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STORMWATER MANAGEMENT PLAN

209 McRoyle Street, Wacol

Submission to Brisbane City Council

April 2022

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Credential:	MIEAust CPEng, RPEQ 
Date:	1 April 2022

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0	First Issue	26 October 2021
1	Revised based on amended site plan	01 April 2022
2		

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1. Introduction

Bana Consulting Engineers (BCE) has been commissioned to develop a Site Based Stormwater Management Plan (SMP) for the proposed industrial development at 209 McRoyle Street, Wacol. The development includes fill earthwork, establishing onsite driveways and carparks, construction of retaining walls at the site boundaries and development of two separate sections for industrial use. The site locality is shown in Figure 1.

The proposed SMP employs the principles of Water Sensitive Urban Design (WSUD), which focuses on reducing stormwater flows and pollutant export from the site with consideration of visual aesthetics of the urban landscape, the site utilisation, and existing constraints. This report includes the study details in regard to:

- Stormwater quality assessment using MUSIC software to achieve pollutant reduction objectives in accordance with Section 7.9.3 of Planning Scheme for permanent water quality control.
- Pre and post developed hydrology and hydraulics assessment using DRAINS model and mitigation of the site post development flows in compliance with the stormwater code.

It is shown that by implementing the proposed stormwater management provisions, the stormwater pollutant loads will be reduced in accordance with the SEQ stormwater treatment objectives and flow attenuation requirements will be achieved in compliance with the Council stormwater code.

2. Site Condition

The subject site in this Concept Stormwater Management Plan (SMP) is located at Lot 72 RP 82703 commonly known as No. 209 McRoyle Street, Wacol. The site has an area of 15661m².

The site development proposal is shown in the SMP drawing in Attachment 1. The proposed development will improve the site condition for future industrial use. However, the future site use has not yet been planned and as such not been included in this concept stormwater management plan.

In the proposed development, the existing residential building and small storage sheds will be kept and the proposed fill earthworks will be undertaken mainly at the rear of the site. The site aerial view extracted from BCC online mapping is shown in Figure 1.

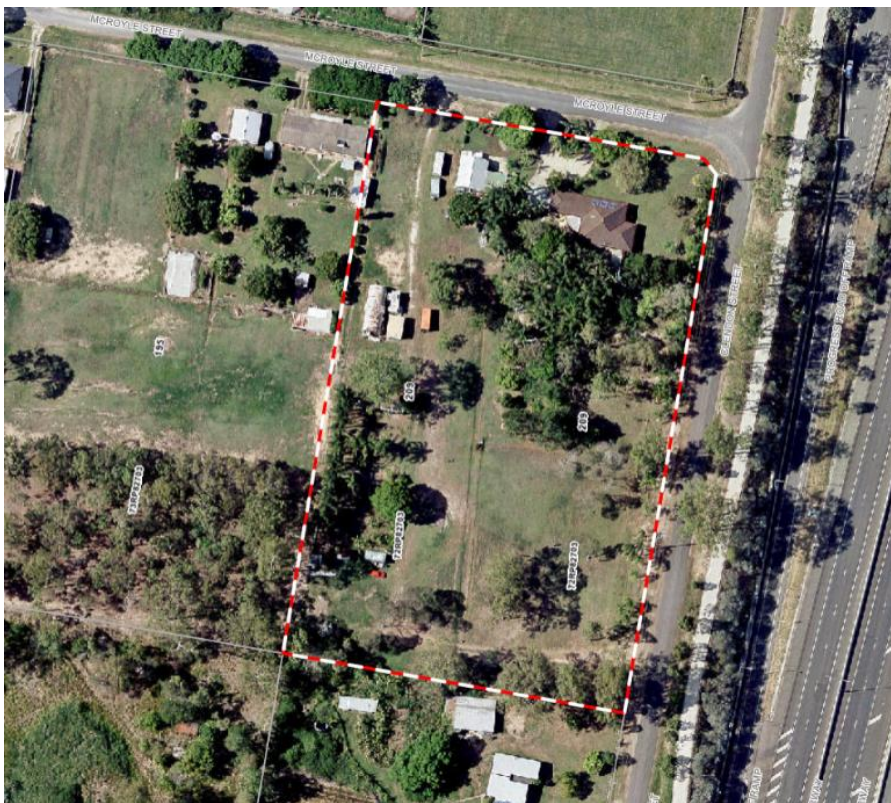


Figure 1: Site Aerial View

The site is bounded by McRoyle Street from the north, Clendon Street from the east and low density developments from the south and west. The site has approximately 5% grade in north east-south west direction.

McRoyle and Clendon Streets do not have a stablished stormwater piping system. The site stormwater flows away from these streets to the south west corner, runs through Lot 73 RP 82703 (195 McRoyle St) and discharges to Bullock Head Creek. The local surface elevations extracted from 2014 Lidar data and the site runoff directions are shown in Figure 2.

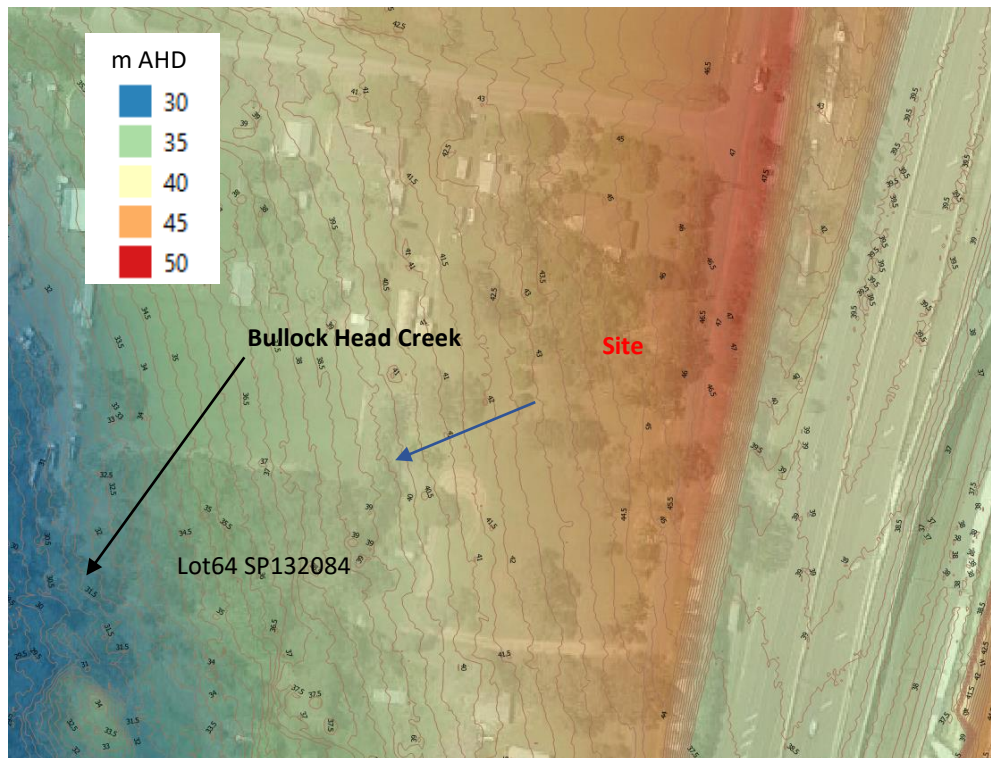


Figure 2: Local Elevations and Stormwater Directions

The site pre and post development surface areas and the allocated impervious rate to each area are shown in Table 1. The post development surface types and their locations are identified in the drawing provided in Attachment 1. The site has a relatively small amount of roof catchments and as such in this table the collective area of all roof catchments is provided. In the proposed development plan the site will be divided to two sections. The surface details of the two section has been provided in the table as ‘Site 1’ and ‘Site 2’.

As shown in Table 1, the site current impervious rate is 4.6% which with the proposed development will increase to 55.5%.

Table 1: Site areas and imperviousness in pre and post development condition

	Catchment	Existing		Developed	
		Area	%Impervious	Area	%Impervious
Site 1	Roof	371	100	371	100
	Ground Pervious	7401	5	6281	40
	Ground Impervious	0	100	1120	100
	Total	7772	9.5	7772	51.5
Site 2	Roof	0	100	129	100
	Ground Pervious	7889	0	5324	40
	Ground Impervious	0	100	2436	100
	Total	7889	0	7889	59.5
Site		15661	4.6	15661	55.5

3. Stormwater Management Strategy

The site SMP is shown in Attachment 1. The considerations in the proposed SMP and implemented measures to offset the development impacts are summarised below:

- The proposed fill earthwork will not change the direction of the site grades. The site surface grade will be kept toward the site south west corner with at least 1% grades.
- The site runoff will be directed to two bioretention basins for quantity mitigation and quality treatment. The specification of each basin is as follows:
 - o Surface area: 200m²
 - o Filter area: 60m²
 - o Detention Volume: 150m³
- The surcharges from the proposed bioretention basins will be captured into the proposed inlet pits and will be piped to the site discharge point behind the proposed retaining wall. A 'level spreader' structure will be located at the back of the wall to ensure the site discharge to the downstream property will continue to spread along the site boundary. The neighbour's consent has been acquired.
- The level spreader to be developed along at least 20m of the site border with downstream neighbors to ensure the development will not concentrate stormwater discharge onto these properties. The level spreader length has been estimated in accordance with the method described in the Catchment and Creek guidelines and based on the 1% AEP flow discharge. The minimum estimated length is about 7m, however the conservative value of 20m has been considered to allow the smooth transition of the flow to the downstream area.
- An erosion and sedimentation plan to be provided for the site prior to commencing the works.

4. Flow Analysis and Mitigation

The DRAINS computer software was used to model the site catchments, determine the pre and post development peak flows generated and assess the stormwater management requirements. Intensity Frequency Duration (IFD) data and rainfall temporal patterns used in the modelling is based on ARR 2019, extracted for the site address. The pre and post development catchments were modelled with the details shown in Table 1.

The initial and continuous loss hydrologic model was used in the runoff calculations as per ARR 2019 recommendation. The loss values included in the model are as follows:

- Impervious Areas: IL=5mm, CL=0mm
- Pervious Areas: IL=15mm, CL=2.5mm

The site peak discharges in different design events for the pre and post development conditions are shown in Table 2. As shown, by implementing the proposed mitigation measures flows will be reduced to less than the existing condition for all the design events. With the proposed mitigation strategy, no adverse impact on the downstream neighbouring properties is expected.

Table 2: Mitigation effect of proposed detention measures

Design AEP	Existing	Developed-Mitigated
0.5EY	0.320	0.163
0.2EY	0.413	0.199
10%	0.495	0.358
5%	0.584	0.508
2%	0.680	0.646
1%	0.788	0.722

5. Water Quality Modelling

The load based pollutant reduction objectives outlined in Clause 2.2.3 of Council Stormwater Management Standards for Development are as follows.

- 80% reduction in total suspended solids (TSS).
- 60% reduction in total phosphorus (TP).
- 45% reduction in total nitrogen (TN).
- 90% reduction in litter / gross pollutants (GP).

The above objectives will be achieved by placing a series of stormwater quality treatment measures as part of the site development. To demonstrate sufficiency of this treatment measures, the site was modelled using MUSIC computer software. MUSIC is widely accepted as the industry standard for water quality modelling and is a reliable tool for assessment of the treatment train effectiveness.

The treatment measures specifications have been incorporated in the model as shown in the SMP presented in Attachment 1.

The load-based pollutant reduction (treatment train effectiveness) figures were derived from the model for different arrangements and the solution providing the best management was selected.

For the purposes of the MUSIC modelling the site was broken up into roof and ground areas with the perviousness details shown in Table 1. The catchment parameters modelled for different land uses were derived from the *Water by Design MUSIC Modelling Guidelines V1.0, 2010*. The results of the MUSIC modelling are summarised in Table 3.

Table 3: MUSIC Modelling Results

	Source	Residual Load	% Reduction	Objective %
Flow (ML/yr)	7.42	7.16	3.6	N/A
Total Suspended Solids (kg/yr)	3130	284	90.9	80
Total Phosphorus (kg/yr)	5.03	1.3	74.2	60
Total Nitrogen (kg/yr)	17.7	9.19	47.9	45
Gross Pollutants (kg/yr)	192	0	100	90

As shown the proposed stormwater quality treatment train achieves all the pollution reduction objectives and therefore provides an acceptable level of treatment for the site.

6. Conclusion

The SMP developed by Bana Consulting demonstrates compliance with Council's requirements with respect to stormwater quantity and quality.

Additional flows generated in post developed condition will be offset by provision of onsite detention volume within 300m² pond. Hydrologic modelling shows a runoff reduction to less than the predevelopment condition at the site boundaries and as such no stormwater related adverse impact from the development is anticipated.

Stormwater quality from the development to be improved through provision of improvement measures including bioswales.

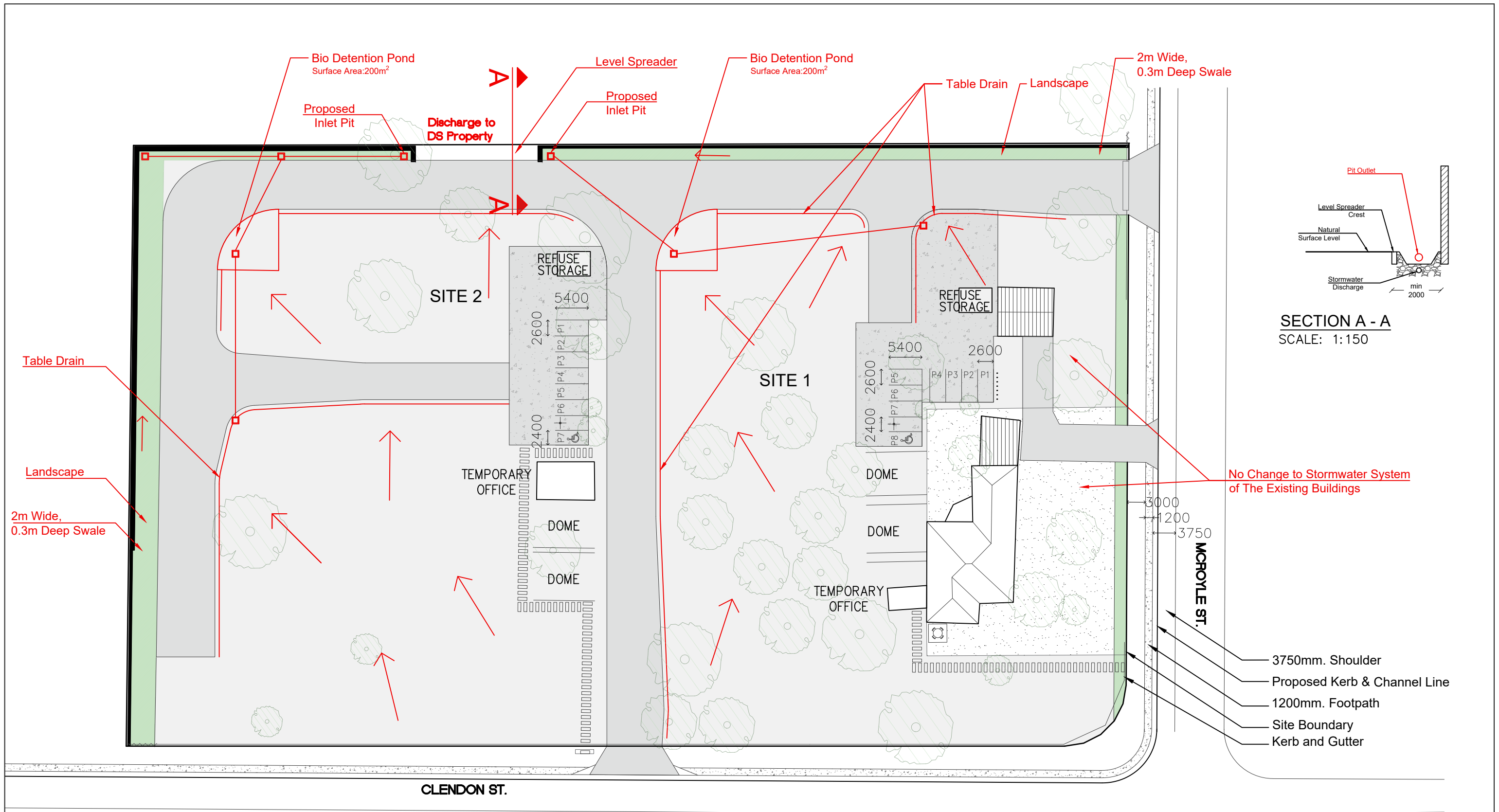
The stormwater concept presented in this report complies with the requirements of Brisbane City Council and is the best management practice for the proposed industrial development.

7. Attachments

Attachment 1	SMP Drawing
Attachment 2	DRAINS Modelling
Attachment 3	MUSIC Modelling

Attachment 1:

SMP Drawing



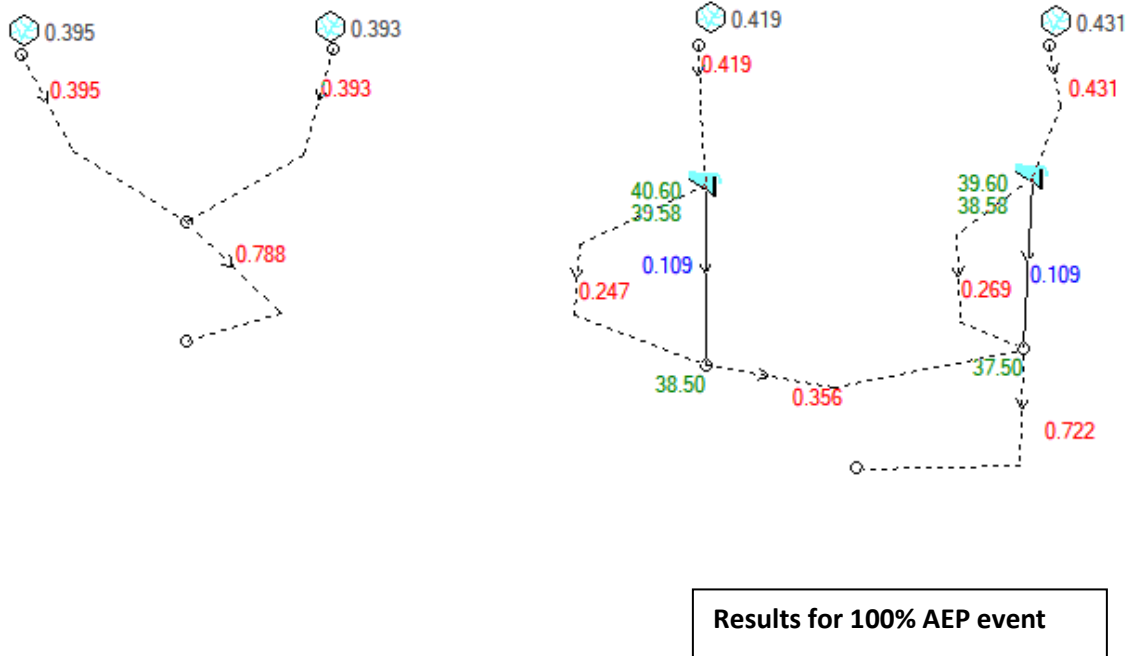
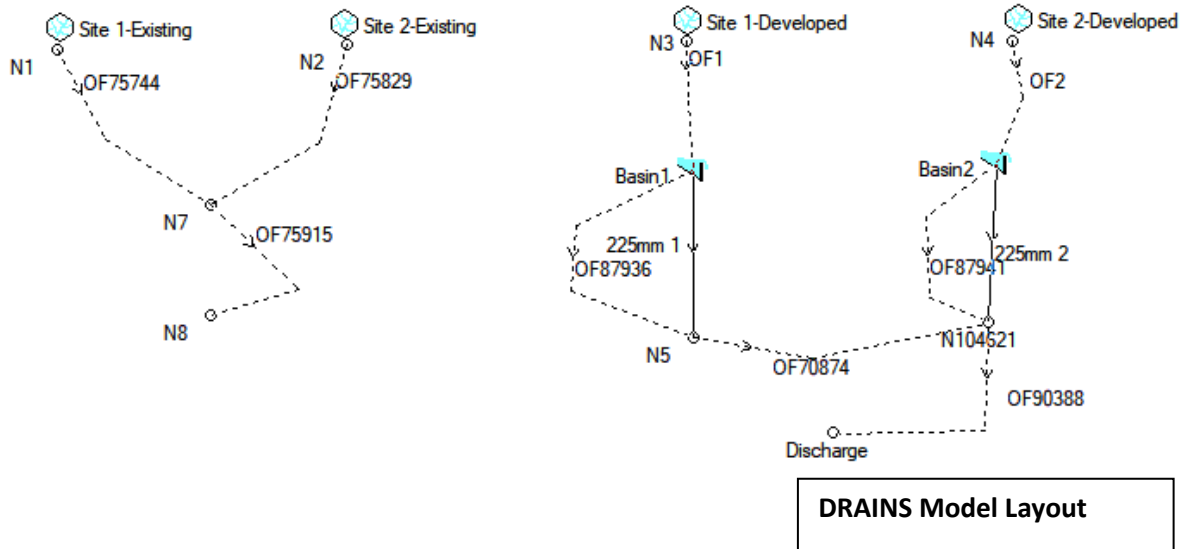
Notes: Detailed engineering plans including sections for the Bio-Detention pond will be provided at the detail design stage.

PROPOSED SITE PLAN
SCALE: 1:600

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	A	DA Drawing	13/10/2022	CONTROLLED A. Mohammadi SAEID MABOUDI RPEQ No: 10051	APPROVED S. Maboudi 		Mr. Najib Mohebzada	Stormwater Management Plan	Oct. 13 2022	mm	As shown	A3	
							LOCAL GOVT. AREA	PROJECT	SHEET NO.	DRAWING NO.		REVISION	
							Brisbane City Council	209 McRoyle St, Wacol QLD 4076	15	SW-01		A	

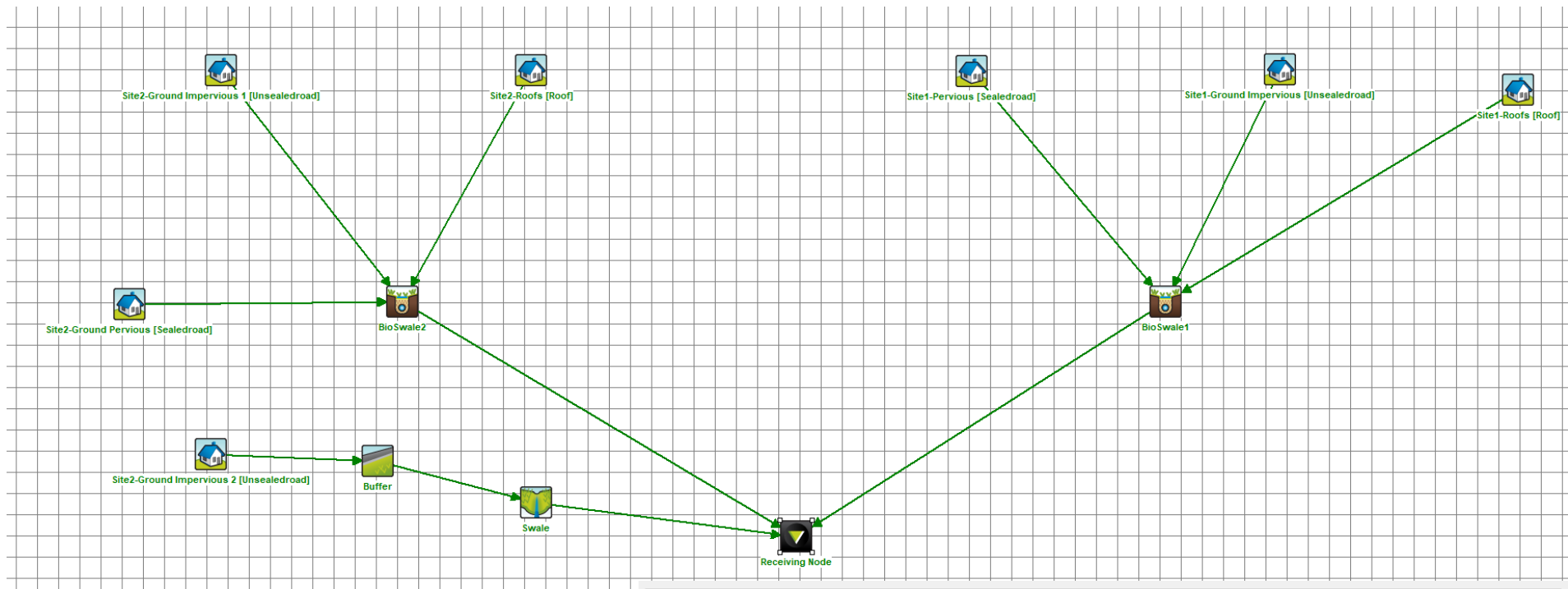
Attachment 2:

DRAINS Modelling



Attachment 3:

MUSIC Modelling



	Sources	Residual Load	% Reduction
Flow (ML/yr)	7.42	7.16	3.6
Total Suspended Solids (kg/yr)	3130	284	90.9
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