APPENDIX A

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Moreton Bay Regional Council
PO Box 159
CABOOLTURE QLD 4510
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APPENDIX A: INFRASTRUCTURE DATA ASSESSMENT REPORT

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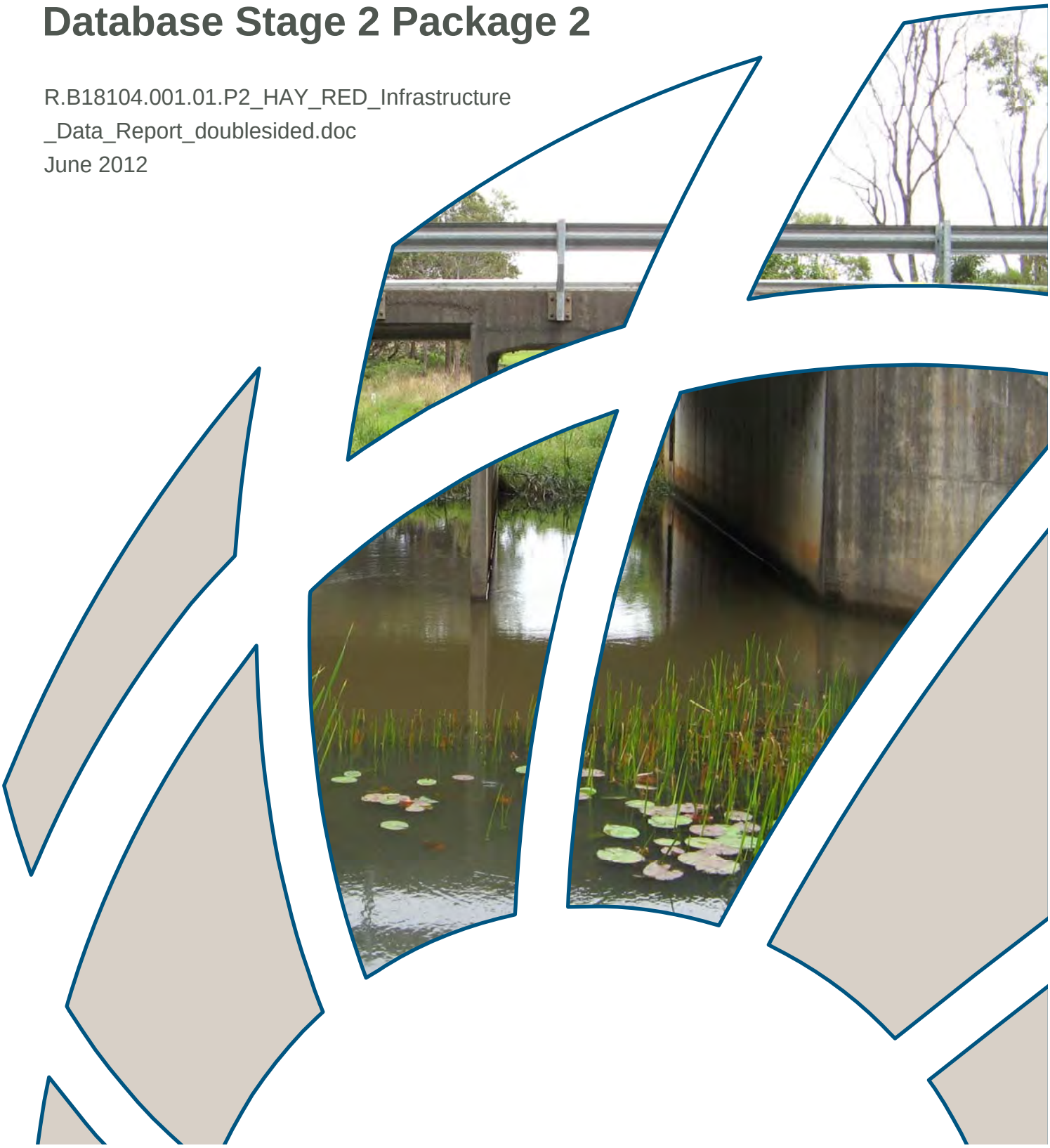
Infrastructure Data Assessment Report Hays Inlet and Redcliffe Catchments Regional Floodplain Database Stage 2 Package 2

R.B18104.001.01.P2_HAY_RED_Infrastructure_Data_Report_doublesided.doc
June 2012



Infrastructure Data Assessment Report Hays Inlet and Redcliffe Catchments Regional Floodplain Database Stage 2 Package 2

Prepared For:	Moreton Bay Regional Council
Prepared By:	BMT WBM Pty Ltd (Member of the BMT group of companies)

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DOCUMENT CONTROL SHEET

BMT WBM Pty Ltd

BMT WBM Pty Ltd
Level 11, 490 Upper Edward Street
Brisbane 4000
Queensland Australia
PO Box 203 Spring Hill 4004

Tel: +61 7 3831 6744
Fax: + 61 7 3832 3627

ABN 54 010 830 421

www.wbmpl.com.au

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Project Manager :	Anne Kolega / Richard Sharpe
Client :	Moreton Bay Regional Council
Client Contact:	Steve Roso / Hester van Zijl
Client Reference	Regional Floodplain Database Stage 2

Title :	Infrastructure Data Assessment Report for the Hays Inlet and Redcliffe catchments as part of Moreton Bay Regional Council's Regional Floodplain Database Stage 2
Author :	Anne Kolega / Richard Sharpe
Synopsis :	Infrastructure Data Assessment Report including the review and prioritisation of available and required infrastructure data for the detailed modelling of the Hays Inlet and Redcliffe catchments for Moreton Bay Regional Councils RFD Stage 2

REVISION/CHECKING HISTORY

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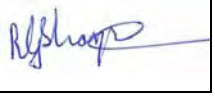
1	15/06/2012	M Hovey		R Sharpe	

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LIST OF FIGURES

1 INTRODUCTION

1.1 Background

Moreton Bay Regional Council (MBRC) is currently undertaking Stage 2 of developing a Regional Floodplain Database (RFD). The RFD includes the development of coupled hydrologic and hydraulic models for the entire local government area (LGA) that are capable of seamless interaction with a spatial database to deliver detailed information about flood behaviour across the region.

Stage 2 includes the detailed hydrologic and hydraulic modelling of 5 packages, which cover 11 catchments in MBRC LGA. This *Infrastructure Data Assessment report* forms part of the hydrologic and hydraulic modelling report of the Hays Inlet and Redcliffe catchments RFD Stage 2, Package 4.

1.2 Scope

The scope of this report can be summarised in the following key points:

- Review available information provided by Council and the Department of Transport and Main Roads (DTMR);
- Undertake a gap analysis based on the broadscale model results and other data provided by Council (i.e. cadastre, local roads, state controlled roads, topographic data);
- Identify infrastructure data that need to be collected for the detailed modelling;
- Prioritise the additional infrastructure data required; and
- Document methodology and required infrastructure data in an Infrastructure Data Assessment report.

1.3 Objective

The objective is to prioritise additional required data, based on the philosophy that detailed information is to be collected to develop a high quality model, with the 100 year ARI flood behaviour being of particular interest, more than smaller events.

Priority A data involves data that is critical for a high quality model; Priority B is to include all remaining data for which assumptions, such as field inspection and desktop measurements could be used *and* achieve a relatively high quality model.

This report has been provided to MBRC for review and further negotiation of required data considering the broader RFD objectives and potential budget constraints for all 5 packages.

2 AVAILABLE DATA FOR GAP ANALYSIS

The infrastructure data assessment was based on the following data being available at commencement of the study:

- Topographic data: The topography is based on LiDAR (**Li**ght **D**etection **A**nd **R**anging) data collected in 2009 and provided by Department of Environment and Resource Management (DERM). The LiDAR data was used to create a 2.5m grid Digital Elevation Model (DEM);
- Hydrography Dataset provided by MBRC in September 2010;
- State controlled roads and minor roads GIS layers provided by MBRC in September 2010;
- As-constructed bridge plans for selected structures along state controlled roads provided by DTMR where available. The categorisation of high, medium and low priority for the DTMR structures was previously undertaken by Aurecon. Based on this desktop assessment, Council requested the as-constructed plans from DTMR to speed up the data consolidation process;
- As-constructed bridge plans for selected minor roads in MBRC LGA were provided by MBRC where available;
- Structure dataset provided by MBRC for the Hays Inlet catchment (derived from the former Pine Rivers Shire Council);
- The flood extents from the Stage 1 broadscale model sub-project were utilised to locate potential structures; and
- A site visit undertaken in the Hays Inlet and Redcliffe catchments on 1 October 2010.

3 DATA CAPTURE METHODOLOGY

3.1 General Methodology

This section describes the methodology for the gap analysis and data prioritisation. All available data outlined in Section 2 were converted into GIS layers and reviewed. The state controlled roads layers were overlaid with the broadscale flood extent in the probable maximum flood (PMF) event to locate waterway structures. Each crossing was marked, if none of the available data already existed in these locations (gap analysis).

The DTMR structures that have previously been categorised as *medium* and *low* priority were reviewed and prioritised.

The data prioritisation was undertaken based on the following considerations:

- The location of the structures within the catchment; e.g. structure data were considered lower priority at the upstream end of tributaries;
- The vicinity to denser populated areas; e.g. rural areas in the upper part of the catchment were considered lower priority;
- The height of a bridge structure, i.e. if the road and structure soffit is well above the water level (i.e. Houghton Highway Bridge), it is anticipated that a flow constriction can be applied to the model based on photos and the site visit. Selected photos taken during the site visit are presented in Appendix B (Figures B-1 to B-7); and
- The flood gradient and flood behaviour in the vicinity of the structures based on the broadscale model results; where a structure is located within a wide floodplain and not within the major flowpath, (downstream part of the catchment along Beachmere Road), details were considered of lower priority.

The outcomes of the gap analysis and prioritisation are presented in the section below.

3.2 Data Prioritisation (A and B)

3.2.1 Bridges and Culverts

The gap analysis in the Hays Inlet and Redcliffe catchments identified the following summary of available data and potential additional structure locations:

- MBRC bridge plans were provided for 1 structure in the Redcliffe catchment;
- DTMR bridges (high, medium and low category) were provided at approximately 9 locations in the Hays Inlet, and 3 locations in the Redcliffe catchment; and
- Structures with no available information have been located at 31 road and flood extent crossings.

Figure A-1 in the Appendix provides a summary of the available and the additional structures identified from the gap analysis. The data prioritisation undertaken in category A and B for the additional locations and the remaining DTMR structures are illustrated in Figure A-2.

The data prioritisation results in the following summary for bridges and culverts:

- 4 DTMR structures prioritised as category A (that were previously categorised “medium”);
- 4 DTMR structures prioritised as category B (that were previously categorised “low”);
- 19 additional crossings (bridges or culverts) prioritised as category A; and
- 12 additional crossings (bridges or culverts) prioritised as category B.

In consultation with MBRC, it is anticipated that Council will source and provide the DTMR as-constructed bridge plans (at east for priority A).

3.2.2 Channels

From the site visit and aerial photography nine channels have been identified in the Redcliffe catchment. Detailed information for these channels is currently being sourced from Council.

3.2.3 Detention Basins

Two basins were identified in the Hays Inlet catchment in the vicinity of the Black Duck Lakes, to the North and the South of Dohles Rocks Road. Information on the basin embankment height is required for these locations; refer to Figure A-2.

3.2.4 Bathymetry

Based on the current DEM it is anticipated that no additional bathymetry data is required in the Hays Inlet and Redcliffe catchments.

4 CONCLUSION AND RECOMMENDATION

This Infrastructure Data Assessment report has summarised available structure data as well as locations where additional structure data is required. The additional structures have been prioritised in two categories.

Priority A data involves data that is critical for a high quality model; Priority B includes all remaining data for which assumptions, such as field inspection and desktop measurements could be used *and* achieve a relatively high quality model.

The development of the Regional Floodplain Database (RFD) will be used not only for the purposes of the RFD, but can also be used for other asset data management purposes by Moreton Bay Regional Council, and therefore this is a good opportunity for Council to collect additional data on waterway structures, especially in the former Caboolture Shire Council and Redcliffe City Council areas.

APPENDIX A: MAPS

Burpengary Creek Catchment

Deception Bay

Sidling Creek Catchment

Lower Pine River Catchment

Bramble Bay

Hays Inlet

Freshwater Ck

North Lakes

Bruce Hwy

Old Gympie Rd

Anzac Ave

Dohles Rocks Rd

Houghton Hwy

Griffith Rd

Oxley Ave

Klingner Road

Snook St

Elizabeth Ave

Victoria Ave

Hornibrook Esp

Medium

High

PMF Peak Flood Levels (m AHD)

32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2.3

LEGEND

- Redcliffe Catchment
- Hays Inlet Catchment
- DMTR Structures (Previous Categories)
- Structure Dataset Provided by MBRC (Former Pine Rivers Shire Council)
- Bridge with As-Construction Plans Provided by MBRC
- Additional Identified Structures
- Basin Embankment
- Road Reserves
- State Controlled Roads
- Minor Roads and Road Reserves

Title:

Infrastructure Data Summary
Hays Inlet and Redcliffe Catchments

Figure: A-1

Rev: A

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Approx. Scale

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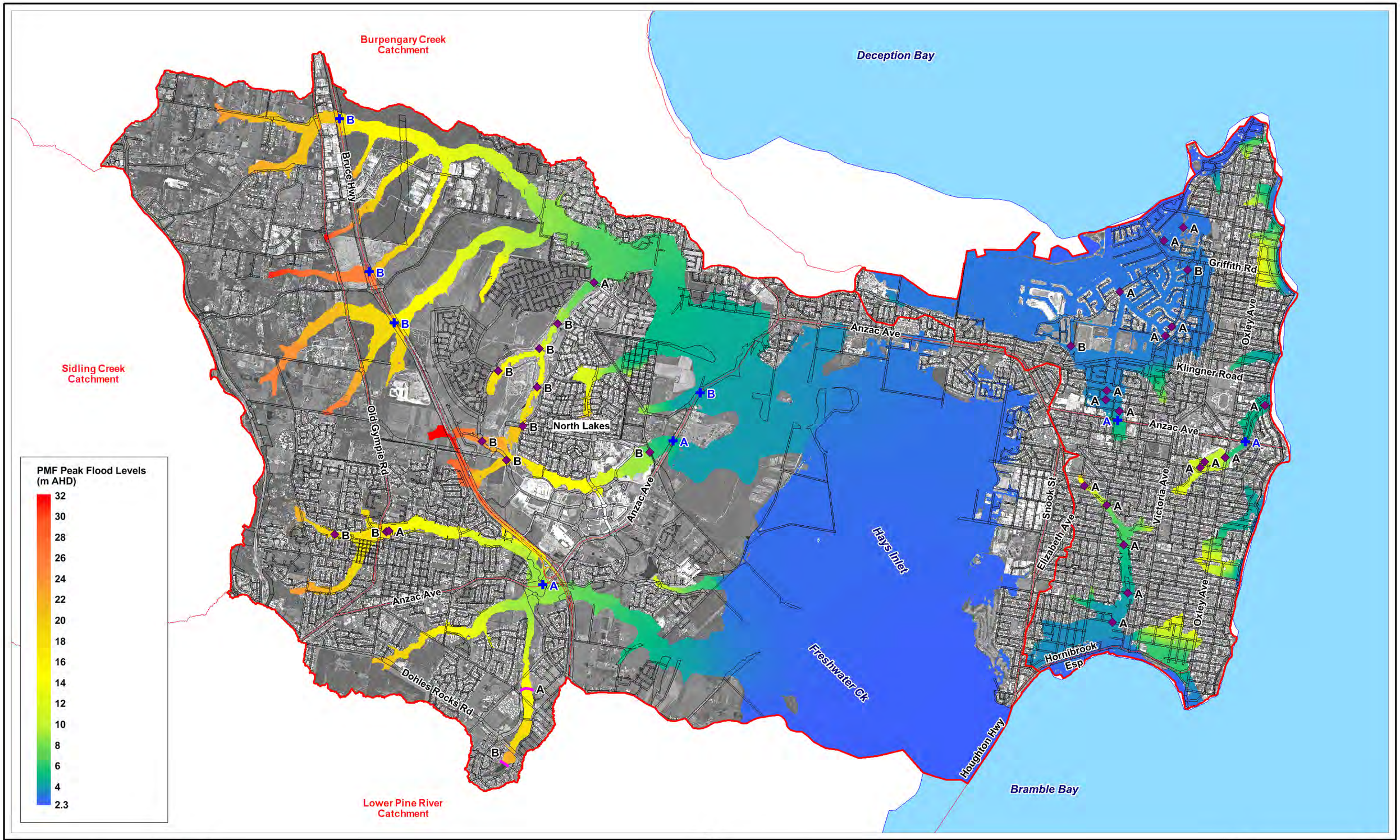

LEGEND

- Redcliffe Catchment
- Hays Inlet Catchment
- DMTR Structures
- Additional Identified Structures
- Basin Embankment
- Road Reserves
- State Controlled Roads
- Minor Roads and Road Reserves

Title:

Data Prioritisation Map
Hays Inlet and Redcliffe Catchments

Figure: **A-2**

Rev: **A**

N

0km 1 2

Approx. Scale

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Filepath : I:\B18104_I_BRH Moreton Bay AK\DRG\Infrastructure_Report\FLD_003_101015_Hay Red Data Prioritisation.wor

APPENDIX B: SITE VISIT PHOTOS

Figure B-1 Hays Inlet Catchent Black Duck Lakes, Weir near Dohles Rocks Road

Figure B-2 Hays Inlet catchment Black Duck Lake between Ogg Road and Blackall Road

Figure B-3 Hays Inlet catchment, Dohles Rocks Road

Figure B-4 Hays Inlet Catchment Brays Road

Figure B-5 Hays Inlet Catchment, Bridge and Shop, School Road

Figure B-6 Hays Inlet Catchment, Structure between Old Gympie road and School Road

Figure B-7 Hays Inlet catchment, Bounty Boulevard, North Lakes

Figure B-8 Redcliffe Catchment Ashmole Road

Figure B-9 Redcliffe Catchment, Corner of Walsh and Yates Street, Looking Upstream

Figure B-10 Redcliffe Catchment, Anzac Avenue (near Dorall Street)

BMT WBM Brisbane
Level 8, 200 Creek Street Brisbane 4000
PO Box 203 Spring Hill QLD 4004
Tel +61 7 3831 6744 Fax +61 7 3832 3627
Email wbm@wbmpl.com.au
Web www.wbmpl.com.au

BMT WBM Denver
14 Inverness Drive East, #B132
Englewood Denver Colorado 80112 USA
Tel +1 303 792 9814 Fax +1 303 792 9742
Email wbmdenver@wbmpl.com.au
Web www.wbmpl.com.au

BMT WBM Melbourne
Level 5, 99 King Street Melbourne 3000
PO Box 604 Collins Street West VIC 8007
Tel +61 3 9614 6400 Fax +61 3 9614 6966
Email wbmmelbourne@wbmpl.com.au
Web www.wbmpl.com.au

BMT WBM Mackay
Suite 1, 138 Wood Street Mackay 4740
PO Box 4447 Mackay QLD 4740
Tel +61 7 4953 5144 Fax +61 7 4953 5132
Email wbmmackay@wbmpl.com.au
Web www.wbmpl.com.au

BMT WBM Newcastle
126 Belford Street Broadmeadow 2292
PO Box 266 Broadmeadow NSW 2292
Tel +61 2 4940 8882 Fax +61 2 4940 8887
Email wbmnewcastle@wbmpl.com.au
Web www.wbmpl.com.au

BMT WBM Perth
1 Brodie Hall Drive Technology Park Bentley 6102
Tel +61 8 9328 2029 Fax +61 8 9486 7588
Email wbmperth@wbmpl.com.au
Web www.wbmpl.com.au

BMT WBM Sydney
Level 1, 256-258 Norton Street Leichhardt 2040
PO Box 194 Leichhardt NSW 2040
Tel +61 2 9713 4836 Fax +61 2 9713 4890
Email wbmsydney@wbmpl.com.au
Web www.wbmpl.com.au

BMT WBM Vancouver
1190 Melville Street #700 Vancouver
British Columbia V6E 3W1 Canada
Tel +1 604 683 5777 Fax +1 604 608 3232
Email wbmvancouver@wbmpl.com.au
Web www.wbmpl.com.au

APPENDIX B

APPENDIX B: HYDROGRAPHY REVIEW REPORT

BMT WBM Pty Ltd
Level 11, 490 Upper Edward Street
Brisbane 4000
Queensland Australia
PO Box 203 Spring Hill 4004

Tel: +61 7 3831 6744
Fax: + 61 7 3832 3627

ABN 54 010 830 421

www.wbmpl.com.au

Our Ref: AK: L.B18104.002.Hydrography Review.doc

10 December 2010

Hester van Zijl
Waterways & Coastal Planning, Infrastructure Planning
Moreton Bay Regional Council

Attention: Hester van Zijl

Dear Hester,

RE: Hydrography Review Report for the Hays Inlet, Redcliffe and Caboolture River Catchments Regional Floodplain Database Stage 2, Packages 2 and 4

1 Background

Moreton Bay Regional Council (MBRC) is currently developing a Regional Floodplain Database (RFD). The RFD includes the development and storage of hydrologic and hydraulic models for the entire Local Government Area (LGA). These model input and output data will be included in a spatial database to store detailed information about flood behaviour across the region.

Stage 2 of the RFD comprises the detailed modelling of 11 catchments (5 packages) covering the MBRC LGA.

This *Hydrography Review Report* forms part of the modelling of the following two packages, RFD, Stage 2:

- Hays Inlet and Redcliffe catchments (package 2); and
- Caboolture River catchment (package 4).

2 Scope

The scope of this hydrography review can be summarised by the following key points:

- Review the subcatchment delineation as part of Stage 1 (broadscale modelling);
- Review previous flood studies within the Hays Inlet, Redcliffe and Caboolture River catchments (provided by MBRC);
- Identify areas that are to be refined; and
- Propose changes and provide a report and digital data to MBRC for review.

MBRC will review the proposed changes and confirm acceptance prior to the amendment of models. This staged approach ensures that detailed Quality Assurance checks are performed and that Council is heavily involved in the study, which will enhance future usage of the models and data within Council. Council's review is also important to consider catchment delineation for modelling of proposed development (that MBRC is aware of to date). It also ensures consistency with Council's naming and identifier (ID) conventions.

3 Objective

The main objective of this task is to create a solid level of detail for future modelling within the catchments, which is consistent with Council's hydrography dataset and the adopted identifiers.

This task focuses on the supply of a **digital** dataset, which can be utilised and amended by MBRC.

4 Hydrography Review Data

The following data was utilised for this assessment:

- Hydrography dataset (catchment delineation) provided by MBRC in September 2010;
- Flood extent (100 Year Embedded Design Storm) derived from RFD, Stage 1, broadscale modelling (BMT WBM, 2010);
- Flood extent (100 Year ARI) of the previous flood study for the Caboolture River catchment (Australian Water Engineering, 1994) provided by MBRC in November 2010;
- Flood extent from combined and transition flood study results (100 Year ARI) based on previous flood studies and storm surge studies in the Hays Inlet and Redcliffe catchments (various consultants). The Hays Inlet catchment was previous split into two subcatchments, formerly called Saltwater and Freshwater Creek catchments; and
- Digital Elevation Model for the three catchments provided by MBRC in September 2010 and based on LiDAR data collected in 2009 and derived from the Department of Environment and Resource Management (DERM).

5 Methodology

The original subcatchment delineation was reviewed utilising the data outlined above. It was noted that in some localised areas the resolution of the original subcatchment delineation is too coarse to replicate the flood extent from the previous studies. These areas were identified by comparing the flood extent from the previous studies with the flood extent from the broadscale models, and checking for areas where the flood extent from the previous studies covered additional tributaries or extended further upstream. The difference in the flood extent is due to the subcatchment breakdown, the associated distribution of flow within each subcatchment and/or the location of the inflows to the hydraulic model.

6 Proposed Changes

Subcatchments that were considered too coarse were subdivided, thereby refining the hydrography and the associated future model output and flood information across the catchments. The proposed changes to the subcatchments are illustrated in Figures 1 and 2. Figures 1 and 2 also show the original subcatchment delineation and the flood extent from the broadscale models and the previous studies in the Hays Inlet and Redcliffe catchments and the Caboolture River catchment respectively.

Accompanying this report, two digital datasets have been provided to MBRC on 08 December 2010:

- *DWCP_Hydro_Catchments_Minor_BMTWBMrevised.TAB*, comprising all subcatchments including the proposed subcatchments; and
- *Proposed_catchment_delineation.TAB* including only the catchments that we propose to change within the three catchments of Redcliffe, Hays Inlet and Caboolture.

The following subcatchments are proposed to be subdivided:

Subcatchment Identifier	Catchment	Minor Basin
FWC_01_14222	Freshwater Creek	Hays Inlet
FWC_02_01351	Freshwater Creek	Hays Inlet
FWC_05_00000	Freshwater Creek	Hays Inlet
FWC_05_00808	Freshwater Creek	Hays Inlet
FWC_08_02696	Freshwater Creek	Hays Inlet
SWC_01_18277	Saltwater Creek	Hays Inlet
SWC_01_18995	Saltwater Creek	Hays Inlet
SWC_02_00000	Saltwater Creek	Hays Inlet
SWC_02_00970	Saltwater Creek	Hays Inlet
SWC_04_00264	Saltwater Creek	Hays Inlet
SWC_08_00418	Saltwater Creek	Hays Inlet
SWC_12_03272	Saltwater Creek	Hays Inlet
SWC_14_04906	Saltwater Creek	Hays Inlet
SWC_14_05488	Saltwater Creek	Hays Inlet
SWC_20_00619	Saltwater Creek	Hays Inlet
SWC_22_01072	Saltwater Creek	Hays Inlet
SWC_24_00639	Saltwater Creek	Hays Inlet
SWC_26_01113	Saltwater Creek	Hays Inlet
SWC_28_01496	Saltwater Creek	Hays Inlet
SWC_32_01672	Saltwater Creek	Hays Inlet
SWC_40_00247	Saltwater Creek	Hays Inlet
GYM_01_08692	Gympie Creek	Caboolture River
GYM_04_01218	Gympie Creek	Caboolture River
GYM_06_00322	Gympie Creek	Caboolture River
WAR_01_12320	Wararba Creek	Caboolture River
WAR_01_13474	Wararba Creek	Caboolture River
WAR_44_00000	Wararba Creek	Caboolture River
WAR_50_04019	Wararba Creek	Caboolture River
WAR_50_06071	Wararba Creek	Caboolture River
WAR_52_00000	Wararba Creek	Caboolture River

The subcatchment breakdown for the subcatchment with the ID “WAR_50_06071” is suggested for consistency of subcatchment sizes in this vicinity (not because of previous flood studies).

7 Recommendation

We recommend that Council reviews the proposed changes and provides feedback on the proposed changes. Based on this feedback we will adopt a final catchment breakdown and update the hydrologic model based on the agreed catchment breakdown as necessary.

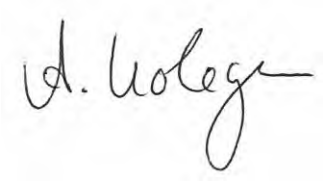
8 Reference

BMT WBM (2010), Hydraulic Modelling (Broadscale) Regional Floodplain Database, Stage 1, Sub-project 1D prepared for Moreton Bay Regional Council; and

Australian Water Engineering, 1994, Caboolture Flood Study comprising Caboolture River, King John and Lagoon Creek, prepared for Caboolture Shire Council.

Please contact myself or Richard Sharpe should you wish to discuss the report.

Yours faithfully
BMT WBM Pty Ltd



Anne Kolega

Enclosed:

Figure 1: Hydrography Review and Proposed Changes Hays Inlet and Redcliffe Catchments

Figure 2: Hydrography Review and Proposed Changes Caboolture River Catchment

Burpengary Creek Catchment

Deception Bay

Sidling Creek Catchment

Bruce Hwy

Old Gympie Rd

North Lakes

Anzac Ave

Griffith Rd

Oxley Ave

Klingner Rd

Anzac Ave

Hays Inlet

Snook St

Elizabeth Ave

Victoria Ave

Oxley Ave

Anzac Ave

Dohles Rocks Rd

Freshwater Ck

Hornibrook Esp

Houghton Hwy

Bramble Bay

Lower Pine River Catchment

LEGEND

- Redcliffe Catchment
- Hays Inlet Catchment
- Stage 1 Flood Extent (100 Year EDS)
- Previous Study Flood Extent (100 Year ARI)
- Original Catchment Delineation
- Proposed Catchment Delineation

Title:

Hydrography Review and Proposed Changes Hays Inlet and Redcliffe Catchments

Figure: 1

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Stanley River Catchment

Pumicestone Passage Catchment

Neurum Creek Catchment

D'Aguilar Hwy

Old Gympie Rd

King St

Bruce Hwy

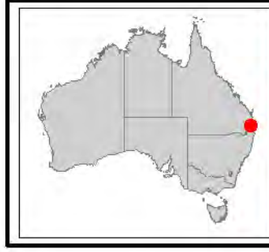
Bribie Island Rd

Beachmere Rd

Morayfield Rd

Upper Pine River Catchment

Burpengary Creek Catchment



LEGEND

- Caboolture River Catchment
- Stage 1 Flood Extent (100 Year EDS)
- Previous Study Flood Extent (100 Year ARI)
- Original Catchment Delineation
- Proposed Catchment Delineation

Title:

Hydrography Review and Proposed Changes Caboolture River Catchment

Figure: 2

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APPENDIX C

APPENDIX C: CALIBRATION AND VALIDATION REPORT

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Calibration Feasibility Report
Hays Inlet and Redcliffe Catchments Regional Floodplain Database
Stage 2

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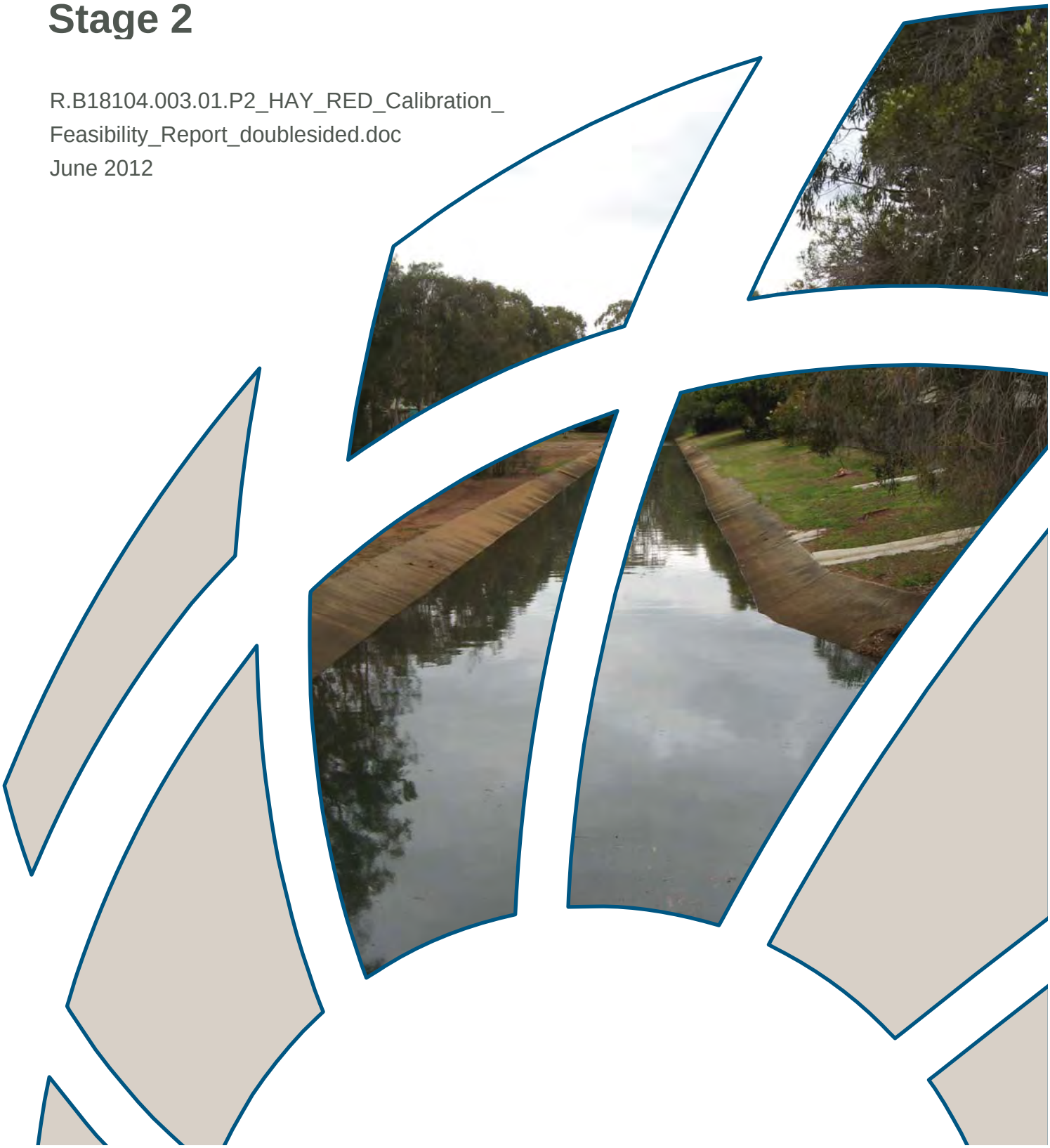
June 2012



Calibration Feasibility Report
Hays Inlet and Redcliffe Catchments
Regional Floodplain Database
Stage 2

Prepared For:	Moreton Bay Regional Council
Prepared By:	BMT WBM Pty Ltd (Member of the BMT group of companies)

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BMT WBM Pty Ltd

BMT WBM Pty Ltd
Level 11, 490 Upper Edward Street
Brisbane 4000
Queensland Australia
PO Box 203 Spring Hill 4004

Tel: +61 7 3831 6744
Fax: + 61 7 3832 3627

ABN 54 010 830 421

www.wbmpl.com.au

Document :	R.B18104.003.01.P2_HAY_RED_Calibration_Feasibility_Report_doublesided.doc
Project Manager :	Richard Sharpe
Client :	Moreton Bay Regional Council
Client Contact:	Steve Roso
Client Reference	Regional Floodplain Database

Title :	Calibration Feasibility Report Hays Inlet and Redcliffe Catchments Regional Floodplain Database Stage 2
Author :	Richard Sharpe \ Anne Kolega
Synopsis :	Calibration Feasibility Report including the review of available rainfall and river gauge data for the calibration of the combined hydrologic and hydraulic models developed for the Hays Inlet and Redcliffe catchment for Moreton Bay Regional Councils RFD Stage 2.

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LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

1.1 Background

Moreton Bay Regional Council (MBRC) is currently undertaking Stage 2 of developing a Regional Floodplain Database (RFD). The RFD includes the development of coupled hydrologic and hydraulic models for the entire local government area (LGA) that are capable of seamless interaction with a spatial database to deliver detailed information about flood behaviour across the region.

Stage 2 includes the detailed hydrologic and hydraulic modelling of 5 packages, which cover 11 catchments in MBRC LGA. This *Calibration Feasibility report* forms part of the hydrologic and hydraulic modelling report of the Hays Inlet and Redcliffe catchments RFD Stage 2, Package 2. Through Stage 2 of the RFD, hydraulic models of the Hays Inlet and Redcliffe catchments will be developed. The aim of this assessment is to investigate the feasibility of calibrating these hydraulic models by considering the quantity and quality of rainfall gauge, river gauge and other information on flooding in the catchments.

1.2 Scope

The scope of this calibration feasibility assessment and report can be summarised as follows:

- Review available information on historical flooding provided by MBRC sourced from MBRC and Queensland Department of Environment and Resource Management (DERM);
- Collect river stream gauge data available from the Bureau of Meteorology (BoM);
- Document available data for model calibration, such as rainfall and river levels; and
- Assess the feasibility of using recorded data from historical flood events to calibrate the Hays Inlet and Redcliffe hydraulic models.

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2 HISTORICAL FLOODING

The Redcliffe peninsular has a number of canals and drains that are susceptible to the ingress of sea water or backup of rainfall runoff in the drains during high tides. King tides are known to cause some flooding in the streets of Redcliffe. Rainfall records in the catchment that have been reviewed as part of this assessment (first gauges installed in 1970) suggest that the most significant rainfall events were in 1974, 1980 and 1981.

The Hays Inlet estuary flows into Bramble Bay. As such the lower reaches of the Saltwater and Freshwater Creeks may be susceptible to flooding during high tides and ocean storm surges. The rainfall records reviewed as part of this assessment (first gauges installed in 1970) suggest that the Hays Inlet catchment's most significant rainfall event occurred in 1974. A number of rainfall events have occurred in the catchment, but none in the reviewed records stand out as being especially large and infrequent. This suggests that a large infrequent rainfall event has not occurred in the catchment since the rainfall gauges were installed in 1970.

It is noted that the Pine River and the Caboolture River catchments recorded major rainfall depth in January 2011, resulting in the highest river levels on record for the Caboolture River. However this event did not result in large amounts of rainfall (or flooding issues) in the Hays Inlet and Redcliffe catchments.

3 AVAILABLE DATA

3.1 Stream Gauge Data

Stream data received from MBRC were reviewed and none was identified to be located within the Hays Inlet or Redcliffe catchment areas. BoM's river data stations were also reviewed online (*Source: http://www.bom.gov.au/qld/flood/seast.shtml*) with no gauge stations found within the catchment areas.

3.2 Rainfall Data

Rainfall gauge data was provided by MBRC comprising the three categories:

- Rainfall Daily;
- Rainfall Alert; and
- Pluviometer (6-minute interval records).

Review was undertaken to identify relevant rainfall data from stations that are located within the Hays Inlet and Redcliffe catchments. Table 3-1 summarises the rainfall data owned by BoM and provided by MBRC for the Hays Inlet and Redcliffe catchments, and Figure 3-1 highlights the gauge locations.

Table 3-1 Rainfall Data Summary

Sensor Name	Sensor Type	BoM Station	Start Date	End Date
Lipscombe Road AL	Rainfall Alert	540445	06/2008	09/2009
Bramble Bay Bowling Club	Rainfall Daily	40807	03/1990	02/1998
Clontarf	Rainfall Daily	40965	01/1987	ongoing
Mango Hill	Rainfall Daily	40986	11/1979	03/2009
Narangba Railway Station	Rainfall Daily	40159	01/1970	10/1986
Margate Collins St	Rainfall Daily	40180	11/1886	ongoing
Redcliffe Council	Rainfall Daily	40697	02/1981	11/2004
Margate Collins St	Pluviometer	40180	03/1963	05/1989
Redcliffe	Pluviometer	40958	11/2004	ongoing
Redcliffe Council	Pluviometer	40697	05/1989	11/2004

3.3 Maximum Height Indicators

Maximum height indicators from MBRC were reviewed. The gauge stations identified within the Hays Inlet catchment are listed in Table 3-2 and shown in Figure 3-1. These height indicators are typically used for road safety purposes and are not appropriate for hydraulic model calibration.

Table 3-2 Maximum Height Indicators Summary

Creek	Location	Level RL
Black duck Creek	Brays Road	9.2
Freshwater Creek	Halpine Dam Spillway	18.5
Freshwater Creek North	Duffield Road	12.1
Freshwater Creek South	Brays Road	7.9
Saltwater creek - Tributary C	North Lakes Golf Course	18.6

3.4 Water Quality Event Monitoring

MBRC has installed a number of Water Quality Event Monitoring data which were also reviewed for utilisation during model calibration. Gauge stations identified within Hays Inlet catchment are listed in Table 3-3.

Table 3-3 Water Quality Event Monitoring Summary

Creek	Location
Saltwater Creek - Tributary C	Kinsellas Road West - Mango Hill
Saltwater Creek - Tributary A	North Ridge Circuit - North Lakes
Freshwater Creek	Bruce Highway - Murrumba Downs
Freshwater Creek - Black Duck 1	Ogg Road - Murrumba Downs
Freshwater Creek - Black Duck 2	McClintock Drive - Murrumba Downs
Freshwater Creek - Halpine Dam	Freshwater Creek Road - Mango Hill
Freshwater Creek - Halpine Dam	Freshwater Creek Road - Mango Hill
Saltwater Creek - Tributary A	Goodwin Road - Narangba
Saltwater Creek - Tributary B	Bounty Boulevard -North Lakes

These gauges record water levels, rainfall and turbidity and were installed in 2007 (except for the Saltwater Creek Tributary C gauge in the North Lakes Development which was installed in 1990). The gauge data may be used as additional information on flood levels for model calibration. The gauge locations are illustrated in Figure 3-1.

3.5 Historic Flood Levels

It is noted that the former Caboolture Shire Council has a database relating to historical flood events for the Caboolture River catchment. However, a similar database was unavailable from the former Pine Rivers Shire Council or the Redcliffe City Council for the Hays Inlet and Redcliffe catchments.

3.6 Resident Survey

MBRC have issued a questionnaire to residents to collate historical flood information, such as flood extents, levels (if available), flood marks and photos. This survey was first undertaken in 2010. Due to the flood event in the Pine River and the Caboolture River in January 2011, MBRC issued another media release to the community through the local newspaper that asks for provision of any available flood information to Council. This data is currently being collated by MBRC through the RFD project website. Information can be provided via E-mail (flood@moretonbay.qld.gov.au or an on-line Flood Data Form (http://www.moretonbay.qld.gov.au/general.aspx?ekfrm=74810&libID=77442).

As mentioned in Section 2, the January 2011 event did not record major rainfall (and no major flooding issues) in the Hays Inlet and Redcliffe catchments. Therefore model calibration using data collected from the resident survey for this recent event will not be feasible.

LEGEND

- Redcliffe Catchment
- Hays Inlet Catchment
- 100 Year Embedded Design Storm Flood Extent (Based on Broadscale Model)
- Rainfall Gauges (Alert)
- Rainfall Gauges (Daily)
- Rainfall Gauges (Pluviometer)
- Water Quality Event Monitoring Gauges
- Maximum Height Indicators

Title:

Rainfall and River Stream Gauge Locations Hays Inlet and Redcliffe Catchments

Figure: 3-1

Rev: A

N

0km 1 2

Approx. Scale

BMT WBM
www.bmtwbm.com.au

Filepath : I:\B18104_I_BRH Moreton Bay AK\DRG\Calibration_Report\FLD_002_20110118_HAY_RED_Calibration.wor

4 CONCLUSIONS AND RECOMMENDATIONS

River gauge data is crucial for a high quality model calibration due to the ability to not only calibrate to the peak flood level, but also to the flood volume and the timing. The number of available gauges across the catchment also has a great effect on the quality of model calibration; generally the more gauge data available the better, and a good spread of the gauges over various tributaries in the catchment is also advantageous.

The severity of the flood is also important. For this particular study a minor flood event (e.g. the 5 or 10 year ARI event) is less useful for calibration compared to larger flood events (e.g. 50 or 100 year ARI event). This is because the study includes modelling of large flood events, and calibrating to large flood events will test both in-bank and out-of-bank flow in the hydraulic model.

There are three pluviometers in the Redcliffe catchment that would enable catchment inflows into the hydraulic models to be determined for various historic events. However there is no river level data in Redcliffe. Therefore it will only be feasible to calibrate the Redcliffe hydraulic model if a reliable dataset of a large number of flood levels from historic flood events would be available. This is not the case and therefore calibration of the combined hydrologic and hydraulic models is not recommended

In the Hays Inlet catchment there are two daily rainfall gauges. The availability of rainfall data is therefore limited, which will inhibit the ability to development representative historical inflows into the hydraulic model. The availability of water level data in the catchment is also limited, but some does exist through water quality event monitoring gauges. There are nine such gauges in the Hays Inlet catchment. Most of these gauges were installed in 2007 with the exception of the Saltwater Creek Tributary C gauge in the North Lakes Development which was installed in 1990. It is acknowledged that for future flood events this data may be used to undertake a calibration (depending on the interval of the data recording). However no significant flood events have occurred since installation of the gauges in 2007. The quality of calibration data available from the water quality monitoring gauges will depend on the record frequency (daily, hourly, etc) and calibration may therefore not be worthwhile.

Based on the conclusions above it is recommended that calibration on the Hays Inlet and Redcliffe catchments is not feasible and should therefore not be carried out.

It is further recommended that:

- As the river height data recorded by these gauges may be used for both water quality and hydraulic model calibration, it is recommended that review of the water quality monitoring gauges is undertaken, in particular the recording frequency of the river levels.. Collection of a detailed time series of river height data is useful for model calibration so that the water volume and timing in the model can be checked as well as the peak flood levels; and
- A number of river height gauges be installed in the Hays Inlet and Redcliffe catchments.

5 REFERENCE

Bureau of Meteorology, 2011, *Water Resources Station Catalogue*, viewed 18 January 2011, <http://www.bom.gov.au/hydro/wrsc>

Moreton Bay Regional Council, 2011, *Share your flood data*, viewed 18 January 2011, <http://www.moretonbay.qld.gov.au/general.aspx?ekfrm=74810&libID=77442>

BMT WBM Brisbane
Level 8, 200 Creek Street Brisbane 4000
PO Box 203 Spring Hill QLD 4004
Tel +61 7 3831 6744 Fax +61 7 3832 3627
Email bmtwbm@bmtwbm.com.au
Web www.bmtwbm.com.au

BMT WBM Denver
8200 S. Akron Street, Unit 120
Centennial Denver Colorado 80112 USA
Tel +1 303 792 9814 Fax +1 303 792 9742
Email denver@bmtwbm.com
Web www.bmtwbm.com.au

BMT WBM Mackay
Suite 1, 138 Wood Street Mackay 4740
PO Box 4447 Mackay QLD 4740
Tel +61 7 4953 5144 Fax +61 7 4953 5132
Email mackay@bmtwbm.com.au
Web www.bmtwbm.com.au

BMT WBM Melbourne
Level 5, 99 King Street Melbourne 3000
PO Box 604 Collins Street West VIC 8007
Tel +61 3 8620 6100 Fax +61 3 8620 6105
Email melbourne@bmtwbm.com.au
Web www.bmtwbm.com.au

BMT WBM Newcastle
126 Belford Street Broadmeadow 2292
PO Box 266 Broadmeadow NSW 2292
Tel +61 2 4940 8882 Fax +61 2 4940 8887
Email newcastle@bmtwbm.com.au
Web www.bmtwbm.com.au

BMT WBM Perth
Unit 6, 29 Hood Street, Subiaco 6008
Tel +61 8 9322 1577 Fax +61 8 9226 0832
Email perth@bmtwbm.com.au
Web www.bmtwbm.com.au

BMT WBM Sydney
Level 1, 256-258 Norton Street Leichhardt 2040
PO Box 194 Leichhardt NSW 2040
Tel +61 2 9713 4836 Fax +61 2 9713 4890
Email sydney@bmtwbm.com.au
Web www.bmtwbm.com.au

BMT WBM Vancouver
401 611 Alexander Street Vancouver
British Columbia V6A 1E1 Canada
Tel +1 604 683 5777 Fax +1 604 608 3232
Email vancouver@bmtwbm.com
Web www.bmtwbm.com.au