

PLANS AND DOCUMENTS

referred to in the
APPROVAL

Dated: 26/04/2024

AMENDED IN RED

14/11/23

BCC DS

LODGED

10/05/2023

APPLICATION REF

A006269838

SITE-BASED STORMWATER MANAGEMENT PLAN

51 Devries Road, Pallara

21 February 2023

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Job No: J9960 v1.0

Job Name: 51 Devries Road, Pallara

Report Name	Date	Report No.
Site-Based Stormwater Management Plan	21 February 2023	J9960 v1.0

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1.0 INTRODUCTION

Storm Water Consulting Pty Ltd was commissioned by Alina Carey to prepare a Site-Based Stormwater Management Plan for the proposed subdivision at 51 Devries Road, Pallara.

It is proposed to subdivide the property to create 7 residential lots as well as a balance lot which is to be used for common property. This report has been prepared to recommend a lawful point of discharge for the site, assess the water quality treatment requirements for the site and to demonstrate that the proposed subdivision complies with the requirements in the Brisbane City Council's Flood Overlay Code and Waterway Corridors Overlay Code. The Flood Overlay Code and Waterway Corridors Overlay Code has been assessed in Appendix D and E respectively.

2.0 SITE CONDITIONS

2.1 Existing Site

The subject site is located within a residential area in Pallara. The property is bound by Devries Road to the north-east, Atlantic Place to the south-west and rural/residential properties in all other directions. The site contains a dwelling on the eastern side of the property. The site is predominately grassed with a scattering of trees and a dam in the middle of the site. A photograph of the dam is presented in Photograph 1, Appendix B. A locality plan is presented in Figure 2.1 below.

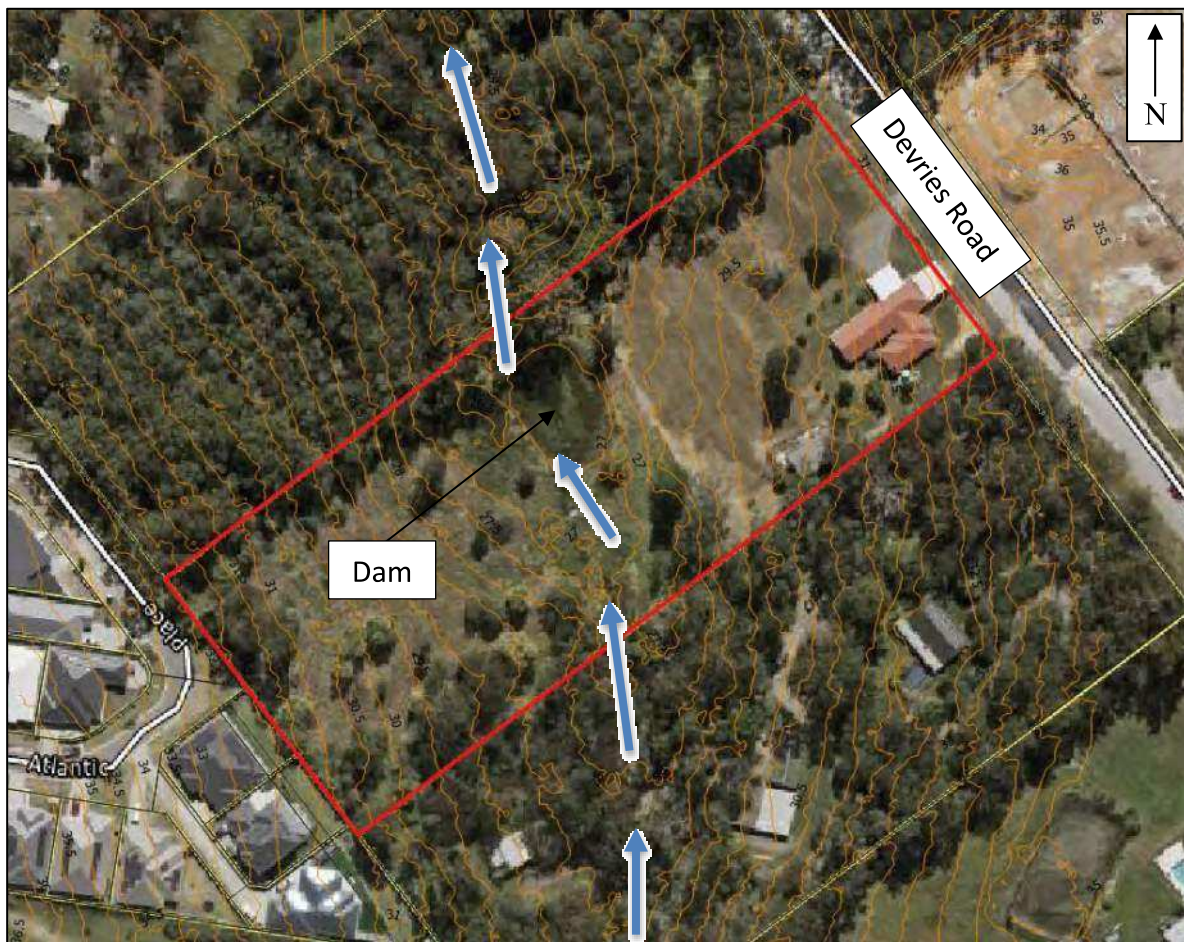


Figure 2.1 – Locality Plan

The site is located within the Council’s Overland Flow Flood Planning Area and Local Waterway Corridor Overlay. A catchment plan is presented in Figure 1, Appendix A. During significant storm events, the site would be impacted by overland flow from Catchment A to the south. The overland flow would travel in a north-westerly direction through the middle of the site.

2.2 Developed Site

It is proposed to subdivide the property to create 7 residential lots as well as a balance lot which is to be used for common property. Each lot will contain a bushfire buffer area/zone. Three lots will have access via Atlantic Place and the remaining lots via Devries Road. Figure 2.2 below illustrates the proposed layout of the site.



Figure 2.2 – Proposed Layout

3.0 HYDROLOGIC CALCULATIONS

3.1 Existing URBS Model

A hydrologic model was created using the URBS software to assess the impacts of the development and to create an inflow boundary for the hydraulic model. The sub-areas and layout for the existing URBS model are presented in Figure 2, Appendix A. The model represents the sub areas within the external catchment and subject site which contribute to flows at Point-A.

The URBS model files are presented in Appendix C, including the model layout files and results. The hydrologic model is based on the 2016 Design Rainfall Data from the Bureau of Meteorology and the latest temporal patterns from Australian Rainfall and Runoff (ARR). The URBS model was run for the 10-minute storm duration up to and including the 72 hours duration for all temporal patterns.

The default storage coefficient (α) and Non-Linearity Index (m) parameters of 1.2 and 0.8 were adopted for the model. An initial rainfall loss of 15mm and a continual rainfall loss of 2.5mm/hr has been adopted for the 63% AEP event up to and including the 1% AEP event. The existing URBS model results are presented in Table 3.1 below.

Table 3.1 – Existing URBS Model Results

AEP %	Site m ³ /s	Point-A m ³ /s
63	0.152	6.594
50	0.222	7.715
20	0.355	11.483
10	0.464	14.947
5	0.558	17.791
2	0.710	21.655
1	0.826	24.646

3.2 Developed URBS Model

The existing model was modified to include the proposed development. The developed URBS model layout is presented in Figure 3, Appendix A. The routing directions, urbanisation factor and percentage impervious were updated accordingly. It is proposed to direct the flows from each lot to the dam in the middle of the site.

Tables 3.2 and 3.3 present a comparison between the existing and developed URBS model results for the site and at Point-A. The results show that the peak discharges from the site would increase between 10% - 40% and by less than 1% at Point-A. Detention is required to mitigate the flows discharging from the site, as detailed on the following pages.

Table 3.2 – Ex v Dev URBS Model Comparison – Site

AEP %	Existing m ³ /s	Developed m ³ /s	Increase m ³ /s	Increase %
63	0.152	0.205	0.053	34.9
50	0.222	0.270	0.048	21.6
20	0.355	0.402	0.047	13.2
10	0.464	0.538	0.074	15.9
5	0.558	0.681	0.123	22.0
2	0.710	0.863	0.153	21.5
1	0.826	0.988	0.162	19.6

Table 3.3 – Ex v Dev URBS Model Comparison – Point-A

AEP %	Existing m ³ /s	Developed m ³ /s	Increase m ³ /s	Increase %
63	6.594	6.609	0.015	0.2
50	7.715	7.728	0.013	0.2
20	11.483	11.484	0.001	0.0
10	14.947	14.949	0.002	0.0
5	17.791	17.792	0.001	0.0
2	21.655	21.646	-0.009	0.0
1	24.646	24.632	-0.014	-0.1

3.3 Developed Mitigated URBS Model

To mitigate the impacts of the development, an underground detention tank is proposed for each lot. It is proposed to locate each detention tank at the rear of each lot within the bushfire buffer zone. Figure 3.1 below illustrates the approximate location for each detention tank, as described above. All flows from sub areas 9-14 and 15-20 are to be discharged to the detention tanks. The modelled detention tank parameters are listed in Table 3.4. Detailed tank results are presented in Appendix C. The tanks have been sized based on a typical “Ausdrain” system. The URBS model was set up to model two detention tanks, one for each side of the waterway corridor. The volume for each detention tank was then prorated based on the area of each lot.

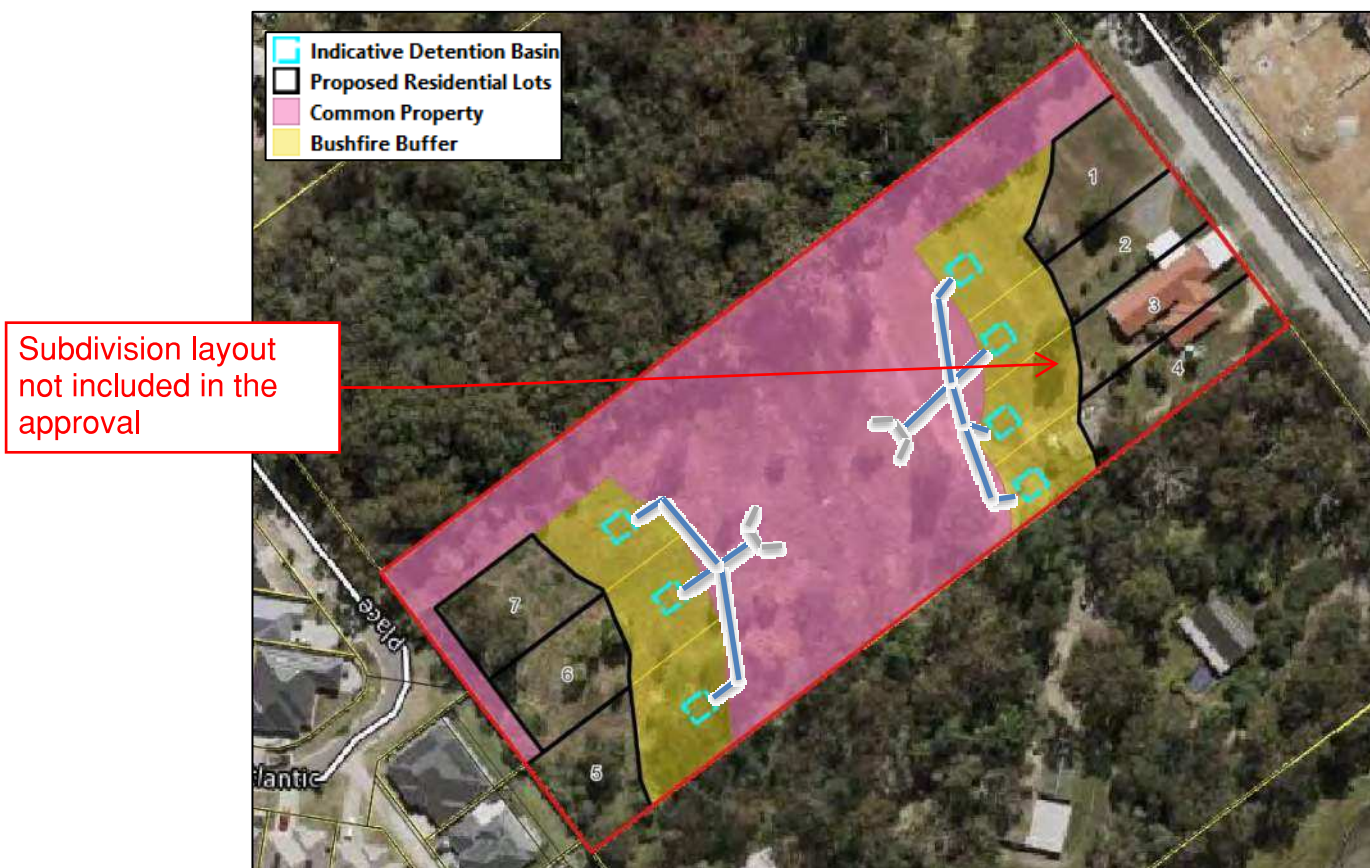


Figure 3.1 – Conceptual Detention Tank Location

Table 3.4 – Proposed Detention Tank Size for Lots 5-7

Lot	Tank Depth m	Tank Area m ²	Tank Volume m ³
5	1.35	22.5	27.5
6	1.35	28.7	35.1
7	1.35	28.7	35.1

Each tank must have a 50mm outlet at the invert of the tank and a 105mm and 110 mm outlet at 0.75m and 1.1m above the invert of the tank respectively.

Table 3.5 – Proposed Detention Tank Size for Lots 1-4

Lot	Tank Depth m	Tank Area m ²	Tank Volume m ³
1	1.35	24.7	30.2
2	1.35	22.4	27.3
3	1.35	26.0	31.8
4	1.35	31.0	37.9

Each tank must have a 40mm outlet at the invert of the tank and a 130mm outlet 0.8m above the invert.

The URBS model was re-run with the detention tanks included. Table 3.6 and 3.7 below and on the following page presents a comparison between the existing and developed mitigated results for the site and at Point-A. The results show that with the inclusion of the detention tanks, there would generally be minor reductions in peak discharges for the design AEP events.

Table 3.6 – Ex vs Dev Mitigated URBS Results – Site

AEP %	Existing URBS m ³ /s	Developed Mitigated URBS m ³ /s	Increase m ³ /s	Increase %
63	0.152	0.152	0.000	0.0
50	0.222	0.208	-0.014	-6.3
20	0.355	0.319	-0.036	-10.1
10	0.464	0.436	-0.028	-6.0
5	0.558	0.533	-0.025	-4.5
2	0.710	0.672	-0.038	-5.4
1	0.826	0.778	-0.048	-5.8

Table 3.7 – Ex vs Dev Mitigated URBS Results – Point-A

AEP %	Existing URBS m³/s	Developed Mitigated URBS m³/s	Increase m³/s	Increase %
63	6.594	6.594	0.000	0.0
50	7.715	7.707	-0.008	-0.1
20	11.483	11.474	-0.009	-0.1
10	14.947	14.944	-0.003	0.0
5	17.791	17.791	0.000	0.0
2	21.655	21.651	-0.004	0.0
1	24.646	24.646	0.000	0.0

The detention tanks have been designed to mitigate the increase in discharge from the proposed subdivision. Each tank is proposed to outlet towards the middle of the site. The lawful point of discharge for the development is the waterway corridor.

4.0 HYDRAULIC MODELLING

A TUFLOW 2D hydrodynamic model was prepared to model the extent of the inundation across the site. The model setup and parameters are discussed below.

4.1 TUFLOW Model

The TUFLOW model was based on a 1m grid size with elevation data assigned from the ALS survey data sourced from the State Government. As the overland flow is within the waterway corridor, the 1% AEP overland flow event was modelled. The URBS model was re-run with an initial loss of zero for the 1% AEP event, resulting in a peak discharge of 25.03m³/s at Point-A. This hydrograph was used as the inflow boundary for the TUFLOW model. Manning's values of $n=0.10$, $n=0.02$, $n=0.035$, $n=0.15$ and $n=0.1$ were used in the model to represent developed properties, roads/concrete, grassed areas, waterway corridor and densely vegetated areas respectively, as illustrated in Figure 4.1 below. Figure 4, Appendix A illustrates the TUFLOW model setup. The 1% AEP water surface level (WSL), depth, velocity and velocity-depth plots are presented in Figures 5-8, Appendix A. The results show that the proposed lots are not inundated during the 1% AEP overland flow event and will therefore not create a material adverse impact to any neighbouring properties.



Figure 4.1 – Manning's Roughness Coefficient Map

5.0 MINIMUM FLOOD IMMUNITY LEVELS

5.1 Minimum Lot Levels

The following table presents the minimum flood planning levels for reconfiguring a lot based on Table 8.2.11.3.J in the Flood Overlay Code.

Table 5.1 – Minimum Lot Level Requirements

Flooding Type	Minimum Lot Level (m AHD)
Waterway Corridor	1% AEP Flood Level + 300mm

Table 5.2 below presents the 1% AEP WSL at the upstream end of each proposed lot, the minimum lot levels and the existing minimum ground levels.

Table 5.2 – Minimum Lot Level Requirements

Lot	1% AEP WSL m AHD	Min. Lot Level m AHD	Existing Min. Ground Level (excluding bushfire zone) m AHD
1	27.7	28.0	29.4
2	27.8	28.1	30.0
3	28.1	28.4	30.0
4	28.3	28.6	30.4
5	29.1	29.4	29.7
6	28.7	29.0	29.6
7	27.8	28.1	29.6

As shown in Table 5.2 above, the minimum ground levels within all proposed residential lots are above the minimum lot levels. Therefore, no fill is required to achieve the minimum flood immunity levels.

5.2 Flood Overlay Code Assessment

Section C of the Flood Overlay Code has been addressed in Appendix D of this report. The existing ground levels on each proposed lot are above the minimum lot level requirement. No filling is therefore required to comply with the minimum flood immunity levels for the subdivision. Each lot within the proposed subdivision has flood-free access.

5.3 Waterway Corridors Overlay Code Assessment

Section C of the Waterway Corridors Overlay Code Assessment has been addressed in Appendix E of this report. No development is proposed within the waterway corridor. The proposed subdivision does not increase the number of lot boundaries that cross the waterway corridor as the corridor is located entirely within the common property.

6.0 WATER QUALITY

6.1 State Planning Policy (2017)

The State Planning Policy (SPP) is a key component of Queensland's land use planning system, which enables development, protects our natural environment and allows communities to grow and prosper. The SPP provides a comprehensive set of principles which underpin Queensland's planning system to guide local government and the state government in land use planning and development assessment.

In terms of water quality, the SPP seeks to protect and enhance the environmental values and quality of Queensland waters. A development application for any of the criterion listed in Table 6.1 below requires compliance with the SPP code: Water Quality (Appendix 2 of SPP).

Table 6.1 – Development Applications affecting Receiving Waters

State Planning Policy Criteria	Application to Development
(1) A material change of use for urban purposes that involves a land area greater than 2500 square metres that: (a) will result in an impervious area greater than 25 per cent of the net developable area, or (b) will result in six or more dwellings, or	Criterion is NOT applicable to development.
(2) Reconfiguring a lot for urban purposes that involves a land area greater than 2500 square metres and will result in six or more lots, or	Criterion is applicable to development.
(3) Operational works for urban purposes that involve disturbing more than 2500 square metres of land.	Criterion is NOT applicable to development.

The development triggers the State Planning Policy Criteria in Table 4.1 as the proposed subdivision will result in six or more lots.

A relaxation for this requirement is requested due to the following site constraints:

- The lots are separated by the waterway corridor and therefore cannot be treated by a single water quality treatment system. A water quality treatment system is therefore required for each side of the waterway corridor.
- The flows from each lot need to discharge to the middle of the site as per the Brisbane City Council prelodgement advice. The water quality treatment device will need to be located close to the middle of the site. This is problematic as:
 - Development within the waterway corridor is prohibited, a bio-retention type system cannot be located within the waterway corridor.

- Each lot requires a bushfire management zone that does not allow for any reeds, grasses and other such planting that will result in an area of continuous fuel which can carry a fire. It would therefore not be possible to locate a bioretention basin within the bushfire management zone as the planting would act as a fuel to carry fire.

7.0 RESPONSE TO PRELODGE MENT ADVICE

A response to the flooding and stormwater items in the Brisbane City Council's Prelodgement Advice dated 19 October 2022 is presented below.

Flooding

Item 1

'A Flood Study prepared and certified by an RPEQ will be required in order to demonstrate compliance with the Code. All flooded parts of waterway will need to be located within common property so that there are no boundary fence crossings of the waterway and an easement for overland flow purposes in favour of Council provided.'

SWC Response:

The flood and waterway corridors overlay codes have been addressed in Appendix D and E of this report. The waterway corridor is located entirely within the common property. The proposed development is considered to be compliant with the requirements in the Flood Overlay Code and Waterway Corridor Overlay Code.

Item 2

'All lots are to be completely flood free, being at the 1% AEP +300mm minimum level from the waterway flooding using a manning's roughness value of 0.15.'

SWC Response:

All lots (excluding the bushfire buffer area) are located above the minimum lot levels (1% AEP + 300mm) as presented in Section 5.0 of this report.

Item 3

'No filling of the waterway corridor will be permitted'

SWC Response:

No filling is proposed within the waterway corridor.

Item 4

'All lots must be above any 2% AEP flooding in Devries Road, and ideally no standard K&C provided because there is no capacity to take flows in existing pipes. Provide hydrological/hydraulic calculations for any culvert crossing of the existing swale.'

SWC Response:

The detailed civil design of the road frontage is to account for any flows within Devries Road.

Stormwater

Item 1

'A Lawful Point of Discharge (LPD) is to be demonstrated. Guidelines as to what Council constitutes to be a satisfactory Lawful point of discharge may be found in section 7.6 of the Infrastructure Design PSP (ID PSP).'

SWC Response:

Detention tanks have been designed to mitigate the increase in discharge from the proposed subdivision. It is proposed to outlet the flows from the detention tanks to the dam within the site.

Item 2

'The development does not have a LPD as the existing and downstream waterways are under private ownership. Consequently, stormwater detention would need to be provided and discharge points should be no closer to downslope properties than midway through the development to allow time for flows to dissipate.'

SWC Response:

Detention tanks have been sized to mitigate the increase in discharge from the proposed subdivision. It is proposed to discharge the flows to the middle of the site.

Item 3

'A freehold ROL is unlikely to be supported from a stormwater perspective as detention/bio-basins associated with an ROL need to be owned and maintained by a single entity (usually council) but in this instance would need to be privately owned and located within common property.'

SWC Response:

A detention tank is proposed for each lot, a relaxation from the water quality treatment requirement has been requested as presented in Section 6.1.

8.0 CONCLUSIONS

It is proposed to subdivide the property to create 7 residential lots as well as a balance lot which is to be used for common property. Each lot will contain a bushfire buffer area/zone. Three lots will have access via Atlantic Place and the remaining lots via Devries Road.

A TUFLOW 2D hydrodynamic model was prepared to model the extent of the inundation across the site. The results show that the middle of the site is inundated during the 1% AEP flood event.

Section C of the Flood Overlay Code has been addressed in Appendix D of this report. The existing ground levels on each proposed lot are above the minimum lot level requirement. No filling is therefore required to comply with the minimum flood immunity levels for the subdivision. Each lot within the proposed subdivision provides flood-free access.

Section C of the Waterway Corridors Overlay Code Assessment has been addressed in Appendix E of this report. No development is proposed within the waterway corridor. The proposed subdivision does not increase the number of lot boundaries that cross the waterway corridor as the corridor is located entirely within the common property.

Detention tanks have been sized in Section 3.0 to ensure that the proposed development does not increase the peak discharges at the downstream boundary of the site.



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Director

LIST OF APPENDICIES

APPENDIX A – Figures

APPENDIX B – Photographs

APPENDIX C – URBS Data

APPENDIX D – Flood Overlay Code Assessment

APPENDIX E – Waterway Corridors Overlay Code Assessment

APPENDIX A

Figures



Point-A

Catchment A (69.42ha)

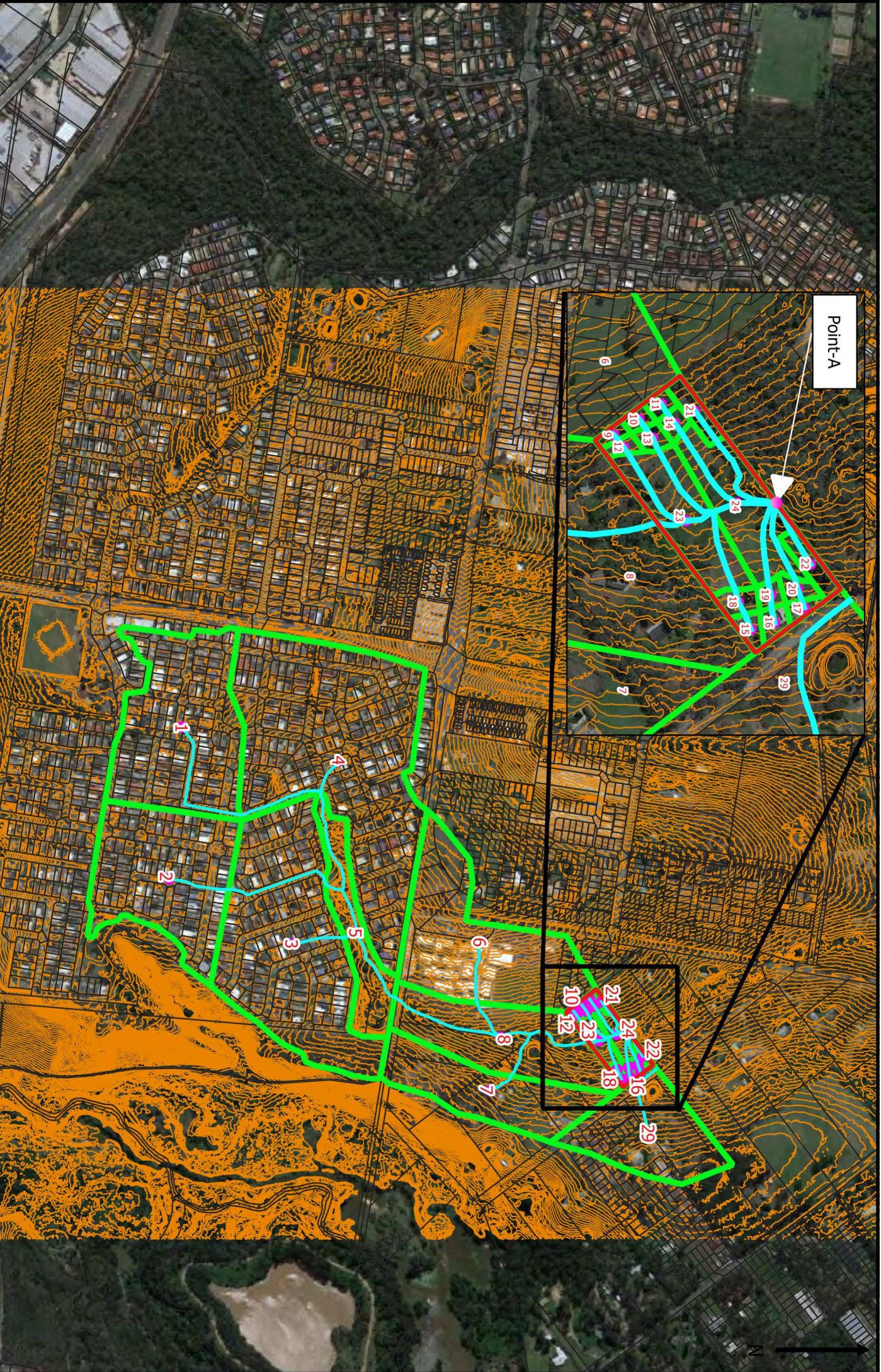
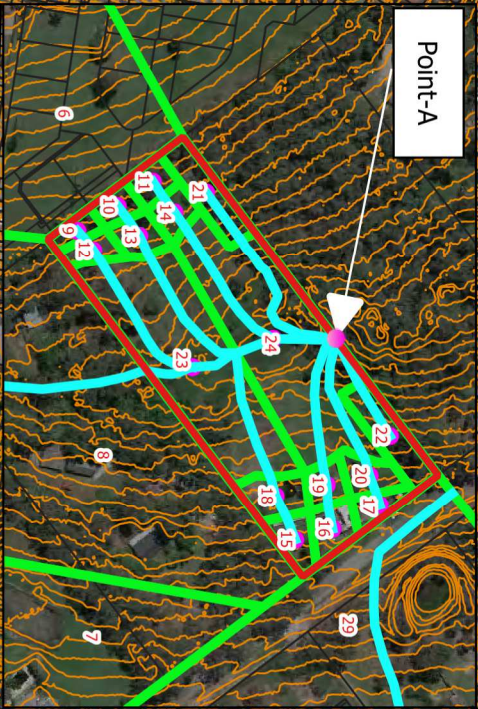
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Figure 1
Catchment Plan

Point-A



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Figure 2
Existing URBS Model Setup