Appendices

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Appendix A
Infrastructure Data Assessment Report

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Infrastructure Data Assessment Report

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Project: Regional Floodplain Database Stage 2 Detailed Modelling – Package 3: Pumicestone Passage and Bribie Island

Data Infrastructure Assessment Report

Reference: 211090

Prepared for: Moreton Bay Regional Council

Revision: 1

31 May 2012

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Document Control Record

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Report Title		Data Infrastructure Assessment Report				
Document ID			**Project Number**		211090	
File Path		P:\SWM2\work\211090 MBRC RFD Stage 2\Reporting\Appendices\A - Infrastructure Data Assessment Report\211090 Data Infrastructure Assessment Report_Final.docx				
Client		Moreton Bay Regional Council	**Client Contact**			
Rev	**Date**	**Revision Details/Status**	**Prepared by**	**Author**	**Verifier**	**Approver**
0	20 October 2010	Draft for MBRC Review	C Smyth	B Breen	T Campbell	T Graham
1	31 May 2012	Final	C Smyth	T Campbell	T Campbell	T Graham
Current Revision		1				

Approval			
Author Signature		Approver Signature	Trinity Graham
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Regional Floodplain Database Stage 2 Detailed Modelling – Package 3: Pumicestone Passage and Bribie Island

Date | 31 May 2012
Reference | 211090
Revision | 1

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1 Introduction

1.1 Study objective

Moreton Bay Regional Council (MBRC) is delivering a Regional Floodplain Database (RFD) in support of their flood risk management, considering emergency response, development control, strategic landuse and infrastructure planning. The MBRC was recently formed under local government amalgamations and is responsible for Caboolture, Pine Rivers, Redcliffe and Bribie Island. The RFD project is focusing on the northern sector as a key growth area for south east Queensland.

The project is being funded by MBRC, Emergency Management Queensland (EMQ) and Emergency Management Australia (EMA) as part of the Disaster Resilience Program and will provide:

- A comprehensive and consistent description of flood behaviour across the region
- Strategies for management of any flooding problems identified
- A system/process to store and manage this information and keep it up-to-date

Stage 1 of the project was completed in July 2010 and involved a number of sub-projects. These projects delivered consistent processes and protocols for the detailed hydrologic and hydraulic model development. A key sub-project involved the development of broadscale hydrodynamic models for each minor basin to provide general understanding of flooding mechanisms and allow prioritisation of data capture.

Stage 2 (current stage) of the project involves the development of detailed hydrologic and hydraulic models for each minor basin.

Stage 3 will build on the detailed models and "add value" through assessment of flood damages and community resilience measures.

1.2 Objective of data infrastructure assessment report

This report pertains to the data infrastructure assessment and gap analysis for Package 3, including:

- Bribie Island
- Pumicestone Passage (including Six Mile, Beerburrum, Elimbah, Ningi and Glass Mountain Creeks)

The Pumicestone Passage basin is mostly rural, with flood-prone lower reaches. There are a large number of structures in this basin, with the potential to impact upon flooding of urban areas. Additionally, accurate modelling of breakout flows travelling between the lower reaches of Ningi and Elimbah Creeks will be important.

The Bribie Island catchment has significant flooding through some urban areas and canal estates. Representation of urban flowpaths and structures will be important to the accurate modelling of this catchment.

This report assesses the infrastructure and bathymetric data requirements for modelling of the Bribie Island and Pumicestone Passage minor basins. It documents the results of the data gap analysis carried out for drainage infrastructure including bridges, culverts, detention basins and trunk drainage and also for below-water bathymetric details. The infrastructure has been prioritised according to the significance of location and potential impacts to the hydraulic model results. Following the gap analysis and the data prioritisation, a composite assessment of survey requirements has been undertaken.

2 Available data and gap analysis

2.1 Bridges

Bridge drawings received by the Department of Transport and Main Roads (DTMR), Moreton Bay Regional Council (MBRC) and Queensland Rail (QR) for road and rail crossings have been assessed to determine whether critical data is available. The critical information required for the hydraulic modelling of bridges includes:

- Deck location, surface/obvert levels and thickness
- Pier locations, dimensions, orientation to flow and pile arrangements
- Handrail location, height and extent
- Cross-section of channel beneath bridge

Appendix A provides a list of the available data for all bridges and identifies data gaps. With regards to the above, deck locations can be obtained from the aerial images where they are not available in drawings. We note that where no data is available regarding whether a particular crossing is a bridge or a culvert, we have assumed that the crossing is a culvert. This assumption may not be correct in all cases.

2.2 Culverts

Bribie Island and Pumicestone Passage stormwater trunk drainage network GIS data, DTMR drawings and QR drawings have been reviewed to determine whether critical data for culvert crossing locations is available. Culvert locations and lengths can be estimated from the aerial image where visible. The critical information required for the hydraulic modelling of culverts includes:

- Culvert shape
- Dimensions and number of barrels
- Culvert invert levels

Culvert locations identified in the data assessment exclude crossings of local dirt roads throughout the upper reaches of the Pumicestone Passage catchment. Appendix A provides a list of the available data for all culverts and identifies data gaps.

We understand that Council's surveyors have undertaken survey of many of the culverts within the Pumicestone Passage and Bribie Island minor basins and that the gap analysis provided in Appendix A will need to be revised once this survey data is provided to Aurecon.

2.3 Trunk underground drainage

The trunk drainage data standard specifies that trunk drainage refers to “extended underground drainage systems which have a large open channel or stream feeding into them (ie stormwater pipe networks which are intended to convey flows from a major storm event)”. Whilst the only location in which we have identified that this definition applies is the outlet to the Bellara Detention Basin, we recommend that the drainage systems in Bellara be included in the modelling as this area is flood-prone and the stormwater networks have the potential to impact upon the flood modelling results throughout this area.

The critical areas in which we think modelling of the pipe network is required include:

- All pipe systems which drain into the Bellara Detention Basin
- All pipe systems which drain from Bellara into the Pacific Harbour canal

The critical information required for the hydraulic modelling of trunk drainage includes:

- Pipe location, shape, dimensions, invert levels, length and number of barrels
- Stormwater pit/junction locations, type, dimensions and invert levels

Stormwater pits and junctions include structures such as kerb inlet pits, manholes and field inlet pits. An assessment of the Bribie Island stormwater drainage network GIS data for the areas defined above established:

- Pipe location, shape, dimensions, invert levels and number of barrels are available
- Stormwater pit locations, invert levels and surface levels are available
- Stormwater pit/junctions types have been categorised into manholes, catch pits, gully pits, pipe outlets and inlet structures however details of the structures corresponding to these categories are not available

2.4 Detention basins

We have identified a single detention basin within Bellara on Bribie Island. The outlet of this basin consists of two culverts. The simple arrangement of the outlet allows it to be represented directly in the hydraulic model, excluding the requirement for a special relationship to be developed. Refer to Section 2.3 for the trunk drainage data relevant to the Bellara Detention Basin.

The culvert inlets on this basin are screened with wire mesh operating as trash racks and the culvert outlets consist of an attachment reducing the flow area of the culvert. These features have been identified through a site visit and no further information is required for the outlet structure.

The LiDAR data at the detention basin outlet is well defined and is free of dense vegetation, thick grass or any other obstructions which may affect the accuracy of the LiDAR survey; therefore the LiDAR representation of the outlet embankment should be sufficient for accurate modelling. No bathymetric data exists for the detention basin.

2.5 Terrain

LiDAR data has been provided by MBRC for the Pumicestone Passage and Bribie Island basins. In addition to the LiDAR data, to accurately model the waterways, bathymetric information will be required for significant perennial reaches. These reaches have been identified and prioritised in Appendix C.

Cross-section data, including bathymetric details, are available from the EXTRAN Model layout and cross-sections provided by MBRC for Six Mile Creek in the Pumicestone Passage Basin. A comparison of the surveyed cross-sections and the LiDAR data showed that there is minimal difference between the two and the inclusion of the invert details from the cross-sections is considered to have an insignificant impact on conveyance capacity through Six Mile Creek, therefore this information will not need to be included in the hydraulic model.

The WorleyParsons (2010) Floodplain Terrain report indicates that bathymetric data for Pacific Harbour and Bribie Gardens is available and is included in the terrain tool (and therefore the zpoints).

Survey data for the Solander Drain is also available. This survey has been compared to the LiDAR data and there is a difference in the bed elevation in the order of 1 m, therefore we recommend that the survey should be included in the hydraulic model.

No bathymetric data is available for the Bellara Detention Basin.

2.6 Prioritisation methodology

The structure data has been prioritised based on three main criteria:

- Broadscale model flood extents – Structures within or nearby the 100 year broadscale model flood extents were identified as structures to be included in the hydraulic model. Conversely structures outside of these extents were considered to be insignificant and were excluded
- Land use – Flood levels through urban areas are generally of greater significance than rural areas therefore structures located in urban areas were considered to be of higher priority
- Major crossings of highways and railway – Highways and railways present a large obstruction to flowpaths. The major crossings of the Bruce Highway, Beerburrum Road and the railway line were given higher priority

Prioritisation of the bathymetric data was determined from the aerial image and has been prioritised based on three major criteria:

- Larger reaches with greater widths and higher water depths were considered to be of higher priority as bathymetry in these reaches could have a substantial impact on channel capacity. Larger channels are typically located in the lower reaches of each waterway
- Reaches with large catchments are likely to have a greater impact in hydraulic model and are considered of higher priority. These are also typically located in the lower reaches of each waterway
- Reaches in urban areas are considered to be of greater significance

Prioritisation of the structures is listed in Appendix B and prioritisation of the bathymetry is listed in Appendix C. Note that all structures have been prioritised, then structures requiring survey have identified following the prioritisation.

2.7 Data prioritisation (A and B)

The structures and bathymetric data have been prioritised into A (high priority) and B (low priority). These structures are shown on Figure 1. Structures identified as Priority A include:

- Structures inside or nearby the 100 year broadscale model flood extents and in urban areas
- Crossings of Pumicestone Road
- Outlet structure from the Bellara Detention Basin
- Significant crossings of the railway and highways (Bruce Highway and Beerburrum Road)

Structures of Priority B include:

- Structures that are inside or nearby the 100 year ARI broadscale model flood extents, in rural areas and not part of a major crossing of the railway or highways

Bathymetric data of Priority A includes large (wide or deep) reaches (typically in the lower reaches) and reaches inside or nearby urban areas. Bathymetric data of Priority B includes smaller reaches, which are typically tributaries, or upper reaches in rural areas. Prioritised bathymetric data is shown on Figure 2.

2.7.1 Survey capture requirements

The survey capture requirements have been identified based upon a composite assessment of data gaps and data prioritisation. Discussions with Council have indicated that most culvert survey within the Pumicestone Passage and Bribie Island catchments has been undertaken; therefore culverts have not been included in the survey data requirements. The prioritised infrastructure and bathymetric survey requirements are included in Appendix D and a copy of the survey scope document is included in Appendix E.

2.7.2 Alternative data capture methods

We understand that there are limited budgets available for survey capture and that MBRC may determine that other catchments are more important with respect to survey data collection, therefore we have tried to identify where alternative methods may be used to provide the critical details required for modelling. These methods are outlined below.

Culverts

In the absence of survey data for modelling of culverts the invert levels could be set to match the LiDAR data surface levels and the culvert size, number of barrels and shape determined from the field with a site visit.

Bridges

Either the obvert levels or the thickness of bridge decks will need to be provided by drawings or survey due to difficulty in alternative determination techniques. The LiDAR data could be used as a less accurate method of determining the deck levels and of representing the cross section underneath the bridge. The aerial images could be used to determine the bridge deck location. Other critical data such pier locations, dimensions, orientation to flow, pile arrangements and handrail location, height and extent can be measured or estimated in the field with a site visit.

Trunk drainage

For the stormwater network data within Bellara, most critical data is available for the pipes. Data relating to pit types is unavailable. It would be possible to either:

- Adopt standard pit types and apply these standard types to all pits for which no data is available
- Undertake a site visit to determine as much information as possible, especially with regard to inlet pit types. The site visit would not provide manhole/junction pit details however standard assumptions could be made regarding these

Bathymetry

No alternative methods exist for capture of bathymetric data. If bathymetric survey is not available, 2d_zlines will need to be used to provide a continuous flowpath through modelled reaches.

3 Recommendations

Priority A culverts are located in areas considered to be critical, such as urban areas where accuracy of results is considered to be important or at major crossings of highways and railways where the structure has could have substantial influence on upstream and downstream conditions. Priority A infrastructure also includes major bridge crossing of highways and railways where inaccuracy in modelling could impact on results upstream and downstream.

Survey requirements for bridges have been identified based upon the gap analysis and the data prioritisation. No survey requirements have been identified for culverts as most of these have already been surveyed by Council.

Where bathymetric data is not available, there are no alternative methods for this data capture and the LiDAR survey will need to be applied, reducing the reliability of the hydraulic model. Reaches of Priority B are typically tributaries in rural areas where reducing the reliability of the hydraulic model may be considered acceptable. Priority B reaches are typically smaller with shallower depths; therefore the reduction in channel capacity may not be significant if the LiDAR data is applied. Priority A reaches are considered to be critical to the hydraulic model and the reduction in channel capacity in the absence of bathymetric data could have a significant impact on results.

It is recommended that survey information for Priority A structures and reaches requiring bathymetric data be sourced in order to maximise the reliability of the hydraulic model and obtain accurate results in critical areas. Alternate methods may be considered for Priority B structures where possible as lower reliability of the hydraulic model may be considered acceptable in these areas.

4 References

4.1 Documents

WorleyParsons (2010), Regional Floodplain Database – Floodplain Terrain, 9 September 2010

4.2 Other data

Aerial images

All MBRC roads GIS data, as provided by council

Bribie Island stormwater trunk drainage network GIS data, as provided by Council September 2010

Department of Transport and Main Roads (DTMR) drawings for bridges and culverts

LiDAR data from, as provided by Council

Moreton Bay Regional Council (MBRC) drawings for bridges

Pumicestone Passage stormwater trunk drainage network GIS data, as provided by Council September 2010

Queensland Rail (QR) drawings for bridges and culverts

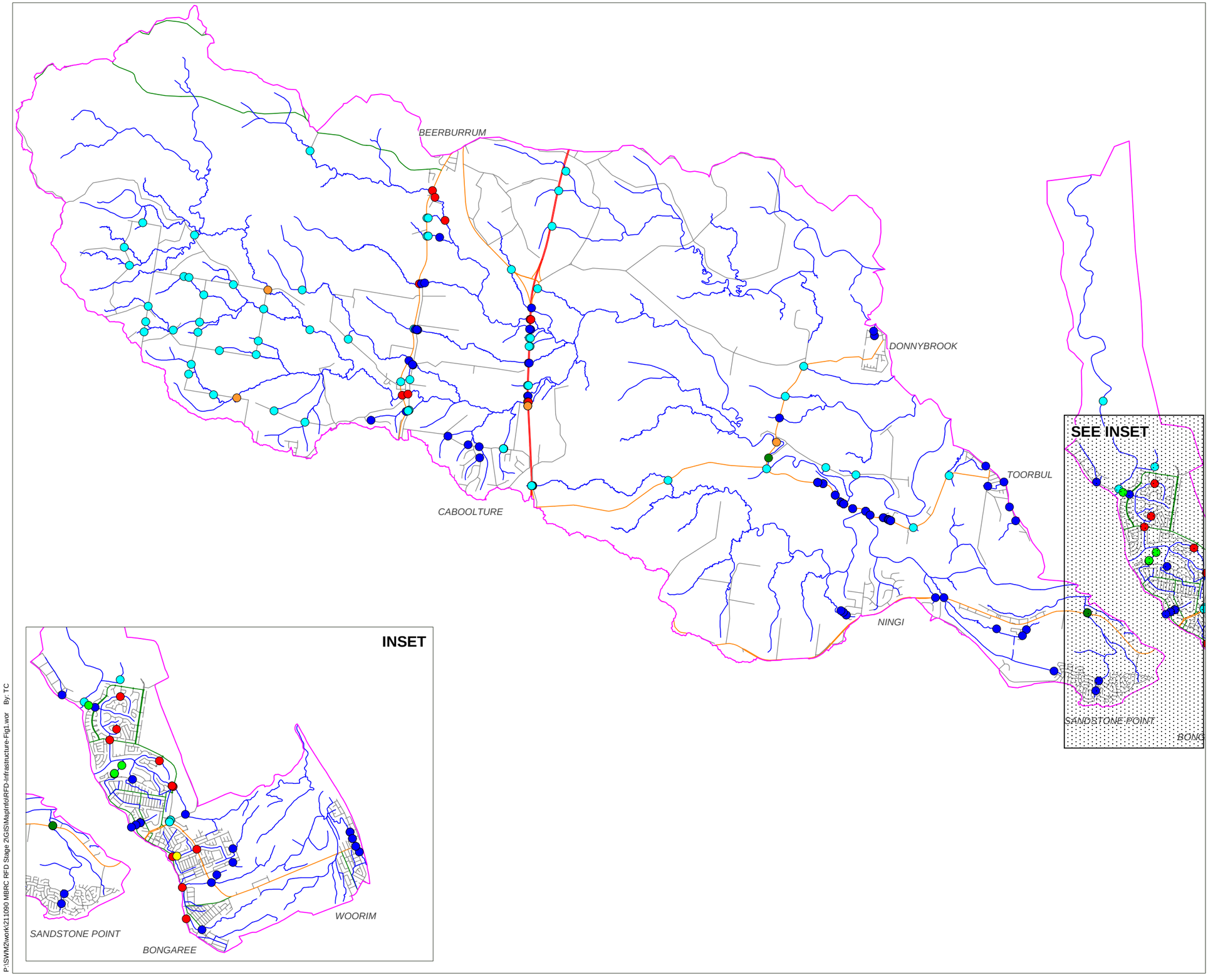
Solander Drain survey 09 September 2008, as provided by council October 2010

Tuflow Z points and loc files covering the Moreton Bay regional basins of Pumicestone Passage (PUM) and Bribie Island (BRI)

Six Mile Creek EXTRAN Model layout and cross sections, as provided by Council October 2010

Appendices

Appendix A
Figures



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aurecon

Legend

Roads by Heirarchy
- 1
- 2
- 3
- 4
- 5

Reaches

Bribie Island Structures
- Bridge Priority A
- Culvert Priority A
- Culvert Priority B
- Footbridge Priority A
- Lock Priority A

Pumicestone Passage Structures
- Bridge Priority A
- Bridge Priority B
- Culvert Priority A
- Culvert Priority B
- Footbridge Priority B

Notes:

Date: 20/10/2010 **Version: 0**

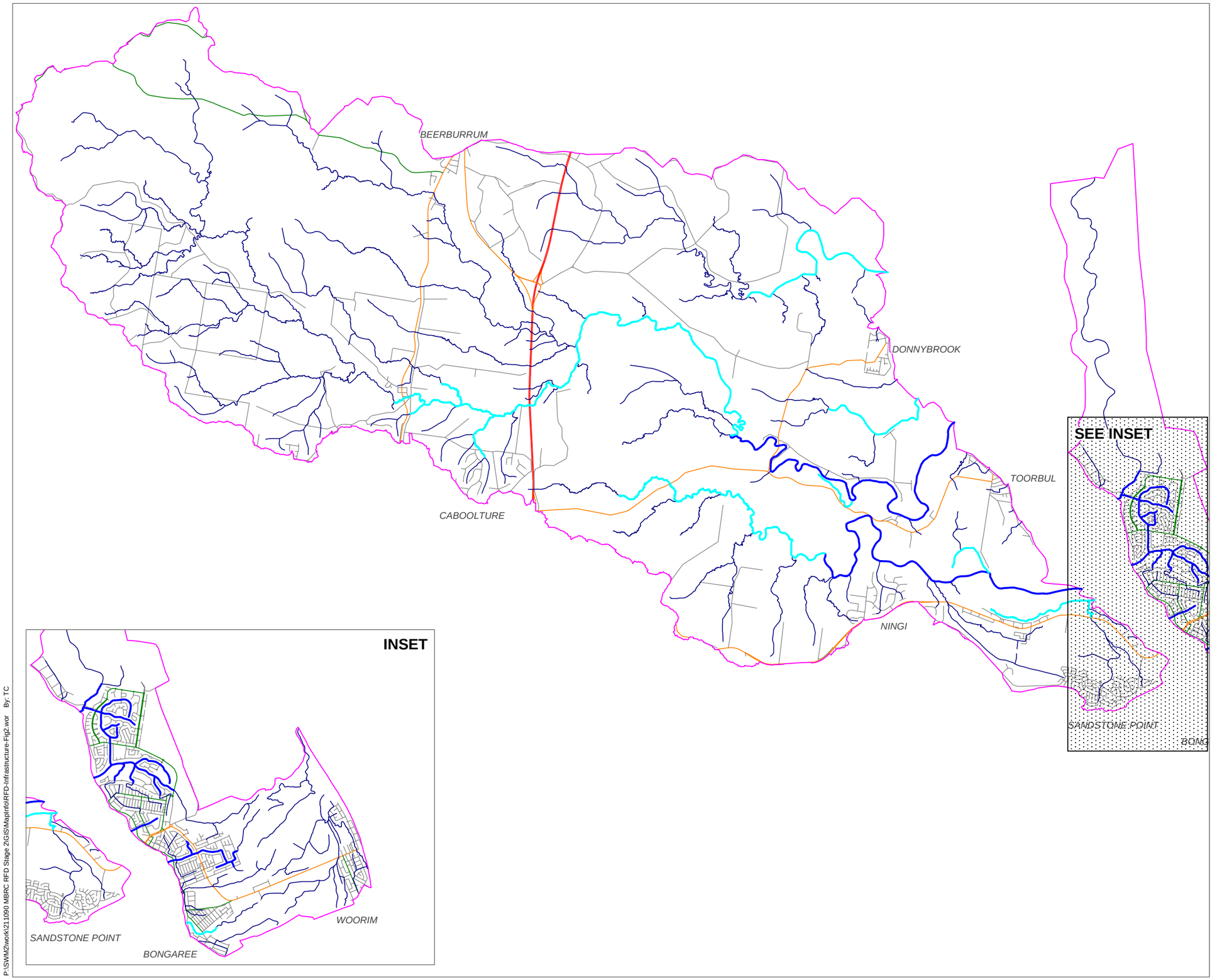
0 5000 (m)

Scale 1:10 000 (m) (@ A3 size)

Projection: MGA Zone 56

RFD Stage 2 Detailed Modelling

Pumicestone Passage and Bribie Island
Figure 1: Structure Locations



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Legend

Roads by Heirarchy
- 1
- 2
- 3
- 4
- 5

- Non-Critical Reaches
- Priority A Reaches
- Priority B Reaches

Notes:

Date: 20/10/2010 **Version: 0**

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0 5000 (m)

Scale 1:10 000 (m) (@ A3 size)

Projection: MGA Zone 56

RFD Stage 2 Detailed Modelling

Pumicestone Passage and Bribie Island
Figure 2: Bathymetric Data Locations

Appendix B
Data assessment and gap analysis

Appendix B – Data assessment and gap analysis

Pumicestone Passage – Bridges

WW_ID	Xing_Name	Domain	Structure type[a]	Data set complete[b]	Missing data	Data source
BEE_01_01652	Bruce Highway	PUM	Bridge	No	Handrail	DTMR DWG
BEE_01_01675	Bruce Highway	PUM	Bridge	No	Handrail	DTMR DWG
BEE_01_06768	Railway	PUM	Bridge	No	Pier Data, Deck Elevation Data	QR DWG
BEE_01_07615	Railway	PUM	Bridge	No	All	None
BEE_01_07828	Beerburrum Road	PUM	Bridge	Yes	None	DTMR DWG
BEE_10_01778	Beerburrum Road	PUM	Bridge	No	All	None
ELI_01_09748	Donnybrook Road	PUM	Footbridge	No	All	None
ELI_01_10536	Donnybrook Road	PUM	Bridge	Yes	None	MBRC DWG
NIN_36_00225	Bribie Island Road	PUM	Footbridge	No	All	None
SMC_01_02645	Bruce Highway	PUM	Bridge	Yes	None	DTMR DWG
SMC_01_02671(A)	Bruce Highway	PUM	Bridge	Yes	None	DTMR DWG
SMC_01_05975	Railway	PUM	Bridge	No	Pier Data, Deck Vertical Data	QR DWG
SMC_01_06873	Beerburrum Road	PUM	Bridge	Yes	None	DTMR DWG
SMC_01_13518	Twin View Road	PUM	Bridge	Yes	None	MBRC DWG
SMC_34_03784	King Road	PUM	Bridge	No	All	None

[a] Where data source is not available the structure type has been taken from aerial images and will need to be confirmed once data is available

[b] Complete data set column refers to critical data as identified in Section 2 of the report

Pumicestone Passage – Culverts

WW_ID	Xing_Name	Domain	Structure type[a]	Data set complete[b]	Missing data	Data source
BEE_01_11919	Old Gympie Road	PUM	Unknown	No	All	None
BEE_06_00530	Railway	PUM	Culvert	No	All	None
BEE_06_00568	Beerburrum Road	PUM	Unknown	No	All	None
BEE_08_00425	Railway	PUM	5/1800 RCP	No	Invert Levels	QR DWG
BEE_08_00755	Railway	PUM	Culvert	No	All	None
BEE_08_00787	Beerburrum Road	PUM	Unknown	No	All	None
BEE_09_01117	Bruce Highway	PUM	Unknown	No	All	None
BEE_09_01592	Steve Irwin Way	PUM	Culvert	No	Invert Levels	QR DWG
BEE_10_01633	Railway	PUM	6/2100 RCP	No	Invert Levels	QR DWG
BEE_10_01724	Railway	PUM	Culvert	No	All	None
BEE_12_00243	Bruce Highway	PUM	1/1800 RCP	Yes	None	DTMR DWG
BEE_12_00275	Bruce Highway	PUM	1/1800 RCP	Yes	None	DTMR DWG
BEE_14_00454	Bruce Highway	PUM	Unknown	No	All	None
BEE_14_00481	Bruce Highway	PUM	Unknown	No	All	None
BEE_16_00679	Bruce Highway	PUM	1/1200x450 RCBC	No	All	None
BEE_16_00703	Bruce Highway	PUM	2/750 RCP	Yes	None	DTMR DWG
BEE_18_01376	Bruce Highway	PUM	3/1800X450 RCBC	No	All	None
BEE_18_01396	Bruce Highway	PUM	6/1800 RCP	Yes	None	DTMR DWG
BEE_18_05085	Rose Creek Road	PUM	2/1800 RCP	No	Invert Levels	QR BWG
BEE_18_05085	Railway	PUM	Culvert	Yes	None	MBRC GIS
BEE_18_05151	Railway	PUM	Culvert	Yes	None	MBRC GIS

WW_ID	Xing_Name	Domain	Structure type[a]	Data set complete[b]	Missing data	Data source
BEE_18_05190	Beerburrum Road	PUM	Culvert	No	All	None
ELI_03_01693	Bruce Highway	PUM	Culvert	No	All	None
ELI_07_00183	Meldale Road	PUM	1/450 RCP	Yes	None	MBRC GIS
ELI_09_00104	Meldale Road	PUM	2/450 RCP	Yes	None	MBRC GIS
ELI_10_00057	Pumicestone Road	PUM	Culvert	No	All	None
ELI_11_04807	Donnybrook Road	PUM	Culvert	No	All	None
Not on reach	Pumicestone Road	PUM	1/750x450 RCBC	Yes	None	DTMR DWG
Not on reach	Pumicestone Road	PUM	1/900x300 RCBC	Yes	None	DTMR DWG
Not on reach	Pumicestone Road	PUM	1/450 RCP	Yes	None	DTMR DWG
Not on reach	Pumicestone Road	PUM	2/600x300 RCBC	Yes	None	DTMR DWG
Not on reach	Pumicestone Road	PUM	2/600x300 RCBC	Yes	None	DTMR DWG
ELI_13_01616	Donnybrook Road	PUM	Culvert	No	All	None
ELI_14_00382	Pumicestone Road	PUM	Culvert	No	All	None
ELI_16_01136	Pumicestone Road	PUM	Culvert	No	All	None
ELI_18_00000	Esplanade	PUM	Unknown	No	All	None
ELI_20_00000	Esplanade	PUM	4/750 RCP	Yes	None	MBRC GIS
ELI_20_00617	Freeman Road	PUM	3/1200x600 RCBC	Yes	None	MBRC GIS
ELI_22_00038	Esplanade	PUM	Culvert	No	All	None
ELI_24_00122	Esplanade	PUM	Unknown	No	All	None
GMC_01_15669	Bruce Highway	PUM	Unknown	No	All	None
GMC_02_00459	Bruce Highway	PUM	Culvert	No	All	None
GMC_04_02236	Bruce Highway	PUM	1/750 RCP	No	All	None
GMC_24_00212	Esplanade North	PUM	Culvert	No	All	None

WW_ID	Xing_Name	Domain	Structure type[a]	Data set complete[b]	Missing data	Data source
GMC_24_00331	Amy Street	PUM	3/750 RCP	Yes	None	MBRC GIS
GMC_26_00000	Amy Street	PUM	2/1200x450 RCBC	Yes	None	MBRC GIS
GMC_28_02630	Donnybrook Road	PUM	Unknown	No	All	None
Not on reach	Pumicestone Road	PUM	1/450x300 RCBC	No	Location	DTMR DWG
Not on reach	Pumicestone Road	PUM	1/450x300 RCBC	No	Location	DTMR DWG
Not on reach	Pumicestone Road	PUM	1/450x300 RCBC	No	Location	DTMR DWG
Not on reach	Pumicestone Road	PUM	1/450x300 RCBC	No	Location	DTMR DWG
Not on reach	Pumicestone Road	PUM	1/450x300 RCBC	Yes	None	DTMR DWG
Not on reach	Pumicestone Road	PUM	1/450x300 RCBC	Yes	None	DTMR DWG
Not on reach	Pumicestone Road	PUM	1/450x300 RCBC	Yes	None	DTMR DWG
NIN_01_18391	Pumicestone Road	PUM	Culvert	No	All	None
NIN_01_23388	Rutters Road	PUM	Culvert	No	All	None
NIN_01_23388	Bruce Highway	PUM	Culvert	No	All	None
NIN_01_23388	Bruce Highway	PUM	Culvert	No	All	None
NIN_14_00567	Minor Road	PUM	Unknown	No	All	None
NIN_14_01586	Wattle Grove Drive	PUM	1/750 RCP	Yes	None	MBRC GIS
NIN_14_01586	Wrenaus Way	PUM	3/750 RCP	Yes	None	MBRC GIS
NIN_22_00733	Bribie Island Road	PUM	Culvert	No	All	None
NIN_24_00716	Bribie Island Road	PUM	Culvert	No	All	None
NIN_24_03255	Sandstone Bvd	PUM	Culvert	No	All	None
NIN_28_00581	Sandheath Place	PUM	Culvert	No	All	None
NIN_28_02308	Sandheath Place	PUM	3/2400x1200 RCBC & 1/1200x1200 RCBC	No	All	MBRC GIS

WW_ID	Xing_Name	Domain	Structure type[a]	Data set complete[b]	Missing data	Data source
NIN_28_02761	Redondo Street	PUM	1/1200x2100 RCBC	No	All	MBRC GIS
NIN_36_00585	Bribie Island Road	PUM	Culvert	No	All	None
NIN_36_03043	Bestmann Road East	PUM	3/1200X600 RCBC	Yes	None	MBRC GIS
NIN_36_03325	Carpenter Way	PUM	3/1200x600 RCBC	Yes	None	MBRC GIS
SMC_01_02671(B)	Bruce Highway	PUM	3360 CSPIP 2A DWG 197272	Yes	None	DTMR DWG
SMC_01_11575	Old Gympie Road	PUM	Unknown	Na	None	None
SMC_08_00499	Prosser Road	PUM	Unknown	No	All	None
SMC_09_02090	Rose Creek Road	PUM	Unknown	No	All	None
SMC_09_02136	Railway	PUM	4/3000x1800 RCBC	No	Invert Levels	QR DWG
SMC_09_02248	Beerburrum Road	PUM	Culvert	No	All	None
SMC_09_06807	Old Gympie Road	PUM	Unknown	No	All	None
SMC_12_00384	Twin View Road	PUM	Unknown	No	All	None
SMC_13_00311	Twin View Road	PUM	Unknown	No	All	None
SMC_14_01506	Woodlands Drive	PUM	Culvert	No	All	None
SMC_15_00438	Railway	PUM	2/1200x900 RCBC	No	Invert Levels	QR DWG
SMC_15_00665	Beerburrum Road	PUM	Culvert	No	All	None
SMC_17_01044	Bruce Highway	PUM	Unknown	No	All	None
SMC_17_01055	Bruce Highway	PUM	1/675RCP 2C DWG197272	Yes	None	DTMR DWG
SMC_18_00832	Woodlands Drive	PUM	Culvert	No	All	None
SMC_19_00348	Bruce Highway	PUM	Unknown	No	All	None
SMC_19_00373	Bruce Highway	PUM	4/825 RCP	Yes	None	DTMR DWG

WW_ID	Xing_Name	Domain	Structure type[a]	Data set complete[b]	Missing data	Data source
SMC_20_01371	Williams Road	PUM	Unknown	No	All	None
SMC_20_03707	Powell Road	PUM	Culvert	No	All	None
SMC_20_03766	Hoffman Road	PUM	Unknown	No	All	None
SMC_20_05638	Minor Road	PUM	Unknown	No	All	None
SMC_22_00787	Newlands Road	PUM	Unknown	No	All	None
SMC_24_00261	Newlands Road	PUM	Unknown	No	All	None
SMC_26_00127	Powell Road	PUM	Culvert	No	All	None
SMC_28_00908	Powell Road	PUM	Culvert	No	All	None
SMC_28_01916	Scurr Road	PUM	Culvert	No	All	None
SMC_28_02077	Scurr Road	PUM	Unknown	No	All	None
SMC_30_00666	Scurr Road	PUM	4/900 RCP	Yes	None	MBRC DWG
SMC_36_00481	King Road	PUM	Unknown	No	All	None
SMC_36_01650	Powell Road	PUM	Unknown	No	All	None
SMC_40_00207	Powell Road	PUM	Unknown	No	All	None
SMC_42_00788	Williams Road	PUM	Unknown	No	All	None
SMC_42_01802	Pates Road	PUM	Culvert	No	All	None
SMC_44_00868	Williams Road	PUM	Culvert	No	All	None
SMC_46_01629	King Road	PUM	Unknown	No	All	None
SMC_48_01569	King Road	PUM	Culvert	No	All	None
SMC_58_00453	Hamilton Road	PUM	9/675 RCP	Yes	None	MBRC GIS
SMC_58_00504	Railway	PUM	2/1800 RCP	No	Invert Levels	QR DWG
SMC_58_00539	Beerburrum Road	PUM	Culvert	No	All	None
SMC_60_00679	Kirrang Drive	PUM	1/900 RCP	Yes	None	MBRC GIS

WW_ID	Xing_Name	Domain	Structure type[a]	Data set complete[b]	Missing data	Data source
SMC_64_01396	Mansfield Road	PUM	1/1500x750 RCBC	Yes	None	MBRC GIS
SMC_66_00151	Bigmor Drive	PUM	1/450 RCP	Yes	None	MBRC GIS
SMC_68_00227	Mansfield Road	PUM	1/600 RCP	Yes	None	MBRC GIS
SMC_70_00654	Mansfield Road	PUM	3/900 RCP	Yes	None	MBRC GIS
SMC_72_01331(A)	Mansfield Road	PUM	2/450 RCP	Yes	None	MBRC GIS
SMC_72_01331(B)	Mansfield Road	PUM	1/450 RCP	Yes	None	MBRC GIS

[a] Where data source is not available the structure type has been taken from aerial images and will need to be confirmed once data is available

[b] Complete data set column refers to critical data as identified in Section 2 of the report

Bribie Island – Bridges

WW_ID	Xing_Name	Domain	Structure type[a]	Data set complete[b]	Missing data	Data source
BON_01_00137	Welsby Parade	BRI	Bridge	No	All	None
BON_01_00212	Footpath	BRI	Lock	No	All	None
BON_01_00811	Goodwin Drive	BRI	Bridge	No	All	None
BON_09_00050	Welsby Parade	BRI	Bridge	No	All	None
BON_21_00037	South Esplanade	BRI	Bridge	No	All	None
DUX_01_02462	Sunderland Drive	BRI	Bridge	No	All	None
DUX_01_01826	Footpath	BRI	Footbridge	No	All	None
DUX_02_00701	Eagles Landing	BRI	Bridge	No	All	None
DUX_04_00568	Sunderland Drive	BRI	Bridge	No	All	None
DUX_04_02128	Quarterdeck Drive	BRI	Bridge	No	All	None
DUX_11_00000	Minor Road	BRI	Footbridge?	No	All	None

WW_ID	Xing_Name	Domain	Structure type[a]	Data set complete[b]	Missing data	Data source
DUX_11_00000	Minor Road	BRI	Footbridge?	No	All	None
DUX_12_00000	Island Parade	BRI	Bridge	No	All	None
WRI_05_00000	Footpath	BRI	Footbridge	No	All	None

[a] Where data source is not available the structure type has been taken from aerial images and will need to be confirmed once data is available

[b] Complete data set column refers to critical data as identified in Section 2 of the report

Bribie Island – Culverts

WW_ID	Xing_Name	Domain	Structure type[a]	Data set complete[b]	Missing data	Data source
BON_01_01940	Protea Drive	BRI	2/1200 RCP	Yes	None	MBRC GIS
BON_03_00000	Cotterill Avenue	BRI	1/1200 RCP	Yes	None	MBRC GIS
BON_09_00673	Goodwin Drive	BRI	4/450 RCP	Yes	None	MBRC GIS
BON_13_00238	Minor Road	BRI	Unknown	No	All	None
BON_21_00612	Toorbul Street	BRI	2/900x300 RCBC	Yes	None	MBRC GIS
Not on reach	Benabrow Avenue	BRI	1/450 RCP	Yes	None	MBRC GIS
Not on reach	Benabrow Avenue	BRI	1/1500X750 RCBC	Yes	None	MBRC GIS
DUX_01_03276	Hornsby Road	BRI	Culvert	No	All	None
DUX_06_00128	Endeavour Drive	BRI	5/1500 RCP	Yes	None	MBRC GIS
DUX_09_00546	Marina Boulevard	BRI	3/1200x450 RCBC	Yes	None	MBRC GIS
DUX_15_00000	Footpath	BRI	Unknown	No	All	None
DUX_15_00148	Eucalypt Street	BRI	1/900 RCP	Yes	None	MBRC GIS
DUX_15_00148	Eucalypt Street	BRI	1/900 RCP	Yes	None	MBRC GIS
DUX_15_00148	Sylvan Beach Esplanade	BRI	1/2400x1800 RCBC	Yes	None	MBRC GIS

WW_ID	Xing_Name	Domain	Structure type[a]	Data set complete[b]	Missing data	Data source
FRE_01_00429	Access Surf Club	BRI	4/2400x1200 RCBC	No	All	None
FRE_01_00623	First Avenue	BRI	3/450 RCP	Yes	None	MBRC GIS
FRE_01_00623	First Avenue	BRI	4/900 RCP	Yes	None	MBRC GIS
FRE_01_01047	Second Avenue	BRI	4/900 RCP	Yes	None	MBRC GIS
WRI_01_00227	White Patch Esplanade	BRI	3/1500 RCP	Yes	None	MBRC GIS
WRI_01_03180	Minor Road	BRI	Unknown	No	All	None
WRI_02_00042	White Patch Esplanade	BRI	Unknown	No	All	None
WRI_03_00554	Minor Road	BRI	Unknown	No	All	None

[a] Where data source is not available the structure type has been taken from aerial images and will need to be confirmed once data is available

[b] Complete data set column refers to critical data as identified in Section 2 of the report

Appendix C
Structure prioritisation

Appendix C – Structure prioritisation

Pumicestone Passage – Structure Prioritisation

WW_ID	Xing_Name	Domain	Land use	Priority
BEE_01_01652	Bruce Highway	PUM	Rural	A
BEE_01_01675	Bruce Highway	PUM	Rural	A
BEE_01_06768	Railway	PUM	Rural	A
BEE_01_07615	Railway	PUM	Rural	A
BEE_01_07828	Beerburrum Road	PUM	Rural	A
BEE_01_11919	Old Gympie Road	PUM	Rural	B
BEE_06_00530	Railway	PUM	Rural	B
BEE_06_00568	Beerburrum Road	PUM	Rural	B
BEE_08_00425	Railway	PUM	Rural	A
BEE_08_00755	Railway	PUM	Rural	B
BEE_08_00787	Beerburrum Road	PUM	Rural	B
BEE_09_01117	Bruce Highway	PUM	Rural	A
BEE_09_01592	Steve Irwin Way	PUM	Rural	B
BEE_10_01633	Railway	PUM	Rural	A
BEE_10_01724	Railway	PUM	Rural	A
BEE_10_01778	Beerburrum Road	PUM	Rural	A
BEE_12_00243	Bruce Highway	PUM	Rural	A
BEE_12_00275	Bruce Highway	PUM	Rural	A
BEE_14_00454	Bruce Highway	PUM	Rural	B
BEE_14_00481	Bruce Highway	PUM	Rural	B
BEE_16_00679	Bruce Highway	PUM	Rural	B
BEE_16_00703	Bruce Highway	PUM	Rural	B
BEE_18_01376	Bruce Highway	PUM	Rural	A
BEE_18_01396	Bruce Highway	PUM	Rural	A
BEE_18_05085	Rose Creek Road	PUM	Rural	B
BEE_18_05085	Railway	PUM	Rural	A
BEE_18_05151	Railway	PUM	Rural	A
BEE_18_05190	Beerburrum Road	PUM	Rural	B
ELI_01_09748	Donnybrook Road	PUM	Rural	B
ELI_01_10536	Donnybrook Road	PUM	Rural	B
ELI_03_01693	Bruce Highway	PUM	Rural	B
ELI_07_00183	Meldale Road	PUM	Rural	B
ELI_09_00104	Meldale Road	PUM	Rural	B
ELI_10_00057	Pumicestone Road	PUM	Rural	B
ELI_11_04807	Donnybrook Road	PUM	Rural	B
Not on reach	Pumicestone Road	PUM	Rural	B

WW_ID	Xing_Name	Domain	Land use	Priority
Not on reach	Pumicestone Road	PUM	Rural	B
Not on reach	Pumicestone Road	PUM	Rural	B
Not on reach	Pumicestone Road	PUM	Rural	B
Not on reach	Pumicestone Road	PUM	Rural	B
ELI_13_01616	Donnybrook Road	PUM	Rural	B
ELI_14_00382	Pumicestone Road	PUM	Rural	B
ELI_16_01136	Pumicestone Road	PUM	Rural	B
ELI_18_00000	Esplanade	PUM	Urban	A
ELI_20_00000	Esplanade	PUM	Urban	A
ELI_20_00617	Freeman Road	PUM	Urban	A
ELI_22_00038	Esplanade	PUM	Urban	A
ELI_24_00122	Esplanade	PUM	Urban	A
GMC_01_15669	Bruce Highway	PUM	Rural	B
GMC_02_00459	Bruce Highway	PUM	Rural	B
GMC_04_02236	Bruce Highway	PUM	Rural	B
GMC_24_00212	Esplanade North	PUM	Urban	A
GMC_24_00331	Amy Street	PUM	Urban	A
GMC_26_00000	Amy Street	PUM	Urban	A
GMC_28_02630	Donnybrook Road	PUM	Rural	B
Not on reach	Pumicestone Road	PUM	Rural	B
Not on reach	Pumicestone Road	PUM	Rural	B
Not on reach	Pumicestone Road	PUM	Rural	B
Not on reach	Pumicestone Road	PUM	Rural	B
Not on reach	Pumicestone Road	PUM	Rural	B
Not on reach	Pumicestone Road	PUM	Rural	B
Not on reach	Pumicestone Road	PUM	Rural	B
NIN_01_18391	Pumicestone Road	PUM	Rural	B
NIN_01_23388	Rutters Road	PUM	Rural	B
NIN_01_23388	Bruce Highway	PUM	Rural	B
NIN_01_23388	Bruce Highway	PUM	Rural	B
NIN_14_00567	Minor Road	PUM	Urban	A
NIN_14_01586	Wattle Grove Drive	PUM	Urban	A
NIN_14_01586	Wrenaus Way	PUM	Urban	A
NIN_22_00733	Bribie Island Road	PUM	Urban	A
NIN_24_00716	Bribie Island Road	PUM	Urban	A
NIN_24_03255	Sandstone Bvd	PUM	Urban	A
NIN_28_00581	Sandheath Place	PUM	Urban	A
NIN_28_02308	Sandheath Place	PUM	Urban	A
NIN_28_02761	Redondo Street	PUM	Urban	A

WW_ID	Xing_Name	Domain	Land use	Priority
NIN_36_00225	Bribie Island Road	PUM	Rural	B
NIN_36_00585	Bribie Island Road	PUM	Rural	B
NIN_36_03043	Bestmann Road East	PUM	Urban	A
NIN_36_03325	Carpenter Way	PUM	Urban	A
SMC_01_02645	Bruce Highway	PUM	Rural	A
SMC_01_02671(A)	Bruce Highway	PUM	Rural	A
SMC_01_02671(B)	Bruce Highway	PUM	Rural	A
SMC_01_05975	Railway	PUM	Urban	A
SMC_01_06873	Beerburrum Road	PUM	Urban	A
SMC_01_11575	Old Gympie Road	PUM	Rural	B
SMC_01_13518	Twin View Road	PUM	Rural	B
SMC_08_00499	Prosser Road	PUM	Rural	B
SMC_09_02090	Rose Creek Road	PUM	Rural	B
SMC_09_02136	Railway	PUM	Rural	A
SMC_09_02248	Beerburrum Road	PUM	Rural	A
SMC_09_06807	Old Gympie Road	PUM	Rural	B
SMC_12_00384	Twin View Road	PUM	Rural	B
SMC_13_00311	Twin View Road	PUM	Rural	B
SMC_14_01506	Woodlands Drive	PUM	Rural	B
SMC_15_00438	Railway	PUM	Rural	B
SMC_15_00665	Beerburrum Road	PUM	Urban	A
SMC_17_01044	Bruce Highway	PUM	Rural	B
SMC_17_01055	Bruce Highway	PUM	Rural	B
SMC_18_00832	Woodlands Drive	PUM	Rural	B
SMC_19_00348	Bruce Highway	PUM	Rural	B
SMC_19_00373	Bruce Highway	PUM	Rural	B
SMC_20_01371	Williams Road	PUM	Rural	B
SMC_20_03707	Powell Road	PUM	Rural	B
SMC_20_03766	Hoffman Road	PUM	Rural	B
SMC_20_05638	Newlands Road	PUM	Rural	B
SMC_22_00787	Newlands Road	PUM	Rural	B
SMC_24_00261	Newlands Road	PUM	Rural	B
SMC_26_00127	Powell Road	PUM	Rural	B
SMC_28_00908	Powell Road	PUM	Rural	B
SMC_28_01916	Scurr Road	PUM	Rural	B
SMC_28_02077	Scurr Road	PUM	Rural	B
SMC_30_00666	Scurr Road	PUM	Rural	B
SMC_34_03784	King Road	PUM	Rural	B
SMC_36_00481	King Road	PUM	Rural	B

WW_ID	Xing_Name	Domain	Land use	Priority
SMC_36_01650	Powell Road	PUM	Rural	B
SMC_40_00207	Powell Road	PUM	Rural	B
SMC_42_00788	Williams Road	PUM	Rural	B
SMC_42_01802	Pates Road	PUM	Rural	B
SMC_44_00868	Williams Road	PUM	Rural	B
SMC_46_01629	King Road	PUM	Rural	B
SMC_48_01569	King Road	PUM	Rural	B
SMC_58_00453	Hamilton Road	PUM	Rural	B
SMC_58_00504	Railway	PUM	Rural	A
SMC_58_00539	Beerburrum Road	PUM	Rural	A
SMC_60_00679	Kirrang Drive	PUM	Urban	A
SMC_64_01396	Mansfield Road	PUM	Urban	A
SMC_66_00151	Bigmor Drive	PUM	Urban	A
SMC_68_00227	Mansfield Road	PUM	Urban	A
SMC_70_00654	Mansfield Road	PUM	Rural	B
SMC_72_01331(A)	Mansfield Road	PUM	Rural	B
SMC_72_01331(B)	Mansfield Road	PUM	Rural	B

Bribie Island – Structure Prioritisation

WW_ID	Xing_Name	Domain	Land use	Priority
BON_01_00137	Welsby Parade	BRI	Urban	A
BON_01_00212	Footpath	BRI	Urban	A
BON_01_00811	Goodwin Drive	BRI	Urban	A
BON_01_01940	Protea Drive	BRI	Urban	A
BON_03_00000	Cotterill Avenue	BRI	Urban	A
BON_09_00050	Welsby Parade	BRI	Urban	A
BON_09_00673	Goodwin Drive	BRI	Urban	A
BON_13_00238	Minor Road	BRI	Urban	A
BON_21_00037	South Esplanade	BRI	Urban	A
BON_21_00612	Toorbul Street	BRI	Urban	A
DUX_01_02462	Sunderland Drive	BRI	Urban	A
DUX_01_01826	Footpath	BRI	Urban	A
Not on reach	Benabrow Avenue	BRI	Urban	A
Not on reach	Benabrow Avenue	BRI	Urban	A
DUX_01_03276	Hornsby Road	BRI	Urban	A
DUX_02_00701	Eagles Landing	BRI	Urban	A
DUX_04_00568	Sunderland Drive	BRI	Urban	A
DUX_04_02128	Quarterdeck Drive	BRI	Urban	A
DUX_06_00128	Endeavour Drive	BRI	Urban	A

WW_ID	Xing_Name	Domain	Land use	Priority
DUX_09_00546	Marina Boulevard	BRI	Urban	A
DUX_11_00000	Minor Road	BRI	Urban	A
DUX_11_00000	Minor Road	BRI	Urban	A
DUX_11_00000	Minor Road	BRI	Urban	A
DUX_12_00000	Island Parade	BRI	Urban	A
DUX_15_00000	Footpath	BRI	Urban	A
DUX_15_00148	Eucalypt Street	BRI	Urban	A
DUX_15_00148	Eucalypt Street	BRI	Urban	A
DUX_15_00148	Sylvan Beach Esplanade	BRI	Urban	A
FRE_01_00429	Access Surf Club	BRI	Urban	A
FRE_01_00623	First Avenue	BRI	Urban	A
FRE_01_00623	First Avenue	BRI	Urban	A
FRE_01_01047	Second Avenue	BRI	Urban	A
WRI_01_00227	White Patch Esplanade	BRI	Rural	B
WRI_01_03180	Minor Road	BRI	Rural	B
WRI_02_00042	White Patch Esplanade	BRI	Urban	A
WRI_03_00554	Minor Road	BRI	Rural	B
WRI_05_00000	Footpath	BRI	Urban	A

Appendix D
Bathymetric data assessment and gap analysis

Appendix D – Bathymetric data assessment and gap analysis

Pumicestone Passage – Bathymetric data gap analysis and prioritization

Reach	Approximate Width	Priority	Data Available
ELI_01_00000	610	A	No
ELI_01_00477	420	A	No
ELI_01_01480	160	A	No
ELI_01_02483	120	A	No
ELI_01_03485	130	A	No
ELI_01_03717	95	A	No
ELI_01_04719	120	A	No
ELI_01_05721	50	A	No
ELI_01_06360	40	A	No
ELI_01_06450	55	A	No
ELI_01_07455	35	A	No
ELI_01_07492	45	A	No
ELI_01_08494	35	A	No
ELI_01_09496	35	A	No
ELI_01_09748	90	A	No
ELI_01_10536	40	A	No
ELI_01_11395	85	A	No
ELI_01_12398	150	B	No
ELI_01_12848	60	B	No
ELI_01_13527	40	B	No
ELI_01_14534	35	B	No
ELI_01_15341	35	B	No
ELI_01_15535	30	B	No
ELI_01_16541	45	B	No
ELI_01_17562	25	B	No
ELI_01_18208	45	B	No
ELI_01_18581	30	B	No
ELI_01_19599	45	B	No
ELI_01_20608	60	B	No
ELI_11_00000	410	B	No
ELI_11_00873	150	B	No
ELI_11_01875	180	B	No
ELI_11_02446	120	B	No
ELI_12_00000	70	B	No
ELI_15_00000	20	B	No
GMC_01_00000	190	B	No

Reach	Approximate Width	Priority	Data Available
GMC_01_00319	190	B	No
GMC_01_00604	140	B	No
GMC_01_01320	420	B	No
GMC_01_02323	490	B	No
GMC_01_02719	250	B	No
GMC_01_03325	280	B	No
GMC_01_04327	180	B	No
GMC_01_04695	160	B	No
GMC_01_05586	30	B	No
GMC_01_06379	20	B	No
GMC_01_06600	20	B	No
GMC_01_06792	25	B	No
GMC_01_06969	20	B	No
GMC_01_07726	10	B	No
GMC_01_08734	10	B	No
GMC_07_00000	5	B	No
NIN_01_00000	180	A	No
NIN_01_01000	180	A	No
NIN_01_02001	210	A	No
NIN_01_02695	90	A	No
NIN_01_03762	120	A	No
NIN_01_04195	120	A	No
NIN_01_04346	130	A	No
NIN_01_05009	150	A	No
NIN_01_05871	60	A	No
NIN_01_06010	60	A	No
NIN_01_07014	30	A	No
NIN_01_08016	30	A	No
NIN_01_09018	15	A	No
NIN_01_09575	15	A	No
NIN_01_10020	15	A	No
NIN_01_10052	15	A	No
NIN_01_10735	10	B	No
NIN_01_11367	10	B	No
NIN_01_11737	10	B	No
NIN_01_12891	10	B	No
NIN_01_13893	10	B	No
NIN_01_14016	10	B	No
NIN_01_15043	10	B	No

Reach	Approximate Width	Priority	Data Available
NIN_01_16067	10	B	No
NIN_01_16736	10	B	No
NIN_01_17759	20	B	No
NIN_01_18261	20	B	No
NIN_01_18391	20	B	No
NIN_01_19284	10	B	No
NIN_03_00000	70	B	No
NIN_03_01109	70	B	No
NIN_34_00000	80	B	No
NIN_34_00156	80	B	No
NIN_36_00000	80	B	No
NIN_36_00225	10	B	No
SMC_01_00000	30	B	Yes
SMC_01_00561	30	B	Yes
SMC_01_01454	35	B	Yes
SMC_01_01554	35	B	Yes
SMC_01_02462	90	B	Yes
SMC_01_02645	90	B	Yes
SMC_01_02671	80	B	Yes
SMC_01_03163	80	B	Yes
SMC_01_03785	50	B	Yes
SMC_01_04812	20	B	Yes
SMC_01_04961	15	B	Yes
SMC_01_05975	20	B	Yes
SMC_01_06731	20	B	Yes
SMC_01_06873	20	B	Yes
SMC_09_00000	30	B	Yes
SMC_09_00045	30	B	Yes
SMC_58_00000	30	B	Yes
SMC_64_00000	10	B	Yes
SMC_64_00746	10	B	Yes
SMC_64_00861	10	B	Yes
SMC_64_01057	5	B	Yes
SMC_64_01396	5	B	Yes

Bribie Island – Bathymetric data gap analysis and prioritisation

Reach	Approximate Width	Priority	Data Available
BON_01_00000	70	A	Yes
BON_01_00137	70	A	Yes
BON_01_00212	70	A	Yes
BON_01_00664	70	A	Yes
BON_01_00811	70	A	Yes
BON_01_01701	70	A	Yes
BON_01_01817	70	A	Yes
BON_01_01940	70	A	Yes
BON_02_00000	60	A	Yes
BON_03_00000	50	A	Yes
BON_05_00000	70	A	Yes
BON_21_00037	10	B	No
BON_21_00612	10	B	No
DUX_01_00000	150	A	Yes
DUX_01_00568	150	A	Yes
DUX_01_00860	150	A	Yes
DUX_01_01204	60	A	Yes
DUX_01_01826	60	A	Yes
DUX_02_00000	60	A	Yes
DUX_02_00701	60	A	Yes
DUX_04_00000	150	A	Yes
DUX_04_00568	150	A	Yes
DUX_04_00738	150	A	Yes
DUX_04_00994	150	A	Yes
DUX_04_01461	150	A	Yes
DUX_04_02128	150	A	Yes
DUX_06_00000	60	A	Yes
DUX_06_00128	60	A	Yes
DUX_07_00000	60	A	Yes
DUX_08_00000	60	A	Yes
DUX_09_00000	60	A	Yes
DUX_10_00000	60	A	Yes
DUX_11_00000	60	A	Yes
DUX_12_00000	60	A	Yes
DUX_15_00000	10	A	No
DUX_15_00148	20	A	No
FRE_06_01263	30	B	No
FRE_06_01416	30	B	No

Reach	Approximate Width	Priority	Data Available
FRE_06_01891	30	B	No
FRE_06_02350	30	B	No
FRE_06_02999	30	B	No
FRE_08_00000	15	B	No
FRE_08_00430	15	B	No
FRE_11_00000	20	B	No
FRE_11_00785	10	B	No
WRI_01_00000	70	A	No
WRI_01_00160	30	A	No
WRI_01_00227	30	A	No
WRI_05_00000	20	A	No

Appendix E
Survey requirements

Appendix E – Survey requirements

Bridge survey requirements

Priority A

WW_ID	Domain	Xing_Name	Priority A Survey Required
BEE_01_01652	PUM	Bruce Highway	Handrail
BEE_01_01675	PUM	Bruce Highway	Handrail
BEE_01_06768	PUM	Railway	Pier Data, Deck Elevation Data
BEE_01_07615	PUM	Railway	All
BEE_10_01778	PUM	Beerburrum Road	All
SMC_01_05975	PUM	Railway	Pier Data, Deck Vertical Data
BON_01_00137	BRI	Welsby Parade	All
BON_01_00811	BRI	Goodwin Drive	All
BON_09_00050	BRI	Welsby Parade	All
BON_21_00037	BRI	South Esplanade	All
DUX_01_02462	BRI	Sunderland Drive	All
DUX_01_01826	BRI	Footpath	All
DUX_02_00701	BRI	Eagles Landing	All
DUX_04_00568	BRI	Sunderland Drive	All
DUX_04_02128	BRI	Quarterdeck Drive	All
DUX_11_00000	BRI	Minor Road	All
DUX_11_00000	BRI	Minor Road	All
DUX_12_00000	BRI	Island Parade	All
WRI_05_00000	BRI	Footpath	All

Priority B

WW_ID	Domain	Xing_Name	Priority B Survey Required
ELI_01_09748	PUM	Footbridge	All
NIN_36_00225	PUM	Footbridge	All
SMC_34_03784	PUM	Bridge	All

Bathymetric survey requirements

Priority A Survey Required	Priority B Survey Required
ELI_01_00000 to ELI_11395	ELI_01_12398 to ELI_01_20608
NIN_01_00000 to NIN_01_10052	ELI_11_00000 to ELI_11_02446
DUX_15_00000 to DUX_15_00148	ELI_12_00000
WRI_01_00000 to WRI_01_00227	GMC_01_00000 to GMC_01_05586
	NIN_01_10735 to NIN_01_19284
	NIN_03_00000 to NIN_03_01109
	NIN_34_00000 to NIN_34_00156
	NIN_36_00000 to NIN_36_00225
	BON_21_00037 to BON_21_00612

Appendix F
Survey scope document

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Project: RFD Stage 2 Detailed Modelling	Reference: 211090-002

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✓			Paul Keating	Aurecon	

From: Talia Campbell	Date: 20 October 2010	Total pages: 5

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Subject: Survey Scope - MBRC Infrastructure

Paul

As discussed, we are requesting a cost estimate to undertake survey of a number of different infrastructure types within the Moreton Bay Regional Council area. I've sought clarification from Council regarding which survey items are required and we would like quotes for the following two elements:

- The bridge, detention basin, trunk drainage and bathymetric components outlined in Sections 1 to 2 of this document
- A general cost per culvert and per bridge for other areas of Moreton Bay Regional Council, in particular the Stanley River and Mary River catchments shown in Figure 1

Can you please provide separate costs for the bridges and bathymetric components outlined below? Can you also provide separate costs for the Priority A and Priority B categories?

1. Bridges

Table 1 presents the general survey data requirements for the bridges. Table 2 and Figure 2 present the bridges for which survey is required.

Table 1 Survey Data Capture Requirements

Item	Description	Data Type	Width	Decimals	Domain/Remark
No of spans	Number of bridge spans	Integer	4	0	
Length of spans[1]	Distance between pier centres	Double	12	3	
Deck point 1	Coordinate at corner of bridge deck – upstream, left hand side of deck when looking downstream	Double	12	3	
Deck level 1	Level at deck point 1	Double	12	3	
Deck point 2	Coordinate at corner of bridge deck – upstream, right hand side of deck when looking downstream	Double	12	3	
Deck level 2	Level at deck point 2	Double	12	3	

Item	Description	Data Type	Width	Decimals	Domain/Remark
Deck point 3	Coordinate at corner of bridge deck – downstream, left hand side of deck when looking downstream	Double	12	3	
Deck level 3	Level at deck point 3	Double	12	3	
Deck point 4	Coordinate at corner of bridge deck – downstream, right hand side of deck when looking downstream	Double	12	3	
Deck level 4	Level at deck point 4	Double	12	3	
Deck point 5	Coordinate at highest point on bridge deck	Double	12	3	
Deck level 5	Level at deck point 5	Double	12	3	
Deck thickness	Thickness of deck from top of deck to soffit (ie top of headstock)	Double	12	3	
No of piers	Number of piers	Integer	4	0	
No of piles per pier	Number of separate piles in each pier	Integer	4	0	
Pile shape[2]	Shape of each pile	Text	30	0	Round/Square/ H-I/Oblong/Other
Pile width	Width of pile in flow direction	Double	12	3	
Pier orientation[3]	Orientation of piers to bridge deck	Integer	4	0	
Handrail type[2]	Handrail material type	Text	30	0	None/Guardrail/ Galvanised Pipes/Galvanised Vertical Bars/Other
Handrail length	Length of handrail	Double	12	3	
Handrail elevation 1	Elevation at centre of upstream handrail if level, otherwise elevation at higher end	Double	12	3	
Handrail elevation 2	Elevation at lower end of upstream handrail	Double	12	3	
Bridge cross-section[4]	Cross section of channel below bridge from top of abutment to top of abutment	Double	12	3	
Photo georeference[5]	Coordinate of photo locations	Double	12	3	Minimum of 4

[1] *If span lengths differ then additional details will be required (ie field notes)*
[2] *If "other" is specified then additional details will be required (ie field notes)*
[3] *Detailed survey of pier angle is not required – angle such as 10°, 45°, 60° etc is acceptable*
[4] *Points to be surveyed at locations in which the grade changes*
[5] *A minimum of 4 photographs is required. These are looking upstream and downstream from the bridge and looking at the upstream and downstream sides of the bridge. Other photographs which validate the above information may also be required (especially with regards to pier details, handrail details and where the Domain/Remark has been selected as "other")*

Please note that:

- All data is to be delivered in MGA coordinates with the origin of coordinates (PM number), coordinate values and estimated accuracy provided. Accuracy is to be 4th order or better
- All heights are to be on AHD datum with origin datum supplied. Accuracy is to be 4th order or better
- The data is to be supplied in ESRI shape file format
- GPS (RTK) methods are acceptable and will achieve the desired accuracies. Ensure there are redundant checks to verify the accuracy

Table 2 Survey Data Locations

Bridge ID	Crossing Name	Crossing Type	Approx. Easting	Approx. Northing
Priority A				
BEE_01_01652	Bruce Highway	Vehicle	497805	7013974
BEE_01_01675	Bruce Highway	Vehicle	497782	7013975
BEE_01_06768	Railway	Vehicle	495565	7016544
BEE_01_07615	Railway	Vehicle	495302	7017144
BEE_10_01778	Beerburrum Road	Vehicle	494894	7014900
SMC_01_05975	Railway	Vehicle	494597	7012038
BON_01_00137	Welsby Parade	Vehicle	515421	7005547
BON_01_00811	Goodwin Drive	Vehicle	516056	7005739
BON_09_00050	Welsby Parade	Vehicle	515677	7004747
BON_21_00037	South Esplanade	Vehicle	515778	7003933
DUX_01_02462	Sunderland Drive	Vehicle	515374	7006499
DUX_01_01826	Footpath	Pedestrian	515439	7007366
DUX_02_00701	Eagles Landing	Vehicle	515082	7008036
DUX_04_00568	Sunderland Drive	Vehicle	513791	7008578
DUX_04_02128	Quarterdeck Drive	Vehicle	514065	7009704
DUX_11_00000	Footbridge	Pedestrian	513909	7007694
DUX_11_00000	Footbridge	Pedestrian	513909	7007694
DUX_12_00000	Island Parade	Vehicle	513968	7008859
WRI_05_00000	Footbridge	Pedestrian	513238	7009480
Priority B				
ELI_01_09748	Footbridge	Pedestrian	503998	7010381
NIN_36_00225	Footbridge	Pedestrian	512305	7006357
SMC_34_03784	Bridge	Vehicle	490139	7011934

2. Bathymetry

Cross-section survey of below-water bathymetry is required for the following creek reaches (as shown in Figure 3). Please provide a quote for surveying cross-sections at an average spacing of 500m on Elimbah Creek and Ningi Creek and at average spacings of 200m for the Bribie Island waterways. The length of each reach for survey of priority A is:

- Elimbah Creek – 12398m
- Ningi Creek – 10735m
- Bellara Detention Basin and Outlet Channel – 756m
- Solander Drain – 960m

We have not included the lengths for survey Priority B channels at this stage.

3. Culverts

For the general costs per culvert, please base these on the following survey requirements.

Table 3 Survey Data Capture Requirements

Item	Description	Data Type	Width	Decimals	Domain/Remark
Culvert type	Description of culvert type	Text	30	0	Pipe/Box/Slab-link box
Diameter or width	Diameter of pipe culvert or width of box or slab-link culvert	Double	12	3	
Height (box)	Internal height of box culvert	Double	12	3	
Height (slab)	Internal height under slab	Double	12	3	
No. barrels	Number of culvert barrels	Integer	4	0	
Inlet point	Coordinate of inlet point (centre of upstream headwall)	Double	12	3	
Outlet point	Coordinate of outlet point (centre of downstream headwall)	Double	12	3	
Length	Length of culvert	Double	12	3	
Upstream invert level	Upstream invert level	Double	12	3	
Downstream invert level	Downstream invert level	Double	12	3	
Material type[1]	Culvert material type	Text	20	0	Concrete/Corrugated iron/Other
Wingwall material type[1]	Headwall and wingwall material type	Text	20	0	Concrete/Block/Rock/None/Other
Wingwall angle[2]	Angle between headwall and wingwall	Integer	4	0	
Pipe inlet details[1]	Description of pipe inlet	Text	30	0	Rounded/Square-edged/Other

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Item	Description	Data Type	Width	Decimals	Domain/Remark
Road elevation 1	RL at centre of structure on road crown if road is level; otherwise RL at higher end of structure on road crown if road has super-elevation	Double	12	3	
Road elevation 2	RL at lower end of structure on road crown if road not level if road has super-elevation; ignore otherwise	Double	12	3	
Handrail type[1]	Handrail material type	Text	30	0	None/Guardrail/ Galvanised Pipes/Galvanised Vertical Bars/Other
Handrail length	Length of handrail	Double	12	3	
Handrail elevation 1	Elevation at centre of handrail if level, otherwise elevation at higher end	Double	12	3	
Handrail elevation 2	Elevation at lower end of handrail	Double	12	3	
Photo georeference[3]	Coordinate of photo locations	Double	12	3	Minimum of 4

[1] If "other" is specified then additional details will be required (ie field notes)
[2] Detailed survey of wingwall angle is not required – angle such as 100°, 135°, 150° etc is acceptable. Note angle should be 0° if no wingwalls are present (ie if headwall only)
[3] A minimum of 4 photographs is required. These are looking at the channel upstream and downstream of the culvert and looking at the upstream and downstream ends of culvert. Other photographs which validate the above information may also be required (especially with regards to headwall/wingwall setup, pipe inlet details, handrail details and where the Domain/Remark has been selected as "other")

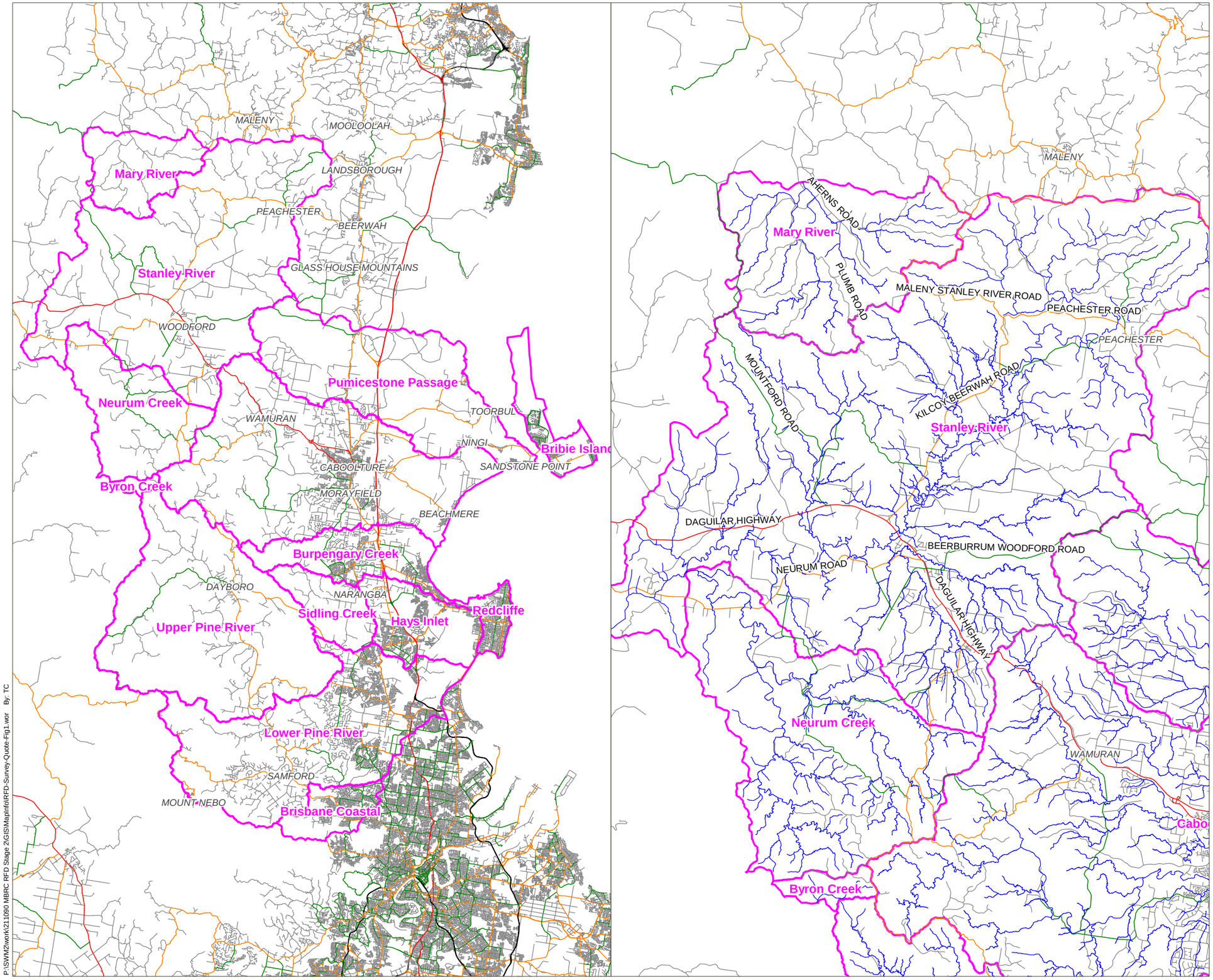
Please note that:

- All data is to be delivered in MGA coordinates with the origin of coordinates (PM number), coordinate values and estimated accuracy provided. Accuracy is to be 4th order or better
- All heights are to be on AHD datum with origin datum supplied. Accuracy is to be 4th order or better
- The data is to be supplied in ESRI shape file or csv format
- GPS (RTK) methods are acceptable and will achieve the desired accuracies. Ensure there are redundant checks to verify the accuracy

If you require any further information please let me know.

Regards

Talia Campbell
Senior Engineer
Water



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Legend

- Minor Basin
- Streams

Roads by Heirarchy

- 1
- 2
- 3
- 4
- 5

Notes:

Date: 19/10/2010 Version: 0

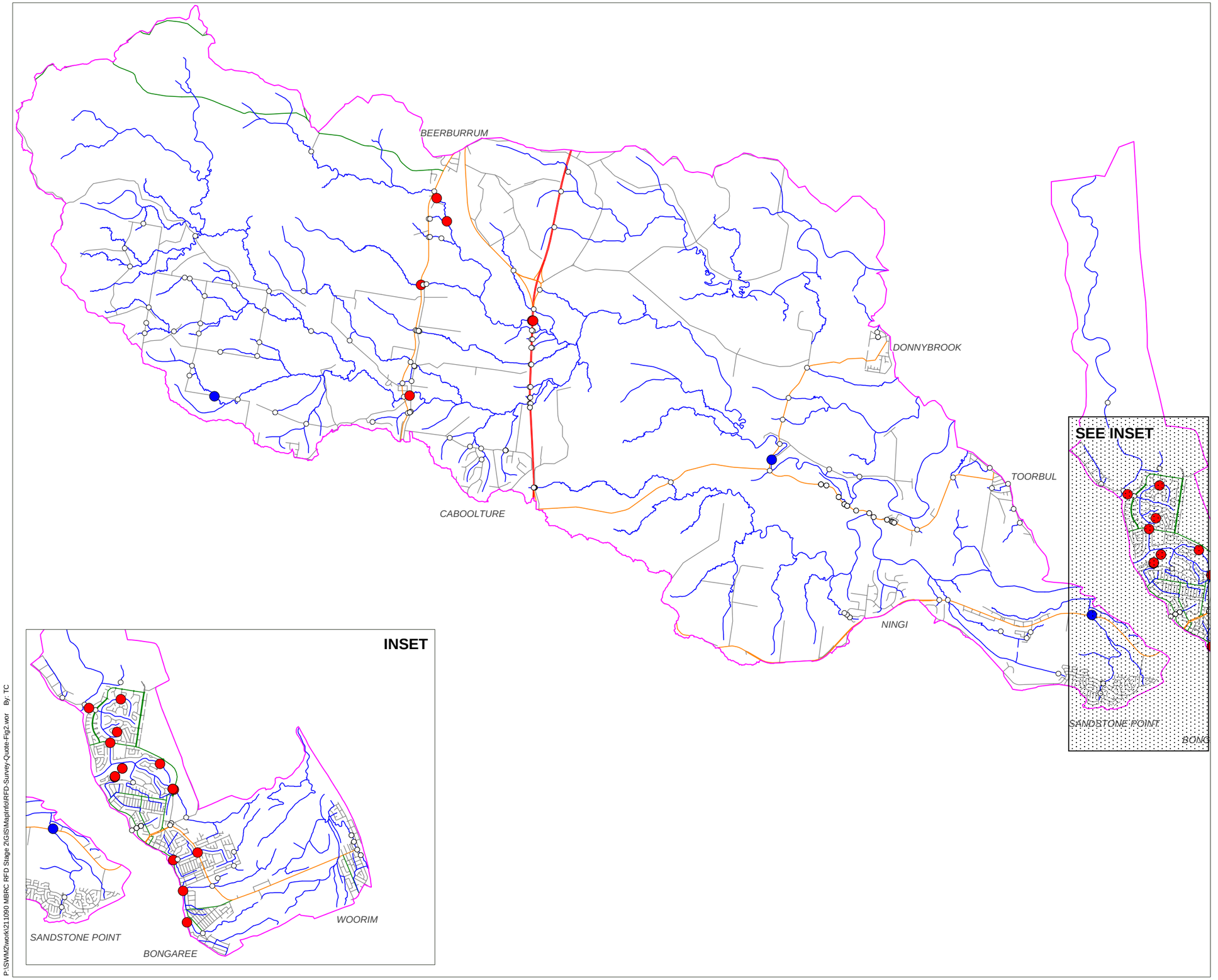
0 150 (m)

Scale 1:3 000 (m) (@ A3 size)

Projection: MGA Zone 56

RFD Stage 2 Detailed Modelling

Figrue 1: Catchments for Survey Quote



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Legend

Roads by Heirarchy
- 1
- 2
- 3
- 4
- 5

Reaches

Survey Requirements
- No Survey Required
- Priority A
- Priority B

Notes:

Date: 20/10/2010 **Version: 0**

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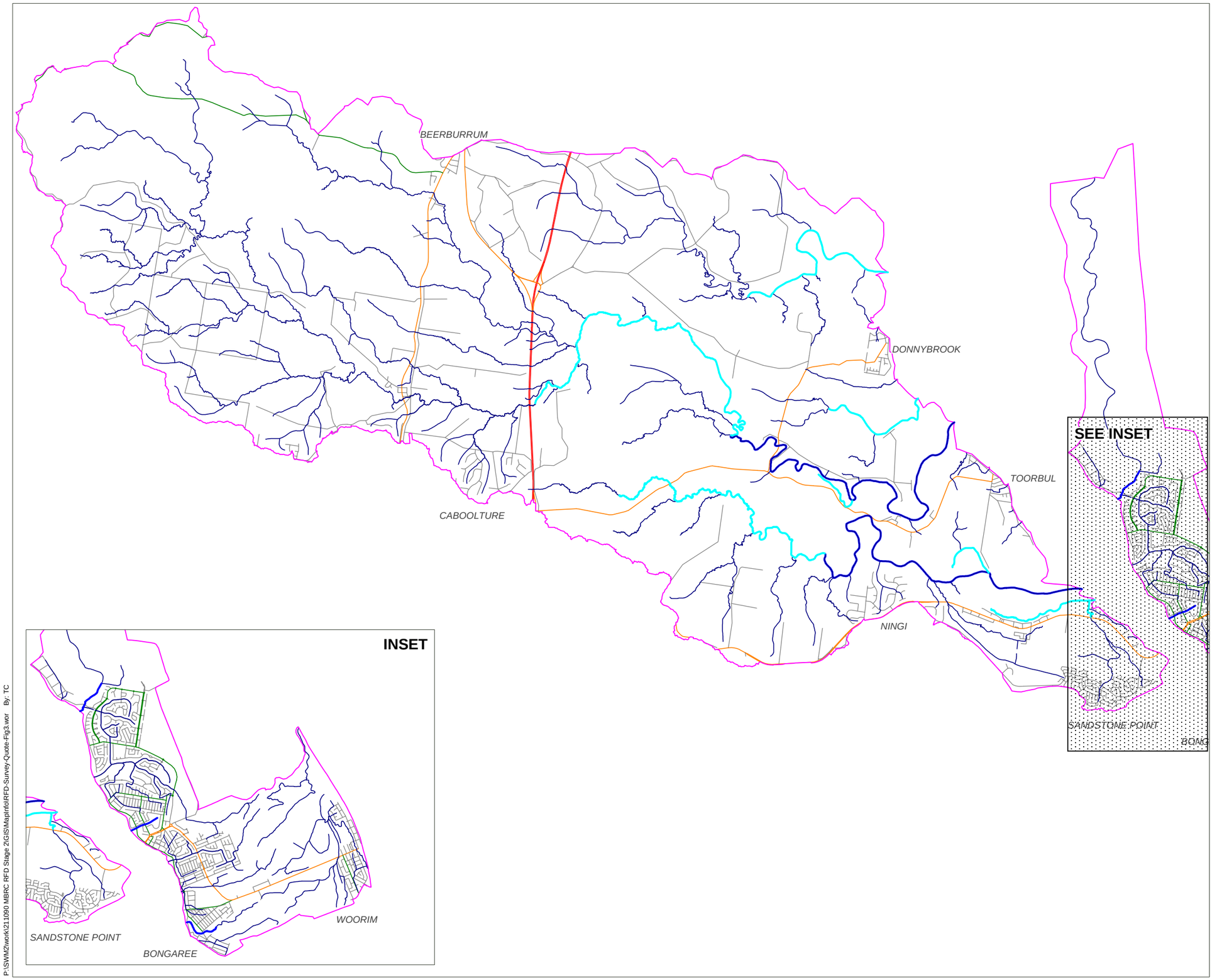
0 5000 (m)

Scale 1:10 000 (m) (@ A3 size)

Projection: MGA Zone 56

RFD Stage 2 Detailed Modelling

Figure 2: Structure Data Survey Locations



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Legend

Roads by Heirarchy

- 1
- 2
- 3
- 4
- 5

- Non-Critical Reaches
- Priority A Survey Required
- Priority B Survey Required

Notes:

Date: 20/10/2010 **Version: 0**

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0 5000 (m)

Scale 1:10 000 (m) (@ A3 size)

Projection: MGA Zone 56

RFD Stage 2 Detailed Modelling

Figure 3: Bathymetric Data Survey Locations

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Appendix B
Hydrography Review Report

Appendix B
Hydrography Review Report

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Project: Regional Floodplain Database Stage 2 Detailed Modelling – Package 3 Pumicestone Passage and Bribie Island

Hydrography Review Report

Reference: 211090

Prepared for: Moreton Bay Regional Council

Revision: 1

31 May 2012

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File Path		P:\SWM2\work\211090 MBRC RFD Stage 2\Reporting\Appendices\B - Hydrography Review Report\211090 Hydrography Review Report_Final.docx				
Client		Moreton Bay Regional Council	**Client Contact**			
Rev	**Date**	**Revision Details/Status**	**Prepared by**	**Author**	**Verifier**	**Approver**
0	19 October 2010	Draft for MBRC Review	C Smyth	M Gould	T Campbell	T Graham
1	31 May 2012	Final	C Smyth	T Campbell	T Campbell	T Graham
Current Revision		1				

Approval			
Author Signature		Approver Signature	
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Regional Floodplain Database Stage 2 Detailed Modelling – Package 3 Pumicestone Passage and Bribie Island

Date | 31 May 2012
Reference | 211090
Revision | 1

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1 Introduction

1.1 Study objective

Moreton Bay Regional Council (MBRC) is delivering a Regional Floodplain Database (RFD) in support of their flood risk management, considering emergency response, development control, strategic landuse and infrastructure planning. The MBRC was recently formed under local government amalgamations and is responsible for Caboolture, Pine Rivers, Redcliffe and Bribie Island. The RFD project is focusing on the northern sector as a key growth area for south east Queensland.

The project is being funded by MBRC, Emergency Management Queensland (EMQ) and Emergency Management Australia (EMA) as part of the Disaster Resilience Program and will provide:

- A comprehensive and consistent description of flood behaviour across the region
- Strategies for management of any flooding problems identified
- A system/process to store and manage this information and keep it up-to-date

Stage 1 of the project was completed in July 2010 and involved a number of sub-projects. These projects delivered consistent processes and protocols for the detailed hydrologic and hydraulic model development. A key sub-project involved the development of broadscale hydrodynamic models for each minor basin to provide general understanding of flooding mechanisms and allow prioritisation of data capture.

Stage 2 (current stage) of the project involves the development of detailed hydrologic and hydraulic models for each minor basin.

Stage 3 will build on the detailed models and “add value” through assessment of flood damages and community resilience measures.

1.2 Objective of hydrography review report

This report pertains to the hydrography review for Package 3, covering two minor basins:

- Bribie Island
- Pumicestone Passage (including Six Mile, Beerburrum, Elimbah, Ningi and Glass Mountain Creeks)

The term ‘hydrography’ describes the sub-catchment delineation, stream reach lines and junction locations and will form the basis of the hydrological model. The hydrography is required to support the following key objectives:

- Sufficiently define catchments to ensure accurate definition of contributing areas at key points of interest (urbanised areas, drainage control points, areas marked for future development)
- Support the hydraulic model objectives through appropriate flow reporting locations, noting the following:
  - The hydraulic model will apply inflow distributed across the sub-catchment, effectively “filling” the sub-catchment from the lowest point
  - The hydraulic model will advise on flood immunity of major roads accessing key urban areas

MBRC have provided initial sub-catchment boundaries, stream reaches and junctions. A review of the hydrography has been undertaken for each minor basin to ensure compliance with the above objectives.

2 Hydrography review

2.1 Package 3 minor basin appreciation

Bribie Island

Bribie Island is located east of Donnybrook, separated by the Pumicestone Passage. The northern two-thirds of the island is National Park. Urbanisation exists along the western shore in the lower third of the island and along the eastern shore in the south east corner. The southern tip is also heavily vegetated with no development.

The island formation is a low lying sand deposit, with minimal natural creeks and watercourses, however there are a number of canal developments on the island. As a result, flood risk is governed by tide/canal levels (including any tidal processes that occur within the Passage) and the stormwater network capacity for the minor storm events. Overflow in major events is generally conveyed via the road network and/or low-lying areas.

Comparison of the 2005 Caboolture Shire Plan with the aerial photography indicates that areas marked for residential development are already under construction. It is unknown whether further significant development is planned for the island.

Key areas of interest are:

- White Patch Esplanade bridge
- Banksia Beach canal estate
- Bellara
- Bongaree canal estate
- Woorim and Esplanade (northern tip)

Pumicestone Passage

The Pumicestone Passage minor basin extends from the D'Aguilar Ranges, incorporating the Glasshouse Mountains, to the Pumicestone Passage across from Bribie Island. The basin has low levels of urbanisation with National Park in the upper reaches and rural residential land use in the lower reaches. The basin is traversed by the Bruce Highway, the North Coast Railway and Beerburrum Road. The urban centres include Beerburrum and Elimbah upstream of the Bruce Highway. On the shoreline, Donnybrook and Toorbul are the main areas of urbanisation.

The southern boundary of the basin follows Bribie Island Rd and incorporates Ningi and Sandstone Point, at the entry bridge to Bribie Island. These areas are both subject to new housing developments. The northern fringes of Caboolture are also included in the basin.

As for Bribie Island, areas shown for development within the 2005 Caboolture Shire Plan either exist or are under construction.

Key areas of interest are:

- Toorbul and access roads
- Donnybrook and access roads
- Sandstone Point/Ningi (future development focus area)
- North Coast Railway and Bruce Highway

2.2 Issues identified during Stage 1

Common issues to both minor basins

There were a number of issues raised during the broadscale modelling development in Stage 1 that are relevant to the hydrography definition for both systems. These include:

- Where a major road reach has been delineated as a separate sub-catchment, the road will show as overtopping under all design events regardless of the deck level relative to flood levels
- Where junctions along the shoreline are located within the ocean/Passage, inflow for that sub-catchment will be applied to the water body, bypassing the downstream sub-catchment

Issues specific to each minor basin are discussed below.

Bribie Island

The broadscale modelling report discusses potential flow breakouts in the north-western area of the proposed modelling domain. Although this area is not of interest, it potentially affects the flow volume diverted south towards the White Patch Esplanade crossing. This could impact the estimated flood immunity of the crossing.

The northern and southern areas of the island are heavily vegetated which has impacted the LiDAR (aerial survey) capture. The broadscale report recommends further data capture in these areas if they are likely to be of interest. With reference to the 2005 Caboolture Shire Plan, it is not considered that these areas would be focus areas for future development on the island. It is therefore suggested that further data capture and refinement in these areas would not be warranted.

Pumicestone Passage

The broadscale modelling report discusses infilling of the Digital Elevation Model (DEM) in the upper reaches of the basin. It is understood that Council have subsequently obtained LiDAR for this area. Given the low level of development in this area, it is unlikely that the quality of the DEM in this area will have an impact on the project objectives.

During Stage 1 it was identified that the level of detail in the upper-most sub-catchments results in a reduced level of detail in the resultant hydraulic model output. Where these sub-catchments are large, the inflows to the hydraulic model are not located in the very upper reaches of the catchment and the predicted inundation extents may be truncated. This is only considered to be of concern where critical areas of interest are located within these upper catchments.

2.3 Stream connectivity

A review of the sub-catchment and reach network was undertaken with reference to the study objectives outlined in Section 1.2. For the Bribie Island basin, two main issues were noted:

- The north-western breakout, as discussed in the previous section
- Inconsistency with the stormwater network

Council provided the trunk drainage stormwater network for Bribie Island. In the Banksia Beach area, it is estimated that the contributing catchments may vary by up to 20% for the minor storm events, during which flow is conveyed via the piped network. Given that high flows will be conveyed along the streets and into the canals, the flow patterns will not generally change from what has been represented in the hydrography. As such, it is not anticipated that this would significantly affect the model output.

However, in the vicinity of Cassia Ave minor event flows would drain to Dux Creek in the south rather than the canal system to the north. The DEM indicates that surface flows would follow a similar path. This may have an impact on local flooding extent predictions.

Another area of concern is the Bellara Detention Pond where sub-catchments for minor storm events potentially differ by 50%. Again, surface flow is likely to follow the same path (given that the road network is a significant drainage component) and this may have an impact on local flooding extents predictions.

For the Pumicestone Passage basin, there have been no issues found in terms of catchment connectivity.

2.4 Inclusion of floodplain structures

The Package 3 Infrastructure Data Assessment Report has identified key structures that are recommended to be included in the hydraulic models. Table 1 below includes a list of the structures for which no junction currently exists in the hydrography. New junctions will be required at these structure locations to ensure the contributing upstream catchment is correct. Note that this table does not include structures for which there are no reaches in the hydrography but that we intend to include in the hydraulic modelling (eg beneath Pumicestone Road and at the Benabrow Avenue/Sunderland Drive roundabout).

Table 1 | Structures for which no junction exists in the hydrography

WW_ID	Domain	Xing_Name	Description
NIN_01_23388	PUM	Bruce Highway	No junctions included for separate carriageways of the highway (as has been done elsewhere)
NIN_14_00567	PUM	Wattle Grove Drive	
NIN_14_01586	PUM	Minor Road	Crossing of minor road looks significant in aerial image
NIN_24_03255	PUM	Sandstone Blvd	
SMC_28_00908	PUM	Powell Road	
SMC_42_00788	PUM	Williams Road	
BEE_18_05085	PUM	Railway	Railway culvert on upstream side of Rose Creek Road
BON_01_01940	BRI	Protea Drive	Lock at outlet to Bribie Gardens canal system
DUX_01_01826	BRI	Footpath	Footbridge on downstream side of Sunderland Drive
DUX_11_00000	BRI	Footpath (x2)?	Aerial image shows two structures across this reach – we are unsure of what these structures actually are and whether they need to be included
DUX_12_00000	BRI	Island Parade	
DUX_15_00148	BRI	Eucalypt Street	Bellara Detention Basin outlet
FRE_01_00623	BRI	Second Avenue	
WRI_05_00000	BRI	Footpath	

There is no junction at the Bellara Detention Pond outlet. Flow from the contributing sub-catchment may be applied downstream of the pond and prevent accurate modelling of water levels within the pond, which in turn affects stormwater network performance.

There is a drainage channel running parallel to Marina Blvd that has been omitted from the reaches layer. However, the two-dimensional method of hydraulic modelling will determine this flow path. Modification of the hydrography reach layer is not considered necessary.

2.5 Existing resolution/detail

Given the objectives of the RFD, the resolution of the defined hydrography is generally considered to be appropriate.

One of the primary issues to be considered is the application of the inflow hydrographs using 2d_sa tables within the hydraulic model. If the 2d_sa table is defined to match the sub-catchment boundary, the inflow will be applied to the lowest point within the sub-catchment, with the following impacts:

- For a given sub-catchment, the flow will likely be applied at the junction and from there routed downstream within the creek/channel. Where a sub-catchment has its primary area of interest in the upper reaches, the local inflows will bypass this area. Where residential areas are located on a ridge between the shore and canal, as for Bribie Island, the flow may be applied directly to the shoreline, again bypassing the residential areas
- For the upper-most sub-catchments, there will be no flow routed through them from upstream sub-catchments. Where they are not urbanised or not of concern, the hydrography need not be modified

2.5.1 Future development

In the case of large areas of land being proposed for development, it would be recommended that sub-catchment delineation align with future development to allow the hydrologic and hydraulic models to be easily updated for “future land use” scenarios. However, based on a review of the 2005 Caboolture Shire Plan it is not anticipated that land use and development areas will change significantly from what currently exists.

3 Proposed changes

Based on the issues discussed in the previous section, the hydrography changes in the following sections (3.1 to 3.3) are recommended. Following these sections, Table 2 and Table 3 summarise the issues and recommendations. These tables include a suggested order of priority for the recommended changes, with red being high priority, orange being medium priority and yellow being low priority.

3.1 Stream connectivity

The following recommendations are made with regard to the sub-catchment and reach network definition.

Bribie Island

- It is recommended that the hydrography be aligned with the stormwater – road network in the vicinity of the Banksia Beach Park and the Bellara Detention Pond. Although the stormwater network describes the minor flow system, it is considered to be indicative of the high flow paths in this area. Figure 1 and Figure 2 illustrate the recommended changes (note that the data shown in these Figures is available is GIS format if required)
- As discussed in Section 2.2, there is potential for flow breakout in the north-western area of the proposed model extent which could impact on the accuracy of flow estimates through the White Patch Esplanade crossing. Given that there is no interest in flooding extents in this north-western area, it is not recommended that the hydrography be modified in this area. Provided the hydraulic model active domain is extended further west to the natural ridgeline, the flow split will be sufficiently represented

Pumicestone Passage

- Where a junction is located within the Pumicestone Passage or ocean and there are areas of interest within that sub-catchment, we propose to modify the 2d_sa table within the hydraulic model. This will prevent the inflow for that sub-catchment being applied to the ocean or Passage and being lost from the system. For the Pumicestone basin, this is particularly important for Donnybrook and Toorbul. For the Bribie Island canal areas, modification of the hydrography is not required. Flood risk will be largely defined by the chosen tide level and consequent canal levels. The addition of inflows to the canals will meet the project objectives

3.2 Inclusion of floodplain structures

The following recommendations are made with regard to modifying the hydrography to accommodate floodplain structures.

- For both minor basins, it is recommended that a junction be included at each of the floodplain structures in Table 1, to ensure that the volume of flow calculated at each structure is accurate and to ensure consistency with the hydrography approach adopted for the detailed modelling
- It is recommended that a junction be placed at the Bribie Island Bellara Detention Pond outlet to ensure accurate levels within the pond are predicted and to ensure consistency with the hydrography approach adopted for the detailed modelling

3.3 Resolution/detail

The following recommendations are made with regard to the level of hydrographic detail provided.

Common recommendations for both minor basins

- It is recommended that road reaches which have been defined as separate sub-catchments are incorporated into the upstream catchments. Alternatively, the 2d_sa tables may be modified within the hydraulic model. This will prevent the road being "flooded" in situations where it has not actually been overtopped
- If a sub-catchment has its primary area of interest in the upper reaches, consideration should be given to further dividing the sub-catchment or alternatively, applying more than one 2d_sa table over the region (where flow would be distributed according to area)
- Where an upper-most sub-catchment is of interest, either the hydrography may be modified, or the 2d_sa table modified within the hydraulic model to ensure flow is routed through it

Figure 1 | Recommended hydrography changes in Banksia Beach, Bribie Island (pink = provided hydrography, green = proposed modification)

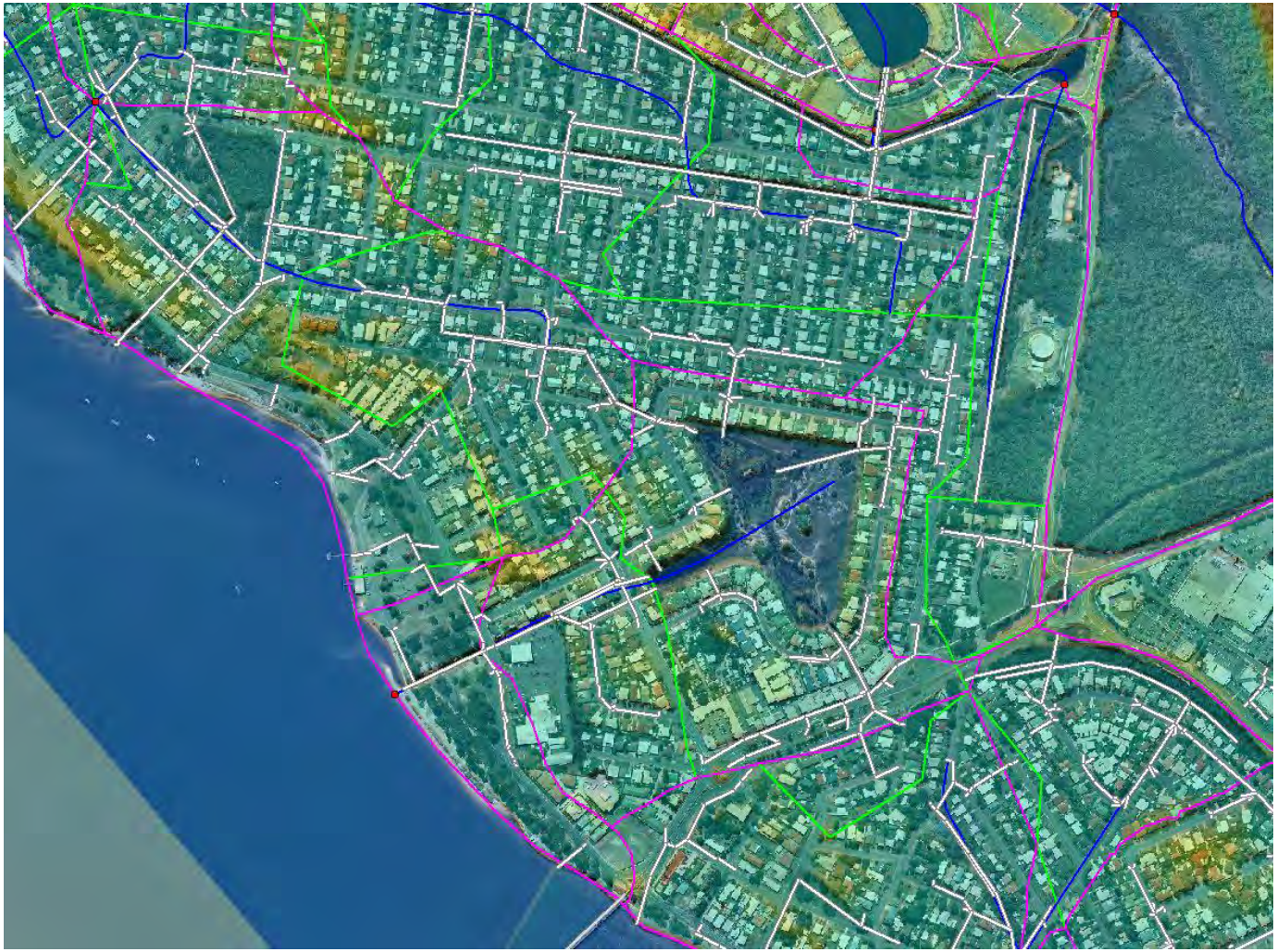

Figure 2 | Recommended hydrography changes in Bellara, Bribie Island (pink = provided hydrography, green = proposed modification)

Table 2 | Bribie Island – Summary of hydrography issues and recommended changes

Priority	Location	Issue	Recommended Change
🔴	Throughout	Where floodplain structures have been identified for inclusion (with reference to Table 1) a junction is required	Include new junctions at new floodplain structures
🟡	Throughout	Junctions should be placed in consistent locations throughout the catchment (ie either upstream/on/downstream of structures)	It is recommended that all floodplain structures have a junction placed in a consistent location with reference to the structure
🟠	Throughout	Where a sub-catchment has its primary area of interest in the upper reaches, local inflows may bypass the area of interest	Refine sub-catchment definition where a sub-catchment has its key area of interest in the upper reach or apply more than one 2d_sa table over the region
🟠	Endeavour Drive (at White Patch) Banksia Beach	Road surface has been defined as a catchment. Rainfall will be applied directly to road within hydraulic model indicating it is wet even if not overtopped	Include road sub-catchment in upstream sub-catchment or amend 2d_sa table in hydraulic model
🟡	Banksia Beach West along coast	Sub-catchments include all houses to western coast despite the ridge along Endeavour Drive This increases the size of contributing catchment and may cause flow to be applied along the shoreline only if it is lower ground	Refine sub-catchment delineation
🟡	Banksia Beach	Sub-catchment delineation is not consistent with the stormwater network provided. Sub-catchments for minor storm events potentially differ by 10-20%. Overland flow paths likely follow same path	Refine sub-catchment delineation
🟠	Banksia Beach Park	In the vicinity of Cassia Ave, Banksia Beach flow appears to drain to Dux Creek in the south rather than the canal system to the north	Refine sub-catchment delineation in the vicinity of Cassia Ave
🟠	Marina Boulevard	Road surface has been defined as a catchment. Rainfall will be applied directly to road within hydraulic model indicating it is wet even if not overtopped	Include road sub-catchment in upstream sub-catchment or amend 2d_sa table in hydraulic model
🔴	Bellara detention pond and surrounding sub-catchments	Sub-catchment delineation is not consistent with the stormwater network provided. Sub-catchments for minor storm events potentially differ by 50%	Modify sub-catchment delineation in the vicinity of Bellara Detention Pond

Priority	Location	Issue	Recommended Change
🔴	Bellara detention pond	There is no junction at the pond outlet. Flow from the contributing catchment may be applied downstream of the pond	Include a junction at the Bellara Detention Pond Outlet.

Table 3 | Bribie Island – Summary of hydrography issues and recommended changes

Priority	Location	Issue	Recommended Change
🔴	Throughout	Where floodplain structures have been identified for inclusion (with reference to Table 1) a junction is required	Include new junctions at new floodplain structures
🟡	Throughout	Junctions should be placed in consistent locations throughout the catchment (ie either upstream/on/downstream of structures)	It is recommended that all floodplain structures have a junction placed in a consistent location with reference to the structure
🟠	Throughout	Where a sub-catchment has its primary area of interest in the upper reaches, local inflows may bypass the area of interest	Refine sub-catchment definition where a sub-catchment has its key area of interest in the upper reach or apply more than one 2d_sa table over the region
🟠	Endeavour Drive (at White Patch) Banksia Beach	Road surface has been defined as a catchment. Rainfall will be applied directly to road within hydraulic model indicating it is wet even if not overtopped	Include road sub-catchment in upstream sub-catchment or amend 2d_sa table in hydraulic model
🟡	Banksia Beach West along coast	Sub-catchments include all houses to western coast despite the ridge along Endeavour Drive This increases the size of contributing catchment and may cause flow to be applied along the shoreline only if it is lower ground	Refine sub-catchment delineation
🟡	Banksia Beach	Sub-catchment delineation is not consistent with the stormwater network provided. Sub-catchments for minor storm events potentially differ by 10-20%. Overland flow paths likely follow same path	Refine sub-catchment delineation
🟠	Banksia Beach Park	In the vicinity of Cassia Ave, Banksia Beach flow appears to drain to Dux Creek in the south rather than the canal system to the north	Refine sub-catchment delineation in the vicinity of Cassia Ave

Priority	Location	Issue	Recommended Change
🟠	Marina Boulevard	Road surface has been defined as a catchment. Rainfall will be applied directly to road within hydraulic model indicating it is wet even if not overtopped	Include road sub-catchment in upstream sub-catchment or amend 2d_sa table in hydraulic model
🔴	Bellara detention pond and surrounding sub-catchments	Sub-catchment delineation is not consistent with the stormwater network provided. Sub-catchments for minor storm events potentially differ by 50%	Modify sub-catchment delineation in the vicinity of Bellara Detention Pond
🔴	Bellara detention pond	There is no junction at the pond outlet. Flow from the contributing catchment may be applied downstream of the pond	Include a junction at the Bellara Detention Pond Outlet.

Table 4 | Pumicestone Passage – Summary of hydrography issues and recommended changes

Priority	Location	Issue	Recommended Change
🔴	Throughout	Where floodplain structures have been identified for inclusion (with reference to Table 1) a junction is required	Include new junctions at new floodplain structures
🟡	Throughout	Junctions should be placed in consistent locations throughout the catchment (ie upstream/on/downstream of structures)	It is recommended that all floodplain structures have a junction placed in a consistent location with reference to the structure
🟡	Throughout	Where a junction is located within the Pumicestone Passage, flow will be applied to the water	No change to the hydrography is recommended. This will be addressed through modification of the 2d_sa tables
🟠	Throughout	Where a sub-catchment has its primary area of interest in the upper reaches, local inflows may bypass the area of interest	Refine sub-catchment definition where a sub-catchment has its key area of interest in the upper reach or apply more than one 2d_sa table over the region

Priority	Location	Issue	Recommended Change
●	Beerburrum Road	Road surface has been defined as a catchment. Rainfall will be applied directly to road within hydraulic model indicating it is wet even if not overtopped	Include road sub-catchment in upstream sub-catchment or amend 2d_sa table in hydraulic model
●	Bruce Highway	Road surface has been defined as a catchment. Rainfall will be applied directly to road within hydraulic model indicating it is wet even if not overtopped	Include road sub-catchment in upstream sub-catchment or amend 2d_sa table in hydraulic model
●	Bribie Island Road Ningi	Road surface has been defined as a catchment. Rainfall will be applied directly to road within hydraulic model indicating it is wet even if not overtopped	Include road sub-catchment in upstream sub-catchment or amend 2d_sa table in hydraulic model

4 Recommendations

Generally, the defined hydrography is considered to be appropriate for the project objectives. Table 2 and Table 3 present recommended changes to the hydrography for the Bribie Island and Pumicestone Passage minor basins. The changes have been presented with a suggested order of priority. It is advised that Council modify the sub-catchments in line with the high priority recommendations (red). The medium (orange) recommendations should also be modified if resources and budget allow it. The low priority recommendations have been included for reference but are unlikely to impact the objectives of the study.

In a number of instances, the application of the flow within the hydraulic model may be modified instead of the hydrography. This has been noted in the summary tables and associated discussion.

It is also recommended that Council reference the latest available Local Plans for the region and consider if further sub-catchment delineation is required to support the “future development” scenarios. Based on the information available for this report, there are no areas of significant development within the Package 3 basins.

5 References

5.1 Documents

Cardno (2009), Bellara Drainage Investigation - Relief Drainage Options, 23 January 2009

Cardno (2008), Bellara Drainage Investigation - Park Lines Relief Drainage Options, 23 December 2008

BMT WBM (2010) Hydraulic Modelling (Broadscale) Regional Floodplain Database - Stage 1 Sub-Project 1D, July 2010

Caboolture Shire Council (2005) Caboolture Shire Plan, December 2005

5.2 Other data

Bribie Island stormwater trunk drainage network, as provided by Council September 2010

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Appendix C
Calibration and Validation Report(s)

Appendix C
Calibration and Validation Report(s)

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Project: Regional Floodplain Database Stage 2 Detailed Modelling – Package 3: Pumicestone Passage and Bribie Island

Calibration and Validation Feasibility Report

Reference: 211090

Prepared for: Moreton Bay Regional Council

Revision: 1

31 May 2012

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Document Control Record

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File Path		P:\SWM2\work\211090 MBRC RFD Stage 2\Reporting\Appendices\C - Calibration and Validation Report\211090 Calibration and Validation Feasibility Report_Final.docx				
Client		Moreton Bay Regional Council	**Client Contact**			
Rev	**Date**	**Revision Details/Status**	**Prepared by**	**Author**	**Verifier**	**Approver**
0	28 October 2010	Draft for MBRC Review	C Smyth	B Breen	T Campbell	T Graham
1	31 May 2012	Final	C Smyth	T Campbell	T Campbell	T Graham
Current Revision		1				

Approval			
Author Signature		Approver Signature	
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Regional Floodplain Database Stage 2 Detailed Modelling – Package 3: Pumicestone Passage and Bribie Island

Date | 31 May 2012
Reference | 211090
Revision | 1

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1 Introduction

1.1 Study objective

Moreton Bay Regional Council (MBRC) is delivering a Regional Floodplain Database (RFD) in support of their flood risk management, considering emergency response, development control, strategic landuse and infrastructure planning. The MBRC was recently formed under local government amalgamations and is responsible for Caboolture, Pine Rivers, Redcliffe and Bribie Island. The RFD project is focusing on the northern sector as a key growth area for south east Queensland.

The project is being funded by MBRC, Emergency Management Queensland (EMQ) and Emergency Management Australia (EMA) as part of the Disaster Resilience Program and will provide:

- A comprehensive and consistent description of flood behaviour across the region
- Strategies for management of any flooding problems identified
- A system/process to store and manage this information and keep it up-to-date

Stage 1 of the project was completed in July 2010 and involved a number of sub-projects. These projects delivered consistent processes and protocols for the detailed hydrologic and hydraulic model development. A key sub-project involved the development of broadscale hydrodynamic models for each minor basin to provide general understanding of flooding mechanisms and allow prioritisation of data capture.

Stage 2 (current stage) of the project involves the development of detailed hydrologic and hydraulic models for each minor basin.

Stage 3 will build on the detailed models and “add value” through assessment of flood damages and community resilience measures.

1.2 Objective of calibration and validation feasibility report

This report pertains to the calibration and validation analysis for Package 3, including:

- Bribie Island
- Pumicestone Passage (including Six Mile, Beerburrum, Elimbah, Ningi and Glass Mountain Creeks)

The Pumicestone Passage basin is mostly rural, with flood-prone lower reaches. There are a large number of structures in this basin, with the potential to impact upon flooding of urban areas. Additionally, accurate modelling of breakout flows travelling between the lower reaches of Ningi and Elimbah Creeks will be important.

The Bribie Island catchment has significant flooding through some urban areas and canal estates. Representation of urban flowpaths and structures will be important to the accurate modelling of this catchment.

This report assesses the feasibility of carrying out calibration and validation for the hydrological and hydraulic modelling of the Pumicestone Passage and Bribie Island basins based on the current and prospective availability of data.

2 Available data

2.1 Stream gauge data

Stream gauge data (recorded water level with respect to time) is essential to calibrating a hydrologic model. Recorded water levels are converted to discharges and compared with hydrologic model predictions. Stream gauge data is also useful in calibrating a hydraulic model through comparisons of recorded and predicted water levels with time at the gauge location. Unfortunately, there are no stream gauges within either the Pumicestone Passage or Bribie Island basins.

2.2 Rainfall data

Rainfall data is used to provide input to a hydrologic model regarding the amount, location and timing of rainfall during a storm event.

Rainfall station locations have been sourced from Moreton Bay Regional Council (MBRC) and the Bureau of Meteorology's (BoM) Water Resources Station Catalogue (WRSC). The gauge locations obtained from these sources are shown in Figure 1 and Figure 2 respectively. There are two types of rainfall stations:

- Alert station (or pluviometer) – rainfall is recorded in short duration intervals (as short as 6 minutes) providing rainfall patterns through the course of a rainfall event
- Daily station – total rainfall during the course of a day is recorded

The alert stations and daily stations within the zone of influence to the Pumicestone Passage and Bribie Island Basins have been provided in Table 1 and Table 2 respectively. The rainfall data has not yet been sourced for these stations. In a number of locations the data sets have conflicting information in regards to gauge ownership, therefore the information from both sources has been provided in the tables below.

Table 1 | Alert/Pluviograph Stations

Gauge Name	Gauge Owner/Data Source	Operational Start Date	Operational Finish Date
Old Gympie Road	SCRC/BoM	7/5/2004	Still operational
Beerwah	SCRC/BoM	7/5/2004	Still operational
Woodford	SEQWC/BoM	15/5/2002	Still operational
Wamuran	MBRC/BoM	30/9/1998	Still operational
Round Mtn Reservoir	MBRC/BoM	7/1/1998	Still operational
Caboolture WTP	MBRC/BoM	7/1/1998	Still operational

Gauge Name	Gauge Owner/Data Source	Operational Start Date	Operational Finish Date
Upper Caboolture	MBRC/BoM	281/2004	Still operational
Bribie Island	MBRC	Not available	Still operational

Table 2 | Daily rainfall stations

Gauge Name	Gauge Owner/Data Source	Operational Start Date	Operational Finish Date
Glass House Mountains	BoM	01/01/1908	01/01/1946
Beerburrum Forest Station	BoM	29/9/1898	Still operational
Pumicestone Post Office	BoM	1/1/1958	1/1/1973
Godwin Beach	BoM	19/11/2005	Still operational
Beachmere Sands Retirement Resort	Private/BoM	10/12/2005	Still operational
Caboolture Post Office	BoM	01/01/1870	05/09/1999
Wamuran Post Office	BoM	30/05/1915	Still operational
Woodford BCC	BoM	06/06/1964	29/12/1995
Bongaree Bowls Club	BoM	29/11/1931	16/04/1991
Bribie Island Qld Uni	BoM	30/03/1978	02/11/1993
Bribie Island Bore	NRW	29/04/1993	Still operational

2.3 Historic flood marks

Historic flood marks are an important part of calibrating a hydraulic model as they provide information regarding the variation in water levels across a floodplain. At the current time, there is no historic flood mark data available. It is understood MBRC is advertising for community input into the provision of historic flood marks (peak water levels).

3 Flood events

3.1 Possible events for calibration/validation

It is possible to undertake an assessment of the available rainfall data to determine when rainfall events occurred. This data could be used to assess which rainfall events were likely to have led to flood events and therefore identify the historic periods in which MBRC should target sourcing of community data. We will undertake this rainfall assessment if MBRC feels it is required.

3.2 Feasibility of calibration/validation

Given the lack of recorded stream gauge data within either the Pumicestone Passage or Bribie Island basins, it will not be possible to calibrate the WBNM models. If a number of reliable historic flood marks are sourced from the community it may be possible to undertake a joint calibration process in which both hydrologic and hydraulic parameters are modified until calibration of the hydraulic model is achieved.

Historic flood mark data sourced from the community is less reliable than surveyed flood data as it relies on community recollection of peak water levels or remaining debris following a flood event. As a result, calibration would be limited in accuracy if this was the only source of historic data.

We recommend that the calibration and validation feasibility for Pumicestone Passage and Bribie Island be reviewed once flood mark data is obtained and the quality of the data is assessed.

4 Recommendations

In order to carry out calibration/validation of a hydrologic model, rainfall and stream gauge data needs to be available. No stream gauge data is available within the Pumicestone Passage or Bribie Island basins.

To calibrate/validate a hydraulic model, both rainfall and water level data needs to be available. At present only rainfall data is available within the Pumicestone Passage and Bribie Island catchments. No stream gauge or historic flood mark records exist within these basins which would provide water level data. The feasibility of model calibration and validation will therefore be dependant on the amount and quality of information obtained from the community in regards to historic flood water levels.

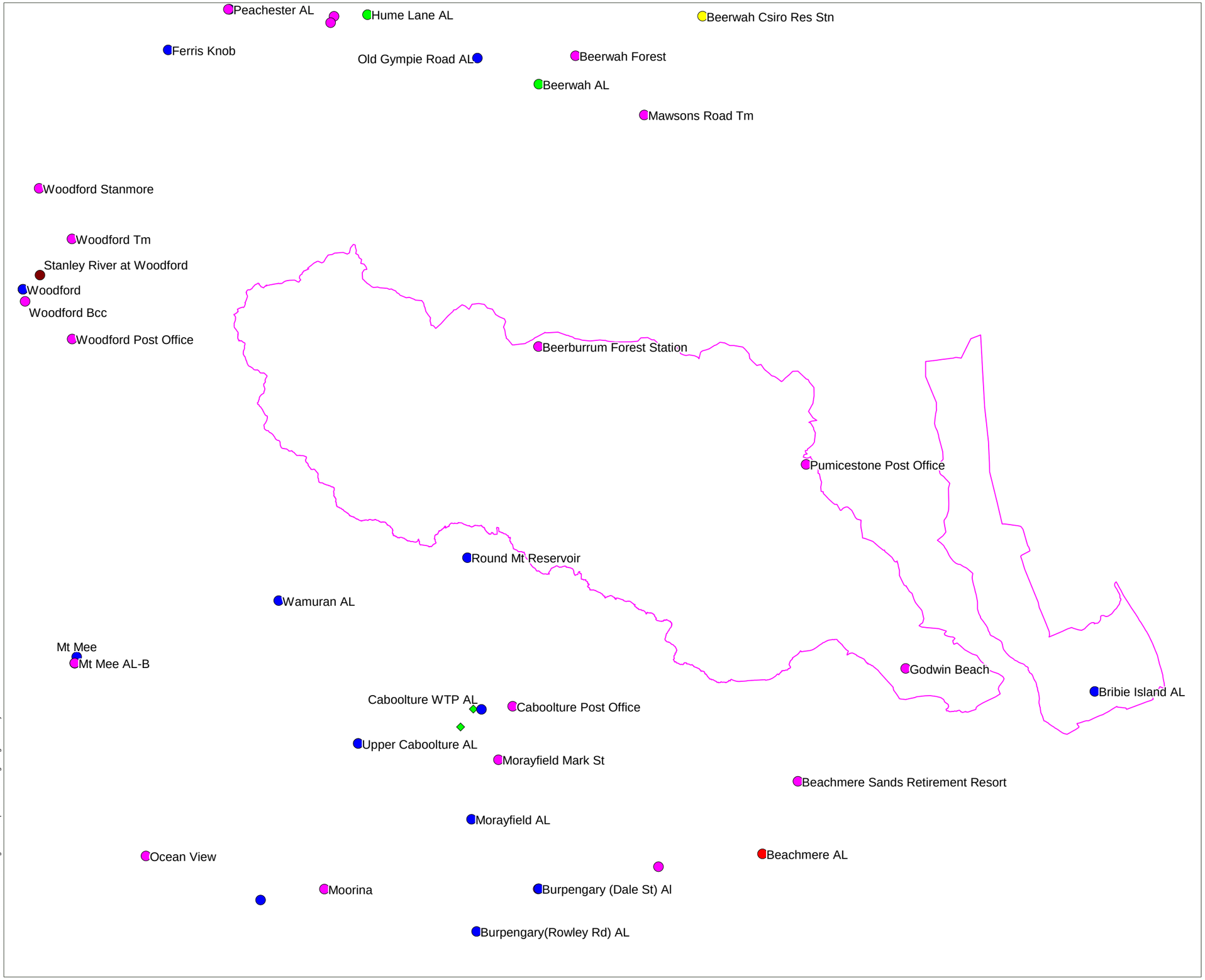
5 References

Bureau of Meteorology, Water Resources Station Catalogue [Online] Available: http://www.bom.gov.au/hydro/wrsc Accessed October 2010

Gauges GIS data, as provided by Council, September 2010

Appendices

Appendix A
Figures



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Legend

Gauge Types

- Battery
- Rainfall Alert
- Rainfall Daily
- Rainfall non-alert (pluviometer)
- Water Level
- Water Level Non-Alert

★ Maximum Height Indicators

◆ WQ Event Monitoring Program

Notes:

Date: 25/10/2010 **Version: 0**

0 7500 (m)

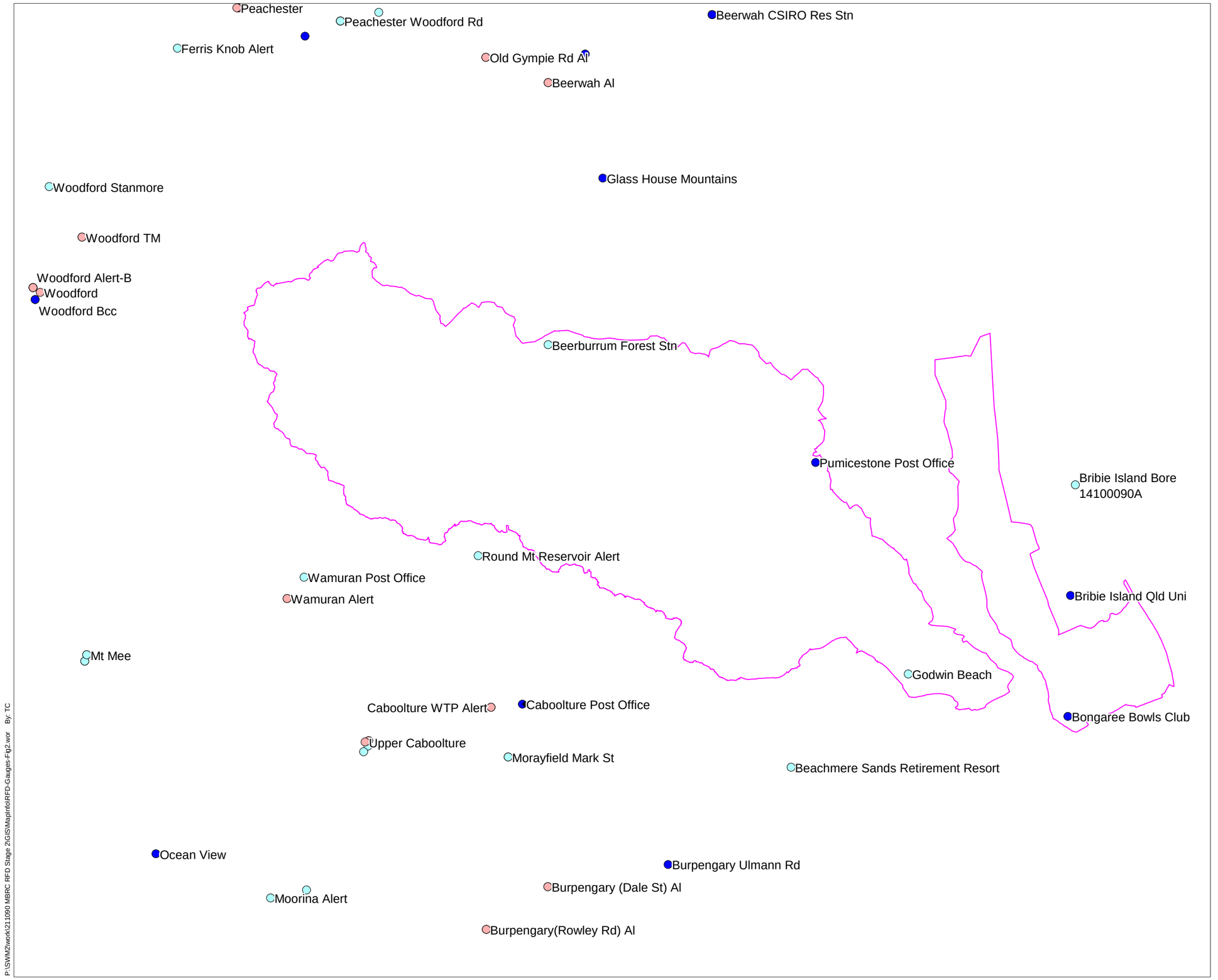
Scale 1:15 000 (m) (@ A3 size)

Projection: MGA Zone 56

RFD Stage 2 Detailed Modelling

Pumicestone Passage and Bribie Island

Figure 1: MBRC Gauge Data Locations



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Legend

Water Resources Station Catalogue
- River Station - Operational
- River Station - Closed
- Rainfall Station - Operational
- Rainfall Station - Closed

Notes:

Date: 25/10/2010 **Version: 0**

0 7500 (m)

Scale 1:15 000 (m) (@ A3 size)

Projection: MGA Zone 56

RFD Stage 2 Detailed Modelling

Pumicestone Passage and Bribie Island

Figure 2: WRSC Gauge Data Locations

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Ethiopia, Hong Kong, Indonesia,
Lesotho, Libya, Malawi, Mozambique,
Namibia, New Zealand, Nigeria,
Philippines, Singapore, South Africa,
Swaziland, Tanzania, Thailand, Uganda,
United Arab Emirates, Vietnam.

Appendix D
Modelling Quality Report