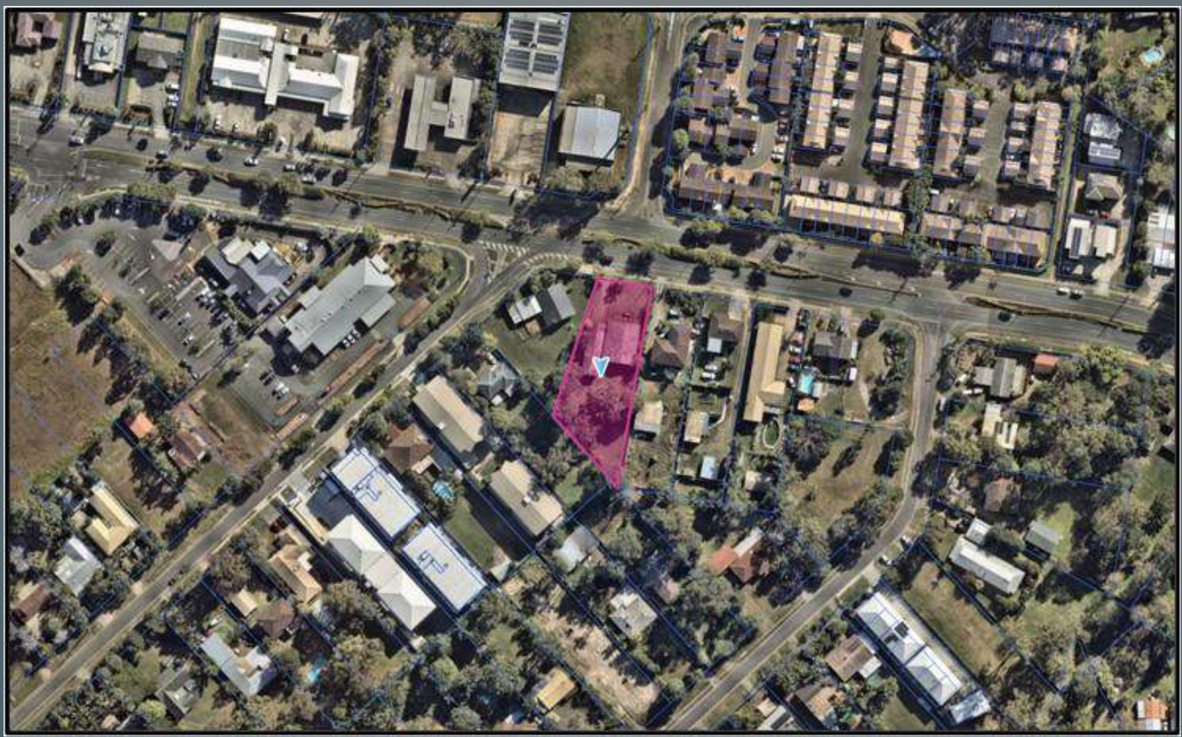
HCE Engineers

Ref. HCE 23327

MATERIAL CHANGE OF USE
85 BRYANTS ROAD, LOGANHOLME

STORMWATER MANAGEMENT PLAN
REVISION 1



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REPORT CONTROL SHEET

HCE Ref. No.:	23327
Site:	**85 Bryants Road, Loganholme**
Report Title:	Stormwater Management Plan

Rev No.	Date	Written By	Reviewed By	Authorised By	Signed
Draft	05/09/24	ST	MN	MB	
0	19/09/24	ST	MN	MB	
1	13/05/25	MN	MB	MB	

DISTRIBUTION

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Appendix E – Council Flood Report

1. INTRODUCTION

HCE Engineers have been engaged to prepare a Stormwater Management Plan to accompany the development application for the material change of use at 85 Bryants Road, Loganholme. The proposed development is for the construction of 12 units with associated hardstand areas and open spaces.

This report identifies stormwater quality and quantity management measures proposed to be incorporated within the development, in order to satisfy the required outcomes of the Logan City Council Planning Scheme SC 6.2.5 – Infrastructure

Revision 1 of this report has been created to address Councils' Information Request dated 12/11/24.

This report has been prepared expressly to provide commentary regarding compliance with Council requirements for the proposed development on the subject site. Information presented in this report should not be applied to properties or developments other than the subject development. No responsibility is accepted for use of any part of this report in any other context or for any other purposes or by any third party.

2. EXISTING SITE AND CATCHMENT DESCRIPTION

The development site is Lot 88 RP118023 which is more commonly known as 85 Bryants Road, Loganholme and has a total area of 1991 m^2. Currently, the site contains a single storey dwelling with multiple mature trees located towards the rear of the development site.

A review of contour mapping via detailed survey and councils mapping and aerial imagery indicates that the development site is currently partially developed and falls towards the southern corner at an approximate grade of 4%.

Refer to Image 1 below.

***Image 1** – Existing Site Conditions (Source Near Map)*

2.1 Existing Drainage Conditions

Currently, there are downpipes that connect to the ground which either leads to an infiltration pit or rubble pit or is conveyed as sheet flow which leads to the rear boundary. A portion of surface runoff is captured by a stormwater field inlet in the southern corner of the lot and is conveyed to the east through neighbouring properties and out to Timor Avenue via a 150mm diameter stormwater pipe.

2.2 External Catchments

There are no external catchments identified.

2.3 Flood Assessment

A flood search has been undertaken and the subject site is located outside of the mapped flood area.

Refer to Appendix E for the Council flood report.

3. WATER QUANTITY MANAGEMENT

3.1 Overview and Objectives

Section 3.6.1.3 of the Infrastructure Planning Scheme Policy notes that the development site is not within the Torres Street catchment. However, in order to satisfy Section 3.6.2.10 of the Infrastructure Planning Scheme Policy, stormwater detention will be required.

A model has been set up using XP-RAFTS software package in order to determine existing site runoff hydrographs and to determine the effectiveness of the proposed detention tank.

3.2 Lawful Discharge

The lawful discharge point is the existing 375mm diameter stormwater pipe in front of 6 Timor Avenue, which is west of the development site. Connecting to this stormwater pipe will require approximately 45m of stormwater pipe to be constructed within Timor Avenue via the neighbouring property at 2 Timor Avenue (Lot 89 RP118023).

The existing field inlet in the southern corner of the site will continue to be utilised to capture runoff from the rear open space and provide a connection point for retaining wall subsoil drainage flow.

3.3 Design Storms

Design Storms for the development have been determined in accordance with Table 7.3.1 of the Queensland Urban Drainage Manual.

Table 1 *– Design Storms*

Storm Event	AEP
Minor	10%
Major	1%

3.4 Hydrologic Modelling

A model has been set up using XP-RAFTS software package in in order to determine existing site runoff hydrographs and to determine the effectiveness of the detention basin in developed conditions.

Initial and continuing losses and hydraulic roughness are outlined in Sections 3.4.1 and 3.4.2 respectively.

3.4.1 Losses

Table 2 *– Losses*

	Initial Loss (mm/hr)	Continuing Loss (mm/hr)
Pervious	10	2
Impervious	2	0

3.4.2 Hydraulic Roughness

Manning's n values have been used to represent the pervious and impervious surface. The following values were adopted.

Table 3 *– Hydraulic Roughness*

	Manning's 'n'
Pervious	0.045
Impervious	0.025

3.4.3 Existing Conditions

XP-RAFTS computer software package was used to model the peak discharges immediately downstream of the subject site under existing conditions during the 39%, 18%, 10%, 5%, 2% and 1% AEP rainfall events.

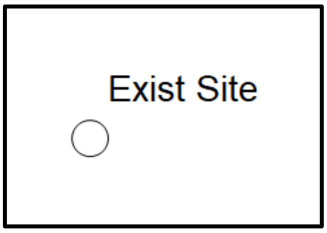

Image 2 *- XP-RAFTS model set up for existing site conditions*

The table below summarises the input parameters for the XP-RAFTS model for the existing scenario.

Table 4 *– XP-RAFTS Source Node Parameters for Existing Site Conditions*

Catchment ID	Area(ha)	Percentage Impervious (%)	Slope (%)
Exist Site	0.199	20	2

The site is partially developed, and it contains a single storey dwelling with a concrete driveway which results in a 20% impervious of the site.

RAFTS is an empirical runoff routing model recognised as a suitable method to predict runoff hydrographs in the urban environments. The Rational Method is a simple hand calculation broadly accepted as being able to provide reasonable peak flow estimates in small urban catchments. The Rational Method calculation has been undertaken to verify the suitability of the RAFTS predicted flows.

Table 5 below displays the Rational Method inputs whilst, Table 6 summarises the flow rates based on the two methods used and as shown the flow rates predicted between the two methods are similar.

Refer to Appendix A for Rational Method Calculations. Refer to Appendix B for XP-RAFTS outputs.

Table 5*– Rational Method Inputs*

Catchment ID	C_{10}	Time of Concentration (min)	Area (ha)
Existing Site	0.74	10	0.199

Table 6 – *Existing Peak Discharge Rates*

AEP	XP-RAFTS Existing Peak Discharge (m^3/s)	Rational Method Existing Peak Discharge (m^3/s)
39%	0.04	0.04
18%	0.06	0.06
10%	0.07	0.07
5%	0.08	0.08
2%	0.10	0.10
1%	0.11	0.12

3.4.4 Proposed Mitigated Conditions

It is proposed to utilise a detention tank to mitigate developed flows from the site. Input parameters under developed conditions are summarised below in Table 7 and the model setup is shown in Image 4. Runoff in excess of the 10% AEP event will bypass the tank for runoff from the Dev Site Node whilst runoff in excess of the 20% AEP event will bypass the tank from the Roof Node. This has been simulated by the diversion link in XP Rafts model.

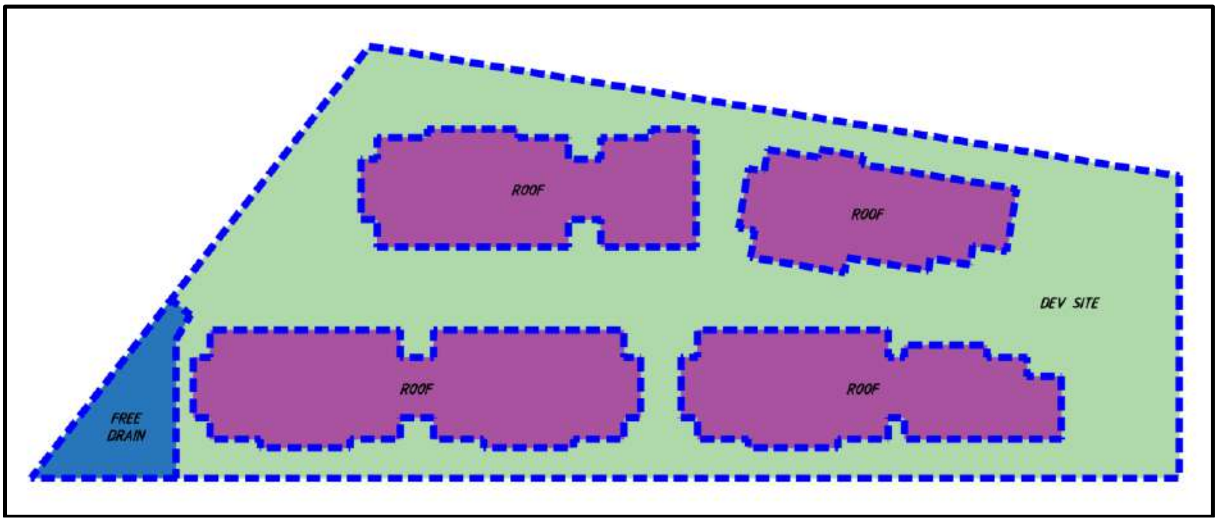

***Image 3** – Proposed Catchment for Development Site*

***Table 7** – XP-RAFTS Source Node Parameters for Developed Site Conditions*

Catchment ID	Area(ha)	Percentage Impervious (%)	Slope (%)
Dev Site	0.113	65	2
Roof	0.078	100	1
Free Drain	0.008	20	2

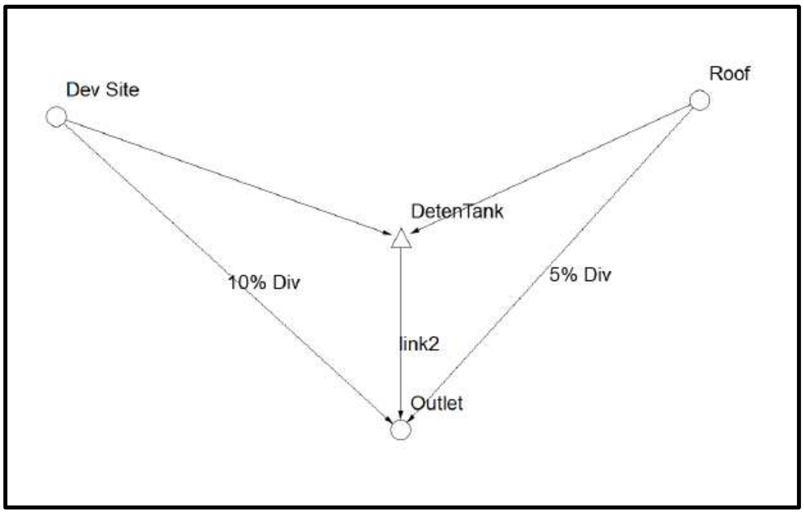

***Image 4** – XP-RAFTS model set up for developed mitigated site conditions*

The detention tank parameters including outlet control is shown in Table 8.

Table 8– *Detention Tank Parameters*

Detention ID	Base RL (m AHD)	Depth (m)	Total Volume (m^3)	Low Flow Outlet Control	High Flow Outlet Control
DetenTank	19.50	1.50	50	140mm diameter orifice	140mm diameter orifice IL 20.43

Table 9 – *Detention Tank Performance (Developed Mitigated Conditions)*

AEP	XP-RAFTS Tank Peak Inflow Discharge (m^3/s)	XP-RAFTS Tank Peak Outflow Discharge (m^3/s)	Detention Tank Ponding Level (m)	Total Detention Tank Storage (m^3)
39%	0.07	0.04	0.68	23
18%	0.09	0.04	0.92	31
10%	0.10	0.05	1.07	37
5%	0.11	0.07	1.20	41
2%	0.11	0.08	1.29	45
1%	0.11	0.08	1.43	48

Table 9 above outlines the detention basin peak inflow and outflow discharge rates. While Table 10 outlines the pre-development and post development peak discharge rates for the site.

Table 10 – *Existing & Developed Peak Discharge Rates*

AEP	XP-RAFTS Existing Peak Discharge (m^3/s)	XP-RAFTS Developed Peak Discharge (m^3/s)	Impact (m^3/s)
39%	0.04	0.04	0.00
18%	0.06	0.05	-0.01
10%	0.07	0.05	-0.02
5%	0.08	0.07	-0.01
2%	0.10	0.09	-0.01
1%	0.11	0.11	0.00

As it can be seen from Table 10 above, the proposed detention basin will ensure the peak discharge rates leaving the site are less or equal to existing for the 39%, 18%, 10%, 5%, 2% and 1% AEP rainfall events. Refer to concept design drawings attached. Refer to Appendix B for XP-RAFTS outputs.

4. WATER QUALITY MANAGEMENT

4.1 Construction Phase

4.1.1 Pollutants of Concern

The construction phase stormwater quality design objectives which may be relevant to this subdivision as set by the *Urban Stormwater Quality Planning Guidelines 2010* are as follows.

***Table 11 -** Design Objectives for Stormwater Quality Management - Construction Phase*

Objective	Measure
Drainage Control	• Design life and design storm of temporary drainage works in accordance with time the disturbed area is exposed <12 months - 1 in 2 ARI 12-24 months - 1 in 5 ARI >24 months - 1 in 10 ARI
Erosion Control	• Minimise exposure of disturbed soils at any time • Avoid or minimise large construction activities in the wet season • Divert water run-off from undisturbed areas around disturbed areas • Use erosion risk ratings to determine appropriate erosion control measures
Sediment Control	• Use soil loss rates to determine appropriate sediment control measures • Design storm for sediment control basins should be based on retaining the maximum sediment quantity for the maximum volume of water runoff
Water Quality Outcomes	• Coarse sediment is retained on site • Nitrogen and phosphorus are managed through sediment control • Prevent litter/waste entering the site, the stormwater or watercourses that discharge from the site. Also minimise or sufficiently contain on-site litter and waste production and regularly clear waste bins. • Hydrocarbons and other contaminants are prevented from entering the stormwater system or internal watercourses that discharge from the site. • Washdown water is prevented from entering the stormwater system or internal watercourses that discharge from the site • Cations and anions including aluminium, iron and sulfate are managed as required under an approved acid sulfate soil management plan
Stormwater Drainage/Flow Management	• Take all reasonable and practicable measures to minimise significant changes to the natural waterway hydraulics and hydrology from: ○ Peak flow for the one year and 100-year ARI event ○ Run-off frequency and volumes entering receiving waters ○ Uncontrolled release of contaminated stormwater

4.1.2 Water Quality Treatment

Appropriate erosion and sediment control measures can be prepared and implemented on site during construction activities to ensure 'best management practices' are achieved.

4.2 Operational Phase

4.2.1 Pollutants of Concern

Per Section 3.6.1.4 of Planning Scheme Policy 5 – Infrastructure a development is required to achieve stormwater management design objectives outlined in the State Planning Policy where the below criteria are applicable.

1. Material change of use for urban purposes where:
   a. the development is greater than 2,500m^2 and results in the creation of six or more additional dwellings; or
   b. the impervious area of the development is greater than 25% and the development is greater than 2,500m^2; or
   c. located in the Loganholme local plan area; or included in the Highway business precinct of the Specialised centre zone and located between the Pacific Highway and the southern boundary of the Loganholme local plan area; or

As the development is located within the Loganholme local plan area, the stormwater management design objectives are required to be met. Table 12 below identifies the minimum reductions required.

Table 12 – *Water Quality Design Objectives for Southeast Queensland*

Pollutant	Minimum Reduction in Mean Annual Load
Total Suspended Solids (TSS)	80%
Total Phosphorus (TP)	60%
Total Nitrogen (TN)	45%
Gross Pollutants (>5mm)	90%

4.2.2 Water Quality Treatment

A proprietary cartridge-based filter system is proposed within the site. Refer to concept design drawings attached.

4.3 Pollutant Export Modelling

4.3.1 Model Selection

To determine the on-site pollutant generation, and the effectiveness of the proposed Stormwater Quality Improvement Devices, the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) version 6.3 was used.

4.3.2 Model Setup

The MUSIC model was set up in accordance with the Healthy Waterways, Water by Design's *MUSIC Modelling Guidelines Version 3.0 - 2018*. The rainfall runoff parameters and pollutant export parameters have been set up according to Table 3.9 for split of this guideline.

All roof water and driveway runoff, and the majority of surface runoff from the site can be conveyed to the proposed stormwater system. There will be a small area of free flow near the southern corner of the site which will be collected by the existing pit and pipe system. It is expected that there will be a reduction in surface flow over the rear boundary compared to existing conditions.

Refer to Image 5 for the schematic model setup and Table 13 for the rainfall data and modelling time step that were used.

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Table 13 *– MUSIC Rainfall Data*

Rainfall Period	Rainfall Station	Modelling Time Step
1990 - 1999	Shailer Park 40715	6 Minute

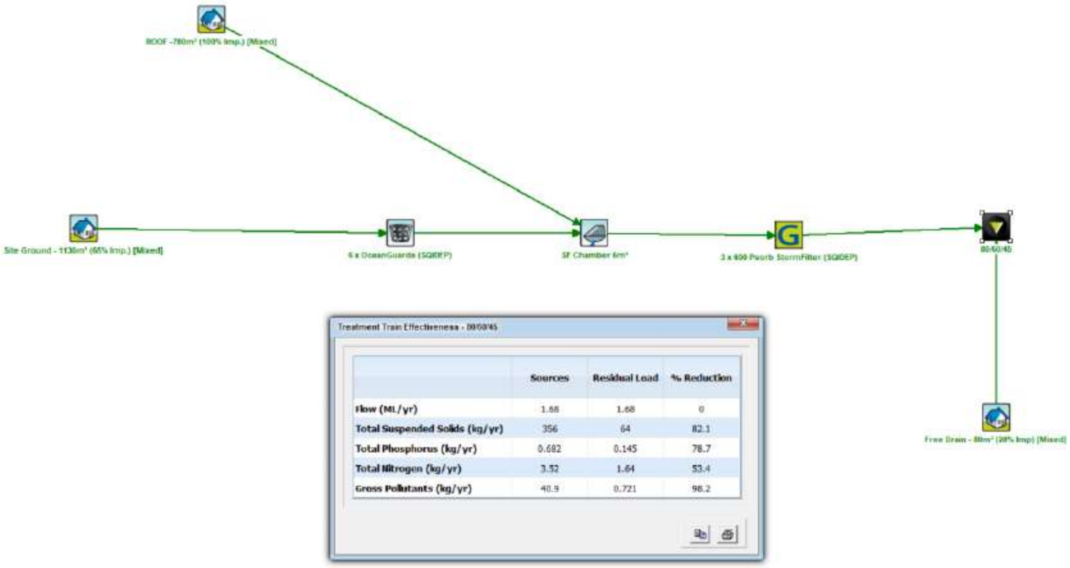

Image 5 - *MUSIC Model Set Up*

Source node catchment data is as per Table 14 below.

Table 14 – *MUSIC model Source Nodes*

Node	Catchment Area (ha)	Impervious Percentage
Roof	0.078	100%
Free Drain	0.008	20%
Site Ground	0.113	65%

4.3.3 Model Results

The above proposed treatment measures have been modelled and the following pollutant load-based reductions have been predicted for the site.

Table 15 *– MUSIC Modelling Results*

Target Pollutant	Required Load Based Reduction	Achieved Reduction
Total Suspended Solids (TSS)	80%	82%
Total Phosphorus (TP)	60%	79%
Total Nitrogen (TN)	45%	53%
Gross Pollutants (GP)	90%	98%

As Table 15 above demonstrates, the installation of the proposed stormwater treatment measures achieves the required reduction requirements for Total Suspended Solids, Total Phosphorus, Total Nitrogen and Gross Pollutants. Refer to Appendix C for the MUSIC results. The proposed treatment measures are therefore compliant with the Acceptable Outcome AO10 of Council's Infrastructure Code.

Trace and heavy metals are usually associated with fine sediment. The proposed treatment train removes very significant proportions of suspended solids therefore it is expected that the removal of trace and heavy metals will be acceptable to adequately protect downstream habitats and ecosystems from heavy metal contamination. No major sources of hydrocarbons are expected on site.

4.4 Water Quality Monitoring

No monitoring of water quality of the runoff from the site is proposed. Untrialled stormwater quality management measures are not proposed. Additionally, the level of treatment proposed is considered best practice and little improvement in the treatment train proposed could be provided.

4.5 Maintenance

4.5.1 OceanGuard Maintenance

Maintenance and cleaning of the Ocean Protect 'OceanGuard' is to be undertaken per the Operation and Maintenance Manual. A copy of this can be viewed in Appendix D

4.5.2 StormFilter Maintenance

Maintenance and cleaning of the Ocean Protect 'StormFilter' is to be undertaken per the Operation and Maintenance Manual. A copy of this can be viewed in Appendix D.

5. CONCLUSION

The proposed development to create 12 new units can be carried out in a manner that meets the desired performance outcomes of the Infrastructure Code.

On-site stormwater detention is proposed to mitigate increases in peak discharge. Stormwater quality will be managed by a combination of Ocean Protect StormFilters and multiple OceanGuards to achieve Water Quality Objectives.

ENGINEERING DRAWINGS

LEGEND

- EXISTING SURFACE CONTOURS (0.25m INTERVAL)
- EXISTING STORMWATER DRAINAGE
- PROPOSED STORMWATER DRAINAGE
- EXISTING SEWERAGE
- PROPOSED SEWERAGE
- EXISTING WATER RETICULATION
- PROPOSED WATER RETICULATION
- PROPOSED WATER SERVICE
- EXISTING TELECOMMUNICATIONS
- EXISTING KERB AND CHANNEL
- PROPOSED RETAINING WALL
- STORMWATER EASEMENT
- EXISTING CONCRETE
- PROPOSED CONCRETE
- EXISTING TREE APPROX. CANOPY SPREAD
- EXISTING WATER METER
- PROPOSED WATER METER
- EXISTING ELECTRICAL POLE
- PROPOSED ELECTRICAL POLE
- EXISTING KERB ADAPTOR
- 11.90 EXISTING LEVEL
- 12.00 DESIGN LEVEL

THIS DESIGN HAS BEEN PREPARED BASED ON SERVICE AUTHORITY AS CONSTRUCTED INFORMATION. NO POT HOLING HAS BEEN UNDERTAKEN TO VERIFY EXISTING SERVICE LOCATIONS AND DEPTHS. IT IS THE CONTRACTORS RESPONSIBILITY TO UNDERTAKE POT HOLING TO VERIFY THE DESIGN.

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PROJECT	TITLE	CLIENT	
85 BRYANTS ROAD LOGANHOLME QLD 4129 LOT 88 RP 118023	CONCEPT CIVIL SERVICING PLAN	SUNSHINE HOMES PTY LTD	NOT FOR CONSTRUCTION. CONCEPT ONLY.

REVISION	AMENDMENT	DATE
A	ISSUED FOR COMMENT	05/09/24
B	ISSUED FOR DA APPROVAL	19/09/24
C	RFI UPDATES	29/04/25

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MN	ST	28/08/24

Approval No. ---- | Scale AS SHOWN

Drawing No. 23327-SK02 | Rev. C

Appendix A – Rational Method Calculations

RATIONAL METHOD CALCULATIONS - EXISTING SITE

Job Reference	23327
Site Address	85 Bryants Road, Loganholme
Council	Site Specific

Number of Sub-Catchments	1	
Minor Storm Event	Q2	*(As per QUDM Table 7.02.1)*
Major Storm Event	Q100	*(As per QUDM Table 7.02.1)*

Subcatchment Summary Table

Number	*Catchment Name*	*Catchment Description*	C_{10}	*tc*
1	Existing Site	Low-medium to high density residential areas	0.74	10

Catchment Calculations (Major and Minor Storm ARI's)

Number	*Area*	*C2*	*I2*	*Q2*	*C100*	*I100*	*Q100*
	ha		*mm/hr*	*m^3/s*		*mm/hr*	*m^3/s*
1	0.199	0.63	114	0.040	0.89	240	0.118

Total Runoff	Minor	0.040	*m^3/s*
	Major	0.118	*m^3/s*
Total Area		0.199	*ha*

Overland Flow Calculations

Trunk SW Infrastructure		
Pipe Diameter	N/A	*m*
Number of Pipes	0	
Grade	0	*m/m*
mannings	0	
Pipe Capacity		*m^3/s*
Pipe Velocity		*m/s*
Capacity @ 3m/s		*m^3/s*
Overland Flow		*m^3/s*

All Storm ARI's

ARI	*Peak Discharge*	
3 Month	0.015	*m^3/s*
1	0.030	*m^3/s*
2	0.040	*m^3/s*
5	0.055	*m^3/s*
10	0.067	*m^3/s*
20	0.080	*m^3/s*
50	0.102	*m^3/s*
100	0.118	*m^3/s*

RATIONAL METHOD CALCULATIONS - DEVELOPED SITE

Job Reference	23327
Site Address	85 Bryants Road, Loganholme
Council	Site Specific

Number of Sub-Catchments	1	
Minor Storm Event	Q2	*(As per QUDM Table 7.02.1)*
Major Storm Event	Q100	*(As per QUDM Table 7.02.1)*

Subcatchment Summary Table

Number	*Catchment Name*	*Catchment Description*	C_{10}	*tc*
1	Proposed Site	Low-medium to high density residential areas	0.80	6

Catchment Calculations (Major and Minor Storm ARI's)

Number	*Area*	*C2*	*I2*	*Q2*	*C100*	*I100*	*Q100*
	ha		*mm/hr*	m^3/s		*mm/hr*	m^3/s
1	0.199	0.68	132	0.050	0.96	288	0.153

Total Runoff	Minor	0.050	m^3/s
	Major	0.153	m^3/s
Total Area		0.199	*ha*

Overland Flow Calculations

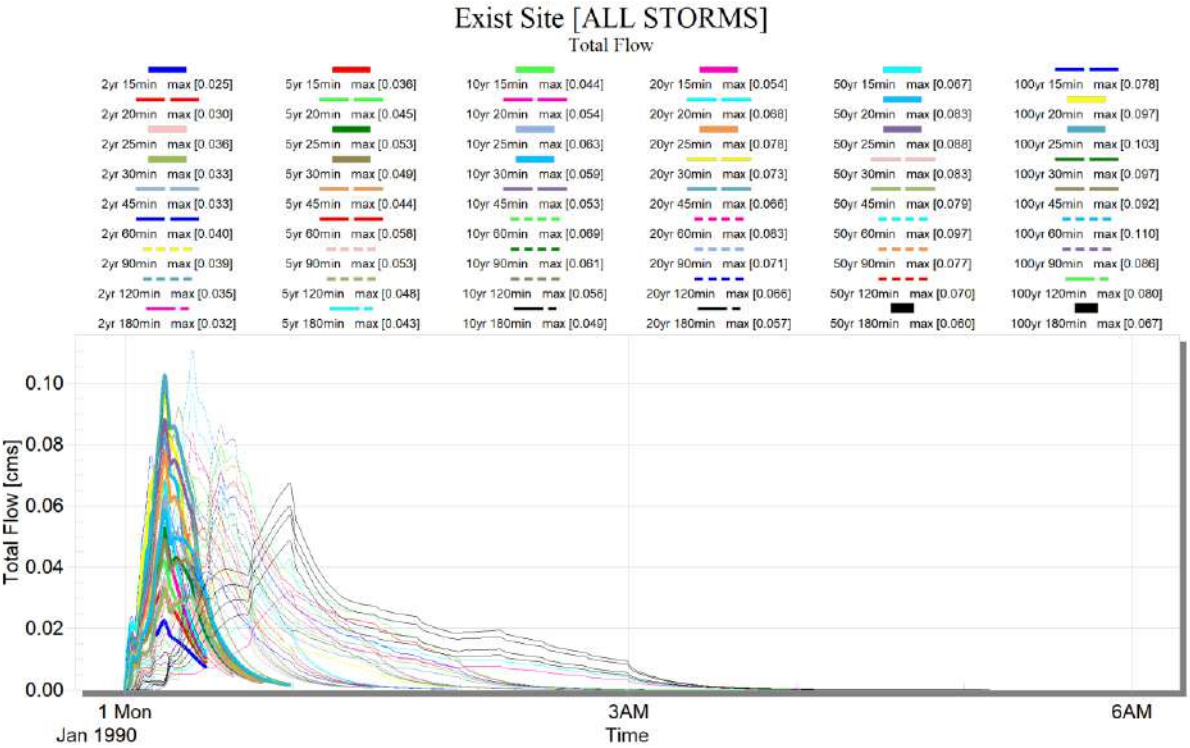
Trunk SW Infrastructure		
Pipe Diameter	N/A	*m*
Number of Pipes	0	
Grade	0	*m/m*
mannings	0	
Pipe Capacity		*m^3/s*
Pipe Velocity		*m/s*
Capacity @ 3m/s		*m^3/s*
Overland Flow		*m^3/s*

All Storm ARI's

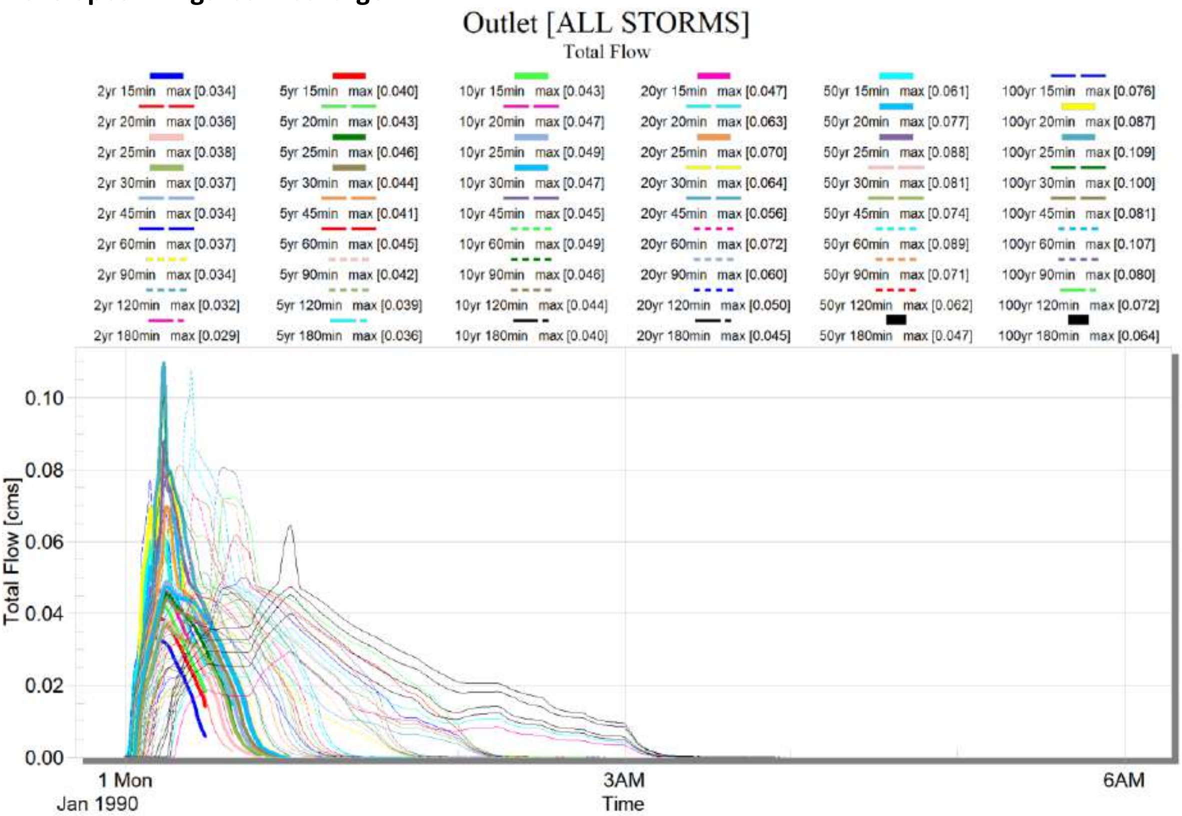
ARI	*Peak Discharge*	
3 Month	0.019	*m^3/s*
1	0.037	*m^3/s*
2	0.050	*m^3/s*
5	0.070	*m^3/s*
10	0.085	*m^3/s*
20	0.103	*m^3/s*
50	0.132	*m^3/s*
100	0.153	*m^3/s*

Appendix B – XP Rafts Outputs

Existing discharge



Developed Mitigated Discharge



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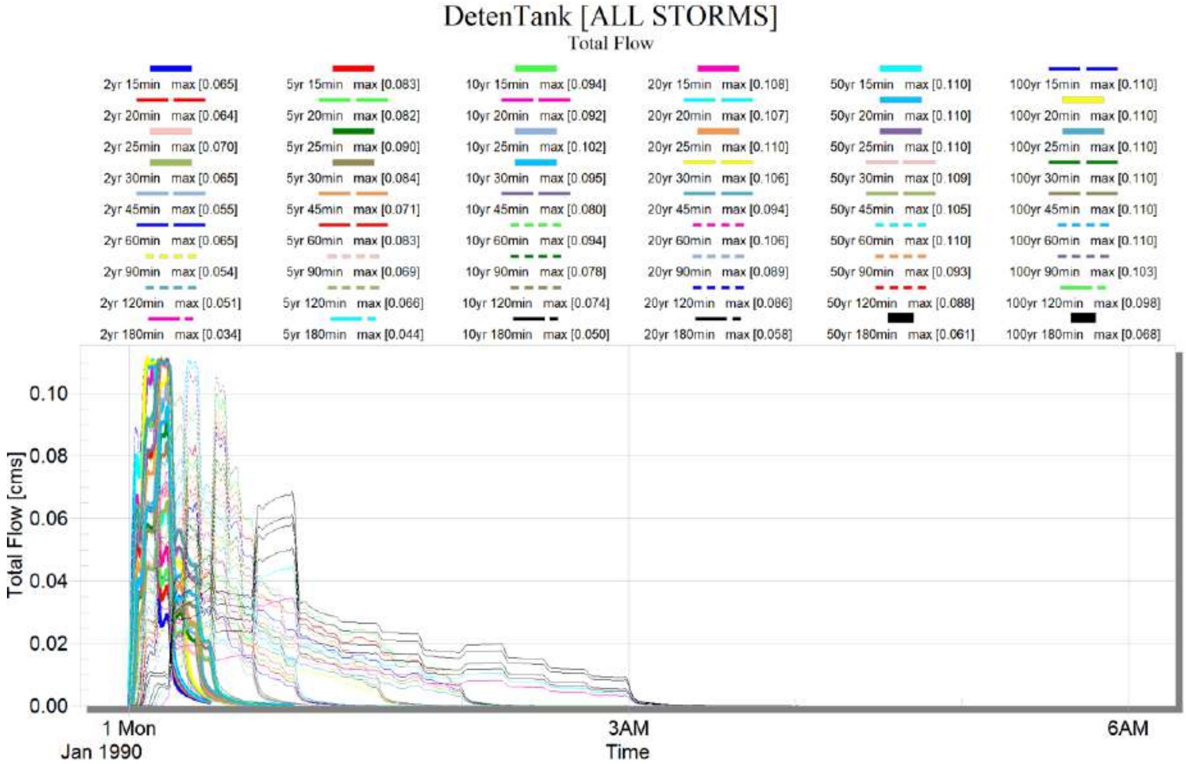
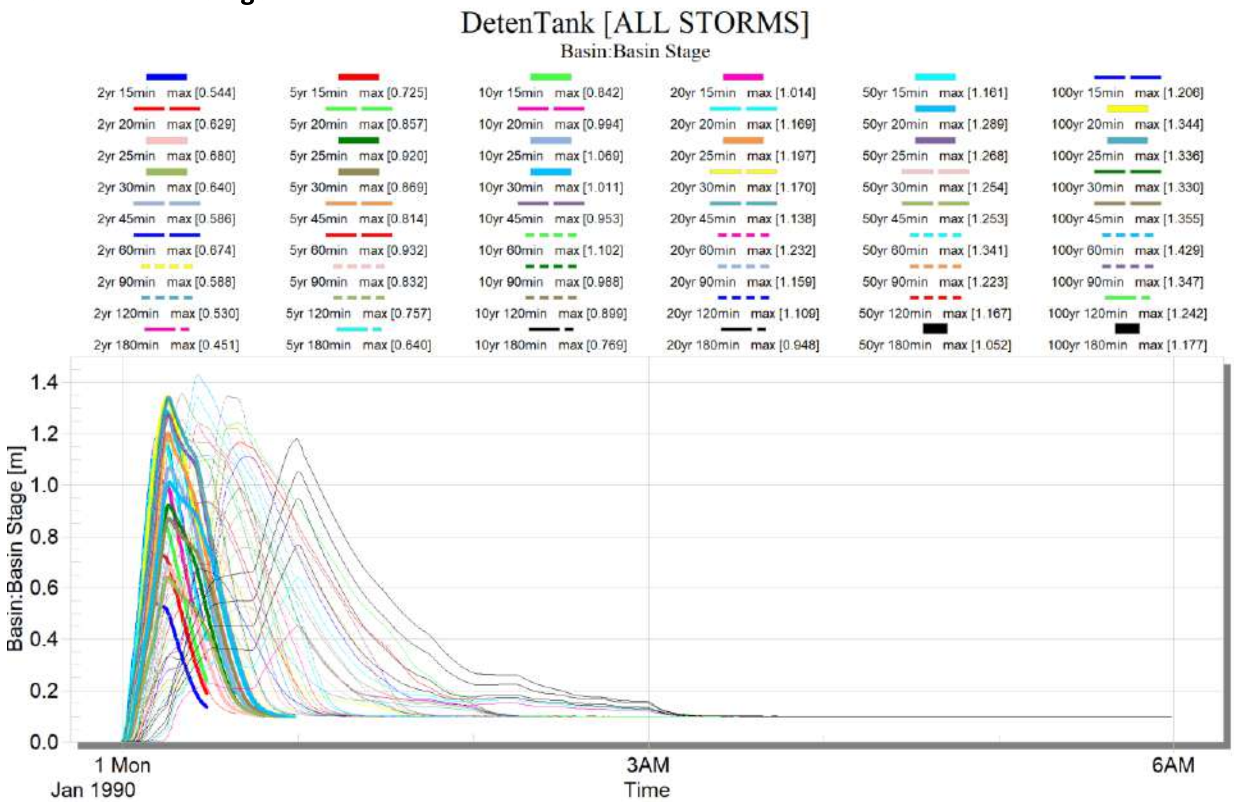
Flow Into Detention Tank



Detention Tank Stage



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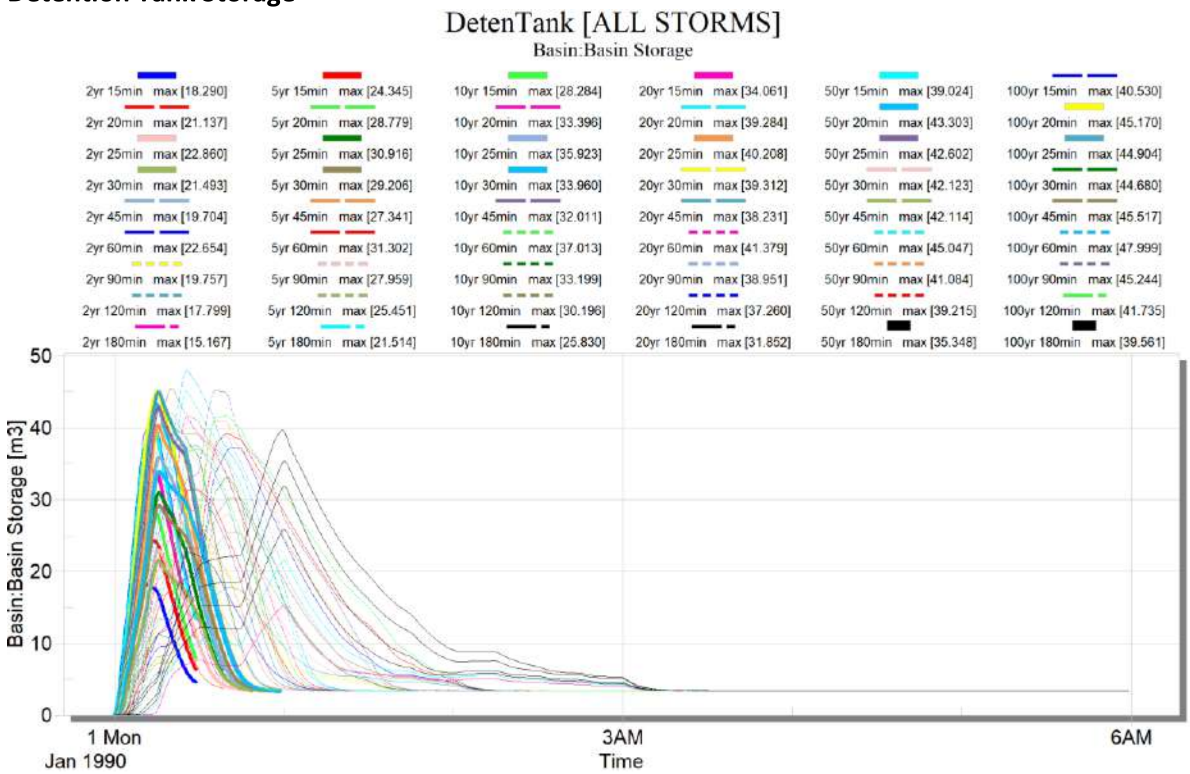
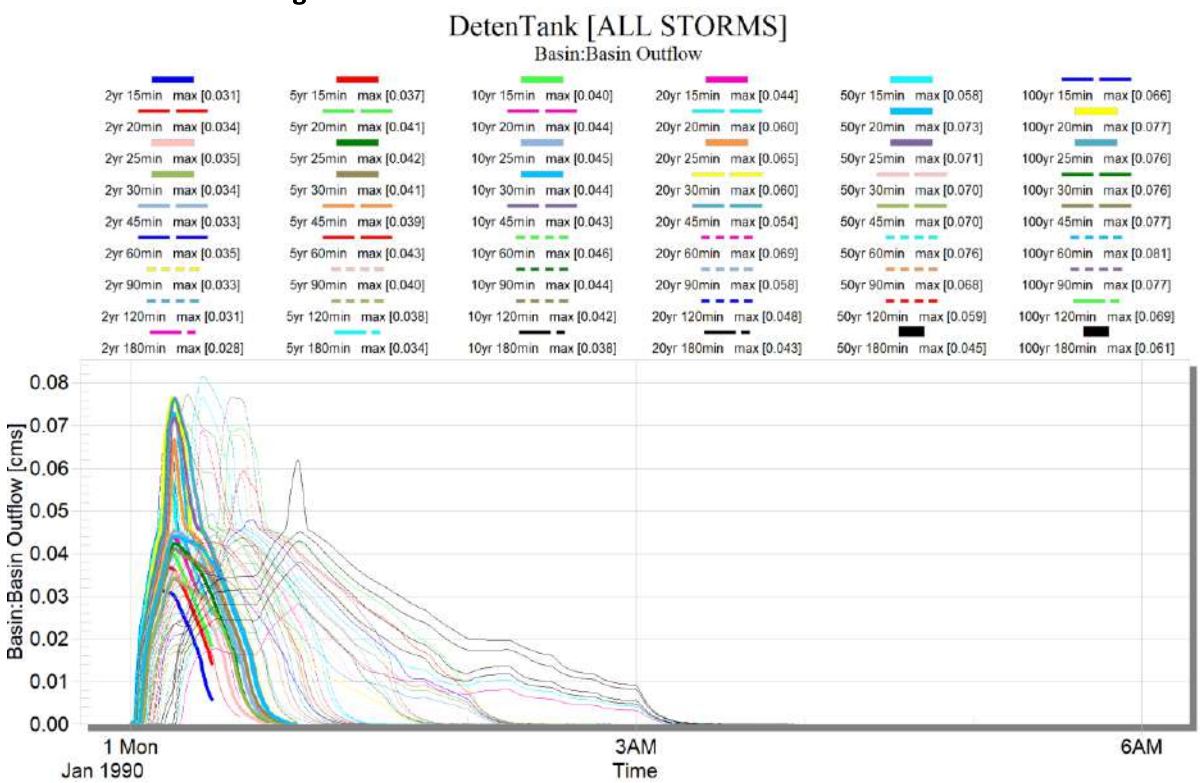
Detention Tank Storage



Detention Tank Discharge



Appendix C – Music Modelling Results

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Treatment Train Effectiveness

	Flow (ML/yr)	TSS (kg/yr)	TP (kg/yr)	TN (kg/yr)	Gross Pollutants (kg/yr)
Sources	1.68	356	0.682	3.52	40.9
Residual Load	1.68	64.0	0.145	1.64	0.721
% Reduction	0.0	82.1	78.7	53.4	98.2