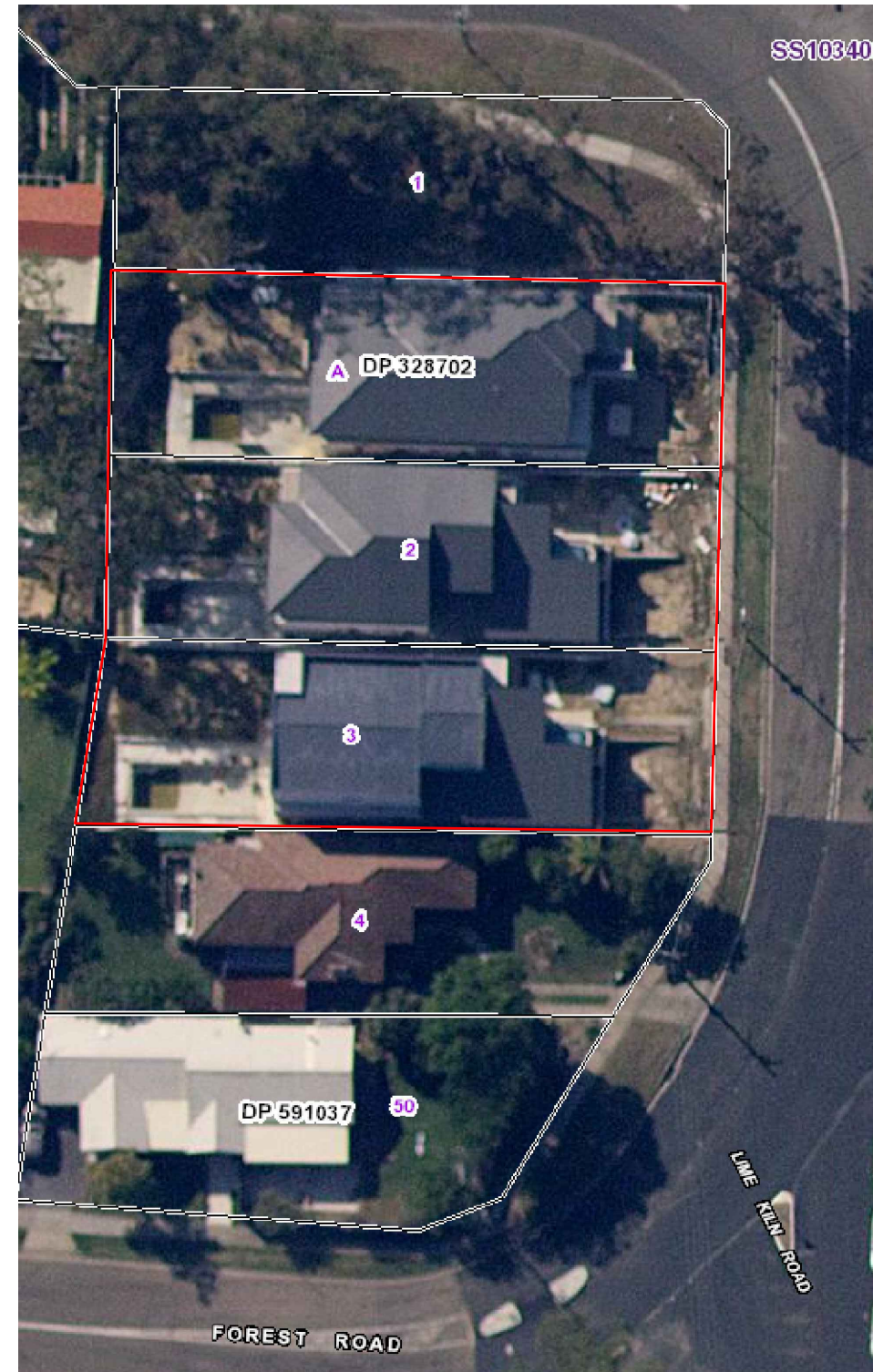


GENERAL NOTES:

1. All work is to be performed in accordance with AS3500.3 and council codes where applicable.
2. The Plumber/ Drainer shall inspect the site and confirm the existing site structures, services and conditions prior to proceeding. If any discrepancies found, contact the engineer for further instructions.
3. All pipes shall be sewer grade P.V.C. laid at min. 1:100, unless noted otherwise.
4. All connections to P.V.C. pipes are to be solvent welded to manufacturers specification
5. All prefabricated pits, drains etc. are to be of heavy duty concrete construction unless noted other.
6. Precise location of down pipes shall be nominated by others. Locations shown are for hydraulic design purposes only.
7. Precise location of pits shall be nominated by others. Locations shown are for hydraulic design purposes only.
8. All eaves gutters shall be of minimum cross sectional area of 8500mm² unless noted otherwise.
9. This design covers the collection and disposal of rainwater from ROOF AREAS ONLY. Any paved areas not noted on the supplied architectural drawings are not included, unless shown.
10. This design does not cover sub surface hydraulic flows.
11. The installer is encouraged to use the 'Dial Before You Dig' service prior to excavation. No underground services have been noted or surveyed in this design. Dig at your own risk.
12. IF IN DOUBT ASK. Consult the design engineer for any changes, omissions and discrepancies.
13. System design has been produced to reflect reduced levels shown on architect supplied drawings.
14. Pipe cover for uPVC pipes:
 - a. Single dwellings, no vehicular loading- 100mm
 - b. Single dwellings, vehicular loading on concrete- 450mm
 - c. Single dwellings, vehicular loading, un-reinforced concrete-100mm below underside of concrete Silt arrestor pit and rain guards must be regularly inspected and cleaned.
15. Location of Stormwater Systems, including downpipes, pipes,pits and rainwater tank are indicative only. Exact locations shall be determined on site to suit site conditions.
16. Sub-soil drains for retaining wall shall be installed by the builder and connected to Stormwater lines. All Agg Lines shall be 100mm DIA, unless noted otherwise.
17. Levels are approximate only. The plumber/drainer shall confirm the levels prior to proceeding. If any discrepancies found, contact the engineer for further instructions.
18. Inspection and certification, if required, shall be done prior to backfilling, allow 24 hour notice for the engineer to carry out the inspection.
19. Any damage to services during construction shall be repaired immediately at the plumber/drainers own expense.
20. Areas & Geometry calculated are approximate and dependent on Surveyors & Architects drawings.
21. It is essential that areas calculated are within plus/minus 5% range.
22. Provide adequate access and overland flow routes out of property and not into adjoining properties
23. Provide minimum 75mm clearance under all gates and operable external doors as to not impede overland flow
24. Water entry and backflow into buildings should be prevented at all times
25. All finished ground surfaces should fall away from structures
26. Charged lines are to be flushed regularly and flush/arrestor pits are to be regularly inspected and cleaned
27. All pipes entering a water tank shall have a first flush device installed
28. All water tanks will be insect proofed by other
29. If tanked water is being reused for drinking or sanitary purposes, appropriate disinfecting by others should be considered.
30. Schedule of calculations is based on plan areas



LOCALITY PLAN

NOT TO SCALE



PROJECT
1176-1178 FOREST RD
LUGARNO

CLIENT
LUGARNO DEVELOPMENTS PTY LTD

CONSULTANT
ROTHSHIRE SERVICES PTY LTD
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REGISTRATION
Alexander Kameas
Principal Structural Engineer

SAFETY IN DESIGN
Are there any additional hazards / risks not normally associated with the type of work detailed in this drawing?
 YES NO

SUSTAINABILITY CONSIDERATIONS

KEYPLAN / LEGEND

ISSUED FOR DA

REV	DATE	DESCRIPTION
A	13.12.2022	ISSUED FOR DA

DESIGNED	CHECKED	APPROVED
DN	AK	AK

DRAWING TITLE
GENERAL NOTES &
STANDARD PRACTICES

PROJECT NO.: 2122301
DWG NO.: GEN-DWG-001

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PROJECT
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REGISTRATION
Alexander Kameas
Principal Structural Engineer
PRE0000232

SAFETY IN DESIGN
Are there any additional hazards / risks not normally associated with the type of work detailed in this drawing?
 YES NO

SUSTAINABILITY CONSIDERATIONS

KEYPLAN / LEGEND

- — — — — Boundary
- — — — — Structures Shown Below
- - - - - Existing Roof
- - - - - Proposed Roof
- - - - - Proposed Easement
- [Dotted Pattern] Impervious Area
- [Green Pattern] Pervious Area
- [Yellow Pattern] Impervious Area within 1.5m from building wall and BDY

PRINT IN COLOR

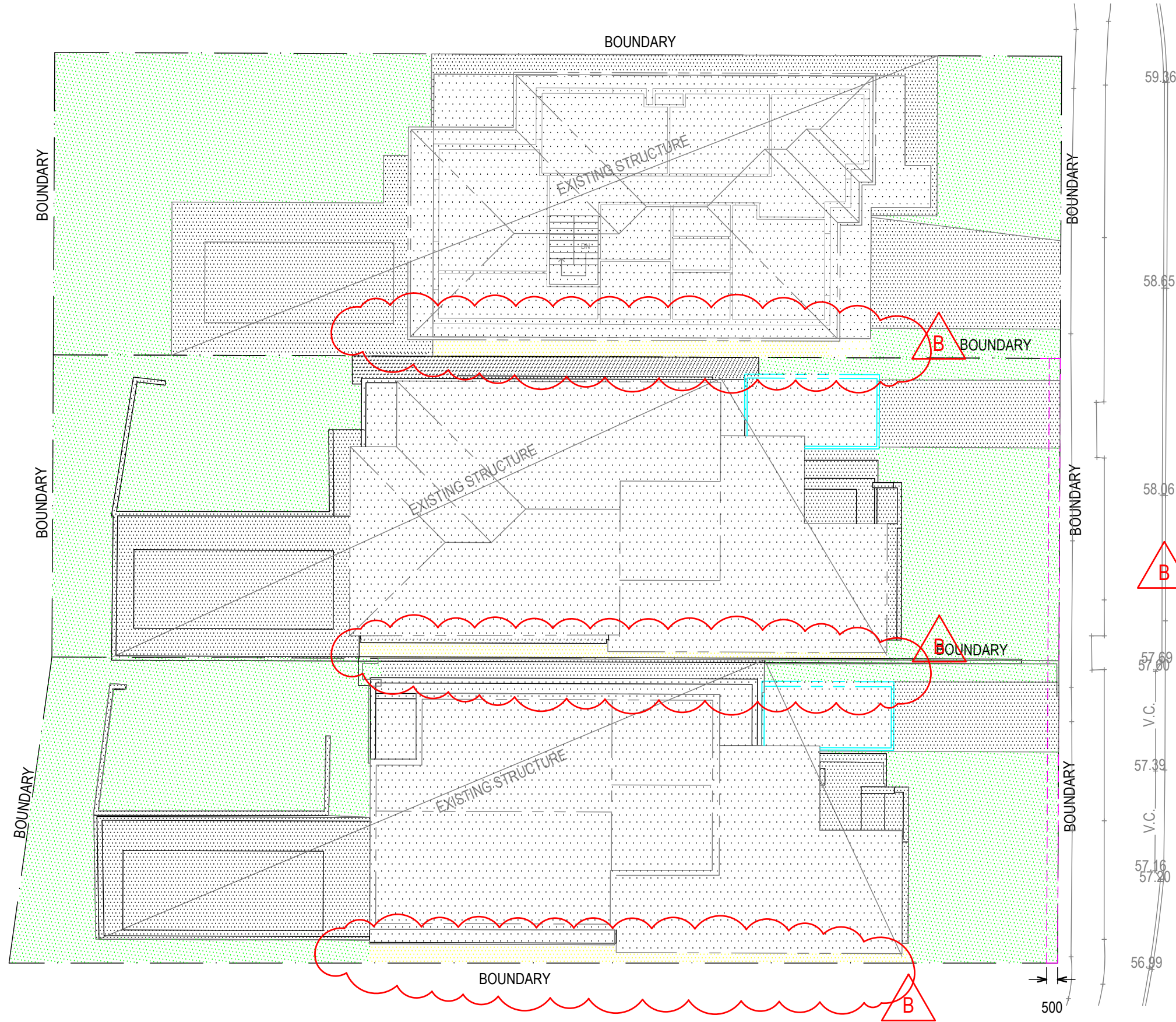
ISSUED FOR DA

REV	DATE	DESCRIPTION
A	13.12.2022	ISSUED FOR DA

DESIGNED	CHECKED	APPROVED
DN	AK	AK

DRAWING TITLE
PROPOSED CATCHMENT PLAN

SCALE:	1:200
PROJECT NO.:	2122301
DWG NO.:	STW-DWG-002



FOREST ROAD

Do not scale from drawings. Use only figured dimensions

TABLE OF COMPLIANCE

ITEM

- Stormwater design is in accordance to AS/NZ 3500.3.2003 & Georges River Council Stormwater Management Policy April 2021.
- As per Georges River Council Stormwater Management Policy April 2021 Table 3: OSD is required for Site with 55% - 65% impervious area. Max PSD 182 L/s/ha; Min. SSR: 206000 L/ha.
- As per Georges River Council Stormwater Management Policy April 2021: Up to a maximum of 20% of the OSD storage volume required may be offset by rainwater tank storage for reuse. One third of the provided rainwater tank storage can be used to offset the OSD up to this maximum 20% limit.
- As per Georges River Council Stormwater Management Policy April 2021: Maximum discharge rate to existing kerb and gutter is 25L/s.
- As per BASIX. Rainwater Tank is to be connected to toilets and at least one outdoor water tap.

Impervious Area Calculation (Appendix A7 - SMP2021)

Surface Type	Impermeability Factor	Calculated Area (m2)	Factored Area (m2)
All areas of less than 1.5 metres clearance between the outer wall of a building and the nearest adjacent property boundary (excludes the area under a roof eave overhang that is to be included as a roof surface)	0.5	15.614	7.807
	1	280.381	280.381
Roof Surface	0.5	0	0
Ground Surface	1	63.494	63.494
	0.75	0	0
Timber Deck	0.5	0	0
	1	0	0
Swimming Pools	0.5	32.788	16.394
	1	31.185	31.185

sum

Total Site Area (m2)	643.983
Total Impervious Area (m2)	399.261
Impervious Area (%)	61.9986863

Table 3 Georges River Council SMP 2021 - SSR & PSD Calculations

Impervious Area (%)	PSD (L/s/ha)	SSR (m3/ha)
Less than 55%	Not Required	
55%-65%	182	206
65%-75%	166	240
75%-85%	152	270
>>>85%	132	295

Catchment PSD (L/s/m2)	0.0182
Catchment SSR (L)	20.6

Site PSD (L/s)	11.7204906
Site SSR (L)	13266.0498

Rainwater Tank	2000
Rainwater Tank offset (20%)	666

Offsetted SSR (L)	12600
-------------------	-------

CRITICAL RAINFALL INTENSITY
BOM 06/10/2022

100 ₅ Rainfall Intensity	239mm/h
20 ₅ Rainfall Intensity	182 mm/h
5 ₅ Rainfall Intensity	136 mm/h

	AREA	(%)	RUNOFF coeff
Proposed	627.066		
Roof	236.218	37.67035687	1
Impervious	158.831	25.32923169	0.9
Pervious	232.017	37.00041144	0.493912

OSD Size	Length	Width	Depth	Volume Check
	6.5	2.5	0.8	13

OSD Levels	
Top of OSD (AHD)	58
Invert of OSD	57.2
Orifice CL	57.3

pi	3.141592654
Orifice Calc.	
h	0.7
g	9.8
Q20	22.63075286
Cd	0.6
A (m2)	0.003081113
d (m)	0.080859905
Max. d(mm)	80.85990506
d(mm)	66
Q20 (orifice) (L/s)	7.603368838

Survey by Summit Geomatic Pty Ltd (6599 Rev. A, dated 25/08/2022)



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REGISTRATION
Alexander Kameas
Principal Structural Engineer
PRE0000232

SAFETY IN DESIGN
Are there any additional hazards / risks not normally associated with the type of work detailed in this drawing?
 YES NO

SUSTAINABILITY CONSIDERATIONS

KEYPLAN / LEGEND



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REV	DATE	DESCRIPTION
A	13.12.2022	ISSUED FOR DA
B	06.02.2023	ISSUED FOR DA

DESIGNED	CHECKED	APPROVED
DN	AK	AK

DRAWING TITLE
1174 OSD CALCULATION SHEET

SCALE:	1:200
PROJECT NO.:	2122301
DWG NO.:	STW-DWG-003

B

TABLE OF COMPLIANCE

ITEM

1. Stormwater design is in accordance to AS/NZ 3500.3.2003 & Georges River Council Stormwater Management Policy April 2021.
2. As per Georges River Council Stormwater Management Policy April 2021 Table 3: OSD is required for Site with 55% - 65% impervious area. Max PSD 182 L/s/ha; Min. SSR: 206000 L/ha.
3. As per Georges River Council Stormwater Management Policy April 2021: Up to a maximum of 20% of the OSD storage volume required may be offset by rainwater tank storage for reuse. One third of the provided rainwater tank storage can be used to offset the OSD up to this maximum 20% limit.
4. As per Georges River Council Stormwater Management Policy April 2021: Maximum discharge rate to existing kerb and gutter is 25L/s.
5. As per BASIX. Rainwater Tank is to be connected to toilets and at least one outdoor water tap.

CRITICAL RAINFALL INTENSITY BOM 06/10/2022

¹⁰⁰ ₅ Rainfall Intensity	239mm/h
²⁰ ₅ Rainfall Intensity	182 mm/h
⁵ ₅ Rainfall Intensity	136 mm/h

Survey by Summit Geomatic Pty Ltd (6599 Rev. A, dated 25/08/2022)



PROJECT

1174-1178 FOREST RD
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CLIENT

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CONSULTANT

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REGISTRATION

Alexander Kameas
Principal Structural Engineer
PRE0000232

SAFETY IN DESIGN

Are there any additional hazards / risks not normally associated with the type of work detailed in this drawing?

YES NO

SUSTAINABILITY CONSIDERATIONS

KEYPLAN / LEGEND



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REV	DATE	DESCRIPTION
A	13.12.2022	ISSUED FOR DA
B	06.02.2023	ISSUED FOR DA
DESIGNED	CHECKED	APPROVED
DN	AK	AK

DRAWING TITLE

1176 OSD CALCULATION SHEET

SCALE: 1:200
PROJECT NO.: 2122301
DWG NO.: STW-DWG-004

Impervious Area Calculation (Appendix A7 - SMP2021)			
Surface Type	Impermeability Factor	Calculated Area (m2)	Factored Area (m2)
All areas of less than 1.5 metres clearance between the outer wall of a building and the nearest adjacent property boundary (excludes the area under a roof eave overhang that is to be included as a roof surface)	0.5	12.324	6.162
Roof Surface	1	283.094	283.094
	0.5	0	0
Ground Surface	1	70.516	70.516
	0.75	0	0
Timber Deck	0.5	0	0
	1	0	0
Swimming Pools	0.5	32.317	16.1585
	1	35.004	35.004

Total Site Area (m2)	627.066
Total Impervious Area (m2)	410.9345
Impervious Area (%)	65.53289446

Table 3 Georges River Council SMP 2021 - SSR & PSD Calculations

Impervious Area (%)	PSD (L/s/ha)	SSR (m3/ha)
Less than 55%	Not Required	
55%-65%	182	206
65%-75%	166	240
75%-85%	152	270
>>>85%	132	295

Catchment PSD (L/s/m2)	0.0166
Catchment SSR (L)	24

Site PSD (L/s)	10.4092956
Site SSR (L)	15049.584

Rainwater Tank	2000
Rainwater Tank offset (20%)	666

Offsetted SSR (L)	14384
-------------------	-------

	AREA	%	RUNOFF coeff
Proposed	627.066	100	
Roof	283.094	45.14580602	1
Impervious	150.161	23.94660211	0.9
Pervious	193.811	30.90759186	0.493912

Proposed	(L/s)
Q100	29.83849334
Q20	23.55670527
Q10	20.84411497
Q5	18.13152466

OSD Size	Length	Width	Depth	Volume Check
	6.5	2.5	0.9	14.625

OSD Levels	
Top of OSD (AHD)	57.95
Invert of OSD	57.05
Orifice CL	57.15

pi	3.141592654
Orifice Calc.	
h	0.8
g	9.8
Q20	23.55670527
Cd	0.6
A (m2)	0.002628744
d (m)	0.074688475
Max. d(mm)	74.68847471
d(mm)	66
Q20 (orifice) (L/s)	8.128343193



TABLE OF COMPLIANCE

ITEM

- Stormwater design is in accordance to AS/NZ 3500.3.2003 & Georges River Council Stormwater Management Policy April 2021.
- As per Georges River Council Stormwater Management Policy April 2021 Table 3: OSD is required for Site with 55% - 65% impervious area. Max PSD 182 L/s/ha; Min. SSR: 206000 L/ha.
- As per Georges River Council Stormwater Management Policy April 2021: Up to a maximum of 20% of the OSD storage volume required may be offset by rainwater tank storage for reuse. One third of the provided rainwater tank storage can be used to offset the OSD up to this maximum 20% limit.
- As per Georges River Council Stormwater Management Policy April 2021: Maximum discharge rate to existing kerb and gutter is 25L/s.
- As per BASIX. Rainwater Tank is to be connected to toilets and at least one outdoor water tap.

CRITICAL RAINFALL INTENSITY
BOM 06/10/2022

100 ₅ Rainfall Intensity	239mm/h
20 ₅ Rainfall Intensity	182 mm/h
5 ₅ Rainfall Intensity	136 mm/h

Survey by Summit Geomatic Pty Ltd (6599 Rev. A, dated 25/08/2022)



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REGISTRATION
Alexander Kameas
Principal Structural Engineer
PRE0000232

SAFETY IN DESIGN
Are there any additional hazards / risks not normally associated with the type of work detailed in this drawing?
 YES NO

SUSTAINABILITY CONSIDERATIONS

KEYPLAN / LEGEND

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REV	DATE	DESCRIPTION
A	13.12.2022	ISSUED FOR DA
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DESIGNED	CHECKED	APPROVED
DN	AK	AK

DRAWING TITLE

1178 OSD CALCULATION SHEET

SCALE: 1:200
PROJECT NO.: 2122301
DWG NO.: STW-DWG-005

Impervious Area Calculation (Appendix A7 - SMP2021)

Surface Type	Impermeability Factor	Calculated Area (m2)	Factored Area (m2)
All areas of less than 1.5 metres clearance between the outer wall of a building and the nearest adjacent property boundary (excludes the area under a roof eave overhang that is to be included as a roof surface)	0.5	15.614	7.807
Roof Surface	1	280.381	280.381
	0.5	0	0
Ground Surface	1	63.494	63.494
	0.75	0	0
Timber Deck	0.5	0	0
	1	0	0
Swimming Pools	0.5	32.788	16.394
	1	31.185	31.185
sum			
Total Site Area (m2)		643.983	
Total Impervious Area (m2)		399.261	
Impervious Area (%)		61.9986863	

Table 3 Georges River Council SMP 2021 - SSR & PSD Calculations

Impervious Area (%)	PSD (L/s/ha)	SSR (m3/ha)
Less than 55%	Not Required	
55%-65%	182	206
65%-75%	166	240
75%-85%	152	270
>>>85%	132	295

Catchment PSD (L/s/m2)	0.0182
Catchment SSR (L)	20.6

Site PSD (L/s)	11.7204906
Site SSR (L)	13266.0498

Rainwater Tank	2000
Rainwater Tank offset (20%)	666

Offsetted SSR (L)	12600
-------------------	-------

	AREA	%	RUNOFF coeff
Proposed	643.983		
Roof	280.381	43.53857167	1
Impervious	143.081	22.21813309	0.9
Pervious	220.521	34.24329524	0.493912

Proposed	(L/s)
Q100	30.07695012
Q20	23.74496062
Q10	21.01069243
Q5	18.27642424

OSD Size	Length	Width	Depth	Volume Check
	6.5	2.5	0.8	13

OSD Levels

Top of OSD (AHD)	57.25
Invert of OSD	56.45
Orifice CL	56.5

pi	3.141592654
Orifice Calc.	
h	0.75
g	9.8
Q20	23.74496062
Cd	0.6
A (m2)	0.003056941
d (m)	0.080542109
Max. d(mm)	80.54210871
d(mm) (Chosen)	66
Q20 (orifice) (m3)	7.870234455





PROJECT
1174-1178 FOREST RD
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ROTHSHIRE SERVICES PTY LTD
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REGISTRATION
Alexander Kameas
Principal Structural Engineer
PRE0000232

SAFETY IN DESIGN
Are there any additional hazards / risks not normally associated with the type of work detailed in this drawing?
 YES NO

SUSTAINABILITY CONSIDERATIONS

KEYPLAN / LEGEND

- Boundary
- Structures Shown Below
- - - Existing Roof
- - - Proposed Roof



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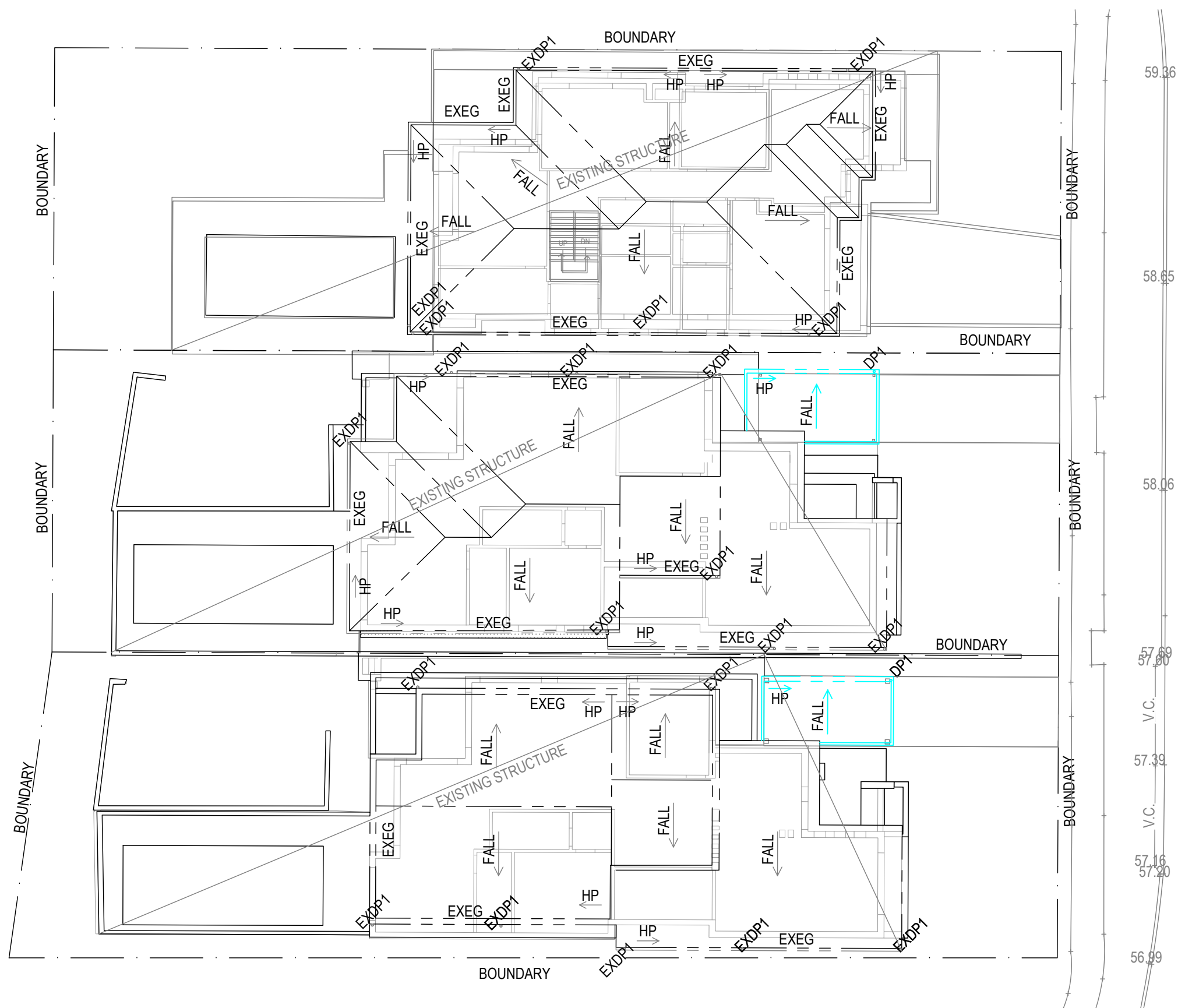
REV	DATE	DESCRIPTION
A	13.12.2022	ISSUED FOR DA
B	06.02.2023	ISSUED FOR DA

DESIGNED	CHECKED	APPROVED
DN	AK	AK

DRAWING TITLE

PROPOSED STORMWATER PLAN

SCALE:	1:200
PROJECT NO.:	2122301
DWG NO.:	STW-DWG-006



EXEG: Existing Eaves Gutter.
EG1: Eaves Gutter, min. 8400mm² effective cross sectional area
EXDP1: Existing Downpipe, Ø90mm uPVC Pipe.
DP1: Downpipe Ø90mm uPVC Pipe.

Do not scale from drawings. Use only figured dimensions

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Pty Ltd (6599 Rev. A,
dated 25/08/2022)



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REGISTRATION
Alexander Kameas
Principal Structural Engineer
PRE0000232

SAFETY IN DESIGN
Are there any additional hazards / risks not normally associated with the type of work detailed in this drawing?
 YES NO

SUSTAINABILITY CONSIDERATIONS

KEYPLAN / LEGEND
 - - - - - Boundary
 - - - - - Existing / Proposed Structures
 - - - - - Existing Agriculture Line
 - - - - - Proposed Agriculture Line



PRINT IN COLOR

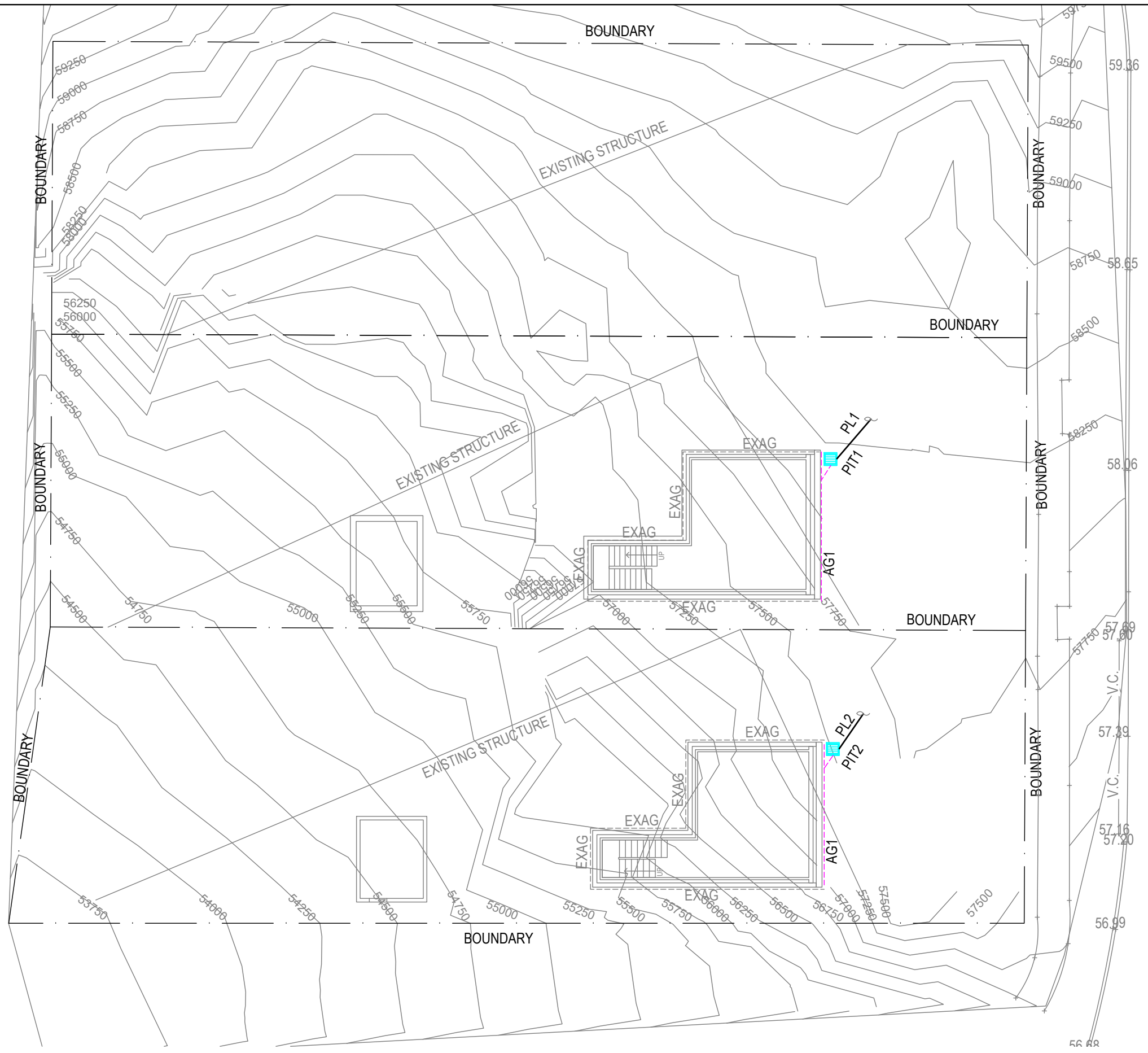
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REV	DATE	DESCRIPTION
A	13.12.2022	ISSUED FOR DA
B	06.02.2023	ISSUED FOR DA

DESIGNED	CHECKED	APPROVED
DN	AK	AK

DRAWING TITLE
PROPOSED BASEMENT 1
STORMWATER PLAN

SCALE:	1:200
PROJECT NO.:	2122301
DWG NO.:	STW-DWG-007



EXAG: Existing Agriculture Line.
AG1: Agriculture Line, Ø100mm.
PIT1 & PIT2: Sump Pit, To be Determined prior to construction.
PL1 & PL2: Pump Line, Ø100mm.

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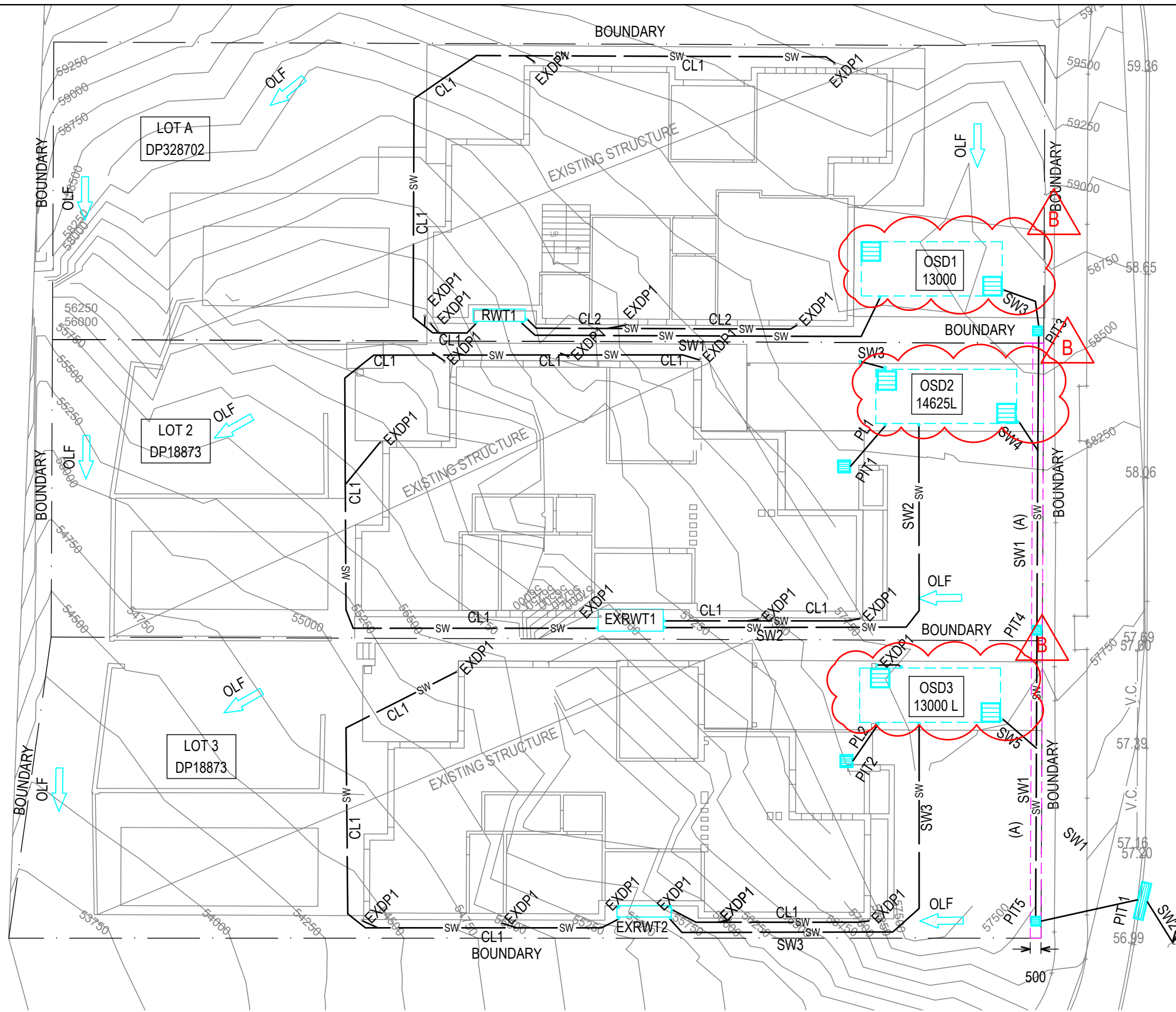
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(A) Easement to drain water DP18873
Lot A DP328702 Beneficiary.
Lot 2 DP18873 Burdened & Beneficiary.
Lot 3 DP18873 Burdened.

PROJECT	1174-1178 FOREST RD LUGARNO	
CLIENT	LUGARNO DEVELOPMENTS PTY LTD	
CONSULTANT	ROTHSHIRE SERVICES PTY LTD A.B.N. 73 655 665 151 (T) 1300 076 847 (E) admin@rothshire.com.au	
REGISTRATION	Alexander Kameas Principal Structural Engineer PRE0000232	
SAFETY IN DESIGN	Are there any additional hazards / risks not normally associated with the type of work detailed in this drawing? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
SUSTAINABILITY CONSIDERATIONS		
KEYPLAN / LEGEND	<ul style="list-style-type: none"> — Boundary — Existing Structure — SW Proposed Stormwater Line (A) Proposed Easement 	
PRINT IN COLOR		
ISSUED FOR DA		
REV	DATE	DESCRIPTION
A	13.12.2022	ISSUED FOR DA
B	06.02.2023	ISSUED FOR DA
DESIGNED	CHECKED	APPROVED
DN	AK	AK
DRAWING TITLE		
PROPOSED STORMWATER SITE PLAN		
SCALE:	1:200	
PROJECT NO.:	2122301	
DWG NO.:	STW-DWG-008	



- EXDP1: Existing Downpipe, Ø90mm uPVC Pipe.
- DP1: Downpipe Ø90mm uPVC Pipe.
- CL1 - CL3: Charged line, Ø100mm uPVC Pipe.
- PL1 & PL2: Pumped Line, Ø100mm.
- PIT1 & PIT2: Sump Pit. TBD.
- SW1 - SW5: Stormwater Pipe, Ø100mmuPVC Pipe.
- EXRWT1 & EXRWT2: Existing Rainwater Tank, 2000L.
- RWT1: Rainwater Tank, 2000L.
- OSD1 - OSD3: Below ground on-site detention tank.

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REGISTRATION
Alexander Kameas
Principal Structural Engineer
PRE0000232

SAFETY IN DESIGN
Are there any additional hazards / risks not normally associated with the type of work detailed in this drawing?
 YES NO

SUSTAINABILITY CONSIDERATIONS

KEYPLAN / LEGEND

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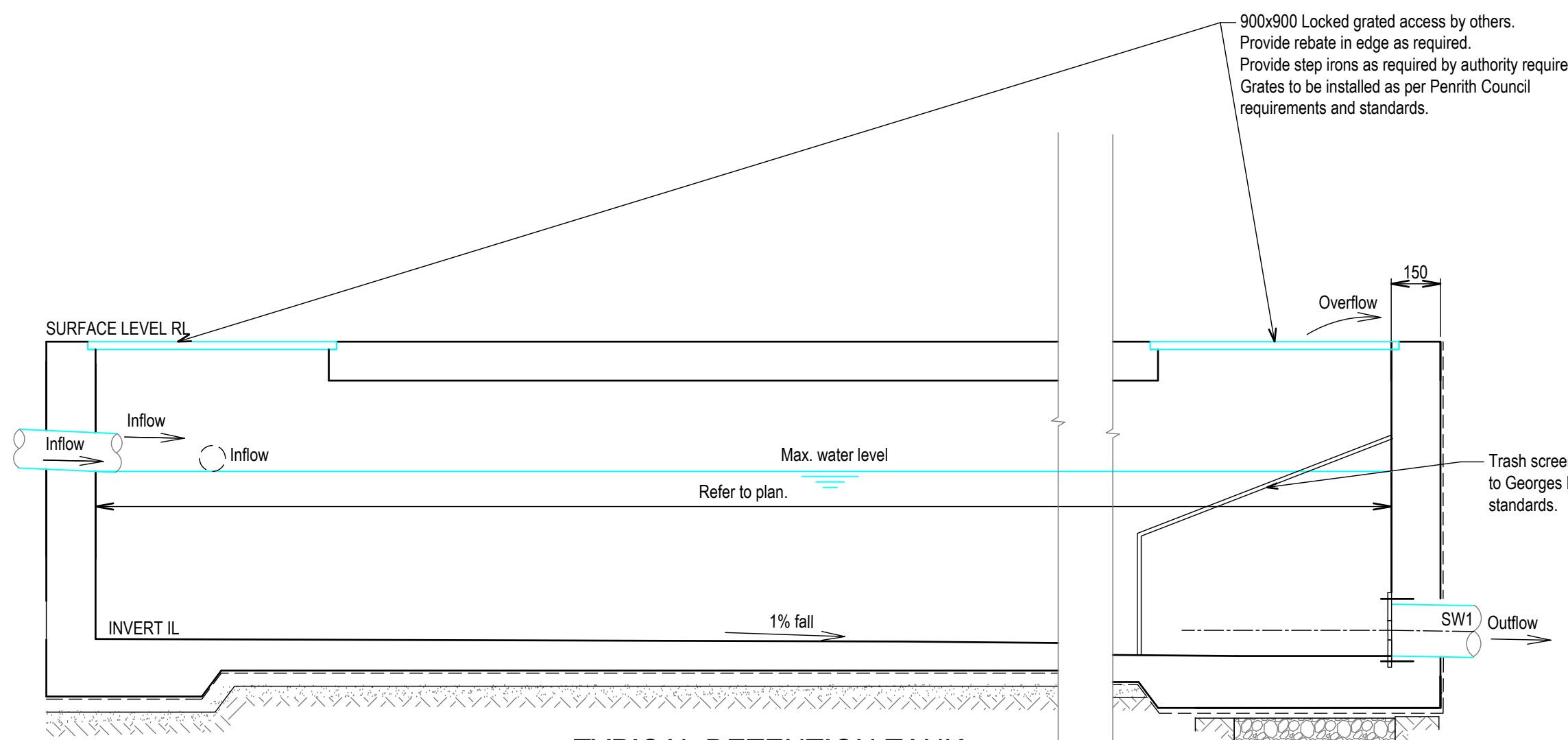
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A	13.12.2022	ISSUED FOR DA
B	06.02.2023	ISSUED FOR DA

DESIGNED	CHECKED	APPROVED
DN	AK	AK

DRAWING TITLE

TYPICAL OSD SECTION AND LEVELS

SCALE:	1:200
PROJECT NO.:	2122301
DWG NO.:	STW-DWG-009

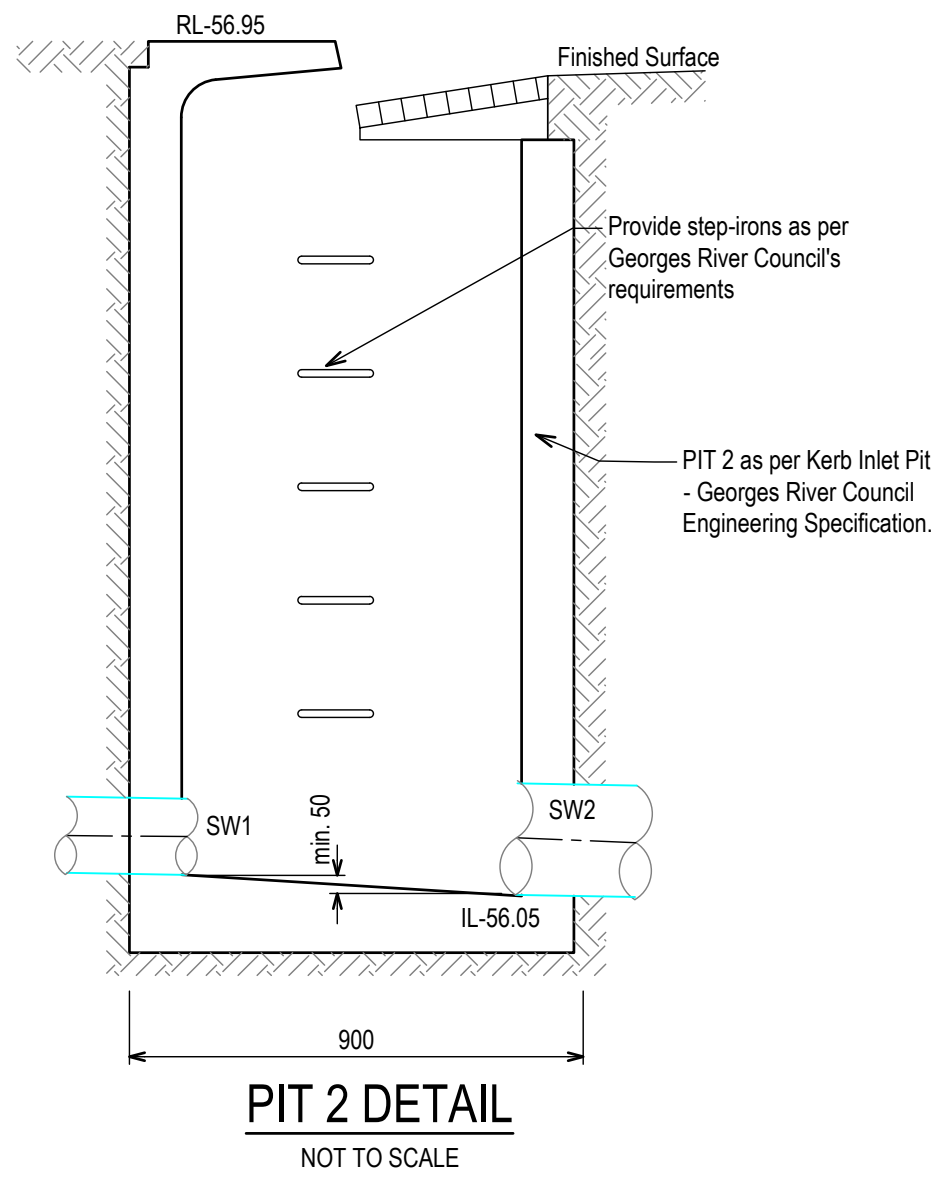


TYPICAL DETENTION TANK LONG SECTION

NOT TO SCALE
NOTE:

Tank structure to structural engineer's details

LEVELS			
NAME	RL	IL	VOLUME (M ³)
OSD1	58.00	57.20	13.000
OSD2	57.95	57.05	14.625
OSD3	57.25	56.50	13.000
PIT1	56.95	56.05	



PROJECT	1174-1178 FOREST RD LUGARNO
CLIENT	LUGARNO DEVELOPMENTS PTY LTD
CONSULTANT	ROTHSHIRE SERVICES PTY LTD A.B.N. 73 655 665 151 (T) 1300 076 847 (E) admin@rothshire.com.au
REGISTRATION	Alexander Kameas Principal Structural Engineer PRE0000232
SAFETY IN DESIGN	Are there any additional hazards / risks not normally associated with the type of work detailed in this drawing? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
SUSTAINABILITY CONSIDERATIONS	

KEYPLAN / LEGEND	
PRINT IN COLOR	

ISSUED FOR DA		
REV	DATE	DESCRIPTION
A	13.12.2022	ISSUED FOR DA
B	06.02.2023	ISSUED FOR DA
DESIGNED	CHECKED	APPROVED
DN	AK	AK

DRAWING TITLE	
SUMP PIT AND GULLY PIT DETAILS	
SCALE:	1:200
PROJECT NO.:	2122301
DWG NO.:	STW-DWG-008

Do not scale from drawings. Use only figured dimensions