PLANNING REPORT

UNITINGSA

Uniting on Hawker - Bowden

Hawker Street, Bowden, SA 5007

> STORMWATER MANAGEMENT PLAN

cpr engineers

REV D | 20 March 2025

UNITING ON HAWKER - BOWDEN STORMWATER MANAGEMENT PLAN

Site Address: Hawker Street, Bowden SA 5007

Project Number: 240141

ISSUE REGISTER PROJECT:

ISSUE DATE	REASON	PREPARED	REVIEWED
26/07/24	Planning Approval	Costa Morias	David Reynolds
06/12/24	Planning Approval	Costa Morias	
19/12/24	Planning Approval	Costa Morias	
20/03/25	Planning Approval	Costa Morias	

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UNITING ON HAWKER - BOWDEN

STORMWATER MANAGEMENT PLAN

240141 – 20 March 2025

INTRODUCTION

The following report outlines the key requirements to manage the disposal of stormwater from the post development site. The site is situated at 2-18 Market Place and 105 Gibson Street, Bowden.

The stormwater concept has been based upon the architectural plans prepared by City Collective architects, and the survey provided.

The existing sites consist of 5 residential unit buildings (noted 2-14 Market Place) and 4 houses with associated garden sheds, pavement and landscaping.

The new development consists of two 3 storey apartment buildings joined via outdoor terraces, additional two storey apartment building, associated carpark and landscaping.

This Stormwater Management Plan has been prepared in accordance with design advice received from the engineering department of the City of Charles Sturt outlining requirements of detention stated in correspondence dated 31 May 2024. Refer Appendix A.

This document is to be read in conjunction with:

- Architectural drawings, 2284-P1000 City Collective site plan,
- CPR Engineers Stormwater Management Plan 24014-C001 :and
- CPR Engineers Stormwater Calculations pages 1 to 5

This Stormwater Management Plan establishes the principles to manage the stormwater on the site and is submitted for review by the City of Charles Sturt as a part of the Development Approval process.

Should further details be required during this period, CPR Engineers will be able to provide these as necessary.

GENERAL STORMWATER MANAGEMENT

The new works will be designed for the following stormwater criteria as outlined by the City of Charles Sturt engineering department (refer Appendix A for correspondence).

Stormwater discharged from the site will comply with:

- *"Post Development 1% AEP to pre-development 20% AEP.*
- *Water Quality improvements*
- *Integrated stormwater management that facilitates tree canopy*
- *FFL to be 300mm above top of kerb or 1% AEP flood levels (whichever is higher)*
  - *0.051mm above the back of path level to determine 1% AEP FFL"*

It is proposed:

- Stormwater runoff from apartment building D will be detained in above ground tanks prior to discharge;
- Remainder of the site will be detained via underground detention tanks and pumped to side entry pits on Market Place.
- Discharge rates from the site are been limited as directed by Council

FINISHED FLOOR LEVEL REQUIREMENTS

Flood mapping of the area provided by council indicates 1% AEP flooding to Hawker Street. Maximum depths of ponding are 0.051m as measured from the back of path to Hawker Street. Refer below.

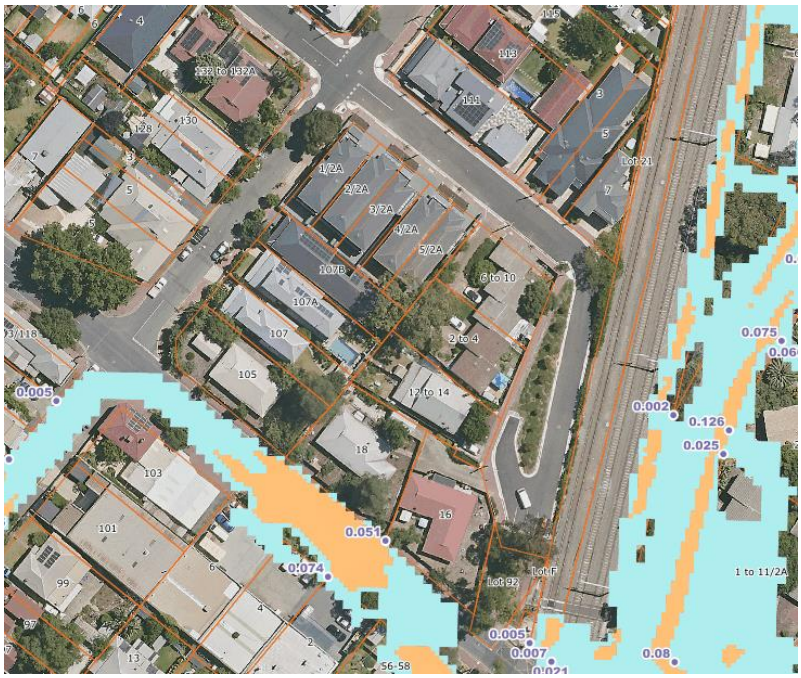

Figure 1: 1% AEP flood mapping (Source: City of Charles Sturt Flood Mapping)

The proposed building requires a finished floor levels set minimum 300mm above the 1% AEP flood level in accordance with City of Charles Sturt requirements. Based on survey taken, the level to the back of path at the flooding location was determined to be 17.51m and flood level taken as 17.561. As such, an FFL of 17.86m has been adopted for all buildings on the site.

With relation to Market Place, the FFL sits 300mm to 800mm above the top of kerb levels.

The perimeter pavements around the buildings shall grade away from the building and as such divert any chance for overland flows to elsewhere on the site.
The above measures have been addressed in order to maintain an appropriate freeboard level higher than surrounding formed ground surfaces to enable overload flows from 1:100 ARI storm events to exit the site in an appropriate manner and so as not to affect the neighbouring properties.

STORMWATER DETENTION

Stormwater calculations have been complete in accordance requirements outlined in the "general stormwater management" section within this report. Refer Appendix C for calculations.

The pre-development condition of the site has the following discharge conditions:

- Existing 20% AEP Pre Development Flow = 29.86L/s

Based on this predevelopment flow, the following detention is required to achieve council requirements:

- Roof runoff from Building D – 8.15kL via 2x5kL above ground tanks. Remaining capacity to be retention for garden reuse. At the interface between retention and detention an outlet of the tank to be fit with a 30mm orifice limiting discharge to 3L/s prior to discharging to the kerb and water table on Hawker Street.
- The remainder of the site – 52.14kL via 1x35kL below ground pump chamber and 22kL below ground detention tank discharging at 24L/s to a side entry pit on Market Place. System to be fit with a backup pump and alarm system.

QUALITY OF WATER

As outlined by City of Charles Sturt storm water run-off is to be treated prior to discharge into council system to comply with the targeted values below.

- 80% retention of the typical urban annual load for Total Suspended Solids (TSS)
- 60% retention of the typical urban annual load for Total Phosphorus (TP)
- 45% retention of the typical urban annual load for Total Nitrogen (TN)
- 90% retention of the typical urban annual load for Gross Pollutants (litter)

MUSIC modelling has been completed for this project. Refer appendix D. To achieve the requirements outlined above Ocean Protect "Ocean Guard" litter baskets will be provided to each side entry and grated inlet pit on the site. In addition, an Ocean Protect "Jelly Fish JF-900-2-1" will be provided to treat stormwater prior to discharge to the underground tanks.

In addition, retention capacity will be provided to the above ground tanks. This will be utilised for irrigation around the site.

These measures will improving the quality of stormwater run-off exiting the site in comparison to current predevelopment conditions which provides no treatment.

ISSUES DURING CONSTRUCTION

The management of stormwater during construction will be under constant monitoring by the appointed builder.

The builder will be employed to maintain control measures on site and to minimise run-off from the site which may contain fine earth particles and any deleterious material that washes off site will be cleaned up by the contractor.

Open swales rock and earth beds as well as hay bales will be used to manage stormwater during Construction and in particular during the earthworks phase of the project. The contractor will be required to submit a sediment and stormwater control plan during the different phases of the development.

Prepared by

Costa Morias
CPR ENGINEERS

costam@cprengineers.com.au

Attachments:

- Council Correspondence
- Site Plan
- Stormwater Detention and Orifice Calculations
- MUSIC Modelling
- Proposed Stormwater Management Plan

APPENDIX A – COUNCIL CORRESPONDENCE

Costa Morias

From: Ryan Nelson <rnelson@charlessturt.sa.gov.au>
Sent: Friday, 31 May 2024 8:34 AM
To: Costa Morias
Cc: David Reynolds
Subject: RE: Stormwater Requirements - 4-18 Market Place, Bowden [Filed 31 May 2024 09:08]

Categories: Filed by Mail Manager

Hi Costa,

We're aware of this site as Uniting SA and City Collective came in to discuss late last year.

Usual requirements apply:

- Post Development 1% AEP to pre-development 20% AEP.
- Water Quality improvements
- Integrated stormwater management that facilitates tree canopy
- FFL to be 300mm above top of kerb or 1% AEP flood levels (whichever is higher)
    - Happy for you to use 0.051mm above the back of path level to determine 1% AEP FFL

If you're looking to connect direct to the Council stormwater network (for flows > 20L/s only) then it would have to be to the 600mm pipe in Market Place to the north-east of the site. Noting that we have only recently completed a road reconstruction so would be looking for a high quality/extent of reinstatement.

Thanks,

Ryan Nelson
Project Engineer – Civil & Stormwater
Engineering Strategy & Assets

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https://filedrop.charlessturt.sa.gov.au/filedrop/rnelson@charlessturt.sa.gov.au

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From: Costa Morias <CostaM@cprengineers.com.au>
Sent: Wednesday, May 29, 2024 11:51 AM
To: Ryan Nelson <rnelson@charlessturt.sa.gov.au>
Cc: David Reynolds <davidr@cprengineers.com.au>
Subject: RE: Stormwater Requirements - 4-18 Market Place, Bowden

Hi Ryan,

Just following up on this one. We've got a meeting about the project on Friday morning and it would be good to be able to go into that with some confirmations about stormwater requirements.

Any queries please let me know.

Regards,
Costa Morias

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From: Costa Morias
Sent: Tuesday, May 21, 2024 9:10 AM
To: 'Ryan Nelson' <rnelson@charlessturt.sa.gov.au>
Cc: David Reynolds <davidr@cprengineers.com.au>
Subject: Stormwater Requirements - 4-18 Market Place, Bowden [Filed 21 May 2024 09:09]

Hi Ryan,

Seems to be projects in City of Charles Sturt month.

We've got an upcoming development at 4-18 Market Place, Bowden inclusive of 105 Gibson Street. Screenshot of extent below. Are you able to outline the detention/retention, water quality and FFL requirements? The site will be a mixed use of townhouses and multi storey buildings.

Looking at the flood mapping, there appears to be some flooding to Hawker. Do we utilise the 0.051 measurement over our footpath levels to determine a FFL? Or do you have some more accurate information?

Unfortunately, the project is still in the early phases so I am not able to share a floor plan or similar.

Any queries please let us know.


Thirteenth St
Gibson St
Hawker St
Market Pl
Gilbert St
105 Gibson Street
beds4me
Furniture store
Pizza Meccanica
Pizza · $$

Regards,
Costa Morias

Visit 174 Fullarton Road, Dulwich, SA 5065

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W www.cprengineers.com.au

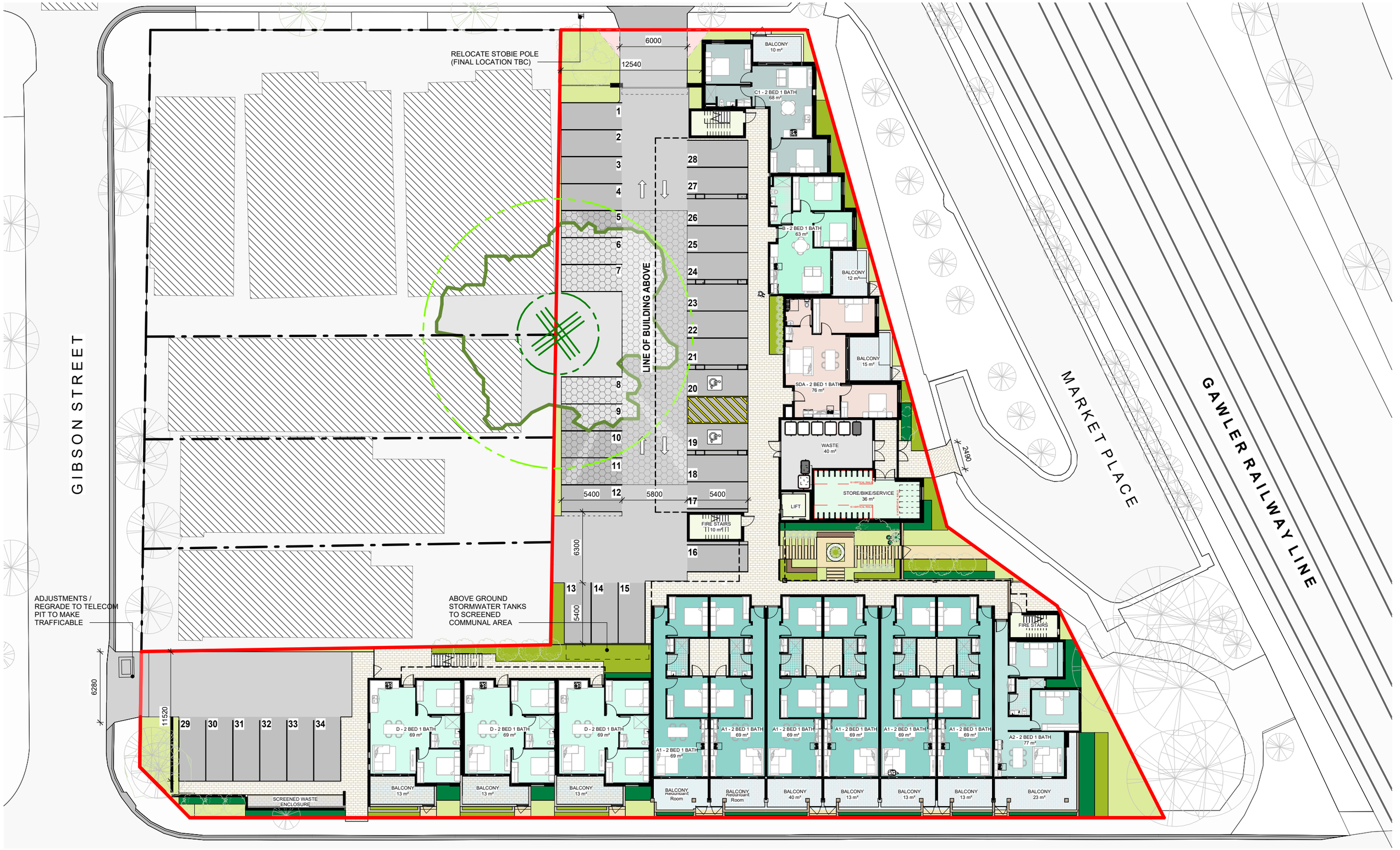
The City of Charles Sturt acknowledges and pays respect to the traditional custodians of the land, the Kaurna people of the Adelaide plains.

Go Green - Think before you print

This initiative forms part of our environmental plan

APPENDIX B – ARCHITECTURAL SITE PLAN

GROUND FLOOR PLAN



UNITING SA Housing

Uniting SA
70 Dale Street,
Port Adelaide, SA 5015
(08) 8440 2200

City Collective

/Urban Design
/Architecture
/Planning

Drawing Title : **GROUND FLOOR PLAN**
Scale : 1 : 300
Status : CONCEPT DESIGN

Project: Uniting on Hawker
Project No: 2284
Date: 14/03/2025

Drawn: SW
Checked: DC
Drawing: P1000
Revision: P.06

APPENDIX C – STORMWATER DETENTION AND ORIFICE CALCULATIONS

Job No:	240141
Date :	20/03/25
Design:	CM
Page:	SW1

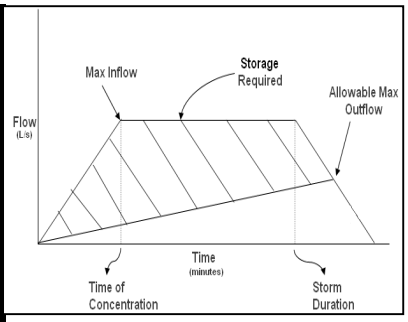
UNITING ON HAWKER

PRE-DEVELOPMENT - 20% AEP FLOWS

Roof Area	707.5 m^2	**Pervious Area**	1517.83
Roof Pitch	5 degrees	**Run-Off Coefficient**	0.25
Run-Off Coefficient	1		
		Pavement Area	769.67
		Run-Off Coefficient	0.9

Storm Design Recurrence Interval	20 % AEP	
Time of Concentration	10.0 minutes	
Max Allowable Outflow	29.86 L/s	Based on (AR&R 2019)

Duration (Minutes)	Intensity (mm/h)	Inflow (L/s)	Inflow Volume (m^3)	Max Storage (m^3)
5	81.2	40.96	12.29	
10	59.2	**29.86**	17.92	
15	47.6	24.01	21.61	
20	40.4	20.38	24.46	
25	35.4	17.86	26.79	
30	31.7	15.99	28.78	
45	24.5	12.36	33.37	
60	20.3	10.24	36.86	
90	15.6	7.87	42.49	
120	12.8	6.46	46.49	
180	9.76	4.92	53.17	
270	7.4	3.73	60.47	
360	6.06	3.06	66.03	



Minimum Tank Size	**0.00** m^3

Outlet Orifice Design

Approximate head above outlet	1	m water
Max allowable outflow	0.029863111	m^3/s
Discharge Velocity	4.43	m/s
Approx Pipe area	6741.950	mm^2
Approx Pipe Diameter	92.65	mm

Job No:	240141
Date :	20/03/25
Design:	CM
Page:	SW2

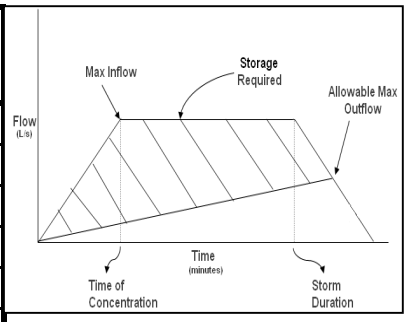
UNITING ON HAWKER

POST-DEVELOPMENT - 1% AEP - Building D

Roof Area	314 m^2	**Pervious Area**	0
Roof Pitch	5 degrees	**Run-Off Coefficient**	0.25
Run-Off Coefficient	1		
		Pavement Area	0
		Run-Off Coefficient	0.9

Storm Design Recurrence Interval	1 % AEP	
Time of Concentration	10.0 minutes	
Max Allowable Outflow	3.000 L/s	Based on (AR&R 2019)

Duration (Minutes)	Intensity (mm/h)	Inflow (L/s)	Inflow Volume (m^3)	Max Storage (m^3)
5	175	16.04	4.81	3.46
10	127	**11.64**	**6.99**	**5.19**
15	102	9.35	8.42	6.17
20	86.9	7.97	9.56	6.86
25	76.2	6.99	10.48	7.33
30	68.2	6.25	11.25	7.65
45	52.8	4.84	13.07	8.12
60	43.8	4.02	14.45	8.15
90	33.3	3.05	16.48	7.48
120	27.3	2.50	18.02	6.32
180	20.5	1.88	20.30	3.20
270	15.3	1.40	22.72	-2.48
360	12.4	1.14	24.55	-8.75



Minimum Tank Size	**8.15** m^3

Outlet Orifice Design

Approximate head above outlet	1	m water
Max allowable outflow	0.003	m^3/s
Discharge Velocity	4.43	m/s
Approx Pipe area	677.285	mm^2
Approx Pipe Diameter	29.37	mm

Job No:	240141
Date :	20/03/25
Design:	CM
Page:	SW3

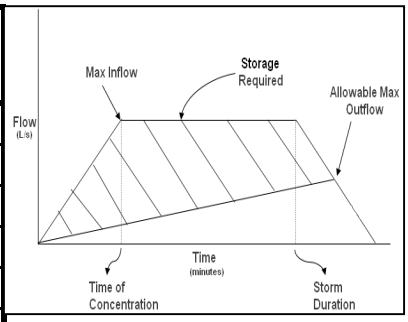
UNITING ON HAWKER

POST-DEVELOPMENT - 1% AEP - Undetained Area

Roof Area	m^2	**Pervious Area**	265
Roof Pitch	5 degrees	**Run-Off Coefficient**	0.25
Run-Off Coefficient	1		
		Pavement Area	12.15
		Run-Off Coefficient	0.9

Storm Design Recurrence Interval	1 % AEP	
Time of Concentration	10.0 minutes	
Max Allowable Outflow	2.752 L/s	Based on (AR&R 2019)

Duration (Minutes)	Intensity (mm/h)	Inflow (L/s)	Inflow Volume (m^3)	Max Storage (m^3)
5	175	3.79	1.14	-0.10
10	127	**2.75**	**1.65**	**0.00**
15	102	2.21	1.99	-0.07
20	86.9	1.88	2.26	-0.22
25	76.2	1.65	2.48	-0.41
30	68.2	1.48	2.66	-0.64
45	52.8	1.14	3.09	-1.45
60	43.8	0.95	3.42	-2.36
90	33.3	0.72	3.90	-4.36
120	27.3	0.59	4.26	-6.47
180	20.5	0.44	4.80	-10.89
270	15.3	0.33	5.37	-17.74
360	12.4	0.27	5.80	-24.74



Minimum Tank Size	**0.00** m^3

Outlet Orifice Design

Approximate head above outlet	1	m water
Max allowable outflow	0.002751667	m^3/s
Discharge Velocity	4.43	m/s
Approx Pipe area	621.221	mm^2
Approx Pipe Diameter	28.12	mm

Job No:	240141
Date :	20/03/25
Design:	CM
Page:	SW4

UNITING ON HAWKER

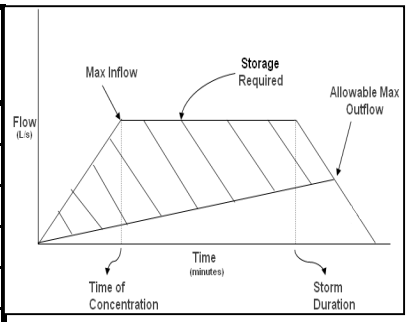
POST-DEVELOPMENT - 1% AEP - Remainder of the Site

Roof Area	1554 m^2	**Pervious Area**	190
Roof Pitch	5 degrees	**Run-Off Coefficient**	0.25
Run-Off Coefficient	1		
		Pavement Area	661
		Run-Off Coefficient	0.9

Storm Design Recurrence Interval	1	% AEP
Time of Concentration	10.0	minutes
Max Allowable Outflow	23.000	L/s

Based on (AR&R 2019)

Duration (Minutes)	Intensity (mm/h)	Inflow (L/s)	Inflow Volume (m^3)	Max Storage (m^3)
5	175	110.59	33.18	22.83
10	127	**80.26**	**48.15**	**34.35**
15	102	64.46	58.01	40.76
20	86.9	54.92	65.90	45.20
25	76.2	48.15	72.23	48.08
30	68.2	43.10	77.58	49.98
45	52.8	33.37	90.09	52.14
60	43.8	27.68	99.65	51.35
90	33.3	21.04	113.64	44.64
120	27.3	17.25	124.22	34.52
180	20.5	12.95	139.91	8.81
270	15.3	9.67	156.63	-36.57
360	12.4	7.84	169.26	-86.04



Minimum Tank Size	**52.14** m^3

Outlet Orifice Design

Approximate head above outlet	1	m water
Max allowable outflow	0.023	m^3/s
Discharge Velocity	4.43	m/s
Approx Pipe area	5192.522	mm^2
Approx Pipe Diameter	81.31	mm

Worksheet Calculating an Elevation-Discharge Relationship for a Circular Orifice or for Multiple Orifices

This calculates an elevation-discharge relationship for an orifice or group of orifices, assuming that it is submerged on the upstream side, and can discharge freely on the downstream side.

FOLLOW THE PROCEDURES BELOW, ENTERING VALUES IN THE YELLOW BOXES.

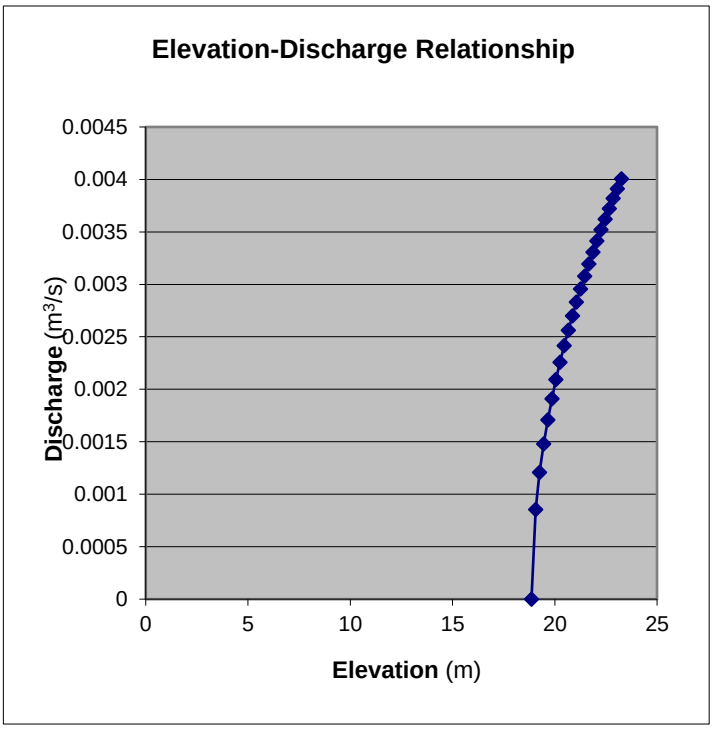
1. Enter Orifice Parameters.

Orifice No.	1	2	3	4	5	6
Elevation of Centre of Orifice (m	18.86					
Orifice Diameter (mm)	30					
Orifice Factor	0.61					

2. Fill in the Required Heights above the Orifice Centre in the yellow column below.

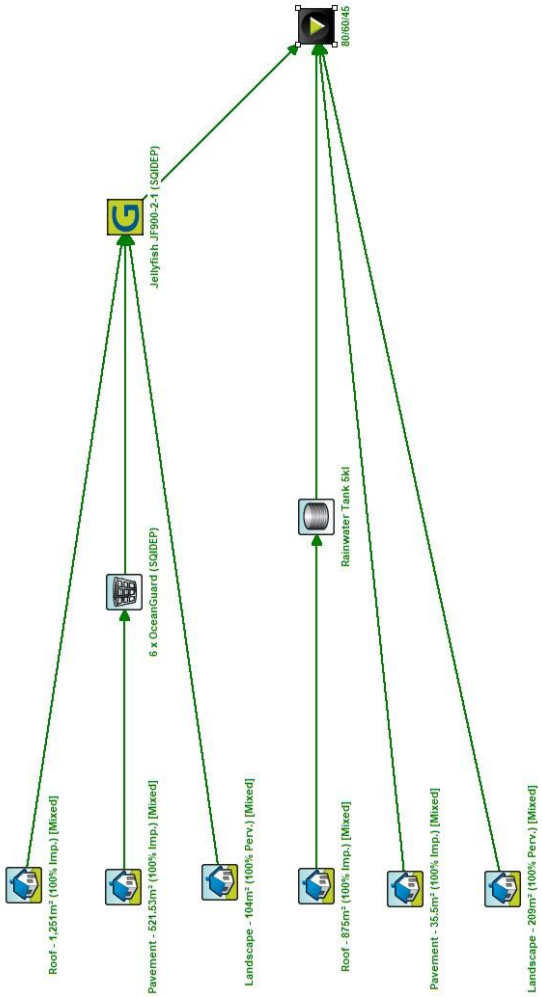
Height above Lowest Orifice (m)	**Elevation** (m AHD)	**Discharge** (m^3/s)
0	18.86	0
0.2	19.06	0.000854
0.4	19.26	0.001207
0.6	19.46	0.001479
0.8	19.66	0.001707
1	19.86	0.001909
1.2	20.06	0.002091
1.4	20.26	0.002259
1.6	20.46	0.002415
1.8	20.66	0.002561
2	20.86	0.0027
2.2	21.06	0.002831
2.4	21.26	0.002957
2.6	21.46	0.003078
2.8	21.66	0.003194
3	21.86	0.003306
3.2	22.06	0.003415
3.4	22.26	0.00352
3.6	22.46	0.003622
3.8	22.66	0.003721
4	22.86	0.003818
4.2	23.06	0.003912
4.4	23.26	0.004004

3. After Checking the Relationship, copy the two orange columns and transfer these to *DRAINS*.



APPENDIX D – MUSIC MODELLING

	Sources	Residual Load	% Reduction
Flow (ML/yr)	0.981	0.848	13.5
Total Suspended Solids (kg/yr)	93.7	16.3	82.6
Total Phosphorus (kg/yr)	0.239	0.0897	62.4
Total Nitrogen (kg/yr)	2.24	1.23	45.1
Gross Pollutants (kg/yr)	39.9	0.966	97.6



APPENDIX E – STORMWATER MANAGEMENT PLAN 240141-C001

SCALE BAR UNITS IN MILLIMETRES
10 20 50

LEGEND

- K&WT — CONCRETE KERB & WATERTABLE HEIGHT AS NOTED.
- K — CONCRETE KERB HEIGHT AS NOTED.
- TRK — CONCRETE TRANSITION KERB
- FK — FLUSH KERB.
- FK1 — DEEPENED FLUSH KERB TO PERMEABLE PAVEMENT AREA. REFER DETAIL
- NEW STORMWATER PIPE (UNSEALED SYSTEM).
- NEW STORMWATER PIPE (SEALED SYSTEM).
- RISING MAIN
- GRATED INLET PIT — ALL PITS TO BE FIT WITH OCEAN PROTECT "OCEAN GUARDS"
- JUNCTION BOX
- SIDE ENTRY PIT
- IP — STORMWATER INSPECTION POINT.
- MAINTENANCE VALVE. REFER DETAIL.
- DP — DOWN PIPES. ALL DOWN PIPES TO HAVE A uPVC TAIL MATCHING THE SIZE OF THE DOWNPIPE, CONNECTING TO MAIN STORM WATER RUN U.N.O.
- CONCRETE CULVERT WITH 6mm GALVANISED CHECKER PL.
- RW1 — RETAINING WALL. SINGLE SLEEPER UNDER GOOD NEIGHBOUR FENCE. (TBC)
- P**.** — DESIGN LEVEL
  - P-PAVEMENT LEVEL
  - TK-TOP OF KERB
  - WT-WATER TABLE
  - TP-TOP OF PIT
  - IL-INVERT LEVEL
  - FFL-FINISHED FLOOR LEVEL
  - EX-EXISTING LEVEL
  - TW-TOP OF WALL
  - BW-BOTTOM OF WALL
  - L-LANDSCAPE
  - H-HEIGHT
- 53.35 — EXISTING SPOT LEVELS FROM SURVEY.
- FALL — DENOTES SURFACE FALL
- 1:100 YEAR STORM EVENT OVERLAND FLOW PATH
- DEMOLISH EXISTING.
- 2 x 5kL RETENTION TANKS.
- DEEPENED FOOTING TO EDGE OF BUILDING.

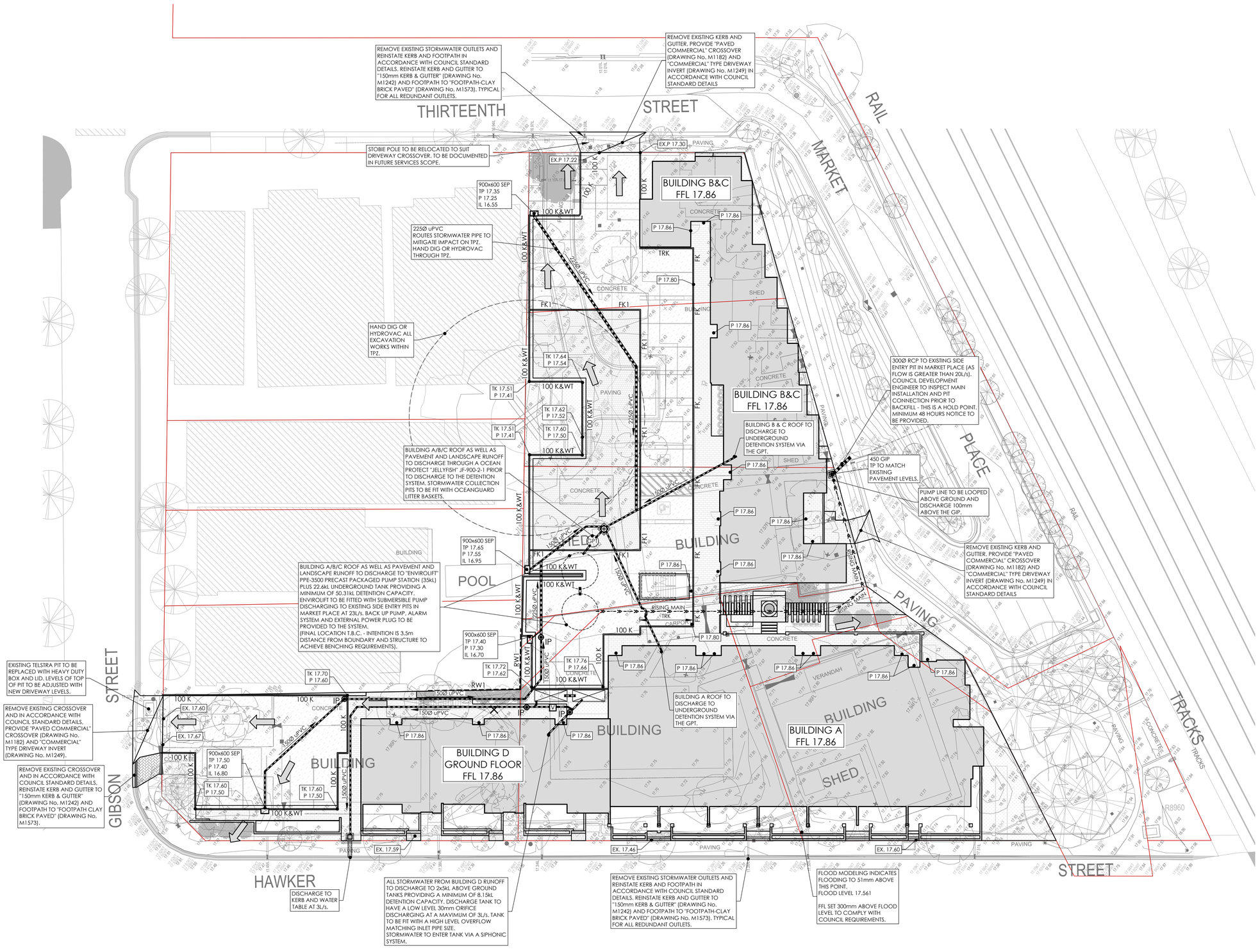
DETENTION ASSESSMENT

PRE-DEVELOPMENT FLOWS
- 20% AEP EVENT = 29.86L/s.

POST DEVELOPMENT FLOWS
- 1% AEP UNDETAINED AREA = 3L/s.
- 1% AEP BUILDING D = 3L/s.
- 1% AEP REMAINDER OF THE SITE = 23L/s.
- TOTAL SITE DISCHARGE = 29L/s.

POST-DEVELOPMENT DETENTION REQUIRED
- 1% AEP UNDETAINED AREA = NIL
- 1% AEP BUILDING A = 8.15kL
- 1% AEP REMAINDER OF THE SITE = 52.14kL

POST-DEVELOPMENT DETENTION PROVIDED
- 2 x 5kL ABOVE GROUND DETENTION TANK FIT WITH A 30mm ORIFICE RESTRICTING FLOWS TO 3L/s.
- 1 x 35kL BELOW GROUND PUMP CHAMBER + 22kL BELOW GROUND DETENTION TANK (TOTAL 52.14kL) DISCHARGING TO THE EXISTING SIDE ENTRY PIT IN MARKET PLACE AT A MAXIMUM RATE OF 23L/s.



0 2000 4000 8000 12000
SCALE (mm) 1:200

APPROVAL ONLY
20-03-25

cpr engineers
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P: 08 8332 1344 E: admin@cprengineers.com.au

Project: UNITING ON HAWKER
Address: HAWKER ST BOWDEN SA 5007
Client: UNITING SA
Architect: CITY COLLECTIVE, SUITE 115 EPWORTH BUILDING, 33 PIRIE ST ADELAIDE 5000, Phone (08) 8182 1270
Sheet Title: STORMWATER MANAGEMENT PLAN

Issue	Date	Details	Eng\Dft
C	20-03-25	RE-ISSUED FOR PLANNING APPROVAL	CM\TAC
B	19-12-24	RE-ISSUED FOR PLANNING APPROVAL	CM\TAC
A	26-07-24	ISSUED FOR PLANNING APPROVAL	CM\TAC

Designed	Drawn	Checked	Scale	Date
C.M.	T.A.C.	-	1:200	Mar-25

Drawing No. 240141-C001 Rev. C

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