ATTACHMENT 9

HYDRAULIC ASSESSMENT (AFFLUX CONSULTING)

TOOTLE ST (EAST), KILMORE

Hydraulic Assessment

Date	17 December 2020
Version	442_01 R01c
Author	Chris Beardshaw
Client	Millar | Merrigan

Document History

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Climate Change Statement

A wide range of sources, including but not limited to the IPCC, CSIRO and BoM, unanimously agree that the global climate is changing. Unless otherwise stated, the information provided in this report does not take into consideration the varying nature of climate change and its consequences on our current engineering practices. The results presented may be significantly underestimated; flood characteristics shown (e.g. flood depths, extents and hazards) are may be different once climate change is taken into account.

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1. Introduction

This report forms a Hydraulic Assessment for the development of a parcel of land known as Tootle St (East), Kilmore. Afflux Consulting were engaged by Millar | Merrigan to investigate the surface water implications for the proposed development of a series of parcels surrounding McIvors Road, Kilmore. This report forms a hydraulic analysis of the concepts and strategies for surface water management as outlined in "McIvors Rd, Kilmore – Stormwater Management Strategy" (Afflux 2019), and is to be used as further information for the GBCMA assessment of the Development Plan (DP) and subsequent Stormwater Management Plans for individual parcels.

The site is within Mitchell Shire Council, the responsible agency for planning and building approvals in the area. The Goulburn Broken Catchment Management Authority (GBCMA) is the authority responsible for flooding, drainage and waterway advice in the region.

Background information about the site and drainage requirements in the area have been obtained from both of these sources where possible, however much of the outcomes for this report have been guided by the Infrastructure Design Manual (IDM, 2019), Melbourne Water drainage scheme principals for large development areas, and the authors experience.

This report examined the impact of proposed strategy on the flooding downstream of the site. It includes:

- Review of Hydrological assumptions
- Hydraulic modelling of proposed detention basins and waterway
- Flood risk assessment of Centenary Drive bridge
- Hydraulic modelling of proposed "Green Link"

The key objectives of the hydraulic assessment are to ensure that the proposed strategy for the site, as outlined in "McIvors Rd, Kilmore – Stormwater Management Strategy" (Afflux 2019) will meet the objectives to the site. In particular, GBCMA wanted the following items to be confirmed:

1. Ensure no worsening of flooding in the 1% AEP as a result of development
2. Lot layout is flood free
3. Ensure no worsening of flooding due to the proposed "Green Link"
4. Hydraulic parameters (such as depth, velocity, levels) to assist with geomorphic response for the waterway

Details of GBCMA correspondence is attached in Appendix A.

2. Background

The site is bounded by Tootle St to the north, Quinns Rd to the east, Northern Hwy to the west and Wandong Rd to the south Figure 2). The area slightly grades to the north (between 1% and 2%). A number of existing waterways and flow paths existing through the property, most significantly Kilmore Creek through the north west corner, but also tributaries of the creek coming from the east. Areas of existing storages (dams) and some farm drains are present across the site.

A development plan overlay currently exists on the parcel, with this strategy informing the development plan required for the planning permit. A rezoning application has been lodged to Council to rezone the parcel from Farming Zone to General Residential Zone consistent with the Kilmore Structure Plan (Figure 1). The proposed development is to consist of approximately 185 Ha of General Standard Density Residential lots with internal roads, Open Space and Parkland as well as a future school site central to the development (Figure 3).

Figure 1. Kilmore Structure Plan

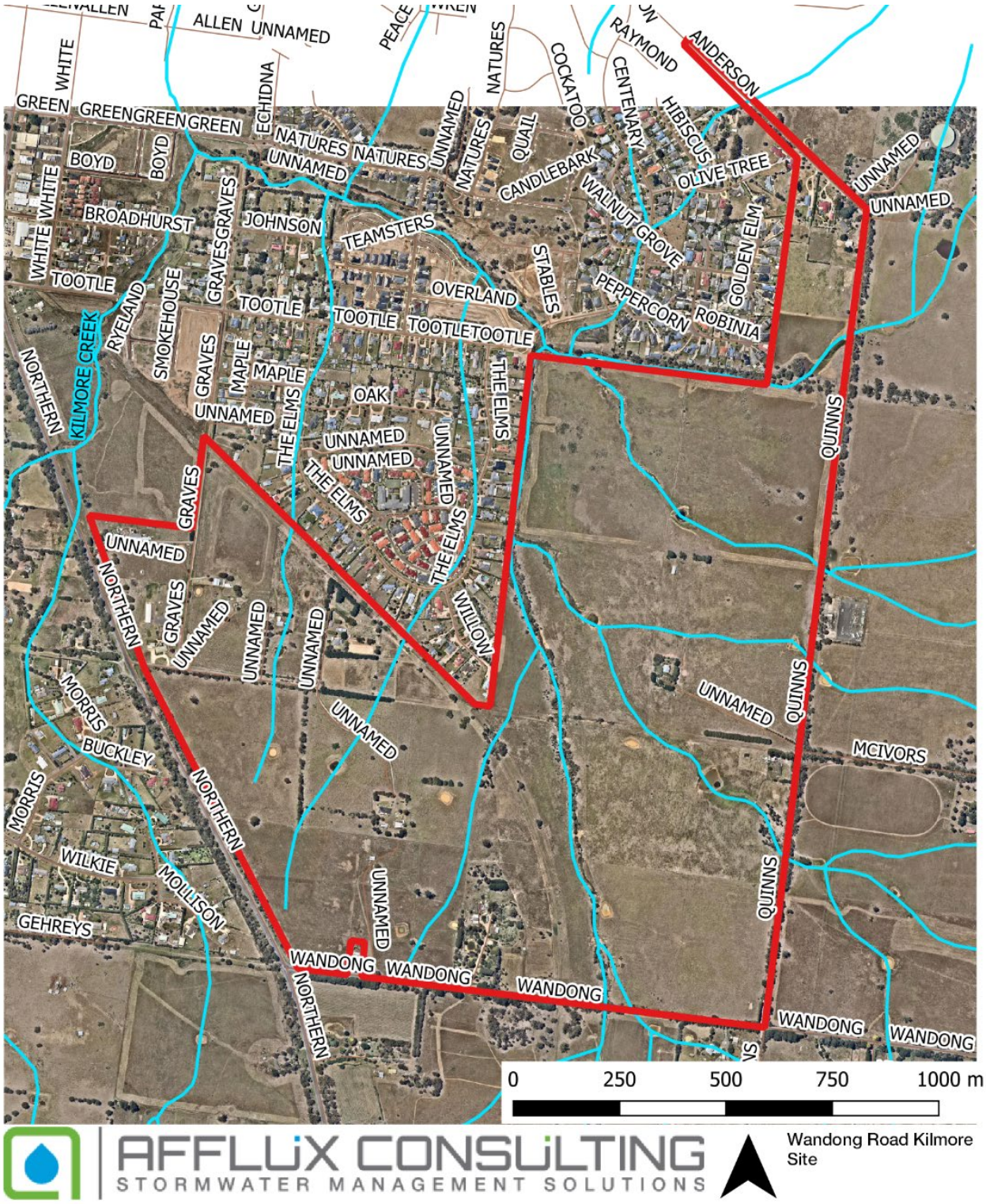


Figure 2. Site Location

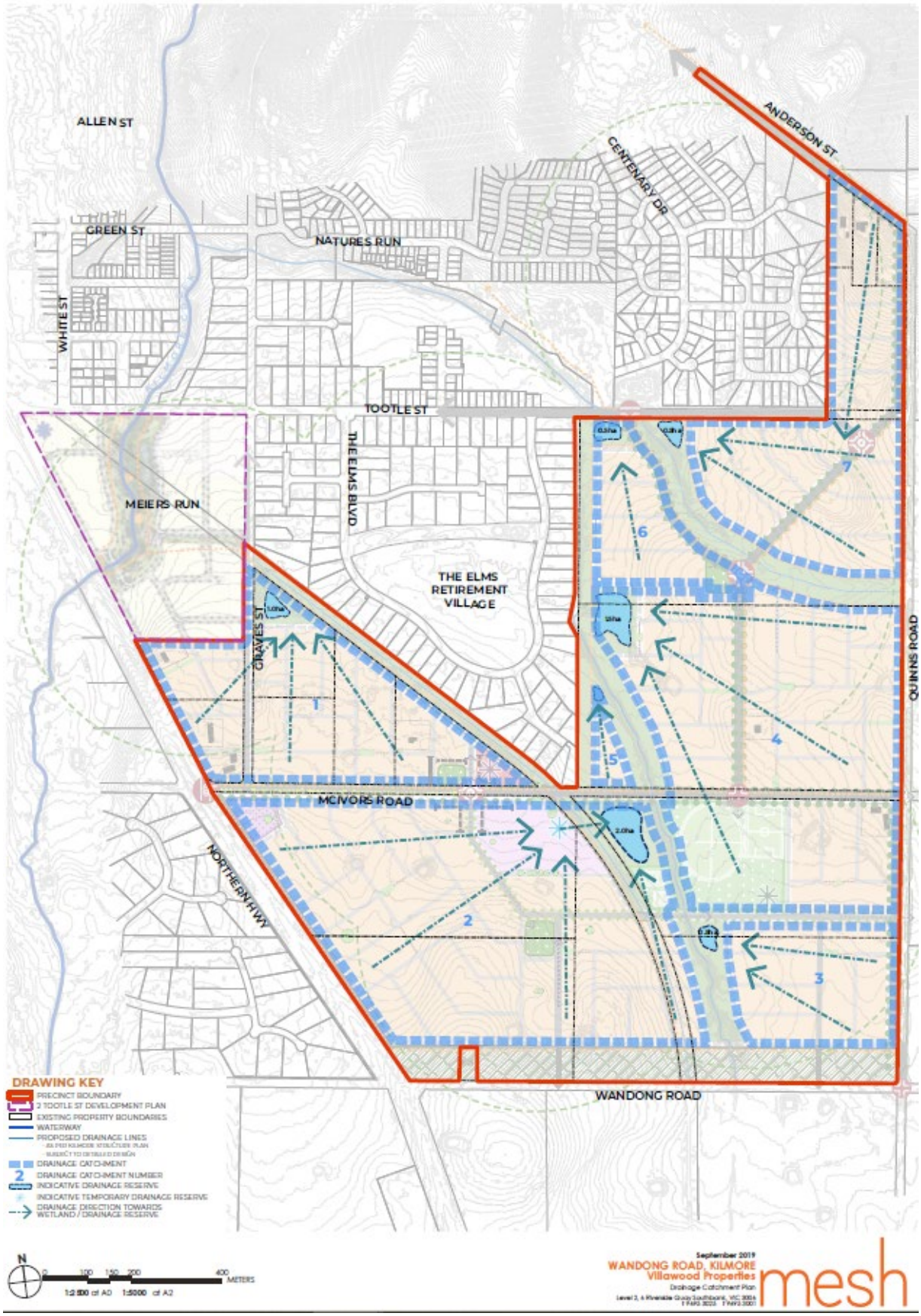


Figure 3. Original Development Plan – Note: Stormwater areas updated since Afflux 2019.

Information Sources

A number of information sources have been used in the formation of this strategy; these include:

Site inspection

- DEPI planning scheme and cadastral information as accessed online August 2019
- Discussions with Mitchell Shire Council
- Discussions and information as provided by GBCMA
- Site survey received from client
- Required Lidar data sourced commercially

Site Visit

A site visit was conducted on the 7th of November 2019. Key drainage features are shown below.

Source: Near Quinns Road Eastern Boundary

Figure 4. Existing Access Track

Source: Looking North West from Quinns

Figure 5. Relatively Undulating Site

Source: Temporary Crossing at Tootle East

Figure 6. "Tootle St East" Temporary Crossing

Source: Main waterway looking south

Figure 7. Vegetated Existing Drainage South of Tootle St

Site Controls

As per the development plan, site flows are to exit to the north at Tootle St/Centenary Drive through an existing culvert (3.6m x 2.7m x 2) as attached below in Figure 8 & Figure 9. All flows leaving the site will need to meet Council requirements of flow attenuation to meet existing conditions. Deck level shown in plans overleaf are 375.23m AHD.

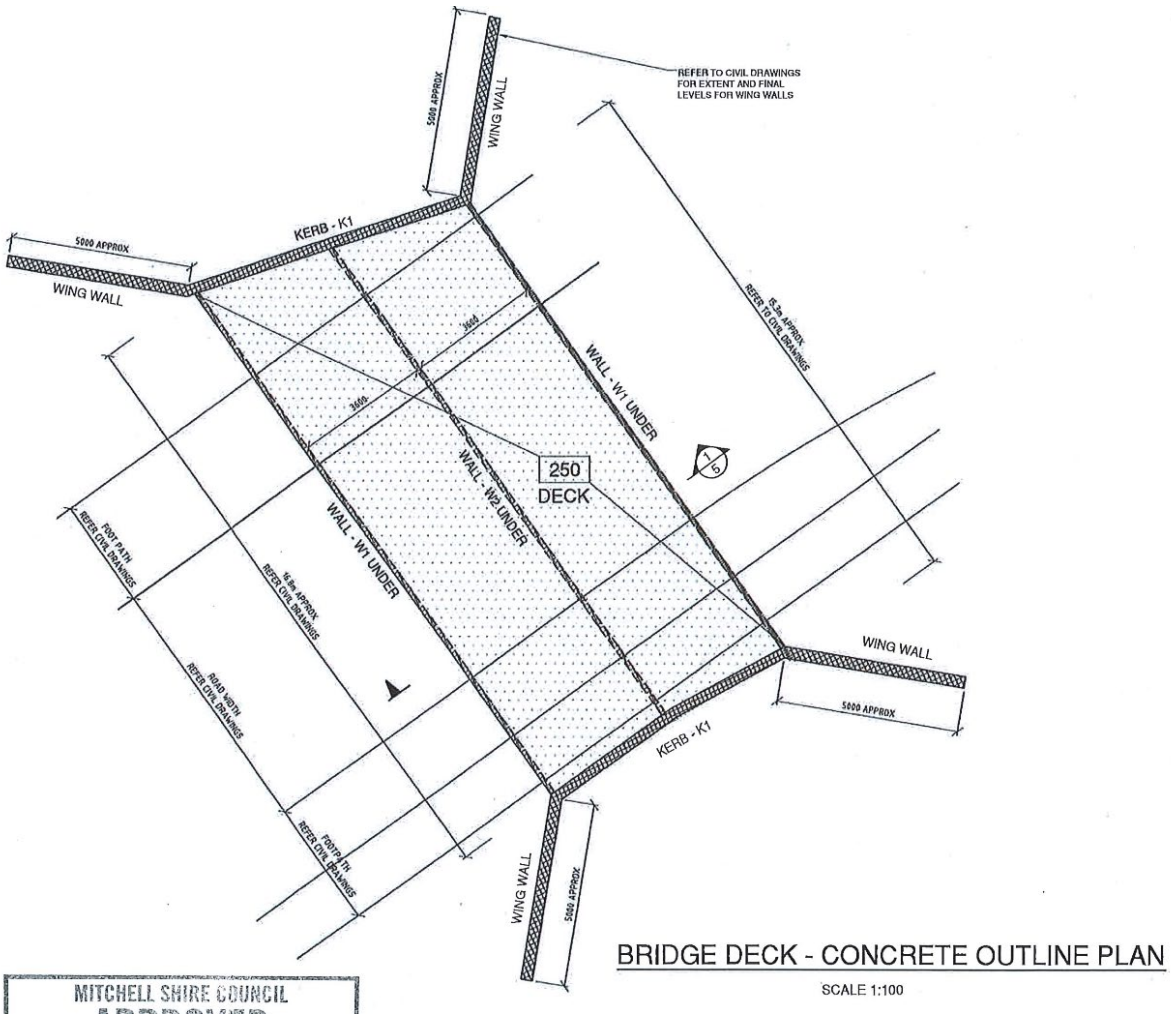


Figure 8. Plan of Centenary Drive Bridge

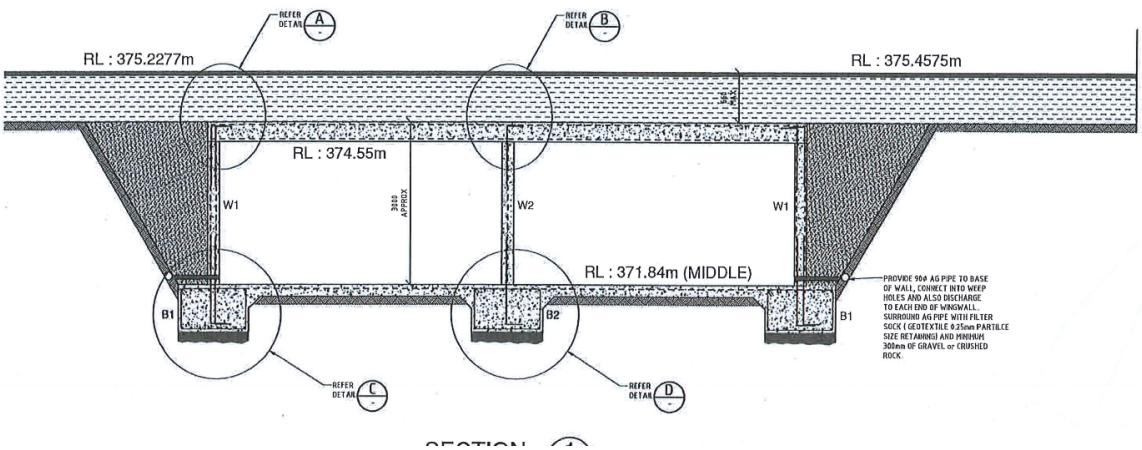


Figure 9. Cross-section of Centenary Drive bridge

Hydrology Review

No changes were made to the underlying hydrological models as part of this work. Please refer to “McIvors Rd, Kilmore – Stormwater Management Strategy” (Afflux, 2019) for more details regarding this base hydrological modelling. Figures and tables below were taken from this report and flows were adopted for the flood modelling discussed in further sections.

Table 1. Catchment Revisions

Catchment	Area Exist	Area Dev	FI Exist	FI Dev
AA	0.12	0.12	0.210	0.600
H	1.04	0.74	0.037	0.037
I (Ia, Ib)	0.87	(0.20, 0.44)	0.053	(0.410, 0.440)
J	0.35	0.35	0.205	0.600
K	0.81	1.35	0.043	0.032
L	0.29	0.29	0.042	0.500
P	0.44	0.44	0.076	0.600
Y	0.71	0.71	0.252	0.252
Z	0.33	0.33	0.126	0.600
Site	0.23	0.23	0.217	0.600

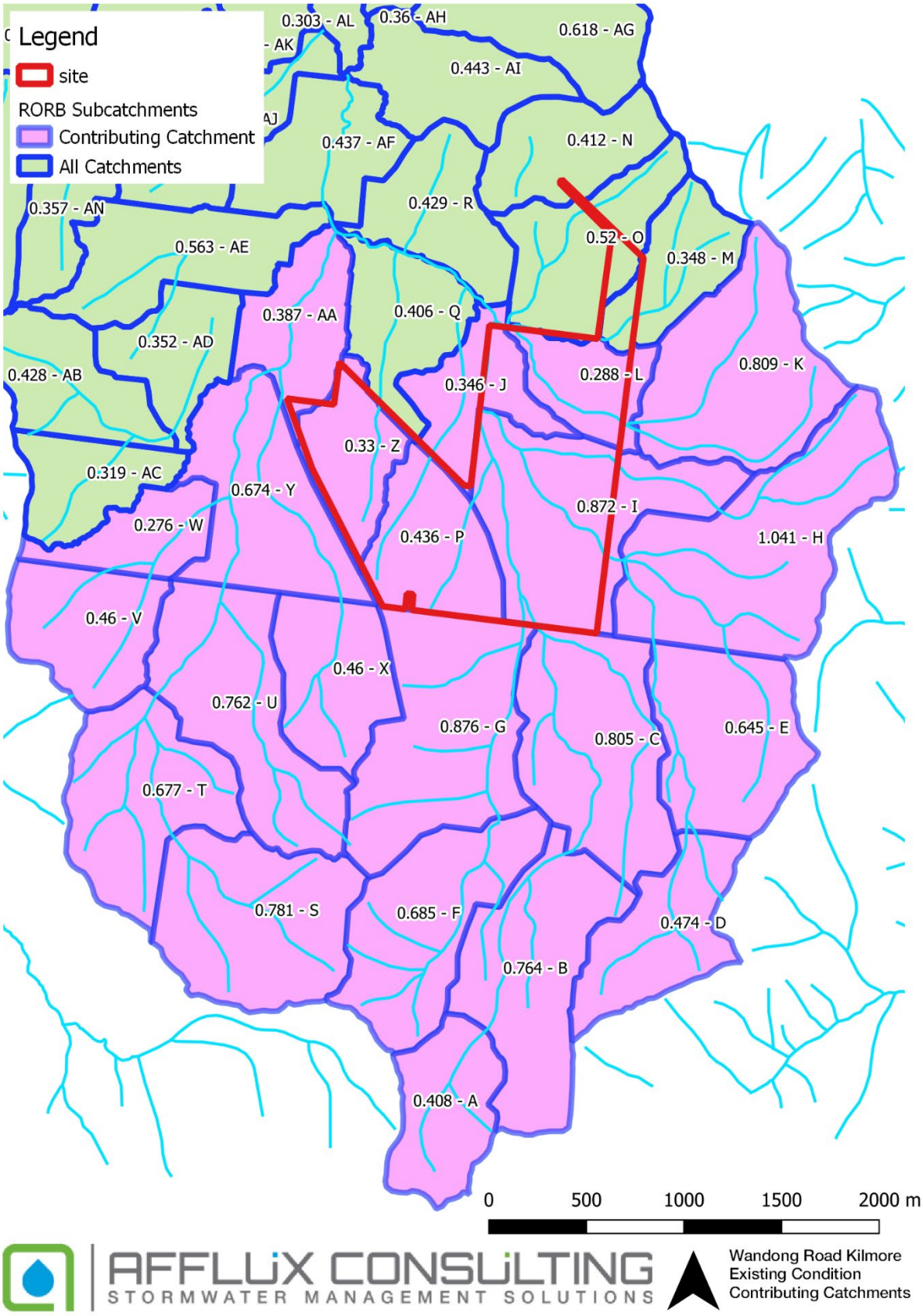


Figure 10. Existing Condition RORB Subcatchments

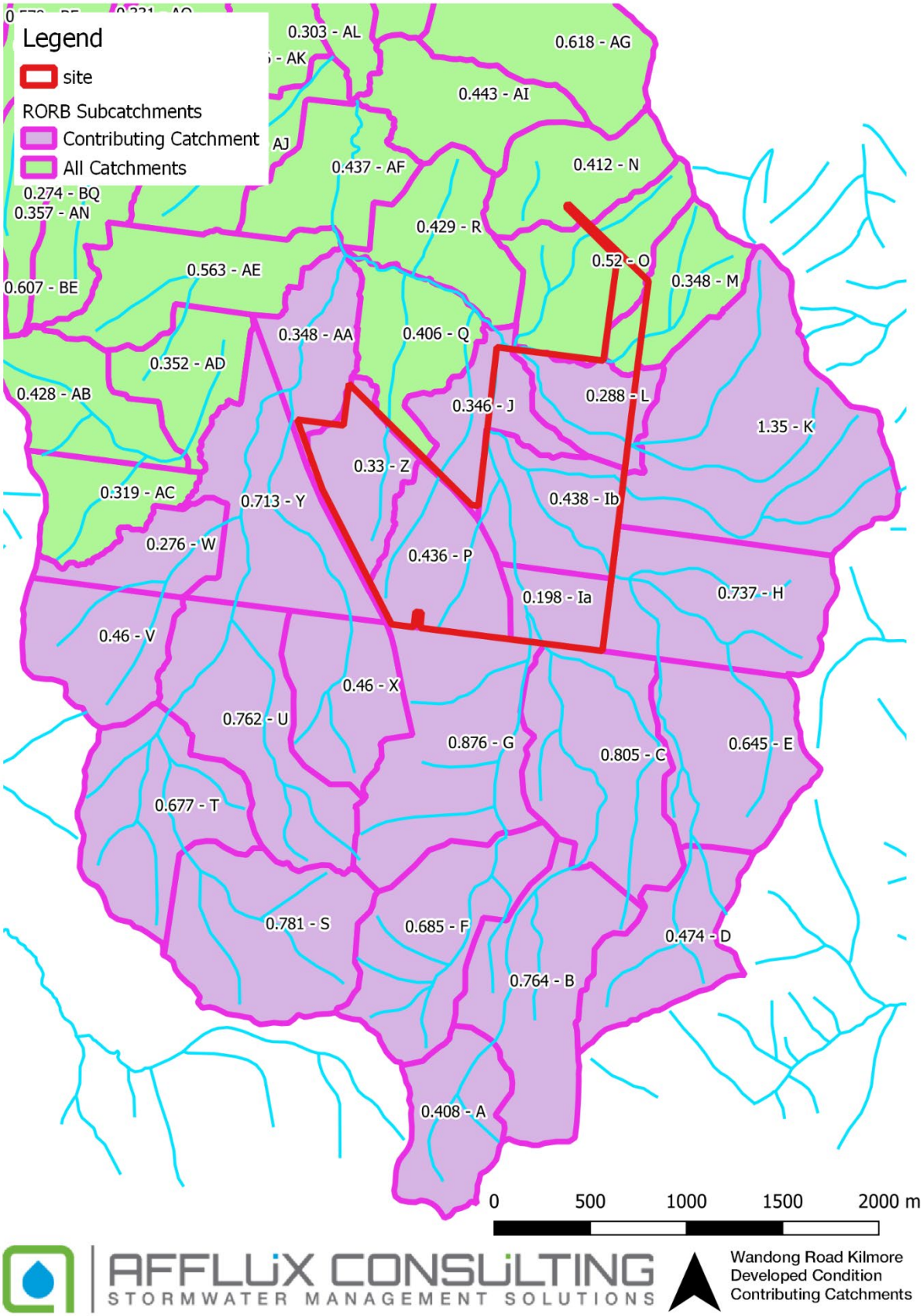


Figure 11. Developed Condition RORB Subcatchments

Based on the RORB model, the key point flows have been derived and these have been tabulated below (Table 2). For minor flow sensitivity, the 20% AEP peak flow has also been shown in Table 3

Table 2. Key flow locations and commentary for 1% AEP

Flow Location	Existing Peak Flow (m^3/s)	Developed Peak Flow (m^3/s)	Notes
G1	22.30 (9h)	22.30 (9h)	
H1b	13.27 (9h)	11.44 (9h)	Catchment H reduced in size and partially diverted north
I1	18.00 (9h)	12.57 (9h)	Catchment I divided in half, Ib enters network at J1
I2	34.15 (9h)	34.50 (9h)	
J1	35.63 (9h)	38.45 (9h)	
K1	4.84 (9h)	8.03 (9h)	Catchment K taking flows from Catchment H
P1	2.83 (1h)	1.86 (9h)	McIvorSt Storage attenuates peak to 9h storm
TootleStEast US	44.70 (9h)	44.31 (9h)	U/S of proposed Tootle St Crossing
TootleStEast DS	52.50 (9h)	52.11 (9h)	D/S of crossing, Catchments M and O contributing
Z Inflow	2.35 (1h)	1.06 (9h)	GraveSt Storage attenuates peak to 9h storm

Table 3. Flow Locations and Peaks for 20% AEP event

Flow Location	Existing Peak Flow (m^3/s)	Developed Peak Flow (m^3/s)
G1	5.81 (9h)	5.81 (9h)
H1b	2.77 (12h)	2.36 (12h)
I1	3.51 (12h)	2.62 (12h)
I2	7.03 (12h)	7.73 (9h)
J1	7.21 (12h)	8.84 (9h)
K1	1.19 (9h)	2.06 (9h)
P1	0.86 (9h)	0.73 (9h)
TootleStEast US	9.51 (12h)	10.46 (9h)
TootleStEast DS	11.24 (12h)	11.79 (9h)
Z Inflow	0.79 (9h)	0.73 (2h)

Proposed waterway and retarding requirements

Afflux (2019) outlined a conceptual stormwater management strategy for the site and provided expected flows and waterway requirements. These recommendations were adopted for this assessment. Where necessary, the proposed design was updated to meet Council's expectations for the region. A summary of the hydraulic parameters and waterway requirements are outlined in Table 5.

Table 4. Reach information

Reach	Developed Flow (m^3/s)	Minimum Ecological/Hydraulic Requirement (m)	Minimum Waterway Corridor Requirement (m)
1	22.3	40	60
2	34.5	50	60
3	38.5	50	60
4	8.0	30	60

Note: Minimum waterway corridor requirement estimated from Melbourne Water Guideline, Waterway Corridors (2013)

Figure 12 maps out the key stormwater components that are explored in this report, namely, Tootle St (East) RB, McIvor Rd RB, Wandong Rd RB and the proposed Green Link.

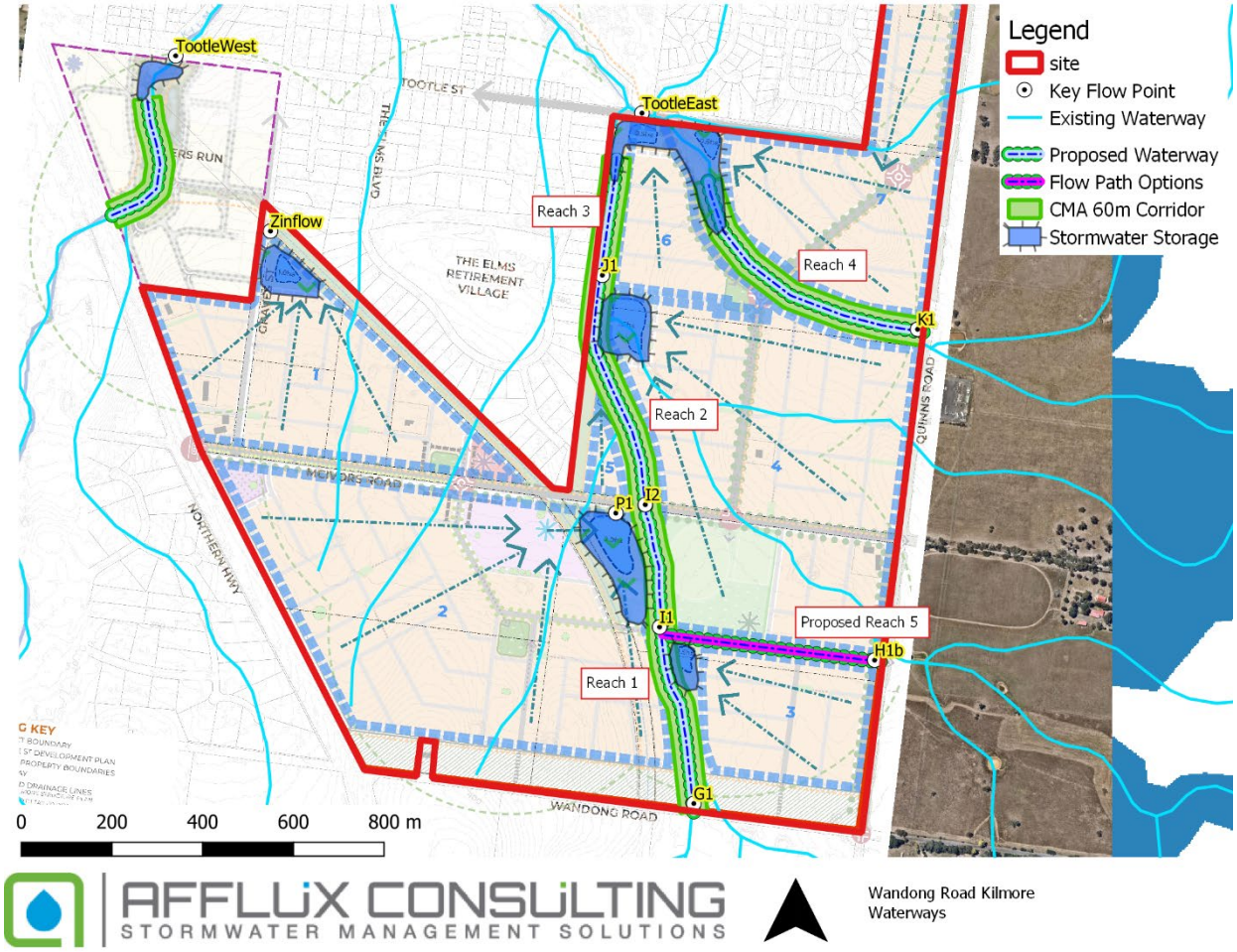


Figure 12. Final Stormwater Management Strategy from Afflux (2019)

Green Link

A Green Link was used to convey upstream catchments located east of Quinns Rd efficiently towards the creek (See Figure 12). The Green Link would incorporate a larger boulevard-style road with a channel and underground drainage. Of the various options presented by Afflux (2019), the Green Link option was deemed best suited to this site as it would best fit the proposed urban form, and aid in the water quality provisions for the development. The typical cross-section from Afflux (2019) is shown in Figure 13/Figure 14.

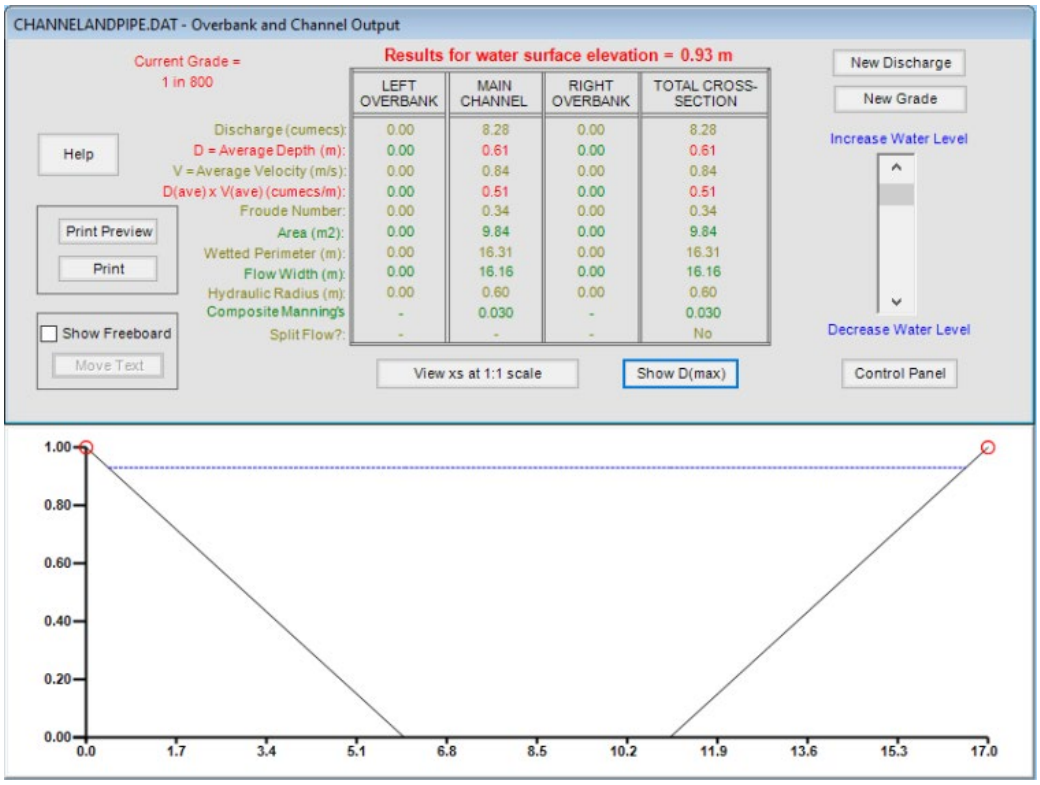


Figure 13. Proposed Roadside Channel Sizing (PC-Convey)

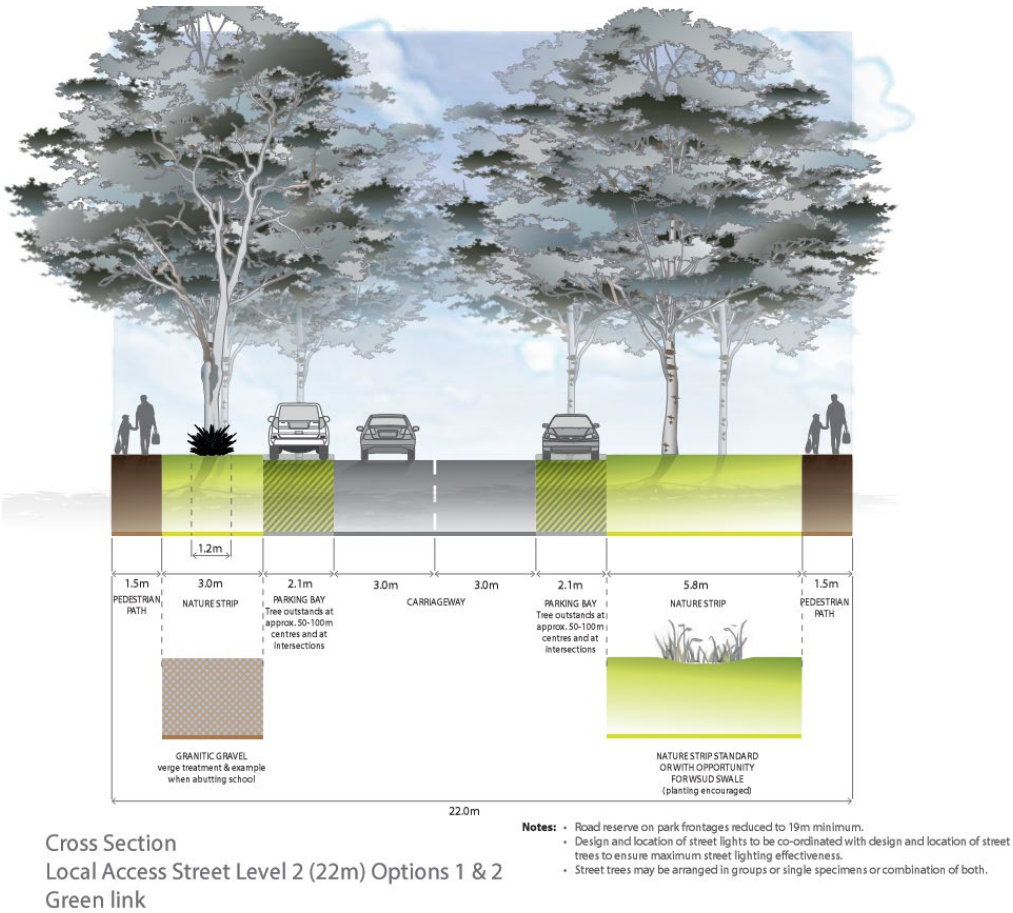


Figure 14. Green Link Road Typical Cross-Section

3. Proposed Concept Design

To complete the hydraulic analysis of the proposed stormwater mitigation strategies, a conceptual terrain is required. Accordingly, a 3 dimensional terrain of the Tootle Street East and McIvor Road retarding basins was undertaken and can be seen in Figure 16 and Figure 17. The design parameters that these concepts were to meet, and the final volumes are shown in Table 6. A number of relatively minor changes were required from the concept stage, including:

- Due to the restrictive size of Centenary Drive culverts (site outlow control), the storages were augmented where possible to reduce overtopping onto the road in a 1% AEP.
- The outlet control at Tootle St East retarding basin was re-configured to work with the existing topography and surrounding site levels however flow capacity of the control was maintained.

More details including cross-sections are included in Appendix D – Proposed Concept Design.

It is worth noting that the catchment I storage, or offline mid storage, has not been added to this hydraulic analysis. As this storage is not space constrainted (within a waterway corridor) or part of the waterway, it is not required in the hydraulic analysis. The flow from this basin will however need to meet the flow assumption contained in this report in any future SWMP or functional design.

	RB I1 - McIvors Rd (m^3)	RB P1 – Wandong Rd (m^3)	RB – Tootle St East (m^3)
RORB (Afflux, 2019)	10,000	1,820	13,900
Proposed Design	14,000	3,100	16,300
Outlet Control	900mm dia	1050mm dia	1.5 W x 2.7H x 7

Table 5. General parameters for storages

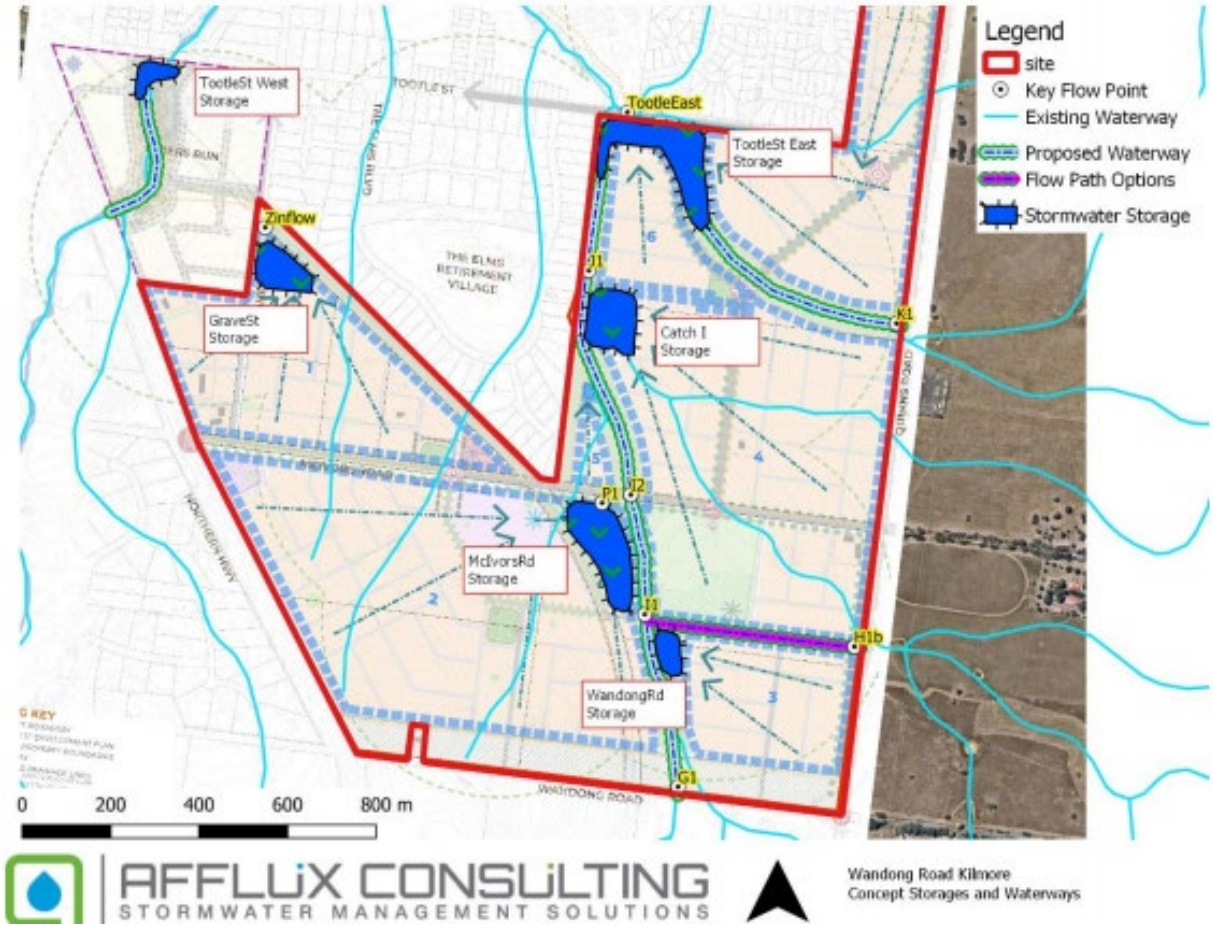
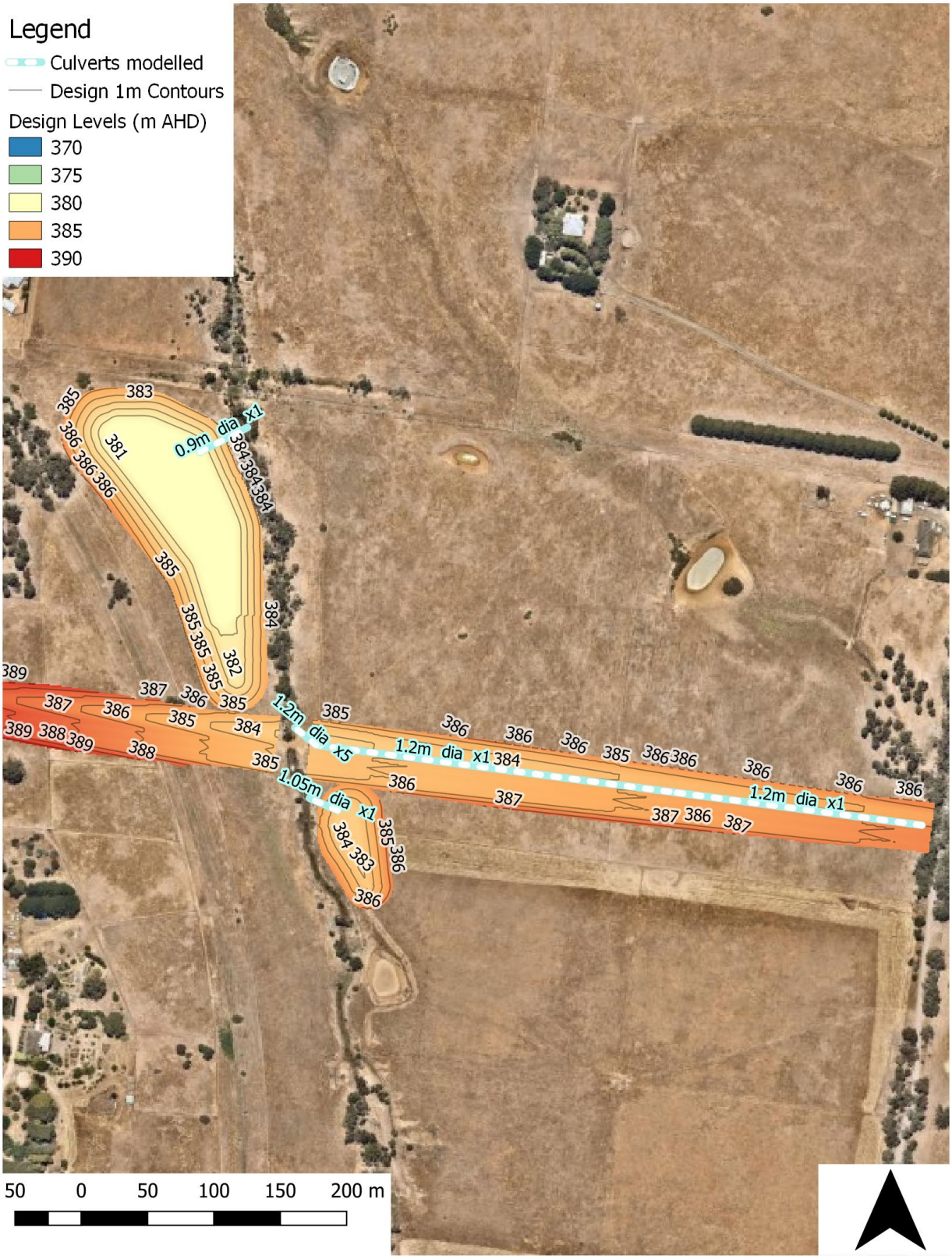


Figure 15. Conceptual Waterway Features

Figure 16. Proposed design of storages and waterway – Tootle St East, Kilmore



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Tootle St (East), Kilmore
Design - Green Link & adjacent RBs

Figure 17. Proposed design of Green Link, McIvor Rd Storage, and Wandong Rd Storage

4. Hydraulic Modelling

A TUFLOW model of the proposed concept design was constructed to assess the hydraulic changes associated with the land development. The developed conditions hydrology as discussed above was input into the model using the derived terrain. For comparison, an Existing and Developed Case were formed. The following assumptions were made to build the 2D flood model:

- Catchment H1b – Flows north in Existing Case; flows are directed into the Green Link in Developed Case (See Appendix B for more info)
- Catchment P – Flows north in Existing Case; flows are directed into McIvors Rd RB in Developed Case (See Appendix B for more info)
- Slope tailwater boundary significantly downstream of Centenary Drive culverts. Hydraulic slope assumed to be similar to topographical slope of ~0.01
- A Manning's Roughness of 0.04 was set as default to in Existing model to represent open space/paddocks. Default Manning's Roughness in Developed model was set to 0.06 to represent moderate vegetation in waterways. A map of site roughness is shown in Figure 18.
- Complete suite of storms run from 1.5hr to 12hr for 1% AEP storm events. The results found critical for the site to be the 9hr storm. This was adopted as the critical and as such the results presented are from the 9hr storm.
- The site Digital Elevation Model (DEM) was derived from Lidar Data with a 1m grid resolution (Existing Case). This is overlain with the design DEM in Developed Case.
- Centenary Drive Bridge modelled as per As Constructed plans (Figure 8 & Figure 9)
- Retarding Basin on Centenary Drive (north of Tootle St) included
- The major and minor storm modelled: 1% and 20% Annual Exceedance Probability (AEP) storms
- Time step of 0.5 seconds. Grid size of 2m
- Additional information on model setup included in Appendix B

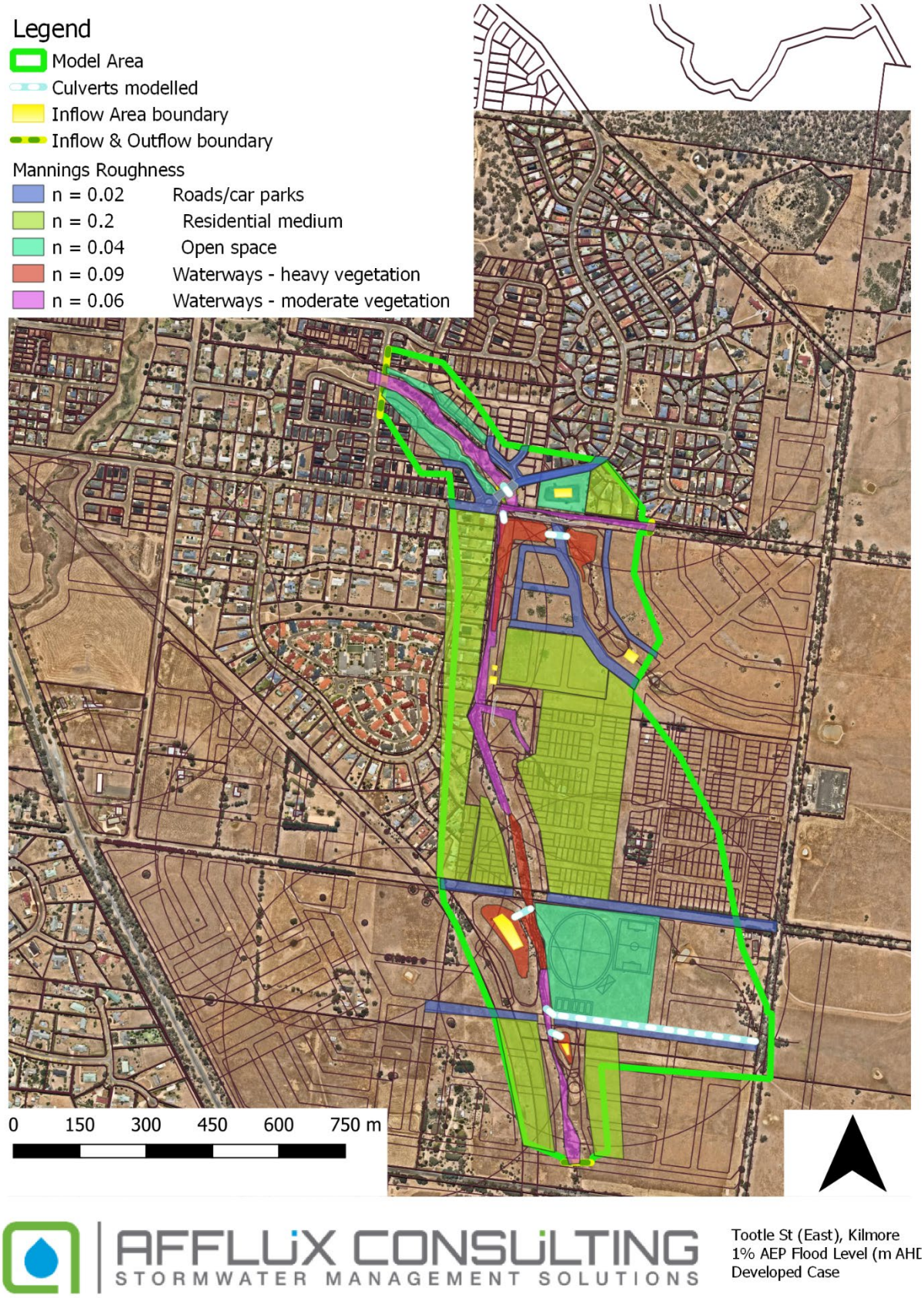
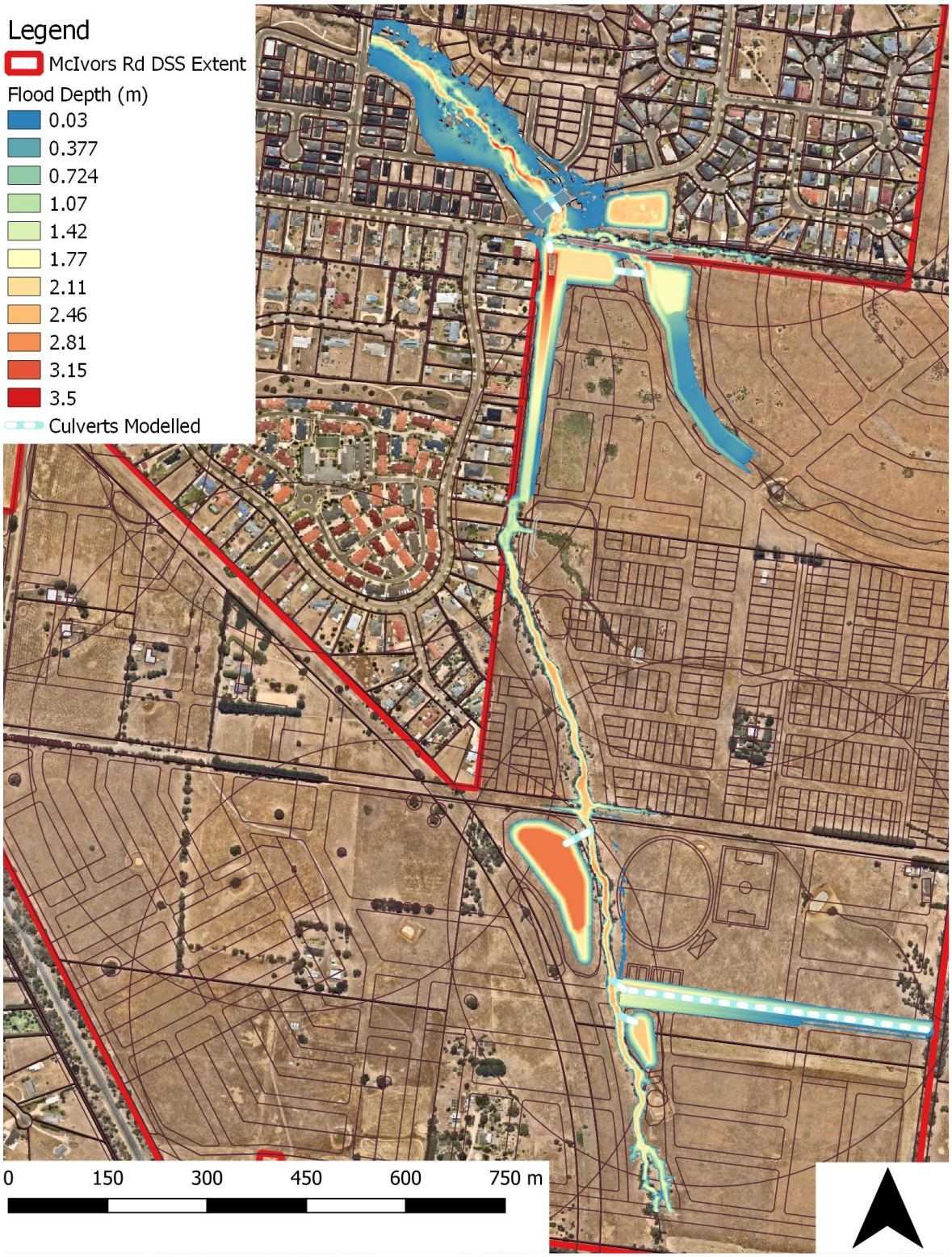


Figure 18. Model Setup

Kilmore Creek – Results

Full flood maps of both Existing and Developed models are included in Appendix B and C. A comparison of Developed and Existing flood levels show no worsening of flood levels downstream of the site (Figure 19). Consequently, the modelling demonstrates that the RB volumes adopted for the design of RBs through the site meet the objectives of the site, and ensure that no increased flood risk as a result of the site's development.

In addition, 1% AEP peak flows through Centenary Drive bridge and downstream of the structure is expected to be less in post-development, suggesting that upstream storages will function as desired to attenuate Developed flows (Figure 20 & Figure 21). A culvert under the old railway reserve will be required to divert flows into the southern basin from catchments to the west.



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Tootle St (East), Kilmore
1% AEP Flood Depth (m)
Developed Case

Figure 19. Developed Case – 1% AEP Flood Depth

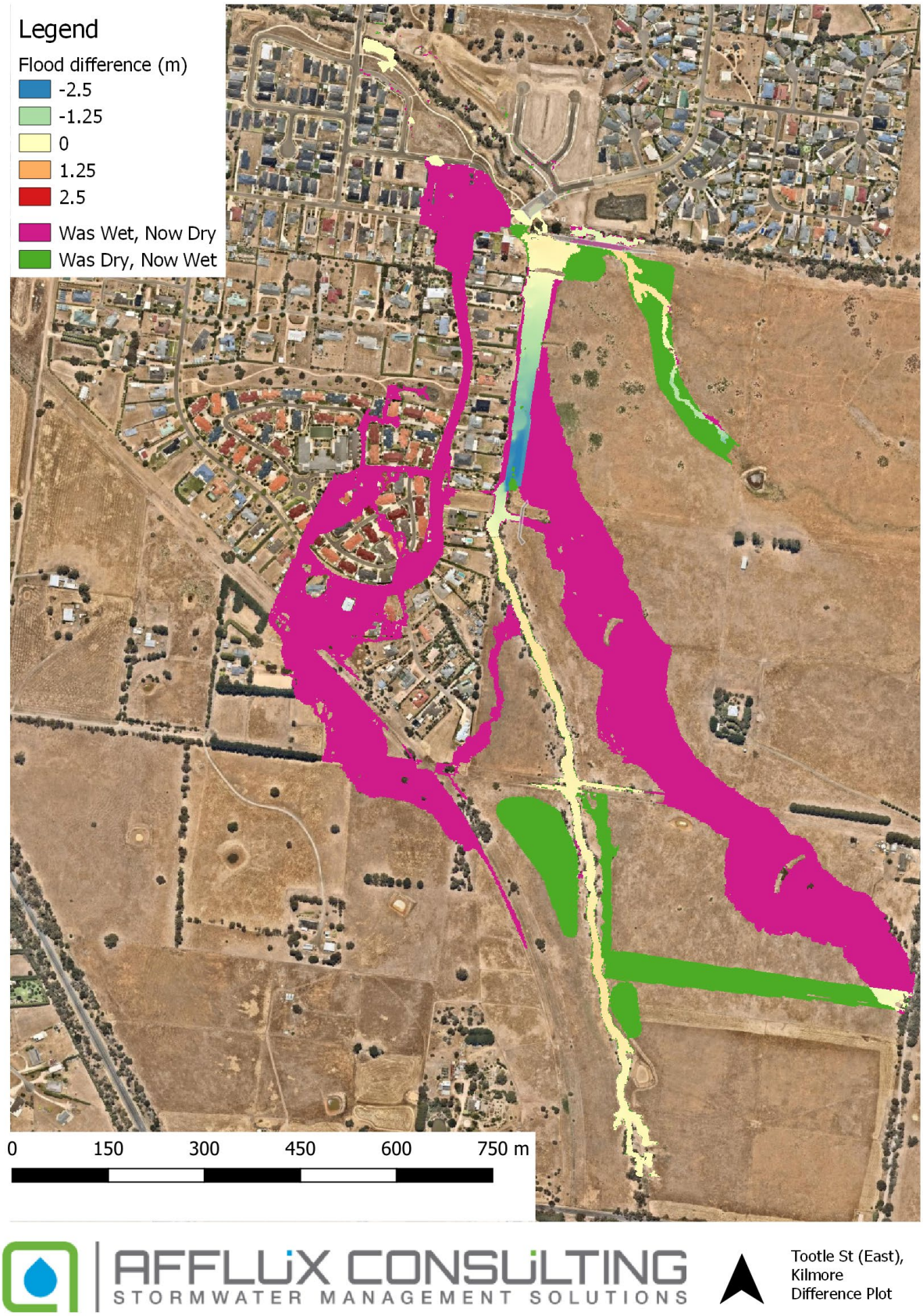

Figure 20. Flood Difference through subject site

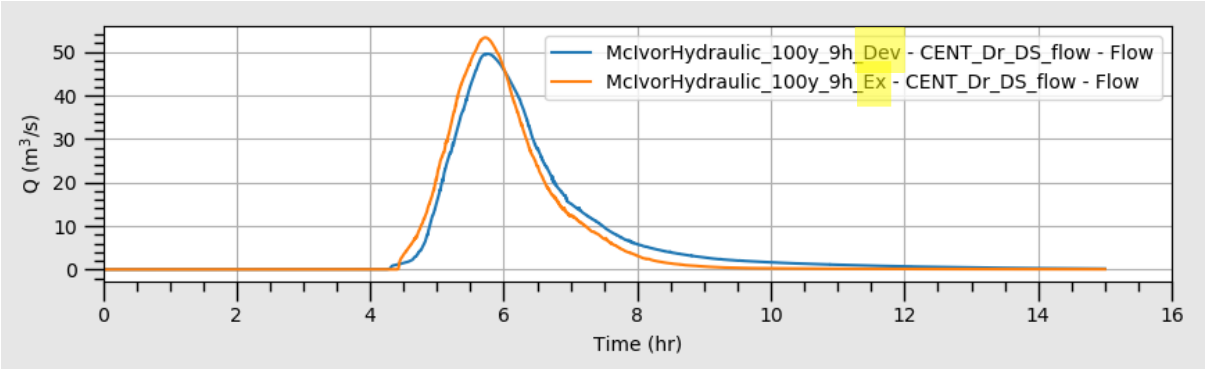

Figure 21. Flow hydrograph downstream of culvert – 1% AEP Storm Event, 9hr Critical Duration

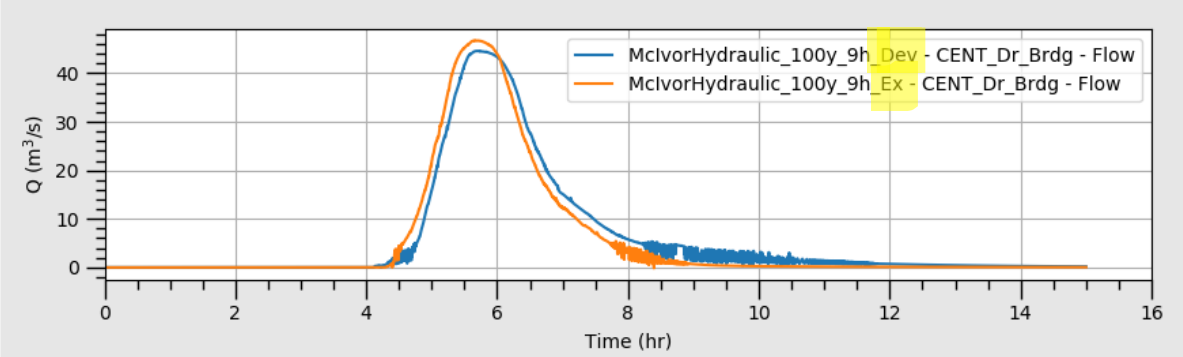

Figure 22. Flow hydrograph through Centenary Drive Culvert – 1% AEP storm event, 9hr critical duration

Green Link – Results

The flood model demonstrates the expected changes to flood extent due to the introduction of the Green Link. In general, the flood extent will be contained within the road reserve of the Green Link and as a result, will reduce flooding to parcels north of the green link. It is expected that the proposed 1200mm dia pipe at 1 in 800 or so will carry ~1m³/s while the remainder to be conveyed overland in the channel and road network.

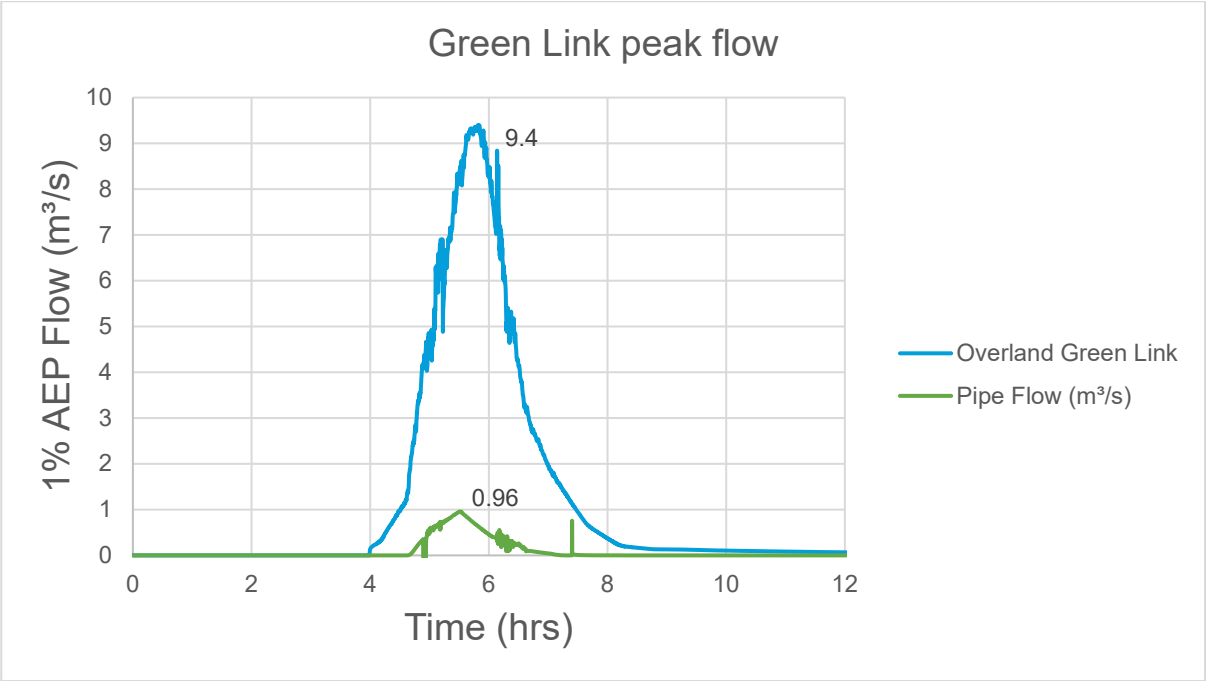

Figure 23. 1% AEP flows split in Green Link

5. Discussion

Various aspects to the hydraulic assessment and design of the site was investigated along with the modelling provided. This included a review of the original strategy and intent, sizing of various storages, development layout, future Tootle St East Road and development staging. This section provides a highlight of the aspects to this investigation important to understanding the hydraulic behaviour through the region.

The theoretical capacity of the culverts on Centenary Drive is ~98m³/s, which should convey the Existing and retarded Developed flows of ~50-60m³/s easily. However as shown by the Developed flood depth in, the road and culvert is expected to be overtopped by up to 0.15m in the 1% AEP storm. This is due to high hydraulic loss factors in the area such as the angle of the culvert and wing walls, impact of Centenary Drive RB overtopping along it's western wall rather than out falling to the south as designed (Figure 24).

Although the results found that the 1% AEP flood extent is not contained squarely within the creek, the Developed flood extent is contained by the roads and reserves, and consequently pose low flood risk to people or property.

The flood difference between Developed and Existing cases highlight the improvement of flood control through the catchment (refer to Figure 20 or Appendix C), particularly to existing properties along The Elms Blvd. This is due to flood control measures to be introduced along with the development of parcels south of McIvors Rd. These parcels will drain to McIvor Rd RB (rather than northwards in the existing case) and hence protect existing old railway reserve and properties fronting The Elms Blvd. The design demonstrates a better flood-risk outcome for the community.

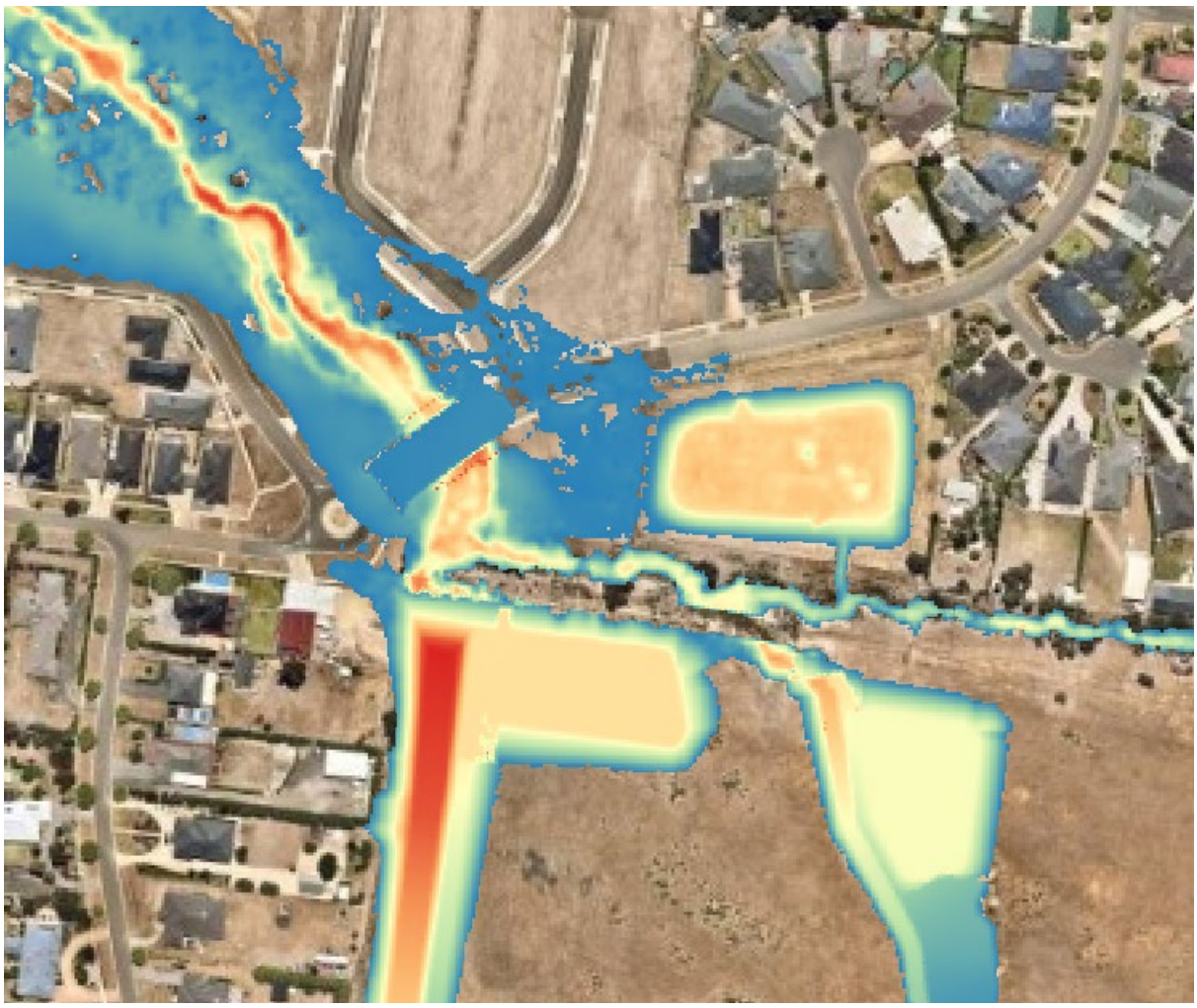

Figure 24. Close up of Centenary Drive RB showing western boundary overtopping in a 1% AEP storm event

In addition to the hydraulic assessment, the Afflux model was compared to previous modelling to check if the assumptions made were reasonable. The only available results from the Kilmore Flood Study were from the 1.5hr storm duration and consequently the Afflux model was also run for the 1.5hr storm as a comparison. Figure 25 shows the results of the Kilmore Flood Study by WBM BMT in approximately 2014 overlaying Afflux flood extent for the same storm duration, and found that the two results compared well. The difference in flood depth were within ±0.2m between the models (See Appendix E). Key areas of difference are shown within the creek where a conservative approach (higher flows) was adopted within the site to test the proposed RBs with a 'worse-case'. This suggests that the assumptions made in this investigation were similar to that of the Kilmore Flood Study and provides confidence that the models are representative of real-world hydraulics.

Overall, the hydraulic modelling demonstrates a net benefit to flood management with the development of Tootle St (East), especially to parcels along The Elms Blvd. No worsening of flood conditions to downstream parcels is expected as a result of the development of this site.

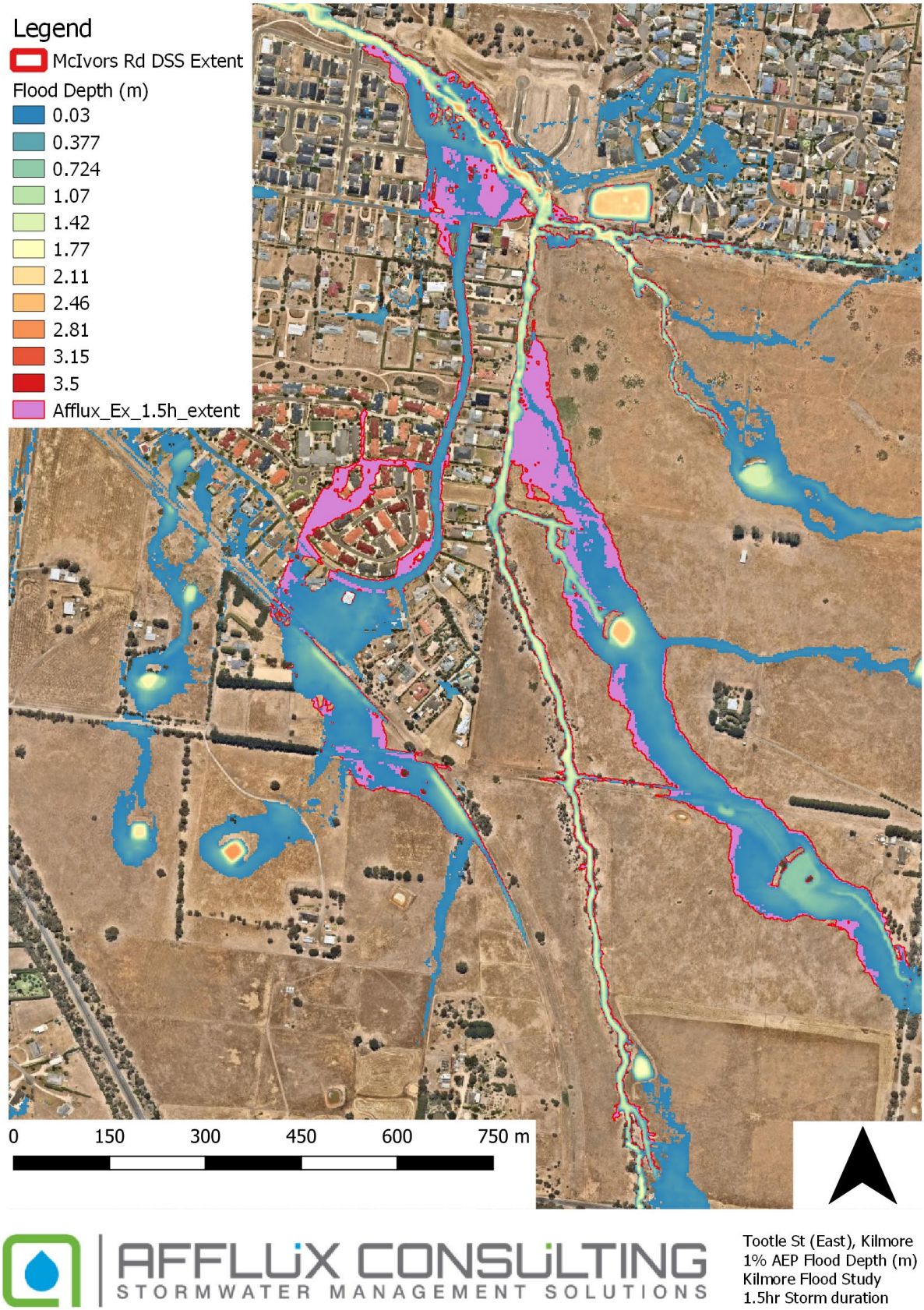

Figure 25. 1% AEP Flood depth results from Kilmore Flood Study, compared to Afflux Flood extent of the same storm duration (1.5hr Storm)

6. Conclusion

This hydraulic assessment examines the flood conditions around Tootle St (East), Kilmore in Existing and Developed scenarios. It found that the proposed RB and Green Link design through the site does not result in worsening flood risk to the area, and in many cases provides significant improvement. In summary the following elements should be adopted for the next stages of this development:

- A series of 60-meter constructed waterways to link the development areas
- Wetlands and Retarding Basins as per concept design (Appendix D)

Appendix A - GBCMA Correspondence

GBCMA Ref: GBCMA-F-2020-00047-02
Contact Officer: Joel Leister

Council No: C136 (Proposed)
Your Ref: PL/05/273

Date: 30 March 2020

Mr Sean Greer mitchell@mitchellshire.vic.gov.au
Coordinator Strategic Planning
Mitchell Shire Council
113 High Street
Broadford Vic 3658

Dear Mr Greer

Meiers Run Estate – Wetland Functional Design Report
2 Tootle Street, Kilmore Vic 3764

The Goulburn Broken CMA has previously provided Mitchell Shire Council with correspondence (Ref: GBCMA-F-2020-00047) that provided in principle support for the Stormwater Management Plan associated with the development of the Kilmore South-East Precinct. This correspondence noted that additional information needed to be provided to the Goulburn Broken CMA.

The additional information has in part been addressed by the provision of the *Meiers Run Estate – 2 Tootle Street, Kilmore – Wetland Functional Design Report* (Afflux Consulting, Feb 2020). In response to a request for additional information, Allux Consulting provided additional data, clarification and maps via email (24 March 2020). As noted in Afflux Consulting (2020), the report aims to address the concerns of the Goulburn Broken CMA as highlighted in our previous correspondence, specifically:

1) *For the ultimate developed conditions, a hydraulic assessment (of the precinct, i.e. all stages) is to be included to establish/demonstrate holistically that the conceptual strategy:*
   - *Provides no "adverse" third-party impacts to downstream areas and the upstream areas of the proposed "green-link."*
   - *Provide hydraulic parameters (i.e. discharge, velocity) is assist with geomorphic response together with a list of possible detailed design matters to be considered in detailed design phase such as soil types, grade reducing structure, etc.*
2) *For the ultimate developed conditions, an assessment of the viability of the proposed wetlands to ensure that proposed measures are ecologically sustainable in terms of required water volumes to support wetland flora, and without impacts to water quality and waterway health (including bluegreen algae).*

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Tel: (03) 5797 4400

The information provided as part of Afflux Consulting (2020) and in the subsequent emails between Goulburn Broken CMA and Afflux Consulting addressed the following concerns:

- The provided mapping has demonstrated that downstream of the Meier Run Estate there is no third-party impacts. However, it is noted design terrain for Stage 1 of the estate has not been included in the modelling, resulting in the mapping showing inundation of the proposed lots.
- The reporting provides various hydraulic modelling outputs that will assist with the detailed design of the wetland and drainage features.
- The reporting demonstrates that the current 'functional design' of the wetland will meet the relevant Melbourne Water (MW) guidelines for wetland design and the best practice environmental management (BPEM) guidelines. This includes demonstrating that the velocity and bed shear stresses and below the MW criteria, and that the water levels in the wetland will support and maintain vegetation.

Having regard to the above, the Goulburn Broken CMA **does not object** to the functional wetland design, **subject to the following conditions:**

- The detailed design of the wetland must maintain (or better) the performance demonstrated in the functional design in terms of both water quality and flood attenuation.
- The detailed design of the wetland demonstrates that the proposed lot layout is flood free during a 100-year ARI (1% AEP) flood event.
- A waterway management plan for the proposed development is established to achieve the long-term waterway planting objectives outlined in the Wetland Functional Design Report.
- Functional and detailed design of the Grave Street Storage and Wetland does not adversely affect the performance of the Tootle West Storage (as demonstrated in the Wetland Functional Design Report).

Whilst it is acknowledged that the additional information requested by the Goulburn Broken CMA has been provided in relation to the Meiers Run Estate, it has not been provided for the balance of development across the Kilmore South East Precinct. Consequently, the in-principle support for the stormwater management strategy across the balance of the Kilmore South East Precinct remains in place until the additional information is provided.

Please Note:

- This document contains floodplain management advice only. It does not constitute approval from any other statutory body. It is your responsibility to obtain any other required approvals.
- The 100-year ARI flood is not the maximum possible flood. There is always a possibility that a flood larger in height and extent, than the 100-year ARI flood, may occur in the future.

If you have any queries, please contact Joel Leister on **(03) 5822 7700**. To assist in handling any enquiries please quote **GBCMA-F-2020-00047** in your correspondence. Please note that all electronic correspondence should be directed to planning@gbcma.vic.gov.au.

Yours sincerely

Guy Tierney
Statutory Planning and Floodplain Manager

CC: Chris Beardshaw (Afflux Consulting)

Information contained in this correspondence is subject to the definitions and disclaimers below.

Definitions and Disclaimers

1. The area referred to in this letter as the 'proposed development location' is the land parcel(s) that, according to the Authority's assessment, represent(s) the location identified by the applicant. The identification of the 'proposed development location' on the Authority's GIS has been done in good faith and in accordance with the information given to the Authority by the applicant(s) and/or local government authority.
2. While every endeavour has been made by the Authority to identify the proposed development location on its GIS using VicMap Parcel and Address data, the Authority accepts no responsibility for or makes no warranty with regard to the accuracy or naming of this proposed development location according to its official land title description.
3. **AEP** as Annual Exceedance Probability – is the likelihood of occurrence of a flood of given size or larger occurring in any one year. AEP is expressed as a percentage (%) risk and may be expressed as the reciprocal of ARI (Average Recurrence Interval).
4. **ARI** as Average Recurrence Interval - is the likelihood of occurrence, expressed in terms of the long-term average number of years, between flood events as large as or larger than the design flood event. For example, floods with a discharge as large as or larger than the 100-year ARI flood will occur on average once every 100 years.
5. **AHD** as Australian Height Datum - is the adopted national height datum that generally relates to height above mean sea level. Elevation is in metres.
6. No warranty is made as to the accuracy or liability of any studies, estimates, calculations, opinions, conclusions, recommendations (which may change without notice) or other information contained in this letter and, to the maximum extent permitted by law, the Authority disclaims all liability and responsibility for any direct or indirect loss or damage which may be suffered by any recipient or other person through relying on anything contained in or omitted from this letter.
7. This letter has been prepared a proposed planning scheme amendment and is for the use only of the party to whom it is addressed and no responsibility is accepted to any third party for the whole or any part of its contents. Neither the whole nor any part of this letter or any reference thereto may be included in any document, circular or statement without the Authority's written approval of the form and context in which it will appear.
8. The flood information provided represents the best estimates based on currently available information. This information is subject to change as new information becomes available and as further studies are carried out.
9. ***The responsible authority may use this information within 90 days of this letter***.

Appendix B - Model Setup & Existing Flood Results

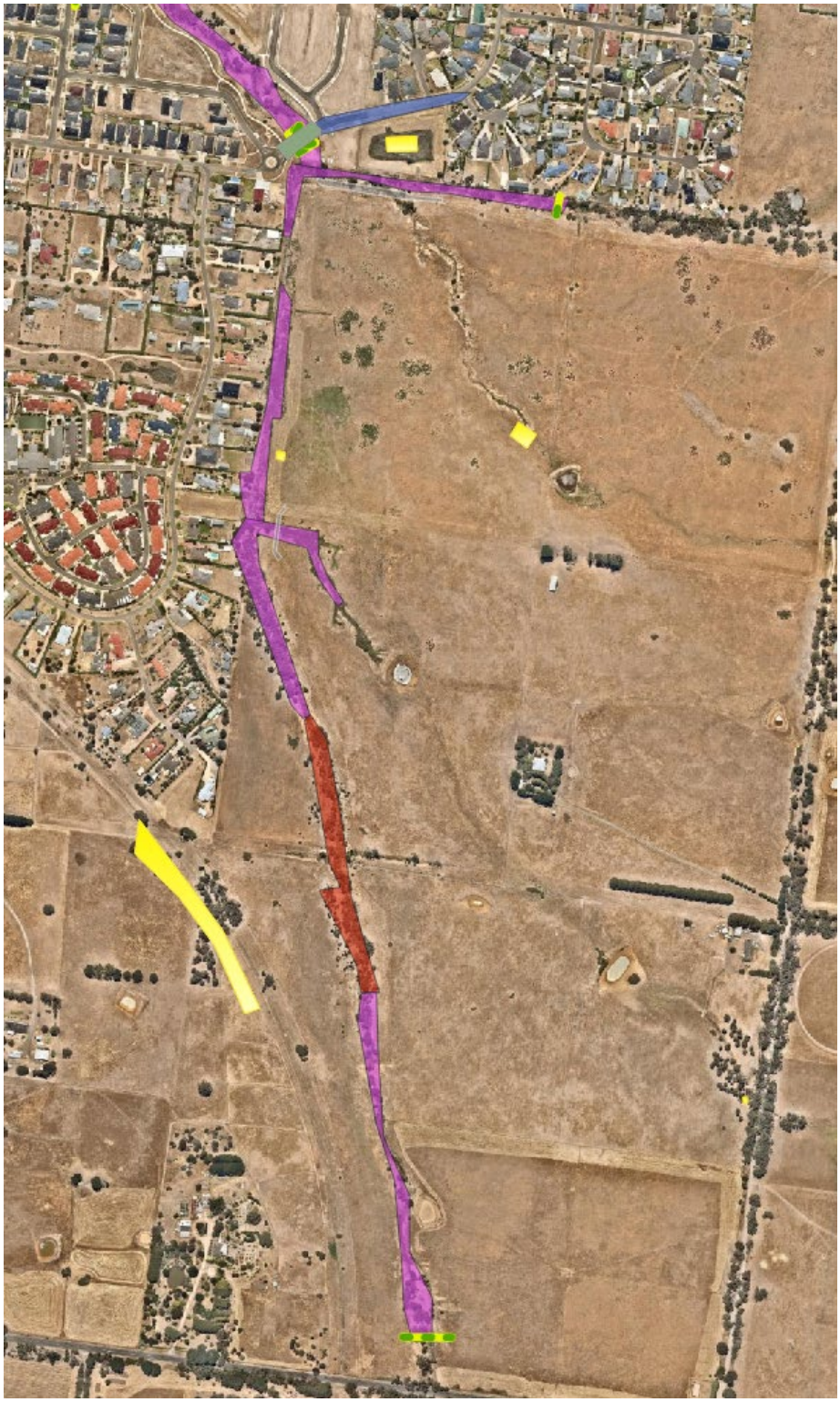


Figure 26. Inflow locations from RORB – Existing Conditions 9hr storm flows

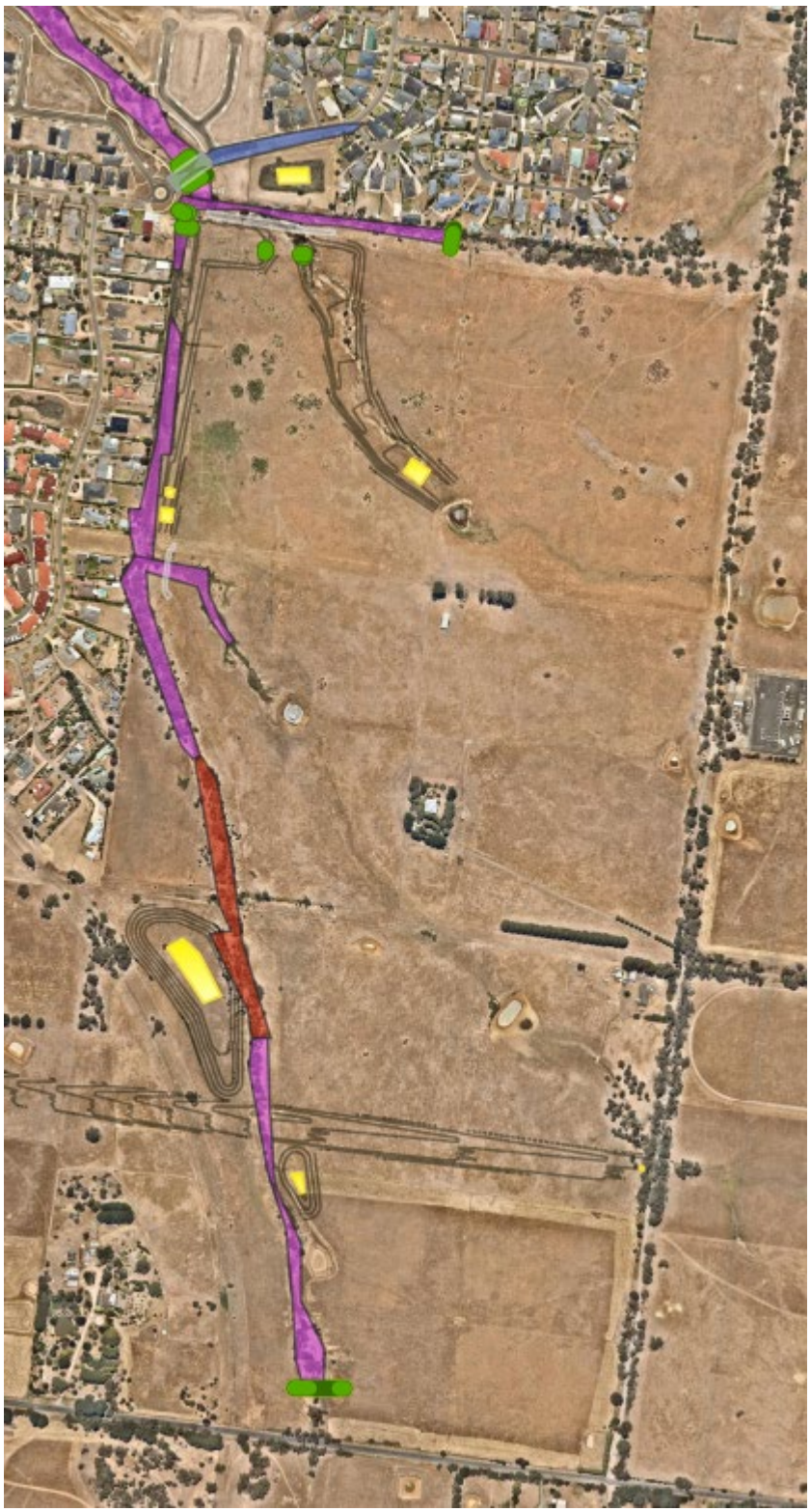
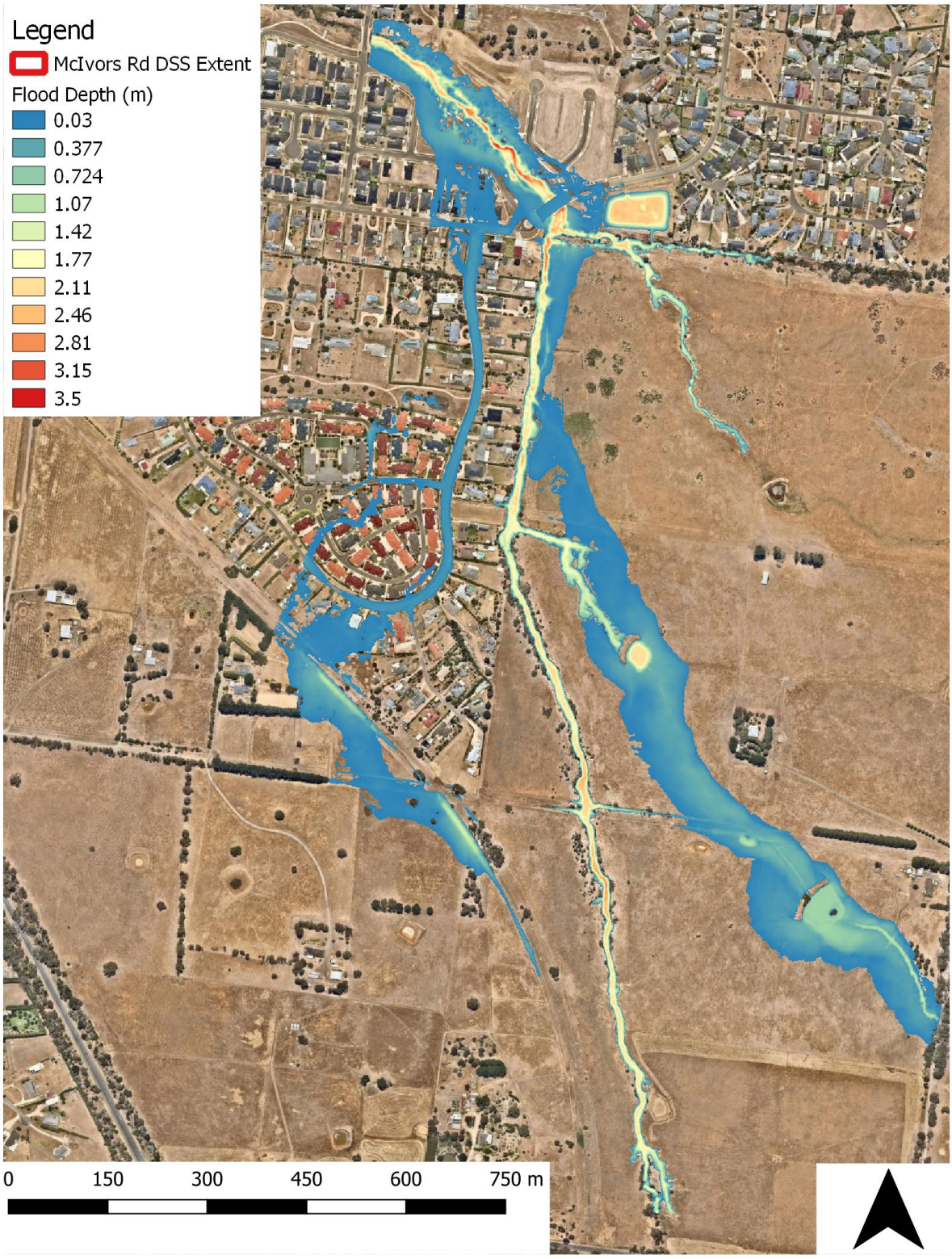
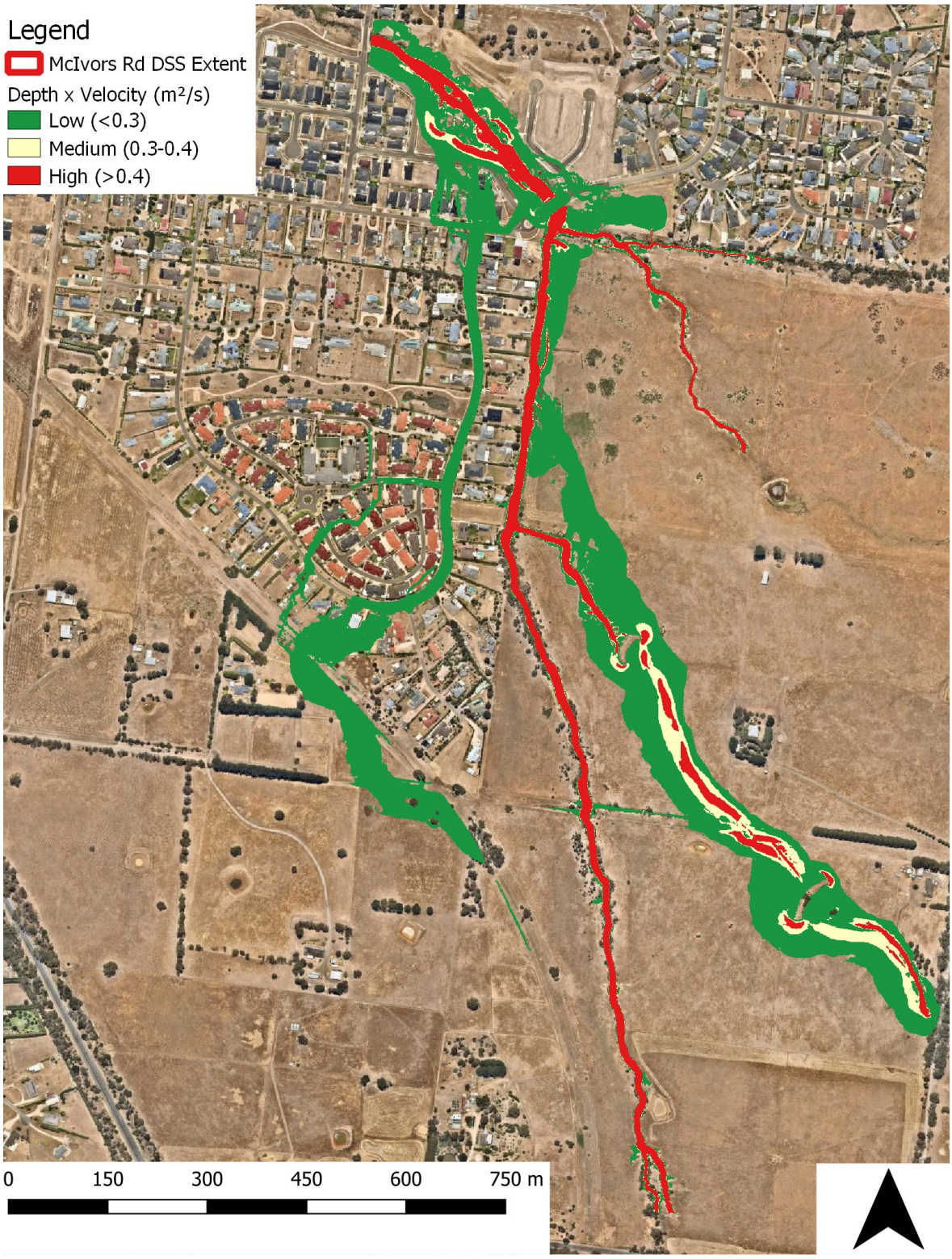


Figure 27. Inflow locations from RORB – Developed Conditions 9hr storm flows



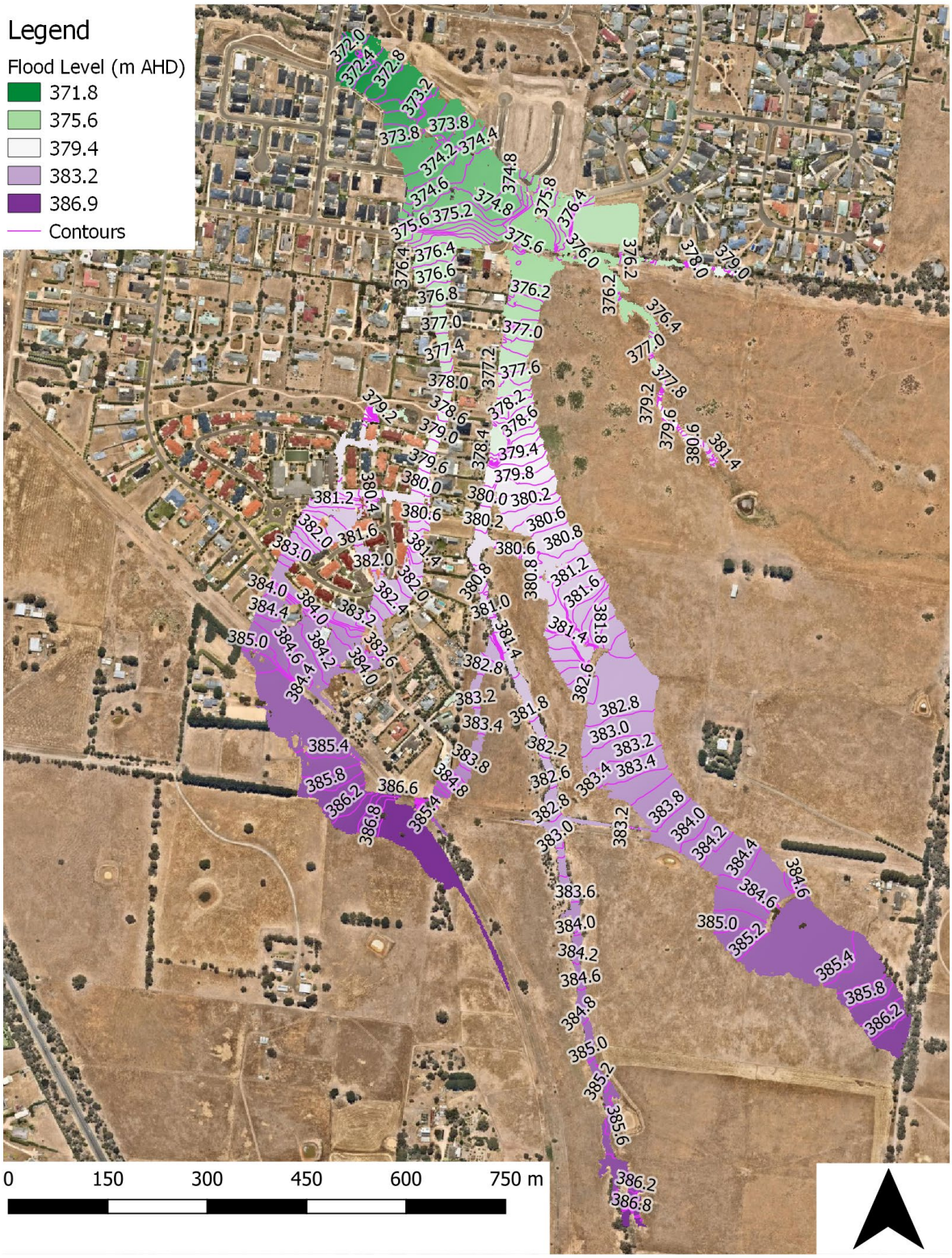
AFFLUX CONSULTING
STORMWATER MANAGEMENT SOLUTIONS

Tootle St (East), Kilmore
1% AEP Flood Depth (m)
Existing Case



AFFLUX CONSULTING
STORMWATER MANAGEMENT SOLUTIONS

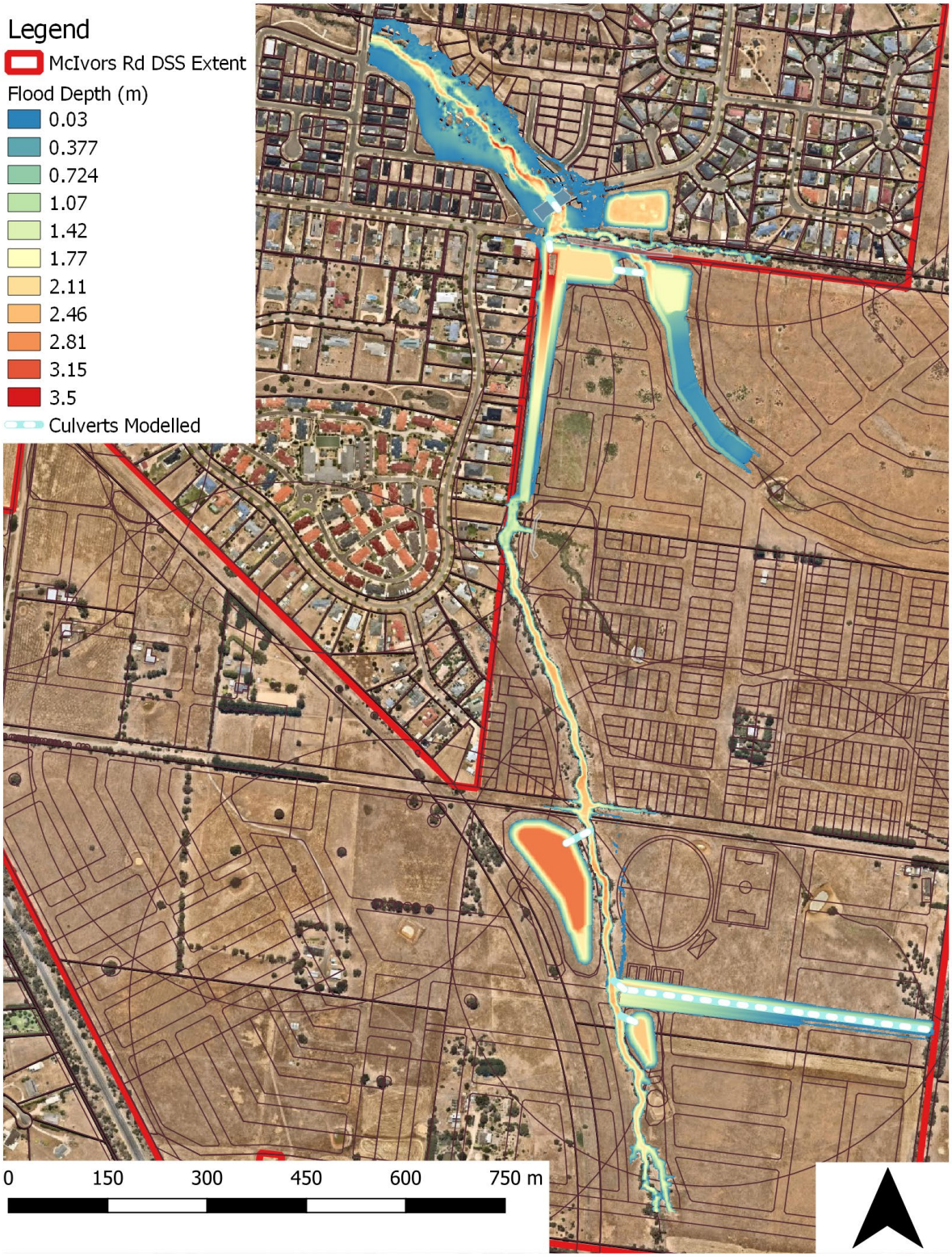
Tootle St (East), Kilmore
1% AEP
Depth x Velocity (m²/s)
Existing Case



AFFLUX CONSULTING
STORMWATER MANAGEMENT SOLUTIONS

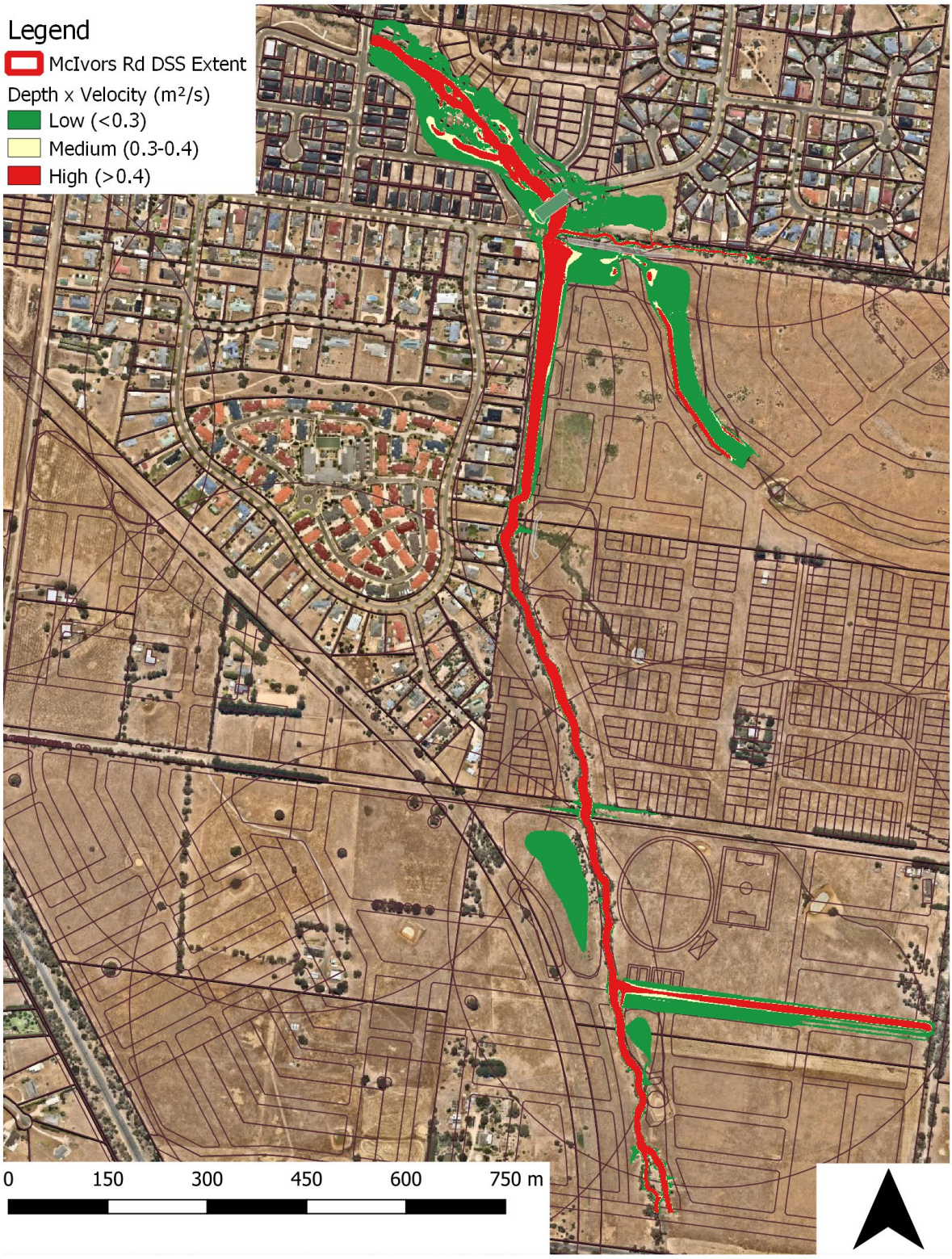
Tootle St (East), Kilmore
1% AEP Flood Level (m AHD
Existing Case

Appendix C - Developed Flood Results



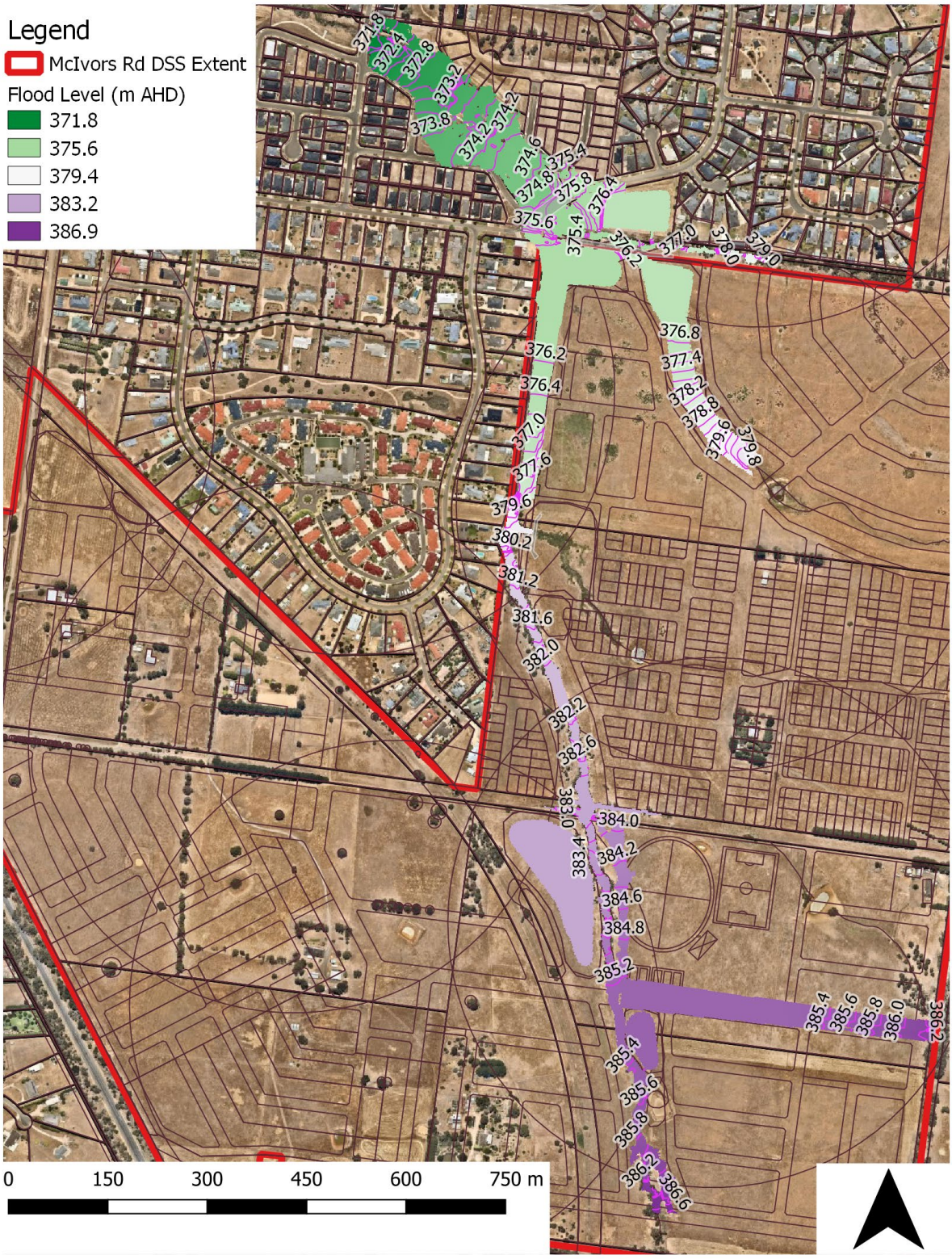
AFFLUX CONSULTING
STORMWATER MANAGEMENT SOLUTIONS

Tootle St (East), Kilmore
1% AEP Flood Depth (m)
Developed Case



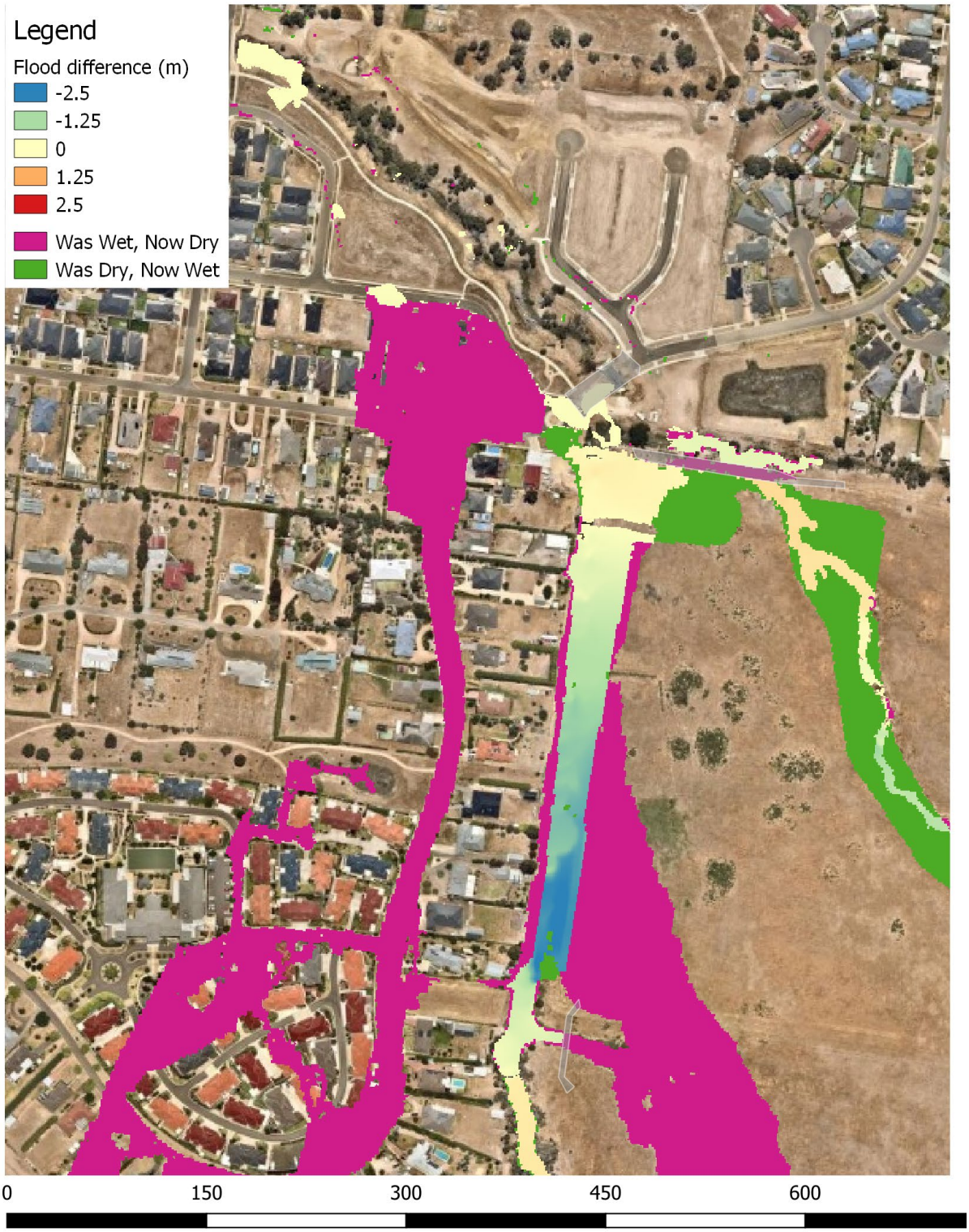
AFFLUX CONSULTING
STORMWATER MANAGEMENT SOLUTIONS

Tootle St (East), Kilmore
1% AEP
Depth x Velocity (m²/s)
Developed Case



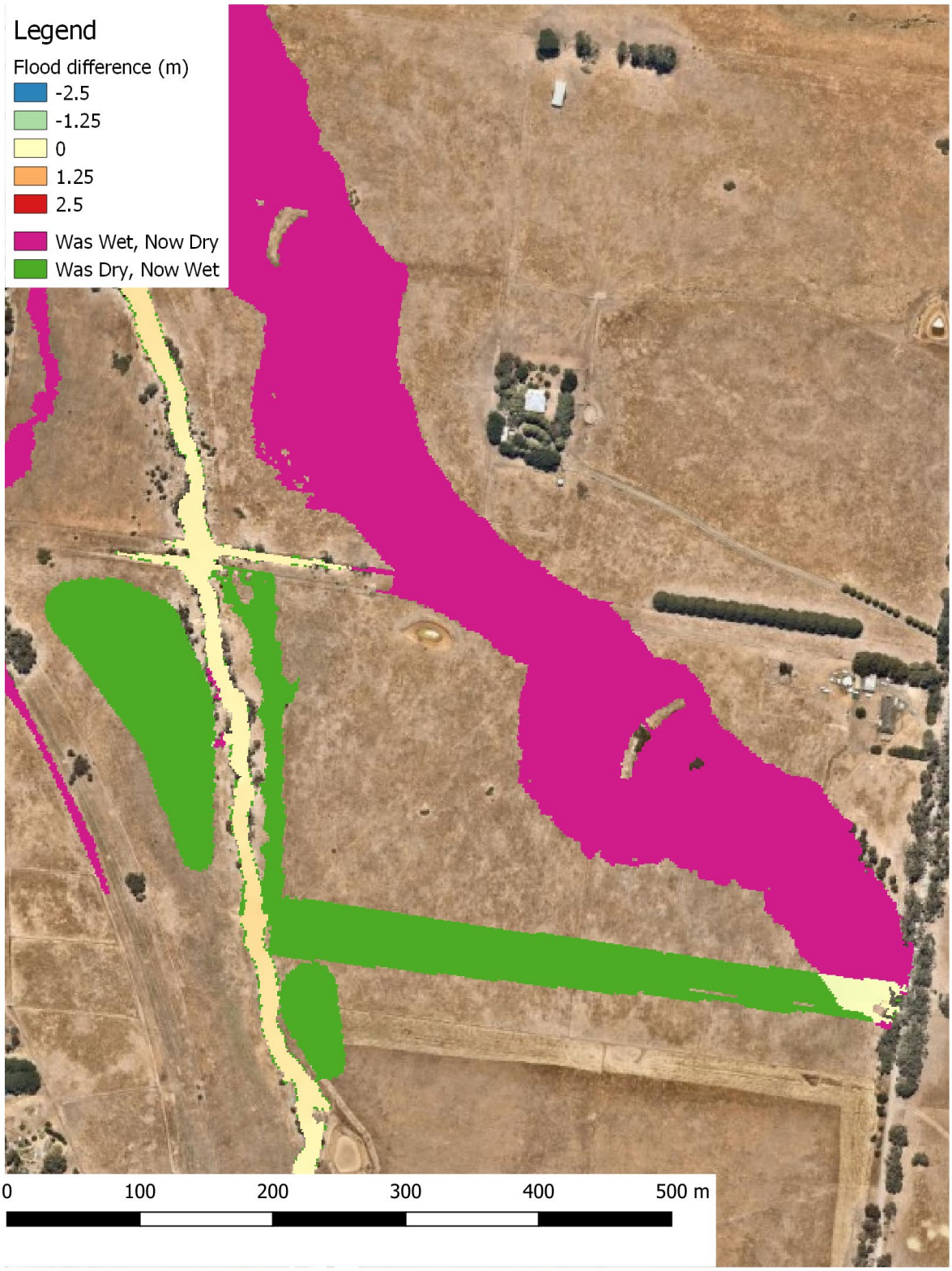
AFFLUX CONSULTING
STORMWATER MANAGEMENT SOLUTIONS

Tootle St (East), Kilmore
1% AEP Flood Level (m AHD
Developed Case



AFFLUX CONSULTING
STORMWATER MANAGEMENT SOLUTIONS

Tootle St (East), Kilmore
Difference Plot



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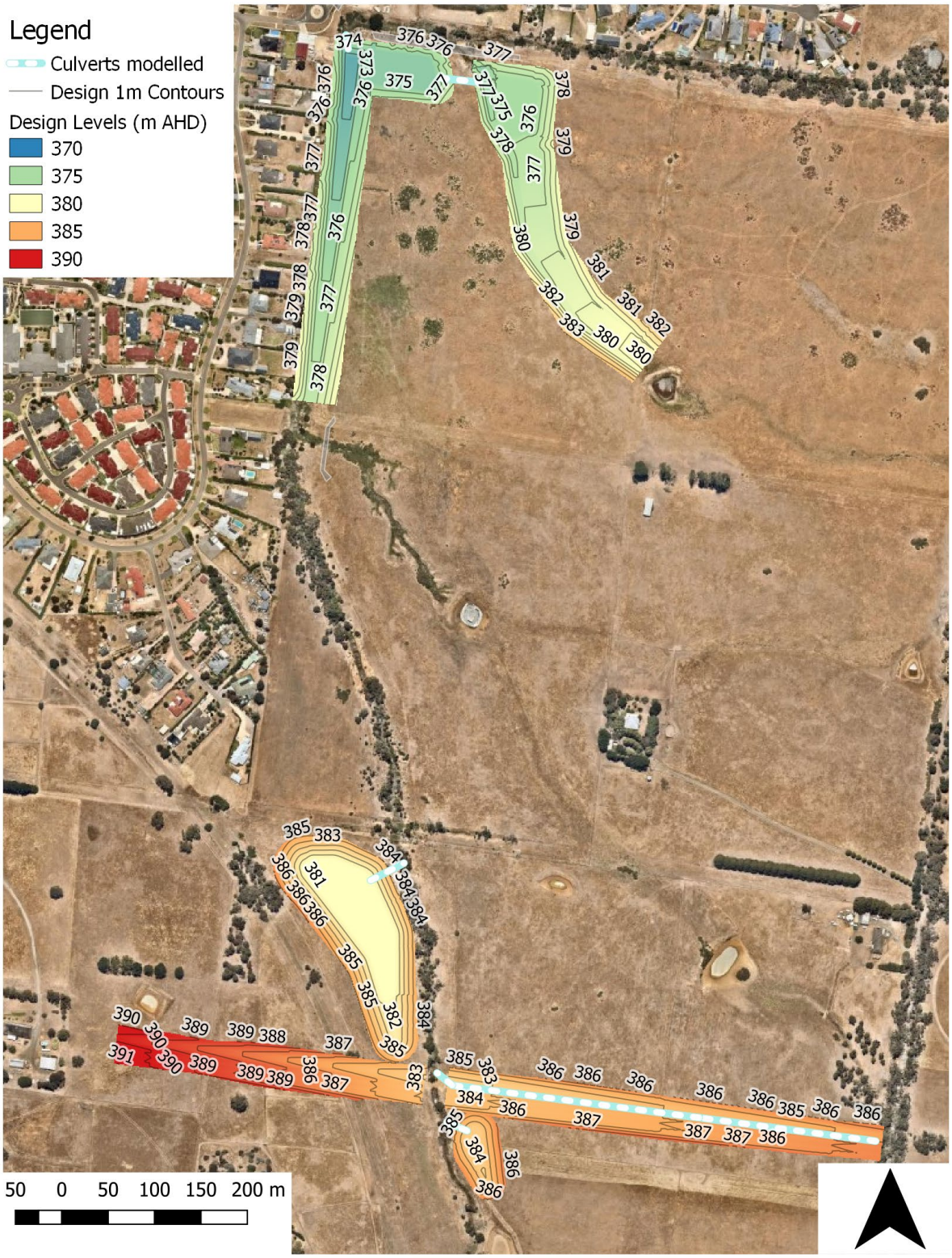
STORMWATER MANAGEMENT SOLUTIONS

Tootle St (East), Kilmore
Difference Plot

Appendix D - Proposed Concept Design



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STORMWATER MANAGEMENT SOLUTIONS

Tootle St (East), Kilmore
Design - Full


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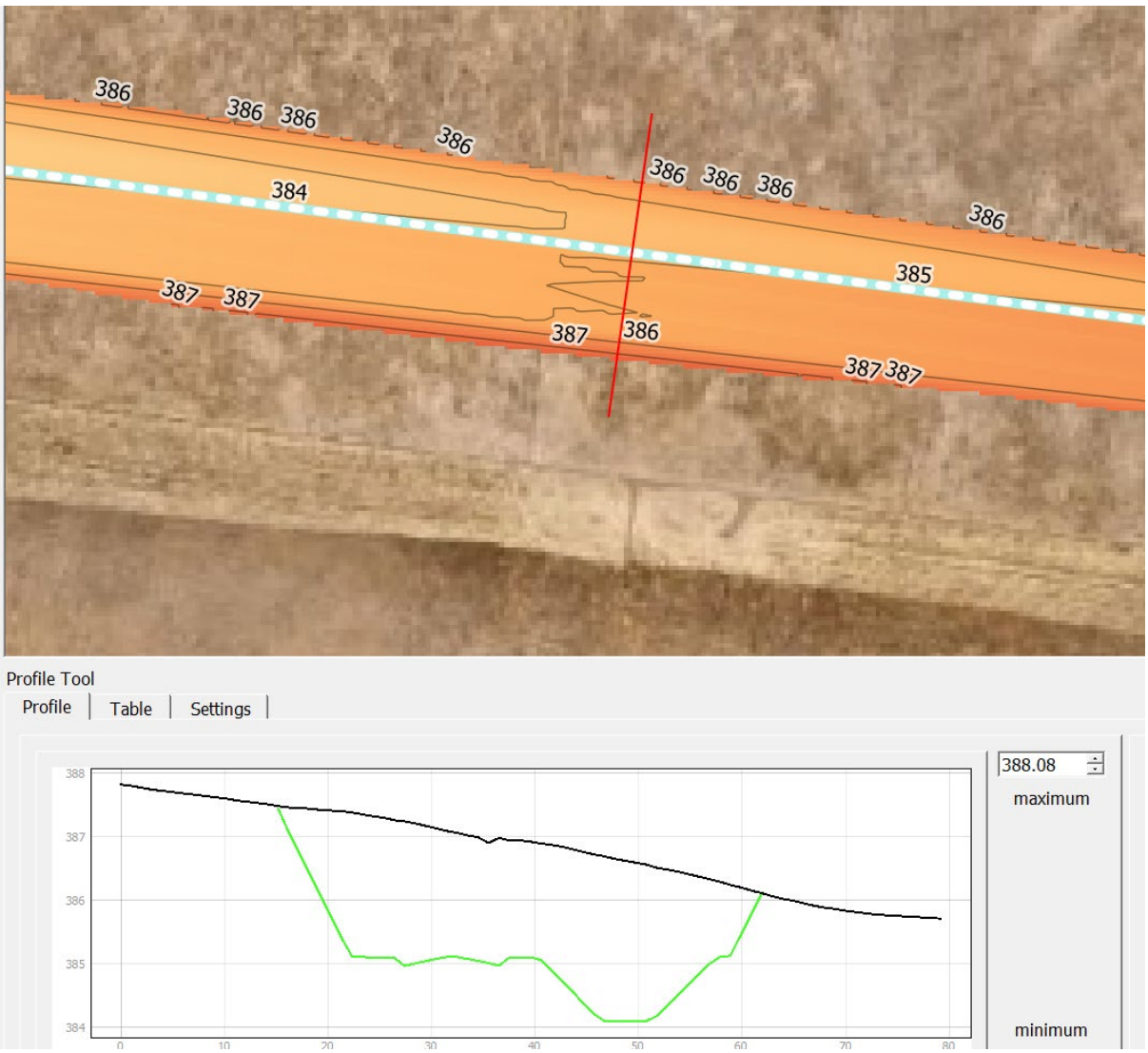
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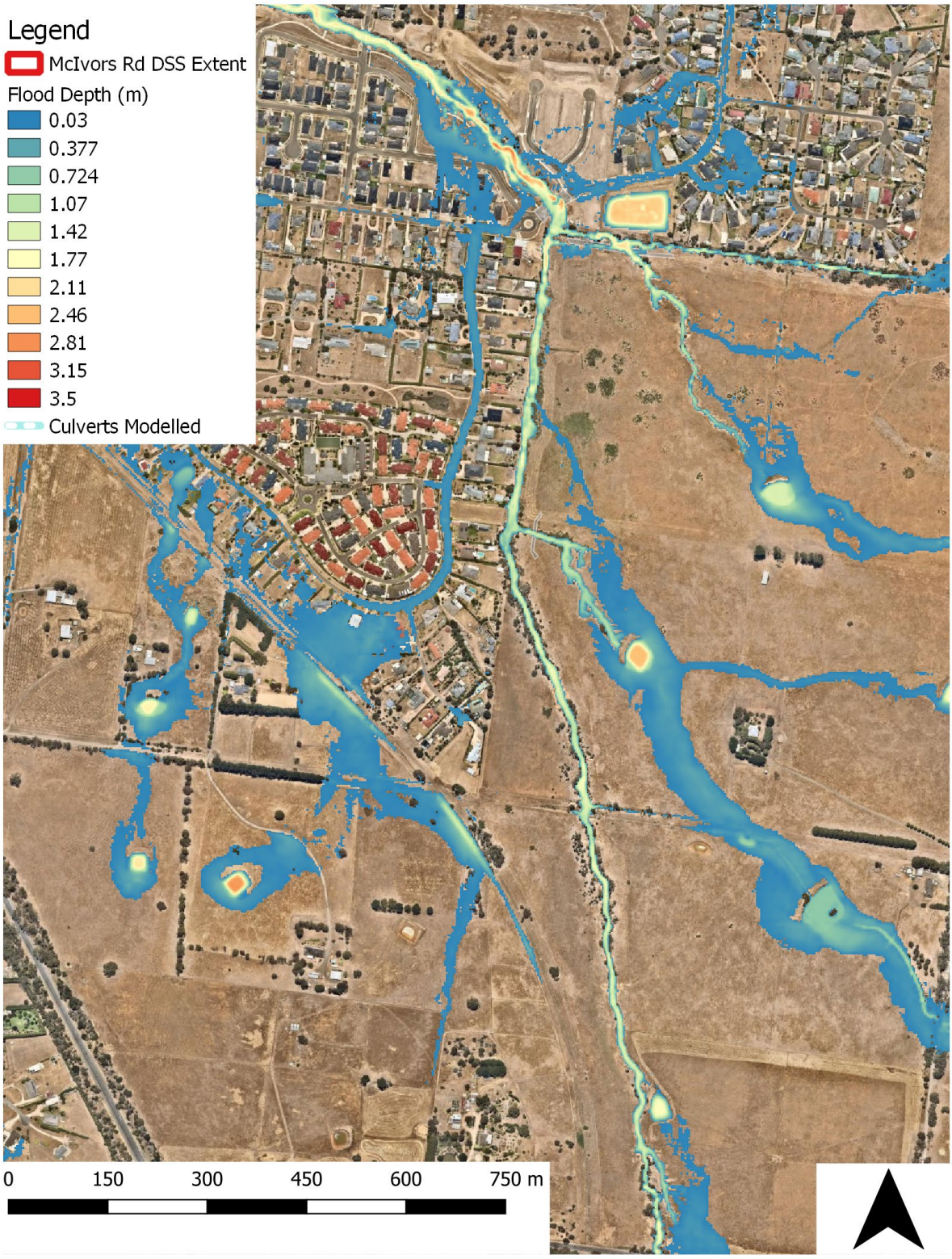
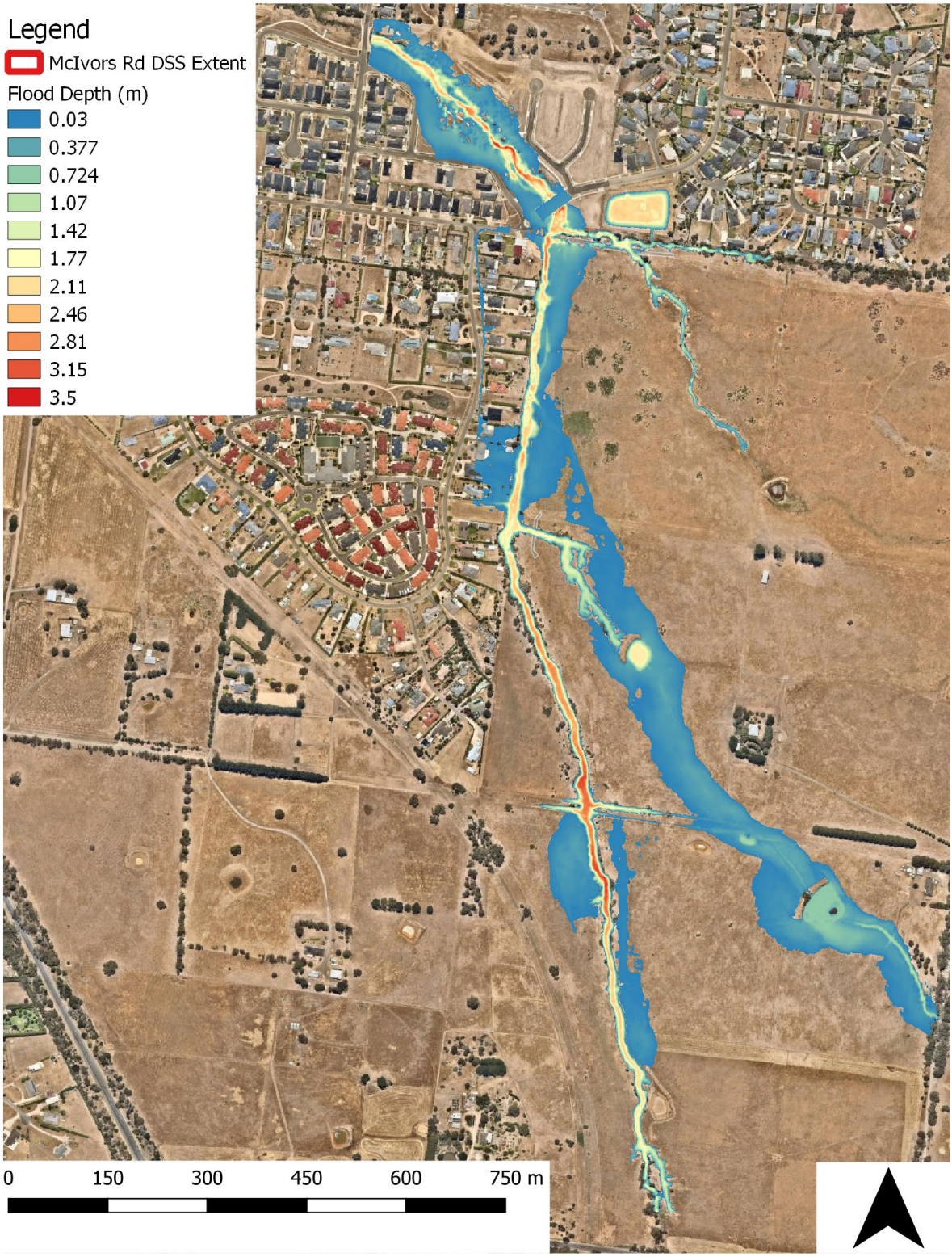


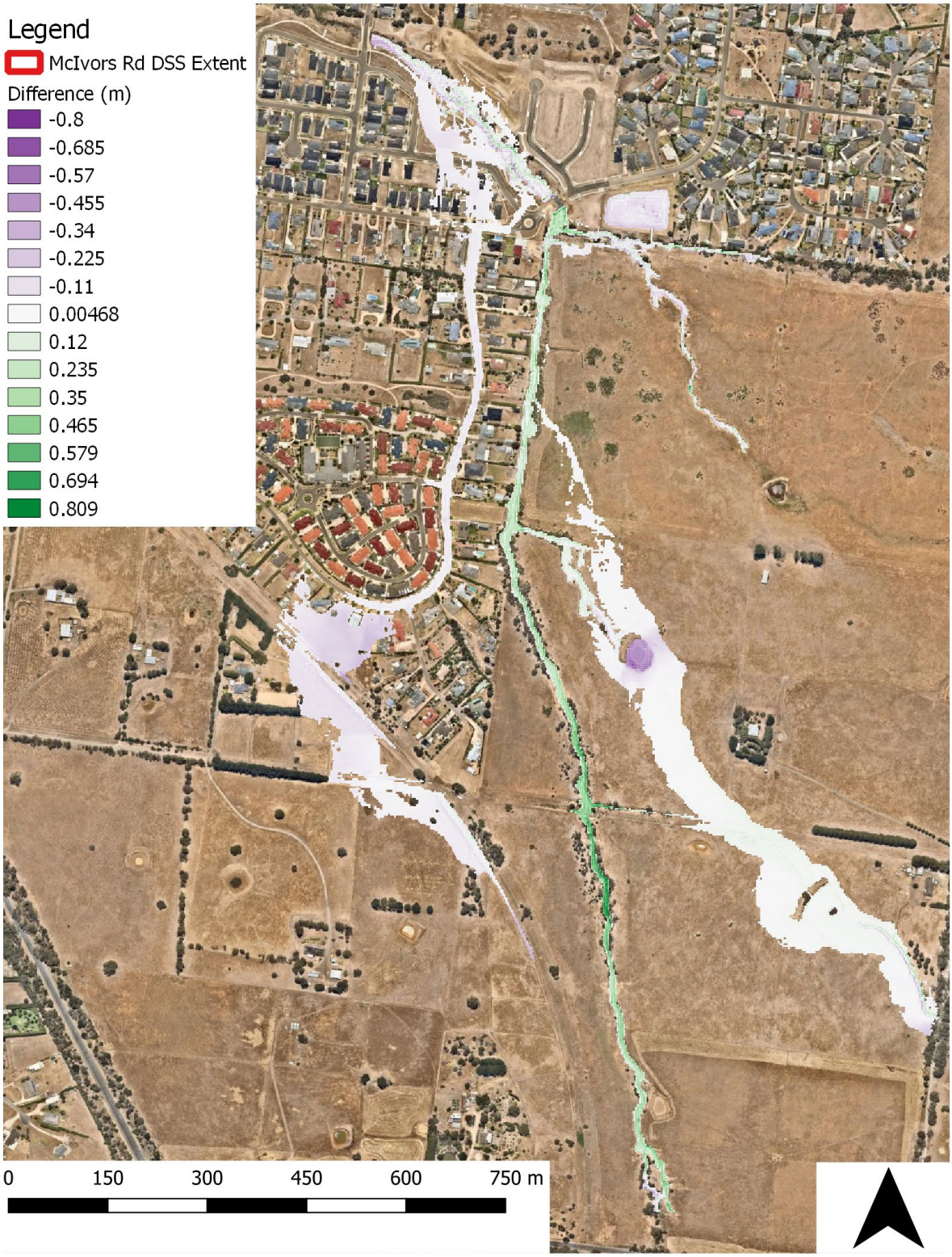
AFFLUX CONSULTING
STORMWATER MANAGEMENT SOLUTIONS

Tootle St (East), Kilmore
1% AEP Flood Depth (m)
Kilmore Flood Study
1.5hr Storm duration



AFFLUX CONSULTING
STORMWATER MANAGEMENT SOLUTIONS

Tootle St (East), Kilmore
1% AEP Flood Depth (m)
1.5hr Storm



AFFLUX CONSULTING
STORMWATER MANAGEMENT SOLUTIONS

Tootle St (East), Kilmore
Flood Difference (m)
Afflux minus Kilmore FS models

For information on this report:

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