

PIPEWORK

- STW STORMWATER
- SS SUBSOIL
- DP DOWNPIPE
- RD ROOF DRAINAGE
- EXISTING SERVICE
- EXISTING SERVICE TO BE DISCONNECTED AND REMOVED

PIPEWORK SYMBOLS

- R RISER
- D DROPPER
- COF CAPPED OFF
- HP HORIZONTAL PENETRATION
- DOF DIRECTION OF FLOW
- NC NEW CONNECTION
- C CONTINUATION
- MH MAN HOLE
- CO CLEAR OUT
- STWKP STORMWATER KERB INLET PIT
- STWIP STORMWATER INLET PIT
- GRD GRATED DRAIN
- SO SAFETY OVERFLOW
- SP SPREADER
- RWO RAINWATER OUTLET
- BRWO BALCONY RAINWATER OUTLET
- PRWO PLANTER RAINWATER OUTLET
- SRWO SPOON DRAIN RAINWATER OUTLET

ABBREVIATIONS

- FFL FINISH FLOOR LEVEL
- IL INVERT LEVEL
- RL REDUCED LEVEL
- UPVC UNPLASTICIZED POLYVINYL CHLORIDE
- NTS NOT TO SCALE
- UNO UNLESS NOTED OTHERWISE
- SQ SQUARE
- mm MILLIMETRES
- m METRES
- m2 SQUARE METRES
- m3 CUBIC METRES
- /sec PER SECOND
- MIN MINIMUM
- MAX MAXIMUM
- APPR APPROXIMATELY
- DIA DIAMETER
- EX EXISTING
- AHD AUSTRALIAN HEIGHT DATUM

STORMWATER

GENERAL NOTES
ALL IN ACCORDANCE WITH COUNCIL'S STORMWATER REQUIREMENTS

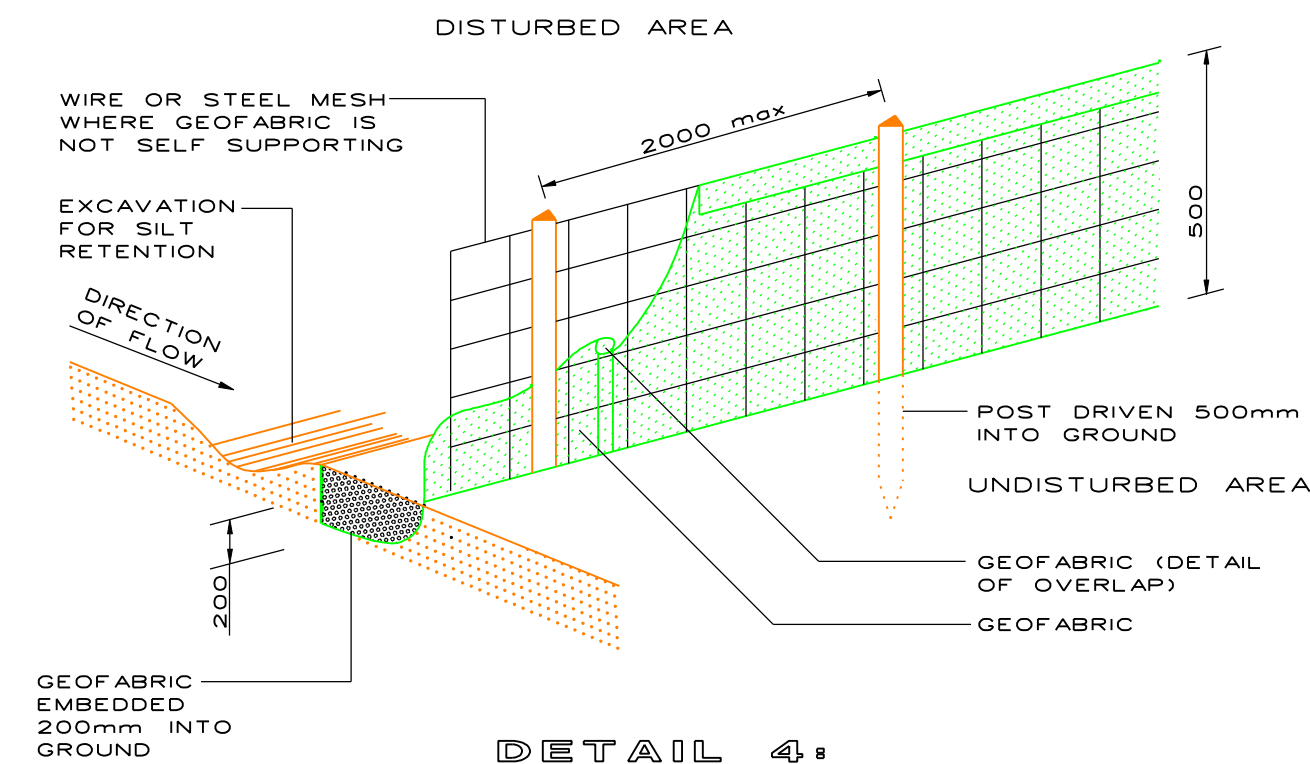
PIPEWORK DESIGN
ALL PIPEWORK IS SIZED AND DESIGNED TO HANDLE A 1:100 YEAR EVENT RAINFALL

PIPEWORK
ALL PIPEWORK TO BE 100mm @ 1% FALL (UNO)

STORMWATER PIT SIZES

MINIMUM INTERNAL MEASUREMENTS:			
DEPTH TO BASE OF CHAMBER	RECTANGULAR WIDTH	RECTANGULAR LENGTH	CIRCULAR LADDER / STEP IRON
SWALLER THAN 600	450	450	600 NO
601 TO 900	600	600	900 NO
901 TO 1200	600	900	1050 NO
GREATER THAN 1200	900	900	1050 YES

INSTALL AS REQUIRED AS REQUIRED TO SUIT CONSTRUCTION PROCESS



DETAIL 4: SILT FENCE
NTS NTS

DETAIL 1: DIAGRAMMATIC SECTION THROUGH DETENTION TANK
NTS

ITEM	DESCRIPTION	
A	TANK AREA	51.0m2
B	EFFECTIVE WATER DEPTH	0.53m
C	EFFECTIVE TANK VOLUME (51.0m2 x 0.53m)	27.0m3
D	INLET / ACCESS / SURCHARGE GRATE (LOCKED)	600 SQ
E	INLET / ACCESS GRATE (LOCKED)	600 SQ
F	MAX. WATER LEVEL ABOVE C OF ORIFICE PLATE	0.69m
G	OUTLET PIPE	225mm DIA
H	TRASH SCREEN	REFER TO DETAIL 3
I	ORIFICE PLATE	REFER TO DETAIL 2
J	SILT TRAP	1.0m SQ
K	WEEP HOLES 20mm DIA	@ 200mm CENTRE
L	BLUE METAL BED (WRAPPED IN GEOFABRIC)	200mm HIGH
M	INLET PIPE	REFER TO PLAN
N	STEP IRONS	

- ALL TANK DIMENSIONS SHOWN ARE INTERNAL MEASUREMENTS
- REFER TO STRUCTURAL ENGINEERS DOCUMENTS FOR WALL / SLAB THICKNESS AND CONSTRUCTION DETAILS

PRE DEVELOPED CATCHMENT AREAS

SYMBOL	CATCHMENT	IMPERVIOUS AREA	PERVIOUS AREA	PERCENTAGE
[Red Hatched]	ROOF AND PAVED AREAS	212.6m2	-	17.9%
[Green Dotted]	DEEPSOIL LANDSCAPING	-	976.2m2	82.1%
TOTAL		1188.8m2		100%

STORMWATER REQUIREMENTS

ALL IN ACCORDANCE WITH LIVERPOOL COUNCIL'S STORMWATER REQUIREMENTS / DCP

GENERAL

PROPOSED MIX USE (RESIDENTIAL / RETAIL) DEVELOPMENT

PERMISSIBLE SITE DISCHARGE (PSD)

PERMISSIBLE SITE DISCHARGE: 40.0 ltrs / sec
OSD BY - PASS DISCHARGE: 5.9 ltrs / sec
OSD DISCHARGE: 34.1 ltrs / sec

ON SITE DETENTION (OSD)

DETENTION STORAGE REQUIRED: 27.0m3

RAINWATER COLLECTION

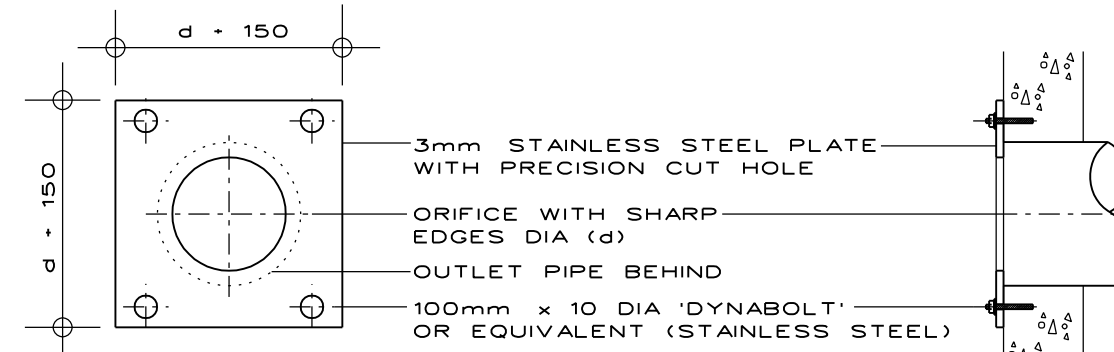
A RAINWATER COLLECTION TANK IS PROPOSED IN LINE WITH THE BASIX REPORT. REFER TO DRAWING H - DA - 03 FOR FURTHER INFORMATION.

FINAL FIGURES TO BE CONFIRMED WITH 'DRAINS COMPUTER MODELING' CALCULATIONS

POST DEVELOPED CATCHMENT AREAS

SYMBOL	CATCHMENT	IMPERVIOUS AREA	PERVIOUS AREA	PERCENTAGE
[Red Hatched]	ROOF AND PAVED AREAS	966.4m2	-	81.3%
[Green Dotted]	DEEPSOIL LANDSCAPING	-	222.4m2	18.7%
TOTAL		1188.8m2		100%

TOTAL DETENTION TANK BY - PASS AREA: 79.2m2
67.2m2 IMPERVIOUS
12.0m2 PERVIOUS

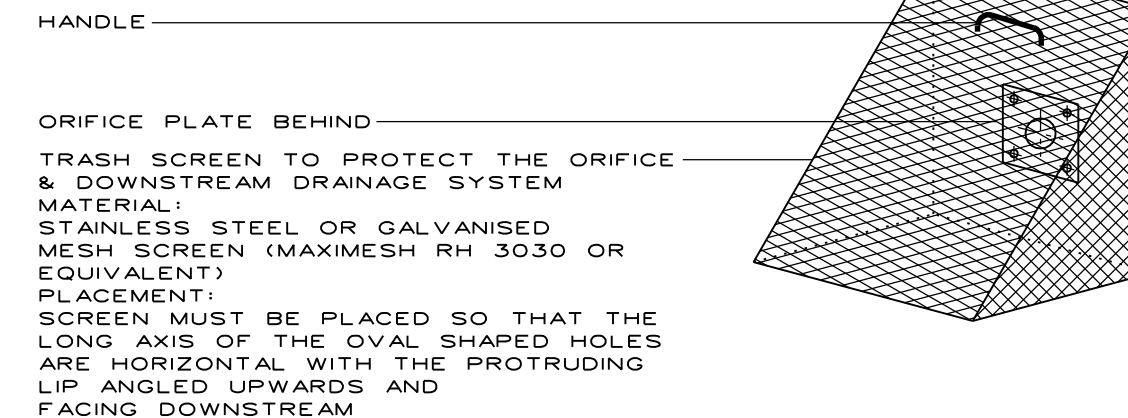


CALCULATION OF ORIFICE SIZE

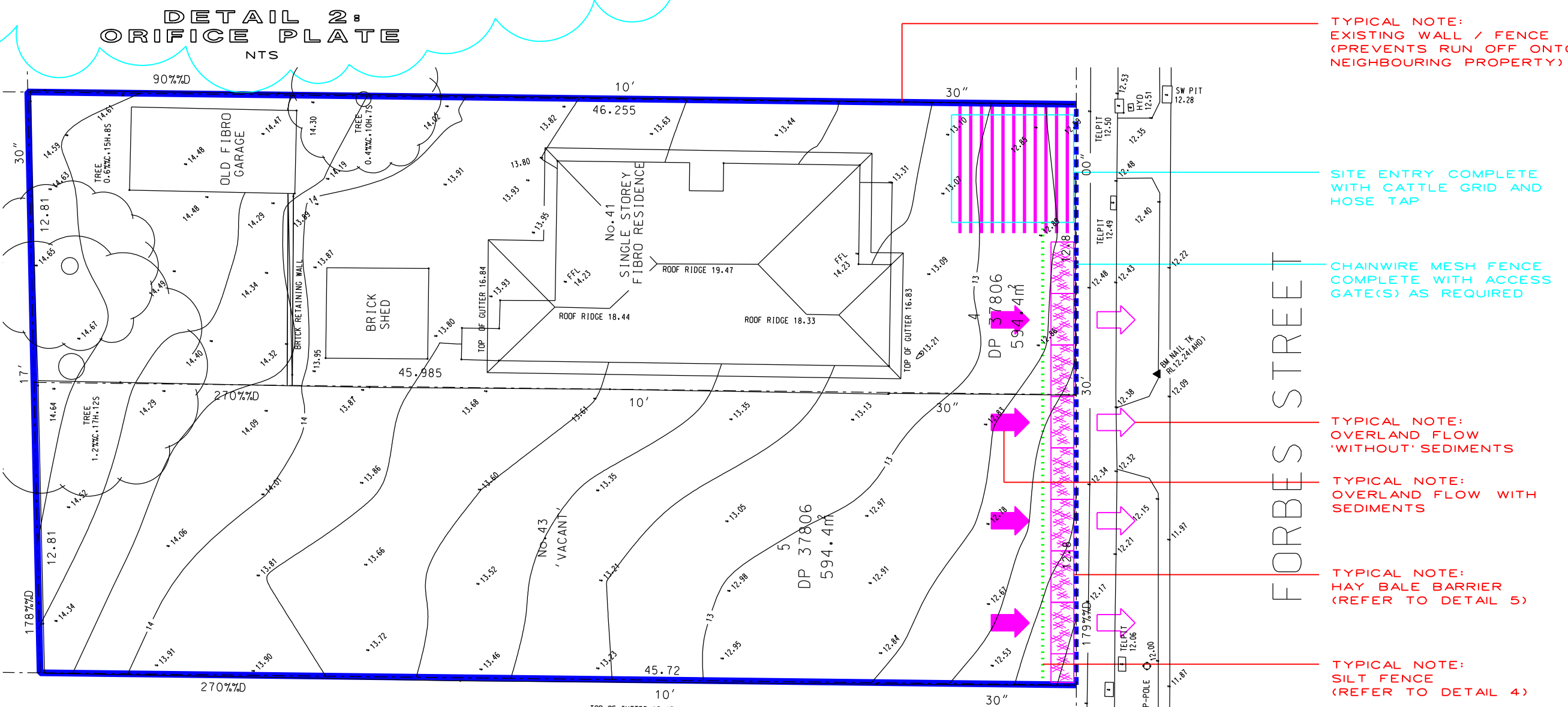
PSD = PERMISSIBLE SITE DISCHARGE IN [m3/s]
A = CROSS SECTIONAL AREA OF ORIFICE PLATE IN [m2]
C = DISCHARGE CO-EFFICIENT (0.6 FOR ORIFICE PLATE)
g = ACCELERATION DUE TO GRAVITY = 9.81 [m/s2]
H = MAX HEIGHT / HEAD OF WATER ABOVE THE CENTRE LINE OF THE ORIFICE PLATE IN [m]
D = ORIFICE DIAMETER IN [mm]

$$A = \frac{PSD}{C \times \sqrt{2 \times g \times H}} = \frac{0.0341}{0.6 \times \sqrt{2 \times 9.81 \times 0.69}} = 0.015m^2$$
$$D = \sqrt{\frac{A \times 4}{\pi}} = \sqrt{\frac{0.015 \times 4}{\pi}} \times 1000 \text{ mm/m} = 138mm \text{ DIA}$$

DETAIL 2: ORIFICE PLATE
NTS



DETAIL 3: REMOVABLE TRASH SCREEN
NTS



SEDIMENTATION CONTROL DURING CONSTRUCTION

DETAIL 5: HAY BALE BARRIER

APPROVAL

CLIENT
CLEMPTON HOLDINGS
pty ltd

ARCHITECT
FOX JOHNSTON

itmdesign
consulting hydraulic engineers
unit 6 / 3 apollo st, warriewood nsw 2102
po box 1438 mono vale nsw 1660
tel(02) 9997 1566 fax (02) 9997 3266
email: markus@itmdesign.com.au

PROJECT
41 - 43
FORBES
STREET
LIVERPOOL

DRAWING TITLE
LEGEND, CATCHMENT
CALCS. AND SED.
CONTROL

SCALE
1:200 @ A1 / 1:400 @ A3
JOB No
17/111

DISCIPLINE
HYD
DRAWING No
H-DA-00
REVISION
B

REV	DESCRIPTION	DATE
B	RE - ISSUED FOR DA	27.06.19
A	ISSUED FOR DA	21.06.18

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

STORMWATER DA
DRAWING ONLY

- NOT FOR CONSTRUCTION
- FINAL LOCATION OF ALL DOWNPIPES, PITS, RAINWATER OUTLETS
AND SUBSOIL PIPES TO BE CONFIRMED DURING CONSTRUCTION
CERTIFICATE STAGE OF THE PROPOSED DEVELOPMENT

NOTES

FOR GENERAL NOTES AND LEGEND
REFER TO DRAWING H - DA - 00

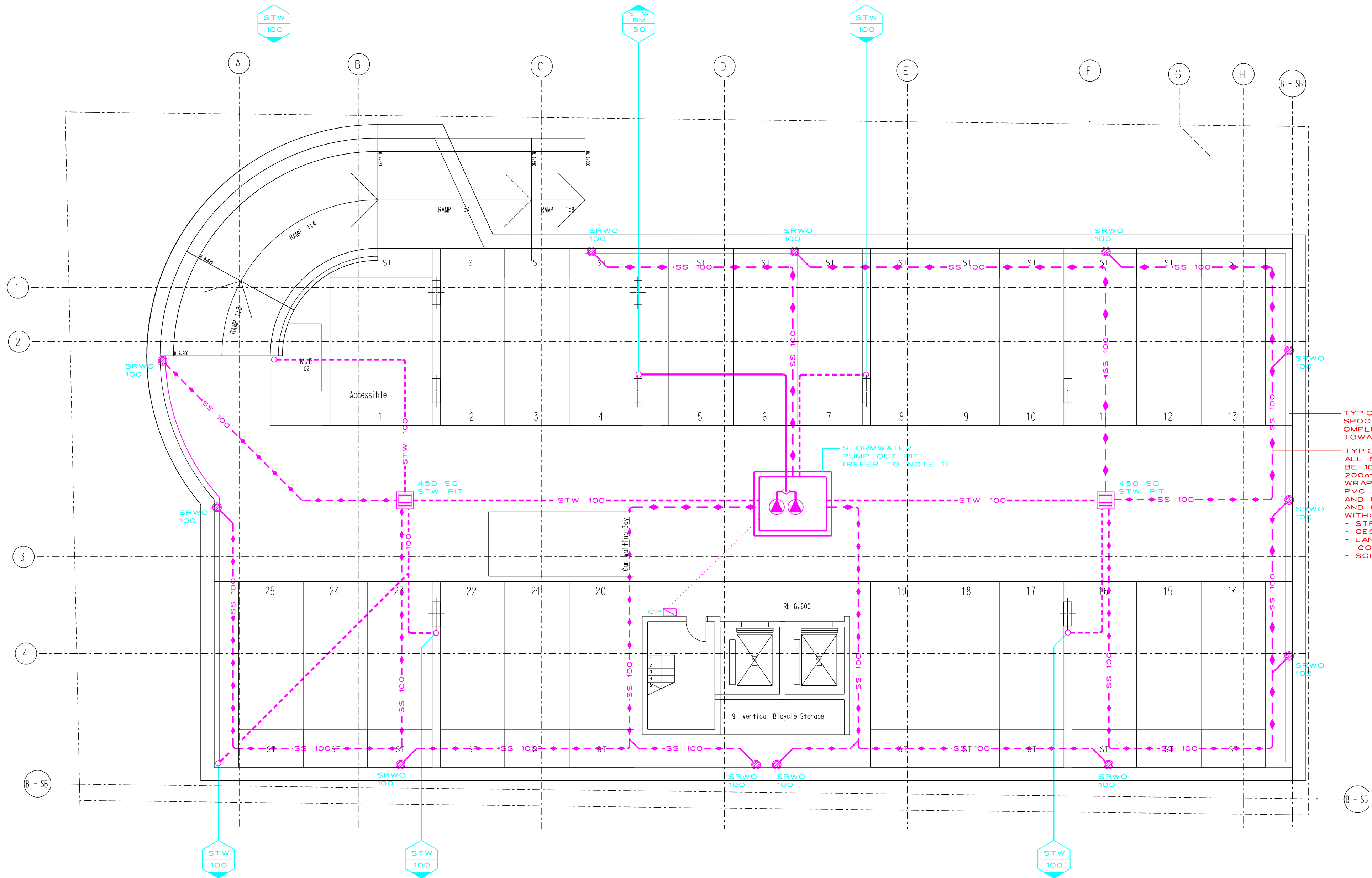
- 1 STORMWATER PUMP OUT PIT COMPLETE WITH:
- DUAL PUMPS
 - LOCKED CLASS 'C' INLET / ACCESS GRATE (600 SQ)
 - CONTROL PANEL
 - AUDIBLE HIGH LEVEL ALARM
 - FLOAT SWITCHES (ALTERNATE PUMP RUN)
 - PUMP DUTY: 2.0 ltrs / sec @ 12m HEAD (EACH PUMP)

PIT MATERIAL / CONSTRUCTION TO BE CO-ORDINATED WITH STRUCTURAL & GEOTECHNICAL ENGINEERS. PAY SPECIAL ATTENTION TO GROUNDWATER PRESSURE AND POSSIBLE 'UPLIFT'.

PIT SIZE:

- APPROX. 50.0m² OF AREAS 'OPEN TO THE SKY' ARE DISCHARGING INTO THE PIT
- ASSUMED SEEPAGE INFLOW RATE = 0.2 ltrs / sec (TO BE VERIFIED DURING CONSTRUCTION)
- EMERGENCY STORAGE REQUIRED FOR THE FOLLOWING DURATION (ASSUMING THE PUMPS MALFUNCTION AND / OR THERE IS A BLACKOUT): 2 HOURS = 7.5m³

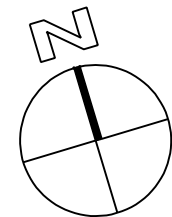
SUGGESTED PIT SIZE:
2.5m x 2.0m x 1.5m EFFECTIVE DEPTH
COMPLETE WITH 0.9m SQ x 0.2m D SUMP
TO HOUSE THE PUMPS



TYPICAL NOTE:
SPOON DRAIN 100mm W x 50mm D
COMPLETE WITH MIN 1% FALL
TOWARDS OUTLETS

TYPICAL NOTE:
ALL SUBSOIL DRAINAGE PIPES TO
BE 100mm DIA COMPLETE WITH
200mm BLUE METAL SURROUND
WRAPPED IN GEOFABRIC. USE
PVC PIPES WITH TOP HALF SLOTTED
AND NOT COILS. FINAL LOCATION
AND EXTENT TO BE CO-ORDINATED
WITH:
- STRUCTURAL ENGINEER
- GEOTECHNICAL ENGINEER
- LANDSCAPING CONSULTANT /
CONTRACTOR
- SOIL CONDITIONS

APPROVAL



LIST OF REFERENCE DRAWINGS USED		DRAWING REVISION	
DISCIPLINE	COMPANY	DRAWING No	A
ARCH	FOX	A-110-000	P09
ARCH	FOX		
SURVEY	URBANEX		
STRUCT			
MECH			
ELEC			
FIRE			

A	ISSUED FOR DA	21.06.18
REV	DESCRIPTION	DATE

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FORBES
STREET
LIVERPOOL

DRAWING TITLE
LOWER BASEMENT
STORMWATER
DRAINAGE

SCALE
1:100 @ A1 / 1:200 @ A3

JOB No
17/111

DISCIPLINE
HYD

DRAWING No
H-DA-01

REVISION
A

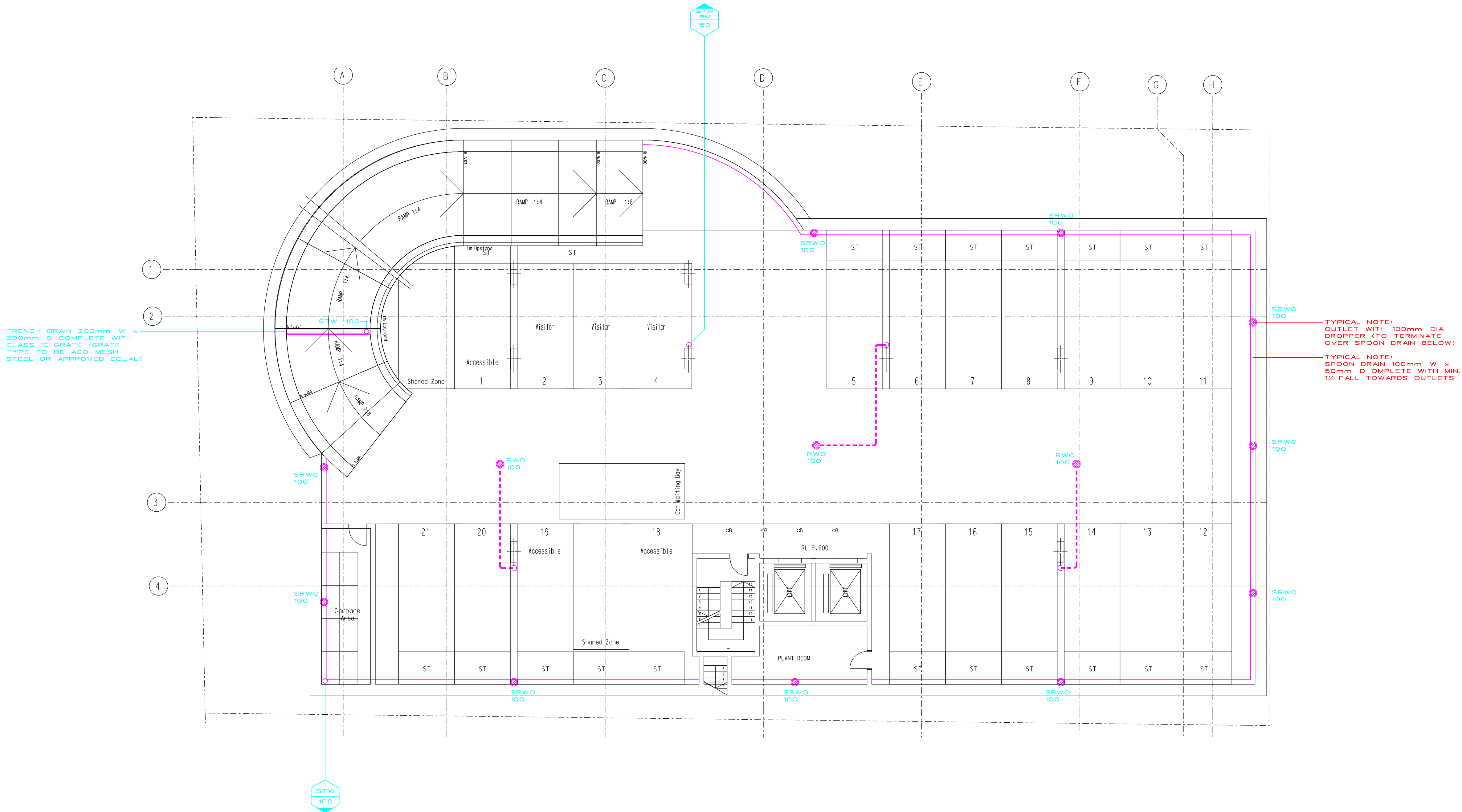
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STW DA DRAWING

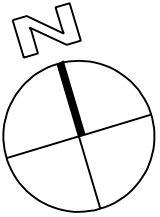
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LIVERPOOL

SCALE 1:100 @ A1 / 1:200 @ A3 JOB No 17/111

DISCIPLINE HYD DRAWING No H-DA-02 REVISION A

- NOT FOR CONSTRUCTION
- FINAL LOCATION OF ALL DOWNPIPES, PITS, RAINWATER OUTLETS AND SUBSOIL PIPES TO BE CONFIRMED DURING CONSTRUCTION CERTIFICATE STAGE OF THE PROPOSED DEVELOPMENT

ALL LANDSCAPED AREAS LOCATED ABOVE CONCRETE SLABS
TO BE EQUIPPED WITH WATERPROOFING MEMBRANE,
DRAINAGE CELL AND GEOFABRIC

FOR GENERAL NOTES AND LEGEND
REFER TO DRAWING H - DA - 00

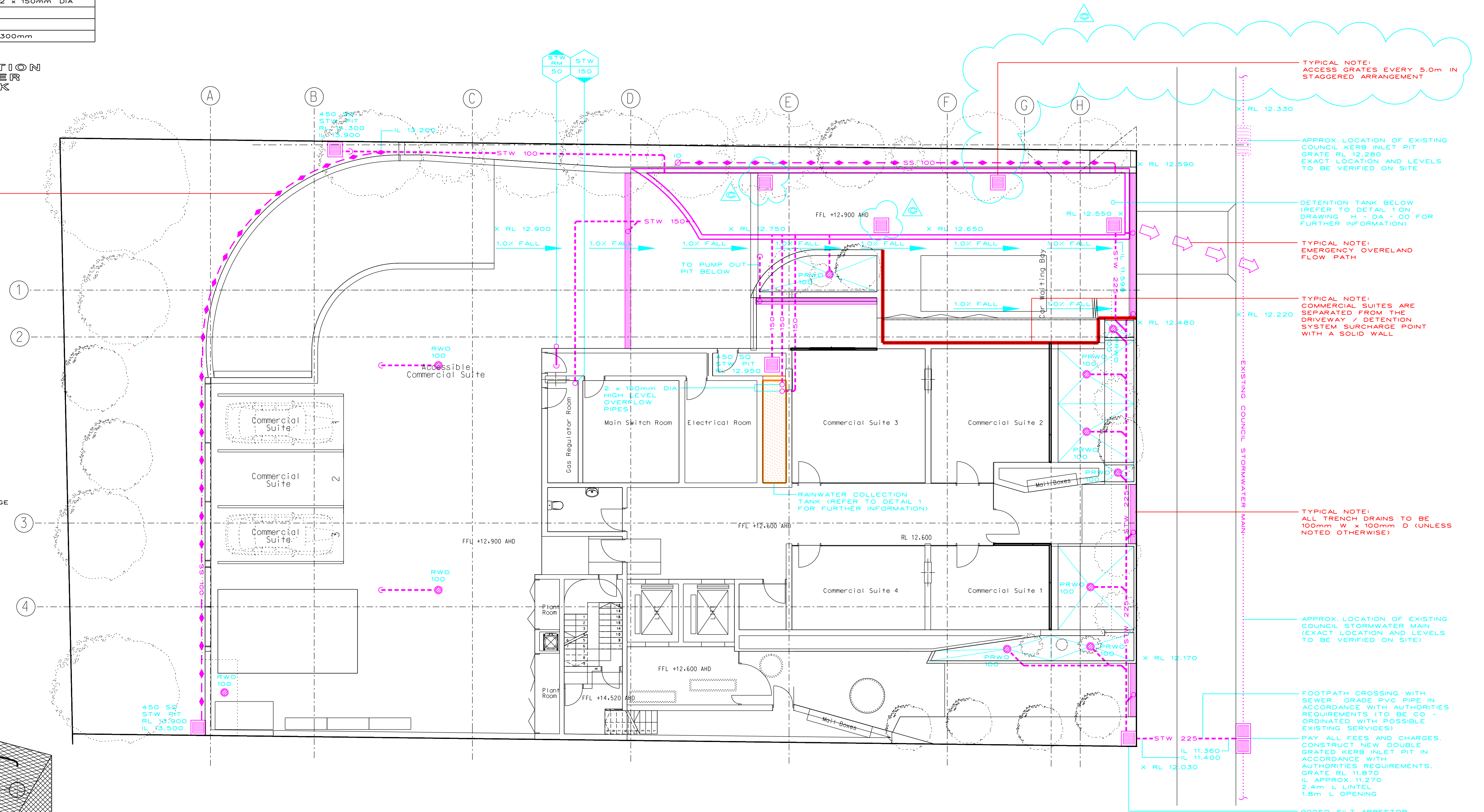
ITEM	DESCRIPTION	
A	TANK AREA	4.5m2
B	EFFECTIVE WATER DEPTH	1.8m
C	EFFECTIVE TANK VOLUME (4.5m2 x 1.8m)	8.0m3
D	OVERFLOW PIPES	2 x 150mm DIA
E	VERTICAL ACCESS OPENING WITH LOCKABLE DOOR	
F	STEP IRONS	
G	FREEBOARD	300mm

-AS PER BASIX REPORT

A cross-sectional diagram of a rectangular pit. At the top, a horizontal line represents the ground surface. Below it, a rectangular structure is shown. The top of this structure is labeled 'INLET / ACCESS / SURCHARGE GRATE 600SQ'. The interior of the structure is labeled 'PIT 600SQ'. On the left side, a horizontal pipe enters the pit, labeled 'INLET'. On the right side, a horizontal pipe exits the pit, labeled 'OUTLET'. At the bottom of the pit, there are several small circles representing weep holes, labeled '200mm HIGH BLUE METAL BED UNDER WEEP HOLES'. Below the weep holes, there is a layer labeled 'SILT TRAP'. To the right of the pit, there is a vertical pipe labeled '200mm DIA' with a '200mm CENTRE' mark. A 'REMOVABLE TRASH SCREEN' is indicated at the bottom of the pit. The entire structure is labeled 'PIT 600SQ'.

OUTLET BEHIND _____

TRASH SCREEN TO PROTECT THE OUTLET
& DOWNSTREAM DRAINAGE SYSTEM
MATERIAL:
STAINLESS STEEL OR GALVANIZED
MESH SCREEN (MAXIMESH RH 3030 OR
EQUIVALENT)
PLACEMENT:
SCREEN MUST BE PLACED SO THAT THE
LONG AXIS OF THE OVAL SHAPED HOLES
ARE HORIZONTAL WITH THE PROTRUDING
LIP ANGLED UPWARDS AND
FACING DOWNSTREAM



C	RE - ISSUED FOR DA	28.06.19
B	RE - ISSUED FOR DA	27.06.19
A	ISSUED FOR DA	21.06.18
REV	DESCRIPTION	DATE

itmdesign
consulting hydraulic engineers
unit 6 / 3 apollo st, warriewood nsw 2102
po box 1438 mono vale nsw 1660
tel (02) 9997 1566 fax (02) 9997 3266
email: markus@itmdesign.com.au

DRAWING TITLE

GROUND FLOOR
STORMWATER
DRAINAGE

SCALE 1:100 @ A1 / 1:200 @ A3

JOB No 17 / 111

DISCIPLINE	DRAWING No	REVISION
HYD	H-PA-03	C



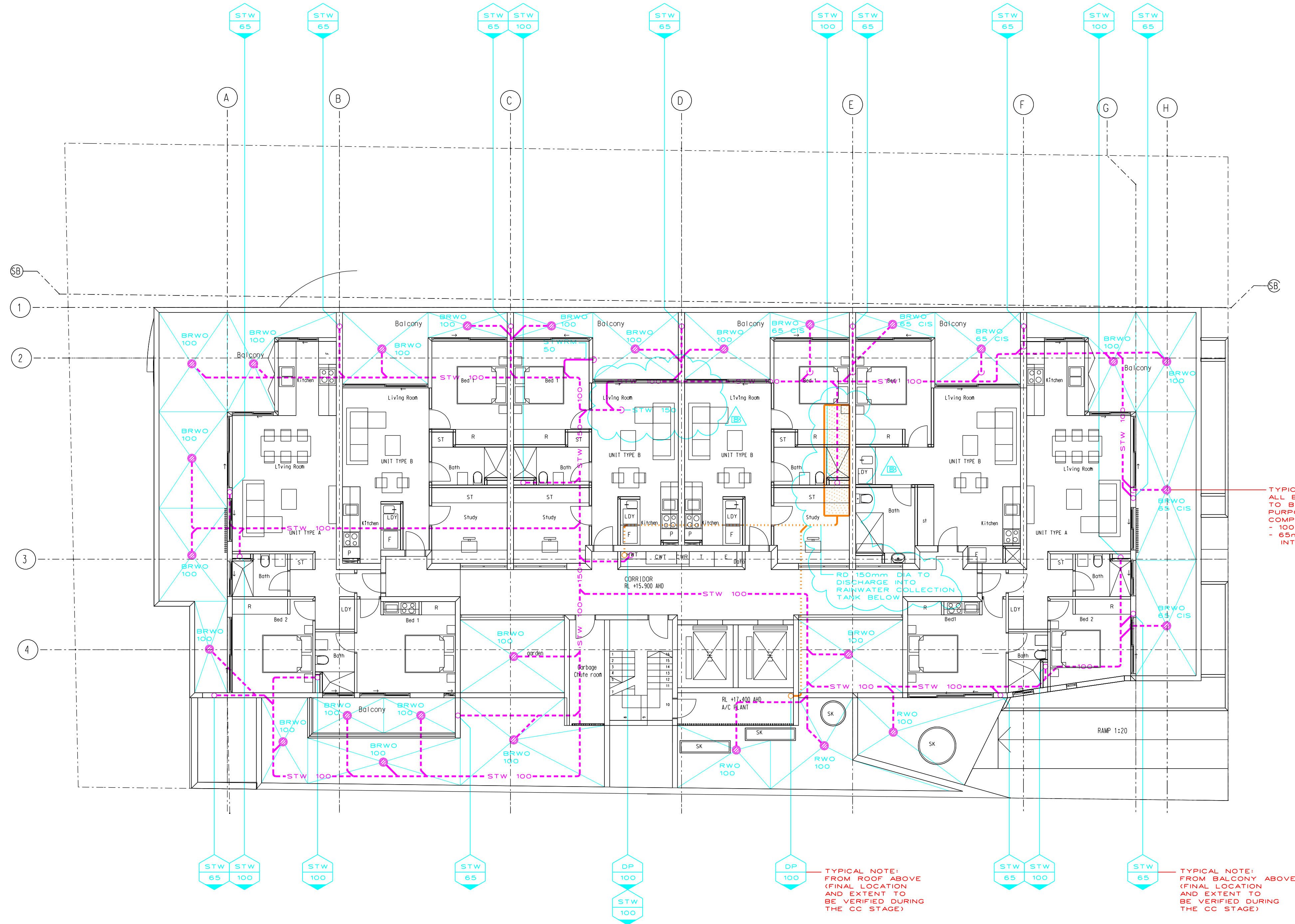
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AND SUBSOIL PIPES TO BE CONFIRMED DURING CONSTRUCTION
CERTIFICATE STAGE OF THE PROPOSED DEVELOPMENT

LANDSCAPING DRAINAGE

ALL LANDSCAPED AREAS LOCATED ABOVE CONCRETE SLABS
TO BE EQUIPPED WITH WATERPROOFING MEMBRANE,
DRAINAGE CELL AND GEOFABRIC

NOTES
FOR GENERAL NOTES AND LEGEND
REFER TO DRAWING H - DA - 00



TYPICAL NOTE:
ALL BALCONY RAINWATER OUTLETS
TO BE SPS 100 / 65 ROUND MULTI
PURPOSE DRAIN (OR APPROVED EQUAL)
COMPLETE WITH:
- 100mm DIA GRATE
- 65mm DIA DISCHARGE PIPE (CAST
INTO SLAB WHERE INDICATED CIS)

TYPICAL NOTE:
FROM ROOF ABOVE
(FINAL LOCATION
AND EXTENT TO
BE VERIFIED DURING
THE CC STAGE)

TYPICAL NOTE:
FROM BALCONY ABOVE
(FINAL LOCATION
AND EXTENT TO
BE VERIFIED DURING
THE CC STAGE)

APPROVAL



REV	DESCRIPTION	DATE
B	RE - ISSUED FOR DA	27.06.19
A	ISSUED FOR DA	21.06.18

CLIENT
CLEMPTON HOLDINGS
pty ltd

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PROJECT
41 - 43
FORBES
STREET
LIVERPOOL

DRAWING TITLE
LEVEL 01
STORMWATER
DRAINAGE

SCALE 1:100 @ A1 / 1:200 @ A3	JOB No 17/111
DISCIPLINE HYD	DRAWING No H-DA-04
	REVISION B

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

STW DA DRAWING