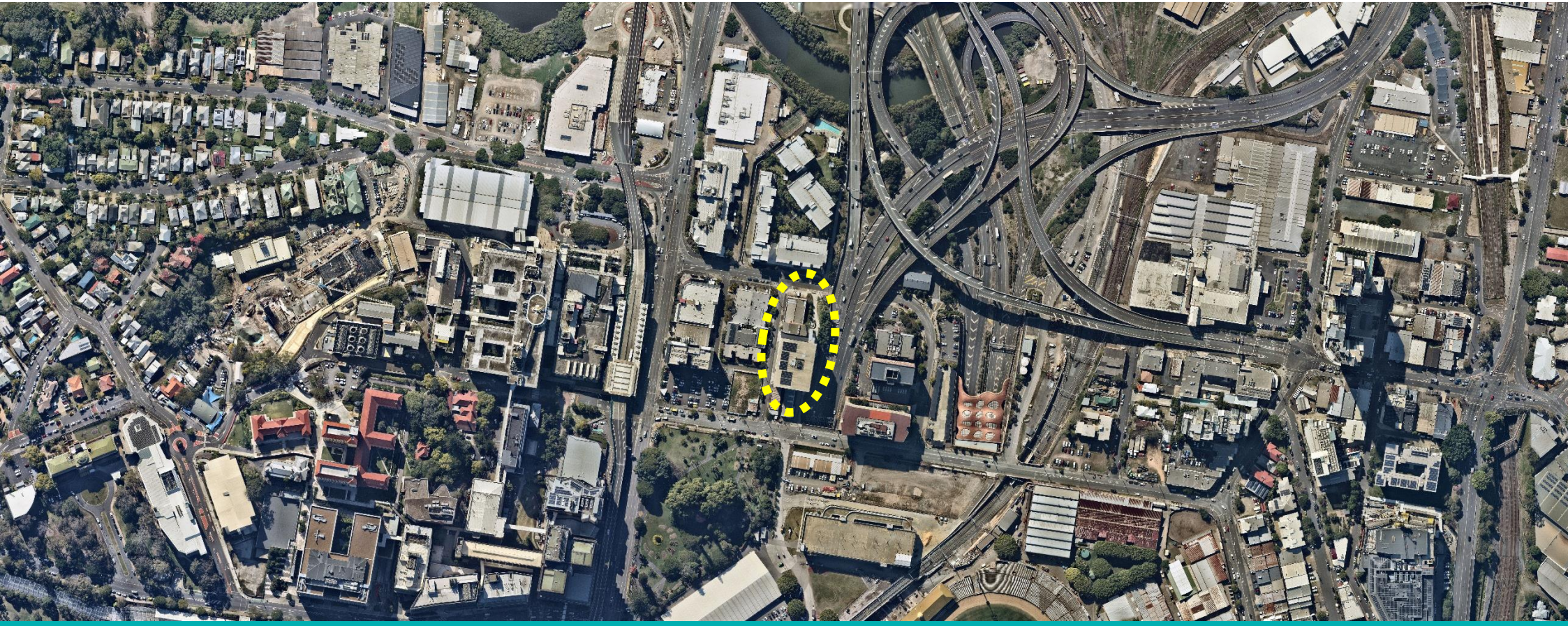
STORMWATER MANAGEMENT PLAN & FLOOD ASSESSMENT

PROPOSED MULTI-USE APARTMENT BUILDING

7-13 WREN STREET, BOWEN HILLS, QLD



CLIENT: AUSTRALASIAN PROPERTY GROUP PTY LTD

DOCUMENT NUMBER: 23-0144

VERSION: A

DATE: 14/09/2023

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Report Title:	Stormwater Management Plan & Flood Assessment– Proposed Multi-Use Apartment Building
Affected Properties:	
Street Address	3-7 Wren Street, Bowen Hills
RP Description	Lot 24 on SP276528 and Lot 23 on RP9941
Prepared For:	AUSTRALASIAN PROPERTY GROUP PTY LTD
Date:	15-08-2023
Revision No.	A
Report Status:	FINAL
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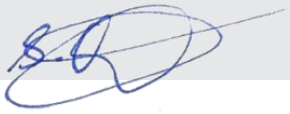
Signature	

1 INTRODUCTION

Topo were engaged by Thompson Adsett on behalf of Australasian Property Group Pty Ltd to prepare a Stormwater Management Plan and Flood Assessment for the proposed Multi-Use Apartment Building at 3-7 Wren Street, Bowen Hills. The site is formally described as Lot 24 on SP276528 and Lot 23 on RP9941.

1.1. GUIDELINES

This SMP and Flood Assessment been prepared in accordance with:

- *Queensland Urban Drainage Manual* (QUDM),
- The Brisbane City Council (BCC) *City Plan 2014,* namely the 9.4.9 Stormwater code, 8.2.11 Flood overlay code and SC6.16 Infrastructure design planning scheme policy – Stormwater Drainage, and
- *State Planning Policy (Water)*

1.2. REVISION

VER.	DATE	AUTHOR	APPROVED
DRAFT	15-08-2023	S. CHAMBERLAIN	S. CHAMBERLAIN
A	14-09-2023	S. CHAMBERLAIN	S. CHAMBERLAIN

2 PROJECT DESCRIPTION

2.1. EXISTING SITE

The site is located in the Brisbane City Council (BCC) Local Government Area at 3-7 Wren Street, Bowen Hills and is formally described as Lot 24 on SP276528 and Lot 23 on RP9941. The site covers an area of 3,500 m^2 and includes existing buildings (roofed areas) and hardstand concrete verges. The site is adjacent to the Inner City Bypass exit on the corner of Wren and Campbell Street, as presented in Figure 1.

2.2. TOPOGRAPHY DRAINAGE & LAWFUL POINT OF DISCHARGE

The majority of the site falls from grades to the north from approximately RL 11.3 m to RL 3.74 m. A small portion falls to the east to and existing park/pathway.

The majority of the existing site is roofed and runoff discharges via kerb adaptors to both Wren Street and Campbell Street. The remaining concrete hardstand areas shed directly to the kerb and channel system in in these streets. There is an existing gully pit along the northern site boundary in Campbell Street, as illustrated in Figure 2. A copy of the site survey plan is included as Appendix A.

The site's Lawful Point of Discharge (LPD) is the BCC controlled road reserve of Wren and Campbell Streets.

2.3. PROPOSED WORKS

The proposed development will consist of

- a day surgery,
- medical suite,
- apartment,
- car parking, and
- essential services, including a stormwater quality treatment system.

The indicative proposed development layout for Level 1 is provided as Figure 3, while architectural plans are presented in Appendix B.

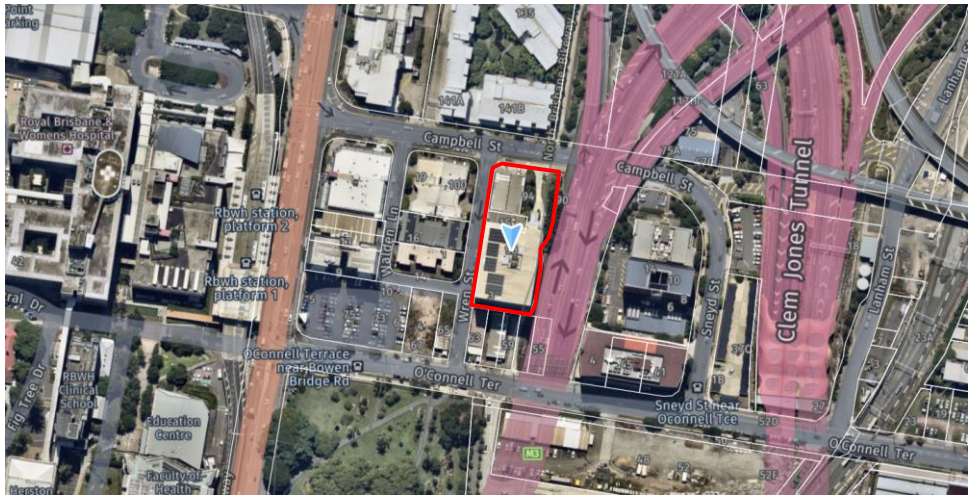


Figure 1 – Site Locality Plan

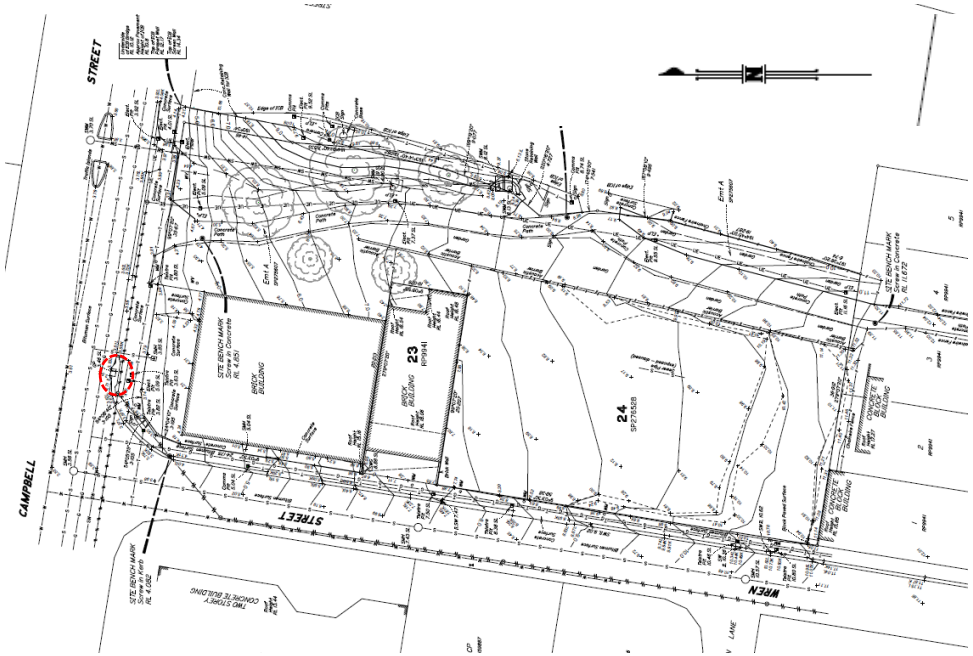


Figure 2 – Site Survey Plan (Source: Michael Jolly Surveys (Ref: 002017.01))

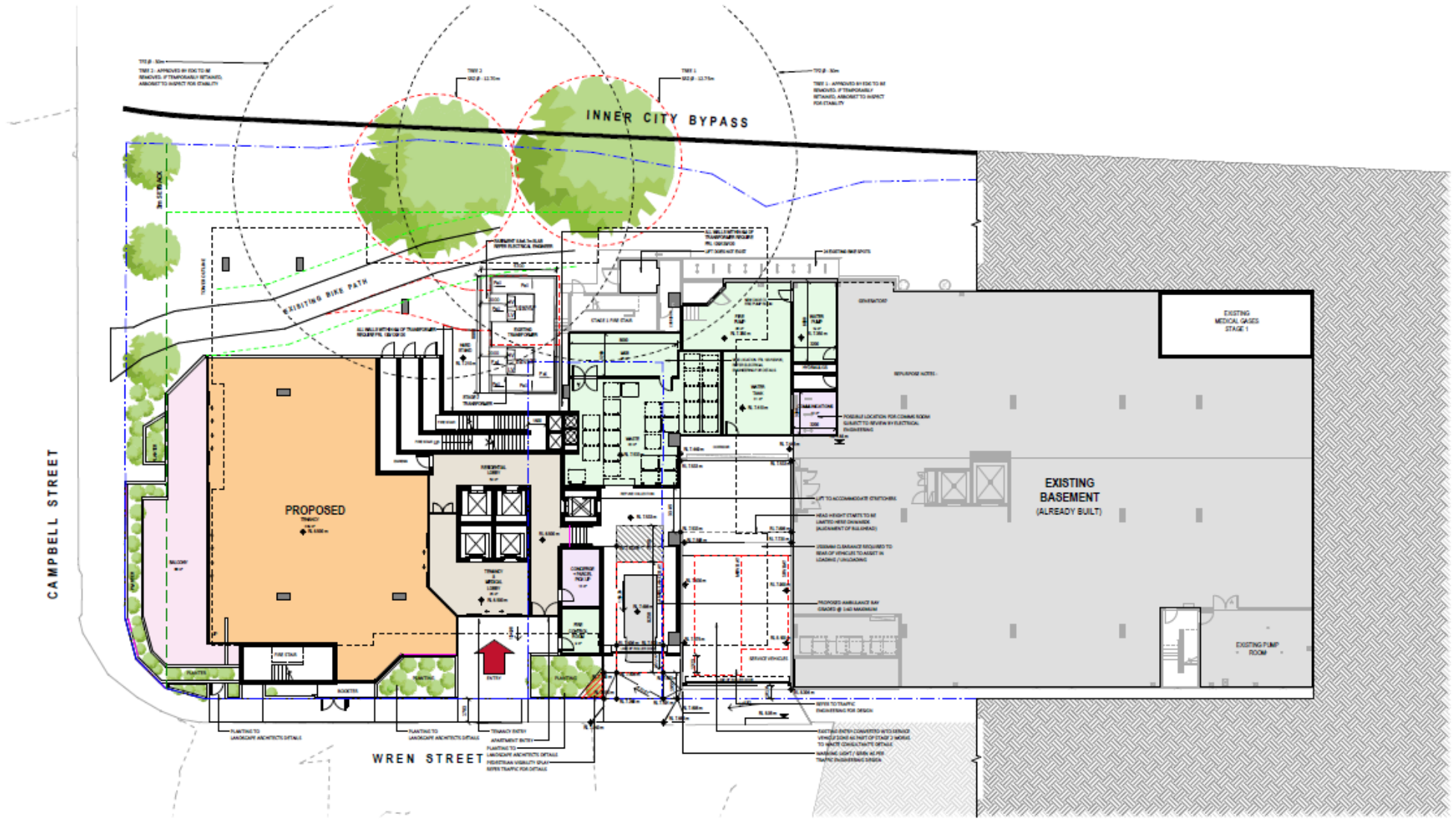


Figure 3 – Proposed Development Layout - Level 1 (Thomson Adsett)

2.4. FLOODING

A BCC flood awareness map is provided as Figure 4 and shows a Low to High likelihood of flooding for the 0.2 % to 5 % annual chance events respectively. Flooding is associated with backwater from Enoggera Creek or Breakfast Creek as stated in the Flood Report included as Appendix C. The 1 % Annual Exceedance Probability (AEP) flood level for the site is **4.9 m AHD**.

The following details are provided in relation to the floor levels of the proposed development:

- Basement levels are below the 1% flood level of 4.9 m AHD, however no basement entry is below this level.
- All habitable floors have been set above the 1 % AEP flood level, i.e. at Level 1 (13.80 m AHD) or above. Refer to Figure 5 or Appendix B for further details.

The commercial tenancy proposed on the lower ground floor level has been set below flood level (floor level 3.85 m AHD). Due to this disparity in line with Councils Flood Code a Flood Emergency Management Plan (FEMP) will be undertaken for the proposed development at detailed design phase that will include the following general requirements:

- The building manager will oversee procedures/operations in the event of a flood reaching the site.
- The proposed commercial tenancy will be closed before the flood commences, therefore not increasing the population at risk.
- All items that can be moved above the 1 % AEP flood level of 4.9 m AHD will be done so before the flood occurs to reduce damage to property.
- Items that cannot be moved above this flood level as well as all materials between the proposed floor level of 3.85 m AHD and the 1 % AEP flood level of 4.9 m AHD will be constructed from materials that can withstand frequent wetting and drying.

More detail will be provided in the FEMP, which will supersede the general requirements outlined above.

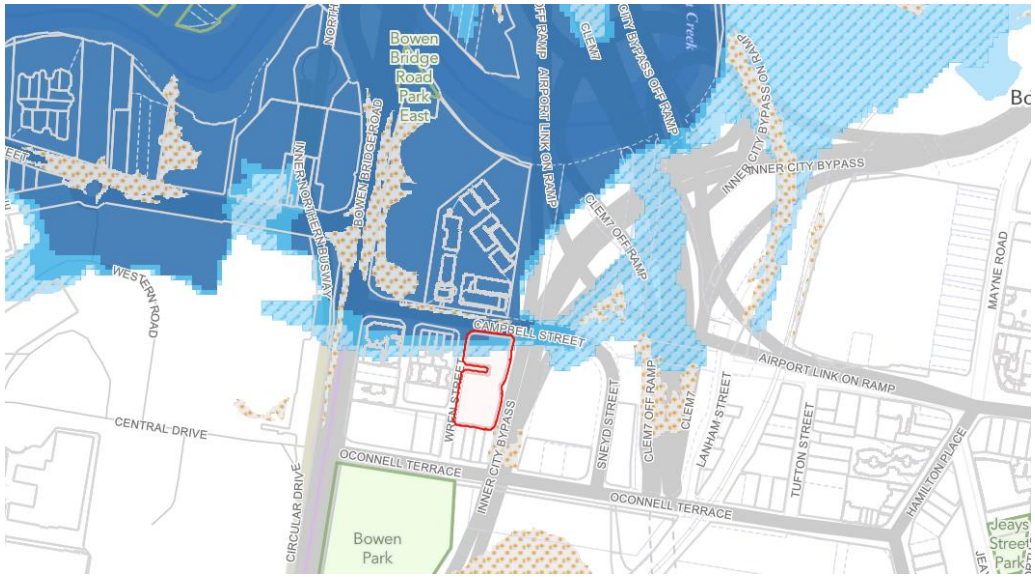


Figure 4 – Flood Awareness map (BCC)

2.5. FLOOD STORAGE

In accordance with the BCC Flood Code, the flood storage across the site has been assessed for the pre-development and the post-development scenario. This assessment is based on the detailed site survey and 1 % AEP flood level of 4.9 m AHD, with the results summarised in Table 1 and plotted in Appendix D.

Table 1 – Flood Storage Requirements

PRE-DEVELOPMENT (m^3)	POST-DEVELOPMENT (m^3)	
FLOOD STORAGE	EXTERNAL FLOOD STORAGE	COMPENSATORY FLOOD STORAGE
133	41.14	92

In the post-development scenario, there will be a flood storage deficit external to the building of approximately 92 m^3. Therefore, a minimum of 92 m^3 compensatory flood storage is required within the development footprint below 4.9 m AHD to maintain the flood storage volume across the site. This will be provided in an underground tank (shown within the lower ground floor plan) with an inlet located in Campbell Street between the 5 % or 2 % flood level. Further details in relation to the compensatory flood storage will be provided during the detailed design phase. A response to BCC Flood Code has been provided in Appendix E.

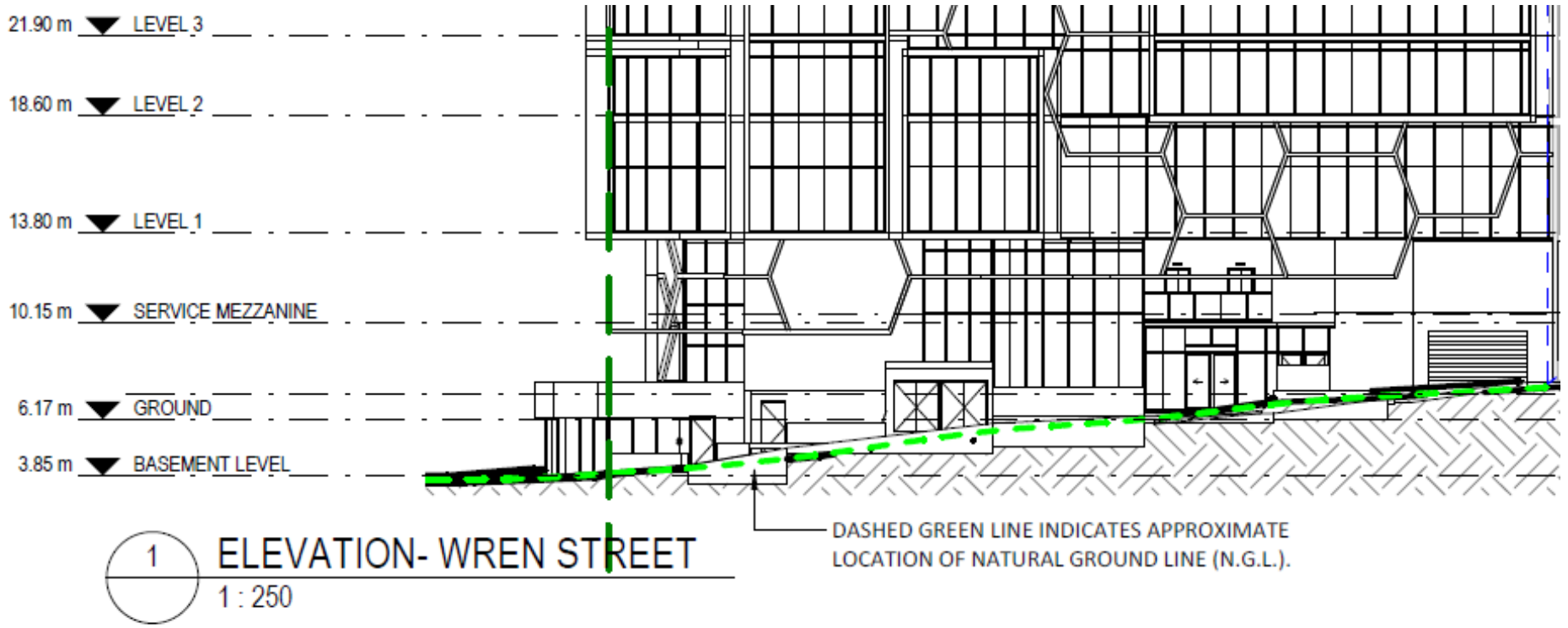


Figure 5 – Wren Street Elevation & proposed Floor Levels (Source: Thomson Adsett)

3 STORMWATER QUANTITY

No peak flow assessment has been carried out within this report as the changes in impervious areas from the existing case (roof and concrete handstand verges) to the proposed development is insignificant. Therefore, there will be no increase in peak flow rate from the developed site.

It should be noted that low flows from the site (Q3 month and less) will be captured from roof and podium areas and directed to a stormwater treatment device, as detailed in Section 4. Therefore, some attenuation of the frequent events will be held and released due to the water quality treatment device which may result in a reduced peak flow rate from the developed site.

Furthermore, the site is in the lower portions of Enoggera Creek which feeds into Brisbane River and is well downstream of the lower one-third of the total contributing Brisbane River catchment. The BCC SC6.16 Infrastructure design planning scheme policy – Stormwater Drainage states if the site discharges directly into the lower catchments of creeks or major drains, it would generally be undesirable to have detention where it may allow peak flows from the site to coincide with the wider catchment flood peak.

Therefore, no detention is proposed for the development.

4 STORMWATER QUALITY

4.1. DESIGN OBJECTIVES

The load-based Water Quality Objectives (WQOs) stipulated in the *State Planning Policy* (2016) for the South-East Queensland region have been utilised for the preparation of this SMP. The design objectives are summarised in Table 2.

Table 2 – Water Quality Design Objectives

MINIMUM REDUCTIONS IN MEAN ANNUAL LOAD FROM UNMITIGATED DEVELOPMENT (%)			
TOTAL SUSPENDED SOLIDS (TSS)	**TOTAL PHOSPHORUS (TP)**	**TOTAL NITROGEN (TN)**	**GROSS POLLUTANTS >5 mm**
80	60	45	90

This report identifies the stormwater quality management objectives for the operational phase (post-construction phase) of the proposed development in both a staged approach (Option 1) whereby each stage (if built separately will achieve water quality objectives) and a total site approach combining both stages (Option 2). Construction based stormwater quality management objectives are to be addressed in an Erosion and Sediment Control Plan (ESCP) to be prepared as part of the detailed design submission and lodged with BCC prior to the commencement of any works on the site.

4.2. MODELLING AND TREATMENT STRATEGY

4.2.1. SOFTWARE

Stormwater runoff quality from the proposed development site has been assessed using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) – Version 6.2.1. It is proposed to treat stormwater runoff from the site in a bioretention system sized to ensure compliance with the load-based reduction targets.

4.2.2. CATCHMENTS

Modelling has been undertaken using a "lumped" catchment modelling approach. The catchment definition is included in Table 3 for both options (staged approach and whole site).

Table 3 – Catchment Definition

	CATCHMENT ID	LAND USE	AREA (HA)	FRACTION IMP.
Option 1	Stage 1	Urban Residential	0.157	100 %
	Stage 2	Urban Residential	0.128	97 %
Option 2	Total site	Urban Residential	0.35	95 %

4.2.3. MUSIC MODEL PARAMETERS

The parameters utilised in the MUSIC model are provided in Table 4 to Table 7.

Table 4 – Meteorological and Rainfall Runoff Data

INPUT	DATA USED IN MODELLING
Rainfall station	40223 BRISBANE
Time step	6 minutes
Modelling period	1-1-1980 to 31-12-1989
Mean annual rainfall (mm)	1,156
Evapotranspiration (mm)	1,525
Rainfall runoff parameters	Urban Residential
Pollutant export parameters	Urban Residential

Table 5 – Rainfall Runoff Parameters

PARAMETER	SOURCE NODES
Land use	Urban Residential
Rainfall threshold (mm)	1
Soil storage capacity (mm)	500
Initial storage (% capacity)	10
Field capacity (mm)	200
Infiltration capacity coefficient a	211
Infiltration capacity coefficient b	5
Initial depth (mm)	50
Daily recharge rate (%)	28
Daily baseflow rate (%)	27
Daily deep seepage rate (%)	0

Table 6 – Pollutant Export Parameters

LAND USE	FLOW TYPE	TSS (LOG_{10} MG/L)		TP (LOG_{10} MG/L)		TN (LOG_{10} MG/L)	
		MEAN	ST. DEV.	MEAN	ST. DEV.	MEAN	ST. DEV.
Urban Residential	Baseflow	1.00	0.34	-0.97	0.31	0.20	0.20
	Stormflow	2.18	0.39	-0.47	0.32	0.26	0.23

Table 7 – Atlan Precast Tank

	OPTION 1 (STAGED APPROACH)		OPTION 2 (TOTAL SITE)
PARAMETER	**TANK STAGE 1**	**TANK STAGE 2**	**TANK**
Low Flow By-pass (m^3/s)	0	0	0
High Flow By-pass (m3/s)	100	100	100
Surface area (m^2)	1	1	3
Extended detention depth (m)	0.85	0.85	0.85
Exfiltration Rate (mm/hr)	0	0	0
Evaporative as % of PET	0	0	0
Low Flow Pipe Diameter (mm)	45	45	68
Overflow Weir Width (m)	0.5	0.5	0.5
Notional Detention Time (hrs)	0.0543	0.0543	0.713

Option 1 – the staged ATLAN system requires

- Stage 1
  - 3 x Atlan Stormsack, and
  - 1 x Atlan Filter cartridge in a Atlan Precast Tank
- Stage 2-
  - 3 x Atlan Stormsack, and
  - 1 x Atlan Filter cartridge in a Atlan Precast Tank.

Option 2 – the total site ATLAN system requires:

- 3 x Atlan Stormsacks, and
- 3 x Atlan Filter cartridge in an Atlan Precast Tank

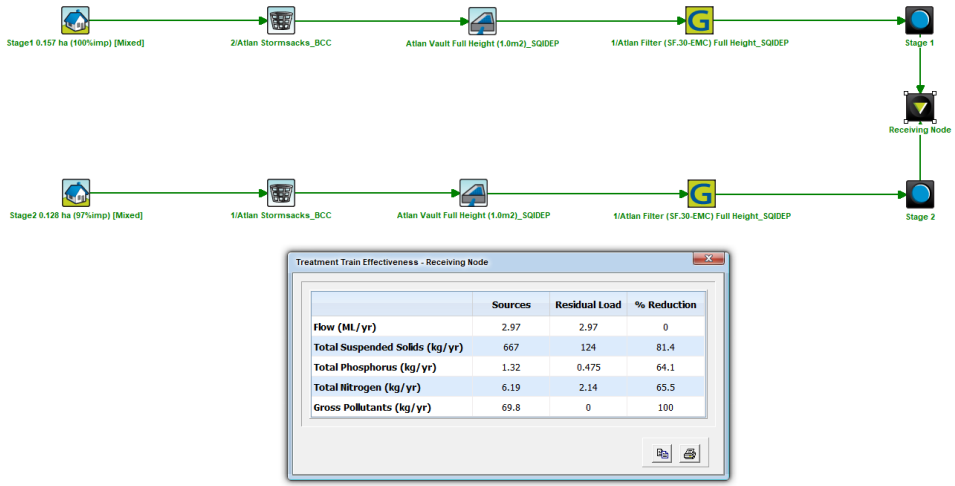
4.2.4. RESULTS

The results of the MUSIC model indicate the treatment train achieves the required design objectives, as summarised in Table 8, Figure 6 and Figure 7. A copy of the BCC Stormwater Codes are provided as Appendix F.

Table 8 – MUSIC Results

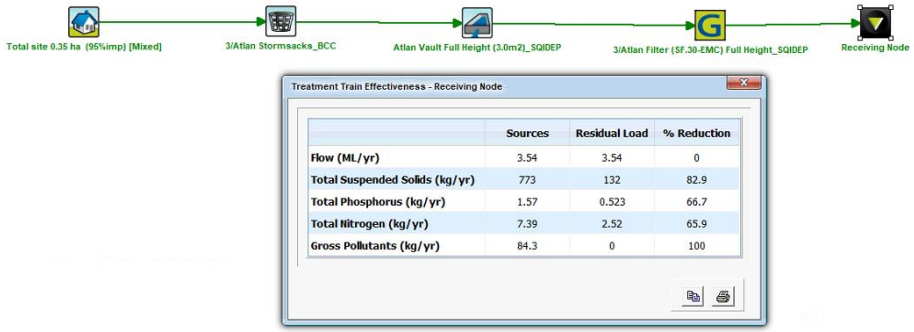
LOCATION	POLLUTANT	INFLOWS (KG/YR)	OUTFLOWS (KG/YR)	REDUCTION ACHIEVED (%)	WATER QUALITY OBJECTIVES (%)
Outlet Option 1	TSS	667	124	81.4	80
	TP	1.32	0.475	64.1	60
	TN	6.19	2.14	65.5	45
	GP	69.8	0	100	90
Outlet Option 2	TSS	800	143	82.1	80
	TP	1.58	0.535	66.2	60
	TN	7.47	2.51	66.4	45
	GP	84.3	0	100	90

Modelling has been undertaken by Atlan. Details of the proposed stormwater treatment systems are provided in Appendix G.



	Sources	Residual Load	% Reduction
Flow (ML/yr)	2.97	2.97	0
Total Suspended Solids (kg/yr)	667	124	81.4
Total Phosphorus (kg/yr)	1.32	0.475	64.1
Total Nitrogen (kg/yr)	6.19	2.14	65.5
Gross Pollutants (kg/yr)	69.8	0	100

Figure 6 – Results & Music Model for Option 1



	Sources	Residual Load	% Reduction
Flow (ML/yr)	3.54	3.54	0
Total Suspended Solids (kg/yr)	773	132	82.9
Total Phosphorus (kg/yr)	1.57	0.523	66.7
Total Nitrogen (kg/yr)	7.39	2.52	65.9
Gross Pollutants (kg/yr)	84.3	0	100

Figure 7 – Results & Music Model for Option 2

5 CONCLUSION

All proposed floor levels have been set with consideration to the 1 % AEP flood level of 4.9 m AHD and provide adequate immunity in accordance with BCC Flood Code (with exception to the proposed commercial tenancy on the lower ground floor as per below).

- All retail and commercial spaces have also been set at Ground Level (6.17 m AHD) or higher (with exception to the lower ground floor tenancy outlined below), and
- All habitable floors have been set at Level (13.80 m AHD) or higher.

The commercial tenancy proposed on the lower ground floor level has been set below flood level (floor level 3.85 m AHD). A FEMP will be prepared at detailed design phase to identify trigger events for the evacuationplan to be imepemted and relevant actions to be taken prior, through adm following a flood event. All construction materials below the 1 % AEP flood level will be capable of withstanding frequent wetting and drying (see Section 2.4 for further information)

Compensatory flood storage has been incorporated into the development to ensure the existing flood storage volume across the site is maintained up to the 1 % AEP event (i.e. 4.9 m AHD). A minimum of 92 m^3 compensatory flood storage is required within the development footprint below 4.9 m AHD. An inlet to the storage tank/system will be located in Campbell Street between the 5 % AEP and 2 % AEP flood level.

The proposed proprietary stormwater treatment device successfully demonstrates compliance with the relevant load-based reduction targets. The following 2 options have been provided below demonstrating compliance both at a staged approach and total site.

Option 1 - the staged ATLAN system requires

- Stage 1
  - 3 x Atlan Stormsack, and
  - 1 x Atlan Filter cartridge in a Atlan Precast Tank
- Stage 2-
  - 3 x Atlan Stormsack, and
  - 1 x Atlan Filter cartridge in a Atlan Precast Tank.

Option 2 - the total site ATLAN system requires:

- 3 x Atlan Stormsacks, and
- 3 x Atlan Filter cartridge in an Atlan Precast Tank

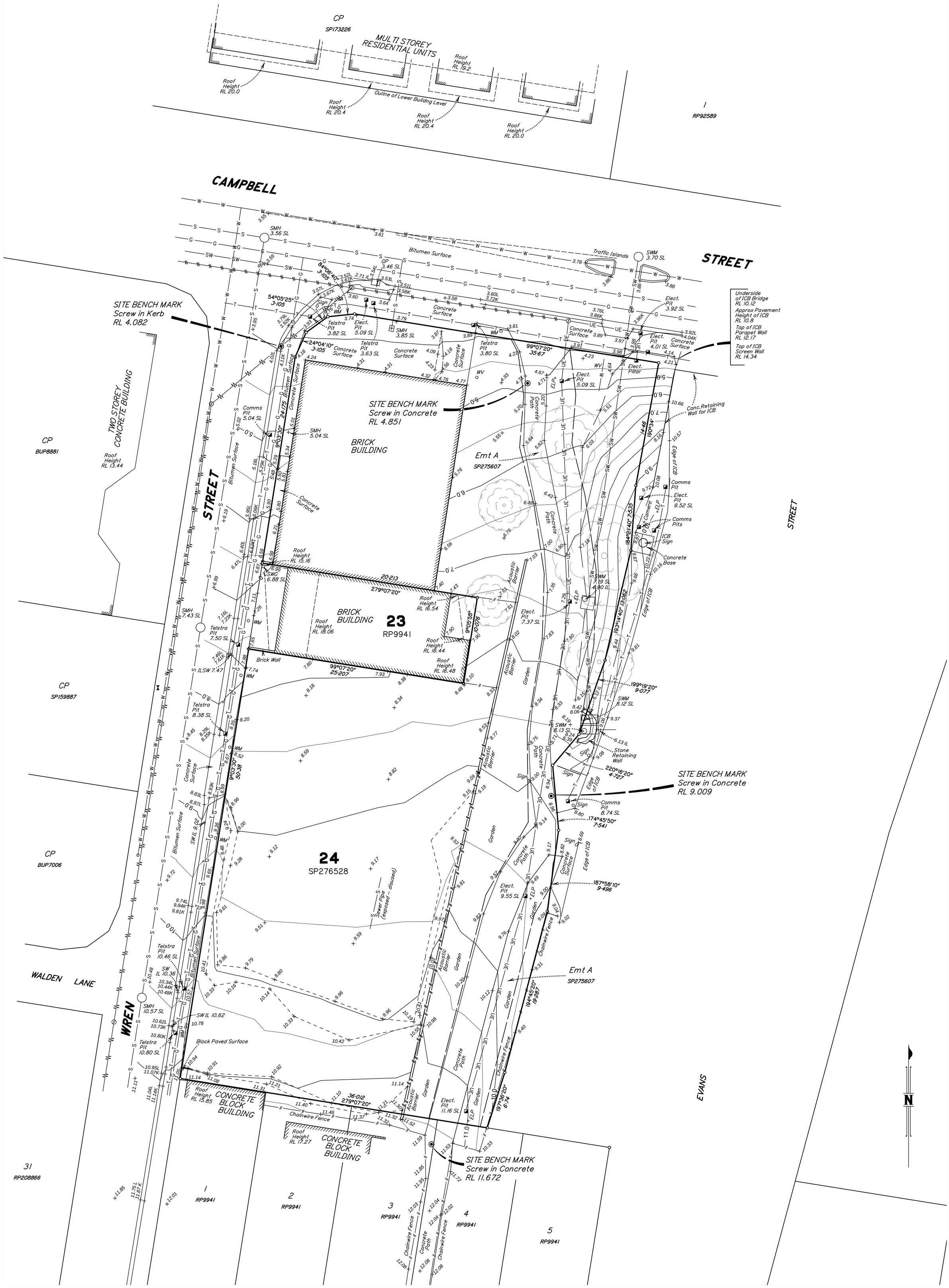
The systems are to be located somewhere suitable for discharge into the existing gully pit in Campbell Street.

Given there will little to no increase in peak flow rate or runoff volume as a result of the development, and the site is located in the lower one-third of the Brisbane River catchment, no on-site detention is required for the development.

The lawful point of discharge will be at the northern end of the site, discharging into the existing gully pit in Campbell Street.

APPENDIX A

SURVEY PLAN



LEGEND

S — S	Sewer Line
W — W	Water main
T — T	Telstra Cables
~ ~	Overhead Electricity
UE	U/ground Electricity
G — G	Gas Main
// — //	Fence Line
SW	Stormwater Line

K Back of Kerb
L Lip of Kerb
IL Invert Level
FH Fire Hydrant
SL Surface Level
⊘ Power Pole

DATUM FOR LEVELS – AHD
PM No 133806 – RL 13.558

Contour Interval – 0.5m

The boundary position and dimensions shown hereon have been compiled from SP276528 and have not been marked on site.

The underground services shown heron have been plotted from the records of the relevant authorities, and may not be accurate.

Scale 1:100 – Lengths are in Metres.

Client	WREN ST HEALTH INVESTMENTS PTY LTD
Project	WREN & CAMPBELL STREETS BOWEN HILLS

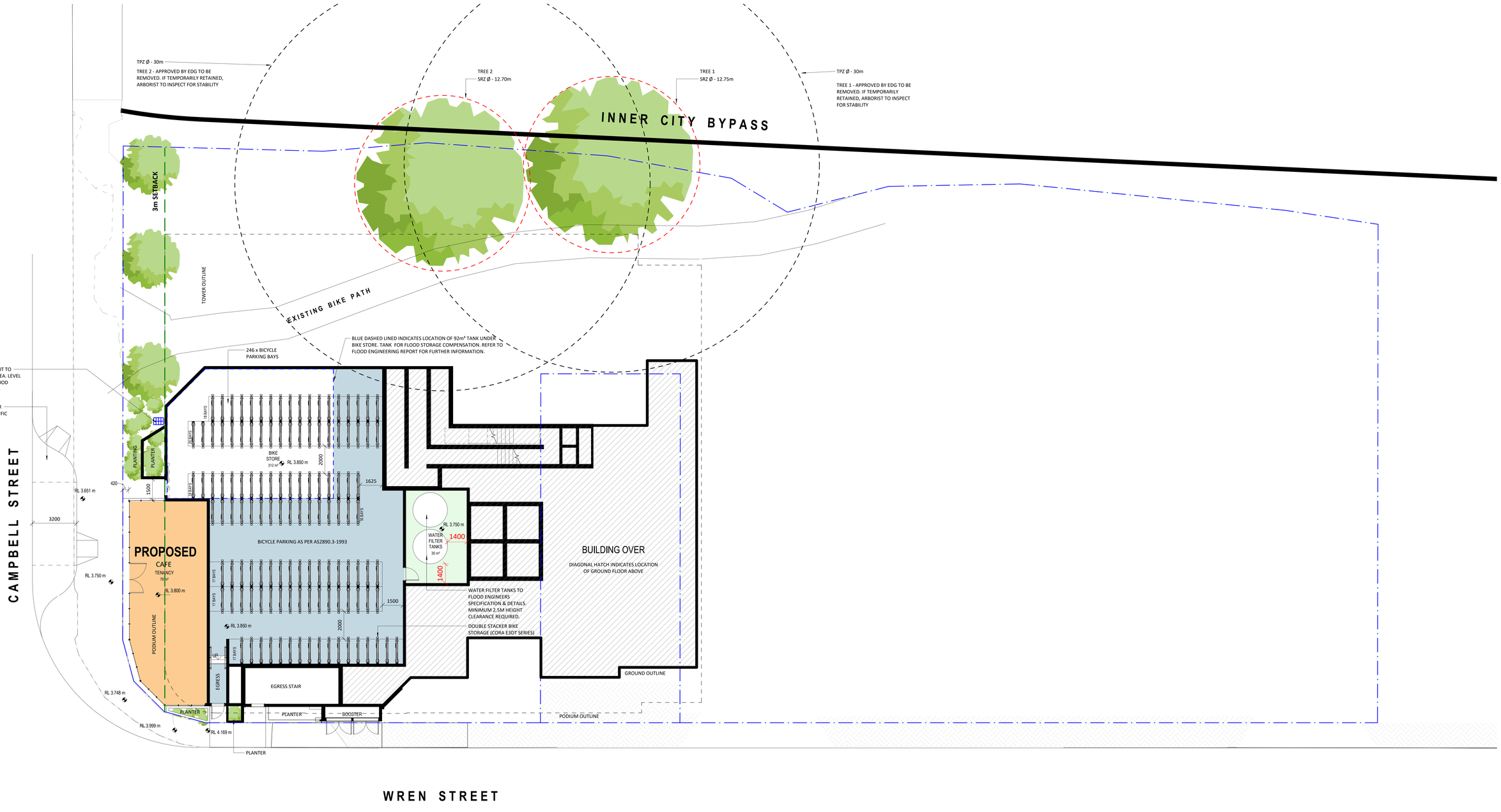
CONTOUR & DETAIL SURVEY
of Lot 24 on SP276528
Original Portion 107
Locality of Bowen Hills
Local Authority: Brisbane C. C.

MICHAEL JOLLY SURVEYS PTY LTD
ABN 81 054 790 144
ACN 054 790 144
Ph (07) 3368 1666
Fax (07) 3368 1499
Email michael@michaeljollysurveys.com.au
Office Address: 2/9 Camford Street, Milton
Postal Address: PO Box 1732, Milton BC, Q, 4064

F.W.	RH	Date	19/4/2018
Drawn	RH	Checked	
F.B.	17–004	Approved	Date
00201701.DWG			
SCALE	1:200 (A1 Size)		
PLAN REF.	002017.01		

APPENDIX B

ARCHITECTURAL PLANS



BASEMENT LEVEL

- OUTLINE OF GROUND ABOVE
- PROPOSED LIFT LOBBY
- PROPOSED TENANCY
- MED WASTE
- STORAGE
- CLEANERS

GROSS FLOOR AREA

TENANCY	88
TOTAL	88m²

EXISTING INDICATIVE STRUCTURAL ROOT ZONE (INNER RED DASH) AND TREE PROTECTION ZONE (OUTER BLACK DASH). REFER LANDSCAPE DRAWINGS

DEVELOPMENT APPLICATION

Wren Street Stage 2

7-15 Wren Street, Bowen Hills, QLD

AustralAsian Property Group Pte Ltd

Telephone +61 7 3840 9999
bne@thomsonadsett.com
Level 9, 470 St Pauls Terrace
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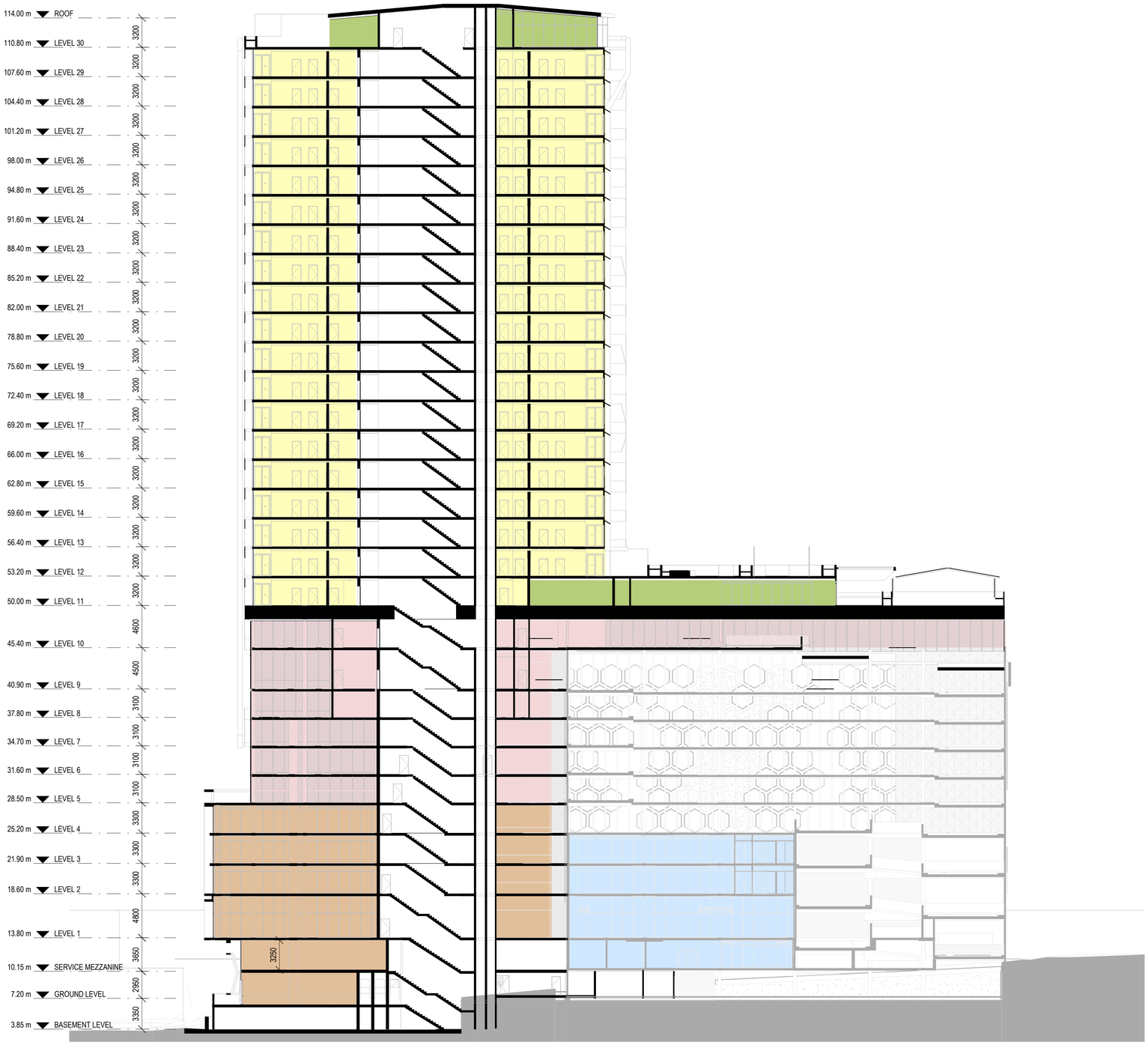
Qld 4006 Australia
thomsonadsett.com

thomson adsett

LOWER GROUND FLOOR PLAN

As indicated @ A0 | 11-09-2023

TA # 22.0169.17 | **DA02.01** | **rev. 6**



LEGEND

- RESIDENTIAL
- PARKING
- STAGE 1 MEDICAL SUITE
- SERVICES
- MEDICAL TENANCY
- TENANCY LOBBY

0 2 4 6 10 20 m

1 SECTION A
1 : 250

DEVELOPMENT APPLICATION

Wren Street Stage 2
7-15 Wren Street, Bowen Hills, QLD

AustralAsian Property Group Pte Ltd

Telephone +61 7 3840 9999
bne@thomsonadsett.com
Level 9, 470 St Pauls Terrace
Fortitude Valley
Qld 4006 Australia
thomsonadsett.com

thomson adsett

SECTIONS - SHEET 1

As indicated @ A1 01-09-2023

TA # 22.0169.17 **DA00.08** **rev. 5**

APPENDIX C

BCC FLOOD REPORT

FloodWise Property Report

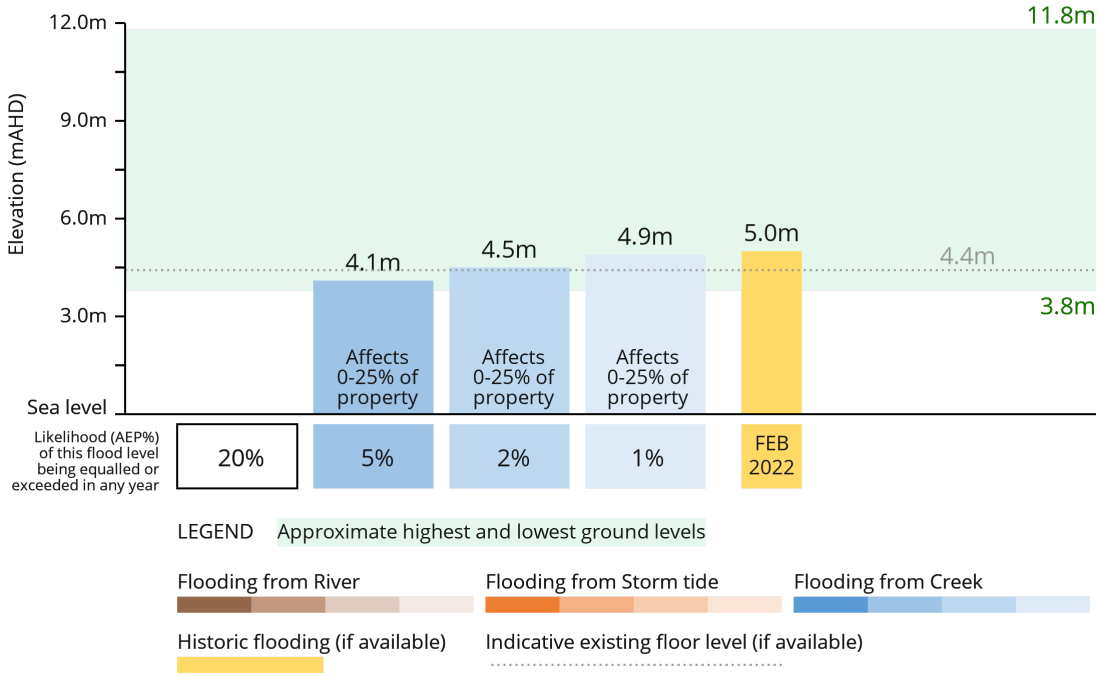
Lot 24 on SP276528

Dedicated to a better Brisbane

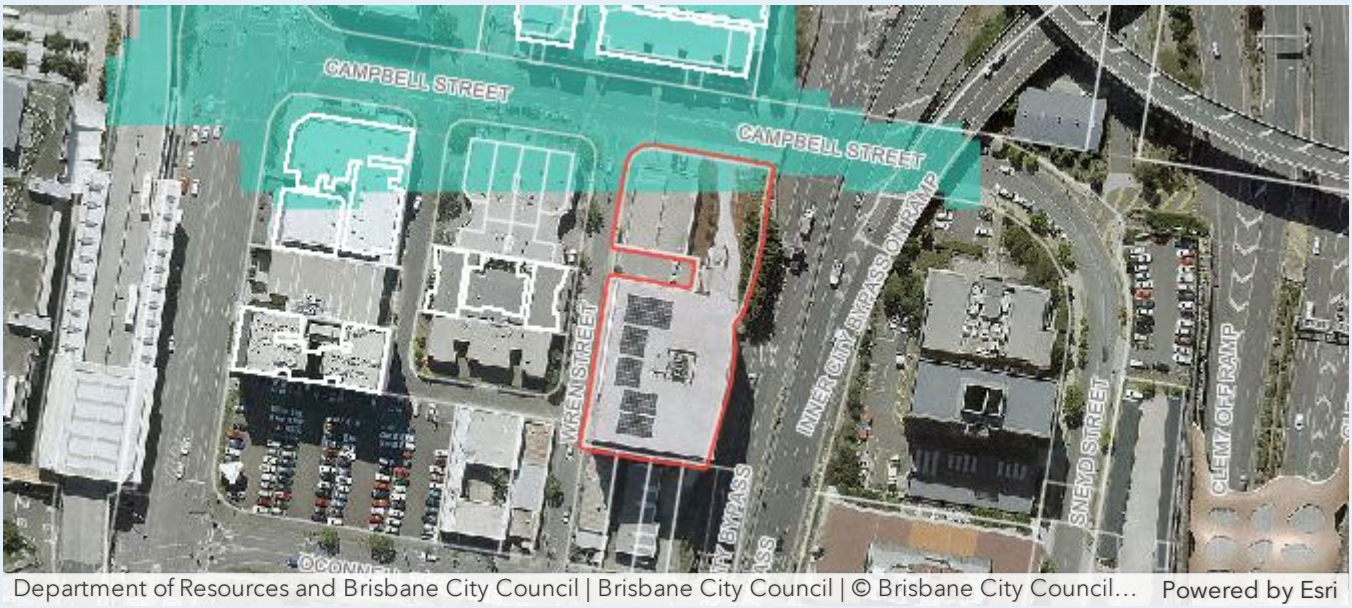
THE PURPOSE OF THIS REPORT IS FOR BUILDING AND DEVELOPMENT

Brisbane City Council's FloodWise Property Report **provides technical flood planning information** including estimated flood levels, habitable floor level requirements and more. **This report uses the adopted flood planning information in CityPlan**, that guides how land in Brisbane is used and developed for the future. Find out more about planning and building. To understand how to be **resilient and prepare for floods**, visit Council's Be Prepared webpage. Find more information about how to read a FloodWise Property Report.

Graph showing only the highest source/type of flooding for 1%, 2%, 5% and 20% likelihoods. Also shows historic flood levels. Other flood types and levels may be present and will be listed in the Flood Planning Information table below. This graph does not include overland flow flooding. If applicable, overland flow information is shown in the Planning and Development Information section below. **NOTE:** See Useful Definitions section to explain terminology.



Combined 1% AEP for river, creek and storm tide flood extent (if applicable). Aerial map shows river and creek flooding extent from the adopted CityPlan. Read more about CityPlan.



Are you resilient and ready for flood?

- Sign up to the Brisbane Severe Weather Alert at **brisbane.qld.gov.au/beprepared**
- Visit bom.gov.au for the latest weather updates.
- Have an evacuation plan, emergency kit and important phone numbers ready.
- Observe where water flows from and to during heavy rain.
- Consider how flood-resilient building techniques will have you home faster and with less damage.

Life threatening emergencies **000** Police/fire/ambulance (mobiles **000** and **112**)

State Emergency Service (SES) **132 500**
Energex **13 19 62**
Brisbane City Council **3403 8888**

Technical Summary

This section of the FloodWise Property Report contains more detailed flood information for this property so **surveyors, builders, certifiers, architects, and engineers can plan and build** in accordance with Council's planning scheme.

Find more information about planning and building in Brisbane or talk to a Development Services Planning Information Officer via Council's Contact Centre on (07) 3403 8888.

Property Information Summary

The following table provides a summary of flood information for this property. More detailed flood level information is provided in the following sections of this report.

Property Summary	Level (mAHD) / Comment	Data Quality Code
Minimum ground level	3.8	C
Maximum ground level	11.8	C
Indicative existing floor level	4.4	C
Source of highest flooding	Creek/Waterway	

Flood Planning Information

The table below displays the peak estimated flood levels by probability for this property. Estimated flood level data should be used in conjunction with applicable planning scheme requirements - Refer to Flood Planning and Development Information section below for further information.

Note this table does not include overland flow. If overland flow is applicable to this property, refer to the Flood Planning and Development section below for further information.

Likelihood / Description	Level (mAHD)	Source
20%	N/A*	
5%	4.1	Creek/Waterway (BREAKFAST CREEK)
2%	4.5	Creek/Waterway (BREAKFAST CREEK)
1%	2.8	River (Brisbane River)
1%	4.9	Creek/Waterway (BREAKFAST CREEK)
0.2%	4.1	River (Brisbane River)
0.2%	5.5	Creek/Waterway (BREAKFAST CREEK)
FEB2022	5.0	Brisbane River and Creek/Waterway
Residential Flood Level (RFL)	2.8	Brisbane River and Creek/Waterway
Minimum Habitable Floor Level (dwelling house)	N/A*	

* Council does not have this data available. Customers are recommended to engage a Registered Professional Engineer of QLD for further advice.

Flood Planning and Development Information

This section of the FloodWise Property Report contains information about Council's planning scheme overlays. Overlays identify areas within the planning scheme that reflect distinct themes that may include constrained land and/or areas sensitive to the effects of development.

Flood overlay code

The Flood overlay code of Council's planning scheme uses the following information to provide guidelines when developing properties. The table below summarises the flood planning areas (FPAs) that apply to this property. Development guidelines for the FPAs are explained in Council's planning scheme.

Flood planning areas (FPA)		
River	**Creek / waterway**	**Overland flow**
FPA5	FPA3	Not Applicable
	FPA4	
	FPA5	

To find more information about Council's flood planning areas (FPAs) for Brisbane River and Creek/waterway flooding to guide future building and development in flood prone areas, please review Council's Flood Planning Provisions.

Coastal hazard overlay code

The Coastal hazard overlay code of Council's planning scheme uses the following information to provide guidelines when conducting new developments. The table below summarises the coastal hazard categories that apply to this property. Development guidelines for the following Coastal hazard overlay sub-categories are explained in Council's planning scheme.

Coastal hazard overlay sub-categories
There are currently no Coastal hazard overlay sub-categories that apply to this property.

Note: Where land is identified within one for more flood planning areas on the Flood overlay or is identified within one of the Storm tide inundation area sub-categories on the Coastal hazard overlay, the assessment criteria that provides the highest level of protection from any source of flooding applies.

Property development flags
Large allotment - This property is either a Large Allotment of over 1000 square metres or is located within a Large Allotment. Flood levels may vary significantly across allotments of this size. Further investigations may be warranted in determining the variation in flood levels and the minimum habitable floor level across the site. For more information or advice, please consult a Registered Professional Engineer of Queensland (RPEQ).

Useful Flood Information Definitions

Australian Height Datum (AHD) - The reference level for defining ground levels in Australia. The level of 0.0m AHD is approximately mean sea level.

Annual Exceedance Probability (AEP) - The probability of a flood event of a given size occurring in any one year, usually expressed as a percentage annual chance.

- **0.2% AEP** - A flood event of this size is considered rare but may still occur. A flood of size or larger has a 1 in 500 chance or a 0.2% probability of occurring in any year.
- **1% AEP** - A flood of this size or larger has a 1 in 100 chance or a 1% probability of occurring in any year.
- **2% AEP** - A flood of this size or larger has a 1 in 50 chance or a 2% probability of occurring in any year.
- **5% AEP** - A flood of this size or larger has a 1 in 20 chance or a 5% probability of occurring in any year.
- **20% AEP** - A flood of this size or larger has a 1 in 5 chance or a 20% probability of occurring in any year.

Data quality

- **Data Quality Code A** - Level data based on recent surveyor report or approved as-constructed drawings.
- **Data Quality Code B** - Level data based on ground-based mobile survey or similar.
- **Data Quality Code C** - Level data derived from Airborne Laser Scanning or LiDAR information.

Defined Flood Level (DFL) - The DFL is used for commercial and industrial development. The Defined flood level (DFL) for Brisbane River flooding is a level of 3.7m AHD at the Brisbane City Gauge based on a flow of 6,800 m /s. DFL is only applicable for non-residential uses affected by Brisbane River flooding.

Flood planning area (FPA) - Council has developed five Flood planning areas (FPAs) as part of City Plan Flood overlay mapping for Brisbane River, Creek/waterway flooding and Overland flow to guide future building and development in flood prone areas. Storm tide flooding is mapped separately. The FPAs are designed to recognise the flood hazard for different flooding types. Flood hazard is a combination of frequency of flooding, the flood depth, and the speed at which the water is travelling. Find more information here.

Maximum and minimum ground level - Highest and lowest ground levels on the property based on available ground level information. A Registered Surveyor can confirm exact ground levels.

Minimum habitable floor level (dwelling house) - The minimum level in metres AHD at which habitable areas of development (generally including bedrooms, living rooms, kitchen, study, family, and rumpus rooms) must be constructed as required by the Brisbane City Plan.

Indicative existing floor level - The approximate level in metres AHD of the lowest habitable floor in the existing building. This data is sourced from a range of sources with varying accuracy levels.

Property - A property will contain 1 or more lots. The multiple lot warning is shown if you have selected a property that contains multiple lots.

Residential flood level (RFL) - This flood level for the Brisbane River equates to the 1% annual exceedance probability (AEP) flood level.

To learn more, visit Brisbane City Council's Flood Information Hub

Brisbane City Council's Online Flood Tools

Council provides several online flood tools:

- to guide planning and development
- to help residents and businesses understand their flood risk and prepare for flooding.

Council's online flood tools for planning and development purposes include:

- **FloodWise Property Report**
- **Flood Overlay Code**

For more information on Council's planning scheme and online flood tools for planning and development:

- phone (07) 3403 8888 and ask to talk to a Development Services Planning Information Officer

- visit brisbane.qld.gov.au/planning-building

Council's Planning Scheme - The City Plan (planning scheme) has been prepared in accordance with the Sustainable Planning Act as a framework for managing development in a way that advances the purpose of the Act. In seeking to achieve this purpose, the planning scheme sets out the Council's intention for future development in the planning scheme area, over the next 20 years.

Disclaimer

1. Defined flood levels and residential flood levels, minimum habitable floor levels and indicative existing floor levels are determined from the best available information to Council at the date of issue. These levels, for a particular property, may change if more detailed information becomes available or changes are made in the method of calculating levels.
2. Council makes no warranty or representation regarding the accuracy or completeness of a FloodWise Property Report. Council disclaims any responsibility or liability in relation to the use or reliance by any person on a FloodWise Property Report.

Planning to build or renovate?

For information, guidelines, tools and resources to help you track, plan or apply for your development visit brisbane.qld.gov.au/planning-building

You can also find the Brisbane City Plan 2014 and Neighbourhood Plans as well as other information and training videos to help, with your building and development plans.

FloodWise Property Report

15 WREN ST, BOWEN HILLS 4006
Lot 23 on RP9941

Dedicated to a better Brisbane

THE PURPOSE OF THIS REPORT IS FOR BUILDING AND DEVELOPMENT

Brisbane City Council's FloodWise Property Report **provides technical flood planning information** including estimated flood levels, habitable floor level requirements and more. **This report uses the adopted flood planning information in CityPlan**, that guides how land in Brisbane is used and developed for the future. Find out more about planning and building. To understand how to be **resilient and prepare for floods**, visit Council's Be Prepared webpage. Find more information about how to read a FloodWise Property Report.

This property has no flood levels

Brisbane City Council has not assigned flood level information for this property however it may be affected by one or more flood or property development flags. Please refer to the Flood Planning and Development Information below for details. The property may have 0.2% AEP flood level which will appear on the Flood Planning Information table if applicable. For professional advice or detailed assessment of a property contact a Registered Professional Engineer of Queensland.

Find Be Prepared information on your flood risk and how to prepare your home or business for potential flooding.

Combined 1% AEP for river, creek and storm tide flood extent (if applicable). Aerial map shows river and creek flooding extent from the adopted CityPlan. Read more about CityPlan.

Are you resilient and ready for flood?

- Sign up to the Brisbane Severe Weather Alert at **brisbane.qld.gov.au/beprepared**
- Visit bom.gov.au for the latest weather updates.
- Have an evacuation plan, emergency kit and important phone numbers ready.
- Observe where water flows from and to during heavy rain.
- Consider how flood-resilient building techniques will have you home faster and with less damage.

Life threatening emergencies **000** Police/fire/ambulance (mobiles **000** and **112**)	State Emergency Service (SES) **132 500** Energex **13 19 62** Brisbane City Council **3403 8888**

Technical Summary

This section of the FloodWise Property Report contains more detailed flood information for this property so **surveyors, builders, certifiers, architects, and engineers can plan and build** in accordance with Council's planning scheme.

Find more information about planning and building in Brisbane or talk to a Development Services Planning Information Officer via Council's Contact Centre on (07) 3403 8888.

Flood Planning and Development Information

This section of the FloodWise Property Report contains information about Council's planning scheme overlays. Overlays identify areas within the planning scheme that reflect distinct themes that may include constrained land and/or areas sensitive to the effects of development.

Flood overlay code

The Flood overlay code of Council's planning scheme uses the following information to provide guidelines when developing properties. The table below summarises the flood planning areas (FPAs) that apply to this property. Development guidelines for the FPAs are explained in Council's planning scheme.

Flood planning areas (FPA)		
River	Creek / waterway	Overland flow
		Not Applicable

To find more information about Council's flood planning areas (FPAs) for Brisbane River and Creek/waterway flooding to guide future building and development in flood prone areas, please review Council's Flood Planning Provisions.

Coastal hazard overlay code

The Coastal hazard overlay code of Council's planning scheme uses the following information to provide guidelines when conducting new developments. The table below summarises the coastal hazard categories that apply to this property. Development guidelines for the following Coastal hazard overlay sub-categories are explained in Council's planning scheme.

Coastal hazard overlay sub-categories
There are currently no Coastal hazard overlay sub-categories that apply to this property.

Note: Where land is identified within one for more flood planning areas on the Flood overlay or is identified within one of the Storm tide inundation area sub-categories on the Coastal hazard overlay, the assessment criteria that provides the highest level of protection from any source of flooding applies.

Useful Flood Information Definitions

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Maximum and minimum ground level - Highest and lowest ground levels on the property based on available ground level information. A Registered Surveyor can confirm exact ground levels.

Minimum habitable floor level (dwelling house) - The minimum level in metres AHD at which habitable areas of development (generally including bedrooms, living rooms, kitchen, study, family, and rumpus rooms) must be constructed as required by the Brisbane City Plan.

Indicative existing floor level - The approximate level in metres AHD of the lowest habitable floor in the existing building. This data is sourced from a range of sources with varying accuracy levels.

Property - A property will contain 1 or more lots. The multiple lot warning is shown if you have selected a property that contains multiple lots.

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APPENDIX D

FLOOD STORAGE PLAN

FLOOD STORAGE VOLUME	
PRE DEVELOPMENT 1% AEP FLOOD STORAGE TO RL 4.9 m AHD	133.015 m^3

LEGEND

SITE BOUNDARY

FLOOD AFFECTED AREA

A	ORIGINAL ISSUE	SC	03.04.23
REVISION	DESCRIPTION	APPROVED BY	DATE

TOPO.

SCALE 1:500

NORTH

A3

ISSUED FOR USE

CLIENT: -

DRAWN: AWE | DESIGNED: SC | DATE: 03.04.23

RPEQ / SIGNATURE (IF REQUIRED)

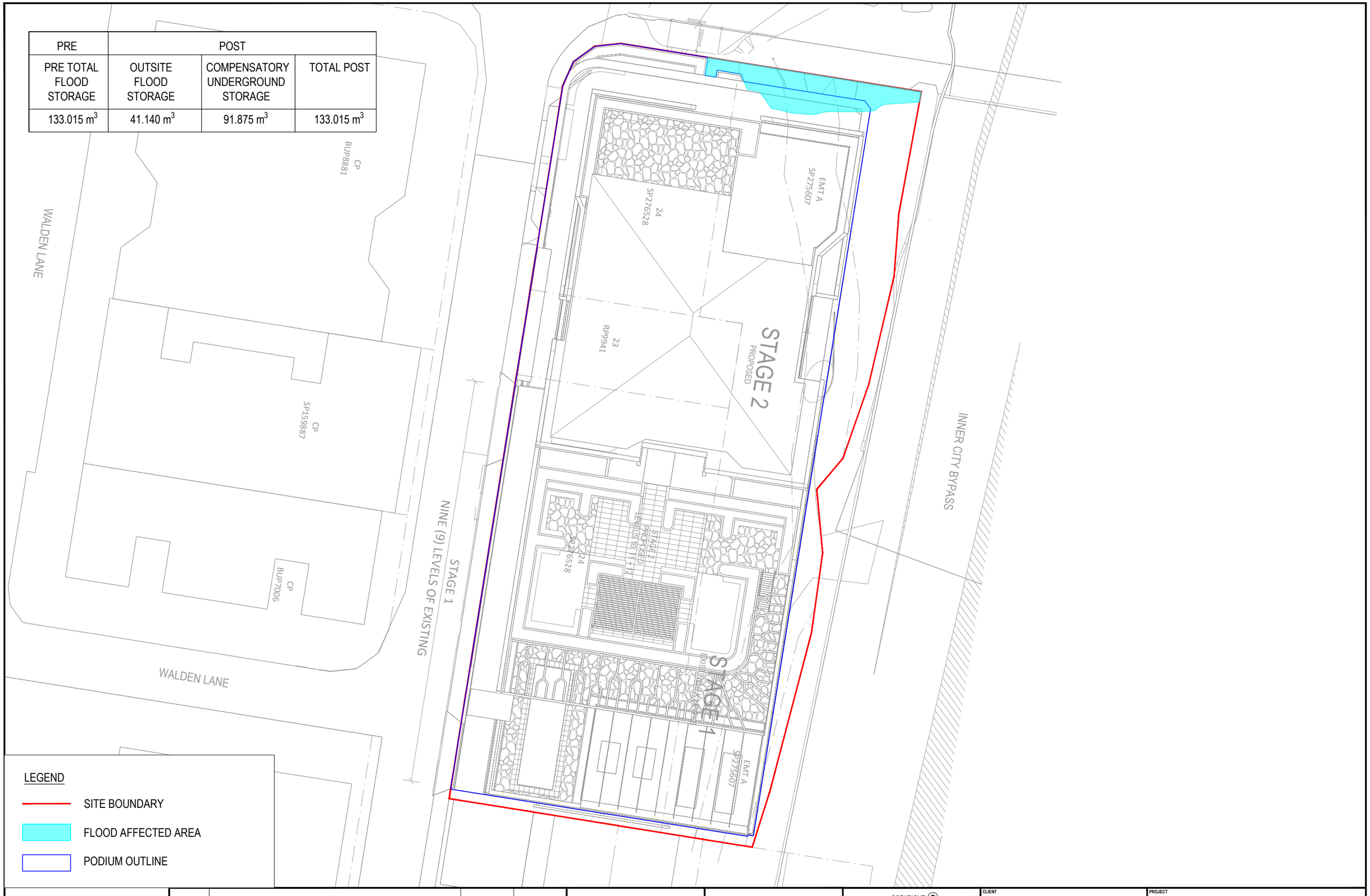
RPEQ NO.15,545

PROJECT: -

DRAWING TITLE: FLOOD STORAGE PLAN PRE-DEVELOPMENT

PROJECT No: - | DRAWING No: | REVISION: A

PRE	POST		
PRE TOTAL FLOOD STORAGE	OUTSITE FLOOD STORAGE	COMPENSATORY UNDERGROUND STORAGE	TOTAL POST
133.015 m^3	41.140 m^3	91.875 m^3	133.015 m^3



REVISION	DESCRIPTION	APPROVED BY	DATE
A	ORIGINAL ISSUE	SC	03.04.23

SCALE 1:500

NORTH

A3

ISSUED FOR USE

CLIENT: -

DRAWN: AWE | DESIGNED: SC | DATE: 03.04.23

RPEQ / SIGNATURE (IF REQUIRED)

RPEQ NO.15,545

PROJECT: -

DRAWING TITLE: FLOOD STORAGE PLAN POST-DEVELOPMENT

PROJECT No: - | DRAWING No: | REVISION: A

APPENDIX E

FLOOD CODE

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	RESPONSE
Section A—If for accepted development subject to compliance with identified requirements (acceptable outcomes only) or assessable development for a dwelling house including any secondary dwelling		
Note—Development for a dwelling house does not require assessment against any other sections of this code.		
PO1 Development involving any habitable or non-habitable part of a dwelling house, including any secondary dwelling, is located and designed to: a. minimise the risk to people from flood hazard; b. achieve acceptable flood immunity; c. minimise property impacts from a flood event up to and including the defined flood event; d. minimise disruption to residents, recovery time and rebuilding or restoration costs after a flood event up to and including the defined flood event.	AO1.1 Development for a dwelling house including any secondary dwelling: a. is not located in the Brisbane River flood planning area 1, 2a or 2b sub-categories or the Creek/waterway flood planning area 1 or 2 sub-categories; or b. is only located in these sub-categories, if a Registered Professional Engineer Queensland certifies that the dwelling house and any secondary dwelling are structurally designed to be able to resist hydrostatic and hydrodynamic loads associated with flooding up to and including the defined flood event. AO1.2 Development for a dwelling house and any secondary dwelling complies with the minimum flood planning levels in Table 8.2.11.3.B. Note—If located in an area that has no flood level information available from the Council such as an overland flow path, a Registered Professional Engineer of Queensland with expertise in undertaking flood studies is to certify that the flood level and development levels for the dwelling house and any secondary dwelling achieve the required flood planning levels in Table 8.2.11.3.B. AO1.3	Not applicable.

	Development involving a building undercroft complies with the minimum clearance requirements in Table 8.2.11.3.E. Editor's note—For creek/waterway, storm-tide and river flooding, applicable flood planning information is available from Council's FloodWise Property Report. Note—The Flood planning scheme policy provides guidance on undercroft design.	
PO2 Development within the Creek/waterway flood planning area sub-categories or Overland flow flood planning area sub-category: a. maintains the conveyance of flood waters to allow flow and debris to pass predominantly unimpeded through the site; b. does not concentrate, intensify or divert floodwater onto upstream, downstream or adjacent properties; c. c. will not result in a material increase in flood levels or flood hazard on upstream, downstream or adjacent properties.	AO2 Development: a. is not located within the Creek/waterway flood planning area 1, 2 or 3 sub-categories or the Overland flow flood planning area sub-category; or b. provides an open undercroft area from natural ground level to habitable floor level for any area inundated by the defined flood event; or Note—This undercroft area is not suitable for providing non-habitable rooms, secure storage of valuables, or future enclosing for storage or car parking. The clear area may include structural elements such as columns and floor substructure. The Flood planning scheme policy provides guidance on undercroft design. Editor's note—An open undercroft design may be achieved through a 'valance' treatment around the perimeter of an otherwise internally clear undercroft. Editor's note—For Creek/waterway, storm-tide and river flooding, applicable flood planning information is available from Council's FloodWise Property Report. c. a report from a Registered Professional Engineer Queensland certifies that the development in the Creek/waterway flood planning area or Overland flow flood planning area sub-categories will not result in a	Not applicable.

	material increase in flood level or flood hazard on upstream, downstream or adjacent properties. Note—Flood studies demonstrate that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy.	

Section B—If accepted development subject to compliance with identified requirements (acceptable outcomes only) or assessable development other than for a dwelling house or reconfiguring a lot

Note—If development that is accepted development subject to compliance with identified requirements complies with the acceptable outcomes of this part, no further assessment against this code is required.

PO3 Development: a. is compatible with flood hazard in a defined flood event; b. minimises the risk to people from flood hazard; c. does not reduce the ability of evacuation resources including emergency services to access and evacuate the site in a flood emergency, with consideration to the scale of the development; d. minimises impacts on property from flooding; e. minimises disruption to residents, business or site operations and recovery time due to flooding; f. minimises the need to rebuild structures after a flood event greater than the defined flood event. Note—Where Table 8.2.11.3.C identifies that a flood risk assessment is required, compliance with this performance outcome can be achieved by submitting a flood risk assessment, which may be included within a flood study, addressing the criteria within this performance solution. Preparing flood risk assessments and flood studies is required to be in accordance with the Flood planning scheme policy. Note—An emergency management plan prepared in accordance with the Flood planning scheme policy, which sets	AO3 Development for a material change of use is identified in Table 8.2.11.3.C as compatible with the flood hazard in the relevant flood planning area.	Not applicable.

out procedures for evacuation due to flooding may be used to demonstrate compliance with this performance outcome.		
PO4 Development for a park ensures that the design of a park and location of structures and facilities responds to the flood hazard and balances the safety of intended users with: a. maintaining continuity of operations; b. impacts of flooding on asset life and ongoing maintenance costs; c. efficient recovery after flood events; d. recreational benefits to the city; e. e. availability of suitable land within the park.	AO4.1 Development involving a building or structure in a park complies with the flood planning levels specified in Table 8.2.11.3.D. AO4.2 Development involving a building or structure in a park where Table 8.2.11.3.D does not apply: a. is not located within the 20% AEP flood extent of any creek/waterway or overland flow path; or b. is located above the 20% AEP flood level of any creek/waterway or overland flow path.	Not applicable.
Section C—If for assessable development other than for a dwelling house		
PO5 Development is located and designed to: a. minimise the risk to people from flood hazard on the site; b. minimise flood damage to the development and contents of buildings up to the defined flood event; c. provide suitable amenity; a. d. minimise disruption to residents, recovery time and the need to rebuild structures after a flood event up to and including the defined flood event.	AO5.1 Development complies with the flood planning levels specified in Table 8.2.11.3.D. Note—If located in an area with no Council-derived flood levels such as an overland flow path, a Registered Professional Engineer Queensland with expertise in undertaking flood studies is to derive the applicable flood level and certify that the development meets the required flood planning levels in Table 8.2.11.3.D. The study is to demonstrate that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy. AO5.2 Development is:	The site is inundated by flood waters. The overarching inundation source is Creek/Waterway and refers to 1% AEP of 4.9m AHD. The BCC property report suggests that the site is also inundated by Brisbane River at 1% AEP being 2.8m AHD, however the lowest level on the site is 3.74m AHD and therefore has no affect. The site is not influenced by overland flow and this category is not applicable. The proposed habitable floor levels have been set in accordance with Category A flood planning levels (Creek/Waterway source) being 1% + 0.5m = 4.9m + 0.5m = 5.4m ANHD or above. A flood storage calculation and compensatory flood storage has been carried out for the site.

	a. not located in the: i. Brisbane River flood planning area 1, 2a, or 2b sub-categories; ii. Creek/waterway flood planning area 1 or 2 sub-categories; iii. Overland flow flood planning area sub-category; or b. only located in these sub-categories if a Registered Professional Engineer Queensland with expertise in undertaking flood studies certifies that: i. the development design, siting and any mitigation measures will ensure the development is structurally adequate to resist hydrostatic, hydrodynamic and debris impact loads associated with flooding up to the defined flood event; and ii. the risk to people is managed to an acceptable level.	The proposed commercial tenancy on the lower ground floor level has been set below flood level at 3.85 m AHD, refer to Topo Report *Stormwater Management Plan* dated September 2023 for further information regarding the specific management during times of flood via a proposed Flood Emergency Management Plan. Please also refer to Item P06 for further information..
PO6 Development involving essential electrical services or a basement storage area is suitably located and designed to ensure public safety and minimise flood recovery and economic consequences of damage during a flood.	AO6.1 Development ensures that: a. all areas containing essential electrical services comply with the flood planning levels in Table 8.2.11.3.D; or b. if a basement contains essential electrical services or a private basement storage area, the basement is a waterproof structure with walls and floors impermeable to the passage of water with all entry points and services located at or above the relevant flood planning level in Table 8.2.11.3.D. Note—A basement storage area does not include a bike storage room, change room, building maintenance storage and non-critical electrical services. AO6.2 Development involving a basement that relies on a pumping solution to manage floodwater ingress or for dewatering after a flood provides a secondary pump system with a backup power source for the pump.	The proposed commercial tenancy proposed on the lower ground floor level has been set below flood level at 3.85 m AHD. Due to this disparity with Councils Flood Code a Flood Emergency Management Plan (FEMP) will be undertaken for the proposed development during the detailed design phase that will include the following general requirements: • The building manager will oversee procedures/operations in the event of a flood reaching the site. • The proposed commercial tenancy will be closed before the flood commences, so will not increase the population at risk. • All items that can be moved above the 1 % flood level of 4.9 m AHD will be done so before the flood occurs to reduce damage to property. • For all items that cannot be moved above this flood level as well as all materials between the proposed floor level of 3.85 m AHD and the 1% flood level of 4.9 m AHD will be constructed from materials that can withstand frequent wetting and drying.

		More detail will be provided in the final FEMP. The proposed development will provide adequate immunity to all electrical services. Refer to Topo Report *Stormwater Management Plan* dated September 2023.
PO7 Development does not directly or indirectly create a material adverse impact on flood behaviour or drainage on properties that are upstream, downstream or adjacent to the development.	AO7.1 Development: a. does not block, or divert floodwaters for any area affected by creek/waterway or overland flow flooding, excluding storm-tide flooding and Brisbane River flooding sources; or b. does not result in a material increase in flood level or hydraulic hazard on upstream, downstream or adjacent properties. Note—Compliance with this acceptable solution can be demonstrated by the submission of a flood study by a Registered Professional Engineer of Queensland with expertise in undertaking flood studies demonstrating that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy. AO7.2 Development retains existing overland flow paths and does not rely wholly on piped solutions to manage major flows. AO7.3 Development which creates a new overland flow path or significantly modifies an existing overland flow path via earthworks does not materially worsen hydraulic hazard on the site from existing conditions Note—Compliance with this acceptable solution can be demonstrated by the submission of a flood study by a Registered Professional Engineer of Queensland with expertise	Due to the nature of the backwater affect of the creek waterway type of flood inundation, a flood storage compensatory investigation has been carried out and adequate flood storage has been provided within the development. Refer to Topo Report *Stormwater Management Plan* dated September 2023. The site is not influenced by overland flow and this category is not applicable.

	in undertaking flood studies demonstrating that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy.	
PO8 Development for filling or excavation in an area affected by creek/waterway flooding does not directly, indirectly or cumulatively cause any material increase in flooding or hydraulic hazard or involve significant redistribution of flood storage from high to lower areas in the floodplain. Note—This can be demonstrated by undertaking earthworks in compliance with the Compensatory earthworks planning scheme policy. Note—This part of the code applies to all development other than a dwelling house and any secondary dwelling which involves filling or excavation, whether or not the development application comprises a separate development application for operational work involving filling or excavation.	AO8 Development ensures that no filling or excavation greater than 100mm is located in the Creek/waterway flood planning area 1, 2 or 3 sub-categories if contained in the 5% AEP flood extent of any Creek/waterway flood planning area sub-category for which no waterway corridor has been mapped in the Waterway corridors overlay.	Due to the nature of the backwater affect of the Creek/Waterway type of flood inundation, a flood storage compensatory investigation has been carried out and adequate flood storage has been provided within the development. Refer to Topo Report *Stormwater Management Plan* dated September 2023.
PO9 Development ensures that the building and site design: a. maintains the conveyance capacity of existing overland flow paths and creek/waterways; b. ensures floodwaters and flood debris can pass predominantly unimpeded under a structure or building to minimise property or building damage, including for a flood larger than the defined flood event; c. mitigates flood impacts by ensuring that filling, excavation and location of services are designed to allow for the conveyance of floodwater across the site. Note—The Flood planning scheme policy provides guidance on relevant considerations in determining minimum undercroft clearances and treatment of ground level in undercroft areas	AO9.1 Development involving a building undercroft in the Creek/waterway flood planning area sub-categories or the Overland flow flood planning area sub-category: a. complies with the minimum building undercroft clearance requirements in Table 8.2.11.3.E; b. not located directly above any part of a waterway corridor as mapped in the Waterway corridors overlay. AO9.2 Development involving a building undercroft in the Creek/waterway flood planning area sub-categories or the Overland flow flood planning area sub category:	The site is not within a flood conveyance area or existing overland flow path, therefore no modelling has been conducted and only a flood storage calculation and compensatory flood storage has been provided. The proposed development will not adversely impact the existing conveyance of flood waters. Refer to Topo Report *Stormwater Management Plan* dated September 2023. There is no undercroft areas within the proposed development.

where floodwater conveyance is required underneath development.	a. has a ground level within the undercroft area that is free draining; b. does not involve excavation below ground level of more than 300mm within the undercroft area.	
PO10 Development for vulnerable uses, difficult to evacuate uses or assembly uses optimises vehicular access and efficient evacuation from the development to parts of the road network unaffected by flood hazard, in order to: a. protect safety of users and emergency services personnel; b. support efficient emergency services access and site evacuation with consideration to the scale of development. Note—A flood risk assessment may be required to address the performance outcomes or acceptable solutions which deal with evacuation and isolation arrangements, and the ability to take refuge. The Flood planning scheme policy provides information for undertaking flood risk assessments.	AO10 Development for vulnerable uses, difficult to evacuate uses or assembly uses: a. is not isolated in any event up to the relevant flood planning level specified in Table 8.2.11.3.L; or b. has direct vehicle access to a critical route or interim critical route in the Critical infrastructure and movement network overlay for evacuation in a flood; or c. can achieve vehicular evacuation to a suitable flood-free location. Note—A suitable flood-free location is of a size and nature sufficient to provide for the size and characteristics of the population likely to need evacuation to that area.	The proposed development provides safe access and egress for the site and provides a safe route to flood free areas outside the site to the south. Refer to Topo Report *Stormwater Management Plan* dated September 2023.
PO11 Development has access which, having regard to hydraulic hazard, provides for safe vehicular and pedestrian movement and emergency services access to adjoining roads.	AO11.1 Development provides an access or driveway into the site which is: a. trafficable during the defined flood event; b. not located in the Creek/waterway flood planning area 1 sub-category; c. not located in the Overland flow flood planning area sub-category if the hydraulic hazard is unsafe in the defined flood event; d. the access or driveway is not inundated by a 10% AEP flood. AO11.2	The proposed development provides safe access and egress for the site and provides a safe route to flood free areas outside the site to the south. Refer to Topo Report *Stormwater Management Plan* dated September 2023.

	Development located in the Creek/waterway flood planning area 1, 2, 3 or 4 sub-categories locates any disabled access in the highest part of the site. Note—explanation of hydraulic hazard provided in the Flood planning scheme policy.	
PO12 Development involving a new road, a bridge or culvert is designed to minimise impacts to flood behaviour, minimise disruption to traffic during a flood and allow for emergency access.	AO12 Development involving a new road complies with the flood planning levels in Table 8.2.11.3.F.	Not applicable.
PO13 Development for pedestrian and cyclist paths: a. provides a suitable level of trafficability; b. manages the impacts of flooding on asset life and ongoing maintenance costs; c. balances route availability with recreational and transport connectivity benefits to the city.	AO13.1 Development for cyclist and pedestrian facilities other than on public roads, including those traversing through a park and adjacent to a watercourse and overland flow path, are located above the 39% AEP (2 year ARI) flood immunity from all flooding sources. Note—If the site is subject to more than one type of flooding, the requirement that affords the greatest level of protection will apply. AO13.2 All new on-road cyclist and pedestrian facilities comply with the flood planning levels and trafficability standards for the applicable category of road in Table 8.2.11.3.F or Table 8.2.11.3.K.	Not applicable.
PO14 Development which increases the residential population within the Brisbane River flood planning area sub-categories minimises the risk to people in all flood events with consideration to flood hazard, including warning time.	AO14 Development in the Brisbane River flood planning area sub-categories in areas where the residential flood level is greater than 12.8m AHD involving: a. an increase in the number of residential dwellings; or	The residential flood level for the site (as per BCC Flood property report) is 2.8m AHD, therefore this is not applicable.

	b. additional residential lots is not subject to an unsafe hydraulic hazard in the 0.2% AEP flood event. Note—Explanation of a hydraulic hazard is provided in the Flood planning scheme policy.	
Additional performance outcomes and acceptable outcomes for essential community infrastructure		
PO15 Development involving essential community infrastructure: a. remains functional to serve community need during and immediately after a flood event, or is part of a network that is able to maintain the function of the essential community infrastructure when parts of the development are unable to function during or after a flood; b. is designed, sited and operated to avoid adverse impacts on the community or the environment due to the impacts of flooding on infrastructure, facilities or access and egress routes; c. is able to remain functional or is part of a network which is able to remain functional even when other infrastructure or services (such as electricity supply) may be compromised in a flood event; d. contains mitigation measures which are not entirely dependent on human activation to respond to a flood event. Note—Protection of function is required up to and including the flood event in Table 8.2.11.3.G.	AO15 Development involving essential community infrastructure: a. is ancillary to and not relied upon for the provision of the essential service during a flood; or b. is located above the flood planning levels in Table 8.2.11.3.G; c. has access to or provides the necessary back-up emergency electricity and communications supply in times of flood; d. is designed and constructed to resist hydrostatic and hydrodynamic forces as a result of inundation by the flood event listed for the development type in Table 8.2.11.3.G; e. that services a local area: i. is able to be accessed in times of flood to service local community needs up to the event listed for that development type in Table 8.2.11.3.G; or ii. has a service continuity plan that demonstrates the continued provision of service during the relevant flood event.	Not applicable.
Additional performance outcomes and acceptable outcomes for reconfiguring a lot		
PO17	AO17.1	

Development locates and designs all lots resulting from reconfiguring a lot to: a. minimise the risk to people from flood hazard; b. minimise damage to property from flood hazard; c. facilitate safe and efficient evacuation. Note— • Consideration of all floods up to the probable maximum flood is relevant to minimising the risk to people. • Flood warning time is not considered sufficient in the Creek/waterway planning area sub-categories or the Overland flow flood planning area sub-category. • Filling above the flood planning level for a flood event greater than the defined flood event cannot be assumed to mitigate the flood hazard.	Development creating new lots is identified in Table 8.2.11.3.I as suitable within the relevant flood planning area. AO17.2 Development provides for reconfiguring a lot design that achieves a road and lot layout which: a. provides trafficable vehicular egress for evacuation during a defined flood event; b. optimises hazard-free movement away from sources of flood hazard within the development. Note—Further advice on road and lot layout is contained in the Flood planning scheme policy. AO17.3 Development which creates a new residential lot in an area subject to Brisbane River flooding, if the residential flood level is greater than 12.8m AHD is not subject to a hydraulic hazard greater than 0.6m2/s DV or 0.6m deep in a 0.2% AEP flood. Note—Refer to the Flood planning scheme policy for further explanation on the 0.2% AEP flood.	Not applicable.
PO18 Development involving reconfiguring a lot: a. minimises the risk to people from flood hazard; b. creates safe evacuation routes or avoids isolation of the development during a flood greater than the defined flood event; c. minimises damage to property and services; d. provides lots and roads that are not frequently flooded or subject to nuisance ponding or seepage; e. ensures lots created for park or private open space minimise the risk to people from flood hazard and are fit for purpose;	AO18.1 Development involving reconfiguring a lot ensures: a. all lots comply with the flood planning levels in Table 8.2.11.3.J; b. a new road complies with the flood planning levels in Table 8.2.11.3.F. AO18.2 Development involving reconfiguring a lot creating more than 6 residential lots or a lot for industry ensures the flood planning levels of a dedicated road fronting the development or providing primary access within 200m of the development:	Not applicable.

f.	provides a lot that is not substantially burdened by flood mitigation infrastructure.	a. complies with Table 8.2.11.3.K; or b. has acceptable trafficability in accordance with the requirements in the Flood planning scheme policy and the Queensland Urban Drainage Manual. Note—The Flood planning scheme policy contains supporting information about trafficability on existing roads and serviceability during floods. AO18.3 Development protects the conveyance of flood hazard area by providing an easement over the: a. 2% AEP flood extent for overland flow flooding; b. 1% AEP flood extent for creek/waterway flooding.

APPENDIX F

STORMWATER CODE

PERFORMANCE CRITERIA	ACCEPTABLE OUTCOMES	RESPONSE
Section A—If for a material change of use, reconfiguring a lot, operational work or building work		
Note—Compliance with the performance outcomes and acceptable outcomes in this section should be demonstrated by the submission of a site-based stormwater management plan for high risk development only.		
PO1 Development provides a stormwater management system which achieves the integrated management of stormwater to: (a) minimise flooding; (b) protect environmental values of receiving waters; (c) maximise the use of water sensitive urban design; (d) minimise safety risk to all persons; (e) maximise the use of natural waterway corridors and natural channel design principles. Editor's note—The stormwater management system to be developed to address PO1 is not intended to require management of stormwater quality.	**AO1** Development provides a stormwater management system designed in compliance with the Infrastructure design planning scheme policy.	A Stormwater Management Plan for the site has been carried out for the site achieving water quality and quantity objectives. A response to Councils Flood Code has also been prepared addressing flood storage. Refer to Topo Report *Stormwater Management Plan* dated September 2023.
PO2 Development ensures that the stormwater management system and site work does not adversely impact flooding or drainage characteristics of premises which are up slope, down slope or adjacent to the site.	**AO2**.1 Development does not result in an increase in flood level or flood hazard on up slope, down slope or adjacent premises. **AO2.2** Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.	Stormwater Management Plan for the site has been carried out for the site addressing no adverse impacts offsite. Refer to Topo Report *Stormwater Management Plan* dated September 2023.
PO3 Development ensures that the stormwater management system does not direct stormwater run-off through existing or	**AO3.1** Development ensures that the location of the stormwater drainage system is contained within a road reserve, drainage reserve, public pathway, park or waterway corridor.	Stormwater Management Plan for the site has been carried out for the site that maintains the existing Lawful Point of Discharge,

proposed lots and property where it is likely to adversely affect the safety of, or cause nuisance to properties.	**AO3.2** Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy. **AO3.3** Development obtains a lawful point of discharge in compliance with the standards in the Infrastructure design planning scheme policy. **AO3.4** Where on private land, all underground stormwater infrastructure is secured by a drainage easement.	being an underground gully pit. Refer to Topo Report *Stormwater Management Plan* dated September 2023.
PO4 Development provides a stormwater management system which has sufficient capacity to safely convey run-off taking into account increased run-off from impervious surfaces and flooding in local catchments	**AO4.1** Development provides a stormwater conveyance system which is designed to safely convey flows in compliance with the standards in the Infrastructure design planning scheme policy. **AO4.2** Development provides sufficient area to convey run-off which will comply with the standards in the Infrastructure design planning scheme policy.	A Stormwater Management Plan for the site has been carried out for the site. No detention has been proposed due to the site being located in the lower third portion of the catchment. Refer to Topo Report *Stormwater Management Plan* dated September 2023.
PO5 Development designs stormwater channels, creek modification works, bridges, culverts and major drains to protect and enhance the value of the waterway corridor or drainage path for fauna movement.	**AO5** Development ensures the design of stormwater channels, creek modifications or other infrastructure, permits terrestrial and aquatic fauna movement.	Not applicable.
PO6 Development ensures that location and design of stormwater detention and water quality treatment:	**AO6.1** Development locates stormwater detention and water quality treatment:	A Stormwater Management Plan for the site has been carried out for the site achieving water quality and quantity objectives. A water quality system has been proposed. No detention has

(a) minimises risk to people and property; (b) provides for safe access and maintenance; (c) minimises ecological impacts to creeks and waterways.	(a) outside of a waterway corridor; (b) offline to any catchment not contained within the development. **AO6.2** Development providing for stormwater detention and water quality treatment devices are designed in compliance with the standards in the Infrastructure design planning scheme policy.	been proposed due to the site being located in the lower third portion of the catchment. Refer to Topo Report *Stormwater Management Plan* dated September 2023.
PO7 Development is designed, including any car parking areas and channel works to: (a) reduce property damage; (b) provide safe access to the site during the defined flood event.	**AO7.1** Development (including any ancillary structures and car parking areas) is located above minimum flood immunity levels in Table 9.4.9.3.B, Table 9.4.9.3.C, Table 9.4.9.3.D, Table 9.4.9.3.E and Table 9.4.9.3.F. Note—Compliance with this acceptable outcome can be demonstrated by the submission of a hydraulic and hydrology report identifying flood levels and development design levels (as part of a site-based stormwater management plan). **AO7.2** Development including the road network provides a stormwater management system that provides safe pedestrian and vehicle access in accordance with the standards in the Infrastructure design planning scheme policy.	A Stormwater Management Plan for the site has been carried out for the site. A response to Councils Flood Code has also been prepared addressing flood storage and adequate immunity levels for building floor levels and safe access and egress. All habitable levels have been set above flood level plus immunity requirements.. Refer to Topo Report *Stormwater Management Plan* dated September 2023.
PO8 Development designs stormwater channels, creek modification works and the drainage network to protect and enhance the environmental values of the waterway corridor or drainage path.	**AO8.1** Development ensures natural waterway corridors and drainage paths are retained. **AO8.2** Development provides the required hydraulic conveyance of the drainage channel and floodway, while maximising its	Not applicable.

	potential to maximise environmental benefits and minimise scour. Editor's note—Guidance on natural channel design principles can be found in the Council's publication Natural channel design guidelines. **AO8.3** Development provides stormwater outlets into waterways, creeks, wetlands and overland flow paths with energy dissipation to minimise scour in compliance with the standards in the Infrastructure design planning scheme policy. **AO8.4** Development ensures that the design of modifications to the existing design of new stormwater channels, creeks and major drains is in compliance with the standards in the Infrastructure design planning scheme policy.	
PO9 Development is designed to manage run-off and peak flows by minimising large areas of impervious material and maximising opportunities for capture and re-use.	**AO9** No acceptable outcome is prescribed.	A Stormwater Management Plan for the site has been carried out for the site achieving water quality and quantity objectives. A water quality system has been proposed which captures the low flows for treatment. No detention of higher flows has been proposed due to the site being located in the lower third portion of the catchment. Refer to Topo Report *Stormwater Management Plan* dated September 2023.
PO10 Development ensures that there is sufficient site area to accommodate an effective stormwater management system.	**AO10** No acceptable outcome is prescribed.	A Stormwater Management Plan for the site has been carried out for the site achieving water quality and quantity objectives. A water quality system has been proposed which captures the low flows for treatment. No detention of higher flows has been proposed due to the site being located in the lower third

Note—Compliance with the performance outcome should be demonstrated by the submission of a site-based stormwater management plan for high-risk development only.		portion of the catchment. Refer to Topo Report *Stormwater Management Plan* dated September 2023.
PO11 Development provides for the orderly development of stormwater infrastructure within a catchment, having regard to the: (a) existing capacity of stormwater infrastructure within and external to the site, and any planned stormwater infrastructure upgrades; (b) safe management of stormwater discharge from existing and future up-slope development; (c) implication for adjacent and down-slope development.	**AO11.1** Development with up-slope external catchment areas provides a drainage connection sized for ultimate catchment conditions that is directed to a lawful point of discharge. **AO11.2** Development ensures that existing stormwater infrastructure that is undersized is upgraded in compliance with the Infrastructure design planning scheme policy.	A Stormwater Management Plan for the site has been carried out for the site achieving water quality and quantity objectives. It is envisaged that the proposed development will not impact on the existing stormwater infrastructure that surrounds the site. Refer to Topo Report *Stormwater Management Plan* dated September 2023.
PO12 Development provides stormwater infrastructure which: (a) remains fit for purpose for the life of the development and maintains full functionality in the design flood event; (b) can be safely accessed and maintained cost effectively; (c) no structural damage to existing stormwater infrastructure.	**AO12.1** The stormwater management system is designed in compliance with the Infrastructure design planning scheme policy. **AO12.2** Development provides a clear area with a minimum of 2m radius from the centre of an existing manhole cover and with a minimum height clearance of 2.5m.	A Stormwater Management Plan for the site has been carried out for the site achieving water quality and quantity objectives. A water quality system has been proposed. No detention of higher flows has been proposed due to the site being located in the lower third portion of the catchment. Refer to Topo Report *Stormwater Management Plan* dated September 2023.
PO13 Development ensures that all reasonable and practicable measures are taken to manage the impacts of erosion, turbidity and sedimentation, both within and external to the development site from construction activities, including vegetation clearing, earthworks, civil construction, installation of services, rehabilitation, revegetation and landscaping to protect:	**AO13** No acceptable outcome is prescribed.	Refer to Topo Report *Stormwater Management Plan* dated September 2023.

(a) the environmental values and water quality objectives of waters; (b) waterway hydrology; (c) the maintenance and serviceability of stormwater infrastructure. Note—The Infrastructure design planning scheme policy outlines the appropriate measures to be taken into account to achieve the performance outcome.		
PO14 Development ensures that: (a) unnecessary disturbance to soil, waterways or drainage channels is avoided; (a) all soil surfaces remain effectively stabilised against erosion in the short and long term.	**AO14** No acceptable outcome is prescribed.	Refer to Topo Report *Stormwater Management Plan* dated September 2023.
PO15 Development does not increase: (a) the concentration of total suspended solids or other contaminants in stormwater flows during site construction; (b) run-off which causes erosion either on site or off site.	**AO15** No acceptable outcome is prescribed.	A Stormwater Management Plan for the site has been carried out for the site achieving water quality and quantity objectives. Refer to Topo Report *Stormwater Management Plan* dated September 2023.
Section B—Additional performance outcomes and acceptable outcomes which apply to high-risk development, being one or more of the following: (a) a material change of use for an urban purpose which involves greater than 2,500m^2 of land that: (i) will result in an impervious area greater than 25% of the net developable area; or (ii) will result in 6 or more dwellings. (b) reconfiguring a lot for an urban purpose that involves greater than 2,500m^2 of land and will result in 6 or more lots; (c) operational work for an urban purpose which involves disturbing greater than 2,500m^2 of land.		
PO16	**AO16**	Not applicable.

Development ensures that the entry and transport of contaminants into stormwater is avoided or minimised to protect receiving water environmental values. Note—Prescribed water contaminants are defined in the Environmental Protection Act 1994. Note—Compliance with the performance outcome should be demonstrated by the submission of a site-based stormwater management plan for high-risk development only.	Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.	
PO17 Development ensures that: (a) the discharge of wastewater to a waterway or external to the site is avoided; or (b) if the discharge cannot practicably be avoided, the development minimises wastewater discharge through re-use, recycling, recovery and treatment. Note—The preparation of a wastewater management plan can assist in demonstrating achievement of this performance outcome. Editor's note—This code does not deal with sewerage which is the subject of the Wastewater code.	**AO17** No acceptable outcome is prescribed.	Not applicable.
Section C—Additional performance outcomes and acceptable outcomes for assessable development for a material change of use or reconfiguring a lot		
PO18 Development protects stormwater infrastructure to ensure the following are not compromised: (a) the long term infrastructure for the stormwater network in the Long term infrastructure plans; (b) the existing and planned infrastructure for the stormwater network in the Local government infrastructure plan;	**AO18** Development protects stormwater infrastructure in compliance with the following: (a) for long term infrastructure for the stormwater network, the Long term infrastructure plans; (b) for existing and planned infrastructure for the stormwater network, the Local government infrastructure plan;	Stormwater Management Plan for the site has been carried out for the site that maintains the existing Lawful Point of Discharge, being an underground gully pit. Refer to Topo Report *Stormwater Management Plan* dated September 2023.

(c) the provision of long term, existing and planned infrastructure for the stormwater network which: (i) is required to service the development or an existing and future urban development in the planning scheme area; or (ii) is in the interests of rational development or the efficient and orderly planning of the general area in which the site is situated. Editor's note—A condition which requires a proposed development to keep permanent improvements and structures associated with the approved development clear of the area of long term infrastructure, may be imposed.	(c) the standards for stormwater drainage in the Infrastructure design planning scheme policy.	
PO19 Development provides for the payment of extra trunk infrastructure costs for the following: (a) for development completely or partly outside the priority infrastructure area in the Local government infrastructure plan; (b) for development completely inside the priority infrastructure area in the Local government infrastructure plan involving: (i) trunk infrastructure that is to be provided earlier than planned in the Local government infrastructure plan; (ii) long term infrastructure for the stormwater network which is made necessary by development that is not assumed future urban development; (iii) other infrastructure for the stormwater network associated with development that is not assumed future urban development which is made necessary by the development. Editor's note—The payment of extra trunk infrastructure costs for development completely inside the priority infrastructure area in the Local government infrastructure plan is to be worked out in accordance with the Charges Resolution.	**AO19** No acceptable outcome is prescribed.	Not applicable.

Editor's note—See section 130 Imposing Development conditions (Conditions for extra trunk infrastructure costs) of the Planning Act 2016.

APPENDIX G

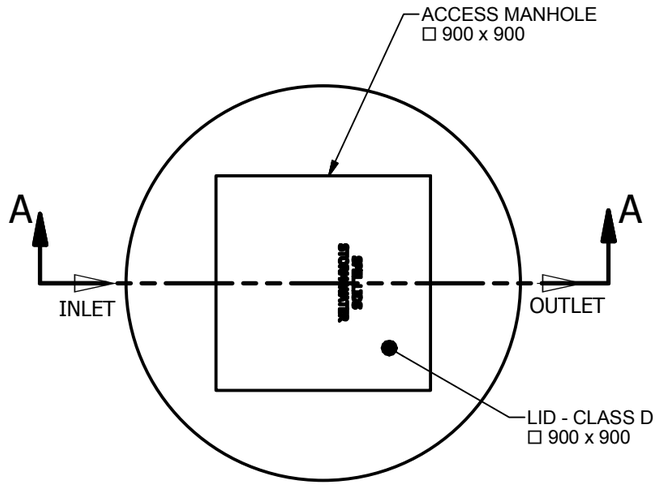
ATLAN STORMWATER TREATMENT SYSTEM DETAILS

ISSUE FOR APPROVAL
NOT FOR CONSTRUCTION

APPROVED.....
NAME.....
SIGNED.....
DATE...../...../.....

Site Level Confirmation	
Finished Surface Level (FSL)	RL:
Access Cover Thickness	mm
Inlet Invert Level	RL:
Outlet Invert Level	RL:
Company:	
Name:	
Date:	

REVISION HISTORY				
REV	DESCRIPTION	BY	DATE	CHECKED BY
1	INITIAL RELEASE	P.Z.	29/03/2018	



PLAN VIEW

TANK VOLUMES	
TANK	LID
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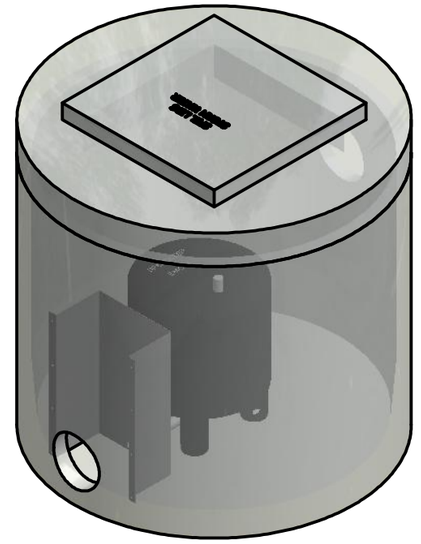
NOTE:
LIFTING WEIGHTS MAY VARY
DEPENDING ON CUSTOM DESIGN



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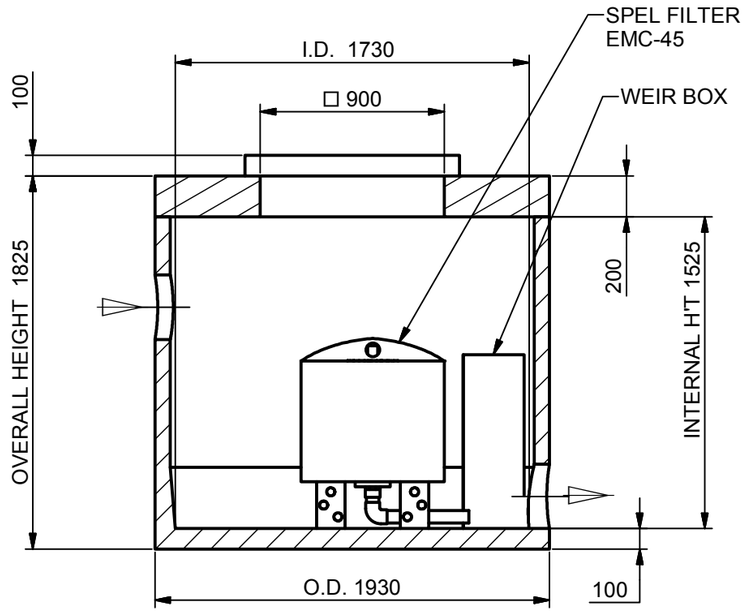
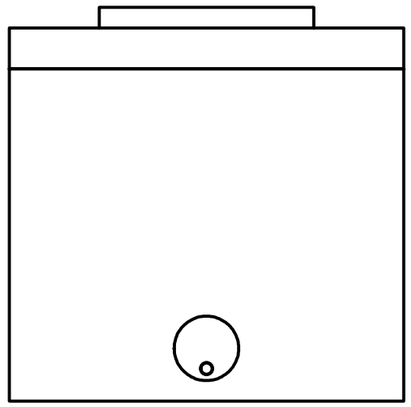


SECTION A-A



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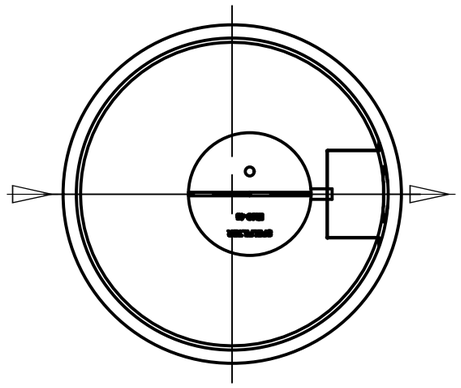


PLAN VIEW
COVER & LID REMOVED FOR CLARITY

TOLERANCE: ALL DIMENSIONS 10mm UNLESS OTHERWISE STATED.

CLIENT:

DISTRIBUTOR :

Drawn	P.Z.	Date 29-03-18
Check		Date
Verified		Date
Approved		Date
Request No.	RN1758	

SPEL
ENVIRONMENTAL
INTEGRATED WATER SOLUTIONS
100 Silverwater Road Silverwater NSW 2128
PH: 1300 773 500 | E: sales@spel.com.au
www.spel.com.au

PROJECT :

TITLE
SPEL PRECAST TANK
3.7 kL CLASS D
SF.169D/01-29.CON.300
1 SPEL FILTER CARTRIDGE

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	1

CUSTOMER CODE :

DWG No. SP18-SF11010-P

C:\Vault Working Folder\Designs\SPEL\PRODUCTS\FILTER\EMC-45\STANDARD\01 FILTER\CONCRETE\PROJECTS\SPEL PRECAST T2 TANK 3.7 KL\SP18-SF11010-P.idw

APPROVED..... ☐

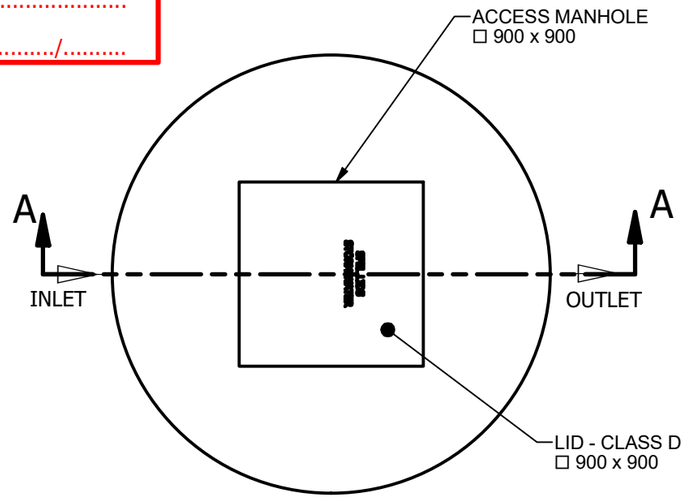
NAME.....

SIGNED.....

DATE...../...../.....

ISSUE FOR APPROVAL

NOT FOR CONSTRUCTION



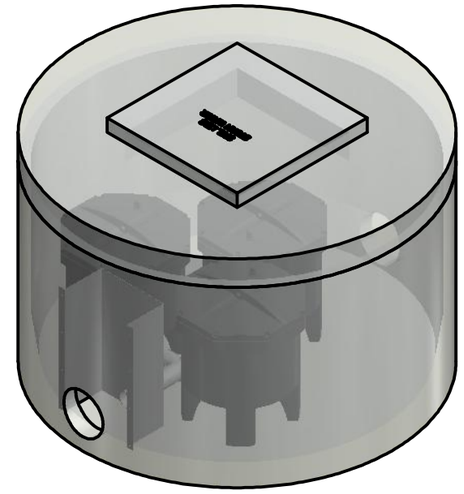
PLAN VIEW

Site Level Confirmation	
Finished Surface Level (FSL):	mm
Inlet Invert Level (IIL):	mm
Outlet Invert Level (OIL):	mm
Inlet Pipe Size:	mm
Inlet Pipe Type:	mm
Outlet Pipe Size:	mm
Outlet Pipe Type:	mm
Company:	
Name:	
Date:	

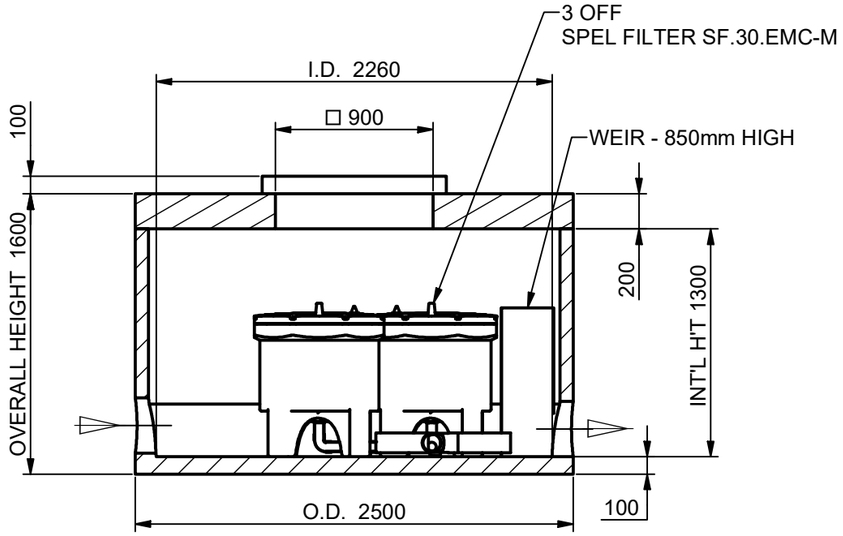
TANK WEIGHTS	
TANK	LID
3.5 t	2.4 t

NOTE:
LIFTING WEIGHTS MAY VARY
DEPENDING ON CUSTOM DESIGN

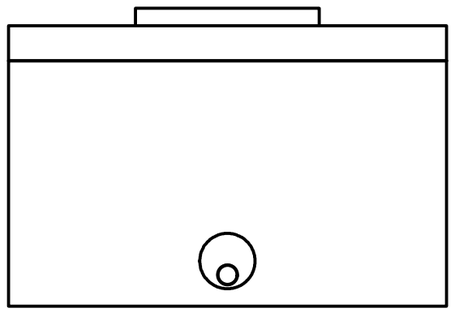
REVISION HISTORY				
REV	DESCRIPTION	BY	DATE	CHECKED BY
1	INITIAL RELEASE	P.Z.	06/05/2020	



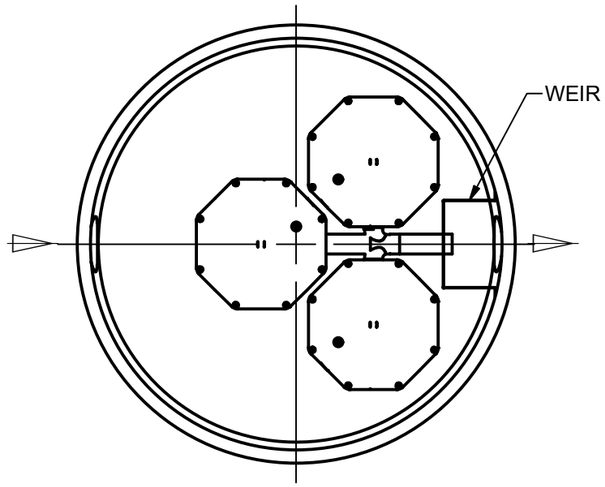
ISOMETRIC VIEW



SECTION A-A



SIDE VIEW



PLAN VIEW
COVER & LID REMOVED FOR CLARITY

TOLERANCE: ALL DIMENSIONS 10mm UNLESS OTHERWISE STATED.

CLIENT:

DISTRIBUTOR :

Drawn	P.Z.	Date 6/05/2020
Check		Date
Verified		Date
Approved		Date
Request No.		

SPEL STORMWATER
100 Silverwater Road Silverwater NSW 2128
PH: 1300 773 500 | **E:** sales@spel.com.au
www.spel.com.au

PROJECT : SPEL 5.2kL ROUND TANK & FILTER FITOUT

TITLE SPEL PRECAST TANK
5.2 kL CLASS D
SF.226D/03-30.CON
3 SPEL FILTER CARTRIDGES

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	1

CUSTOMER CODE :

DWG No. SP20-SF15010-P

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