STRUCTURAL SYSTEMS
consulting engineers

Date Issued	Tuesday, 10 September 2024
Job No	DT 240706
Site	162 GOUGER STREET, ADELAIDE
Client	LELIO BIBBO
Proposed	16 STOREY APPARTMENT + CARPARK

Hydrological Analysis

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DT 240706

162 Gouger Street, Adelaide

Flooding - Evidence Required Overlay.
DTS / DPF FFL at least 300mm above highest point of top kerb of the primary street.

At Gouger street, 41.95 TK is the highest TK level.

Adopt 42.25 as FFL of the development.

Where access door need to Complied with access standard 1428.1 - 2021, provide compliant ramps & steps inside building - Refer plan.

Except where the development comprises a variation to an application that has either been: (a) previously referred to the Government Architect or Associate Government Architect or (b) given development authorisation under the *Planning, Development and Infrastructure Act 2016 or Development Act 1993* and (c) the variation to that application is, in the opinion of the relevant authority, minor in nature or would not warrant a referral when considering the purpose of the referral any of the following classes of development: (a) development within the area of the overlay located within the Corporation of the City of Adelaide where the total amount to be applied to any work, when all stages of the development are completed, exceeds $10,000,000 (b) development within the area of the overlay located within the City of Port Adelaide Enfield where the total amount to be applied to any work, when all stages of the development are completed, exceeds $3 000 000 (c) development within all other areas of the overlay that involves the erection or construction of a building that exceeds 4 building levels.	Government Architect or Associate Government Architect	To provide expert design advice to the relevant authority on how the development: (a) responds to its surrounding context and contributes to the quality and character of a place (b) contributes to inclusiveness, connectivity, and universal design of the built environment (c) enables buildings and places that are fit for purpose, adaptable and long-lasting (d) adds value by positively contributing to places and communities (e) optimises performance and public benefit (f) supports sustainable and environmentally responsible development.	Development of a class to which Schedule 9 clause 3 item 22 of the Planning, Development and Infrastructure (General) Regulations 2017 applies.

Hazards (Flooding – Evidence Required) Overlay

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Development adopts a precautionary approach to mitigate potential impacts on people, property, infrastructure and the environment from potential flood risk through the appropriate siting and design of development.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Flood Resilience	

PO 1.1 Development is sited, designed and constructed to minimise the risk of entry of potential floodwaters where the entry of flood waters is likely to result in undue damage to or compromise ongoing activities within buildings.	DTS/DPF 1.1 Habitable buildings, commercial and industrial buildings, and buildings used for animal keeping () incorporate a finished floor level at least 300mm above: (a) the highest point of top of kerb of the primary street () or (b) the highest point of natural ground level at the primary street () boundary where there is no kerb

Procedural Matters (PM) – Referrals

The following table identifies classes of development / activities that require referral in this Overlay and the applicable referral body. It sets out the purpose of the referral as well as the relevant statutory reference from Schedule 9 of the Planning, Development and Infrastructure (General) Regulations 2017.

Class of Development / Activity	Referral Body	Purpose of Referral	Statutory Reference
None	None	None	None

Heritage Adjacency Overlay

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Development adjacent to State and Local Heritage Places maintains the heritage and cultural values of those Places.

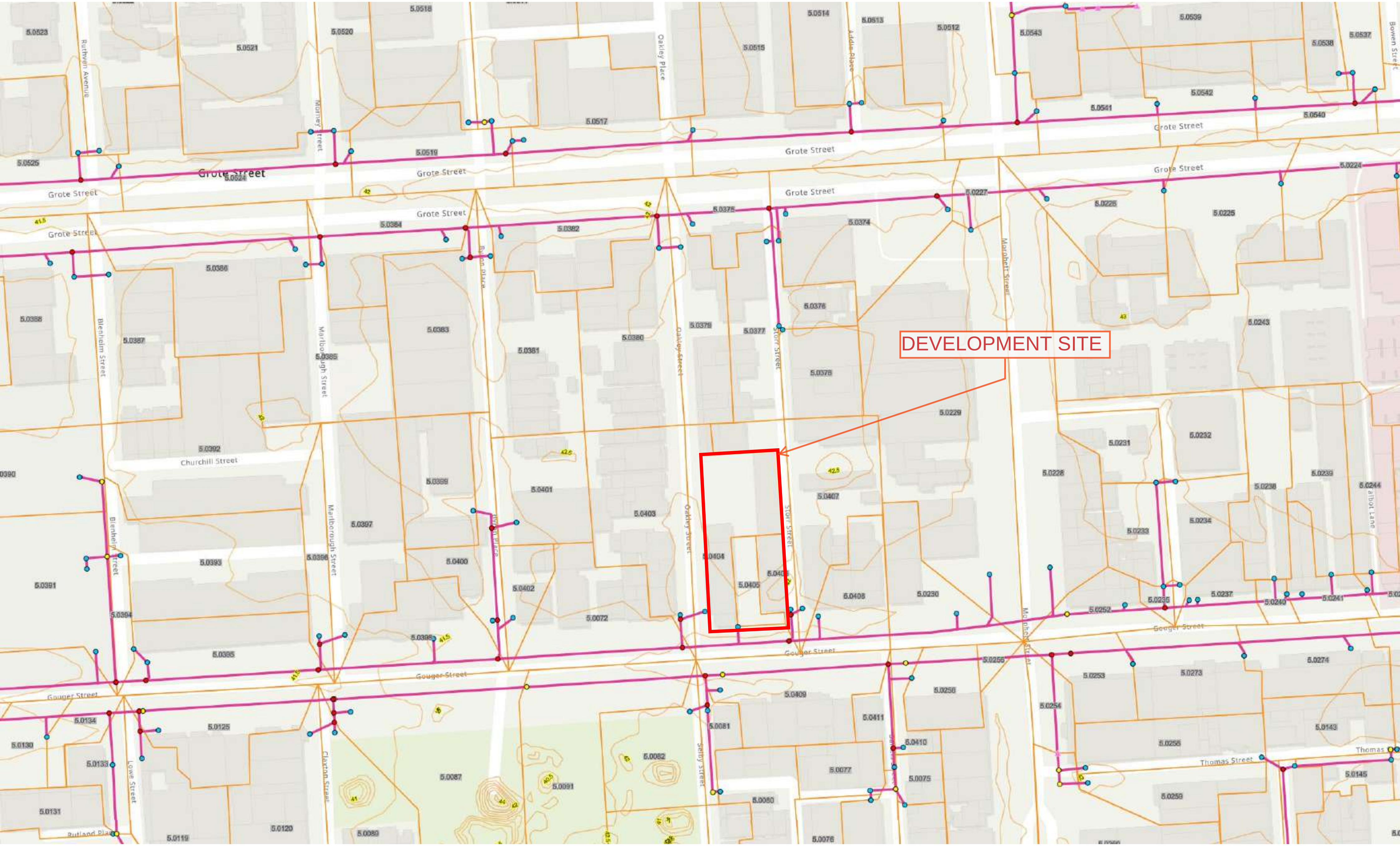
Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Built Form	
PO 1.1 Development adjacent to a State or Local Heritage Place does not dominate, encroach on or unduly impact on the setting of the Place.	DTS/DPF 1.1 None are applicable.

Procedural Matters (PM) – Referrals

The following table identifies classes of development / activities that require referral in this Overlay and the applicable referral body. It sets out the purpose of the referral as well as the relevant statutory reference from Schedule 9 of the Planning, Development and Infrastructure (General) Regulations 2017.

Class of Development / Activity	Referral Body	Purpose of Referral	Statutory Reference


DEVELOPMENT SITE
Grote Street
Gouger Street
Churchill Street
Thomas Street
Oakley Street
Oakley Place
Storr Street
Morphett Street
Marlborough Street
Blenheim Street
Ruthven Avenue
Clayton Street
Selby Street
Lowe Street
Bowen Street
Talbot Lane

CITY OF ADELAIDE

Job # 37538140
Seq # 244343895

Provided by City of Adelaide

BEFORE YOU DIG www.byda.com.au

Legend

- BYDA Enquiry

Lighting & Electrical & Fibre
- Lighting Switchboard
- Lighting
- Pit
- Fibre Conduit
- Conduit

Traffic
- Audio Tactile
- Push Button
- Lantern
- Poles
- Pit
- Detector
- Signal Controller
- Conduit

Water Infrastructure
- Catchment Pit
- Junction Box
- Stormwater Main
- Irrigation

Base
- Footpath

In an emergency contact City of Adelaide on (08) 8203 7203

06/09/24 (valid for 30 days)

Plans generated by SmarterWX™ Automate

0 10 20 40 m

N

Scale 1:1,000

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The development is located at Adelaide city Council area. To improve water quality & reduce the peak flow to Council system, rain water tank is required to meet Council & state stormwater requirements.

Tank size & re-use to be analysis by Insite Water Tool (by Water Sensitive SA)

Design input:

Site area: 1426 m^2

Ground floor retail area:

Aretail = 420 + 88 = 508 m^2

Ground floor common area: (include security, parcel & lobby area)

Acrcom = 85 m^2

Roof area that contribute to tank:

100% of upper roof over level 16

Aroof = 1100 m^2 to RWT

Landscape area at level 3 - amenities:

A_{perL3} = 90 + 6.4 + 6.4 + 38 = 140.8 m^2

These area are un-covered that generate SW runoff

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The remaining area are: balconies, lower roof uncovered:

$A_{bal} = 1426 - 1100 - 141$

$= 185\ m^2$

Input data to Insite water tool

Level 3 Common area:

$A_{L3\,com} = 223 + 271 = 494\ m^2$

to simplify the reuse, provide water re-use for L3 only for irrigation, toilet & hot water. This area a common area for the building → highly utilities, water can be emptied quickly.

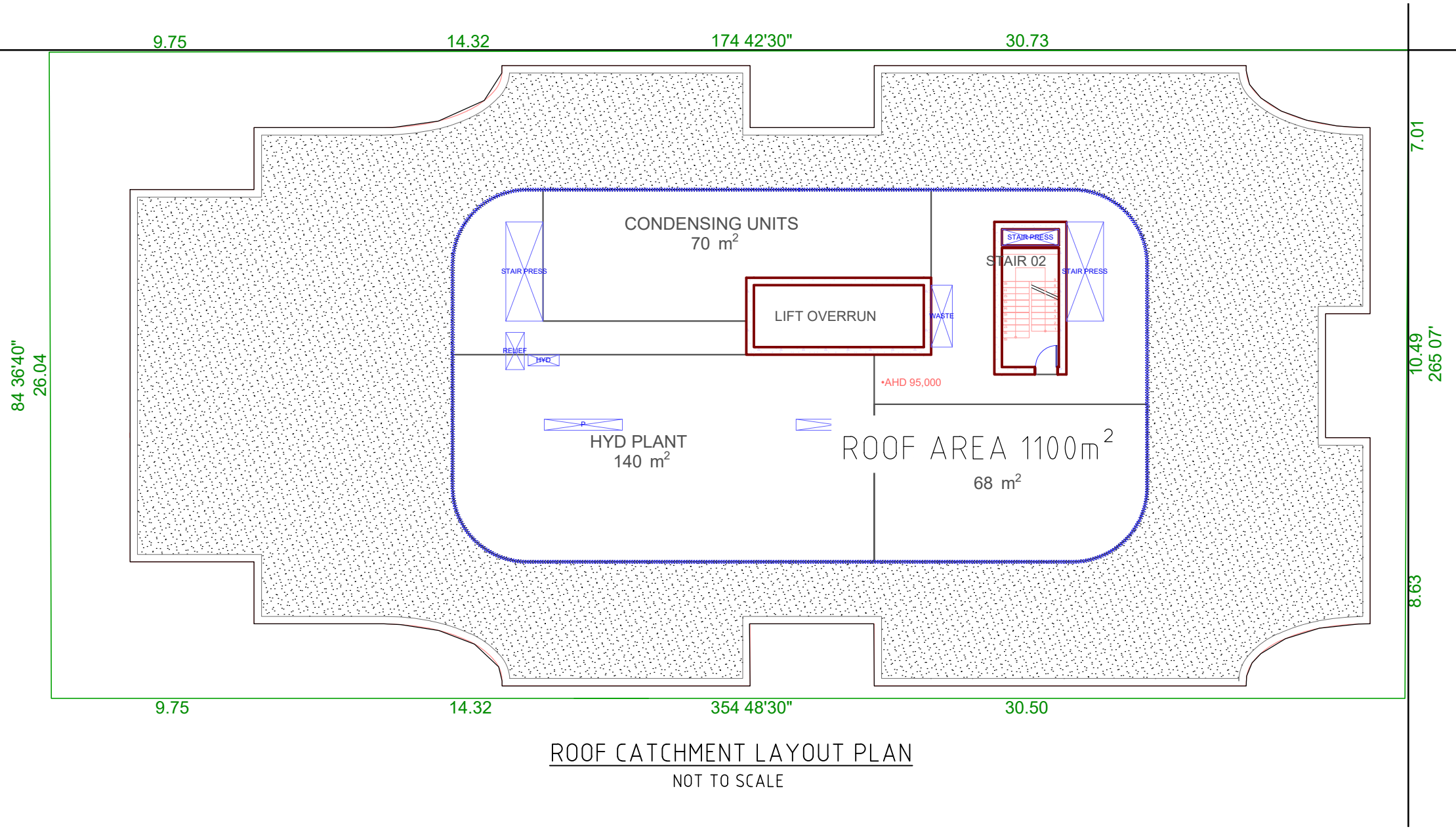
the recommendation tank size: 22500 kL with 20000L for reuse, the remaining is for overflow

All others area storm water runoff shall be directed to junction pit on Storr Street or share with same pit on Oakley Street.

Actual pipe layout to be designed in Building Approval stage.

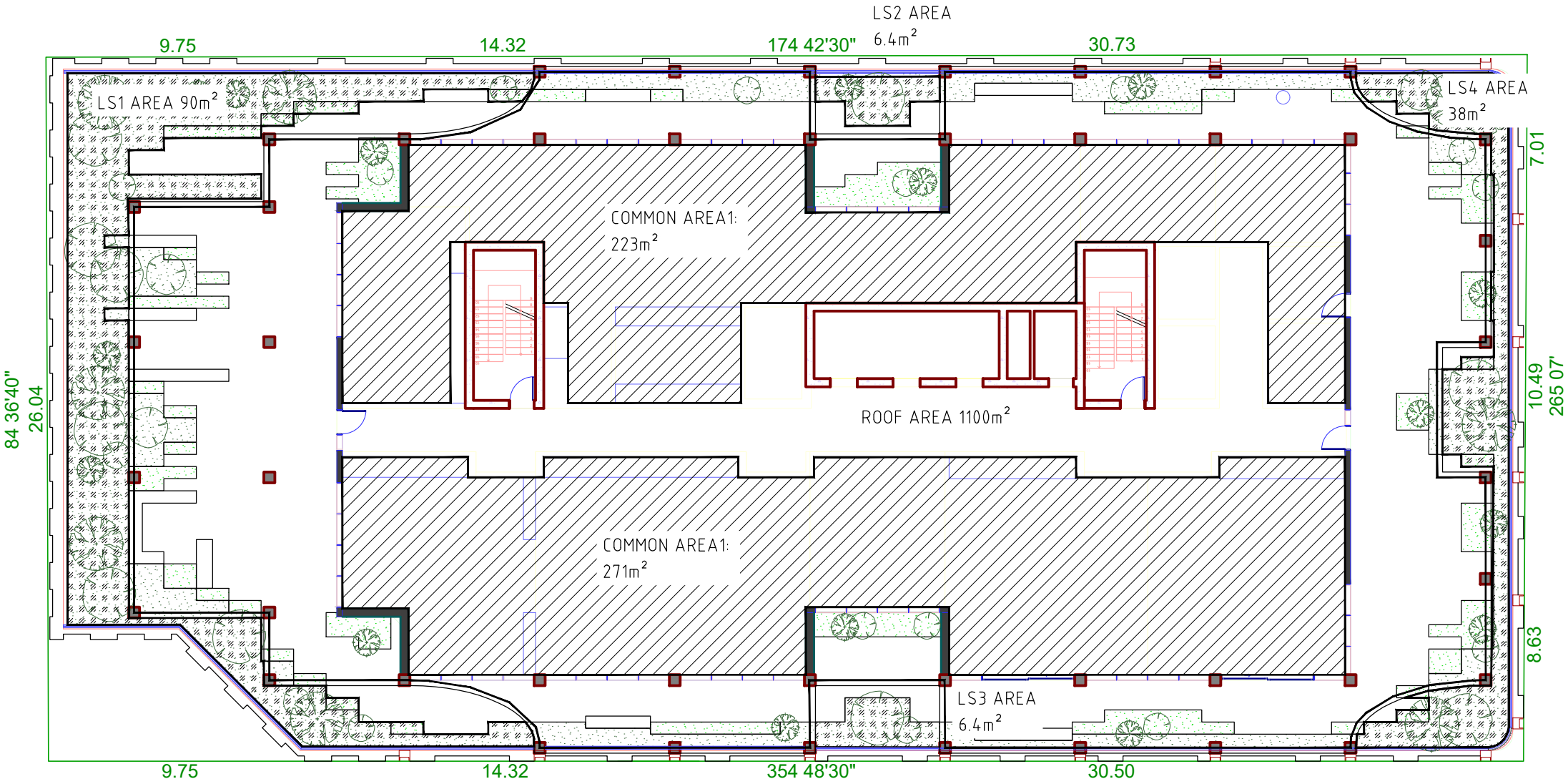
IFD Design Rainfall Intensity (mm/h)
Issued: 17-Aug-22
Location Label: Adelaide
Requested coordinate: Latitude -34.9222 Longitude 138.6106
Nearest grid cell: Latitude 34.9125 (S) Longitude 138.6125 (E)

		Annual Exceedance Probability (AEP)						
Duration	Duration in min	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	77.0	87.9	126.0	154.0	185.0	231.0	270.0
2 min	2	67.9	77.2	109.0	135.0	162.0	203.0	238.0
3 min	3	60.5	68.8	97.7	120.0	144.0	181.0	212.0
4 min	4	54.7	62.2	88.6	109.0	131.0	163.0	191.0
5 min	5	50.0	57.0	81.3	100.0	120.0	150.0	175.0
10 min	10	36.3	41.4	59.3	72.9	87.5	109.0	127.0
15 min	15	29.2	33.4	47.7	58.7	70.5	87.8	103.0
20 min	20	24.8	28.3	40.5	49.8	59.8	74.6	87.1
25 min	25	21.7	24.8	35.5	43.6	52.4	65.3	76.3
30 min	30	19.5	22.2	31.7	39.0	46.9	58.4	68.3
45 min	45	15.1	17.2	24.5	30.2	36.2	45.2	52.9
1 hour	60	12.6	14.3	20.4	25.0	30.0	37.4	43.8
1.5 hour	90	9.7	11.0	15.6	19.1	22.9	28.5	33.3
2 hour	120	8.0	9.1	12.8	15.7	18.8	23.4	27.3
3 hour	180	6.1	7.0	9.8	11.9	14.2	17.6	20.5
4.5 hour	270	4.7	5.3	7.4	9.0	10.7	13.2	15.2
6 hour	360	3.9	4.4	6.1	7.3	8.7	10.7	12.3
9 hour	540	2.9	3.3	4.6	5.5	6.5	7.9	9.1
12 hour	720	2.4	2.7	3.7	4.5	5.3	6.4	7.3
18 hour	1080	1.8	2.0	2.8	3.3	3.9	4.7	5.3
24 hour	1440	1.5	1.6	2.2	2.7	3.1	3.7	4.2
30 hour	1800	1.2	1.4	1.9	2.2	2.6	3.1	3.5
36 hour	2160	1.1	1.2	1.6	1.9	2.3	2.7	3.0
48 hour	2880	0.9	1.0	1.3	1.5	1.8	2.1	2.4
72 hour	4320	0.6	0.7	0.9	1.1	1.3	1.5	1.7
96 hour	5760	0.5	0.6	0.7	0.9	1.0	1.2	1.3
120 hour	7200	0.4	0.5	0.6	0.7	0.8	0.9	1.0
144 hour	8640	0.4	0.4	0.5	0.6	0.7	0.8	0.9
168 hour	10080	0.3	0.4	0.5	0.5	0.6	0.7	0.8

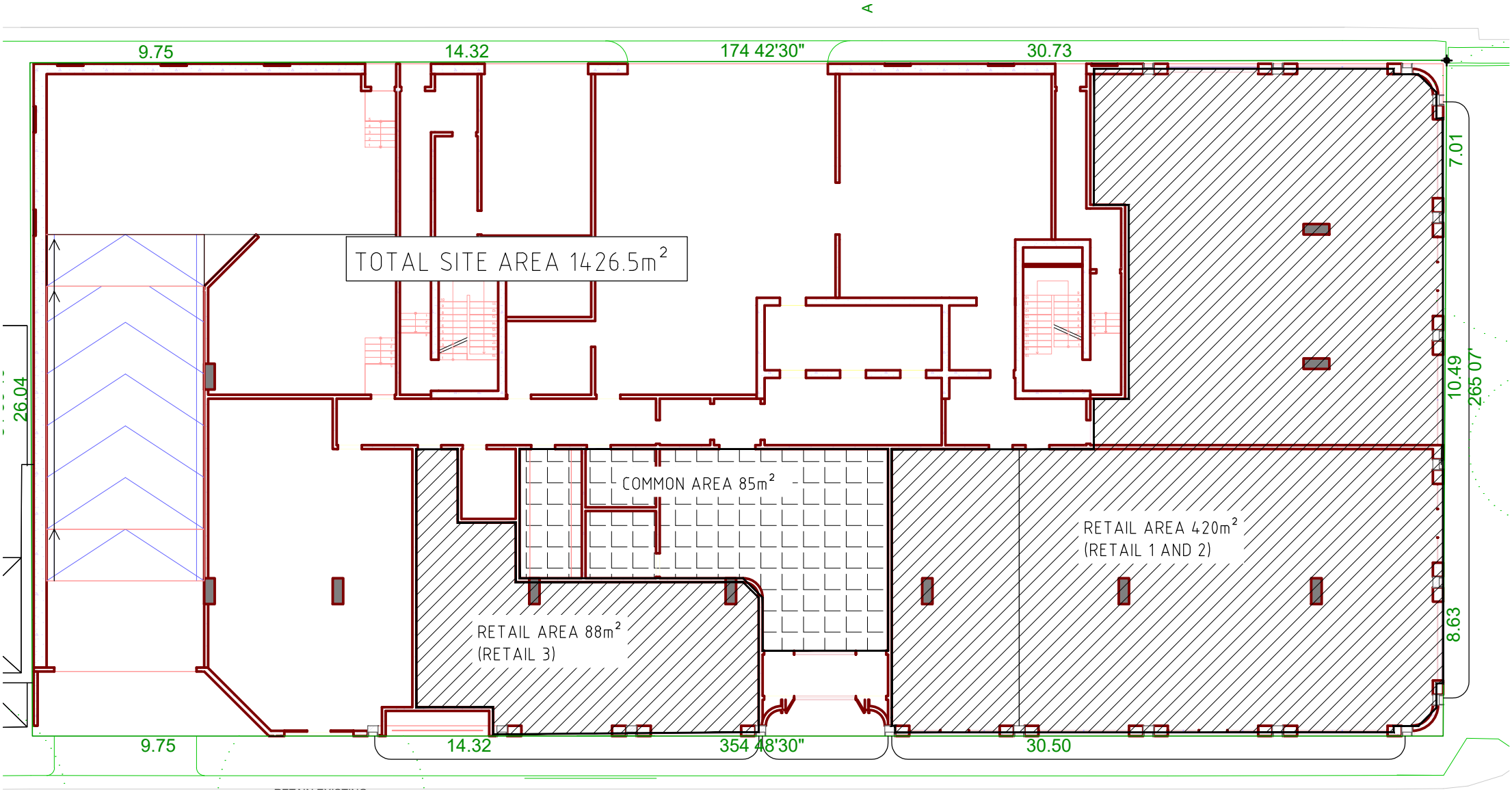


ROOF CATCHMENT LAYOUT PLAN

NOT TO SCALE



L3 CATCHMENT LAYOUT PLAN NOT TO SCALE



GROUND FLOOR CATCHMENT LAYOUT PLAN

NOT TO SCALE

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Design stormwater discharge flow rate to outlet point - Post development

Combined all the outlet without detention/ retention

Catchment analysis

Total Catchment Area =	1426	m^2			C_{10}
1st grade paving	1100	m^2	equivalent	77.1 %	0.9
2nd grade paving	185	m^2	equivalent	13.0 %	0.75
Pervious area	141	m^2	equivalent	9.9 %	0.1

Landscape area on L3

Cy = C10*Fy

Design ARI (years)	1	2	5	10	20	40	50	60	80	100
Fy	0.8	0.85	0.95	1	1.05	1.13	1.15	1.17	1.19	1.2

Equivalent CA at ARI (years)

	1	2	5	10	20	40	50	60	80	100
(m^2) CA =	914	971	1086	1143	1200	1273	1276	1279	1282	1283
(ha) CA =	0.091	0.097	0.109	0.114	0.120	0.127	0.128	0.128	0.128	0.128
Cequiv =	0.64	0.68	0.76	0.80	0.84	0.89	0.89	0.90	0.90	0.90

Estimate discharge rate for design area for 1, 5,10,20 and 100 years ARI storm event (L/s)

Q = 0.000278*CAI (L/s) Rational Method

Storm Duration (min)	I_5 (20%AEP) (mm/hr)	Outflow (L/s) 5y ARI	I_{10} (10%AEP) (mm/hr)	Outflow (L/s) 10y ARI	I_{20} (5%AEP) (mm/hr)	Outflow (L/s) 20y AR	I_{100} (1%AEP) (mm/hr)	Outflow (L/s) 100y AR	Runoff Vol (1%AEP) (m3)
5	81.30	**24.54**	100.00	**31.77**	120.00	**40.03**	175.00	**62.44**	18.73
10	59.30	**17.90**	72.90	**23.16**	87.50	**29.19**	127.00	**45.31**	27.19
15	47.70	**14.40**	58.70	**18.65**	70.50	**23.52**	103.00	**36.75**	33.07
20	40.50	**12.22**	49.80	**15.82**	59.80	**19.95**	87.10	**31.08**	37.29
25	35.50	**10.71**	43.60	**13.85**	52.40	**17.48**	76.30	**27.22**	40.83
30	31.70	**9.57**	39.00	**12.39**	46.90	**15.65**	68.30	**24.37**	43.86
45	24.50	**7.39**	30.20	**9.59**	36.20	**12.08**	52.90	**18.87**	50.96
60	20.40	**6.16**	25.00	**7.94**	30.00	**10.01**	43.80	**15.63**	56.26
90	15.60	**4.71**	19.10	**6.07**	22.90	**7.64**	33.30	**11.88**	64.16
120	12.80	**3.86**	15.70	**4.99**	18.80	**6.27**	27.30	**9.74**	70.13
180	9.75	**2.94**	11.90	**3.78**	14.20	**4.74**	20.50	**7.31**	78.99
270	7.39	**2.23**	8.98	**2.85**	10.70	**3.57**	15.20	**5.42**	87.86
360	6.05	**1.83**	7.34	**2.33**	8.70	**2.90**	12.30	**4.39**	94.79
540	4.56	**1.38**	5.50	**1.75**	6.49	**2.17**	9.07	**3.24**	104.85
720	3.71	**1.12**	4.46	**1.42**	5.25	**1.75**	7.27	**2.59**	112.06
1080	2.77	**0.84**	3.31	**1.05**	3.87	**1.29**	5.28	**1.88**	122.07
1440	2.23	**0.67**	2.66	**0.85**	3.11	**1.04**	4.19	**1.49**	129.16
1800	1.89	**0.57**	2.24	**0.71**	2.61	**0.87**	3.49	**1.25**	134.48
2160	1.64	**0.49**	1.94	**0.62**	2.25	**0.75**	3.00	**1.07**	138.72
2880	1.31	**0.40**	1.54	**0.49**	1.78	**0.59**	2.35	**0.84**	144.89
4320	0.95	**0.29**	1.11	**0.35**	1.27	**0.42**	1.65	**0.59**	152.59

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Design stormwater discharge flow rate to rainwater tank

Catchment analysis

Total Catchment Area =	1100	m^2	100% upper roof		C_{10}
1st grade paving	1100	m^2	equivalent	100.0 %	0.9
2nd grade paving	0	m^2	equivalent	0.0 %	0.75
Pervious area	0	m^2	equivalent	0.0 %	0.1

Cy = C10*Fy

Design ARI (years)	1	2	5	10	20	40	50	60	80	100
Fy	0.8	0.85	0.95	1	1.05	1.13	1.15	1.17	1.19	1.2
Equivalent CA at ARI (years)										
	1	2	5	10	20	40	50	60	80	100
(m^2) CA =	792	842	941	990	1040	1100	1100	1100	1100	1100
(ha) CA =	0.079	0.084	0.094	0.099	0.104	0.110	0.110	0.110	0.110	0.110
Cequiv =	0.72	0.77	0.86	0.90	0.95	1.00	1.00	1.00	1.00	1.00

Estimate discharge rate for design area for 1, 5,10,20 and 100 years ARI storm event (L/s)

Q = 0.000278*CAI (L/s) Rational Method

Storm Duration (min)	I_5 (20%AEP) (mm/hr)	Outflow (L/s) 5y ARI	I_{10} (10%AEP) (mm/hr)	Outflow (L/s) 10y ARI	I_{20} (5%AEP) (mm/hr)	Outflow (L/s) 20y ARI	I_{100} (1%AEP) (mm/hr)	Outflow (L/s) 100y ARI	Runoff Vol (1%AEP) (m3)
10	59.30	**15.50**	72.90	**20.06**	87.50	**25.29**	127.00	**38.84**	23.30
15	47.70	**12.47**	58.70	**16.16**	70.50	**20.37**	103.00	**31.50**	28.35
20	40.50	**10.59**	49.80	**13.71**	59.80	**17.28**	87.10	**26.64**	31.96
25	35.50	**9.28**	43.60	**12.00**	52.40	**15.14**	76.30	**23.33**	35.00
30	31.70	**8.29**	39.00	**10.73**	46.90	**13.55**	68.30	**20.89**	37.60
45	24.50	**6.41**	30.20	**8.31**	36.20	**10.46**	52.90	**16.18**	43.68
60	20.40	**5.33**	25.00	**6.88**	30.00	**8.67**	43.80	**13.39**	48.22
90	15.60	**4.08**	19.10	**5.26**	22.90	**6.62**	33.30	**10.18**	54.99
120	12.80	**3.35**	15.70	**4.32**	18.80	**5.43**	27.30	**8.35**	60.11
180	9.75	**2.55**	11.90	**3.28**	14.20	**4.10**	20.50	**6.27**	67.70
270	7.39	**1.93**	8.98	**2.47**	10.70	**3.09**	15.20	**4.65**	75.30
360	6.05	**1.58**	7.34	**2.02**	8.70	**2.51**	12.30	**3.76**	81.24
540	4.56	**1.19**	5.50	**1.51**	6.49	**1.88**	9.07	**2.77**	89.86
720	3.71	**0.97**	4.46	**1.23**	5.25	**1.52**	7.27	**2.22**	96.04
1080	2.77	**0.72**	3.31	**0.91**	3.87	**1.12**	5.28	**1.61**	104.63
1440	2.23	**0.58**	2.66	**0.73**	3.11	**0.90**	4.19	**1.28**	110.70
1800	1.89	**0.49**	2.24	**0.62**	2.61	**0.75**	3.49	**1.07**	115.26
2160	1.64	**0.43**	1.94	**0.53**	2.25	**0.65**	3.00	**0.92**	118.90
2880	1.31	**0.34**	1.54	**0.42**	1.78	**0.51**	2.35	**0.72**	124.18
4320	0.95	**0.25**	1.11	**0.31**	1.27	**0.37**	1.65	**0.50**	130.78

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Retention tank - Steel Tank SR225 ϕ3400 x 2480 (Diameter x H)

22.5kL to allow for outlet and overflow pipe connection

Height (m) = 2.48

Increment (m) = 0.124

Total Calculated vol (L) = 22500 = 22.5 kL

Tank setup levels	Layer	Elevation (m)	Surface Area (sqm)	Calculated Volume (L)	ve Volume (L)	
46.8	0	46.800	9.07258			
L1 FFL	1	46.924	9.07258	1125	1125	
	2	47.048	9.07258	1125	2250	
	3	47.172	9.07258	1125	3375	
	4	47.296	9.07258	1125	4500	
	5	47.420	9.07258	1125	5625	
	6	47.544	9.07258	1125	6750	
	7	47.668	9.07258	1125	7875	
	8	47.792	9.07258	1125	9000	
	9	47.916	9.07258	1125	10125	
	10	48.040	9.07258	1125	11250	
	11	48.164	9.07258	1125	12375	
	12	48.288	9.07258	1125	13500	
	13	48.412	9.07258	1125	14625	
	14	48.536	9.07258	1125	15750	
	15	48.660	9.07258	1125	16875	
	16	48.784	9.07258	1125	18000	
	17	48.908	9.07258	1125	19125	
	18	49.032	9.07258	1125	20250	Approx. Invert of overflow pipe out
	19	49.156	9.07258	1125	21375	
	20	49.280	9.07258	1125	22500	

Overflow pipe invert level set at = 49.01

Total available depth to orifice pipe invert tank vol at OF: 20 kL

the overflow pipe need to be able to drain the tank overflow. The worst case 1% AEP storm event with assumption when tank is full $Q_{out\ 1\%AEP,\ 10\ mins}$ = **38.8** L/s

For 225 mmΦ overflow

d = 225 mm h = 275 mm

Qout = 6.6 x 10^-5 x d^2 x (h-d/2)^0.5 = **42.6** L/s PASS

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Projects

1 Project details

2 Stormwater design

Project Name *

DT240706_162 Gouger St_Adelaide

Use street number and name (each project must have a unique name)

Council

Adelaide City Council

Note -> please reload the Council each time you edit an existing project: Change the Council and then change it back.

Rainfall Location *

Adelaide Metropolit

Automatically loads rainfall and irrigation demand for your BoM rainfall region

Planning reference (optional)

Site Area (m2) *

1426.5

The maximum allowed site area is 5000m2

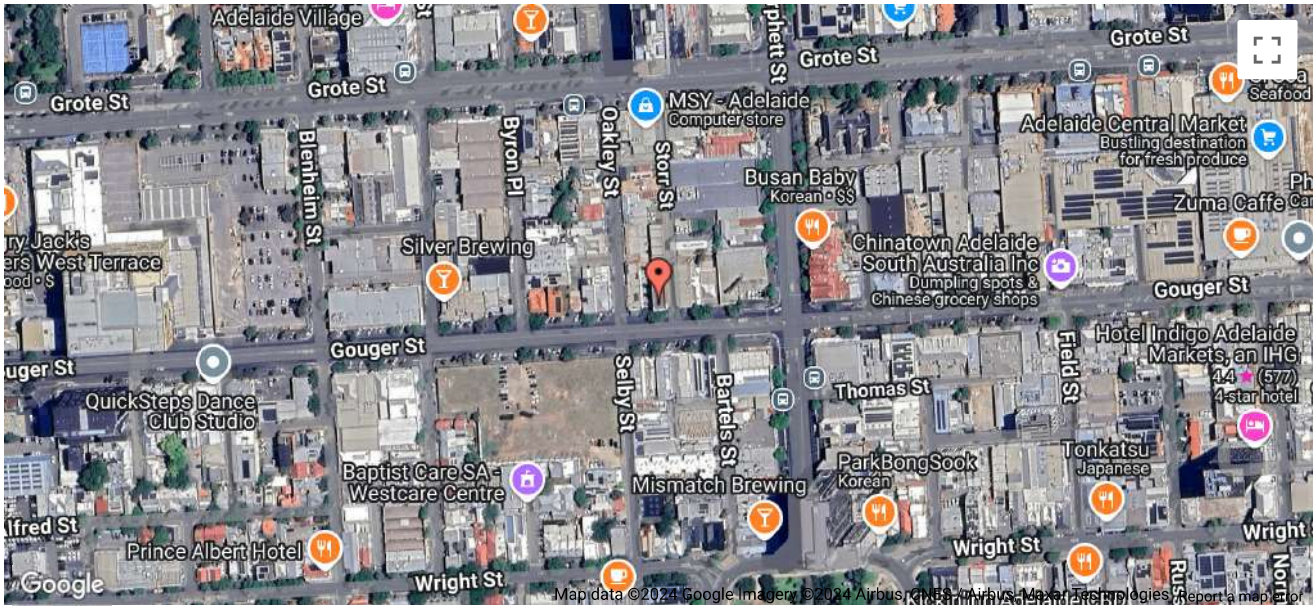
New development type *

Multi unit development (a

Address *

162 Gouger Street, Adelaide SA, Australia

Please enter your address - you can drag the pin on the map to change your location



Building Spaces

This occupancy calculator helps InSite understand your water demand. Enter more than one building space type by pressing 'add' to create a new line.

Proposed Building Type

Public library, theatre or club - BCA

Add the PROPOSED building types in the development. BCA Classes are as per the Building Code of Australia

Internal floor area (m2) *

494

Please enter the proposed internal floor area of this type of building (e.g. 3 x 100m2 apartments would be 300)

Estimated Building Occupancy

29.6

Building internal area x Occupancy Profile

⊕ Add ⊖ Remove

NEXT

Projects

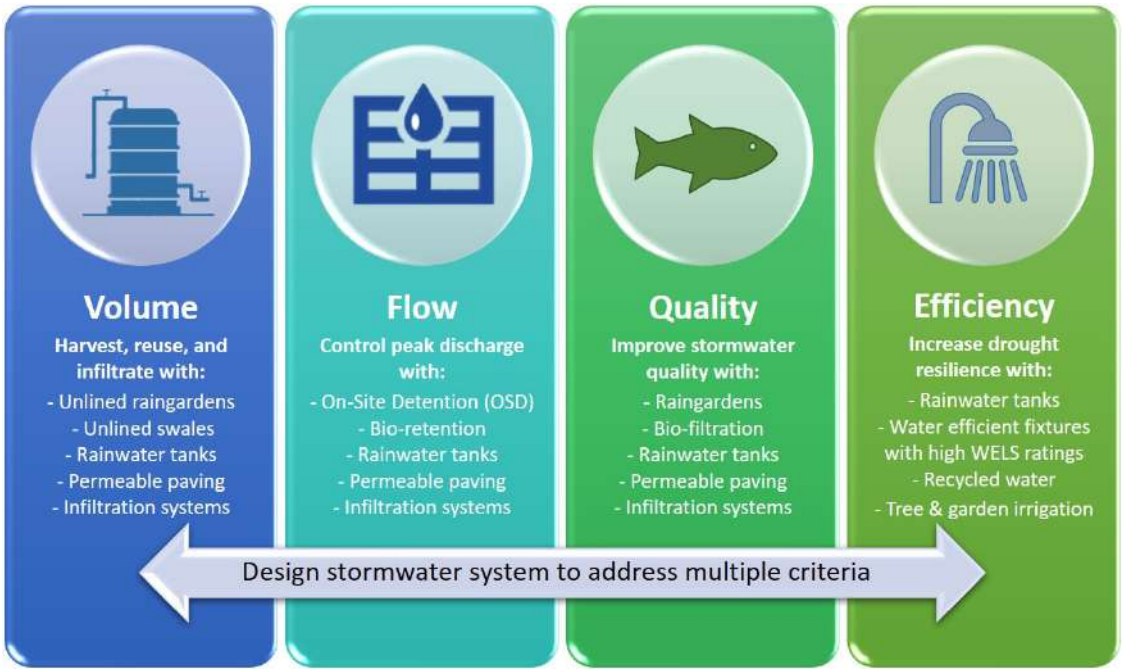
1 Project details

2 Stormwater design

Instructions

In addition to conveying stormwater in pipes, stormwater design should: Reduce the total **Volume** of runoff, manage peak **Flow**s so as not to overwhelm local drainage networks, improve water **Quality** flowing into streams and coastal areas, and improve water **Efficiency** for drought resilience.

STEP 1: Please enter all impervious areas in your site connected to Council or Water Authority drains. Pervious paths, garden and lawn areas not connected to drains can be excluded. Then enter any connected tank and WSUD treatments.
STEP 2: Check which of the stormwater design criteria your project has passed.
STEP 3: Optimise your design by changing the water storage design, WELS ratings and stormwater treatments.

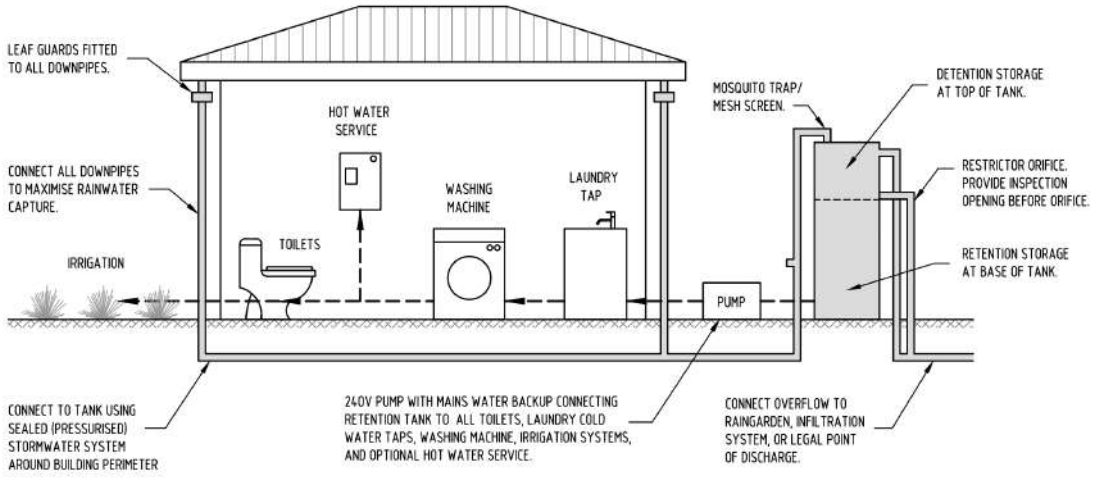


See the InSite Water User Manual for more detailed instructions.

Specify stormwater runoff and management solutions

Enter only the impervious areas in your site connected to Council or Stormwater Authority drains. Don't enter pervious areas like pervious paving, garden, gravel and lawn areas.

Impervious area	Impervious area name	Impervious Area (m2)	Rainwater tank size (L)	Detention tank size (L)
Roof connected to tank	Roof to Tank	1100	20000	0
Only add areas that are impervious and that are connected to drainage	Enter your own name for this impervious area (optional)	Enter size of impervious area in square metres	Connected rainwater tank size (if applicable)	Connected detention tank size (if applicable)



RETENTION TANK RETICULATION DETAIL

N.T.S.
NOTE: THE DESIGN AND INSTALLATION OF ALL STORMWATER SYSTEMS SHALL COMPLY WITH AS/NZS 3500.3:2018 "STORMWATER DRAINAGE".

– Remove Impervious Area

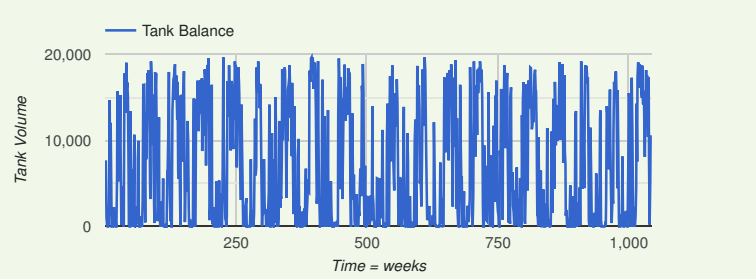
Impervious area	Impervious area name	Impervious Area (m2)	Treatment type	Treatment size (m2)
Courtyard	Balconies Not to Tank	185	None	
Only add areas that are impervious and that are connected to drainage	Enter your own name for this impervious area (optional)	Enter size of impervious area in square metres	Select a treatment from the drop-down menu What's this?	Size of treatment (if applicable)

+ Add Another Impervious Area – Remove Impervious Area

Water balance calculator

The water balance calculator runs a daily tank balance simulation using 20 years of local rainfall data.

Water tank performance over time



Drag cursor over a section of the graph to zoom in and view weekly average water tank performance.
Right click on graph to zoom out.

Rainwater Tank Reliability %
53.4
End use demand met by the tank. Target 50% or better – increase tank size or connected roof area to improve reliability

Rainwater Tank Overflow %
32.7
% of roof runoff flowing to stormwater system. Target less than 25% – increase tank water demand and increase tank size to reduce overflow

Rainwater tank settings -> Click to expand

Tick boxes if rainwater or recycled water is connected

☑ Toilet ☐ Laundry ☑ Irrigation ☑ Hot Water

Rainwater tanks (L)
20000
Total volume of rainwater tanks on site

Roof areas (m2)
1100.0
Total roof area connected to rainwater tanks

Detention tanks (L)
0.00
Total volume of detention tanks on site

Irrigated garden area (m2)
140
Area of garden to be irrigated by the tank

Other rainwater uses (L/day)
Enter any other connected rainwater or recycled water demands in L/day

% of toilets connected *
100
Default is 100% = all building toilets connected to the rainwater or recycled water source

% of apartments or occupants connected *
100
Default is 100% = reduce this percentage if some of the apartments or building areas are not connected to the rainwater or recycled water source

Efficiency settings-> Click to expand

Water Efficiency WELS Settings

Basin WELS star rating: > 4 Star
Toilet WELS rating: > 4 Star
Bath WELS star rating: Not App
Washing Machine WELS star rating: Not App
Kitchen Taps WELS rating: Default
Urinal WELS rating: Not App
Shower WELS star rating: Not App
Dishwasher WELS star rating: Not App

☐ Recycled water source
Tick if recycled water from a local (3rd pipe) scheme used in the building. This calculator will assume that rainwater (if a tank is connected) will be used preferentially to recycled water.

Local catchment details -> Click to expand

Default values are selected, only change these settings if directed to do so by your local stormwater authority

Flow reduction strategy
Volume retention and/or Infiltration
Choose the method your site will use for peak flow reduction. Peak flow reduction reduces downstream flooding during large storm events. See the User Manual for details.

Catchment strategy required
On Site Retention (OSR) of volume to pre-develo
'Regime-in-balance' = captures the difference in volume between the pre-development and the post-development runoff in a 1-in-5 year storm. 'Yield minimum' = captures the entire volume of runoff in a 1-in-5 year storm. 'Yield minimum' should be used in ecologically sensitive areas or areas where the drainage system is already at maximum capacity. See the User Manual for details.

Local drainage system capacity *
Commercial (includin
Enter the design capacity of the local drainage system (usually Residential >750m2 per dwelling)

Base case (pre-development) fraction impervious (ratio)
0.90
default = 0.35 or 0.4 - refer to local drainage authority guidelines

Site storage design

Other details required for the detention tank sizing calculations - these have been pre-populated, but may be required to be customised depending on local Council Guidelines.

Base case (pre-development) design storm
10% AEP (~1 in 10 ARI) - default reside
refer to your local drainage authority guidelines

Post development detention requirement (Site Storage Requirement)
10% AEP (~1 in 10 ARI) - default reside
refer to local drainage authority guidelines

Additional Site Storage (L) - connected to all impervious areas
Additional site storage volume added adjacent to the legal point of discharge for FLOW retention or detention. This is an underground storage tank sited at the lowest point in the site and connected to all impervious areas.

Results

Objective: Harvest and re-use or infiltrate stormwater

Target: No more than a 10% increase in average annual runoff volume

VOLUME RESULT

-54.5

% change in annual average volume

PASS

Objective: Control peak stormwater discharge

Target = 0. If greater than zero this is the additional Site Storage Requirement (SSR) volume required. If less than zero then the development complies

PEAK FLOW RESULT

-6.6

m3 of additional site storage required

PASS

Objective: Improve stormwater runoff water quality

Target: Achieve a score of 100 or more

QUALITY RESULT

128

Pollution reduction score (out of 100)

PASS

Objective: Increase drought resilience

Target: Achieve greater than 25% potable water use reduction

EFFICIENCY RESULT

37.6

% water saving

PASS

This project meets all of the policy objectives

PREVIOUS PAGE | SAVE PROJECT AND GO TO REPORTING

STRUCTURAL
SYSTEMS
consulting engineers
P: 8231 6000
E: civil@structuralsystemssa.com.au

Fire Tank room drainage

Maintain all high point at all access to avoid flood affected.

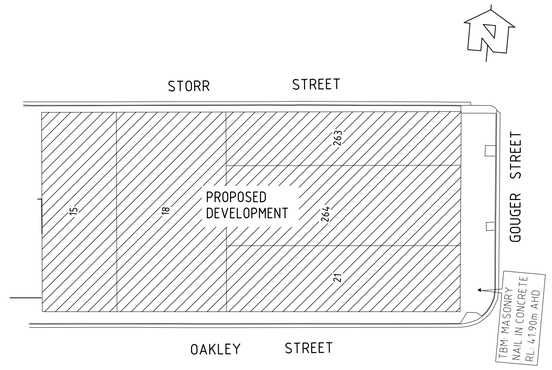
The room however has FFL ≤ 1m below surrounding ground surface level.
Perch ground water can be either directed to sewer system. Very minimal flow is anticipated or the room to be fully sealed & tanked to avoid any ingress of ground water.

Pump still recommended in this case for emergency drainage when the need is arise.

PROJECT : 16 STOREY APARTMENT + CARPARK
ADDRESS: 162 GOUGER ST, ADELAIDE

DRAWING INDEX

DRAWING No	STAGE	REV	DRAWING TITLE	DATE ISSUED
DT 240706.SW01	PA	0	COVER SHEET, DRAWING INDEX, GENERAL NOTES	10/09/24
DT 240706.SW02	PA	0	GROUND FLOOR SITE PLAN	10/09/24
DT 240706.SW03	PA	0	LEVEL 1 STORMWATER DRAINAGE PLAN	10/09/24



LOCALITY PLAN
SCALE 1:400

GENERAL NOTES:

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ASSOCIATED DRAWINGS (STRUCTURAL, SERVICES, ARCHITECT), REPORT, ATTACHMENTS, APPENDICES AND SPECIFICATIONS. ANY DISCREPANCIES TO BE DIRECTED TO THE DESIGNER AND SUPERINTENDENT FOR CLARIFICATION, RECOMMENDATION AND RESOLUTIONS.
2. THESE DRAWINGS ARE NOT CADASTRAL PLANS AND SHALL NOT BE USED IN DETERMINING PRECISE DIMENSION WITH RESPECT TO BOUNDARIES.
3. ALL DIMENSIONS ARE IN METER (m) AND LEVELS ARE IN METRES (m) UNLESS NOTED OTHERWISE AND SHALL BE VERIFIED ON SITE PRIOR TO COMMENCEMENT OF WORKS.
4. REFER TO SURVEY DWG BY JOHN C BESTED & ASSOC PTY LTD REFERENCE No 25341 DRAWING 25341-ENG VERSION 1 SURVEYED ON 30-06-23.
5. LEVEL DATUM IS A.H.D. UNLESS NOTED OTHERWISE.
6. WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, THE RELEVANT CURRENT STANDARDS, AUSTRALIA CODES (INCLUDING ALL AMENDMENTS), THE LOCAL STATUTORY AUTHORITIES EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
7. ALL WORK EXTERNAL TO SITE BOUNDARY TO BE CARRIED OUT TO COUNCIL REQUIREMENTS AND APPROVAL. THE CONTRACTOR/ BUILDER MUST BE IN CONTACT AND LIAISON WITH COUNCIL PRIOR TO CONSTRUCTION TO OBTAIN THE RELEVANT PERMIT, APPROVAL AND THE CURRENT COUNCIL STANDARDS AND DETAILS.

EXISTING SERVICES & DUTY OF CARE NOTE:

1. WHEN WORKING IN THE VICINITY OF EXISTING SERVICES YOU HAVE A LEGAL "DUTY OF CARE" THAT MUST BE OBSERVED.
2. DRAWINGS AND DOCUMENTS IN THIS PROJECT SHOW IDENTIFIED EXISTING SERVICES, HOWEVER, UNKNOWN SERVICES MAY EXIST WHICH WERE NOT IDENTIFIED AT THE TIME OF THE DESIGN. THESE UNKNOWN SERVICES MAY POSSIBLY INTERFERE WITH THE PROPOSED WORKS.
3. ALL IDENTIFIED EXISTING SERVICES ARE A SCHEMATIC BASE ON THE INFORMATION PROVIDED BY DETAILED SURVEY DRAWING. CONTRACTOR MUST REQUEST ALL SERVICES PLANS FROM THE VARIOUS AUTHORITIES, FOR ANY PARTICULAR LOCATION AT A REASONABLE TIME BEFORE CONSTRUCTION BEGINS.
4. THE LOCATION OF THE SERVICES, DEPTHS, LEVELS, SIZES THAT MAY IMPACT ON THE PROPOSED WORKS SHALL BE FULLY VERIFIED AND CHECKED AGAINST THE PROPOSED DESIGN WORKS BY CONTRACTOR/ BUILDER. HAND-DIGGING TECHNIQUES (POT-HOLDING) WILL NEED TO BE UNDERTAKEN TO LOCATE SERVICES AS EXACT GROUND COVER AND ALIGNMENTS CANNOT BE GIVEN WITH ANY CERTAINTY. THE DOCUMENTED COVER MAY ALTER AFTER TIME. CAREFUL SITE INVESTIGATION IS ESSENTIAL TO UNCOVER AND REVEAL EXACT POSITION OF EXISTING SERVICES.
5. UPON VERIFICATION OF ALL EXISTING UNDERGROUND SERVICES, THE CONTRACTOR SHALL ADVISE ENGINEER AND SUPERINTENDENT OF ANY POTENTIAL CLASH OR INTERFERENCE WITH THE PROPOSED WORKS AS SOON AS IDENTIFIED. SEEK FURTHER INSTRUCTION BEFORE CONTINUE WITH WORK. ALL WORKS DIRECTLY OR RELATED TO THE POTENTIAL CLASH / INTERFERENCE SHALL BE STOPPED UNTIL THE ISSUE IS RESOLVED.
6. IN THE EVENT THAT ANY CLASH / INTERFERENCE IS BY A SERVICE THAT CAN ONLY BE MODIFIED BY THE SERVICE PROVIDER, THESE WORK SHALL BE COORDINATED BY THE CONTRACTOR OR ITS NOMINATED AGENT.

RAIN WATER TANK NOTES

THE REQUIRED RAINWATER TANK 22500 LITRES FOR RETENTION (USAGE VOLUME OF 20000L). TANK TO COLLECTING 100% OF UPPER ROOF CATCHMENT AREA.

REFER STORMWATER LAYOUT PLAN FOR TANK OVERFLOW SIZE AND SETTING. THE STORMWATER IN RETENTION TANK TO BE PLUMBED TO IRRIGATION TAPS, ALL TOILETS, CLEANER COLD WATER TAP AND HOT WATER HEATER AT LEVEL 3 - COMMON AREAS.

REFER SERVICES ENGINEER AND ARCHITECT FOR APPROVED TANKS SELECTION. THE TANK MUST BE COMPLIED TO 3500.1 SECTION 8. ALL PIPES CONNECTING TO RAINWATER TANK TO BE SEALED SYSTEM WITH FLEXIBLE JOINT AT BOTH INLETS, OUTLETS AND OVERFLOW OUTLETS.

TANK OVERFLOW REFER TO DRAINAGE PLAN AND TO COMPLIED WITH AS 3500.1 SECTION 8.4.

TANK MUST BE FITTED WITH MOSQUITO PROOF, NON DE-GRADABLE SCREENS, FORMED NOT LESS THAN 0.315mm DIAMETER MATERIAL AND HAVE A MINIMUM OF 6x7 OPENINGS PER cm^2 AT ALL OPENING TO HEALTH SA GUIDELINES.

PROVIDE WATER FILTER SYSTEM TO SUIT RE-USED. THE PLUMBING CONNECTION TO WATER SUPPLY SYSTEM TO BE COMPLIED WITH SA WATER REQUIREMENTS AND AS 3500.1.

THE TANK SHALL BE DESIGNED TO BE ABLE TO ACCOMMODATE THE IMPOSED DEAD LOADS, WIND LOADS AND WHERE APPLICABLE THE EARTHQUAKE LOADS. TANKS SUPPORT AND FIXING REFER TO MANUFACTURER'S REQUIREMENTS AND DETAILS.

NOTES
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3. THE ENGINEER'S DRAWINGS MUST NOT BE SCALED.
4. ALL DIMENSIONS IN mm UNLESS OTHERWISE SPECIFIED.
5. ADDITIONS AND SUBSTITUTIONS SHALL ONLY BE MADE WITH THE ENGINEER'S PRIOR KNOWLEDGE AND APPROVAL.
6. IT IS THE RESPONSIBILITY OF THE INDIVIDUAL TO ENSURE THAT THEY ARE USING THE CURRENT VERSION OF THIS DRAWING. STRUCTURAL SYSTEMS PTY LTD ACCEPTS NO LIABILITY FOR ISSUES ARISING FROM THE USE OF SUPERSEDED DRAWINGS.

FOR PLANNING APPROVAL

ISSUE NO.	DESCRIPTIONS	DATE	BY
P.A.0	ISSUED FOR PLANNING APPROVAL ARCH DRAWING RECEIVED: 04/09/2024 LEVEL RECEIVED: 10/07/2024	10/09/24	NN

PROJECT
16 STOREY APARTMENT + CARPARK

ADDRESS
162 GOUGER ST, ADELAIDE

DRAWING TITLE
LOCALITY PLAN, GENERAL NOTES AND DRAWING INDEX

CLIENT
LELIO BIBBO

STRUCTURAL SYSTEMS consulting engineers

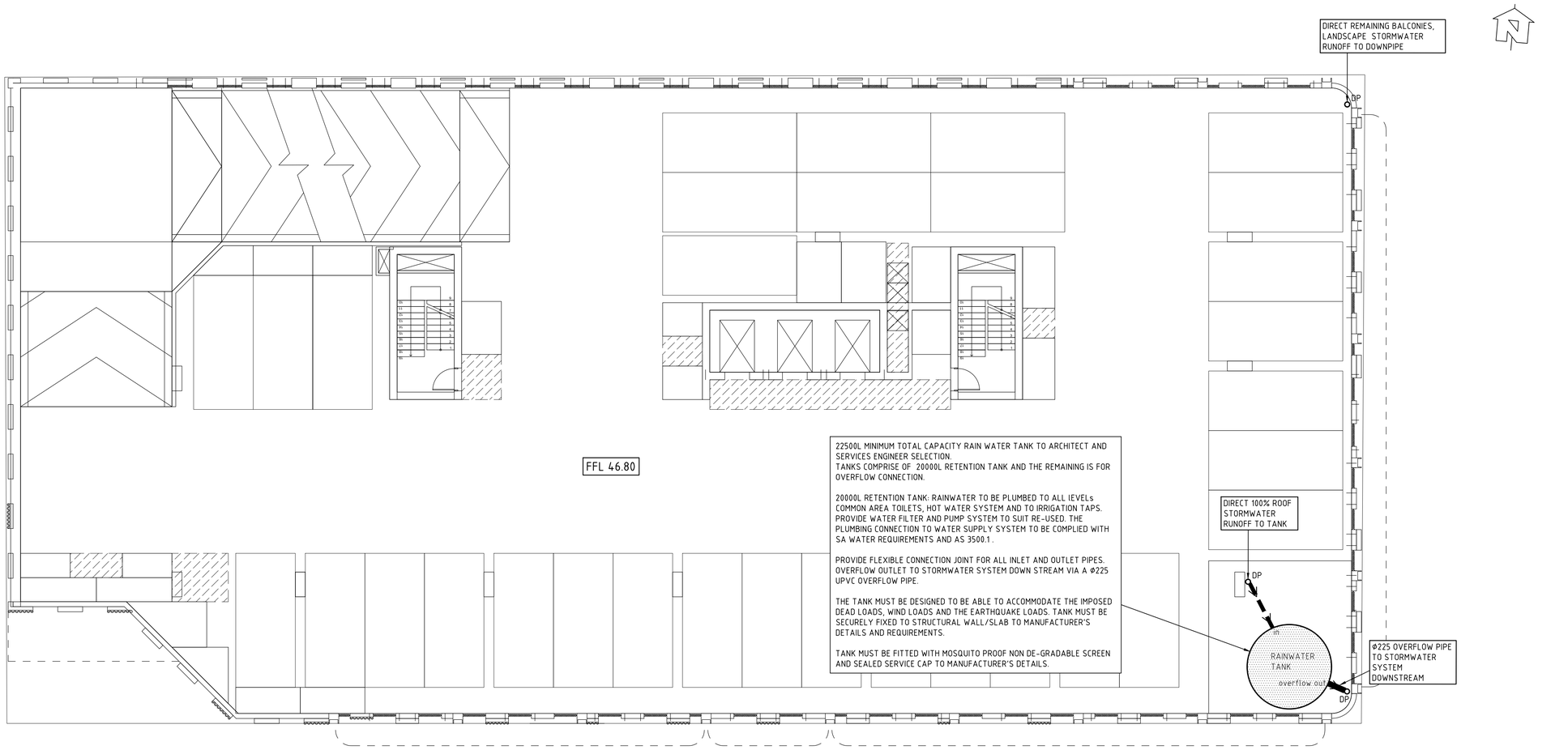
108 Wright Street, Adelaide SA 5000 Tel: (08) 8231 6000
Fax: (08) 8231 3444 Email: civil@structuralsystemssa.com.au ABN 21 366 115 939

DRAWN	NN	DESIGNED	NN
CHECKED		DATE REVISED	
SCALE	1:100 UNO ALL DIMENSIONS IN mm - DO NOT SCALE	PAPER SIZE	A1
		DATE ISSUED	10/09/2024
		PLOT SCALE	1:100

JOB No.	DRAWING No.	STAGE	ISSUE
DT 240706	SW01	PA	0

STAGE ABBREVIATION P-PRELIMINARY; DS-ENGINEERING DESIGN STAGE; PA-FOR PLANNING APPROVAL; T-TENDER, BA-BUILDING APPROVAL; C-FOR CONSTRUCTION

10/09/2024 11:34:12 AM



LEVEL 1 STORMWATER DRAINAGE PLAN

SCALE 1:100

SCALE 1:100 0m 1m 2m 3m 4m 5m 10m

NOTES

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2. USE FLEXIBLE CONNECTION FOR STORMWATER PIPES.
3. THIS IS NOT A CADASTRAL PLAN AND SHOULD NOT BE USED IN DETERMINING PRECISE DIMENSIONS WITH RESPECT TO BOUNDARIES.
4. STORMWATER TANK TO BE PLUMBED TO WC, HOT WATER SYSTEM REFER TANK NOTES

LEGEND

ø150 UPVC	STORMWATER ALIGNMENT ø150 UPVC PIPE. MIN. SLOPE 1:100 TYPICAL UNO.
ø225 UPVC	STORMWATER ALIGNMENT ø225 UPVC PIPE. MIN. SLOPE 1:200 TYPICAL UNO.
DP	DOWNPIPE
XX.XX	DESIGN LEVEL / PAVING LEVEL
FFL XX.XX	DESIGN FINISH FLOOR LEVEL

NOTES

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FOR PLANNING APPROVAL

ISSUE NO.	DESCRIPTIONS	DATE	BY
PA.0	ISSUED FOR PLANNING APPROVAL	10/09/24	NN
	ARCH DRAWING RECEIVED: 04/09/2024		
	LEVEL RECEIVED: 10/07/2024		

PROJECT
16 STOREY APARTMENT + CARPARK

ADDRESS
162 GOUGER ST, ADELAIDE

DRAWING TITLE
LEVEL 1 STORMWATER DRAINAGE PLAN

CLIENT
LELIO BIBBO

STRUCTURAL SYSTEMS consulting engineers

108 Wright Street, Adelaide SA 5000 Tel: (08) 8231 6000
Fax: (08) 8231 3444 Email: civil@structuralsystemssa.com.au ABN 21 366 115 939

DRAWN	NN	DESIGNED	NN
CHECKED		DATE REVISED	
SCALE	PAPER SIZE	DATE ISSUED	10/09/2024
1:100 UNO	A1	PLOT SCALE	1:100
ALL DIMENSIONS IN mm - DO NOT SCALE			

JOB No.	DRAWING No.	STAGE	ISSUE
DT 240706	SW03	PA	0

STAGE ABBREVIATION: P=PRELIMINARY; DS=ENGINEERING DESIGN STAGE; PA=FOR PLANNING APPROVAL; T=TENDER; BA=BUILDING APPROVAL; C=FOR CONSTRUCTION

10/09/2024 11:37:12 AM

STRUCTURAL SYSTEMS
consulting engineers

Date Issued	Tuesday, 3 December 2024
Job Number	DT 240706
Site Address	162 GOUGER STREET, ADELAIDE
Client	LELIO BIBBO
Proposed	16 STOREY APPARTMENT + CARPARK

Dear Nick,

Please find our responses and updated drawing as discussed in the meeting.

The PlanSA letter only required two (2) points:

1. Hazards (Flooding – Evidence Required) Overlay

- Flood resilience – following Concil's initial and further referral responses, provide an updated Stormwater Management Plan that considers the overland flow depths in Gouger, Storr and Oakley Streets to inform an appropriate FFL above 1% Annual Exceedance Probability Storm Event. This is to ensure the development is sited and designed to minimise the risk of entry of potential floodwaters where the entry of flood waters is likely to result in undue damage to or compromise ongoing activities within buildings, under PO 1.1.

Based on the provided flood mapping plan and detailed site survey, the calculated modelled flood levels are as follows:

- Eastern side: 41.87 (grate level) + 0.21 (ponding depth) = 42.09 A.H.D.
- Western side: 41.82 (grate level) + 0.22 (ponding depth) = 42.04 A.H.D.
- Centre – existing carpark entrance: 41.88 (paving level) + 0.20 (ponding depth) = 42.08 A.H.D.

The proposed Finished Floor Level (FFL) is 42.25 A.H.D., which is 160mm to 210mm above the 1% AEP flood levels, falling short of the 300mm freeboard requested by the Council. However, to meet both universal access requirements and the 300mm freeboard, additional ramps would be necessary. The internal space required for these ramps would reduce the usable retail space to an impractically small size.

Given the need to balance the flood risk of a 1% AEP (less than 1 chance in a lifetime) event with the potential compromise to everyday usability, the proposed FFL provides a reasonable solution. The current design ensures a sufficient clearance above the 1% AEP flood levels while maintaining acceptable access space for the ramps.

To further mitigate the impact of extreme, yet rare, floods and avoid potential damage or disruption to activities, alternative design solutions could be considered, such as: flood-resistant internal floor finishes (e.g., tiles, concrete) in the retail areas, and flood-resistant doors to protect high-value or sensitive areas. Please note that all new developments within the Adelaide City Council area are now required to include large detention and retention tanks to reduce flood levels.

2. Capital City Zone

- Universal access – per dot point three of Council's request, clarify the levels at each side of the proposed doorways (noting the width of doorways will require different levels each side to match existing and maintain longitudinal falls) to confirm universal access per PO 6.1.

Please refer to the attached revised civil drawing for additional footpath levels.

The Council letter does have more items. Our comment for each section as below:

<u>Infrastructural and Assets:</u>

Point 1,2 and 3 – refer to the attached revised civil drawing for additional footpath levels.

1. Statement is a request by Council to provide compliant footpath as per AS 1428.1 (DDA)

2. Applicant should refer to Council's response to point 1 i.e. Council requesting level at boundary provide compliant footpath as per AS 1428.1

3. Council comment relates to providing levels each side of the doorways noting width of doorways will require different levels each side to match existing and maintain longitudinal falls

4. Noted

5. Council seeks confirmation from architect/developer

6. Council seeks confirmation from architect/developer/services engineer

7. Council seeks confirmation from developer/services engineer

Stormwater and Flooding:

Point 1 – Refer to the comment above for PlanSA.

Point 2 – The underground pipe systems are typically designed to manage minor storm events (ranging from 20% AEP to 5% AEP), while overland flow paths are designed for major storm events (such as 1% AEP storms).

The proposed development does not increase the inflow rates to the pits during any storm events – refer to the provided calculation. Post-development discharge rates are lower than the pre-development rates at both pits, which is achieved through the contribution of the large retention tank.

If the Council considers the existing pipes to be undersized for the current (pre-development) conditions and believes they will remain insufficient after the proposed development reduces discharge rates, we would suggest that the necessary upgrades to the pipes be considered by the Council, not the developer.

Stormwater/Flooding

1. *Proponent is responsible for addressing hazards/flooding evidence required overlay. Council provided catchment plan (attached) and stormwater information to assist. However, Council is not responsible for undertaking the assessment. The State Government flood mapping is attached which may assist.*

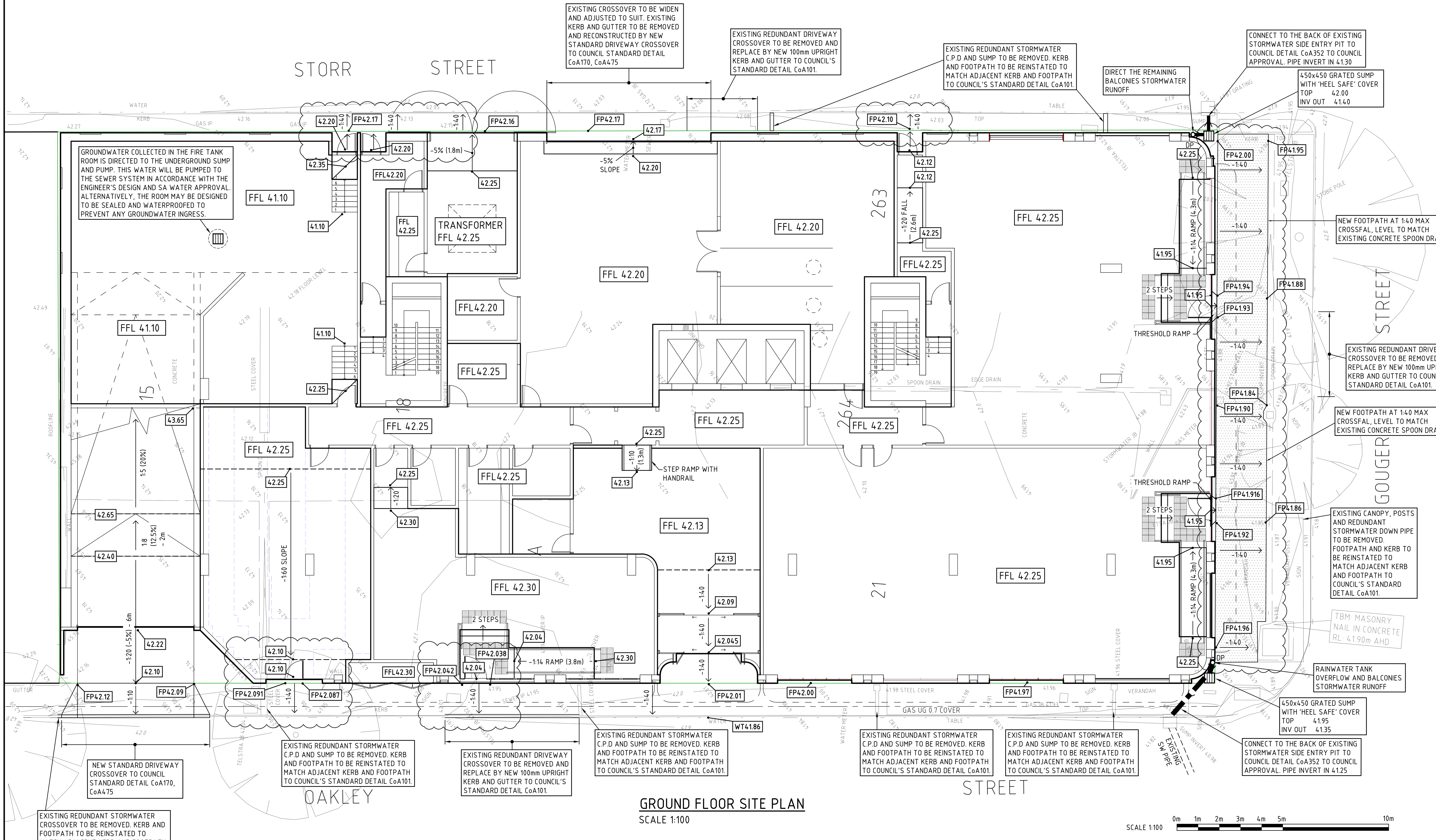
Please refer to the attached flood plan for Council most recent available flood information in 1%AEP storm event – existing scenario. A few of the peak flow depth and peak ponding depth are acquired and design shall provide min 300mm freeboard to this flood flow depth in different locations.

2. *Noted, calculation indicated the peak flow in 1% AEP storm event will exceed the existing Ø225mm outlet pipe hydraulic capacity for both Storr Street and Oakley Street. Should be upgraded outlet pipe size to minimum Ø375mm pipe as it does not have capacity to accommodate the discharge.*
3. *Noted*
4. *Noted*

If you require any further information or assistance, please contact us.

Regards,

Nam Nguyen BEng (Hons)
STRUCTURAL SYSTEMS PTY LTD Structural & Civil Engineers **D** (08) 8231 6000



GROUND FLOOR SITE PLAN
SCALE 1:100

SCALE 1:100 0m 1m 2m 3m 4m 5m 10m

NOTES

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2. ALL WORK EXTERNAL TO SITE BOUNDARY TO BE CARRIED OUT TO COUNCIL REQUIREMENTS.
3. USE FLEXIBLE CONNECTION FOR STORMWATER PIPES.
4. THIS IS NOT A CADASTRAL PLAN AND SHOULD NOT BE USED IN DETERMINING PRECISE DIMENSIONS WITH RESPECT TO BOUNDARIES.
5. ALL U.P.V.C. PIPES LESS THAN 200mm BELOW THE SURFACE ON THE DRIVEWAY TO BE ENCASED IN 100mm CONCRETE.
6. PIPES LESS THAN 300mm IN DEPTH (FROM TOP OF PIPE) MUST HAVE CONCRETE COVER.
7. BUILDERS/ CONTRACTORS TO CHECK FOR ANY UNDERGROUND SERVICES PRIOR TO CONSTRUCTION.
8. IT IS THE RESPONSIBILITY OF THE OWNER/BUILDER TO ENSURE THAT FINISHED LEVELS AS PROPOSED BY ENGINEER BE ADEQUATE AS TO GET DESIRED FALL TO SEWERAGE INVERT. OWNER/BUILDER/PLUMBING CONSULTANT/PLUMBER MUST CHECK EXISTING SEWERAGE CONNECTION POINT INVERT TO ENSURE THAT PROPOSED FINISHED LEVELS ARE ADEQUATE PRIOR TO COMMENCEMENT OF ANY WORK.

LEGEND

Ø150 UPVC	STORMWATER ALIGNMENT Ø150 UPVC PIPE. MIN. SLOPE 1:100 TYPICAL UNO.
Ø225 UPVC	STORMWATER ALIGNMENT Ø225 UPVC PIPE. MIN. SLOPE 1:200 TYPICAL UNO.
EXISTING SW PIPE	EXISTING COUNCIL STORMWATER PIPE, TO BE VERIFIED ON SITE.
42.15	EXISTING LEVEL
42.0	EXISTING MAJOR CONTOUR
42.1	EXISTING MINOR CONTOUR
XX.XX	DESIGN GROUND LEVEL / PAVING LEVEL
FPXX.XX	DESIGN FOOTPATH LEVEL
FFL XX.XX	DESIGN FINISH FLOOR LEVEL
	DESIGN CONTOUR/HIGH POINT/GRADE CHANGE

THE EXISTING FOOTPATH TO BE REBUILT BY DEVELOPER IN ACCORDANCE WITH COUNCIL REQUIREMENTS AND DESIGN SPECIFICATIONS. CROSSFALL 1:40 MAXIMUM TYPICAL.

GRATED PIT
TACTILE
DP DOWNPIPE

NOTES
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4. ALL DIMENSIONS IN mm UNLESS OTHERWISE SPECIFIED.
5. ADDITIONS AND SUBSTITUTIONS SHALL ONLY BE MADE WITH THE ENGINEER'S PRIOR KNOWLEDGE AND APPROVAL.
6. IT IS THE RESPONSIBILITY OF THE INDIVIDUAL TO ENSURE THAT THEY ARE USING THE CURRENT VERSION OF THIS DRAWING. STRUCTURAL SYSTEMS PTY LTD ACCEPTS NO LIABILITY FOR ISSUES ARISING FROM THE USE OF SUPERSEDED DRAWINGS.

FOR PLANNING APPROVAL

ISSUE NO.	DESCRIPTIONS	DATE	BY
PA.2	FOOTPATH LEVELS ADDED	30/11/24	NN
PA.1	LEVELS & NOTES ADDED, REVISED	04/11/24	NN
PA.0	ISSUED FOR PLANNING APPROVAL ARCH DRAWING RECEIVED: 04/09/2024 LEVEL RECEIVED: 10/07/2024	10/09/24	NN

PROJECT
16 STOREY APARTMENT + CARPARK

ADDRESS
162 GOUGER ST, ADELAIDE

DRAWING TITLE
GROUND FLOOR SITE PLAN

CLIENT
LELIO BIBBO

STRUCTURAL SYSTEMS
consulting engineers

108 Wright Street, Adelaide SA 5000 Tel: (08) 8231 6000
Fax: (08) 8231 3444 Email: civil@structuralsystemssa.com.au ABN 21 366 115 939

DRAWN	NN	DESIGNED	NN
CHECKED		DATE REVISED	30/11/2024
SCALE 1:100 UNO	PAPER SIZE A1	DATE ISSUED	10/09/2024
ALL DIMENSIONS IN mm - DO NOT SCALE		PLOT SCALE	1:100
JOB No. DT 240706	DRAWING No. SW02	STAGE PA	ISSUE 2

STAGE ABBREVIATION: P=PRELIMINARY; DS=ENGINEERING DESIGN STAGE; PA=FOR PLANNING APPROVAL; T=TENDER; BA=BUILDING APPROVAL; C=FOR CONSTRUCTION