Stormwater Management Report 102 -108 Humffray Street South, Bakery Hill (Rev01)

Ref No: 23253-01

Prepared For: Humffray Development Partnership

Date: 12th of October 2022

Introduction

Cardno Now Stantec has been commissioned by Humffray Development Partnership Pty Ltd to design and assess the drainage & on-site system requirements for the proposed commercial & residential buildings on 102 – 108 Humffray Street South, Bakery Hill.

The existing site conditions largely comprise of impervious areas (roof & pavement) where the proposed site integrates more landscaped areas (refer to SW01) resulting in a net reduction of impervious area. The proposed development does not increase the off-site runoff and adversely impact pre-development conditions therefore prompting no formal requirement for on-site detention.

After reviewing the 'Flood Information Property Report' by the CMA the existing site provides flood storage for the 1% AEP, particularly at the corner of Porter Street & Bradby's Lane. Due the flood report stating a 1% AEP flood level of 416.72 (AHD) plus 300mm freeboard the proposed site must be raised to an FFL of 417.02 to adhere to the CMA guidelines. Based on the design proposed, a portion of the 1% AEP flood storage must be compensated on-site via a proposed underground tank.

We have proposed an underground tank to compensate this storage on-site & store approx. 35 m^3. The volume of 35 m^3 was calculated by using the feature survey by Dickson Hearn & interpolating the area below 416.72. A grated pit sized for the 1% AEP will be located below the flood level of 416.72 to cater for collecting & conveying the flow to the tank. We're awaiting confirmation of the 'final' storage required to be 'compensated' by the CMA although we have been conservative in our approach. The proposed tank will comprise of 20 m^3 re-use volume & 37.02 m^3 flood compensation volume totaling a tank of 57.02 m^3.

All impervious areas (roof area & pavements) will be collected & conveyed by a stormwater drainage system designed for the 10% AEP. A defined 1% overland flow path has been shown on (SW01)

WSUD has been designed in accordance with the Urban Stormwater Best Practise Environmental Management Guidelines (CSIRO,1999). The site will be treated via proprietary hydro system devices & water reuse tanks as shown in the MUSIC modelling results.

Revision	Description	Author		Quality Check		Independent Review	
01	APPROVAL	[redacted]	18/10/2022	[redacted]	18/10/2022		

Pre-Development

$Concrete/Asphalt = 935.11\ m^2$, $C_w = 0.9$ $(Council\ Stormwater\ Management\ Systems\ Policy)$

$Landscape/Grass = 0\ m^2$, $C_w = 0.17$ $(Council\ Stormwater\ Management\ Systems\ Policy)$

$Roof\ Area = 2240.96\ m^2$, $C_w = 0.9$ $(Council\ Stormwater\ Management\ Systems\ Policy)$

$Crushed\ Rock = 1038.03\ m^2$, $C_w = 0.70$ $(Council\ Stormwater\ Management\ Systems\ Policy)$

$Total\ Site\ Area = 4214.10\ m^2$

$$C_p = \frac{(935.11 \times 0.9) + (0 \times 0.17) + (2240.96 \times 0.9) + (1038.03 \times 0.70)}{4214.10} = 0.85$$

Post Development

$Concrete/Asphalt = 1013.98\ m^2$, $C_w = 0.9$ $(Council\ Stormwater\ Management\ Systems\ Policy)$

$Landscape/Grass = 622.57\ m^2$, $C_w = 0.17$ $(Council\ Stormwater\ Management\ Systems\ Policy)$

$Roof\ Area = 2577.55\ m^2$, $C_w = 0.9$ $(Council\ Stormwater\ Management\ Systems\ Policy)$

$Total\ Site\ Area = 4214.10\ m^2$

$$C_w = \frac{(1013.98 \times 0.9) + (622.57 \times 0.17) + (2577.55 \times 0.9)}{4214.10} = 0.79$$

$As\ C_w < C_p\ Onsite\ Detention\ is\ not\ required.$

On-Site Compensation Storage (Flood storage for the 1% AEP)

Tank Layout:

Module dimensions: 0.76m (length) x 0.4m (wide) x 0.44m (height)

Usable volume per module: 0.132m^3

16 modules (width) x 9 modules (length) x 3 modules (height) = 432 modules

$V_s = 432 \times 0.132 = 57.02\ m^3$ (20 m^3 for re-use purposes & 37.02 m^3 for attenuation purposes only)

Stormwater Water Treatment

To achieve best practice results for water quality in accordance with Urban Stormwater Best Practise Environmental Management Guidelines (CSIRO,1999), the following outcomes are proposed for implementation:

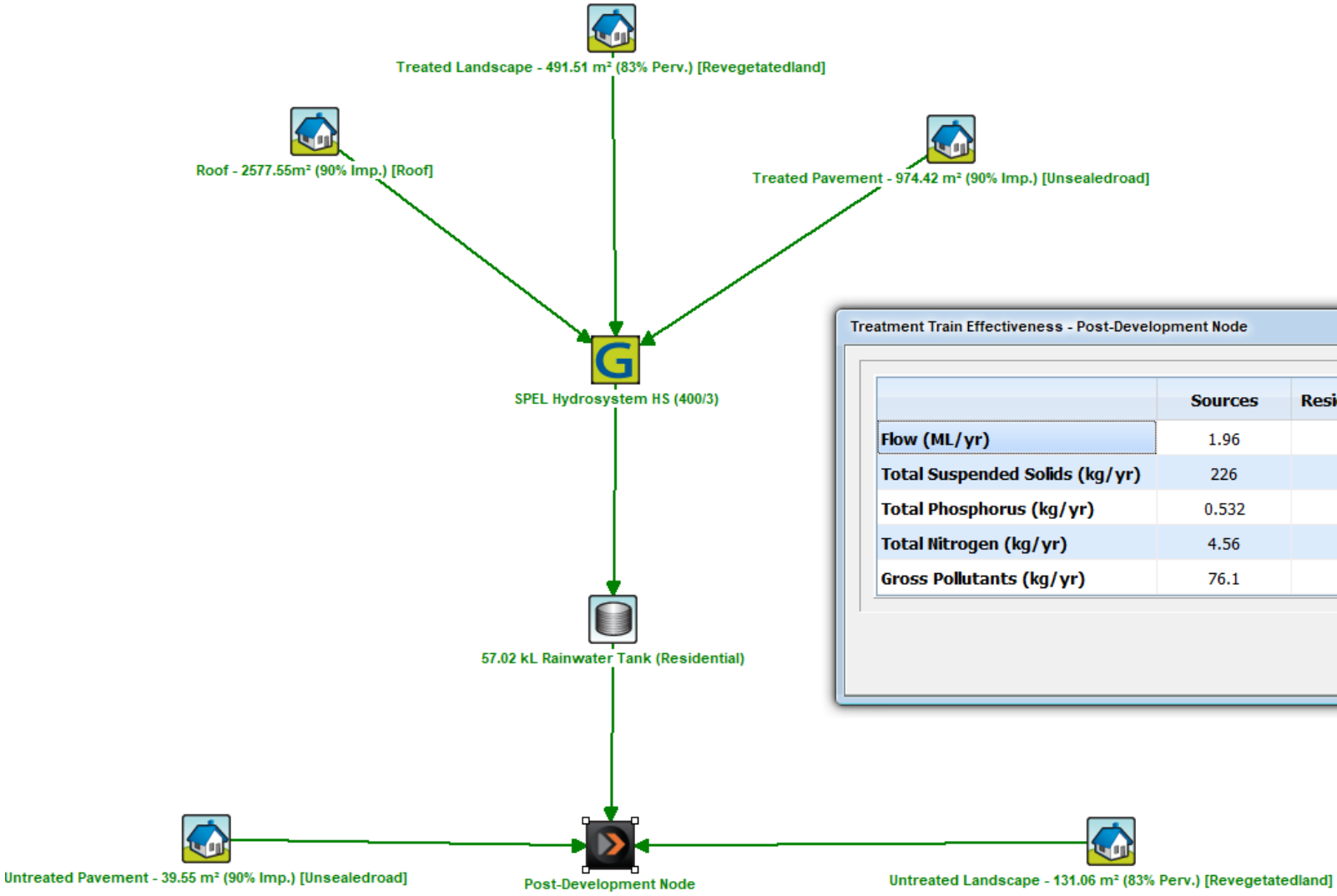
Catchment

- SPEL Hydrosystem HS 400/3 stormwater filter unit with high-flow bypass arrangement (treatable flow rate of 7.50 L/s) (as shown on the plan)
- 57.02 kL rainwater harvesting / flood compensation tank (20 kL for re-use & 37.02 kL for on-site compensation). Estimated demand for the residential building was 2,500 L/day where the demand rate was formulated by 20 L/day per bedroom (Approx. 125 bedrooms)

Conclusion

Cardno Now Stantec consider the general approach adopted in this report is appropriate to deal with the safe & efficient discharge of stormwater associated with the proposed commercial & residential building on 102 – 108 Humffray Street, Soldiers Hill. More detailed design will be undertaken after the grant of Planning Consent.

Music Model



Treatment Train Effectiveness - Post-Development Node

	Sources	Residual Load	% Reduction
Flow (ML/yr)	1.96	1.39	28.8
Total Suspended Solids (kg/yr)	226	43.3	80.9
Total Phosphorus (kg/yr)	0.532	0.189	64.4
Total Nitrogen (kg/yr)	4.56	2.07	54.6
Gross Pollutants (kg/yr)	76.1	1.42	98.1

Appendix

Property Flood Information Summary

Please note that inundation levels may not be consistent over the whole property.

1% AEP Riverine Flooding	Min	Max
Ballarat Flood Modelling Update 2015 (CBD 2m)		
Flood Depth (metres)	0.03	0.40
Velocity (m/s)	0.00	0.09
Flood Level (mAHD)	416.72	416.72

Figure 1: Property Flood Information Summary (CMA)

Flood Extent Map

This map shows the extent of flooding in the event of a 1% AEP (1 in 100 yr ARI) flood as it relates to the highlighted property.

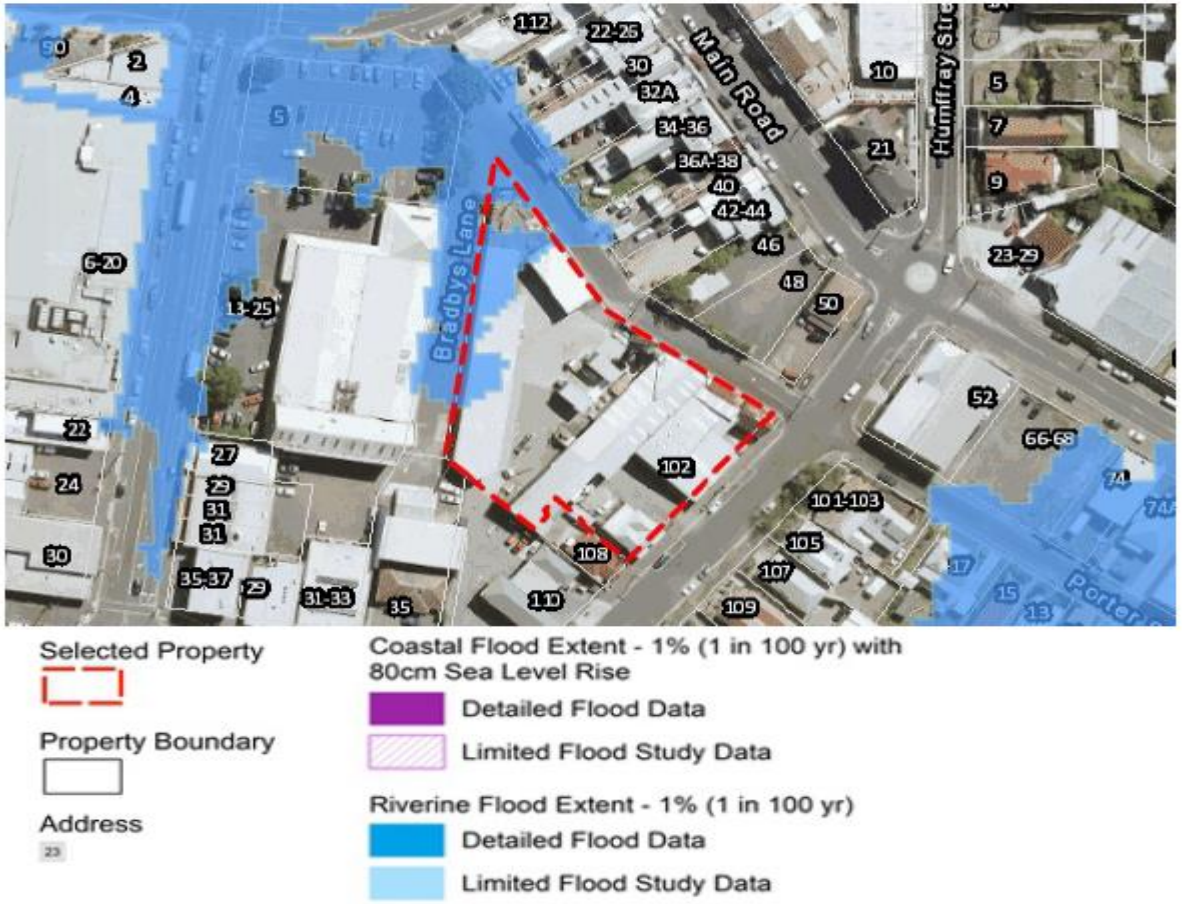
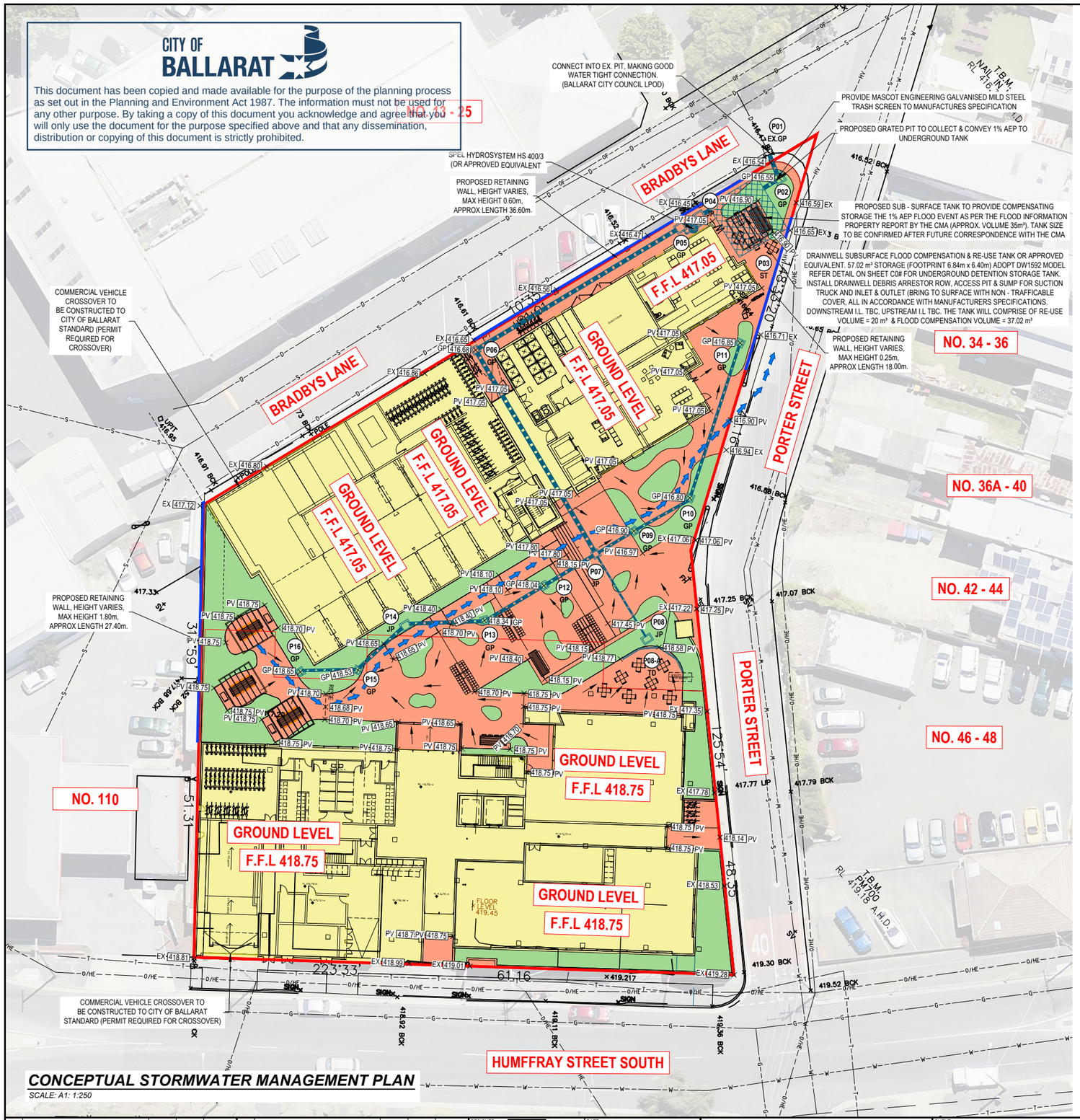


Figure 2: Flood Extent Map (CMA)

NO. 24 - 25



CONCEPTUAL STORMWATER MANAGEMENT PLAN

SCALE: A1: 1:250

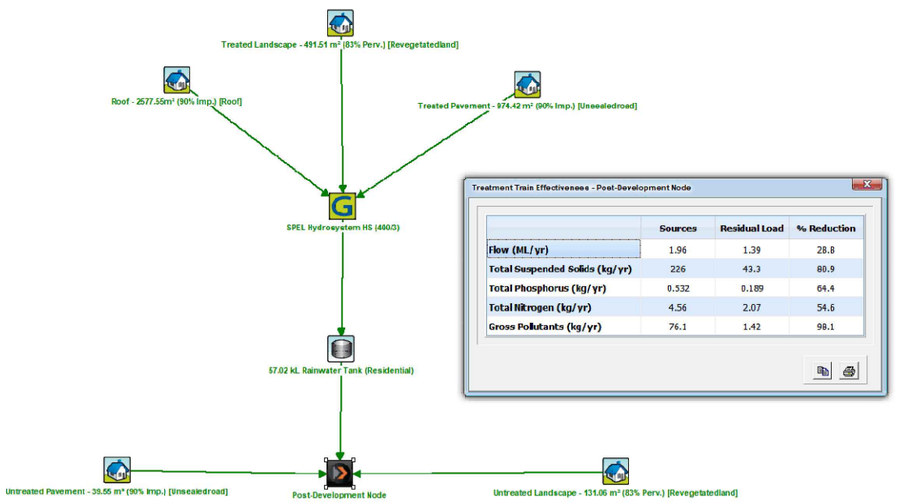
LEGEND

- PROPOSED STORMWATER DRAINAGE PIPE & FLOW DIRECTION
- EXISTING SEWER MAIN ALIGNMENT & PIT
- EXISTING TELSTRA
- EXISTING OPTIC FIBRE
- EXISTING POWER (O/H)
- EXISTING WATER MAIN
- EXISTING GAS MAIN
- EXISTING KERB & CHANNEL
- EXISTING STORMWATER DRAINAGE PIPE/PIT
- PROPOSED TITLE BOUNDARY
- PROPOSED RETAINING WALL
- PAVEMENT FALL DIRECTION
- PROPOSED UNDERGROUND CARPARK EXTENT
- JP PROPOSED JUNCTION PIT
- SEP PROPOSED SIDE ENTRY PIT
- GP PROPOSED GRATED PIT
- 1% AEP OVERLAND FLOW PATH (MAJOR STORMWATER FLOW)
- ×435.80 PV PROPOSED PROPOSED PAVEMENT LEVEL
- ×435.25 GP PROPOSED TOP OF GRATED PIT LEVEL
- ×416.54 EX EXISTING LEVEL
- EXTENT OF PROPOSED PAVEMENT
- EXTENT OF PROPOSED BUILDING
- EXTENT OF PROPOSED LANDSCAPING
- PROPOSED ROOF DRAINAGE PIPE & PIT (INDICATIVE ONLY)

ON-SITE DETENTION

PRE-DEVELOPMENT		POST-DEVELOPMENT	
AREA IMPERVIOUS: 3176.07m²	;C_W = 0.90	AREA IMPERVIOUS: 3591.53m²	;C_W = 0.90
AREA SEMI-PERVIOUS: 1038.03m²	;C_W = 0.70	AREA SEMI-PERVIOUS: 0m²	;C_W = 0.70
AREA PERVIOUS: 0m²	;C_W = 0.17	AREA PERVIOUS: 622.57m²	;C_W = 0.17
AREA TOTAL: 4214.10m²	;C_W = 0.85	AREA TOTAL: 4214.10m²	;C_W = 0.79

NET IMPERVIOUS AREA IS DECREASED FOR POST DEVELOPMENT CONDITIONS (ie. C_W POST-DEV = 0.79 < C_W PRE-DEV = 0.85. THEREFORE, ON-SITE DETENTION IS NOT REQUIRED FOR THE PROPOSED DEVELOPMENT.



MUSIC MODEL TREATMENT TRAIN AND OUTPUT RESULTS

NOTE:
ALL DOWNPIPES TO RESIDENTIAL & COMMERCIAL BUILDINGS SHALL BE CONNECTED UPSTREAM OF GRATED PIT (P05).

NOTE:
ANY USE OF THE ELECTRONIC DRAWINGS OR DATA PROVIDED BY STANTEC SHALL BE USED AT THE USER'S RISK. NO RESPONSIBILITY WILL BE TAKEN BY STANTEC AS TO THE ACCURACY OF THE DIGITAL DRAWING OR DATA. ANY SET OUT WORKS UNDERTAKEN USING STANTEC DIGITAL DRAWINGS OR DATA SHOULD BE CHECKED AGAINST EXISTING TITLE PEGS, TEMPORARY AND/OR PERMANENT SURVEY MARKS AS NOMINATED BY THE PROJECTS LICENSED SURVEYOR, THE SET-OUT INFORMATION PROVIDED ON ARCHITECTURAL AND/OR OTHER PROJECT RELATED DRAWINGS AND DOCUMENTS, IN CONJUNCTION WITH THE APPROVED HARD COPY DRAWINGS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION

NOTE:
THE LOCATION OF EXISTING UNDERGROUND SERVICES ARE SHOWN INDICATIVELY ONLY. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING ALL AUTHORITIES TO DETERMINE THE LOCATION OF UNDERGROUND SERVICES PRIOR TO THE COMMENCEMENT OF CONSTRUCTION WORK. ANY CLASH OF WORKS WITH A SERVICE IS TO BE REPORTED TO THE ENGINEER IMMEDIATELY. THE CONTRACTOR SHALL ENSURE THAT ALL SERVICES ARE FULLY PROTECTED DURING CONSTRUCTION, ANY SERVICES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED AT THE CONTRACTORS EXPENSE.

FOR APPROVAL

ISSUE	ISSUED FOR	DATE	DRAWN	APPROVED
01	APPROVAL	10/08/2022	J.A	
02	APPROVAL	18/10/2022	J.A	R.D

ISSUE	ISSUED FOR	DATE	DRAWN	APPROVED

DESIGNED: [redacted] DATE: AUGUST 2022
DRAWN: [redacted] SCALE: AS SHOWN
SURVEY: DICKSON HEARN SHEET SIZE: A1 / A3
CHECKED: [redacted] APPROVED: [redacted]
DATE: 18/10/2022 DATE: 19/10/2022

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CIVIL DRAWING

NORTH

DRAWING TITLE: CONCEPTUAL STORMWATER MANAGEMENT PLAN (SHEET 1 OF 1)

REF. No.: 23512-01 SHEET: SW01 OF 01 REV: 02