

Moreton Bay Rail Project

Independent Hydraulic Review

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
ABBREVIATIONS AND ACRONYMS	4
1. INTRODUCTION	5
1.1 Objectives of the Project.....	5
1.2 Probability Terminology.....	5
2. BACKGROUND AND DATA	7
2.1 Overview of Methodology	7
2.2 Previous Flood Studies.....	11
2.3 Models.....	11
2.4 Hydrology Data	12
2.5 Flood Observations and Survey	19
3. COMMUNICATIONS AND STAKEHOLDER ENGAGEMENT	24
4. HYDROLOGY	25
4.1 Introduction	25
4.2 1 st May 2015 Rainfall.....	26
4.3 Estimation of Probability of 1 st May 2015 Rainfall.....	28
4.4 Supplementary Rainfall Assessments	28
4.5 Summary.....	29
4.6 WBNM Hydrologic Model	37
4.6.1 Rainfall Parameters.....	37
4.6.2 Catchment Conditions.....	37
4.6.3 Rainfall Losses.....	37
4.6.4 Storm Events and Durations	37
4.7 Results and Conclusions.....	38
4.7.1 Hydrograph Routing.....	38
5. HYDRAULICS	41
5.1 Introduction	41
5.2 Existing Base condition	42
5.2.1 Model Extent	42
5.2.2 Grid Size and Time Step	42
5.2.3 Base Topography and Bathymetry	43
5.2.4 Detailed Survey.....	43
5.2.5 Model Boundaries	43
5.2.6 Existing Hydraulic Structures	44
5.2.7 Roughness	44
5.2.8 Existing Base condition results	50
5.2.9 Discussion.....	50
5.3 Developed condition	56
5.3.1 Developed condition Results	57
5.4 Calibration	64
5.5 Flood Impacts	73

6.	CONCLUSIONS	83
7.	REFERENCES	85
8.	APPENDICES	86

LIST OF FIGURES

Figure 1 – Locality Plan	9
Figure 2 – Extent of Survey Works	10
Figure 3 – Catchment Plan	14
Figure 4 – Cumulative Rainfall on 1 st May 2015	15
Figure 5 – Gauge and tide levels recorded on 1 st May 2015.	16
Figure 6 – Radar Image captured on 1 st May 2015 (used with permission of BoM)	17
Figure 7 – Blended half-hourly rainfield data grid for 1 st May 2015 (used with permission of BoM)	18
Figure 8 – Photos taken during site visits	23
Figure 9 – Total Rainfall depths recorded during the 1 st May 2015 event within Saltwater Creek catchment	27
Figure 10 – Comparison of maximum bursts recorded during the 1 st May 2015 and IFD curves gauges closest to Saltwater Creek catchment	32
Figure 11 – Comparison of maximum bursts recorded during the 1 st May 2015 and IFD curves for other gauges surrounding Hays Inlet catchment	34
Figure 12 – Comparison of maximum bursts recorded during the 18 th February 2015 and IFD curves for Deception Bay ALERT gauge	35
Figure 13 – Cumulative Rainfall on 18 th February 2015 around Hays Inlet catchment	36
Figure 14 – WBNM Model setup	39
Figure 15 – Resulting hydrographs upstream of Anzac Avenue (Sub-catchment SWC_01_08554)	40
Figure 16 – Comparison of hydraulic model extents, Saltwater Creek catchment	46
Figure 17 – TUFLOW Hydraulic Model Setup, Existing Base condition	47
Figure 18 – Terrain representation, TUFLOW hydraulic model, Existing Base condition	48
Figure 19 – Land-use distribution, TUFLOW hydraulic model, Existing Base condition	49
Figure 20 – 1% AEP design event (1 hour, 3 hours and 6 hours), Peak water level, Existing Base condition	51
Figure 21 – 1% AEP design event (1 hour, 3 hours and 6 hours), Peak water depth, Existing Base condition	52
Figure 22 – 1 st May 2015 event, Peak water level, Existing Base condition	53
Figure 23 – 1 st May 2015 event, Peak water depth, Existing Base condition	54
Figure 24 – Peak water level profiles along Saltwater Creek Centreline, Existing Base condition	55
Figure 25 – Saltwater Creek hydraulic model setup, Developed condition	58
Figure 26 – 1% AEP design event (1 hour, 3 hours and 6 hours), Peak water level, Developed condition ..	59
Figure 27 – 1% AEP design event (1 hour, 3 hours and 6 hours), Peak water depth, Developed condition ..	60
Figure 28 – 1 st May 2015 event, Peak water level, Developed condition	61
Figure 29 – 1 st May 2015 event, Peak water depth, Developed condition	62
Figure 30 – Difference in Water levels, 1% AEP and 1 st May 2015 event, Developed vs Existing Base conditions	63
Figure 31 – Comparison of modelled and surveyed levels, 1 st May 2015 Event, Existing Base condition vs Developed condition	72
Figure 32 – Afflux, 1% AEP event, Developed vs Existing Base condition	80
Figure 33 – Afflux, 1 st May 2015 event, Developed condition vs. Existing Base condition	81
Figure 34 – Water level and Afflux profiles along Creek centreline, 1 st May 2015 event, Existing Base and Developed conditions	82

LIST OF TABLES

Table 1 - Conversions ARI to AEP	6
Table 2 – Summary of previous model assumptions and limitations	12
Table 3 – Details of rainfall/level ALERT gauges	13
Table 4 – Details of Scarborough Tidal beacon	13
Table 5 – Surveyed Flood debris marks, floor and ground levels	19
Table 6 – Hourly and total rainfall depths recorded during the 1 st May 2015 event	26
Table 7 – Adopted Manning’s n values	45
Table 8 – Summary of flood level increases during 1 st May 2015 and 1% AEP events	73
Table 9 – Comparison of results with surveyed levels, 1 st May 2015 event	75
Table 10 – Number of properties with observed impacts and field surveyed flood debris	79

EXECUTIVE SUMMARY

SMEC Australia Pty Ltd (SMEC) was appointed by the Department of Transport and Main Roads (TMR) to undertake an Independent Hydraulic Review of the possible impacts on flooding from the construction works associated with Moreton Bay Rail Project (MBR) in response to the rainfall event that occurred on the 1st May 2015.

The purpose of the independent review was to undertake hydrological and hydraulic modelling in order to determine if the MBR project affected water levels in the area during the 1st May 2015 rainfall event. The Terms of Reference for the project limited the review to the Saltwater Creek catchment only in the suburbs of Rothwell, Mango Hill and Deception Bay. The review consisted of undertaking hydrological and hydraulic analysis using the rainfall scenarios of a 1% Annual Exceedance Probability (AEP) and the 1st May 2015 flood events. These scenarios were used to determine the water levels in the Saltwater Creek catchment under the following conditions:

- *Existing Base condition* - Analysis without the inclusion of works associated with the Moreton Bay Rail Project i.e. what would the water levels be in the Saltwater Creek catchment if there was no construction of the project?
- *Developed condition* - Analysis with the inclusion of the Moreton Bay Rail Project works which were in place at the time of the rainfall event on the 1st May 2015 i.e. has the Moreton Bay Rail Project contributed to a rise in water levels compared to the original base condition?

As part of the review a communication and stakeholder engagement strategy was developed and implemented by SMEC in consultation with affected property owners, businesses and other key stakeholders undertaken from May 2015 to July 2015. This consultation process included face to face meetings and surveys with directly affected residents. The review was published widely and there was an open invitation for affected residents to contribute. In addition individual letters were delivered to the identified affected residents.

A total of 58 surveys with residents and other stakeholders were undertaken to gather information to assist in informing the review process. The review was publicised widely and there was an open invitation for affected residents to contribute. In addition, individual letters were delivered to all initially identified affected properties.

As well as data obtained from the community, information was also supplied by Moreton Bay Regional Council (MBRC), the Bureau of Meteorology (BoM) and other agencies and sources holding data relating to flood levels and rainfall relevant to the 1st May 2015. To supplement and validate this information detailed field survey was completed within the review area during June 2015. This field survey was undertaken to assist in accurately representing the MBR project works at the time of the 1st May 2015 in the hydraulic model. Survey of observed flood debris marks were also obtained from impacted resident's properties and within other areas along the Saltwater Creek flood plain to assist in calibrating the flood model.

The rainfall analysis and review indicated that for the critical durations for the Saltwater Creek catchment (between 3 and 6 hours), the AEP for the 1st May 2015 rainfall event was in excess of the 1% AEP design event and close to the 0.1% AEP design event.

It is noted that this event was also significantly larger than the 18th February 2015 rainfall event from Cyclone Marcia which was estimated at being just larger than the 2% AEP design event.

The 1st May 2015 rainfall and consequent flood therefore was an extreme event, larger than the 1% AEP event normally used for planning and infrastructure design.

The existing base condition and developed condition hydraulic models were calibrated to reflect the surveyed flood debris marks and anecdotal information from the community surveys. The calibration process resulted in an acceptable correlation with measured levels at most locations. The calibration exercise also included changes to various model parameters to improve the representation of the Saltwater Creek catchment conditions in terms of the roughness values and terrain through recently completed Light Detection and Ranging (LiDAR) survey and supplemented with the detailed field survey undertaken for this review.

Afflux calculated by comparing resulting water levels from the existing base and developed conditions indicate the MBR project works increased the flood levels upstream of project works within the Saltwater Creek catchment during the 1st May 2015 event. The magnitude of the increase varies depending on the location within the catchment and are summarised below:

- There was no increase in flood levels upstream of Greene Street, Rothwell including Major Street and properties further upstream;
- There was an afflux affecting properties at and near Mary Street, Mango Hill. The water level observed was approximately 4.2 mAHD and of this 35 mm can be attributed to the MBR Project;
- There was an afflux affecting properties in McGahey Street, Rothwell. The water level observed was approximately 3.92 mAHD and of this 90-100 mm can be attributed to the MBR Project;
- There was an afflux affecting properties at Anzac Avenue, Rothwell. The water level observed was approximately 3.91 mAHD and of this 90-105 mm can be attributed to the MBR Project; and
- Higher localised affluxes not affecting properties occurred within the downstream section of the floodplain.

The afflux can be attributed to the following MBR Project works which were under construction at the time of the 1st May 2015 storm event:

- The Saltwater Creek railway bridge and railway embankments resulted in localised afflux which did not affect properties and was contained within the floodplain;
- The local access road and carpark for the MBR Rothwell Station which will become part of the MBR project's permanent works. This access road has restricted flows entering the south eastern tributary of Saltwater Creek and flows at the southern side of Anzac Avenue;
- Temporary works along Anzac Avenue generally associated with the temporary concrete barriers restricting flows across Anzac Avenue; and
- Temporary construction works between the eastbound and westbound carriageways of Anzac Avenue which consisted of sheet piling, earthworks and culvert works restricting flows between Anzac Avenue.

It should be noted that 85 residential properties are located in the area where flood levels were increased by MBR works during the 1st May 2015 storm event and of these 49 were located in the area affected in the 1% AEP storm event. All of these properties would have experienced flooding on the 1st May 2015 even without the influence of the MBR project works.

ABBREVIATIONS AND ACRONYMS

Abbreviation/ Acronym	Description
AAJV	AECOM Aurecon Joint venture
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ALERT	Automated Local Evaluation in Real Time
AM	Ante Meridiem
ARI	Average Recurrence Interval
ARR	Australian Rainfall and Runoff
BoM	Bureau of Meteorology
CSE	Communication and Stakeholder Engagement
DSITI	Department of Science, Information, Technology and Innovation
IFD	Intensity-Frequency-Duration
LiDAR	Light Detection and Ranging
m	Metres
MBR	Moreton Bay Rail Project
MBRC	Moreton Bay Regional Council
mm	Millimetres
PMF	Probably Maximum Flood
RDA	Rapid Damage Assessment
PM	Post Meridiem
SMEC	SMEC Australia Pty Ltd
TMR	Department of Transport and Main Roads
ToR	Terms of Reference
WBNM	Watershed Bounded Network Model

1. INTRODUCTION

1.1 Objectives of the Project

The purpose of the independent review was to undertake hydrological and hydraulic modelling in order to determine if the MBR affected water levels in the Saltwater Creek catchment area during the 1st May 2015 rainfall event. The review was limited to the Saltwater Creek catchment only in the suburbs of Rothwell, Mango Hill and Deception Bay. The full scope of the review is provided in the ToR contained in Appendix A.

1.2 Probability Terminology

The ARI and the AEP are both a measure of the rarity of a rainfall or flood event. ARI is a likelihood of occurrence, expressed in terms of the long-term average number of years, between rainfall/flood events as large as or larger than a given design rainfall or flood event. This means, that the probability of an event of a given magnitude being equalled or exceeded in a given period of time is unchanged throughout the life of the structure or the drainage network.

ARI is often misinterpreted as a magnitude which is only exceeded at regular intervals or that it refers to the elapsed time to the next exceedance. Despite the connotations of the name "Average Recurrence Interval", a 100 year ARI event will not happen regularly every 100 years, or only once in 100 years. In any given 100 year period, a 100 year ARI event may occur once, twice, several times, or not at all.

As the use of the ARI terminology often leads to confusion, the AEP terminology was adopted throughout the present study where AEP expresses the probability or chance of a particular rainfall event occurring or being exceeded in any year. AEP is therefore used since this terminology ensures that the probability is clearly shown as a risk of occurrence in any one year. For example, a 100 year ARI flood has a 1% AEP or chance of being equalled or exceeded in any one year, while a 50 year ARI flood has a 2% chance of being exceeded in any one year. The relationship between ARI intervals and AEP values is presented below in Table 1.

The use of AEP's is now recommended by Australian Rainfall and Runoff (AR&R), Australia's guide for flood estimation.

Table 1 - Conversions ARI to AEP

ARI (YEARS)	AEP (%)
10	10
20	5
50	2
100	1
1000	0.1
2000	0.05
General Equation	$AEP = 1 - \exp\left(\frac{-1}{ARI}\right)$

2. BACKGROUND AND DATA

2.1 Overview of Methodology

The main objective of the present study is to determine if the construction of the MBR exacerbated flooding conditions within the Saltwater Creek catchment during the rainfall event experienced on the 1st May 2015.

Our modelling has relied on information received from many sources and the accuracy or quality of the data obtained could vary and some issues are unknown. A due diligence review of this information was undertaken to confirm that the data used for the review was fit for purpose.

The approach used within this investigation to determine the impact of the MBR project on Saltwater Creek flooding conditions consisted of reviewing and updating the existing hydrologic and hydraulic models previously built by MBRC and subsequently used by the AAJV, the consulting engineers for the MBR project, to simulate the flooding conditions experienced within the Saltwater Creek catchment on the 1st May 2015.

Two scenarios were investigated during this study:

- Existing Base condition - this scenario represents base case conditions of Saltwater Creek floodplain prior to the construction of any infrastructure associated with the MBR project; and
- Developed condition - this scenario comprises all MBR associated infrastructure (temporary and permanent) in place within Saltwater Creek floodplain on the 1st May 2015.

Three different rainfall events were analysed as part of this study:

- 1% AEP design rainfall event;
- 18th February 2015 (Tropical Cyclone Marcia); and
- 1st May 2015.

Hydrologic and hydraulic models received from AAJV were initially reviewed to verify the validity of parameters and assumptions used and also to highlight any potential limitations. After the initial review, the received hydrologic and hydraulic models were updated to simulate the 1st May 2015 flood event and to more accurately represent current floodplain conditions within the model.

In order to have an accurate representation of existing structures and permanent road furniture that might have impacted on flows within the Saltwater Creek floodplain at the time of the 1st May 2015 flood event, detailed survey was commissioned to inform this study.

It should be noted, that the commissioned survey focused on floodplain features either existing or associated with the MBR project that could potentially impact flows within Saltwater Creek floodplain and as such was restricted to the nominated locations where floodplain conditions have been modified as part of the MBR project.

Floodplain locations outside the scope of the ToR for this project or not altered by the MBR project were not included within the scope of the survey.

Flood debris marks observed at locations affected during the 1st May 2015 event along the Saltwater Creek floodplain were also surveyed to provide actual data for model calibration. This included obtaining survey of flood debris marks at private properties and within publicly assessable areas along Saltwater Creek and within the MBR project site. Figure 1 shows the project locality plan indicating project works included in this review while Figure 2 shows the location of the areas surveyed during this study.

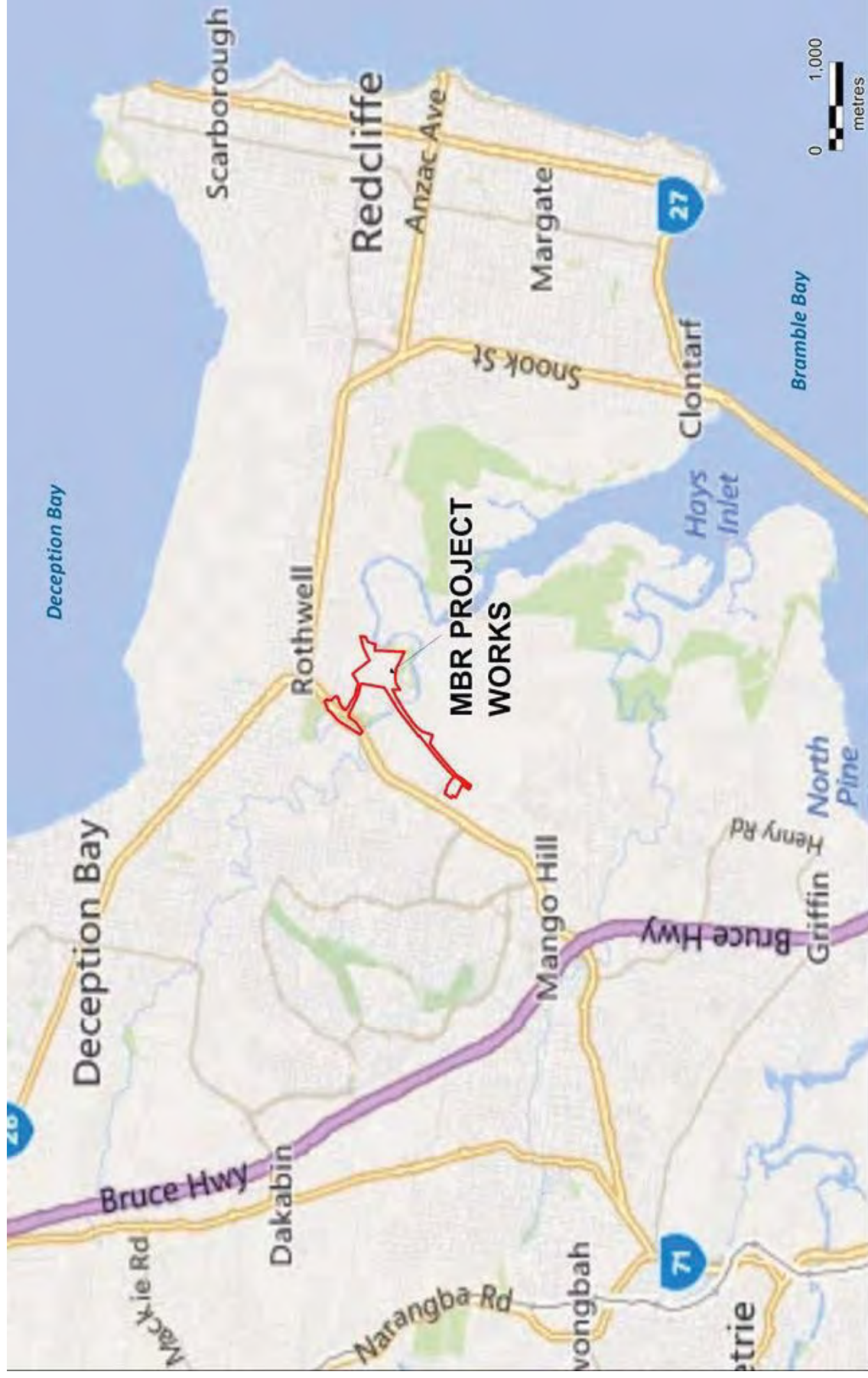


Figure 1 – Locality Plan

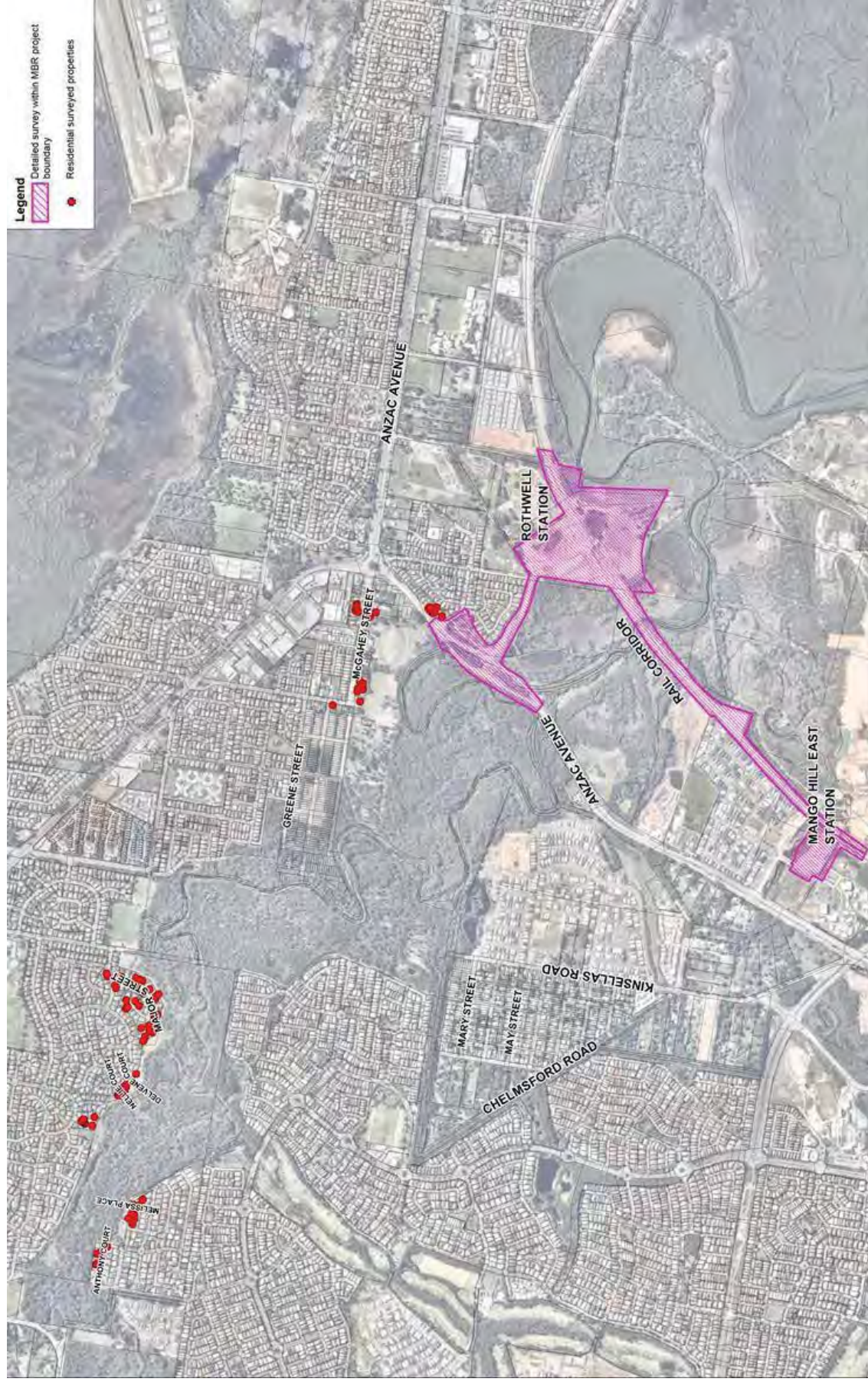


Figure 2 – Extent of Survey Works

2.2 Previous Flood Studies

A number of studies have been undertaken across the Hays Inlet and Saltwater Creek subcatchment. These studies have been commissioned by either MBRC or TMR.

The two most relevant studies conducted for the Saltwater Creek catchment are: *Regional Floodplain Database Hydrologic and Hydraulic Modelling for Hays Inlet (BMT WBM, 2012)*, prepared for MBRC and *Moreton Bay Rail Project, Design report – Hydrology/Hydraulics Lawnton Petrie and Petrie to Kippa-Ring (AAJV, 2014)*, prepared for TMR. These studies form the basis of the present investigation.

The *Moreton Bay Rail Project, Design report – Hydrology/Hydraulics Lawnton Petrie and Petrie to Kippa-Ring (AAJV, 2014)* was used by AAJV to predict impacts associated with the MBR project and inform the detailed design phase of the project.

The AAJV study conducted during the design phase of the MBR project, adopted all significant modelling assumptions from the original MBRC study but specifically focused in the MBR project areas.

It should be noted that the previous studies did not include calibration or validation of modelling results to historical records in the region covered by this investigation.

2.3 Models

Hydrologic and hydraulic models developed as part of previous studies for the Hays Inlet catchment (BMT WBM, 2012) and Saltwater Creek catchment (AAJV, 2014) were provided to SMEC by TMR and AAJV to form the base of the present hydraulic investigation.

MBRC originally commissioned the development of a Watershed Bounded Network Model (WBNM) hydrologic model and a 1D/2D hydrodynamic TUFLOW model (BMT WBM, 2012). The hydraulic model is based on LiDAR data captured in 2009 and adopted a land use configuration and model parameters based on a set of parameters that were consistently applied over the entire MBRC area (SKM, 2010) and that are not necessarily exclusive to Hays Inlet catchment conditions.

Both models (hydrologic and hydraulic) were adopted and modified in 2014 by AAJV in order to conduct the flood impact assessment for the design phase of the MBR project. In particular, the TUFLOW hydrodynamic model was modified to allow shorter run times to assist in an iterative design approach at different locations and to highlight particular areas of concern. The vast majority of the original modelling parameters (roughness, inflows, base topography) were unchanged, however the original models were updated to reflect surveyed features within the MBR project areas. The original WBNM hydrologic model was also revised as part of the MBR project, to improve partitioning and representation of small local catchments draining into the proposed MBR alignment.

The main limitations and assumptions of the received hydrological and hydraulic models corresponding to previous studies are summarised below in Table 2.

Table 2 – Summary of previous model assumptions and limitations

MBRC(2012)	AAJV (2014)
WBNM Hydrologic Model	
WBNM Hydrologic model of Hays Inlet catchment	WBNM Hydrologic model of Hays Inlet catchment
No calibration or validation due to lack of available data	MBRC WBNM model adopted. Only minor changes were performed on subcatchments intersected by the MBR alignment. No calibration or validation due to lack of available data
Two catchment conditions were assessed (Existing and Ultimate)	Ultimate catchments conditions were used
WBNM hydrological model local subcatchment flows routed within the TUFLOW hydraulic model.	Combination of local subcatchment flows and inflows extracted from entire Hays Inlet model being input into the TUFLOW hydraulic model.
TUFLOW Hydraulic Model	
TUFLOW Hydrodynamic model of entire Hays Inlet catchment	TUFLOW Hydrodynamic model of Saltwater Creek catchment. Model extent shortened and inflows modified to Saltwater Creek only.
Topography based on LiDAR captured on 2009. No bathymetry is included in model.	No change
No calibration or validation due to lack of available local data	No change
Land-use categorisation including depth varying roughness. Presumably based on 2009 imagery.	No change
Model extent includes entire Hays Inlet catchment	Shortened models were validated against entire Hays Inlet catchment model results for the 1% AEP event only. Resulting water levels differed from original results by approximately +/- 50 mm.
Only base case floodplain conditions were considered	After validation, models were updated with detailed survey and design grids to represent base case (Pre-MBR), MBR Temporary works and final (Post-MBR) conditions.
Only design events were included in model (10% AEP to PMF). No historical events were included	Only three design events were investigated (5% AEP, 1% AEP and 0.05% AEP). No historical events included.
Several sensitivity scenarios were also included within the model	Tailwater sensitivity scenarios were considered, a static tailwater level of 2.2 mAHD (representing the 1% AEP Storm Tide Event) was adopted.

2.4 Hydrology Data

Sub-daily rainfall data recorded for 5 minutes time increments between 30th April 2015 and 2nd May 2015 in 10 different ALERT stations located throughout the Hays Inlet catchment area was provided by MBRC. Water levels measured during the same period at the Lipscombe Road ALERT gauge (540445) and Rothwell ALERT gauge (540659) were also provided.

Tidal data recorded during the same period at the closest tidal beacon located at Scarborough was made available by Department of Science, Information, Technology and Innovation (DSITI). Locations of the recording gauges and tidal beacon are shown in Figure 3 while their details are respectively listed in Table 3 and Table 4.

Table 3 – Details of rainfall/level ALERT gauges

Station Number	Station Name	Latitude	Longitude	Rainfall	Levels	Source
540411	Browns Creek Road ALERT	-27.19	152.92	Y	--	MBRC
540619	Burpengary (Mathew Cr) ALERT	-27.16	152.94	Y	--	MBRC
40980	Deception Bay ALERT	-27.18	153.02	Y	--	MBRC
540658	Kallangur ALERT	-27.24	152.99	Y	--	MBRC
540629	Kippa-Ring ALERT	-27.22	153.09	Y	--	MBRC
540439	Lawnton ALERT	-27.28	152.99	Y	--	MBRC
540445	Lipscombe Road ALERT	-27.20	153.01	Y	Y	MBRC
540417	Murrumba Downs ALERT	-27.29	153.02	Y	--	MBRC
540659	Rothwell ALERT	-27.22	153.04	Y	Y	MBRC
540498	Woody Point ALERT	-27.26	153.09	Y	--	MBRC

Table 4 – Details of Scarborough Tidal beacon

Station Name	Latitude	Longitude	Tide Levels	Source
Scarborough Tidal Beacon	-27.19	153.11	Y	DSITI

Cumulative total rainfall for the ten ALERT gauges is plotted in Figure 4. A maximum total rainfall of 353 mm was recorded at the Deception Bay ALERT gauge during the 1st May 2015 event. Lipscombe Road ALERT and Lawnton ALERT stations followed closely recording total rainfalls of 350 mm and 346 mm respectively. Maximum rainfall intensities of about 80 mm/hour (240 mm in 3 hours) were experienced during the most intense burst of the event at Deception Bay, which occurred on 1st May 2015, between 02:00 PM and 05:00 PM (refer to Figure 4).

Figure 6 shows water levels recorded on 1st May 2015 at the two gauges located within Saltwater Creek and at the Scarborough Tidal beacon. It should be noted that all levels (including tides) are reported in mAHD. No recorded flowrates or rating curves for the gauges are available.

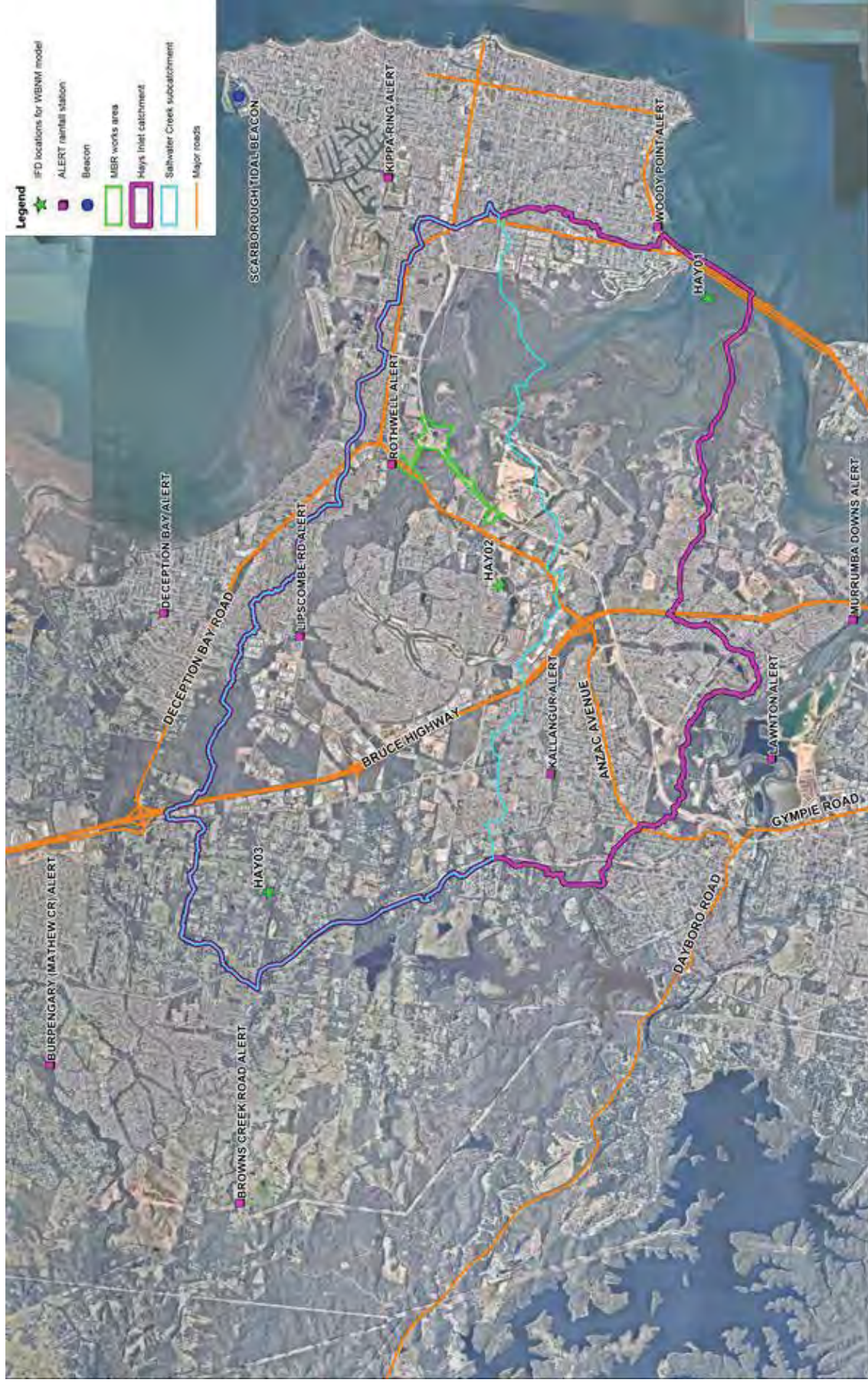


Figure 3 – Catchment Plan

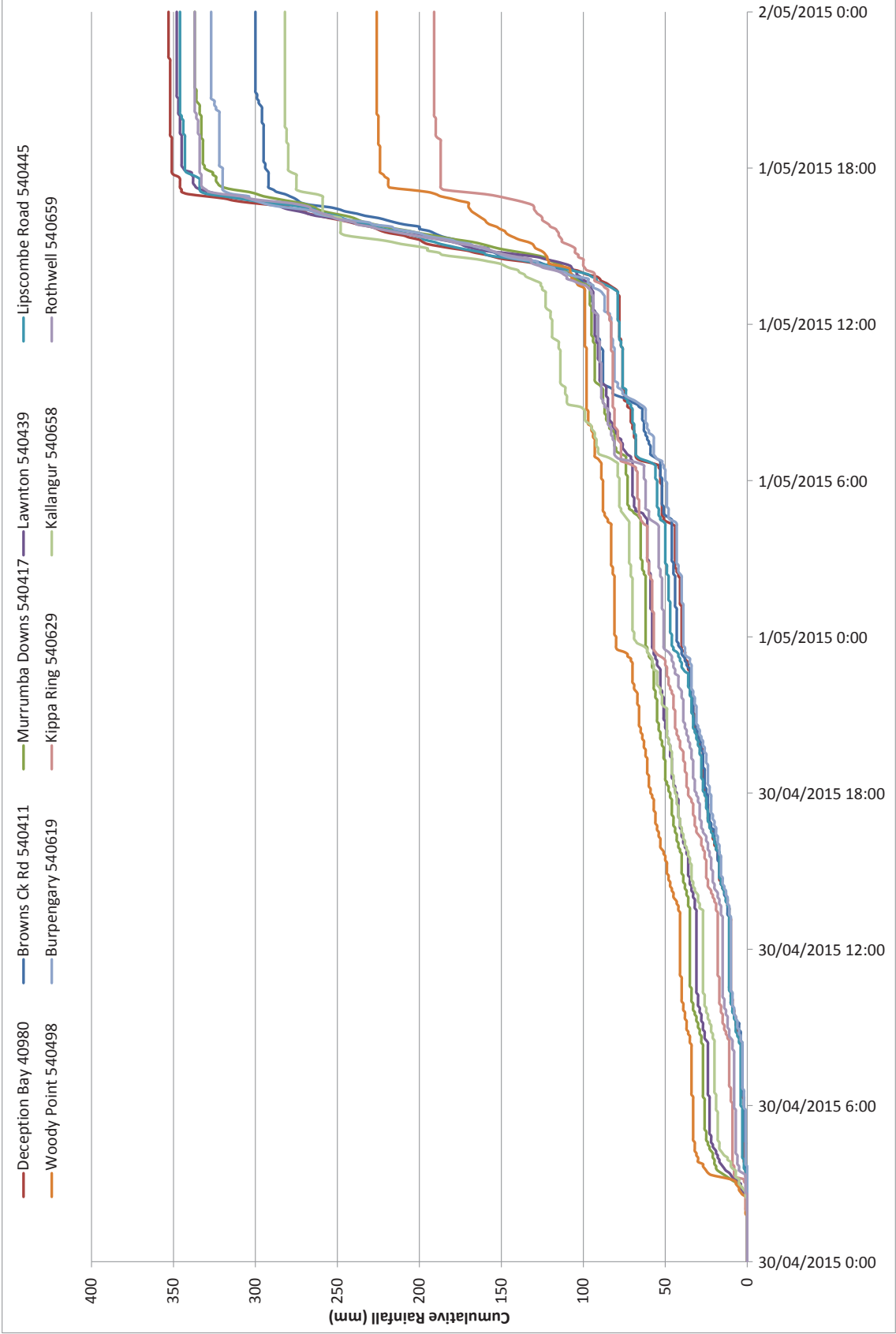


Figure 4 – Cumulative Rainfall on 1st May 2015.

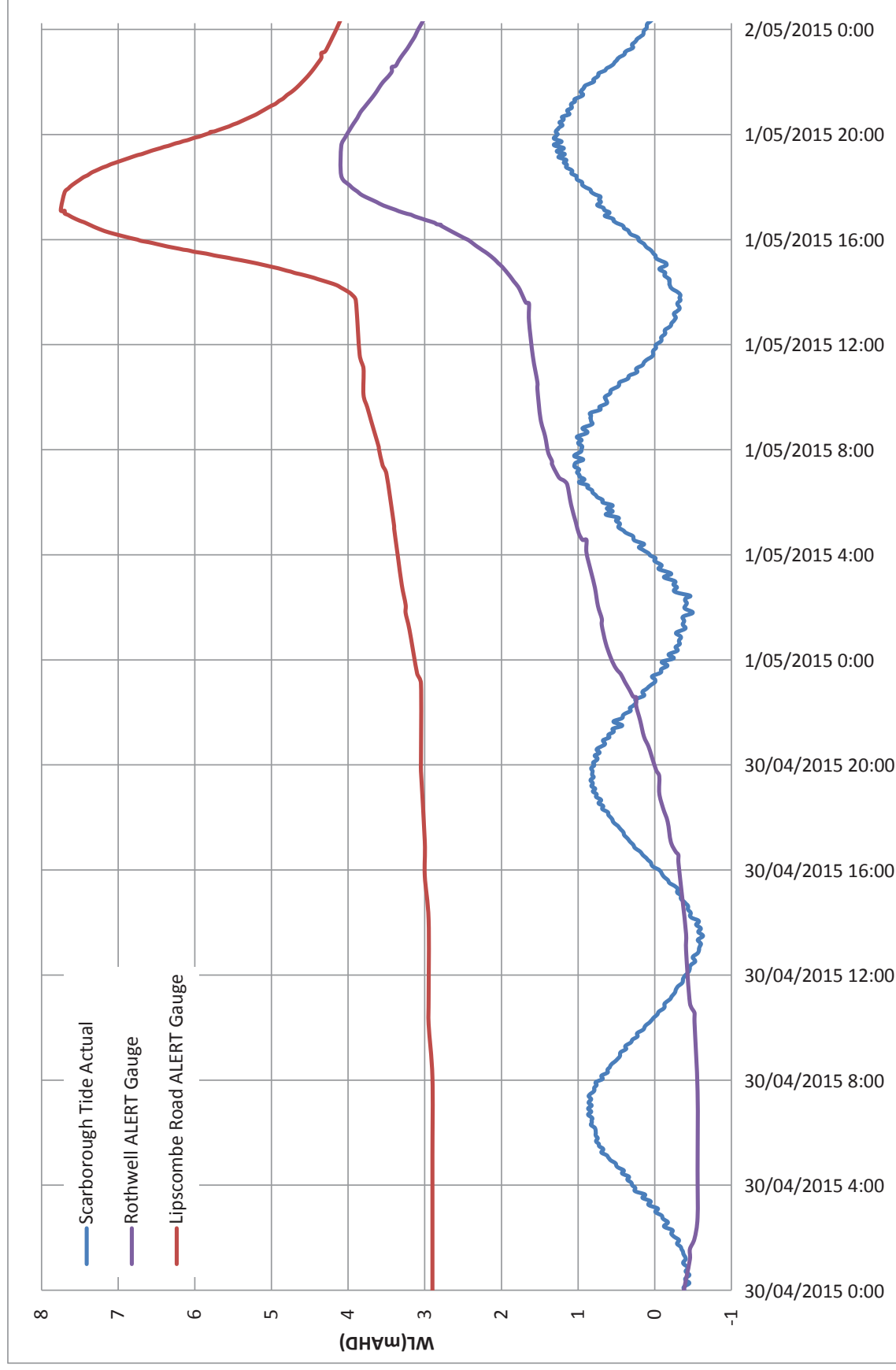


Figure 5 – Gauge and tide levels recorded on 1st May 2015.

Figure 6 and Figure 7 respectively show a radar image and a blended half-hourly rainfield data grid captured on the 1st May 2015 by BoM. They provide an indication of the intensity and magnitude of the rain experienced on the 1st May 2015 across the Saltwater Creek catchment.



Figure 6 – Radar Image captured on 1st May 2015 (used with permission of BoM)

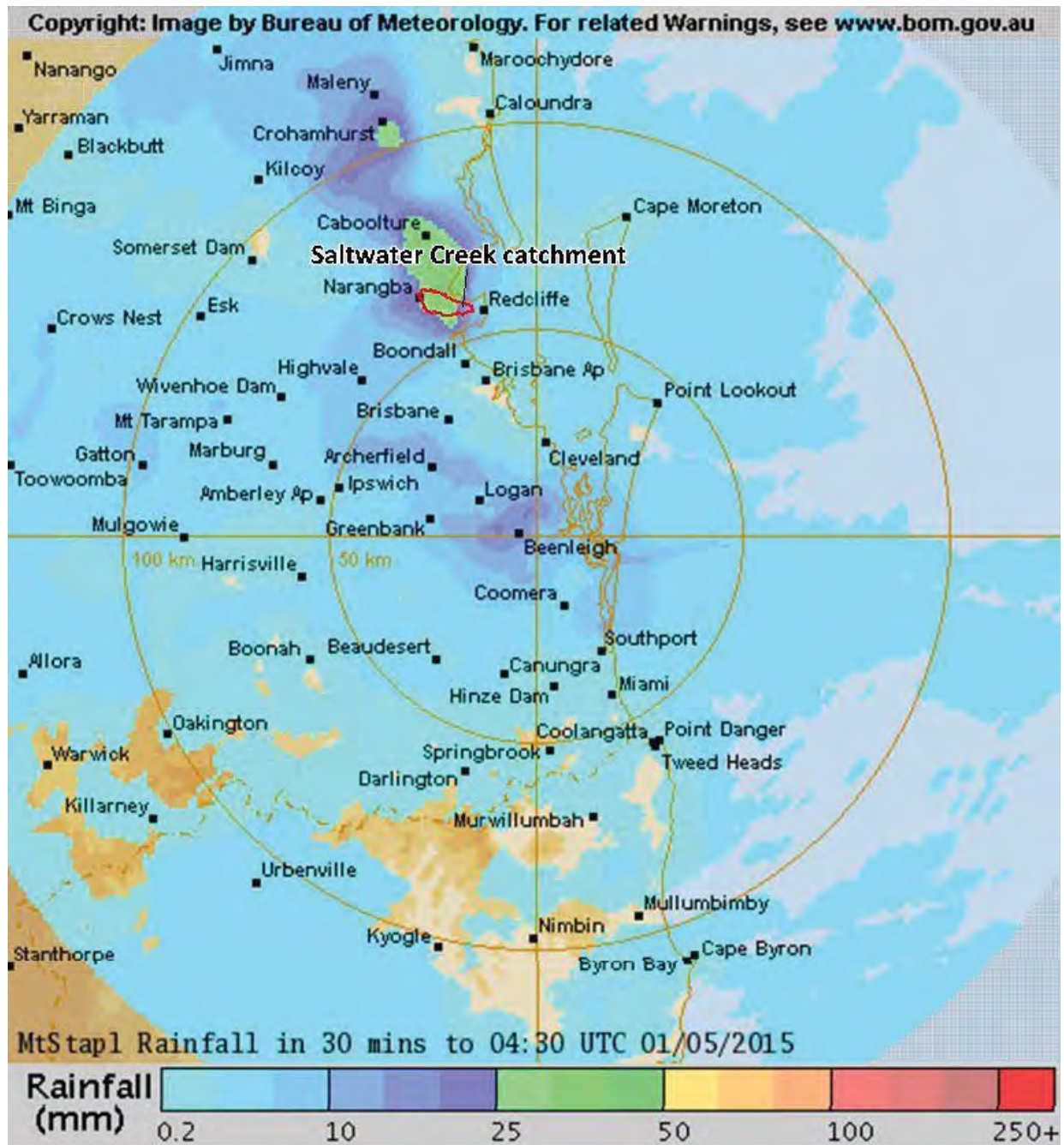


Figure 7 – Blended half-hourly rainfall data grid for 1st May 2015 (used with permission of BoM)

2.5 Flood Observations and Survey

As part of this study, flood debris marks observed at several locations affected during the 1st May 2015 event along the Saltwater Creek floodplain were surveyed by RPS Group and Downes Survey Group to inform this study and provide relevant data for model calibration (refer to Figure 2). Where feasible, habitable floor levels and ground levels were also surveyed.

The streets where flood and ground levels were surveyed include: Major Street, Anthony Court, Nadine Place, Nellie Court, Delvene Court, Melissa Place, Natalie Close and Coman Street in Deception Bay and Anzac Avenue, McGahey Street and Finnegan Street in Rothwell. Selected surveyed levels are included in Table 5. Note that horizontal and vertical accuracy for each of the resulting new control marks were +/- 20 mm and 30 mm respectively.

Other sources have been used within this study to verify surveyed levels and other modelling assumptions made. Nearmap and detailed aerial imagery captured on different dates (19th March 2015, 22nd April 2015 and 4th June 2015) was used to verify the existence of flow impeding structures and infrastructure present within Saltwater Creek catchment before and after the 1st May 2015 flood event.

Video and photographic evidence provided by the community and also collected during site visits, surveys and MBR construction daily diaries were used within this study to help determine the Saltwater Creek floodplain conditions observed during the 1st May 2015 flood event and also to verify presence of infrastructure (existing and associated with the MBR project) that could potentially have impacted water levels during the flood event. Figure 8 shows a selection of photos taken at different points along the Saltwater Creek floodplain.

In addition, the MBRC supplied a table of information collected in their RDA carried out in the days following the flood event. This table included a summary of flood damage and indicative flood heights for properties identified by the council. In general, the properties included in this table were in the same locations as those included in the surveys undertaken by SMEC but also included some additional locations not covered within the SMEC surveyed areas. Data from the RDA at these properties located around Mary Street, Mango Hill was included in the analysis. A copy of the RDA assessment summary is included in Appendix B.

Anecdotal information was also captured by SMEC from the community and other stakeholders at affected locations (see Figure 2). Information in terms of maximum observed depths, timing and duration of flooding and past flooding events was captured and used within this investigation. A comprehensive report summarising all responses gathered by the SMEC community team is included as Appendix D.

Table 5 – Surveyed Flood debris marks, floor and ground levels

Address	Flood Level (mAHD)	Floor Level (mAHD)	Ground Level (mAHD)
Anzac Avenue			
567 Anzac Avenue	3.90	3.49	3.35
569 Anzac Avenue	3.90	3.38	2.84
571 Anzac Avenue	3.92	3.17	2.79

Address	Flood Level (mAHD)	Floor Level (mAHD)	Ground Level (mAHD)
2 Finnegan Street	3.88	3.30	N/A
McGahey Street			
Rothwell Park	3.94	N/A	3.43
14 McGahey Street	3.96	3.54	3.56
15-19 McGahey Street	3.95	2.80	2.75
16 McGahey Street	3.94	3.65	3.51
18 McGahey Street	3.91	3.66	3.41
21 McGahey Street	3.89	2.70	2.53
39 McGahey Street	3.92	3.50	2.06
41 McGahey Street	3.93	2.09	2.27
11 Coman Street	3.95	3.45	N/A
Mary Street			
2 Kinsellas Road West	4.28	N/A	N/A
22 Kinsellas Road West	4.28	N/A	N/A
Major Street			
10 Embassy Street	5.72	5.97	N/A
2 Major Street	5.67	5.32	4.96
3 Major Street	5.77	5.16	4.85
10 Major Street	5.74	5.17	4.93
11 Major Street	5.89	4.89	4.79
13 Major Street	5.72	4.90	4.67
14 Major Street	5.75	5.23	5.14
19 Major Street	5.77	5.00	4.70
23 Major Street	5.79	5.03	4.68
28 Major Street	6.26	5.70	5.35
31 Major Street	5.92	5.03	4.82
35 Major Street	5.93	4.87	4.73
39 Major Street	6.02	4.84	4.34
41 Major Street	6.01	5.17	5.04

Address	Flood Level (mAHD)	Floor Level (mAHD)	Ground Level (mAHD)
43 Major Street	6.03	5.25	5.09
6 Samantha Court	5.88	5.42	5.33
8 Samantha Court	5.84	N/A	5.34
9 Samantha Court	5.88	5.64	5.39
13 Samantha Court	5.77	5.54	5.24
Nadine Place			
3 Delvene Court	6.2	5.98	5.82
9 Nellie Court	6.36	5.65	5.52
12 Nellie Court	6.41	5.76	5.66
6 Nadine Place	6.48	6.58	N/A
7 Nadine Place	6.53	6.75	N/A
8 Nadine Place	6.55	6.30	3.27
Anthony Court			
4 Melissa Place	6.57	6.51	6.18
5 Melissa Place	6.62	6.40	6.40
6 Melissa Place	6.59	6.42	6.25
6 Natalie Close	6.67	6.55	6.25
12 Anthony Court	7.19	7.10	6.82
14 Anthony Court	7.36	7.11	6.87
16 Anthony Court	7.33	7.13	6.86
18 Anthony Court	7.42	7.32	6.96



MBR Bridge under construction (25/05/2015)



Looking South from Anzac Avenue (25/05/2015)



Concrete Barrier along Anzac Avenue (25/05/2015)



Stockpile near Rothwell Station (25/05/2015)



Saltwater Creek near Major Street (16/07/2015)



Saltwater Creek near Anzac Avenue (16/07/2015)



Fences near McGahey Street, Rothwell (16/07/2015)



Saltwater Creek near Whitecedar Circuit (16/07/2015)

Figure 8 – Photos taken during site visits

3. COMMUNICATIONS AND STAKEHOLDER ENGAGEMENT

Communications and stakeholder engagement was an important part of this project, and was undertaken to engage with the community and stakeholders, maintain relationships and to assist them in understanding the purpose and scope of the review. Community and stakeholders also assisted the project team to gain a better understanding of the flood event and its consequences.

A detailed description of the process is included in Appendix D, but an overview of the activities is as follows:

- A dedicated free call 1800 number and email address were established to ensure stakeholders could make submissions about the flood event. These communication mechanisms remained open throughout the entire review process. Details were included in all communications.
- All residents in flood affected parts of the floodplain identified in the ToR received an initial contact letter advising of the independent hydraulic review and requesting assistance in understanding local issues.
- All houses located in the streets outlined in the ToR were also door knocked at the beginning of the review and face to face meetings were arranged with the surveyors and community engagement specialists.
- In addition to this, a series of advertisements were placed in local and state newspapers in another attempt to engage with those who lived in the affected streets but had moved out due to the flooding.
- A media release was also issued outlining SMEC's role in the review. This media release, along with the ToR were placed on SMEC's website.

The majority of residents who responded and who were willing were interviewed met with SMEC and the survey team to share their experience and recollections. A small proportion of residents were interviewed by phone.

A total of 58 directly affected residents provided detail about the 1st May 2015 event and this information was recorded in a stakeholder database and provided to technical specialists for review. Hundreds of photographs were also supplied to the CSE team to assist in the review.

Subsequently an additional letter was distributed to all residents in the identified study area advising that the opportunity to provide input was still open and that they should contact the review team if they had not already done so. It was also an opportunity for the review team to thank those who had already contributed.

The review generated considerable local interest and provided valuable information that assisted in the review.

4. HYDROLOGY

4.1 Introduction

A key input to any flood investigation is the calculation of the runoff from the catchment, which is the hydrologic component.

Rainfall is the key parameter required to predict runoff rates, volume and distribution within a catchment, but it is also essential to accurately estimate most of the morphological characteristics of the subject catchment including catchment size, terrain slope, waterway morphology, catchment land-use/vegetation, rainfall losses, soil saturation and floodplain storage.

Hydrologic models are most commonly used to calculate flood hydrographs for catchments, and are methods to convert rainfall (both for recorded historical events and for design events) into flood hydrographs representing the flood peak discharge, flood volume and flow distribution.

The hydrologic modelling conducted to date for the Saltwater Creek catchment has used a WBNM hydrologic model originally built by MBRC (BMT WBM, 2012) of the entire Hays Inlet catchment (refer to Figure 3).

As the subject catchment is ungauged, no calibration/validation to historical events was possible. Consequently, only design rainfall events had been modelled for the catchment, prior to this investigation.

Design rainfalls represent the rainfall of defined probability of occurrence and are defined by IFD data. This data shows the rainfall intensity for particular probabilities (frequency) and durations.

Design rainfall events are a statistical representation of real rainfall events associated with a specific AEP that are used to design drainage infrastructure.

In Australia, design rainfall depths are calculated using methods detailed in Australian Rainfall and Runoff – A Guide to Flood Estimation (AR&R) published by Engineers Australia (formerly Institution of Engineers Australia) in 1987. The IFD data for Australia has been updated recently in 2013, but this update has not made a significant change to the design rainfall estimations in the vicinity of the Saltwater Creek catchment.

The 2013 IFD data has been used in the assessment of the probability of the 1st May 2015 storm, however the 1% AEP flood modelled within this analysis has applied the 1987 rainfalls since this was the data applied in all previous analyses.

Design rainfall intensity reduces with increasing duration, though the total depth of rainfall over the total storm increases. However the flood peak discharge depends on the rainfall intensity for the storm critical duration for the particular catchment, (i.e., there is a balance between the maximum rainfall intensity and the proportion of the catchment that contributes to the flood peak flow). Small catchments will respond more quickly than larger catchments, so shorter duration rainfall events are the critical ones for these catchments. Within a catchment, shorter duration rainfalls will be critical in the upper reaches while larger duration events will be critical for the lower reaches where the catchment has become larger.

4.2 1st May 2015 Rainfall

The rainfall event that occurred on 1st May 2015 was observed to be a significant event and was captured with a good spatial distribution of rainfall gauges located throughout the catchment (refer to Figure 9). There were ten gauges located within or just outside the Hays Inlet catchment that recorded sub-daily (automatic gauges that record rainfall continuously) rainfall data during the 1st May 2015 event. Sub-daily rainfall data is necessary to accurately predict flood hydrographs especially for storm durations shorter than 24 hours.

The data provided for ALERT gauges record rainfall data every 5 minutes, thus also allowing a good representation of the temporal distribution of the 1st May 2015 rainfall event. ALERT gauge recordings indicate that rainfall started on the 30th April 2015 around 02:00 AM, started to increase on the 1st May 2015 at about 06:00 AM and reached the most intense rainfall period on 1st May 2015 between 01:00 PM and 06:00 PM (refer to Figure 4).

Table 6 lists the hourly cumulative rainfall data recorded on 1st May 2015 over the most intense rainfall period (between 01.00 PM and 06:00 PM) as well as total rain recorded over 48 hours at all gauges. Figure 9 shows the spatial distribution of the gauges over the Saltwater Creek catchment along with the total rain recorded on the 1st May 2015.

Table 6 – Hourly and total rainfall depths recorded during the 1st May 2015 event

Station Name	Number	Time (hours)						Total rainfall*
		12:00 - 13:00	13:00 - 14:00	14:00 - 15:00	15:00 - 16:00	16:00 - 17:00	17:00 - 18:00	
		Rainfall depth (mm)						
Deception Bay	040980	0	20	82	62	88	21	353
Browns Creek Road	540411	4	12	51	57	64	14	300
Murrumba Downs	540417	1	13	43	81	62	34	337
Lawnton	540439	1	10	63	74	77	25	348
Lipscombe Road	540445	1	18	78	61	83	24	346
Woody Point	540498	0	8	22	30	28	37	226
Burpengary	540619	4	22	52	70	73	16	327
Kippa Ring	540629	2	8	12	18	29	35	191
Kallangur	540658	4	13	59	53	11	21	282
Rothwell	540659	3	18	47	81	69	25	337

*Total rainfall reported was recorded in 48 hours from 30th April 2015 at 12:00 PM to 2nd May 2015 at 12:00 PM



Figure 9 – Total Rainfall depths recorded during the 1st May 2015 event within Saltwater Creek catchment

4.3 Estimation of Probability of 1st May 2015 Rainfall

Received rainfall data was analysed to compare maximum rainfall bursts recorded during the 1st May 2015 event for different durations with the 2013 design IFD rainfall values calculated via the BoM website (Green et al., 2012) at all gauge locations.

IFD curves for events larger than the 1% AEP event were calculated using CRC-Forge application (Department of Energy and Water Supply, 2013) and verified using growth curves and temporal patterns of short duration design storms for extreme events after the work of Jordan et al., 2005.

Results indicate that intensities recorded at the Saltwater Creek catchment during the 1st May 2015 exceeded the 1% AEP design event rainfall intensities for most durations. Intensities for the critical catchment durations (between 3 and 6 hours) at the stations closest to the affected areas (Rothwell, Lipscombe Road and Deception Bay) were observed to be close to the 0.1% AEP design event intensities, as measured rainfall intensities fall close to the 0.1% AEP curve (refer to Figure 10).

Results of the conducted rainfall analysis indicate the AEP of the 1st May 2015 rainfall event. While the AEP of the rainfall is a good indication of the AEP of the resulting flood event, other conditions such as the initial condition of the catchment may affect this probability. Thus, the AEP of the 1st May 2015 flood event is confirmed in Section 5 based on the results from hydrological and hydraulic modelling.

4.4 Supplementary Rainfall Assessments

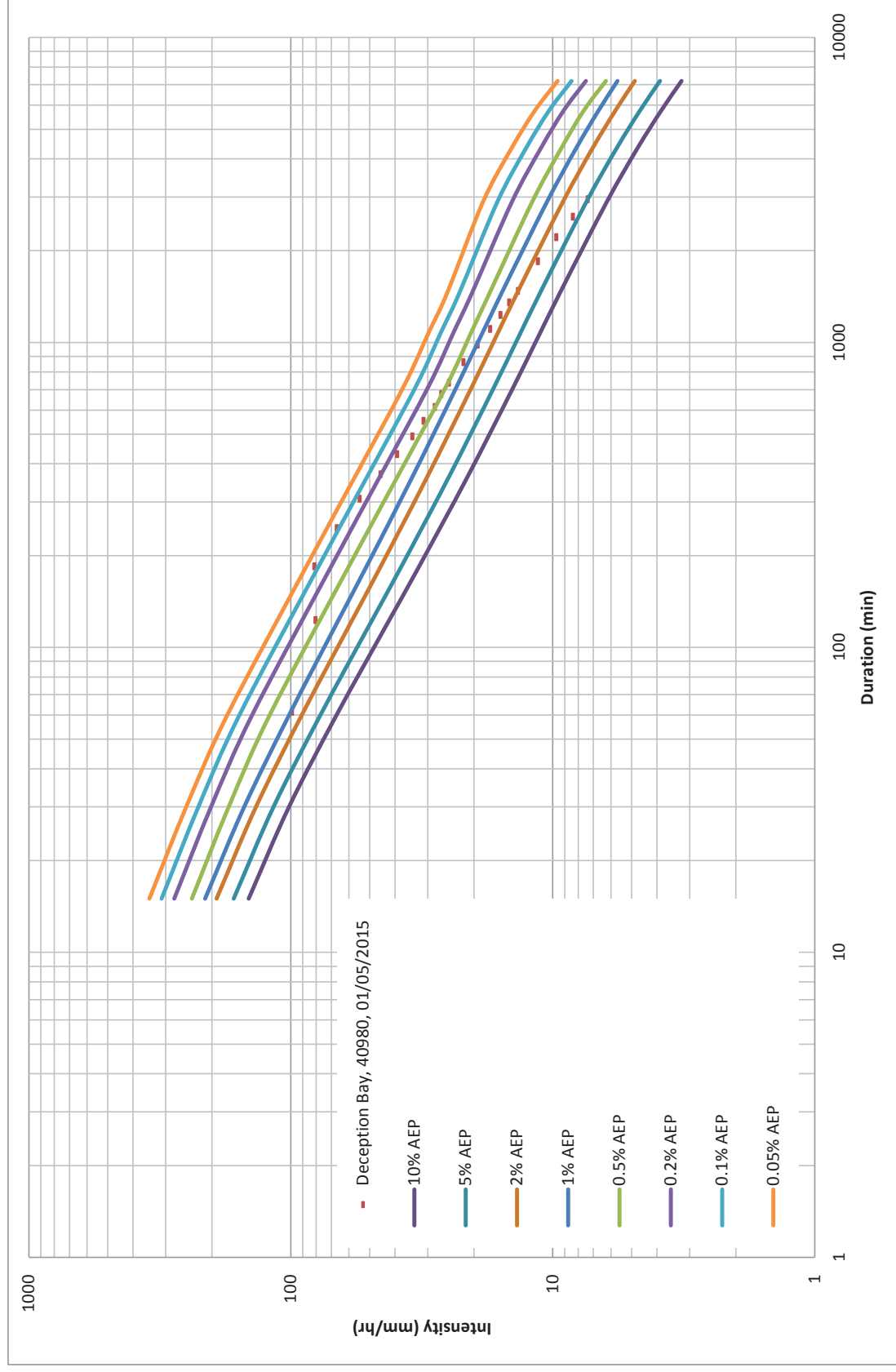
Analysis has been undertaken to compare the 1st May 2015 event with other historical rainfall data. The rainfall data needed to understand flooding on the Saltwater Creek catchment requires sub-daily data, since short duration events are critical for producing floods on this catchment. Rain gauges recording sub-daily data have operated for only a short period in this region, and the rainfall on 1st May 2015 was the largest event of the critical duration since these records began.

There are longer records of daily read rainfall data, with a long term station located at the nearby Amcor-Petrie Mill rainfall station (Station number: 040171, Latitude: 27.27S, Longitude: 152.98E), which has records back to 1887. The highest daily rainfall recorded in the period of record for this gauge was on 16th February 1893, when the daily rainfall was 380 mm. The 1893 flood was the largest flood recorded in south-east Queensland, especially on large catchments such as the Brisbane River, but the available records do not have any indication of the short duration rainfalls critical for the smaller catchments such as Saltwater Creek. While the review of the data from this station does not give a definitive indication of the probability of the 1st May 2015 storm, it certainly indicates the extreme nature of the storm.

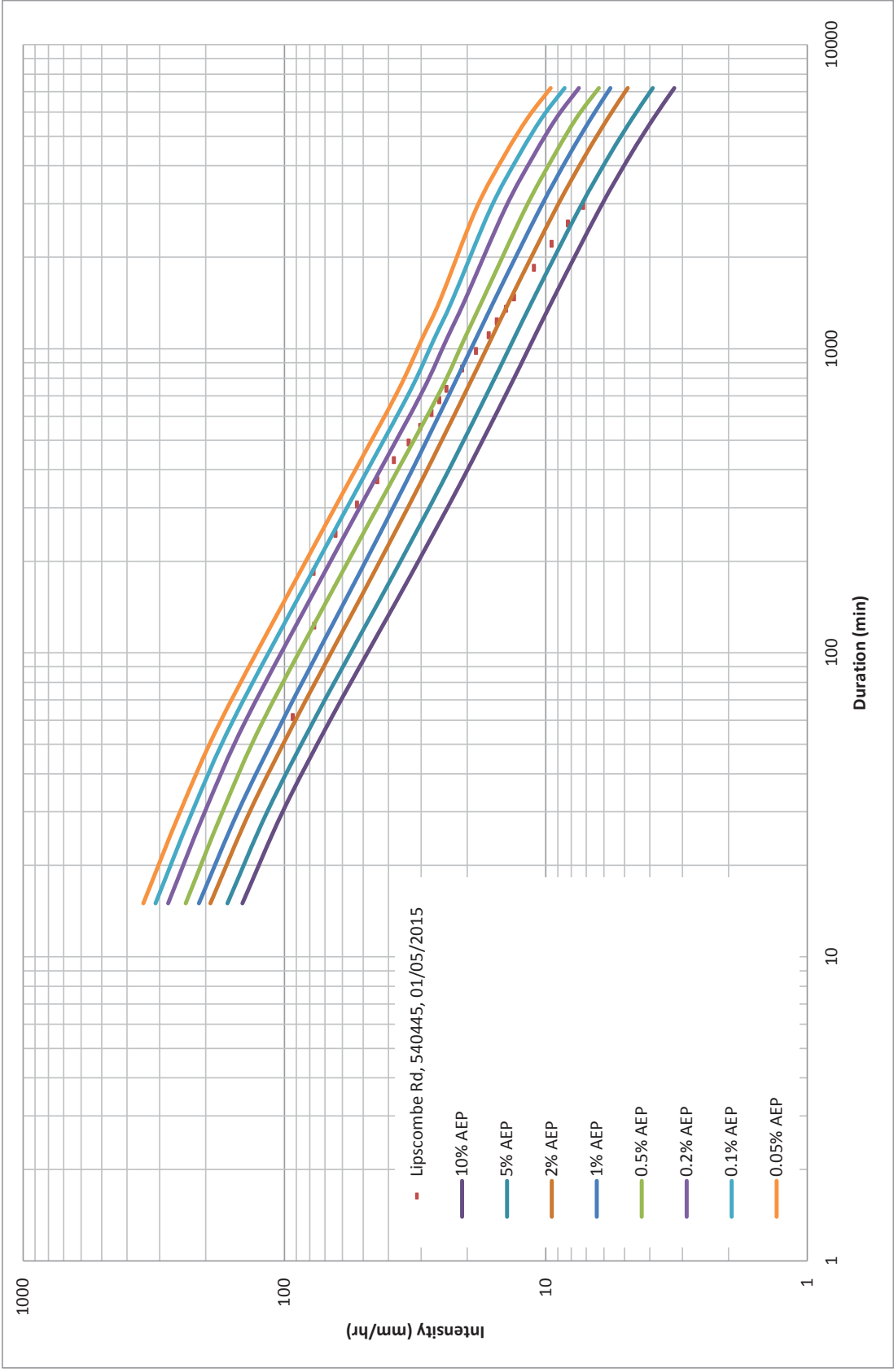
There was another large storm and flood that affected the Saltwater Creek catchment earlier in 2015 on the 18th February due to Cyclone Marcia. While this was also a large event, analysis of the rainfall data showed that the rainfall event experienced around the Saltwater Creek catchment during this event had an AEP just larger than 2% for durations coinciding with the catchment critical durations (refer to Figure 12). Although the total rainfall recorded was higher, the storm had two distinct peaks and was spread across a longer period of time (72 hours). This was still a significant event but the rainfall intensities for the critical storm duration were less than those observed for the 1st May 2015 event (refer to Figure 13).

4.5 Summary

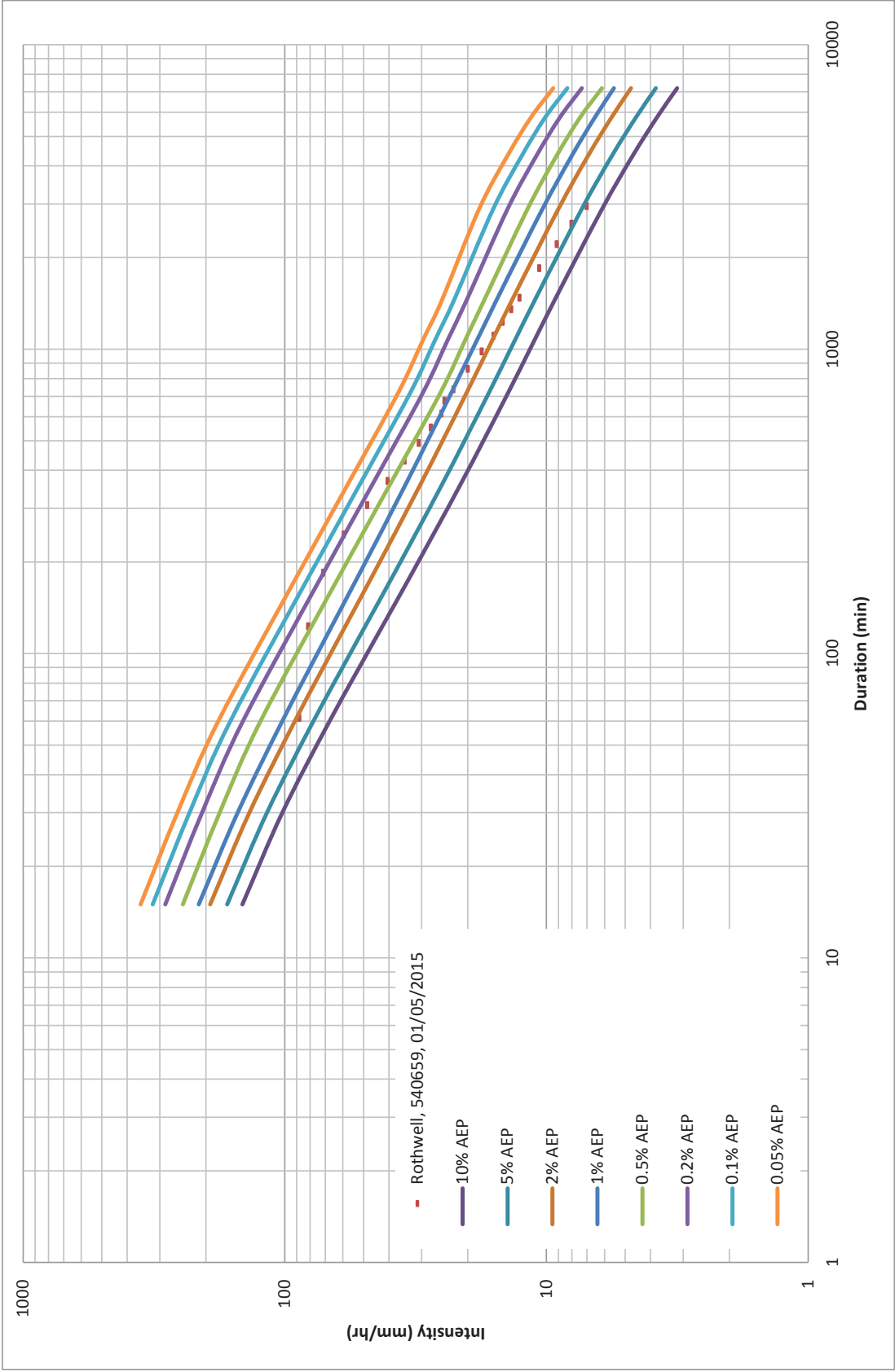
In summary, results from the rainfall analysis carried out in this report indicate that for the durations critical for the Saltwater Creek catchment (between 3 and 6 hours), the AEP for the 1st May 2015 rainfall event was far larger than 1% AEP and close to the 0.1% AEP design event. The AEP for the 18th February 2015 rainfall event is just larger than the 2% AEP design event. The AEP for the 1st May 2015 flood event is confirmed in Section 5 based on the results from hydrological and hydraulic modelling.



a) Deception Bay, 040980

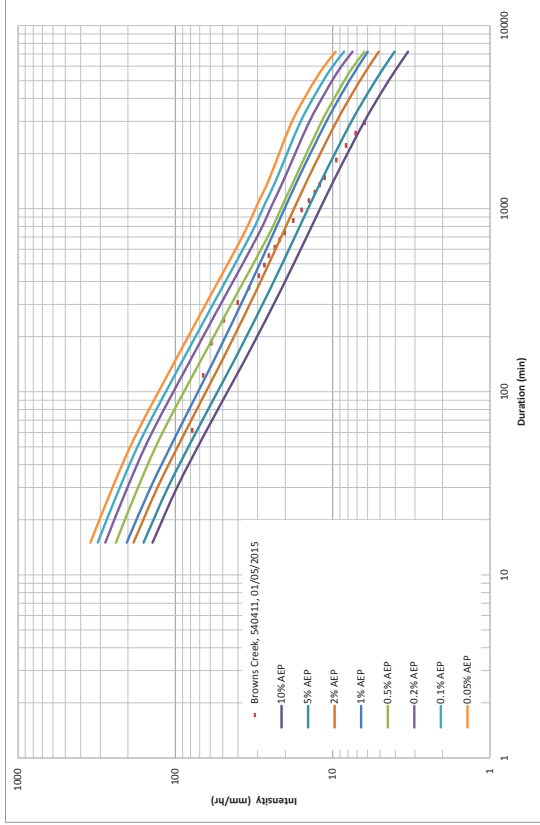


b) Lipscombe Road, 540445

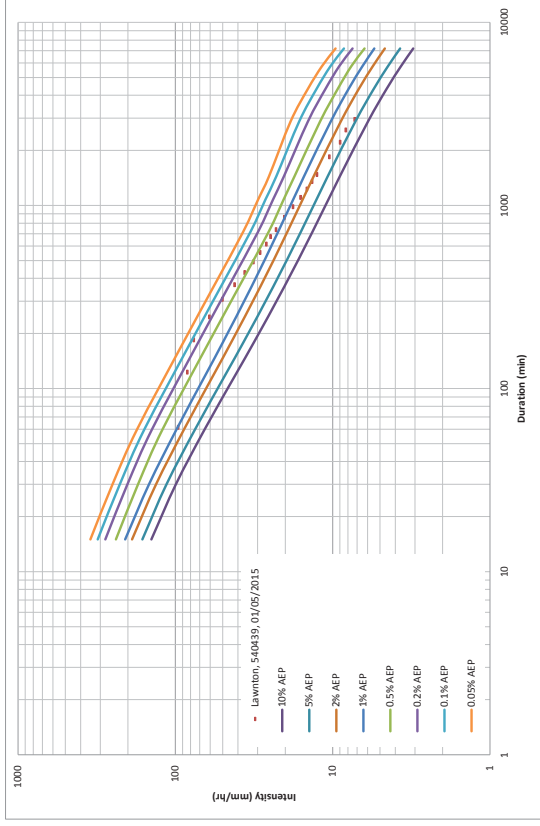


c) Rothwell, 540659

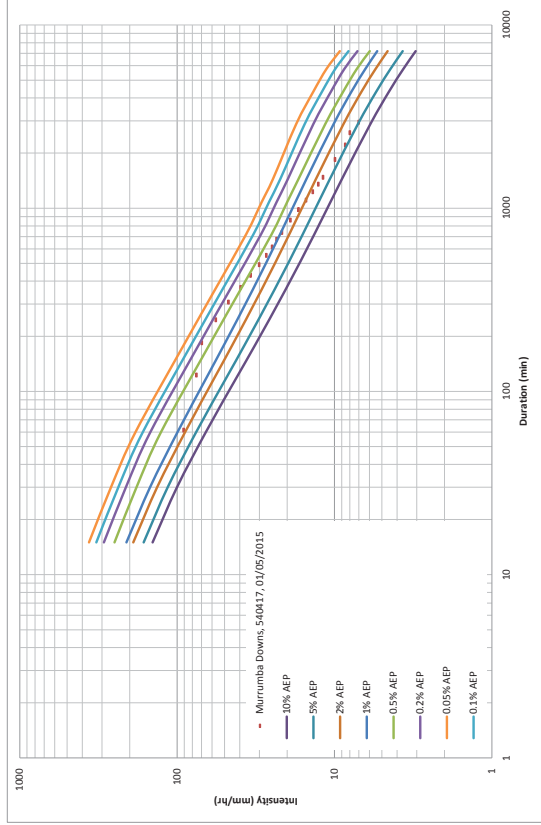
Figure 10 – Comparison of maximum bursts recorded during the 1st May 2015 and IFD curves gauges closest to Saltwater Creek catchment



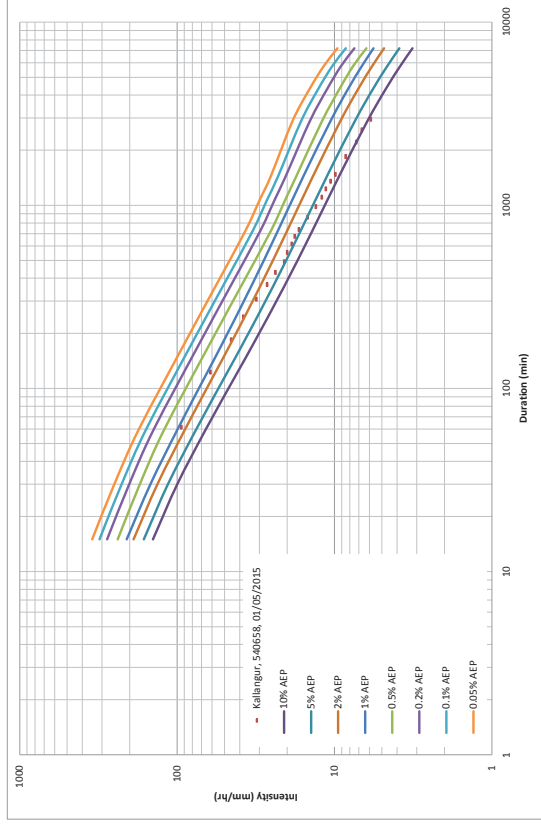
a) Browns Creek Road, 540411



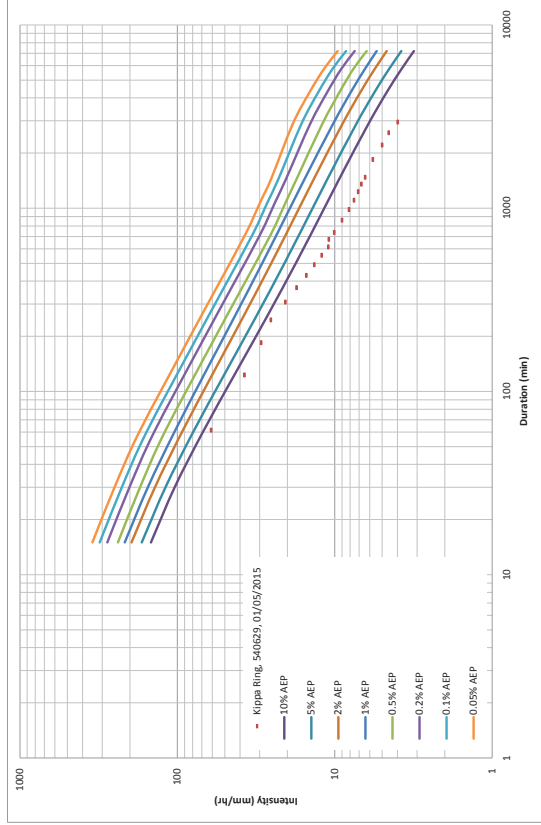
b) Lawnton, 540619



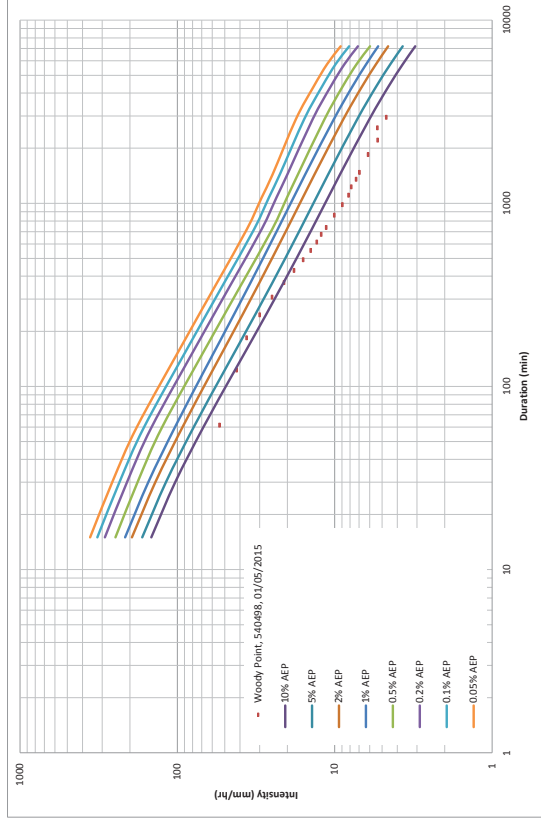
c) Murrumba Downs, 540417



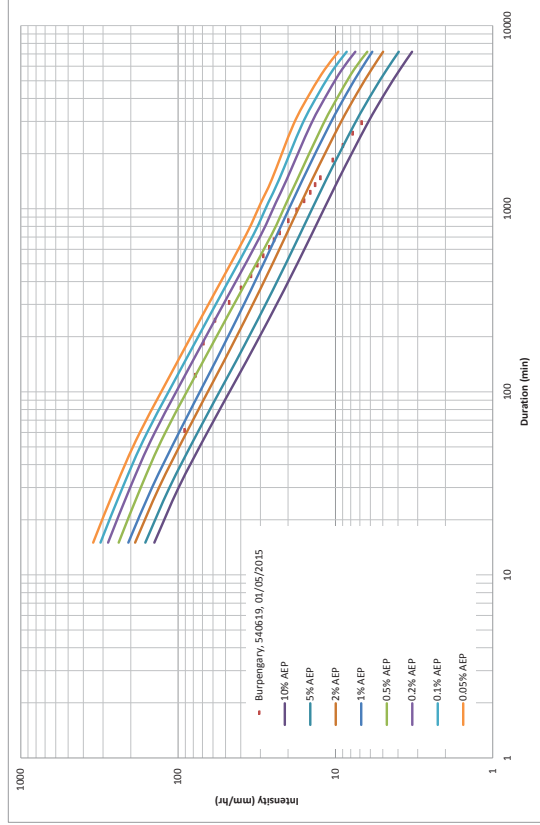
d) Kallangur, 540658



e) Kippa Ring, 540629



f) Woody point, 540498



g) Burpengary, 540439

Figure 11 – Comparison of maximum bursts recorded during the 1st May 2015 and IFD curves for other gauges surrounding Hays Inlet catchment

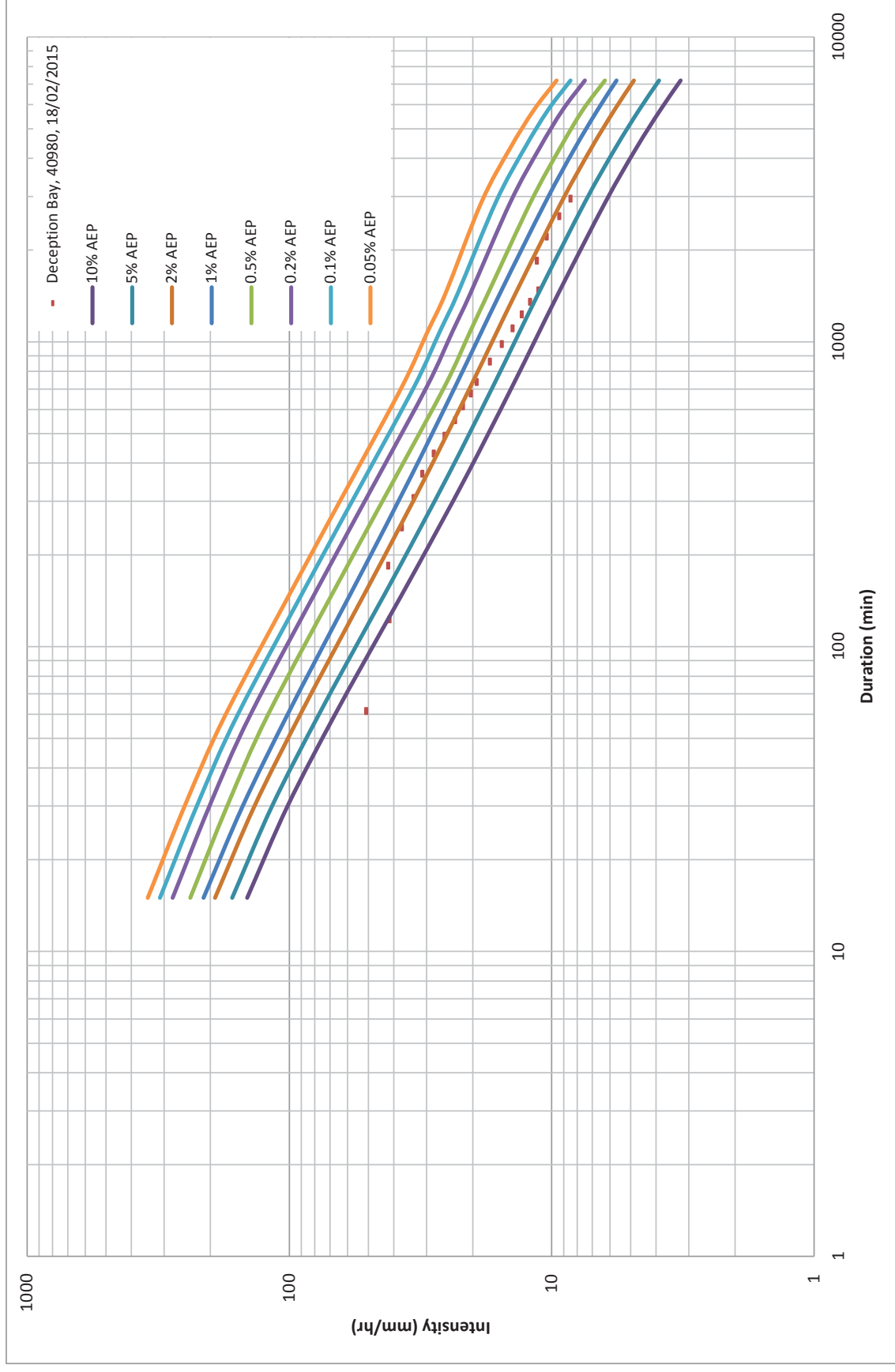


Figure 12 – Comparison of maximum bursts recorded during the 18th February 2015 and IFD curves for Deception Bay ALERT gauge

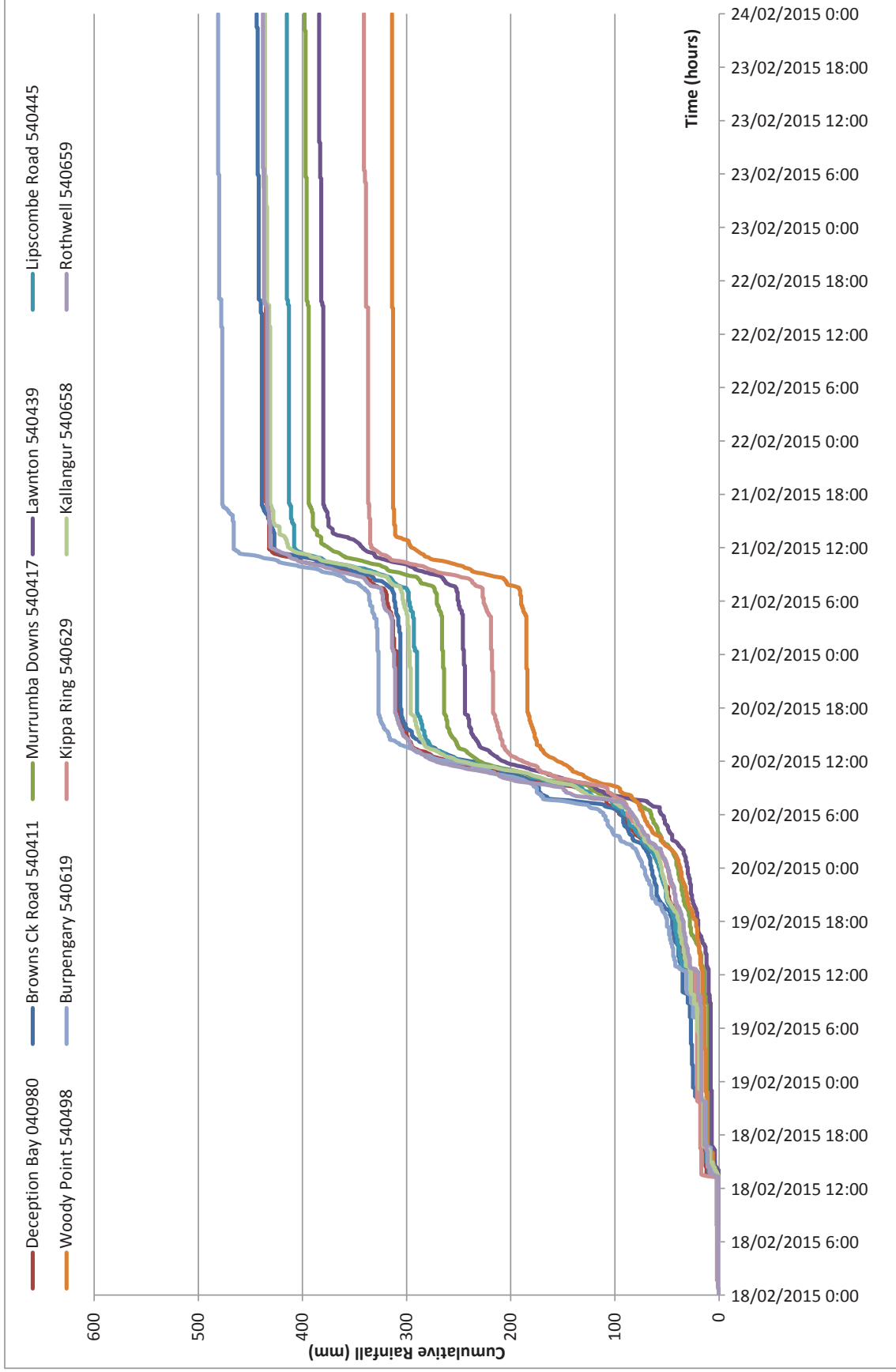


Figure 13 – Cumulative Rainfall on 18th February 2015 around Hays Inlet catchment

4.6 WBNM Hydrologic Model

The Hays Inlet catchment area is approximately 80 km² while the Saltwater Creek subcatchment area is approximately 47 km² (refer to Figure 3). The base of all hydrologic modelling conducted to date for Hays Inlet catchment (which includes the Saltwater Creek subcatchment) is a WBNM hydrologic model originally built by MBRC (BMT WBM, 2012). As the catchment is ungauged, this model has not been previously calibrated to historical events and only includes design rainfall events.

Both models (hydrologic and hydraulic) were adopted and modified in 2014 by AAJV in order to conduct the flood impact assessment for the design phase of the MBR project. Most modifications conducted by AAJV were performed within the TUFLOW hydraulic model. The original WBNM hydrologic model was only slightly adjusted by AAJV to improve partitioning and representation of small local catchments adjacent to the MBR alignment. Figure 14 shows a model layout of the received WBNM model.

4.6.1 Rainfall Parameters

The design rainfall parameters included within the received WBNM model were calculated using the standard methods detailed in Australian Rainfall and Runoff – A Guide to Flood Estimation (AR&R) published by Engineers Australia (formerly Institution of Engineers Australia) in 1987 at three different locations (HAY01, HAY02 and HAY03 depicted as green stars in Figure 3). The temporal pattern zone used for this catchment is Zone 3.

AR&R (1987) design storms have been used in this study to be consistent with the AAJV study but a comparison herein conducted showed that 1987 and 2013 IFD values at the Saltwater Creek catchment are nearly identical.

4.6.2 Catchment Conditions

The AAJV study only used “Ultimate” development catchment conditions to derive flows for both their ‘Existing and Developed’ scenarios. A sensitivity check based on recent aerial photography confirmed that current catchment conditions are similar to the hypothetical “Ultimate” conditions included within the WBNM model, consequently “Ultimate” catchment conditions were also used in this study to derive flows for both Existing Base case and Developed conditions.

4.6.3 Rainfall Losses

Consistently with the received WBNM model, initial and continuing losses of 0 mm and 2.5 mm/hour respectively were used for all design and historical events run during this investigation. The heavy rainfall experienced on 18th to 22nd February 2015 followed by some minor events occurring during March and April 2015 suggest that soil conditions within Saltwater Creek catchment prior to the 1st May 2015 event might have been close to saturated, thus indicating that the initial/continuous losses assumed herein for this historical event are reasonable for the purpose of this study.

4.6.4 Storm Events and Durations

The AAJV study only included design events and the critical durations for the Saltwater Creek catchment (1, 3 and 6 hours). During this study, the received WBNM model was run for three storm events:

- 1% AEP design event (1, 3 and 6 hour durations);
- 18th February 2015 (Tropical Cyclone Marcia); and
- 1st May 2015.

The 0.05% AEP event (1, 3 and 6 hour durations) was also run to assist in ascertaining the AEP of the 1st May 2015 event.

The 1st May 2015 and 18th February 2015 historical events were analysed using the rainfall collected at the ten ALERT stations provided by MBRC. WBNM distributes the rainfall applied throughout the catchment based on geographical coordinates of the gauges and the catchment centres using the inverse square distance method (i.e. a rain gauge which is far away from a subcatchment has a small weight on the rainfall applied to the subject area). All other details of the WBNM model remained unchanged.

4.7 Results and Conclusions

Figure 15 compares total flowrates obtained from the WBNM model at a location just upstream of Anzac Avenue (SWC_01_08554) for the four events analysed (1% AEP, 0.05% AEP, 18th February 2015 and 1st May 2015). Consistent with the rainfall analysis, the results indicate that peak flowrates calculated for the 1st May 2015 event are larger than those resulting from the 1% AEP design event and are close to the 0.1% AEP design event. Results for the 18th February 2015 event indicate that this event was just larger than the 2% AEP design event, because of the distribution and less intense rainfall across the catchment for the critical storm duration.

4.7.1 Hydrograph Routing

It should also be noted that within the MBRC study local subcatchment flows are extracted from the WBNM hydrological model and input into the TUFLOW hydrodynamic model as local inflows, this effectively means that the routing of local flows occurs within the hydraulic model.

For the AAJV study, a combination of local flows derived from the WBNM model and regional Saltwater Creek flows calculated with the original MBRC TUFLOW hydrodynamic model (at locations upstream of Major Street, Deception Bay) are used as inflows for the TUFLOW hydrodynamic model.

As this study is only concerned with Saltwater Creek catchment, the later approach was also used to achieve manageable run times and allow an iterative and robust approach. For this study, TUFLOW model extent and inflow locations were modified (refer to Section 5).

Comments1: MBRC REGIONAL FLOODPLAIN DATABASE

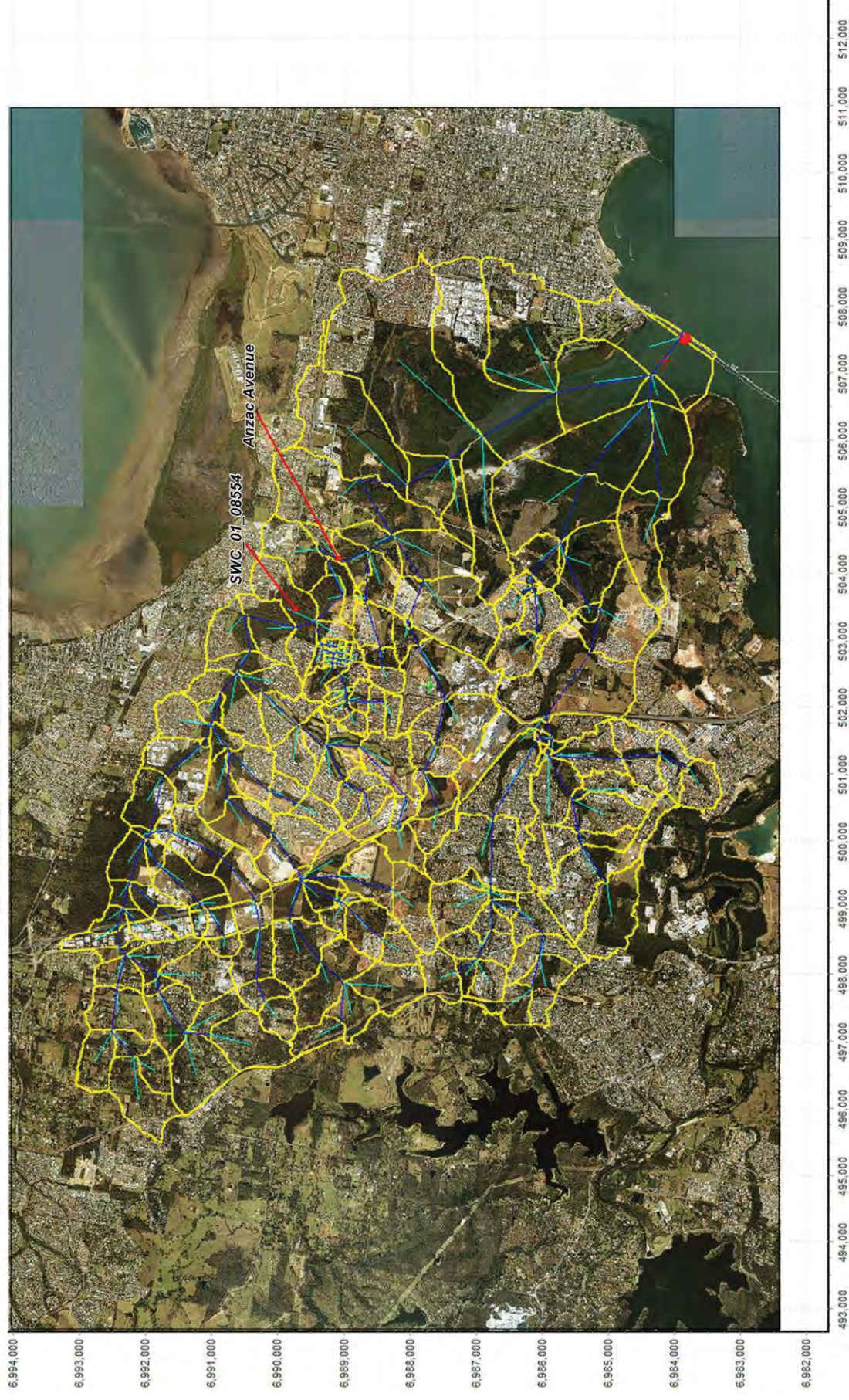


Figure 14 – WBNM Model setup

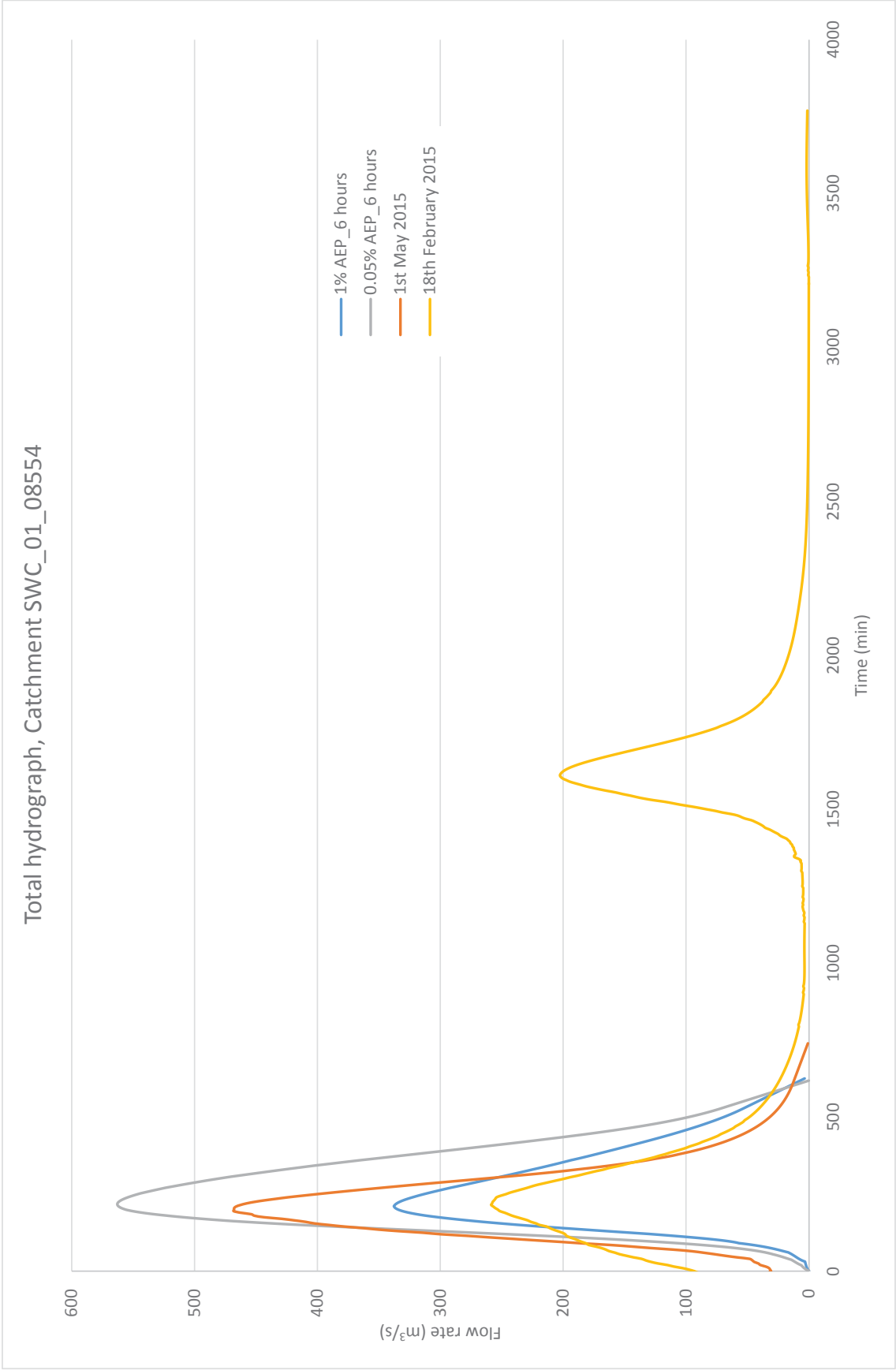


Figure 15 – Resulting hydrographs upstream of Anzac Avenue (Sub-catchment SWC_01_08554)

5. HYDRAULICS

5.1 Introduction

Hydraulic models developed as part of previous studies for the Hays Inlet catchment (BMT WBM, 2012) and Saltwater Creek catchment (AAJV, 2014) were provided to SMEC by TMR and AAJV to form the basis of the hydraulic investigation. While these models were used by AAJV for the MBR project, they were originally developed for MBRC as part of their floodplain management process.

MBRC originally commissioned the development a 1D/2D hydrodynamic TUFLOW model (BMT WBM, 2012). The hydraulic model is based on LiDAR data captured on 2009 and adopted a land use configuration and associated model parameters based on a set of factors that were consistently applied over the entire MBRC area and that are not necessarily representative of the Hays Inlet catchment conditions (SKM, 2010).

This model was adopted and modified in 2014 by AAJV to conduct the flood impact assessment for the design phase of the MBR project. The extent of the original MBRC TUFLOW hydrodynamic model was modified and cut to improve model run times and allow for an iterative design approach to be undertaken in the Saltwater Creek catchment.

Inflows used within the AAJV hydraulic model are a combination of local flows and regional Saltwater Creek flows calculated with the original MBRC hydrodynamic model (at locations upstream of Major Street, Deception Bay). AAJV conducted a validation of this approach documented in Section 5 of Moreton Bay Rail Project, Design report – Hydrology/Hydraulics Lawnton Petrie and Petrie to Kippa-Ring (AAJV, 2014).

Most of the TUFLOW model parameters (including roughness, local inflows and base topography) were unchanged, however AAJV updated the original MBRC models to more accurately reflect terrain within the MBR project area within Saltwater Creek catchment, specifically around Anzac Avenue. Three different scenarios were modelled as part of the MBR project detailed design phase:

- Existing Base case (with no MBR works included);
- Temporary works (including temporary works associated with MBR project); and
- Design case (including proposed final MBR works).

As part of the current investigation, the AAJV TUFLOW hydraulic models corresponding to Existing Base case and Temporary works were run for AEP 1% design flood and slightly adapted to run the 18th February 2015 and the 1st May 2015 storm events.

Both TUFLOW models (Existing Base case and Temporary works) were then revised to more accurately represent current floodplain conditions within the model and flooding patterns within Saltwater Creek floodplain.

These revised TUFLOW models form the basis of the Existing Base and Developed conditions herein investigated. As the construction of the MBR project is not yet completed and is ongoing, this study did not investigate the impact the final design may have on flooding within the catchment.

5.2 Existing Base condition

This scenario represents the existing conditions of Saltwater Creek catchment in 2014 without any works or infrastructure associated with the MBR project and is used herein to represent the existing base case needed to compare with Developed conditions and determine the potential impact of the MBR project works on flooding.

Modelling for the existing base condition was based on the provided existing condition AAJV TUFLOW model. During this study, the AAJV TUFLOW model was updated to calibrate modelling results to surveyed flood debris marks from the 1st May 2015.

Model updates conducted to represent existing base conditions are:

- Extension of TUFLOW model domain to allow modelling of areas located upstream of Samantha Court;
- Detailed representation of Anzac Avenue (including the addition of permanent safety barriers, road and bridge guardrails and the Saltwater Creek Pedestrian bridge);
- Update of floodplain topography, using LiDAR data captured in 2014 by MBRC;
- Inclusion of detailed survey to accurately represent conditions on 1st May 2015; and
- Changes to Manning's n roughness in the Saltwater Creek floodplain to represent current land-use conditions determined from aerial photography and site inspections.

Figure 17 shows a layout and key features of the updated TUFLOW model used to represent the existing base condition. It should be noted that at the time of writing, the accuracy of the 2009 and 2014 LiDAR data sets cannot be confirmed, as it was captured by others.

This modelled scenario does not replicate the MBRC or AAJV model results, however it is considered to be a more accurate representation of current local conditions observed during the 1st May 2015 event.

5.2.1 Model Extent

The received AAJV TUFLOW hydraulic model covers an area of 14 km² exclusively located within Saltwater Creek catchment. The model is bound to the northwest by Samantha Court in Deception Bay and to the south by Hays Inlet Conservation Park while the eastern and western boundaries are represented by the Saltwater Creek catchment boundaries.

As this TUFLOW model does not extend beyond Samantha Court, it was extended during this study to allow modelling of Deception Bay areas located further upstream that were affected during the 1st May 2015 event, including Delvene Court, Nellie Court, Anthony Court and Melissa Place. Figure 16 compares the previous MBRC and AAJV TUFLOW model extents with the updated TUFLOW model extent. This new TUFLOW model extent was used for modelling both current existing base and developed conditions (refer to Section 5.3).

5.2.2 Grid Size and Time Step

The received AAJV TUFLOW model was originally constructed using a 5 m x 5 m square grid and used a time-step of two seconds. These parameters were not changed during this study.

5.2.3 Base Topography and Bathymetry

The base topography of the received AAJV TUFLOW model was LiDAR data captured in 2009 which did not include bathymetry of tidal reaches of Saltwater Creek and its tributaries.

As part of this study, the base topography of the Saltwater Creek floodplain terrain was updated with LiDAR data captured in 2014 by MBRC. This recent LiDAR data set is believed to more accurately represent the current floodplain topography. No bathymetry data was available during this study.

5.2.4 Detailed Survey

The received AAJV TUFLOW model was updated to include permanent road barriers, permanent guardrails and permanent fences located along Anzac Avenue that were not previously accounted for.

Guardrails located along Anzac Avenue were surveyed or measured from aerial photographs to be 750 mm. They were included in the model with a fully blocked upper part and 75% blocked across the lower part of the structure/ post height (based on TMR Steel beam guardrail Standard Drawing 1475). Guardrails and fences were represented as partially blocked structures.

Permanent concrete barriers adjacent to the southern Anzac Avenue junction where north bound and south bound lanes converge were estimated to be 1 m high and were represented as fully blocked structures.

Figure 18 shows the Saltwater Creek floodplain terrain as represented within the current Existing Base condition TUFLOW model.

5.2.5 Model Boundaries

The received AAJV TUFLOW model, included two Saltwater Creek regional inflow locations and several local inflows representing subcatchment flows. During this study, four regional inflow locations representing the accumulated Upper Saltwater Creek flow (SW_Ck_4, just downstream of Lipscombe Road) and three of its unnamed western tributaries (SW_Ck_trib_19, SW_Ck_trib_24 and SW_Ck_trib_31) were included within the updated TUFLOW model.

Local inflows representing subcatchments flows were also updated within the TUFLOW hydraulic model to reflect the smaller number of subcatchments and inserted as source area inflows (refer to Figure 17).

Regional inflows were calculated by running the provided TUFLOW MBRC Hays Inlet model for the corresponding storm events and extracting resulting hydrographs at selected locations (SW_Ck_4, SW_Ck_trib_19, SW_Ck_trib_24 and SW_Ck_trib_31). Local inflows representing subcatchments flows were calculated with the provided WBNM hydrological model.

The downstream boundary of the AAJV TUFLOW model was located at the Hays Inlet Conservation Park, approximately 5 km downstream of the proposed MBR Saltwater Creek Bridge. Several static tailwater levels were originally considered within this study, with a 2.2 mAHD storm tide level being ultimately adopted by AAJV to model design events and calculate affluxes during in the MBR design study.

During this study, the 2.2 mAHD static boundary was also used as tailwater for the 1% AEP design event and for the 18th February 2015 event, as no actual tidal records were available for this date.

For the 1st May 2015 event a dynamic tidal boundary at Hays Inlet Conservation Park was calculated by running the received MBRC Hays Inlet TUFLOW model with tidal levels recorded at the Scarborough Tidal beacon during the 1st May 2015 flood event and extracting resulting water levels corresponding to the downstream boundary location. A sensitivity analysis scenario using a static tailwater of 2.20 mAHD was also analysed for the 1st May 2015 event to investigate the influence of the tailwater boundary in the area of interest, and this made only a minimal impact on the results.

5.2.6 Existing Hydraulic Structures

The received “Existing Case” AAJV TUFLOW model only included the two existing Anzac Avenue bridges (northeast bound and southwest bound). Both bridges were originally modelled as two-dimensionally layered form loss coefficients (2d_lfcsh) polygons including some blockage and loss factors associated to piers. Decks were modelled as completely blocked (no loss factors were associated to this full blockage) while bridge railings were modelled as completely unblocked.

As part of this investigation, the pedestrian bridge located upstream of the northeast bound lane of Anzac Avenue was added to the TUFLOW model. 2D_lfcsh polygons representing all bridge decks/railings were modified to represent full deck and railing blockage to account for debris blockage (loss factors were also added).

Existing culverts included in the received AAJV model were unchanged during this study. Note that characteristics of existing culverts (sizes and configuration) not located within surveyed areas were not verified within this study.

5.2.7 Roughness

The surface roughness within the received AAJV TUFLOW model was represented using the Manning’s coefficient n . The Manning’s n sets constant values across individual grid cells within the model and simulates an average representation of flow impedance across the cell.

The set of original roughness values and spatial distribution used in the AAJV TUFLOW model are listed in Table 7. Note that dense, medium dense and low grass vegetation were originally assigned a vertically varied Manning’s n value.

The spatial distribution and original roughness values were updated during this study to more accurately represent current floodplain conditions within the TUFLOW model (refer to Figure 19). In terms of values, only the vertically varied dense and medium dense Manning’s n values were updated. A new material was also created to reflect medium vegetation with sparse pockets of clearing (see Table 7). This exercise was based on detailed aerial imagery captured on 19th March 2015, 22nd April 2015 and 4th June 2015. Site visits were also conducted to verify roughness assumptions (refer to Figure 8). Roughness values ultimately selected for this study are consistent with values reported on Appendix C of the Natural Channel Design guidelines published by Brisbane City Council (BCC, 2003).

Table 7 – Adopted Manning's n values

Material	Original Manning's n value	Updated Manning's n value
Dense vegetation (vertically varied)	0.09 (< 1.5 m) 0.18 (> 3.5 m)	0.13 (< 1.5 m) 0.18 (> 3.5 m)
Medium dense vegetation (vertically varied)	0.075 (< 1.5 m) 0.15 (> 3.5 m)	0.1 (< 1.5 m) 0.15 (> 3.5 m)
Low grass (vertically varied)	0.25 (= 0 m) 0.06 (> 0.2 m) 0.045 (> 0.4 m) 0.035 (> 0.8 m) 0.025 (> 2 m)	0.25 (= 0 m) 0.06 (> 0.2 m) 0.045 (> 0.4 m) 0.035 (> 0.8 m) 0.025 (> 2 m)
Reeds	0.08	0.08
Crops	0.04	0.04
Roads/ footpaths	0.015	0.015
Buildings	1.0	1.0
Waterbodies	0.03	0.03
Urban block	0.3	0.3
Medium dense vegetation with some clearing	N/A	0.08 < 1.5 m 0.15 > 3.5 m

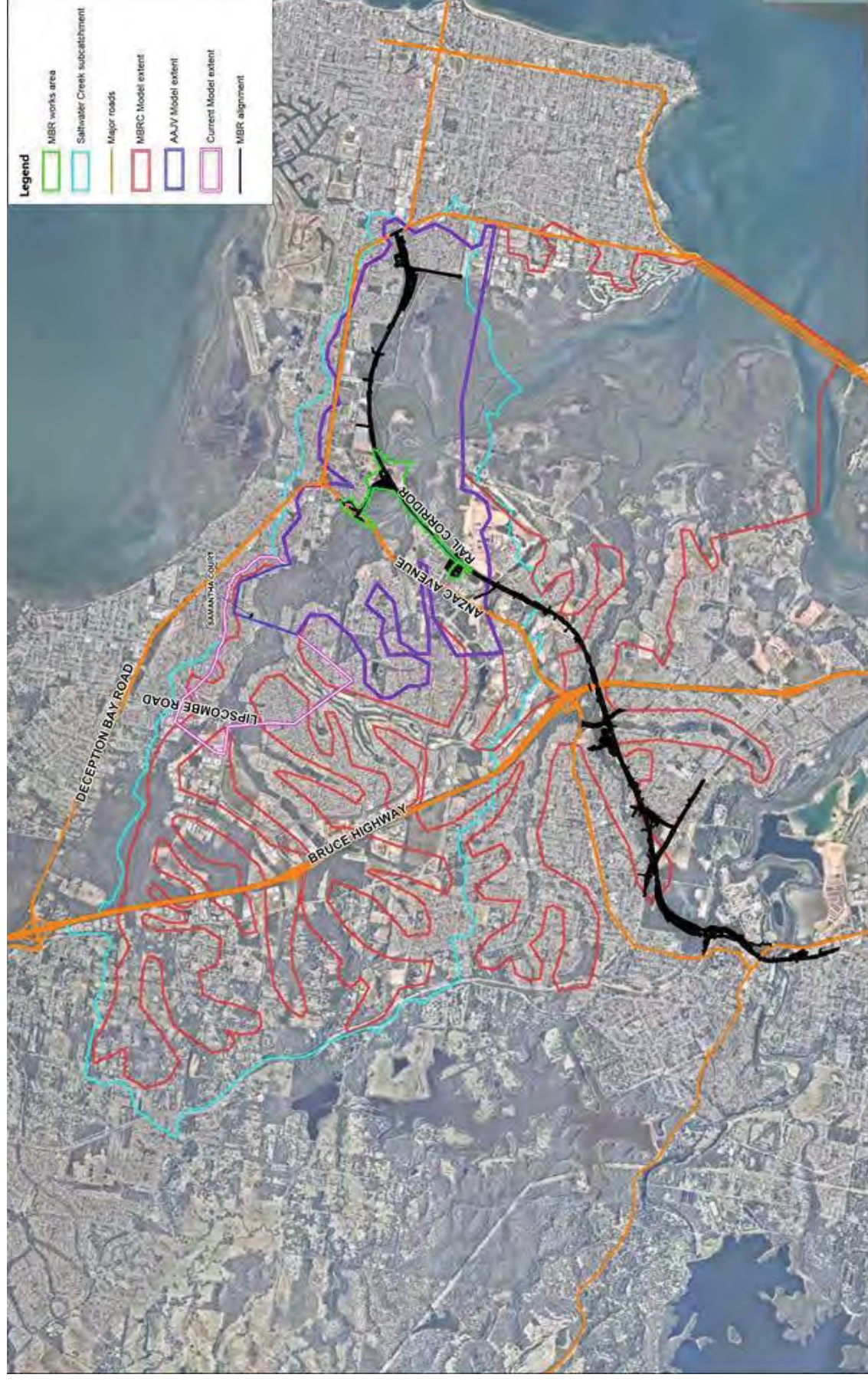


Figure 16 – Comparison of hydraulic model extents, Saltwater Creek catchment

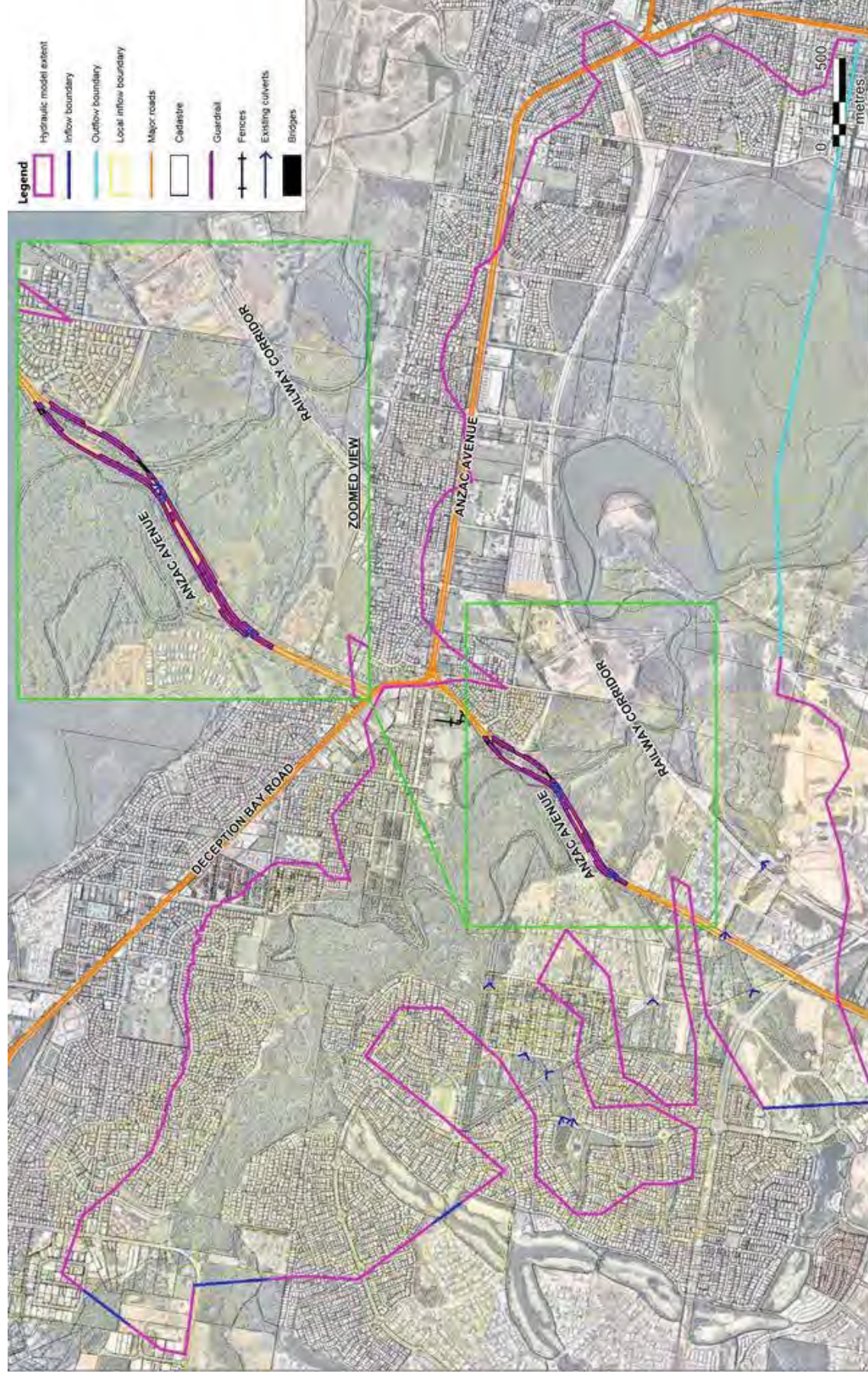


Figure 17 – TUFLOW Hydraulic Model Setup, Existing Base condition

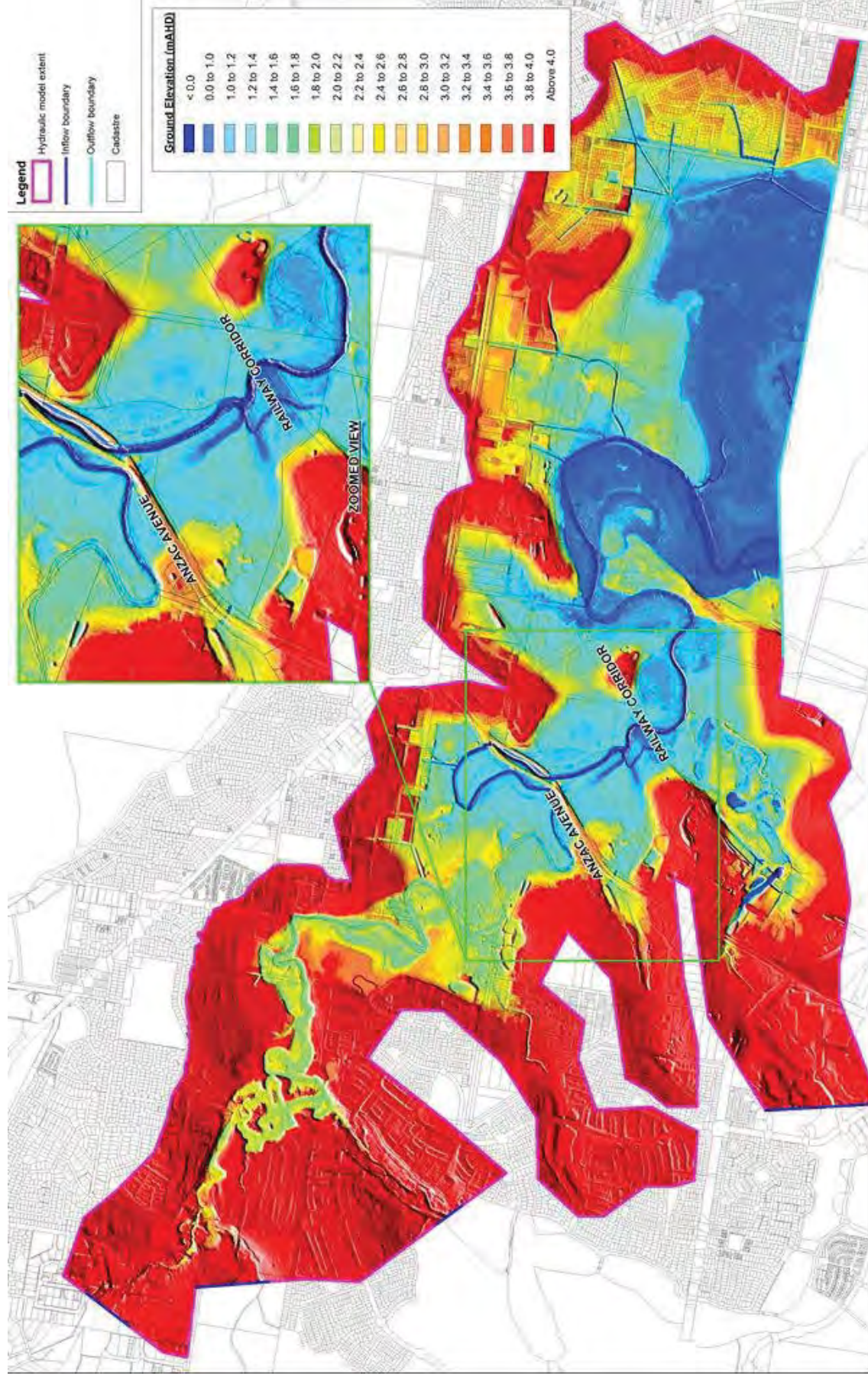


Figure 18 – Terrain representation, TUFLOW hydraulic model, Existing Base condition

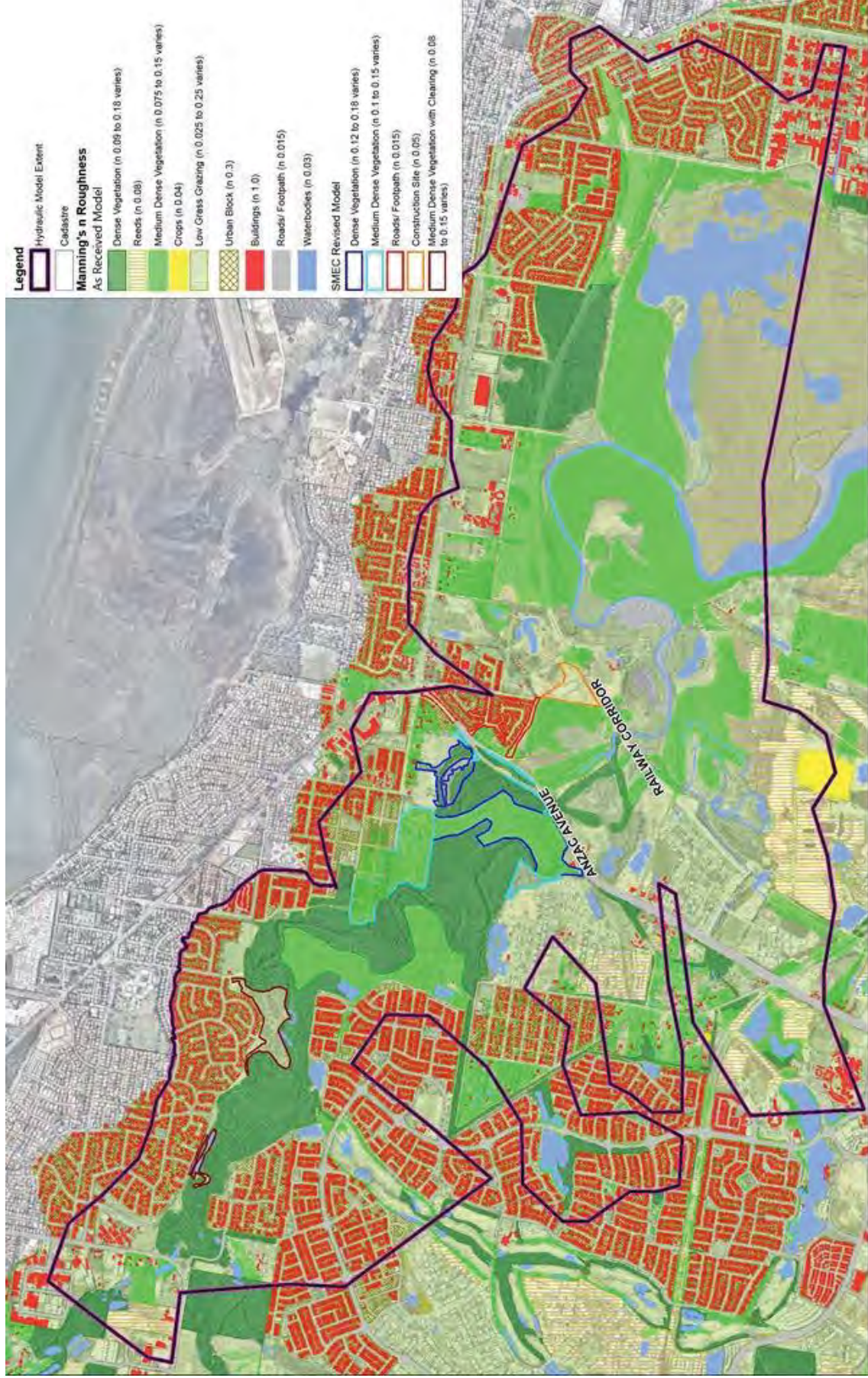


Figure 19 – Land-use distribution, TUFLOW hydraulic model, Existing Base condition

5.2.8 Existing Base condition results

The 1% AEP design event for the critical catchment durations (1 hour, 3 hours and 6 hours) and the two recent historical events (18th February 2015 and 1st May 2015) were run using the existing conditions model to replicate levels recorded during the 2015 flood events. In addition, the 0.05% AEP event was run to confirm the AEP of the 1st May 2015 flood event.

Figure 20 to Figure 23 respectively show calculated maximum water levels and depths for the 1% AEP and the 1st May 2015 event. Appendix E includes enlarged versions of maps showing modelling results.

5.2.9 Discussion

Figure 24 shows resulting water level profiles extracted along Saltwater Creek centreline for the 1% AEP and the 1st May 2015 events. These results indicate that water levels corresponding to the 1st May 2015 event, are in average 350 mm higher than those calculated for the 1% AEP event and about 250 mm lower than 0.05% AEP event levels.

These hydraulic model results are consistent with the AEP previously assigned to the 1st May 2015 rainfall event and confirm that the AEP of the 1st May 2015 flood event is effectively in excess of the 1% AEP and close to the 0.1% AEP event.

Results also indicate that water levels for existing conditions presented herein for the three subject events were in average 300 mm higher than water levels calculated using the model received by AAJV (existing base case). This difference is a result of the update of the model to incorporate additional features not included originally, the update of the floodplain topography and the update to Manning's n values. These enhancements to the model have ensured that the hydraulic model represents the recorded flood levels accurately, as discussed further in Section 5.4.

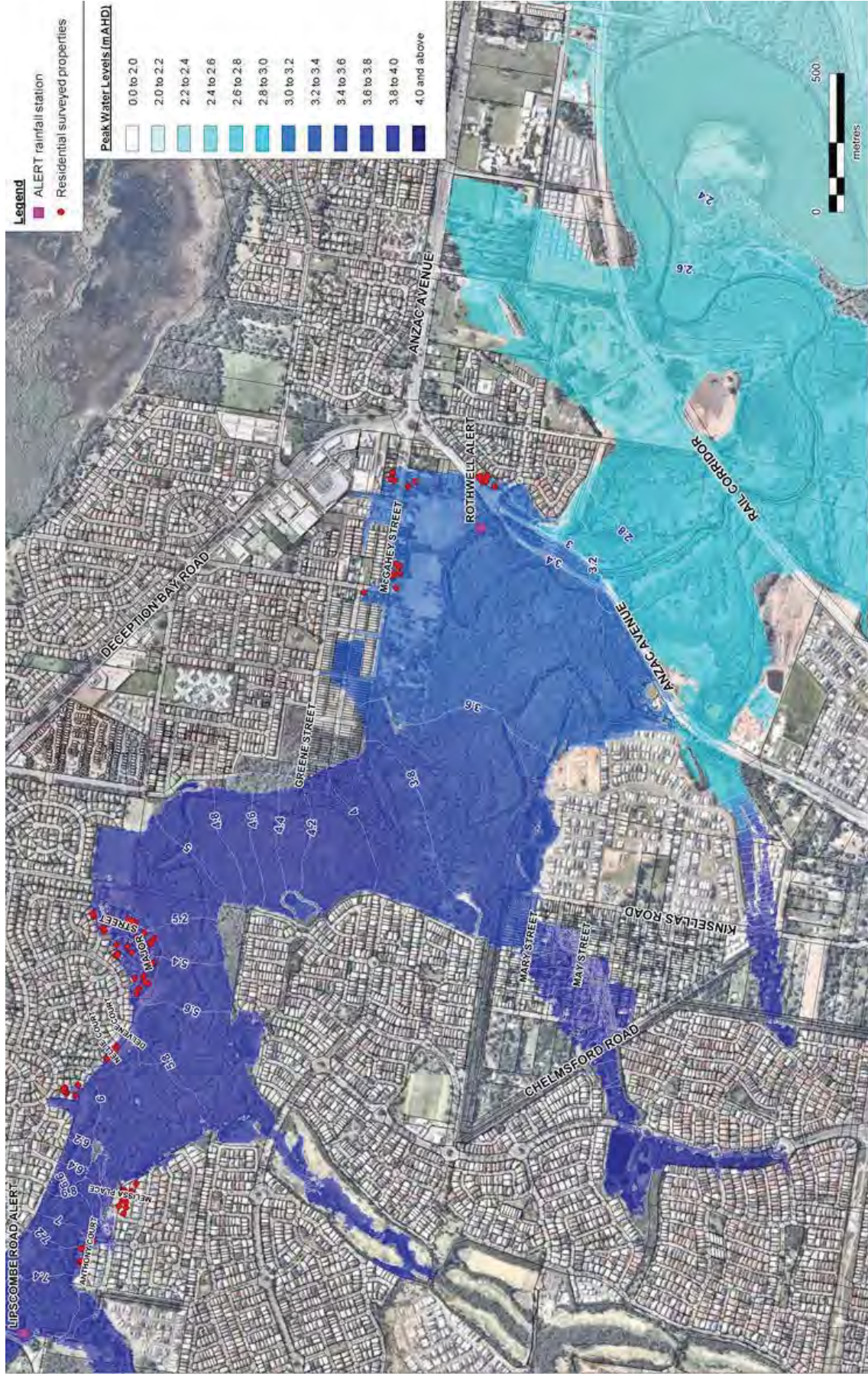


Figure 20 – 1% AEP design event (1 hour, 3 hours and 6 hours), Peak water level, Existing Base condition

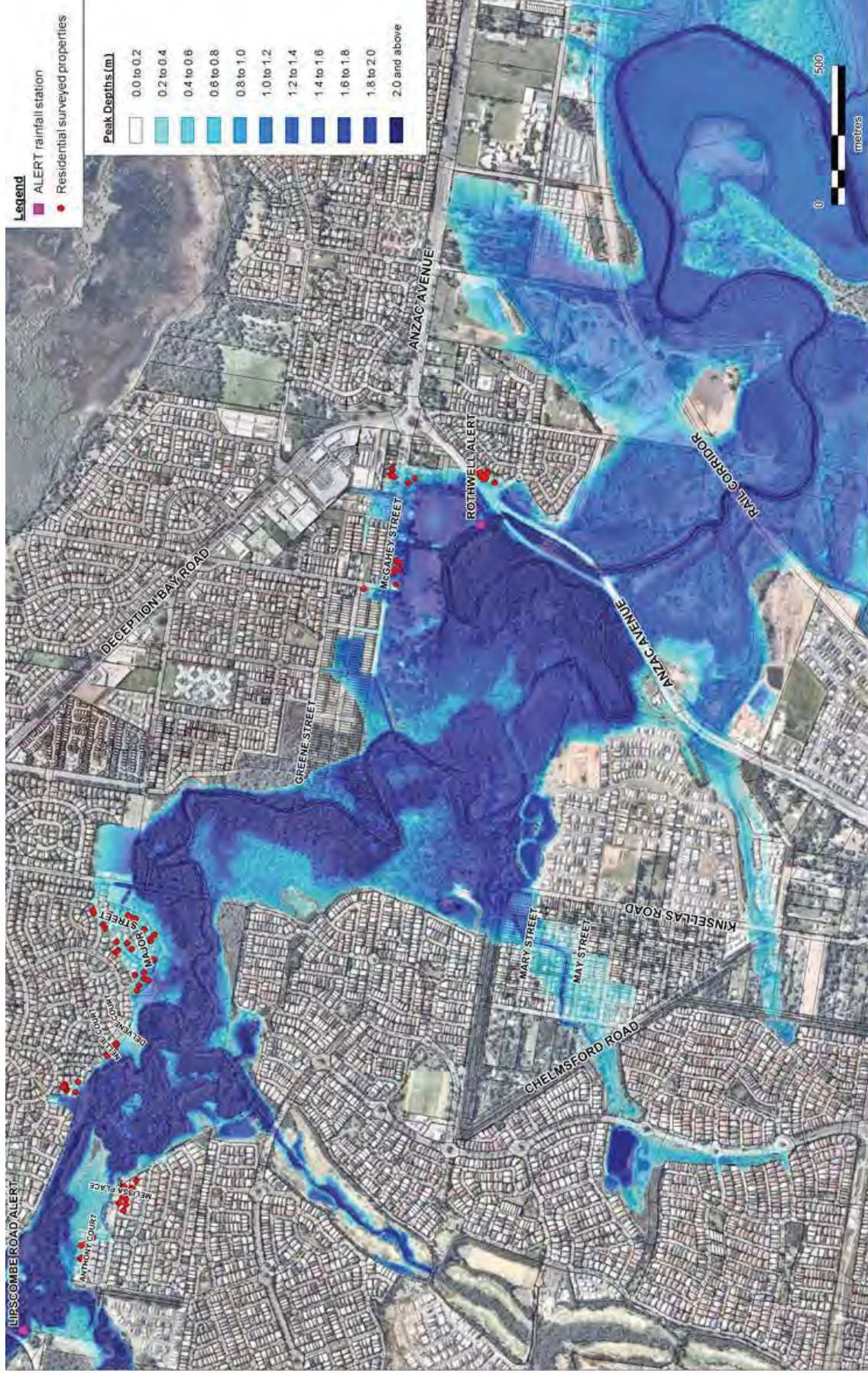


Figure 21 – 1% AEP design event (1 hour, 3 hours and 6 hours), Peak water depth, Existing Base condition

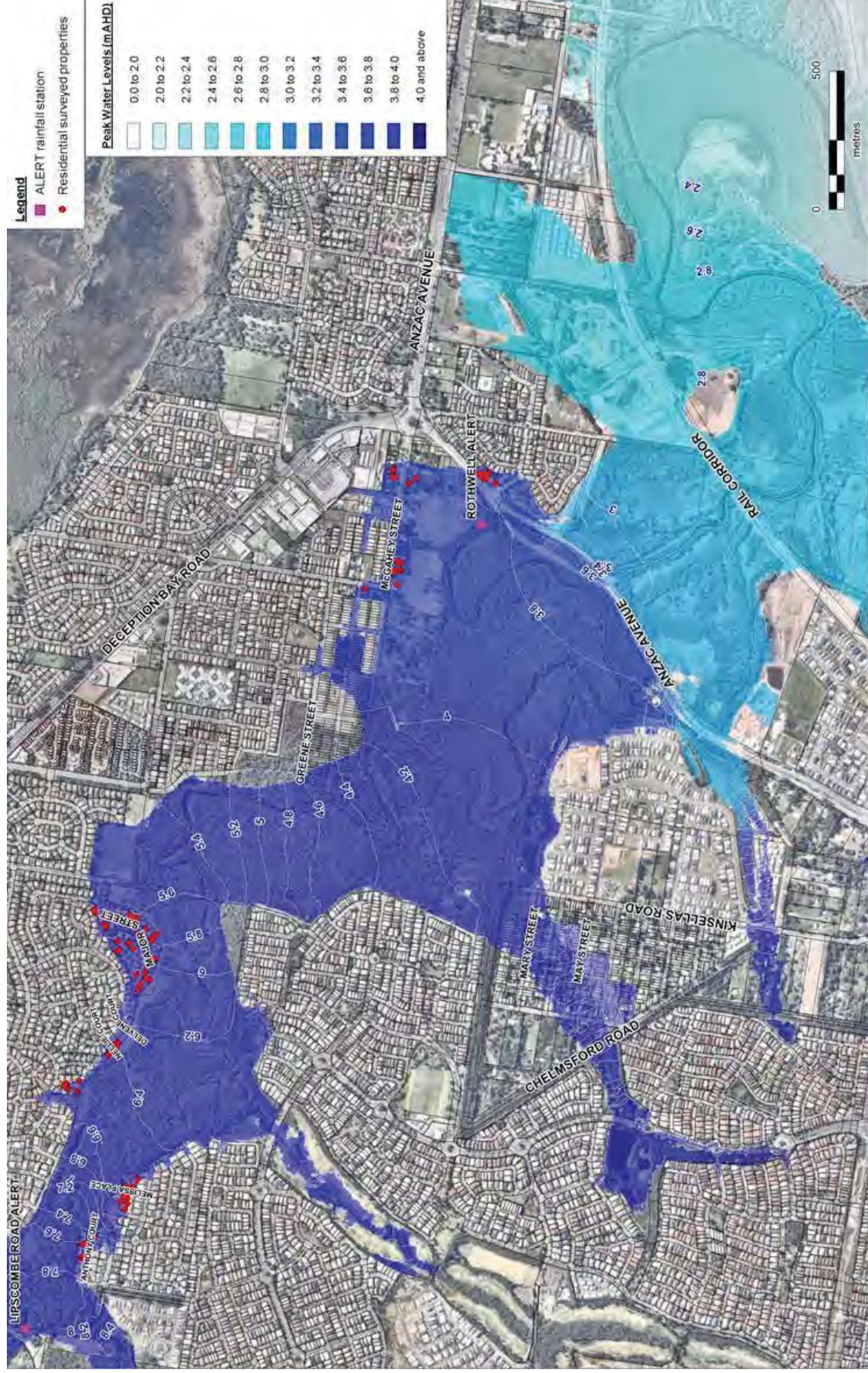


Figure 22 – 1st May 2015 event, Peak water level, Existing Base condition

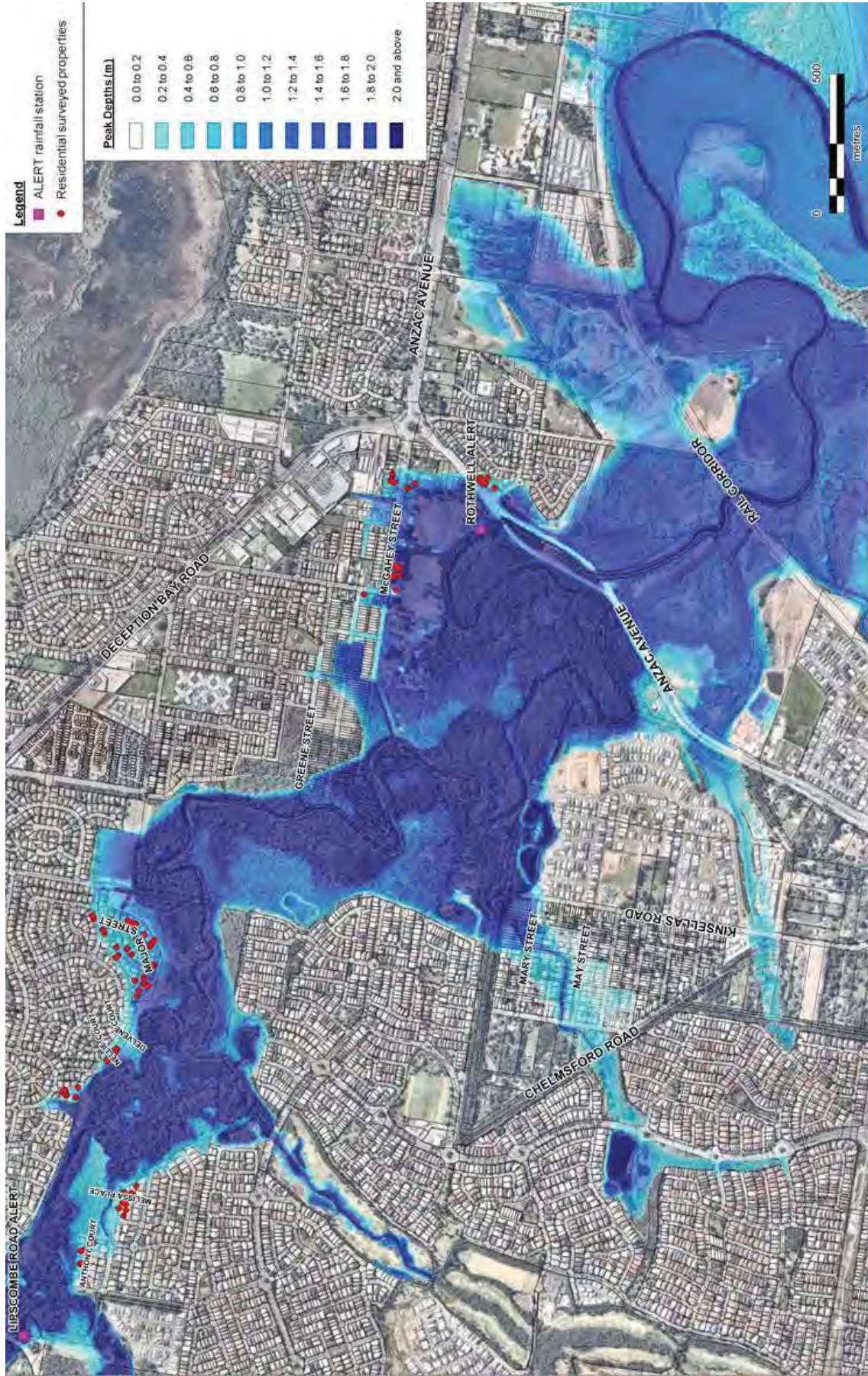


Figure 23 – 1st May 2015 event, Peak water depth, Existing Base condition

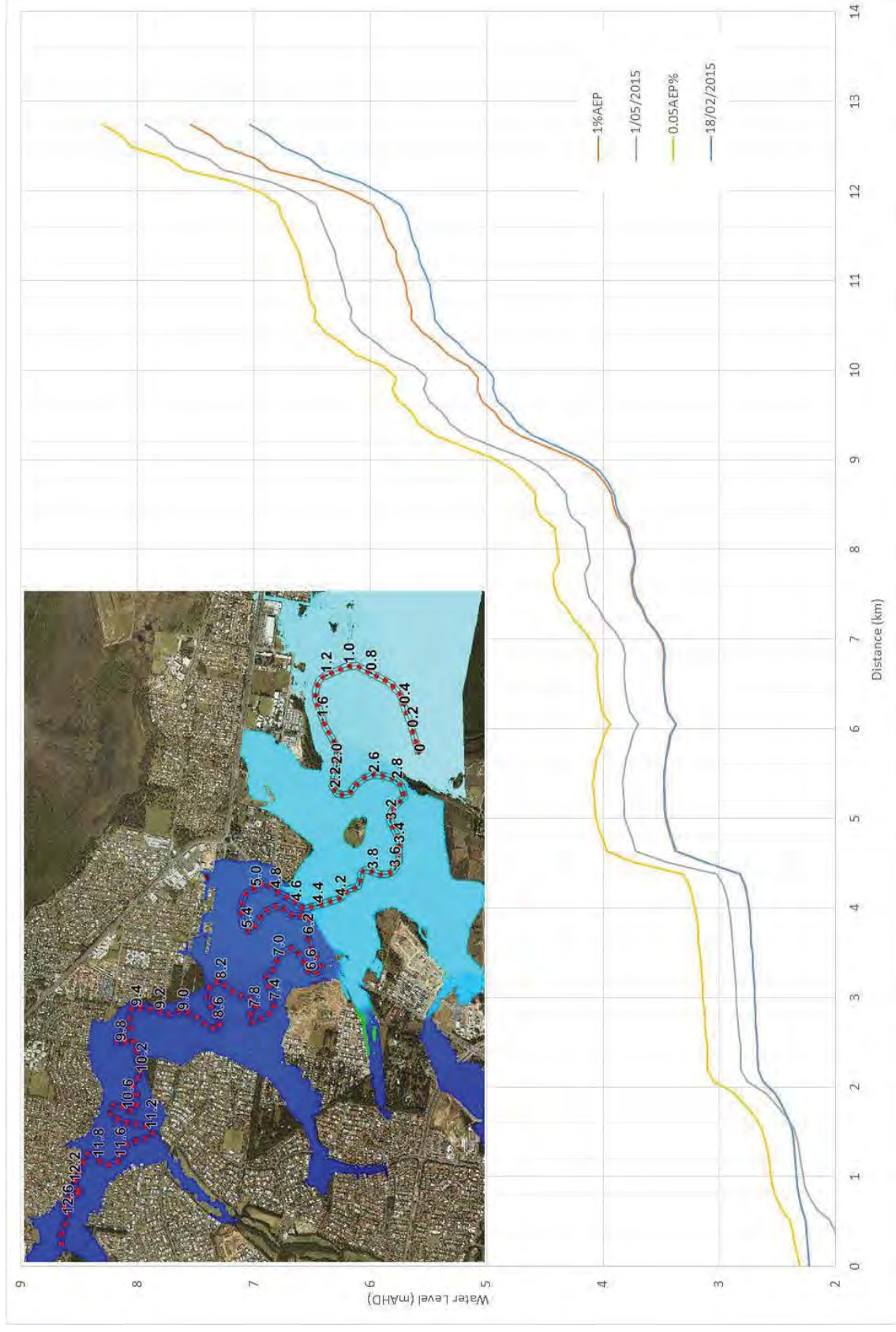


Figure 24 – Peak water level profiles along Saltwater Creek Centreline, Existing Base condition

5.3 Developed condition

This scenario represents the developed conditions of Saltwater Creek catchment and includes all works or infrastructure associated with the MBR project which were in place at the time of the rainfall event on the 1st May 2015. It is used to represent the developed conditions and determine the potential impact of the MBR works on flooding during the 1st May 2015 event.

The developed condition TUFLOW hydraulic model is based on the TUFLOW model for the existing base condition, but includes all permanent and temporary works associated with the MBR project which were in place on the 1st May 2015.

Modelling parameters and assumptions for both TUFLOW models (Existing Base and Developed conditions) are identical except for the MBR permanent and temporary works that were in existence on 1st May 2015. All boundary conditions (inflows and tailwater) and land-use (values and spatial distribution) are also identical to the existing base conditions TUFLOW model.

The only changes associated to the MBR works reflected within the Developed condition model are:

- Permanent railway works including the Saltwater Creek bridge;
- Rothwell Station car park and access road, also essentially permanent;
- Construction works on and near Anzac Avenue, including works associated with the access road for the Rothwell Station car park; and
- Temporary safety barriers and fences around construction site along Anzac Avenue.

Figure 25 shows the changes reflected within the model to represent Developed condition, as constructed on the 1st May 2015. Note that temporary concrete barriers located along Anzac Avenue in the southern edges of both the northeast and southwest bound lanes are included. Temporary works conducted as part of the MBR in Saltwater Creek (between both Anzac Avenue lanes), including sheetpiling, cofferdams, diversions and temporary drainage structures are also included.

It should be noted that temporary works located around Anzac Avenue were surveyed in early June (approximately on 5th June 2015). Accordingly, some of the temporary works present during the 1st May 2015 event were no longer existent at the time of survey (i.e. trenches and excavation dug within Saltwater Creek, pipes and cranes located south of the Anzac Avenue southwest bound lane, etc.). These observed features were represented within the TUFLOW model based on MBR project team construction notes, aerial imagery, photographic evidence and construction diaries either provided by Thiess or collected from other sources. Appendix C shows photographic evidence of temporary works placed at Anzac Avenue during the 1st May 2015 event.

Temporary concrete barriers were represented in the TUFLOW model as fully blocked structures while pipes and cranes sitting next to the road were modelled utilising a patch of increased roughness ($n = 1$) to model their associated flow impedance.

Culverts that form part of the MBR works were also inserted within the updated TUFLOW model, assuming them as unblocked prior to any flood event.

5.3.1 Developed condition Results

The Developed condition TUFLOW model was run to simulate flooding conditions within Saltwater Creek floodplain during the 1% AEP design event and the 1st May 2015 event.

The resulting 1% AEP water level and depths are presented in Figure 26 and Figure 27 respectively while resulting peak water surface levels and depths corresponding to the 1st May 2015 event are presented in Figure 28 and Figure 29. Figure 30 shows the difference between water levels observed during the 1st May 2015 event and those corresponding to the 1% AEP event for Developed condition. It can be seen that water levels observed during the 1st May 2015 event were higher than those corresponding to the 1% AEP event.

Appendix E includes enlarged versions of maps showing modelling results.

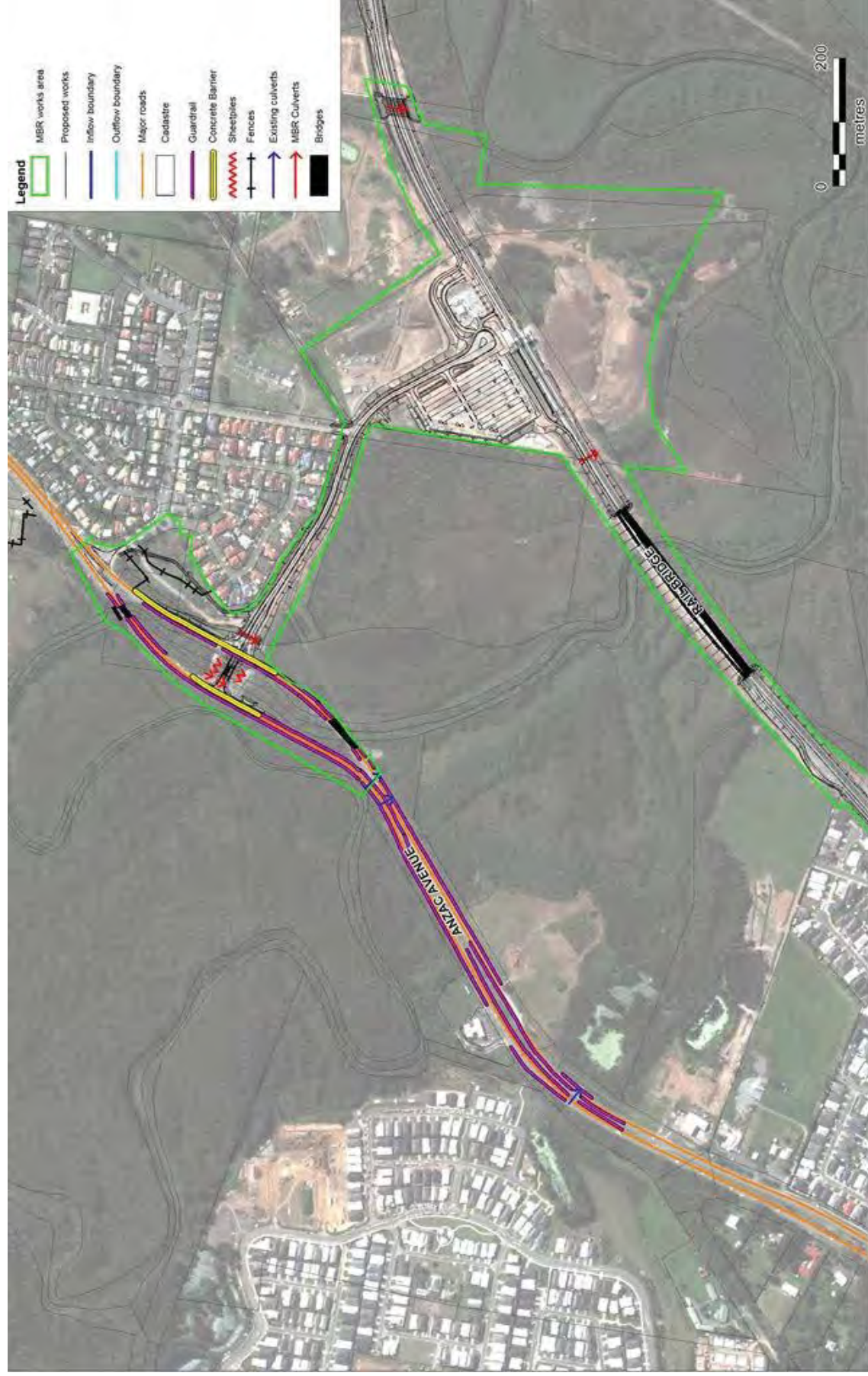


Figure 25 –Saltwater Creek hydraulic model setup, Developed condition

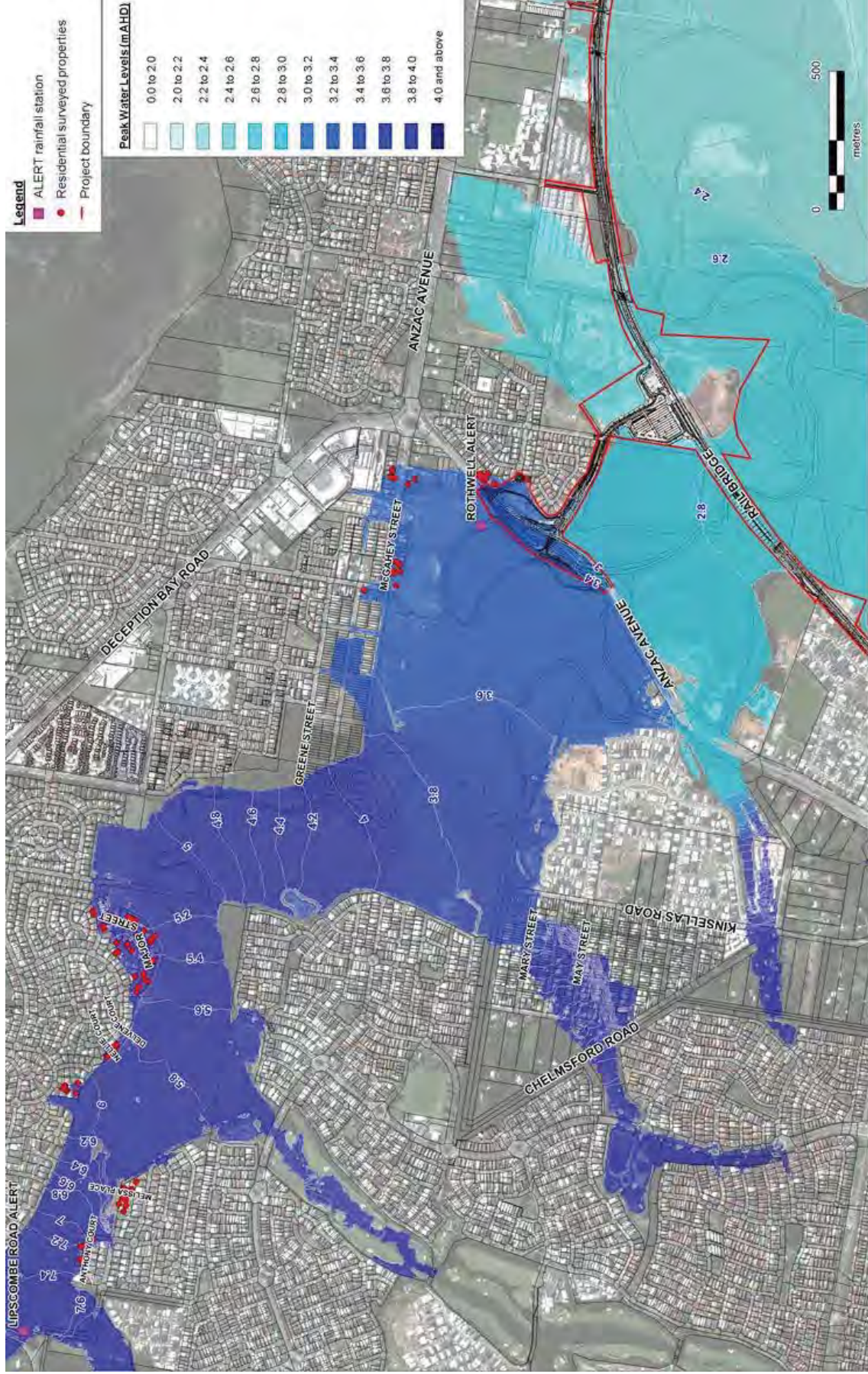


Figure 26 – 1% AEP design event (1 hour, 3 hours and 6 hours), Peak water level, Developed condition

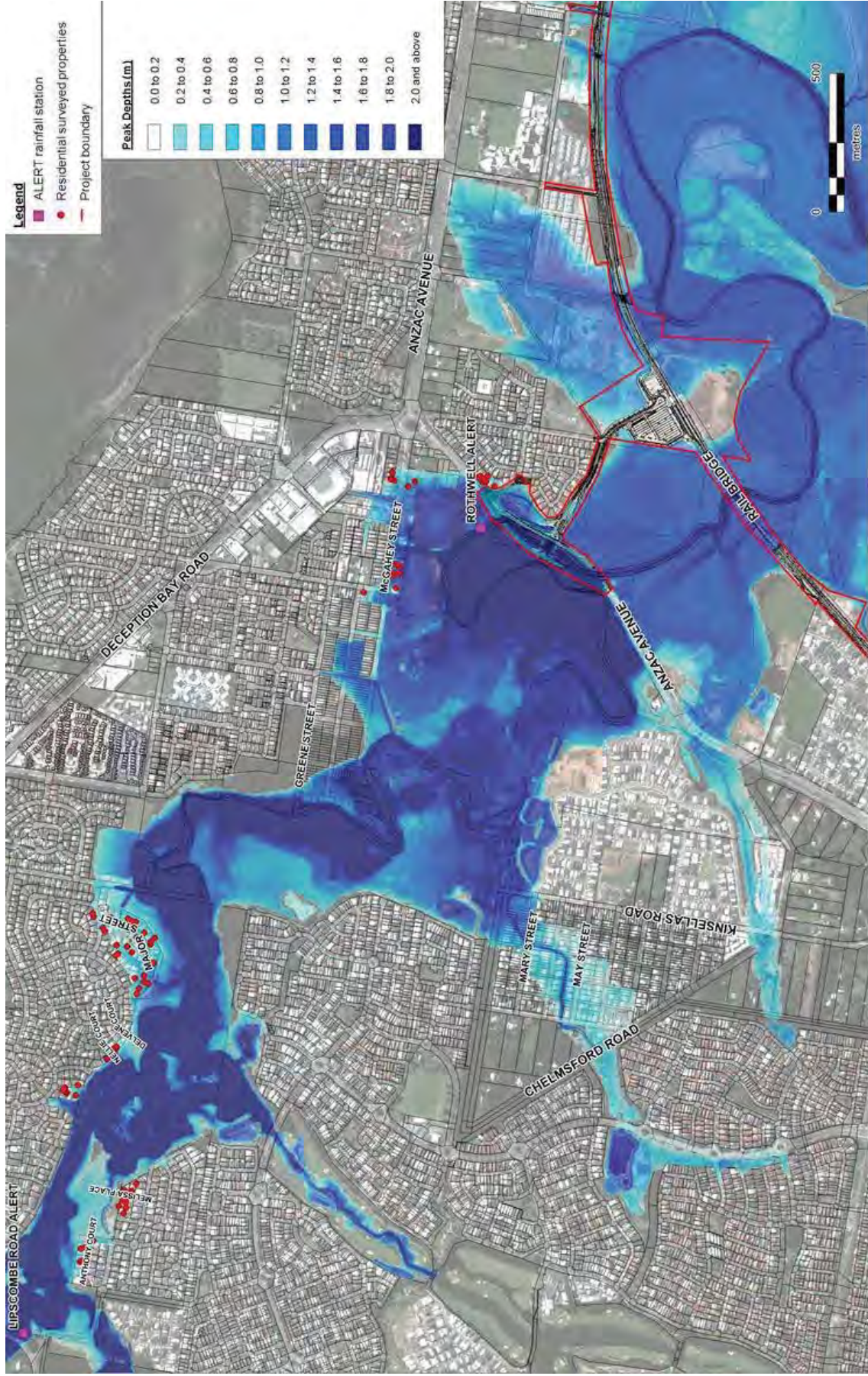


Figure 27 – 1% AEP design event (1 hour, 3 hours and 6 hours), Peak water depth, Developed condition

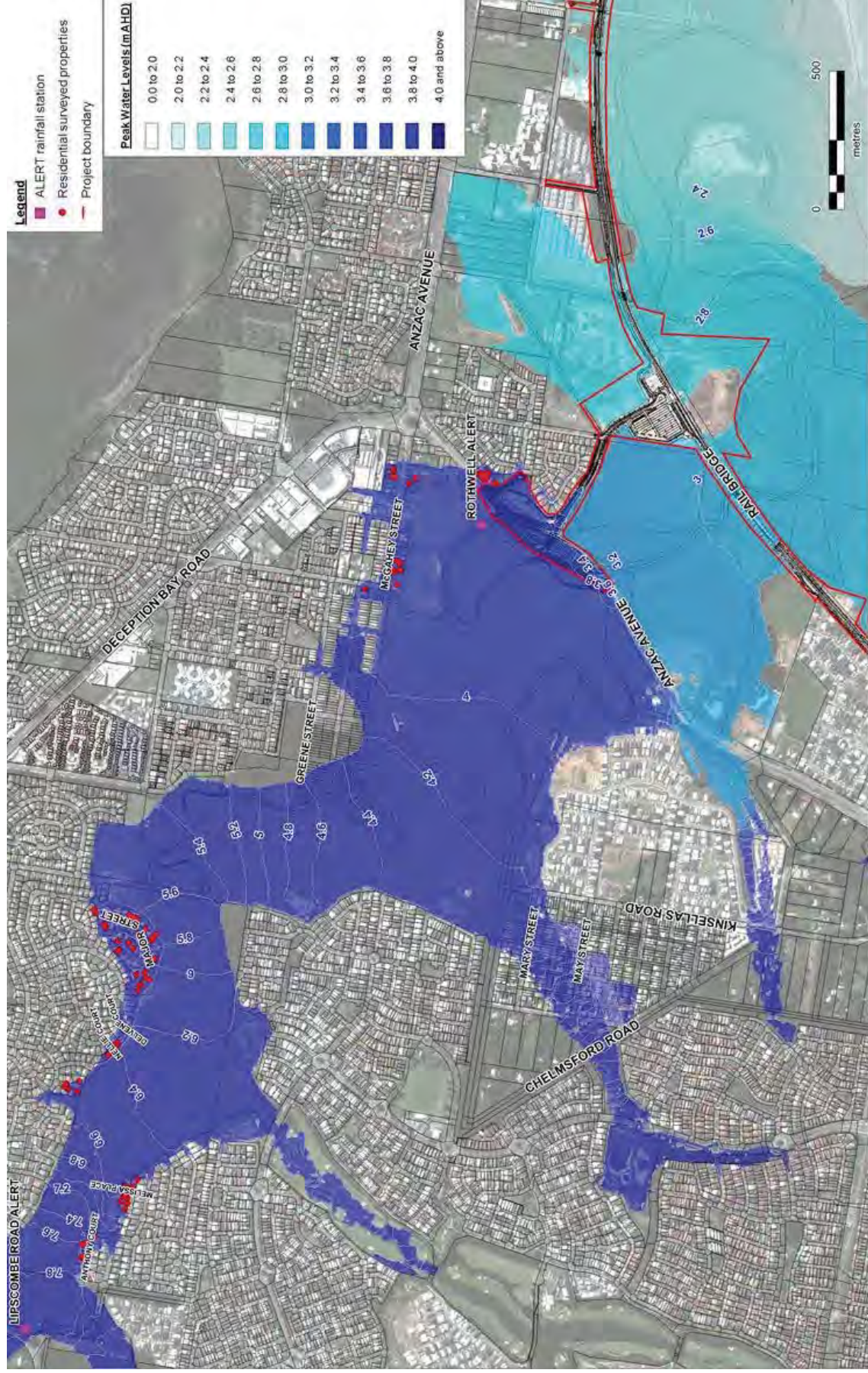


Figure 28 – 1st May 2015 event, Peak water level, Developed condition

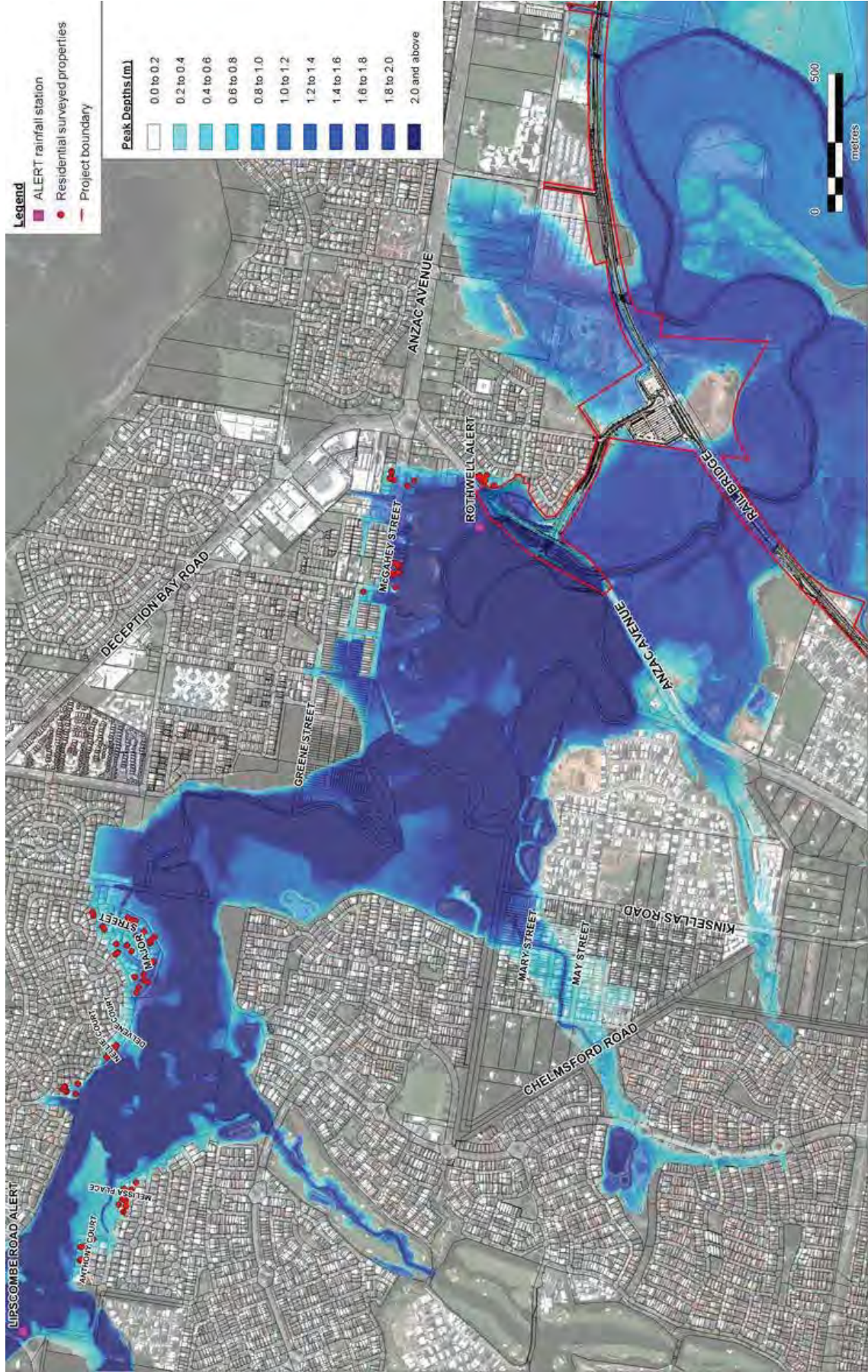


Figure 29 – 1st May 2015 event, Peak water depth, Developed condition

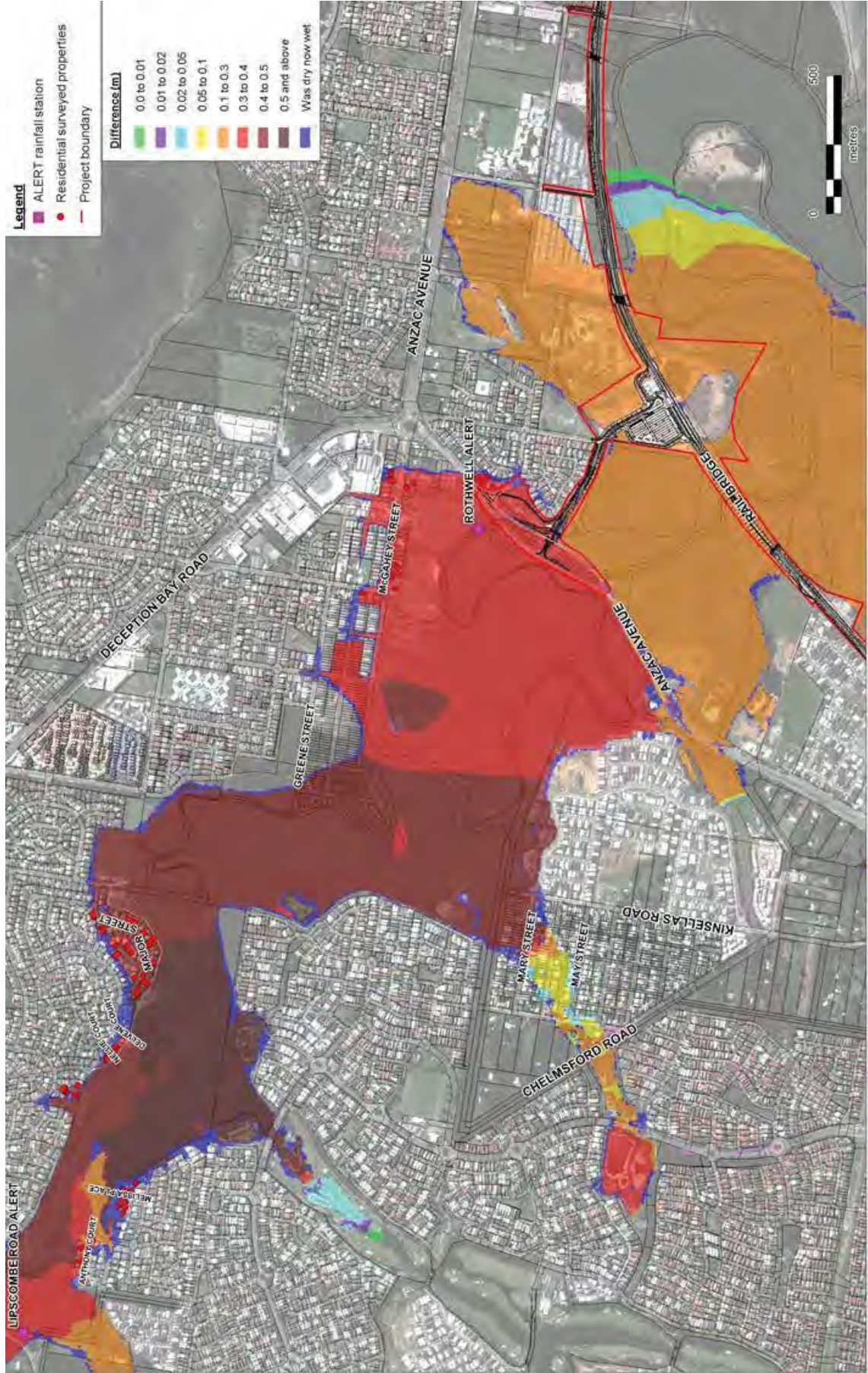


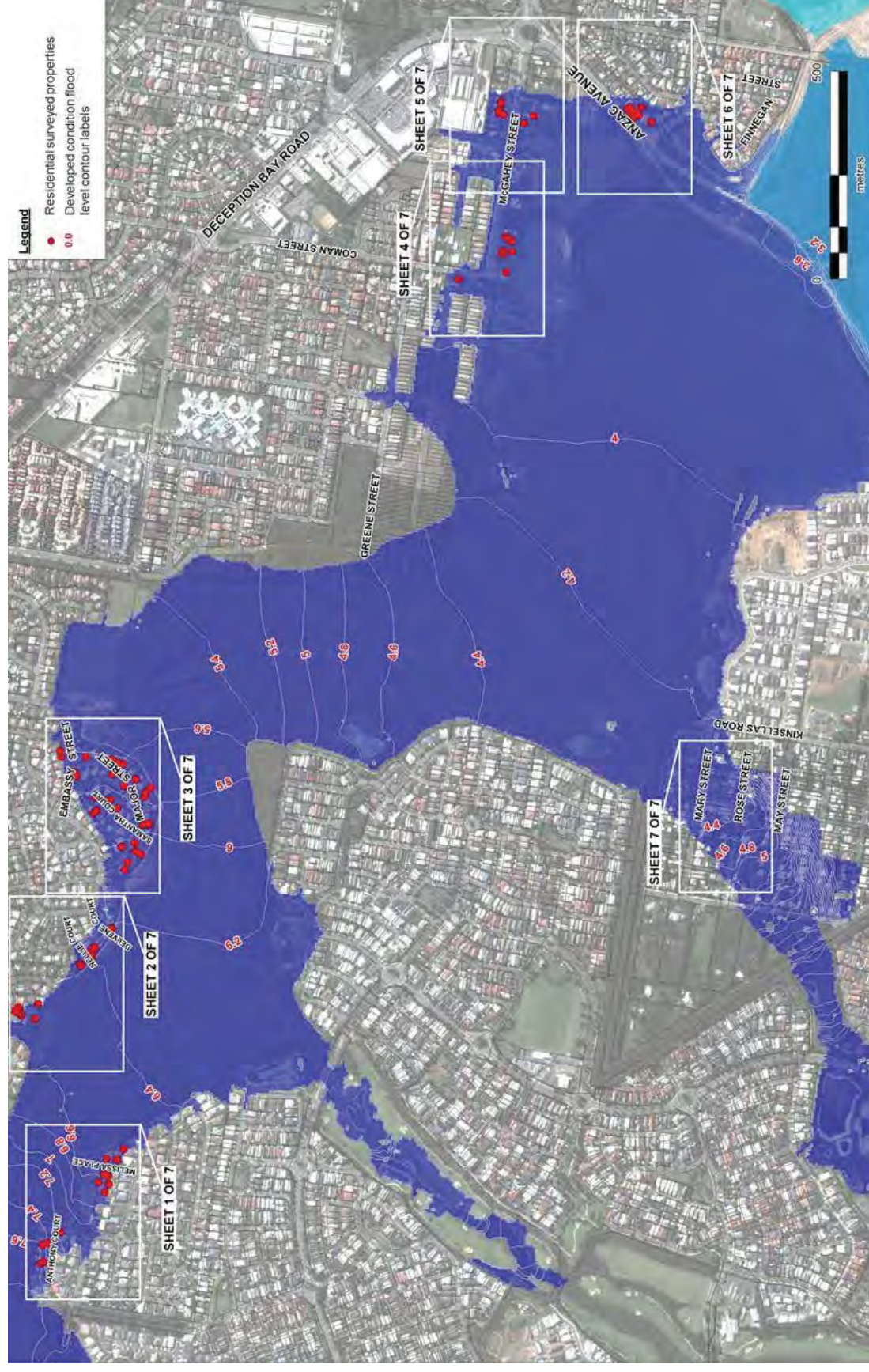
Figure 30 – Difference in Water levels, 1% AEP and 1st May 2015 event, Developed vs Existing Base conditions

5.4 Calibration

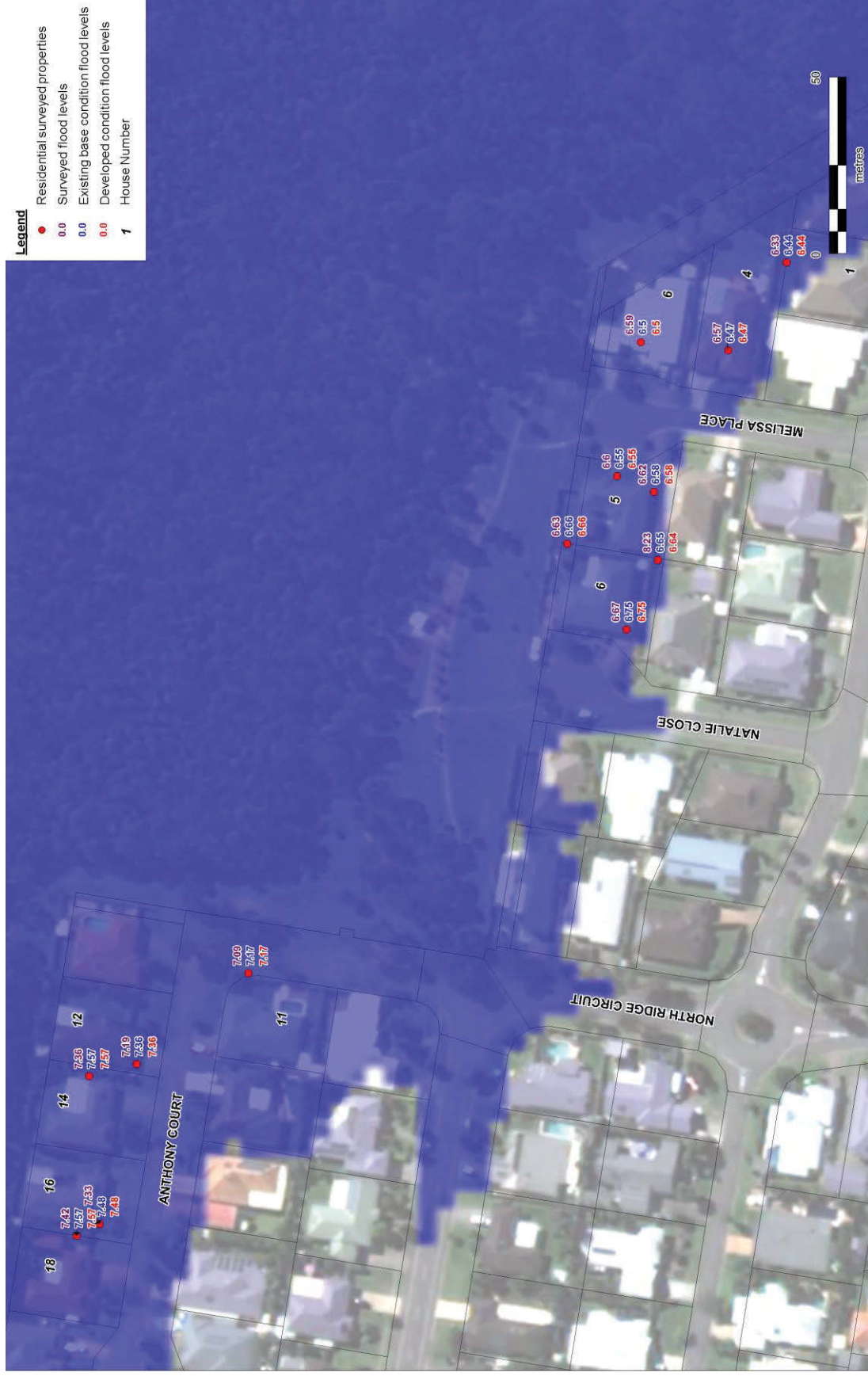
The developed condition model was calibrated against observed 1st May 2015 flood levels, since this model represented conditions when flood levels were observed. Modelling results are compared with 1st May 2015 flood marks surveyed as part of this study in Figure 31. Appendix E includes enlarged versions of maps showing modelling results.

The comparison indicates that the Developed condition model closely replicates the observed flood levels during the 1st May 2015 flood event at most locations. A maximum difference of +/- 30 mm is achieved for most locations. In places where the model does not match surveyed levels (i.e. Anthony Court, Deception Bay), a maximum 186 mm average difference in levels is observed. This location is outside the area of impact of the MBR project (refer to Section 5.5).

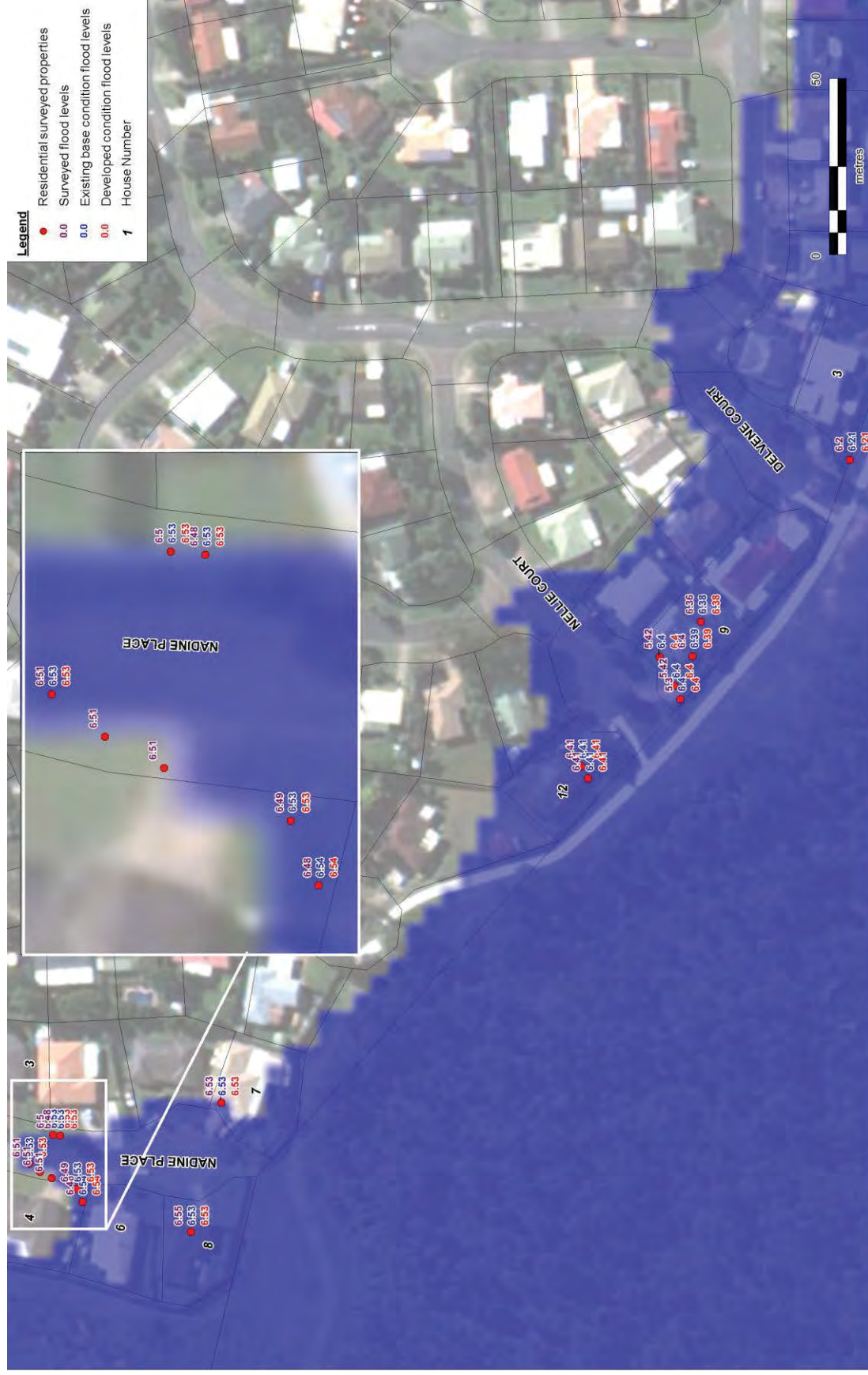
The resulting water levels presented herein are different (higher) than those obtained using the MBRC and AAJV TUFLOW models. However, they closely represent floodplain conditions observed during the 1st May 2015 event within the model due model refinements, robust calibration undertaken and additional survey of observed flood marks undertaken in the area.



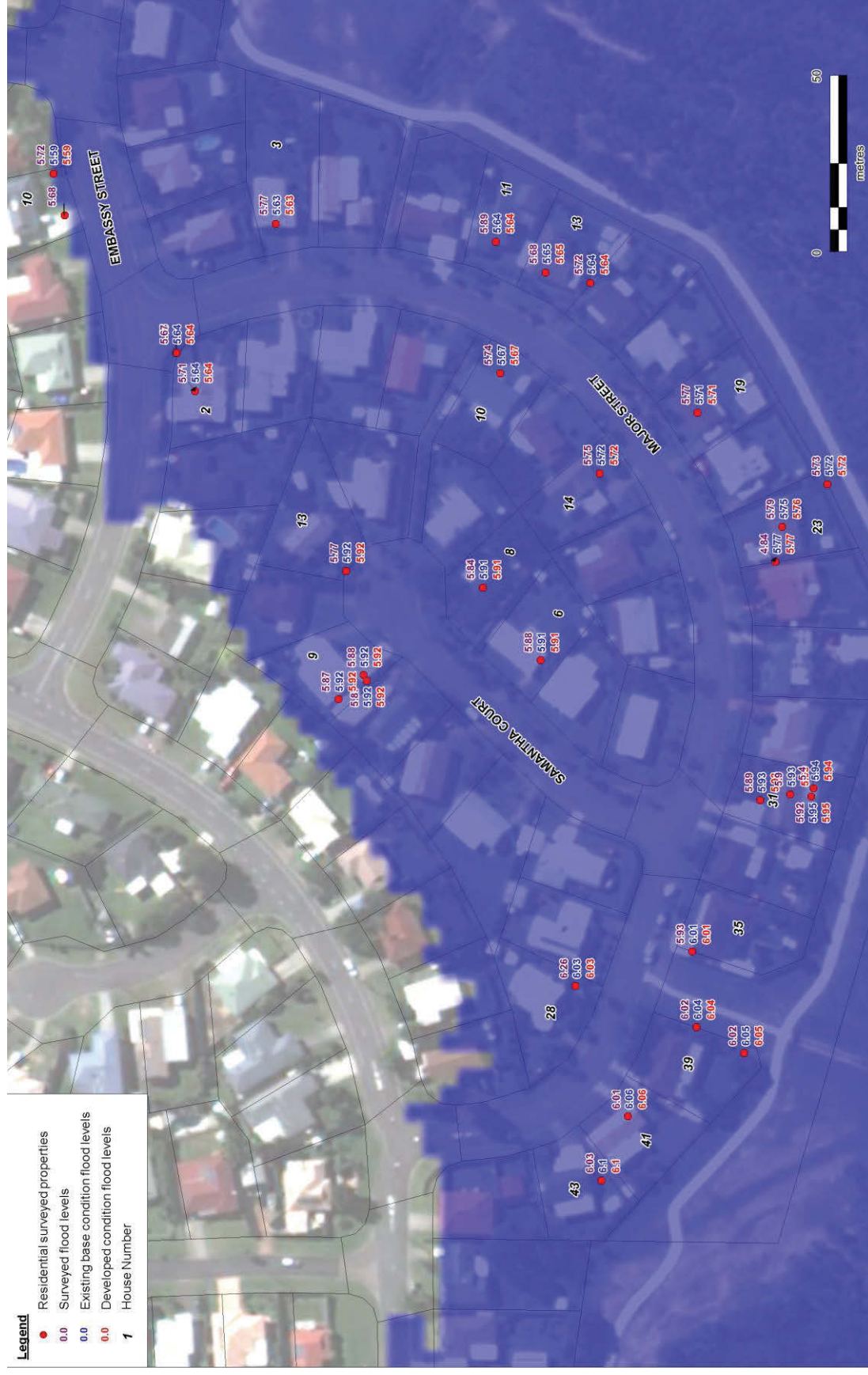
a) Key Map



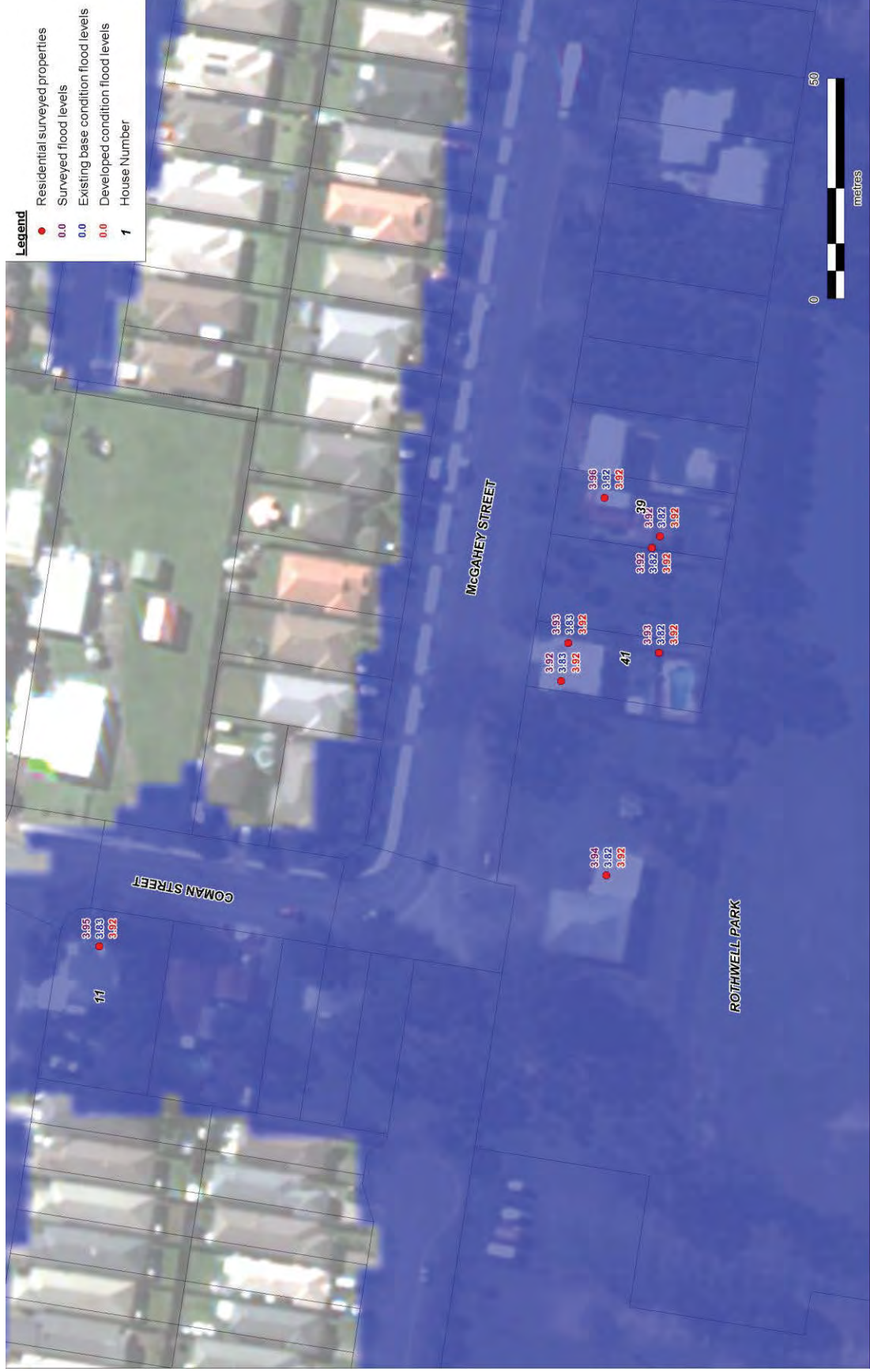
b) Inset, Anthony Court



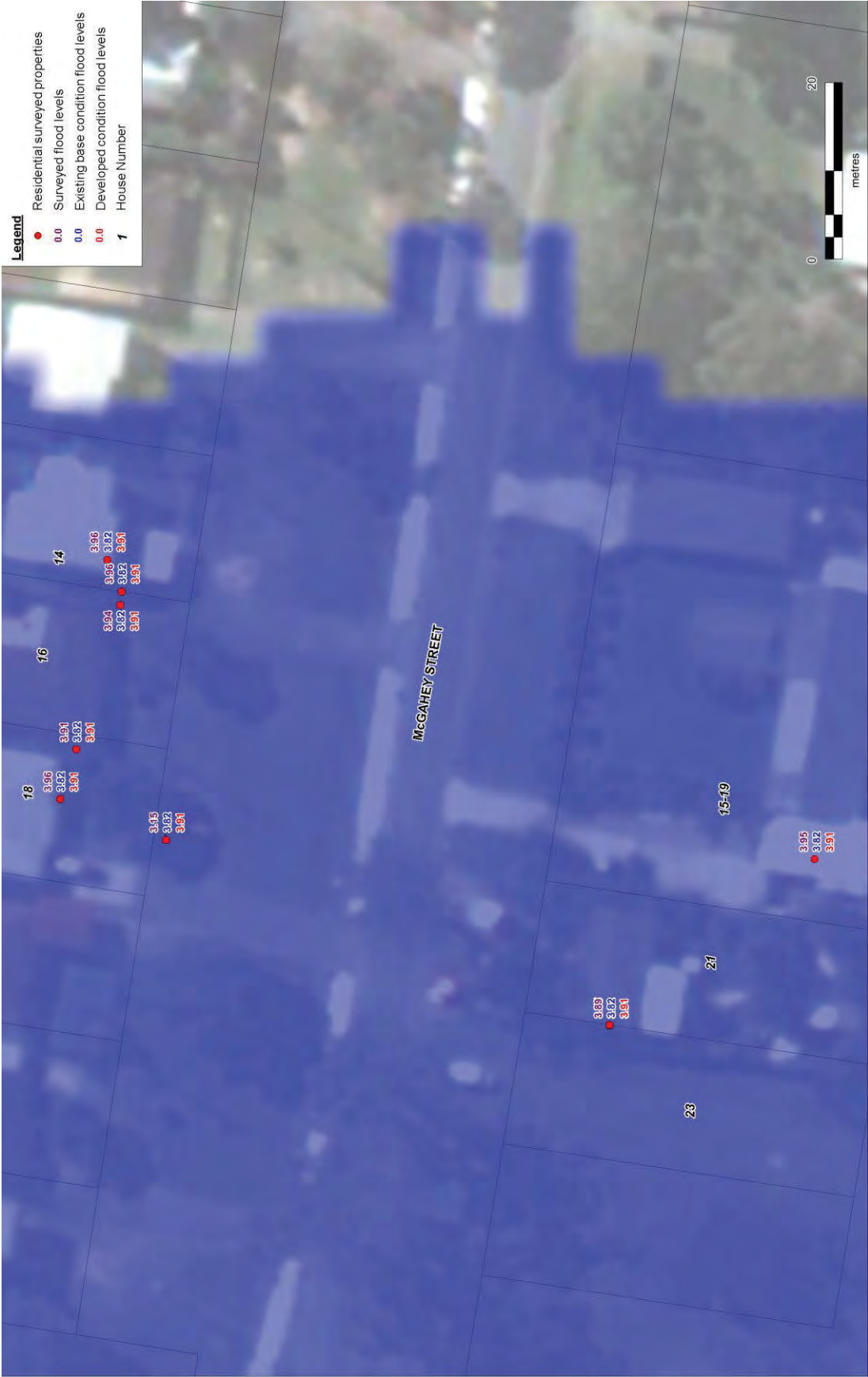
c) Inset, Nellie Court



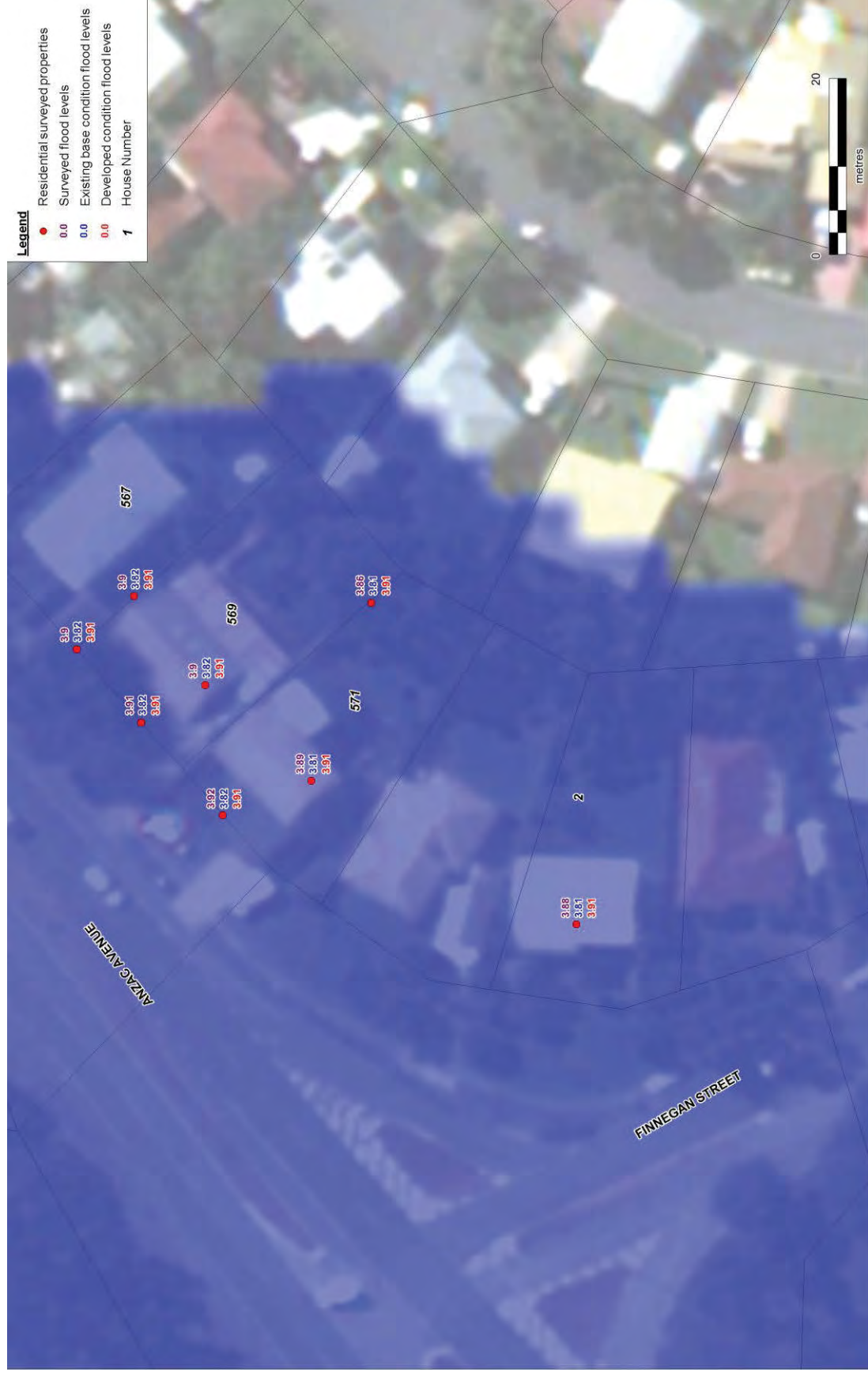
d) Inset, Major Street



e) Inset, McGahey Street, West



f) Inset, McGahey Street, East



g) Inset, Anzac Avenue



h) Inset, Mary Street

Figure 31 – Comparison of modelled and surveyed levels, 1st May 2015 Event, Existing Base condition vs Developed condition

5.5 Flood Impacts

For this study, afflux is defined as the difference in water levels observed between existing base and developed conditions. Consequently, observed afflux identifies any impacts on current flooding conditions that the MBR project caused. Afflux grids were calculated by subtracting calculated existing base condition water levels from calculated developed condition water levels.

Figure 32 and Figure 33 respectively show afflux maps for both the 1% AEP and the 1st May 2015 event. Figure 34 shows a profile of water levels extracted along the Saltwater Creek centreline for both existing base and developed conditions. The afflux value in mm are also included in this plot (refer to the secondary vertical axis).

Calculated affluxes show that the MBR project works caused an increase in flood levels during both the 1st May 2015 and would also have caused an afflux if the 1% AEP event would have occurred on the 1st May 2015. The magnitude of this afflux varies throughout the catchment and is summarised below in Table 8.

Table 8 – Summary of flood level increases during 1st May 2015 and 1% AEP events

1 st May 2015 event	1% AEP design event
There was no increase in flood levels upstream of Greene Street, Rothwell including Major Street and properties further upstream.	There would be no increase in flood levels upstream of Greene Street, Rothwell including Major Street and properties further upstream.
There was an afflux affecting properties at Mary Street, Mango Hill. The water level observed was approximately 4.2 mAHd and of this 35 mm can be attributed to the MBR Project.	There would be an afflux affecting properties at Mary Street, Mango Hill. The water level observed was approximately 3.8 mAHd and of this 20 mm can be attributed to the MBR Project.
There was an afflux affecting properties in McGahey Street, Rothwell. The water level observed was approximately 3.92 mAHd and of this 90-100 mm can be attributed to the MBR Project.	There would be an afflux affecting properties in McGahey Street, Rothwell. The water level observed was approximately 3.53 mAHd and of this 60 mm can be attributed to the MBR Project.
There was an afflux affecting properties at Anzac Avenue, Rothwell. The water level observed was approximately 3.91 mAHd and of this 90-100 mm can be attributed to the MBR Project.	There would be an afflux affecting properties at Anzac Avenue, Rothwell. The water level observed was approximately 3.53 mAHd and of this 80 mm can be attributed to the MBR Project.
Maximum localised afflux of about 750 mm immediately upstream of the Rothwell Station access road, this afflux is caused by the newly built access road and does not affect any properties.	Maximum localised afflux of about 650 mm immediately upstream of the Rothwell Station access road, this afflux would be caused by the newly built access road and does not affect any properties.
Higher localised affluxes not affecting properties occurred within the floodplain downstream of Greene Street, Rothwell.	Higher localised affluxes not affecting properties occurred within the floodplain downstream of Greene Street, Rothwell.

The afflux experienced upstream of Anzac Avenue as a result of the MBR project dissipates approximately within 4.5 km (at Greene Street, Rothwell), where a steep section of the flood profile is observed and the afflux does not extend upstream into Major Street and other areas.

The slope of the Saltwater Creek flood profile between Greene Street and Major Street is approximately 0.1% (1 m in 1000 m) in comparison to the much flatter slope of 0.015% (1 m in 6500 m) observed further downstream between Greene Street and Anzac Avenue (refer to Figure 34).

This stretch of Saltwater Creek floodplain located between Greene Street, Rothwell and Major Street, Deception Bay also represents the narrowest section of the floodplain with a width of 600 m which doubles in width (to 1200 m) at the Anzac Avenue, Rothwell.

Table 9 compares water levels observed during the 1st May 2015 event with model calculated water levels for the 1st May 2015 and the 1% AEP design event at each property surveyed during the current investigation. Results show that modelled water levels closely match surveyed levels within most areas. Presented water depths calculated by subtracting surveyed floor levels from calculated water levels are also presented.

It can be seen that the streets most severely affected during the 1st May 2015 event were those surrounding Anzac Avenue in Rothwell. McGahey Street, Rothwell experienced depths close to 2 m while 750 mm depths were observed at Anzac Avenue. The observed levels were on average 400 mm higher than those corresponding to the 1% AEP event. The MBR project has caused an increase in the order of 100 mm to flood depths affecting properties within this area during the 1st May 2015 event.

Properties in Major Street, Deception Bay, experienced maximum depths of approximately 1.2 m during the 1st May 2015 event, however flooding conditions within these properties and areas located upstream were not impacted by the MBR works.

Modelling results show there was an increase in flood level caused by the MBR project at 85 residential properties during the 1st May 2015 event and 49 properties would have been impacted in occurrence of the design 1% AEP event. The impact at these properties varies in severity. Table 10 shows the number of properties impacted at different areas along with the number of properties where flood debris, floor and ground levels were recorded through field survey.

It should be noted that all properties located in the area where flood levels were increased by the MBR project during the 1st May 2015 storm event and the 1% AEP storm event would have experienced flooding with or without the construction of the MBR project.

The order of magnitude of the calculated affluxes is consistent with impacts calculated as part of the *Moreton Bay Rail Project, Design report – Hydrology/Hydraulics Lawnton Petrie and Petrie to Kippa-Ring* (AAJV, 2014).

Table 9 – Comparison of results with surveyed levels, 1st May 2015 event

Address	Surveyed Floor Level (mAHD)	Surveyed Water Level from 1 st May (mAHD)	1% AEP Flood Water Level Existing Base condition (mAHD)	1% AEP Flood Water Level Developed condition (mAHD)	Increase in Water Level for 1% AEP (mm)	1 st May Flood Water Level Existing Base condition (mAHD)	1 st May Flood Water Level Developed condition (mAHD)	Increase in Water Level for 1 st May (mm)	1% AEP Depth over floor, assuming, MBR works (mm)	1 st May Flood Depth over floor, assuming MBR works (mm)
Anzac Avenue										
567 Anzac Ave	3.49	3.90	3.47	3.53	60	3.82	3.91	90	39	419
569 Anzac Ave	3.38	3.90	3.47	3.53	60	3.82	3.91	90	148	528
571 Anzac Ave	3.17	3.92	3.47	3.53	60	3.82	3.91	90	359	740
2 Finnegan St	3.30	3.88	3.46	3.53	68	3.81	3.91	100	225	608
McGahey Street										
Rothwell Park	N/A	3.94	3.48	3.53	57	3.82	3.92	100	N/A	N/A
14 McGahey St	3.54	3.96	N/A	N/A	N/A	3.82	3.91	90	N/A	374
15-19 McGahey St	2.80	3.95	3.47	3.53	58	3.82	3.91	90	733	1113
16 McGahey St	3.65	3.94	N/A	3.53	N/A	3.82	3.91	90	0	258
18 McGahey St	3.66	3.91	3.47	3.53	58	3.82	3.91	90	0	249
21 McGahey St	2.70	3.89	3.47	3.53	58	3.82	3.91	90	828	1208
39 McGahey St	3.50	3.92	3.48	3.53	57	3.82	3.92	100	36	423
41 McGahey St	2.09	3.93	3.48	3.53	57	3.83	3.92	90	1447	1834

Address	Surveyed Floor Level (mAHD)	Surveyed Water Level from 1 st May (mAHD)	1% AEP Flood Water Level Existing Base condition (mAHD)	1% AEP Flood Water Developed condition (mAHD)	Increase in Water Level for 1% AEP (mm)	1 st May Flood Water Level Existing Base condition (mAHD)	1 st May Flood Water Level Developed condition (mAHD)	Increase in Water Level for 1 st May (mm)	1% AEP Depth over floor, assuming, MBR works (mm)	1 st May Flood Depth over floor, assuming MBR works (mm)
11 Coman St	3.45	3.95	3.48	3.54	57	3.83	3.92	90	80	465
Mary Street										
2 Kinsellas Road West	N/A	4.28	3.78	3.79	10	4.17	4.20	32	N/A	N/A
22 Kinsellas Road West	N/A	4.28	N/A	N/A	N/A	4.17	4.20	32	N/A	N/A
Major Street										
10 Embassy St	5.97	5.72	N/A	N/A	N/A	5.59	5.59	0	N/A	0
2 Major St	5.32	5.67	5.20	5.20	0	5.64	5.64	0	0	315
3 Major St	5.16	5.77	5.19	5.19	0	5.63	5.63	0	33	469
10 Major St	5.17	5.74	5.20	5.20	0	5.67	5.67	0	36	504
11 Major St	4.89	5.89	5.18	5.18	0	5.64	5.64	0	290	748
13 Major St	4.90	5.72	5.18	5.18	0	5.64	5.64	0	271	735
14 Major St	5.23	5.75	5.23	5.23	0	5.72	5.72	0	2	491
19 Major St	5.00	5.77	5.23	5.23	0	5.71	5.71	0	228	712
23 Major St	5.03	5.79	5.27	5.27	0	5.75	5.76	10	242	733

Address	Surveyed Floor Level (mAHD)	Surveyed Water Level from 1 st May (mAHD)	1% AEP Flood Water Level Existing Base condition (mAHD)	1% AEP Flood Water Developed condition (mAHD)	Increase in Water Level for 1% AEP (mm)	1 st May Flood Water Level Existing Base condition (mAHD)	1 st May Flood Water Level Developed condition (mAHD)	Increase in Water Level for 1 st May (mm)	1% AEP Depth over floor, assuming, MBR works (mm)	1 st May Flood Depth over floor, assuming MBR works (mm)
28 Major St	5.70	6.26	5.53	5.53	0	6.03	6.03	0	0	327
31 Major St	5.03	5.92	5.47	5.47	0	5.95	5.95	0	436	919
35 Major St	4.87	5.93	5.53	5.53	0	6.01	6.01	0	661	1144
39 Major St	4.84	6.02	5.54	5.54	0	6.05	6.05	0	695	1205
39 Major St	5.17	6.01	5.55	5.55	0	6.06	6.06	0	383	891
41 Major St	5.25	6.03	5.58	5.58	0	6.1	6.1	0	334	849
43 Major St	5.42	5.88	5.50	5.50	N/A	5.59	5.59	0	N/A	0
6 Samantha Ct	N/A	5.84	5.50	5.50	0	5.91	5.91	0	82	495
8 Samantha Ct	5.64	5.88	N/A	N/A	0	5.91	5.91	0	N/A	N/A
9 Samantha Ct	5.54	5.77	5.50	5.50	N/A	5.92	5.92	0	N/A	277
13 Samantha Ct	5.97	5.72	N/A	N/A	0	5.92	5.92	0	0	380
Nadine Place										
3 Delvene Ct	5.98	6.20	5.74	5.74	0	6.21	6.21	0	0	233
9 Nellie Ct	5.65	6.36	5.93	5.93	0	6.38	6.38	0	281	732
12 Nellie Ct	5.76	6.41	5.94	5.94	0	6.41	6.41	0	180	654

Address	Surveyed Floor Level (mAHD)	Surveyed Water Level from 1 st May (mAHD)	1% AEP Flood Water Level Existing Base condition (mAHD)	1% AEP Flood Water Developed condition (mAHD)	Increase in Water Level for 1% AEP (mm)	1 st May Flood Water Level Existing Base condition (mAHD)	1 st May Flood Water Level Developed condition (mAHD)	Increase in Water Level for 1 st May (mm)	1% AEP Depth over floor, assuming, MBR works (mm)	1 st May Flood Depth over floor, assuming MBR works (mm)
6 Nadine Pl	6.58	6.48	N/A	N/A	N/A	6.53	6.53	0	N/A	0
7 Nadine Pl	6.75	6.53	N/A	N/A	N/A	6.53	6.53	0	N/A	0
8 Nadine Pl	6.30	6.55	N/A	N/A	N/A	6.53	6.53	0	N/A	228
Anthony Court										
4 Melissa Pl	6.51	6.57	N/A	N/A	N/A	6.47	6.47	0	N/A	0
5 Melissa Pl	6.40	6.62	N/A	N/A	N/A	6.58	6.58	0	N/A	177
6 Melissa Pl	6.42	6.59	N/A	N/A	N/A	6.5	6.5	0	N/A	84
6 Natalie Cl	6.55	6.67	N/A	N/A	N/A	6.75	6.75	0	N/A	204
12 Anthony Ct	7.10	7.19	7.09	7.09	0	7.36	7.36	0	0	256
14 Anthony Ct	7.11	7.36	7.19	7.19	0	7.57	7.57	0	82	458
16 Anthony Ct	7.13	7.33	7.17	7.17	0	7.48	7.48	0	40	354
18 Anthony Ct	7.32	7.42	7.22	7.22	0	7.57	7.57	0	0	252

Table 10 – Number of properties with observed impacts and field surveyed flood debris

Street	Number of properties impacted ¹ by the MBR project during 1 st May 2015	Number of properties impacted ¹ by the MBR project during 1% AEP Event	Number of Properties where flood debris marks were Surveyed (as ToR)
Deception Bay			
Natalie Close	0	0	1
Melissa Place	0	0	3
Anthony Court	0	0	6
Nadine Place	0	0	2
Nellie Court	0	0	2
Delvene Court	0	0	3
Samantha Court	0	0	6
Major Street	0	0	17
Embassy Street	0	0	1
Rothwell			
McGahey Street (including Coman Street, Hubner Drive, Clancy Court)	46	29	11 (this included 1 park: Rothwell Park and 1 pet resort: 15-19 McGahey Street)
Anzac Avenue	5	4	4
Finnegan Street (including Pamphlett Street)	4	3	2
Mango Hill			
Kinsellas Road	1	0	2 (this included 1 park: Part Danzy Buchanan Park, surveyed by MBRC)
Chermside Road	2	0	0
Parkhaven Street	3	1	0
Mary Street	16	8	0
Rose Street	8	4	0
Total	85	49	60

Note: Impacted properties in this table refer to properties located in the floodplain area inundated where afflux was observed, it does not necessarily means flooded above floor level

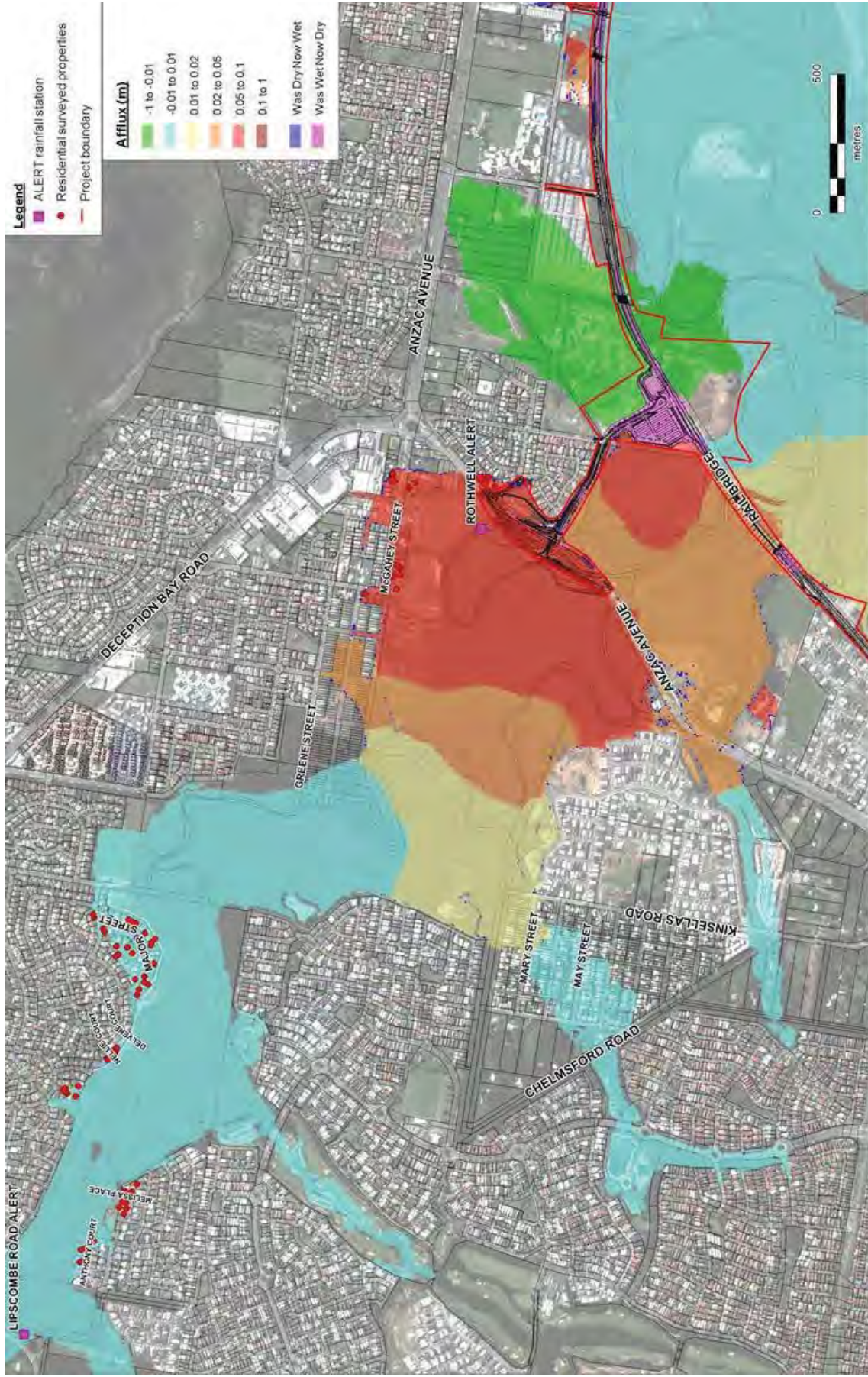


Figure 32 – Afflux, 1% AEP event, Developed vs Existing Base condition

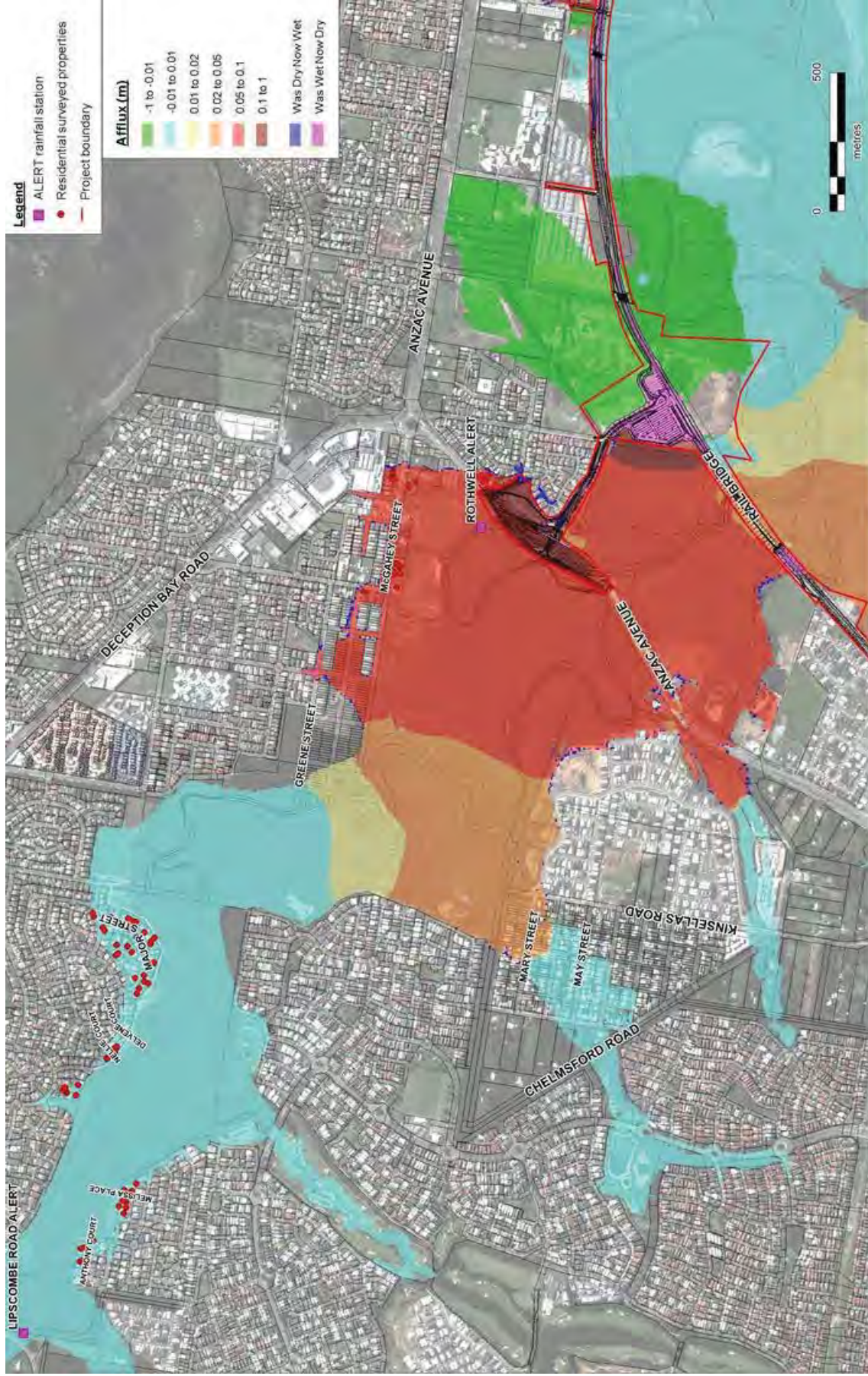


Figure 33 – Afflux, 1st May 2015 event, Developed condition vs. Existing Base condition

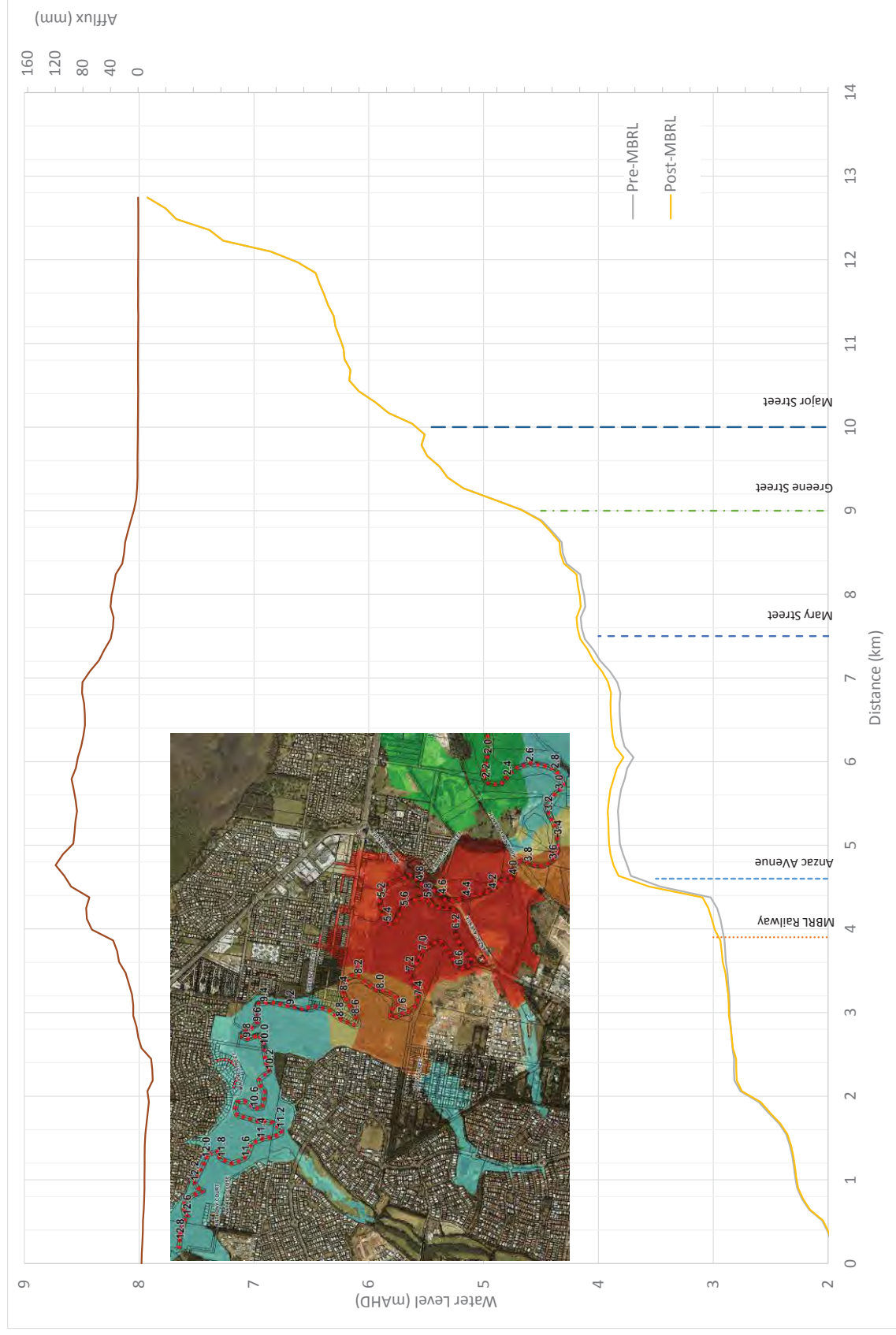


Figure 34 –Water level and Afflux profiles along Creek centreline, 1st May 2015 event, Existing Base and Developed conditions

6. CONCLUSIONS

This report documents the hydrological and hydraulic review conducted to determine if the MBR project exacerbated flood levels in the Saltwater Creek catchment during the 1st May 2015 rainfall event.

Results from the analysis show that for the durations critical for the Saltwater Creek catchment (between 3 and 6 hours), the AEP for the 1st May 2015 rainfall event was in excess of an AEP 1% and approximately the 0.1% AEP design event. This event was also significantly larger than the 18th February 2015 rainfall event from Cyclone Marcia which was estimated at being just larger than the 2% AEP design event.

Afflux calculated by comparing resulting water levels from the existing base and developed conditions indicate the MBR project works increased the flood levels upstream of project works within the Saltwater Creek catchment during the 1st May 2015 event. The magnitude of the increase varies depending on the location within the catchment and are summarised below:

- There was no increase in flood levels upstream of Greene Street, Rothwell including Major Street and properties further upstream;
- There was an afflux affecting properties at Mary Street, Mango Hill. The water level observed was approximately 4.2 mAHD and of this 35 mm can be attributed to the MBR Project;
- There was an afflux affecting properties in McGahey Street, Rothwell. The water level observed was approximately 3.92 mAHD and of this 90-100 mm can be attributed to the MBR Project;
- There was an afflux affecting properties at Anzac Avenue, Rothwell. The water level observed was approximately 3.91 mAHD and of this 90-105 mm can be attributed to the MBR Project; and
- Higher localised affluxes not affecting properties occurred within the floodplain downstream of Greene Street, Rothwell.

The afflux can be attributed to the following MBR Project works which were under construction at the time of the 1st May 2015 storm event:

- The Saltwater Creek railway bridge and railway embankments resulted in localised afflux which did not affect properties and was contained within the floodplain;
- The local access road and carpark for the MBR Rothwell Station which will become part of the MBR project's permanent works. This access road has restricted flows entering the south eastern tributary of Saltwater Creek and flows at the southern side of Anzac Avenue;
- Temporary works along Anzac Avenue generally associated with the temporary concrete barriers restricting flows across Anzac Avenue; and

- Temporary construction works between the eastbound and westbound carriageways of Anzac Avenue which consisted of sheet piling, earthworks and culvert works restricting flows between Anzac Avenue.

It should be noted that 85 residential properties are located in the area where flood levels were increased by MBR works during the 1st May 2015 storm event and of these 49 were located in the area affected in the 1% AEP storm event. All of these properties would have experienced flooding on the 1st May 2015 even without the influence of the MBR project works.

7. REFERENCES

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8. APPENDICES

Appendix A: Terms of References

Moreton Bay Rail Project: Independent Hydraulic Review

Saltwater Creek Catchment Terms of Reference

Prepared for: Transport and Main Roads
Date: 26 May 2015

DOCUMENT CONTROL

Title	Moreton Bay Rail Project: Independent Hydraulic Review Saltwater Creek Catchment
Prepared for	Transport and Main Roads
Internal Ref	30031466

Details of Revisions and Approvals for Issue

Rev	Date	Author	Reviewer	Approved
FINAL	26/05/2015	Ashley Zanetti	Jared Cooke	Bob Tilbury

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DISCLAIMER

This Terms of Reference (TOR) is provided solely for the purposes of the Independent Hydraulic Review of the Moreton Bay Rail Project. This TOR is provided pursuant to a Consultancy Agreement between SMEC Australia Pty Limited ("SMEC") and the Department of Transport and Main Roads under which SMEC undertook to perform a specific and limited task for the Department of Transport and Main Roads. This TOR is strictly limited to the matters stated in it and subject to the various assumptions, qualifications and limitations in it and does not apply by implication to other matters. SMEC makes no representation that the scope, assumptions, qualifications and exclusions set out in this TOR will be suitable or sufficient for other purposes nor that the content of the TOR covers all matters which you may regard as material for your purposes. This TOR must be read as a whole. The executive summary is not a substitute for this. Any subsequent TOR must be read in conjunction with this TOR.

The report supersedes all previous draft or interim TOR's, whether written or presented orally, before the date of this TOR. This TOR has not and will not be updated for events or transactions occurring after the date of the TOR or any other matters which might have a material effect on its contents or which come to light after the date of the TOR. SMEC is not obliged to inform you of any such event, transaction or matter nor to update the TOR for anything that occurs, or of which SMEC becomes aware, after the date of this TOR.

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TABLE OF CONTENTS

1. INTRODUCTION.....	1
1.1 Objectives of the Project	6
2. TERMS OF REFERENCE	6
2.1 Purpose	6
2.2 In Scope.....	6
2.3 Out of Scope	6
2.4 Timeline for the review.....	6
2.5 Governance	6
3. METHODOLOGY.....	6
3.1 Data Gathering.....	6
3.2 Data Review	6
3.3 Model Development.....	6
3.4 Model Validation	6
3.5 Reporting.....	6
3.6 Review and Finalisation	6
3.7 Project Management	6
3.8 Communications and Stakeholder Management	6
ATTACHMENT A – REVIEW AREA	7

1. INTRODUCTION

1.1 Objectives of the Project

SMEC Australia Pty Ltd (SMEC) has been appointed by the Department of Transport and Main Roads (TMR) to undertake an Independent hydraulic review of the possible impacts on flooding from the construction works at the Moreton Bay Rail Project (MBRL) in response to the rainfall event that occurred on the 1st May 2015.

This document outlines the scope of works, terms of reference and the limitations of SMEC's commission for this independent review.

The purpose of the independent review will be to undertake hydrological and hydraulic modelling in order to determine if the MBRL affected water levels in the area during the 1st May 2015 rainfall event. The review is limited to the Saltwater Creek catchment only in the suburbs of Rothwell, Mango Hill and Deception Bay.

2. TERMS OF REFERENCE

TMR provided a high level terms of reference (TOR) for the review on the 5th May 2015. This TOR is outlined below and has been supplemented to incorporate comments from the Independent Project Manager and briefing to SMEC regarding the commission on the 11th May 2015.

2.1 Purpose

The purpose of the independent review is to undertake hydrological and hydraulic modelling in order to determine if the MBRL affected water levels in the area during the 1st May 2015 rainfall event. The review is limited to the Saltwater Creek catchment only in the suburbs of Rothwell, Mango Hill and Deception Bay. The extent of the review and the boundary is shown in Attachment A of this TOR.

2.2 In Scope

The scope of the review is limited to the following.

1. Undertake hydrological and hydraulic analysis to determine the water levels in the Saltwater Creek catchment with the following conditions:
 - **Existing Base Condition** - Analysis without the inclusion of works associated with the Moreton Bay Rail Link Project i.e. what would the water levels be in the Saltwater Creek Catchment if there was no construction of the MBRL?
 - **Developed Condition** – Analysis with the inclusion of the MBRL works which were completed at the time of the rainfall event on the 1st May 2015 i.e. has the MBRL contributed to a raise in water level compared to the original base condition?
2. The flood scenarios to be reviewed with the above conditions are as follows:
 - A flood event with a 1% annual exceedance probability (AEP)
 - The flood event of Friday the 1st of May 2015

(Note the review is to determine the approximate AEP of the 1st of May rainfall event)
3. Development of afflux and inundation mapping for the conditions and scenarios detailed above

4. Collection of flood level and rainfall data relevant to the 1st of May 2015 event.
5. Community Consultation to flood affected residents within and adjacent to the Saltwater Creek Catchment
6. Assessing any changes in inundation levels for impacted properties

The flood models developed originally for the Moreton Bay Regional Council and then applied in the planning and design of the Moreton Bay Rail Project will be the basis of this analysis.

2.3 Out of Scope

The following is out of scope for the review:

- Hydrological and Hydraulic assessment outside of the Saltwater Creek Catchment
- Hydrological and Hydraulic assessment associated with the local drainage network linking into the Saltwater Creek Catchment
- Review of the existing Moreton Bay Regional Council flood model.

2.4 Timeline for the review

It is anticipated the review will take approximately 12 weeks from the date of SMEC's appointment. The following time frames for the key tasks of the review are as follows:

- 2 weeks for data collection and flood level surveys
- 4 weeks for model development and validation
- 3 weeks for hydraulic modelling
- 2 weeks for report preparation
- 1 week for review and finalisation

Face to face meetings with affected residents within the study area will occur in the first six weeks of the project. Inputs by residents at these meetings will be used to assist in the model development and validation of 1st May rain event.

2.5 Governance

The review will be independently managed on behalf of Transport and Main Roads. The Independent Project Manager will be responsible for the coordination and communication with Transport and Main Roads and Moreton Bay Regional Council in accordance with the Project Probity Protocols.

3. METHODOLOGY

The review methodology has been subdivided into six tasks:

1. Data gathering
2. Data review
3. Flood Model development
4. Flood Model validation
5. Report Preparation
6. Review and finalisation of the Report

3.1 Data Gathering

A vast quantity of data will be available to ensure an accurate review is undertaken. This data will be made available from multiple sources and will include information relating to the preconstruction, design and construction stages associated with the Moreton Bay Rail Link Project and surrounding areas.

A further detailed data request list is to be developed as part of the review.

All available data will be gathered at the start of the independent review and thoroughly reviewed for accuracy, completeness and consistency prior to any flood modelling being undertaken.

A key component of the data gathering will be to undertake consultation with key residents and stakeholders. This will include consultation with the MBRL project team and other relevant organisations, authorities, community and stakeholders in order to gain data across multiple areas to ensure a comprehensive, accurate and unbiased data set is obtained.

The following steps will be undertaken as part of the data gathering:

- Undertake a site inspection as soon as possible and collect site information and photos
- Obtain all existing reports and models for Saltwater Creek
- Liaise with the Bureau of Meteorology and other sources for rainfall records and tidal levels
- Collect all topographic information and detailed survey
- Collect pre-construction and as constructed survey
- Survey any marked water levels and debris marks within the catchment not already surveyed and any hydraulics structures that are included in the model and scope of the review. Note a separate survey brief containing further details is to be developed as part of the review
- All relevant documentation, reports, models, data and the scope of works and technical criteria for the Moreton Bay Rail Link Project.

3.2 Data Review

There have already been a number of previous studies undertaken for the target area. These studies are to be reviewed to understand the approach taken in terms of flood modelling for the catchment including flood modelling associated with temporary construction works under the MBRL. Relevant information will be extracted from these studies and will be used as a basis for understanding the local catchment flood behaviour and updating the MBRL flood model associated with the Saltwater Creek Catchment.

The following data relevant for setup and modification of the flood models will be obtained from the data gathering stage of the project. The data review will ensure that the data collected is relevant and complete. The data used in the update of the flood models is outlined below:

- Gauged flow/water level data
- Design flow estimates
- Flood behaviour
- Confirmed modelling parameters
- Records on historic flooding including water levels, timing of event and coincidental flooding (if relevant)
- Information on hydraulic structures
- Processes relevant for understanding and estimation of appropriate downstream modelling boundary condition
- Review other activities in the catchment for potential impacts

Where the above information is not available or if after the data review stage the level of completion and accuracy is not deemed suitable SMEC will immediately advise the independent project manager and develop a data request or project scope change request to ensure this information is obtained.

The data review stage is to also consist of reviewing the existing hydrological and hydraulic models available to determine any fatal flaws in the model. A detailed review of all input data within the existing models will not be undertaken and is considered out of scope.

3.3 Model Development

The flood model received during the data gathering stage is to be updated with the latest as constructed survey. The flood model will be run using the verified hydrological data collected from the May 1st rain event. The model will be refined around key areas of interest to gain a greater understanding of any resulting impacts. The model development will consist of the following tasks:

- Review and update the Hydrological and Hydraulic Model with the rainfall data collected for the 1st May rain event for calibration
- Undertake Hydraulic Modelling of the 1% AEP event using the pre-construction survey
- Undertake Hydraulic Modelling of the 1% AEP event using the as-constructed information for the 1st May event

- Undertake Hydraulic Modelling of the May 1st event using the pre-construction survey
- Undertake Hydraulic Modelling of the May 1st event using the as constructed information for the 1st May event

3.4 Model Validation

As part of the model validation SMEC will undertake a general parameter sensitivity analysis in order to assess how much influence the model parameter values have on the modelling results and their impact on the calibration and validation. This will include the following:

- Troubleshoot any issues discovered during the model runs
- Sensitivity analysis of the main hydraulic model parameters (e.g. roughness, tailwater boundary conditions, rainfall/inflows)

3.5 Reporting

On completion of the study SMEC will prepare a report incorporating the methodology and findings of the study in sufficient detail to support the validity of the conclusions. Before issuing the findings of the report this will be reviewed internally by SMEC's experienced panel of reviewers. The report shall include but not limited to the following:

- Introduction and general project information
- Modelling area characteristics
- Review of the May 1st event
- Review the 1 % AEP event
- Data collection and review
- Previous reporting
- Hydrologic modelling
- Hydraulic Modelling
- Model review and update
- Scenarios modelled
- Specific assessment of property impacts
- Interpretation of modelling results
- Summary and recommendations
- Limitations

Mapping will be produced of the modelled events to gain a better understanding of the potential impacts that may have resulted from the MBRL construction as of the 1st May 2015. Resulting impacts will be assessed and compared with outcomes from the pre-construction modelling outcomes. The mapping provided will include the following:

- Water surface profiles
- Afflux for modelled events
- Flood extent maps for modelled events

3.6 Review and Finalisation

The report will be submitted to the independent project manager for review and comment prior to finalising the report and making available the outcomes of the review.

3.7 Project Management

A start up meeting will be held with the Independent Project Manager and relevant stakeholders from the MBRL Project Team to discuss the required objectives and key deliverables and timings for the project. The MBRL team after this meeting will remain independent from the review team with status reporting and weekly project meetings arranged between SMEC and the Independent Project Manager.

3.8 Communications and Stakeholder Management

The objectives of the Communications and Stakeholder management review team are to:

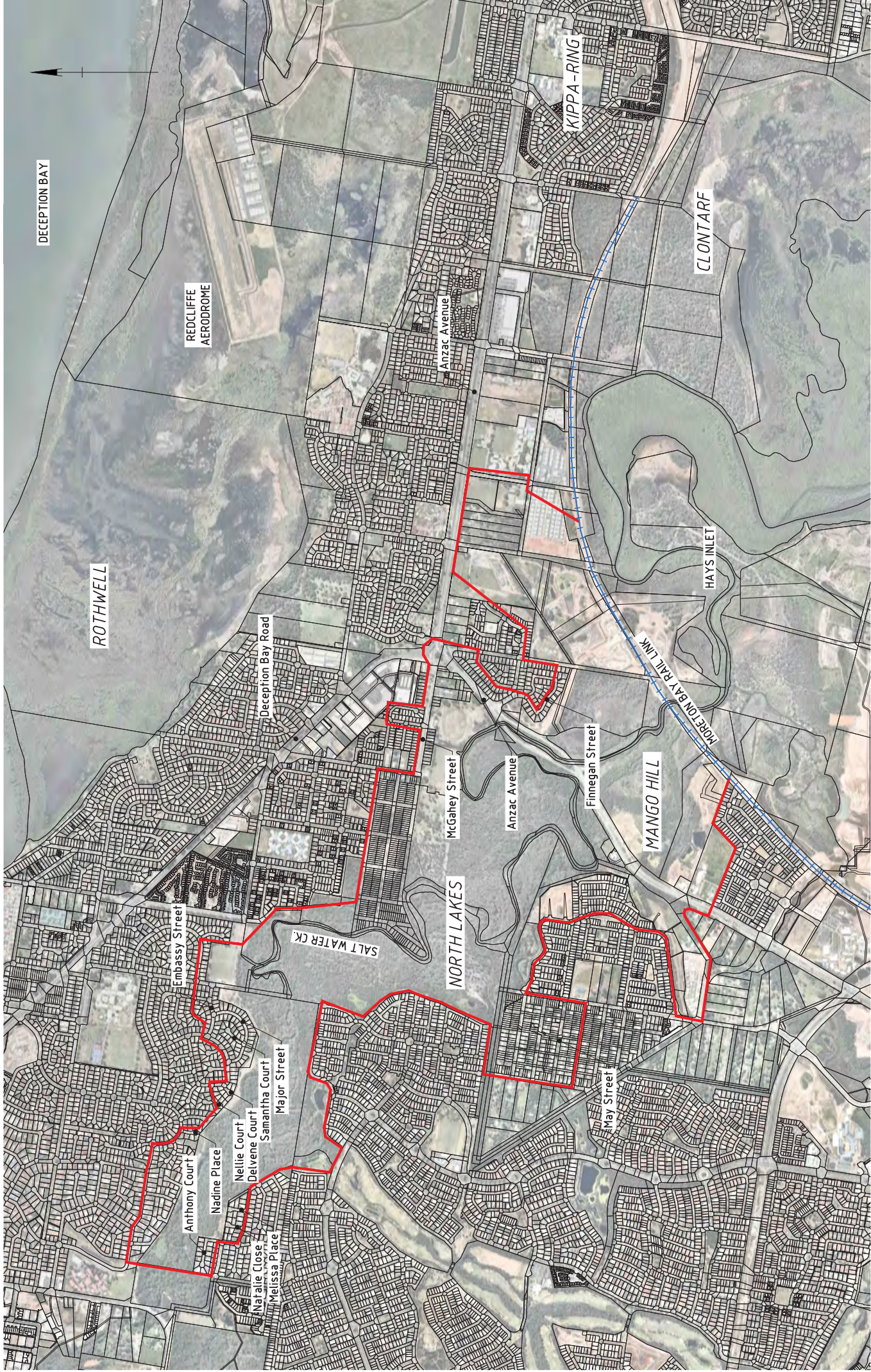
- Engage with impacted residents and businesses within the study area about the 1 May 2015 event and document their views
- Maintain relationships with impacted residents and businesses and engage as appropriate for the duration of the review
- Engage with stakeholders to obtain information to inform the review.
- Provide a transparent and responsive engagement process.

The SMEC team is independent of the Moreton Bay Rail Project engagement team and will manage all activities including stakeholder meetings, media releases and advertisements, notices and letters associated with the independent review as required.

A dedicated freecall phone number and email will be established to facilitate engagement.

The information from the communications and stakeholder engagement process will inform the technical review being undertaken.

ATTACHMENT A – REVIEW AREA



NOT FOR CONSTRUCTION

LEGEND

- EXTENT OF SURVEY
- MORETON BAY RAIL LINK

Not To Scale

DRAWING FILE LOCATION / NAME
V:_Youth\Projects\30030000\CAD\30031466\Info_Docs\30031466-ID-0000.dwg

INFORMATION DOCUMENT

30031466-ID-0001

Appendix B: RDA Assessment Summary

DATE ENQ REC'D	STREETNUM	STREETNAME	LOCALITY	RDA SURVEYDATE	CONDITION	WATERHEIGHT (m)	RDA ADVICE	DoCs ADVICE	MBRC ADVICE	Longitude	Latitude
3/05/2015	33	Admiral Drive	DECEPTION BAY		MINOR	0		3/5/2015 No Hoodwater in house itself but all through garage Daughter has just moved in so all of her things are in boxes in garage - has all been damaged 2 babies in household Department Housing No Insurance.			
3/05/2015	47	Admiral Drive	DECEPTION BAY	3/05/2015	MODERATE	0.1	3/5/2015 1.m of water through house, shed in rear of house water damaged. Cleanup required.	3/5/2015 Requires SES support. Referred to SES via email to disaster management.	4/5/2015 Brian Peterson: all ok	152.99	-27.16
3/05/2015	49	Admiral Drive	DECEPTION BAY		NO DAMAGE	0	Sewer hazard, debris removal, water entered shed at rear of property			153.03	-27.21
3/05/2015	51	Admiral Drive	DECEPTION BAY	3/05/2015	NO DAMAGE	0		3/5/2015 Requires SES support. Referred to SES via email to disaster management.		153.03	-27.21
3/05/2015	53	Admiral Drive	DECEPTION BAY	3/05/2015	MINOR	0.1	3/5/2015 Minimal water damage to house.	3/5/2015 Rental No Contents Insurance Mum and 18 daughter Water through whole house staying with parents		153.03	-27.21
3/05/2015	55	Admiral Drive	DECEPTION BAY	3/05/2015	MINOR	0.5	3/5/2015 Water entered house over electrical outlets Electrical/sewer hazard. Task debris removal and washout		4/5/2015 Brian Peterson: spoke to resident at this address - SES have been assisting residents in the street since the weekend - all ok		
4/05/2015	18	Anthony Court	DECEPTION BAY		MINOR	<300MM					
4/05/2015	14	Antigua Crescent	DECEPTION BAY	4/05/2015 5:03	NO DAMAGE	0	4/5/2015 no damage			153.02	-27.17
4/05/2015	22	Antigua Crescent	DECEPTION BAY	4/05/2015 5:07	NO DAMAGE	0	4/5/2015 no damage			153.02	-27.17
4/05/2015	31	Antigua Crescent	DECEPTION BAY	4/05/2015 5:15	NO DAMAGE	0	4/5/2015 No damage			153.02	-27.17
4/05/2015	34	Antigua Crescent	DECEPTION BAY	4/05/2015 5:12	NO DAMAGE	0	4/5/2015 No damage			153.02	-27.17
4/05/2015		Arma Place	DECEPTION BAY		MINOR						
4/05/2015	5 houses	Bailey Road	DECEPTION BAY	5/4/2015 12:00 AM	MINOR			5/5/15 Outreach advised highest homes impact not to actual living areas	4/5/2015 Chris Trewin advises minor damage to 5 houses		
4/05/2015	122	Bancroft Terrace	DECEPTION BAY	4/05/2015 4:53	NO DAMAGE	0	4/5/2015 no evidence of water on property, corner of Bermuda Avenue			153.02	-27.17
4/05/2015	126??	Bancroft Terrace	DECEPTION BAY	4/05/2015 4:52	NO DAMAGE	0	4/5/2015 No damage. corner of Bancroft / Bermuda Ave.			153.02	-27.17
4/05/2015	140	Bancroft Terrace	DECEPTION BAY	4/05/2015 4:49	NO DAMAGE	0	4/5/2015 No damage. Tree debris in yard. unable to determine if event related.			153.02	-27.17
4/05/2015	176	Bancroft Terrace	DECEPTION BAY	4/05/2015 4:45	NO DAMAGE	0	4/5/2015 No damage.			153.02	-27.17
4/05/2015	181	Bancroft Terrace	DECEPTION BAY	4/05/2015 4:45	NO DAMAGE	0	4/5/2015 no evidence of water on property		7/5/2015 CSR 1754235 - resident advised inundation of habitable rooms approx 1700mm. Property assessed by insurance co and deemed unlivable. No ill health affects. Resident advised would be sewerage overflow inside property. Skip	153.02	-27.17
7/05/2015	185-191	Bancroft Terrace	DECEPTION BAY		SEVERE						
4/05/2015	188	Bancroft Terrace	DECEPTION BAY	4/05/2015 4:43	NO DAMAGE	0	4/5/2015 No damage.			153.02	-27.17
4/05/2015		Barbados Boulevard	DECEPTION BAY	5/4/2015 12:00 AM	MINOR				Multiple bins to be dropped in area - to service Barbados Blvd		
4/05/2015	2	Barbados Boulevard	DECEPTION BAY	4/05/2015 13:57	MINOR	0.2	4/5/2015 House inundated with water due to overflow from creek and storm water drains. Spoke to home owner.			153.02	-27.17
4/05/2015	6	Barbados Boulevard	DECEPTION BAY	4/05/2015 3:57	MINOR	0.15	4/5/2015 water over floor boards			153.02	-27.17
4/05/2015	8	Barbados Boulevard	DECEPTION BAY	4/05/2015 3:35	NO DAMAGE	0	4/5/2015 No damage. evidence of minor flooding to garage only			153.02	-27.17
4/05/2015	10	Barbados Boulevard	DECEPTION BAY	4/05/2015 4:09	NO DAMAGE	0	4/5/2015 No damage.			153.02	-27.17
4/05/2015	12	Barbados Boulevard	DECEPTION BAY	4/05/2015 3:39	NO DAMAGE	0	4/5/2015 No damage.			153.02	-27.17
4/05/2015	16	Beaufort Place	DECEPTION BAY		MINOR	<300mm			5/5/2015 CT: habitable inundation less than 300mm		
4/05/2015	59	Bermuda Avenue	DECEPTION BAY	4/05/2015 5:35	NO DAMAGE	0	4/5/2015 No damage.		5/5/2015 CT: habitable inundation less than 300mm	153.02	-27.17
4/05/2015	66	Bermuda Avenue	DECEPTION BAY	4/05/2015 5:30	NO DAMAGE	0	4/5/2015 No damage.			153.02	-27.17
4/05/2015	78	Bermuda Avenue	DECEPTION BAY	4/05/2015 5:30	NO DAMAGE	0	4/5/2015 No damage.			153.02	-27.17
4/05/2015	2 houses	Blue Pacific Road	DECEPTION BAY	5/4/2015 12:00 AM	MINOR				4/5/2015 Chris Trewin advises minor damage to 2 houses		
6/05/2015	88-98	Blue Pacific Road	DECEPTION BAY			0			6/5/2015 CSR 1753596 EHO rang resident who advised no inundation inside house. May need a skip bin.		
4/05/2015	124	Blue Pacific Road	DECEPTION BAY	4/05/2015 4:39	NO DAMAGE	0	4/5/2015 No damage. House abandoned.			153.02	-27.17
4/05/2015		Caribbean Court	DECEPTION BAY	5/4/2015 12:00 AM	MINOR				Multiple bins dropped in area, to service Caribbean Court		
4/05/2015	2	Caribbean Court	DECEPTION BAY	4/05/2015 5:19	NO DAMAGE	0	4/5/2015 No damage.			153.02	-27.17
4/05/2015	11	Caribbean Court	DECEPTION BAY	4/05/2015 5:23	MODERATE	0	4/5/2015 Water over powerpoints			153.02	-27.17
4/05/2015	13	Caribbean Court.	DECEPTION BAY	4/05/2015 5:19	NO DAMAGE	0	4/5/2015 No damage.			153.02	-27.17
6/05/2015	1	Central Avenue	DECEPTION BAY		MINOR	<300mm			6/5/2015: habitable inundation less than 300mm		
4/05/2015	1	Cornwall Street	DECEPTION BAY	4/05/2015 5:05	NO DAMAGE	0	4/5/2015 No damage . Corner of Cornwall / Bermuda Avenue			153.02	-27.17
4/05/2015	2	Cornwall Street	DECEPTION BAY	4/05/2015 5:07	NO DAMAGE	0	4/5/2015 no evidence of water on property, corner with bermuda avenue			153.02	-27.17

DATE ENQ REC'D	STREETNUM	STREETNAME	LOCALITY	RDA SURVEY/DATE	CONDITION	WATERHEIGHT (m)	RDA ADVICE	DoCs ADVICE	MBRC ADVICE	Longitude	Latitude
8/05/2015	18/17	Cunningham Street	DECEPTION BAY		MINOR				8/5/2015 CSRI1755189 Inundated to 100mm inside - no health issues - no skip required.		
6/05/2015	335	Cunningham Street	DECEPTION BAY		MINOR	100mm			6/5/2015 CT: unit complex - 20 units flooded - 10-17, 25-33		
3/05/2015	1	Deception Bay Road	DECEPTION BAY		MODERATE	>300mm					
3/05/2015	1	Delvene Ct	DECEPTION BAY	3/05/2015	MINOR	0.1	3/5/2015 Minor water damage through house. No work required			153.03	-27.21
3/05/2015	3	Delvene Ct	DECEPTION BAY	3/05/2015	MINOR	0.3	3/5/2015 water entered house over electrical outlets - electrical issue - task debris removal and	3/5/2015 Requires SES support. Referred to SES via email to disaster management.		153.03	-27.21
3/05/2015	4	Delvene Ct	DECEPTION BAY	3/05/2015	NO DAMAGE	0				153.03	-27.21
3/05/2015	6	Delvene Ct	DECEPTION BAY	3/05/2015	MINOR	0.1	3/5/2015 Minor water damage through house. No work required			153.03	-27.21
3/05/2015	8	Delvene Ct	DECEPTION BAY	3/05/2015	MINOR	0.3	3/5/2015 water entered house over electrical outlets - electrical issue - task debris removal and	3/5/2015 Requires SES support. Referred to SES via email to disaster management.		153.03	-27.21
3/05/2015	1	Embassy Street	DECEPTION BAY	3/05/2015	MODERATE	1	3/5/2015 Water through house. sewage affected. insured. occupants requiring alternative temporary accommodation. (biological hazmat)	3/5/2015 Kinship Carer rental property No Contents insurance Water flooded waste night everything sidtroyed Linen clothes may be washed has support of brother [resently staying with brother Day - lost all contents	4/5/2015 Brian Peterson: all ok	153.03	-27.21
3/05/2015	2	Embassy Street	DECEPTION BAY	3/05/2015	MINOR	0.01				153.03	-27.21
3/05/2015	3	Embassy Street	DECEPTION BAY	3/05/2015	MODERATE	0.7		3/5/2015 fully insured - lost all contents - can't enter house	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	4	Embassy Street	DECEPTION BAY	3/05/2015	NO DAMAGE	0				153.03	-27.21
3/05/2015	5	Embassy Street	DECEPTION BAY					3/5/2015 no insurance - lost all contents - sewerage throughout	4/5/2015 Brian Peterson: no one at home		
3/05/2015	7	Embassy Street	DECEPTION BAY	3/05/2015	MODERATE	0.7	3/5/2015 Water through house. sewage affected. uninsured. occupants requiring alternative temporary accommodation. no power. (biological	3/5/2015 has insurance no flood cover - lost all contents - structural damage	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	8	Embassy Street	DECEPTION BAY	3/05/2015	NO DAMAGE	0				153.03	-27.21
3/05/2015	9	Embassy Street	DECEPTION BAY		MINOR	<300mm		3/5/2015: no insurance - lost all contents	4/5/2015 Brian Peterson: all ok but will ring if need assistance	153.03	-27.21
3/05/2015	10	Embassy Street	DECEPTION BAY	3/05/2015	NO DAMAGE	0				153.03	-27.21
3/05/2015	11	Embassy Street	DECEPTION BAY	3/05/2015	MODERATE	0.7	3/5/2015 Water through house. sewage affected. uninsured. occupants requiring alternative temporary accommodation. no power. Task debris	3/5/2015 no insurance - lost all contents	4/5/2015 Brian Peterson: all ok but will ring if need assistance	153.03	-27.21
3/05/2015	12	Embassy Street	DECEPTION BAY	3/05/2015	NO DAMAGE	0				153.03	-27.21
3/05/2015	14	Embassy Street	DECEPTION BAY	3/05/2015	NO DAMAGE	0				153.03	-27.21
6/05/2015	15	Embassy Street	DECEPTION BAY	3/05/2015	MINOR	<300mm			6/5/2015 EHO - inundation less than 300mm	153.03	-27.21
3/05/2015	16	Embassy Street	DECEPTION BAY	3/05/2015	NO DAMAGE	0				153.03	-27.21
3/05/2015	17	Embassy Street	DECEPTION BAY	3/05/2015	MINOR	0.01		3/5/2015 PRIORITY - Mental Health Issues 2 Adults in Home Departmental Housing No Support have to stay in house Water through whole house but Mattresses OK Got out of Hospital on	4/5/2015 Brian Peterson: ok but will ring if need assistance??? Check bin required.	153.03	-27.21
3/05/2015	18	Embassy Street	DECEPTION BAY	3/05/2015	NO DAMAGE	0				153.03	-27.21
3/05/2015	19	Embassy Street	DECEPTION BAY	3/05/2015	NO DAMAGE	0				153.03	-27.21
3/05/2015	20	Embassy Street	DECEPTION BAY	3/05/2015	NO DAMAGE	0			6/5/2015 EHO - no habitable inundation	153.03	-27.21
3/05/2015	21	Embassy Street	DECEPTION BAY	3/05/2015	NO DAMAGE	0				153.03	-27.21
3/05/2015	22	Embassy Street	DECEPTION BAY	3/05/2015	MINOR	<300mm			6/5/2015 EHO - inundation less than 300mm	153.03	-27.21
6/05/2015	3	Ethel Street	DECEPTION BAY		MINOR	<300mm			6/5/2015 CT: habitable inundation less than 300mm		
6/05/2015	5	Ethel Street	DECEPTION BAY						6/5/2015 CT: not home		
3/05/2015	64	Government Street	DECEPTION BAY	3/05/2015	MINOR	0.6	Government Street Sports Ground. water through canteen and store and power. mower, fridge,			153.03	-27.21
4/05/2015	1	Havana Street	DECEPTION BAY	4/05/2015 3:36	MINOR	0.2	electronic score board etc affected.			153.02	-27.17
4/05/2015	4	Havana Street	DECEPTION BAY	4/05/2015 3:41	NO DAMAGE	0	4/5/2015 Water damage in living area. 0.2 meters			153.02	-27.17
4/05/2015	5	Havana Street	DECEPTION BAY	4/05/2015 3:43	NO DAMAGE	0	4/5/2015 No damage.			153.02	-27.17
4/05/2015	7	Havana Street	DECEPTION BAY	4/05/2015 3:48	MINOR	0.2	4/5/2015 200mm water damage to living area.			153.02	-27.17
4/05/2015	13	Havana Street ??	DECEPTION BAY	4/05/2015 3:50	MINOR	0	Carpet debris out front of house.			153.02	-27.17
4/05/2015	13	Havana Street ??	DECEPTION BAY	4/05/2015 4:26	NO DAMAGE	0	4/5/2015 Water damage in living area 0.2 meters			153.02	-27.17
4/05/2015	15	Havana Street	DECEPTION BAY	4/05/2015 3:46	MINOR	0.2	4/5/2015 No damage.			153.02	-27.17
4/05/2015	16	Havana Street	DECEPTION BAY	4/05/2015 3:48	NO DAMAGE	0	4/5/2015 water over floor boards.			153.02	-27.17
4/05/2015	18	Havana Street	DECEPTION BAY	4/05/2015 3:34	NO DAMAGE	0	4/5/2015 no evidence of water on property			153.02	-27.17
4/05/2015	19	Havana Street	DECEPTION BAY	4/05/2015 3:34	MINOR	0.2	4/5/2015 water over carpets and floor boards			153.02	-27.17
4/05/2015	19	Havana Street	DECEPTION BAY	4/05/2015 3:43	MINOR	0.2	4/5/2015 water over floor boards.			153.02	-27.17
11/05/2015	4	Herberton Court	DECEPTION BAY		NO DAMAGE	0			11/5/2015 CSRI1756065 - no habitable inundation, garage affected.	153.02	-27.17
4/05/2015	1	Jamaica Drive	DECEPTION BAY	4/05/2015 4:32	NO DAMAGE	0	4/5/2015 No damage.			153.02	-27.17
4/05/2015	2	Jamaica Drive	DECEPTION BAY	4/05/2015 4:34	NO DAMAGE	0	4/5/2015 No damage.			153.02	-27.17
4/05/2015	9	Jamaica terrace	DECEPTION BAY	4/05/2015 4:40	MINOR	0.2	4/5/2015 Water damage in living 0.2 meters			153.02	-27.17

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4/05/2015	13	Jamaica Drive	DECEPTION BAY	4/05/2015 4:28	NO DAMAGE	0	4/5/2015 No Damage. Minor tree debris out front. not certain if event related.			153.02	-27.17
4/05/2015	25	Jamaica Drive	DECEPTION BAY	4/05/2015 4:22	NO DAMAGE	0	4/5/2015 No Damage. corner Jamaica Drive / Trinidad Terrace.			153.02	-27.17
4/05/2015	36	Jamaica Street	DECEPTION BAY	4/05/2015 4:20	NO DAMAGE	0	4/5/2015 no damage but tree down but no threat to house			153.02	-27.17
4/05/2015	43	Jamaica Drive	DECEPTION BAY	4/05/2015 4:18	NO DAMAGE	0	4/5/2015 No Damage.			153.02	-27.17
4/05/2015	46	Jamaica Street	DECEPTION BAY	4/05/2015 4:16	NO DAMAGE	0	4/5/2015 No Damage.			153.02	-27.17
4/05/2015	51	Jamaica Drive	DECEPTION BAY	4/05/2015 4:13	NO DAMAGE	0	4/5/2015 No Damage.		6/5/2015 CSR 1753758 EHO rang resident who advised house not inundated but storage container on property was inundated. Advised street activated and to contact Recovery Centre re fin	153.02	-27.17
4/05/2015	53	Jamaica Drive	DECEPTION BAY	4/05/2015 4:29	NO DAMAGE	0	4/5/2015 living space not affected			153.02	-27.17
4/05/2015	54	Jamaica Drive	DECEPTION BAY	4/05/2015 4:34	NO DAMAGE	0	4/5/2015 no evidence of water on property			153.02	-27.17
4/05/2015	55	Jamaica Drive	DECEPTION BAY	4/05/2015 4:27	MODERATE	0.5	4/5/2015 water over powerpoints			153.02	-27.16
4/05/2015	58	Jamaica Drive	DECEPTION BAY	4/05/2015 4:12	MINOR	0.2	4/5/2015 water over tiles			153.02	-27.16
4/05/2015	59	Jamaica Drive	DECEPTION BAY	4/05/2015 4:23	MINOR	0.2	4/5/2015 water over floor boards.			153.02	-27.16
6/05/2015	61	Jamaica Drive	DECEPTION BAY	4/05/2015 4:17	NO DAMAGE	0	4/5/2015 owner confirmed no damage		6/5/2015 CT: habitable inundation less than 300mm	153.02	-27.16
6/05/2015	3	Jason Street	DECEPTION BAY		MINOR	<300mm			6/5/2015 CT: no habitable inundation		
6/05/2015	7	Jason Street	DECEPTION BAY		NO DAMAGE	0			6/5/2015 CT: no habitable inundation		
6/05/2015	9	Jason Street	DECEPTION BAY		NO DAMAGE	0			7/5/2015 CSR1754046 no inundation, email sent to ECM Engineering to confirm if land slip at Bancroft Terrace Park/damage to retaining wall		
7/05/2015	10-12	Joseph Crescent	DECEPTION BAY		NO DAMAGE	0			6/5/2015 CT: habitable inundation less than 300mm		
6/05/2015	1	Krause Street	DECEPTION BAY		MINOR	<300mm			6/5/2015 CT: no habitable inundation - commercial nursery		
6/05/2015	2	Krause Street	DECEPTION BAY		NO DAMAGE	0			6/5/2015 CT: habitable inundation less than 300mm		
7/05/2015	4	Krause Street	DECEPTION BAY		MINOR	<300mm			6/5/2015 CT: habitable inundation less than 300mm		
8/05/2015	10	Krause Street	DECEPTION BAY		MINOR	<300mm			6/5/2015 CT: no habitable inundation		
9/05/2015	20	Krause Street	DECEPTION BAY		NO DAMAGE	0			6/5/2015 CT%: habitable inundation less than 300mm - unit complex - 1 unit flooded		
6/05/2015	14	Lipscombe Road	DECEPTION BAY		MINOR	<300mm			6/5/2015 CT%: habitable inundation less than 300mm - unit complex - 16 units flooded		
6/05/2015	24	Lipscombe Road	DECEPTION BAY		MINOR	<300mm			5/5/2015 CT: habitable inundation less than 300mm		
5/05/2015	12	Little Street	DECEPTION BAY		MINOR	<300mm			5/5/2015 CT: habitable inundation less than 300mm		
5/05/2015	13	Little Street	DECEPTION BAY		MINOR	<300mm			5/5/2015 CT: habitable inundation less than 300mm		
3/05/2015	2	Major Street	DECEPTION BAY	3/05/2015	MODERATE	0.4	3/5/2015 living in caravan - sewage affected	3/5/2015 fully insured - lost all contents - Requires SES support. Referred to SES via email to disaster management.	4/5/2015 Brian Peterson: assist with rubbish into skip bins	153.03	-27.21
3/05/2015	3	Major Street	DECEPTION BAY	3/05/2015	MODERATE	0.5	3/5/2015 Approximately 0.5m of water through house. Believed to be Department of Housing.	3/5/2015 Housing been - lost all contents	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	4	Major Street	DECEPTION BAY	3/05/2015	MODERATE	0.5	3/5/2015 water through house. sewage affected. occupants requiring alternative temporary accommodation.	3/5/2015 fully insured - lost all contents	4/5/2015 Brian Peterson: all ok - but will ring if need assistance	153.03	-27.21
3/05/2015	5	Major Street	DECEPTION BAY	3/05/2015	MODERATE	1	3/5/2015 Approximately 1m of water through house. All utilities have been isolated. Electrical/sewer/gas bottle hazards No work required	3/5/2015 Housing been - lost all contents	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	6	Major Street	DECEPTION BAY	3/05/2015	MODERATE	0.5	3/5/2015 water through house. sewage affected. occupants requiring alternative temporary accommodation.	3/5/2015 3 Adults Insured Home and Car not Contents Cost contents - owner first time lost all contents	4/5/2015 Brian Peterson: all ok - but will ring if need assistance (B/C supplied)	153.03	-27.21
3/05/2015	7	Major Street	DECEPTION BAY				No One Home Water Through Building stay with daughter Suncorp insurance 25 years				
3/05/2015	8	Major Street	DECEPTION BAY	3/05/2015	MODERATE	0.5	3/5/2015 water through house. sewage affected. occupants requiring alternative temporary accommodation.	3/5/2015 no insurance - lost all contents	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	9	Major Street	DECEPTION BAY	3/05/2015	MODERATE	1	3/5/2015 Approximately 1m of water through house. All utilities have been isolated. Electrical/sewer issues No work required	3/5/2015 Housing been - lost all contents	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	10	Major Street	DECEPTION BAY	3/05/2015	MODERATE	0.5	3/5/2015 water through house. sewage affected. occupants requiring alternative temporary accommodation.	3/5/2015 lost all contents	4/5/2015 Brian Peterson: may need assistance to put rubbish in bin	153.03	-27.21
3/05/2015	11	Major Street	DECEPTION BAY	3/05/2015	MODERATE	1	3/5/2015 Approximately 1m of water through house. All utilities have been isolated. Electrical/sewer issues Fence damaged. No work required	3/5/2015 Housing been - lost all contents	4/5/2015 Brian Peterson: no one at home - neighbour said stuff is out of house	153.03	-27.21
3/05/2015	12	Major Street	DECEPTION BAY	3/05/2015	MODERATE	0.6	3/5/2015 water through house. sewage affected. occupants requiring alternative temporary accommodation.	3/5/2015 lost all contents	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	13	Major Street	DECEPTION BAY	3/05/2015	MODERATE	1.2	3/5/2015 water entered house over electrical outlets Electrical/sewer hazard. Task debris removal (build material minor less than 5m3) and	3/5/2015 lost all contents	4/5/2015 Brian Peterson: ok but will ring if need assistance	153.03	-27.21

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3/05/2015	14	Major Street	DECEPTION BAY	3/05/2015	MODERATE	0.5	3/5/2015 water through house, sewage affected, occupants requiring alternative temporary accommodation.	3/5/2015 no insurance - lost all contents - lost dog	4/5/2015 Brian Peterson: all ok	153.03	-27.21
3/05/2015	15	Major Street	DECEPTION BAY	3/05/2015	MODERATE	1.2	3/5/2015 water entered house over electrical outlets Electrical/sewer hazard. Task debris removal and washout	3/5/2015 lost all contents	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	16	Major Street	DECEPTION BAY	3/05/2015	MODERATE	0.5	3/5/2015 water through house, sewage affected, occupants requiring alternative temporary accommodation.	3/5/2015: fully insured - lost all contents	4/5/2015 Brian Peterson: may need assistance to put rubbish in bin	153.03	-27.21
3/05/2015	17	Major Street	DECEPTION BAY		MODERATE	>300mm	3/5/2015 water through house, sewage affected, occupants requiring alternative temporary accommodation.	3/5/2015 no insurance - lost all contents	4/5/2015 Brian Peterson: all ok		
3/05/2015	18	Major Street	DECEPTION BAY	3/05/2015	MODERATE	0.5	3/5/2015 water through house, sewage affected, occupants requiring alternative temporary accommodation.	3/5/2015 no insurance - lost all contents	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	19	Major Street	DECEPTION BAY		MODERATE	1	3/5/2015 water through house, sewage affected, occupants requiring alternative temporary accommodation.	3/5/2015 Own Home, Assessor 8am, 1 meter High Insured, car flooded, Tonight- husband staying did not lose a lot of food 1 fridge in Shed ok 2 adults 1 teenager	4/5/2015 Brian Peterson: all ok		
3/05/2015	20	Major Street	DECEPTION BAY	3/05/2015	MODERATE	0.5	3/5/2015 water through house, sewage affected, occupants requiring alternative temporary accommodation.	3/5/2015: lost all contents	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	21	Major Street	DECEPTION BAY		MODERATE	>300mm		3/5/2015 fully insured - lost all contents	4/5/2015 Brian Peterson: all ok		
3/05/2015	22	Major Street	DECEPTION BAY		MODERATE		3/5/2015 water entered house over electrical outlets Electrical/sewer hazard. Task debris removal and washout		4/5/2015 Brian Peterson: no one at home		
3/05/2015	25	Major Street	DECEPTION BAY	3/05/2015	MODERATE	1.2	3/5/2015 water entered house over electrical outlets Electrical/sewer hazard. Task debris removal and washout	3/5/2015: fully insured - lost all contents	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	26	Major Street	DECEPTION BAY		MODERATE	>300mm			4/5/2015 Brian Peterson: all ok		
3/05/2015	27	Major Street	DECEPTION BAY	3/05/2015	MODERATE	1.2	3/5/2015 water entered house over electrical outlets Electrical/sewer hazard. Task debris removal and washout	3/5/2015 building insurance only - lost all contents	4/5/2015 Brian Peterson: all ok	153.03	-27.21
3/05/2015	28	Major Street	DECEPTION BAY	3/05/2015	MODERATE	0.3	3/5/2015 Sewer issue	3/5/2015 no insurance - lost all contents	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	29	Major Street	DECEPTION BAY	3/05/2015	MODERATE	1.2	3/5/2015 1.2m water through house. All utilities isolated. Require cleanout.	3/5/2015 no insurance - lost all contents - nowhere to live from Monday	4/5/2015 Brian Peterson: all ok	153.03	-27.21
3/05/2015	30	Major Street	DECEPTION BAY	3/05/2015	NO DAMAGE	0		3/5/2015 Housing been - lost all contents	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	31	Major Street	DECEPTION BAY		MODERATE	>300mm	3/5/2015 water entered house over electrical outlets Electrical/sewer hazard. Task debris removal and washout	3/5/2015 lost all contents			
3/05/2015	33	Major Street	DECEPTION BAY	3/05/2015	MODERATE	1.2	3/5/2015 water entered house over electrical outlets Electrical/sewer hazard. Task debris removal and washout	3/5/2015 lost all contents	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
2/05/2015	35	Major Street	DECEPTION BAY	2/05/2015	MODERATE		2/5/2015 Collapse hazard, electrical hazard, debris removal required	2/5/2015 DOCS: full insured, lost all contents	4/5/2015 Brian Peterson - initially required assistance for 2-3 hours but no longer required	153.03	-27.47
3/05/2015	39	Major Street	DECEPTION BAY	3/05/2015	MODERATE	1.5	3/5/2015 1.5m water through house. All utilities isolated. Electrical/sewer issuesRequire cleanout.	3/5/2015 fully insured - lost all contents	4/5/2015 Brian Peterson: all ok	153.03	-27.21
3/05/2015	41	Major Street	DECEPTION BAY	3/05/2015	MODERATE	1.5	3/5/2015 water entered house over electrical outlets Electrical/sewer hazard. Task debris removal and washout	3/5/2015 no insurance - lost all contents	4/5/2015 Brian Peterson: no one home	153.03	-27.21
3/05/2015	43	Major Street	DECEPTION BAY	3/05/2015	MODERATE	1.5	3/5/2015 water entered house over electrical outlets Electrical/sewer hazard. Task debris removal and washout	3/5/2015 fully insured - lost all contents	4/5/2015 Brian Peterson: assist for 2-3 hours	153.03	-27.21
2/05/2015	4	Major Street	DECEPTION BAY	5/2/2015 1:48 PM	MINOR					153.03	-27.21
3/05/2015	4	Melissa Place	DECEPTION BAY	3/05/2015	MINOR	0.3	3/5/2015 staying in motel - sewer issue		4/5/2015 Brian Peterson: resident on disability pension and needs assistance to get his wet furniture etc outside to dry	153.02	-27.21
4/05/2015	5	Melissa Place	DECEPTION BAY		MINOR	<300mm			4/5/2015 Brian Peterson: resident advised all fine		
3/05/2015	6	Melissa Place	DECEPTION BAY		MINOR	<300mm		3/5/2015 Insured Never flooded before husband sick Real Estate Lady has been around to tell them	4/5/2015 Brian Peterson: appears to be all cleaned	153.02	-27.20
6/05/2015	15	Monique Court	DECEPTION BAY	3/05/2015	MINOR	0.2	3/5/2015 staying with next door - sewer issue		4/5/2015 Brian Peterson: spoke to resident who said Melissa Place may need assistance		
3/05/2015	8	Nadine Place	DECEPTION BAY	3/05/2015	MINOR	<300mm					
4/05/2015	5	Natalie Close	DECEPTION BAY		MINOR		Sewer issue				
3/05/2015	6	Natalie Close	DECEPTION BAY	3/05/2015	MINOR	0.1		3/5/2015 Water not in house but in garage		153.02	-27.21
3/05/2015	1	Nellie Court	DECEPTION BAY		NO DAMAGE	0		Daughter staying with her currently and her house			
2/05/2015	2	Nellie Court	DECEPTION BAY	5/2/2015 1:18 PM	MINOR					153.03	-27.47
3/05/2015	7	Nellie Court	DECEPTION BAY	3/05/2015	MINOR	0.3	3/5/2015 water entered house over electrical outlets - electrical issue - task debris removal and			153.03	-27.21
3/05/2015	9	Nellie Court	DECEPTION BAY	3/05/2015	MODERATE	0.8	3/5/2015 Approximately 8m of water through house. Power disconnected. Cleanout required. Debris removal/skip bin required.	3/5/2015 Requires SES support. Referred to SES via email to disaster management.		153.03	-27.21
3/05/2015	10	Nellie Court	DECEPTION BAY	3/05/2015	NO DAMAGE	0				153.03	-27.21

DATE ENQ REC'D	STREETNUM	STREETNAME	LOCALITY	RDA SURVEYDATE	CONDITION	WATERHEIGHT (m)	RDA ADVICE	DoCs ADVICE	MBRC ADVICE	Longitude	Latitude
	12	Nellie Court	DECEPTION BAY		MINOR	1	3/5/2015 Electrical hazard - water entered house over electrical outlets - task to remove debris		6/5/2015 CSR 1754238 - resident advises no inundation of habitable area, although about 300mm through shed. Concerned near sewerage treatment plant and whether wading through water would have detrimental effect.		
6/05/2015	146	North Ridge Circuit	DECEPTION BAY		NO DAMAGE	0			4/5/2015 Chris Trevin advises minor damage to 2 properties		
4/05/2015	169	Old Bay Road	DECEPTION BAY	4/05/2015	MINOR	<300mm			7/5/2015 - CSR1753498 - activated street - require skip bin - possible sewerage overflow.		
4/05/2015									4/5/2015 Chris Trevin advises minor damage to 2 properties		
4/05/2015	196	Old Bay Road	DECEPTION BAY		MINOR	<300mm			7/5/2015 - CSR1753498 - activated street - require skip bin - possible sewerage overflow		
			YEPPOON		SEVERE					150.74	-23.14
			YEPPOON		SEVERE					150.74	-23.14
6/05/2015	69	Osborne Terrace	DECEPTION BAY		MINOR	<300mm			6/5/2015 CT: habitable inundation less than 300mm		
6/05/2015	77	Osborne Terrace	DECEPTION BAY		MINOR	<300mm			6/5/2015 CT: habitable inundation less than 300mm		
6/05/2015	78	Osborne Terrace	DECEPTION BAY		MINOR	<300mm			6/5/2015 CT: no habitable inundation - water in laundry less than 300mm		
6/05/2015	86	Osborne Terrace	DECEPTION BAY		NO DAMAGE	0			6/5/2015 CT: habitable inundation less than 300mm		
6/05/2015	88	Osborne Terrace	DECEPTION BAY		MINOR	<300mm			6/5/2015 CT: habitable inundation less than 300mm		
6/05/2015	90	Osborne Terrace	DECEPTION BAY		MINOR	<300mm			6/5/2015 CT: habitable inundation less than 300mm		
6/05/2015	94	Osborne Terrace	DECEPTION BAY		MINOR	<300mm			7/5/2015 CSR 1754055 - no inundation. Advised resident to contact BCC re inundation of car at Geebung workplace		
7/05/2015	13	Richard Court	DECEPTION BAY		NO DAMAGE	0				153.03	-27.21
2/05/2015	??	Samantha Court	DECEPTION BAY	5/2/2015 1:50 PM	MINOR	<300mm		3/5/2015 fully insured - lost all contents - car not insured			
3/05/2015	1	Samantha Court	DECEPTION BAY		MINOR	<300mm			4/5/2015 Brian Peterson: all ok		
3/05/2015	3	Samantha Court	DECEPTION BAY	3/05/2015	MODERATE	0.3	3/5/2015 water through house, sewage issue. Occupant requiring alternative temporary accommodation. no power.		4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	4	Samantha Court	DECEPTION BAY	3/05/2015	MODERATE	0.5	3/5/2015 water through house, sewage issue. Rental. Tenant requiring alternative temporary accommodation.		4/5/2015 Brian Peterson: waiting on assessor before rubbish removed	153.03	-27.21
3/05/2015	5	Samantha Court	DECEPTION BAY	3/05/2015	MODERATE	0.4	3/5/2015 water through house, sewage issue. Occupant requiring alternative temporary accommodation. no power.	3/5/2015: landlord insurance no contents - lost all contents		153.03	-27.21
4/05/2015	6	Samantha Court	DECEPTION BAY		MODERATE	300mm			4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	7	Samantha Court	DECEPTION BAY	3/05/2015	MODERATE	0.3	3/5/2015 water through house, sewage issue. Occupant requiring alternative temporary accommodation. no power.		4/5/2015 Brian Peterson: all ok	153.03	-27.21
3/05/2015	8	Samantha Court	DECEPTION BAY	3/05/2015	MODERATE	0.5	3/5/2015 living in caravan - sewage affected	3/5/2015- fully insured - lost all contents	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	9	Samantha Court	DECEPTION BAY	3/05/2015	MODERATE	0.2	3/5/2015 water through house, sewage issue. Occupant requiring alternative temporary accommodation. no power.	3/5/2015 full insured - lost all contents	4/5/2015 Brian Peterson: waiting on assessor before rubbish removed	153.03	-27.21
3/05/2015	10	Samantha Court	DECEPTION BAY	3/05/2015	MODERATE	0.5	3/5/2015 water through house, sewage issue. Occupant requiring alternative temporary accommodation.		4/5/2015 Brian Peterson: all ok	153.03	-27.21
3/05/2015	11	Samantha Court	DECEPTION BAY	3/05/2015	MODERATE	0.01	3/5/2015 older lady staying in house - sewage affected	3/5/2015 insured - no flood cover - lost all contents - monitor and check in	4/5/2015 Brian Peterson: no one at home	153.03	-27.21
3/05/2015	12	Samantha Court	DECEPTION BAY	3/05/2015	MODERATE	0.5	water through house, sewage issue. Occupant requiring alternative temporary accommodation. no power.			153.03	-27.21
3/05/2015	13	Samantha Court	DECEPTION BAY	3/05/2015	MODERATE	0.3	3/5/2015 water through house, sewage issue. Occupant requiring alternative temporary accommodation. no power.		4/5/2015 Brian Peterson: all ok	153.03	-27.21
7/05/2015	13	Shayne Avenue	DECEPTION BAY		MINOR			3/5/2015 no insurance - lost all contents	7/5/2015 CSR 1754328 Habitable rooms inundated approx 150mm. Garage was flood approx 300mm. No sewerage overflow. No skip bin required.		
6/05/2015	17	Shayne Avenue	DECEPTION BAY		NO DAMAGE	<300mm			6/5/2015 CT: no habitable inundation		
6/05/2015	26	Shayne Avenue	DECEPTION BAY		NO DAMAGE	0			6/5/2015 CT: no habitable inundation		
6/05/2015	46	Shayne Avenue	DECEPTION BAY		NO DAMAGE	0			6/5/2015 CT: no habitable inundation		
6/05/2015	49	Shayne Avenue	DECEPTION BAY		NO DAMAGE	0			6/5/2015 CT: no habitable inundation		
6/05/2015	51	Shayne Avenue	DECEPTION BAY		NO DAMAGE	0			6/5/2015 CT: no habitable inundation		

DATE ENQ RECD	STREETNUM	STREETNAME	LOCALITY	RDA SURVEY/DATE	CONDITION	WATERHEIGHT (m)	RDA ADVICE	DoCs ADVICE	MBRC ADVICE	Longitude	Latitude
6/05/2015	53	Shayne Avenue	DECEPTION BAY		MINOR	150mm			6/5/2015 CT: ? Habitable inundation - water higher than 300mm - not home to confirm, however items on footpath 8/5/2015 CSR 1755162 EHO - property inundated 250mm inside house. No health issues. Skip bin not required. 6/5/2015 CT: ? Habitable inundation - water higher than 300mm - not home to confirm, however items on footpath		
6/05/2015	55	Shayne Avenue	DECEPTION BAY		MODERATE	>300mm					
6/05/2015	57	Shayne Avenue	DECEPTION BAY		MINOR				6/5/2015 CT: Habitable inundation - but no advice re depth - unit complex, 2 units flooded		
6/05/2015	59	Shayne Avenue	DECEPTION BAY		NO DAMAGE	0			6/5/2015 CT: no habitable inundation child care		
6/05/2015		Simon Street	DECEPTION BAY		NO DAMAGE	0			6/5/2015 CT: Simon St attended - no signs of habitable inundation		
7/05/2015	30	Simon Street	DECEPTION BAY		NO DAMAGE	0			7/5/2015 CSR 1754101 - site inspected 6/5/2015. No inundation of habitable rooms. Garage flooded approximately 300mm		
									7/5/2015 CSR 1754567 - EHO rang resident who advised inundation of habitable rooms less than 300mm. No ill health effects. Advised no sewerage overflow inside property. Skip bin not		
7/05/2015	29	Spencer Avenue	DECEPTION BAY		MINOR	<300mm			6/5/2015 CT: unsure about habitable inundation - noone home - items on footpath		
6/05/2015	38	Spring Street	DECEPTION BAY								
4/05/2015	1	St Lucia Court	DECEPTION BAY	4/05/2015 5:33	NO DAMAGE	0	4/5/2015 no evidence of water on property				
4/05/2015	57	St Lucia Court	DECEPTION BAY	4/05/2015 5:32	NO DAMAGE	0	4/5/2015 No Damage.				
									3/5/2015 Michelle has been directly affected by the East Coast Low. She has had to have the power turned due to leaking roof. Michelle is renting and as she says is very fortunate as she lost only food and a few pieces of clothing. She is with her son. Please contact.		
3/05/2015	16	Stamp Street	DECEPTION BAY		NO DAMAGE	0					
6/05/2015	1	Surrey Court	DECEPTION BAY		NO DAMAGE	0			6/5/2015 CSR 1754962 - no habitable inundation - garage inundated less than 300mm.	153.02	-27.17
4/05/2015	2	Surrey Court	DECEPTION BAY	4/05/2015 4:58	NO DAMAGE	0	4/5/2015 no evidence of water on property, corner of Bermuda Avenue			153.02	-27.17
4/05/2015	16	Surrey Court	DECEPTION BAY	4/05/2015 5:02	NO DAMAGE	0	4/5/2015 No Damage.			153.02	-27.17
4/05/2015	20	Surrey Court	DECEPTION BAY	4/05/2015 5:02	NO DAMAGE	0	4/5/2015 No Damage.			153.02	-27.17
4/05/2015	3	Trinidad Terance	DECEPTION BAY	4/05/2015 4:29	NO DAMAGE	0	4/5/2015 No Damage.			153.02	-27.17
4/05/2015	7	Trinidad Terance	DECEPTION BAY	4/05/2015 4:32	MINOR	0.2	4/5/2015 No Damage.			153.02	-27.17
4/05/2015	11	Trinidad Terance	DECEPTION BAY	4/05/2015 4:44	NO DAMAGE	0	4/5/2015 no damage house on high ground			153.02	-27.17
4/05/2015	13	Trinidad Terance	DECEPTION BAY	4/05/2015 4:49	NO DAMAGE	0	4/5/2015 no damage house on high ground			153.02	-27.17
4/05/2015	22	Trinidad Terance	DECEPTION BAY	4/05/2015 5:16	NO DAMAGE	0	4/5/2015 No Damage.			153.02	-27.17
4/05/2015	29	Trinidad Terance	DECEPTION BAY	4/05/2015 4:53	NO DAMAGE	0	4/5/2015 No Damage.			153.02	-27.17
4/05/2015	37	Trinidad Terance	DECEPTION BAY	4/05/2015 4:55	NO DAMAGE	0	4/5/2015 No Damage.			153.02	-27.17
4/05/2015	39	Trinidad Terance	DECEPTION BAY	4/05/2015 5:02	NO DAMAGE	0	4/5/2015 no damage corner of Antiqua Court			153.02	-27.17
4/05/2015	40	Trinidad Terance	DECEPTION BAY	4/05/2015 5:01	NO DAMAGE	0	4/5/2015 no damage corner of Antiqua Court			153.02	-27.17
4/05/2015	42	Trinidad Terance	DECEPTION BAY	4/05/2015 4:58	NO DAMAGE	0	4/5/2015 No Damage.			153.02	-27.17
4/05/2015	1	Vincent Court	DECEPTION BAY	4/05/2015 5:12	NO DAMAGE	0	4/5/2015 No Damage. Corner of Vincent Crt / Antigua Crescent			153.02	-27.17
6/05/2015	14	Webster Road	DECEPTION BAY		MODERATE	>300mm			6/5/2015 CT: habitable inundation more than 300mm - already organised skip bin with council		
6/05/2015	16	Webster Road	DECEPTION BAY		MODERATE	>300mm			6/5/2015 CT: habitable inundation more than 300mm - already organised skip bin with council		
6/05/2015	18	Webster Road	DECEPTION BAY		MINOR	<300mm			6/5/2015 CT: habitable inundation less than 300mm		
3/05/2015		Chernside Road	MANGO HILL		MINOR						
3/05/2015		Mary Street East & West	MANGO HILL						3/5/2015 4 houses content Structural Damage		
3/05/2015	15	Mary Street East	MANGO HILL		NO DAMAGE	0	3/5/2015 6 + houses - content and structural damage		3/5/2015 Emma 0425742131 INSURED content damage - Shed only - Air Conditioning		
3/05/2015	17	Mary Street East	MANGO HILL		MODERATE	0.8	3/5/2015 Water through house. Sewage through house. occupant requiring alternative temporary accommodation				
3/05/2015	198	Mary Street East	MANGO HILL		MODERATE	0.8	3/5/2015 Water through house. Sewage through house. occupant requiring alternative temporary accommodation.		3/5/2015 Rental Absolute Real Estate NO Insurance lost car and contents Staying with Friends		

DATE ENQ REC'D	STREETNUM	STREETNAME	LOCALITY	RDA SURVEYDATE	CONDITION	WATERHEIGHT (m)	RDA ADVICE	DoCs ADVICE	MBRC ADVICE	Longitude	Latitude
3/05/2015	19a	Mary Street East	MANGO HILL		MODERATE	0.8	3/5/2015 Water through house. Sewage through house, occupant requiring alternative temporary accommodation.	3/3/2015 Family's lost car and all contents water 1.5 - 2 metre inside house NOT Insured. Locked into 6 month lease at another property to get accommodation with Absolute Real Estate (Strathpine) being changed as extra \$65 per week Family very stressed traumatic experience during flood boated out ethnic family with no local supports Require skip bin + SES + Cancelling 3/5/2015 Elderly couple with known medical conditions (heart issues/stroke) - waiting for heart transplant. Staying at mother's house in Rothwell. Renting with Absolute Real Estate. Have no power and a lot of damage include sewerage throughout house. Not insured. Require SES support to move furniture out due to medical conditions.			
3/05/2015	21B	Mary Street East	MANGO HILL		MODERATE	>300mm		3/5/2015 Insured. 22 years in house, minimum damage.			
3/05/2015	28	Mary Street West	MANGO HILL						5/5/2015 CT: habitable foundation less than 300mm		
3/05/2015	32	Mary Street West	MANGO HILL		MINOR	<300mm			5/5/2015 CT: habitable foundation less than 300mm		
3/05/2015	33	Mary Street West	MANGO HILL		MINOR	<300mm			5/5/2015 CT: habitable foundation less than 300mm		
3/05/2015	34	Mary Street West	MANGO HILL		MINOR	<300mm			5/5/2015 CT: habitable foundation less than 300mm		
3/05/2015	37	Mary Street West	MANGO HILL		MINOR	<300mm			5/5/2015 CT: habitable foundation less than 300mm		
3/05/2015	39	Mary Street West	MANGO HILL		MINOR	<300mm			5/5/2015 CT: habitable foundation less than 300mm		
3/05/2015		May Street	MANGO HILL								
3/05/2015		Rose Street East	MANGO HILL								
3/05/2015		Rose Street West	MANGO HILL								
3/05/2015	31	Rose Street West	MANGO HILL	3/05/2015	MINOR	0.1	3/5/2015 still livable	3/5/2015 8 houses - Content and structural Damage		153.03	-27.22
3/05/2015	32	Rose Street West	MANGO HILL	3/05/2015	MINOR	0.37	4/5/2015 37cm of water through lower level. Residence still living inside	4/5/2015 INSURED 32 cm water in House		153.03	-27.22
3/05/2015		Rose Street West	MANGO HILL					3/5/2015 Insured.			
3/05/2015	35	Rose Street West	MANGO HILL	3/05/2015	MINOR	0.1		3/5/2015 Insured.		153.03	-27.22
3/05/2015	39	Rose Street West	MANGO HILL	3/05/2015	MINOR	0.1		3/5/2015 Insured.		153.03	-27.22
	565	Anzac Avenue	ROTHWELL	5/2/2015 4:57 AM	NO DAMAGE	0.05	3/5/2015 No Damage			153.05	-27.22
2/05/2015	569	Anzac Avenue	ROTHWELL	5/2/2015 5:02 AM	MODERATE	0.5	2/5/2015 500mm of floodwater through home. Power isolated at board. Occupants moving to other accommodation. Clean up in progress.	3/5/2015 Adults and 4 kids. No contents insurance. Renting - real estate not being very cooperative. Unable to stay in house - staying with nephew but only 2 bedroom apartment. 1 m of water through whole house.		153.05	-27.22
2/05/2015	571	Anzac Avenue	ROTHWELL	5/2/2015 5:10 AM	MODERATE	1	2/5/2015 1mt of floodwater through home. Occupants not home at time of assessment. Clean up in progress.	3/5/2015 Owners. Insured. Living area downstairs flooded. Upstairs living able to stay. Downstairs staying with family. Lost all clothing and downstairs furniture.		153.05	-27.22
3/05/2015	573	Anzac Avenue	ROTHWELL		MODERATE	1		3/5/2015 Not home - neighbour reported 1 metre of water through whole house - appears young children. Insured (neighbour reported). Reportedly staying with family. 4 weeks old and 2 rented skip?) OK		153.04	-27.21
2/05/2015	72	Clancy Court	ROTHWELL	5/2/2015 1:43 PM	NO DAMAGE		2/5/2015 No Damage	4/5/2015 resident Cheryl Buttenshaw - Water 60-70 cm deep Privately owned NRMA house and contents waiting for assessor		153.04	-27.21
2/05/2015	7	Coman St South	ROTHWELL	5/2/2015 2:08 AM	MINOR	0.4	2/5/2015 Approx 400mm through garage & house. Power has been isolated at board due to water reaching power points. Male occupant on crutches due to knee replacement.	3/5/2015 Two storey house downstairs flooded+ post pool equipment destroyed + outdoor furniture + furniture rumpus room + work tools workshop downstairs waiting for allocations skip bin DO have house and Contents Insurance SUNCORP		153.04	-27.21
2/05/2015	11	Coman St South	ROTHWELL	5/2/2015 2:21 AM	MINOR	0.4	2/5/2015 Approx 400mm through lower level. Power has been isolated at board due to water inundation. Occupants have started clean up.			153.04	-27.21
2/05/2015	17	Coman St South	ROTHWELL	5/2/2015 2:49 AM	NO DAMAGE	0	2/5/2015 No Damage			153.04	-27.21
2/05/2015	113	Coman St South	ROTHWELL					5/5/2015 BP - cleared - SES there yesterday - ok			
2/05/2015	2	Finnegan Street	ROTHWELL	5/2/2015 5:15 AM	MINOR	0.5		3/5/2015 Highest house. One bedroom downstairs - flooded. Water through car. Insured house and car. Own house.	5/5/2015 BP - 1 skip in place for 2, 4, 6 Finnegan St - seems to have cleaned up - ok	153.05	-27.22
2/05/2015	4	Finnegan Street	ROTHWELL	5/2/2015 4:53 AM	MODERATE	1		3/5/2015 50cm through whole house. Seeking counselling for kids - 8 year old, 3 and 6. Insured - own house. Staying with friends. Friends have helped cleaning up.	5/5/2015 BP - 1 skip in place for 2, 4, 6 Finnegan St - seems to have cleaned up - ok	153.05	-27.22
2/05/2015	6	Finnegan Street	ROTHWELL	5/2/2015 5:07 AM	NO DAMAGE	0			5/5/2015 BP - 1 skip in place for 2, 4, 6 Finnegan St - seems to have cleaned up - ok	153.05	-27.22
2/05/2015	1	Hubner Drive	ROTHWELL	5/2/2015 3:27 AM	NO DAMAGE	0	2/5/2015 No Damage		5/5/2015 BP - 1 skip in place for 2, 4, 6 Finnegan St - seems to have cleaned up - ok	153.04	-27.21
2/05/2015	14	Hubner Street	ROTHWELL	5/2/2015 3:46 AM	NO DAMAGE	0	2/5/2015 No Damage			153.04	-27.21

DATE ENQ REC'D	STREETNUM	STREETNAME	LOCALITY	RDA SURVEYDATE	CONDITION	WATERHEIGHT (m)	RDA ADVICE	DoCs ADVICE	MBRC ADVICE	Longitude	Latitude
2/05/2015	9	Jones Street	ROTHWELL	5/2/2015 2:35 AM	NO DAMAGE	0	2/5/2015 No damage			153.04	-27.21
2/05/2015	32	Jones Street	ROTHWELL	5/2/2015 2:45 AM	NO DAMAGE	0	2/5/2015 No damage		5/5/2015 BP - Nothing obvious anymore - suggest SES were here yesterday to assist. Skip bin at No	153.04	-27.21
3/05/2015		McGahey Street	ROTHWELL		MINOR		2/5/2015 Club house & shed received approx 300mm of flood water through out. Due to low lying position approx 4 meters of flood water through property from paddock level to highest point on club house. Management on site cleaning	3/5/2015 Northshore Pet Resort house attached water through the property seems well supported 3/5/2015 Cross country course destroyed fog/jumps moved saddles and rugs destroyed then built the clubhouse above the flood line (council) Jo do not have insurance Fridges/freezers/vacume destroyed Do need help to physically move - rebuild course			
2/05/2015		Redcliffe Horse & Pony Club	ROTHWELL	5/2/2015 1:50 AM	MINOR	0.3			5/5/2015 BP - Nothing obvious anymore - suggest SES were here yesterday to assist. Skip bin at No 35. OK.	153.04	-27.21
2/05/2015	14	McGahey Street	ROTHWELL	5/2/2015 4:23 AM	MINOR	0.05	2/5/2015 No damage	underneath houses flooded not too bad 3/5/2015 Kathleen 88 Yrs Electric Beds and Hoist destroyed all furniture destroyed likely to have structure damage RACQ Insurance do not know what to do waiting to hear from insurance need help to move furniture	5/5/2015 BP - Nothing obvious anymore - suggest SES were here yesterday to assist. Skip bin at No 35. OK.	153.05	-27.21
3/05/2015	16	McGahey Street	ROTHWELL		MINOR	<300mm		3/5/2015 Owners of home insured couple in 70's with intellectually disabled adult son water right through house have stayed at house seem to have plan to be managing			
2/05/2015	18	McGahey Street	ROTHWELL	5/2/2015 4:10 AM	MODERATE	0.3	2/5/2015 300mm through house. Occupants remaining in home. Clean up in progress.	3/5/2015 Not Home - Neighbour reported 80yrs occupant is staying with son in law, water through house	5/5/2015 BP - Nothing obvious anymore - suggest SES were here yesterday to assist. Skip bin at No 35. OK.	153.05	-27.21
2/05/2015	20	McGahey Street	ROTHWELL	5/2/2015 4:03 AM	MODERATE	0.5	2/5/2015 500mm through house. Occupant not remaining in home. Clean up in progress.		5/5/2015 BP - Nothing obvious anymore - suggest SES were here yesterday to assist. Skip bin at No 35. OK.	153.05	-27.21
3/05/2015	21	McGahey Street	ROTHWELL				2/5/2015 500mm through house. Power isolated board. Occupants not remaining in house. Cleanup in progress.	3/5/2015 Not Home appears to be a lot of damage 3/5/2015 Water through house to knee high level and is seeking financial assistance. Has some contents insured.	5/5/2015 BP - Nothing obvious anymore - suggest SES were here yesterday to assist. Skip bin at No 35. OK.		
2/05/2015	22	McGahey Street	ROTHWELL	5/2/2015 3:53 AM	MODERATE	0.5			5/5/2015 BP - Nothing obvious anymore - suggest SES were here yesterday to assist. Skip bin at No 35. OK.	153.05	-27.21
2/05/2015	24	McGahey Street	ROTHWELL	5/2/2015 3:50 AM	NO DAMAGE	0.4	3/5/2015 1.5 meters through lower level change rooms & other storage areas.		5/5/2015 BP - Nothing obvious anymore - suggest SES were here yesterday to assist. Skip bin at No 35. OK.	153.05	-27.21
2/05/2015	25	McGahey Street	ROTHWELL	5/2/2015 3:32 AM	MODERATE	1.5	2/5/2015 2 meters of water through lower level. Power not isolated at board. Owner on site. Clean up in progress.		5/5/2015 BP - Nothing obvious anymore - suggest SES were here yesterday to assist. Skip bin at No 35. OK.	153.05	-27.21
2/05/2015	31-33	McGahey Street	ROTHWELL	5/2/2015 3:19 AM	MODERATE	2	2/5/2015 2 meters of water through lower level. Power not isolated at board. Owner on site. Clean up in progress.	3/5/2015 Home Owner Have insurance but lots of difficulties making claims mainly storage downstairs all damaged upstairs carpet wet, a pace maker High Set most living area upstairs so not damaged Very frustrated with repeating flooding damage to lower level & Shed	5/5/2015 BP - Nothing obvious anymore - suggest SES were here yesterday to assist. Skip bin at No 35. OK.	153.04	-27.21
2/05/2015	37	McGahey Street	ROTHWELL	5/2/2015 3:11 AM	MODERATE	2	2/5/2015 500mm floodwater through home. Power to points has been isolated at board. Owner on site. Clean up in progress.	3/5/2015 Has Home and Contents insurance everything lost + Car Westpac home insurance AMMI Car insurance Staying at sisters can get emergency accommodation through insurance	5/5/2015 BP - Nothing obvious anymore - suggest SES were here yesterday to assist. Skip bin at No 35. OK.	153.04	-27.21
2/05/2015	39	McGahey Street	ROTHWELL	5/2/2015 3:07 AM	MODERATE	2	2/5/2015 2 meters of floodwater through lower level (laundry, workshop etc). Owners turned power back on. Electrician in attendance on arrival. Clean up in progress.		5/5/2015 BP - Nothing obvious anymore - suggest SES were here yesterday to assist. Skip bin at No 35. OK.	153.04	-27.21
2/05/2015	41	McGahey Street	ROTHWELL	5/2/2015 2:58 AM	MODERATE	2			5/5/2015 BP - Nothing obvious anymore - suggest SES were here yesterday to assist. Skip bin at No 35. OK.	153.04	-27.21
2/05/2015	58	McGahey Street	ROTHWELL	5/2/2015 12:55 PM	NO DAMAGE	0	No damage	3/5/2015 Damage to one living area - water 5cm through back rooms. Owner insured. Water through shed - motorbikes, lawn mowers, caravan	5/5/2015 BP - Nothing obvious anymore - suggest SES were here yesterday to assist. Skip bin at No 35. OK.	153.04	-27.21
3/05/2015	28	Pamphlett Street	ROTHWELL		MINOR	<300mm			5/5/2015 BP - no obvious signs in Pamphlett St - appears to be cleaned - ok 6/5/2015 CSR 1733501 EHO rang resident who advised no inundation inside house - issues with cracked paving due to burst/damaged stormwater pipe and wants council to accept responsibility - to ECM		
6/05/2015	6	Renoir Court	ROTHWELL		NO DAMAGE	0				153.04	-27.21
2/05/2015	7	Seabelle Street	ROTHWELL	5/2/2015 2:36 AM	NO DAMAGE	0	2/5/2015 No damage			153.04	-27.21
2/05/2015	2	Waterlily Ct	ROTHWELL	5/2/2015 2:43 AM	NO DAMAGE	0	2/5/2015 No damage			153.04	-27.21
2/05/2015	48	Waterlily Ct	ROTHWELL	5/2/2015 2:40 AM	NO DAMAGE	0	2/5/2015 No damage			153.04	-27.21

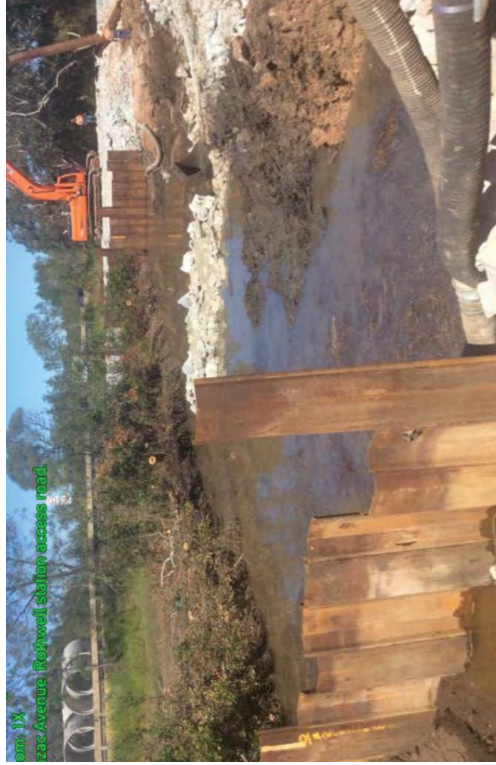
Appendix C: Temporary Works Photos



Temporary Works at Anzac Avenue (21/04/2015)



Temporary Works at Anzac Avenue (22/04/2015)



Temporary Works at Anzac Avenue (23/04/2015)



Cleared Areas at Stabling Yard (27/04/2015)



Temporary Works at Anzac Avenue (28/04/2015)



Temporary Works at Anzac Avenue (28/04/2015)



Temporary Works at Anzac Avenue (27/04/2015)



Temporary Works at Anzac Avenue (28/04/2015)



Saltwater Creek Shared Path Bridge (04/05/2015)

Images from MBRL Daily Diaries



Temporary Works at Anzac Avenue (04/05/2015)



Aerial Image at Anzac Avenue (15/04/2015)



Nearmap Image at Anzac Avenue (04/06/2015)



Aerial Image at Rothwell Station (15/04/2015)



Nearmap Image at Rothwell Station (04/06/2015)

Aerial Images



Drivethrough along Anzac Avenue (29/04/2015)



Drivethrough along Anzac Avenue (29/04/2015)



Drivethrough along Anzac Avenue (29/04/2015)



Drivethrough along Anzac Avenue (29/04/2015)



Anzac Avenue (10/06/2015)



Anzac Avenue (10/06/2015)



Anzac Avenue (10/06/2015)



Anzac Avenue (10/06/2015)

Photos from RPS Survey

Appendix D: Community Responses

Moreton Bay Rail Project

Independent Hydraulic Review

Communications and Stakeholder Management Report

Prepared for: Department of Transport and Main
Roads
Date: 5 August 2015



TABLE OF CONTENTS

1. EXECUTIVE SUMMARY	4
2. TERMS OF REFERENCE - SCOPE	5
3. COMMUNICATIONS AND STAKEHOLDER ENGAGEMENT	6
3.1 Communications and Stakeholder Management Role	6
3.2 Communications and Stakeholder Engagement Objectives	6
3.3 Review Context	6
3.4 Key Messages	7
3.5 Stakeholders.....	8
4. ENGAGEMENT DELIVERY	10
4.1 Communication Mechanisms	10
4.1.1 Freecall Number	10
4.1.2 Project Email Facility	10
4.1.3 Recording of Stakeholder Communication	10
4.2 Communication and Engagement Activities	11
4.2.1 Identify and Connect with Impacted Stakeholders	11
4.2.2 Letter Box Drop	11
4.2.3 Door Knock	11
4.2.4 Publicise the Review	11
4.2.5 Advertising	12
4.2.6 Informing MBRC and MBR	12
4.2.7 Informing Federal and State Elected Representatives	12
4.2.8 1800 Number and Email Live	12
4.2.9 Terms of Reference	12
4.2.10 Engage Directly with Residents	12
4.2.11 Engagement with Other Relevant Stakeholders	13
4.2.12 Feedback on Review Progress and Timing of Lodgement of Report	13
4.2.13 Advice of Report Lodgement	13
5. ENGAGEMENT FEED-BACK	14
5.1 Deception Bay	15
5.1.1 Major Street	15
5.1.2 Embassy Street	17
5.1.3 Samantha Court	18
5.1.4 Delvene Court	19
5.1.5 Nadine Place	20
5.1.6 Nellie Court	21
5.1.7 Melissa Court	22
5.1.8 Natalie Close	23
5.1.9 Anthony Court	24
5.2 Rothwell	25
5.2.1 McGahey Street (including Coman Street near intersection with McGahey)	25

5.2.2	Anzac Avenue	28
5.2.3	Finnegan Street.....	29
5.3	Other Stakeholders	30
5.4	Residents Outside the Terms of Reference	30
6.	ISSUES AND RISKS	34
7.	MEDIA COVERAGE	35
9.	CONCLUSION	36
11.	ATTACHMENTS	37
	Attachment A: Communication Collateral	I
	Attachment B: Media Release	III
	Attachment C: Advertisements	III
	Attachment D: Survey	IV
	Attachment E: Survey Responses – Further Commentary	V

LIST OF TABLES

Table 1 – Feedback Received	4
Table 2 – Stakeholders Identified for Engagement and Meetings.....	8
Table 3 – Communication and Engagement Process Tools	10
Table 4 – Survey Responses for Major Street.....	15
Table 5 – Survey Responses for Embassy Street	17
Table 6 – Survey Responses for Samantha Court	18
Table 7 – Survey Responses for Delvene Court	19
Table 8 – Survey Responses for Nadine Place	20
Table 9 – Survey Responses for Nellie Court	21
Table 10 – Survey Responses for Melissa Court	22
Table 11 – Survey Responses for Natalie Close	23
Table 12 – Survey Responses for Anthony Court	24
Table 13 – Survey Responses for McGahey Street	25
Table 14 – Survey Responses for Anzac Avenue	28
Table 15 – Survey Responses for Finnegan Street.....	29
Table 16 – Comments by Residents Outside the Terms of Reference	30
Table 17 – Mainstream Media Coverage	35

1. EXECUTIVE SUMMARY

SMEC Australia Pty Ltd (SMEC) was appointed by the Department of Transport and Main Roads (TMR) to undertake an independent hydraulic review of the possible impacts on flooding from the construction works at the Moreton Bay Rail Project (MBR) in response to the rainfall event that occurred on the 1st May 2015.

The purpose of the independent review was to undertake hydrological and hydraulic modelling in order to determine if the MBR project affected water levels in the area during the 1st May 2015 rainfall event. The review was limited to the Saltwater Creek catchment only in the suburbs of Rothwell, Mango Hill and Deception Bay.

A Communication and Stakeholder Engagement Strategy was developed and implemented by SMEC and subsequent consultation with affected property owners, businesses and other key stakeholders within the catchment area was undertaken from May to July 2015.

Consultation and engagement activities undertaken include:

- Emails and letters to directly affected property owners;
- Face to face meetings and surveys undertaken with directly affected stakeholders;
- Advertisements in local newspapers;
- Updates and meetings with local MPs, council and other key stakeholders;
- Media releases and media interviews ;
- Updates of the review and access to the Terms of Reference via the SMEC website; and
- Staffed feedback mechanisms including a 1800 enquiry line and dedicated email address.

The type and quantity of feedback received is shown in the following table:

Table 1 – Feedback Received

Survey	Outside terms of reference submissions
58	16

Following the consultation and engagement process this report was developed to document the approach and activities that SMEC has undertaken in delivering communications, engagement and stakeholder management during the review.

2. TERMS OF REFERENCE - SCOPE

TMR provided a high level terms of reference (TOR) for the review. The TOR is available under a separate cover in the main report.

3. COMMUNICATIONS AND STAKEHOLDER ENGAGEMENT

3.1 Communications and Stakeholder Management Role

For the purposes of the review the SMEC Communications and Stakeholder Management (CSM) team was independent of the TMR and MBR Communications teams. The role of the SMEC team was to engage with impacted residents and businesses identified in the Terms of Reference to obtain information to inform the Independent Hydraulic Review.

The CSM team also organised and attended meetings with other relevant stakeholders as part of the review. Stakeholders are listed in section 3.5 of this document.

3.2 Communications and Stakeholder Engagement Objectives

Communication objectives have been identified to meet the needs of the review and to ensure key stakeholders (in particular affected residents) were engaged during the review process. These objectives were first developed in the Communication and Stakeholder Management Plan and are as follows:

The objectives of the CSM team were to:

- Engage with impacted residents and businesses about the 1st May 2015 event and document their views
- Maintain relationships with impacted residents and businesses and engage as appropriate for the duration of the review
- Engage with stakeholders to obtain information to inform the review
- Provide a transparent and responsive consultation process.

3.3 Review Context

To inform the CSM team's scope a meeting was held on 14th May 2015 at the SMEC offices with TMR's MBR Communications Manager.

At this meeting it was agreed that:

- Enquiries received by MBR and recorded on the Consultation Management System about the 1st May event from the time of the event to the end of the review period will be issued to the SMEC team
- Past and future correspondence relating to the 1st May event will be issued to the SMEC team (Correspondence to 14th May 2015 was issued at the meeting)
- Relevant MBR construction and project notifications will be issued to the SMEC team (Completed at meeting on 14th May 2015)
- The MBR Communication Plan and KPIs for the project will be forwarded to the SMEC team.

- Details of the Emergency Services Reference Group members will be issued to the SMEC team.

To further inform the review the CSM team would review relevant documents on the MBR website. It was noted that SMEC would be advised of Ministerial briefing expectations during the course of the review.

It was agreed the Terms of Reference for the Independent Hydraulic Review would be posted on relevant websites.

SMEC advised that a dedicated 1800 number and email had been established for the review. As courtesy a copy of the media release and initial letter to impacted residents seeking to engage would be sent to the MBR project team.

As courtesy SMEC would advise the MBR project team when its CSM team would be in the field and the nature of activities being undertaken.

It was acknowledged the MBR and SMEC teams were independent of the other and that requests for information would continue to occur through the approved channels.

In addition a meeting was held on 22 May 2015 at Moreton Bay Regional Council offices to confirm the review process and how communications were to occur. At this meeting the media release and first communication to the community was issued for information.

3.4 Key Messages

The following key messages to community about the review included:

- SMEC (Snowy Mountains Engineering Corporation) has recently been appointed by the Queensland Government to undertake an independent hydraulic review into the rain event of 1st May, 2015.
- The focus of the independent review is to determine if the Moreton Bay Rail Project adversely affected flood levels in the area. The review is limited to the Saltwater Creek catchment only in the suburbs of Rothwell, Mango Hill and Deception Bay.
- The independent review is expected to be completed in approximately 12 weeks, with a report of the findings to be presented to the Queensland Government.
- As part of the independent review SMEC will be undertaking hydrological and hydraulic modelling as well as meeting with locally affected residents and businesses to discuss the event.
- Gathering information from the affected community is part of the review.
- Some property owners have been identified with whom we may need to meet for the purposes of gathering information and/or surveying the water level from the 1st May 2015 event. We are encouraging those who have received a letter in the post to contact us so that we have their relevant details. We will be in touch to set up a meeting (if required) with our team members.
- A Terms of Reference document has been developed outlining the scope of the works to be undertaken and is available for download on the SMEC website.

3.5 Stakeholders

The following is a table of stakeholders with whom the CSM team identified for engagement and meetings were sought according to availability during the review process.

Table 2 – Stakeholders Identified for Engagement and Meetings

Stakeholder Type	Stakeholders	Who
Elected representatives		
	Federal	The Hon. Peter Dutton, Federal Member for Dickson The Hon. Luke Howarth, Federal Member for Petrie
	State	Mr Christopher Whiting, MP, Member for Murrumbidgee Mr Shane King, MP, Member for Kallangur The Hon. Jackie Trad, MP, Minister for Transport and Infrastructure, Deputy Premier The Hon. Annastacia Palaszczuk, MP, Premier
External	Local	Mayor, Cr Allan Sutherland, Cr David Dwyer (Division 7) Cr James Houghton (Division 5), Cr Julie Greer (Division 4), Cr Peter Flannery (Division 2)
	Transport and Main Roads Media Unit (via authorised communication channel)	
	Transport and Main Roads Moreton Bay Rail Link Project (Communications) via authorised communication channels for review	
	Moreton Bay Regional Council (Communications) via authorised communication channels for the review	
	Directly impacted residents and businesses	Rothwell Anzac Avenue, Finnegan Street, McGahey Street Deception Bay

		Major Street, Anthony Court, Embassy Street, Samantha Court, Nellie Court, Delvene Court, Nadine Place, Melissa Place, Natalie Close Mango Hill May Street
	Other residents and businesses	Properties in adjoining streets to those listed above who may have experienced flooding issues.
	Utility Providers if required	Unitywater APA Telstra
	Emergency Services	Police Ambulance Fire and Rescue SES (Deception Bay, Redcliffe, Petrie)
	Local Media	Redcliffe Bayside Herald The Messenger North Lakes Times Pine Rivers Press
	State Media	AAP Reuters, The Courier Mail, Quest Community, Newspapers, Brisbane Times, ABC Radio, 4BC, 4 ZZZ Channel 7,10,9 and ABC News

4. ENGAGEMENT DELIVERY

The focus of the CSM team was to build awareness of the review, inform stakeholders of the process and engage with impacted stakeholders and provide feed-back on review progress at regular intervals.

The range of tools applied to the communication and engagement process is outlined in the table below.

Table 3 – Communication and Engagement Process Tools

Type	Tools
One way	Letters Advertisements in local newspapers and online Media Releases Web copy
Two way	One-on-one meetings with property owners Meetings with elected representatives Survey/Comment Form 1800 number/email

4.1 Communication Mechanisms

4.1.1 Freecall Number

A dedicated freecall number (1800 547 605) was established to provide community members with the project's main point of telephone contact.

This number remains operational as at July 2015.

4.1.2 Project Email Facility

A review email address (community@smec.com) provided stakeholders and members of the community with an alternative for telephone enquiries.

This email address remains operational as at July 2015.

4.1.3 Recording of Stakeholder Communication

All community interaction during the review (correspondence, meetings, survey forms, and telephone enquiries) was recorded in the project's communication management database.

Information recorded has been used for analysis and reporting purposes and assisted in the identification, tracking, and management of residents, community and other key stakeholders.

4.2 Communication and Engagement Activities

The communication and engagement occurred in five key phases:

- Raise awareness and invite participation
 - Identify and connect with impacted stakeholders
 - Issue letter to stakeholders
 - Door knock
 - Publicise the review
 - Advertise in local papers
 - 1800 number and email live.
 - Inform MBRC and MBR project through approved communication channels
 - Inform local Federal and State elected representatives
 - Upload Terms of Reference onto SMEC website.
- Engage directly with impacted stakeholders
- Engage with other relevant stakeholders
- Feed-back on the review progress
- Advice of report lodgement.

All communications collateral (letters) issued to the community in relation to these phases can be found in **Attachment A**.

4.2.1 Identify and Connect with Impacted Stakeholders

The approach to identify and engage with impacted residential and business property owners/tenants was developed in the knowledge that impacted parties were living out of the area and going back periodically to their homes to check for mail.

4.2.2 Letter Box Drop

To connect with residents a direct mail into 225 letter boxes occurred on 19th May 2015. The letter outlined SMEC's appointment, the scope of the review and invited residents to connect with the team via the dedicated 1800 line and email.

A copy of this letter can be found in **Attachment A**.

4.2.3 Door Knock

A door knock of impacted streets was also conducted on 2nd June 2015 and letters left in the Terms of Reference streets to raise awareness of the review and invite participation.

4.2.4 Publicise the Review

A media release was issued on 19th May 2015 to the Courier Mail and three local newspapers advising that SMEC was appointed to undertake the review, the focus and scope of the review

and to promote the review's 1800 number and email communication channels. All media coverage relating to the independent review is outlined in **Section 6 – Media Coverage**.

A copy of this media release can be found in **Attachment B**.

4.2.5 Advertising

Between 30th May 2015 and 10th June 2015 advertisements appeared in three papers calling for residents/businesses in the review scope to connect with the CSM team:

- The Courier Mail (30th May 2015) – Public Notice
- The Messenger (6th June 2015)
- Redcliffe & Bayside Herald (10th June 2015)

Copies of these advertisements and public notice can be found in **Attachment C**.

4.2.6 Informing MBRC and MBR

In addition Moreton Bay Regional Council's Customer Service Centre and the Moreton Bay Rail project team were sent courtesy copies of correspondence through the appropriate communication channels to enable relevant calls received by either organisation to be directed to the review team.

4.2.7 Informing Federal and State Elected Representatives

Federal and State elected representatives were sent a copy of the media release and introductory letter by the CSM team and meetings were held when requested.

4.2.8 1800 Number and Email Live

The 1800 number and email went live on 18th May 2015.

A total of 180 calls were received and 157 emails for the duration of the review's consultation phase.

4.2.9 Terms of Reference

The Terms of Reference were uploaded onto the SMEC website on 9th June 2015.

4.2.10 Engage Directly with Residents

With the impacted stakeholder register developed, the CSM team connected via email and/or phone to set up a meeting for the surveying team and a CSM member to meet with residents at their property from 9th June 2015 to 20th June 2015.

The purpose of this engagement was to obtain relevant technical data via surveying and gathering information from residents.

The team met with impacted property owners and conducted a written survey with residents to identify the following:

- Personal details
- Length of time living in the area

- Direction from which the water entered property on 1st May 2015
- Time of water entering property
- Height of water inside
- Height of water outside
- Speed of water inside and outside
- Time water receded
- Individual account of 1st May 2015 event
- If the property had been flooded previously
- Levels of previous flood event/s
- General comments

Residents who were unable to undertake a meeting during this period were asked to do the survey via the phone or send in a written record of their experience and photos if available to inform the review. Two participated in the survey via phone and also sent in photos.

A copy of the survey can be found in **Attachment D**.

4.2.11 Engagement with Other Relevant Stakeholders

Meeting requests were made to the State Emergency Services Authority (SES) and also Unitywater as stakeholders who could inform the team of what was occurring in the Saltwater Catchment area on 1st May 2015.

The SES advised the team to contact the local SES representative based at Moreton Bay Regional Council for further information. A meeting was held with MBRC Disaster Management Team on 22nd July 2015. A meeting was held with Unitywater on 30 June 2015.

4.2.12 Feedback on Review Progress and Timing of Lodgement of Report

On 24th June 2015 a letter was issued to impacted residents/businesses in the Terms of Reference area providing an update on project status and advising there was still an opportunity to provide details through the 1800 number and project email.

A copy of this letter can be found in **Attachment A**.

4.2.13 Advice of Report Lodgement

In August a letter will be prepared for issue to impacted residents/businesses thanking them for their co-operation and advising of the report lodgement to the Queensland Government.

5. ENGAGEMENT FEED-BACK

The review generated a significant level of interest from residents affected by the 1st May 2015 storm event. During the consultation period the CSM team received 58 surveys.

The feedback provided from the residents was used as supporting information to assist in the development of the hydraulic modelling. These accounts of events and water levels were validated with actual survey data from observed flood debris marks.

A total of 19 respondents from within the Terms of Reference area provided supporting photographs to the review team by email and six respondents provided supporting photographs in hard copy and five respondents provided supporting photographs on digital storage media (USB storage drives).

The following section summarises the survey responses. Further commentary is provided in **Attachment E**.

5.1 Deception Bay

5.1.1 Major Street

The following table summarises the survey responses for Major Street.

Table 4 – Survey Responses for Major Street

No of years living in property	Direction from which water came into property on 1 May 2015	Time of water entering property	Height of water inside property	Height of water outside property	Time water receded	Have you been flooded previously Y/N	Date of flooding event	Height of water outside	Height of water inside if relevant)
2 – 5 yrs	Creek and road	3-4pm	700mm	1.2m	9-10pm	Y	February 2015	20-30cm	N/A (did not enter property)
2-5	Creek, road, neighbouring property	3.30-4pm	400mm	1.1m	Approx. 8.30pm	Y	February 2015	20-30cm (up driveway)	N/A
5-10	N/A	N/A	450mm	450mm	Gone by next morning	N	N/A	N/A	N/A
10-15	Creek	Not provided	1m	1m	Gone by next day	Y	February 2015	300mm	300mm
25-30	Creek, road	3.30pm	800mm	800mm	Gone by next day	Y	February 2015	N/A	250mm (up to back step)
10-15	Creek	5.30pm	2.5 feet	2.5 feet	Not provided	Y	February 2015	N/A	Front yard covered
2-5	Creek, road	Not provided	38cm	0.5m	Not provided	N	N/A	N/A	N/A
10-15	Creek, road	3pm	1m	1m	8pm – still high	Y	February 2015	Lapped at backdoor	N/A

No of years living in property	Direction from which water came into property on 1 May 2015	Time of water entering property	Height of water inside property	Height of water outside property	Time water receded	Have you been flooded previously Y/N	Date of flooding event	Height of water outside	Height of water inside if relevant)
2-5	Creek, road, pipes	3.30pm	0.4m	.5m	9.14pm	N	N/A	N/A	N/A
5-10	Creek, pipes	Late afternoon	250mm	60cm	7-9pm	Y	February 2015	Bottom of shed slab	N/A
5-10	Creek, road	4.20pm	70cm	Higher outside	1.5 hours after peak	Y	February 2015	N/A	Came up to house (not in house)
10-15	Road, pipe	5pm	Varying between 51-61cm	70cm	Peaked at 5.30pm, receding by 7pm	Y	February, 2015	N/A	Halfway up driveway
2-5	Creek	3pm	1.37m	1.66m	11pm	Y	February 2015	0.4 metres	2.5 metres
15-20	Creek, road	6.30-7pm	500-600mm	800-900mm	8.30pm	N	N/A	N/A	N/A
5-10	Creek	2pm	1200mm	1200-1700mm	9.30pm (water gone)	Y	February 2015	1m	1m
20-25	Creek	Approx. 4pm	0.5 metres	0.5 metres	Approx. 1 to 1.5 hours after entry	N	N/A	N/A	N/A
25-30	Creek, road, pipe	4-5pm	Hip height	Hip height	Late evening	Y	February 2015	Came up to house (not in house)	N/A

5.1.2 Embassy Street

The following table summarises the survey responses for Embassy Street.

Table 5 – Survey Responses for Embassy Street

No of years living in property	Direction water came from into property on 1 May 2015	Time of water entering property	Height of water inside property	Height of water outside property	Time water receded	Have you been flooded previously Y/N	Date of flooding event	Height of water outside	Height of water inside (if relevant)
2-5	Creek, road	Not provided	Not provided	Came up driveway	9pm	N	N/A	N/A	N/A

5.1.3 Samantha Court

The following table summarises the survey responses for Samantha Court.

Table 6 – Survey Responses for Samantha Court

No of years living in property	Direction water came from into property on 1 May 2015	Time of water entering property	Height of water inside property	Height of water outside property	Time water receded	Have you been flooded previously Y/N	Date of flooding event	Height of water outside	Height of water inside (if relevant)
2-5	Road	3pm	450-500mm	450-500mm	Receded next day	Y	Feb, 2015	Half way up drive	Na
1	Road, neighbouring property	5pm	36cm	32-60cm	Between 8.45pm and 9.15pm	N/A	N/A	N/A	N/A
5-10	Creek	5.30pm (approx.)	0.8m	0.8m	8pm	N	N/A	N/A	N/A
20-25	Neighbouring property, road	4-4.30pm	0.17m	400mm	5pm	N	N/A	N/A	N/A
15-20	Road	Not provided	12-14 inches	12-14 inches	Up to or more than one hour	N	N/A	N/A	N/A
5-10	Road, creek, pipes, neighbouring property	4pm	Knee height	Hip height	Later in evening	N	N/A	N/A	N/A

5.1.4 Delvene Court

The following table summarises the survey responses for Delvene Court.

Table 7 – Survey Responses for Delvene Court

No of years living in property	Direction water came from into property on 1 May 2015	Time of water entering property	Height of water inside property	Height of water outside property	Time water receded	Have you been flooded previously Y/N	Date of flooding event	Height of water outside	Height of water inside (if relevant)
2-5	Creek	N/A	N/A	300mm	7.45pm (gone)	N	N/A	N/A	N/A
10-15	Creek	N/A	400mm	600mm	7.30-8pm	N	N/A	N/A	N/A
20-25	Street	N/A	N/A	2 inches	From 8pm	N	N/A	N/A	N/A

5.1.5 Nadine Place

The following table summarises the survey responses for Nadine Place.

Table 8 – Survey Responses for Nadine Place

No of years living in property	Direction water came from into property on 1 May 2015	Time of water entering property	Height of water inside property	Height of water outside property	Time water receded	Have you been flooded previously Y/N	Date of flooding event	Height of water outside	Height of water inside (if relevant)
Not provided	Not provided	6pm	Not provided	Not provided	10.30pm	Not provided	N/A	N/A	N/A
10-15	Creek	2-3pm	Not provided	Up to verandah	11pm	N	N/A	N/A	N/A

5.1.6 Nellie Court

The following table summarises the survey responses for Nellie Court.

Table 9 – Survey Responses for Nellie Court

No of years living in property	Direction water came from into property on 1 May 2015	Time of water entering property	Height of water inside property	Height of water outside property	Time water receded	Have you been flooded previously Y/N	Date of flooding event	Height of water outside	Height of water inside (if relevant)
20-25	Creek	3.30-4pm	.700m	1 metre	By 10.30pm	N	N/A	N/A	N/A
10-15	Creek	4.00pm	755mm	1 metre	By 10pm	N	Na	Na	Na

5.1.7 Melissa Court

The following table summarises the survey responses for Melissa Court.

Table 10 – Survey Responses for Melissa Court

No of years living in property	Direction water came from into property on 1 May 2015	Time of water entering property	Height of water inside property	Height of water outside property	Time water receded	Have you been flooded previously Y/N	Date of flooding event	Height of water outside	Height of water inside (if relevant)
5-10	Creek and road	5-5.20pm	60mm in back entertainment area	N/A	5.30pm, gone by 8.30pm	N	N/A	N/A	N/A
			45 – 50mm in garage						
5-10	Creek	5-5.20pm	1-1.2m	.3m	5.45-6.15pm	N	N/A	N/A	N/A
10-15	Creek and road	5-5.20pm	100mm	400mm	Gone by 7.30pm	N	Na	Na	Na

5.1.8 Natalie Close

The following table summarises the survey responses for Natalie Close.

Table 11 – Survey Responses for Natalie Close

No of years living in property	Direction water came from into property on 1 May 2015	Time of water entering property	Height of water inside property	Height of water outside property	Time water receded	Have you been flooded previously Y/N	Date of flooding event	Height of water outside	Height of water inside (if relevant)
10-15	Creek	5-5.20pm	0.5-0.6m	0.25-0.3m	7.15-7.45pm	N	N/A	N/A	N/A

5.1.9 Anthony Court

The following table summarises the survey responses for Anthony Court.

Table 12 – Survey Responses for Anthony Court

No of years living in property	Direction water came from into property on 1 May 2015	Time of water entering property	Height of water inside property	Height of water outside property	Time water receded	Have you been flooded previously Y/N	Date of flooding event	Height of water outside	Height of water inside (if relevant)
2-5	Creek	4.30-5pm	0.150m	0.460m	Not provided	N	N/A	N/A	N/A
5-10	Creek	Not provided	One inch	300mm	Not provided	N	N/A	N/A	N/A
2-5	Creek	6pm	100mm	400mm	Gone by 9pm	N	N/A	N/A	N/A
2-5	Creek	N/A	N/A	N/A	7-8pm	N	N/A	N/A	N/A
5-10	Creek, road, pipe	N/A	N/A	Halfway up driveway (approx. hip height)	5.30-6pm	N	N/A	N/A	N/A
10-15	Creek	2.38pm	200mm	450mm	By 8.30pm	N	N/A	N/A	N/A

5.2 Rothwell

5.2.1 McGahey Street (including Coman Street near intersection with McGahey)

The following table summarises the survey responses for McGahey Street.

Table 13 – Survey Responses for McGahey Street

No of years living in property	Direction water came from into property on 1 May 2015	Time of water entering property	Height of water inside property	Height of water outside property	Time water receded	Have you been flooded previously Y/N	Date of flooding event	Height of water outside	Height of water inside (if relevant)
20-25	Creek	5.50pm	12 – 18 inches		8pm still up	N	N/A	N/A	N/A
20-25	Creek, road, neighbouring property	3.30-4pm coming up road	400-500mm	400-500mm	7pm	N	N/A	N/A	N/A
10-15	Creek	5pm (in AFL club)	1.6m	1.6m	Next day still at fence	Y	February 2015	600-700mm	600-700mm
20-25	Creek, road	4pm water on road, 5.40pm coming in house	400mm		Gone next day	N	N/A	N/A	N/A

No of years living in property	Direction water came from into property on 1 May 2015	Time of water entering property	Height of water inside property	Height of water outside property	Time water receded	Have you been flooded previously Y/N	Date of flooding event	Height of water outside	Height of water inside (if relevant)
10-15	Creek	1pm coming up from creek, 6pm club went under	0.5m	0.5m	Still present at 8pm	Y	February 2015 2011	300mm (2015) Top of paddock fences (2011)	300mm (2015)
5-10	Creek	6pm in house	6"	6"	8pm	N	N/A	N/A	N/A
0-1	Creek, road	3pm (downstairs)	1600-1800mm (two storey)	1600-1800mm	6pm peak	Y	February 2015	1.5m	1.5m
2-5	Creek	6pm	400mm	1.6m	7pm peak, 6am still water	Y	February 2015	30cm below floor level	Not provided
25-30	Creek	5pm (on driveway)	330mm	Not provided	7.15pm	N	N/A	N/A	N/A
5 – 10	Creek	5.15pm	400mm	1.2m	8.30pm	Y	February 2015	0.5m	0.300m

No of years living in property	Direction water came from into property on 1 May 2015	Time of water entering property	Height of water inside property	Height of water outside property	Time water receded	Have you been flooded previously Y/N	Date of flooding event	Height of water outside	Height of water inside (if relevant)
20-25	Creek, road, neighbouring property	3.30-4pm coming up road	400-500mm	400-500mm	7pm	N	N/A	N/A	N/A

5.2.2 Anzac Avenue

The following table summarises the survey responses for Anzac Avenue.

Table 14 – Survey Responses for Anzac Avenue

No of years living in property	Direction water came from into property on 1 May 2015	Time of water entering property	Height of water inside property	Height of water outside property	Time water receded	Have you been flooded previously Y/N	Date of flooding event	Height of water outside	Height of water inside (if relevant)
15-20	Creek, road	2.45pm past normal point, 6.30/7pm in property	1.2m	1.2m	12pm	Y	Feb 2015	6 inches from front door	0mm
5-10	Creek, stormwater	5.30pm (knee high through house)	2 – 3 foot	3 foot	10.30pm	Y	Feb 2015	175mm above ground	N/A
2-5	Creek, road	4-5pm in front yard	350mm	550mm	10pm (still rising)	Y	Feb 2015	Came up to brickwork	N/A
30+	Creek, road	N/A	N/A	Came up a long way past previous mark	Up through the night	N	N/A	N/A	N/A

5.2.3 Finnegan Street

The following table summarises the survey responses for Finnegan Street.

Table 15 – Survey Responses for Finnegan Street

No of years living in property	Direction water came from into property on 1 May 2015	Time of water entering property	Height of water inside property	Height of water outside property	Time water receded	Have you been flooded previously Y/N	Date of flooding event	Height of water outside	Height of water inside (if relevant)
30+	Creek, road	3pm up to curb	0.5m under house	500mm	3.30am	N	N/A	N/A	N/A
10-15	Creek	N/A	N/A	N/A	10.30pm still up	N	N/A	N/A	N/A

5.3 Other Stakeholders

5.3.1.1 *Mango Hill - May Street East*

Several attempts were made through doorknocks, letterbox drops and advertisements to engage and consult with residents from May Street East at Mango Hill. No residents from this street made contact with the project team.

5.3.1.2 *Unitywater*

The key points raised by Unitywater in relation to the 1st May 2015 event are as follows:

- There had only been one water main failure at Narangba in the Saltwater Creek Catchment of a 300mm break in the pipe which was noted at 6pm and acted upon by Unitywater.
- The sewerage system performed well based on the size of the rainfall event. 50mm rain events are noted as an extreme wet weather event in Unitywater's system.
- The overflows at key control points operated as expected.

5.3.1.3 *MBRC Emergency Service Records*

Moreton Bay Regional Council Emergency Service records were provided to the project team for cross-referencing against records provided by affected stakeholders during the independent review's consultation phase.

5.3.1.4 *Impacted Horse and Pony Club*

Correspondence received from an impacted Horse and Pony Club was forwarded to the independent review project team by Councillor Allan Sutherland's (Mayor, Moreton Bay Regional Council) office.

5.4 Residents Outside the Terms of Reference

Comments made by residents out of the Terms of Reference are listed in the table below. Five respondents provided the team with photographs.

Table 16 – Comments by Residents Outside the Terms of Reference

Comments
<ul style="list-style-type: none">▪ I was one of the victims whose home was flooded on 1st May, 2015. Attached is correspondence from the Moreton Bay Coordinator Disaster Management officer, with whom I had a telephone discussion. He will be taking my issue to a meeting into what happened to people like me who should have been recognised and registered as our case was justified and we should not have been missed from the investigation Moreton Bay Rail Link (MBR) as we live right beside the Petrie Train line where works are being done and in a street of 4 houses 3 were flooded. Post calls to stakeholder:

- The Petrie to Redcliffe section is a new alignment. Prior to it being built, it had never flooded before. On 1st May 2015 Petrie Station was flooded, the railway car park was flooded and the water came back up the street from the railway station to the Petrie Roundabout. Stakeholder has lived in her property 30 years. To know what occurred she advised that there is a drain under the rail line which goes from their side under the line to the creek and on the other side of the creek is farmland. There is a drain under their property and drains in the parkland from No 6. Water drains into the park from houses and the school and usually runs out via the park. On 1st May 2015 water has come back from the park over the back fence (2M high). Water came through tunnel under railway to join water in the park. Water has come down the hill into Burgundy Court. Water could not get away. The water took 20-30 minutes to enter the property late afternoon. The height over the swimming pool at the back was three foot over the height of the pool and it was up past his knees in the kitchen. It is thought the water started to recede after 2 hours. They also experienced flooding on 20th February 2051 when water entered their garage and was at ankle depth in the pergola at the back. On 20th February 2015 it did not enter the house.
- The past history of my land is that there has never been a flood to my property and I have lived here since 2003.
- On 1st May 2015 the water came through my yard like a torrent, like it found a causeway. My fences were destroyed.
- The water started rising in my house at about 16.30 and we noticed this because the garbage bin started floating down the back yard. The water rose quickly on 1st May 2015 and there was no time to move anything. My dogs were scared.
- The maximum height of the water rose in my house was 500mm and in the shed 800mm to 1m.
- The water receded quickly. It was gone from in the house in about 2 hours.
- I am scared now every time the rainy weather comes.
- I am scared now as summer is coming along with the cyclones and torrential rains.
- I appreciate that you have forwarded my experiences during the event to the relevant authorities for their consideration.
- To support my experience please find attached photographs of the damage the mass of water caused to my fences as a result of the 1st May 2015 flood.
- And to also advise: There was severe damage to Freshwater Creek Road as a result of the flood water back, which blew out the manhole in Freshwater Creek Road
- I am interested in getting reimbursed for the expense it has cost me for my car repairs. I have lived in Tuohy Court Rothwell since 2010, went through the Brisbane flooding and never has the street flooded like it did in the storm we had 3 weeks ago. I knew when they blocked Saltwater creek drainage off with their road works etc. that it had caused the huge problem of water not getting away. How stupid to do that, to block off a natural water way. I have to get a replacement gear box now after spending money to get the car going again. The company of engineers need to pay up and reimburse people, me included, and some people lost everything.

- Unitywater saying it was stormwater backup, wants to log his details
- Stakeholder reported that the area has been flooding and that it really shouldn't be. Never used to flood but since new development at Carseldine water is not getting away fast enough along Telegraph Road.
- Stakeholder asked whether Chris Whiting, MP had any knowledge of the letter, they asked if a community meeting was going to occur and if he would visit impacted residents, stated, she was interested in the class action.
- 23 years a resident, 16 acres, shed had 1 foot of water through, in tidal area
- Property is 20 years old and has never been flooded, in March event sewerage came up through property first (12 inches) and then property was flooded, May event sewerage first again and then 1.2 m of water. Believes it is due to MBR bridge and Unitywater. Creek next door has never flooded in recorded history
- Foundations, slab on the ground. If not level with top level of road it runs into the house. Just wanted to let us know
- Has compared all flood mapping from MBRC and Redcliffe Council.
- Would like to email review team what he has discovered from conducting comparisons
- Water entered property at 5–6pm. Water building up then came through colorbond fence and completed flooded it. Inside came up to the skirting board. Outside up 10 inches. Back shed went under. Just wanted this recorded. No action.
- Request from Hays Inlet Flood Victims for meeting 7th July 2015. The SMEC team asked for individual submissions and photos instead of a group meeting.
- Flood event coincided with high tide on that day. East coast low on that day resulted in high tide level at end of peninsula considerably higher than usual.
- Is able to relate to a surveyor and demonstrate on site.
- The stakeholder has had disagreements with TMR and Thiess. Believes that they are corrupt and breaking the law with their environmental policy. Stakeholder would like to meet with the team because he has many aerial photographs and flood plans that contradict what Thiess and TMR say. The stakeholder believes that Freshwater Creek directly impacts on Saltwater Creek and the flooding has been caused by the railway
- After conducting research, have determined that the rail corridor construction has caused flooding in three locations: Saltwater Creek at Rothwell/Mango Hill, Unnamed creek at St Benedicts, Mango Hill and Freshwater Creek at Mango Hill.
- SMEC as “independent” reviewers have performed water and environment work on the project previously. Our investigations have shown environmental damage

as a result of the 1st May 2015 flood event specifically attributed to it by the Moreton Bay Rail construction. As a result I believe you have a conflict of interest relating to this review.

- With the information we now currently have, we need to present this to your engineers to show that the terms of reference only represent approximately one-third of the damage done by the Rail corridor and need to be extended to be truly an independent review. I will attach one photograph that shows how 168m of earthen embankment has been built into the Q100/1% flood area in Freshwater Creek which has acted as a dam and held back up to 6m of water, black flooding Freshwater Creek Road Mango Hill, Anzac Avenue and Alison Drive, Kallangur.
 - Further evidence that the flood height differential at 8m high on the upstream side of the embankment and only 2m high on the downstream side of the embankment clearly shows, despite whatever event, that the construction in the creek is causing flooding. We can show how this has happened at the other two locations as well.
 - Previously, I have asked SMEC to consider this other information and meet with us and they are refusing because it is outside of their Terms of Reference.
 - As SMEC has been appointed as a Government Agent to do this job, they may be acting illegally/criminally, if they fail to take into account more damage outside of the Term of Reference after they have been made aware of the information as they will only be acting on part of the information and will therefore be acting impartially as per the definition of corruption under the Crime and Corruption Act 2009, see attached.
 - SMEC should now meet with us to see this evidence and then go back to the Premiers office to get the Terms of Reference modified to include the other two creeks.
-
- Does not seem to be an official rain recording site in the North Lakes area or no information is provided by meteorological services. Have maintained rainfall records since 2006.
 - While not as accurate as official records, still give a clear picture of rainfall in the area.
 - More than 400mm received over two days (February 20th and 21st 2015) during a trough associated with Cyclone Marcia. More than 350mm received on Friday 1st May 2015, most of which fell between 2 and 4pm.
 - Development of North Lakes means that there is now very high surface runoff which will continue to increase with development.
 - Was perplexed to hear as early as the following Saturday morning that the railway line and associated works were the reason for the flooding. It sets a very dangerous precedent to name the reason, because then the tendency is to search back and fit facts to this outcome.
 - No wish to underestimate difficulties faced by families affected by the flood. However it is important to consider the impact of unprecedented rainfall in a landscape not designed to deal with it. I would hope that local and state governments are sending their hydrologists to the North Lakes area before 'blame' is allocated.
-
- Submission received from local school via TMR.

6. ISSUES AND RISKS

The sensitive nature of the review means that the team were cognisant of, and responsive to, issues raised during the project. This was achieved through:

- Monitoring and recording stakeholder meeting outcomes
- Monitoring stakeholder enquiries via the 1800 number, emails and other correspondence
- Monitoring responses and media statements from identified opinion leaders
- Monitoring media coverage (including social media)
- Project team discussions and liaison.

7. MEDIA COVERAGE

The mainstream media coverage post the 1 May event which was tracked by the CSM team relating to the Independent Hydraulic Review. The summary is as follows:

Table 17 – Mainstream Media Coverage

Media	Date
Print Media	
Independent Review for Moreton Bay Floods	Tuesday 5 th May 2015, News.com.au
Moreton Bay council flood mapping under scrutiny in wake of killer storm	Tuesday 5 th May 2015, Courier Mail
Deputy Premier Jackie Trad announces independent review into Moreton Bay flooding	Tuesday 5 th May 2015, ABC Online
Independent review for Moreton Bay floods	Tuesday 5 th May 2015, SBS Online
Moreton Bay residents could take months to recover from Brisbane storm, local authorities say	Wednesday 6 th May 2015, ABC Online
Flooded residents are entitled to seek legal advice: Moreton's mayor	Tuesday 14 th May 2015, Brisbane Times
Independent report finds Moreton Bay Rail Link works contributed to flooding of Deception Bay Homes	Monday 20 th May 2015, Courier Mail, Quest Community Newspapers
Listen Up: Victims demand to be heard at flood inquiry	Monday 20 th May 2015, Courier Mail, Quest Community Newspapers
Investigation into Brisbane's MBR	Engineers Australia, Thursday 28 th May 2015
Flood victims vent anger over Moreton Bay Regional Council decision to charge rates	Wednesday 29 th May 2015, Courier Mail, Quest Community Newspapers
Have Your Say (Letter to Editor, Mr Chris Whiting MP)	Wednesday 3 rd June 2015, Quest Community Newspapers
Radio News	
Extreme storm cell unprecedented Interview with Ms Jacqui Trad MP	ABC Radio News
Deadly Queensland floods in Moreton Bay Region earn independent review	101.5FM Moreton Bay

8. CONCLUSION

The consultation process assisted the review as affected stakeholders accounts were documented and allowed for a larger cross section of data to be used to validate and calibrate the hydraulic modelling. Without the communities involvement in this process the accuracy and robustness of the outcome could not have be achieved.

9. ATTACHMENTS

Attachment A: Communication Collateral

Attachment B: Media Release

Attachment C: Advertisements

Attachment D: Survey

Attachment E: Survey Responses – Further Commentary



Attachment A: Communication Collateral

Level 1, 154 Melbourne Street
South Brisbane, QLD 4101, Australia
(PO Box 5333, West End, QLD 4101, Australia)
T +61 7 3029 6600 **F** +61 7 3029 6650 **E** brisbane@smec.com
www.smec.com

28 May 2015

Dear resident,

RE: Independent Hydraulic Review

As you may be aware, SMEC (Snowy Mountains Engineering Corporation) has recently been appointed by the Queensland Government to undertake an independent hydraulic review into the rain event of 1 May, 2015. The focus of the review is to determine if the Moreton Bay Rail Project affected water levels in the area.

The independent review is expected to be completed in approximately 12 weeks, with a report of the findings to be presented to the Queensland Government.

As part of the independent review SMEC will be investigating hydrological and hydraulic modelling as well as meeting with locally affected residents and businesses to discuss the event.

Gathering information from the affected community is an important part of the review.

The reason you are receiving this letter is because you have been identified as a resident/business with whom we may need to meet for the purposes of gathering information and/or surveying the level that the water reached on or near your property on 1 May.

We would appreciate you contacting the SMEC Community Engagement Team to provide your preferred contact details.

Please dial freecall 1800 547 605 (between the hours of 9 am to 5pm Monday to Friday) or contact us via email at community@smec.com

Thank you for your co-operation. Your assistance in this important review is appreciated.

Yours sincerely,



Bob Tilbury

Project Director, Independent Hydraulic Review

SMEC

Level 1, 154 Melbourne Street
South Brisbane, QLD 4101, Australia
(PO Box 5333, West End, QLD 4101, Australia)
T +61 7 3029 6600 **F** +61 7 3029 6650
www.smec.com

Dear resident,

RE: Progress Update - Independent Hydraulic Review

Representatives from the review team (including community engagement consultants and surveyors) recently met with a number of residents to gather information for the Moreton Bay Rail Project Independent hydraulic Review, following the rain event on 1 May 2015.

SMEC (Snowy Mountains Engineering Corporation) is undertaking the review after being appointed by the Queensland Government.

We would like to thank residents for assisting with the surveying in the area and for providing photos and/or conveying their experiences of the event with the SMEC community engagement team.

This field data and information is currently being used to inform the hydrological and hydraulic modelling.

SMEC is now halfway through the review process. We would also like to invite residents who have not engaged with the team to ring or email us and provide information to further assist us in the review by calling 1800 547 605 (between the hours of 9 am to 5pm Monday to Friday) or via email at community@smec.com

A report outlining the findings of the Independent Hydraulic Review will be presented to the Queensland Government in August.

Your assistance in this important review is much appreciated and we thank you for your co-operation.

Yours sincerely,



Bob Tilbury

Project Director, Independent Hydraulic Review

SMEC



Attachment B: Media Release



Media Release



SMEC to Review Hydraulic Impact of Moreton Bay Rail Project

15 May 2015

SMEC has been engaged by the Queensland Government to undertake an independent hydraulic review of the impacts on flooding from the construction works at the Moreton Bay Rail Project as a result of the severe rain event that occurred in southeast Queensland, Australia on 1 May 2015.

The objective of the review is to determine if the Moreton Bay Rail Link Project has affected local water levels in the area. SMEC will investigate all hydrological and hydraulic modelling impacts of the rail project, and will meet with local residents and businesses to discuss the impacts of the event.

The independent review is scheduled for completion in approximately 12 weeks' time, at which point a report of the findings will be presented to the Queensland Government.

- ends -

For more information please contact:

SMEC Project Team

E: community@smec.com T: 1800 547 605

www.smec.com



Attachment C: Advertisements

Published in The Courier Mail – Public notice: 30 May 2015

Independent Hydraulic Review

SMEC has been engaged by the Queensland Government to undertake an independent hydraulic review of the potential impacts on flooding from the Moreton Bay Rail Project construction works during the rain event that occurred in southeast Queensland on 1 May 2015.

SMEC is seeking to meet with locally affected residents and businesses in Rothwell, Deception Bay and Mango Hill to gather information to inform the flood modelling.

**To assist, please contact the project team on
freecall 1800 547 605 or email community@smec.com**

Published in Quest Community Newspapers: 10 June 2015 and Published in The Messenger: 6 June 2015



SMEC has been engaged by the Queensland Government to undertake an independent hydraulic review of the potential impacts on flooding from the construction works at the Moreton Bay Rail Project during the rain event that occurred in southeast Queensland on 1 May 2015.

SMEC is seeking to meet with locally affected residents and businesses in the designated review area to gather information to inform the modelling.

If you are a resident in the following areas and identified streets, please contact the project team on freecall 1800 547 605 (between the hours of 9am to 5pm Monday to Friday) or contact us via email at community@smec.com. Community members outside of these areas are also encouraged to contact SMEC and provide input into the review.

Deception Bay

- Major Street
- Anthony Court
- Embassy Street
- Samantha Court
- Nellie Court
- Delvene Court
- Nadine Place
- Melissa Place
- Natalie Close

Rothwell

- Anzac Avenue
- Finnegan Street
- McGahey Street

Mango Hill

- May Street



Attachment D: Survey

MORETON BAY RAIL PROJECT: INDEPENDENT HYDRAULIC REVIEW

Dear resident,

As you may be aware, SMEC (Snowy Mountains Engineering Corporation) has recently been appointed by the Queensland Government to undertake an independent hydraulic review into the rain event of 1 May, 2015. The focus of the review is to determine if the Moreton Bay Rail Project affected water levels in the area.

The independent review is expected to be completed in August 2015, with a report of the findings to be presented to the Queensland Government. As part of the review SMEC will be undertaking hydrological and hydraulic modelling as well as meeting with locally affected residents and businesses to discuss the event.

Gathering information from the affected community is an important part of the review.

We would appreciate you providing information on this survey form to our representative on site or by 30 June 2015 to assist the review process.

Please scan and email back to community@smec.com or send via mail marked attention:

CSM Team
Moreton Bay Rail Project: Independent Hydraulic Review
SMEC Australia Level 1, 154 Melbourne Street
South Brisbane, QLD 4101, Australia
(PO Box 5333, West End, QLD 4101, Australia)

Please dial freecall 1800 547 605 (between the hours of 9 am to 5pm Monday to Friday) to discuss with the review team. Thank you for your co-operation.

INDEPENDENT HYDRAULIC REVIEW SURVEY

Please provide the following details:

Name: _____

Address: _____ Postcode: _____

Telephone contact: _____

Email contact: _____

Please indicate the number of years you have lived in the property (please tick the relevant box)

- ☐ <1 year
- ☐ 2 – 5 years
- ☐ 5- 10 years
- ☐ 10 – 15 years
- ☐ 15 – 20 years
- ☐ 20 – 25 years
- ☐ 25 – 30 years
- ☐ 30 years +

Please confirm by signing here that you authorise the team to take photos to inform the Independent Hydraulic Review:

Signature: _____ Date: _____

1. At what time on the 1st of May did you see the water rising/approaching? – If you witnessed the event, please describe what happened.

2. For the water that entered your property or was seen nearby your property in which direction did the water come from?

- ☐ Creek
- ☐ Road
- ☐ Neighbouring Property
- ☐ Drainage Culvert or Pipe
- ☐ Other

Please describe the direction in detail:

3. What was the maximum height of the water level at your property? Please describe in general terms (e.g. 1 metre or 2 metres or .5 metre)

Level outside the house: _____

Level inside the house: _____

4. Have you marked the level/s anywhere within your property?

(Please tick your response)

☐ Yes Describe where the mark is located: _____

☐ No

5. Can you describe the velocity (speed) of the water ?

Outside your property: _____

Inside your property: _____

6. How long did it take for the water to recede (go away) from your property?

7. Can you please provide a brief account of the 1st May event (can be in dot point and include time intervals)

8. Has the property been subject to flooding previously?

(Please tick relevant answer)

- ☐ Yes. When?: _____
- ☐ No

If yes, have you marked the level in your property?

(Please tick relevant answer)

- ☐ Yes Describe where the mark is located: _____
- ☐ No

If yes, what height would that have been approximately for the previous flood event (prior to 1 May)?

Outside the property: _____

Inside the property: _____

9. Are there any other comments or information you would like to add to the survey? If so, please describe.

Thank you for your time in providing feedback.

This information will be used solely for the purpose of informing the hydraulic review in line with the the *Commonwealth Privacy Act, 1988*.

Please confirm by signing here that you are comfortable that the notes taken reflect what you have said to the SMEC representative:

*Signature:*_____ *Date:*_____

*Witnessed by:*_____ *Date:*_____



Attachment E: Survey Responses – Further Commentary

1. SURVEY RESPONSES – FURTHER COMMENTARY

1.1 Deception Bay

Further commentary is provided below from residents of Deception Bay.

1.1.1 Major Street

1.1.1.1 Velocity of Water

Internal and external water velocities were provided by respondents from Major Street.

- Outside: Turbulent and fast running, 25 horse power boat struggled with current
- Inside properties: Swirling

1.1.1.2 Major Street - Stakeholder comments of their experience of the 1st May 2015 event

Table 1 – Major Street Stakeholder Comments

- | |
|---|
| <ul style="list-style-type: none">▪ 1.30pm: text husband to say water was in backyard beside pool on grassed area (approximately 2 inches deep) 2.00pm: water came up through bathroom drain 2.15pm: water in backyard 2.45pm: waist height water throughout |
| <ul style="list-style-type: none">▪ Light drizzle in the morning and by 1.30pm heaving rain, then bucketing rain 3.30pm, at 4.15pm water at back door, at 4.20pm water at front door then water was in the house, Called SES at 5pm, at 5.10pm called 000 – called Fire Brigade at 5.34pm, call from ambulance at 6pm and moved to higher ground, moved from laundry to the kitchen, 6 -8pm water remained high and it started to recede at 8pm, got out at 9pm and at that time half way up by calf.▪ Extra information: 3pm sent SMS to mother-in-law “It’s bucketing down really heavy. Has been since 1.30pm. 4.15pm called QLD Plastics (husband’s workplace). Spoke to husband and stepped in water. 4.20pm Husband left work. 4.47pm refer to photo showing water in backyard. I was sitting on top of washing machine in laundry. 5pm Called SES. Could not get through. 5.10pm called 000.▪ 5.34pm refer to photo showing laundry door handle – 50-60cms approximately. 6.00pm got to kitchen bench for higher ground – refer to photo of water in kitchen. 6.03pm 70cm water. Started to recede after 8pm. Don’t know for how long. 9pm rescued by firemen. Inside house, water was covering my feet. Outside with firemen walking in middle of road, water was halfway up calf.▪ 6.30pm - 7pm: water came inside 7.30pm: seemed to peak 8.30pm: started to recede.▪ Late afternoon the drains were noisy, at 2.30 - 3pm my daughter advised that it was flooded at the end of Major Street and was too deep to take cars out. At 4 - 5pm the water started entering our property |

- On 1 May I left my property between 3 - 4pm - street was full of water at 3pm it was waist height. 1.2metres at peak. The end of the street was flooding and back yard full. My husband returned to the house at 8pm to waist height water.
- 3pm - sewer bubbling in backyard. 3.30pm coming up easement (next to number 35) and was gradual until it hit road. Water flows through backyard normally but this time it backed up
- On 1 May water came from Hays Inlet - wiped out side fence. Drain would back up near culvert and I believe the water pooled between 2 main drains at McGahey and culvert at back.
- 3.30pm water under step. 3.40pm water was at knee level. 4pm Left with neighbour and water was 350mm high.
- According to neighbour water came in at 3pm and receded by 11pm
- Late afternoon notice there was a problem. Son concerned water was coming over patio. Looked out window and car parked on gutter water up to the sill on the passenger side. Moved car. Went out 7 minutes later and halfway up the lawn. 10 min later up to pavers on front step then started coming through. Came in very fast and rapidly. No chance to put things up. Trying to turn off power. Evacuated after tried to move things. Up to knees in water. Climbed through window. Couldn't see next door neighbourhood fence. Had to lift wife up and out. Made it to end of street and out to left but still underwater. Wife rescued by boat. The deepest spot walking though was up to armpits.
- We were away. Our neighbour rang to say that the water in Major was up to waist height on the road. It came up quickly. At that time he did not think it would enter our property but he rang back the next day and said unfortunately it had gone into our house.
- The water came up the front yard at 5.30pm, then it came up from the floorboards and then in from the front and back. I was rescued between 6 – 6.30pm
- Heavy rain was falling from 2.15pm. The water came into the back yard at 3pm and then the front from 3 – 4pm.
- At 2pm I noticed water was coming up through the pipes. At 3.30pm the water was ankle deep in the yard. Within 40 minutes the water was through the fence and at the height of the flood was the height of the bird bath outside. I got out at 5.55pm at the peak of the flood. The floodwaters had receded at 9.14pm that night.
- At 3pm the water started rising over crown land south of Major Street, by 5pm the water entered the house at a depth of 51cm. I was evacuated at 6pm.
- We were not at home that night, water was gone by the next morning.

- Water began rising in the house at 1700hrs approximately. My wife was carried to an ambulance on higher ground and I was transported by goat to higher ground at 1900 hours approximately.

1.1.1.3 Major Street - General Comments

Table 2 – Major Street General Comments

- | |
|--|
| <ul style="list-style-type: none"> MBRC flood department told stakeholder that Feb was a 1/100 event and that they had .001% chance of it happening again. |
| <ul style="list-style-type: none"> In 2011 the creek was 40 – 50 metres away from the back fence, in Feb 2015 came to the bottom of the bricks and we observed the week before the event in April that at the concrete barriers to the works the water was at the road level still with both pumps working – 4 days after the 1 May event water was still on the road at Anzac Creek, locals are attributing to the blocking of the creeks by the rail works or the development at North Lakes. |
| <ul style="list-style-type: none"> Believe there was more water in February 2015 |
| <ul style="list-style-type: none"> We have lived here through cyclones and floods and 20 years ago there were very heavy rains and full drains but the water could drain away. MBR has blocked the creek |
| <ul style="list-style-type: none"> In 2011 - the water just kept moving through the backyard - just slightly pooling in gazebo area. The damming at Anzac Avenue is the impacting factor. I noticed in December (1st week of school holidays), the creek was blocked up from weeds and did not look healthy like it normally does |
| <ul style="list-style-type: none"> In February 2015 there was no flooding for us - only water on the road and in 2011 - nothing |
| <ul style="list-style-type: none"> In 2011 - pooling water and slight damp carpet. In February water 300 through property and backed up from McGahey Street |
| <ul style="list-style-type: none"> Never seen rain like it before. In February Council said it was the tide. |
| <ul style="list-style-type: none"> Never flooded till February 2015. At that event it came from the toilet area and bathroom and then in from the large window at the front. MBRC came out and measured (surveyed) in February but never contacted the residents. After the 1 May event I was concerned when I rang Council and they advised it was a 1: 1000 year flood. I sourced the rainfall data from the Deception Bay Rainfall Statistics and the rainfall events should be noted: 126.4mm, 11 October 2010. 104.4mm, 10 January 2011 234.8mm, 25 January 2012 (we were not flooded) 90m, 28 April 2012 102.8mm, 3 March 2013 53.4mm, 28 March 2014 138.4 mm, 21 Feb 2015 96.2mm, 2 May 2015 It should be noted these figures are posted 24 hours after each day's rain event. |

- Without flooding previously you need to look at the previous rain events – in November 2010 we had a sustained rain event of three days with the highest levels of rain recorded. You also need to check the amount of rain in 2011 and the rain level for February 2015 when the water was half way up the front yard.
- I noticed water in the shed late afternoon. I was able to put my boat into the road late afternoon between 6pm and 7pm. I helped to move people for about 1.5 hours and then the water started receding.
- On 20 February water rose and crossed the avenue and lapped at the base of the house. I rang MBRC that put me in touch with MBR and I asked about the works impacting on this 20th Feb situation. MBR advised they were looking into it. In the week leading up to 1 May MBR were pumping on the NE side of the creek because it was dammed and changed the creek from a tidal to a non-tidal creek.
- Police said it was the construction work. Not received information from MBR. Received information from Bushcare about the creek.
- On 20 February it was the first noticeable flooding impact in street and the first time we had experienced anything like it.

1.1.2 Embassy Street

1.1.2.1 Velocity of water

Water velocity inside or outside of properties was not provided by residents of Embassy Street.

1.1.2.2 Embassy Street - Stakeholder comments of their experience of the 1st May 2015 event

Table 3 – Embassy Street Stakeholder Comments

- Prior to settlement – checked MBRC website for flood map before settlement. On 1 May at 3pm noticed major flooding. Around 5pm gurgling pipes heard, 5pm bottom of letterbox had water around it, 6pm back of car had water, 9pm water was gone.

1.1.2.3 Embassy Street - General comments

Table 4 – Embassy Street General Comments

- Neighbour has lived here for 23 years and no flooding. Creek makes sense as the cause.

1.1.3 Samantha Court

1.1.3.1 Velocity of Water

Internal and external water velocities were provided by respondents from Samantha Court.

- Outside: Strong current, rose rapidly
- Inside properties: Swirling

1.1.3.2 ***Samantha Court - Stakeholder comments of their experience of the 1st May 2015 event***

Table 5 – Samantha Court Stakeholder Comments

<ul style="list-style-type: none"> ▪ 4pm road flooded and backyard flooded. 4.15pm water was entering property, 4.30pm hip height outside and knee height inside
<ul style="list-style-type: none"> ▪ 1.30pm - school pick up, water in backyard 2pm - water half way up driveway 2.30pm - water three quarters up driveway 3.00pm - at floor level 3.30pm - 4.50pm - 450 mm 7.30pm - flood peaked - 450mm - 500mm. ▪ Water came in from the back yard at 3 - 4pm, Came in from the road at 4.30pm up the driveway and peaked at 5pm.
<ul style="list-style-type: none"> ▪ 4.45pm noticed water moving into property from neighbours properties, it breached at 5pm entering the house, peaked around 6.30pm - 7pm and then started to recede between 8.45pm - 9.15pm
<ul style="list-style-type: none"> ▪ Stuck at work. Two children were home and rang to say water was coming up the toilet. Rang back and said coming close to house. Phone call to say it was coming through the walls and under the door and electrical sockets. Phone cut out shortly after. Didn't realise how bad it was. Advised to tell neighbour as daughter had to hand onto fence to get there. Water so high. At top of cul-de-sac it was at chest height. Got back home to children at 9pm via Admiral Drive. Everyone was out in street, Carpets destroyed, furniture upside down. All in shock.
<ul style="list-style-type: none"> ▪ I arrived back home at 5.30pm and could not get into my road. I parked at Government Street and waded in at waist height to my home.

1.1.3.3 ***Samantha Court - General comments***

Table 6 – Samantha Court General Comments

<ul style="list-style-type: none"> ▪ On 20 February it was the first noticeable flooding impacts in street and the first time we had experienced anything like it.
<ul style="list-style-type: none"> ▪ We have been in the area since 1989 with lots of rain events with major water falling and no flooding. With Anzac Avenue pipes and environment changed.
<ul style="list-style-type: none"> ▪ I have been advised that an MBR employee asked if they should pull up the wall in Saltwater Creek prior to the big rains predicted at 300mm to 400mm well before the event and the foreman said no. The creek was choked by the construction project - the retainer wall - they tried to pump out with 2 x 10 - 12" hoses prior to the event

- I was surprised at the speed at which the flood water receded.
- Were concerned of the coffer dam and rock walls as resident's brother was concerned about this situation some time ago. Had puddles in backyard previously but never seen anything like this before, yet not as much rain but huge impact.

1.1.4 Delvene Court

1.1.4.1 Velocity of Water

Internal or external water velocities were not provided by any respondents from Delvene Court.

1.1.4.2 Delvene Court - Stakeholder comments of their experience of the 1st May 2015 event

Table 7 – Delvene Court Stakeholder Comments

- It was raining fairly heavily in the morning and afternoon over five hours. It came into the yard at 1pm - the level was two inches on the back step. The water eased off at 3pm and it was still raining. As water comes from the high point on Lieutenant Delvene Court was flooded. At 3pm it was high on Delvene as the water could not get away. The water was backed up.
- Did not see event, Left work at Caboolture at 3.45pm and arrived home at 7.45pm. Water didn't come in house but did make it up to just below window sill.

1.1.4.3 Delvene Court - General comments

Table 8 – Delvene Court General Comments

- We have lived here 23 years and it has not flooded before. In 1996/1997 it rained for a fortnight and we had 28 inches of rain but it never flooded. In 2012/2013 there was surface water - but not flooding
- Concerned about ongoing issues, will insurance be affected as well as selling price being decreased due to event. Report needs to be made public.
- If it is due to an accident then it shouldn't be listed as a floodplain

1.1.5 Nadine Place

The following table summarises the survey responses for Nadine Place.

1.1.5.1 Velocity of Water

Internal and external water velocities were provided by respondents from Nadine Place.

- Outside: Like rapids

- Inside properties: Internal water velocities were not provided by any respondents from Nadine Place.

1.1.5.2 Nadine Place - Stakeholder comments of their experience of the 1st May 2015 event

Table 9 – Nadine Place Stakeholder Comments

<ul style="list-style-type: none"> ▪ 5-6pm water broke over the retaining wall. 6pm at garage lip. 10.30pm water to retaining wall. Water burst. Since Christmas has experienced two events.
<ul style="list-style-type: none"> ▪ We are the ONLY house in Nadine Place that sustained any flooding within the home, the others had a little in their front and back yards but the water never reached their homes, so we don't want to be forgotten as we are the only people in the street that actually flooded. I was in such a state of shock at the time and there were many other people taking photos of our property both inside and out including neighbours that came in to survey the damage. I feel I need to make it clear that we are the only ones that suffered any losses.
<ul style="list-style-type: none"> ▪ Normally with 2 weeks of rain the water level will come up level to the wood sleepers in park. On 1 May between 2pm -3pm the water level was at bottom of driveway 2pm: bottom of driveway, 3pm: up driveway and in from garage door, 7pm: peaked and level was up to verandah.

1.1.5.3 Nadine Place - General comments

Table 10 – Nadine Place General Comments

<ul style="list-style-type: none"> ▪ General comments were not provided by respondents from Nadine Place.
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1.1.6 Nellie Court

1.1.6.1 Velocity of Water

Internal and external water velocities were provided by respondents from Nellie Court.

- Outside: Like rapids, fast
- Inside properties: Internal water velocities were not provided by respondents from Nellie Court.

1.1.6.2 Nellie Court - Stakeholder comments of their experience of the 1st May 2015 event

Table 11 – Nellie Court Stakeholder Comments

<ul style="list-style-type: none"> ▪ 3.30pm: water was noticed in backyard. 3.45pm: water started coming into house under doors. 3.50pm: ankle deep water in house. 4.00pm: knee height. 4.05pm: left property for own safety.

- 4.00pm: at path, got up to walk into grandchild's room and on way through to hallway noticed water on concrete landing, walked into bedroom and noticed water coming through wall. Spent approximately 1-2 minutes picking up toys onto the bed and turned to walk back out to lounge room and the water had risen to knee high, 5.00pm: left property for safety and the water was waist high.

1.1.6.3 *Nellie Court - General comments*

Table 12 – Nellie Court General Comments

- Stakeholder reported that he heard a storm-water/sewer had burst
- In February 2015 water came up front yard
- In February 2015 water came up to the footpath adjacent to the property and was near edge of driveway/carport

1.1.7 *Melissa Court*

1.1.7.1 *Velocity of Water*

Internal and external water velocities were provided by respondents from Melissa Court.

- Outside: Fast
- Inside properties: swirling, lake like

1.1.7.2 *Melissa Court - Stakeholder comments of their experience of the 1st May 2015 event*

Table 13 – Melissa Court Stakeholder Comments

- Heavy rain experienced from lunchtime onwards. At 4.30pm I sent to check the creek as water was coming over the easement. At back fence it was at knee height. I went to the front and water was all over the road and I alerted the neighbours. At 4.45pm No 6 had water through their house and we vacated at 5pm with the family. We came back at 5.30pm and water had dropped as rain has stopped. When we came back again at 8.30pm there was no water, only residual water. We had 60mm in back entertainment area and 45 - 50mm in the garage.
- 3.30pm-4pm: checked North Ridge Circuit bridge and it was at road level. 5.00pm: no water in adjacent parkland. 5.20pm: water across in parkland behind neighbour across the street "Charlie". 5.30pm-5.45pm: water started coming in house. 5.45pm - 6.15pm: water went down.
- On 1 May the man hole in the reserve blew its stack and water and effluent was in the reserve. Locals asked Unitywater to shut it down but Unitywater advised they could not assist as they lacked the resources. At 4pm there was a big downpour. At 5pm I went to use the phone in the study and saw water on the road coming in from the

reserve. We went out of house and parked the car next door at No 3 and went in their house. Water had by that time entered our property. It was knee deep on the road and 100mm in the house.

1.1.7.3 *Melissa Court - General comments*

Table 14 – Melissa Court General Comments

- In previous events the levels have risen in the toilet.
- Concrete barriers on Anzac Ave impacted, 1 in 2000 year, council didn't maintain or develop infrastructure
- A legal search when we moved in showed our house was not in the flood plain. I believe the stormwater drain near our property has never been maintained by MBRC and there is heresay that the MBR stopped pumping at Rothwell at the new section. I would say its the housing development in North Lakes, lack of work on drainage by MBRC, QR with the rail and Unitywater. We have been here 11 years and the stormwater was clear when we moved in. We could always move into and out of our street and over the creek and this time on 1 May the creek road was flooded with no way out. Even on 20 Feb the main bridge on Boundary Road was flooded but our creek access road was not. On 1 May the water was so forceful it pushed over the fencing coming into the estate.

1.1.8 *Natalie Close*

1.1.8.1 *Velocity of Water*

Internal and external water velocities were provided by respondents from Natalie Close.

- Outside: Difficult to walk against, fast, like an outgoing tide
- Inside properties: Rose very quickly

1.1.8.2 *Natalie Close- Stakeholder comments of their experience of the 1st May 2015 event*

Table 15 – Natalie Close Stakeholder Comments

- 5.15 pm water was coming over gutter at front of property (curb and channelling)
5.30pm water came in property 7.45pm water was gone, water was still in park but gone from inside, sewer burst its cap at 1-2pm

1.1.8.3 *Natalie Close - General comments*

Table 16 – Natalie Close General Comments

- Development in the area, lack of maintenance of stormwater, Anzac Ave construction

1.1.9 Anthony Court

1.1.9.1 Velocity of water

Internal and external water velocities were provided by respondents from Anthony Court.

- Outside: Didn't appear to be rushing.
- Inside properties: Internal water velocities were not provided by any respondents from Anthony Court.

1.1.9.2 Anthony Court - Stakeholder comments of their experience of the 1st May 2015 event

Table 17 – Anthony Court Stakeholder Comments

- | |
|--|
| <ul style="list-style-type: none">▪ 2.38pm water in backyard from creek and stormwater, 3.30pm left to pick up daughter from kindy and bridge on North Ridge Circuit was covered. 8.30pm water was gone 6.00pm neighbours rang to say that water was in the property▪ 5.30pm - 6pm the water peaked approximately half way up the driveway, could see that water was right across the street and into neighbours property. Thought that they just had water in the front yard, didn't realise it had come from the creek/stormwater behind them. |
| <ul style="list-style-type: none">▪ 3pm: went to pick up kids from school. 3.30pm: bridge at Boundary Rd and bridge at North Ridge Circuit was just about to go under. 5-5.30pm: North Ridge Circuit was under (husband could not access estate via North Ridge and went around other way). 6pm: Husband arrived at bollard area at other access point, rang to be picked up, travelled down Anthony Court to get to husband - roughly 20cm deep. 6.10-6.15pm: returned from picking up husband to Anthony Court and it was approximately .500m high, water was gushing over bonnet (car was written off). 8pm: road was drying off.▪ 6pm water was thigh to waist deep on Anthony, current was strong |
| <ul style="list-style-type: none">▪ On the day of Friday 1st May I was working at our Sleepy's store in Maroochydore Homemaker Centre and was unaware of what had been occurring outside during the day, as the store is inside a homemaker centre. I was 1st alerted of what was occurring when I received a text message from partner advising me that they had been sent home from work early. When I called her to find out why, she went on to explain that there were a lot of roads already closed around the greater Brisbane area, due to flooding, and she was concerned that she may not be able to get home. This certainly was the case, as when she entered North Ridge circuit she had to stop the vehicle due to the torrent of water flowing across the road. (A depth of more than 1 metre) She then called me, worried about our dog's wellbeing, as it stays home of a day while we go to work. About an hour after my partner had attempted to get home, she received a call from another resident in the street, stating that they had busted down one of our colour bond gates, to rescue our dog (who was sitting up on an air conditioning unit) to avoid being swept away by the water which was now in our backyard. My partner was resigned to the fact that she would not be getting home anytime soon, due to the flooded roads, so she went to my brother's house at North Lakes for the night. I left our store at Maroochydore at 4:30 pm and arrived home |

just after midnight, due to the flooding on the Bruce Highway. One of the neighbours came and knocked on the door shortly after I arrived home to inform me that the dog was ok, and Busta was staying directly across the road from my house for the night. Upon entering the house I was walking through water puddles throughout the tiled areas of the residence, and the carpets were all totally saturated in water. I had a couple of beverages to settle my nerves after my ordeal getting home, while surveying the damage under torchlight. I went to bed at about 1 am and got up around 6 am the next morning, to start the day after, to a blue sky. We had a team of friends and family members at our house by 10am, where we started the process of cleaning up. All carpets and underlays were removed, and fans were put on the concrete to assist in drying the floors out. The floors were mopped not fewer than 5 times on this day to remove the sludge which was deposited by the water that had entered the house. Several items of furniture were also dumped on Saturday 2nd May as they were damaged by the water, and the Moreton Bay Regional Council had promptly organised skip bins for the resident's in the street. We are getting new carpets laid this coming week and I'm hoping that our contents insurance claim is expedited soon as it just appears to be going around in circles. The concrete floors are rather cold to walk on of an evening and 1st up in the morning. (The owner of the home is paying for these out of his pocket as they are also waiting on the insurance to come through) Some of the residents of Anthony Court have informed me that they don't expect to back in their homes until Christmas due to the rebuilding needed in their homes. I have attached a few photos of the damage and if you need any more, please feel free to contact me.

- At 4pm saw water in backyard that was rising from creek behind property, I noticed water in backyard at 4pm it was coming from the creek behind and it looked through the fence had created a dam as the water level was quite high on the other side of the fence.
- Left work to travel home, arrived at estate at approximately 6pm and waded through waist deep water to get to property. 6.15pm water was level with floor and entry. 6pm water was thigh to waist deep and the current was strong.
- 5pm across street was all water, roughly the same time as the stormwater drainage in backyard had started backing up and had risen to the same height as back door.

1.1.9.3 **Anthony Court - General comments**

Table 18 – Anthony Court General Comments

- Development up stream, council, rail and water. Rumours in area that developers had done illegal stormwater connections into sewerage
- Combination of 450mm rain fall, development in the area, creek from Dakabin, railway and king tide. In February, North Ridge Circuit almost went under but didn't - this time it did. Council should reclaim properties.
- Concerned about the slope on the back of property as creek is on the other side.

- Shine Lawyers are reporting that MBRC have listed the area as a flood plain, acknowledges that it was a massive rain event in a short time.
- Development in the area has increased run off and pressure on sewerage network as well as the blocking of the creek at Anzac Ave.

1.2 Rothwell

Further commentary is provided below from residents of Rothwell.

1.2.1 McGahey Street (including Coman Street near intersection with McGahey)

1.2.1.1 Velocity of Water

Internal and external water velocities were provided by respondents from McGahey Street.

- Outside: Rose quickly – came up in an hour and was visibly rising, rushed through houses, running very quickly.
- Inside properties: Fairly still.

1.2.1.2 McGahey Street - Stakeholder comments of their experience of the 1st May 2015 event

Table 19 – McGahey Street Stakeholder Comments

- 4.30pm: no water nearby, down at AFL club grounds. 5.15pm: lapping into office. 5.50pm: 1.2 m deep.
- 4pm: noticed water in back corner building up on left corner (as you look towards Anzac Ave). 5.30pm: water started coming through weep holes in walls into floor. 6pm: water was coming in house. 7pm: water peaked. 6am: still had water in property - water remained in AFL club grounds/pony club for nearly 4 days.
- 1.30pm - 2pm: small creek off Salt Water Creek peaked and breached. 2pm: water dispersed across the paddocks. 3.00pm: water entered downstairs area from front and back of property. 3.30pm: 8-12 inches through, rising 4-6 inches within minutes. 5.00pm: chest deep on female (153cm), shortly after chin height on male (178cm). 6pm: peaked (got to bottom side of study floor) back of house only slightly lower than second floor level.
- 5pm across the field near road was where the water was, 5pm: got home from work. 6pm - 7.30pm: not touching driveway through to being in the property. 7.30pm: peak.
- Stakeholder was not at home at the time, 5pm noticed water in football club grounds of approximately 3-4 foot, 6-6.30pm the water was at peak of 1.4m.
- 1pm noticed water was coming in to paddocks from the creek. 3pm: 1m across all paddocks. 6pm: Club went under. 7pm: estimated peak. 8pm: still up.

- 3.30pm – 4pm noticed AFL club on McGahey Street was flooded. 4pm: got home. 4.30pm: water was in backyard (this looked like it had come from backed up stormwater drain), water was coming up Jones Street. 5pm: believe that it peaked with water entering in property and house.
- 4pm noticed water on road a few houses down (no water nearby), 5.40pm the water was lapping at the door. 5.45pm the water came bubbling through the floor, 5.45-6pm water was knee high (believed to be at peak), husband whom is incapacitated was carried up the street to safety
- 5pm noticed water was on driveway, water was also backing up from AFL club at this time into stormwater channels at the side of the road and was approaching. Noticed that water was out the front of the property, stakeholder uncertain of timing for when water entered the property. 7.15pm the water seemed to peak, 10-10.30pm all water was gone.

1.2.1.3 McGahey Street - General comments

Table 20 – McGahey Street General Comments

- Stakeholder believes that the properties along McGahey Street should not have been developed and that it is Council's job to now reclaim the area so that this does not happen again. Stakeholder believes that the scope of the investigation is too narrow as they believe the wider development in the area is also a major contributing factor to the flooding along with that of the MBR works on Anzac Avenue at the time of the event. Stakeholder wishes to seek compensation from MBRC as the AFL club is being moved and they too are trying to run a business on McGahey Street as well as maintain a home on the property, they do not believe this to be fair and just.
- Annoyed that AFL club is being relocated by Houghton (MP), railway has impacted however primarily Council's development.
- Water wasn't as dirty this time, seemed to have nowhere to go.
- Seemed to be normal rainfall with a bit extra to it, possible extra development as the cause, high tide in Brisbane at 8pm, 9pm in Deception Bay.
- Are the pipes big enough to handle creek? MBR is an impacting factor. Believes MBRC should buy back properties as they should never have been allowed to be built, annoyed that AFL club is being relocated.
- President was a superintendent for Thiess, Leightons and Abigroup. When club was built they were told by MBRC that it has to be 300 above Q100, finished and opened in April 2000. President stated that the construction methodology was correct at Anzac Ave however their timing was wrong, 6 weeks too early. Normally flood waters just flow through however this time it flowed down then backed up

- Water flowed up Jones Street and entered back corner of the property with it moving towards Coman street. Estate behind property has changed the flow MBRC used to clean out the creek but haven't done so for about 10 years.
- Tiny pipes on Anzac Avenue couldn't carry water away, the rail link weirs to blame.
- Being separated from husband has been heartbreaking as she is the primary carer for her husband and the pair are reliant upon each other. The stakeholder is 83 years old and does not want to live out her days without her husband in a home, she was diagnosed with cancer the day before the rain event on the 1 May.
- Seemed to have 2 levels whereby it peaked then dropped and then stopped before starting again. Wants to know did the rail start pumping, met with local member - a man at the meeting said that the construction was wrong.
- Please see green binder for all other items: MBRC letter, slide show presentation (documents provided to project team).

1.2.2 Anzac Avenue

1.2.2.1 Velocity of Water

Internal and external water velocities were provided by respondents from Anzac Avenue.

- Outside: Fast, visibly moving, see it rising up the glass
- Inside properties: Swirling, lake like

1.2.2.2 Anzac Avenue - Stakeholder comments of their experience of the 1st May 2015 event

Table 21 – Anzac Avenue Stakeholder Comments

- Between 4pm and 5pm water was in front yard, 5.39pm video showed water coming up through bathroom drains, SES advised stakeholder to stay in property or to get on roof as they couldn't get to them. At 9.00pm it was close to peak, at 10.00pm came back into property after leaving to retrieve clothes and it was still rising
- 2.45pm - call from son 4.00pm - got home and water was crossing road 5.15pm - water coming up driveway "visibly moving up" 6.30pm - coming under downstairs door - see it rising up glass door 7ish - lost power
- On 1 May I returned home at 4.10pm and traffic was still moving on Anzac Parade, by 5.30pm it was knee deep through the house, with water coming from creek backed up by the stormwater, left at 7.30pm and the water was up to my mid -thigh.
- Uncertain of time but noticed that it had reached approximately 18-20m passed the bus stop (at its peak)

1.2.2.3 Anzac Avenue - General comments

Table 22 – Anzac Avenue General Comments

<ul style="list-style-type: none">On 20 February water rose and crossed the avenue and lapped at the base of the house. I rang MBRC that put me in touch with MBR and I asked about the works impacting on this 20th Feb situation. MBR advised they were looking into it. In the week leading up to 1 May MBR were pumping on the NE side of the creek because it was dammed and changed the creek from a tidal to a non-tidal creek.Water has never been so high, cement blocks blocked the water, working on Six Mile Creek king tide - +400mm rain fallWanted to let review team know that they are doing it really hard and that they are living in a unit with another family (very confined)
<ul style="list-style-type: none">Photos, 3802 and video – 2010 (11th October)
<ul style="list-style-type: none">On 20 February water rose and crossed the Avenue and lapped at base of house. I rang MBRC that put me in touch with MBR and I asked about the works impacting on this 20 Feb situation. MBR advised they were looking into it. In the week leading up to 1 May MBR were pumping on the NE side of the creek because it was dammed and changed the creek from a tidal to a non-tidal creek

1.2.3 Finnegan Street

1.2.3.1 Velocity of water

Internal and external water velocities were provided by respondents from Finnegan Street.

- Outside: Fast
- Inside properties: Swirling, lake like

1.2.3.2 Finnegan Street - Stakeholder comments of their experience of the 1st May 2015 event

Table 23 – Finnegan Street Stakeholder Comments

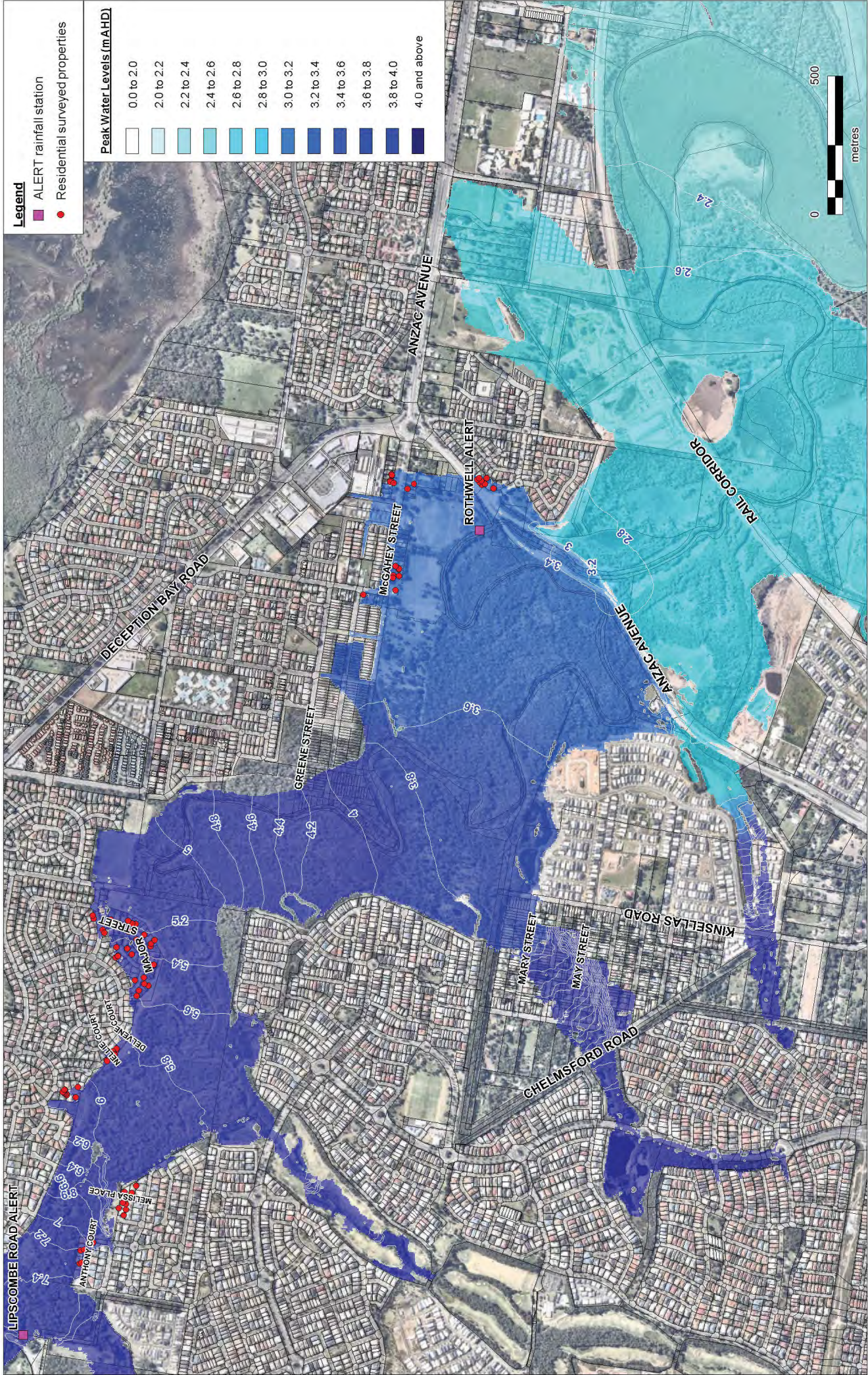
<ul style="list-style-type: none">Stakeholder backs onto haulage road for MBR corridor (witness's water flow downstream from Anzac Avenue). Site entry video at 10.30pm provided, concrete barriers were in place in Feb but hadn't started works. 2009/2010 event could see water from back yard as the yard looks out into Salt Water Creek catchment. Roadworks started in April (1st) 20143.00pm: up to driveway curbing 4.00pm: on cement slab downstairs (ankle deep) 5.00pm/6.00pm: up to 3rd step on back stairs, power went out, next door neighbours came over as they were flooded 1.30am: water started receding 3.30am: neighbours were able to leave in a 4wd as water had gone down far enough
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1.2.3.3 *Finnegan Street - General comments*

Table 24 – Finnegan Street General Comments

- MBR is impacting force
- The entire area was swamp land and thus still acts as such. Son reported to stakeholder that North Pine Dam was opened which flows into Hays inlet which in turn flows into Salt Water Creek, it has always risen when this happens. Anzac Ave was dammed up from works. Area is not able to absorb the water anymore.

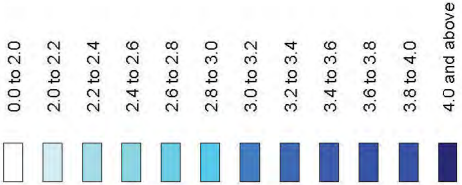
Appendix E: Maps of Modelling Results



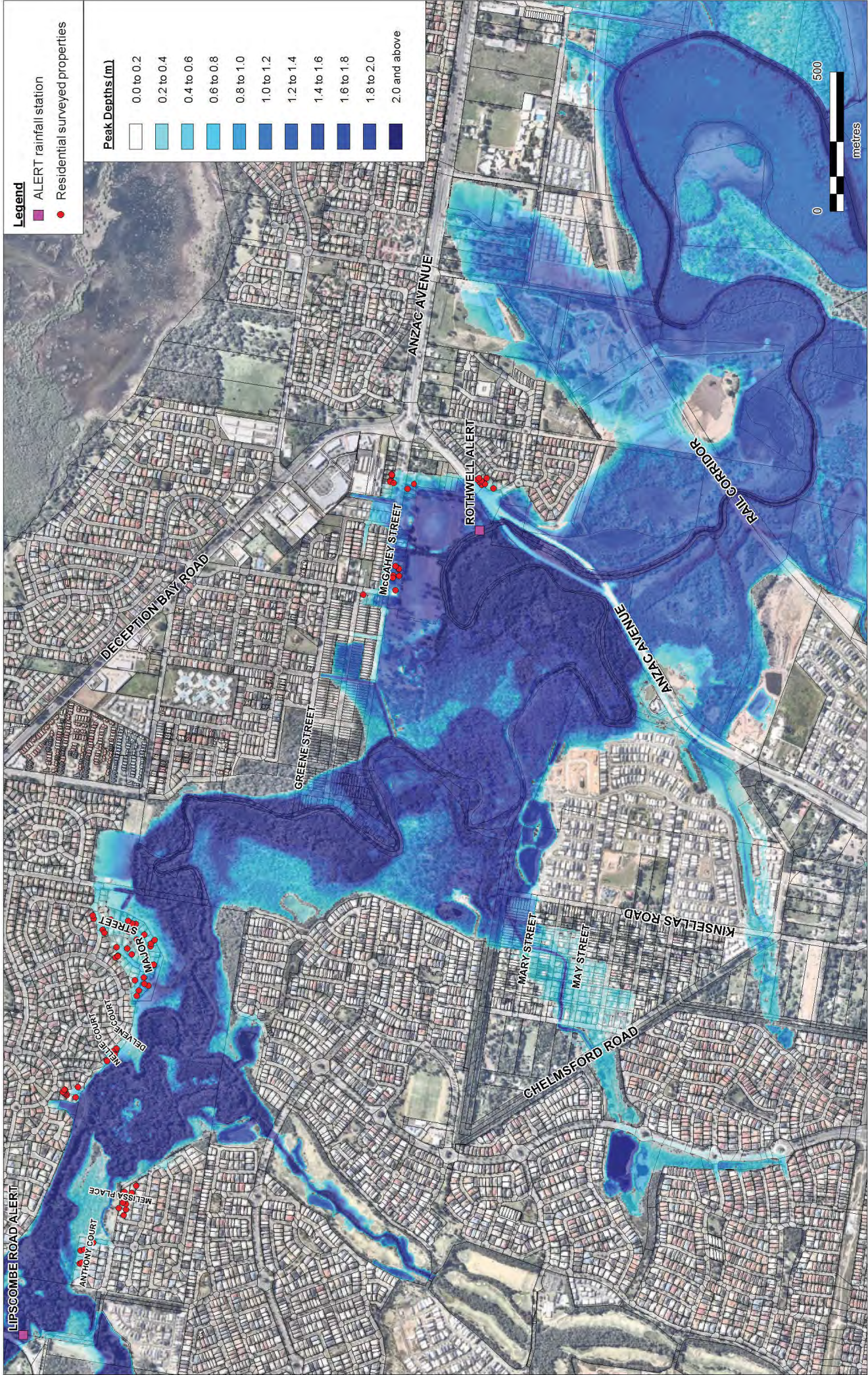
Legend

- ALERT rainfall station
- Residential surveyed properties

Peak Water Levels (m AHD)



COORDINATE SYSTEM Datum: GDA94 Projection: MGA Zone 56		DRAWING NO. FIGURE-20		CLIENT	
PAGE SIZE A3	SCALE 1:12,500	REVISION A	MODEL REFERENCE 077		
PROJECT NO. 30031 466		DATE 07/08/2015			
PROJECT TITLE MBR Independent Hydraulic Review		TITTLE		EXISTING BASE CONDITION PEAK WATER LEVELS	
Copyright SMEC Australia Pty Ltd. All Rights Reserved		1% AEP EVENT		CONSULTANT	
					
				SMEC Australia Ltd Level 1, 154 Melbourne Street South Brisbane QLD 4101	
				www.smec.com	



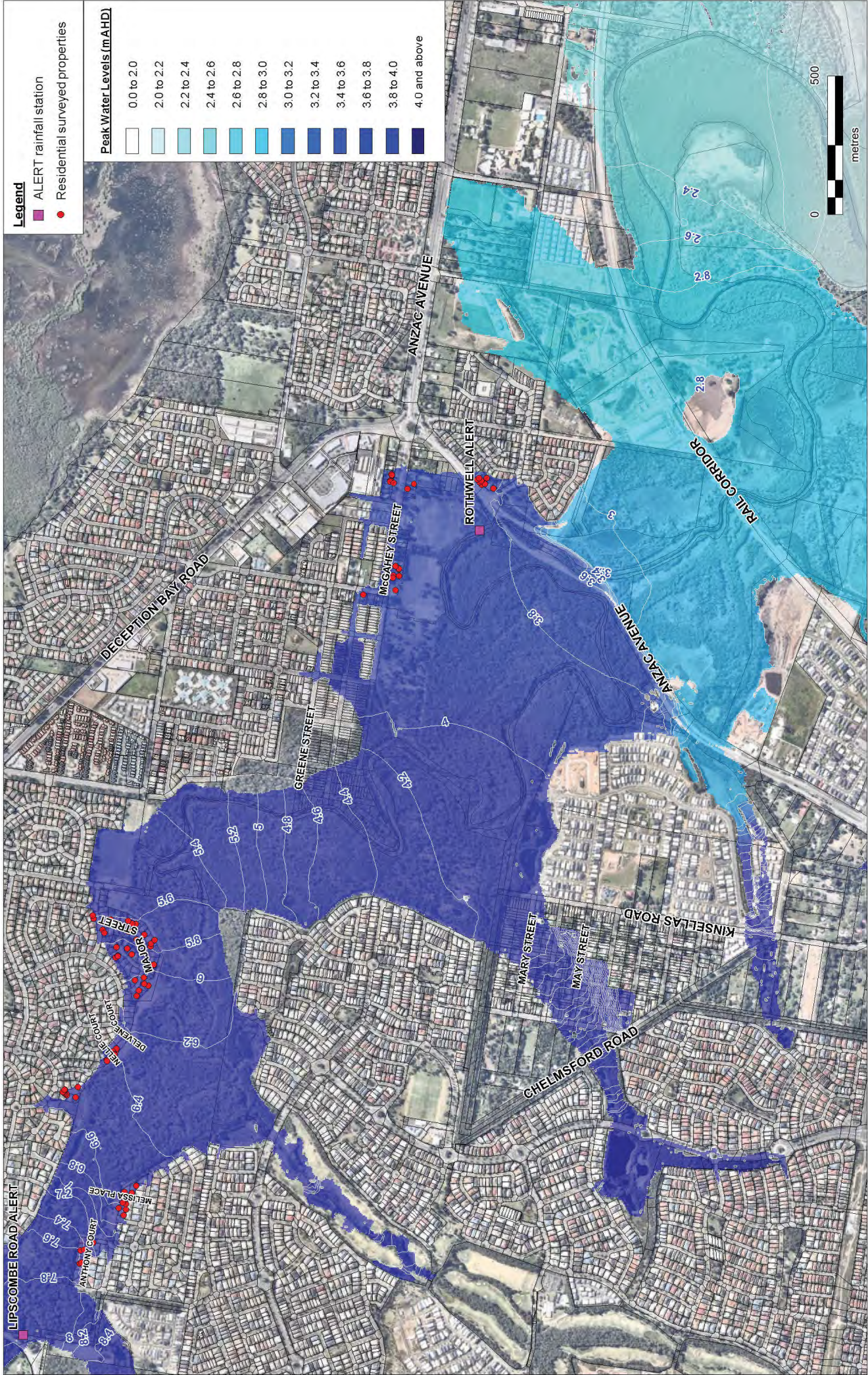
Legend

- ALERT rainfall station
- Residential surveyed properties

Peak Depths (m)

- 0.0 to 0.2
- 0.2 to 0.4
- 0.4 to 0.6
- 0.6 to 0.8
- 0.8 to 1.0
- 1.0 to 1.2
- 1.2 to 1.4
- 1.4 to 1.6
- 1.6 to 1.8
- 1.8 to 2.0
- 2.0 and above

<div>COORDINATE SYSTEM Datum: GDA94 Projection: MGA Zone 56</div> <div>PAGE SIZE A3 SCALE 1:12,500</div>		<div> NORTH</div>		<div>DRAWING NO. FIGURE-21</div> <div>REVISION A</div> <div>MODEL REFERENCE 077</div>		<div>CONSULTANT</div> <div></div> <div>SMEC Australia Ltd Level 1, 154 Melbourne Street South Brisbane QLD 4101</div>	
<div>PROJECT NO. 30031466</div> <div>PROJECT TITLE MBR Independent Hydraulic Review</div>		<div>CREATED BY KTAN</div> <div>DATE 07/08/2015</div>		<div></div> <div>QUEENSLAND GOVERNMENT</div>			
<div>EXISTING BASE CONDITION PEAK DEPTHS</div> <div>1% AEP EVENT</div>							



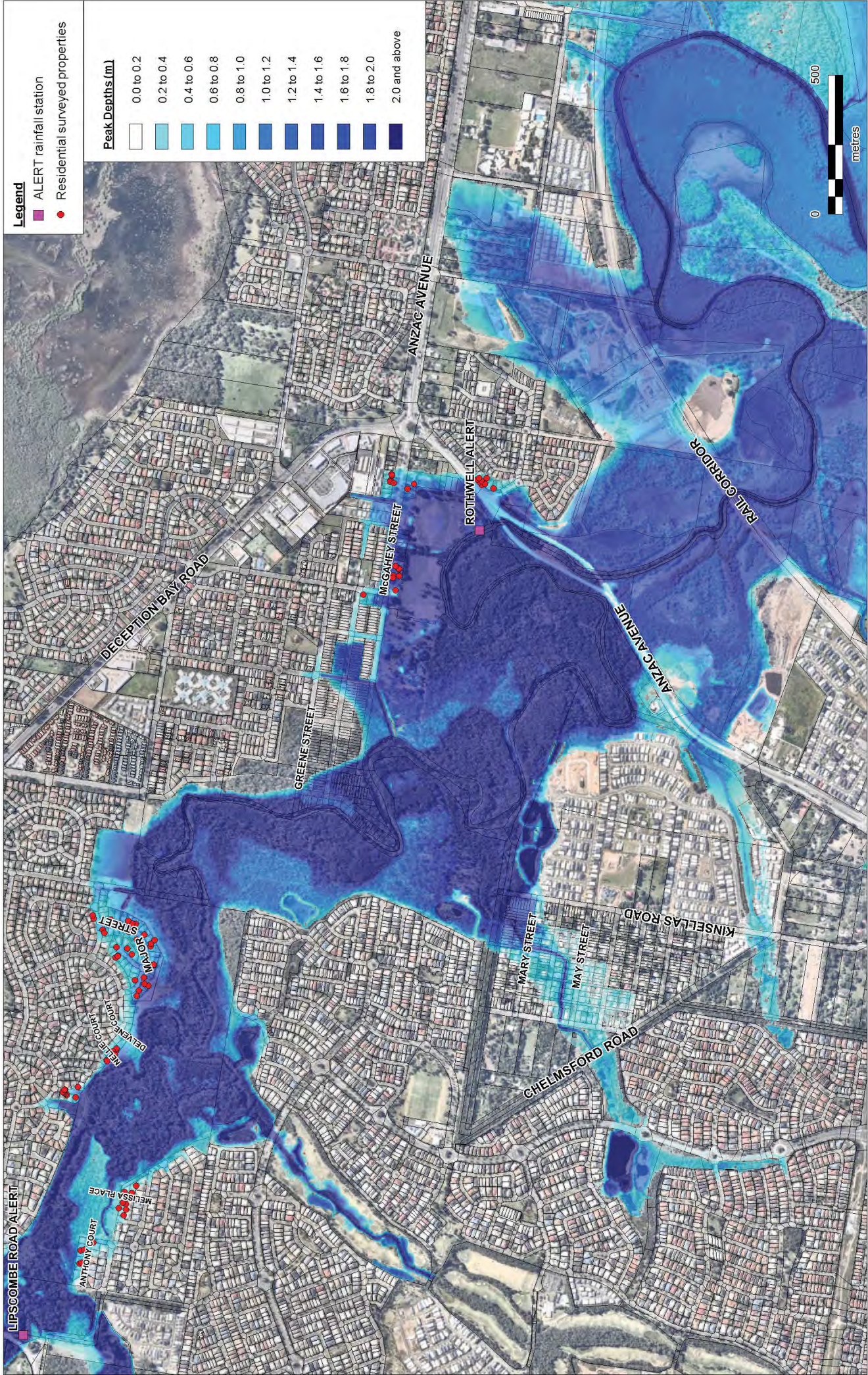
Legend

- ALERT rainfall station
- Residential surveyed properties

Peak Water Levels (mAHd)

- 0.0 to 2.0
- 2.0 to 2.2
- 2.2 to 2.4
- 2.4 to 2.6
- 2.6 to 2.8
- 2.8 to 3.0
- 3.0 to 3.2
- 3.2 to 3.4
- 3.4 to 3.6
- 3.6 to 3.8
- 3.8 to 4.0
- 4.0 and above

COORDINATE SYSTEM Datum: GDA94 Projection: MGA Zone 56		DRAWING NO. FIGURE-22		CLIENT	
PAGE SIZE A3	SCALE 1:12,500	REVISION A	MODEL REFERENCE 077	 QUEENSLAND GOVERNMENT	
PROJECT NO. 30031 466	PROJECT TITLE MBR Independent Hydraulic Review	DATE 07/08/2015	EXISTING BASE CONDITION PEAK WATER LEVELS		
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Legend

- ALERT rainfall station
- Residential surveyed properties

Peak Depths (m)

- 0.0 to 0.2
- 0.2 to 0.4
- 0.4 to 0.6
- 0.6 to 0.8
- 0.8 to 1.0
- 1.0 to 1.2
- 1.2 to 1.4
- 1.4 to 1.6
- 1.6 to 1.8
- 1.8 to 2.0
- 2.0 and above

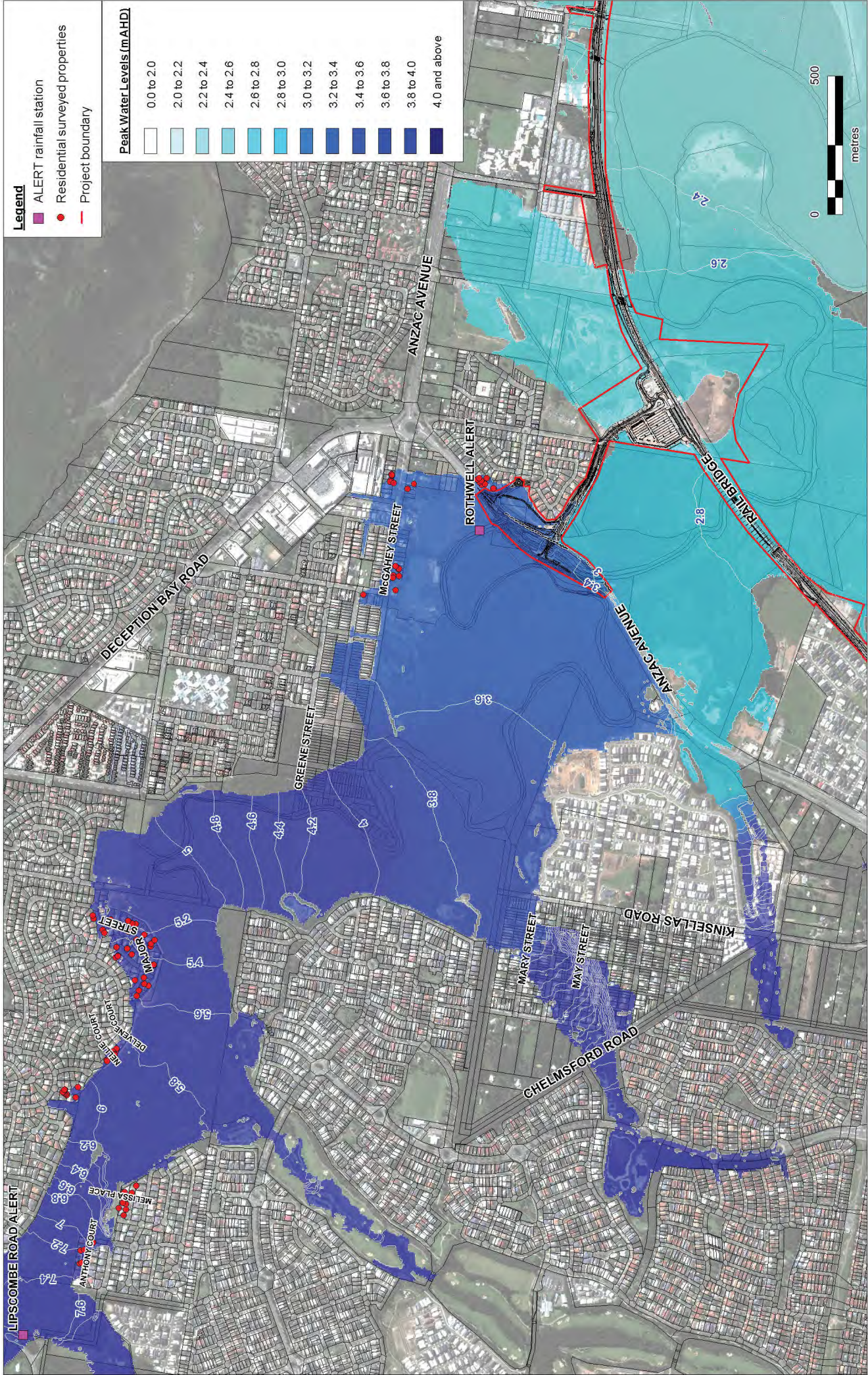
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PAGE SIZE A3	SCALE 1:12,500	REVISION A	MODEL REFERENCE 077	 QUEENSLAND GOVERNMENT	
PROJECT NO. 30031466		PROJECT TITLE MBR Independent Hydraulic Review	DATE 07/08/2015		
PROJECT TITLE MBR Independent Hydraulic Review		EXISTING BASE CONDITION PEAK DEPTHS 1ST MAY 2015 EVENT			
PROJECT NO. 30031466		PROJECT TITLE MBR Independent Hydraulic Review		CONSULTANT  SMEC Australia Ltd Level 11 154 Melbourne Street South Brisbane QLD 4101	



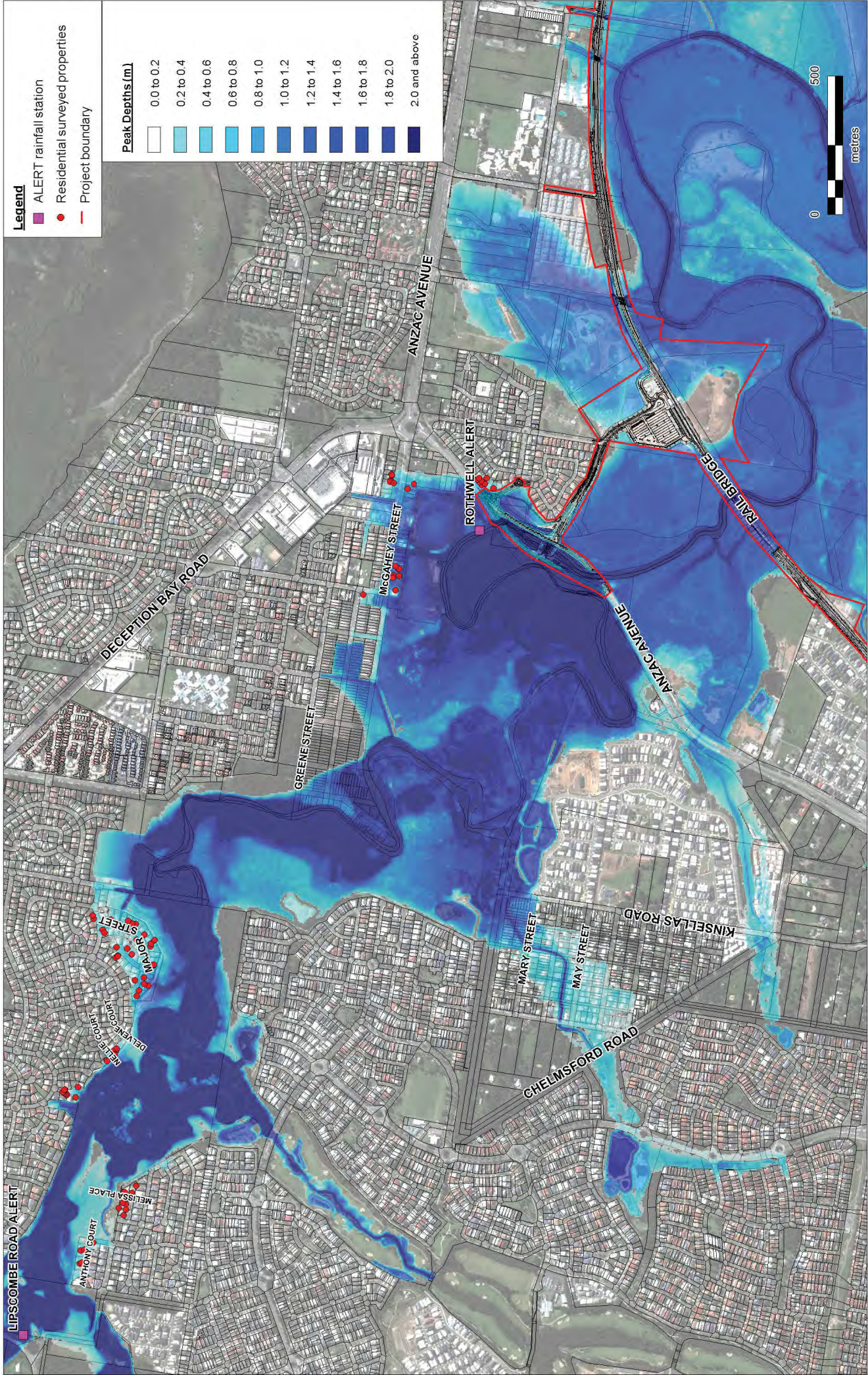
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COORDINATE SYSTEM Datum: GDA94 Projection: MGA Zone 56				 NORTH					
PAGE SIZE A3		SCALE 1:12,500		DRAWING NO. FIGURE-26		REVISION A		MODEL REFERENCE 047	
PROJECT NO. 30031466		PROJECT TITLE MBR Independent Hydraulic Review		CREATED BY KTAN		DATE 07/08/2015		DEVELOPED CONDITION PEAK WATER LEVELS 1% AEP EVENT	
				TITLE					
								CONSULTANT SMEC Australia Ltd Level 11, 154 Melbourne Street South Brisbane QLD 4101	



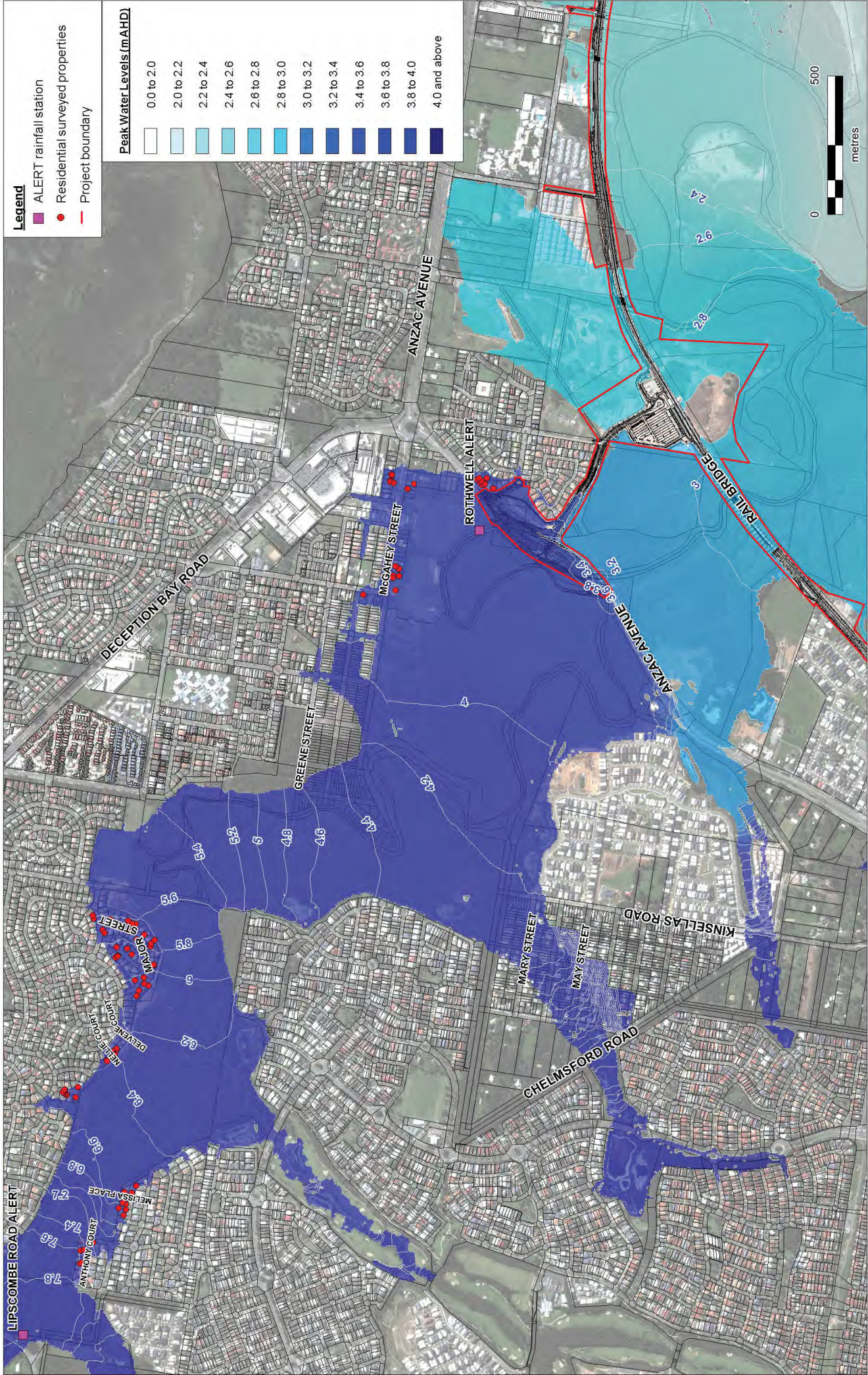
Legend

- ALERT rainfall station
- Residential surveyed properties
- Project boundary

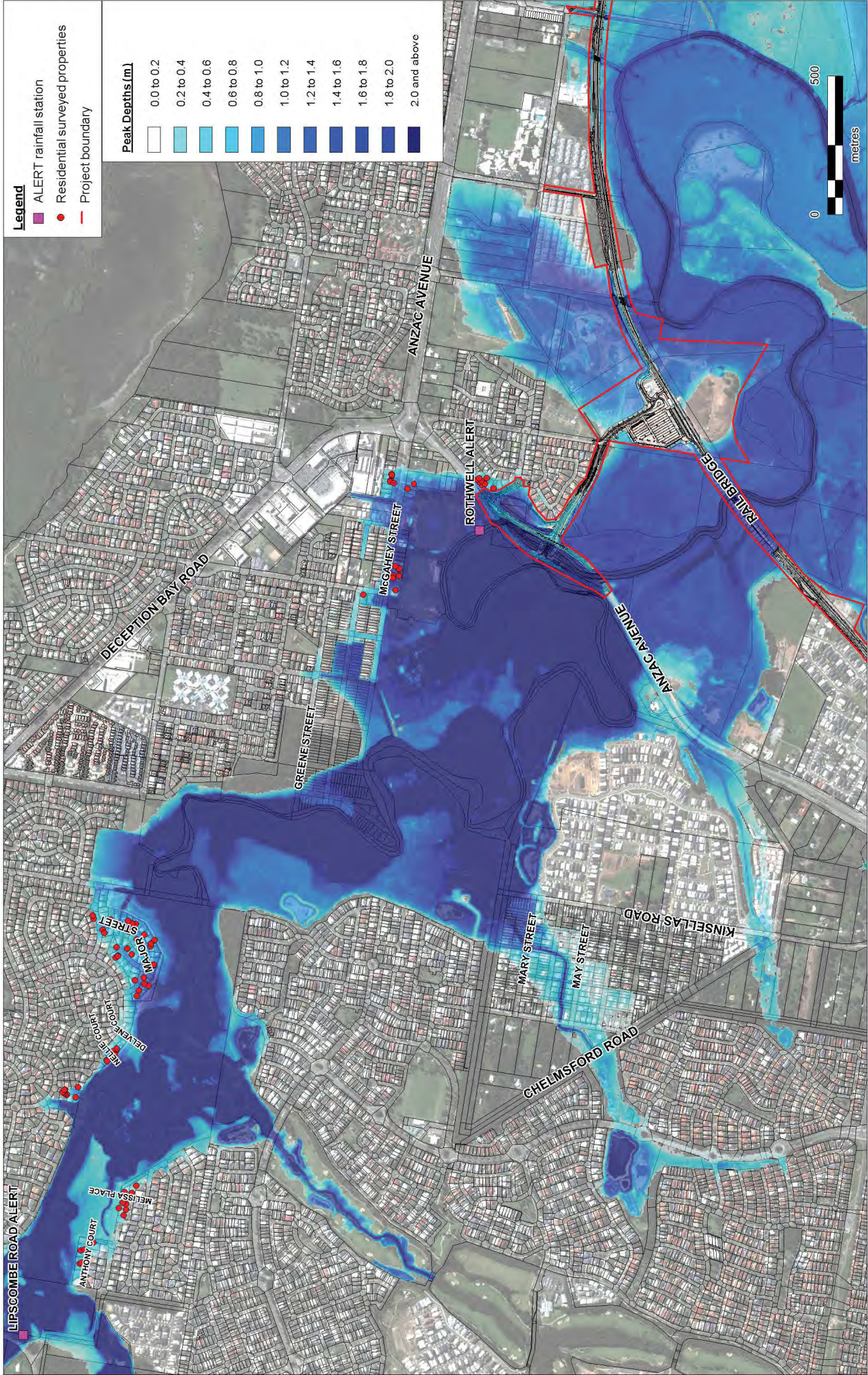
Peak Depths (m)

- 0.0 to 0.2
- 0.2 to 0.4
- 0.4 to 0.6
- 0.6 to 0.8
- 0.8 to 1.0
- 1.0 to 1.2
- 1.2 to 1.4
- 1.4 to 1.6
- 1.6 to 1.8
- 1.8 to 2.0
- 2.0 and above

<div>COORDINATE SYSTEM Datum: GDA94 Projection: MGA Zone 56</div> <div>PAGE SIZE A3 SCALE 1:12,500</div> <div>PROJECT NO. 30031466 PROJECT TITLE MBR Independent Hydraulic Review</div>				<div> NORTH</div>		<div>DRAWING NO. FIGURE-27 REVISION A MODEL REFERENCE 047</div> <div>CREATED BY KTAN DATE 07/08/2015</div>				<div> CLIENT</div>		<div>CONSULTANT</div> <div> SMEC</div> <div>SMEC Australia Ltd Level 1, 154 Melbourne Street South Brisbane QLD 4101</div>	
<div>TITLE</div> <div>DEVELOPED CONDITION PEAK DEPTHS</div> <div>1% AEP EVENT</div>													



<div>COORDINATE SYSTEM Datum: GDA94 Projection: MGA Zone 56</div> <div>PAGE SIZE A3 SCALE 1:12,500</div>		<div> NORTH</div>		<div>DRAWING NO. FIGURE-28</div> <div>REVISION A</div> <div>MODEL REFERENCE 047</div>		<div>CLIENT</div> <div></div> <div> CONSULTANT</div> <div>SMEC Australia Ltd Level 1, 154 Melbourne Street South Brisbane QLD 4101</div> <div>www.smecc.com</div>
		<div>CREATED BY KTAN</div> <div>DATE 07/08/2015</div>				
<div>PROJECT NO. 30031466</div> <div>PROJECT TITLE MBR Independent Hydraulic Review</div>		<div>TITLE</div>		<div>DEVELOPED CONDITION PEAK WATER LEVELS</div> <div>1ST MAY 2015 EVENT</div>		



Legend

- ALERT rainfall station
- Residential surveyed properties
- Project boundary

Peak Depths (m)

- 0.0 to 0.2
- 0.2 to 0.4
- 0.4 to 0.6
- 0.6 to 0.8
- 0.8 to 1.0
- 1.0 to 1.2
- 1.2 to 1.4
- 1.4 to 1.6
- 1.6 to 1.8
- 1.8 to 2.0
- 2.0 and above

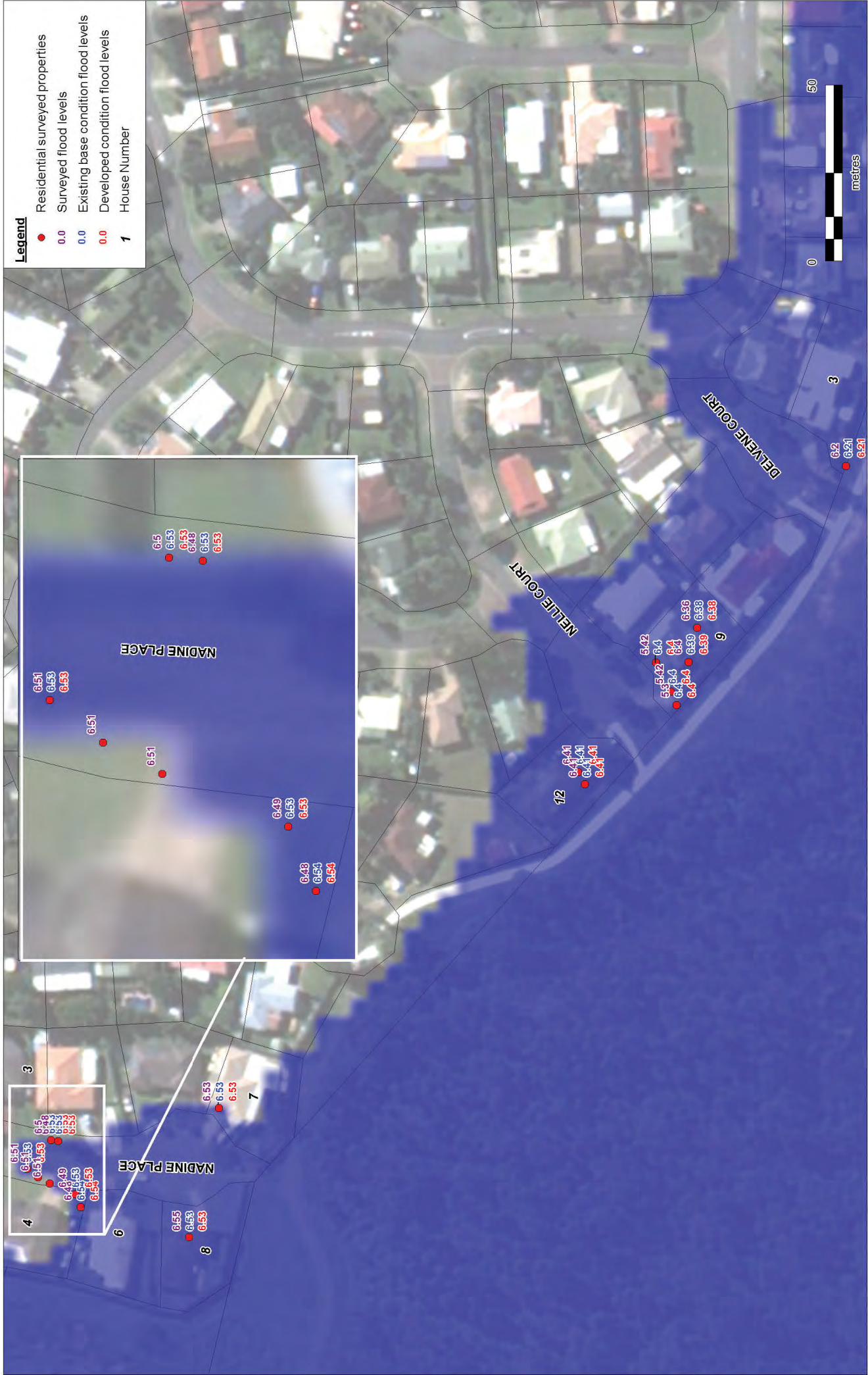
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PAGE SIZE A3	SCALE 1:12,500			CREATED BY KTAN		DATE 07/08/2015		DEVELOPED CONDITION PEAK DEPTHS 1ST MAY 2015 EVENT										
PROJECT NO. 30031466	PROJECT TITLE MBR Independent Hydraulic Review	TITLE																

CONSULTANT

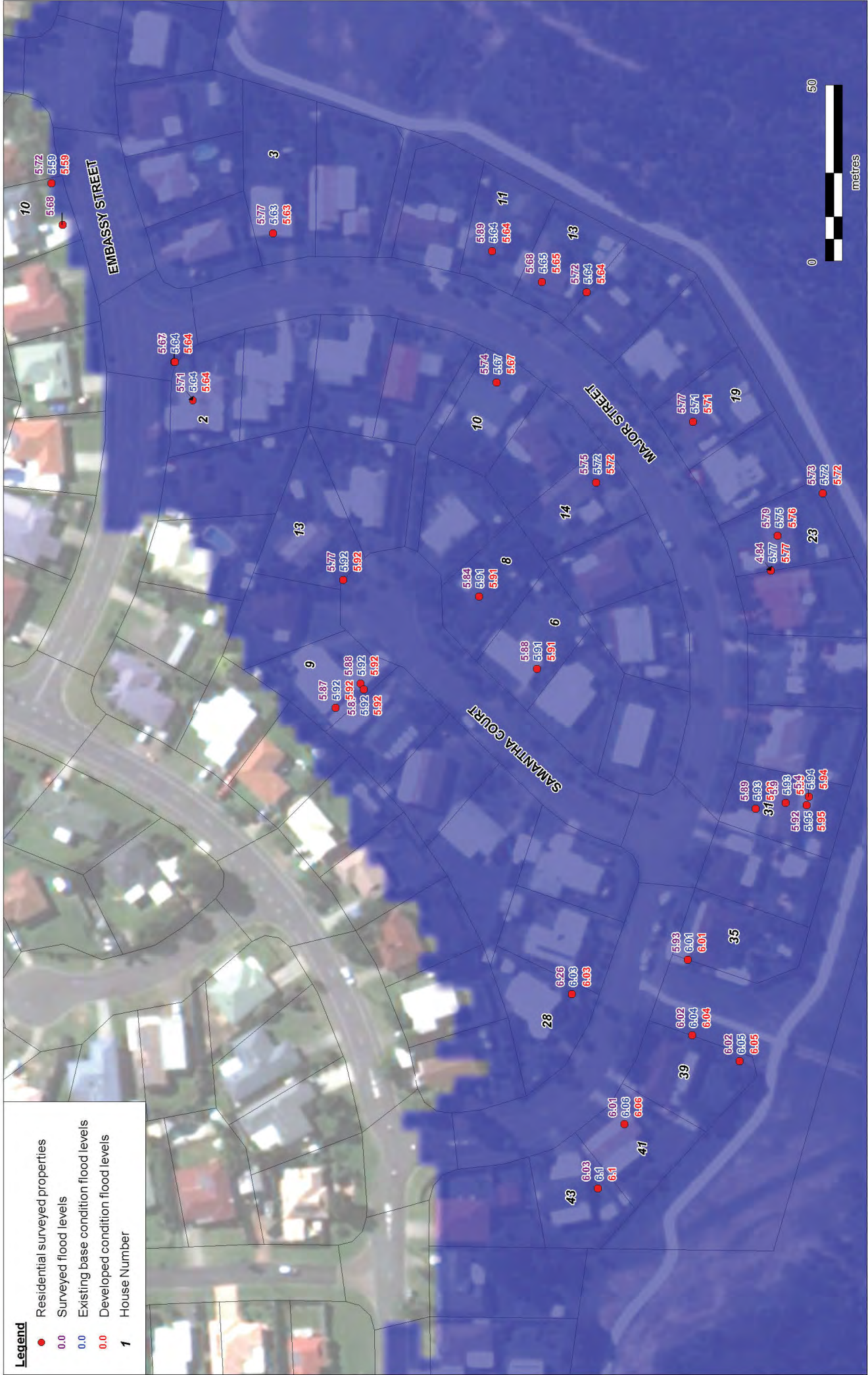
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COORDINATE SYSTEM Datum: GDA94 Projection: MGA Zone 56		NORTH		DRAWING NO. FIGURE-31C		REVISION A		MODEL REFERENCE 077 & 047		CLIENT		CONSULTANT	
PAGE SIZE A3	SCALE 1:1,000	CREATED BY KTAN		DATE 07/08/2015		TITLE		1ST MAY 2015 FLOOD LEVELS COMPARISON		QUEENSLAND GOVERNMENT		SMEC	
PROJECT NO. 30031 466		PROJECT TITLE MBR Independent Hydraulic Review		SHEET 2 OF 7		SMEC Australia Ltd		Level 1, 154 Melbourne Street		South Brisbane QLD 4101		www.smecc.com	



Legend

Residential surveyed properties



Surveyed flood levels

Existing base condition flood levels

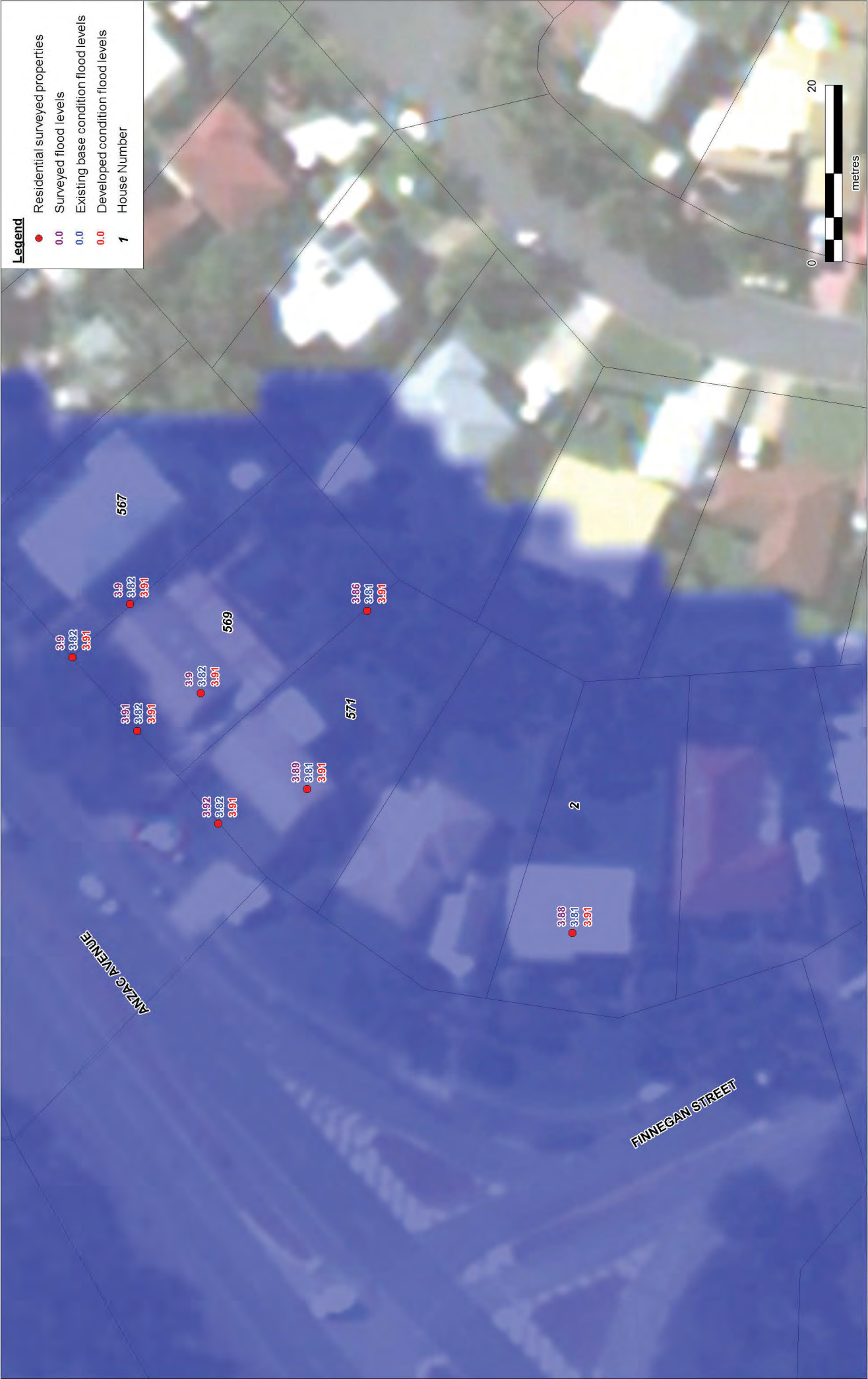
Developed condition flood levels

1

House Number

COORDINATE SYSTEM Datum: GDA94 Projection: MGA Zone 56		NORTH		CLIENT				 SMEC Australia Ltd Level 1, 154 Melbourne Street South Brisbane QLD 4101 www.smeccom.com			
PAGE SIZE A3	SCALE 1:1,000	DRAWING NO. FIGURE-31D	REVISION A	MODEL REFERENCE 077 & 047							
PROJECT NO. 30031 466		PROJECT TITLE MBR Independent Hydraulic Review		DATE 07/08/2015							
				CREATED BY KTAN							
					1ST MAY 2015 FLOOD LEVELS COMPARISON						
					SHEET 3 OF 7						
				TITLE							

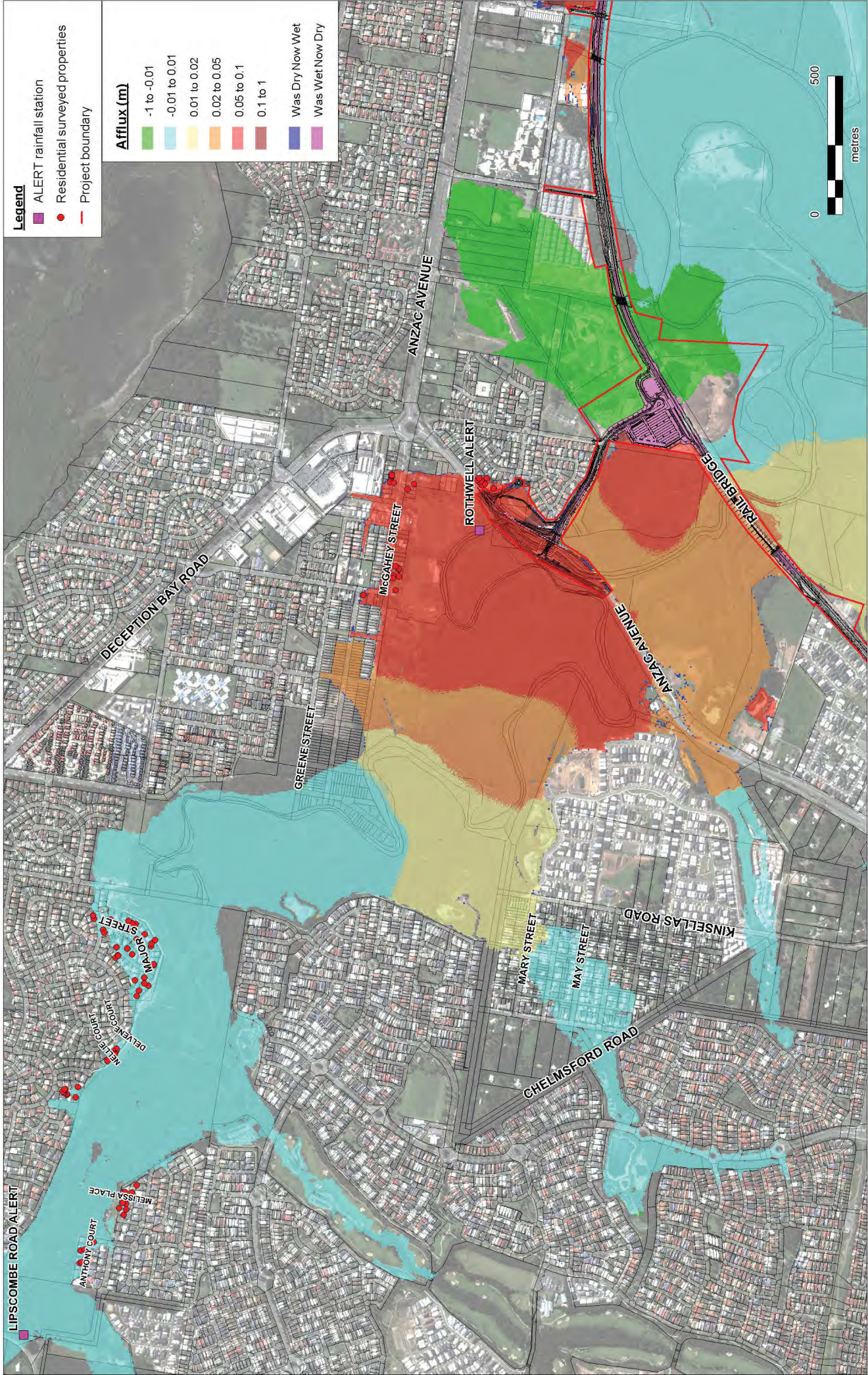
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COORDINATE SYSTEM Datum: GDA94 Projection: MGA Zone 56		DRAWING NO. FIGURE-31G		REVISION A		MODEL REFERENCE 077 & 047		 QUEENSLAND GOVERNMENT	 CONSULTANT SMEC Australia Ltd Level 1, 154 Melbourne Street South Brisbane QLD 4101 www.smec.com
PAGE SIZE A3 SCALE 1:400		CREATED BY KTAN		DATE 07/08/2015					
PROJECT NO. 30031466		PROJECT TITLE MBR Independent Hydraulic Review		TITLE		1ST MAY 2015 FLOOD LEVELS COMPARISON SHEET 6 OF 7			



COORDINATE SYSTEM Datum: GDA94 Projection: MGA Zone 56			 NORTH		 CLIENT	 CONSULTANT SMEC Australia Ltd Level 1, 154 Melbourne Street South Brisbane QLD 4101
PAGE SIZE A3	SCALE 1:600					
PROJECT NO. 30031466	PROJECT TITLE MBR Independent Hydraulic Review					
DRAWING NO. FIGURE-31H			REVISION A	MODEL REFERENCE 077 & 047		
CREATED BY KTAN			DATE 07/08/2015			
1ST MAY 2015 FLOOD LEVELS COMPARISON SHEET 7 OF 7						



Legend

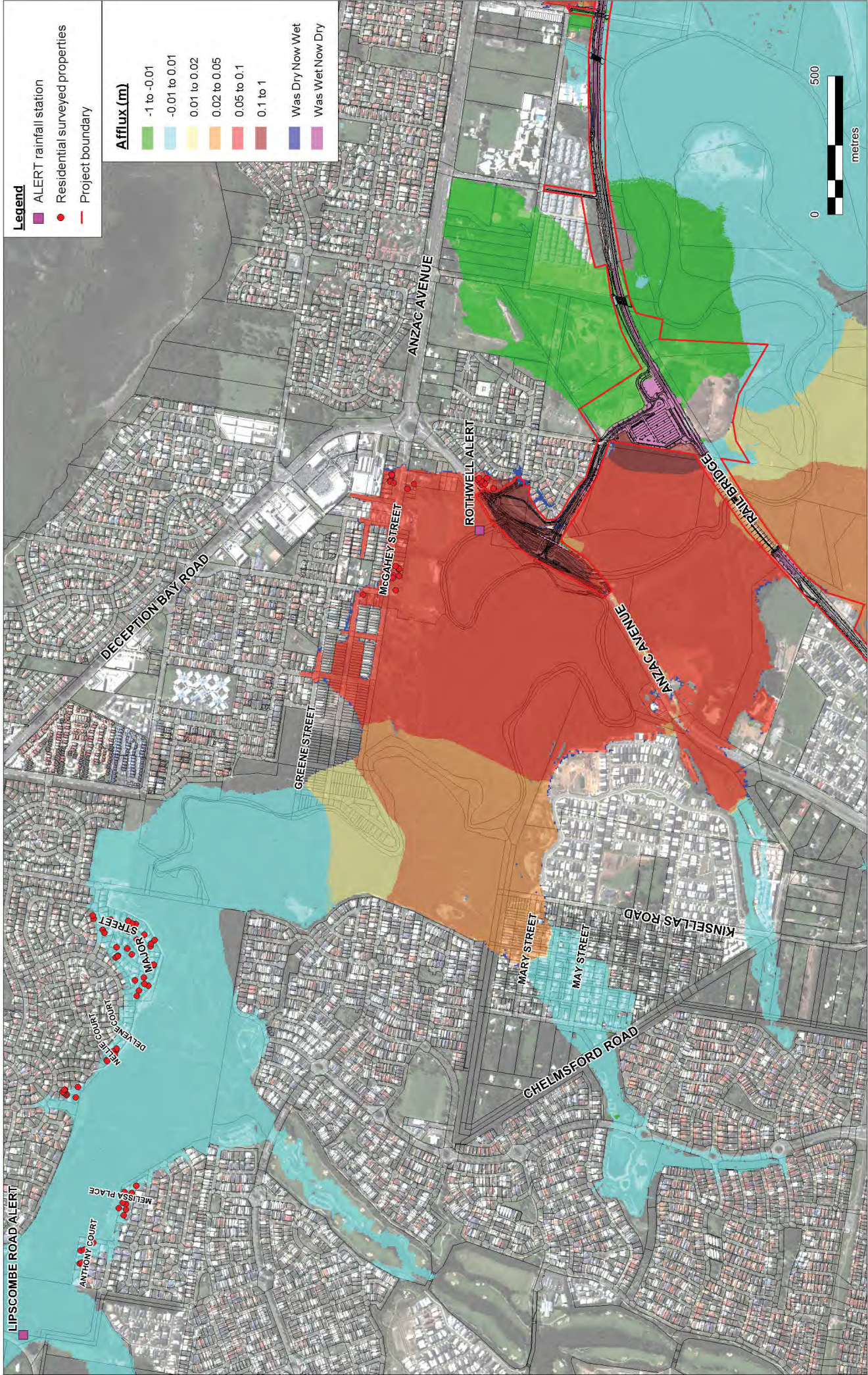
- ALERT rainfall station
- Residential surveyed properties
- Project boundary

Afflux (m)

- 1 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.1
- 0.1 to 1

- Was Dry Now Wet
- Was Wet Now Dry

COORDINATE SYSTEM Datum: GDA94 Projection: MGA Zone 56			 NORTH		DRAWING NO. FIGURE-32		REVISION A		MODEL REFERENCE		047-077		
PAGE SIZE A3 SCALE 1:12,500						CREATED BY KTAN		DATE 07/08/2015					
PROJECT NO. 30031466			PROJECT TITLE MBR Independent Hydraulic Review			TITLE		1% AEP EVENT AFFLUX					
												CLIENT	
												CONSULTANT	
SMEC Australia Ltd Level 1, 154 Melbourne Street South Brisbane QLD 4101													



Legend

- ALERT rainfall station
- Residential surveyed properties
- Project boundary

Afflux (m)

- 1 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.1
- 0.1 to 1

- Was Dry Now Wet
- Was Wet Now Dry

COORDINATE SYSTEM Datum: GDA94 Projection: MGA Zone 56			 NORTH		DRAWING NO. FIGURE-33		REVISION A		MODEL REFERENCE		047-077	
PAGE SIZE A3 SCALE 1:12,500						CREATED BY KTAN		DATE 07/08/2015				
PROJECT NO. 30031466			PROJECT TITLE MBR Independent Hydraulic Review			TITLE		1ST MAY 2015 AFFLUX				