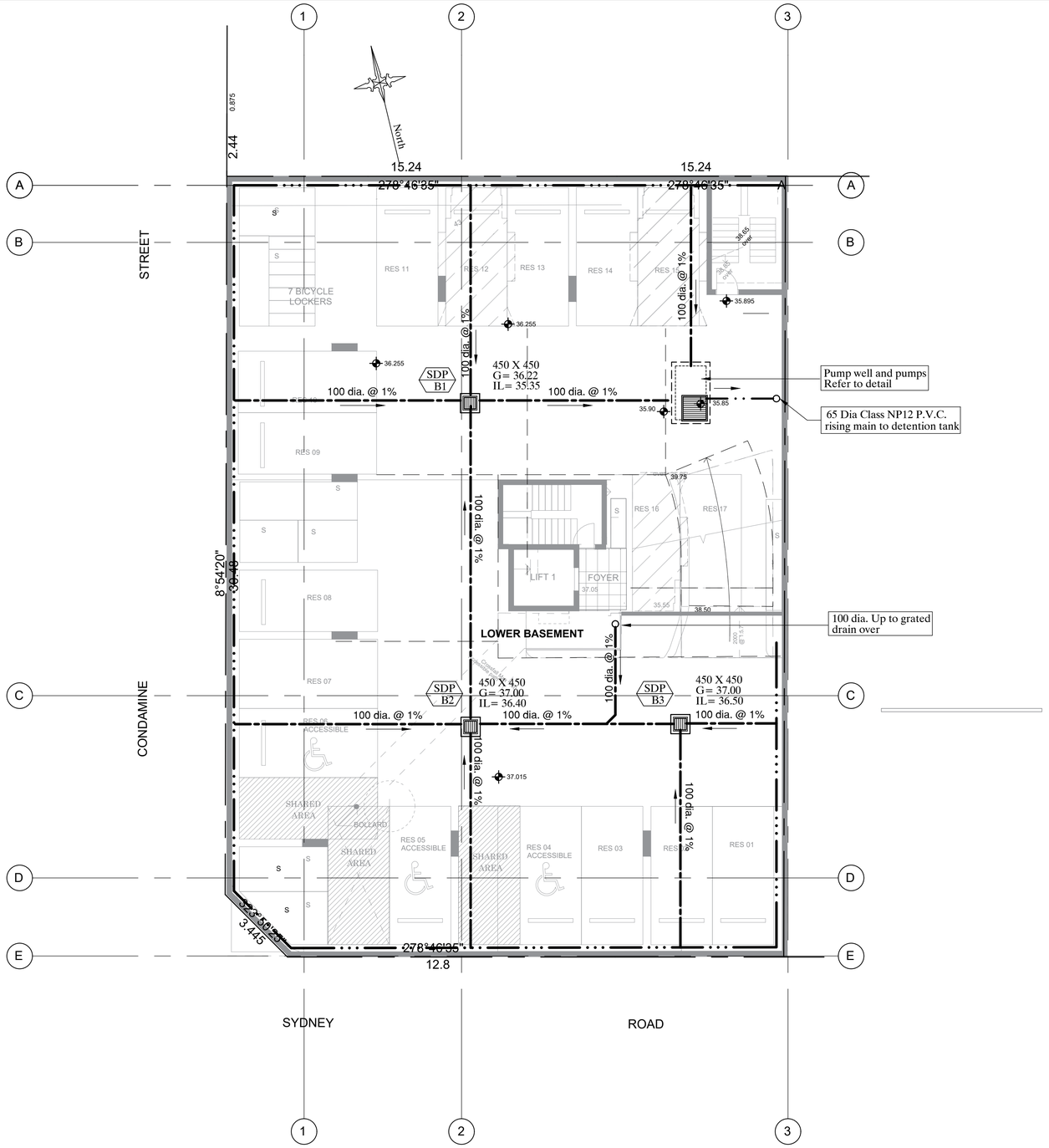

LOWER BASEMENT FLOOR PLAN

Scale 1 in 100

Scale 1 in 100 when printed on A1 sheet

ALL STORMWATER DRAINAGE TO BE SEWER GRADE P.V.C.
ALL STORMWATER DRAINAGE TO 100 Dia. @ 1% MIN. GRADE
UNLESS OTHERWISE NOTED ON PLAN

0m 2m 4m 6m 8m 10m 12m 14m 16m 18 20m

dwg scale : 1 : 100

LEGEND

- DP-1 / 100 dia. — Downpipe with min. size
- 450 X 450 G=13.60 IL=13.05 / SDP 1 — Stormwater Drainage Pit with Size, Grate Level & Invert Level
- GD 1 — Grated Drain
- RG-A 1 — Roof Inlet Grate Type A (250 Dia domed inlet X 100 Dia outlet by GALIN ENG,or similar)
- BG-A 1 — Balcony Inlet Grate Type A (200 x 200 mm flat inlet X 80 Dia outlet by GALIN ENG,or similar)
- BG-B 1 — Balcony Inlet Grate Type B (250 x 250 mm flat inlet X 100 Dia outlet by GALIN ENG,or similar)
- GGI 1 — 100 Dia. Grated Gully Inlet In Garden On Suspended Slab
- suspended slab area drained with 40mm ATLANTIS drainage cell
- 100 dia. @ 1% — P.V.C. Gravity Stormwater Drainage With Pipe Size & Flow Direction
- 65 Dia Pump Well Rising Main
- Sub-Soil Drain
- x138.x — Existing Level
- 20.25 / 20.25 — Proposed Level

GENERAL STORMWATER NOTES

1. All pipes and stormwater structures shall be in strict accordance with relevant S.A.A. Codes for materials, workmanship and to rules and regulations of the local Council.
2. The drawings are diagramatic and setouts shall be checked with the Architectural drawings.
3. All levels and dimensions shall be checked on site prior to start of construction.
4. Pipe materials indicated may be altered provided they comply with the requirements of the relevant authorities.
5. Gutters and downpipes shall be in strict accordance with AS 2179 & AS 2180. Gutters shall have a minimum effective cross sectional area of 12,800mm sq with 1 in 500 min. grade to downpipes, with 150 dia. downpipes unless otherwise noted on plans.
6. Stormwater pipes up to and including 300 dia. shall be PVC pipes, sewer grade, conforming to AS 1260 and installed in accordance with AS 3500.3 and related reference documents.
7. All existing services to be located prior to the commencement of construction. Any costs incurred for adjustments and/or relocation of services to be borne by the applicant.
8. Provide unrestricted overland flowpaths from all pits and drain to detention tank inlet grates.
9. On-site stormwater detention reduces flooding by providing temporary storage of stormwater during storms. After the storm, the stored water is slowly released, normally through a control orifice. Systems incorporating a High Early Discharge first fill the HED section, then overflow into the storage and later flow-back into HED through a one-way line. During light rain, no storage occurs. During extreme rainfall, the detention system will fill and could overflow. A typical storage system will quickly fill but take several hours to empty. Submersion during this period will not affect most grass, plants or trees.
10. Councils require that on-site detention systems be inspected during construction to enable a final Hydraulic Certificate and Work as Executed details to be supplied upon completion. Councils require that concrete works (tank bases, lids, retaining walls etc) are inspected before pouring and a Structural Engineers Certificate is issued on completion.
11. These details are subject to approval by Council and possibly other authorities. Do not continue or commit to any works until these details are approved. Advise Design Engineer of any special conditions imposed or design variations made to the details. Any alterations (however minor) must be authorised by the Design Engineer.
12. Conditions found during construction that conflict with these details shall be reported to the Design Engineer. If in doubt, ask. Design sizes, levels, heights and depths must not be varied without approval.
13. All works are to be completed before the Final Certificate will be issued. Tanks are to be clear of all formwork, builder's rubbish and silt. The outline and sump drain is to be clear. All pits and grates are to be completed and shall be free of building material and spoil. All downpipes are to be connected. Landscape works including driveways, kerbs and drive trench grates shall be installed. Orifices, screens, step irons and tank grate locks are to be correctly fitted. Surface detention areas are to be turfed.
14. Maintenance of the on-site stormwater detention system is the responsibility of the Owner. A complete set of these details shall be provided to the present owner. The details should be passed on to subsequent owners. It is important that these systems are not modified without approval. Do not enter any pit or tank where there is risk of inadequate ventilation or buildup of noxious odours, gases, or leakage of any volatile or toxic contaminations into the chamber. Obtain professional assistance if any of these conditions occur.
15. Maintenance and cleaning is required as follows. Remove and flush clean the trash screen. Hose out the tank base and remove accumulated debris. Flush the discharge-line clear. This must be done to Council's time requirements and as all Council's vary it is the responsibility of the Owner to find out Council's requirements.
16. Orifice plates shall be fabricated from 3mm thick stainless steel, with a circular hole machined to 1/2mm. Plates shall be fixed flush using four stainless steel expansion or chemical anchors. If required by Council, the orifice plate shall also be epoxy fixed. Unless otherwise detailed, plates shall be fixed on the centreline of the outlet.
17. Screen mesh shall be Lysaght's expanded metal, type RH3030, and shall not be hot dipped galvanised after fabrication. The screen shall have elongated mesh openings set horizontal, and the projecting mesh lines pointing down and facing upstream. Screens shall be provided with a suitable handle located on the top upstream face of the screen (for removal and, for flat screens, to define the screen orientation). All screens shall be removable by hand without the use of tools. Fixing brackets shall be stainless or galvanised mild-steel type. Bracket anchors shall be stainless steel. When installed, the maximum edge gap shall be 3mm + or - 3mm.
18. One-way flaps shall be Rocla Floodgate type. Flaps shall be located clear of inlets, screens and step irons and must not prevent the screen from being removed.
19. Concrete shall be 20 MPa for footings and tank bases, and 25 MPa for suspended tank lid slabs. Mesh reinforcement shall be lapped one square plus 25mm and bar reinforcement shall be lapped 500mm.
20. Permanent (non-structural) formwork shall be Lysaght's Bondek, any grade, or equal.
21. Tanks may be in-situ or precast. Note that falls, sumps and the position and depth to orifice plates or discharge control pipe is critical: both for hydraulic and health reasons. Overflow and access grates also provide light and ventilation requirements of various Authorities. Provide step irons to all tanks over 1200 depth.
22. Tank risers should be in-situ concrete. Risers shall have the same clear internal size as the tank access opening. Provide step irons to risers as specified.
23. Individual-rung step irons to tank, tank risers and deep pits shall be an approved type (galvanised steel or high impact plastic)complying with AS 1657. Fix rungs permanently and securely by drilling and epoxy grouting. Provide the specified number of step-irons, equally spaced vertically between 250mm and 350mm, with alternate rungs offset 200mm.
24. Grates and frame units shall be hinged and childproof, using either a spring loaded bolt or a bolt and lug locking system (padlocks are not permitted). The frames shall be securely attached to the tank or riser, or built into an in-situ slab.
25. Grates shall be class A (light duty) in paths and lawns: class B (medium duty) in residential vehicular areas: and class C (heavy duty) in public roadways.

Revision	Details	Date
D	Altered Drainage To Suit Architectural Changes	2022-02-17
C	LEC Revisions	2022-02-16
B	Adjusted OSD Position To Suit Architectural Changes	2022-02-02
A	Architect plans altered. Drainage altered to suit	2020-11-19

Project
Multi Unit Residential Development
At 332-338 Sydney Road Balgowlah
For Balgowlah Developments Pty. Ltd.

BURGESS, ARNOTT & GRAVA PTY. LTD.
CONSULTING STRUCTURAL, CIVIL & HYDRAULIC ENGINEERS
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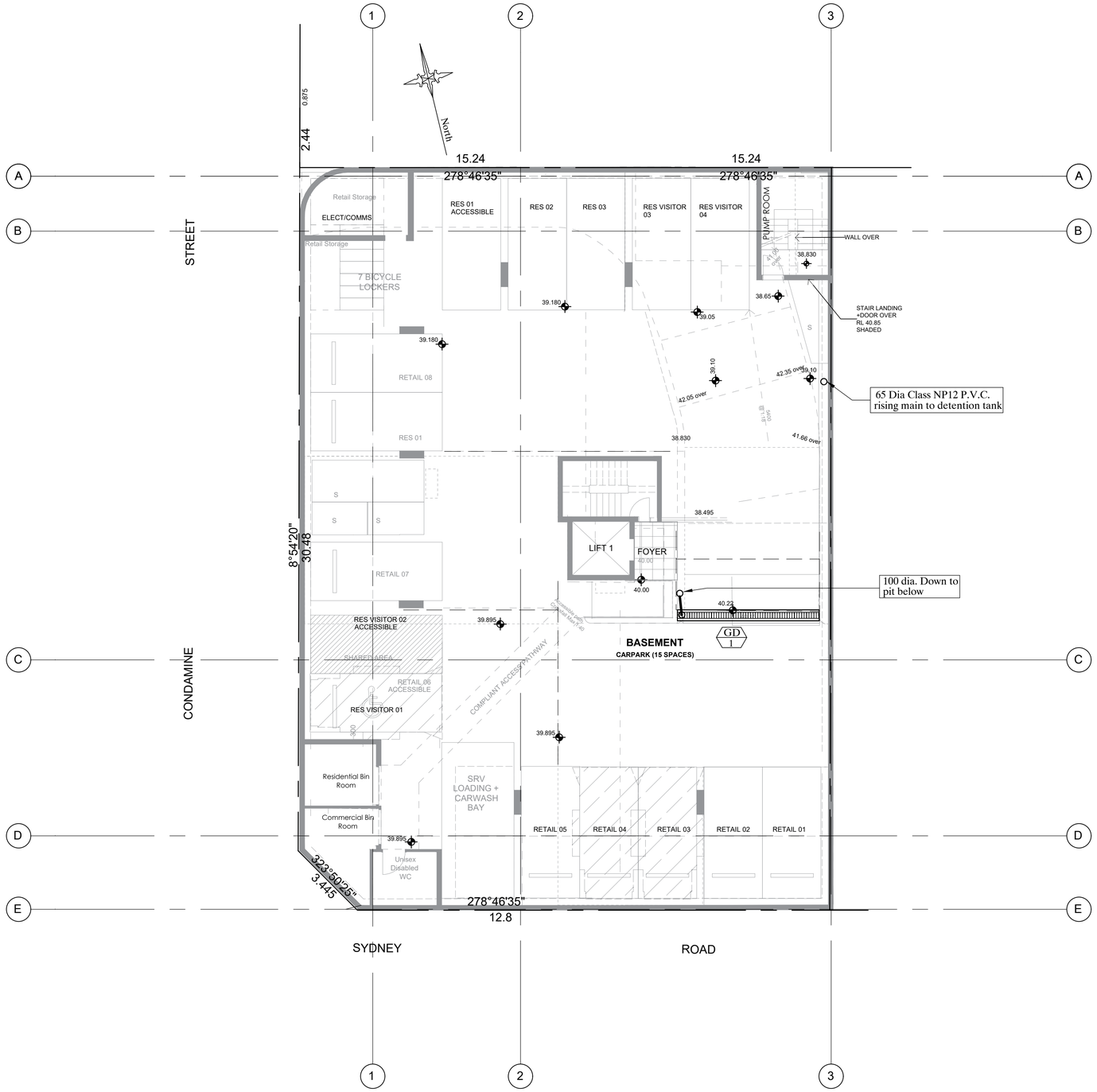
Title
STORMWATER DRAINAGE CONCEPT
LOWER BASEMENT FLOOR PLAN

Checked	Scale	Date	Drawing No.	Rev.
R. Grava	As shown	Mar.2020	2020-025-H1	D
Approved by			Drawing 1 in set of 8	
Chartered Engineer			Drawing size A1	



UPPER BASEMENT FLOOR PLAN

Scale 1 in 100

Scale 1 in 100 when printed on A1 sheet

ALL STORMWATER DRAINAGE TO BE SEWER GRADE P.V.C.
ALL STORMWATER DRAINAGE TO 100 Dia. @ 1% MIN. GRADE
UNLESS OTHERWISE NOTED ON PLAN

0m 2m 4m 6m 8m 10m 12m 14m 16m 18 20m

dwg scale : 1 : 100

LEGEND

- DP-1 / 100 dia. — Downpipe with min. size
- 450 X 450 G=13.60 IL=13.05 — Stormwater Drainage Pit with Size, Grate Level & Invert Level
- SDP 1
- GD 1 — Grated Drain
- RG-A 1 — Roof Inlet Grate Type A, 250 Dia domed inlet X 100 Dia outlet by GALIN ENG.or similar
- BG-A 1 — Balcony Inlet Grate Type A, 200 x 200 mm flat inlet X 80 Dia outlet by GALIN ENG.or similar
- BG-B 1 — Balcony Inlet Grate Type B, 250 x 250 mm flat inlet X 100 Dia outlet by GALIN ENG.or similar
- GGI 1 — 100 Dia. Grated Gully Inlet In Garden On Suspended Slab
- suspended slab area drained with 40mm ATLANTIS drainage cell
- 100 dia. @ 1% — P.V.C. Gravity Stormwater Drainage With Pipe Size & Flow Direction
- 65 Dia Pump Well Rising Main
- Sub-Soil Drain
- 20.25 — Existing Level
- 20.25 — Proposed Level

Revision	Details	Date
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Title
STORMWATER DRAINAGE CONCEPT
UPPER BASEMENT FLOOR PLAN

Checked	Scale	Date	Drawing No.	Rev.
R. Grava	As shown	Mar.2020	2020-025-H2	D
Approved by			Drawing 2 in set of 8	
Chartered Engineer			Drawing size A1	

Connect Ø375 Pipe To Opposite (Western) Side Of Condamine St. (Approx 36m)

Ø375 Concrete Pipe @ 1%

T.O.K. 42.00
IL 41.25

Proposed Gully Pit
Refer Northern Beaches Council Standard Detail

450 x 450
G= 42.22
IL= 41.40

SDP 2

900 x 900
G= 41.85
IL= 41.25

SDP 1

225 dia. @ 1.0% Min.
Suspended from under side of slab

IL 41.52

I/O - Inspection Outlet

I/O

225 dia. @ 1% 300 Dia. UPVC@ 1.0% Min.

IL 42.65

65 Dia Class NP12 P.V.C. rising main to detention tank

From OSD

Detention Tank Over Driveway

SINGLE STOREY BRICK BUILDING METAL ROOF No.120

SINGLE STOREY BRICK BUILDING TILE ROOF

FOUR STOREY BRICK RESIDENCE METAL ROOF

TWO STOREY BRICK RESIDENCE METAL ROOF No.330

TWO STOREY BRICK RESIDENCE METAL ROOF No.328

TWO STOREY BRICK RESIDENCE METAL ROOF No.322-326

STREET

CONDAMINE

SYDNEY ROAD

SHOP 1

SHOP 2

SHOP 3

SHOP 4

FOYER

PUMP ROOM

BULKY GOODS STORE 4 m2

BIN ROOM

LIFT 1

718 m2

STAIR

AC + ELECT PLANT ROOM

STAIR LANDING RL 40.85 UNDER SHADED

STEPS

CONCRETE DRIVEWAY

BALCONY

PAVED

METAL AWNING

PATH

CONCRETE SQUARE KERB

PRAM CROSSING

LINE OF AWNING OVER

LINE OF FLOOR OVER

LINE OF KERB

(INVERT OF KERB)

(BACK OF LAYBACK)

(LIP OF KERB)

BENCH MARK NAIL IN BITUMEN RL 43.22 AHD

MESH

FENCE

CONCRETE

42,840 REGRADE EXISTING BITUMEN DRIVEWAY

REGRADE EXISTING BITUMEN DRIVEWAY

15.24
278°46'35"

30.48
98°46'35"

2.44
188°54'20"

12.8
324°50'25"
3.445

DP 796788

DP 402050

DP 402050

SP 61772

LEGEND

DP-1 100 dia.	Downpipe with min. size
450 X 450 G=13.60 IL=13.05	Stormwater Drainage Pit with Size, Grate Level & Invert Level
SDP 1	
GD 1	Grated Drain
RG-A 1	Roof Inlet Grate Type A 250 Dia domed inlet X 100 Dia outlet by GALIN ENG.or similar
BG-A 1	Balcony Inlet Grate Type A 200 x 200 nim flat inlet X 80 Dia outlet by GALIN ENG.or similar
BG-B 1	Balcony Inlet Grate Type B 250 x 250 nim flat inlet X 100 Dia outlet by GALIN ENG.or similar
GGI 1	100 Dia. Grated Gully Inlet In Garden On Suspended Slab
	suspended slab area drained with 40mm ATLANTIS drainage cell
100 dia. @ 1%	P.V.C. Gravity Stormwater Drainage With Pipe Size & Flow Direction
	65 Dia Pump Well Rising Main
	Sub-Soil Drain
43.88	Existing Level
20.25 / 20.25	Proposed Level

GROUND FLOOR PLAN

Scale 1 in 100

Scale 1 in 100 when printed on A1 sheet

ALL STORMWATER DRAINAGE TO BE SEWER GRADE P.V.C.
ALL STORMWATER DRAINAGE TO 100 Dia. @ 1% MIN. GRADE UNLESS OTHERWISE NOTED ON PLAN

0m 2m 4m 6m 8m 10m 12m 14m 16m 18 20m

dwg scale : 1 : 100

Revision	Details	Date
D	Altered Drainage To Suit Architectural Changes	2022-02-17
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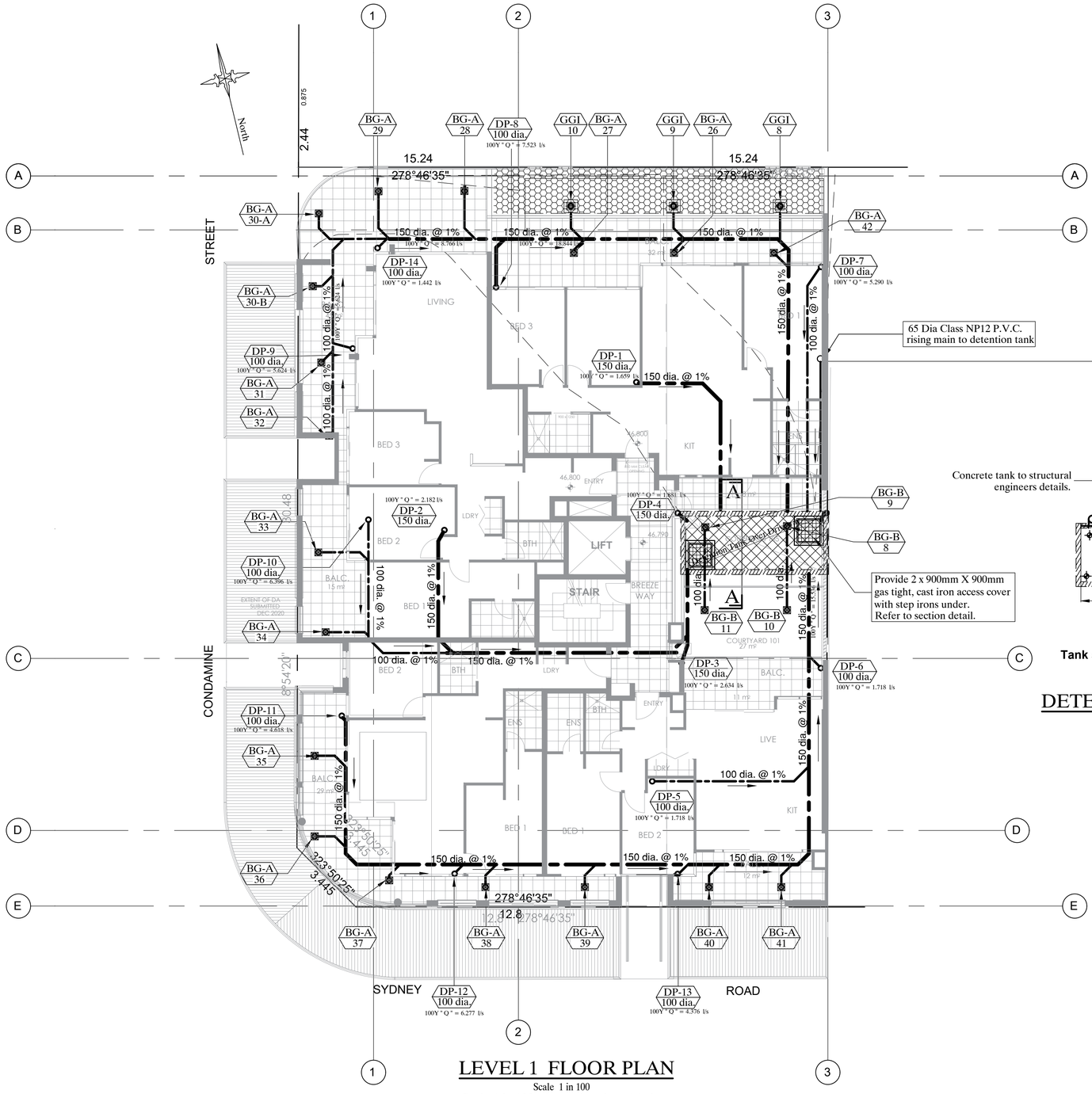
Title
STORMWATER DRAINAGE CONCEPT GROUND FLOOR PLAN

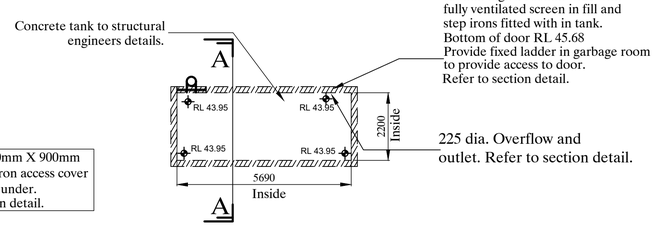
Checked	Scale	Date	Drawing No.	Rev.
R. Grava	As shown	Mar.2020	2020-025-H3	D
Approved by			Drawing 3 in set of 8	
Chartered Engineer			Drawing size A1	



LEVEL 1 FLOOR PLAN

Scale 1 in 100

Scale 1 in 100 when printed on A1 sheet



Tank surface area 12.32 m2 x 2.45 m deep
Volume 29.6 m3

DETENTION TANK BASE

Scale 1 in 100

LEGEND

- DP-1 / 100 dia. — Downpipe with min. size
- 450 X 450 G=13.60 IL=13.05 — Stormwater Drainage Pit with Size, Grate Level & Invert Level
- SDP 1 — Stormwater Drainage Pit with Size, Grate Level & Invert Level
- GD 1 — Grated Drain
- RG-A 1 — Roof Inlet Grate Type A 250 Dia domed inlet X 100 Dia outlet by GALIN ENG.or similar
- BG-A 1 — Balcony Inlet Grate Type A 200 x 200 mm flat inlet X 80 Dia outlet by GALIN ENG.or similar
- BG-B 1 — Balcony Inlet Grate Type B 250 x 250 mm flat inlet X 100 Dia outlet by GALIN ENG.or similar
- GGI 1 — 100 Dia. Grated Gully Inlet In Garden On Suspended Slab
- suspended slab area drained with 40mm ATLANTIS drainage cell
- 100 dia. @ 1% — P.V.C. Gravity Stormwater Drainage With Pipe Size & Flow Direction
- 65 Dia Pump Well Rising Main
- Sub-Soil Drain
- 43.95 — Existing Level
- 20.25 / 20.25 — Proposed Level

0m 2m 4m 6m 8m 10m 12m 14m 16m 18 20m

dwg scale : 1 : 100

Revision	Details	Date
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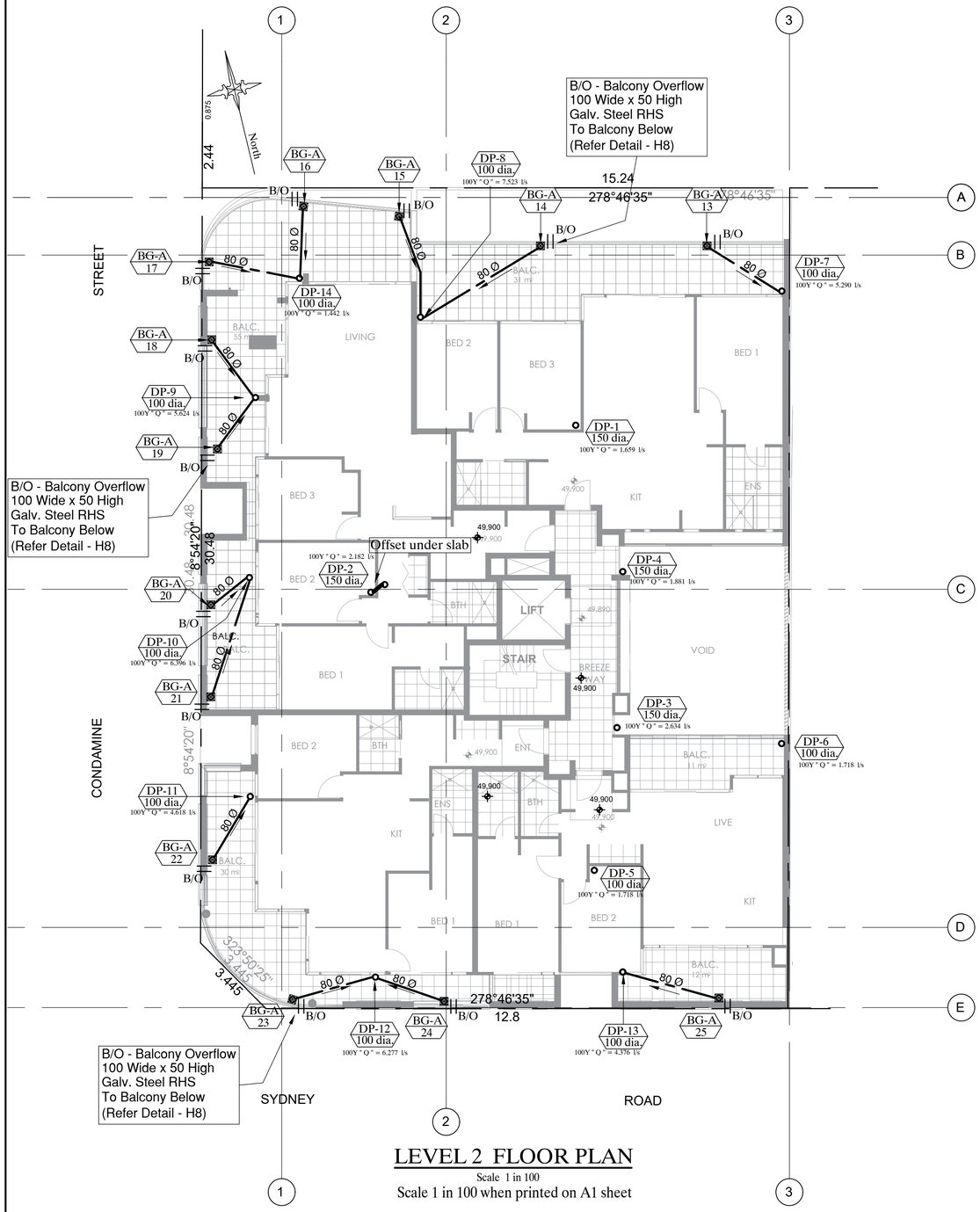
Title
STORMWATER DRAINAGE CONCEPT
LEVEL 1 FLOOR PLAN

Checked	Scale	Date	Drawing No.	Rev.
R. Grava	As shown	Mar.2020	2020-025-H4	D

Approved by
Chartered Engineer

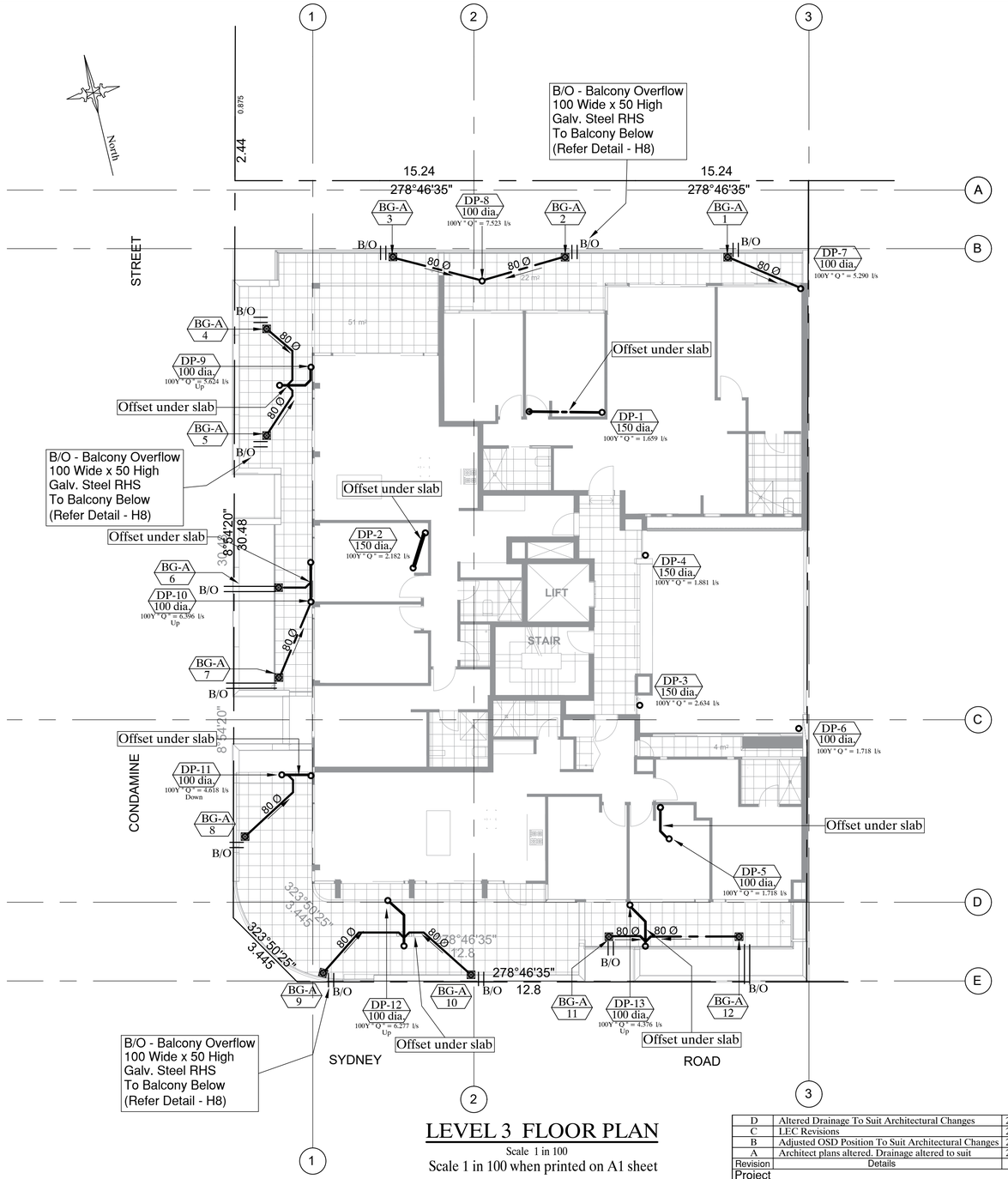
Drawing 4 in set of 8
Drawing size A1



LEVEL 2 FLOOR PLAN

Scale 1 in 100

Scale 1 in 100 when printed on A1 sheet



LEVEL 3 FLOOR PLAN

Scale 1 in 100

Scale 1 in 100 when printed on A1 sheet

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C	LEC Revisions	2022-02-16
B	Adjusted OSD Position To Suit Architectural Changes	2022-02-02
A	Architect plans altered. Drainage altered to suit	2020-11-19

Project

Multi Unit Residential Development

At 332-338 Sydney Road Balgowlah

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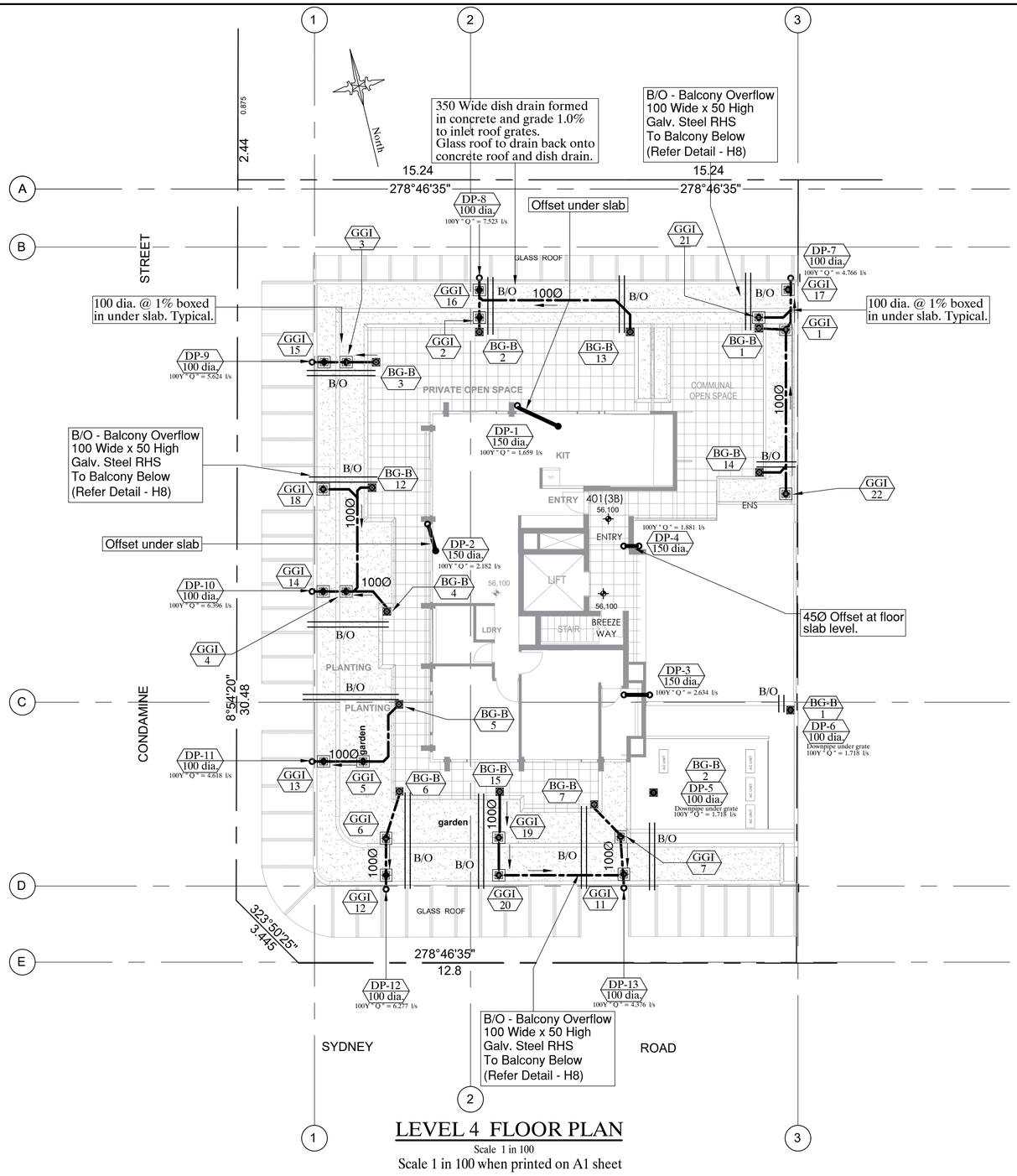
Title

STORMWATER DRAINAGE CONCEPT
LEVELS 2 & 3 FLOOR PLAN

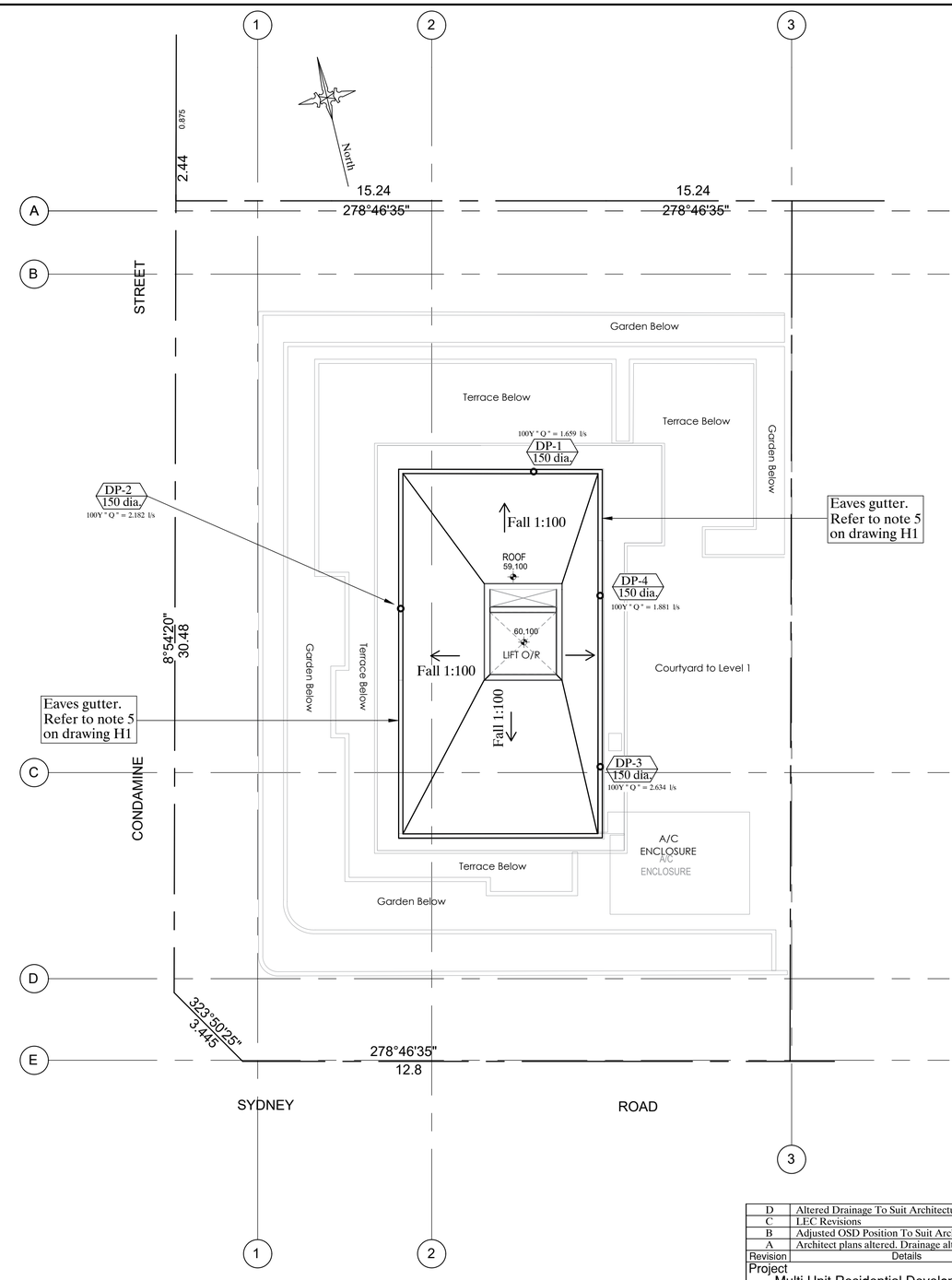
Checked	Scale	Date	Drawing No.	Rev.
R. Grava	As shown	Mar.2020	2020-025-H5	D
Approved by			Drawing 5 in set of 8	
Chartered Engineer			Drawing size A1	



LEVEL 4 FLOOR PLAN

Scale 1 in 100

Scale 1 in 100 when printed on A1 sheet



ROOF PLAN

Scale 1 in 100

Scale 1 in 100 when printed on A1 sheet

0m 2m 4m 6m 8m 10m 12m 14m 16m 18 20m

dwg scale : 1 : 100

Revision	Details	Date
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Project
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Title
STORMWATER DRAINAGE CONCEPT
LEVEL 4 FLOOR PLAN
ROOF PLAN

Checked	Scale	Date	Drawing No.	Rev.
R. Grava	As shown	Mar.2020	2020-025-H6	D
Approved by			Drawing 6 in set of 8	
Chartered Engineer			Drawing size A1	

750 x 750sq. Gas tight
cast iron cover and frame

COURTYARD 105

105 (3B) V1
46,790

RL 46,690

RL 46.40

2200 x 5690 OSD TANK

Tank surface area 12.32 m2 X 2.45 m deep
Volume 29.6 m3

Max. water Level RL 45.45 (1:100 YR)

RL 45.45

2450

STORMWATER DRAINAGE
DETENTION TANK
CONCRETE TANK TO
STRUCTURAL ENG'S. DETAILS

Step irons

225 dia.Outlet pipe

Trash screen to detail.

Orifice plate 80mm dia.
to detail.

RL 43.95

RL 43.95

225 dia.

C/L RL 43.95

225 dia.

225 dia.

SHOP4
RL 43,300

Provide recess in floor slab to
accommodate orifice plate and
silicon seal plate to wall.
Cement fill recess after fitting
orifice plate.

2250

Provide service entry door
650mm high x 900mm wide with
fully ventilated screen in fill and
step irons fitted with in tank.
Bottom of door RL 45.68

225 dia Overflow
IL 45.45

Provide fixed ladder in garbage room
to provide access to tank service door.

225 dia Outlet Along Wall To SDP-2

29.6m³ OSD With Ø60 Orifice Plate			
Storm Event (% AEP)	PSD (L/s) [35% Imperv. 1:5YR Storm]	Postdev. Flow From OSD (L/s)	Top Water Level In OSD (m)
1 in 5 YR (20%)	18	11	44.67
1 in 10 YR (10%)	18	12	44.85
1 in 20 YR (5%)	18	14	45.04
1 in 50 YR (2%)	18	15	45.24
1 in 100 YR (1%)	18	16	45.45

42.85 over

IL 42.65

225 dia @ 1.0 % min. to SDP-2

42.60

42.50

Driveway beyond

41.90

Driveway

41.25

40.93

40.43

SECTION A - A
SECTION THROUGH DETENTION TANK AND OUTLET
N.T.S.

STAIR LANDING BELOW
RL 39.10

Fixing lug each side
fixed with 1- M12 S/S Dyna bolt

800

800

RH3030 Maximesh gal.

25mm x 25mm x 5mm
angle gal. steel frame

Provide 2 lifting handles on screen

800

400

TRASH SCREEN DETAIL
N.T.S.

STAIR LANDING
RL 39.10

Orifice diameter 80mm

225 dia.Outlet pipe

50 50

50

C/L RL 44.55

50

C/L RL 44.55

Pipe diameter (behind plate)

3mm Stainless steel plate

4 / 100 X 10mm
S/S Dyna bolts

Provide recess in floor slab to
accommodate orifice plate and
silicon seal plate to wall.
Cement fill recess after fitting
orifice plate.

ORIFICE PLATE DETAIL
N.T.S.

Revision	Details	Date
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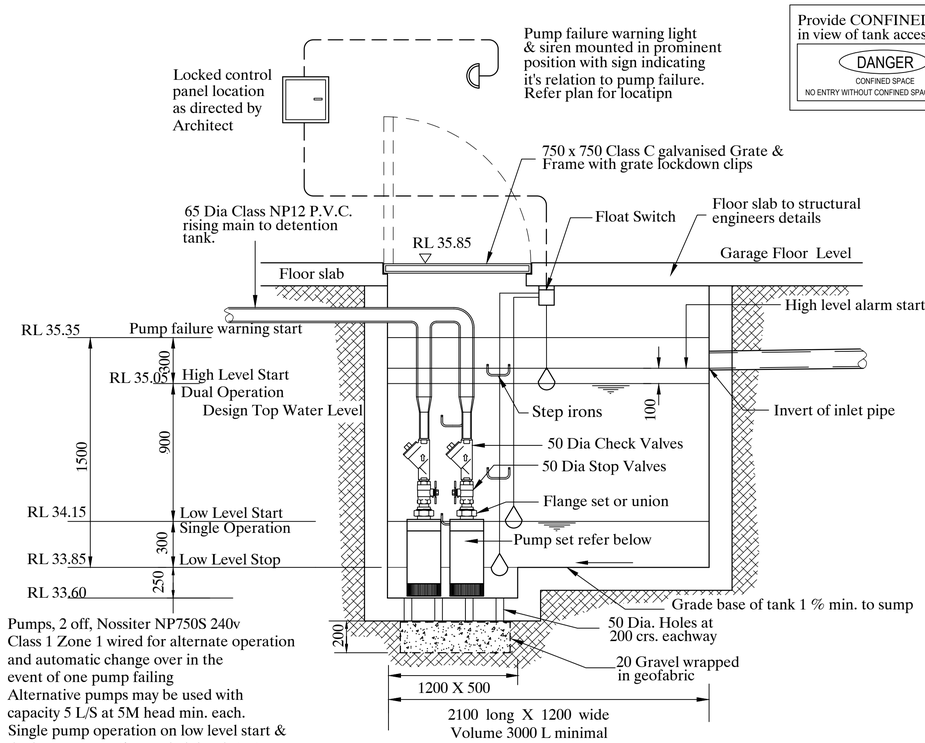
Title
STORMWATER DRAINAGE
CONCEPT DETAILS SHEET 1 OF 2

Checked	Scale	Date	Drawing No.	Rev.
R. Grava	As shown	Mar.2020	2020-025-H7	D
Approved by			Drawing 7 in set of 8	
Chartered Engineer			Drawing size A1	



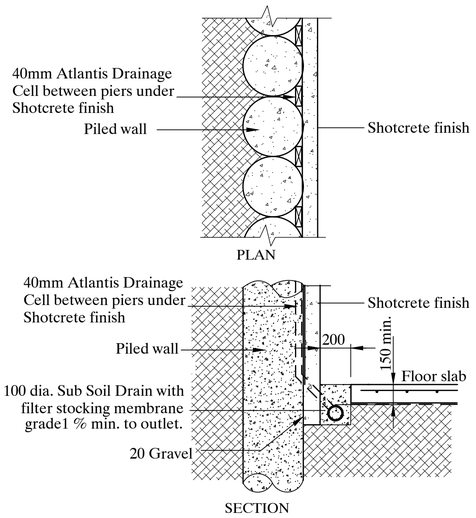
Pumps, 2 off, Nossiter NP750S 240v
Class 1 Zone 1 wired for alternate operation and automatic change over in the event of one pump failing
Alternative pumps may be used with capacity 5 L/S at 5M head min. each.
Single pump operation on low level start & dual pump operation on hgh level start.
Alternative pre-cast approved concrete pit may be used

PUMP WELL DETAIL

N.T.S.

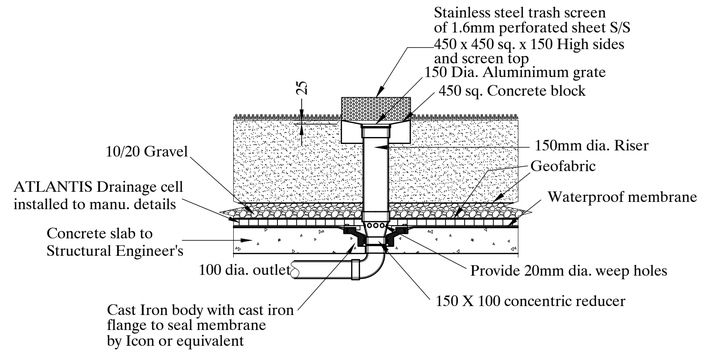
Provide CONFINED SPACE DANGER signs in view of tank access grates and covers

DANGER
CONFINED SPACE
NO ENTRY WITHOUT CONFINED SPACE TRAINING



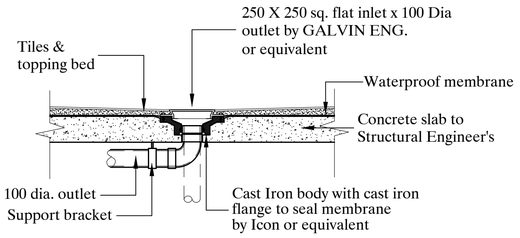
TYPICAL SECTION SUB-SOIL DRAIN TO PILED BASEMENT WALL

N.T.S.



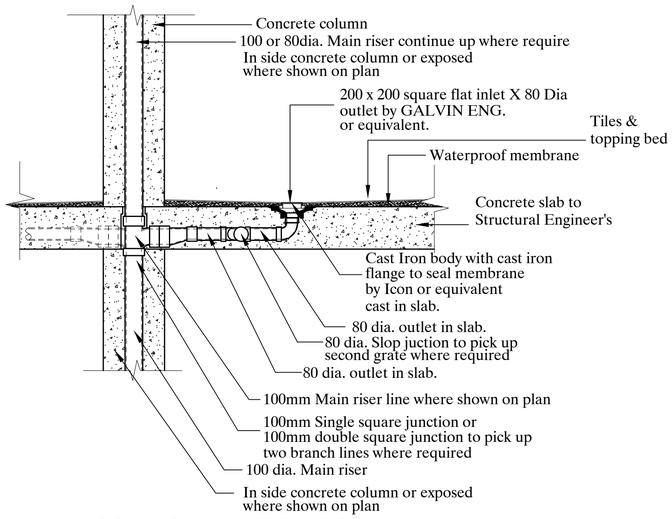
TYPICAL LAWN INLET DETAILS ON SUSPENDED SLAB

Shown on plan GGI 1



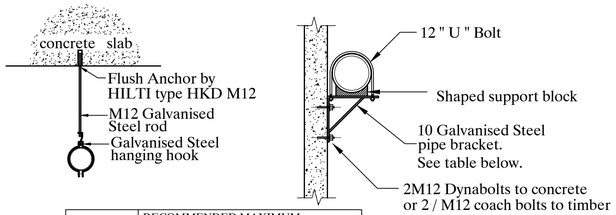
250sq. BALCONY INLET GRATE TYPE BG-B

Shown on plan BG-B 1

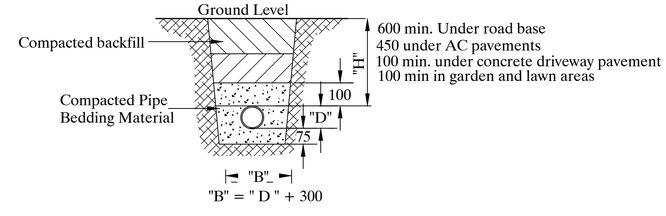


BALCONY GRATE TYPE BG-A

N.T.S.
Shown on plan VG-A 1



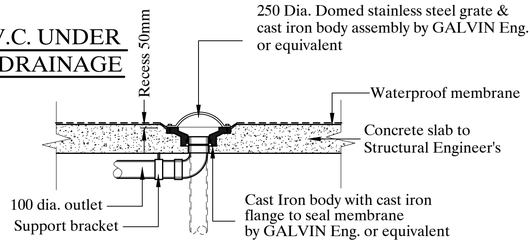
NOMINAL SIZE OF PIPE	RECOMMENDED MAXIMUM SPACING OF SUPPORTS in M	
	HORIZONTAL OR GRADED PIPES	VERTICAL PIPES
80	1.35	2.70
100	1.50	3.00
125	1.70	3.00
150	2.00	3.00
175	2.00	3.00
200	2.00	3.00
225	2.00	3.00
250	2.00	3.00
300	2.00	3.00



For Material Refer AS 2566

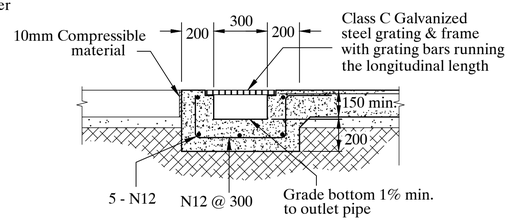
TYPICAL SECTION OF P.V.C. UNDER GROUND STORMWATER DRAINAGE

N.T.S.



ROOF GRATE TYPE RG-A

Shown on plan RG-A 1

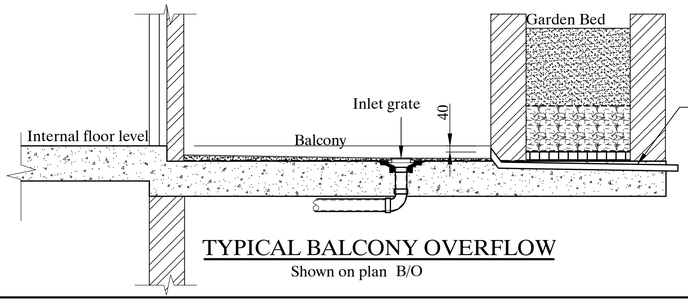


GRATED DRAIN TO DRIVEWAY

N.T.S.

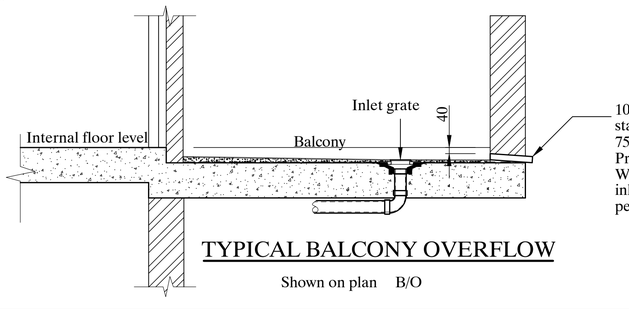
TYPICAL SECTION OF SUSPENDED STORMWATER DRAINAGE

N.T.S.



TYPICAL BALCONY OVERFLOW

Shown on plan B/O



TYPICAL BALCONY OVERFLOW

Shown on plan B/O

Revision	Details	Date
D	Altered Drainage To Suit Architectural Changes	2022-02-17
C	LEC Revisions	2022-02-16
B	Adjusted OSD Position To Suit Architectural Changes	2022-02-02
A	Architect plans altered. Drainage altered to suit	2020-11-19

Project
Multi Unit Residential Development
At 332-338 Sydney Road Balgowlah
For Balgowlah Developments Pty. Ltd.

BURGESS, ARNOTT & GRAVA PTY. LTD.
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Title
STORMWATER DRAINAGE
CONCEPT DETAILS SHEET 2 OF 2

Checked	Scale	Date	Drawing No.	Rev.
R. Grava	As shown	Mar.2020	2020-025-H8	D

Approved by
Chartered Engineer

Drawing 8 in set of 8
Drawing size A1