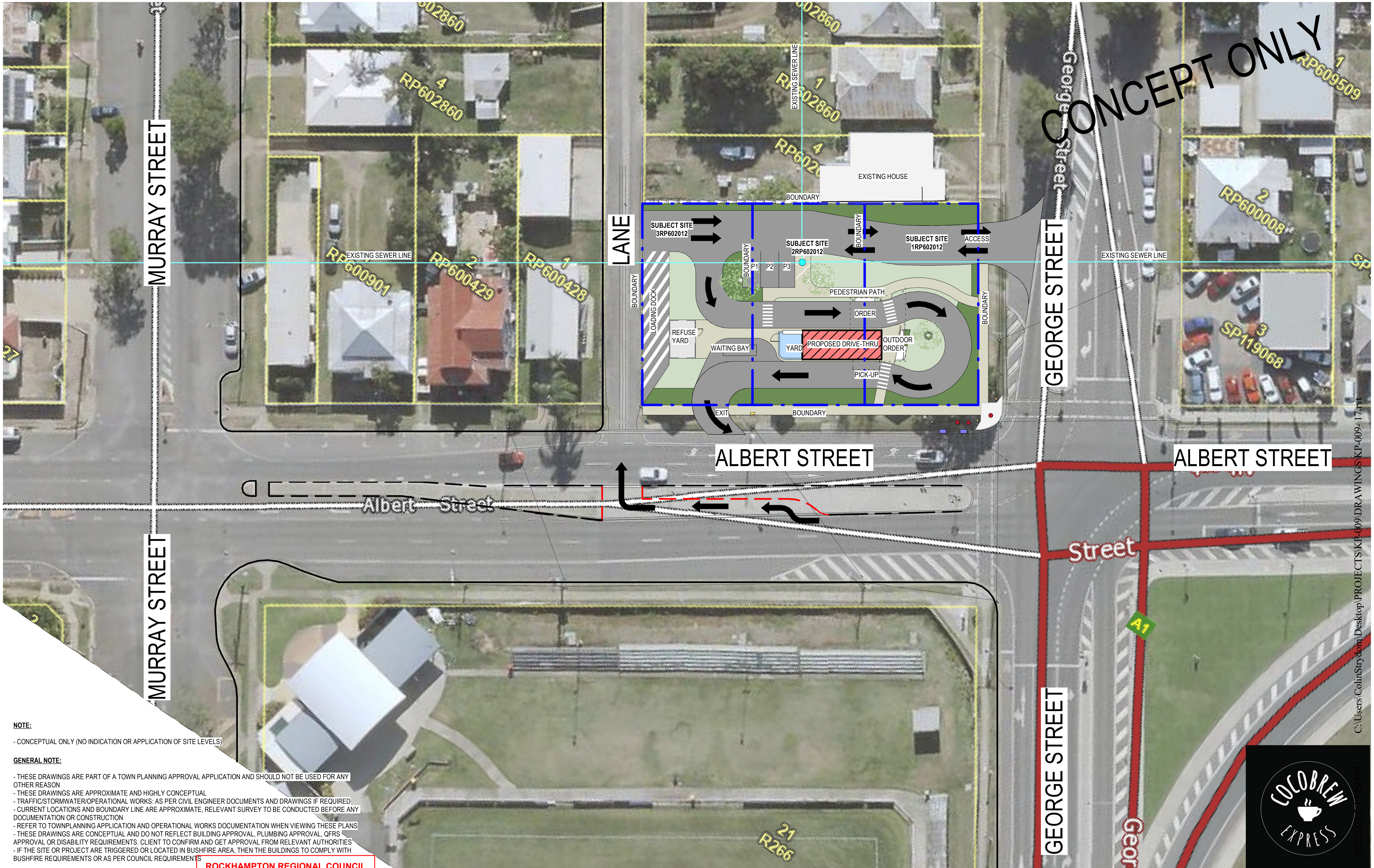

NOTE:

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GENERAL NOTE:

- THESE DRAWINGS ARE PART OF A TOWN PLANNING APPROVAL APPLICATION AND SHOULD NOT BE USED FOR ANY OTHER REASON
- THESE DRAWINGS ARE APPROXIMATE AND HIGHLY CONCEPTUAL
- TRAFFIC/STORMWATER/OPERATIONAL WORKS: AS PER CIVIL ENGINEER DOCUMENTS AND DRAWINGS IF REQUIRED
- CURRENT LOCATIONS AND BOUNDARY LINE ARE APPROXIMATE, RELEVANT SURVEY TO BE CONDUCTED BEFORE ANY DOCUMENTATION OR CONSTRUCTION
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- THESE DRAWINGS ARE CONCEPTUAL AND DO NOT REFLECT BUILDING APPROVAL, PLUMBING APPROVAL, QFRS APPROVAL OR DISABILITY REQUIREMENTS. CLIENT TO CONFIRM AND GET APPROVAL FROM RELEVANT AUTHORITIES
- IF THE SITE OR PROJECT ARE TRIGGERED OR LOCATED IN BUSHFIRE AREA, THEN THE BUILDINGS TO COMPLY WITH BUSHFIRE REQUIREMENTS OR AS PER COUNCIL REQUIREMENTS

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/127-2020

Dated: 12 March 2021

drawing title:

LOCATION PLAN

drawing no: SK-001

project no: KP-009

project:

PROPOSED DRIVE-THRU

A3 DRAWING NOTED SCALES RELATE TO A3 DRAWINGS

location:
LOT NO. 3RP602012+
2RP602012+ 1RP602012

client:
-

REVISIONS

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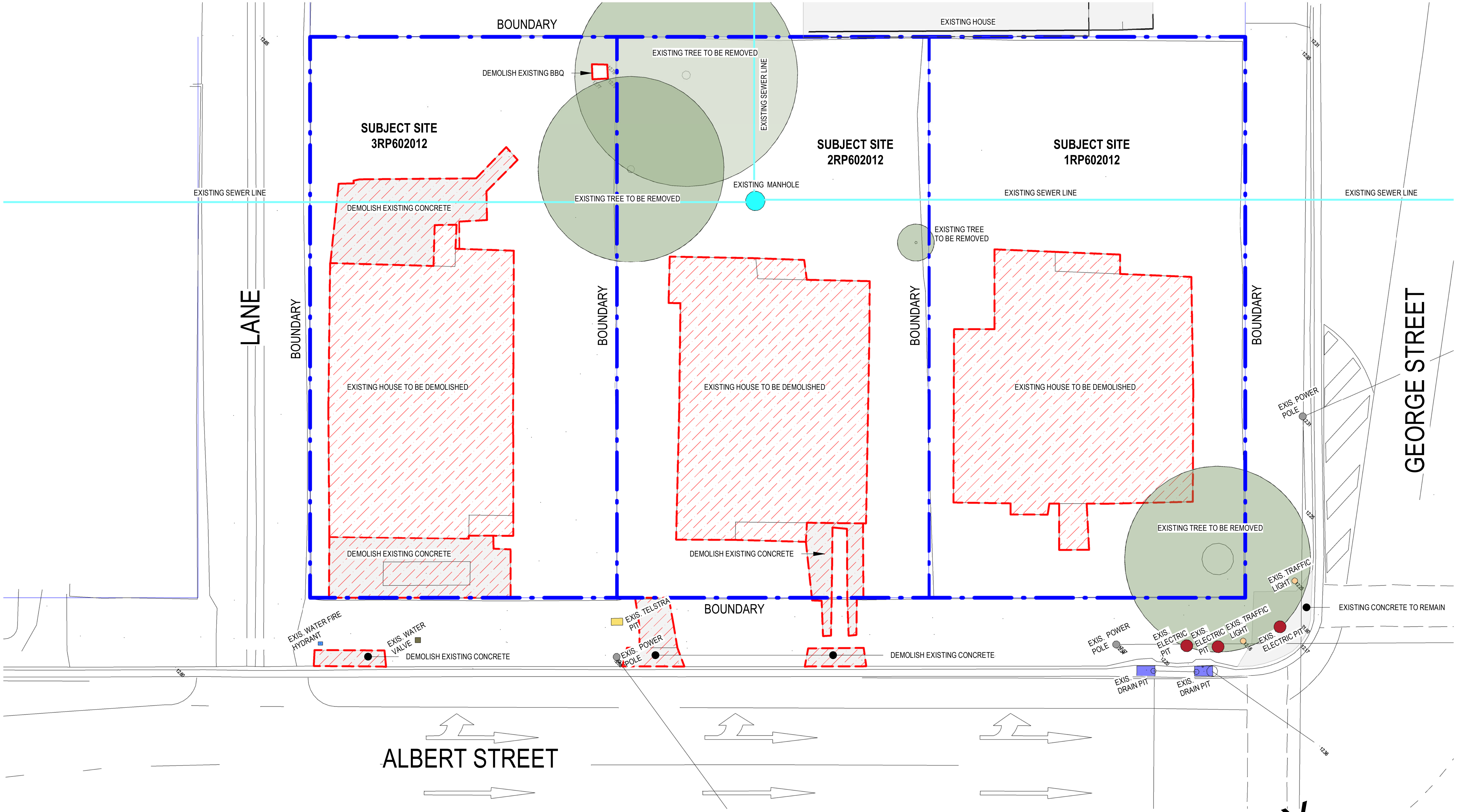

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Dated: 12 March 2021

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drawing title:
EXISTING SITE PLAN

drawing no: SK-002 project no: KP-009

project: PROPOSED DRIVE-THRU

A3 DRAWING NOTED SCALES RELATE TO A3 DRAWINGS

location: LOT NO. 3RP602012+ 2RP602012+ 1RP602012

client: -

REVISIONS

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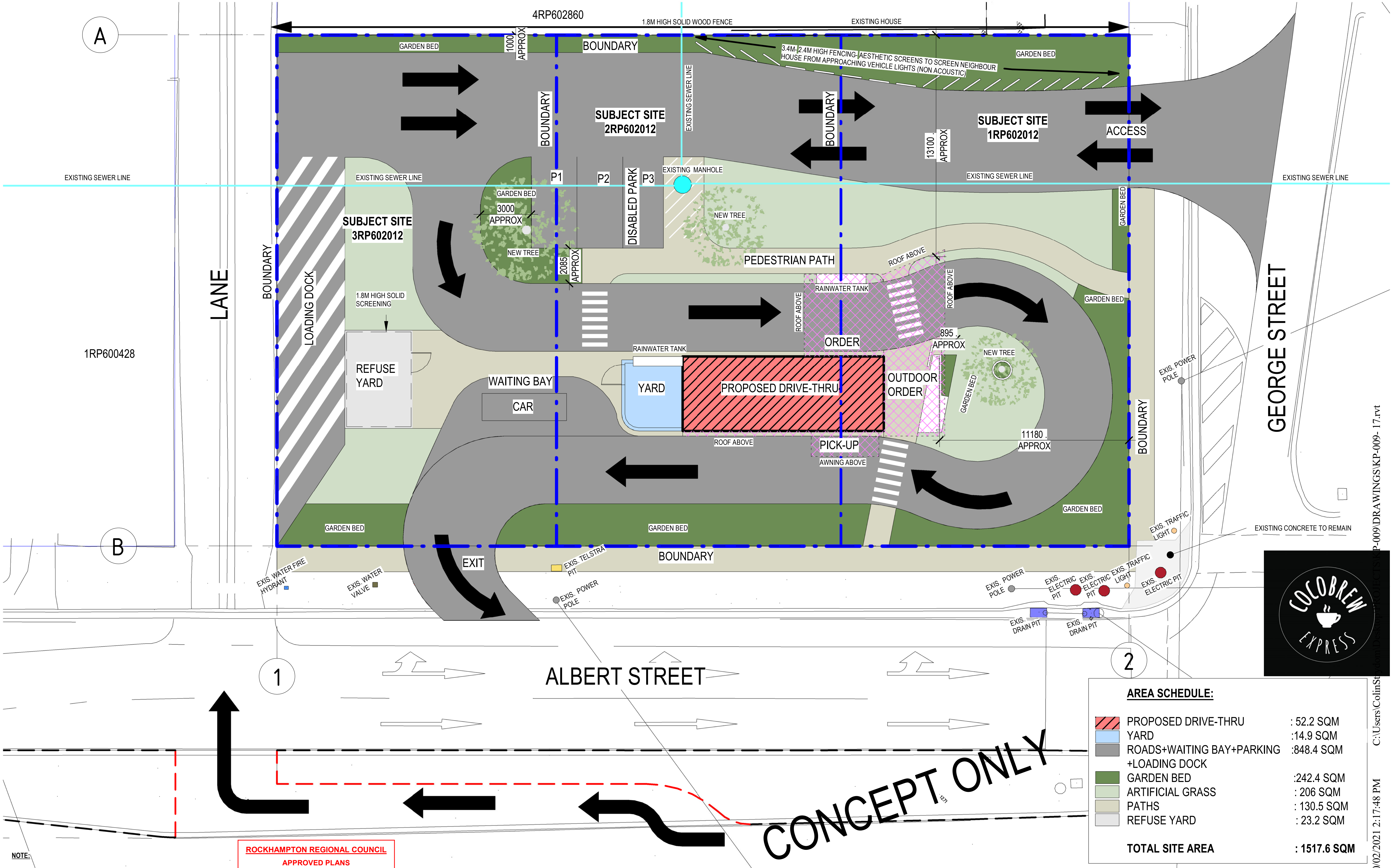

AREA SCHEDULE:

	PROPOSED DRIVE-THRU	: 52.2 SQM
	YARD	:14.9 SQM
	ROADS+WAITING BAY+PARKING +LOADING DOCK	:848.4 SQM
	GARDEN BED	:242.4 SQM
	ARTIFICIAL GRASS	: 206 SQM
	PATHS	: 130.5 SQM
	REFUSE YARD	: 23.2 SQM
	TOTAL SITE AREA	**: 1517.6 SQM**

NOTE:
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APPROVED PLANS
These plans are approved subject to the current conditions of approval associated with
Development Permit No.: D/127-2020
Dated: 12 March 2021

drawing title:
PROPOSED SITE PLAN

drawing no: SK-003
project no: KP-009

project: A3 DRAWING NOTED SCALES RELATE TO A3 DRAWINGS
PROPOSED DRIVE-THRU

location:
LOT NO. 3RP602012+ 2RP602012+ 1RP602012

client:
-

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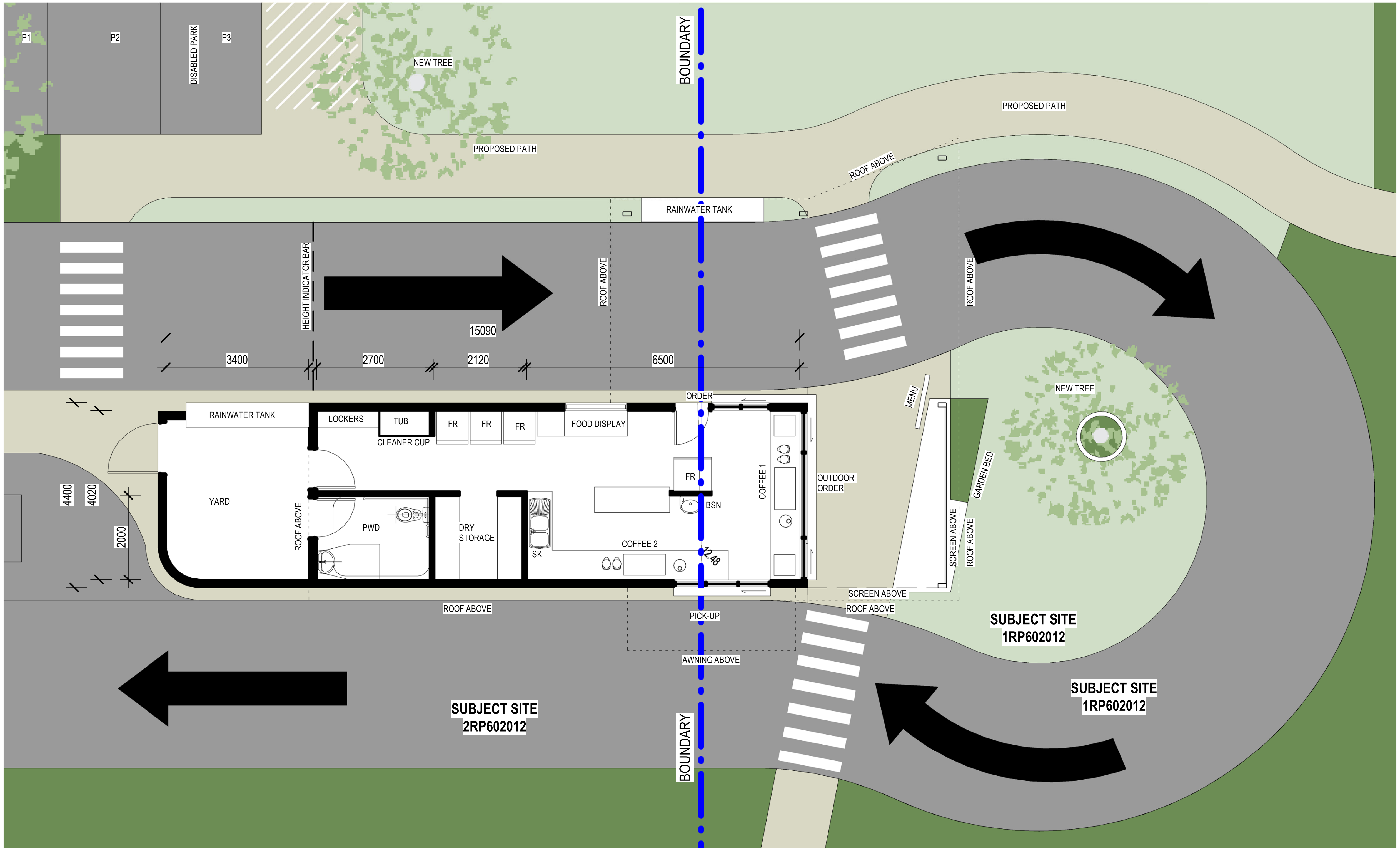

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Dated: 12 March 2021

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drawing title:
FLOOR PLAN

drawing no: SK-004

project no: KP-009

project: PROPOSED DRIVE-THRU

A3 DRAWING NOTED SCALES RELATE TO A3 DRAWINGS

location:
LOT NO. 3RP602012+ 2RP602012+ 1RP602012

client:
-

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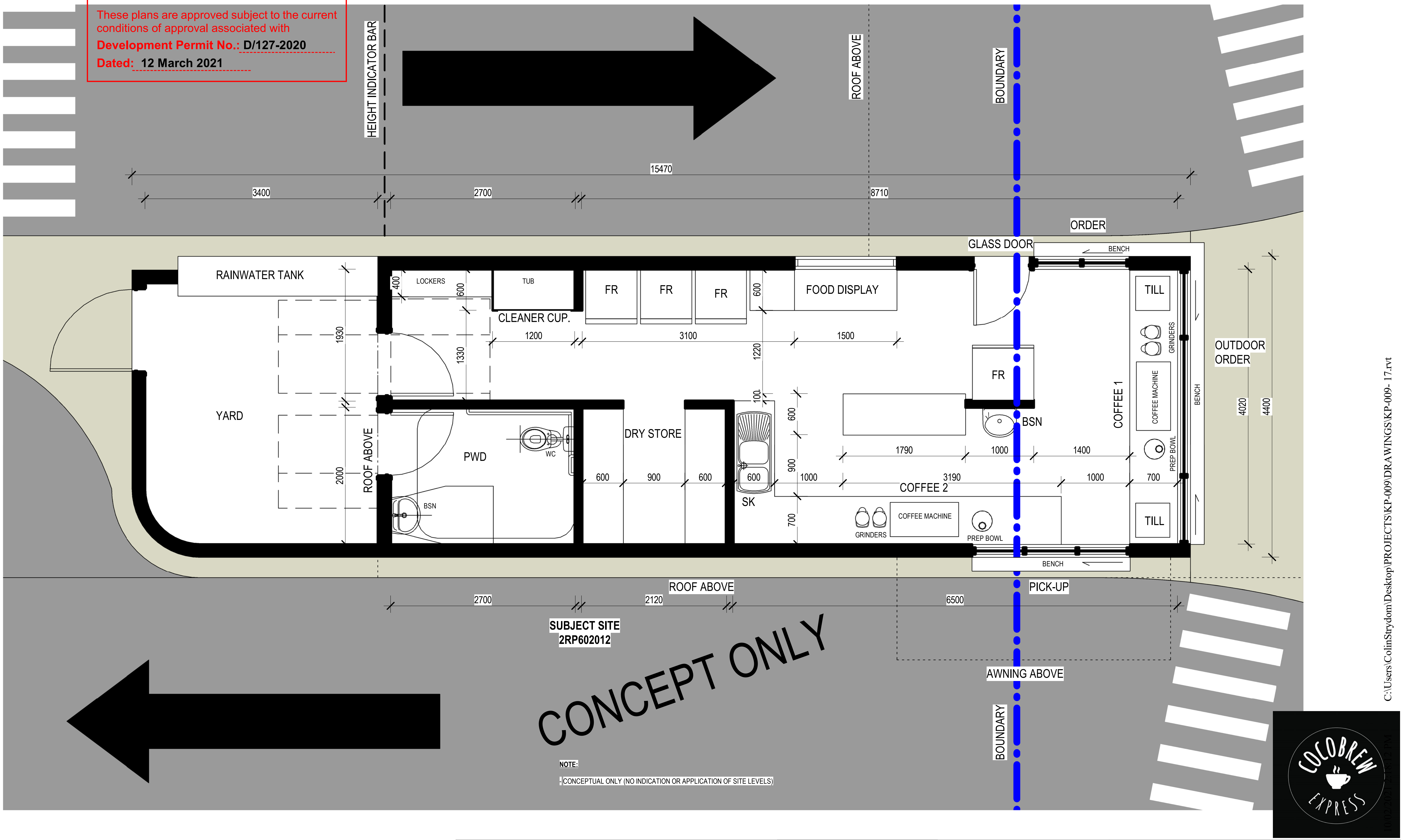

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drawing title: **LAYOUT PLAN**

drawing no: SK-005

project no: KP-009

project: PROPOSED DRIVE-THRU

A3 DRAWING — NOTED SCALES RELATE TO A3 DRAWINGS

location: LOT NO. 3RP602012+ 2RP602012+ 1RP602012

client: -

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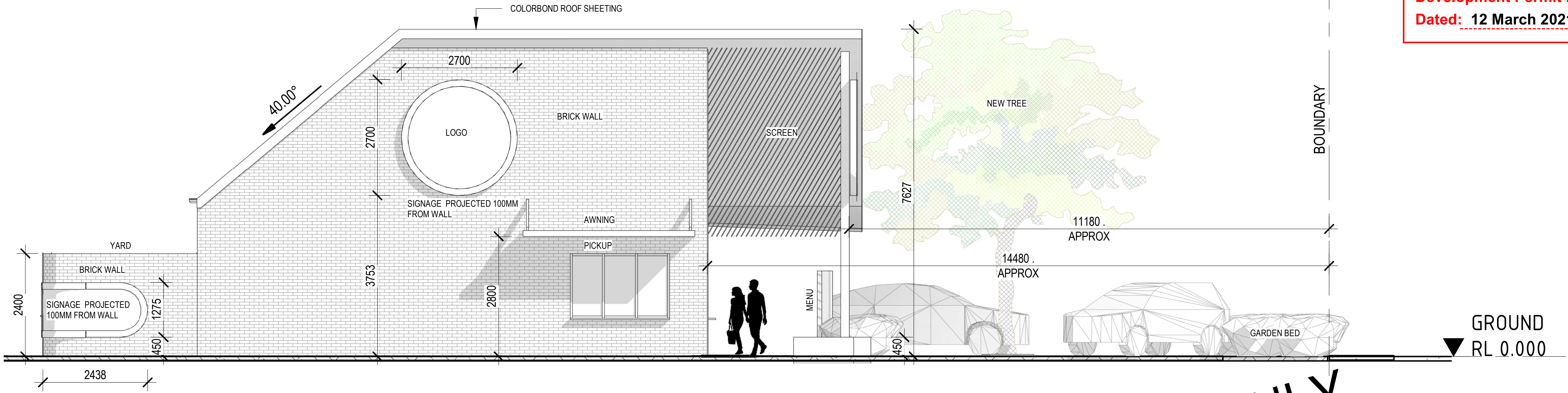

1 SOUTH EAST ELEVATION

1 : 100 @ A3

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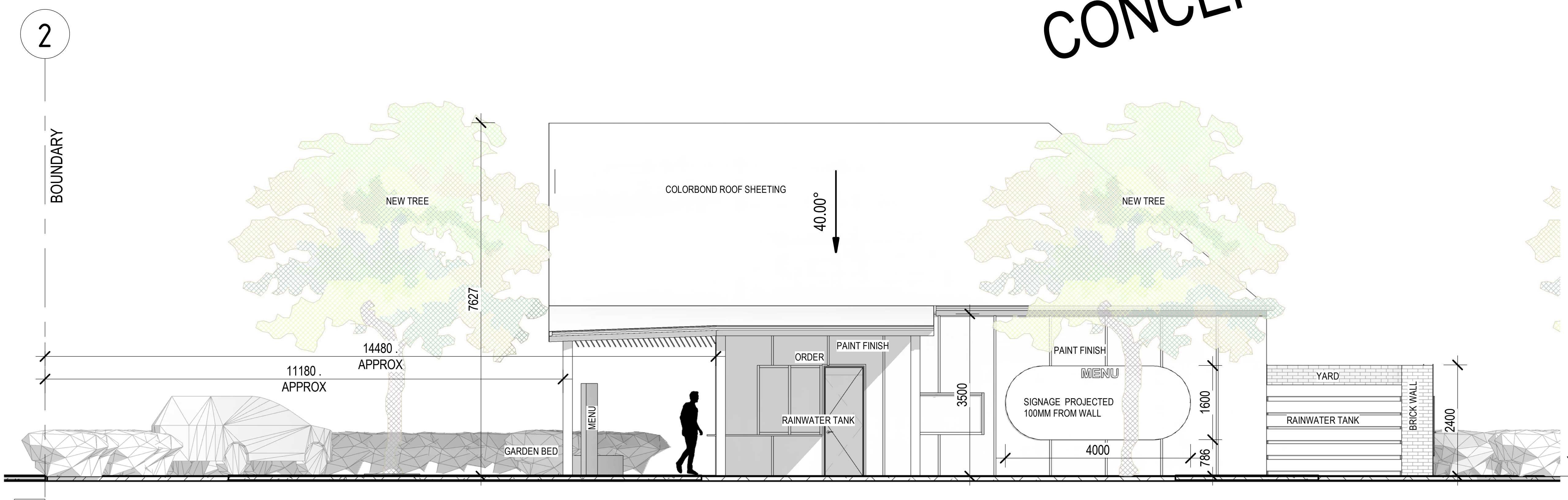

2 NORTH WEST ELEVATION

1 : 100 @ A3

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COCOBREW EXPRESS

drawing title:
ELEVATIONS

drawing no: SK-006 project no: KP-009

project: **A3 DRAWING** NOTED SCALES RELATE TO A3 DRAWINGS
PROPOSED DRIVE-THRU

location:
LOT NO. 3RP602012+ 2RP602012+ 1RP602012

client:
-

REVISIONS

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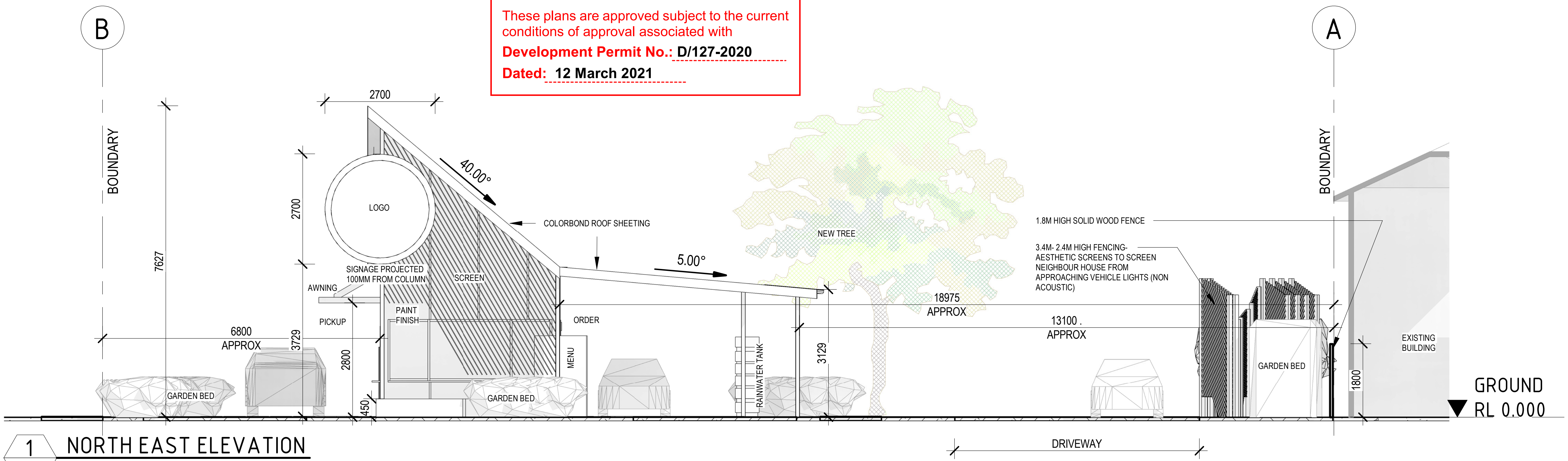
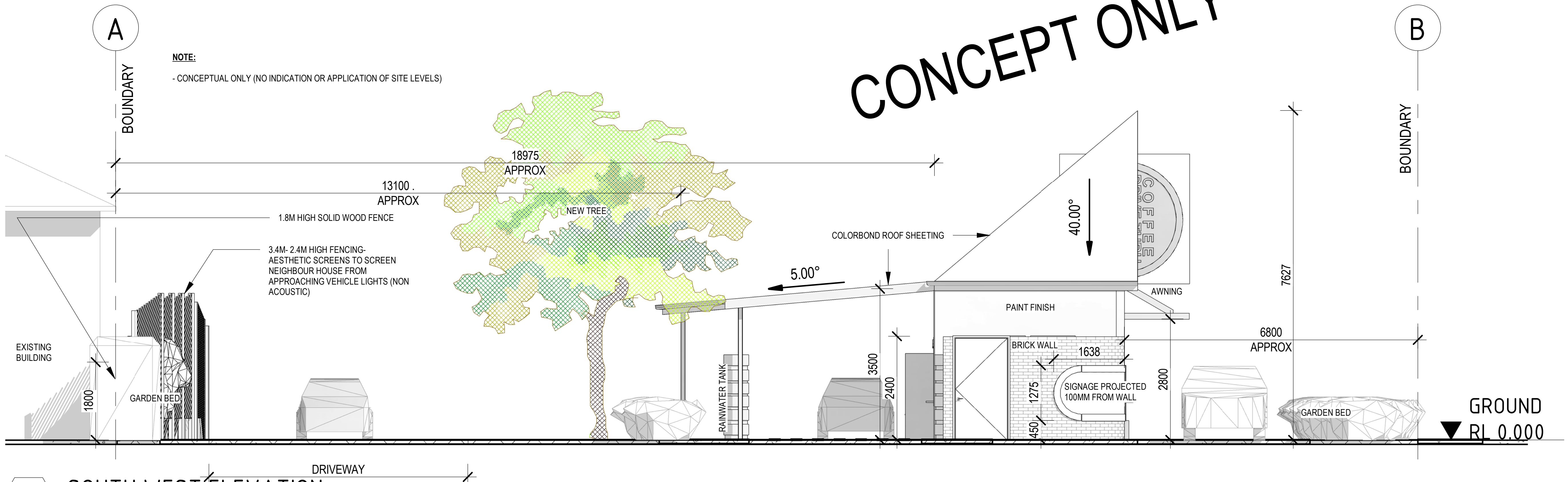


1 NORTH EAST ELEVATION

1 : 100 @ A3

CONCEPT ONLY



2 SOUTH WEST ELEVATION

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drawing title:
ELEVATIONS

drawing no: SK-007 project no: KP-009

project: PROPOSED DRIVE-THRU

A3 DRAWING NOTED SCALES RELATE TO A3 DRAWINGS

location: LOT NO. 3RP602012+ 2RP602012+ 1RP602012

client: -

REVISIONS

REV	DESCRIPTION	DATE
8	PRLEIMINARY	26/10/2020
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drawing title:

3D VIEWS

drawing no: SK-009 project no: KP-009

project: PROPOSED DRIVE-THRU

A3 DRAWING NOTED SCALES RELATE TO A3 DRAWINGS

location: LOT NO. 3RP602012+ 2RP602012+ 1RP602012

client: -

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drawing title:
3D VIEWS

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Dated: 12 March 2021

drawing no: SK-010

project no: KP-009

project: A3 DRAWING NOTED SCALES RELATE TO A3 DRAWINGS

PROPOSED DRIVE-THRU

location:
LOT NO. 3RP602012+
2RP602012+ 1RP602012

client:
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drawing title:
3D VIEWS

drawing no: SK-011 project no: KP-009

project: PROPOSED DRIVE-THRU

A3 DRAWING NOTED SCALES RELATE TO A3 DRAWINGS

location: LOT NO. 3RP602012+ 2RP602012+ 1RP602012

client: -

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10/02/2021

drawing title:
3D- VIEWS

drawing no: SK-012 project no: KP-009

project: PROPOSED DRIVE-THRU

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CONSULTING ENGINEERS

Stormwater Management Plan

Proposed Coffee Shop

40, 42 & 44 Albert Street, Rockhampton City, Rockhampton

Prepared For: Kele Property Group

Job No. 036-20-21

03 December 2020

Revision B

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/127-2020

Dated: 12 March 2021

ABN 69 958 286 371
P (07) 4921 1780
F (07) 4921 1790
E mail@mcmengineers.com
PO Box 2149
Wandal Q 4700
63 Charles Street
North Rockhampton Q 4701

Stormwater Management Plan

Rev.	Description	Signature	RPEQ No	Date
B	Updated Site layout	[signature]	5141	03.12.20
A	Issued For Approval	CWH	5141	04.11.20

CONTENTS

Stormwater Management Plan

Proposed Coffee Shop

1.0 INTRODUCTION AND APPROACH

1.1. PROJECT OVERVIEW

McMurtrie Consulting Engineers (MCE) have been commissioned by Kele Property Group to undertake a site-based Stormwater Management Plan (SMP) for a proposed coffee shop. The site is located at 40, 42, 44 Albert Street, Rockhampton City on Lots 1, 2 and 3 on RP602012.

The aim of this SMP is to demonstrate that the proposed development will comply with Capricorn Municipal Development Guidelines (CMDG), Queensland Urban Drainage Manual (QUDM 2016), Australian Rainfall and Runoff 2016 (ARR'16) and State Planning Policy (SPP 2017).

1.2. METHODOLOGY

The assessment methodology adopted for this SMP is summarised below.

- Broadly identify the contributing catchments to the project.
- Identify Lawful Point of Discharge (LPOD) for the site stormwater runoff.
- Identify the critical storm events and duration for this project
- Estimate peak discharge runoff for pre-development and post-development scenarios.
- Identify potential mitigation and management strategies to ensure no worsening to downstream catchments and infrastructure.

1.3. DATA SOURCES

The background data used to undertake this assessment were collected from the following sources:

- ARR'16 data hub
  - Rainfall data
  - Design storm ensemble temporal patterns
- Rockhampton Regional Council GIS data
- Preliminary overall layout plan (completed by Design Architecture)
- Pluviograph rainfall data for the 'Rockhampton Aero' station

2.0 SITE CHARCTERISTICS

2.1. SITE LOCATION

The site is located at 40, 42, 44 Albert Street, Rockhampton City on Lots 1, 2 and 3 on RP602012. Site details have been summarised within Table 1. The proposed site is located as per **Figure 1** below.

Table 1: Site Description

Registered Owner	Property and Location	
	Lot and Property Description	Address
Kele Propert Group	Lots 1, 2 and 3 on RP602012	40, 42, 44 Albert Street, Rockhampton City, Rockhampton

Figure 1: Site Location

The proposed development site is located in the Rockhampton City area within the Rockhampton Regional Council Local Government Area. The site is approximately 0.152 ha in size

2.2. TOPOGRAPHY

The area is presently occupied by 3 Residential structures with sparse trees and grass. The site is bounded on the west by George Lane, the south by Albert Street, the east by George Street and north by residential lots. Typically, existing ground levels across the site are at RL12.6.

Figure 2: Existing 3 Residential structures from intersection of Albert and George Street

3.0 HYDROLOGY ASSESSMENT

3.1. LAWFUL POINT OF DISCHARGE

The existing site is generally falling 1% towards George lane, Albert Street and George street kerb, ultimately arriving at the existing stormwater pits on Albert Street. This point of discharge is under the lawful control of the local government and satisfies the requirements for Lawful Points of Discharge (LPOD) in accordance with QUDM.

Any stormwater volume increase from post development will be detained to ensure there will be no adverse impacts on downstream properties and infrastructure.

3.2. HYDROLOGIC MODELLING

Hydrologic calculations have been undertaken using XPSTORM 2019 V1 for pre and post development scenarios. The modelling within XPSTORM environment has been undertaken to estimate the peak discharge for storms up to 1% AEP. Hydrologic modelling has been undertaken using the Laurenson Runoff Routing Method. Laurenson's Method is an industry leading hydrologic routing method that can be used for catchments ranging between 10m² up to 20,000km². The information required to apply Laurenson's Method include:

- Rainfall Intensity Data (obtained from the Bureau of Meteorology 2016 IFD utility)
- Rainfall Temporal Patterns (obtained from the ARR'16 Data Hub)
- Catchment Area (ha)
- Catchment Slope
- Initial and Continuing Infiltration Data
- Catchment Roughness (Manning's 'n')

Given the relatively limited scope of this hydraulic impact assessment a lumped catchment approach, as defined by ARR'16 and shown in Figure 2 below, was applied to the hydrologic review of the site. The lumped approach is suitable for this site given the relative consistency in land use and the ultimate purpose of the model.

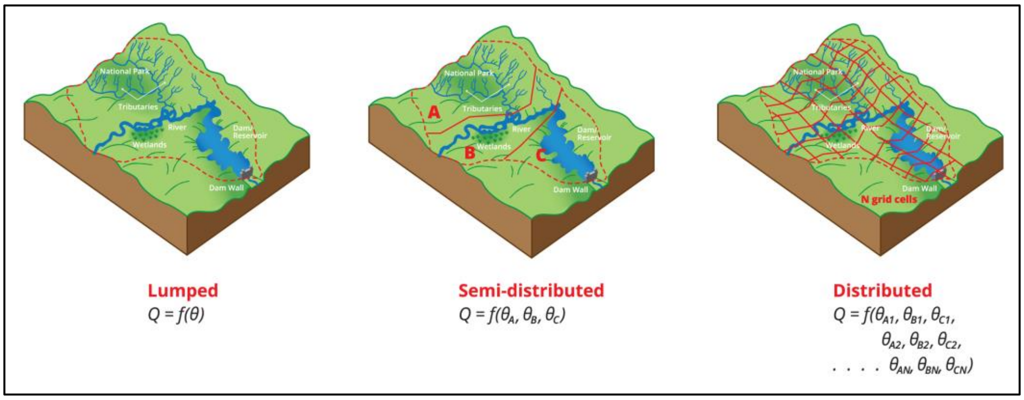

Figure 3: Catchment Analysis Options

3.2.1. CATCHMENT HYDROLOGY PARAMETERS

Table 2 and 3 summarises the input data for the development site in pre-development and post-development conditions.

Table 2: Pre-Development Model Parameters (XP Storm)

Parameter		Grass	Concrete	Roof Material
Area (ha)		0.092	0.007	0.053
Impervious (%)		0.0	100	100
Slope (%)		1	1	57
Laurenson 'n' (storage non-linearity exponent)		-0.285	-0.285	-0.285
Infiltration	Initial Loss (mm/hr)	0.0	0.0	0.0
	Continuing Loss (mm/hr)	1.7	0.0	0.0
Manning's Roughness (n)		0.025	0.012	0.022

Table 3: Post-Development Model Parameters (XP Storm)

Parameter		Garden	Grass	Concrete	Roof Material
Area (ha)		0.024	0.020	0.096	0.012
Impervious (%)		0.0	0.0	100	100
Slope (%)		1	1	1	57
Laurenson 'n' (storage non-linearity exponent)		-0.285	-0.285	-0.285	-0.285
Infiltration	Initial Loss (mm/hr)	0.0	0.0	0.0	0.0
	Continuing Loss (mm/hr)	1.7	1.7	0.0	0.0
Manning's Roughness (n)		0.06	0.025	0.012	0.022

3.2.2. HYDROLOGY RESULTS

Applying the ARR'16 ensemble temporal patterns to the catchment allowed the identification of the critical duration for the mean minor (10% AEP) and major (1% AEP) storm event. Below figures are screen shots of Box and Whisker plot taken from XPSTORM software. This plot shows the comparison of storm ensembles for different durations for minor and major storm events. For complete box and whisker charts for the remainder of recurrence intervals refer Appendix B.

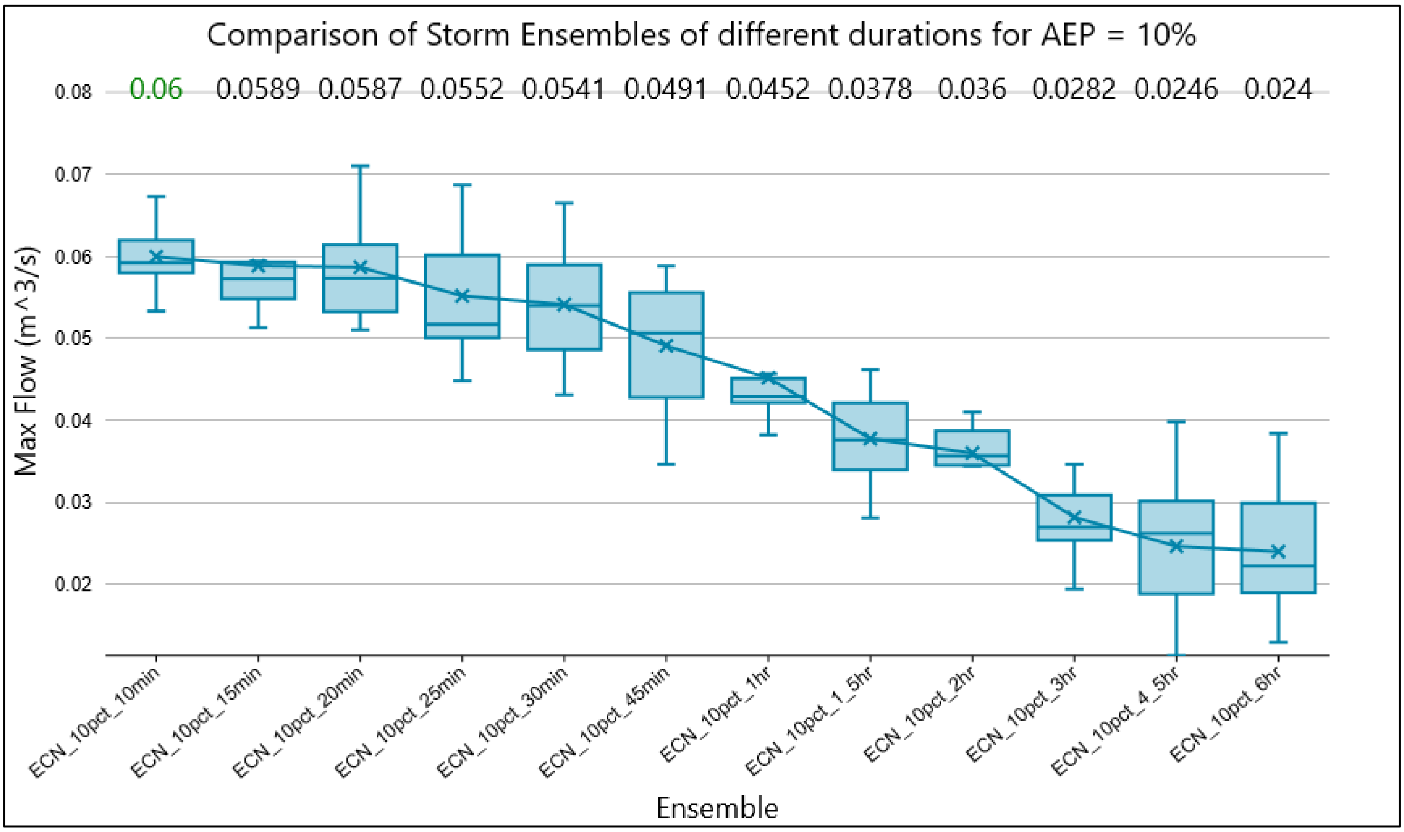

Figure 4: Comparison of Storm Ensembles of different durations for 10% AEP (Pre-development) (XPSTORM Model)

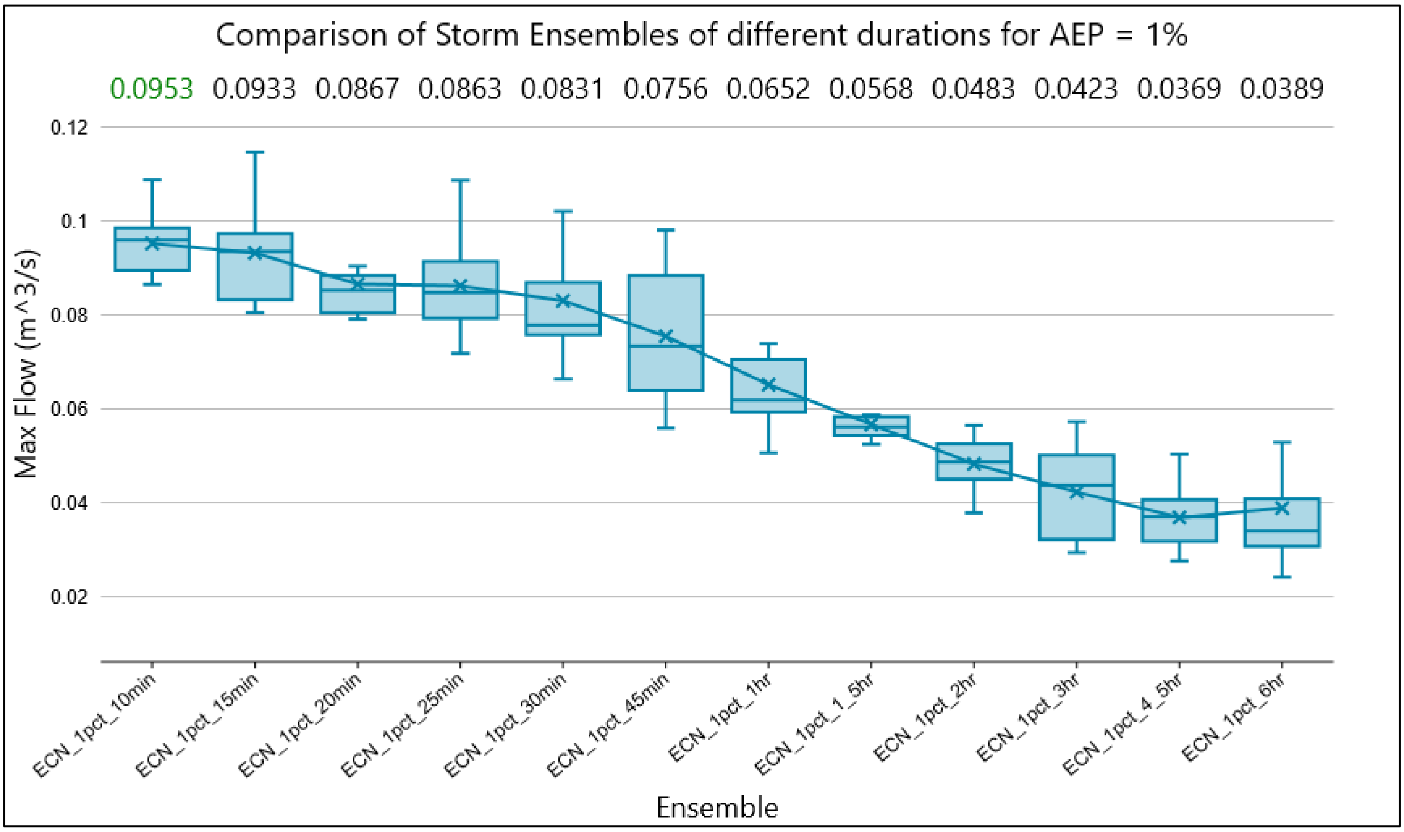

Figure 5: Comparison of Storm Ensembles of different durations for 1% AEP (Pre-development) (XPSTORM Model)

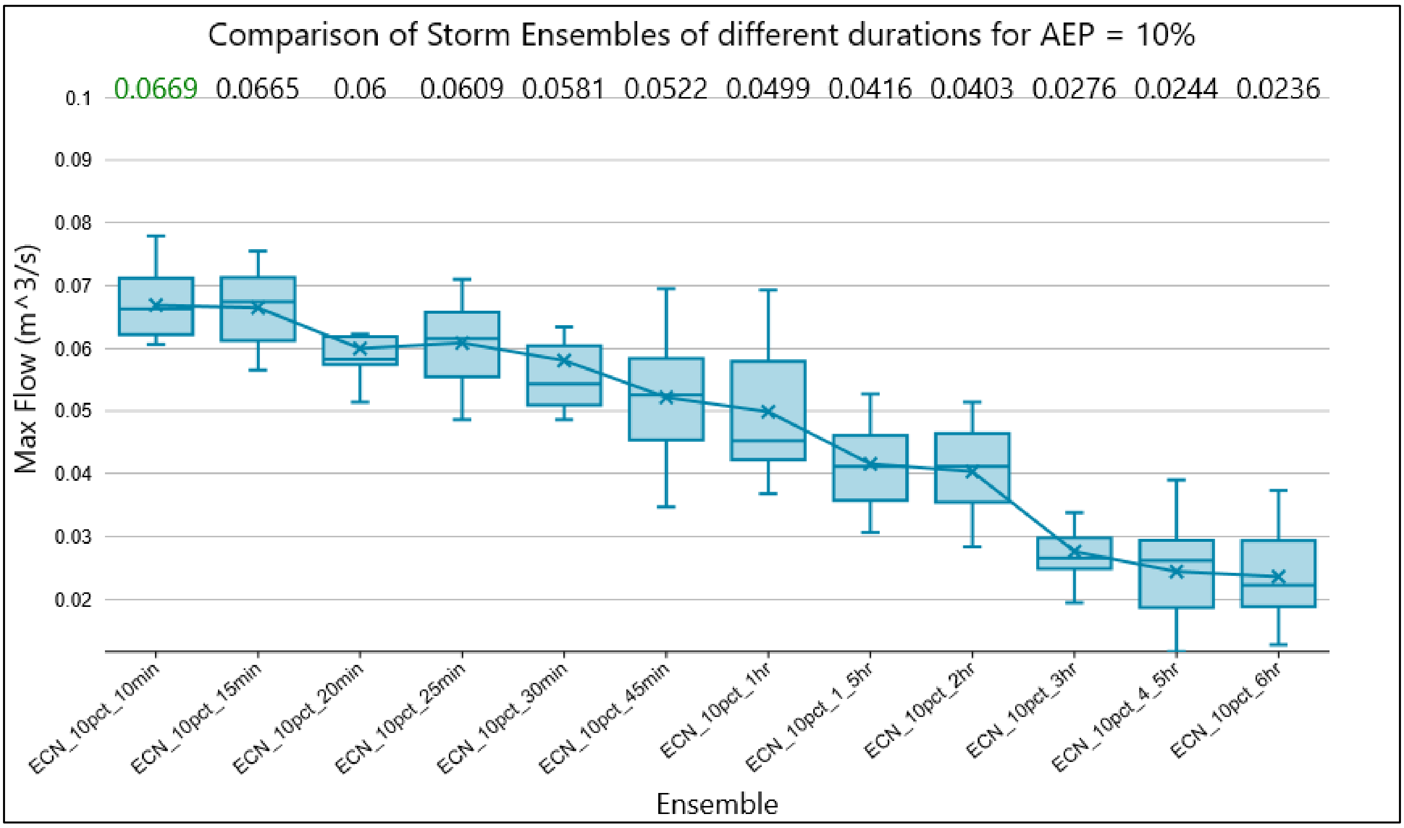

Figure 6: Comparison of Storm Ensembles of different durations for 10% AEP (Post-development) (XPSTORM Model)

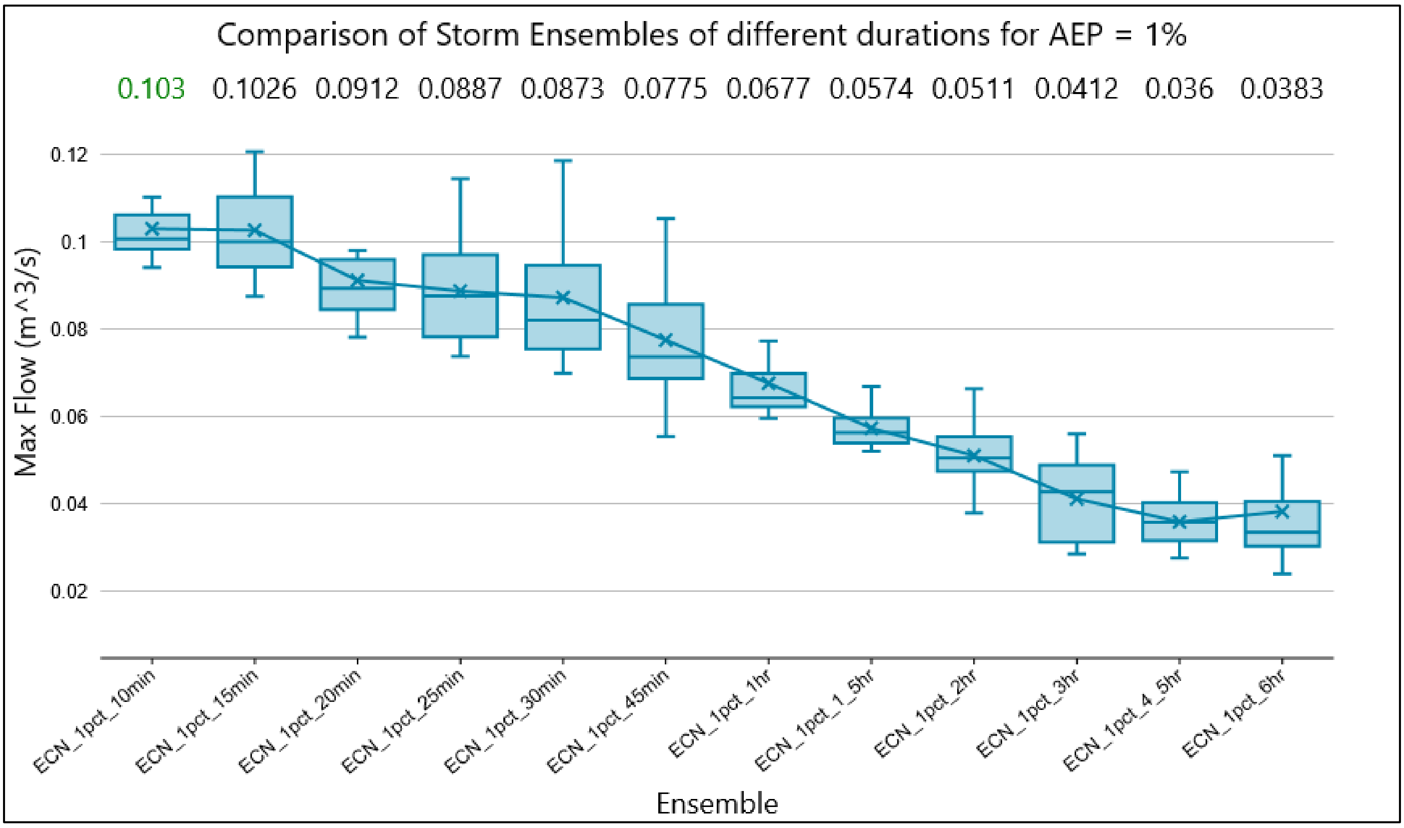

Figure 7: Comparison of Storm Ensembles of different durations for 1% AEP (Post-development) (XPSTORM Model)

The peak results of each of the ensembles for minor and major storm events are summarised in Table 4 (Refer Appendix C for storm events for additional durations and recurrence intervals). The same storm events are applied to the hydraulic analysis.

Table 4: Critical Storm Events

Annual Exceedance Probability (AEP %)	Max. Mean Storm Event	
	Pre development	Post development
10% (Minor Event)	10pct_10min_8	10pct_10min_4
1% (Major Event)	1pct_10min_2	1pct_10min_3

3.2.3. EXTERNAL CATCHMENTS

There appears to be no external catchments impacting the subject site as the northern lot appears to fall into George Lane.

4.0 HYDRAULIC ASSESSMENT

4.1 BACKGROUND

The hydraulic assessment for the site has been carried out using XPSTORM 2019 V1. The aim of the hydraulic modelling is to demonstrate that the post-development minor and major storm peak discharge at the LPOD is equal or less than the peak pre-development discharge. Series of pits and pipes will be utilised to convey discharge to the existing stormwater pit on Albert Street. The internal stormwater pits will be located in sags to allow storage, with a weir outlet onto George street for major storm events.

4.2 DETENTION

The proposed development will utilise approximately 83.5m³ of detention volume at graded sag inlets to ensure no worsening to downstream catchments and infrastructure. The western loading bay cannot be detained, as such the detention strategy will have to account for this. Table 5 summarises the peak storm events for the pre-development and post-development conditions, Refer appendix B and C for hydrology and hydraulics of storm events with AEP 63.2%, 50%, 20% and 5%.

Table 5: Peak Discharge Rate at LPOD

Storm Event (AEP %)	Pre-Development Discharge (m³/s)	Post-Development Discharge – Unmitigated (m³/s)	Outflow from Open Detention Basin (m³/s)			
			125 uPVC	0.5 m Weir	Loading area	Total
63.2%	0.0318	0.0377	0.026	0.000	0.003	0.0290
50%	0.0358	0.0424	0.026	0.000	0.004	0.0300
20%	0.0491	0.0569	0.027	0.000	0.005	0.0320
10% (Minor Event)	0.0600	0.0669	0.027	0.000	0.005	0.0320
5%	0.0706	0.0774	0.027	0.000	0.007	0.0340
1% (Major Event)	0.0953	0.1010	0.027	0.002	0.008	0.0370

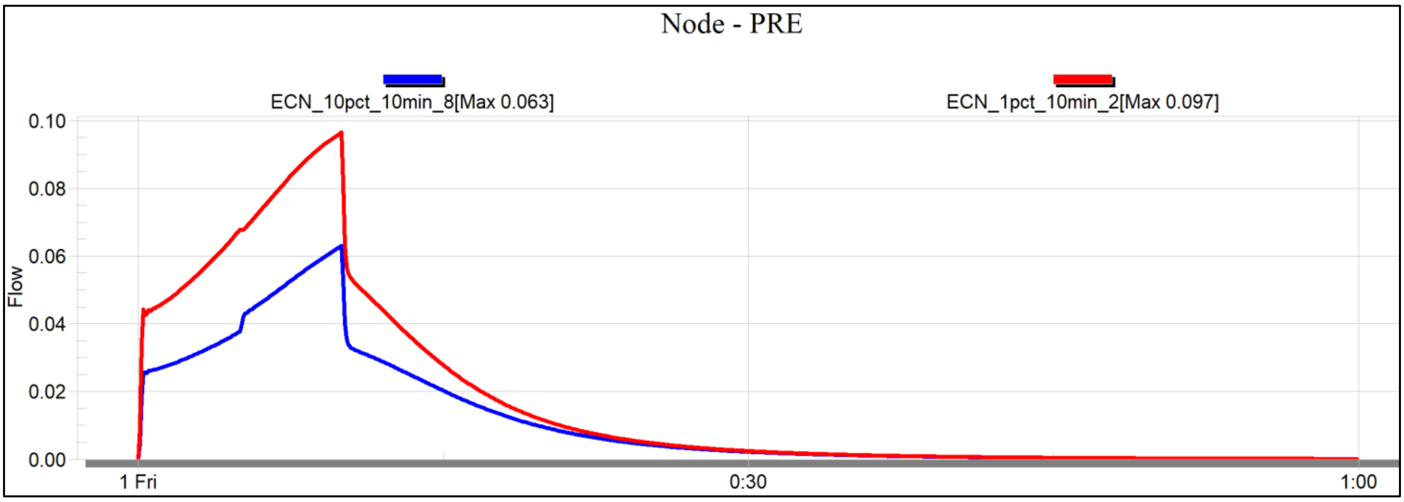

Figure 8: Pre-Development Peak Discharge Rate at LPOD

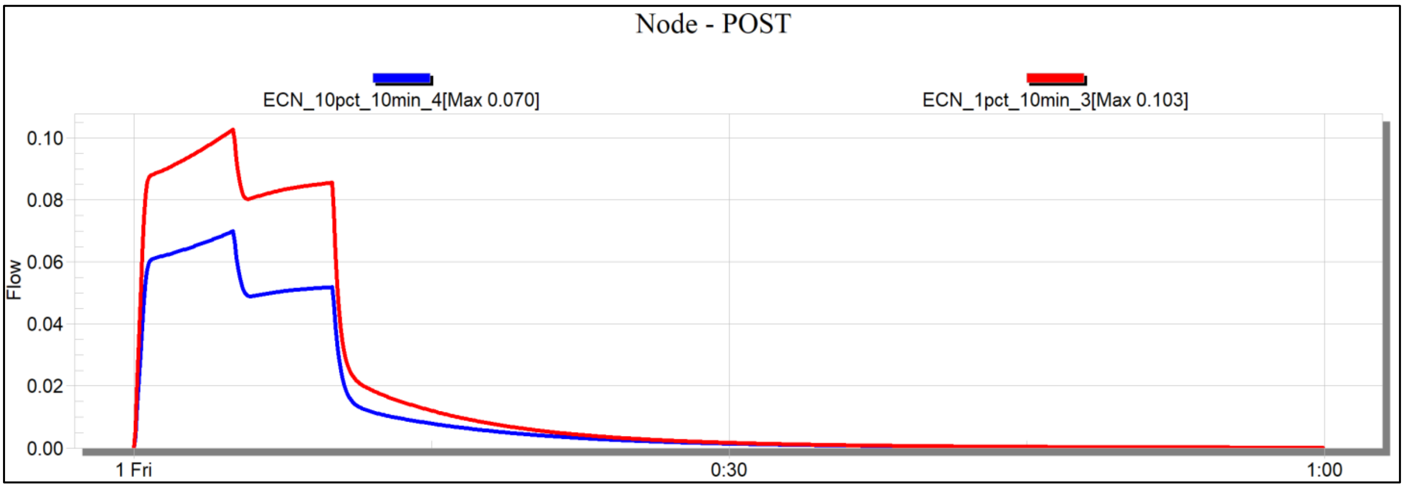

Figure 9: Post-Development Peak Discharge Rate at LPOD

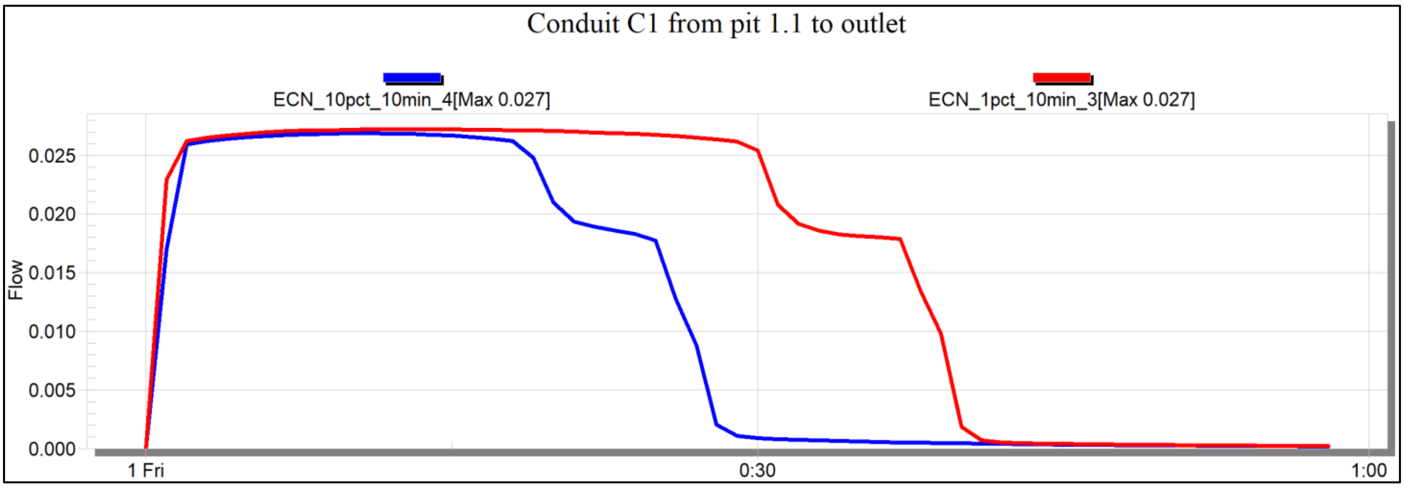

Figure 10: Outflow from site – 125mm pipe

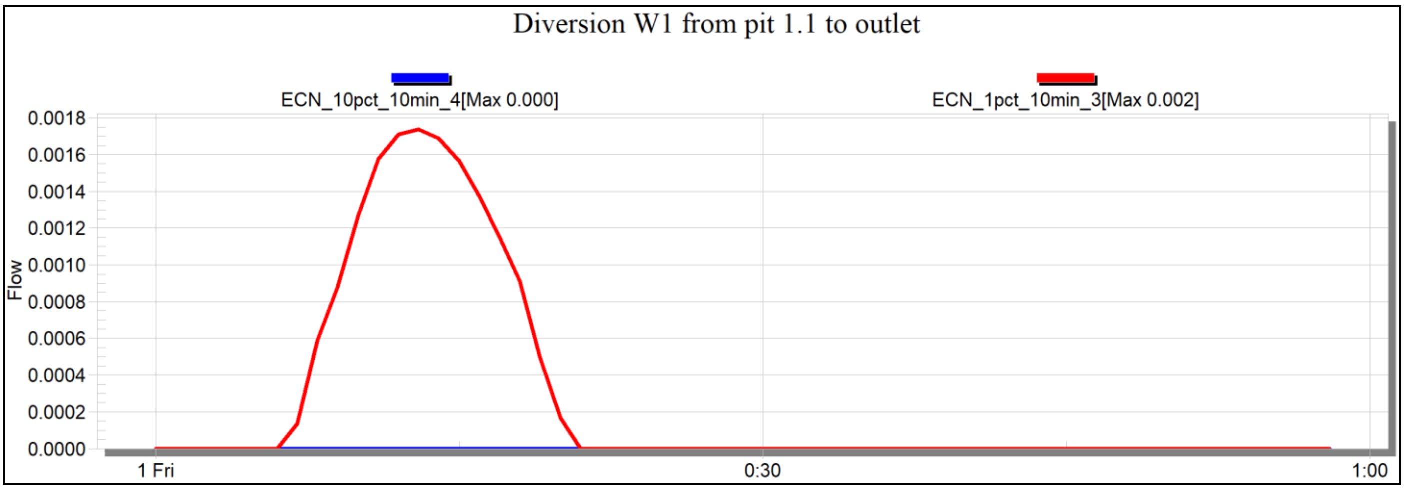

Figure 11: Outflow from site – 0.5m Weir

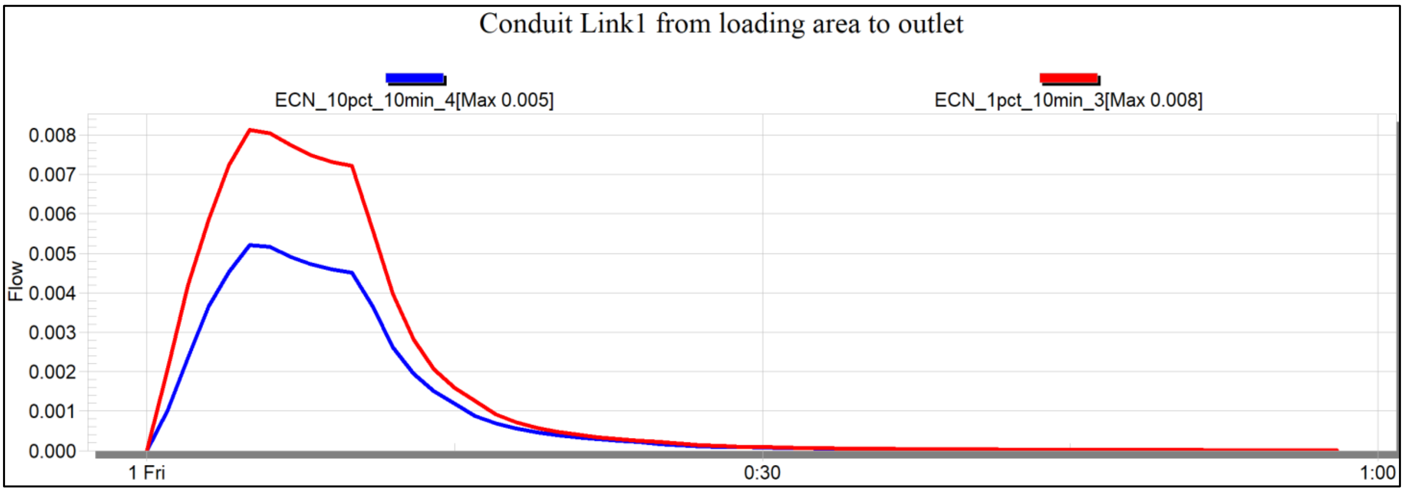

Figure 12: Outflow from site – unmitigated loading area

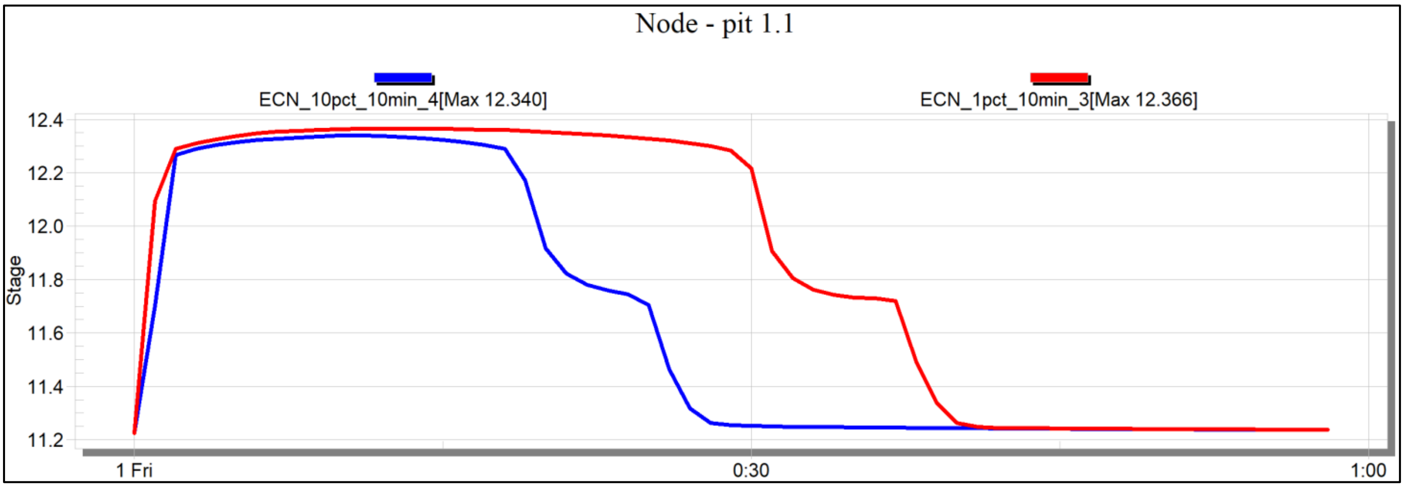

Figure 13: Peak Water Level

Table 6 summarises storage parameters to achieve the target mitigated pre-development flow rates.

Table 6: Stormwater network Parameters

Effective Detention Volume (approximate)	**83.5m³**
Pit IL	**11.225m**
Pit SL	**12.22m**
Weir Width	**0.5m**
Weir RL	**12.35m**
Peak Water Level in 1% AEP (approximate)	**12.366m**
Peak Water Depth on road in 1% AEP (approximate)	**0.146m**
Outlet Structure	**125mm uPVC with 0.5m Weir**

Outflow from stormwater pit will be discharged into existing stormwater pit on Albert Street.

5.0 QUALITY ASSESSMENT

5.1. BACKGROUND

The proposed development will result is on a subject site of 1515m². State planning Policy states that water quality assessment benchmarks for MCU are for premises 2500m2 or greater, therefore there is no requirement for water quality management of the operational phase of the development.

The development of the land has the potential to increase the pollutant loads within stormwater runoff and downstream watercourses. During construction phase of the development, disturbances to the existing ground have the potential to significantly increase sediment loads entering downstream drainage systems and watercourses.

The following sections describe construction phase controls.

5.2. CONSTRUCTION PHASE

5.2.1. KEY POLLUTANTS

During the construction phase a number of key pollutants have been identified for this development. Table 7 illustrates the key pollutants that have been identified.

Pollutant	Sources
Litter	Paper, construction packaging, food packaging, cement bags, material off cuts.
Sediment	Exposed soils and stockpiles during earthworks and building works.
Hydrocarbons	Fuel and oil spills, leaks from construction equipment and temporary car park areas.

Table 7: Key Pollutants – Construction Phase

5.2.2. EROSION AND SEDIMENT CONTROLS

Erosion and Sediment Control (ESC) devices employed on the site shall be designed and constructed in accordance with CMDG.

PRE CONSTRUCTION

- Stabilised site access/exit.
- Sediment fences to be located along the contour lines downstream of disturbed areas.
- Diversion drains to divert clean runoff around the construction site.
- Educate site personnel to the requirements of the Sediment and Erosion Control Plan.

CONSTRUCTION

- Maintain construction access/exit, sediment fencing, catch drains and all other existing controls as required.
- Progressively surface and revegetate finished areas as appropriate.

During construction, all areas of exposed soils allowing dust generation are to be suitably treated. Treatments will include mulching the soil and watering. Road access is to be regularly cleaned to prevent the transmission of soil on vehicle wheels and eliminate any build-up of typical road dirt and tyre dusts from delivery vehicles.

Adequate waste disposal facilities are to be provided and maintained on the site to cater for all waste materials such as litter hydrocarbons, toxic materials, acids or alkaline substances.

6.0 CONCLUSION

The following conclusions are drawn based on the above study of the site;

- Post-development runoff routed through an internal drainage network, with crests and sags to allow ponding for additional storage.
- Outflow from the stormwater network will be discharged into albert street stormwater pit, the legal point of discharge, via 125mm dia uPVC and 0.5m weir.
- There will be no stormwater quality strategy adopted for the operational phase of the development in accordance with the requirements of the State Planning Policy (July 2017).

6.0 CONCLUSION

The following conclusions are drawn based on the above study of the site;

- Post-development runoff routed through an internal drainage network, with crests and sags to allow ponding for additional storage.
- Outflow from the stormwater network will be discharged into albert street stormwater pit, the legal point of discharge, via 125mm dia uPVC and 0.5m weir.
- There will be no stormwater quality strategy adopted for the operational phase of the development in accordance with the requirements of the State Planning Policy (July 2017).

APPENDIX A

Stormwater Management Plan

EXISTING CATCHMENT PLAN
SCALE: 1:100(A1) 1:200(A3)

LEGEND

(green hatch)	GRASSED AREA - 920m^2
(yellow hatch)	CONCRETE AREA - 70m^2
(red hatch)	ROOF AREA - 530m^2

2 0 2 4 6 8 10m
SCALE 1:100 @ A1 SCALE 1:200 @ A3

FOR APPROVAL

SURVEYOR				
ADDRESS:				
CO-ORDINATE DATUM				
HEIGHT DATUM	DRAWING No.	REFERENCE DRAWING TITLE		

REV	DATE	REVISION DESCRIPTION	DFT	DFT CHK	DES	DES CHK
A	02/11/2020	SUBMITTED FOR APPROVAL	IBB	IBB	IBB	CWH

	BY	DATE
REVIEWED		
RPEQ ENG		
RPEQ No:		

CLIENT

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SCALE: NTS

PREPARED BY 036-20-21
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Fax: (07) 4921 1790

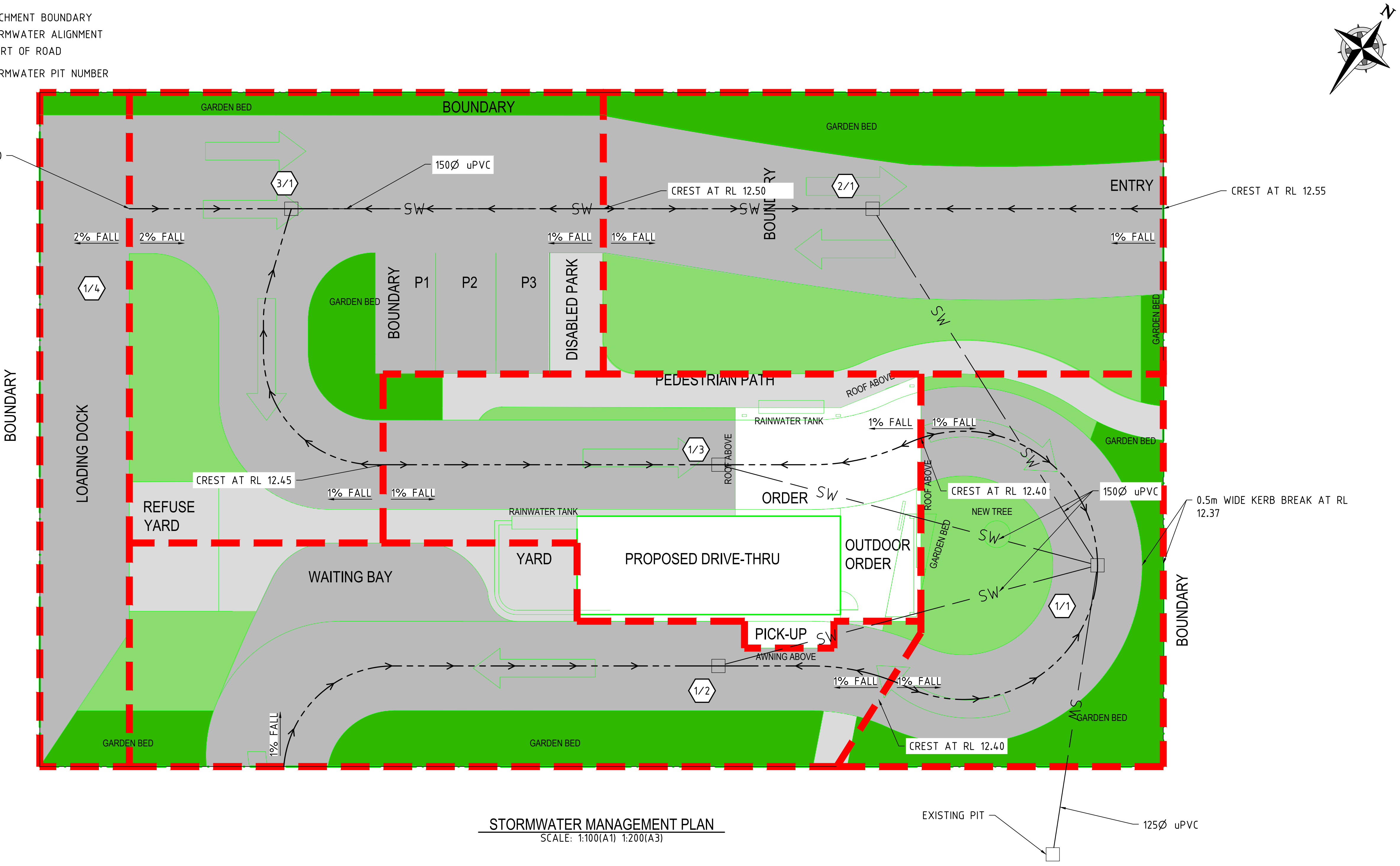
CLIENT KELE PROPERTY GROUP
PROJECT PROPOSED COFFEE SHOP
TITLE EXISTING CATCHMENT PLAN

A1 | DRAWING NUMBER 036-20-21-SMP-001 | REVISION A

PLOT DATE: 2/11/2020 4:03:48 PM DRAWING LOCATION: S:\PROJECT RECORDS\20-21\036-20-21 - PROPOSED COFFEE SHOP\DESIGN\DWG\EXISTING.DWG

LEGEND

- CATCHMENT BOUNDARY
- — SW — STORMWATER ALIGNMENT
- INVERT OF ROAD
- (1/1) STORMWATER PIT NUMBER



STORMWATER MANAGEMENT PLAN

SCALE: 1:100(A1) 1:200(A3)

CATCHMENT PROPERTIES

CATCHMENT	GARDEN	GRASS	CONCRETE	ROOF
1/1	$50m^2$	$50m^2$	$110m^2$	$0m^2$
2/1	$70m^2$	$80m^2$	$160m^2$	$0m^2$
3/1	$40m^2$	$40m^2$	$270m^2$	$0m^2$
1/2	$60m^2$	$20m^2$	$200m^2$	$0m^2$
1/3	$10m^2$	$10m^2$	$110m^2$	$120m^2$
1/4	$10m^2$	$0m^2$	$110m^2$	$0m^2$

2 0 2 4 6 8 10m

SCALE 1:100 @ A1 SCALE 1:200 @ A3

FOR APPROVAL

SURVEYOR

ADDRESS:

CO-ORDINATE DATUM

HEIGHT DATUM

DRAWING No.	REFERENCE DRAWING TITLE	REV	DATE	REVISION DESCRIPTION	DFT	DFT CHK	DES	DES CHK
		B	03/12/2020	UPDATED SITE LAYOUT	IBB	IBB	IBB	CWH
		A	02/11/2020	SUBMITTED FOR APPROVAL	IBB	IBB	IBB	CWH

	BY	DATE
REVIEWED		
RPEQ ENG		

RPEQ No:

CLIENT

SCALE: NTS

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CLIENT KELE PROPERTY GROUP

PROJECT PROPOSED COFFEE SHOP

TITLE PRELIMINARY STORMWATER LAYOUT

A1 DRAWING NUMBER 036-20-21-SMP-002 REVISION B

APPENDIX B

Additional Box and Whisker Charts

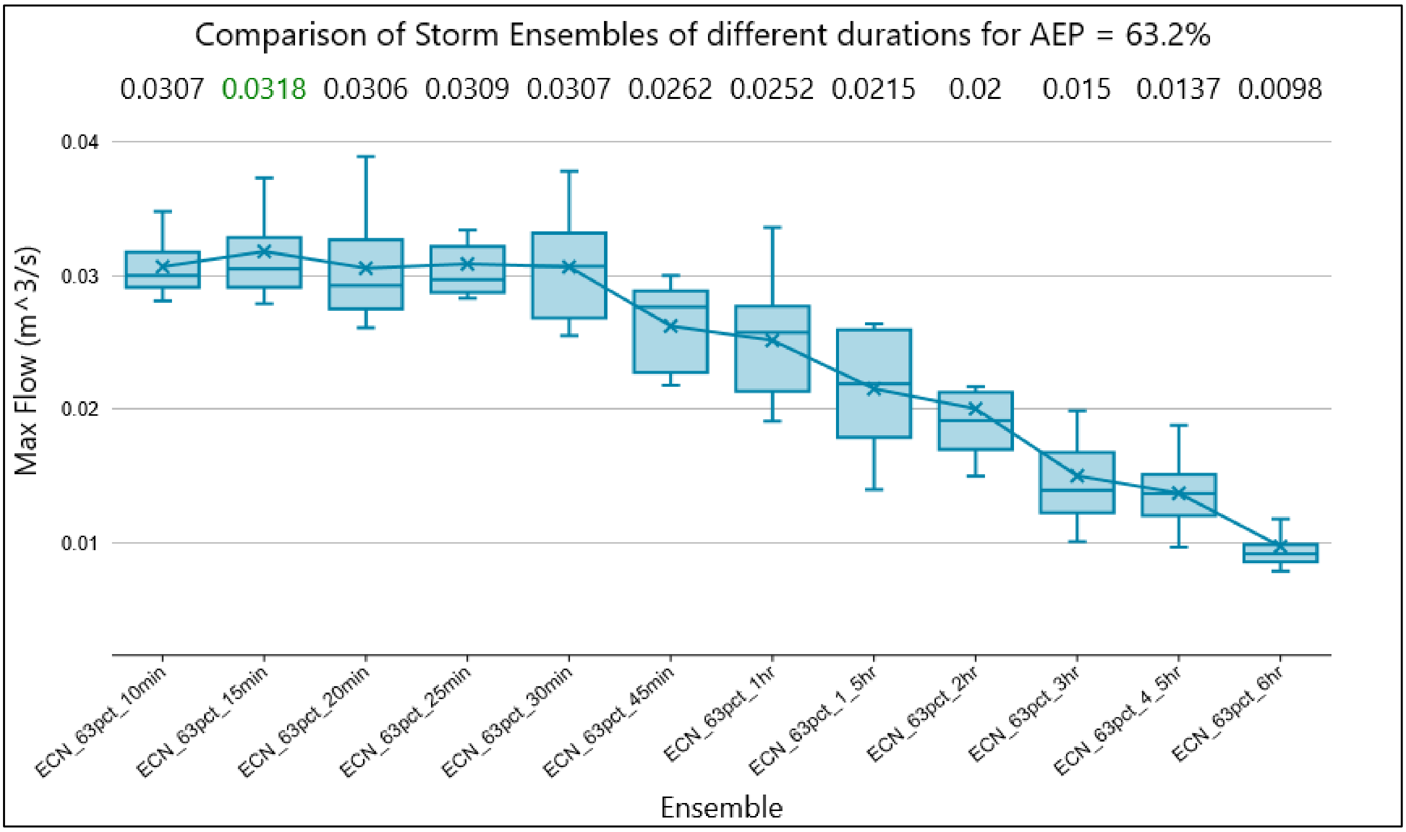

Figure 1: Comparison of Storm Ensembles of different durations for 63.2% AEP (Pre-development) (XPSTORM Model)

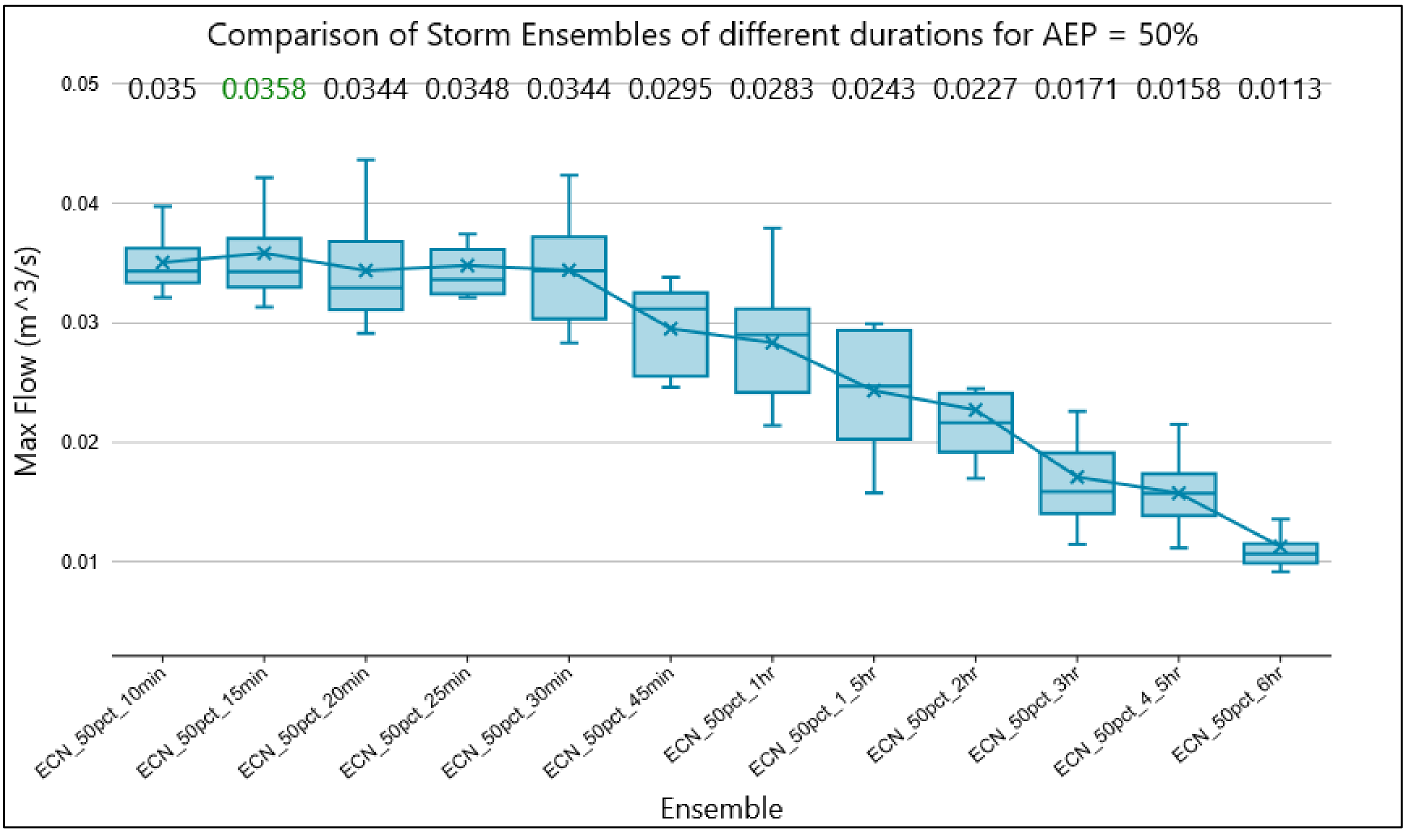

Figure 2: Comparison of Storm Ensembles of different durations for 50% AEP (Pre-development) (XPSTORM Model)

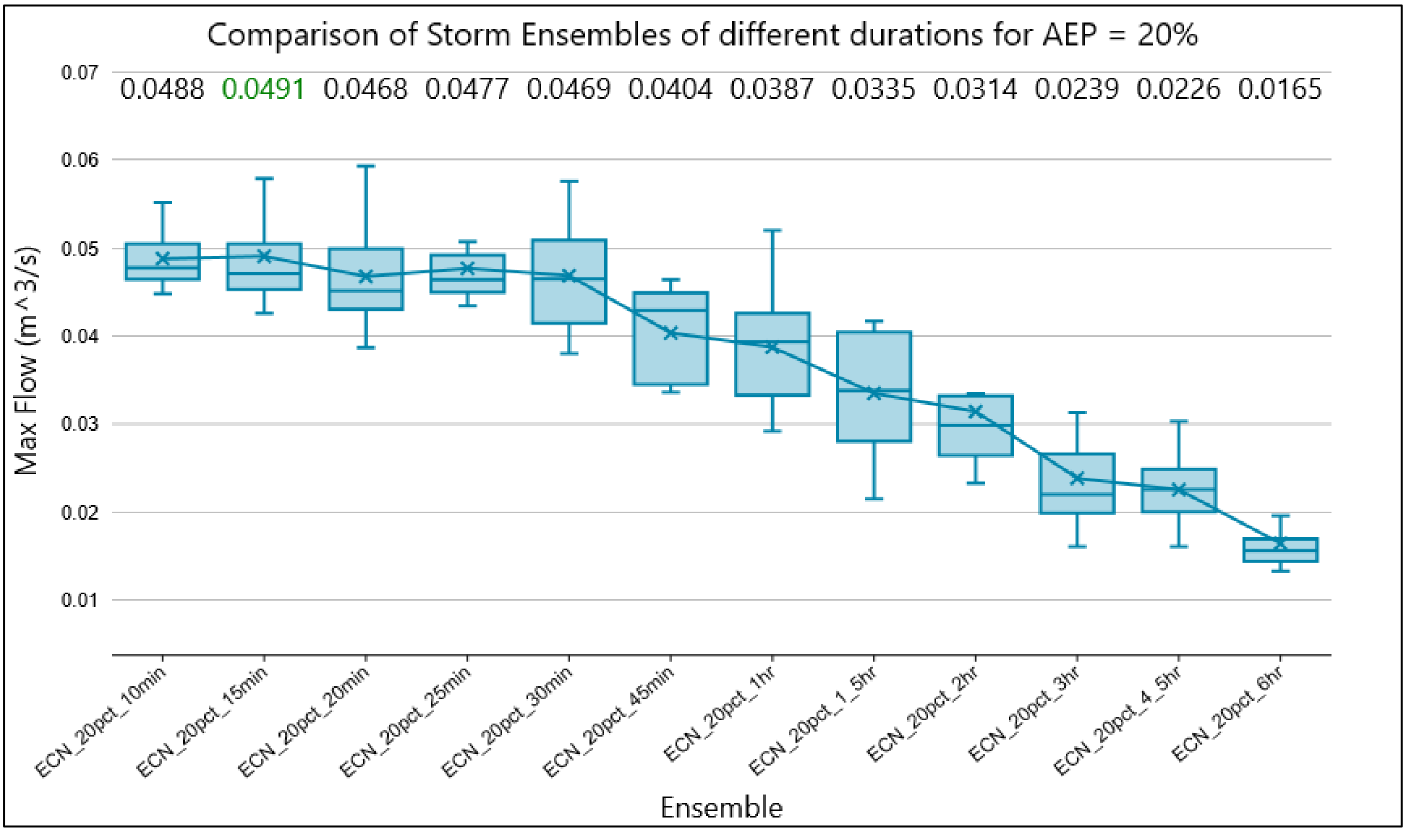

Figure 3: Comparison of Storm Ensembles of different durations for 20% AEP (Pre-development) (XPSTORM Model)

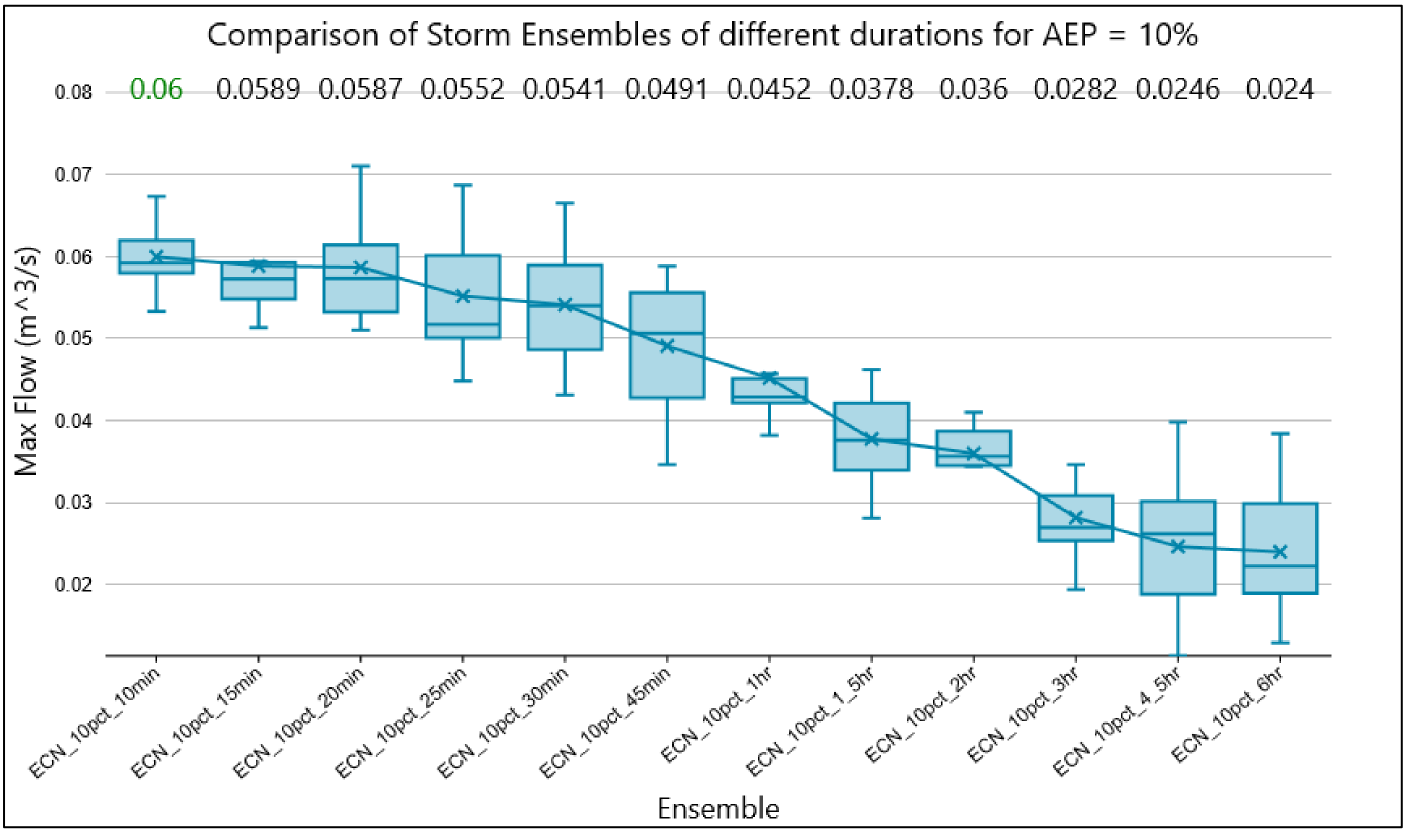

Figure 4: Comparison of Storm Ensembles of different durations for 10% AEP (Pre-development) (XPSTORM Model)

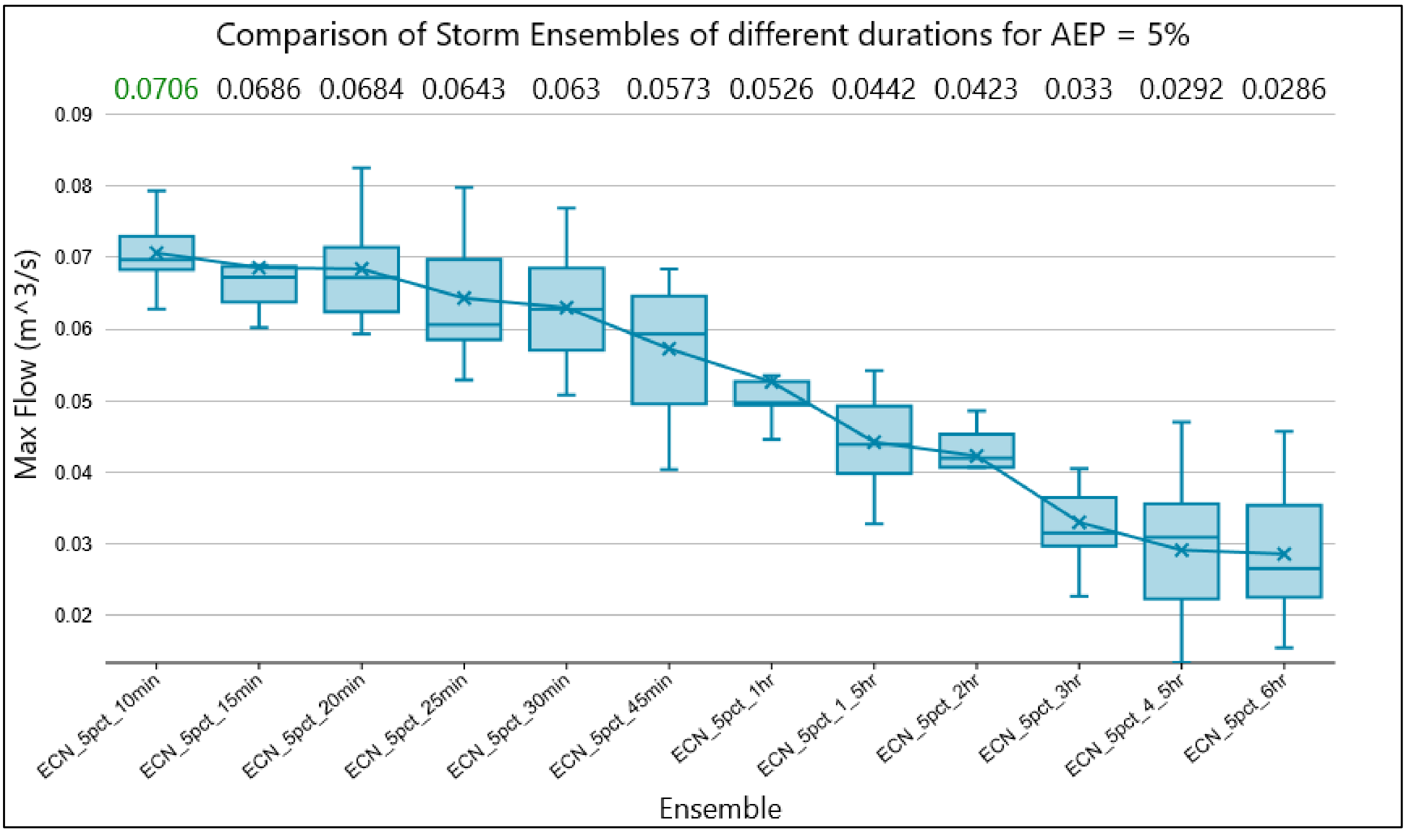

Figure 5: Comparison of Storm Ensembles of different durations for 5% AEP (Pre-development) (XPSTORM Model)

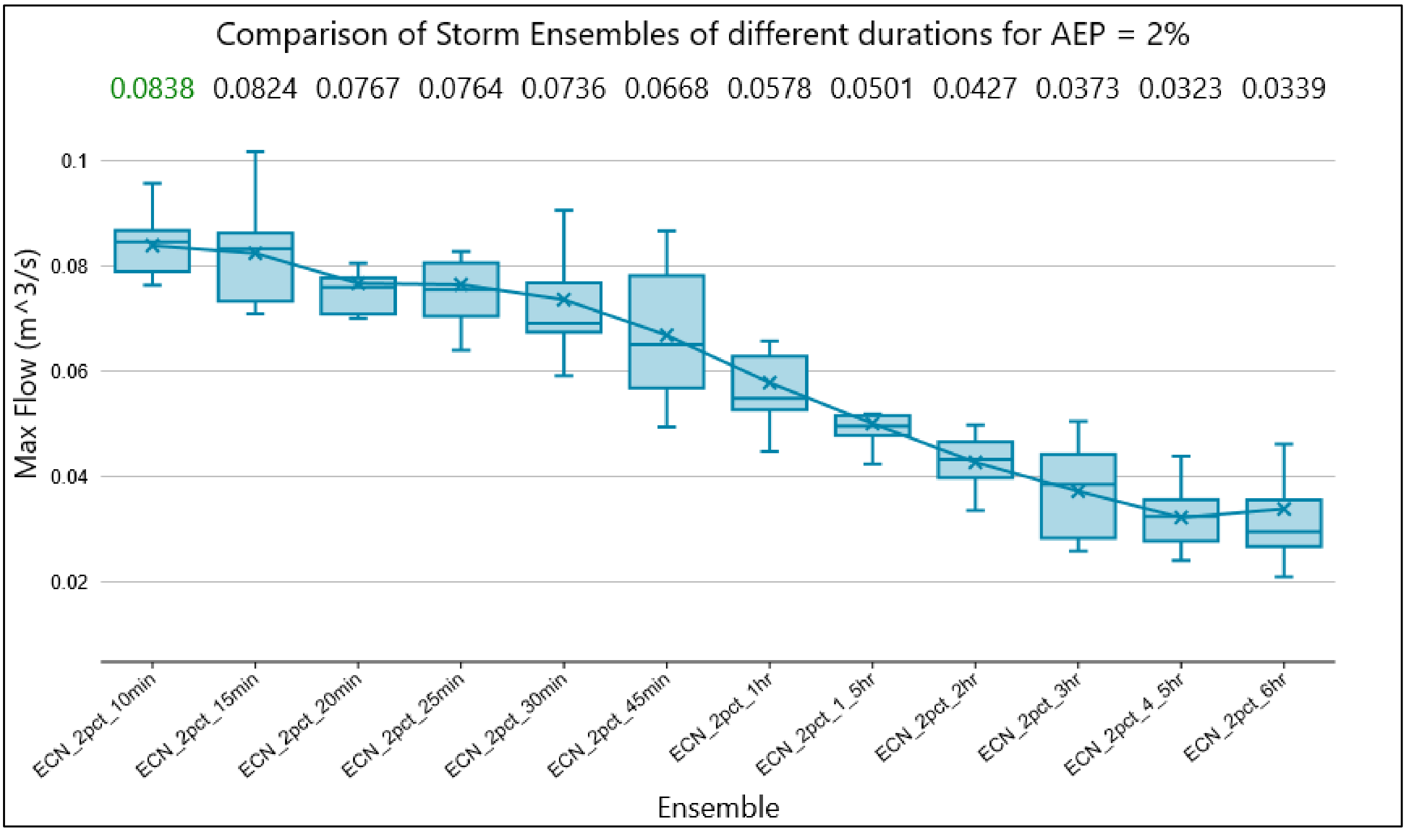

Figure 6: Comparison of Storm Ensembles of different durations for 2% AEP (Pre-development) (XPSTORM Model)

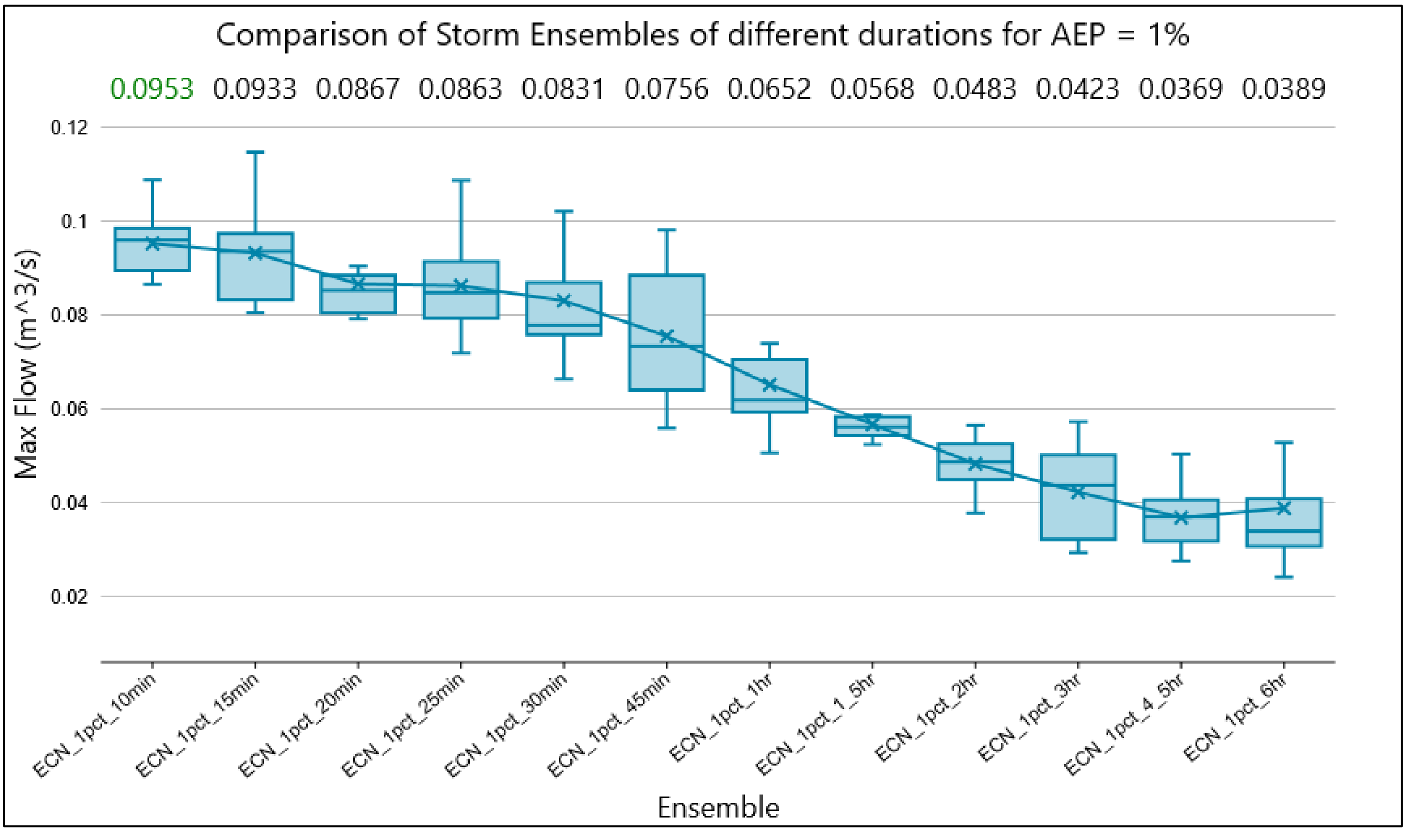

Figure 7: Comparison of Storm Ensembles of different durations for 1% AEP (Pre-development) (XPSTORM Model)

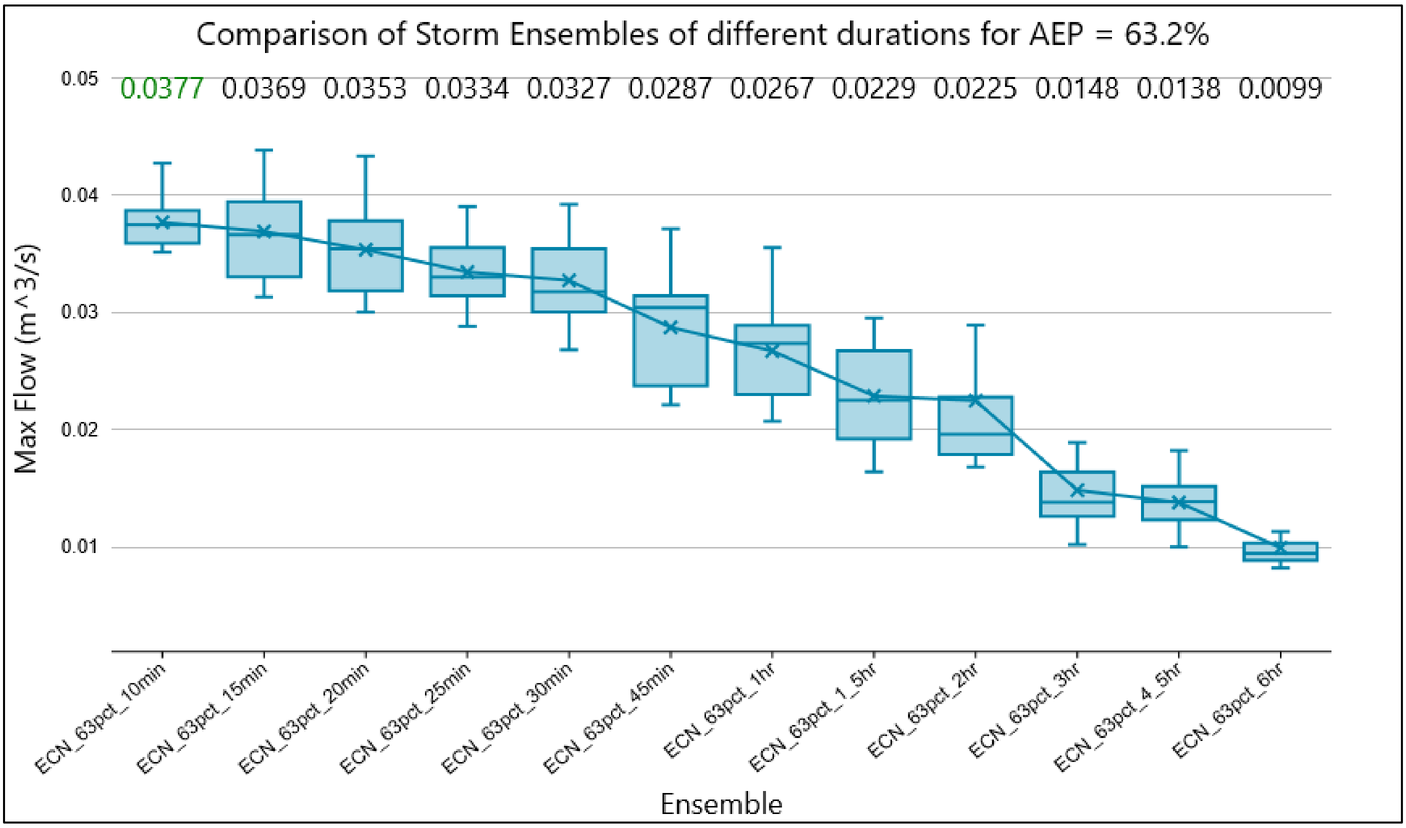

Figure 8: Comparison of Storm Ensembles of different durations for 63.2% AEP (Post-development) (XPSTORM Model)

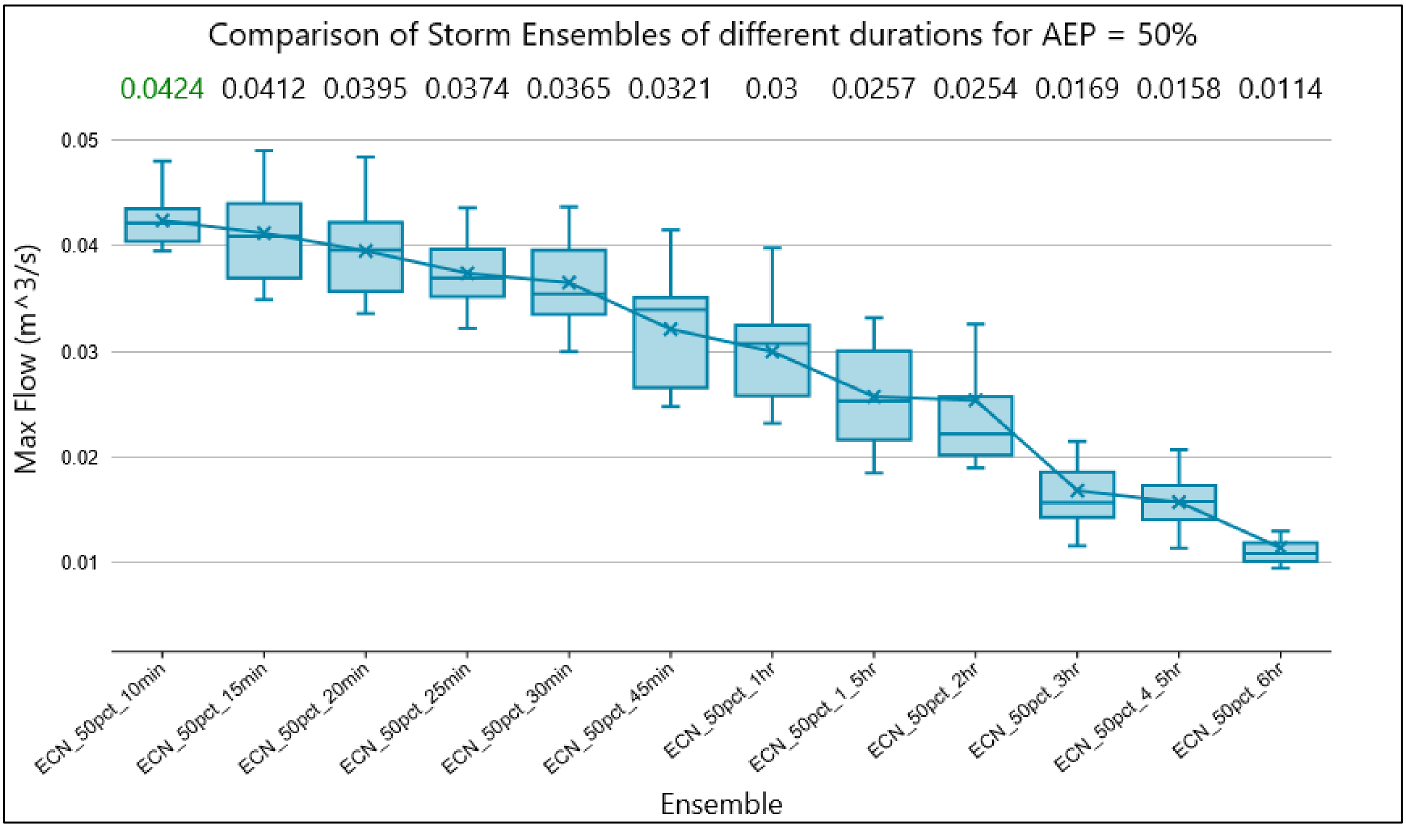

Figure 9: Comparison of Storm Ensembles of different durations for 63.2% AEP (Post-development) (XPSTORM Model)

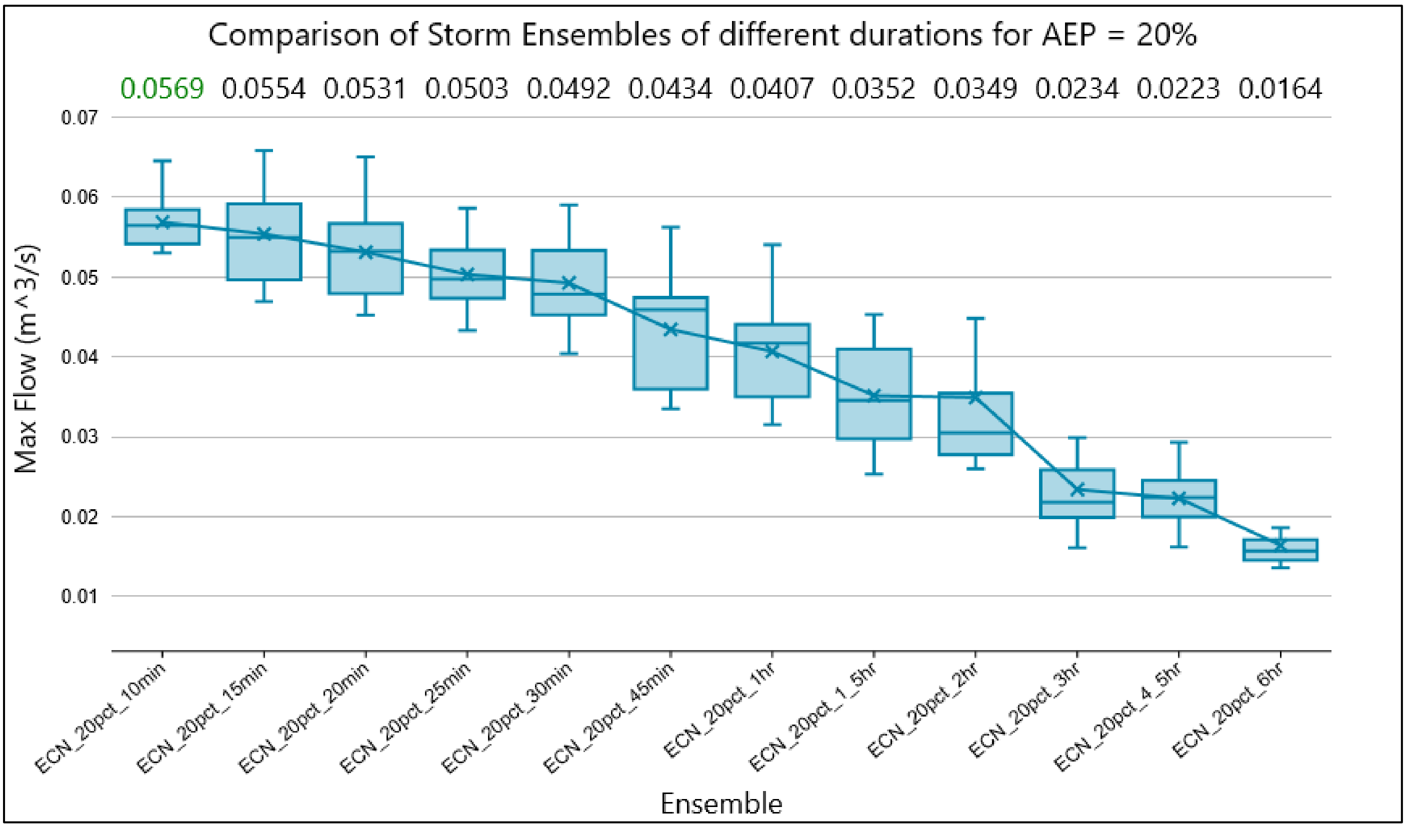

Figure 10: Comparison of Storm Ensembles of different durations for 63.2% AEP (Post-development) (XPSTORM Model)

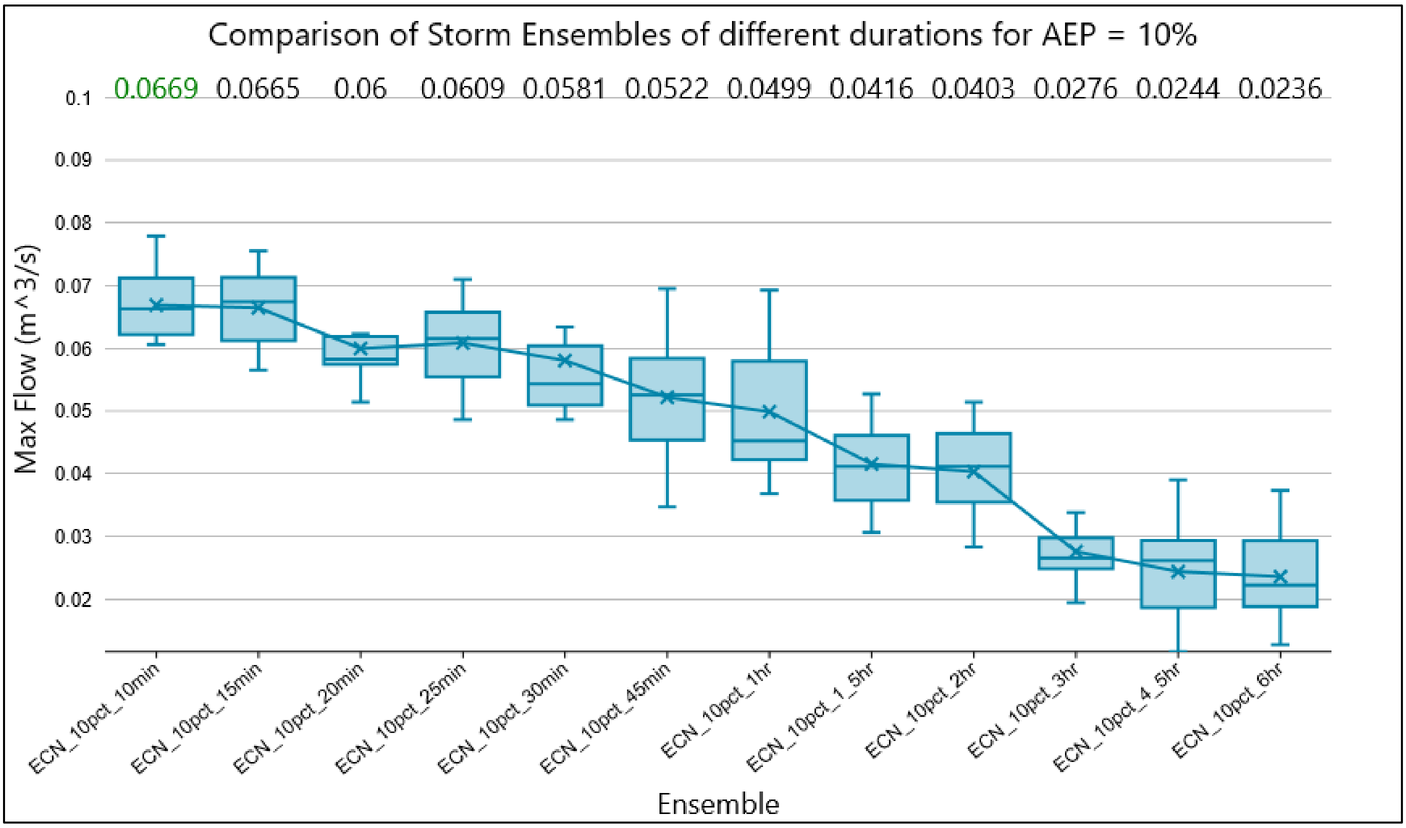

Figure 11: Comparison of Storm Ensembles of different durations for 63.2% AEP (Post-development) (XPSTORM Model)

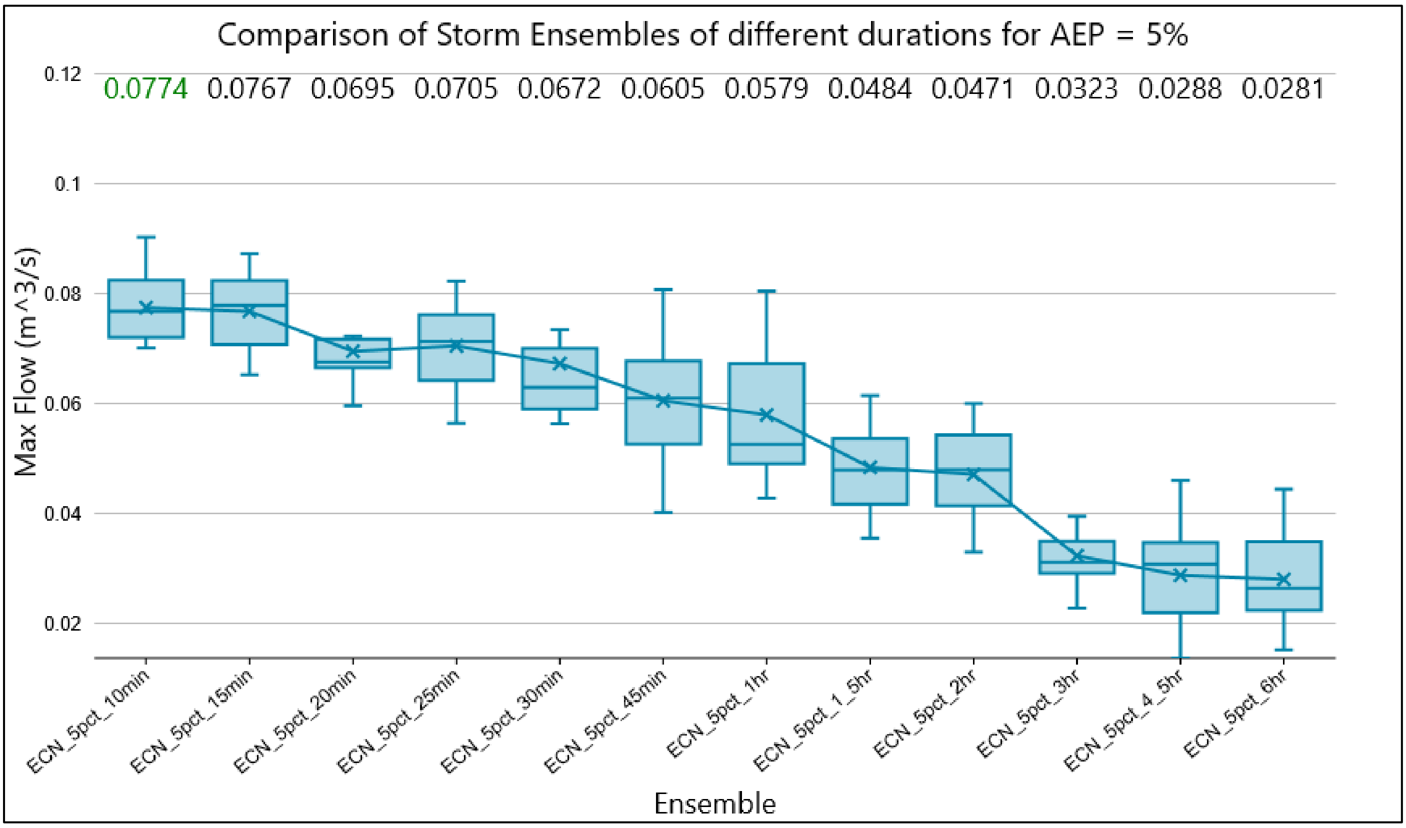

Figure 12: Comparison of Storm Ensembles of different durations for 63.2% AEP (Post-development) (XPSTORM Model)

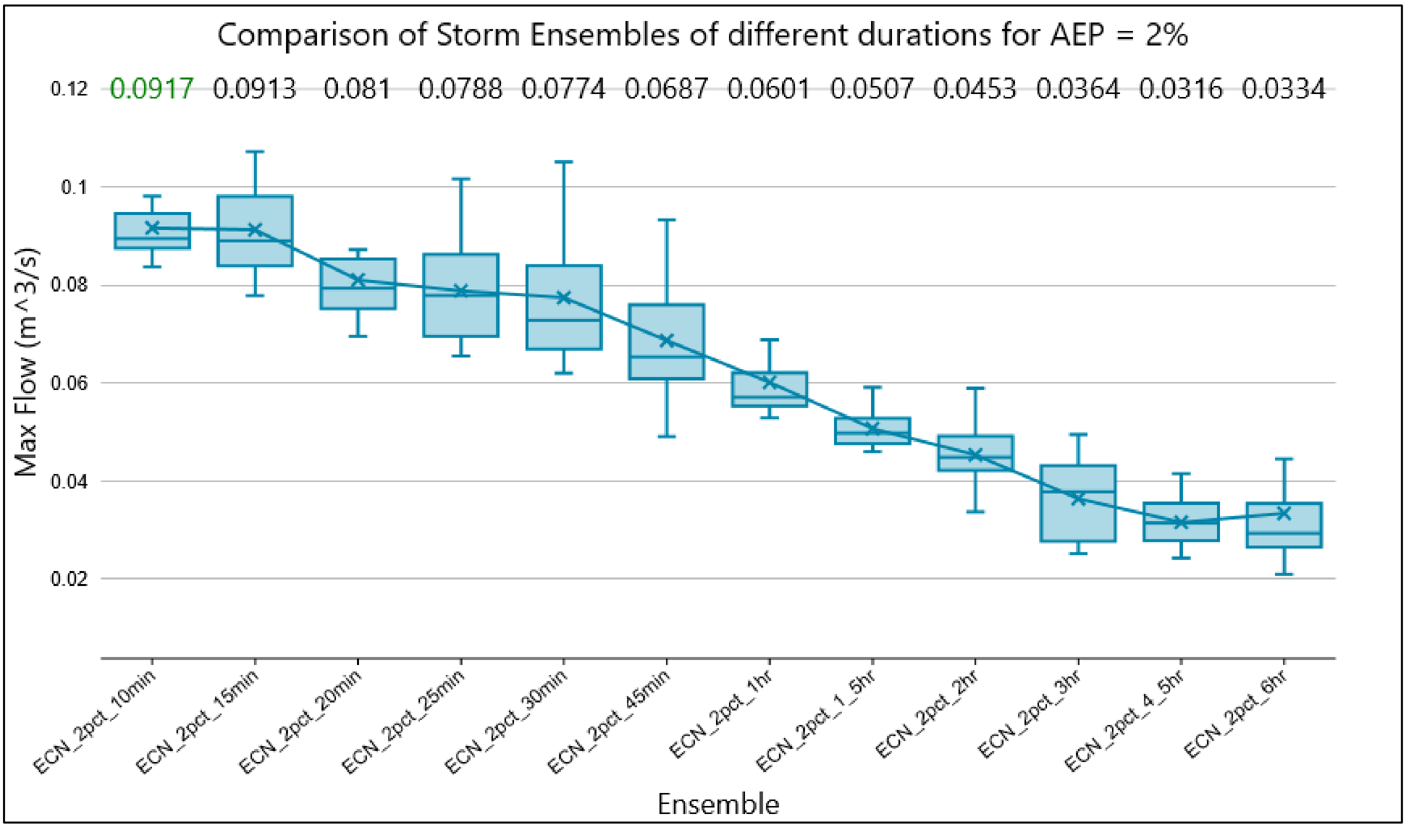

Figure 13: Comparison of Storm Ensembles of different durations for 63.2% AEP (Post-development) (XPSTORM Model)

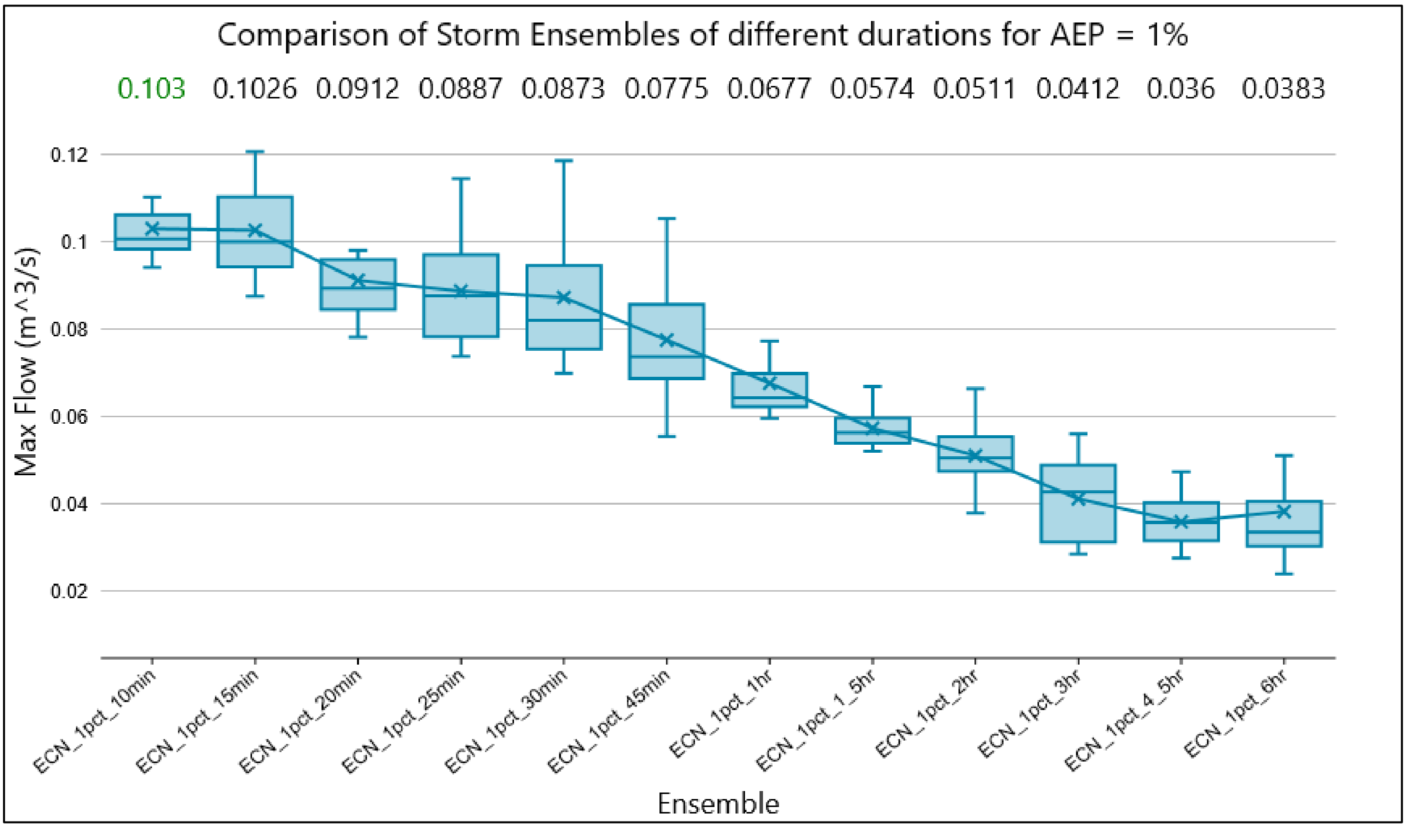

Figure 14: Comparison of Storm Ensembles of different durations for 63.2% AEP (Post-development) (XPSTORM Model)

In order to ensure there is no actionable nuisance on the stormwater network site discharge will need to be reduced below that of the peak pre-development discharge for each recurrence interval. From the box and whisker charts it can be inferred that the mitigation strategy will need to account for the following events.

	Peak pre-development Storm events		Max mean Post-development Storm events greater than Peak pre-development Storm events				
AEP %	Event	Discharge (m^3/s)	10 minute event	15 minute event	20 minute event	25 minute event	30 minute event
63.2	15min_7	0.0318	10min_8	15min_1	20min_2	25min_3	30min_1
50	15min_7	0.0358	10min_8	15min_1	20min_2	25min_4	30min_1
20	15min_7	0.0491	10min_8	15min_1	20min_2	25min_4	30min_1
10	10min_8	0.06	10min_4	15min_2	20min_5	25min_3	-
5	10min_8	0.0706	10min_5	15min_2	20min_5	-	-
2	10min_2	0.0838	10min_3	15min_4	-	-	-
1	10min_2	0.0953	10min_3	15min_4	-	-	-

Refer appendix C for hydraulic graphs for the above events and table summarising net reduction in flow for all post development storms.

APPENDIX C

Additional storm hydraulic assessment

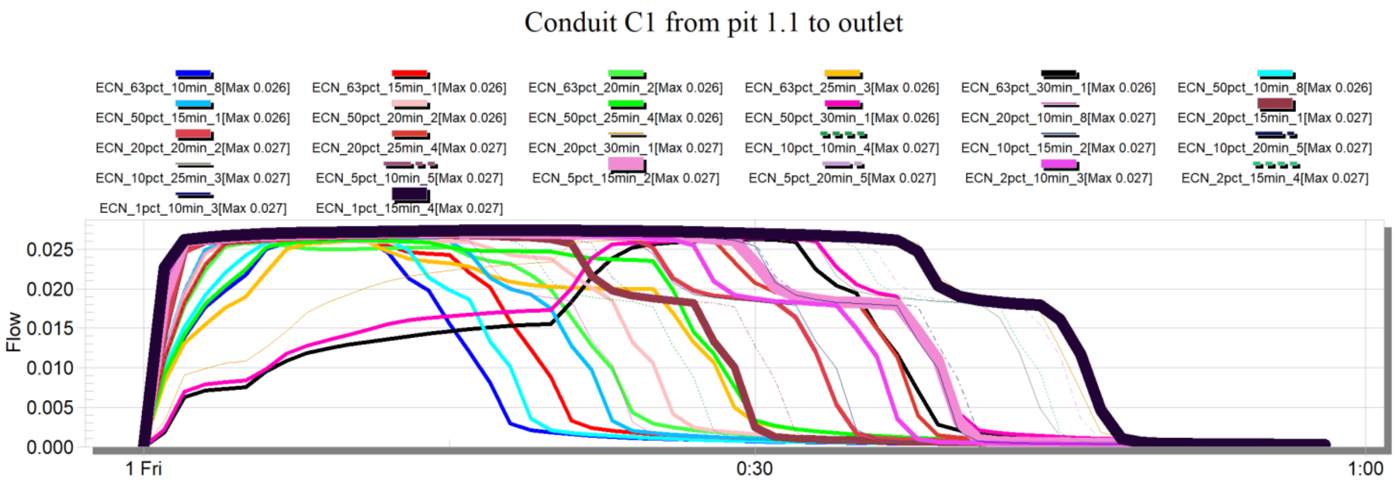

Figure 1: Outflow from site – 125mm pipe

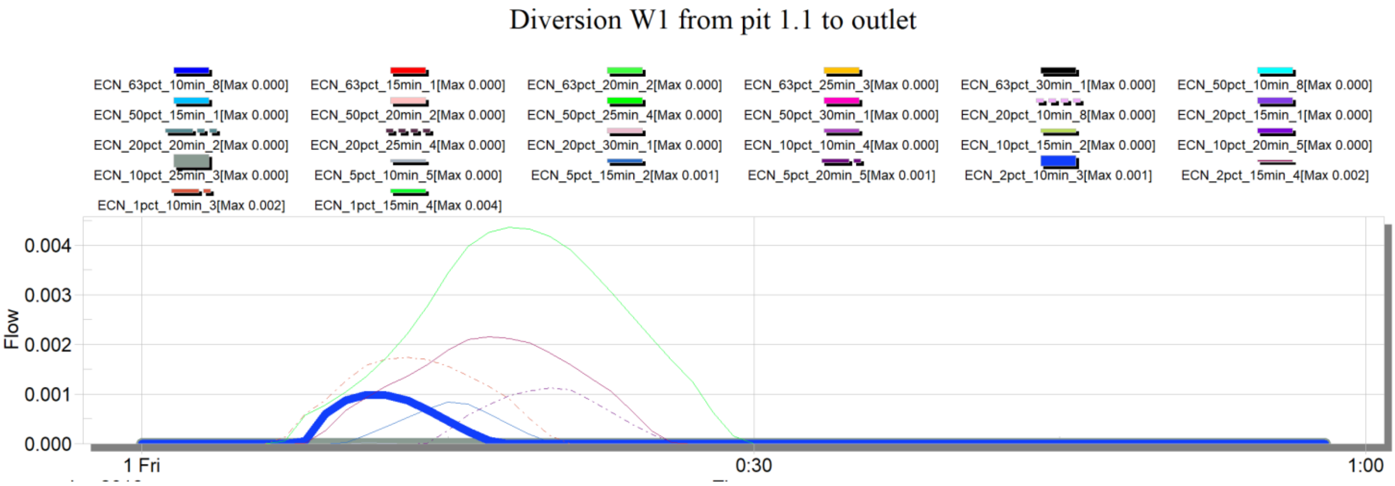

Figure 2: Outflow from site – 0.5m Weir

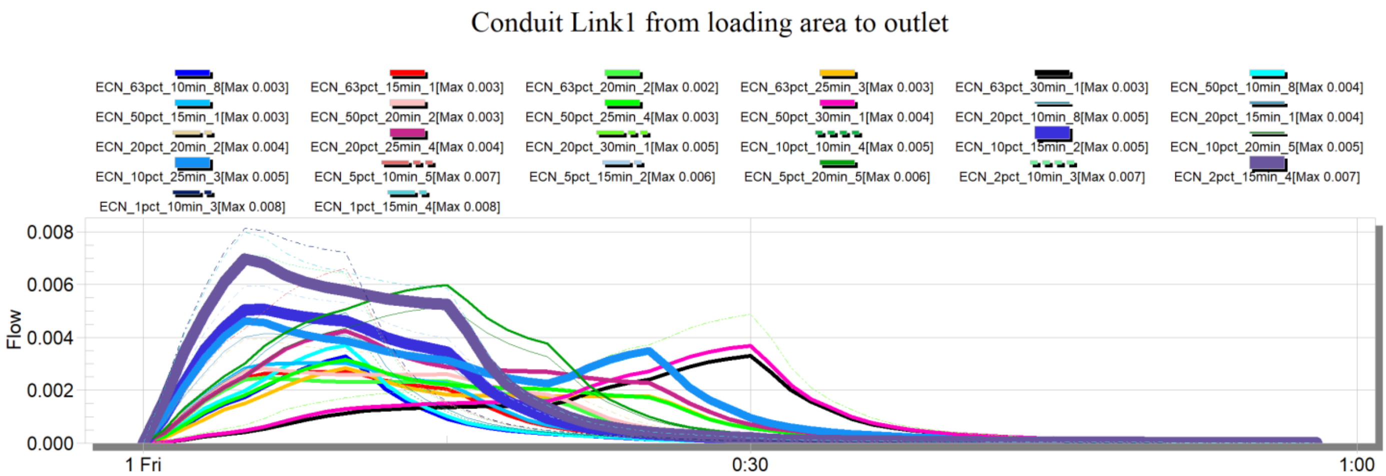

Figure 3: Outflow from site – Unmitigated loading area

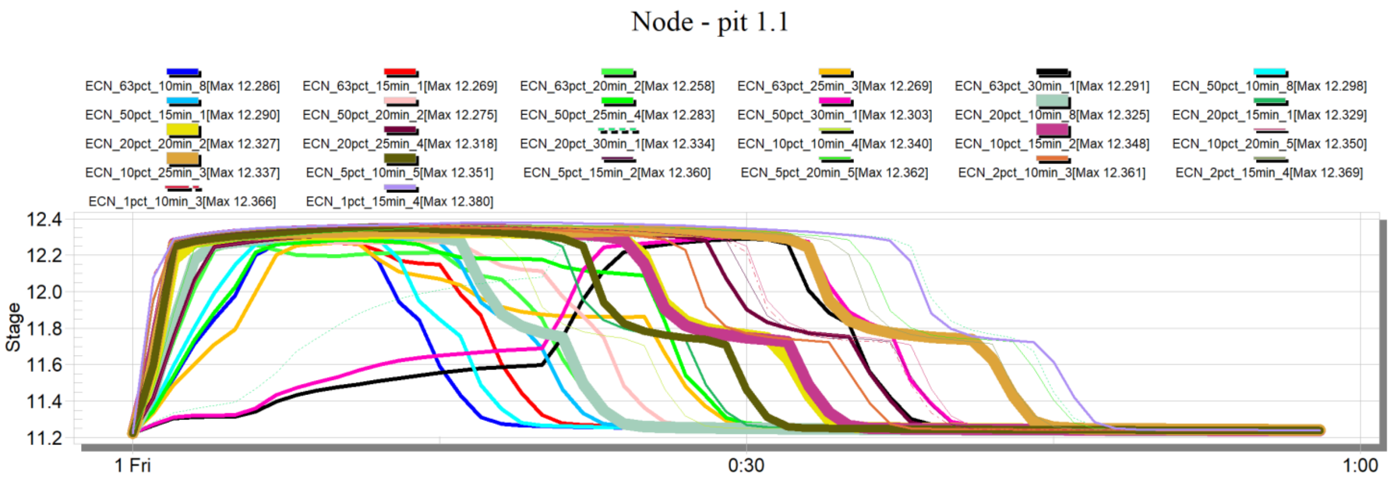

Figure 4: Peak Water Level

Refer below summary of graphs.

	Peak pre-development Storm events		Max mean Post-development Storm events greater than Peak pre-development Storm events																					
AEP %	Event	Discharge (m^3/s)	10 minute event				15 minute event				20 minute event				25 minute event				30 minute event				Critical post development runoff	Change in peak runoff
			125 uPVC	0.5m Weir	Loading area	Total	125 uPVC	0.5m Weir	Loading area	Total	125 uPVC	0.5m Weir	Loading area	Total	125 uPVC	0.5m Weir	Loading area	Total	125 uPVC	0.5m Weir	Loading area	Total		
63.2	15min_7	0.0318	10min_8				15min_1				20min_2				25min_3				30min_1					
			0.026	0.000	0.003	0.029	0.026	0.000	0.003	0.029	0.026	0.000	0.002	0.028	0.026	0.000	0.003	0.029	0.026	0.000	0.003	0.029	0.029	-0.003
50	15min_7	0.0358	10min_8				15min_1				20min_2				25min_4				30min_1					
			0.026	0.000	0.004	0.030	0.026	0.000	0.003	0.029	0.026	0.000	0.003	0.029	0.026	0.000	0.003	0.029	0.026	0.000	0.004	0.030	0.030	-0.006
20	15min_7	0.0491	10min_8				15min_1				20min_2				25min_4				30min_1					
			0.027	0.000	0.005	0.032	0.027	0.000	0.004	0.031	0.027	0.000	0.004	0.031	0.027	0.000	0.004	0.031	0.027	0.000	0.005	0.032	0.032	-0.017
10	10min_8	0.06	10min_4				15min_2				20min_5				25min_3				-					
			0.027	0.000	0.005	0.032	0.027	0.000	0.005	0.032	0.027	0.000	0.005	0.032	0.027	0.000	0.005	0.032					0.032	-0.028
5	10min_8	0.0706	10min_5				15min_2				20min_5				-				-					
			0.027	0.000	0.007	0.034	0.027	0.001	0.006	0.034	0.027	0.001	0.006	0.034									0.034	-0.037
2	10min_2	0.0838	10min_3				15min_4				-				-				-					
			0.027	0.001	0.007	0.035	0.027	0.002	0.007	0.036													0.036	-0.048
1	10min_2	0.0953	10min_3				15min_4				-				-				-					
			0.027	0.002	0.008	0.037	0.027	0.004	0.008	0.039													0.039	-0.056