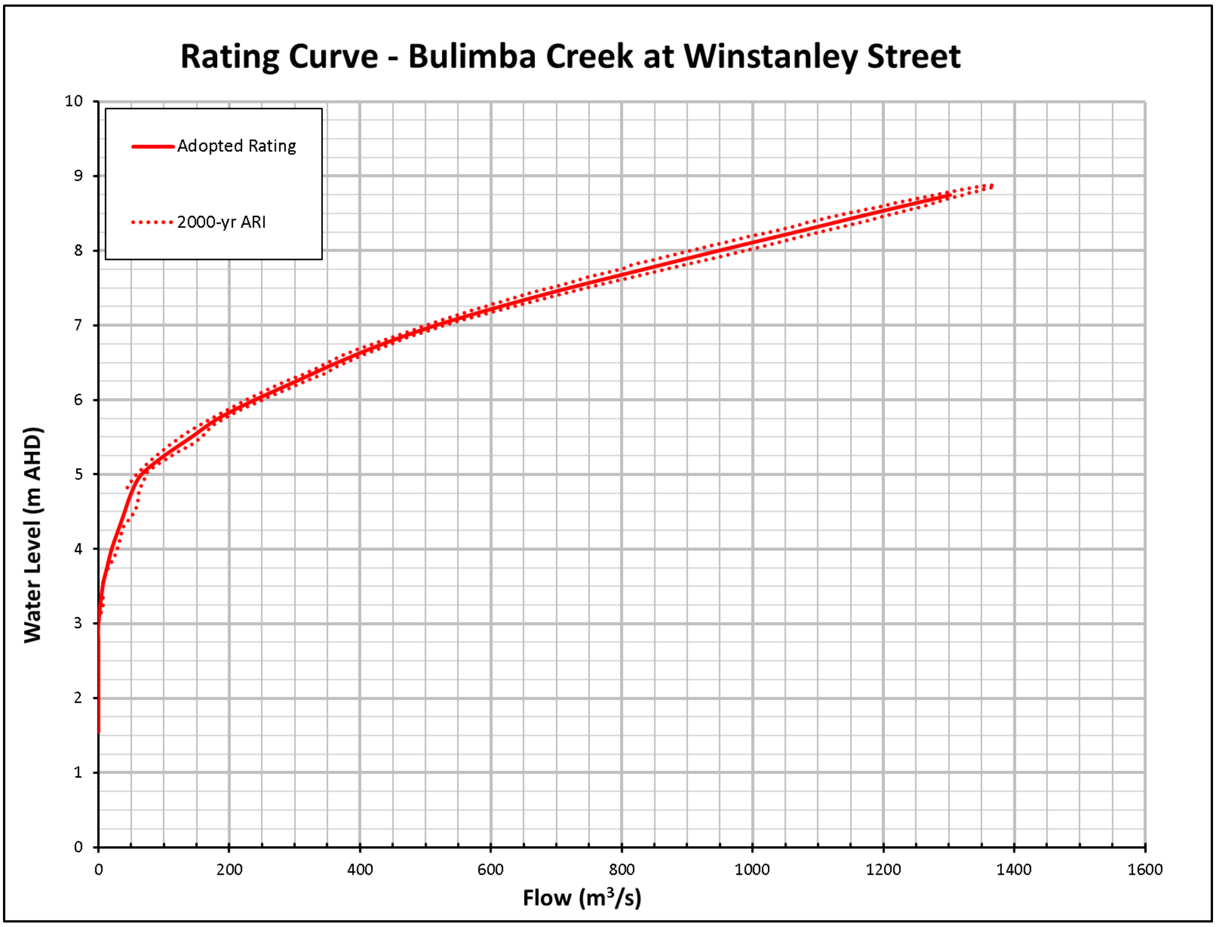

Rating Curve - Bulimba Creek at Gold Coast Railway
Adopted Rating
2000-yr ARI
Water Level (m AHD)
50
49
48
47
46
45
44
43
42
0
50
100
150
200
250
Flow (m³/s)

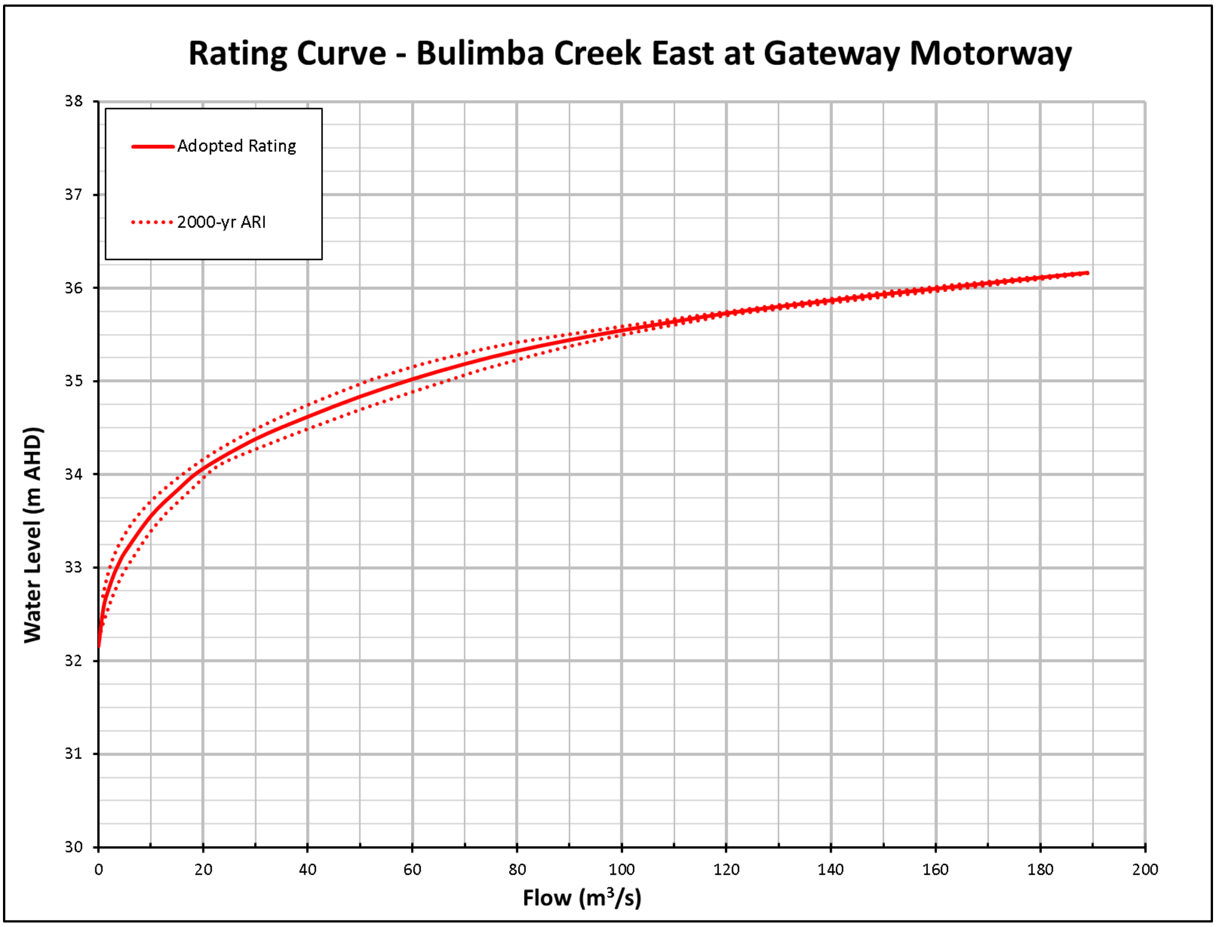

Rating Curve - Bulimba Creek at Pacific Motorway
Adopted Rating
2000-yr ARI
Water Level (m AHD)
35
34
33
32
31
30
29
28
27
26
25
0
100
200
300
400
500
Flow (m³/s)


Rating Curve - Bulimba Creek at Mt Gravatt - Capalaba Road
Adopted Rating
2000-yr ARI
Water Level (m AHD)
Flow (m³/s)
20
19
18
17
16
15
14
13
12
11
10
0
200
400
600
800
1000
1200

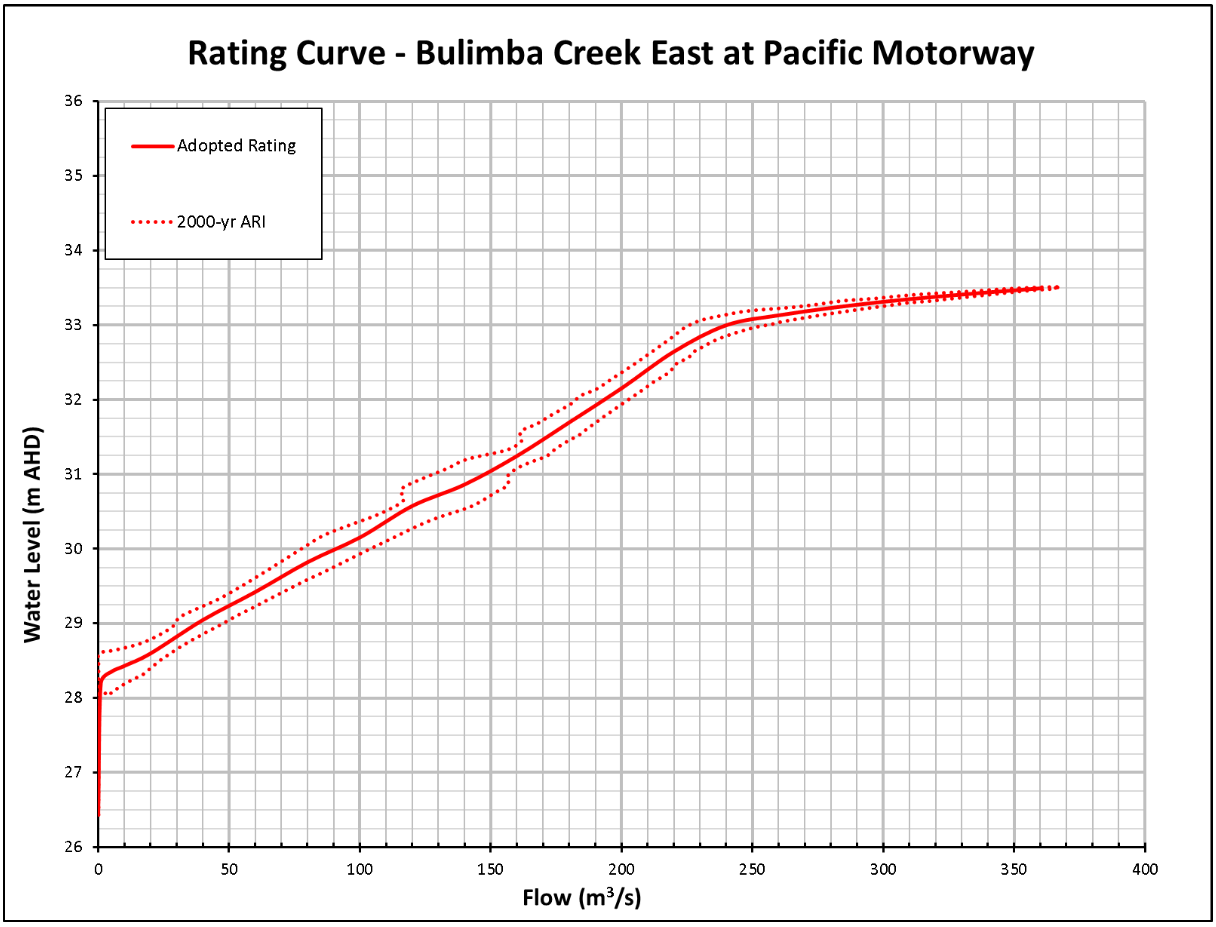

Rating Curve - Bulimba Creek at Wecker Road
Adopted Rating
2000-yr ARI
Water Level (m AHD)
Flow (m³/s)
18
17
16
15
14
13
12
11
10
9
8
0
200
400
600
800
1000
1200


Rating Curve - Bulimba Creek at Pine Mountain Road
Adopted Rating
2000-yr ARI
Water Level (m AHD)
Flow (m³/s)
0
200
400
600
800
1000
1200
1400
2
3
4
5
6
7
8
9
10
11
12

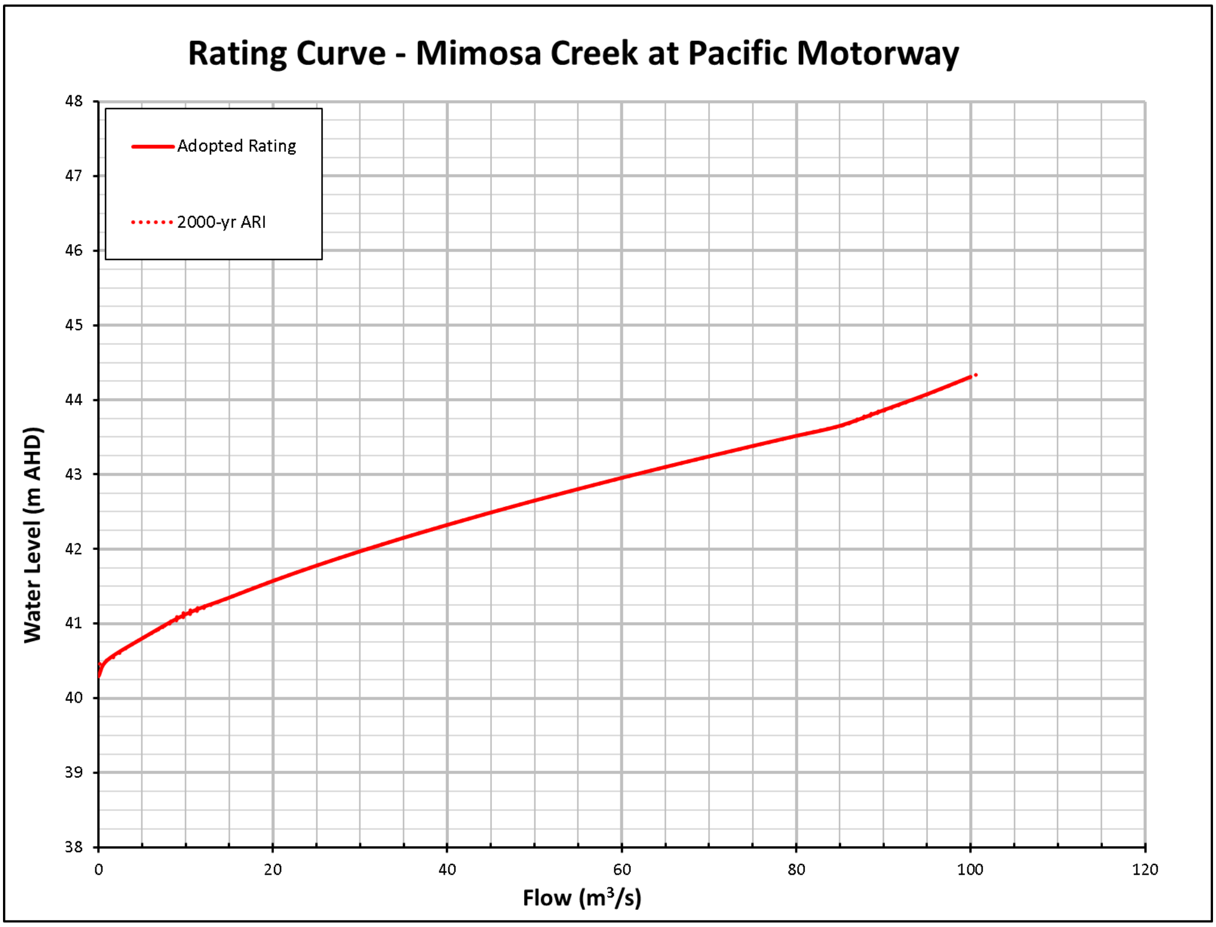

Rating Curve - Bulimba Creek at Winstanley Street
Adopted Rating
2000-yr ARI
Water Level (m AHD)
Flow (m³/s)
0
200
400
600
800
1000
1200
1400
1600
0
1
2
3
4
5
6
7
8
9
10



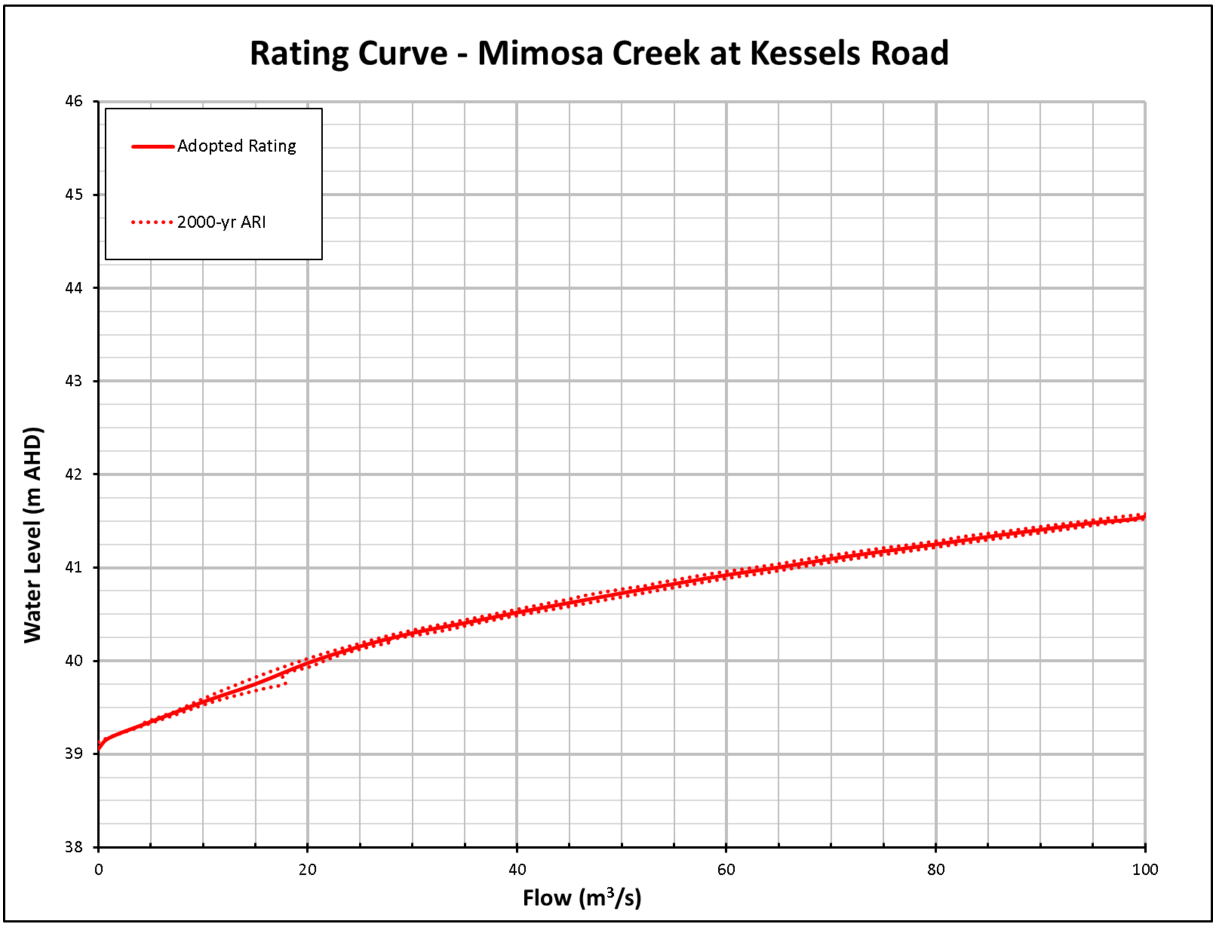
Rating Curve - Bulimba Creek East at Gateway Motorway
Adopted Rating
2000-yr ARI
Water Level (m AHD)
Flow (m³/s)
38
37
36
35
34
33
32
31
30
0
20
40
60
80
100
120
140
160
180
200



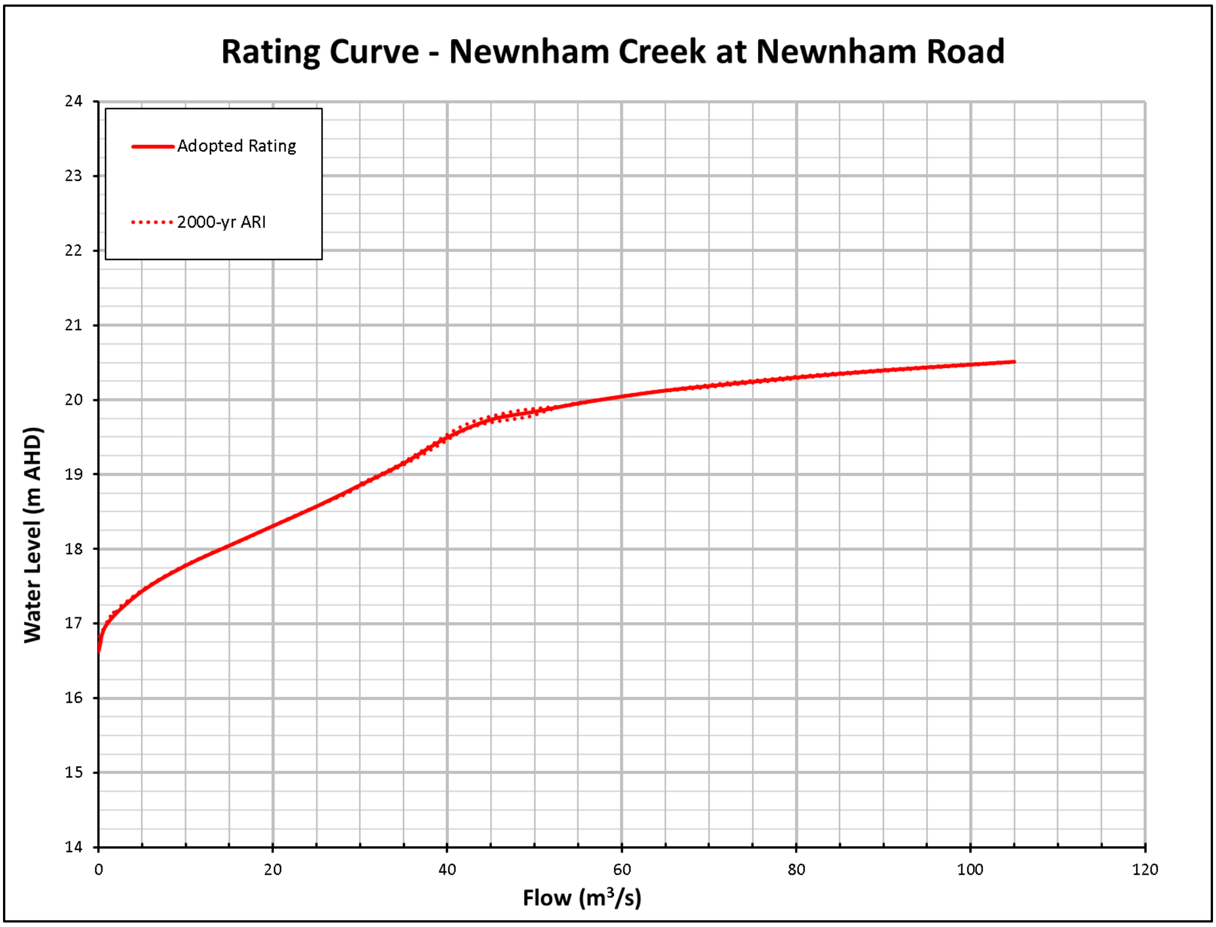
Rating Curve - Bulimba Creek East at Pacific Motorway
Adopted Rating
2000-yr ARI
Water Level (m AHD)
Flow (m³/s)
36
35
34
33
32
31
30
29
28
27
26
0
50
100
150
200
250
300
350
400

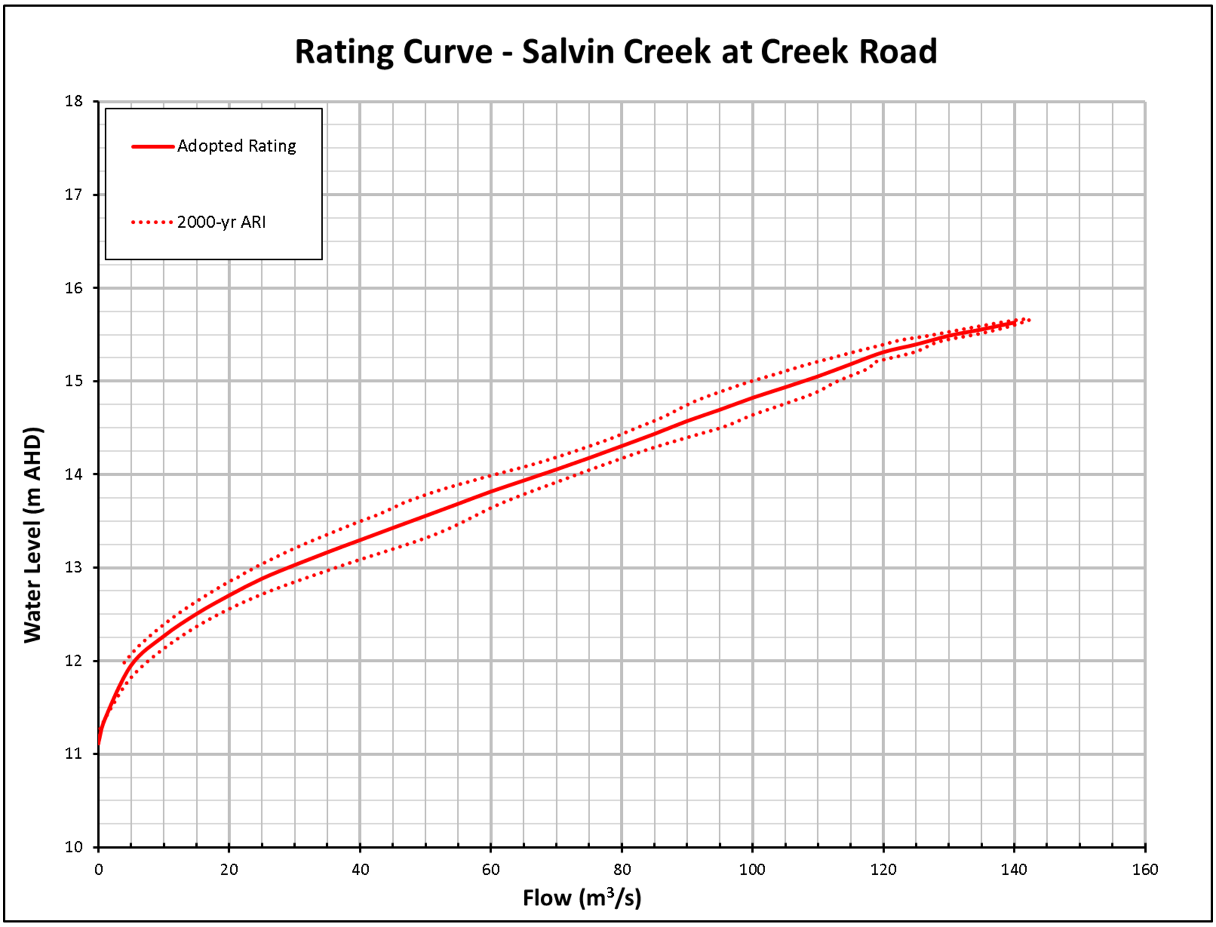


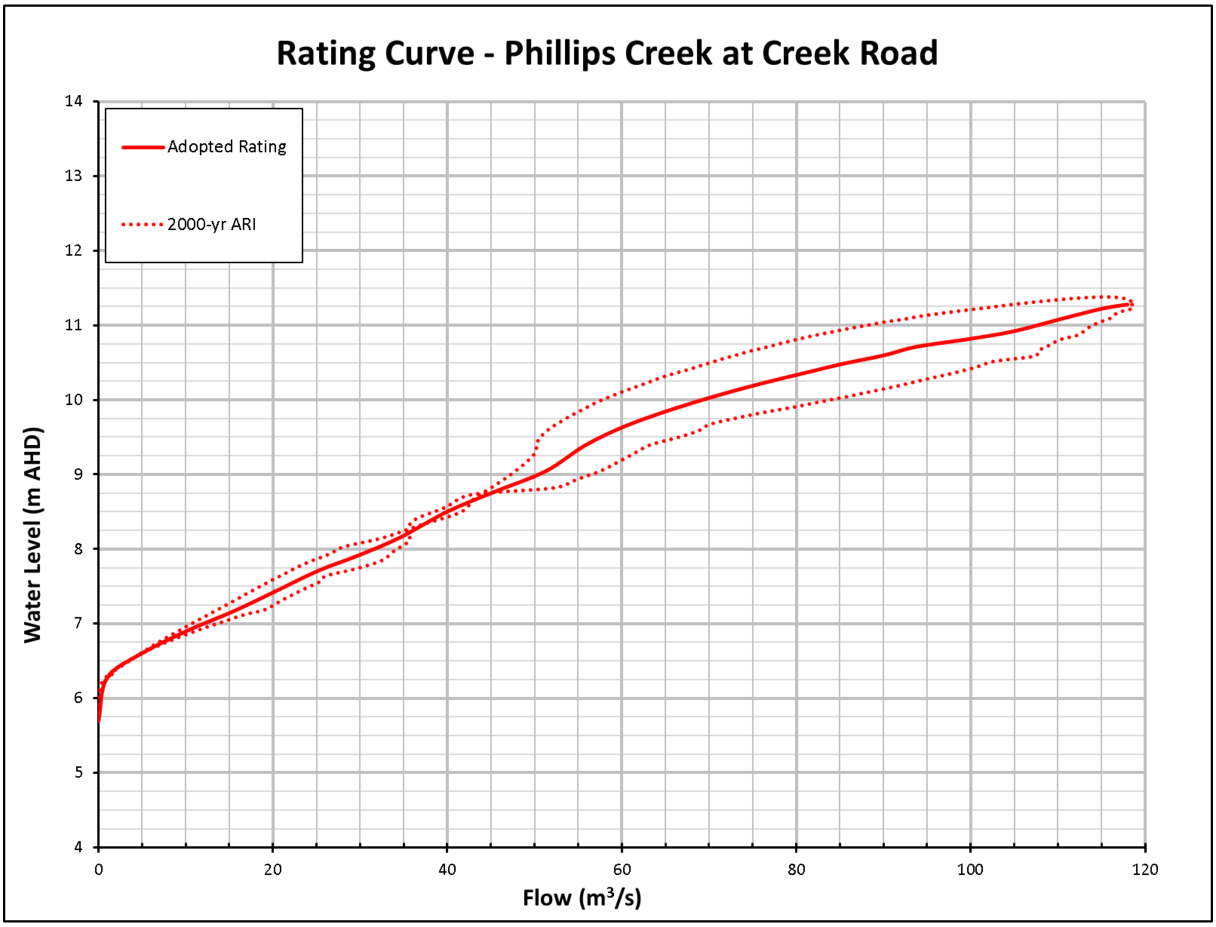
Rating Curve - Mimosa Creek at Pacific Motorway
Adopted Rating
2000-yr ARI
Water Level (m AHD)
Flow (m³/s)
48
47
46
45
44
43
42
41
40
39
38
0
20
40
60
80
100
120



Rating Curve - Mimosa Creek at Kessels Road
Adopted Rating
2000-yr ARI
Water Level (m AHD)
Flow (m³/s)
46
45
44
43
42
41
40
39
38
0
20
40
60
80
100


Rating Curve - Newnham Creek at Newnham Road
Adopted Rating
2000-yr ARI
Water Level (m AHD)
Flow (m³/s)
24
23
22
21
20
19
18
17
16
15
14
0
20
40
60
80
100
120


Rating Curve - Salvin Creek at Creek Road
Adopted Rating
2000-yr ARI
Water Level (m AHD)
Flow (m³/s)
18
17
16
15
14
13
12
11
10
0
20
40
60
80
100
120
140
160



Rating Curve - Phillips Creek at Creek Road
Adopted Rating
2000-yr ARI
Water Level (m AHD)
14
13
12
11
10
9
8
7
6
5
4
0
20
40
60
80
100
120
Flow (m3/s)

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Appendix L: Hydraulic Structure Reference Sheets

The hydraulic structure reference sheets provide an overview of the hydraulic characteristics and performance of the waterway structure for the current catchment and climate conditions. They have been compiled from the best available data for the waterway structure.

Peak flood levels and structure flood immunity have typically been extracted from the design flood surface grids at the structure location, while the overtopping level of the weir / road have been derived from the existing ground surface at the low point of the road alignment in the vicinity of the structure (and not necessarily at the structure).

Flooding characteristics at waterway structures can be complex and it is recommended that the hydraulic structure reference sheets be read in conjunction with the results of the TUFLOW model.

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Waterway	Structure ID	AMTD	Structure location	Structure details	Modelled structure representation	Origin of Structure Coding	HSRS
Bethel Street Drain	123	535	Bethel Street	3 / 1.35 m dia RCPs	1d culvert / 2d weir	BCC Design Drawings + 2019 ALS	Yes
Broadwater Road Drain	151	120	Kenora Street	Pedestrian Bridge	Not modelled		No
	152	1145	Broadwater Road	3 / 2.1 x 2.1 m RCBCs	1d culvert / 2d weir	BCC Design Drawings + 2019 ALS	Yes
	153	1360	Brisbane Adventist College	Drop Structure	1d weir	2019 Survey	No
	154	1700	Brisbane Adventist College	Pedestrian Bridge	Not modelled		No
	155	1735	Brisbane Adventist College	Single span access bridge	1d bridge / 1d weir	2019 Survey	No
	156	1785	Brisbane Adventist College	Drop Structure	1d weir	2019 Survey	No
	157	1860	16 Rowe Cl, Wishart	Drop Structure	1d weir	2019 Survey	No
	158	1900	16 Rowe Cl, Wishart	Drop Structure	1d weir	2019 Survey	No
	159	2040	226 Wishart Rd, Wishart	1 / 2.8 x 3.3 m RCBC + 2 / 2.8 x 2.8 m RCBCs	1d culvert / 1d weir	2019 Survey	No
Bulimba - Garden City Overflow	62	33165	Logan Road	2 / 3 x 3 m RCBCs	1d culvert / 2d weir	BCC Bulimba Creek HEC-RAS Model (PRJ 050408)	Yes
	64	33310	Pacific Motorway	2 / 3.1 x 3.1 m RCBCs	1d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model	Yes
Bulimba Creek	1	3265	Lytton Road - Eastbound	Three span road bridge	1d bridge / 2d weir	DTMR Design Drawings + 2019 Survey	Yes
	2	3335	Lytton Road - Westbound	Four span road bridge	1d bridge / 1d weir	DTMR Design Drawings + 2019 Survey	Yes
	3	4460	Port of Brisbane Motorway	Seven span dual road bridges	2d bridge / 2d weir	DTMR Design Drawings + 2019 Survey	Yes
	7	4500	Cleveland Railway	Seven span rail bridge	2d bridge / 2d weir	QLD Rail Design Drawings + PoB TUFLOW Model + 2019 Survey	Yes
	10	11950	Gateway Motorway Viaduct	Multi-span bridge	2d bridge / 2d weir	DTMR Design Drawings + 2019 Survey	Yes
	12	12230	Murarrie Road	Three span road bridge	1d bridge / 2d weir	BCC Design Drawings +	Yes

Waterway	Structure ID	AMTD	Structure location	Structure details	Modelled structure representation	Origin of Structure Coding	HSRS
						Survey from unknown date	
	13	13080	Wynnum Road	Dual road bridges - Upstream three span / Downstream five span	2d bridge / 2d weir	BCC Design Drawings + Survey from unknown date + 2019 ALS	Yes
	16	17105	Preston Road	Three span pedestrian bridge	Not modelled		No
	17	18695	Meadowlands Road	Four span road bridge	1d bridge / 1d weir	BCC Design Drawings + Survey from unknown date	Yes
	18	19765	Scrub Road	Three span pedestrian bridge	1d bridge / 1d weir	BCC Bulimba Creek MIKE11 Model	No
	27	21035	Old Cleveland Road	Four span dual road bridges	2d bridge / 2d weir	Design Drawings + 2019 Survey	Yes
	28	21260	Kidwelly Street	7 / 1.2 x 0.45 m RCBCs	Not modelled		No
	29	21625	Winstanley Street	Three span road bridge	1d bridge / 1d weir	BCC Design Drawings + Survey from unknown date	Yes
	36	22510	Meadowbank Street	Single span pedestrian bridge	1d bridge / 1d weir	Design Drawings + 2019 Survey	No
	37	23415	Pine Mountain Road	Seven span road bridge	2d bridge / 2d weir	BCC Design Drawings + Survey from unknown date	Yes
	54	25495	Parklane Place	Pedestrian bridge	Not modelled		No
	55	25965	Oakley Street	Three span pedestrian bridge	1d bridge / 1d weir	BCC Bulimba Creek HEC-RAS Model (PRJ 081194)	No
	56	26825	Wecker Road	Five span road bridge	2d bridge / 2d weir	BCC Design Drawings + Survey from unknown date	Yes
	57	28275	Mount Gravatt Capalaba Road	Dual four span road bridges	2d bridge / 2d weir	DTMR Design Drawings + 2019 Survey	Yes
	58	31000	Sherwood Place	Single span pedestrian bridge	1d bridge / 1d weir	BCC Bulimba Creek HEC-RAS Model (PRJ 070012)	No
	59	32000	Craig Street	Two span pedestrian bridge	2d bridge / 2d weir	BCC Bulimba Creek HEC-RAS Model (PRJ 070012)	No
	60	33040	105 m d/s of Logan Road	Single span pedestrian bridge	1d bridge / 1d weir	BCC Bulimba Creek HEC-RAS Model (PRJ 050408)	No

Waterway	Structure ID	AMTD	Structure location	Structure details	Modelled structure representation	Origin of Structure Coding	HSRS
	61	33165	Logan Road	5 / 3 x 3 m RCBCs	1d culvert / 2d weir	BCC Bulimba Creek HEC-RAS Model (PRJ 050408)	Yes
	63	33310	Pacific Motorway	5 / 3.1 x 3.1 m RCBCs	1d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model	Yes
	65	34195	Bleasby Road	Single span pedestrian bridge	Not modelled		No
	66	34575	Padstow Road	3 / 3 x 2.1 m RCBCs	1d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model	Yes
	67	34575	Padstow Road	7 / 3.35 x 2.2 m RCBCs	1d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model	Yes
	68	35045	Malbon Street	Single span pedestrian bridge	1d bridge / 1d weir	BCC Bulimba Creek MIKE11 Model	No
	69	36600	Altandi Street	Three span pedestrian bridge	2d bridge / 2d weir	BCC Bulimba Creek MIKE11 Model	No
	70	36850	D/S Gold Coast Railway Pedestrian Bridge	Single span pedestrian bridge	1d bridge / 1d weir	BCC Bulimba Creek MIKE11 Model	No
	71	37010	Gold Coast Railway #1	Multi-span railway bridge	2d bridge / 2d weir	QLD Rail Design Drawings + Survey from unknown date	Yes
	72	37025	Gold Coast Railway #2	Multi-span railway bridge	2d bridge / 2d weir	QLD Rail Design Drawings + Survey from unknown date	Yes
	73	37130	Beenleigh Road	4 / 3.6 x 1.2 m RCBCs	1d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model	Yes
	74	37335	Gowan Road Pedestrian Crossing	2 / 0.9 m RCPs	1d culvert / 1d weir	2019 Survey data	No
	75	38145	Adjacent Glenefer St	Energy Dissipator	2d weir	2019 Survey data	No
	76	38265	Adjacent Glenefer St	Single span pedestrian bridge	Not modelled		No
	77	38490	Adjacent Glenefer St	Single span pedestrian bridge	1d bridge / 1d weir	2019 Survey data	No
	78	38605	Brandon Road	4 / 2.7 x 0.9 m RCBCs	1d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model	Yes
	79	38960	Nemies Road	8 / 1.5 x 1.5 m RCBCs	1d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model	Yes
	80	39330	Calliope St Bikeway	2 / 1.5 m dia RCPs	1d culvert / 1d weir	2019 Survey data	No

Waterway	Structure ID	AMTD	Structure location	Structure details	Modelled structure representation	Origin of Structure Coding	HSRS
	81	39910	Compton Road	3 / 1.8 m dia RCPs	Not modelled – outside model extent		No
Bulimba Creek East	89	1260	Gateway Motorway - On / Off Ramp	Dual two span road bridges	1d bridge / 1d weir	DTMR Design Drawings + 2019 ALS	Yes
	90	1600	Miles Platting Road	Single span road bridge	1d bridge / 2d weir	DTMR Design Drawings + 2019 ALS	Yes
	91	1650	South East Busway Loop	Three span busway bridge	1d bridge / 2d weir	DTMR Design Drawings + 2019 Survey	No
	92	1900	South East Busway	Single span busway bridge	1d bridge / 1d weir	DTMR Design Drawings + 2019 Survey	No
	93	1960	Pacific Motorway	5 / 3 x 2.7 m RCBCs	1d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Yes
	93a	2010	U/S at Pacific Motorway	Single span bikeway bridge	1d bridge / 1d weir	DTMR Design Drawings + 2019 Survey	No
	93b	2010	U/S at Pacific Motorway	1 / 3.6 x 1.2 m RCBC	1d culvert / 2d weir	DTMR Design Drawings	No
	93c	2010	U/S at Pacific Motorway	2 / 1.8 x 1.8 m RCBC	1d culvert / 2d weir	DTMR Design Drawings	No
	94	2520	Logan Road	4 / 2.4 m dia RCPs + 2 / 2.4 x 2.4 m RCBCs	1d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Yes
	194	2600	Glen Hotel, Eight Mile Plains	Glen Hotel Weir	1d weir	2019 ALS + Site measurements	No
	96	2925	Gateway Motorway	Dual two span road bridges	1d bridge / 2d weir	DTMR Design Drawings + BCC Bulimba Creek MIKE11 Model + 2019 ALS	Yes
	97	3510	Underwood Road	4 / 3.6 x 1.8 m RCBCs	1d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Yes
	99	5350	Gateway Motorway	3 / 2.4 m dia RCPs	1d culvert / 1d channel	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Yes
	100	5425	Gold Coast Railway	10 / 1.5 x 1.15 m RCBCs	1d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Yes
	101	5450	Beenleigh Road	4 / 1.5 x 0.6 m RCBCs	1d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Yes
Bulimba Creek East - Railway	98	30	Gateway Motorway	Dual single span road bridges	2d bridge / 2d weir	DTMR Design Drawings + 2019 ALS	Yes

Waterway	Structure ID	AMTD	Structure location	Structure details	Modelled structure representation	Origin of Structure Coding	HSRS
Bypass							
Bulimba Main Drain	175	285	Gosport Street	2 / 3 x 1.8 m RCBCs + 1 / 3.6 x 2 m RCBC + 1 / 3.6 x 1.8 m RCBC + 1 / 3.2 x 1.4 m RCBC + 1 / 3 x 1.2 m RCBC	1d culvert / 2d weir	PoB TUFLOW Model / Hemmant-Lytton TUFLOW Model	No
	176	745	Lytton Road	3 / 1.5 m dia RCPs	1d culvert / 2d weir	PoB TUFLOW Model / Hemmant-Lytton TUFLOW Model	No
	177	1225	Port of Brisbane Motorway	2 / 2.7 x 1.5 m RCBCs	1d culvert / 2d weir	PoB TUFLOW Model / Hemmant-Lytton TUFLOW Model	No
	178	1275	Cleveland Railway	1 / 2.6 x 1.45 m RCBC	1d culvert / 2d weir	PoB TUFLOW Model / Hemmant-Lytton TUFLOW Model	No
	184	1135	Canberra Street	1 / 1.5 m dia RCP	1d culvert / 2d weir	PoB TUFLOW Model / Hemmant-Lytton TUFLOW Model	No
Bulimba Sewer Crossing	4	4460	Port of Brisbane Motorway	Single span dual road bridges	2d bridge / 2d weir	DTMR Design Drawings + PoB TUFLOW Model + 2019 Survey	No
	8	4500	Cleveland Railway	Single span rail bridge	2d bridge / 2d weir	QLD Rail Design Drawings + PoB TUFLOW Model + 2019 Survey	No
Bulimba Oxbow	5a	N/A	Port of Brisbane Motorway - Eastbound	Multi-span bridge structure	2d bridge / 2d weir	DTMR Design Drawings + PoB TUFLOW Model + 2019 Survey	No
	5b	N/A	Port of Brisbane Motorway - Westbound	Multi-span bridge structure	2d bridge / 2d weir	DTMR Design Drawings + PoB TUFLOW Model + 2019 Survey	No
	6	N/A	Port of Brisbane Motorway - Eastbound On Ramp	Multi-span bridge structure	2d bridge / 2d weir	DTMR Design Drawings + PoB TUFLOW Model + 2019 Survey	No
	9	N/A	Cleveland Railway	Six span rail bridge	2d bridge / 2d weir	QLD Rail Design Drawings + PoB TUFLOW Model + 2019	No

Waterway	Structure ID	AMTD	Structure location	Structure details	Modelled structure representation	Origin of Structure Coding	HSRS
						Survey	
Cloverbrook Place Drain	121	680	Fursden Road	3 / 2.4 x 1.2 RCBCs	1d culvert / 2d weir	BCC Design Drawings + 2019 ALS	Yes
	122	695	U/S at Fursden Road	Pedestrian bridge	Not modelled		No
	124	1160	1a Celestial Ct, Carina	3 / 0.6 m dia RCPs	Not modelled		No
Daw Road Drain	171	495	Cressbrook St	Pedestrian bridge	Not modelled		No
Lindum Creek	179	695	Gosport Street	4 / 3 x 0.9 m RCBCs	1d culvert / 2d weir	PoB TUFLOW Model / Hemmant-Lytton TUFLOW Model	No
	180	835	Lytton Road	5 / 1.5 m dia RCPs	1d culvert / 2d weir	PoB TUFLOW Model / Hemmant-Lytton TUFLOW Model	No
	181	1085	Port of Brisbane Motorway	Dual road bridges	1d bridge / 2d weir	PoB TUFLOW Model / Hemmant-Lytton TUFLOW Model	No
	182	1255	Inghams Place	2 / 3.6 x 1.2 m RCBCs + 1 / 3.6 x 1.45 m RCBC	1d culvert / 2d weir	PoB TUFLOW Model / Hemmant-Lytton TUFLOW Model	No
	183	1775	Cleveland Railway	2 / 3 x 1.5 m RCBCs	1d culvert / 2d weir	PoB TUFLOW Model / Hemmant-Lytton TUFLOW Model	No
Miles Platting Road Drain	172	130	Gateway Motorway	3 / 3.67 x 1.86 m RCBCs + 2 / 3.83 x 2.04 m SLBCs	1d culvert / 2d weir	2008 DTMR Survey + 2019 ALS	Yes
	173	1050	Miles Platting Road	5 / 1.2 m dia RCPs	1d culvert / 1d weir	BCC MPR HEC-RAS Model (PRJ 131072) + 2019 ALS	Yes
Mimosa Creek	82	115	U/S at Bulimba Creek Confluence	2 / 1.2 x 0.9 m RCBCs	1d culvert / 2d weir	BCC Design Drawings	No
	83	505	Adjacent 2 Starcross St, MacGregor	2 / 2.1 x 1.8 m RCBCs	1d culvert / 1d weir	BCC Design Drawings	No
	84	1225	Parkway Street	Two span road bridge	1d bridge / 2d weir	BCC Design Drawings + Survey from unknown date	Yes

Waterway	Structure ID	AMTD	Structure location	Structure details	Modelled structure representation	Origin of Structure Coding	HSRS
	85	1580	Kessels Road	Single span road bridge	1d bridge / 2d weir	DTMR Design Drawings + 2019 Survey	Yes
	86a	1865	Pacific Motorway	Single span pedestrian bridge	Not Modelled		No
	86b	1900	Pacific Motorway	3 / 3 x 2.7 m RCBCs	1d culvert / 2d weir	DTMR Design Drawings + ALS 2019	Yes
	86c	1930	Pacific Motorway	Single span busway bridge	Not Modelled		No
	87	2085	Nagle Street	Single span road bridge	1d bridge / 1d weir	BCC Design Drawings + Survey from unknown date	Yes
	88	3020	20 Hibiscus Pl, Upper Mount Gravatt	1 / 2.7 x 0.75 m RCBC	1d culvert / 1d weir	BCC Mimosa Creek HEC-RAS Model (PRJ 100163)	No
Minnippi Creek	114	1100	Creek Road - Southbound	2 / 3 x 1.8 m RCBC	1d culvert / 2d weir	BCC Design Drawings	Yes
	115	1130	Creek Road - Northbound	3 / 2.1 x 0.99 m RCBCs	1d culvert / 2d weir	2019 Survey + 2019 ALS	Yes
	116	1145	U/S at Creek Road	Pedestrian bridge	Not modelled		No
	117	1295	1710 Creek Road, Carina	Pedestrian bridge	Not modelled		No
	117a	1430	1710 Creek Road, Carina	Drop Structure	1d weir only	BCC Design Drawings	No
	118	1670	Todman Street	2 / 1.5 m dia RCPs	1d culvert / 2d weir	BCC Todman Street HEC-RAS Model (PRJ 170565) + 2019 ALS	Yes
	118a	1785	Adjacent Todman Street	Drop Structure	1d weir only	BCC Todman Street HEC-RAS Model (PRJ 170565) + 2019 ALS	No
	118b	1830	Adjacent Todman Street	Drop Structure	1d weir only	BCC Todman Street HEC-RAS Model (PRJ 170565) + 2019 ALS	No
	118c	2025	Adjacent Todman Street	Drop Structure	1d weir only	BCC Todman Street HEC-RAS Model (PRJ 170565) + 2019 ALS	No
Minnippi	14	915	Wynnum Road	Single span road bridge	1d bridge / 2d weir	2019 Survey + 2019 ALS	Yes

Waterway	Structure ID	AMTD	Structure location	Structure details	Modelled structure representation	Origin of Structure Coding	HSRS
Overflow	15	1275	Gateway Motorway	6 / 3.11 x 3.66m RCBC	2d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Yes
Moorabbin Drive Drain	119	975	Billan Street	6 / 1.5 m dia RCPs	1d culvert / 2d weir	BCC Design Drawings + 2019 ALS	Yes
	120	1075	Gray Street	5 / 1.5 m dia RCPs	1d culvert / 2d weir	BCC Design Drawings	Yes
Murarrie Overflow	11	N/A	Gateway Motorway	6 / 1.83 x 1.51 m RCBCs + 5 / 2.13 x 1.7 m SLBCs	2d culvert / 2d weir	DTMR Design Drawings	Yes
Murarrie Park Drain	112	716	1238 Wynnum Road, Murarrie	3 / 2.1 x 1.8 RCBC	1d culvert / 2d weir	2019 Survey	No
	113	894	1238 Wynnum Road, Murarrie	Single span pedestrian bridge	1d bridge / 2d weir	2019 Survey	No
Newnham Creek	38	25	U/S at Bulimba Creek Confluence	Pedestrian bridge	Not modelled		No
	39	770	100 Wecker Road, Mansfield	5 / 1.65 m dia RCPs	1d culvert / 2d weir	BCC Newnham Creek HEC-RAS Model + 2019 ALS	No
	40	915	33 Secam St, Mansfield	Stormwater Quality Improvement Device	1d only	BCC Newnham Creek HEC-RAS Model	No
	41	960	Secam Street	3 / 2.4 x 2.4 m RCBCs	1d culvert / 2d weir	BCC Newnham Creek HEC-RAS Model + 2019 ALS	Yes
	42	990	58 Wecker Road, Mansfield	5 / 1.8 m dia RCPs	1d culvert / 2d weir	BCC Newnham Creek HEC-RAS Model + 2019 ALS	No
	43	1060	Devlan Street	5 / 1.8 m dia RCPs	1d culvert / 2d weir	BCC Newnham Creek HEC-RAS Model + 2019 ALS	Yes
	44	1160	Bunnings Access #3	Single span access bridge	1d bridge / 1d weir	BCC Newnham Creek HEC-RAS Model	No
	45	1190	Bunnings Access #2	Single span access bridge	1d bridge / 1d weir	BCC Newnham Creek HEC-RAS Model	No
	46	1280	Bunnings Access #1	Single span access bridge	1d bridge / 1d weir	BCC Newnham Creek HEC-RAS Model	No
	47	1375	Newnham Road	4 / 1.8 m dia RCPs	1d culvert / 2d weir	BCC Newnham Creek HEC-RAS Model	Yes
	48	1610	285 Creek Road	Single span access bridge	1d bridge / 1d weir	BCC Newnham Creek HEC-RAS Model	No

Waterway	Structure ID	AMTD	Structure location	Structure details	Modelled structure representation	Origin of Structure Coding	HSRS
	49	1667	285 Creek Road	Drop Structure	1d weir	BCC Newnham Creek HEC-RAS Model	No
	50	1716	269 Creek Road	Drop Structure	1d weir	BCC Newnham Creek HEC-RAS Model	No
	51	1771	269 Creek Road	Drop Structure	1d weir	BCC Newnham Creek HEC-RAS Model	No
	52	1810	215 Creek Road	Single span arch bridge	1d bridge / 1d weir	BCC Newnham Creek HEC-RAS Model	No
	53	1853	215 Creek Road	Single span pedestrian bridge	1d bridge / 1d weir	BCC Newnham Creek HEC-RAS Model	No
Padstow Road Drain	169	58	434 McCullough St, MacGregor	Single span pedestrian bridge	1d bridge / 1d weir	2019 Survey	No
	170	260	McCullough Street	2 / 3.3 x 2.1 m RCBCs	1d culvert / 2d weir	2019 Survey	Yes
Parklands Circuit Drain	165	240	Gateway Motorway	3 / 2.7 x 1.5 m RCBCs + 2 / 3.62 x 1.72 SLBCs	1d culvert / 2d weir	2008 DTMR Survey + 2019 ALS	Yes
	166	755	Prebble Street	4 / 0.675 m dia RCPs	1d culvert / 1d weir	BCC Design Drawings + 2019 ALS	Yes
	167	915	Kyeema Street	2 / 0.525 m dia RCPs	1d culvert / 2d weir	BCC Design Drawings	No
	168	1195	Echidna Street	2 / 3 x 1.2 m RCBCs + 1 / 3.6 x 1.8 SLBC	1d culvert / 2d weir	BCC Design Drawings	Yes
Phillips Creek	19	470	150 m d/s of Old Cleveland Access Road	Pedestrian Culvert	Not modelled		No
	20	620	Old Cleveland Access Road	3 / 2.4 x 2.4 m RCBCs	1d culvert / 2d weir	BCC Lower Phillips Creek EPA-SWMM Model + 2019 ALS	Yes
	21	715	60 m d/s of Old Cleveland Road	Stormwater Quality Improvement Device	2d only	BCC Design Drawings	No
	22	805	Old Cleveland Road	3 / 2.4 x 2.4 m RCBCs + 1 / 3.6 x 1.8 m RCBC to 1 / 2.7 m dia RCP	1d culvert / 2d weir	BCC Lower Phillips Creek EPA-SWMM Model + 2019 ALS	Yes
	23a	1050	Carindale Shopping Centre	3 / 2.4 x 2.4 m RCBCs	1d culvert / 2d weir	BCC Lower Phillips Creek EPA-SWMM Model	Yes
	23b	1145	Creek Road - Southbound	Two span road bridge	1d culvert / 2d weir	BCC Upper Phillips Creek HEC-RAS Model + 2019 ALS	Yes

Waterway	Structure ID	AMTD	Structure location	Structure details	Modelled structure representation	Origin of Structure Coding	HSRS
	23c	1160	Creek Road - Northbound	Single span road bridge	1d culvert / 2d weir	BCC Upper Phillips Creek HEC-RAS Model + 2019 ALS	Yes
	24	1280	100 m u/s of Creek Road	Single span pedestrian bridge	1d bridge / 1d weir	BCC Upper Phillips Creek HEC-RAS Model	No
	25	2300	Gallipoli Road	5 / 1.8 m dia RCPs	1d culvert / 2d weir	BCC Upper Phillips Creek HEC-RAS Model + 2019 ALS	Yes
	26	2460	Anzac Road	5 / 1.8 m dia RCPs	1d culvert / 2d weir	BCC Upper Phillips Creek HEC-RAS Model	Yes
Reynolds Street Drain	128	225	Araluen Place	1 / 2.35 x 0.9 m RCBC	Not modelled		No
	129	445	Reynolds Street	4 / 2.7 x 1.2 m RCBCs	1d culvert / 2d weir	BCC Design Drawings	Yes
	130	575	Wright Street	3 / 0.9 m RCPs	1d culvert / 2d weir	2019 Survey	Yes
	131	620	1358 Wright Street	2 / 1.2 x 0.9 m RCBCs	1d culvert / 2d weir	2019 Survey	No
Salvin Creek	30	180	U/S at Bulimba Creek Confluence	Pedestrian bridge	Not modelled		No
	31	550	Donnington Street (Lower)	3 / 3.6 x 2.4 m RCBCs	1d culvert / 2d weir	BCC Salvin Creek HEC-RAS Model + 2019 ALS	Yes
	32	1135	Donnington Street (Upper)	3 / 3.6 x 2.4 m RCBCs	1d culvert / 2d weir	BCC Salvin Creek HEC-RAS Model + 2019 ALS	Yes
	33	1500	Creek Road	Parallel road bridges: NB - Single span bridge / SB - Two span bridge	1d bridge / 2d weir	BCC Salvin Creek HEC-RAS Model + 2019 ALS	Yes
	34	1870	Pine Mountain Road	2 / 2.7 x 1.8 m RCBCs + 1 / 3 x 2 m SLBC + 1 / 3 x 2.4 m RCBC	1d culvert / 2d weir	BCC Salvin Creek HEC-RAS Model + 2019 ALS	Yes
	35	2385	Bevan Street	5 / 3.3 x 1.5 m RCBCs	1d culvert / 2d weir	BCC Salvin Creek HEC-RAS Model + BCC Design Drawings	Yes
Silky Oak Crescent Drain	139	85	Oakley Street	3 / 1.5 m dia RCPs	1d culvert / 1d weir	BCC Design Drawings + 2019 Survey	Yes
Spring Creek	132	885	Scrub Road	Single span road bridge	1d bridge / 1d weir	2019 Survey	Yes

Waterway	Structure ID	AMTD	Structure location	Structure details	Modelled structure representation	Origin of Structure Coding	HSRS
	133	1735	51 Woodland St, Carindale	Single span pedestrian bridge	1d bridge / 1d weir	2019 Survey	No
Stanton Road Drain	125	55	U/S at Minnippi Overflow Confluence	4 / 1.5 m dia RCPs	1d culvert / 2d weir	2019 Survey + 2019 ALS	No
	126	350	Stanton Road	2 / 1.5 m dia RCPs	1d culvert / 2d weir	2019 Survey + 2019 ALS	No
	127	925	33 Eversholt St, Tingalpa	Multi-span timber footbridge	Not modelled		No
Tributary A	105	170	Gateway Motorway	3 / 3.5 m dia RCPs + 2 / 3.3 m dia RCPs	1d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Yes
	106	530	Pacific Motorway - Off Ramp	5 / 2.44 x 1.85 m RCBCs + 4 / 3.05 x 2.06 m SLBCs	1d culvert / 2d weir	DTMR M1 Merge TUFLOW Model + 2008 DTMR Survey + 2019 ALS	Yes
	107	995	Pacific Motorway	3 / 3 x 1.8 m RCBCs to 3 / 3 x 2.1 m RCBCs	1d culvert / 2d weir	DTMR M1 Merge TUFLOW Model	Yes
Tributary A Overflow	186	105	Pacific Motorway	7 / 2.4 x 1.5 m RCBCs	1d culvert / 2d weir	DTMR M1 Merge TUFLOW Model	No
	187	155	Pacific Motorway On Ramp	7 / 2.4 x 1.5 m RCBCs	1d culvert / 2d weir	DTMR M1 Merge TUFLOW Model	No
	188	190	Busway	7 / 2.4 x 1.5 m RCBCs	1d culvert / 2d weir	DTMR M1 Merge TUFLOW Model	No
	189	105	Pacific Motorway	4 / 1.8 x 1.2 m RCBCs	1d culvert / 2d weir	DTMR M1 Merge TUFLOW Model	No
	190	155	Pacific Motorway On Ramp	5 / 2.4 x 0.75 m RCBCs	1d culvert / 2d weir	DTMR M1 Merge TUFLOW Model	No
	191	190	Busway	5 / 2.4 x 0.75 m RCBCs	1d culvert / 2d weir	DTMR M1 Merge TUFLOW Model	No
	192	550	School Road	4 / 3 x 2.1 m RCBCs	1d culvert / 2d weir	DTMR M1 Merge TUFLOW Model	No
	193	685	U/S at Pacific Motorway	Diversion Weir	2d weir	DTMR M1 Merge TUFLOW Model	No
Tributary A2	108	390	Freeway Office Park	Concrete Weir	2d weir	Cardno Report for Development	No
	109	490	Freeway Office Park	4 / 2.7 x 1.5 m RCBCs + 3 / 2.7 x 1.65 m SLBCs	1d culvert / 1d weir	Cardno Report for Development	No

Waterway	Structure ID	AMTD	Structure location	Structure details	Modelled structure representation	Origin of Structure Coding	HSRS
	110	575	D/S at Logan Road	5 / 1.2 x 0.3 m RCBCs	1d weir only	DTMR Design Drawings + 2014 ALS	No
	111	605	Logan Road	2 / 3.0 x 1.5 m RCBCs + 1 / 3.0 x 2.4 m RCBC	1d culvert / 2d weir	DTMR Design Drawings + 2019 ALS	Yes
Tributary A2 Overflow	185	605	Logan Road	1 / 2.4 x 1.2 m RCBC	1d culvert / 2d weir	DTMR Design Drawings	No
Tributary B	95	160	Logan Road	1 / 2.4 x 1.5 m RCBC	1d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model + Site Measurements + 2019 ALS	Yes
	102	170	Gaskell Street	3 / 3 x 1.5 m RCBCs	2d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model + 2019 ALS	No
	103	233	Allara Place	Pedestrian bridge	Not modelled		No
	104	465	Dance Crescent	2 / 3.6 x 1.5 m RCBCs + 1 / 3.6 x 1.7 m RCBC	1d culvert / 2d weir	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Yes
Tributary C	174	100	Gateway Motorway	4 / 2.7 m dia RCPs	1d culvert / 2d weir	DTMR Design Drawings	Yes
Warwick Creek	134	35	Greendale Way	Single span road bridge	2d bridge / 2d weir	BCC Design Drawings + 2019 Survey	Yes
	135	485	Amersham Crescent	3 / 2.4 x 2.4 m RCBCs + 2 / 2.4 x 2.1 m RCBCs	1d culvert / 2d weir	BCC Design Drawings + 2019 ALS	Yes
	136	1050	Cribb Road	6 / 3.6 x 1.2 m RCBCs	1d culvert / 1d weir	BCC Design Drawings	Yes
	136a	1080	U/S at Cribb Road	Pedestrian bridge	Not modelled		No
	137	1165	100 m u/s of Cribb Road	Pedestrian bridge	Not modelled		No
	138	1640	Oakley Street	6 / 1.8 m dia RCPs	1d culvert / 1d weir	BCC Design Drawings + 2019 Survey	Yes
Wecker Road Drain	140	235	Christian College	Single span pedestrian bridge	Not modelled		No
	141	405	Christian College	3 / 1.7 m dia RCPs	1d culvert / 2d weir	2019 Survey + 2019 ALS	No
	142	460	Christian College	3 / 1.7 m dia RCPs	1d culvert / 2d weir	BCC Scrub Road HEC-RAS Model (PRJ 050299)	No
	143	590	Scrub Road	Single span road bridge	1d bridge / 1d weir	BCC Scrub Road HEC-RAS	Yes

Waterway	Structure ID	AMTD	Structure location	Structure details	Modelled structure representation	Origin of Structure Coding	HSRS
	144	603	Scrub Road	Pedestrian bridge	(combined road / pedestrian)	Model (PRJ 050299) + 2019 Survey	No
	145	745	Wecker Road	3 / 1.5 m dia RCPs	1d culvert / 1d weir	BCC Scrub Road HEC-RAS Model (PRJ 050299) + 2019 ALS	Yes
	145a	945	359 Wecker Road, Mansfield	Access bridge	Not modelled		No
	146	1135	Gateway Motorway	4 / 1.8 m dia RCPs	1d culvert / 2d weir	DTMR Design Drawings	Yes
	147	1515	Weedon Street East	2 / 2.7 x 0.9 m RCBCs	1d culvert / 2d weir	2019 Survey + 2019 ALS	Yes
	148	1650	Mount Petrie Road	5 / 1.8 x 0.9 m RCBCs	1d culvert / 1d weir	BCC Design Drawings + 2019 ALS	Yes
	149	1660	Mount Petrie Road	Single span pedestrian bridge	1d bridge / 1d weir	BCC Design Drawings	No
Wishart Road Drain	160	245	Wishart Road	3 / 1.76 x 1.38 m RCBCs	1d culvert / 2d weir	BCC Design Drawings + 2019 ALS	Yes
	161	540	10 St George Ct, Wishart	Single span access bridge	1d bridge / 1d weir	2019 Survey	No
	162	553	10 St George Ct, Wishart	Single span access bridge	1d bridge / 1d weir	2019 Survey	No
	163	620	Wishart State School	1 / 1.65 m dia RCP	1d culvert / 2d weir	BCC Design Drawings + 2019 ALS	No
	164	715	35 Avenell St, Wishart	Single span access bridge	1d bridge / 1d weir	2019 Survey	No

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Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Bethel Street Culvert

BCC Asset ID	C0339P	Tributary Name	Bethel Street Drain
Owner	BCC	AMTD (m)	535
Year of Construction	1995	Coordinates (GDA94)	E 510516 N 6959264
Year of Significant Modification	N/A	Hydraulic Model ID	S123
Source of Structure Information	BCC Design Drawings + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\123 - Bethel		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	1.35
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	2.36
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	2.33
Structure Length (m) (in direction of flow)		17.1	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		4.95	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	August 2015
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	August 2015
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				100-yr ARI (1 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	5.8[(b)]	5.8[(b)]	5.29	5.29	0.00	1.4[(b)]	N/A	24 / E6
0.2	15.0	14.8	4.99	4.92	0.07	3.5	N/A	0.5 / E7
1	12.7	12.7	4.65	4.58	0.07	3.0	N/A	1.0 / E9
2	11.6	11.6	4.49	4.17	0.32	2.7	N/A	0.5 / E7
5	10.0	10.0	4.25	3.95	0.30	2.3	N/A	0.5 / E3
10	8.8	8.8	4.08	3.85	0.22	2.1	N/A	0.5 / E3
20	7.8	7.8	3.89	3.74	0.15	1.8	N/A	0.5 / E9
50	5.8	5.8	3.62	3.54	0.08	1.9	N/A	0.5 / E9

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

[(b)]Backwater affected value

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Broadwater Road Culvert

BCC Asset ID	C0126B	Tributary Name	Broadwater Road Drain
Owner	BCC	AMTD (m)	1145
Year of Construction	1970	Coordinates (GDA94)	E 510091 N 6953188
Year of Significant Modification	N/A	Hydraulic Model ID	S152
Source of Structure Information	BCC Design Drawings + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\152 - Broadwater Road		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	2.13 x 2.13
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	18.37
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	18.21
Structure Length (m) (in direction of flow)		~20	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 21.50 at structure / 21.25 east of the structure	
Average Handrail Height (m)		N/A – fence only	

Image Description	Looking Downstream
Date	6th October 2020
Source	Photo taken as part of site visit 6th October 2020

Image Description	Looking Upstream
Date	6th October 2020
Source	Photo taken as part of site visit 6th October 2020

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	165.8	63.3	22.72	21.27	1.44	7.8	N/A	0.5 / E7
0.2	131.8	61.3	22.52	21.01	1.50	7.5	N/A	0.5 / E7
1	97.4	58.5	22.27	20.72	1.55	7.2	N/A	0.5 / E7
2	84.4	57.2	22.15	20.58	1.57	7.0	N/A	0.5 / E7
5	70.4	55.4	21.99	20.42	1.57	6.8	N/A	0.5 / E3
10	60.1	53.7	21.85	20.28	1.57	6.6	N/A	0.5 / E6
20	52.4	51.6	21.68	20.17	1.51	6.3	N/A	0.5 / E9
50	39.6	39.6	20.99	19.92	1.07	3.8	N/A	0.5 / E8

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Nemies Road Culvert

BCC Asset ID	C0171B	Tributary Name	Bulimba Creek
Owner	BCC	AMTD (m)	38950
Year of Construction	Unknown	Coordinates (GDA94)	E 506494 N 6946679
Year of Significant Modification	N/A	Hydraulic Model ID	S79
Source of Structure Information	BCC Bulimba Creek MIKE11 Model	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old MIKE11 Model\Model files\Data files		

Structure Description		Multiple cell concrete box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	8
Number of Piers in Waterway	N/A	Dimensions (m)	1.5 x 1.5
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	53.57
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	53.46
Structure Length (m) (in direction of flow)		~ 21	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 56.6	
Average Handrail Height (m)		0.7 (Armco)	

Image Description	Looking Downstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Image Description	Looking Upstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Link to Flood Model Results	G:\BI\CD\Proj19\190477_Cabbage_Tree_Crk_Fld_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				10-yr ARI (10 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	143.8	83.4	57.51	55.86	1.66	7.7	N/A	0.5 / E7
0.2	114.2	80.2	57.28	55.64	1.64	7.4	N/A	0.5 / E7
1	85.9	75.7	56.97	55.42	1.56	7.0	N/A	1.0 / E4
2	74.6	73.7	56.84	55.28	1.56	6.8	N/A	1.0 / E4
5	71.0	71.0	56.67	55.23	1.45	6.6	N/A	0.5 / E3
10	50.5	50.5	55.58	55.02	0.57	4.7	N/A	0.5 / E3
20	44.0	44.0	55.36	54.94	0.42	3.4	N/A	0.5 / E8
50	31.0	31.0	54.99	54.60	0.38	3.0	N/A	0.5 / E8

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Brandon Road Culvert

BCC Asset ID	C0240B	Tributary Name	Bulimba Creek
Owner	BCC	AMTD (m)	38595
Year of Construction	Unknown	Coordinates (GDA94)	E 506723 N 6946911
Year of Significant Modification	N/A	Hydraulic Model ID	S78
Source of Structure Information	BCC Bulimba Creek MIKE11 Model	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old MIKE11 Model\Model files\Data files		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	4
Number of Piers in Waterway	N/A	Dimensions (m)	2.7 x 0.9
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	51.60
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	51.50
Structure Length (m) (in direction of flow)		~ 20	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 52.95	
Average Handrail Height (m)		0.7 (Armco)	

Image Description	Looking Downstream
Date	January 2018
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	October 2014
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				< 2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	137.0	38.7	54.56	54.18	0.38	5.3	N/A	0.5 / E7
0.2	109.9	37.6	54.38	54.00	0.37	4.9	N/A	0.5 / E7
1	84.9	36.6	54.18	53.88	0.30	4.8	N/A	1.0 / E4
2	71.5	35.5	54.07	53.80	0.27	4.6	N/A	1.0 / E4
5	59.0	34.0	53.93	53.67	0.26	3.5	N/A	0.5 / E3
10	50.3	32.7	53.83	53.59	0.24	3.4	N/A	0.5 / E3
20	43.1	31.2	53.75	53.52	0.23	3.2	N/A	0.5 / E8
50	30.6	26.3	53.48	53.33	0.15	2.7	N/A	0.5 / E8

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Beenleigh Road Culvert

BCC Asset ID	C0093B	Tributary Name	Bulimba Creek
Owner	BCC	AMTD (m)	37115
Year of Construction	Unknown	Coordinates (GDA94)	E 506480 N 6948154
Year of Significant Modification	N/A	Hydraulic Model ID	S73
Source of Structure Information	BCC Bulimba Creek MIKE11 Model	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old MIKE11 Model\Model files\Data files		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	4
Number of Piers in Waterway	N/A	Dimensions (m)	3.6 x 1.2
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	44.50
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	44.39
Structure Length (m) (in direction of flow)		~ 20	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 46.5	
Average Handrail Height (m)		1.2 (tubular rail - not modelled)	

Image Description	Looking Downstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Image Description	Looking Upstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				< 2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)[8]	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	223.4	55.6	47.42	47.31	0.11	4.2	N/A	1.0 / E5
0.2	187.1	54.1	47.24	47.12	0.11	4.1	N/A	1.0 / E5
1	150.5	54.4	47.08	46.95	0.13	4.1	N/A	1.0 / E5
2	128.5	54.4	47.00	46.83	0.16	4.1	N/A	1.0 / E5
5	103.2	54.5	46.90	46.70	0.20	4.1	N/A	1.0 / E9
10	85.1	54.8	46.81	46.60	0.21	3.2	N/A	1.0 / E9
20	69.5	53.6	46.72	46.50	0.22	3.1	N/A	1.0 / E9
50	47.4	47.3	46.44	46.27	0.17	2.7	N/A	1.0 / E9

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gold Coast Railway Upstream Bridge

BCC Asset ID	N/A	Tributary Name	Bulimba Creek
Owner	QLD Rail	AMTD (m)	37010
Year of Construction	Unknown	Coordinates (GDA94)	E 506548 N 6948229
Year of Significant Modification	N/A	Hydraulic Model ID	S72
Source of Structure Information	QLD Rail design drawings	Flood Model Representation	2d bridge / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\71 and 72 - Beenleigh Rail		

Structure Description		Six span railway bridge	
Bridges		**Culverts**	
Number of Spans	6	Number of Barrels	N/A
Number of Piers in Waterway	5	Dimensions (m)	N/A
Pier shape and Width (m)	Rectangular – width varies	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	43.50	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		~ 8	
Span Length (m)		53.1	
Lowest Level of Deck Soffit (m AHD)		47.2	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 48.00	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	July 2020
Source	Google Imagery

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gold Coast Railway Downstream Bridge

BCC Asset ID	N/A	Tributary Name	Bulimba Creek
Owner	QLD Rail	AMTD (m)	37000
Year of Construction	Unknown	Coordinates (GDA94)	E 506560 N 6948235
Year of Significant Modification	N/A	Hydraulic Model ID	S71
Source of Structure Information	QLD Rail design drawings	Flood Model Representation	2d bridge / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\71 and 72 - Beenleigh Rail		

Structure Description		Eight span railway bridge	
Bridges		**Culverts**	
Number of Spans	8	Number of Barrels	N/A
Number of Piers in Waterway	7	Dimensions (m)	N/A
Pier shape and Width (m)	1.0 circular	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	43.40	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		~ 5	
Span Length (m)		69.7	
Lowest Level of Deck Soffit (m AHD)		47.1	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 48.26	
Average Handrail Height (m)		N/A	

Image Description	Looking Upstream
Date	July 2020
Source	Google Imagery

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure(s) Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[8]	D/S Peak Water Level (m AHD)[9]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	223.6	N/A	47.03	46.63	0.40	N/A	N/A	1.0 / E5
0.2	187.7	N/A	46.85	46.52	0.33	N/A	N/A	1.0 / E5
1	151.6	N/A	46.66	46.39	0.27	N/A	N/A	1.0 / E5
2	129.1	N/A	46.54	46.31	0.23	N/A	N/A	1.0 / E5
5	103.3	N/A	46.39	46.20	0.19	N/A	N/A	1.0 / E9
10	85.2	N/A	46.27	46.11	0.15	N/A	N/A	1.0 / E9
20	69.8	N/A	46.16	46.03	0.13	N/A	N/A	1.0 / E9
50	47.2	N/A	45.94	45.83	0.11	N/A	N/A	1.0 / E9

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level.

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

[8]Uptream of the upstream railway bridge

[9]Downtream of the downstream railway bridge

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Padstow Road Culvert

BCC Asset ID	C0161B	Tributary Name	Bulimba Creek
Owner	BCC	AMTD (m)	34575
Year of Construction	Unknown	Coordinates (GDA94)	E 507521 N 6950022
Year of Significant Modification	N/A	Hydraulic Model ID	S67
Source of Structure Information	BCC Bulimba Creek MIKE11 Model	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old MIKE11 Model\Model files\Data files		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	7
Number of Piers in Waterway	N/A	Dimensions (m)	3.35 x 2.2
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	31.6
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	31.5
Structure Length (m) (in direction of flow)		24	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 35 (at culvert)	
Average Handrail Height (m)		1.27	

Image Description	Looking Downstream
Date	December 2013
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	December 2013
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				10-yr ARI (10 % AEP)[8]				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	324.6	170.3	35.29	35.02	0.26	3.3	N/A	1.0 / E5
0.2	242.8	160.8	35.02	34.80	0.21	3.1	N/A	2.0 / E1
1	216.2	151.1	34.71	34.57	0.14	2.9	N/A	2.0 / E1
2	165.7	115.7	34.36	34.31	0.06	2.2	N/A	2.0 / E6
5	144.3	97.7	34.14	34.12	0.02	1.9	N/A	2.0 / E10
10	114.1	76.9	33.91	33.90	0.01	1.5	N/A	2.0 / E8
20	89.0	60.3	33.72	33.71	0.01	1.3	N/A	2.0 / E10
50	60.9	41.0	33.45	33.44	0.01	0.9	N/A	2.0 / E7

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

[8]*Overtopping of the road originates from the Padstow Road Drain. The flood immunity of this structure is significantly greater than 10-yr ARI (10% AEP) when viewed in isolation.*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Padstow Road Culvert - Overflow

BCC Asset ID	C0162B	Tributary Name	Bulimba Creek
Owner	BCC	AMTD (m)	34575
Year of Construction	Unknown	Coordinates (GDA94)	E 507595, N 6950009
Year of Significant Modification	N/A	Hydraulic Model ID	S66
Source of Structure Information	BCC Bulimba Creek MIKE11 Model	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old MIKE11 Model\Model files\Data files		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	3 x 2.1
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	31.3
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	31.2
Structure Length (m) (in direction of flow)		24	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 34.75 (at culvert)	
Average Handrail Height (m)		~ 1	

Image Description	Looking Upstream
Date	April 2018
Source	BCC Asset Management Records

Image Description	Looking Downstream
Date	April 2018
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				20-yr ARI (5 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	324.6	47.7	35.43	34.94	0.50	2.5	N/A	1.0 / E5
0.2	135.8	48.5	35.21	34.69	0.52	2.6	N/A	2.0 / E1
1	216.2	47.2	34.99	34.47	0.52	2.5	N/A	2.0 / E1
2	165.7	43.3	34.64	34.20	0.44	2.3	N/A	2.0 / E6
5	144.3	40.5	34.47	34.09	0.38	2.1	N/A	2.0 / E10
10	114.1	35.3	34.26	33.97	0.29	1.9	N/A	2.0 / E8
20	89.0	30.3	34.07	33.86	0.21	1.6	N/A	2.0 / E10
50	60.9	21.4	33.66	33.55	0.11	1.5	N/A	2.0 / E7

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Pacific Motorway Culvert

BCC Asset ID	N/A	Tributary Name	Bulimba Creek
Owner	DTMR	AMTD (m)	33310
Year of Construction	Unknown	Coordinates (GDA94)	E 508661 N 6950577
Year of Significant Modification	N/A	Hydraulic Model ID	S63
Source of Structure Information	BCC Bulimba Creek MIKE11 Model	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old MIKE11 Model\Model files\Data files		

Structure Description		Multiple cell concrete box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	5
Number of Piers in Waterway	N/A	Dimensions (m)	3.1 x 3.1
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	26.88
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	26.5
Structure Length (m) (in direction of flow)		~ 120	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		Varies - 31.75 to 32.5	
Average Handrail Height (m)		Varying height concrete barriers	

Image Description	Looking Downstream
Date	6th October 2020
Source	Photo taken as part of site visit 6th October 2020

Image Description	Looking Upstream
Date	6th October 2020
Source	Photo taken as part of site visit 6th October 2020

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				100-yr ARI (1 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	441.2	288.2	34.18	31.39	2.78	8.0	N/A	2.0 / E1
0.2	381.8	264.8	33.47	31.19	2.28	7.3	N/A	2.0 / E1
1	323.7	232.5	32.54	30.83	1.71	7.0	N/A	2.0 / E1
2	276.8	203.8	31.36	30.23	1.13	6.9	N/A	2.0 / E6
5	239.5	179.1	30.72	29.65	1.07	5.0	N/A	2.0 / E10
10	194.9	148.9	30.28	29.25	1.03	4.7	N/A	2.0 / E10
20	156.0	133.4	30.04	28.97	1.07	4.5	N/A	2.0 / E4
50	108.6	108.2	29.63	28.54	1.09	4.2	N/A	2.0 / E7

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Pacific Motorway Culvert

BCC Asset ID	N/A	Tributary Name	Bulimba Creek – Garden City Overflow
Owner	DTMR	AMTD (m)	33310
Year of Construction	Unknown	Coordinates (GDA94)	E 508580 N 6950631
Year of Significant Modification	N/A	Hydraulic Model ID	S64
Source of Structure Information	BCC Bulimba Creek MIKE11 Model	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old MIKE11 Model\Model files\Data files		

Structure Description		Multiple cell concrete box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	2
Number of Piers in Waterway	N/A	Dimensions (m)	3.1 x 3.1
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	27.25
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	26.85
Structure Length (m) (in direction of flow)		~ 86	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		Varies - 31.75 to 32.5	
Average Handrail Height (m)		Varying height concrete barriers	

Image Description	Looking Downstream
Date	Circa 2007
Source	Photo taken from 2014 Bulimba Creek Flood Study Report

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				100-yr ARI (1 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Culvert (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Culvert Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	441.2	113.7	34.17	31.39	2.78	6.4	N/A	2.0 / E1
0.2	381.8	104.0	33.46	31.19	2.28	5.4	N/A	2.0 / E1
1	323.7	91.2	32.55	30.83	1.72	5.5	N/A	2.0 / E1
2	276.8	74.5	31.33	30.23	1.10	5.1	N/A	2.0 / E6
5	239.5	60.4	30.68	29.65	1.03	4.7	N/A	2.0 / E10
10	194.9	46.0	30.11	29.25	0.86	4.3	N/A	2.0 / E10
20	156.0	22.7	29.03	28.82	0.21	3.4	N/A	2.0 / E4
50	108.6	0.4	28.35	28.34	0.00	0.4	N/A	2.0 / E7

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Logan Road Culvert

BCC Asset ID	N/A	Tributary Name	Bulimba Creek
Owner	DTMR	AMTD (m)	33165
Year of Construction	Unknown	Coordinates (GDA94)	E 508810 N 6950626
Year of Significant Modification	N/A	Hydraulic Model ID	S61
Source of Structure Information	BCC Bulimba Creek HEC-RAS Model (PRJ 050408)	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	R:\BI\CD\Project_Archive\2005\050408_Bulimba_Creek_Wishart_Stage_1\Flood Management\Further Works and 2D-Modelling\Further 1D Modelling\Calculations\HEC-RAS\Sept06		

Structure Description		Multiple cell concrete box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	5
Number of Piers in Waterway	N/A	Dimensions (m)	3 x 3
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	25.26
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	25.15
Structure Length (m) (in direction of flow)		47.6	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 30.5	
Average Handrail Height (m)		0.7 (Armco)	

Image Description	Looking Downstream
Date	6th October 2020
Source	Photo taken as part of site visit 6th October 2020

Image Description	Looking Upstream
Date	6th October 2020
Source	Photo taken as part of site visit 6th October 2020

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				50-yr ARI (2 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	424.1	238.2	31.34	30.06	1.28	7.1	N/A	2.0 / E1
0.2	369.6	237.4	31.14	29.80	1.34	7.0	N/A	2.0 / E1
1	322.3	225.9	30.78	29.58	1.20	6.7	N/A	2.0 / E1
2	273.0	197.4	30.18	29.33	0.85	5.8	N/A	2.0 / E6
5	239.3	183.3	29.56	29.17	0.39	4.1	N/A	2.0 / E10
10	194.8	150.0	29.15	28.94	0.21	3.3	N/A	2.0 / E10
20	156.3	131.1	28.86	28.73	0.14	2.9	N/A	2.0 / E7
50	108.7	108.2	28.41	28.35	0.06	2.5	N/A	2.0 / E7

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Logan Road Culvert

BCC Asset ID	N/A	Tributary Name	Bulimba Creek – Garden City Overflow
Owner	DTMR	AMTD (m)	33165
Year of Construction	Unknown	Coordinates (GDA94)	E 508753 N 6950698
Year of Significant Modification	N/A	Hydraulic Model ID	S62
Source of Structure Information	BCC Bulimba Creek HEC-RAS Model (PRJ 050408)	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	R:\BI\CD\Project_Archive\2005\050408_Bulimba_Creek_Wishart_Stage_1\Flood Management\Further Works and 2D-Modelling\Further 1D Modelling\Calculations\HEC-RAS\Sept06		

Structure Description		Multiple cell concrete box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	2
Number of Piers in Waterway	N/A	Dimensions (m)	3 x 3
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	24.98
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	24.80
Structure Length (m) (in direction of flow)		~ 52	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 30.5	
Average Handrail Height (m)		0.7 (Armco)	

Image Description	Looking Downstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Image Description	Looking Upstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Link to Flood Model Results	[G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA]()
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				50-yr ARI (2 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	424.1	95.0	31.38	30.23	1.14	5.3	N/A	2.0 / E1
0.2	369.6	94.7	31.18	29.92	1.26	5.3	N/A	2.0 / E1
1	322.3	89.8	30.82	29.67	1.15	5.0	N/A	2.0 / E1
2	273.0	76.5	30.21	29.42	0.79	4.3	N/A	2.0 / E6
5	239.3	55.9	29.63	29.25	0.38	3.1	N/A	2.0 / E10
10	194.8	44.8	29.23	29.00	0.22	2.5	N/A	2.0 / E10
20	156.3	25.3	28.81	28.75	0.06	1.4	N/A	2.0 / E7
50	108.7	1.3	28.34	28.34	0.00	0.1	N/A	2.0 / E7

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Mount Gravatt Capalaba Road

BCC Asset ID	N/A	Tributary Name	Bulimba Creek
Owner	DTMR	AMTD (m)	28275
Year of Construction	Circa 1979	Coordinates (GDA94)	E 511220 N 6953092
Year of Significant Modification	2015 Bridge Duplication	Hydraulic Model ID	S57
Source of Structure Information	DTMR Design Drawings + 2019 Survey	Flood Model Representation	2d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\57 - Mt Gravatt Capalaba		

Structure Description		Four span dual road bridges	
Bridges		**Culverts**	
Number of Spans	4	Number of Barrels	N/A
Number of Piers in Waterway	3	Dimensions (m)	N/A
Pier shape and Width (m)	1.05 circular	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	~ 11.85	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		~ 36	
Span Length (m)		54.1	
Lowest Level of Deck Soffit (m AHD)		18.45	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		19.25 at median east of the bridge structure	
Average Handrail Height (m)		~ 1.1	

Image Description	Looking Downstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Image Description	Looking Upstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				100-yr ARI (1 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	1019.8	N/A	19.57	18.65	0.92	N/A	N/A	2.0 / E5
0.2	879.1	N/A	19.04	18.35	0.69	N/A	N/A	2.0 / E5
1	753.1	N/A	18.60	18.00	0.60	N/A	N/A	2.0 / E5
2	635.8	N/A	18.22	17.70	0.52	N/A	N/A	2.0 / E6
5	535.2	N/A	17.88	17.44	0.44	N/A	N/A	2.0 / E8
10	437.5	N/A	17.48	17.10	0.39	N/A	N/A	2.0 / E8
20	340.6	N/A	17.07	16.74	0.33	N/A	N/A	2.0 / E8
50	240.2	N/A	16.52	16.26	0.27	N/A	N/A	2.0 / E8

[1] *Flow underneath the road and only for 1D structures*

[2] *Measured at centre-span of bridge or at centre of culvert*

[3] *This is afflux at peak water level*

[4] *(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5] *(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6] *Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7] *Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Wecker Road Bridge

BCC Asset ID	B2810	Tributary Name	Bulimba Creek
Owner	BCC	AMTD (m)	26825
Year of Construction	Circa 1994	Coordinates (GDA94)	E 510880 N 6954299
Year of Significant Modification	N/A	Hydraulic Model ID	S56
Source of Structure Information	BCC Design Drawings + Survey from unknown date	Flood Model Representation	2d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\56 - Wecker Road		

Structure Description		Five span road bridge	
Bridges		**Culverts**	
Number of Spans	5	Number of Barrels	N/A
Number of Piers in Waterway	4	Dimensions (m)	N/A
Pier shape and Width (m)	0.4 wide blade pier	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	8.9	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		11.6	
Span Length (m)		80	
Lowest Level of Deck Soffit (m AHD)		14.39	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		14.25 at median west of the bridge structure	
Average Handrail Height (m)		~ 1.0	

Image Description	Looking Downstream
Date	June 2014
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	June 2014
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				5-yr ARI (20 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	1078.0	N/A	16.33	16.22	0.10	N/A	N/A	2.0 / E3
0.2	931.6	N/A	15.99	15.88	0.12	N/A	N/A	2.0 / E5
1	795.5	N/A	15.64	15.53	0.11	N/A	N/A	2.0 / E5
2	664.2	N/A	15.31	15.18	0.14	N/A	N/A	2.0 / E6
5	555.8	N/A	14.96	14.82	0.14	N/A	N/A	3.0 / E4
10	451.2	N/A	14.56	14.43	0.13	N/A	N/A	3.0 / E4
20	349.7	N/A	14.13	14.00	0.13	N/A	N/A	2.0 / E7
50	245.6	N/A	13.60	13.46	0.13	N/A	N/A	2.0 / E8

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Pine Mountain Road Bridge

BCC Asset ID	B0905	Tributary Name	Bulimba Creek
Owner	BCC	AMTD (m)	23415
Year of Construction	Circa 1994	Coordinates (GDA94)	E 510302 N 6956115
Year of Significant Modification	N/A	Hydraulic Model ID	S37
Source of Structure Information	BCC Design Drawings + Survey from unknown date	Flood Model Representation	2d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\37 - Pine Mountain Road		

Structure Description		Seven span road bridge	
Bridges		**Culverts**	
Number of Spans	7	Number of Barrels	N/A
Number of Piers in Waterway	6	Dimensions (m)	N/A
Pier shape and Width (m)	0.6 wide blade pier	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	3.38	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		11.3	
Span Length (m)		129.8	
Lowest Level of Deck Soffit (m AHD)		9.54	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		10.25 east of the bridge structure	
Average Handrail Height (m)		~ 1.0	

Image	Looking Downstream
Date	September 2015
Source	BCC Asset Management Records

Image	Looking Upstream
Date	September 2015
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				50-yr ARI (2 % AEP)				
AEP (%)	Total Discharge (m^3/s)[8]	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	1157.0	N/A	10.94	10.52	0.41	N/A	N/A	2.0 / E1
0.2	996.0	N/A	10.57	10.17	0.40	N/A	N/A	2.0 / E3
1	847.9	N/A	10.24	9.83	0.42	N/A	N/A	2.0 / E9
2	705.3	N/A	9.90	9.48	0.41	N/A	N/A	2.0 / E6
5	594.2	N/A	9.63	9.20	0.43	N/A	N/A	3.0 / E4
10	477.4	N/A	9.32	8.86	0.45	N/A	N/A	3.0 / E4
20	357.0	N/A	8.95	8.51	0.44	N/A	N/A	2.0 / E7
50	243.0	N/A	8.54	8.14	0.40	N/A	N/A	2.0 / E8

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Winstanley Street

BCC Asset ID	B2170	Tributary Name	Bulimba Creek
Owner	BCC	AMTD (m)	21625
Year of Construction	1982	Coordinates (GDA94)	E 510451 N 6957523
Year of Significant Modification	N/A	Hydraulic Model ID	S29
Source of Structure Information	BCC Design Drawings + Survey from unknown date	Flood Model Representation	1d bridge / 1d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\29 - Winstanley		

Structure Description		Three span road bridge	
Bridges		**Culverts**	
Number of Spans	3	Number of Barrels	N/A
Number of Piers in Waterway	2	Dimensions (m)	N/A
Pier shape and Width (m)	1.1 circular	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	1.44	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		11.5	
Span Length (m)		50	
Lowest Level of Deck Soffit (m AHD)		5.74	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		6.25 east of the bridge structure	
Average Handrail Height (m)		~ 1.1	

Image	Looking Downstream
Date	March 2014
Source	BCC Asset Management Records

Image	Looking Upstream
Date	September 2018
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)[8]	Discharge through Structure (m^3/s)[1&8]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	1362.9	592.4	8.87	8.55	0.32	3.0	1.7	2.0 / E3
0.2	1170.7	566.4	8.51	8.22	0.29	2.9	1.3	3.0 / E7
1	1012.1	553.0	8.17	7.91	0.26	2.8	0.9	3.0 / E7
2	808.1	509.5	7.72	7.52	0.20	2.6	0.0	3.0 / E8
5	677.8	484.0	7.41	7.25	0.17	2.5	0.0	3.0 / E4
10	531.8	445.0	7.01	6.88	0.13	2.3	0.0	3.0 / E4
20	396.4	372.3	6.60	6.51	0.09	1.9	0.0	3.0 / E1
50	256.2	256.2	6.06	6.05	0.02	1.3	0.0	3.0 / E1

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Old Cleveland Road Bridges

BCC Asset ID	B9104 and B9204	Tributary Name	Bulimba Creek
Owner	BCC	AMTD (m)	21035
Year of Construction	1974	Coordinates (GDA94)	E 510474 N 6958097
Year of Significant Modification	Bridge duplicated ~1977	Hydraulic Model ID	S27
Source of Structure Information	Design Drawings + 2019 Survey	Flood Model Representation	2d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\27 - Old Cleveland Road		

Structure Description		Four span dual road bridges	
Bridges		**Culverts**	
Number of Spans	4	Number of Barrels	N/A
Number of Piers in Waterway	3	Dimensions (m)	N/A
Pier shape and Width (m)	0.6 rectangular	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	1.35	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		26	
Span Length (m)		81.1	
Lowest Level of Deck Soffit (m AHD)		8.24	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		9.5 and overtops west of the bridge structure	
Average Handrail Height (m)		~ 1.2	

Image	Looking Downstream
Date	November 2015
Source	BCC Asset Management Records

Image	Looking Upstream
Date	November 2015
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)[8]	Discharge through Structure (m^3/s)[1&8]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	1257.6	N/A	7.86	7.53	0.33	N/A	N/A	3.0 / E7
0.2	1109.2	N/A	7.57	7.26	0.30	N/A	N/A	3.0 / E7
1	956.3	N/A	7.19	6.95	0.24	N/A	N/A	3.0 / E7
2	766.6	N/A	6.80	6.59	0.21	N/A	N/A	3.0 / E8
5	644.5	N/A	6.49	6.31	0.18	N/A	N/A	3.0 / E4
10	510.4	N/A	6.14	6.03	0.11	N/A	N/A	3.0 / E4
20	385.2	N/A	5.79	5.71	0.08	N/A	N/A	3.0 / E1
50	256.0	N/A	5.40	5.35	0.05	N/A	N/A	3.0 / E1

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Meadowlands Road Bridge

BCC Asset ID	B2300	Tributary Name	Bulimba Creek
Owner	BCC	AMTD (m)	18695
Year of Construction	1985	Coordinates (GDA94)	E 511869 N 6958840
Year of Significant Modification	N/A	Hydraulic Model ID	S17
Source of Structure Information	BCC Design Drawings + Survey from unknown date	Flood Model Representation	1d bridge / 1d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\17 - Meadowlands Road		

Structure Description		Four span road bridge	
Bridges		**Culverts**	
Number of Spans	4	Number of Barrels	N/A
Number of Piers in Waterway	3	Dimensions (m)	N/A
Pier shape and Width (m)	0.7 rectangular	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	-2.61	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		12	
Span Length (m)		66.3	
Lowest Level of Deck Soffit (m AHD)		5.33	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		5.25 east of the bridge structure	
Average Handrail Height (m)		~1.2	

Image Description	Looking Downstream
Date	April 2014
Source	BCC Asset Management Records

Looking Upstream	Looking Upstream
Date	August 2012
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				50-yr ARI (2 % AEP)				
AEP (%)	Total Discharge (m^3/s)[8]	Discharge through Structure (m^3/s)[1&8]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	1230.1	1103.0	5.79	5.45	0.34	3.4	0.0	4.5 / E9
0.2	1094.7	1072.3	5.42	5.25	0.18	3.4	0.0	4.5 / E3
1	929.0	929.0	5.12	5.00	0.12	3.1	0.0	4.5 / E3
2	817.5	817.5	4.84	4.75	0.09	2.9	0.0	3.0 / E9
5	647.2	647.2	4.57	4.51	0.06	2.4	0.0	3.0 / E4
10	510.3	510.3	4.35	4.31	0.04	2.0	0.0	3.0 / E4
20	383.7	383.7	4.11	4.09	0.02	1.6	0.0	3.0 / E1
50	244.4	244.4	3.79	3.78	0.01	1.1	0.0	3.0 / E7

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Wynnum Road Bridge

BCC Asset ID	B2230, B2240 and B9688	Tributary Name	Bulimba Creek
Owner	BCC	AMTD (m)	13080
Year of Construction	1955	Coordinates (GDA94)	E 510596 N 6961369
Year of Significant Modification	1974 duplicated upstream	Hydraulic Model ID	S13
Source of Structure Information	BCC Design Drawings + Survey from unknown date + 2019 ALS	Flood Model Representation	2d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\13 - Wynnum Road		

Structure Description		Dual road bridges	
Bridges		**Culverts**	
Number of Spans	U/S – 3 span D/S – 5 span	Number of Barrels	N/A
Number of Piers in Waterway	U/S – 2 D/S – 4	Dimensions (m)	N/A
Pier shape and Width (m)	U/S – 0.45 rectangular D/S – 0.35 blade	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	-2.66	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		24.5	
Span Length (m)		45.3 / 45.6	
Lowest Level of Deck Soffit (m AHD)		4.31 / 4.27	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		3.5 west of the bridge structure	
Average Handrail Height (m)		~ 1.2	

Image Description	Looking Downstream
Date	December 2015
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	June 2020
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				10-yr ARI (10 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	950.2	N/A	4.72	4.58	0.14	N/A	N/A	24.0 / E6
0.2	795.3	N/A	4.26	4.09	0.17	N/A	N/A	4.5 / E3
1	640.1	N/A	3.93	3.74	0.19	N/A	N/A	4.5 / E3
2	530.6	N/A	3.65	3.48	0.18	N/A	N/A	4.5 / E1
5	401.5	N/A	3.28	3.14	0.14	N/A	N/A	6.0 / E10
10	321.4	N/A	2.99	2.89	0.10	N/A	N/A	6.0 / E10
20	243.3	N/A	2.68	2.62	0.06	N/A	N/A	18.0 / E6
50	163.0	N/A	2.22	2.18	0.04	N/A	N/A	9.0 / E6

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Murarrie Road Bridge

BCC Asset ID	B1490	Tributary Name	Bulimba Creek
Owner	BCC	AMTD (m)	12230
Year of Construction	1985	Coordinates (GDA94)	E 510880 N 6962116
Year of Significant Modification	N/A	Hydraulic Model ID	S12
Source of Structure Information	BCC Design Drawings + Survey from unknown date	Flood Model Representation	1d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\12 - Murrarie Road		

Structure Description		Three span road bridge	
Bridges		**Culverts**	
Number of Spans	3	Number of Barrels	N/A
Number of Piers in Waterway	2	Dimensions (m)	N/A
Pier shape and Width (m)	0.76 Circular	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	-3.93	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		11	
Span Length (m)		44.1	
Lowest Level of Deck Soffit (m AHD)		2.37	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		Varies on approach roads	
Average Handrail Height (m)		~ 1.2	

Image Description	Looking Downstream
Date	November 2015
Source	BCC Asset Management Records

Image Description	Looking at Underside of Upstream Face
Date	November 2015
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	861.5	268.0	4.40	4.36	0.04	1.5	N/A	24.0 / E6
0.2	655.3	289.2	3.86	3.81	0.05	1.6	N/A	4.5 / E3
1	541.4	291.9	3.49	3.43	0.06	1.6	N/A	6.0 / E6
2	402.9	281.5	3.11	3.05	0.06	1.6	N/A	6.0 / E9
5	357.2	279.1	2.94	2.88	0.06	1.6	N/A	6.0 / E10
10	296.5	259.7	2.72	2.66	0.05	1.5	N/A	6.0 / E10
20	235.4	224.8	2.46	2.43	0.04	1.3	N/A	18.0 / E6
50	152.5	152.5	2.05	2.04	0.01	1.0	N/A	9.0 / E6

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gateway Motorway Viaduct

BCC Asset ID	N/A	Tributary Name	Bulimba Creek
Owner	DTMR	AMTD (m)	11950
Year of Construction	1986	Coordinates (GDA94)	E 511103 N 6962223
Year of Significant Modification	2008 duplicated downstream	Hydraulic Model ID	S10
Source of Structure Information	DTMR Design Drawings + 2019 Survey	Flood Model Representation	2d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\10 and 11 - Gateway #1\10 - Bulimba Creek Viaduct		

Structure Description		Multiple span dual road bridges	
Bridges		**Culverts**	
Number of Spans	U/S – 15 span D/S – 8 span	Number of Barrels	N/A
Number of Piers in Waterway	U/S – 14 D/S – 7	Dimensions (m)	N/A
Pier shape and Width (m)	Varies	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	~ -4.0	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		49	
Span Length (m)		~ 448.4 / 296.1	
Lowest Level of Deck Soffit (m AHD)		~ 3.8 / 5.1	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 3.65 south of bridge structure	
Average Handrail Height (m)		Varying height concrete barriers	

Image Description	Looking Downstream
Date	April 2021
Source	Google Imagery

Image Description	Looking Upstream
Date	April 2021
Source	Google Imagery

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				100-yr ARI (1 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	861.5	N/A	4.35	4.16	0.19	N/A	N/A	24.0 / E6
0.2	655.3	N/A	3.80	3.65	0.16	N/A	N/A	24.0 / E6
1	541.4	N/A	3.42	3.26	0.15	N/A	N/A	6.0 / E6
2	402.9	N/A	3.03	2.89	0.13	N/A	N/A	6.0 / E9
5	357.2	N/A	2.86	2.73	0.13	N/A	N/A	6.0 / E10
10	296.5	N/A	2.64	2.53	0.11	N/A	N/A	6.0 / E10
20	235.4	N/A	2.41	2.32	0.09	N/A	N/A	18.0 / E6
50	152.5	N/A	2.03	1.98	0.05	N/A	N/A	9.0 / E6

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Cleveland Railway

BCC Asset ID	N/A	Tributary Name	Bulimba Creek
Owner	QLD Rail	AMTD (m)	4500
Year of Construction	1992	Coordinates (GDA94)	E 512099 N 6963817
Year of Significant Modification	N/A	Hydraulic Model ID	S7
Source of Structure Information	QLD Rail Design Drawings + 2019 Survey	Flood Model Representation	2d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\7 to 9 - QLD Rail\S7		

Structure Description		Seven span railway bridge	
Bridges		**Culverts**	
Number of Spans	7	Number of Barrels	N/A
Number of Piers in Waterway	6	Dimensions (m)	N/A
Pier shape and Width (m)	1.05 circular	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	-4.79	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		13	
Span Length (m)		104	
Lowest Level of Deck Soffit (m AHD)		2.76	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		Varies	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	Unknown
Source	Photo taken from 2014 Bulimba Creek Flood Study Report

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	1003.9	N/A	3.28	3.25	0.03	N/A	N/A	24.0 / E10
0.2	854.2	N/A	2.82	2.79	0.03	N/A	N/A	24.0 / E10
1	698.4	N/A	2.28	2.24	0.04	N/A	N/A	6.0 / E10
2	568.7	N/A	1.96	1.93	0.03	N/A	N/A	6.0 / E9
5	480.7	N/A	1.75	1.72	0.03	N/A	N/A	6.0 / E10
10	376.2	N/A	1.51	1.49	0.02	N/A	N/A	6.0 / E10
20	284.5	N/A	1.32	1.30	0.02	N/A	N/A	18.0 / E2
50	171.8	N/A	1.12	1.11	0.01	N/A	N/A	9.0 / E6

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Port of Brisbane Motorway

BCC Asset ID	N/A	Tributary Name	Bulimba Creek
Owner	DTMR	AMTD (m)	4460
Year of Construction	2002	Coordinates (GDA94)	E 512083 N 6963854
Year of Significant Modification	2012 bridge duplicated upstream	Hydraulic Model ID	S3
Source of Structure Information	DTMR Design Drawings + 2019 Survey	Flood Model Representation	2d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\3 to 6 - Port of Brisbane Motorway\BCC - Port of Brisbane		

Structure Description		Dual seven span road bridges	
Bridges		**Culverts**	
Number of Spans	7	Number of Barrels	N/A
Number of Piers in Waterway	6	Dimensions (m)	N/A
Pier shape and Width (m)	0.55 Octagonal	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	-4.79	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		23	
Span Length (m)		104	
Lowest Level of Deck Soffit (m AHD)		2.85	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		Varies	
Average Handrail Height (m)		Varying height concrete barriers	

Image Description	Looking Downstream
Date	August 2019
Source	BCC 2019 Survey

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	1003.9	N/A	3.24	3.17	0.07	N/A	N/A	24.0 / E10
0.2	854.2	N/A	2.78	2.71	0.07	N/A	N/A	24.0 / E10
1	698.4	N/A	2.22	2.15	0.07	N/A	N/A	6.0 / E10
2	568.7	N/A	1.91	1.84	0.07	N/A	N/A	6.0 / E9
5	480.7	N/A	1.71	1.65	0.06	N/A	N/A	6.0 / E10
10	376.2	N/A	1.48	1.44	0.04	N/A	N/A	6.0 / E10
20	284.5	N/A	1.30	1.27	0.03	N/A	N/A	18.0 / E2
50	171.8	N/A	1.11	1.10	0.01	N/A	N/A	9.0 / E6

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Lytton Road – Westbound Bridge

BCC Asset ID	N/A	Tributary Name	Bulimba Creek
Owner	DTMR	AMTD (m)	3335
Year of Construction	Circa 2002	Coordinates (GDA94)	E 511192, N 6964199
Year of Significant Modification	N/A	Hydraulic Model ID	S2
Source of Structure Information	DTMR Design Drawings + 2019 Survey	Flood Model Representation	1d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\1 and 2 - Lytton Road\BCC - Lytton Rd Bridges\SID 33056 Bulimba Creek SB		

Structure Description		Four span road bridge	
Bridges		**Culverts**	
Number of Spans	4	Number of Barrels	N/A
Number of Piers in Waterway	3	Dimensions (m)	N/A
Pier shape and Width (m)	1.2 circular	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	-3.34	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		14	
Span Length (m)		90.1	
Lowest Level of Deck Soffit (m AHD)		2.85	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		Varies	
Average Handrail Height (m)		Multiple concrete barriers ~ 1.1 typically	

Image Description	Looking Downstream
Date	December 2005
Source	Site Inspection

Image Description	Looking Upstream
Date	December 2005
Source	Photo taken from 2014 Bulimba Creek Flood Study Report

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	1005.3	1005.3	3.00	2.80	0.20	2.9	0.0	24.0 / E10
0.2	907.6	907.6	2.51	2.41	0.10	2.8	0.0	24.0 / E10
1	711.7	711.7	1.94	1.86	0.08	2.5	0.0	6.0 / E10
2	568.2	568.2	1.68	1.62	0.06	2.2	0.0	6.0 / E9
5	479.5	479.5	1.52	1.47	0.05	1.9	0.0	6.0 / E10
10	375.8	375.8	1.34	1.31	0.03	1.6	0.0	6.0 / E10
20	284.7	284.7	1.20	1.18	0.02	1.2	0.0	18.0 / E2
50	171.9	171.9	1.07	1.06	0.01	0.8	0.0	9.0 / E6

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Lytton Road – Eastbound Bridge

BCC Asset ID	N/A	Tributary Name	Bulimba Creek
Owner	DTMR	AMTD (m)	3265
Year of Construction	Unknown	Coordinates (GDA94)	E 511110, N 6964205
Year of Significant Modification	2001 bridge widened	Hydraulic Model ID	S1
Source of Structure Information	DTMR Design Drawings + 2019 Survey	Flood Model Representation	1d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\1 and 2 - Lytton Road\BCC - Lytton Rd Bridges\SID 8400 Bulimba Creek NB		

Structure Description		Three span road bridge	
Bridges		**Culverts**	
Number of Spans	3	Number of Barrels	N/A
Number of Piers in Waterway	2	Dimensions (m)	N/A
Pier shape and Width (m)	0.6 circular	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	-3.39	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		16	
Span Length (m)		75.6	
Lowest Level of Deck Soffit (m AHD)		2.84	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		Varies	
Average Handrail Height (m)		Multiple concrete barriers ~ 1.1 typically	

Image Description	Looking Downstream
Date	December 2005
Source	Site Inspection

Image Description	Looking Upstream
Date	December 2005
Source	Photo taken from 2014 Bulimba Creek Flood Study Report

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	1005.2	1005.2	2.77	2.52	0.25	3.1	0.0	24.0 / E10
0.2	907.6	907.6	2.38	2.35	0.03	2.9	0.0	24.0 / E10
1	711.7	711.7	1.83	1.81	0.02	2.6	0.0	6.0 / E10
2	568.2	568.2	1.60	1.58	0.02	2.2	0.0	6.0 / E9
5	479.5	479.5	1.45	1.44	0.01	2.0	0.0	6.0 / E10
10	375.8	375.8	1.30	1.29	0.01	1.6	0.0	6.0 / E10
20	284.7	284.7	1.18	1.17	0.01	1.3	0.0	18.0 / E2
50	171.9	171.9	1.06	1.05	0.01	0.8	0.0	9.0 / E6

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Beenleigh Road

BCC Asset ID	C0249B	Tributary Name	Bulimba Creek East
Owner	BCC	AMTD (m)	5450
Year of Construction	Unknown	Coordinates (GDA94)	E 508574 N 6946839
Year of Significant Modification	N/A	Hydraulic Model ID	S101
Source of Structure Information	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old MIKE11 Model\Model files\Data files		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	4
Number of Piers in Waterway	N/A	Dimensions (m)	1.5 x 0.6
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	48.66
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	48.60
Structure Length (m) (in direction of flow)		20.7	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 49.75	
Average Handrail Height (m)		~ 1.1 (armco)	

Image Description	Looking Downstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				< 2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	91.4	11.5	50.74	50.13	0.60	4.9	N/A	0.5 / E7
0.2	71.5	11.4	50.66	50.03	0.63	4.9	N/A	0.5 / E7
1	51.5	11.3	50.56	49.92	0.64	4.9	N/A	0.5 / E10
2	43.4	11.3	50.51	49.87	0.65	4.9	N/A	0.5 / E9
5	36.6	11.0	50.45	49.81	0.64	4.9	N/A	1.0 / E3
10	28.9	10.8	50.36	49.75	0.61	4.9	N/A	0.5 / E6
20	25.6	10.6	50.31	49.69	0.62	4.8	N/A	1.0 / E7
50	18.6	10.2	50.15	49.47	0.68	4.7	N/A	1.0 / E7

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gold Coast Railway

BCC Asset ID	N/A	Tributary Name	Bulimba Creek East
Owner	QLD Rail	AMTD (m)	5425
Year of Construction	Unknown	Coordinates (GDA94)	E 508598 N 6946846
Year of Significant Modification	N/A	Hydraulic Model ID	S100
Source of Structure Information	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old MIKE11 Model\Model files\Data files		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	10
Number of Piers in Waterway	N/A	Dimensions (m)	1.5 x 1.15
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	48.60
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	47.96
Structure Length (m) (in direction of flow)		20.6	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 50.0	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	November 2009
Source	Google Imagery

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	92.6	42.1	50.13	49.20	0.93	4.1	N/A	0.5 / E7
0.2	73.8	39.2	50.03	49.09	0.94	3.1	N/A	0.5 / E7
1	54.3	35.0	49.92	48.95	0.97	2.9	N/A	0.5 / E10
2	45.5	32.8	49.87	48.88	0.98	2.9	N/A	0.5 / E9
5	38.3	30.8	49.81	48.82	0.99	2.8	N/A	1.0 / E3
10	30.2	28.2	49.75	48.74	1.00	2.7	N/A	0.5 / E6
20	27.0	26.1	49.69	48.70	0.99	2.7	N/A	1.0 / E7
50	18.7	18.7	49.47	48.55	0.92	2.4	N/A	1.0 / E7

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gateway Motorway Culvert

BCC Asset ID	N/A	Tributary Name	Bulimba Creek East
Owner	DTMR	AMTD (m)	5350
Year of Construction	Unknown	Coordinates (GDA94)	E 508659 N 6946840
Year of Significant Modification	N/A	Hydraulic Model ID	S99
Source of Structure Information	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Flood Model Representation	1d culvert / 1d channel
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old MIKE11 Model\Model files\Data files		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	2.4 diameter
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	47.41
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	46.66
Structure Length (m) (in direction of flow)		75	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		N/A	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	November 2009
Source	Google Imagery

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP) Gateway Motorway				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	92.6	22.3	49.20	48.74	0.47	2.5	0.0	0.5 / E7
0.2	73.8	19.6	49.09	48.61	0.48	2.4	0.0	0.5 / E7
1	54.3	16.9	48.96	48.48	0.48	2.4	0.0	1.0 / E4
2	45.5	15.6	48.89	48.41	0.48	2.3	0.0	1.0 / E5
5	38.3	14.1	48.82	48.33	0.49	2.4	0.0	1.0 / E3
10	30.2	13.0	48.76	48.26	0.50	2.4	0.0	1.0 / E3
20	27.0	12.0	48.70	48.20	0.51	2.4	0.0	1.0 / E7
50	18.7	9.5	48.55	48.02	0.53	2.4	0.0	1.0 / E5

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gateway Motorway Bridge

BCC Asset ID	N/A	Tributary Name	Bulimba Creek East – Railway Bypass
Owner	DTMR	AMTD (m)	30
Year of Construction	1996	Coordinates (GDA94)	E 508968 N 6947045
Year of Significant Modification	N/A	Hydraulic Model ID	S98
Source of Structure Information	DTMR Design Drawings + 2019 ALS	Flood Model Representation	2d bridge / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\98 - Gateway @ Runcorn		

Structure Description		Dual span road bridges	
Bridges		**Culverts**	
Number of Spans	1	Number of Barrels	N/A
Number of Piers in Waterway	N/A	Dimensions (m)	N/A
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	~ 45.7	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		33.8	
Span Length (m)		~15.8	
Lowest Level of Deck Soffit (m AHD)		50.65	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~51.85 on westbound carriageway west of the structure	
Average Handrail Height (m)		Concrete barrier ~ 1.2 typically	

Image Description	Looking Downstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Image Description	Looking Upstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	27.2	N/A	47.61	47.11	0.50	N/A	N/A	0.5 / E7
0.2	17.7	N/A	47.34	47.02	0.32	N/A	N/A	0.5 / E7
1	11.2	N/A	47.16	46.89	0.27	N/A	N/A	1.0 / E5
2	7.6	N/A	47.05	46.84	0.21	N/A	N/A	1.0 / E5
5	3.8	N/A	46.76	46.70	0.06	N/A	N/A	1.0 / E3
10	0.8	N/A	46.61	46.61	0.00	N/A	N/A	1.0 / E9
20	0.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
50	0.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Underwood Road Culvert

BCC Asset ID	C0091B	Tributary Name	Bulimba Creek East
Owner	BCC	AMTD (m)	3510
Year of Construction	Unknown	Coordinates (GDA94)	E 509481 N 6948011
Year of Significant Modification	N/A	Hydraulic Model ID	S97
Source of Structure Information	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old MIKE11 Model\Model files\Data files		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	4
Number of Piers in Waterway	N/A	Dimensions (m)	3.6 x 1.8
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	35.33
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	35.21
Structure Length (m) (in direction of flow)		~ 15.9	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 38.25	
Average Handrail Height (m)		~ 0.7 (Armco)	

Image Description	Looking Downstream
Date	November 2019
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	November 2019
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				10-yr ARI (10 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	157.9	99.1	39.35	39.11	0.24	3.8	N/A	1.0 / E5
0.2	131.3	97.7	39.19	38.89	0.29	3.8	N/A	1.0 / E5
1	103.3	92.9	38.90	38.59	0.31	3.6	N/A	1.0 / E5
2	86.8	84.8	38.62	38.39	0.23	3.3	N/A	1.0 / E5
5	68.7	68.6	38.22	38.12	0.10	2.6	N/A	1.0 / E5
10	57.9	57.9	37.98	37.93	0.05	2.2	N/A	1.0 / E5
20	47.7	47.7	37.74	37.72	0.02	1.8	N/A	1.0 / E5
50	33.8	33.8	37.34	37.33	0.01	1.3	N/A	1.0 / E5

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gateway Motorway Bridge

BCC Asset ID	N/A	Tributary Name	Bulimba Creek East
Owner	DTMR	AMTD (m)	2925
Year of Construction	1996	Coordinates (GDA94)	E 509702 N 6948452
Year of Significant Modification	N/A	Hydraulic Model ID	S96
Source of Structure Information	DTMR Design Drawings + BCC Bulimba Creek MIKE11 Model + 2019 ALS	Flood Model Representation	1d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\96 - Gateway - Bulimba East\Bulimba Creek Bridge		

Structure Description		Dual two span road bridges	
Bridges		**Culverts**	
Number of Spans	2	Number of Barrels	N/A
Number of Piers in Waterway	1	Dimensions (m)	N/A
Pier shape and Width (m)	0.55 circular	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	32.15	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		50	
Span Length (m)		39.8	
Lowest Level of Deck Soffit (m AHD)		37.19	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 38	
Average Handrail Height (m)		Multiple concrete barriers	

Image Description	Looking Downstream
Date	December 2005
Source	Photo taken from 2014 Bulimba Creek Flood Study Report

Image Description	Looking Upstream
Date	December 2005
Source	Photo taken from 2014 Bulimba Creek Flood Study Report

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)[8]	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	189.6	189.6	36.16	36.04	0.12	2.2	N/A	1.0 / E5
0.2	154.7	154.7	35.95	35.86	0.09	1.9	N/A	1.0 / E5
1	119.1	119.1	35.71	35.65	0.07	1.6	N/A	1.0 / E5
2	99.7	99.7	35.57	35.52	0.06	1.5	N/A	1.0 / E5
5	79.3	79.3	35.35	35.31	0.04	1.3	N/A	1.0 / E5
10	66.0	66.0	35.16	35.12	0.04	1.2	N/A	1.0 / E5
20	54.4	54.4	34.97	34.94	0.03	1.2	N/A	1.0 / E5
50	38.7	38.7	34.65	34.62	0.03	1.1	N/A	1.0 / E5

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Logan Road Culvert

BCC Asset ID	N/A	Tributary Name	Bulimba Creek East
Owner	DTMR	AMTD (m)	2520
Year of Construction	Unknown	Coordinates (GDA94)	E 509730 N 6948937
Year of Significant Modification	N/A	Hydraulic Model ID	S94
Source of Structure Information	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old MIKE11 Model\Model files\Data files		

Structure Description		Multiple cell culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	As below
Number of Piers in Waterway	N/A	Dimensions (m)	4 / 2.4 m dia RCPs + 2 / 2.4 x 2.4 m RCBCs
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	29.89 / 30.57
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	29.77 / 30.37
Structure Length (m) (in direction of flow)		~ 32	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 33.6 (median)	
Average Handrail Height (m)		~ 0.7 (Armco)	

Image Description	Looking Downstream
Date	17th September 2020
Source	Photo taken as part of site visit 17th September 2020

Image Description	Looking Upstream
Date	December 2005
Source	Photo taken from 2014 Bulimba Creek Flood Study Report

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				5-yr ARI (20 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	199.5	131.7	34.49	33.68	0.81	5.8	N/A	1.0 / E5
0.2	161.7	127.5	34.26	33.40	0.86	5.7	N/A	1.0 / E5
1	127.0	121.2	33.81	32.90	0.91	5.2	N/A	1.0 / E5
2	107.9	107.9	33.34	32.57	0.76	4.2	N/A	1.0 / E5
5	89.8	89.8	32.99	32.23	0.76	3.8	N/A	1.0 / E5
10	71.0	71.0	32.56	31.98	0.57	3.6	N/A	1.0 / E5
20	58.4	58.4	32.25	31.77	0.48	3.3	N/A	1.0 / E5
50	39.9	39.9	31.83	31.39	0.44	2.9	N/A	1.0 / E4

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Pacific Motorway Culvert

BCC Asset ID	N/A	Tributary Name	Bulimba Creek East
Owner	DTMR	AMTD (m)	1960
Year of Construction	Unknown	Coordinates (GDA94)	E 510116 N 6949283
Year of Significant Modification	N/A	Hydraulic Model ID	S93
Source of Structure Information	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old MIKE11 Model\Model files\Data files		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	5
Number of Piers in Waterway	N/A	Dimensions (m)	3 x 2.7
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	27.34
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	27.25
Structure Length (m) (in direction of flow)		50	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 31.65	
Average Handrail Height (m)		Multiple concrete barriers	

Image Description	Looking Upstream
Date	August 2019
Source	BCC 2019 Survey

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				10-yr ARI (10 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	344.5	216.6	33.52	32.68	0.83	7.0	N/A	1.0 / E5
0.2	276.8	213.4	33.23	31.67	1.55	7.0	N/A	1.0 / E5
1	211.5	200.6	32.63	30.91	1.72	6.6	N/A	1.0 / E5
2	190.4	186.4	32.14	30.66	1.48	6.4	N/A	1.0 / E5
5	161.0	161.0	31.51	30.43	1.07	6.3	N/A	1.0 / E9
10	149.9	149.9	30.96	30.15	0.82	4.9	N/A	1.0 / E5
20	128.1	128.1	30.57	29.79	0.78	4.4	N/A	1.0 / E5
50	91.3	91.3	29.98	29.46	0.52	3.3	N/A	1.0 / E5

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Miles Platting Road Bridge

BCC Asset ID	B9967	Tributary Name	Bulimba Creek East
Owner	BCC	AMTD (m)	1600
Year of Construction	Circa 1994	Coordinates (GDA94)	E 510264 N 6949601
Year of Significant Modification	N/A	Hydraulic Model ID	S90
Source of Structure Information	DTMR Design Drawings + 2019 ALS	Flood Model Representation	1d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\90 - Miles Platting Rd		

Structure Description		Single span road bridge	
Bridges		**Culverts**	
Number of Spans	1	Number of Barrels	N/A
Number of Piers in Waterway	N/A	Dimensions (m)	N/A
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	25.25	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		26	
Span Length (m)		20.4	
Lowest Level of Deck Soffit (m AHD)		31.8	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 30.9 west of bridge structure	
Average Handrail Height (m)		~ 1.2	

Image Description	Looking Downstream
Date	May 2016
Source	BCC Asset Management Records

Image Description	Underside of Structure
Date	May 2016
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	353.5	353.5	30.23	29.95	0.28	4.5	N/A	1.0 / E5
0.2	268.4	268.4	29.72	29.51	0.20	3.7	N/A	1.0 / E5
1	209.3	209.3	29.33	29.18	0.15	3.2	N/A	1.0 / E5
2	189.0	189.0	29.19	29.05	0.13	3.0	N/A	1.0 / E5
5	160.0	160.0	28.98	28.87	0.11	2.7	N/A	1.0 / E9
10	145.4	145.4	28.87	28.77	0.09	2.5	N/A	1.0 / E5
20	121.5	121.5	28.68	28.60	0.07	2.2	N/A	1.0 / E7
50	90.5	90.5	28.40	28.35	0.05	1.8	N/A	1.0 / E5

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gateway Motorway - On / Off Ramp

BCC Asset ID	N/A	Tributary Name	Bulimba Creek East
Owner	DTMR	AMTD (m)	1260
Year of Construction	1996	Coordinates (GDA94)	E 510423 N 6949911
Year of Significant Modification	N/A	Hydraulic Model ID	S89
Source of Structure Information	DTMR Design Drawings + 2019 ALS	Flood Model Representation	1d bridge / 1d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\89 - Gateway On_Off - Bulimba East\Gateway Motorway On-Off Ramp		

Structure Description		Dual two span road bridges	
Bridges		**Culverts**	
Number of Spans	2	Number of Barrels	N/A
Number of Piers in Waterway	1	Dimensions (m)	N/A
Pier shape and Width (m)	0.6 circular	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	24.5	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		~23.5	
Span Length (m)		24.5	
Lowest Level of Deck Soffit (m AHD)		29.1	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~ 30 west of bridge structure	
Average Handrail Height (m)		Concrete barriers ~ 1.2	

Image Description	Looking Upstream at Upstream Bridge
Date	March 2020
Source	Google Imagery

Image Description	Looking Downstream at Downstream Bridge
Date	March 2020
Source	Google Imagery

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	348.6	348.6	28.81	28.24	0.56	4.2	0.0	1.0 / E5
0.2	265.5	265.5	28.28	27.90	0.38	3.5	0.0	1.0 / E5
1	208.2	208.2	27.88	27.60	0.28	3.1	0.0	1.0 / E5
2	187.8	187.8	27.72	27.49	0.24	2.9	0.0	1.0 / E5
5	159.2	159.2	27.50	27.31	0.19	2.6	0.0	1.0 / E9
10	144.3	144.3	27.37	27.20	0.16	2.5	0.0	1.0 / E5
20	120.5	120.5	27.15	27.02	0.13	2.3	0.0	1.0 / E7
50	89.7	89.7	26.84	26.74	0.10	1.9	0.0	1.0 / E5

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Fursden Road Culvert

BCC Asset ID	C0136B	Tributary Name	Cloverbrook Place Drain
Owner	BCC	AMTD (m)	680
Year of Construction	Circa 1976	Coordinates (GDA94)	E 510378 N 6959715
Year of Significant Modification	N/A	Hydraulic Model ID	S121
Source of Structure Information	BCC Design Drawings + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\121 - Fursden		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	2.4 x 1.2
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	0.50
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	0.46
Structure Length (m) (in direction of flow)		9.76	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~2.10 west of the structure	
Average Handrail Height (m)		~ 0.7 (Armco)	

Image Description	Looking Downstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Image Description	Looking Upstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				< 2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	N/A [(b)]	N/A [(b)]	5.29	5.29	0.00	N/A [(b)]	N/A	24.0 / E1
0.2	N/A [(b)]	N/A [(b)]	4.92	4.92	0.00	N/A [(b)]	N/A	4.5 / E3
1	N/A [(b)]	N/A [(b)]	4.58	4.58	0.00	N/A [(b)]	N/A	4.5 / E3
2	N/A [(b)]	N/A [(b)]	4.24	4.24	0.00	N/A [(b)]	N/A	4.5 / E3
5	N/A [(b)]	N/A [(b)]	3.89	3.89	0.00	N/A [(b)]	N/A	6.0 / E10
10	N/A [(b)]	N/A [(b)]	3.57	3.57	0.00	N/A [(b)]	N/A	6.0 / E10
20	N/A [(b)]	N/A [(b)]	3.21	3.21	0.00	N/A [(b)]	N/A	4.5 / E8
50	N/A [(b)]	N/A [(b)]	2.73	2.73	0.00	N/A [(b)]	N/A	4.5 / E8

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

[(b)]Backwater affected value

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Miles Platting Road Culvert

BCC Asset ID	C0258P	Tributary Name	Miles Platting Road Drain
Owner	BCC	AMTD (m)	1050
Year of Construction	N/A	Coordinates (GDA94)	E 510944 N 6949483
Year of Significant Modification	N/A	Hydraulic Model ID	S173
Source of Structure Information	BCC MPR HEC-RAS Model (PRJ 131072) + 2019 ALS	Flood Model Representation	1d culvert / 1d weir
Link to Data Source	R:\BI\CD\Project_Archive\2013\131072_Rochedale_road_network_-_Miles_Platting_Ro\Flood Management\Calculations\Miles Platting Road\HECRAS		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	5
Number of Piers in Waterway	N/A	Dimensions (m)	1.2 dia
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	38.30
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	38.15
Structure Length (m) (in direction of flow)		12.2	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~39.9	
Average Handrail Height (m)		~ 0.7 (Armco)	

Image Description	Looking Downstream
Date	October 2012
Source	BCC Asset Management Records

Image Description	Looking upstream
Date	October 2012
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				< 2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	76.3	24.6	40.93	40.42	0.51	4.4	1.7	0.5 / E2
0.2	61.5	24.1	40.80	40.29	0.51	4.3	1.6	0.5 / E2
1	46.5	23.4	40.66	40.15	0.51	4.1	1.5	0.5 / E2
2	40.6	22.9	40.57	40.09	0.48	4.0	1.4	0.5 / E2
5	34.0	21.9	40.45	40.02	0.43	3.9	1.3	0.5 / E8
10	29.3	21.0	40.36	39.96	0.40	3.7	1.2	0.5 / E8
20	24.9	20.1	40.28	39.91	0.37	3.6	1.1	0.5 / E9
50	18.1	17.4	40.07	39.80	0.27	3.1	0.7	0.5 / E8

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gateway Motorway Culvert

BCC Asset ID	C3066B	Tributary Name	Miles Platting Road Drain
Owner	DTMR	AMTD (m)	130
Year of Construction	N/A	Coordinates (GDA94)	E 510608 N 6950247
Year of Significant Modification	Between 2009 and 2011	Hydraulic Model ID	S172
Source of Structure Information	2008 DTMR Survey + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\12d\Bulimba Creek Flood Study\Bulimba Creek Flood Study\Bulimba_Creek_Flood_Study.project		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	As below
Number of Piers in Waterway	N/A	Dimensions (m)	3 / 3.67 x 1.86 m RCBCs + 2 / 3.83 x 2.04 m SLBCs
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	25.8
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	25.66
Structure Length (m) (in direction of flow)		43.9	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~29.8	
Average Handrail Height (m)		Multiple concrete barriers	

Image Description	Looking Downstream
Date	Circa 2021
Source	Google Imagery

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	134.7	134.7	28.93	27.15	1.78	6.2	N/A	0.5 / E7
0.2	111.9	111.9	28.41	27.01	1.41	3.8	N/A	0.5 / E7
1	84.5	84.5	27.89	26.81	1.08	3.7	N/A	0.5 / E7
2	73.6	73.6	27.68	26.72	0.95	3.5	N/A	0.5 / E7
5	61.1	61.1	27.46	26.62	0.83	3.3	N/A	0.5 / E8
10	52.7	52.7	27.30	26.55	0.75	3.1	N/A	0.5 / E8
20	44.9	44.9	27.15	26.48	0.67	3.0	N/A	0.5 / E8
50	32.5	32.5	26.90	26.36	0.54	2.4	N/A	0.5 / E8

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Nagle Street Bridge

BCC Asset ID	B1520	Tributary Name	Mimosa Creek
Owner	BCC	AMTD (m)	2085
Year of Construction	Circa 1971	Coordinates (GDA94)	E 507348 N 6951765
Year of Significant Modification	N/A	Hydraulic Model ID	S87
Source of Structure Information	BCC Design Drawings + Survey from unknown date	Flood Model Representation	1d bridge / 1d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\87 - Nagle Street		

Structure Description		Single span road bridge	
Bridges		**Culverts**	
Number of Spans	1	Number of Barrels	N/A
Number of Piers in Waterway	N/A	Dimensions (m)	N/A
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	40.6	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		10.8	
Span Length (m)		8.5	
Lowest Level of Deck Soffit (m AHD)		44.1	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~44.6	
Average Handrail Height (m)		~1.1	

Image Description	Looking Downstream
Date	February 2018
Source	BCC Asset Management Records

Image Description	Underside of Structure
Date	February 2018
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				500-yr ARI (0.2 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	101.8	99.2	44.89	44.59	0.30	3.3	0.7	1.0 / E5
0.2	84.2	84.2	44.29	44.08	0.21	2.9	0.0	1.0 / E5
1	66.7	66.7	43.82	43.79	0.03	2.5	0.0	2.0 / E8
2	55.4	55.4	43.67	43.65	0.02	2.1	0.0	1.0 / E5
5	45.8	45.8	43.55	43.53	0.02	1.8	0.0	2.0 / E5
10	36.8	36.8	43.41	43.40	0.01	1.6	0.0	2.0 / E5
20	29.3	29.3	43.23	43.22	0.01	1.3	0.0	1.0 / E5
50	20.3	20.3	42.91	42.90	0.01	1.0	0.0	1.0 / E9

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Pacific Motorway Culvert

BCC Asset ID	N/A	Tributary Name	Mimosa Creek
Owner	DTMR	AMTD (m)	1900
Year of Construction	Circa 1979	Coordinates (GDA94)	E 507378 N 6951594
Year of Significant Modification	Busway bridge ~1999 Bikeway bridge ~2005	Hydraulic Model ID	S86
Source of Structure Information	DTMR Design Drawings + ALS 2019	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\86 - SE Freeway Mimosa		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	3 x 2.7
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	40.29
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	39.84
Structure Length (m) (in direction of flow)		~ 68.3 (including busway and bikeway bridges)	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~44.5	
Average Handrail Height (m)		Multiple concrete barriers	

Image Description	Looking Downstream
Date	April 2021
Source	Google Imagery

Image Description	Looking Upstream
Date	6th October 2020
Source	Photo taken as part of site visit 6th October 2020

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	100.7	100.7	44.34	43.12	1.22	6.9	N/A	1.0 / E5
0.2	84.0	84.0	43.62	42.82	0.80	4.7	N/A	1.0 / E5
1	66.6	66.6	43.14	42.50	0.65	4.3	N/A	2.0 / E8
2	55.4	55.4	42.81	42.26	0.55	4.1	N/A	1.0 / E5
5	45.8	45.8	42.51	42.03	0.48	3.8	N/A	2.0 / E5
10	36.8	36.8	42.21	41.78	0.43	3.5	N/A	2.0 / E5
20	29.2	29.2	41.94	41.53	0.41	3.3	N/A	1.0 / E5
50	20.2	20.2	41.58	41.19	0.39	2.9	N/A	1.0 / E9

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Kessels Road Bridge

BCC Asset ID	N/A	Tributary Name	Mimosa Creek
Owner	DTMR	AMTD (m)	1580
Year of Construction	2013	Coordinates (GDA94)	E 507248 N 6951315
Year of Significant Modification	N/A	Hydraulic Model ID	S85
Source of Structure Information	DTMR Design Drawings + 2019 Survey	Flood Model Representation	1d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\85 - Kessels Road		

Structure Description		Single span road bridge	
Bridges		**Culverts**	
Number of Spans	1	Number of Barrels	N/A
Number of Piers in Waterway	N/A	Dimensions (m)	N/A
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	~ 39	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		40	
Span Length (m)		18.8	
Lowest Level of Deck Soffit (m AHD)		41.58	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~42.95	
Average Handrail Height (m)		~ 1.2	

Image Description	Looking Downstream
Date	6th October 2020
Source	Photo taken as part of site visit 6th October 2020

Image Description	Looking Upstream
Date	6th October 2020
Source	Photo taken as part of site visit 6th October 2020

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	121.2	121.2	42.25	41.65	0.60	2.7	N/A	1.0 / E5
0.2	101.3	101.3	41.56	41.41	0.15	2.4	N/A	1.0 / E5
1	80.5	80.5	41.27	41.15	0.12	2.2	N/A	2.0 / E3
2	67.3	67.3	41.06	40.95	0.11	2.1	N/A	1.0 / E5
5	55.5	55.5	40.85	40.76	0.09	1.9	N/A	2.0 / E10
10	44.6	44.6	40.64	40.56	0.08	1.8	N/A	2.0 / E10
20	35.2	35.2	40.44	40.37	0.07	1.9	N/A	1.0 / E4
50	24.0	24.0	40.15	40.09	0.06	1.9	N/A	1.0 / E4

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Parkway Street Bridge

BCC Asset ID	B1580	Tributary Name	Mimosa Creek
Owner	BCC	AMTD (m)	1225
Year of Construction	N/A	Coordinates (GDA94)	E 507188 N 6951014
Year of Significant Modification	N/A	Hydraulic Model ID	S84
Source of Structure Information	BCC Design Drawings + Survey from unknown date	Flood Model Representation	1d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\84 - Parkway		

Structure Description		Two span road bridge	
Bridges		**Culverts**	
Number of Spans	2	Number of Barrels	N/A
Number of Piers in Waterway	1	Dimensions (m)	N/A
Pier shape and Width (m)	0.35 circular	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	36.4	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		11.5	
Span Length (m)		23.7	
Lowest Level of Deck Soffit (m AHD)		40.1	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~40.4 east of bridge structure	
Average Handrail Height (m)		~ 1.1	

Image Description	Looking Downstream
Date	November 2015
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	November 2015
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	122.2	122.2	39.96	39.82	0.14	2.7	N/A	1.0 / E5
0.2	102.2	102.2	39.75	39.64	0.11	2.4	N/A	1.0 / E5
1	81.1	81.1	39.50	39.40	0.10	2.2	N/A	2.0 / E3
2	68.0	68.0	39.32	39.24	0.08	2.0	N/A	1.0 / E5
5	56.1	56.1	39.13	39.06	0.07	1.9	N/A	2.0 / E10
10	45.0	45.0	38.92	38.87	0.05	1.7	N/A	2.0 / E10
20	35.7	35.7	38.73	38.68	0.05	1.5	N/A	1.0 / E4
50	24.2	24.2	38.42	38.39	0.03	1.3	N/A	1.0 / E4

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Burchell Street Culvert

BCC Asset ID	C0189P	Tributary Name	Minnippi Creek
Owner	BCC	AMTD (m)	1670
Year of Construction	N/A	Coordinates (GDA94)	E 509008 N 6960546
Year of Significant Modification	N/A	Hydraulic Model ID	S118
Source of Structure Information	BCC Todman Street HEC-RAS Model (PRJ 170565) + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj17\170565_WHE_Todman_St_Carina_Sch_80\Design-Calc\Flood Management\HEC-RAS\HEC-RAS - 2018 Update		

Structure Description		Multiple cell culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	2
Number of Piers in Waterway	N/A	Dimensions (m)	1.5
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	7.12
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	6.97
Structure Length (m) (in direction of flow)		22	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~10.30	
Average Handrail Height (m)		~0.7 (Armco)	

Image Description	Looking Downstream
Date	August 2018
Source	Site Inspection

Image Description	Looking Upstream
Date	August 2018
Source	Site Inspection

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				20-yr ARI (5 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	36.4	19.0	11.11	7.99	3.13	5.4	N/A	0.5 / E2
0.2	27.6	18.4	10.88	7.89	2.99	5.2	N/A	1.0 / E4
1	21.9	17.7	10.63	7.81	2.82	5.0	N/A	1.0 / E4
2	18.2	16.9	10.45	7.77	2.67	4.8	N/A	1.0 / E5
5	14.7	14.7	9.94	7.70	2.24	4.2	N/A	2.0 / E10
10	12.6	12.6	9.53	7.66	1.87	3.6	N/A	1.0 / E8
20	11.1	11.1	9.27	7.61	1.66	3.3	N/A	1.0 / E1
50	7.5	7.5	8.64	7.48	1.16	2.4	N/A	1.0 / E4

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Creek Road – Northbound Culvert

BCC Asset ID	C0002B	Tributary Name	Minnippi Creek
Owner	BCC	AMTD (m)	1130
Year of Construction	N/A	Coordinates (GDA94)	E 509490 N 6960686
Year of Significant Modification	N/A	Hydraulic Model ID	S115
Source of Structure Information	2019 Survey + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\12d\Bulimba Creek Flood Study\Bulimba Creek Flood Study\2019 Survey\2019_Survey.project		

Structure Description		Multiple cell culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	2.1 x 0.99 RCBCs
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	2.13
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	2.05
Structure Length (m) (in direction of flow)		9	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~3.75 South of the culvert	
Average Handrail Height (m)		~0.7 (Armco)	

Image Description	Looking Downstream
Date	June 2019
Source	BCC 2019 Survey

Image Description	Looking Upstream
Date	June 2019
Source	BCC 2019 Survey

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				< 2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	70.7	15.2	5.56	5.55	0.02	3.0	N/A	0.5 / E7
0.2	53.7	15.3	5.31	5.29	0.02	3.1	N/A	1.0 / E4
1	40.2	14.9	5.10	5.07	0.03	2.9	N/A	1.0 / E4
2	34.1	13.1	5.00	4.96	0.04	2.3	N/A	1.0 / E5
5	27.7	13.8	4.82	4.75	0.06	2.7	N/A	1.0 / E5
10	23.8	12.8	4.62	4.54	0.08	2.2	N/A	1.0 / E5
20	20.9	11.5	4.48	4.37	0.11	2.0	N/A	1.0 / E7
50	15.0	10.9	4.15	4.02	0.13	2.0	N/A	1.0 / E4

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Creek Road – Southbound Culvert

BCC Asset ID	C0046B	Tributary Name	Minnippi Creek
Owner	BCC	AMTD (m)	1100
Year of Construction	1979	Coordinates (GDA94)	E 509519 N 6960698
Year of Significant Modification	N/A	Hydraulic Model ID	S114
Source of Structure Information	BCC Design Drawings	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\114 - CreekRd Minnippi		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	2
Number of Piers in Waterway	N/A	Dimensions (m)	3 x 1.8 RCBCs
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	1.98
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	1.93
Structure Length (m) (in direction of flow)		22.5	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~4.9 South of the culvert	
Average Handrail Height (m)		~0.7 (Armco)	

Image Description	Looking Downstream
Date	October 2019
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	October 2019
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				10-yr ARI (10 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	70.7	30.8	5.55	4.95	0.60	2.9	N/A	0.5 / E7
0.2	53.7	30.0	5.29	4.72	0.57	2.8	N/A	1.0 / E4
1	40.2	29.4	5.07	4.51	0.56	2.7	N/A	1.0 / E4
2	34.1	29.1	4.96	4.37	0.59	2.7	N/A	1.0 / E5
5	27.7	27.4	4.75	4.23	0.53	2.5	N/A	1.0 / E5
10	23.8	23.8	4.54	4.15	0.39	2.2	N/A	1.0 / E5
20	20.9	20.9	4.37	4.07	0.30	1.9	N/A	1.0 / E7
50	15.0	15.0	4.02	3.87	0.15	1.4	N/A	1.0 / E4

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gateway Motorway Culvert

BCC Asset ID	N/A	Tributary Name	Minnippi Overflow
Owner	DTMR	AMTD (m)	1275
Year of Construction	N/A	Coordinates (GDA94)	E 509519 N 6960698
Year of Significant Modification	N/A	Hydraulic Model ID	S15
Source of Structure Information	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Flood Model Representation	2d culvert / 2d weir
Link to Data Source	G:\BI\CD\Proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old MIKE11 Model\Model files\Data files		

Structure Description		Multiple cell culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	6
Number of Piers in Waterway	N/A	Dimensions (m)	3.11 x 3.66 RCBCs
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	1.00
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	0.85
Structure Length (m) (in direction of flow)		~57	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~4.95 South of the culvert	
Average Handrail Height (m)		1.2m (Concrete Barrier)	

Image Description	Looking Downstream
Date	September 2020
Source	Google Imagery

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	152.8	N/A	4.97	4.38	0.59	N/A	N/A	24.0 / E1
0.2	129.3	N/A	4.66	4.15	0.51	N/A	N/A	4.5 / E3
1	107.8	N/A	4.33	3.91	0.42	N/A	N/A	4.5 / E3
2	87.0	N/A	4.03	3.71	0.32	N/A	N/A	4.5 / E3
5	62.7	N/A	3.70	3.49	0.21	N/A	N/A	6.0 / E10
10	40.7	N/A	3.38	3.28	0.11	N/A	N/A	6.0 / E10
20	14.6	N/A	2.91	2.89	0.02	N/A	N/A	6.0 / E5
50	0.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Wynnum Road Bridge

BCC Asset ID	B9849	Tributary Name	Minnippi Overflow
Owner	BCC	AMTD (m)	915
Year of Construction	2007	Coordinates (GDA94)	E 511689 N 6961024
Year of Significant Modification	N/A	Hydraulic Model ID	S14
Source of Structure Information	2019 Survey + 2019 ALS	Flood Model Representation	1d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\12d\Bulimba Creek Flood Study\Bulimba Creek Flood Study\2019 Survey\2019_Survey.project		

Structure Description		Single span road bridge	
Bridges		**Culverts**	
Number of Spans	1	Number of Barrels	N/A
Number of Piers in Waterway	N/A	Dimensions (m)	N/A
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	-0.2	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		~39.5	
Span Length (m)		12	
Lowest Level of Deck Soffit (m AHD)		2.55	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~3.1 East of the bridge	
Average Handrail Height (m)		Varying height handrail/barriers	

Image Description	Looking Downstream
Date	August 2019
Source	BCC 2019 Survey

Image Description	Looking Upstream
Date	August 2019
Source	BCC 2019 Survey

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				20-yr ARI (5 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	160.5	80.6	4.36	3.61	0.76	3.2	N/A	24.0 / E6
0.2	119.5	79.9	4.16	3.20	0.96	3.1	N/A	24.0 / E6
1	88.0	78.2	3.83	2.88	0.95	3.1	N/A	6.0 / E6
2	69.5	67.7	3.45	2.74	0.71	2.7	N/A	6.0 / E6
5	49.7	49.7	2.93	2.54	0.39	2.0	N/A	6.0 / E10
10	29.9	29.9	2.47	2.32	0.15	1.3	N/A	6.0 / E10
20	12.8	12.8	2.09	2.06	0.03	0.7	N/A	9.0 / E6
50	6.4	6.4	1.86	1.85	0.01	0.4	N/A	2.0 / E7

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gray Street Culvert

BCC Asset ID	C0140P	Tributary Name	Moorabbin Drive Drain
Owner	BCC	AMTD (m)	1075
Year of Construction	1976	Coordinates (GDA94)	E 509853 N 6959900
Year of Significant Modification	N/A	Hydraulic Model ID	S120
Source of Structure Information	BCC Design Drawings	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\120 - Gray		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	5
Number of Piers in Waterway	N/A	Dimensions (m)	1.5 dia
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	0.71
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	0.65
Structure Length (m) (in direction of flow)		19.5	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~2.52 East of the culvert	
Average Handrail Height (m)		NA	

Image Description	Looking Downstream
Date	April 2014
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	April 2014
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				< 2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	N/A [(b)]	N/A [(b)]	5.28	5.28	0.00	N/A [(b)]	N/A	24.0 / E1
0.2	N/A [(b)]	N/A [(b)]	4.90	4.90	0.00	N/A [(b)]	N/A	4.5 / E3
1	N/A [(b)]	N/A [(b)]	4.56	4.56	0.00	N/A [(b)]	N/A	4.5 / E3
2	N/A [(b)]	N/A [(b)]	4.24	4.24	0.00	N/A [(b)]	N/A	4.5 / E3
5	N/A [(b)]	N/A [(b)]	3.89	3.89	0.00	N/A [(b)]	N/A	6.0 / E10
10	N/A [(b)]	N/A [(b)]	3.57	3.57	0.00	N/A [(b)]	N/A	6.0 / E10
20	N/A [(b)]	N/A [(b)]	3.20	3.20	0.00	N/A [(b)]	N/A	6.0 / E5
50	N/A [(b)]	N/A [(b)]	2.73	2.73	0.00	N/A [(b)]	N/A	4.5 / E8

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

[(b)]Backwater affected value

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Billan Street Culvert

BCC Asset ID	C0125P	Tributary Name	Moorabbin Drive Drain
Owner	BCC	AMTD (m)	975
Year of Construction	1976	Coordinates (GDA94)	E 509884 N 6959997
Year of Significant Modification	N/A	Hydraulic Model ID	S119
Source of Structure Information	BCC Design Drawings + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\119 - Billan		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	6
Number of Piers in Waterway	N/A	Dimensions (m)	1.5 dia
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	0.41
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	0.35
Structure Length (m) (in direction of flow)		19.5	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~2.35	
Average Handrail Height (m)		NA	

Image Description	Looking Downstream
Date	April 2014
Source	BCC Asset Management Records

Link to Flood Model Results	[G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA](G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA)
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				< 2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	N/A [(b)]	N/A [(b)]	5.28	5.28	0.00	N/A [(b)]	N/A	24.0 / E1
0.2	N/A [(b)]	N/A [(b)]	4.90	4.90	0.00	N/A [(b)]	N/A	4.5 / E3
1	N/A [(b)]	N/A [(b)]	4.56	4.56	0.00	N/A [(b)]	N/A	4.5 / E3
2	N/A [(b)]	N/A [(b)]	4.24	4.24	0.00	N/A [(b)]	N/A	4.5 / E3
5	N/A [(b)]	N/A [(b)]	3.89	3.89	0.00	N/A [(b)]	N/A	6.0 / E10
10	N/A [(b)]	N/A [(b)]	3.57	3.57	0.00	N/A [(b)]	N/A	6.0 / E10
20	N/A [(b)]	N/A [(b)]	3.20	3.20	0.00	N/A [(b)]	N/A	6.0 / E5
50	N/A [(b)]	N/A [(b)]	2.73	2.73	0.00	N/A [(b)]	N/A	4.5 / E8

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

[(b)]Backwater affected value

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gateway Motorway Culvert

BCC Asset ID	N/A	Tributary Name	Murarrie Overflow
Owner	DTMR	AMTD (m)	N/A
Year of Construction	N/A	Coordinates (GDA94)	E 511423 N 6961868
Year of Significant Modification	Circa 2008	Hydraulic Model ID	S11
Source of Structure Information	DTMR Design Drawings	Flood Model Representation	2d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\10 and 11 - Gateway #1\11 - Bulimba Creek MEL Culvert		

Structure Description		Multiple cell box culvert (upstream) to single span bridge (downstream)	
Bridges		**Culverts**	
Number of Spans	1	Number of Barrels	As below
Number of Piers in Waterway	N/A	Dimensions (m)	6 / 1.83 x 1.51 m RCBCs + 5 / 2.13 x 1.7 m SLBCs
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	1
Bridge Invert Level (m AHD)	0.92 (min)	Downstream Invert (m AHD)	0.92
Structure Length (m) (in direction of flow)		~51 (culvert + bridge)	
Span Length (m)		25.67 (bridge centreline of abutments)	
Lowest Level of Deck Soffit (m AHD)		~2.87	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~3.6 North west of structure	
Average Handrail Height (m)		1.2m (Concrete Barrier)	

Image Description	Looking Downstream
Date	Circa 2021
Source	Google Imagery

Image Description	Looking Upstream
Date	Circa 2021
Source	Google Imagery

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				100-yr ARI (1 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	82.8	N/A	4.97	4.38	0.59	N/A	N/A	24.0 / E6
0.2	84.5	N/A	4.66	4.15	0.51	N/A	N/A	4.5 / E3
1	75.1	N/A	4.33	3.91	0.42	N/A	N/A	6.0 / E6
2	58.8	N/A	4.03	3.71	0.32	N/A	N/A	6.0 / E6
5	35.8	N/A	3.70	3.49	0.21	N/A	N/A	6.0 / E10
10	18.1	N/A	3.38	3.28	0.11	N/A	N/A	6.0 / E10
20	4.5	N/A	2.91	2.89	0.02	N/A	N/A	18.0 / E6
50	0.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Newnham Road Culvert

BCC Asset ID	C0169P	Tributary Name	Newnham Creek
Owner	BCC	AMTD (m)	1375
Year of Construction	N/A	Coordinates (GDA94)	E 509304 N 6954615
Year of Significant Modification	N/A	Hydraulic Model ID	S47
Source of Structure Information	BCC Newnham Creek HEC-RAS Model	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	R:\BI\CD\Project_Archive\2007\071072_Newnham_Creek_Model_Update \FloodManagement\Calculations\Hecras\HEC-RAS March 2007		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	4
Number of Piers in Waterway	N/A	Dimensions (m)	1.8 dia
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	16.68
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	16.38
Structure Length (m) (in direction of flow)		~37.8	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~19.5 South east of structure	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	November 2019
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	November 2019
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				5-yr ARI (20 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	105.0	53.6	20.52	19.01	1.50	5.3	N/A	0.5 / E7
0.2	80.4	52.1	20.31	18.51	1.79	5.1	N/A	0.5 / E7
1	65.4	50.8	20.12	18.29	1.83	5.0	N/A	1.0 / E4
2	57.3	47.4	20.03	18.11	1.92	4.7	N/A	1.0 / E4
5	47.1	44.4	19.81	17.71	2.10	4.4	N/A	1.0 / E3
10	41.0	40.8	19.53	17.60	1.92	4.0	N/A	0.5 / E3
20	35.4	35.4	19.17	17.51	1.66	3.5	N/A	1.0 / E7
50	24.7	24.7	18.56	17.30	1.26	2.6	N/A	0.5 / E8

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Devlan Street Culvert

BCC Asset ID	C0319P	Tributary Name	Newnham Creek
Owner	BCC	AMTD (m)	1060
Year of Construction	N/A	Coordinates (GDA94)	E 509579 N 6954668
Year of Significant Modification	N/A	Hydraulic Model ID	43
Source of Structure Information	BCC Newnham Creek HEC-RAS Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	R:\BI\CD\Project_Archive\2007\071072_Newnham_Creek_Model_Update\FloodManagement\Calculations\Hecras\HEC-RAS March 2007		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	5
Number of Piers in Waterway	N/A	Dimensions (m)	1.8 dia
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	14.5
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	14.3
Structure Length (m) (in direction of flow)		~27.6	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~17.26	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	January 2020
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	January 2020
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				20-yr ARI (5 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	100.7	57.7	18.18	17.31	0.86	4.5	N/A	0.5 / E7
0.2	79.2	55.6	17.96	17.09	0.88	4.4	N/A	0.5 / E7
1	64.6	54.3	17.77	16.88	0.89	4.3	N/A	1.0 / E4
2	56.9	54.0	17.55	16.65	0.90	4.2	N/A	1.0 / E4
5	47.0	47.0	16.99	16.35	0.64	3.7	N/A	1.0 / E3
10	41.3	41.3	16.85	16.14	0.71	3.2	N/A	0.5 / E3
20	35.2	35.2	16.55	15.91	0.64	2.8	N/A	1.0 / E7
50	24.6	24.6	16.11	15.48	0.64	2.4	N/A	0.5 / E8

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Secam Street Culvert

BCC Asset ID	C0517B	Tributary Name	Newnham Creek
Owner	BCC	AMTD (m)	960
Year of Construction	1989	Coordinates (GDA94)	E 509670 N 6954675
Year of Significant Modification	N/A	Hydraulic Model ID	41
Source of Structure Information	BCC Newnham Creek HEC-RAS Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	R:\BI\CD\Project_Archive\2007\071072_Newnham_Creek_Model_Update \FloodManagement\Calculations\Hecras\HEC-RAS March 2007		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	2.4 x 2.4
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	12.37
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	12.30
Structure Length (m) (in direction of flow)		~23.2	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~15.66	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	October 2012
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	May 2016
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				10-yr ARI (10 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	99.3	65.4	16.73	16.56	0.17	3.8	N/A	0.5 / E7
0.2	78.6	59.5	16.54	16.35	0.20	3.4	N/A	0.5 / E7
1	64.4	55.7	16.33	16.10	0.23	3.2	N/A	1.0 / E4
2	56.3	53.4	16.09	15.86	0.23	3.1	N/A	1.0 / E5
5	47.1	46.9	15.88	15.70	0.18	2.7	N/A	1.0 / E3
10	40.9	40.9	15.59	15.45	0.14	2.4	N/A	0.5 / E3
20	35.2	35.2	15.20	15.11	0.09	2.0	N/A	1.0 / E7
50	25.1	25.1	14.88	14.84	0.04	1.5	N/A	0.5 / E8

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

McCullough Street Culvert

BCC Asset ID	C0160B	Tributary Name	Padstow Road Drain
Owner	BCC	AMTD (m)	260
Year of Construction	N/A	Coordinates (GDA94)	E 507285 N 6950062
Year of Significant Modification	N/A	Hydraulic Model ID	S170
Source of Structure Information	2019 Survey	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\12d\Bulimba Creek Flood Study\Bulimba Creek Flood Study\2019 Survey\2019_Survey.project		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	2
Number of Piers in Waterway	N/A	Dimensions (m)	3.3 x 2.1
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	34.68
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	34.50
Structure Length (m) (in direction of flow)		~34.8	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~34.82 east of structure	
Average Handrail Height (m)		~0.7m (Armco)	

Image Description	Looking Downstream
Date	April 2019
Source	BCC 2019 Survey

Image Description	Looking Upstream
Date	April 2019
Source	BCC 2019 Survey

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				10-yr ARI (10 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	67.6	26.2	37.75	37.73	0.03	1.9	N/A	0.5 / E2
0.2	54.4	26.4	37.64	37.60	0.04	1.9	N/A	0.5 / E2
1	40.9	26.8	37.51	37.45	0.06	1.9	N/A	0.5 / E7
2	35.7	27.0	37.44	37.38	0.07	2.0	N/A	0.5 / E7
5	29.4	26.7	37.31	37.24	0.07	1.9	N/A	0.5 / E3
10	23.9	23.9	37.14	37.09	0.04	1.7	N/A	0.5 / E3
20	21.0	21.0	36.98	36.95	0.03	1.5	N/A	0.5 / E9
50	15.6	15.6	36.65	36.64	0.01	1.1	N/A	0.5 / E8

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Echidna Street Culvert

BCC Asset ID	C8903B	Tributary Name	Parklands Circuit Drain
Owner	BCC	AMTD (m)	1195
Year of Construction	2014	Coordinates (GDA94)	E 511152 N 6950934
Year of Significant Modification	N/A	Hydraulic Model ID	S168
Source of Structure Information	BCC Design Drawings	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\168 - Echidna		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	As below
Number of Piers in Waterway	N/A	Dimensions (m)	2 / 3 x 1.2 RCBCs (a) + 1 / 3.6 x 1.8 SLBC (b)
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	32.83 (a) 32.43 (b)
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	32.74 (a) 32.34 (b)
Structure Length (m) (in direction of flow)		~24.4	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~35.08	
Average Handrail Height (m)		~1m (the wall height varies between 1m and 1.1m)	

Image Description	Looking Downstream
Date	October 2020
Source	Site Inspection

Image Description	Looking Upstream
Date	October 2020
Source	Site inspection

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	16.5	16.5	33.74	33.38	0.36	2.4	N/A	0.5 / E7
0.2	13.4	13.4	33.59	33.31	0.28	2.2	N/A	0.5 / E8
1	9.6	9.6	33.49	33.20	0.28	1.7	N/A	0.5 / E7
2	8.5	8.5	33.43	33.17	0.26	1.6	N/A	0.5 / E7
5	7.3	7.3	33.37	33.13	0.24	1.5	N/A	0.5 / E3
10	6.3	6.3	33.31	33.09	0.21	1.5	N/A	0.5 / E3
20	5.5	5.5	33.26	33.06	0.20	1.3	N/A	0.5 / E9
50	4.0	4.0	33.17	33.00	0.17	1.0	N/A	0.5 / E9

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Prebble Street Culvert

BCC Asset ID	C7483P	Tributary Name	Parklands Circuit Drain
Owner	BCC	AMTD (m)	755
Year of Construction	2016	Coordinates (GDA94)	E 511015 N 6951325
Year of Significant Modification	N/A	Hydraulic Model ID	166
Source of Structure Information	BCC Design Drawings + 2019 ALS	Flood Model Representation	1d culvert / 1d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\166 - Prebble Street		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	4
Number of Piers in Waterway	N/A	Dimensions (m)	0.675 dia
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	26.58
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	26.39
Structure Length (m) (in direction of flow)		~7.2	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~27.38	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	October 2020
Source	Site Inspection

Image Description	Looking Upstream
Date	October 2020
Source	Site inspection

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				< 2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	55.2	4.7	28.30	28.04	0.27	3.3	N/A	0.5 / E7
0.2	43.8	4.7	28.21	27.94	0.27	3.3	N/A	0.5 / E7
1	32.3	4.7	28.10	27.78	0.32	3.3	N/A	0.5 / E7
2	28.1	4.6	28.05	27.70	0.35	3.2	N/A	0.5 / E7
5	22.7	4.6	27.98	27.59	0.39	3.2	N/A	0.5 / E6
10	19.3	4.5	27.93	27.52	0.41	3.1	N/A	0.5 / E6
20	16.3	4.4	27.88	27.44	0.44	3.1	N/A	0.5 / E9
50	11.3	4.2	27.78	27.29	0.49	2.9	N/A	0.5 / E9

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gateway Motorway Culvert

BCC Asset ID	C3072B	Tributary Name	Parklands Circuit Drain
Owner	DTMR	AMTD (m)	240
Year of Construction	N/A	Coordinates (GDA94)	E 510955 N 6951810
Year of Significant Modification	Circa 2010	Hydraulic Model ID	S165
Source of Structure Information	2008 DTMR Survey + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\12d\Bulimba Creek Flood Study\Bulimba Creek Flood Study\2019 Survey\2019_Survey.project		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	As below
Number of Piers in Waterway	N/A	Dimensions (m)	3 / 2.7 x 1.5 m RCBCs 2 / 3.62 x 1.72 SLBCs
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	19.81
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	19.66
Structure Length (m) (in direction of flow)		~37.8	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~20.90 (North east of the culverts)	
Average Handrail Height (m)		Armco + concrete barriers + Noise Barrier	

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	27.8	27.8	20.99	20.89	0.11	2.6	N/A	0.5 / E7
0.2	26.0	26.0	20.94	20.63	0.31	2.5	N/A	0.5 / E2
1	21.2	21.2	20.80	20.34	0.46	2.3	N/A	0.5 / E7
2	19.5	19.5	20.75	20.19	0.56	2.3	N/A	0.5 / E7
5	17.4	17.4	20.63	20.06	0.56	2.3	N/A	0.5 / E6
10	18.8	18.8	20.60	20.05	0.55	2.3	N/A	0.5 / E6
20	15.2	15.2	20.56	20.02	0.53	2.2	N/A	0.5 / E9
50	10.8	10.8	20.45	19.91	0.54	1.9	N/A	1.0 / E7

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Anzac Road Culvert

BCC Asset ID	C0110P	Tributary Name	Phillips Creek
Owner	BCC	AMTD (m)	2460
Year of Construction	N/A	Coordinates (GDA94)	E 509142 N 6958409
Year of Significant Modification	N/A	Hydraulic Model ID	S26
Source of Structure Information	BCC Upper Phillips Creek HEC-RAS Model	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	R:\BI\CD\Project_Archive\2012\120168_Creek_Rd_bridge_#4\Flood_Management\Calculations\HEC-RAS\July 2013		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	5
Number of Piers in Waterway	N/A	Dimensions (m)	1.8 dia
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	14.72
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	14.70
Structure Length (m) (in direction of flow)		~17.2	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~17.54	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	November 2019
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	November 2019
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				10-yr ARI (10 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	111.8	53.6	18.26	17.76	0.50	4.2	N/A	0.5 / E7
0.2	86.0	53.1	18.10	17.53	0.57	4.2	N/A	0.5 / E7
1	67.9	49.2	17.95	17.36	0.59	3.9	N/A	1.0 / E4
2	58.3	49.6	17.83	17.22	0.60	3.9	N/A	1.0 / E4
5	46.5	46.5	17.57	17.03	0.54	3.7	N/A	1.0 / E3
10	38.9	38.9	17.17	16.84	0.33	3.1	N/A	1.0 / E3
20	34.9	34.9	16.88	16.60	0.27	3.0	N/A	1.0 / E7
50	24.4	24.4	16.43	16.20	0.24	2.8	N/A	1.0 / E1

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gallipoli Road Culvert

BCC Asset ID	C0143P	Tributary Name	Phillips Creek
Owner	BCC	AMTD (m)	2300
Year of Construction	N/A	Coordinates (GDA94)	E 509290 N 6958442
Year of Significant Modification	N/A	Hydraulic Model ID	S25
Source of Structure Information	BCC Upper Phillips Creek HEC-RAS Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	R:\BI\CD\Project_Archive\2007\070411_Philips_Creek_Model\FloodManagement\Calculations\HEC-RAS		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	5
Number of Piers in Waterway	N/A	Dimensions (m)	1.8 dia
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	14.12
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	14.10
Structure Length (m) (in direction of flow)		~20.7	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~15.95 (north of the culvert)	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	September 2016
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	January 2015
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				5-yr ARI (20 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	110.2	62.3	17.45	16.28	1.17	4.9	N/A	0.5 / E7
0.2	85.5	60.0	17.21	16.05	1.16	4.7	N/A	0.5 / E7
1	67.1	50.4	17.07	15.81	1.26	4.0	N/A	1.0 / E4
2	57.3	47.1	16.92	15.70	1.22	3.7	N/A	1.0 / E5
5	46.3	42.3	16.72	15.57	1.14	3.3	N/A	1.0 / E3
10	38.4	37.7	16.54	15.46	1.08	3.2	N/A	1.0 / E3
20	36.1	36.1	16.21	15.39	0.82	3.2	N/A	1.0 / E7
50	24.0	24.0	15.78	15.08	0.69	2.7	N/A	1.0 / E1

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Creek Road – Northbound/Southbound Bridge

BCC Asset ID	B0546, B9692	Tributary Name	Phillips Creek
Owner	BCC	AMTD (m)	1145, 1160
Year of Construction	July 1974 (23b)	Coordinates (GDA94)	E 509885 N 6957920 E 509900 N 6957915
Year of Significant Modification	Dec 2014 (23c)	Hydraulic Model ID	S23b/S23c
Source of Structure Information	BCC Creek Road Bridge HEC-RAS Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	R:\BI\CD\Project_Archive\2012\120168_Creek_Rd_bridge_#4\Flood_Management\Calculations\HEC-RAS\July 2013		

Structure Description		Upstream - Single Span Road Bridge Downstream - Two Span Road Bridge	
Bridges		**Culverts**	
Number of Spans	1	Number of Barrels	N/A
Number of Piers in Waterway	N/A	Dimensions (m)	N/A
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	5.97	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		~34.5	
Span Length (m)		14	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~9.23	
Average Handrail Height (m)		0.7 (armco) & 1.40	

Image Description	Looking Downstream from Upstream Bridge
Date	September 2017
Source	BCC Asset Management Records

Image Description	Looking Downstream at Downstream Bridge (different angel)
Date	September 2017
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				20-yr ARI (5 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	118.7	78.9	11.38	11.28[8]	0.11	2.4	N/A	1.0 / E5
0.2	100.0	76.8	10.86	10.74[8]	0.13	2.3	N/A	1.0 / E5
1	81.9	72.6	10.10	9.94[8]	0.16	2.2	N/A	1.0 / E5
2	70.7	67.6	9.70	9.56[8]	0.14	2.3	N/A	1.0 / E5
5	59.0	59.0	9.14	9.04	0.10	1.8	N/A	1.0 / E6
10	52.0	52.0	8.82	8.76	0.06	1.9	N/A	1.0 / E5
20	44.7	44.7	8.74	8.70	0.04	1.6	N/A	1.0 / E5
50	30.8	30.8	7.96	7.93	0.03	2.0	N/A	1.0 / E5

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

[8]*Taken from 1D results in lieu of 2D grid*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Carindale Shopping Centre Culvert

BCC Asset ID	O20000296	Tributary Name	Phillips Creek
Owner	N/A	AMTD (m)	1050
Year of Construction	N/A	Coordinates (GDA94)	E 509996 N 6958012
Year of Significant Modification	N/A	Hydraulic Model ID	S23a
Source of Structure Information	BCC Lower Phillips Creek EPA-SWMM Model	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	R:\BI\CD\Project_Archive\2012\120168_Creek_Rd_bridge_#4\Flood_Management\Calculations\SWMM		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	2.4 x 2.4
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	5.95
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	4.34
Structure Length (m) (in direction of flow)		~265	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		N/A	
Average Handrail Height (m)		N/A	

Image Description	Looking at Upstream Face (left of photo)
Date	July 2011
Source	Site Inspection

Image Description	Looking Upstream
Date	September 2020
Source	Site Inspection

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				20-yr ARI (5 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	116.6	78.8	11.28[8]	9.52	N/A	7.3	N/A	1.0 / E5
0.2	97.1	76.8	10.74[8]	8.78	N/A	7.2	N/A	1.0 / E5
1	81.2	72.7	9.94[8]	7.64	N/A	7.0	N/A	1.0 / E5
2	69.1	67.6	9.56[8]	6.96	N/A	6.5	N/A	1.0 / E5
5	59.0	59.0	9.04	6.51	N/A	5.7	N/A	1.0 / E6
10	52.0	52.0	8.76	6.32	N/A	4.3	N/A	1.0 / E5
20	44.7	44.7	8.70	6.09	N/A	3.8	N/A	1.0 / E5
50	30.8	30.8	7.93	5.72	N/A	3.6	N/A	1.0 / E5

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*Afflux not reported as structure is 265m long*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

[8]*Taken from 1D results in lieu of 2D grid*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Old Cleveland Road Culvert

BCC Asset ID	C0176B	Tributary Name	Phillips Creek
Owner	BCC	AMTD (m)	805
Year of Construction	1998	Coordinates (GDA94)	E 510156 N 6958170
Year of Significant Modification	2014 – extra cell (pipe) added	Hydraulic Model ID	S22
Source of Structure Information	BCC Lower Phillips Creek EPA-SWMM Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	R:\BI\CD\Project_Archive\2012\120168_Creek_Rd_bridge_#4\Flood_Management\Calculations\SWMM		

Structure Description		Multiple cell culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	As below
Number of Piers in Waterway	N/A	Dimensions (m)	3 / 2.4 x 2.4 m RCBCs (a) + 1 / 3.6 x 1.8 m RCBC into 1 / 2.7 m dia RCP (b)
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	3.88 (a) 3.66 (b)
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	3.74 (a) 3.49 (b)
Structure Length (m) (in direction of flow)		~72	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		19.7 (east of culvert)	
Average Handrail Height (m)		0.7 (armco)	

Image Description	Looking Downstream
Date	October 2014
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	November 2015
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				500-yr ARI (0.2 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	112.0	105.3	9.52	7.54	1.98	4.7	N/A	1.0 / E5
0.2	90.5	90.5	8.77	7.38	1.39	4.0	N/A	1.0 / E5
1	76.6	76.6	7.84	7.18	0.66	3.4	N/A	2.0 / E3
2	66.7	66.7	7.04	6.76	0.28	3.0	N/A	2.0 / E3
5	58.8	58.8	6.46	6.05	0.41	2.9	N/A	1.0 / E9
10	51.7	51.7	6.23	5.70	0.53	2.7	N/A	1.0 / E5
20	44.1	44.1	6.00	5.53	0.47	2.5	N/A	1.0 / E5
50	30.5	30.5	5.62	5.34	0.29	2.0	N/A	1.0 / E5

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Old Cleveland Access Road Culvert

BCC Asset ID	C0118B	Tributary Name	Phillips Creek
Owner	BCC	AMTD (m)	620
Year of Construction	1987	Coordinates (GDA94)	E 510291 N 6958284
Year of Significant Modification	N/A	Hydraulic Model ID	S20
Source of Structure Information	BCC Lower Phillips Creek EPA-SWMM Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	R:\BI\CD\Project_Archive\2012\120168_Creek_Rd_bridge_#4\Flood_Management\Calculations\SWMM		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	2.4 x 2.4
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	2.60
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	2.44
Structure Length (m) (in direction of flow)		~30.2	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~6.87 (south east of culvert)	
Average Handrail Height (m)		0.7 (armco)	

Image Description	Looking Downstream
Date	November 2016
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	October 2019
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				20-yr ARI (5 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7] & Ensemble
0.05	92.5	79.7	7.50	7.21	0.29	7.3	N/A	2.0 / E8
0.2	77.2	74.0	7.35	6.85	0.50	6.3	N/A	2.0 / E8
1	59.6	59.6	7.15	6.61	0.54	4.5	N/A	3.0 / E7
2	56.6	56.6	6.72	6.17	0.55	4.4	N/A	3.0 / E2
5	53.5	53.5	6.02	5.90	0.13	3.2	N/A	3.0 / E6
10	45.2	45.2	5.55	5.53	0.02	3.0	N/A	3.0 / E4
20	43.5	43.5	5.25	4.87	0.38	2.9	N/A	1.0 / E5
50	30.4	30.4	4.88	4.72	0.16	2.0	N/A	1.0 / E5

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Wright Street Culvert

BCC Asset ID	C0191B	Tributary Name	Reynolds Street Drain
Owner	BCC	AMTD (m)	575
Year of Construction	Unknown	Coordinates (GDA94)	E 512057 N 6958025
Year of Significant Modification	N/A	Hydraulic Model ID	S130
Source of Structure Information	2019 Survey	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\12d\Bulimba Creek Flood Study\Bulimba Creek Flood Study\2019 Survey		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	0.9 dia
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	5.76
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	5.71
Structure Length (m) (in direction of flow)		~9.8	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~6.98 (north east of culvert)	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	June 2019
Source	BCC 2019 Survey

Image Description	Looking Upstream
Date	June 2019
Source	BCC 2019 Survey

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				5-yr ARI (20 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	11.9	4.4	7.57	7.19	0.38	2.3	N/A	1.0 / E3
0.2	9.8	4.3	7.53	7.16	0.37	2.2	N/A	1.0 / E6
1	8.0	4.2	7.49	7.13	0.36	2.2	N/A	2.0 / E2
2	6.7	4.1	7.45	7.10	0.35	2.2	N/A	2.0 / E2
5	5.6	4.1	7.42	7.07	0.35	2.1	N/A	2.0 / E5
10	4.4	3.9	7.36	7.04	0.32	2.1	N/A	2.0 / E5
20	3.3	3.3	7.23	7.00	0.22	1.7	N/A	1.0 / E4
50	2.1	2.1	7.02	6.94	0.08	1.1	N/A	1.0 / E4

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Reynolds Street Culvert

BCC Asset ID	C1848B	Tributary Name	Reynolds Street Drain
Owner	BCC	AMTD (m)	445
Year of Construction	2003	Coordinates (GDA94)	E 511958 N 6958093
Year of Significant Modification	N/A	Hydraulic Model ID	S129
Source of Structure Information	BCC Design Drawings	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\129 - Reynolds		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	4
Number of Piers in Waterway	N/A	Dimensions (m)	2.7 x 1.2
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	4
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	3.69
Structure Length (m) (in direction of flow)		~20.7	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~5.91	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Image Description	Looking Upstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				50-yr ARI (2 % AEP)[8]				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	N/A [(b)]	N/A [(b)]	6.42	6.42	0.00	N/A [(b)]	N/A	4.5 / E10
0.2	N/A [(b)]	N/A [(b)]	5.82	5.82	0.00	N/A [(b)]	N/A	3.0 / E4
1	N/A [(b)]	N/A [(b)]	5.54	5.54	0.00	N/A [(b)]	N/A	3.0 / E7
2	N/A [(b)]	N/A [(b)]	5.25	5.25	0.00	N/A [(b)]	N/A	3.0 / E9
5	N/A [(b)]	N/A [(b)]	4.94	4.94	0.00	N/A [(b)]	N/A	3.0 / E4
10	N/A [(b)]	N/A [(b)]	4.67	4.67	0.00	N/A [(b)]	N/A	3.0 / E7
20	6.8	6.8	4.55	4.23	0.32	1.9	N/A	1.0 / E1
50	4.5	4.5	4.42	4.13	0.29	1.7	N/A	1.0 / E4

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

[8]*Overland flow from Wright Street in larger events*

[(b)]*Backwater affected value*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Bevan Street Culvert

BCC Asset ID	C0251B	Tributary Name	Salvin Creek
Owner	BCC	AMTD (m)	2385
Year of Construction	1998	Coordinates (GDA94)	E 509079 N 6955913
Year of Significant Modification	N/A	Hydraulic Model ID	S35
Source of Structure Information	BCC Salvin Creek HEC-RAS Model + BCC Design Drawings	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old Study Data\Salvin\Salvin Creek\Salvin Creek 2019 Update		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	5
Number of Piers in Waterway	N/A	Dimensions (m)	3.3 x 1.5
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	19.85
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	19.80
Structure Length (m) (in direction of flow)		~14.6	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~22.02	
Average Handrail Height (m)		0.7 (armco)	

Image Description	Looking Downstream
Date	October 2012
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	October 2012
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				100-yr ARI (1 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	123.5	96.7	22.91	22.19	0.72	6.5	N/A	0.5 / E7
0.2	96.3	87.4	22.52	22.05	0.47	5.9	N/A	0.5 / E7
1	71.6	71.6	21.99	21.91	0.08	2.9	N/A	1.0 / E9
2	62.8	62.8	21.87	21.82	0.05	2.5	N/A	0.5 / E7
5	52.9	52.9	21.72	21.69	0.04	2.1	N/A	0.5 / E3
10	44.5	44.5	21.59	21.56	0.03	1.8	N/A	0.5 / E3
20	37.6	37.6	21.46	21.45	0.01	1.5	N/A	0.5 / E9
50	27.0	27.0	21.24	21.23	0.01	1.2	N/A	0.5 / E8

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Pine Mountain Road Culvert

BCC Asset ID	C0177B	Tributary Name	Salvin Creek
Owner	BCC	AMTD (m)	1870
Year of Construction	Unknown	Coordinates (GDA94)	E 509419 N 6956245
Year of Significant Modification	N/A	Hydraulic Model ID	S34
Source of Structure Information	BCC Salvin Creek HEC-RAS Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old Study Data\Salvin\Salvin Creek\Salvin Creek 2019 Update		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	As below
Number of Piers in Waterway	N/A	Dimensions (m)	1 / 3 x 2 m + 2 / 2.7 x 1.8 m + 1 / 3 x 2.4 m
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	15.8, 15.8, 16.05
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	15.65, 15.65, 16.04
Structure Length (m) (in direction of flow)		~21.8, 21.8, 20	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~18.89	
Average Handrail Height (m)		0.7 (armco)	

Image Description	Looking Downstream
Date	November 2019
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	February 2019
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				100-yr ARI (1 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	116.8	97.3	19.66	17.98	1.68	7.0	N/A	0.5 / E7
0.2	91.3	87.7	19.22	17.79	1.43	5.9	N/A	0.5 / E7
1	70.4	70.4	18.51	17.58	0.93	5.0	N/A	1.0 / E9
2	62.1	62.1	18.23	17.47	0.75	4.3	N/A	0.5 / E7
5	52.1	52.1	17.93	17.32	0.61	3.7	N/A	0.5 / E3
10	43.6	43.6	17.70	17.17	0.53	3.4	N/A	0.5 / E3
20	37.4	37.4	17.52	17.03	0.50	3.3	N/A	0.5 / E9
50	26.6	26.6	17.18	16.66	0.53	2.9	N/A	0.5 / E9

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Creek Road Bridge

BCC Asset ID	B9865, B0542	Tributary Name	Salvin Creek
Owner	BCC	AMTD (m)	1500
Year of Construction	2006, 1974	Coordinates (GDA94)	E 509650 N 6956480
Year of Significant Modification	2006	Hydraulic Model ID	S33
Source of Structure Information	BCC Salvin Creek HEC-RAS Model + 2019 ALS	Flood Model Representation	1d bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old Study Data\Salvin\Salvin Creek\Salvin Creek 2019 Update		

Structure Description		Parallel Road Bridges NB: Single Span Bridge & SB: Two Span Bridge	
Bridges		**Culverts**	
Number of Spans	NB: 1 SB: 2	Number of Barrels	N/A
Number of Piers in Waterway	NB: N/A SB: 1	Dimensions (m)	N/A
Pier shape and Width (m)	NB: N/A SB: 1.0 Circular	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	11.12	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		~31	
Span Length (m)		NB: 15.64, SB: 6.51	
Lowest Level of Deck Soffit (m AHD)		NB: 13.69, SB: 14.25	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~13.43 (north of Bridge)	
Average Handrail Height (m)		Varying height handrails	

Image Description	Looking Downstream
Date	October 2019
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	October 2019
Source	BCC Asset Management Records

Link to Flood Model Results	[G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA](G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA)
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				50-yr ARI (2 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	158.9	138.0	15.67	15.01	0.66	3.9	N/A	0.5 / E7
0.2	126.7	120.0	15.23	14.77	0.46	3.4	N/A	1.0 / E4
1	105.0	105.0	14.79	14.49	0.30	3.0	N/A	3.0 / E6
2	87.0	87.0	14.43	14.25	0.18	2.5	N/A	3.0 / E5
5	69.6	69.6	14.13	14.03	0.10	2.0	N/A	3.0 / E10
10	58.2	58.2	13.91	13.85	0.07	1.6	N/A	1.0 / E3
20	51.1	51.1	13.76	13.71	0.05	1.4	N/A	1.0 / E7
50	34.4	34.4	13.30	13.28	0.01	1.2	N/A	1.0 / E7

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Donnington Street (Upper) Culvert

BCC Asset ID	C0133B	Tributary Name	Salvin Creek
Owner	BCC	AMTD (m)	1135
Year of Construction	1981	Coordinates (GDA94)	E 509808 N 6956767
Year of Significant Modification	N/A	Hydraulic Model ID	S32
Source of Structure Information	BCC Salvin Creek HEC-RAS Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old Study Data\Salvin\Salvin Creek\Salvin Creek 2019 Update		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	3.6 x 2.4
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	8.90
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	8.81
Structure Length (m) (in direction of flow)		~43.9	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~13.43	
Average Handrail Height (m)		0.7 (armco)	

Image Description	Looking Downstream
Date	October 2019
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	October 2019
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				100-yr ARI (1 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	193.9	141.0	14.53	11.92	2.61	9.1	N/A	1.0 / E5
0.2	158.3	135.5	14.21	11.62	2.60	8.7	N/A	1.0 / E5
1	122.8	122.8	13.52	10.98	2.54	7.9	N/A	1.0 / E5
2	107.1	107.1	12.76	10.84	1.92	6.9	N/A	1.0 / E5
5	89.3	89.3	12.05	10.66	1.39	4.3	N/A	1.0 / E3
10	74.3	74.3	11.62	10.50	1.12	4.2	N/A	1.0 / E3
20	63.5	63.5	11.35	10.38	0.97	4.0	N/A	1.0 / E5
50	43.1	43.1	10.79	10.11	0.68	3.5	N/A	1.0 / E5

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Donnington Street (Lower) Culvert

BCC Asset ID	C0131B	Tributary Name	Salvin Creek
Owner	BCC	AMTD (m)	550
Year of Construction	Unknown	Coordinates (GDA94)	E 510247 N 6957028
Year of Significant Modification	N/A	Hydraulic Model ID	S31
Source of Structure Information	BCC Salvin Creek HEC-RAS Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Old Study Data\Salvin\Salvin Creek\Salvin Creek 2019 Update		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	3.6 x 2.4
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	5.95
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	5.90
Structure Length (m) (in direction of flow)		~35.4	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~9.92 (north of culvert)	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	October 2019
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	October 2019
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				100-yr ARI (1 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	188.0	138.0	11.40	8.71	2.69	8.9	N/A	1.0 / E5
0.2	146.0	132.7	11.10	8.29	2.81	8.5	N/A	1.0 / E5
1	116.5	116.5	10.25	7.89	2.36	7.5	N/A	1.0 / E5
2	103.9	103.9	9.66	7.65	2.02	6.7	N/A	1.0 / E5
5	85.9	85.9	9.16	7.47	1.69	3.8	N/A	1.0 / E9
10	73.0	73.0	8.71	7.32	1.39	3.7	N/A	1.0 / E9
20	62.0	62.0	8.42	7.17	1.26	3.5	N/A	1.0 / E5
50	42.4	42.4	7.83	6.75	1.09	2.9	N/A	1.0 / E5

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Oakley Street Culvert

BCC Asset ID	C0664P	Tributary Name	Silky Oak Crescent Drain
Owner	BCC	AMTD (m)	85
Year of Construction	1998	Coordinates (GDA94)	E 512002 N 6954980
Year of Significant Modification	N/A	Hydraulic Model ID	S139
Source of Structure Information	BCC Design Drawings + 2019 Survey	Flood Model Representation	1d culvert / 1d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\138 and 139 - Oakley Street		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	1.5 dia
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	22.21
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	22.12
Structure Length (m) (in direction of flow)		~22	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~24.50	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	May 2019
Source	BCC Survey

Image Description	Looking Upstream
Date	May 2019
Source	BCC Survey

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	12.1	12.1	23.87	23.24	0.63	3.0	N/A	0.5 / E2
0.2	9.8	9.8	23.65	23.13	0.52	2.7	N/A	1.0 / E4
1	7.9	7.9	23.42	23.03	0.38	2.3	N/A	2.0 / E5
2	6.6	6.6	23.31	22.96	0.35	2.0	N/A	1.0 / E7
5	5.5	5.5	23.20	22.88	0.32	1.8	N/A	2.0 / E4
10	4.4	4.4	23.10	22.80	0.29	1.7	N/A	1.0 / E8
20	3.7	3.7	23.01	22.74	0.27	1.6	N/A	1.0 / E4
50	2.4	2.4	22.85	22.62	0.23	1.4	N/A	1.0 / E4

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Scrub Road Bridge

BCC Asset ID	B1770	Tributary Name	Spring Creek
Owner	BCC	AMTD (m)	885
Year of Construction	1992	Coordinates (GDA94)	E 511141 N 6956202
Year of Significant Modification	N/A	Hydraulic Model ID	S132
Source of Structure Information	2019 Survey	Flood Model Representation	1d bridge / 1d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\12d\Bulimba Creek Flood Study\Bulimba Creek Flood Study\2019 Survey\2019_Survey.project		

Structure Description		Single Span Road Bridge	
Bridges		**Culverts**	
Number of Spans	1	Number of Barrels	N/A
Number of Piers in Waterway	N/A	Dimensions (m)	N/A
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	~8.80	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		~14	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~13.82	
Average Handrail Height (m)		~1.2m & 0.7m (armco)	

Image Description	Looking Downstream
Date	June 2019
Source	BCC Survey

Image Description	Looking Upstream
Date	June 2019
Source	BCC Survey

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	92.4	92.4	12.43	12.33	0.11	2.7	N/A	1.0 / E5
0.2	75.0	75.0	12.20	12.11	0.09	2.4	N/A	1.0 / E5
1	61.5	61.5	11.99	11.92	0.07	2.2	N/A	2.0 / E2
2	50.8	50.8	11.88	11.82	0.05	1.9	N/A	1.0 / E5
5	43.9	43.9	11.73	11.69	0.04	1.8	N/A	2.0 / E8
10	35.3	35.3	11.55	11.52	0.04	1.6	N/A	2.0 / E8
20	27.8	27.8	11.40	11.37	0.03	1.5	N/A	1.0 / E4
50	18.1	18.1	10.94	10.92	0.03	1.5	N/A	1.0 / E7

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Pacific Motorway Culvert

BCC Asset ID	C3209B, C8084B, C2388B	Tributary Name	Tributary A
Owner	DTMR	AMTD (m)	995
Year of Construction	N/A	Coordinates (GDA94)	E 510570 N 6948513
Year of Significant Modification	N/A	Hydraulic Model ID	S107
Source of Structure Information	DTMR M1 Merge TUFLOW Model	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\SD2GM FloodModel		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	From 3 x 1.8 to 3 x 2.1
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	32.96
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	32.76
Structure Length (m) (in direction of flow)		~52	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~31.63 North west of culvert	
Average Handrail Height (m)		Varying height Concrete Barrier	

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6] (DS end culvert)	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	60.0	60.0	36.29	35.70	0.58	3.2	N/A	0.5 / E10
0.2	51.5	51.5	35.88	35.51	0.37	2.7	N/A	0.5 / E7
1	39.7	39.7	35.44	35.22	0.22	2.1	N/A	0.5 / E7
2	36.1	36.1	35.25	35.10	0.15	1.9	N/A	0.5 / E7
5	30.2	30.2	35.00	34.92	0.08	1.6	N/A	0.5 / E6
10	27.2	27.2	34.86	34.79	0.07	1.5	N/A	0.5 / E6
20	24.3	24.3	34.74	34.67	0.07	1.4	N/A	0.5 / E9
50	18.8	18.8	34.49	34.43	0.06	1.3	N/A	0.5 / E9

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Pacific Motorway - Off Ramp Culvert

BCC Asset ID	N/A	Tributary Name	Tributary A
Owner	DTMR	AMTD (m)	530
Year of Construction	Unknown	Coordinates (GDA94)	E 510276 N 6948848
Year of Significant Modification	Circa 2021	Hydraulic Model ID	S106
Source of Structure Information	DTMR M1 Merge TUFLOW Model + 2008 DTMR Survey + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\SD2GM FloodModel		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	As below
Number of Piers in Waterway	N/A	Dimensions (m)	5 / 2.44 x 1.85 m RCBCs + 4 / 3.05 x 2.06 m SLBCs
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	30.63
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	30.51
Structure Length (m) (in direction of flow)		~32	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~33.95 west of culvert	
Average Handrail Height (m)		Varying height Concrete Barrier	

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				500-yr ARI (0.2 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	106.2	106.2	34.19	34.02	0.17	2.2	N/A	1.0 / E4
0.2	105.6	105.6	33.55	33.44	0.10	2.2	N/A	0.5 / E7
1	81.5	81.5	33.21	33.17	0.04	1.7	N/A	0.5 / E7
2	71.8	71.8	33.10	33.07	0.03	1.5	N/A	0.5 / E7
5	59.8	59.8	32.94	32.91	0.02	1.3	N/A	0.5 / E6
10	52.3	54.7	32.81	32.80	0.02	1.1	N/A	0.5 / E6
20	46.3	48.1	32.69	32.68	0.01	1.2	N/A	0.5 / E9
50	34.4	34.4	32.42	32.41	0.01	1.0	N/A	0.5 / E9

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gateway Motorway Culvert

BCC Asset ID	N/A	Tributary Name	Tributary A
Owner	DTMR	AMTD (m)	170
Year of Construction	Unknown	Coordinates (GDA94)	E 510111 N 6949117
Year of Significant Modification	N/A	Hydraulic Model ID	S105
Source of Structure Information	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	R:\BI\CD\Project_Archive\2006\060815_Bulimba_Creek_Flood_Study\FloodMgmt\Calcs\Hyd\Existing\Existing\Model files		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	As below
Number of Piers in Waterway	N/A	Dimensions (m)	3 / 3.5 m RCPs + 2 / 3.3 m RCPs
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	28.38
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	27.88
Structure Length (m) (in direction of flow)		~125	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~38.95	
Average Handrail Height (m)		Varying height Concrete Barrier	

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	136.6 [8]	136.6	33.92	33.54	0.37	3.3	N/A	1.0 / E5
0.2	127.0 [8]	127.0	33.64	33.26	0.38	3.2	N/A	1.0 / E5
1	114.7 [8]	114.7	32.95	32.67	0.28	3.0	N/A	1.0 / E5
2	103.9 [8]	103.9	32.47	32.19	0.28	3.0	N/A	1.0 / E5
5	87.3	87.3	31.75	31.54	0.22	2.9	N/A	1.0 / E5
10	75.9	75.9	31.21	31.00	0.21	2.8	N/A	1.0 / E9
20	64.7	64.7	30.79	30.60	0.18	2.6	N/A	1.0 / E4
50	49.2	49.2	30.24	29.90	0.34	2.4	N/A	0.5 / E9

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

[8]*Does not include flow through the Pacific Motorway opening underneath the Gateway Motorway*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Logan Road Culvert

BCC Asset ID	N/A	Tributary Name	Tributary A2
Owner	DTMR	AMTD (m)	605
Year of Construction	Circa 1997	Coordinates (GDA94)	E 501604 N 6947993
Year of Significant Modification	N/A	Hydraulic Model ID	S111
Source of Structure Information	DTMR Design Drawings + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\110 to 111 - Logan Road		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	As below
Number of Piers in Waterway	N/A	Dimensions (m)	2 / 3.0 x 1.5 m RCBCs + 1 / 3.0 x 2.4 m RCBC
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	40.3
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	39.52
Structure Length (m) (in direction of flow)		~41.5	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~44.04 North of culvert	
Average Handrail Height (m)		1.1m & 0.7m (armco)	

Image Description	Looking Upstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Link to Flood Model Results	[G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA](G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA)
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	40.0 [8]	40.0	42.39	41.46	0.93	4.3	N/A	0.5 / E7
0.2	34.6 [8]	34.6	42.14	41.29	0.85	3.5	N/A	0.5 / E2
1	28.4 [8]	28.4	41.92	41.11	0.81	3.3	N/A	0.5 / E2
2	25.7	25.7	41.81	41.01	0.81	3.1	N/A	0.5 / E2
5	21.6	21.6	41.65	40.87	0.78	3.0	N/A	0.5 / E8
10	18.4	18.4	41.51	40.79	0.72	2.8	N/A	0.5 / E8
20	15.4	15.4	41.38	40.69	0.69	2.7	N/A	0.5 / E8
50	11.1	11.1	41.17	40.54	0.63	2.4	N/A	0.5 / E8

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

[8]*Does not include flow through the overflow culvert 100 m north of the structure*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Dance Crescent Culvert

BCC Asset ID	C0250B	Tributary Name	Tributary B
Owner	BCC	AMTD (m)	465
Year of Construction	1992	Coordinates (GDA94)	E 509384 N 6948935
Year of Significant Modification	N/A	Hydraulic Model ID	S104
Source of Structure Information	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	R:\BI\CD\Project_Archive\2006\060815_Bulimba_Creek_Flood_Study\FloodMgmt\Calcs\Hyd\Existing\Existing\Model files		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	As below
Number of Piers in Waterway	N/A	Dimensions (m)	2 / 3.6 x 1.5 m RCBCs + 1 / 3.6 x 1.7 m RCBC
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	33.83
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	33.70
Structure Length (m) (in direction of flow)		~20	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~35.85	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	August 2012
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	August 2012
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				20-yr ARI (5 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	67.3	53.1	36.33	35.99	0.35	4.2	N/A	0.5 / E8
0.2	52.3	47.2	36.07	35.78	0.29	3.7	N/A	0.5 / E2
1	39.3	38.9	35.65	35.55	0.09	2.9	N/A	0.5 / E2
2	34.2	34.2	35.47	35.44	0.03	2.1	N/A	0.5 / E2
5	28.6	28.6	35.31	35.29	0.02	1.9	N/A	0.5 / E8
10	24.6	24.6	35.19	35.17	0.02	1.7	N/A	0.5 / E8
20	20.3	20.3	35.05	35.03	0.02	1.8	N/A	0.5 / E8
50	14.5	14.5	34.83	34.81	0.01	1.7	N/A	0.5 / E8

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Logan Road Culvert

BCC Asset ID	N/A	Tributary Name	Tributary B
Owner	DTMR	AMTD (m)	160
Year of Construction	Unknown	Coordinates (GDA94)	E 509667 N 6948991
Year of Significant Modification	N/A	Hydraulic Model ID	S95
Source of Structure Information	BCC Bulimba Creek MIKE11 Model + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	R:\BI\CD\Project_Archive\2006\060815_Bulimba_Creek_Flood_Study\FloodMgmt\Calcs\Hyd\Existing\Existing\Model files		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	1
Number of Piers in Waterway	N/A	Dimensions (m)	2.4 x 1.5
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	31.05
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	31
Structure Length (m) (in direction of flow)		~31.7	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~33.65 South east of culvert	
Average Handrail Height (m)		0.7 (armco)	

Image Description	Looking Downstream
Date	September 2020
Source	Site Inspection

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				50-yr ARI (2 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	23.6	14.4	34.53	33.62	0.91	6.7	N/A	1.0 / E8
0.2	17.6	14.6	34.32	33.35	0.97	6.7	N/A	1.0 / E1
1	13.5	13.4	33.90	32.79	1.11	6.2	N/A	1.0 / E5
2	11.9	11.9	33.50	32.37	1.13	5.5	N/A	1.0 / E9
5	10.5	10.5	33.18	31.95	1.23	3.4	N/A	1.0 / E8
10	9.0	9.0	32.95	31.50	1.46	3.4	N/A	0.5 / E8
20	8.3	8.3	32.77	31.31	1.45	3.4	N/A	0.5 / E8
50	7.4	7.4	32.64	30.99	1.64	3.0	N/A	0.5 / E8

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gateway Motorway Culvert

BCC Asset ID	N/A	Tributary Name	Tributary C
Owner	DTMR	AMTD (m)	100
Year of Construction	Circa 1996	Coordinates (GDA94)	E 509355 N 6947914
Year of Significant Modification	N/A	Hydraulic Model ID	S174
Source of Structure Information	DTMR Design Drawings	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\174 - Gateway		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	4
Number of Piers in Waterway	N/A	Dimensions (m)	2.7 dia
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	36.9
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	36.6
Structure Length (m) (in direction of flow)		~76.5	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~46.16 south of culvert	
Average Handrail Height (m)		Varying height concrete barriers	

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	55.1	55.1	39.94	39.51	0.43	2.4	N/A	0.5 / E7
0.2	44.4	44.4	39.61	39.32	0.28	2.0	N/A	0.5 / E7
1	34.5	34.5	39.31	39.14	0.17	1.9	N/A	0.5 / E7
2	31.7	31.7	39.09	38.95	0.15	1.9	N/A	0.5 / E7
5	24.3	24.3	38.76	38.65	0.11	1.9	N/A	0.5 / E6
10	20.6	20.6	38.51	38.40	0.11	1.9	N/A	0.5 / E6
20	20.6	20.6	38.51	38.40	0.11	1.9	N/A	0.5 / E9
50	12.4	12.4	38.01	37.92	0.09	1.8	N/A	0.5 / E9

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Oakley Street Culvert

BCC Asset ID	C0226P	Tributary Name	Warwick Creek
Owner	BCC	AMTD (m)	1640
Year of Construction	1998	Coordinates (GDA94)	E 512030 N 6955043
Year of Significant Modification	N/A	Hydraulic Model ID	S138
Source of Structure Information	BCC Design Drawings + 2019 Survey	Flood Model Representation	1d culvert / 1d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\138 and 139 - Oakley Street\138		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	6
Number of Piers in Waterway	N/A	Dimensions (m)	1.8 dia
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	21.7
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	21.6
Structure Length (m) (in direction of flow)		~17.08	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~24.50 south of culvert	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	May 2019
Source	BCC 2019 Survey

Image Description	Looking Upstream
Date	May 2019
Source	BCC 2019 Survey

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	22.3	22.3	23.11	23.05	0.06	1.9	N/A	6.0 / E6
0.2	19.2	19.2	23.00	22.96	0.05	1.8	N/A	6.0 / E6
1	15.7	15.7	22.90	22.84	0.05	1.8	N/A	6.0 / E8
2	12.3	12.3	22.73	22.68	0.05	1.7	N/A	6.0 / E8
5	9.2	9.2	22.56	22.49	0.07	1.6	N/A	2.0 / E8
10	6.9	6.9	22.44	22.31	0.12	1.5	N/A	2.0 / E8
20	5.1	5.1	22.33	22.16	0.17	1.4	N/A	3.0 / E1
50	2.8	2.8	22.16	21.93	0.23	1.4	N/A	3.0 / E10

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Cribb Road Culvert

BCC Asset ID	C0360B	Tributary Name	Warwick Creek
Owner	BCC	AMTD (m)	1050
Year of Construction	1996	Coordinates (GDA94)	E 511944 N 6955384
Year of Significant Modification	N/A	Hydraulic Model ID	S136
Source of Structure Information	BCC Design Drawings	Flood Model Representation	1d culvert / 1d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\136 - Cribb Road		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	6
Number of Piers in Waterway	N/A	Dimensions (m)	3.6 x 1.2
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	18.26
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	18.20
Structure Length (m) (in direction of flow)		~11.5	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~20.54	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	April 2014
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	April 2014
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	30.0	30.0	19.79	19.77	0.02	1.2	N/A	2.0 / E2
0.2	25.4	25.4	19.69	19.68	0.01	1.0	N/A	2.0 / E2
1	20.9	20.9	19.58	19.57	0.01	0.9	N/A	2.0 / E2
2	17.1	17.1	19.45	19.45	0.01	1.0	N/A	2.0 / E2
5	13.2	13.2	19.31	19.30	0.01	1.0	N/A	2.0 / E7
10	10.4	10.4	19.17	19.17	0.01	0.9	N/A	2.0 / E7
20	7.9	7.9	19.02	19.01	0.01	0.9	N/A	3.0 / E6
50	4.7	4.7	18.78	18.77	0.00	1.0	N/A	1.0 / E4

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Amersham Crescent Culvert

BCC Asset ID	C0361B	Tributary Name	Warwick Creek
Owner	BCC	AMTD (m)	485
Year of Construction	1995	Coordinates (GDA94)	E 511640 N 6955746
Year of Significant Modification	N/A	Hydraulic Model ID	S135
Source of Structure Information	BCC Design Drawings + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\135 - Amersham Crescent		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	As below
Number of Piers in Waterway	N/A	Dimensions (m)	3 / 2.4 x 2.4 m RCBCs + 2 / 2.4 x 2.1 m RCBCs
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	14.29
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	14.20
Structure Length (m) (in direction of flow)		~13.4	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~17.86 south west of culvert	
Average Handrail Height (m)		N/A (non-impact wall / fence)	

Image Description	Looking Downstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Image Description	Looking Upstream
Date	23rd August 2021
Source	Photo taken as part of site visit 23rd August 2021

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	75.7	75.7	17.05	16.32	0.73	3.0	N/A	1.0 / E10
0.2	61.9	61.9	16.72	16.17	0.55	2.6	N/A	1.0 / E10
1	49.8	49.8	16.42	15.97	0.45	2.3	N/A	2.0 / E2
2	41.2	41.2	16.19	15.82	0.37	2.1	N/A	2.0 / E2
5	35.1	35.1	16.03	15.73	0.30	1.9	N/A	2.0 / E2
10	27.5	27.5	15.82	15.60	0.22	1.6	N/A	2.0 / E2
20	21.5	21.5	15.62	15.45	0.17	1.4	N/A	1.0 / E4
50	13.1	13.1	15.31	15.21	0.10	1.3	N/A	1.0 / E4

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Greendale Way Bridge

BCC Asset ID	B9781	Tributary Name	Warwick Creek
Owner	BCC	AMTD (m)	35
Year of Construction	2009	Coordinates (GDA94)	E 511292 N 6956006
Year of Significant Modification	N/A	Hydraulic Model ID	S134
Source of Structure Information	BCC Design Drawings + 2019 Survey	Flood Model Representation	2d Bridge / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\134 - Greendale Way		

Structure Description		Single Span Road Bridge	
Bridges		**Culverts**	
Number of Spans	1	Number of Barrels	N/A
Number of Piers in Waterway	N/A	Dimensions (m)	N/A
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	11.58	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		~24.5	
Span Length (m)		19.8	
Lowest Level of Deck Soffit (m AHD)		14.69	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~15.65 north east of bridge	
Average Handrail Height (m)		1.4	

Image Description	Looking Downstream
Date	Unknown
Source	Unknown

Image Description	Looking Upstream
Date	May 2019
Source	BCC 2019 Survey

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	75.4	75.4	13.30	12.81	0.48	N/A	N/A	1.0 / E4
0.2	61.3	61.3	13.20	12.68	0.52	N/A	N/A	1.0 / E10
1	49.4	49.4	13.06	12.56	0.50	N/A	N/A	2.0 / E2
2	41.0	41.0	12.92	12.45	0.47	N/A	N/A	2.0 / E2
5	34.6	34.6	12.83	12.38	0.46	N/A	N/A	2.0 / E8
10	27.2	27.2	12.73	12.28	0.45	N/A	N/A	2.0 / E8
20	20.8	20.8	12.60	12.19	0.40	N/A	N/A	1.0 / E4
50	12.3	12.3	12.52	12.10	0.42	N/A	N/A	1.0 / E4

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Mount Petrie Road Culvert

BCC Asset ID	C0078B	Tributary Name	Wecker Road Drain
Owner	BCC	AMTD (m)	1650
Year of Construction	N/A	Coordinates (GDA94)	E 512018 N 6953615
Year of Significant Modification	N/A	Hydraulic Model ID	S148
Source of Structure Information	BCC Design Drawings + 2019 ALS	Flood Model Representation	1d culvert / 1d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\148 and 149 - Mt Petrie Road		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	5
Number of Piers in Waterway	N/A	Dimensions (m)	1.8 x 0.9
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	26.90
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	26.77
Structure Length (m) (in direction of flow)		~15.9	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~28.20	
Average Handrail Height (m)		0.7 (armco)	

Image Description	Looking Downstream
Date	September 2012
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	September 2012
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				20-yr ARI (5 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	34.6	24.3	28.72	28.24	0.48	5.0	N/A	0.5 / E7
0.2	26.6	22.6	28.54	28.09	0.44	4.6	N/A	0.5 / E7
1	19.6	19.2	28.23	27.94	0.30	3.9	N/A	0.5 / E2
2	17.2	17.2	28.08	27.88	0.20	3.5	N/A	0.5 / E2
5	14.3	14.3	27.92	27.79	0.13	2.6	N/A	0.5 / E3
10	12.3	12.3	27.83	27.72	0.10	2.5	N/A	0.5 / E3
20	10.4	10.4	27.73	27.67	0.06	2.3	N/A	0.5 / E8
50	7.3	7.3	27.56	27.53	0.02	1.6	N/A	0.5 / E8

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Weedon Street East Culvert

BCC Asset ID	C0197B	Tributary Name	Wecker Road Drain
Owner	BCC	AMTD (m)	1515
Year of Construction	N/A	Coordinates (GDA94)	E 511914 N 6953664
Year of Significant Modification	N/A	Hydraulic Model ID	S147
Source of Structure Information	2019 Survey + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\12d\Bulimba Creek Flood Study\Bulimba Creek Flood Study\2019 Survey\2019_Survey.project		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	2
Number of Piers in Waterway	N/A	Dimensions (m)	2.7 x 0.9
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	24.57
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	24.56
Structure Length (m) (in direction of flow)		~11	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~25.68 west of culvert	
Average Handrail Height (m)		N/A	

Image Description	Looking Downstream
Date	May 2019
Source	BCC 2019 Survey

Image Description	Looking Upstream
Date	May 2019
Source	BCC 2019 Survey

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				< 2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	75.2	13.3	26.50	26.47	0.03	4.5	N/A	0.5 / E2
0.2	59.9	13.1	26.32	26.20	0.12	4.5	N/A	0.5 / E8
1	44.8	13.0	26.22	26.05	0.16	4.4	N/A	1.0 / E9
2	39.0	13.0	26.17	25.99	0.19	4.4	N/A	0.5 / E7
5	31.7	12.9	26.11	25.89	0.22	4.4	N/A	0.5 / E6
10	27.2	12.6	26.06	25.83	0.24	4.3	N/A	0.5 / E6
20	23.0	12.3	26.01	25.76	0.26	4.2	N/A	0.5 / E9
50	15.6	11.5	25.91	25.56	0.34	4.0	N/A	1.0 / E7

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Gateway Motorway Culvert

BCC Asset ID	C3055P	Tributary Name	Wecker Road Drain
Owner	DTMR	AMTD (m)	1135
Year of Construction	N/A	Coordinates (GDA94)	E 511783 N 6954000
Year of Significant Modification	N/A	Hydraulic Model ID	S146
Source of Structure Information	DTMR Design Drawings	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\146 - Gateway - Wecker Road Drain\N239 Culverts		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	4
Number of Piers in Waterway	N/A	Dimensions (m)	1.8 dia
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	22.1
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	21.64
Structure Length (m) (in direction of flow)		~79.2	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~25.68 west of culvert	
Average Handrail Height (m)		Varying height concrete barrier	

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	55.0 [8]	55.0	26.15	23.52	2.63	5.4	N/A	0.5 / E7
0.2	46.4 [8]	46.4	25.74	23.24	2.50	4.6	N/A	1.0 / E5
1	39.3	39.3	25.07	23.10	1.97	3.9	N/A	1.0 / E5
2	34.9	34.9	24.71	23.00	1.71	3.6	N/A	1.0 / E5
5	29.9	29.9	24.36	22.89	1.47	3.6	N/A	1.0 / E3
10	25.1	25.1	24.07	22.77	1.30	3.5	N/A	0.5 / E6
20	21.6	21.6	23.88	22.68	1.20	3.3	N/A	1.0 / E7
50	15.3	15.3	23.54	22.49	1.05	3.0	N/A	1.0 / E7

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

[8]Does not include flow through the overflow culvert north of the structure

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Wecker Road Culvert

BCC Asset ID	C0192P	Tributary Name	Wecker Road Drain
Owner	BCC	AMTD (m)	745
Year of Construction	N/A	Coordinates (GDA94)	E 511494 N 6954207
Year of Significant Modification	N/A	Hydraulic Model ID	S145
Source of Structure Information	BCC Scrub Road HEC-RAS Model (PRJ 050299) + 2019 ALS	Flood Model Representation	1d culvert / 1d weir
Link to Data Source	R:\BI\CD\Project_Archive\2005\050299_Scrub_Rd_Mansfield\Flood Management\HEC-RAS_v4.0_As_Constructed_Modelling		

Structure Description		Multiple barrel piped culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	1.5 dia
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	16.98
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	16.89
Structure Length (m) (in direction of flow)		~11	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~18.95	
Average Handrail Height (m)		0.7 (armco)	

Image Description	Looking Downstream
Date	September 2012
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	September 2012
Source	BCC Asset Management Records

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				< 2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	70.0	23.5	19.69	18.98	0.72	4.4	1.5	0.5 / E10
0.2	50.8	22.7	19.53	18.86	0.67	4.3	1.3	1.0 / E5
1	42.9	22.6	19.49	18.77	0.72	4.3	1.2	1.0 / E4
2	38.0	22.3	19.42	18.71	0.72	4.2	1.2	1.0 / E5
5	31.7	21.4	19.32	18.61	0.71	4.0	1.0	1.0 / E3
10	26.2	20.1	19.22	18.50	0.72	3.8	0.9	1.0 / E3
20	22.3	19.0	19.18	18.41	0.77	3.6	0.8	1.0 / E7
50	15.2	15.1	18.98	18.18	0.80	3.3	0.3	1.0 / E7

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Scrub Road Bridge

BCC Asset ID	B9740	Tributary Name	Wecker Road Drain
Owner	BCC	AMTD (m)	590
Year of Construction	2010	Coordinates (GDA94)	E 511388 N 6954275
Year of Significant Modification	N/A	Hydraulic Model ID	S143
Source of Structure Information	BCC Scrub Road HEC-RAS	Flood Model Representation	1d Bridge / 1d weir
Link to Data Source	R:\BI\CD\Project_Archive\2005\050299_Scrub_Rd_Mansfield\Flood Management\HEC-RAS_v4.0_As_Constructed_Modelling		

Structure Description		Single Span Road Bridge	
Bridges		**Culverts**	
Number of Spans	1	Number of Barrels	N/A
Number of Piers in Waterway	N/A	Dimensions (m)	N/A
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	N/A
Bridge Invert Level (m AHD)	16.13	Downstream Invert (m AHD)	N/A
Structure Length (m) (in direction of flow)		~22.4 (road bridge + bikeway)	
Span Length (m)		20.84	
Lowest Level of Deck Soffit (m AHD)		19.62	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~20.57	
Average Handrail Height (m)		1.5m and 0.7 (armco)	

Image Description	Looking Downstream
Date	May 2019
Source	BCC 2019 Survey

Image Description	Looking Upstream
Date	May 2019
Source	BCC 2019 Survey

Link to Flood Model Results	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				> 2000-yr ARI (0.05 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	71.1	71.1	18.49	18.39	0.10	4.0	N/A	1.0 / E4
0.2	56.6	56.6	18.27	18.19	0.08	3.9	N/A	1.0 / E5
1	48.0	48.0	18.11	18.03	0.07	3.9	N/A	1.0 / E5
2	42.8	42.8	18.00	17.92	0.07	3.8	N/A	1.0 / E5
5	36.4	36.4	17.81	17.73	0.08	3.8	N/A	1.0 / E3
10	30.8	30.8	17.56	17.43	0.13	3.8	N/A	1.0 / E3
20	26.7	26.7	17.40	17.16	0.25	3.7	N/A	1.0 / E5
50	18.5	18.5	17.22	16.82	0.40	3.7	N/A	1.0 / E5

[1]Flow underneath the road and only for 1D structures

[2]Measured at centre-span of bridge or at centre of culvert

[3]This is afflux at peak water level

[4](i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening

[5](i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model

[6]Velocities provided here are approximate only and the model should be interrogated for design purposes.

[7]Based on peak water level

Hydraulic Structure Reference Sheet

Bulimba Creek Flood Study

Wishart Road Culvert

BCC Asset ID	C0077B	Tributary Name	Wishart Road Drain
Owner	BCC	AMTD (m)	245
Year of Construction	N/A	Coordinates (GDA94)	E 509773 N 6952835
Year of Significant Modification	N/A	Hydraulic Model ID	S160
Source of Structure Information	BCC Design Drawings + 2019 ALS	Flood Model Representation	1d culvert / 2d weir
Link to Data Source	G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Data\Structures\160 - Wishart Road		

Structure Description		Multiple cell box culvert	
Bridges		**Culverts**	
Number of Spans	N/A	Number of Barrels	3
Number of Piers in Waterway	N/A	Dimensions (m)	1.76 x 1.38
Pier shape and Width (m)	N/A	Upstream Invert (m AHD)	25.51
Bridge Invert Level (m AHD)	N/A	Downstream Invert (m AHD)	24.98
Structure Length (m) (in direction of flow)		~19.5	
Span Length (m)		N/A	
Lowest Level of Deck Soffit (m AHD)		N/A	
Overtopping Level of Weir/Road (m AHD) (not including handrail)		~27.08	
Average Handrail Height (m)		0.7 (armco)	

Image Description	Looking Downstream
Date	December 2012
Source	BCC Asset Management Records

Image Description	Looking Upstream
Date	December 2012
Source	BCC Asset Management Records

Link to Flood Model Results	[G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA](G:\BI\CD\proj19\190093_Bulimba_Creek_Flood_Study\Flood Management\Tuflow\results\S1_DES\CLA)
Model Version Number	BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
Model Scenario	Scenario 1 Design (S1_DES) / Scenario 1 Extreme (S1_EXT)

Structure Flood Immunity (immunity of lowest point of weir above structure)				< 2-yr ARI (50 % AEP)				
AEP (%)	Total Discharge (m^3/s)	Discharge through Structure (m^3/s)[1]	U/S Peak Water Level (m AHD)[2]	D/S Peak Water Level (m AHD)[2]	Afflux (m)[3]	Structure Velocity (m/s)[4&6]	Weir Velocity (m/s)[5&6]	Critical Storm Duration (hrs)[7]& Ensemble
0.05	55.8	24.7	27.97	26.71	1.26	5.7	N/A	0.5 / E7
0.2	45.6	23.5	27.81	26.62	1.18	5.4	N/A	0.5 / E7
1	34.4	22.2	27.66	26.51	1.15	5.1	N/A	0.5 / E7
2	29.7	21.6	27.58	26.46	1.12	4.9	N/A	0.5 / E7
5	23.6	20.4	27.44	26.40	1.05	4.7	N/A	0.5 / E3
10	19.8	19.3	27.33	26.34	1.00	4.4	N/A	0.5 / E3
20	17.5	17.5	27.18	26.26	0.92	3.3	N/A	0.5 / E8
50	13.2	13.2	26.89	26.09	0.80	3.0	N/A	0.5 / E8

[1]*Flow underneath the road and only for 1D structures*

[2]*Measured at centre-span of bridge or at centre of culvert*

[3]*This is afflux at peak water level*

[4]*(i) Only for 1D structures. (ii) This is the peak of the depth/width averaged velocity within the structure opening*

[5]*(i) Only for 1D structures (ii) This is the peak of the depth/width averaged velocity across the 1D weir section of the model*

[6]*Velocities provided here are approximate only and the model should be interrogated for design purposes.*

[7]*Based on peak water level*

Appendix M: External Peer Review Documentation

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Dedicated to a better Brisbane

MEMORANDUM

Brisbane City Council

To:	Brany Iezzi **Senior Program Officer, NEWS Branch**	Date:	**6th September 2021**
Via:	Hanieh Zolfaghari **Senior Engineer, Flood Management**		
From:	Scott Glover **Senior Engineer, Flood Management**		
Re:	**Response to BMT Final Review Memorandum for Bulimba Creek Flood Study**		

Flood Management
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The purpose of this memorandum is to respond to the final review comments for Bulimba Creek Flood Study provided by BMT in their memorandum dated 30th June 2021 (Refer to Appendix A).

We have summarised BMT comments and our responses bellow:

Temporal Patterns

BMT: Since the catchment area is greater than 75 km^2, areal temporal patterns have been applied to storms with durations of 12 hours and longer. Point temporal patterns are more appropriate for much of the upper to mid catchment, and it is recommended that a sensitivity analysis is done using point temporal patterns.

BCC: The URBS model uses point temporal patterns for storm durations from 0.5hrs to 9hrs and areal temporal patterns for storm durations from 12hrs to 24hrs, as the catchment is greater than 75km2. This is in accordance with the ARR2019 Guidelines. The critical storm durations for the Upper and Middle Catchment areas are less than 6 hours, meaning that point temporal patterns are already being used for these areas.

Minimum Storm Duration

BMT: The shortest storm duration that was simulated was 0.5 hours, which is critical in some upper catchment channels. Shorter storm durations may cause higher flood levels in these channels. This issue is considered minor, as the flooding is confined to the channel in affected areas.

BCC: The minimum storm duration used for BCC Creek Flood Studies as documented in the BCC Flood Study Procedure document is 30-minutes, as shorter storm durations are typically not critical for the open waterways modelled as part of the creek flood studies.

As a check, the critical storm duration at the upstream extent of each modelled waterway was obtained from the BCC Citywide Creek and Overland Flow TUFLOW model. This model used a minimum storm duration of 15-minutes. The investigation identified that the critical storm duration at the upstream extent of all modelled waterways was at least 30-minutes.

PMP Spatial Distribution

BMT: For the probable maximum flood (PMF) events with duration up to 6 hours, a set of ellipses were used to spatially vary the rainfall concentration across the catchment. Model results will be sensitive to where the ellipses are centred over the catchment. A single position was used, and upper catchment PMF flood levels may increase if the ellipses are moved further upstream. Nevertheless, the positioning of the ellipse centroids over the catchment is considered suitable and Council may wish to undertake a sensitivity analysis on the ellipse positioning.

BCC: The Generalised Short Duration Method (GSDM) document on page 12 advises the following on positioning the spatial distribution diagram: *"overlay the spatial distribution diagram on the catchment outline and move it to obtain the best fit by the smallest possible ellipse. This ellipse is now the outermost ellipse of the distribution."*

2019 (Book 8 Section 3.9.2) references GSDM and states: *"the spatial pattern should generally be centred over the catchment and orientated in such a way as to overlap the catchment boundary with the smallest possible ellipse."*

Whilst modelled results will be sensitive to where the ellipses are centred, the GSDM methodology doesn't mention the requirement to use multiple ellipse positions. We consider our methodology is in accordance with the GDSM procedure. Also, given the relatively small size of the catchment, the high uncertainty of the PMP estimation, it is not considered warranted to undertake a sensitivity analysis on multiple ellipse positions.

RCP 4.5 or RCP 8.5

BMT: Council has used a low representative concentration pathway (RCP 4.5) for the climate change analysis, resulting in a 9.8% increase in rainfall intensity for a 2100 climate horizon. Given the uncertainties surrounding climate change, a decrease in precision, using a value of 10%, would suffice. A high concentration pathway (RCP 8.5) would result in a 20% increase in rainfall intensity for a 2100 climate horizon, which is more typical of that applied in flood studies in other regions across Australia.

BCC: The use of RCP 4.5 in lieu of RCP 8.5 for projected climate change increases on design rainfall has been agreed previously with the NEWS Branch and is documented in the BCC Flood Study Procedure document. AR&R 2019 (Book 1, Section 6.3.5) advises that the minimal basis for design should be the low concentration pathway RCP 4.5, unless additional expense can be justified on socioeconomic and environmental grounds to adopt the high concentration pathway RCP8.5.

Guidance on Event Selection for Future Model Use

BMT: It is recommended that the model report provides guidance with regards to event selection on future use of the model for assessments such as impact assessment for developments. This could include, for example, a process for selecting representative storm durations and temporal patterns that are dominant, or close to dominant, across portions of the catchment to exclude redundant events and reduce the number of simulations required.

BCC: Appendices I and J list the critical duration and median ensemble for all locations within the model extents for the 2-yr (50% AEP) to 2000-yr (0.05% AEP), inclusive of climate change. Also, the Hydraulic Structure Reference Sheets (HSRS) list the critical duration and median ensemble for the major hydraulic structures within the model extents for the 2-yr (50% AEP) to 2000-yr (0.05% AEP), exclusive of climate change.

Checking of Design Flows

BMT: At-site flood frequency analyses (FFA) were not undertaken due to non-stationarity relating to extensive catchment development in recent decades. Also, a regional FFA has not been undertaken due to the high degree of urbanisation in the catchment. Thus, there is no point of reference to check design flood flows. It is recommended that some method is used as a sensibility check on the design flows, which may include a rational method approach on portions of the upper catchment, a regional or at-site FFA, cognisant of the shortcoming associated with these methods. Of these options, an at-site FFA is recommended, acknowledging that the results are likely to underestimate the contemporary flow regime due to development in the catchment. Non-stationarity due to catchment development is a recurring constraint on the use of streamflow records for flood frequency analyses in Brisbane and developing a project that aims to overcome this issue may be a worthwhile endeavour for future flood studies.

BCC: Typically, when BCC updates a flood study, the new flood study results are compared against the previous (older) study for the purpose of results sensibility (not as a direct comparison). For the Bulimba Creek Catchment, the previous flood study was completed in 2014. For this new flood study, some non-reported sensibility comparisons have been undertaken for the design flows (and flood levels), noting however, that there are inherent differences between the two flood study methodologies, including but not limited to:

- Use of City Plan 2014 versus City Plan 2000
- Use of the new BCC IFDs versus 1987 IFDs
- Use of 2019 DEA hydrological methods versus DIS Storm hydrological methods

At site Flood Frequency Analysis (FFA) was not used to determine peak design flows due to non-stationarity resulting from catchment urbanisation from development. The stationarity was not checked as part of the flood study, however, given the high degree of urbanisation in the last 50 years, it is considered that the catchment would display non-stationarity trends. This constraint is common for urbanised catchments; however, there is no well established techniques / guidelines to overcome this issue. As correctly identified by BMT, it would require some type of investigation / research project to come up with a technique to account for changing urbanisation in a FFA, which is suitable for Brisbane City Council catchments.

Currently, one stream gauge (540126) has approximately 50 years of record and the other two upper / middle catchment stream gauges (540127 and 540128) have 26 years of record. It is considered that stream gauge 540126 has a record of sufficient length (50 years) to accurately determine 2-yr ARI (50% AEP) to possibly 50-yr ARI (2% AEP) design floods, however insufficient to accurately determine the 100-yr ARI (1% AEP) design flood, should a suitable FFA urbanisation adjustment technique be developed in the future.

Until an urbanisation adjustment technique is developed for FFA in BCC catchments, we do not believe it is warranted to undertake checking using FFA, when the accuracy of the results will be unknown. Also, given that the 100-yr ARI (1% AEP) is the primary flood planning event, the length of current record (50 years) is not considered sufficient to accurately determine the peak design flow.

The Rational Method is not recommended for use by AR&R 2019 but is still referenced in the current version of QUDM. There are numerous catchment conditions where the use of the Rational Method would be considered inappropriate, based on the definitions in QUDM (page 4-4). If there were areas of suitable catchment conditions, these would need to be less than 5 km^2, limiting use to the upstream catchment and smaller tributaries. On this basis, we do not consider it warranted to undertake checks using the Rational Method.

We trust the above clarifications address the points raised in BMT's Memorandum dated 30th June 2021.

Regards

S. Glover ....

Scott Glover

Senior Engineer, Flood Management

City Projects Office

Appendix A – BMT Final Review Letter for Bulimba Creek Flood Study

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30 June 2021

Brisbane City Council
City Projects Office
Green Square, Level 1
505 St Pauls Terrace
Fortitude Valley
Qld 4006

Attention: Hanieh Zolfaghari

Dear Hanieh

RE: BULIMBA CREEK FLOOD MODELLING PEER REVIEW

Introduction

BMT was commissioned by Brisbane City Council (Council) to undertake a peer review of the Bulimba Creek flood modelling prepared as part of the Bulimba Creek Flood Study. The review was undertaken in three stages: firstly, the initial model design, then model calibration and finally the design event modelling was reviewed. At the commencement of these review stages, Council submitted the following data to BMT:

- Hydrologic models (URBS);
- Hydraulic models including model output files (TUFLOW);
- GIS data; and
- Preliminary flood study reporting.

Review responses were provided to Council via email at the initial model design and calibration stages, and Council provided suitable responses to all queries. This letter documents the final outcomes of BMT's review following all three stages.

Overview of Hydrologic Modelling

Hydrological models were developed using URBS. The structure of the URBS models and the sub-catchment parameters have been reviewed. The URBS model parameters have been appropriately applied and are within the standard values for URBS models. The *Australian Rainfall and Runoff* guideline[1] (ARR2019) was used to develop design storm events. The intensity-frequency-duration (IFD) curves used for the design event rainfall were obtained from a separate project undertaken by WMAwater for events of up to 1% AEP. The WMAwater report is not publicly available and assessment of these IFD curves is beyond the scope of our review. The standard IFD curves provided by the Bureau of Meteorology[2] (BoM) were used for the 0.05% AEP event. IFD curves between the 1% and 0.05% AEP events were interpolated

[1] Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors), 2019, Australian Rainfall and Runoff: A Guide to Flood Estimation, Commonwealth of Australia, http://book.arr.org.au.s3-website-ap-southeast-2.amazonaws.com
[2] http://www.bom.gov.au/water/designRainfalls/revised-ifd

to reconcile differences between the BoM IFD and WMAwater IFD curves, which is considered a reasonable solution. Three sets of IFD curves were developed, with one set for the upper, one set for the mid and another set for the lower catchment. This is considered an adequate IFD resolution across the catchment given the overall catchment area of 123 km². Since the catchment area is greater than 75 km², areal temporal patterns have been applied to storms with durations of 12 hours and longer. Point temporal patterns are more appropriate for much of the upper to mid catchment, and it is recommended that a sensitivity analysis is done using point temporal patterns. The shortest storm duration that was simulated was 0.5 hours, which is critical in some upper catchment channels. Shorter storm durations may cause higher flood levels in these channels. This issue is considered minor, as the flooding is confined to the channel in affected areas.

For the probable maximum flood (PMF) events with duration up to 6 hours, a set of ellipses were used to spatially vary the rainfall concentration across the catchment. Model results will be sensitive to where the ellipses are centred over the catchment. A single position was used, and upper catchment PMF flood levels may increase if the ellipses are moved further upstream. Nevertheless, the positioning of the ellipse centroids over the catchment is considered suitable and Council may wish to undertake a sensitivity analysis on the ellipse positioning.

An areal reduction factor (ARF) of 1.0 was applied as a simplification to the ARR2019 guidance, which is considered an acceptable compromise given the difficulty in applying ARR2019 guidance for this parameter to catchment scale studies such as this. This simplification will result in overestimated design rainfall depths. Future users of the model should note that the flows and flood levels may be overestimated, especially in the mid to lower catchment, and the hydrology could be refined for design of infrastructure within the catchment. It would be useful to compute flows at a few key locations in the mid and lower catchment using ARR2019 ARF values to understand the sensitivity of flows to this parameter. Zero initial rainfall losses (IL) have been applied in pervious portions of the catchment. For many of the events, median pre-burst rainfall depths were similar or greater than the IL of 14 mm recommended in ARR2019 for this catchment location. Therefore, this simplification is appropriate for many of the events. Pre-burst rainfall depths were smaller than 14 mm for the 50% AEP event and for some storm durations for the 20% AEP event. Therefore, the IL of zero is conservative and will overestimate flows for these small events, which are of lesser importance for the current study and more relevant to stormwater and road drainage design. While the IL approach is appropriate for the purpose of the current study, when used for impact assessments of developments it can potentially be non-conservative. For example, a development which results in pervious area becoming impervious would still have the same zero IL applied to it. It is recommended that this is included as a limitation in the documentation (or include a recommendation that IL is applied to pervious areas if using the model to undertake flood impact assessments).

Baseflow was included in the hydrologic modelling for the calibration and design events up to 1% AEP using a constant baseflow index (BFI), which typically decreases as the event size increases. The baseflow component was introduced during model calibration to improve the hydrograph shape and had a marginal influence on peak flow. The constant BFI provided suitable results across the range of historic events that were simulated, which were estimated to have a magnitude ranging between 50% and 1% AEP. Thus, the use of a constant BFI is considered suitable for the Bulimba Creek flood study. Baseflow was excluded for extreme events, which is also considered appropriate.

Council has used a low representative concentration pathway (RCP 4.5) for the climate change analysis, resulting in a 9.8% increase in rainfall intensity for a 2100 climate horizon. Given the uncertainties surrounding climate change, a decrease in precision, using a value of 10%, would suffice. A high concentration pathway (RCP 8.5) would result in a 20% increase in rainfall intensity for a 2100 climate horizon, which is more typical of that applied in flood studies in other regions across Australia.

At-site flood frequency analyses (FFA) were not undertaken due to non-stationarity relating to extensive catchment development in recent decades. Also, a regional FFA has not been undertaken due to the high degree of urbanisation in the catchment. Thus, there is no point of reference to check design flood flows. It is recommended that some method is used as a sensibility check on the design flows, which may include a rational method approach on portions of the upper catchment, a regional or at-site FFA, cognisant of the shortcoming associated with these methods. Of these options, an at-site FFA is recommended, acknowledging that the results are likely to underestimate the contemporary flow regime due to development in the catchment. Non-stationarity due to catchment development is a recurring constraint on the use of streamflow records for flood frequency analyses in Brisbane and developing a project that aims to overcome this issue may be a worthwhile endeavour for future flood studies.

Overview of Hydraulic Modelling

Hydraulic models of the creeks in the study area were developed using the TUFLOW Classic fixed grid solver with a 6 m computational grid cell size. The creeks were modelled in 1D and linked to the 2D model domain of the floodplain.

The comparison of modelled and recorded timing and magnitude of peak flood levels appears reasonable in the upper and mid catchment, particularly given the sensitivity of some MHG gauge positions to structure blockage. The model appears to peak earlier than recorded in the mid-catchment, which has an influence on the peak flow coincidence with peak tide in the lower catchment. This may be the cause for more pronounced deviations between modelled and recorded peak flood levels in the lower catchment. The design events use a static downstream boundary level, which ameliorates the tidal coincidence issue to some degree. Since Council has exhausted options available to improve the calibration, and given the computational cost associated with the model simulations, the calibration is considered reasonable for the purpose of the study.

The ensemble event approach prescribed in ARR2019 requires ten temporal patterns to be simulated for each storm duration and flood magnitude, which were all simulated in both the hydrologic and hydraulic model. Given the burden of multiple temporal patterns applied to numerous storm magnitudes and durations, and the need to simulate several catchment and climate scenarios, a total of 2,600 design floods were simulated at great computational cost.

Given the expansive use of 1D/2D links along the channel banks in the model, small mass errors relating to flux between the 1D domain (creeks) and 2D domain (floodplain) produce total mass errors typically between -0.9% and 0.8%, which is an acceptable error range. Mass errors for a small proportion of simulations (10%) exceed -1.0% and the highest mass error is -1.3%. Reducing the extent of 1D domain may improve the mass error at the expense of channel topographic and hydraulic roughness detail. The number of negative depth instances in the 1D domain, an artefact of instability, are generally <0.04 as a proportion of the computational steps, which indicates that the 1D domain is mostly stable. A small proportion of simulations (0.3%) produced more persistent negative depths (>0.3 instances as a proportion of computational steps) on Bulimba Creek at Yugarapul Park, Sunnybank. These negative depths are mainly associated with the 0.5-hour storm duration events that are not critical at this location. Instances of negative depths in the 2D domain are typically marginal. There are persistent negative depths at the Old

Cleveland Road bridge abutment on Bulimba Creek for the PMF simulations. This is a minor point given the extreme flows for this event and the localised nature of the negative depths.

Council has also assessed the model performance relating to afflux across bridge structures by comparing TUFLOW results with those obtained from HEC-RAS, and flow consistency between the hydraulic and hydrologic model. The results show good agreement between modelling approaches.

Limitations of the Review

This review focussed on scrutinising the design and performance of the models developed by Council. The scope of the review does not extend to the underlying data used to develop the model or Council's broader flood study methodology and procedure. For example, the accuracy of the topographic data, land use mapping (based on Brisbane City Council's City Plan and refined using aerial imagery), structure details and historic flood data has not been explicitly checked. If supplied information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions may change. As a consequence, BMT provides no liability to the accuracy or the precision of the supplied data. All liability to do with the assumptions that rely on the accuracy or the precision of the supplied data rest with Brisbane City Council.

Conclusion and recommendations

The flood modelling undertaken as part of the Bulimba Creek Flood Study complies with current industry practice and is considered suitable for the purposes of the study. Some approaches that have been adopted err on the side of caution. Thus, the flood levels and flows are considered conservative, especially in the mid to lower catchment, and there may be opportunities to refine the assessment of flood risk in some areas during future, at-site flood assessments. Further sensitivity and sensibility testing have been suggested but are not expected to change the outcomes of the study.

Implementing recent flood modelling innovations (use of TUFLOW HPC and utilising the sub-grid sampling and quadtree features) may maintain model accuracy while reducing computational costs and simulation times. Given current hardware and licensing limitations, and the large number of simulations required, it is not clear whether these innovations will provide a substantial advantage at this time. Nevertheless, the model is cumbersome to use due to the number of simulations required to run the full set of design events.

It is recommended that the model report provides guidance with regards to event selection on future use of the model for assessments such as impact assessment for developments. This could include, for example, a process for selecting representative storm durations and temporal patterns that are dominant, or close to dominant, across portions of the catchment to exclude redundant events and reduce the number of simulations required.

Council may also consider developing a more user-friendly model in which the computational effort and model complexity have been improved by removing 1D channels along the creeks and coarsening the model resolution, while maintaining model accuracy using sub-grid sampling. There may be opportunities to coarsen the model resolution further in the lower catchment using quadtree. Again, this suggestion is made in the context of future development assessments in the catchment and the model calibration would need to be re-checked.

Please contact BMT should you wish to discuss the contents of this letter further.

Yours Faithfully

Richard Sharpe RPEQ (18843)
Senior Flood Engineer
BMT

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Appendix N: Modelling User Guide

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Bulimba Creek Flood Study

Model User Guide

Prepared by Brisbane City Council's, City Projects Office

June 2021

Dedicated to a better Brisbane

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Table of Contents

List of Tables

List of Figures

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1.0 Introduction

1.1 Bulimba Creek Flood Study (2021)

This document is to be read in conjunction with the Bulimba Creek Flood Study - Volume 1 (2021).

The Bulimba Creek Flood Study (2021) incorporates the calibration and verification of the hydrologic and hydraulic models as well as design event and very rare / extreme event modelling. Hydrologic and hydraulic models have been developed using the URBS and TUFLOW modelling software respectively.

Calibration of the URBS and TUFLOW models was undertaken utilising three historical storms; namely 9th March 2001, 27th January 2013 and 1st May 2015. Verification of the URBS and TUFLOW models utilised the 30th March 2017 historical storm event.

Design and very rare / extreme flood magnitudes were estimated for the full range of events from 2-yr ARI (50 % AEP) to PMF. These analyses assumed hydrologic ultimate catchment development conditions in accordance with the current version of BCC City Plan.

Three waterway scenarios were considered, as follows:

- Scenario 1 – Existing Waterway Conditions: Based on the current waterway conditions. Some minor modifications were made to the TUFLOW model developed as part of the calibration / verification phase. This scenario was run for both (i) current and (ii) projected future climate conditions.
- Scenario 2 – Minimum Riparian Corridor (MRC): Includes an allowance for a riparian corridor along the edge of the channel. This scenario was run for only projected future climate conditions.
- Scenario 3 – Ultimate Conditions: Includes an allowance for the minimum riparian corridor (as per Scenario 2) and also assumes development infill to the boundary of the "Modelled Flood Corridor" in order to simulate potential development. This scenario was run for only projected future climate conditions.

1.2 Scope of this Document

This document provides a guide to users of the URBS hydrologic and TUFLOW hydraulic models that were developed as part of the flood study.

2.0 Hydrologic and Hydraulic Models

2.1 Hydrologic Models

2.1.1 General

The URBS modelling has been undertaken using Version 6.34 (beta), with simulations performed using the URBS Control Centre Version 4.3.4 in lieu of a batch file.

The name and location of the URBS Control Centre project is as follows:

..\URBS\Bulimba\Bulimba.prj

The URBS modelling has been separated into:

- Calibration / Verification, and
- Design and Very Rare / Extreme

The following sections discuss each respectively.

2.1.2 Calibration and Verification Models

For the calibration / verification runs, a separate model for each of the historical events has been developed. These are discussed individually in the following sections:

Event 1 – 27th January 2013

The name and location of the 27th January 2013 event folder is as indicated below, with the URBS Control Centre settings indicated in Figure 2.1

..\URBS\Bulimba\Calibration\Jan_2013

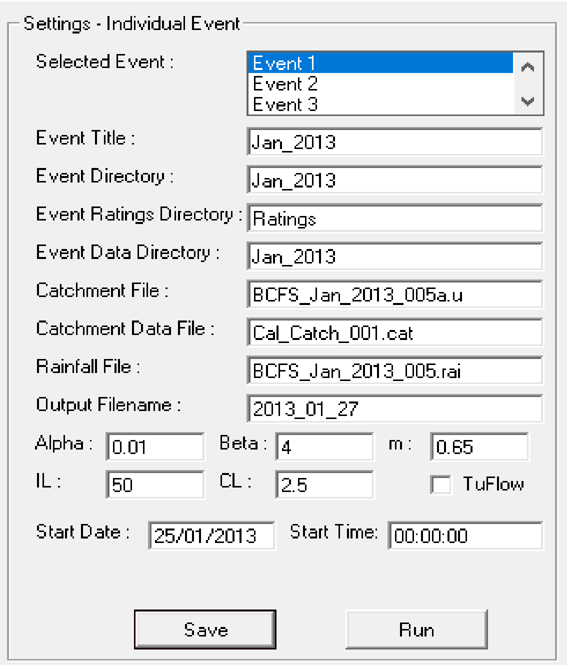

Figure 2.1: Event 1 (27th January 2013)

Event 2 – 1st May 2015

The name and location of the 1st May 2015 event folder is as indicated below, with the URBS Control Centre settings indicated in Figure 2.2.

..\URBS\Bulimba\Calibration\May_2015

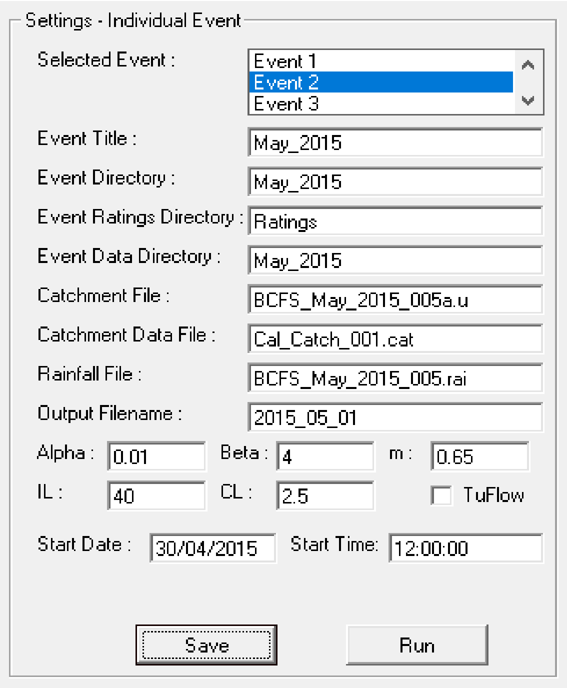

Figure 2.2: Event 2 (1st May 2015)

Event 3 – 30th March 2017

The name and location of the 30th March 2017 event folder is as indicated below, with the URBS Control Centre settings indicated in Figure 2.3.

..\URBS\Bulimba\Calibration\March_2017

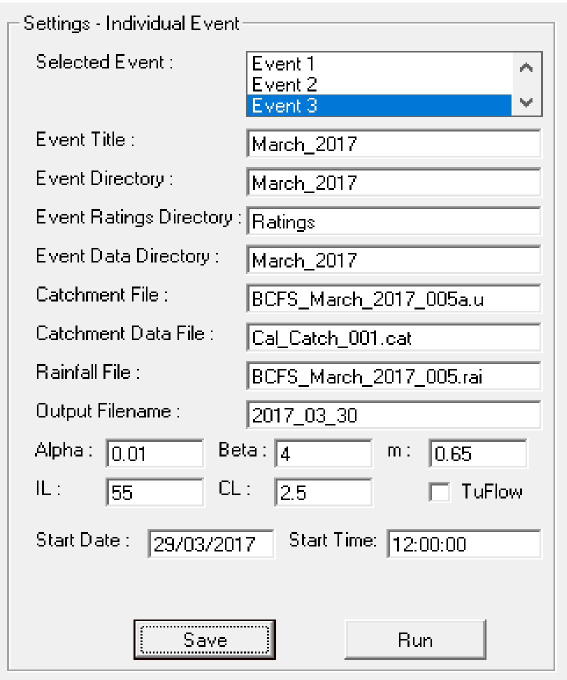

Figure 2.3: Event 3 (30th March 2017)

Event 4 – 9th March 2001

The name and location of the 9th March 2001 event folder is as indicated below, with the URBS Control Centre settings indicated in Figure 2.4.

..\URBS\Bulimba\Calibration\March_2001

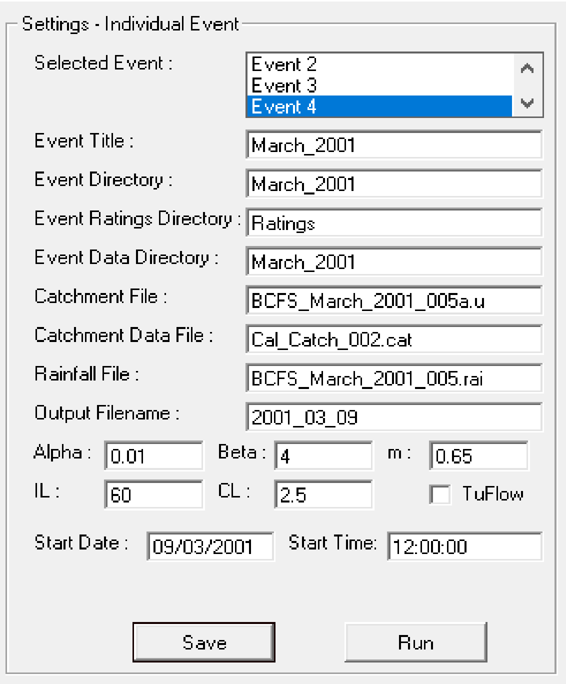

Figure 2.4: Event 4 (9th March 2001)

2.1.3 Design and Very Rare / Extreme Models

For the design and very rare / extreme events, two models have been developed. The first model has been developed for the 2-yr ARI (50% AEP) to 100-yr ARI (1% AEP) events and includes baseflow. The second model has been developed for the 200-yr ARI (0.5% AEP) to 2000-yr ARI (0.05% AEP) events and does not include baseflow. The name of the URBS vector files are as follows:

- BCFS_Design_005a.u - 2-yr ARI (50% AEP) to 100-yr ARI (1% AEP)
- BCFS_Design_005.u - 200-yr ARI (0.5% AEP) to 2000-yr ARI (0.05% AEP)

The name and location of the model folder(s) is as indicated below, with the URBS Control Centre settings indicated in Figure 2.5 and

Figure 2.6.

- AR&R 2019: ..\URBS\Bulimba\Des16
- AR&R 1987: ..\URBS\ Bulimba Des87

When running the 2-yr ARI (50% AEP) to 100-yr ARI (1% AEP) events, the Baseflow Volume Factor (BFVF) needs to set to the BFVF (adjusted) value from Table 2.1. If considering climate change, the climate change year needs to be adjusted accordingly.

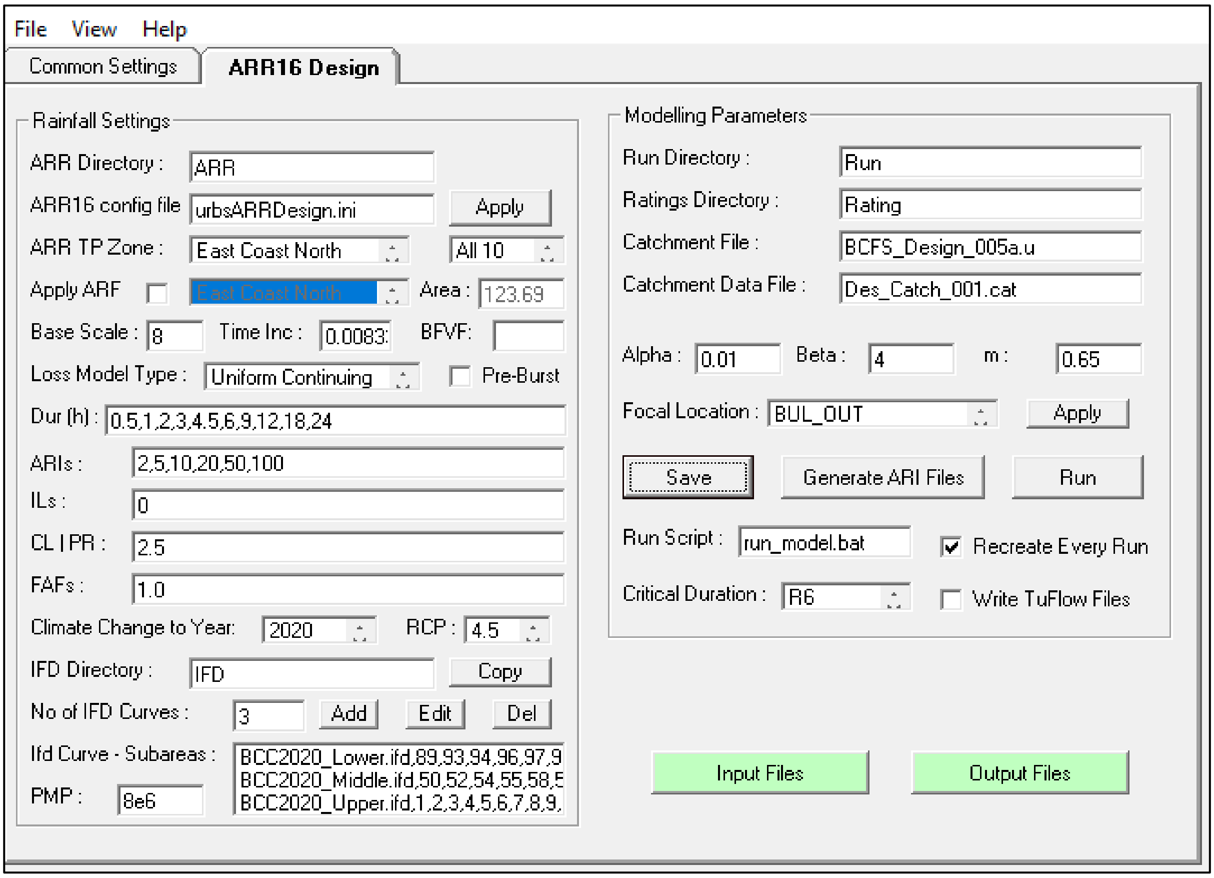

Figure 2.5: Design Event Run Settings – 2-yr ARI (50% AEP) to 100-yr ARI (1% AEP)

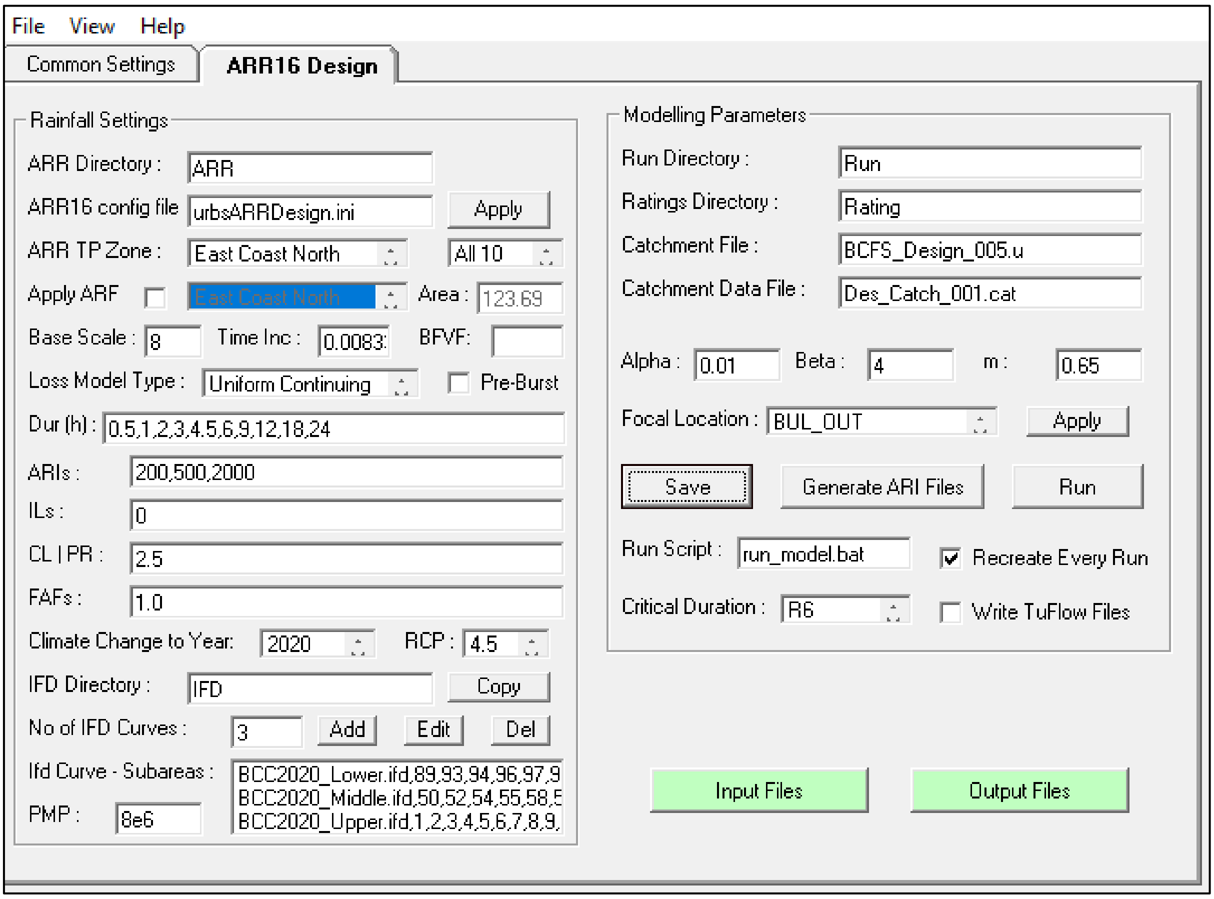

Figure 2.6: Very Rare Event Run Settings – 200-yr ARI (0.5% AEP) to 2000-yr ARI (0.05% AEP)

Table 2.1 – Adjusted URBS BFVF

ARI (AEP)	BFVF (unadjusted)	$BFVF^{AEP}$	BFVF (adjusted)
2-yr (50 %)	0.2821	1.6	0.1763
5-yr (20 %)	0.2821	1.2	0.2350
10-yr (10 %)	0.2821	1.0	0.2821
20-yr (5 %)	0.2821	0.8	0.3526
50-yr (2 %)	0.2821	0.7	0.4029
100-yr (1 %)	0.2821	0.6	0.4701

In order to run the PMF event, the URBS Control Centre settings are as per Figure 2.7.

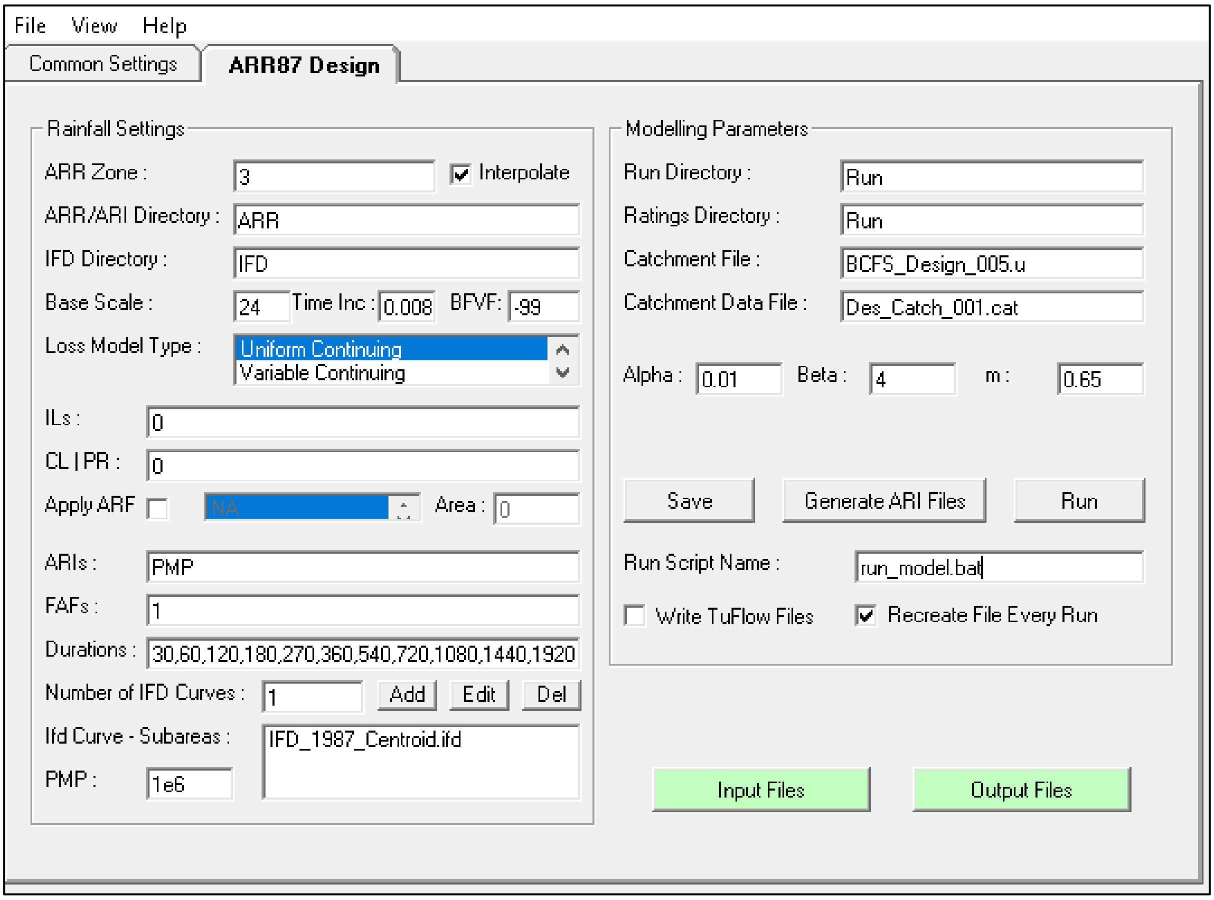

Figure 2.7: PMF Run Settings

2.2 Hydraulic Models

2.2.1 General

TUFLOW modelling was undertaken in TUFLOW Classic using build: 2020-01-AB-iSP-w64.

The TUFLOW modelling was undertaken using a single TUFLOW Control File (TCF), which was named: BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4_079.tcf. The ESTRY Control File (ECF) is embedded into the TCF.

This TCF can be used to simulate all of the model runs undertaken as part of the flood study. The model is run using the appropriate TUFLOW batch command based on the required scenario and events.

2.2.2 TUFLOW Calibration and Verification Models

TUFLOW simulations were undertaken for all four historical events. The January 2013 / May 2015 / March 2017 model is essentially the same for each, apart from the boundary conditions. The March 2001 model is similar, however omits some of the hydraulic structures which were not constructed at that time. Table 2.2 indicates the scenario and event codes to be used inside the TUFLOW batch file.

Table 2.2 – TUFLOW Calibration and Verification Batch Codes

Model Simulation	Scenario 1 (~s1~)	Scenario 2 (~s2~)	Event 1 (~e1~)	Event 2 (~e2~)	Event 3 (~e3~)	Event 4 (~e4~)
9th March 2001	CAL	CLA	2001	03	09	DS_2001
27th January 2013	CAL	CLA	2013	01	27	DS_2013
1st May 2015	CAL	CLA	2015	05	01	DS_2015
30th March 2017	CAL	CLA	2017	03	30	DS_2017

As an example, the batch file command for 1st May 2015 simulation would be as follows:

```
tuflow_iSP_w64.exe -b -s1 CAL -s2 CLA -e1 2015 -e2 05 -e3 01 -e4 DS_2015
BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf
```

2.2.3 TUFLOW Design Event Models

TUFLOW simulations were undertaken for all Scenario 1, Scenario 2 and Scenario 3 design events up to and including the 100-yr ARI (1 % AEP) event. Table 2.3 and Table 2.4 indicate the scenario and event codes to be used inside the TUFLOW batch file.

Table 2.3 – TUFLOW Scenario 1 and Scenario 3 Design Event Batch Codes

Model Simulation	Scenario 1 (~s1~)	Scenario 2 (~s2~)	Event 1 (~e1~)	Event 2 (~e2~)	Event 3 (~e3~)	Event 4 (~e4~)
Design Events (Scenario 1) Without Climate Change	S1_DES	CLA	002y 005y 010y 020y 050y 100y	E1 E2 E3 E4 E5 E6 E7 E8 E9 E10	030m 060m 120m 180m 270m 360m 540m 720m 1080m 1440m	MHWS
Design Events (Scenario 1 and 3) With Climate Change	S1_DES or S3_DES	CLA	002yCC 005yCC 010yCC 020yCC 050yCC 100yCC	E1 E2 E3 E4 E5 E6 E7 E8 E9 E10	030m 060m 120m 180m 270m 360m 540m 720m 1080m 1440m	MHWS+0.8m

As an example, the batch file command for Scenario 1 100-yr ARI Ensemble #4 60-minute simulation (inclusive of climate change) would be as follows:

tuflow_iSP_w64.exe -b -s1 S1_DES -s2 CLA -e1 100yCC -e2 E4 -e3 060m -e4 MHWS+0.8m BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf

Table 2.4 – TUFLOW Scenario 2 Design Event Batch Codes

Model Simulation	Scenario 1 (~s1~)	Scenario 2 (~s2~)	Event 1 (~e1~)	Event 2 (~e2~)	Event 3 (~e3~)	Event 4 (~e4~)
Design Events (Scenario 2) With Climate Change	S2_DES	CLA	100yCC	E1 E2 E3 E4 E5 E6 E7 E8 E9 E10	030m 060m 120m 180m 270m 360m 540m 720m 1080m 1440m	MHWS+0.8m

As an example, the batch file command for Scenario 2 100-yr ARI Ensemble #5 120-minute simulation (inclusive of climate change) would be as follows:

tuflow_iSP_w64.exe -b -s1 S2_DES -s2 CLA -e1 100yCC -e2 E5 -e3 120m -e4 MHWS+0.8m BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf

2.2.4 TUFLOW Very Rare and Extreme Event Models

TUFLOW simulations were undertaken for the Scenario 1 and Scenario 3 very rare / extreme events up to and including the PMF event. Table 2.5 indicates the scenario and event codes to be used inside the TUFLOW batch file.

Table 2.5 – TUFLOW Scenario 1 and Scenario 3 Very Rare and Extreme Event Batch Codes

Model Simulation	Scenario 1 (~s1~)	Scenario 2 (~s2~)	Event 1 (~e1~)	Event 2 (~e2~)	Event 3 (~e3~)	Event 4 (~e4~)
Very Rare Events (Scenario 1) Without Climate Change	S1_EXT	CLA	200y 500y 2000y	E1 E2 E3 E4 E5 E6 E7 E8 E9 E10	030m 060m 120m 180m 270m 360m 540m 720m 1080m 1440m	HAT
Extreme Event (Scenario 1) Without Climate Change	S1_EXT	CLA	PMF	E0	030m 060m 120m 180m 270m 360m 540m 720m 1080m 1440m	HAT
Very Rare Events (Scenario 1 and 3) With Climate Change	S1_EXT or S3_EXT	CLA	200yCC 500yCC	E1 E2 E3 E4 E5 E6 E7 E8 E9 E10	030m 060m 120m 180m 270m 360m 540m 720m 1080m 1440m	HAT+0.8m
Very Rare Event (Scenario 1) With Climate Change	S1_EXT	CLA	2000yCC	E1 E2 E3 E4 E5 E6 E7 E8 E9 E10	030m 060m 120m 180m 270m 360m 540m 720m 1080m 1440m	HAT+0.8m

As an example, the batch file command for Scenario 1 200-yr ARI Ensemble #4 60-minute simulation (exclusive of climate change) would be as follows:

tuflow_iSP_w64.exe -b -s1 S1_EXT -s2 CLA -e1 200y -e2 E4 -e3 060m -e4 HAT BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf

Similarly, the batch file command for Scenario 1 PMF 360-minute simulation would be as follows:

tuflow_iSP_w64.exe -b -s1 S1_EXT -s2 CLA -e1 PMF -e2 E0 -e3 360m -e4 HAT BCFS_~s1~_~s2~_~e1~_~e2~_~e3~_~e4~_079.tcf