EXPERIENCE. PRECISION. EXCELLENCE.

WSA

WILKINSON SHAW & ASSOCIATES
consulting engineers

WWW.WILKINSONSHAW.COM.AU

201-209 Wilruna Street, Wacol

STORMWATER MANAGEMENT REPORT

Client: FT Investment Group Pty Ltd

Project No: P21-047

REPORT CONTROL SHEET

W.S.A. Ref:	P21-047
Project Name:	201-209 Wilruna Street, Wacol
Report Title:	Stormwater Management Report
Report Author:	Kym Wilkinson

Revision / Checking					
Rev No.	**Date**	**Revised By**	**Signed**	**Reviewed By**	**Signed**
3	25.01.22	KW		SPW	
2	30.10.21				
1	23.08.21				
Authorised by:			**RPEQ No. :**	**7549**	**Date:** 28.01.22

This document has been approved by the following appropriately qualified and experienced professional civil engineer:

Steven Wilkinson
Registered Professional Engineer of Queensland No. 7549

Downloadable Files:
MUSIC (Version 6.3): P21047 V3.zip
WBNM Base File Folder: WBNMbase.zip
StormInjector Results (WBNM): P21047_V3.esi
Storm Injector Viewer: Version 1.2.8

Disclaimer

This report has been prepared on behalf of and for the exclusive use of FT Investment Group Pty Ltd and is subject to and issued in accordance with FT Investment Group Pty Ltd's instruction to Wilkinson Shaw Associates (WSA). The content of this report was based on previous information, survey and/or studies supplied as listed below:

- Site layout is based on 8080-03G "Subdivision Proposal Plan" provided by Gateway Survey & Planning.
- Detailed Survey is based on 8080-01B "Contour Survey" dated 12/08/2021 provided by Gateway Survey & Planning

Table of Contents

List of Figures

List of Tables

The proposed development will ultimately see the construction of 12 residential dwellings and associated services.

2.3 Topography and Site Drainage

Contours shows that the subject property generally falls gently down the block towards the Wilruna Street frontage. Levels on the site range between 27.5m and 25.75m (AHD) along the western boundary and 22.2m and 22.0m (AHD) along the boundary fronting Wilruna Street. The site drains in a easterly direction at a grade of approximately 4%.

The existing site was previously developed with a residential dwelling and numerous structures. From undertaking a site inspection it appears roofwater from the existing structures are discharged directly to the ground.

2.4 Easement Acquisitions and Relinquishments

No easements for stormwater discharge are proposed.

3.0 Lawful Point of Discharge

With the release of the latest version of QUDM the determination of whether a property has a lawful point of discharge at a particular location has been altered. The criteria for determining a lawful point of discharge are:

(i) Will the proposed development alter the site's stormwater discharge characteristics in a manner that may substantially damage a third-party property?

- If not, then no further steps are required to obtain tenure for a lawful point of discharge (assuming any pervious changes were lawful).
- If there is a reasonable risk of such damage, then consider issue (ii) or (iii).

(ii) Is the location of the discharge from the development site under the lawful control of the local government or other statutory authority from whom permission to discharge has been received? This will include a park, watercourse, drainage or road reserve, stormwater registered drainage easement, or land held by local government (including freehold land).

- If so, then no further steps are required to obtain tenure for a lawful point of discharge.
- If not, then consider issue (iii). A land owner or regulator may require that the

developer obtain an authority to discharge as described in (iii) in order for the stormwater to ultimately flow to a location described in (ii).

(iii) An authority to discharge over affected properties will be necessary. In descending order of certainty, an authority may be in the form of:

- Dedication of a drainage reserve or park
- A registered easement for stormwater discharge/works
- Written discharge approval.

The lawful point of discharge has been identified for the site as being the existing stormwater infrastructure in Wilruna and Wuriga Street.

4.0 Opportunities and Constraints

4.1 Site Opportunities

The site opportunities regarding stormwater management are discussed briefly below.

- There is considerable fall on the site thus allowing for adequate capture and cover for stormwater;
- Time of concentrations in the development can be minimised by using low gradients of the constructed driveways.

4.2 Site Constraints

Constraints identified for the site regarding stormwater management include:

- The development may contribute to increase flows and may negatively impact downstream catchments unless appropriately managed;
- The existing stormwater infrastructure has limited cover; and
- Currently there is no internal site drainage or connection to the stormwater network for the site.

This stormwater management strategy has been developed to ensure that these site constraints can be managed while taking advantage of the opportunities identified.

Table 13: Global Loss Parameters

Initial Loss (mm) Pervious	Continuing Loss (mm) Pervious	Initial Loss (mm) Impervious	Continuing Loss (mm) Impervious
18.0	1.4	1.0	0

Table 14: Median Preburst Depths

Duration in min	Annual Exceedance Probability (AEP)						
	1EY/0.5EY	50%	0.2EY/20%	10%	5%	2%	1%
60	1.9	1.9	3.6	4.8	5.9	8.5	10.6
90	0.6	0.6	3.2	4.9	6.5	10.6	13.7
120	2.0	2.0	7.4	10.9	14.3	16.9	18.8
180	1.0	1.0	7.5	11.9	16.0	22.9	28.0
360	2.6	2.6	9.7	14.4	19.0	26.6	32.3

6.2.3 Validation of the Hydrologic Model

As this is a site-specific investigation and there is no gauged local catchment, there is no site-based data to calibrate the runoff for the site. Accordingly, the WBNM hydrologic model has been validated against the Rational Method.

Table 15: Rational Method Comparison with Hydrologic Model

Annual Exceedance Probability	Peak Discharge (m^3/s)		Variation	
	Rational	WBNM	m^3/s	%
1EY	0.094	0.073	0.021	22.2
0.5EY	0.114	0.092	0.022	19.0
0.2EY	0.174	0.170	0.004	2.5
10%	0.217	0.241	-0.024	-11.3
5%	0.261	0.271	-0.010	-4.0
2%	0.333	0.331	0.002	0.6
1%	0.385	0.389	-0.004	-1.0

The WBNM results are generally within 15% of the Rational Method result across all of the design AEP Events considered and are therefore considered acceptable. It is acknowledged that on more frequent design storms that there is a larger variation between the Rational Method and WBNM. As the values predicted by WBNM are less than the Rational Method the amount of detention required is likely to be overestimated. Accordingly, the WBNM model has been adopted to inform design discharge estimates from the development.

6.3 Results

It is proposed that an onsite detention tank be constructed to mitigate the increase in runoff generated by the development. As such, the detention system was sized by using WBNM and the details of the

dam is shown in Tables 16 and 17. Please note that the storage volumes utilised by the bioretention component of the basin have not been incorporated into the model.

Table 16: Proposed Detention Dam Details

Location	In easement in favour of Body Corporate
Basin Type	Underground precast tanks
Storage Depth	1.4m (to weir)
Available Storage Volume	161 m^3 to weir
Lower Outlet	225mm pipe
Lower RL	Base of tank
Second Outlet	375mm pipe
Second Outlet RL	450mm above base of dam
Overflow Weir Length	2.4m
Overflow Weir RL	Surface level (grated inlet)

Table 17: Stage, Storage and Discharge Arrangement

Elevation (m)	Storage (m^3)	Outlet 1 (l/s)	Outlet 2 (l/s)	Weir (l/s)	Total Discharge (l/s)
22	0	0	0	0	0
22.2	29	26	0	0	26
22.4	59	57	0	0	57
22.45	66	62	0	0	63
22.6	88	75	23	0	98
22.8	117	90	102	0	192
23.1	159	110	199	0	308
23.28	160	121	239	0	359
23.4	161	128	260	0	387
23.5	161	133	277	114	524

The analysis using WBNM shows that for a detention tank with peak storage volume of approximately 160 m^3 will ensure that total discharge off the site after the development is complete will be no worse than the existing situation. The maximum water level reached in the detention dam in the 1% AEP 25-minute storm is 1.155m with additional results shown in Table 18. Table 19 tabulates the maximum outflow for all storm events analysed. The discharges are tabulated for the existing situation and the developed situation with detention included.

Table 18: Maximum Detention Depths and Outflow for Each Critical Storm Event for the Dam

AEP Event	Peak Inflow	Peak Discharge (m^3/s)	Peak Depth (m)
1EY	0.104	0.057	0.398
0.5EY	0.128	0.070	0.482
0.2EY	0.198	0.135	0.678
10%	0.251	0.176	0.766
5%	0.303	0.211	0.848
2%	0.369	0.266	0.991
1%	0.421	0.324	1.155

Table 19: Total Discharge Results (Maximum Flow Rate)

Annual Exceedance Probability	Peak Discharge (m^3/s)		Variation	
	Undeveloped	Developed with Detention	m^3/s	%
1EY	0.073	0.072	-0.001	-1.4
0.5EY	0.092	0.088	-0.004	-4.3
0.2EY	0.170	0.161	-0.009	-5.3
10%	0.241	0.210	-0.031	-12.9
5%	0.271	0.266	-0.005	-1.8
2%	0.331	0.322	-0.009	-2.7
1%	0.389	0.381	-0.008	-2.1

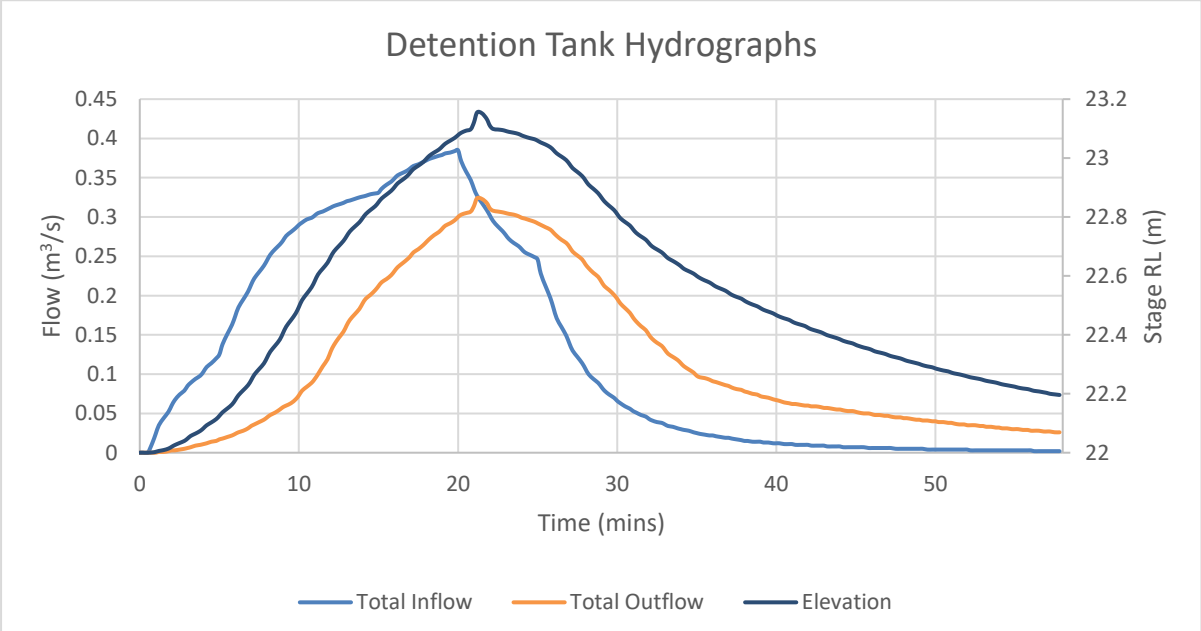


Figure 4: Hydrographs of inlet flow and outlet flow from the detention storage (1% AEP, 25-minute storm)

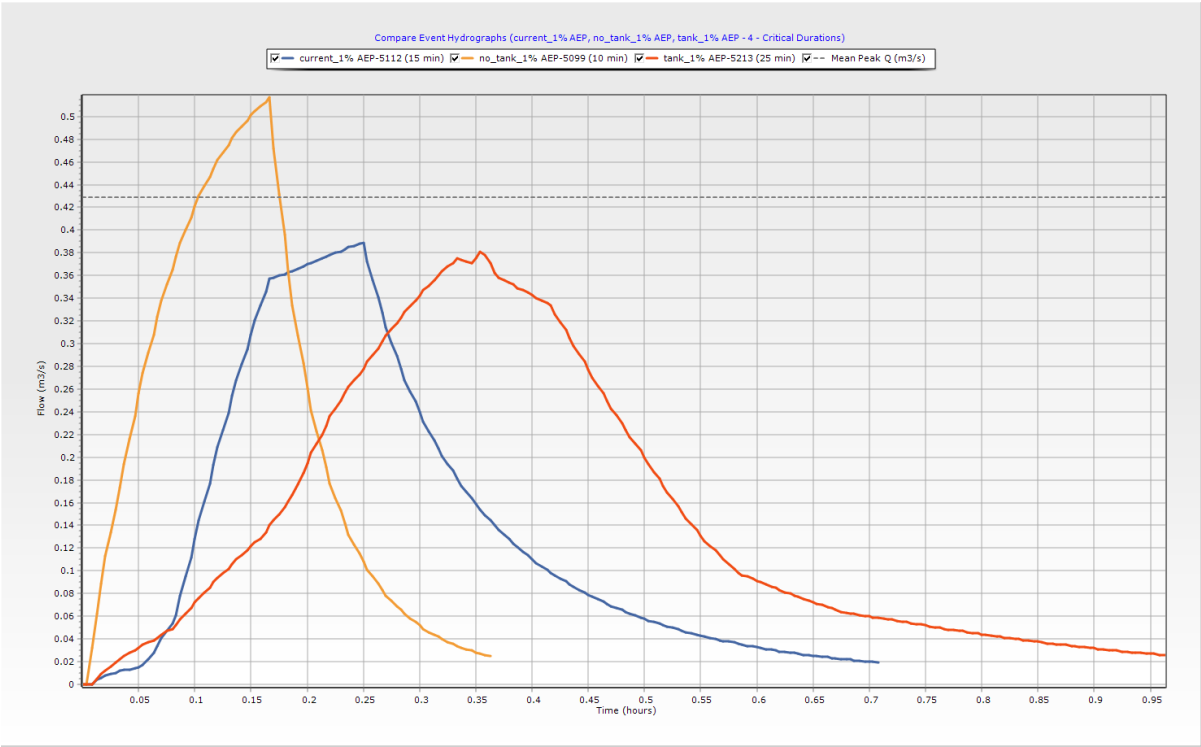


Figure 5: Combination of all Hydrographs for 1%AEP

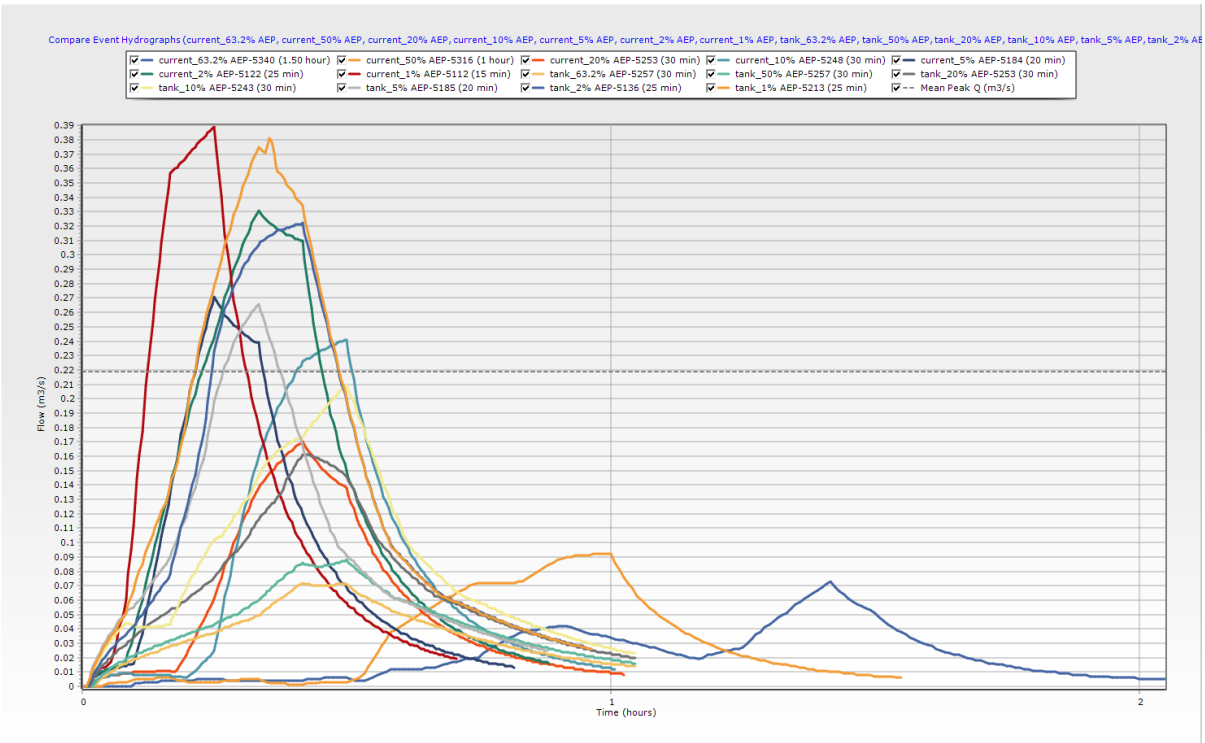
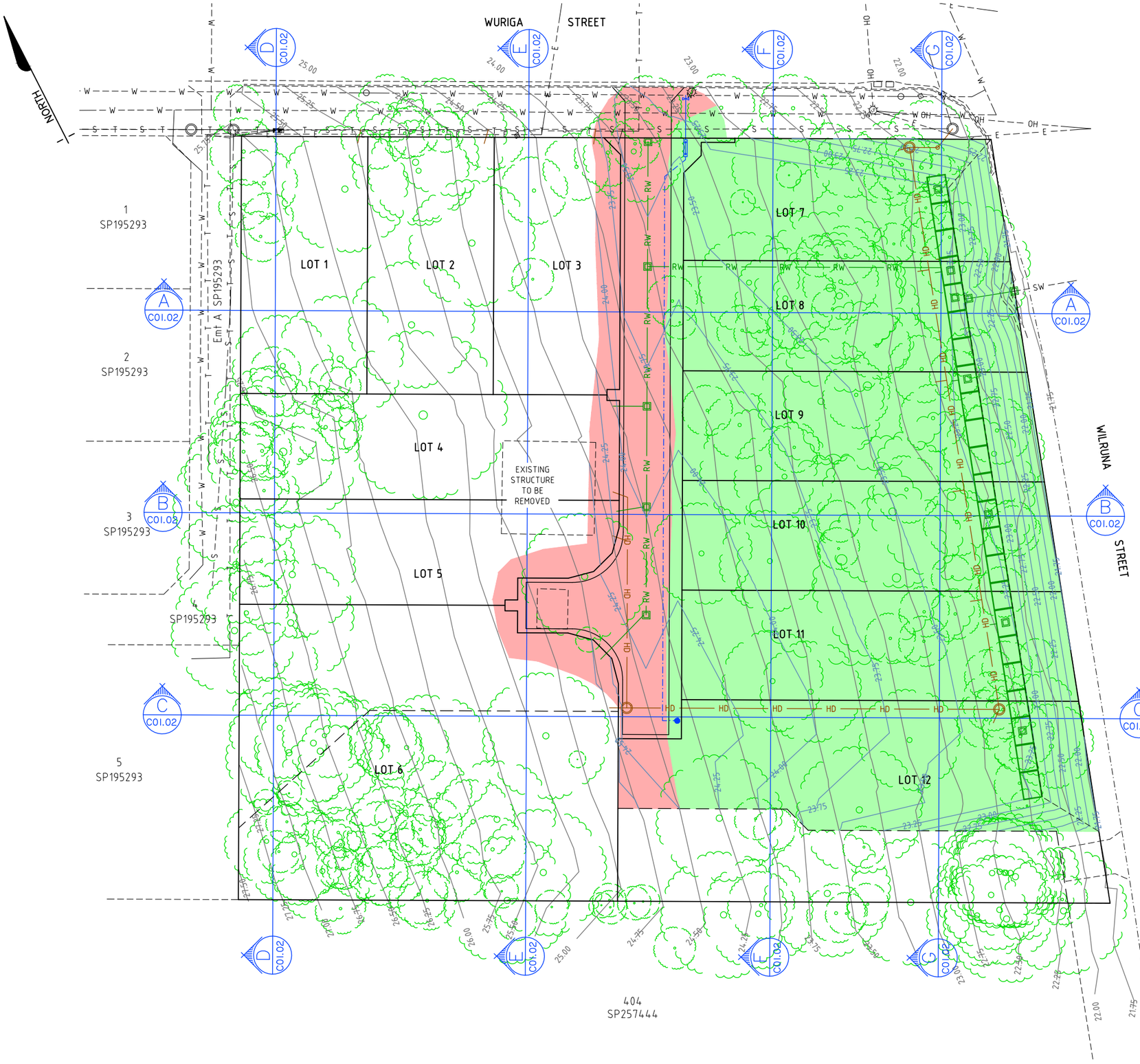


Figure 6: Combination of all Hydrographs for Current and Developed Situation (with and without mitigation)

Appendix 1 ~ Engineering Drawings



LEGEND

- 27.50 — EXISTING SURFACE CONTOURS
- 26.60 — DESIGN SURFACE CONTOURS
- EXISTING KERB AND CHANNEL
- OH — EXISTING OVERHEAD ELECTRICAL
- T — EXISTING TELSTRA
- SW — EXISTING STORMWATER
- W — EXISTING WATERMAIN
- S — EXISTING SEWER
- RW — PROPOSED ROOFWATER DRAINAGE
- HD — PROPOSED SEWER HOUSE DRAINGE
- PROPOSED INTERNAL DOMESTIC AND FIRE MAIN
- PROPOSED WATERMAIN
- PROPOSED AREA OF CUT
- PROPOSED AREA OF FILL (LEVEL 1)
- EXISTING TREE

NOTE:
THIS CONCEPTUAL PLAN HAS BEEN PREPARED BASED ON SERVICE AUTHORITY AS CONSTRUCTED INFORMATION. POT HOLING AND ADDITIONAL SURVEY IS TO BE UNDERTAKEN PRIOR TO FURTHER DESIGN.
IDENT SURVEY OF BOUNDARYS REQUIRED TO CONFIRM ACCURACY.

1:250 (A1) 0 2.5 5.0 7.5 10.0 12.5m

REV	BY	CKD	DATE	DESCRIPTION
B	DMS	KLW	25.01.22	LAYOUT AMENDED
A	DMS	KLW	20.08.21	ISSUED FOR APPROVAL

DESIGN	DMS
DRAWN	DMS
CHECKED	KLW
APPROVED	STEVEN WILKINSON RPEQ: 7549
DATE:	25.01.22

WILKINSON SHAW & ASSOCIATES
consulting engineers
WILKINSON SHAW & ASSOCIATES PTY LTD
ABN: 29 104 860 497
OFFICE: 182 PINE ROAD (WEST), RICHLANDS QLD 4077
MAIL: PO BOX 583 INALA QLD 4077
PHONE: (07) 3555 9888
EMAIL: office@wilkinsonshaw.com.au
WEB: www.wilkinsonshaw.com.au
35+ YEARS SINCE 1984

PROJECT: PROPOSED SUBDIVISION 201–209 WILRUNA STREET WACOL QLD 4076

DRAWING SHEET TITLE: CONCEPTUAL EARTHWORKS PLAN

CLIENT: FT INVESTMENT GROUP PTY LTD

SURVEYOR: GATEWAY SURVEY & PLANNING

LOT DESCRIPTION: LOTS 1 & 2 ON RP29754

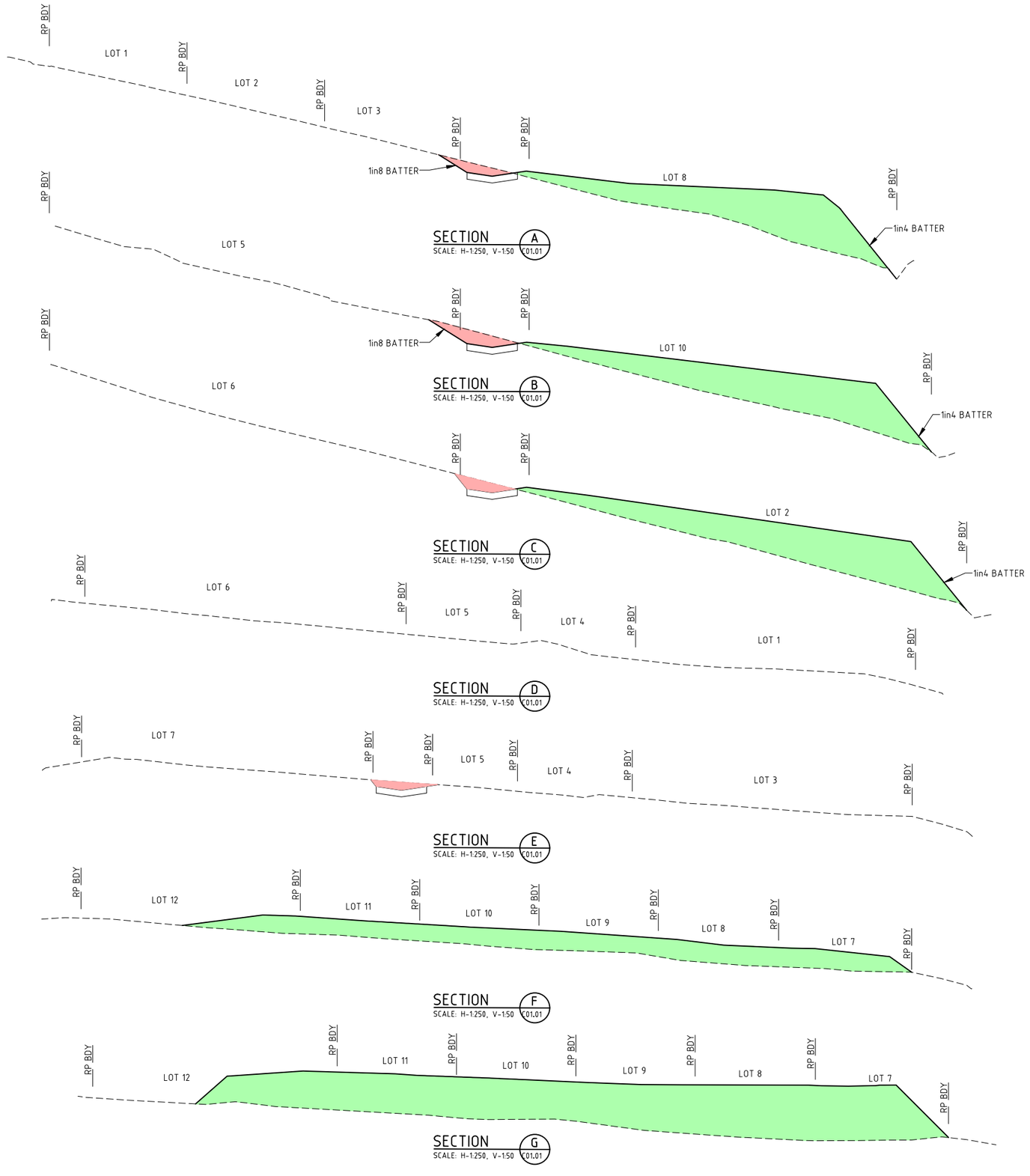
COUNCIL REF: A005860421

DRAWING NO. P21–047–DA–C01.01

SCALE AS SHOWN

DATUM A.H.D.

REVISION B



1:50 (A1) 0 0.5 1.0 1.5 2.0 2.5m

1:250 (A1) 0 2.5 5.0 7.5 10.0 12.5m

REV	BY	CKD	DATE	DESCRIPTION
B	DMS	KLW	25.01.22	LAYOUT AMENDED
A	DMS	KLW	20.08.21	ISSUED FOR APPROVAL

DESIGN	DMS
DRAWN	DMS
CHECKED	KLW
APPROVED	STEVEN WILKINSON RPEQ: 7549
DATE:	25.01.22

WILKINSON SHAW & ASSOCIATES
consulting engineers
WSA

WILKINSON SHAW & ASSOCIATES PTY LTD
ABN: 29 104 860 497
OFFICE: 182 PINE ROAD (WEST), RICHLANDS QLD 4077
MAIL: PO BOX 583 INALA QLD 4077
PHONE: (07) 3555 9888
EMAIL: office@wilkinsonshaw.com.au
WEB: www.wilkinsonshaw.com.au

35+ YEARS SINCE 1984

PROJECT
PROPOSED SUBDIVISION
201–209 WILRUNA STREET
WACOL QLD 4076

DRAWING SHEET TITLE
CONCEPTUAL EARTHWORKS SECTIONS

CLIENT
FT INVESTMENT GROUP PTY LTD

SURVEYOR
GATEWAY SURVEY & PLANNING

LOT DESCRIPTION:
LOTS 1 & 2 ON RP29754

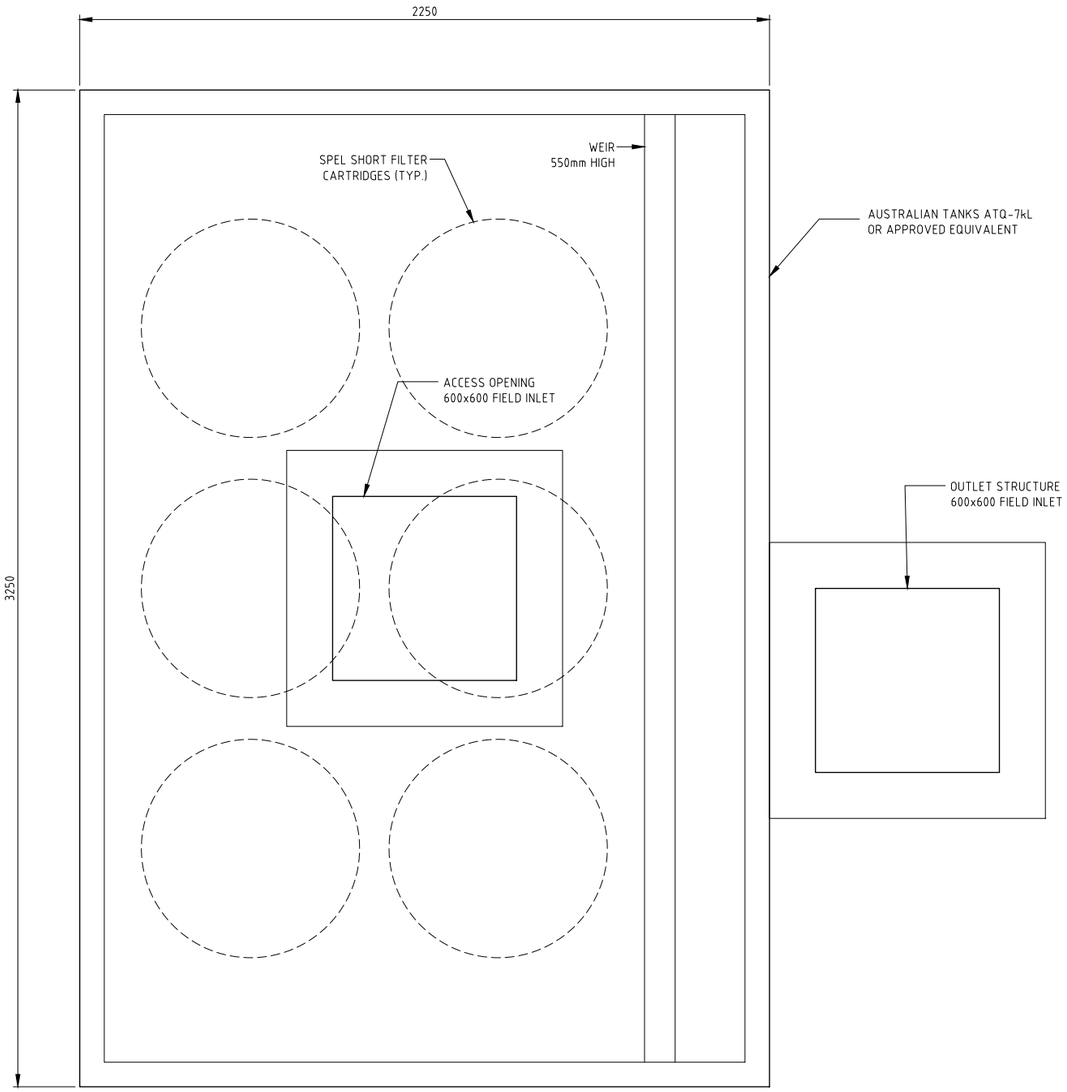
COUNCIL REF:
A005860421

DRAWING NO.
P21–047–DA–C01.02

SCALE AS SHOWN

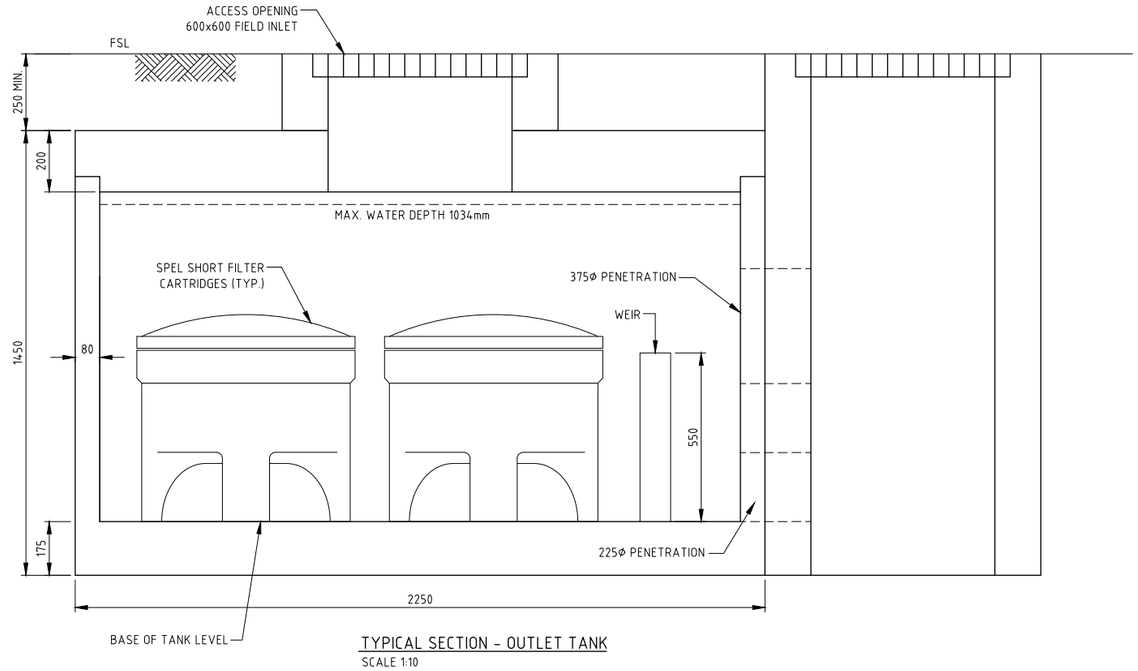
REVISION
B

DATUM A.H.D.



PLAN
SCALE 1:10

NOTE:
ALL TANKS INTER-CONNECTED AS DETERMINED AT OPW STAGE



TYPICAL SECTION - OUTLET TANK
SCALE 1:10

1:10 (A1) 0 0.1 0.2 0.3 0.4 0.5m

REV	BY	CKD	DATE	DESCRIPTION
A	DMS	KLW	25.01.22	LAYOUT AMENDED

DESIGN	DMS
DRAWN	DMS
CHECKED	KLW
APPROVED	STEVEN WILKINSON RPEQ: 7549
DATE:	25.01.22

WILKINSON SHAW & ASSOCIATES
consulting engineers
WILKINSON SHAW & ASSOCIATES PTY LTD
ABN: 29 104 860 497
OFFICE: 182 PINE ROAD (WEST), RICHLANDS QLD 4077
MAIL: PO BOX 583 INALA QLD 4077
PHONE: (07) 3555 9888
EMAIL: office@wilkinsonshaw.com.au
WEB: www.wilkinsonshaw.com.au

35+ YEARS SINCE 1984

PROJECT: PROPOSED SUBDIVISION 201-209 WILRUNA STREET WACOL QLD 4076

DRAWING SHEET TITLE: CONCEPTUAL DETENTION TANK DETAILS

CLIENT: FT INVESTMENT GROUP PTY LTD

SURVEYOR: GATEWAY SURVEY & PLANNING

LOT DESCRIPTION: LOTS 1 & 2 ON RP29754

COUNCIL REF: A005860421

DRAWING NO. P21-047-DA-C03.01

SCALE AS SHOWN

REVISION A

DATUM A.H.D.