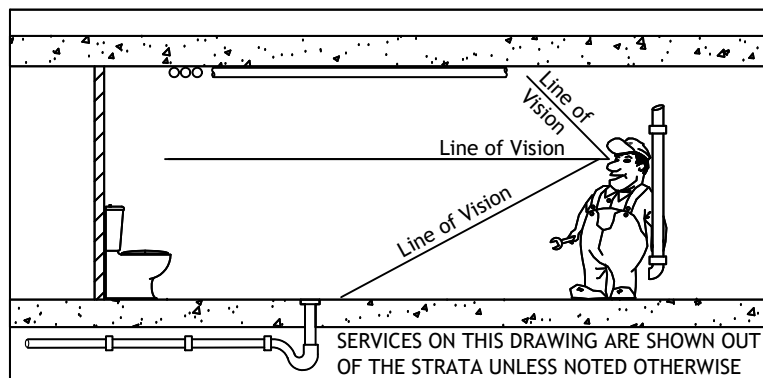


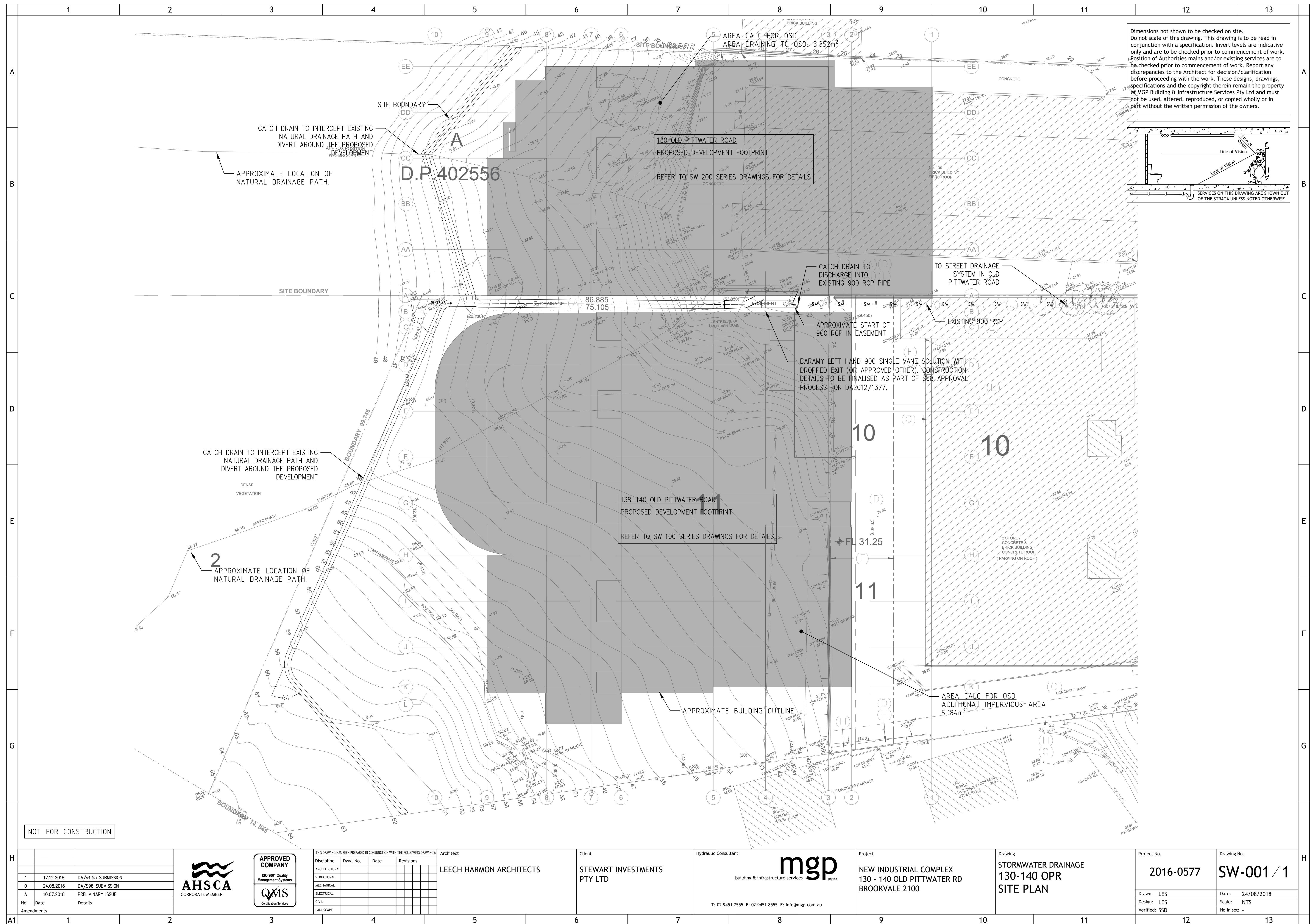
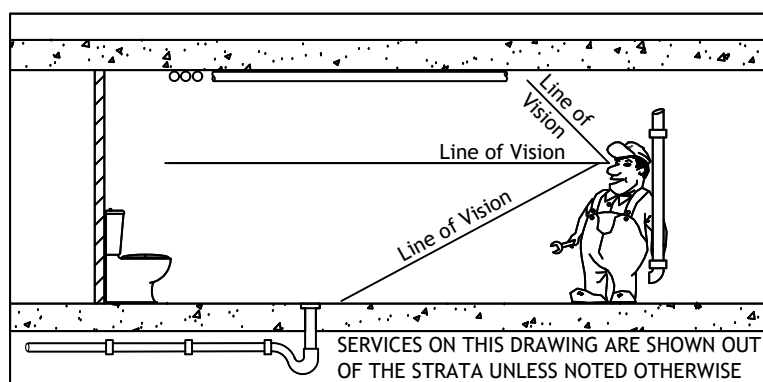
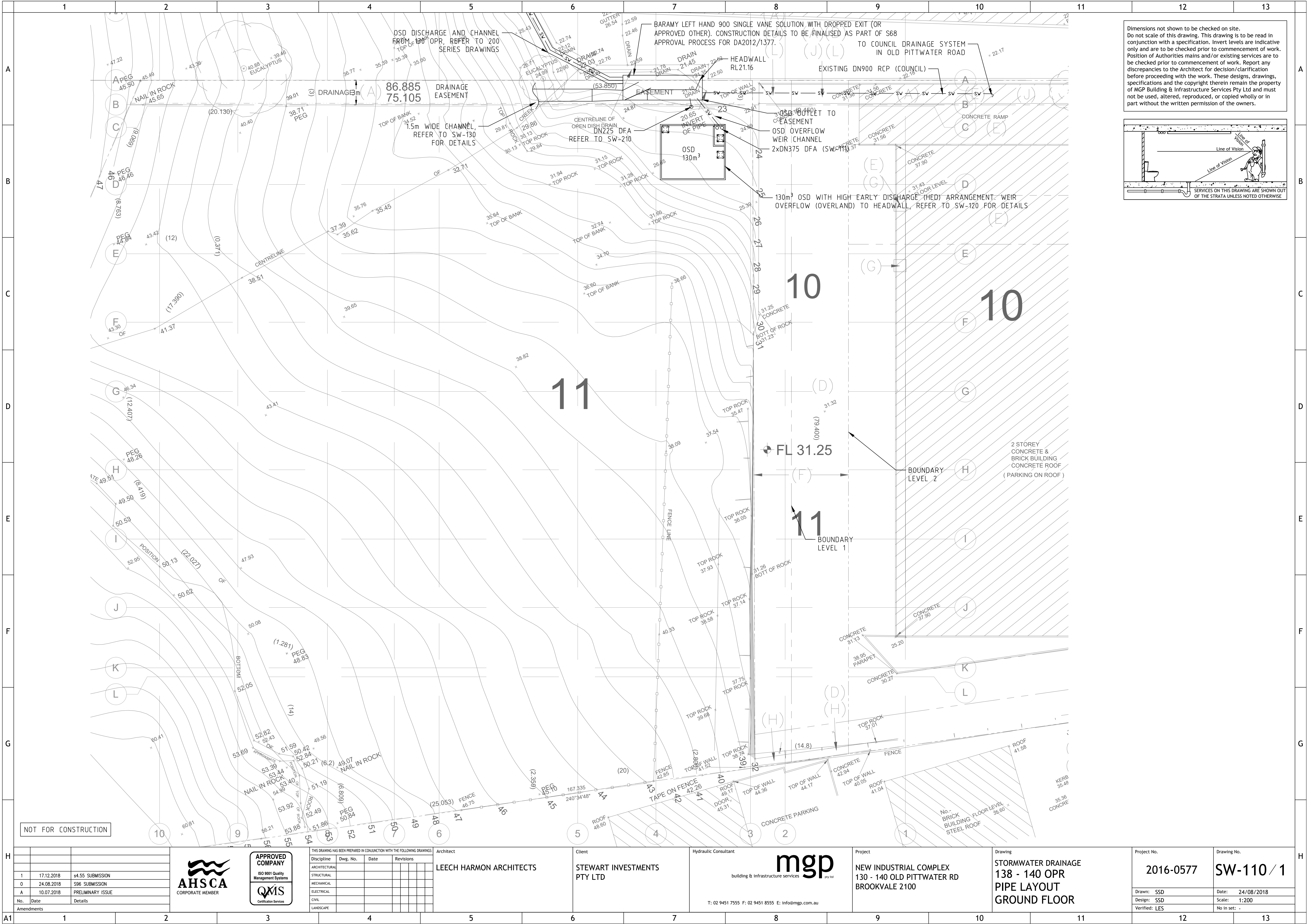


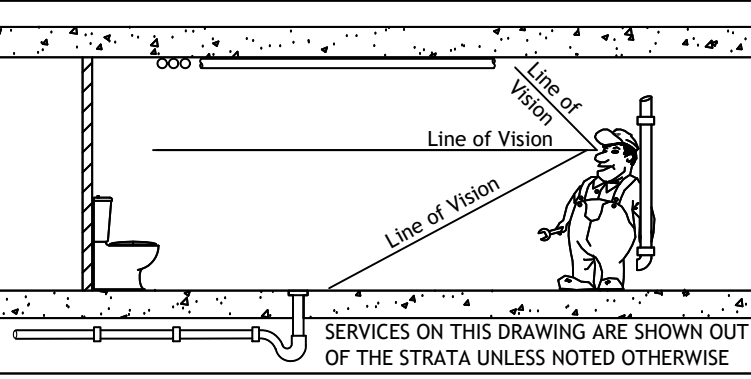
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C	<div>DRAWING LIST</div> <div><div>GENERAL</div><div>SW-000 COVER SHEET</div><div>SW-001 SITE PLAN</div></div>														C																																							
D	<div><div>138-140 OLD PITTWATER ROAD</div><div>SW-100 LEGEND</div><div>SW-110 PIPE LAYOUT, GROUND FLOOR</div><div>SW-111 PIPE LAYOUT, LEVEL 1</div><div>SW-112 PIPE LAYOUT, LEVEL 2</div><div>SW-113 PIPE LAYOUT, LEVEL 2A</div><div>SW-114 PIPE LAYOUT, LEVEL 3</div><div>SW-115 ROOF LAYOUT</div><div>SW-120 OSD DETAILS</div><div>SW-130 CATCH DRAIN LAYOUT</div><div>SW-131 CATCH DRAIN CALCS</div></div>														D																																							
E	<div><div>130 OLD PITTWATER ROAD</div><div>SW-200 LEGEND</div><div>SW-210 PIPE LAYOUT, GROUND FLOOR</div><div>SW-211 PIPE LAYOUT, LEVEL 1</div><div>SW-212 PIPE LAYOUT, LEVEL 2A</div><div>SW-213 PIPE LAYOUT, LEVEL 3</div><div>SW-214 ROOF LAYOUT</div><div>SW-220 OSD DETAILS</div><div>SW-230 CATCH DRAIN LAYOUT</div><div>SW-231 CATCH DRAIN CALCS</div></div>														E																																							
F	<div><div>SEDIMENT & EROSION CONTROL PLAN (COMBINED)</div><div>SW-340 SEDIMENT & EROSION CONTROL PLAN</div></div>														F																																							
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A1	<table><tr><td></td><td></td><td></td></tr><tr><td>1</td><td>17.12.2018</td><td>DA/s4.55 SUBMISSION</td></tr><tr><td>0</td><td>24.08.2018</td><td>DA/S96 SUBMISSION</td></tr><tr><td>No.</td><td>Date</td><td>Details</td></tr><tr><td>Amendments</td><td></td><td></td></tr></table>				1	17.12.2018	DA/s4.55 SUBMISSION	0	24.08.2018	DA/S96 SUBMISSION	No.	Date	Details	Amendments			<div><div>AHSCA</div><div>CORPORATE MEMBER</div></div> <div><div>APPROVED COMPANY</div><div>ISO 9001 Quality Management Systems</div><div>QMS</div><div>Certification Services</div></div>	<div>THIS DRAWING HAS BEEN PREPARED IN CONJUNCTION WITH THE FOLLOWING DRAWINGS:</div> <table><tr><th>Discipline</th><th>Dwg. No.</th><th>Date</th><th>Revisions</th></tr><tr><td>ARCHITECTURAL</td><td></td><td></td><td></td></tr><tr><td>STRUCTURAL</td><td></td><td></td><td></td></tr><tr><td>MECHANICAL</td><td></td><td></td><td></td></tr><tr><td>ELECTRICAL</td><td></td><td></td><td></td></tr><tr><td>CIVIL</td><td></td><td></td><td></td></tr><tr><td>LANDSCAPE</td><td></td><td></td><td></td></tr></table>	Discipline	Dwg. No.	Date	Revisions	ARCHITECTURAL				STRUCTURAL				MECHANICAL				ELECTRICAL				CIVIL				LANDSCAPE				<div>Architect</div> <div>LEECH HARMON ARCHITECTS</div>	<div>Client</div> <div>STEWART INVESTMENTS PTY LTD</div>	<div>Hydraulic Consultant</div> <div><div>building & infrastructure services</div><div>pty ltd</div></div> <div>T: 02 9451 7555 F: 02 9451 8555 E: info@mgrp.com.au</div>	<div>Project</div> <div>NEW INDUSTRIAL COMPLEX 130 - 140 OLD PITTWATER RD BROOKVALE 2100</div>	<div>Drawing</div> <div>STORMWATER DRAINAGE COVER SHEET</div>	<div>Project No.</div> <div>2016-0577</div> <div>Drawn: SSD</div> <div>Design: SSD</div> <div>Verified: LES</div>	<div>Drawing No.</div> <div>SW-000 / 1</div> <div>Date: 24/08/2018</div> <div>Scale: NTS</div> <div>No in set: -</div>	
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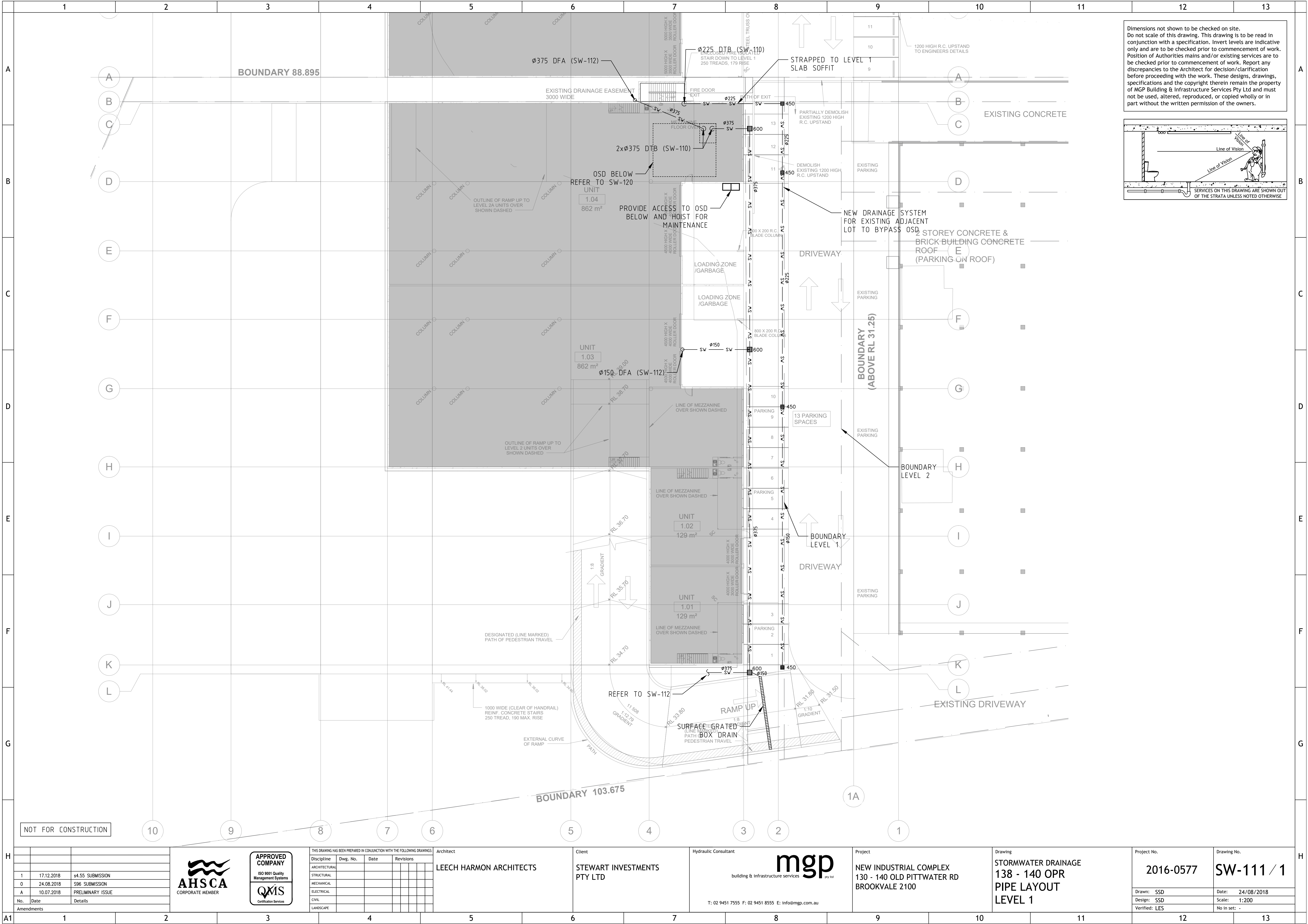


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C	DRAWING LIST													C	
D	ABBREVIATIONS													D	
E	LEGEND													E	
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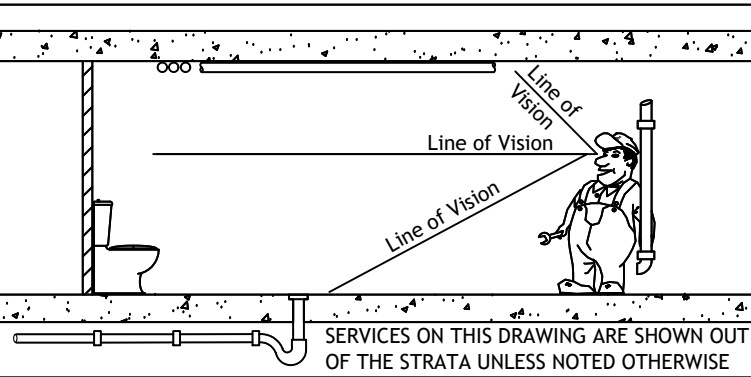


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ARCHITECTURAL			
STRUCTURAL			
MECHANICAL			
ELECTRICAL			
CIVIL			
LANDSCAPE			

Architect
LEECH HARMON ARCHITECTS

Client
STEWART INVESTMENTS
PTY LTD

Hydraulic Consultant
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building & infrastructure services
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Project
NEW INDUSTRIAL COMPLEX
130 - 140 OLD PITTVATER RD
BROOKVALE 2100

Drawing
STORMWATER DRAINAGE
138 - 140 OPR
PIPE LAYOUT
LEVEL 1

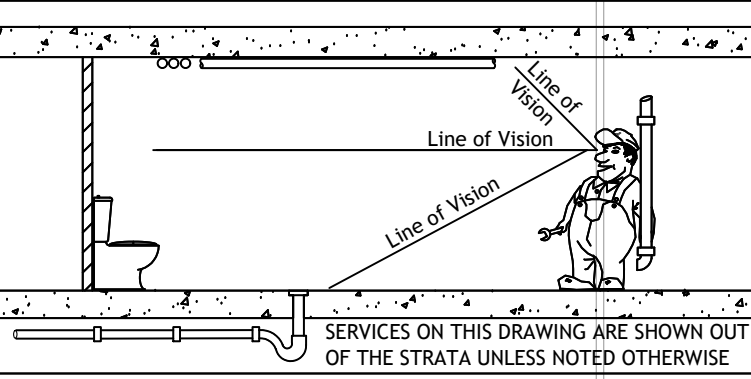
Project No.
2016-0577

Drawing No.
SW-111 / 1

Drawn: SSD	Date: 24/08/2018
Design: SSD	Scale: 1:200
Verified: LES	No in set: -



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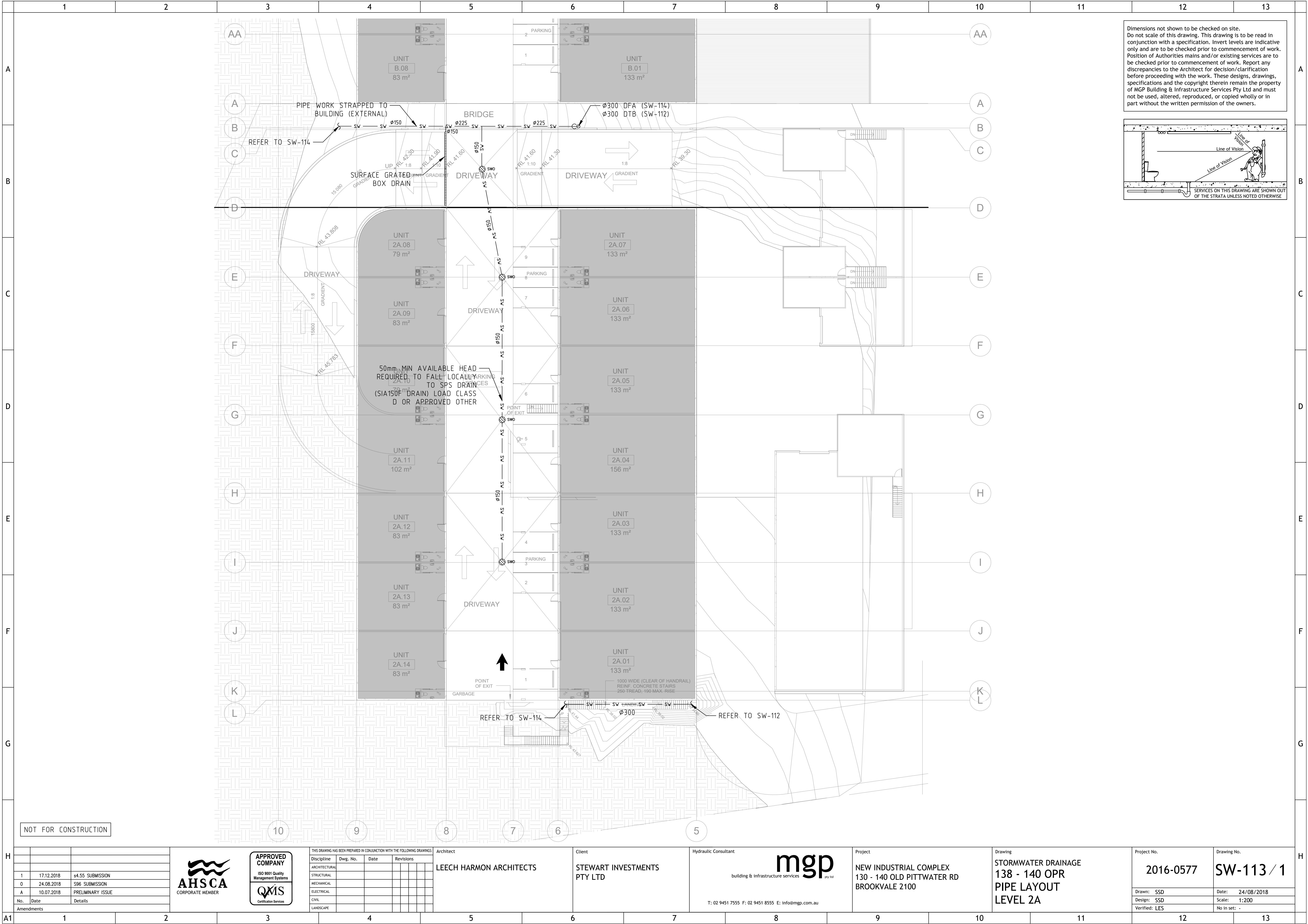
Project
NEW INDUSTRIAL COMPLEX
130 - 140 OLD PITTVATER RD
BROOKVALE 2100

Drawing
STORMWATER DRAINAGE
138 - 140 OPR
PIPE LAYOUT
LEVEL 2

Project No.
2016-0577

Drawing No.
SW-112 / 1

Drawn: SSD	Date: 24/08/2018
Design: SSD	Scale: 1:200
Verified: LES	No in set: -



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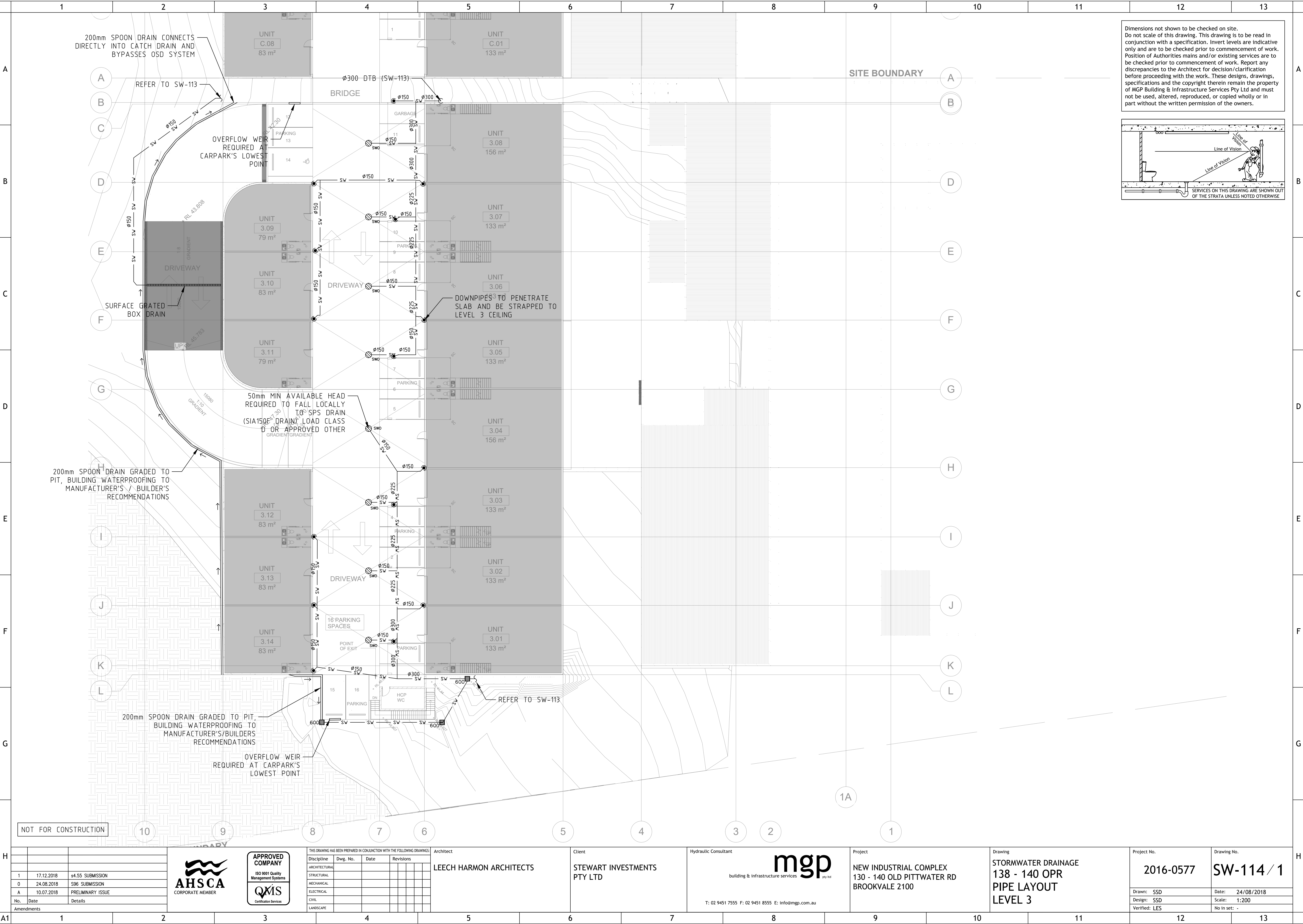
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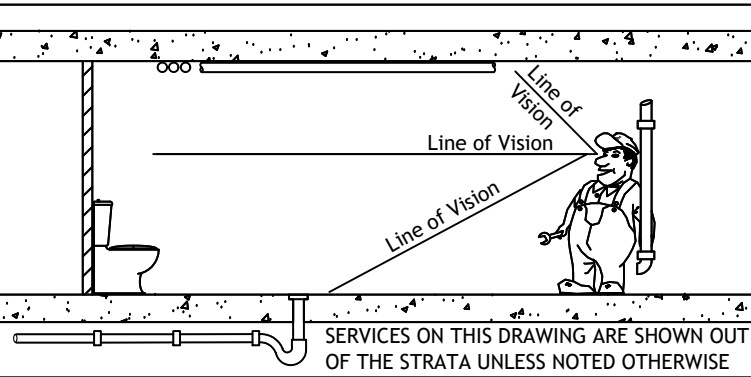
Project
NEW INDUSTRIAL COMPLEX
130 - 140 OLD PITTWATER RD
BROOKVALE 2100

Drawing
STORMWATER DRAINAGE
138 - 140 OPR
PIPE LAYOUT
LEVEL 2A

Project No.	2016-0577	Drawing No.	SW-113 / 1
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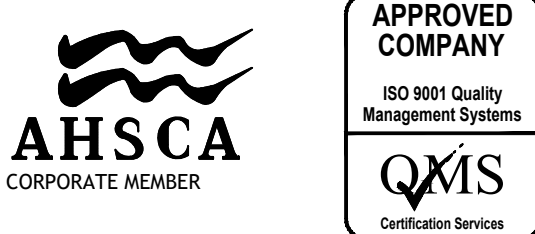


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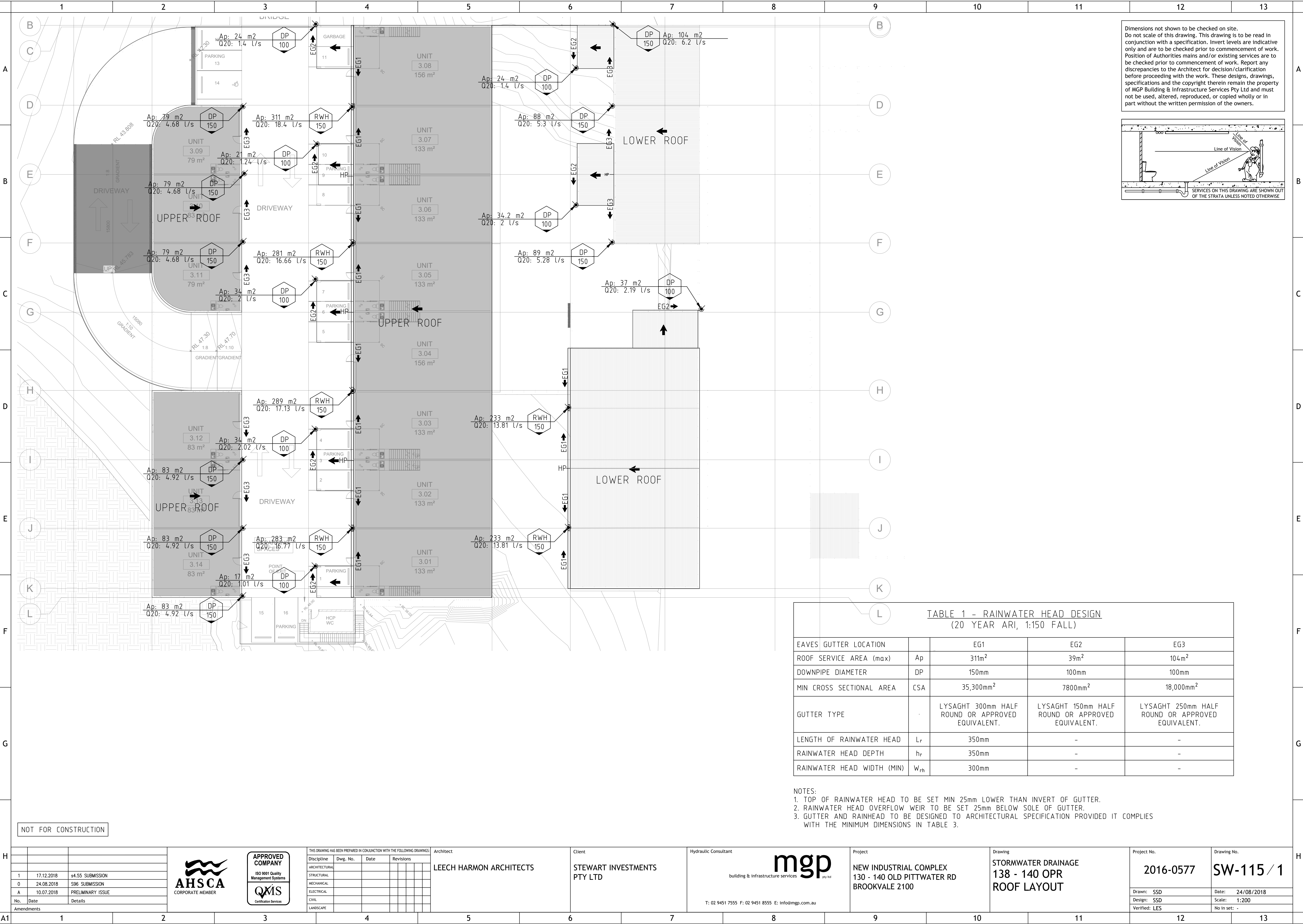
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NEW INDUSTRIAL COMPLEX
130 - 140 OLD PITTWATER RD
BROOKVALE 2100

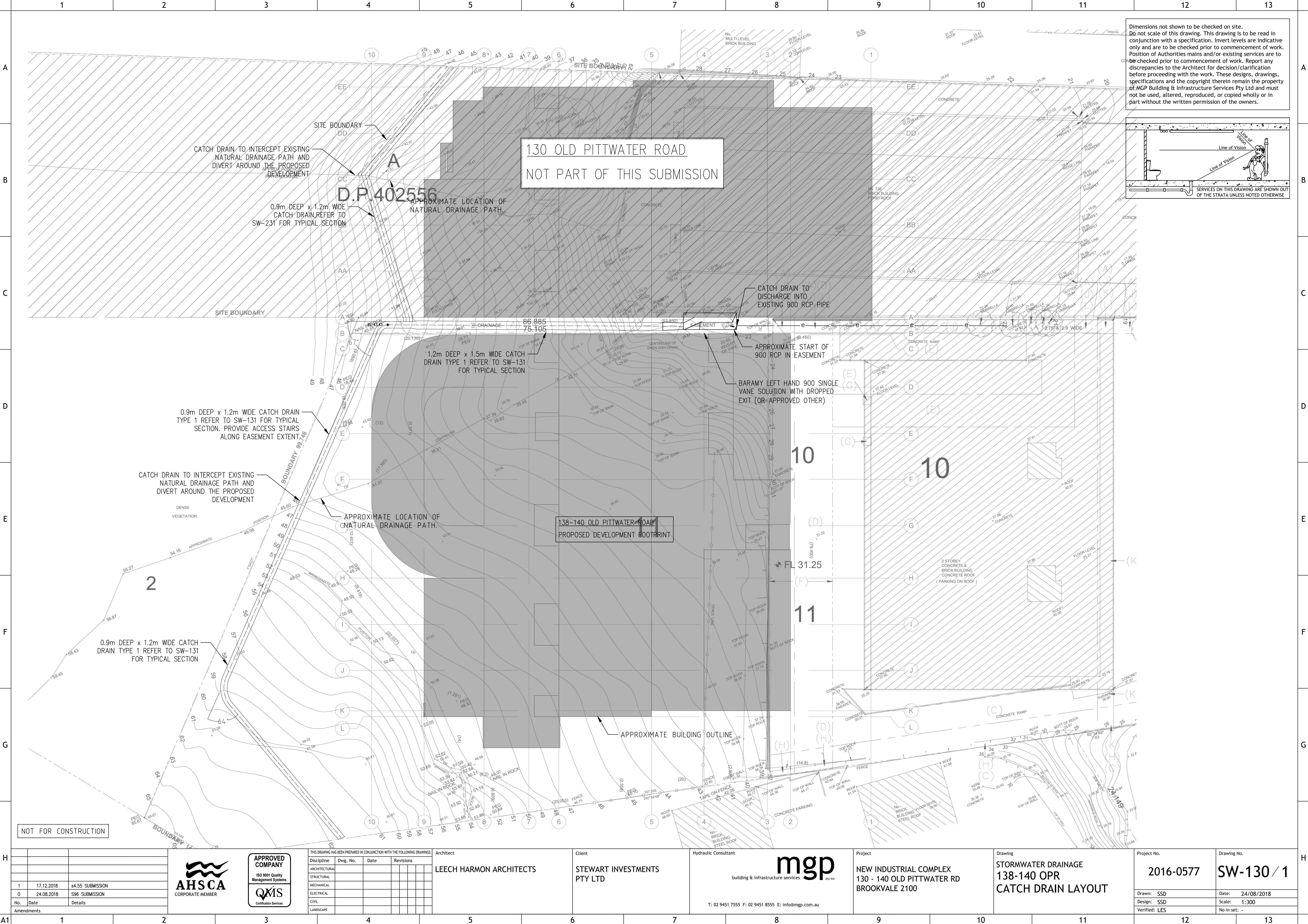
Drawing
STORMWATER DRAINAGE
138 - 140 OPR
PIPE LAYOUT
LEVEL 3

Project No.
2016-0577

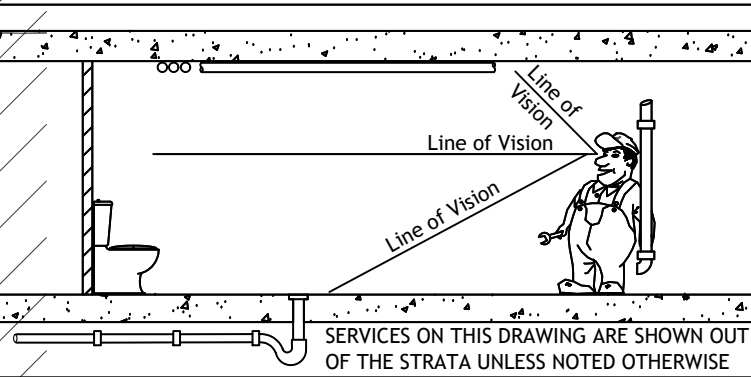
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Project
**NEW INDUSTRIAL COMPLEX
130 - 140 OLD PITTWATER RD
BROOKVALE 2100**

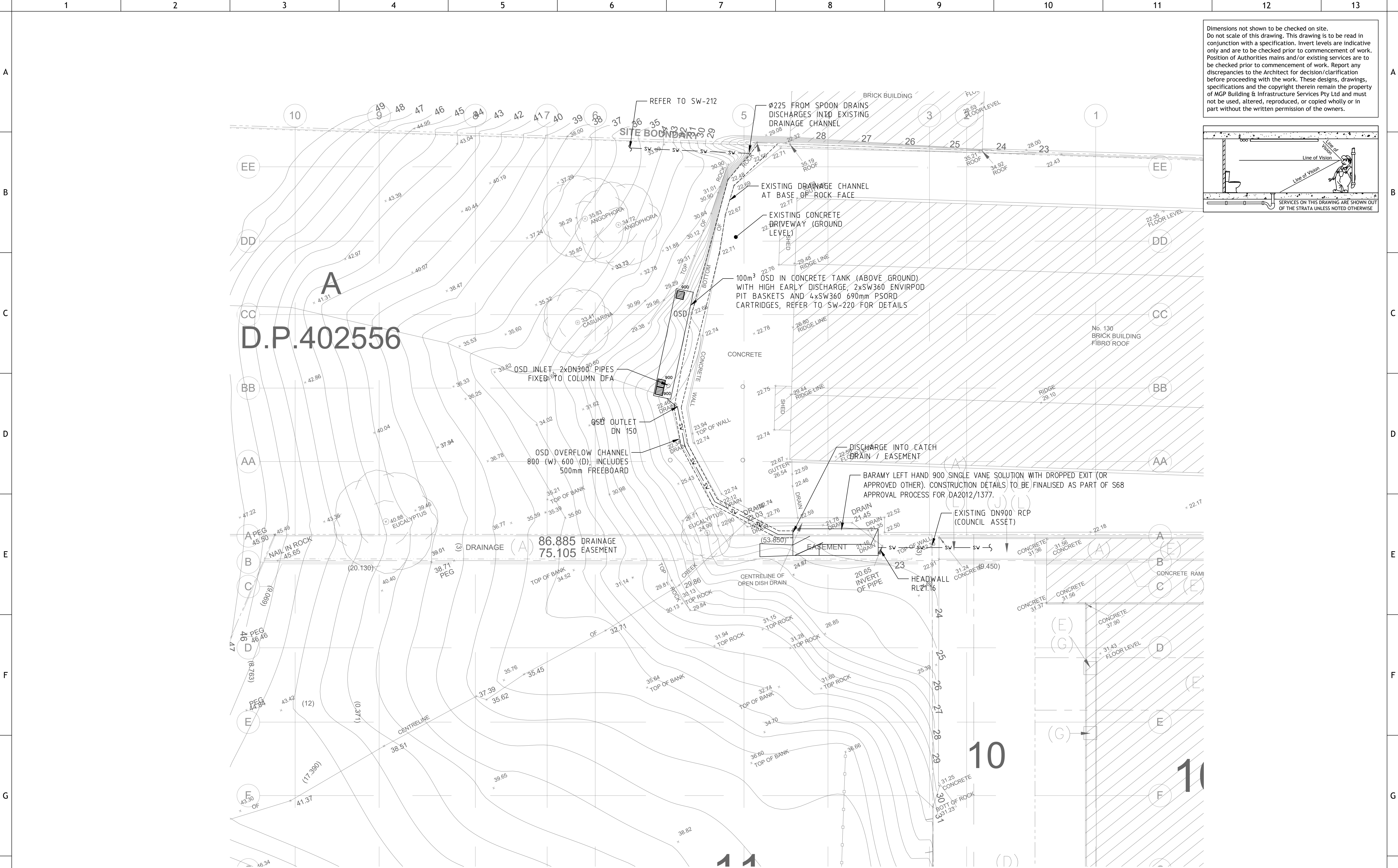
Drawing
**STORMWATER DRAINAGE
138-140 OPR
CATCH DRAIN LAYOUT**

Project No.
2016-0577

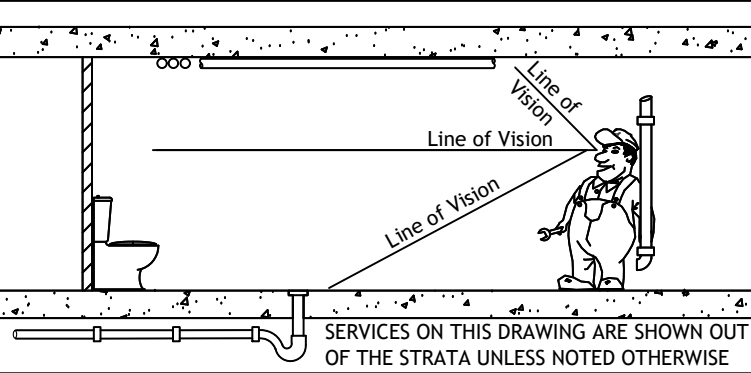
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Verified: LES	No in set: -

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H	<div><div>NOT FOR CONSTRUCTION</div><table><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td>1</td><td>17.12.2018</td><td>DA SUBMISSION</td></tr><tr><td>0</td><td>24.08.2018</td><td>DA SUBMISSION</td></tr><tr><td>No.</td><td>Date</td><td>Details</td></tr><tr><td>Amendments</td><td></td><td></td></tr></table><div><div><div>AHSCA CORPORATE MEMBER</div></div><div><div>APPROVED COMPANY</div><div>ISO 9001 Quality Management Systems</div><div></div><div>Certification Services</div></div></div><div><div>THIS DRAWING HAS BEEN PREPARED IN CONJUNCTION WITH THE FOLLOWING DRAWINGS:</div><table><tr><th>Discipline</th><th>Dwg. No.</th><th>Date</th><th>Revisions</th></tr><tr><td>ARCHITECTURAL</td><td></td><td></td><td></td></tr><tr><td>STRUCTURAL</td><td></td><td></td><td></td></tr><tr><td>MECHANICAL</td><td></td><td></td><td></td></tr><tr><td>ELECTRICAL</td><td></td><td></td><td></td></tr><tr><td>CIVIL</td><td></td><td></td><td></td></tr><tr><td>LANDSCAPE</td><td></td><td></td><td></td></tr></table></div><div><div>Architect</div><div>LEECH HARMON ARCHITECTS</div><div>Client</div><div>STEWART INVESTMENTS PTY LTD</div><div>Hydraulic Consultant</div><div><div>building & infrastructure services</div><div>py ltd</div><div>T: 02 9451 7555 F: 02 9451 8555 E: info@mgp.com.au</div></div><div><div>Project</div><div>NEW INDUSTRIAL COMPLEX 130 - 140 OLD PITTWATER RD BROOKVALE 2100</div><div>Drawing</div><div>STORMWATER DRAINAGE 130 OPR LEGEND</div><div><div>Project No.</div><div>2016-0577</div><div>Drawing No.</div><div>SW-200 / 1</div></div><div><div>Drawn: SSD</div><div>Date: 24/08/2018</div><div>Design: SSD</div><div>Scale: NTS</div><div>Verified: LES</div><div>No in set: -</div></div></div></div></div>										1	17.12.2018	DA SUBMISSION	0	24.08.2018	DA SUBMISSION	No.	Date	Details	Amendments			Discipline	Dwg. No.	Date	Revisions	ARCHITECTURAL				STRUCTURAL				MECHANICAL				ELECTRICAL				CIVIL				LANDSCAPE				H
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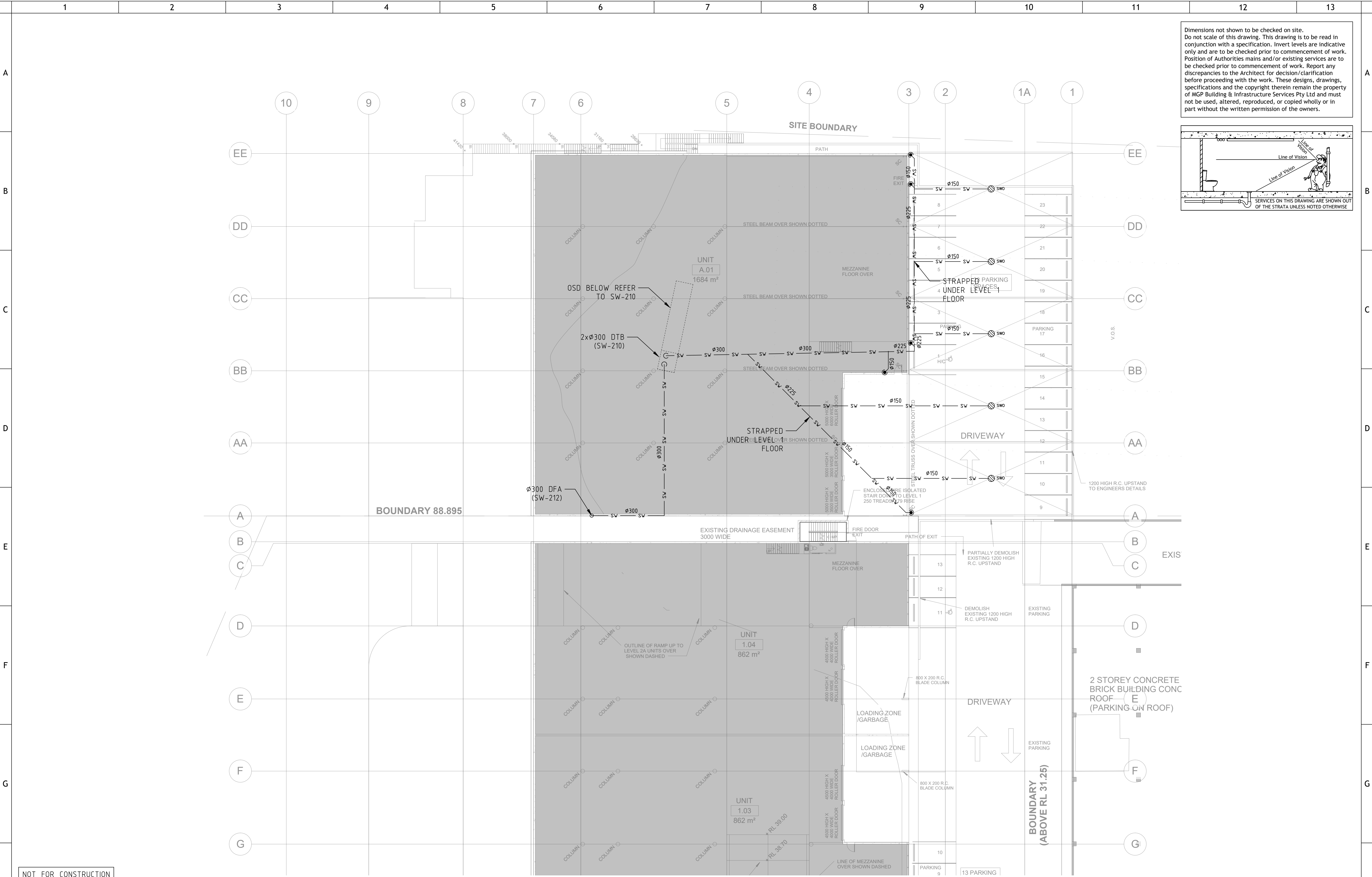


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H				 AHSCA CORPORATE MEMBER		THIS DRAWING HAS BEEN PREPARED IN CONJUNCTION WITH THE FOLLOWING DRAWINGS:				Architect	LEECH HARMON ARCHITECTS	Client	STEWART INVESTMENTS PTY LTD	 building & infrastructure services mgp pty ltd	Hydraulic Consultant	T: 02 9451 7555 F: 02 9451 8555 E: info@mgp.com.au	Project	NEW INDUSTRIAL COMPLEX 130 - 140 OLD PITTVATER RD BROOKVALE 2100	Drawing	STORMWATER DRAINAGE 130 OPR PIPE LAYOUT GROUND FLOOR	Project No.	2016-0577	Drawing No.	SW-210 / 1	H
	1	17.12.2018	DA SUBMISSION			Discipline	Dwg. No.	Date	Revisions																
	0	24.08.2018	DA SUBMISSION			ARCHITECTURAL																			
	A	10.07.2018	PRELIMINARY ISSUE			STRUCTURAL																			
	No.	Date	Details			MECHANICAL																			
	Amendments					ELECTRICAL																			
			CIVIL																						
			LANDSCAPE																						



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0	24.08.2018	DA SUBMISSION
A	10.07.2018	PRELIMINARY ISSUE
No.	Date	Details
Amendments		



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STRUCTURAL			
MECHANICAL			
ELECTRICAL			
CIVIL			
LANDSCAPE			

Architect
LEECH HARMON ARCHITECTS

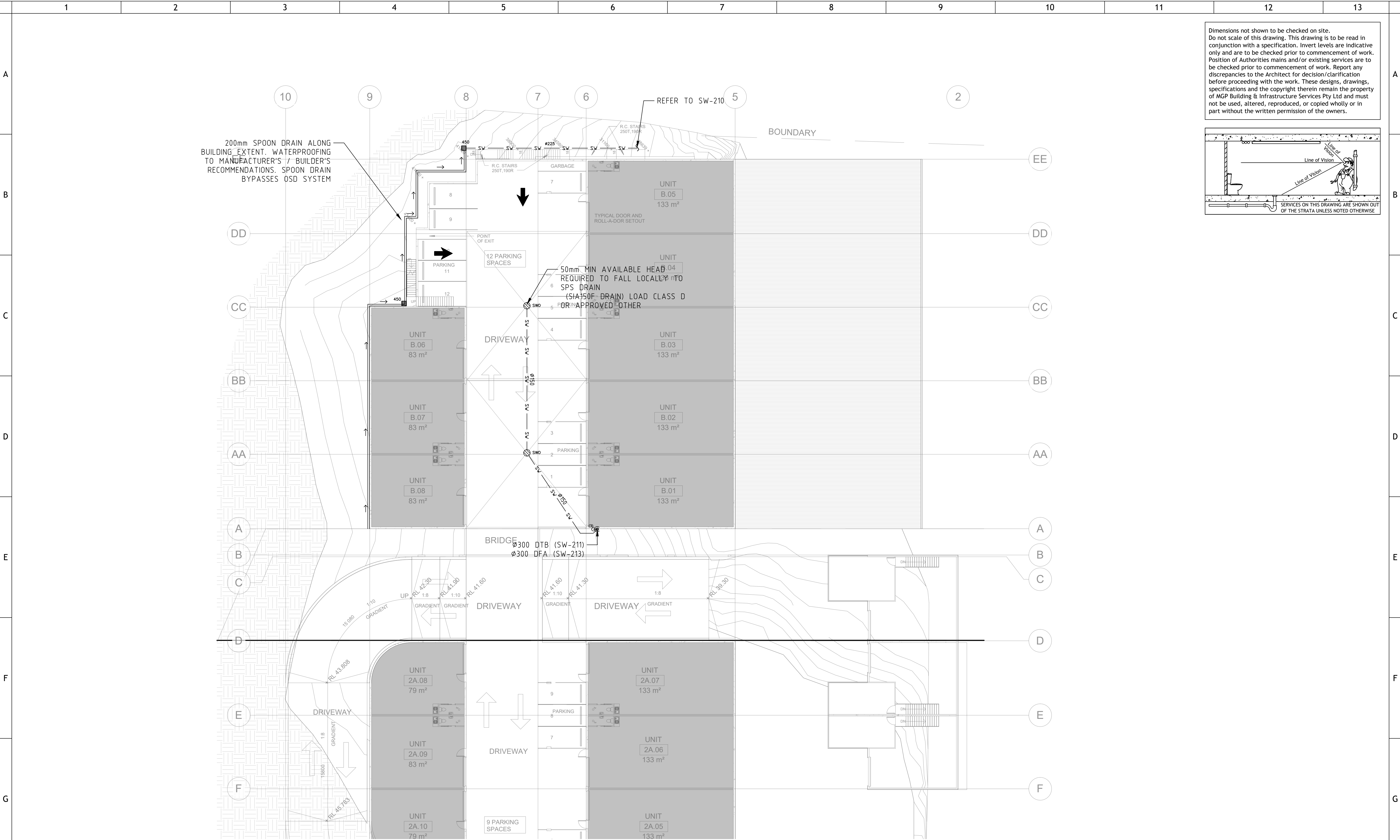
Client
STEWART INVESTMENTS
PTY LTD

Hydraulic Consultant
mgp
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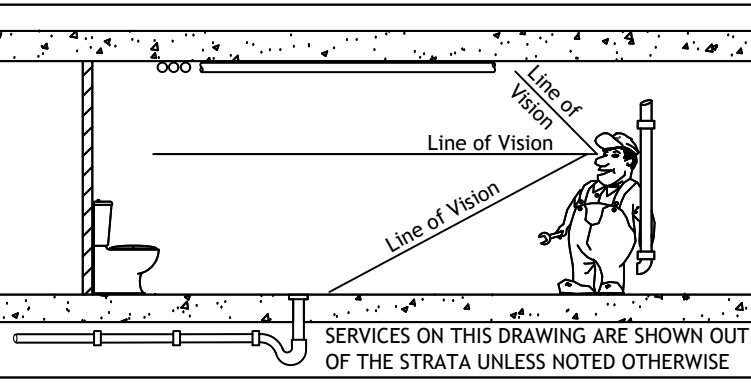
Project
NEW INDUSTRIAL COMPLEX
130 - 140 OLD PITTVATER RD
BROOKVALE 2100

Drawing
STORMWATER DRAINAGE
130 OPR
PIPE LAYOUT
LEVEL 1

Project No.	2016-0577	Drawing No.	SW-211 / 1
Drawn: SSD		Date:	24/08/2018
Design: SSD		Scale:	1:200
Verified: LES		No in set:	-



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1	17.12.2018	DA SUBMISSION
0	24.08.2018	DA SUBMISSION
A	10.07.2018	PRELIMINARY ISSUE
No.	Date	Details
Amendments		



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ELECTRICAL			
CIVIL			
LANDSCAPE			

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Client
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PTY LTD

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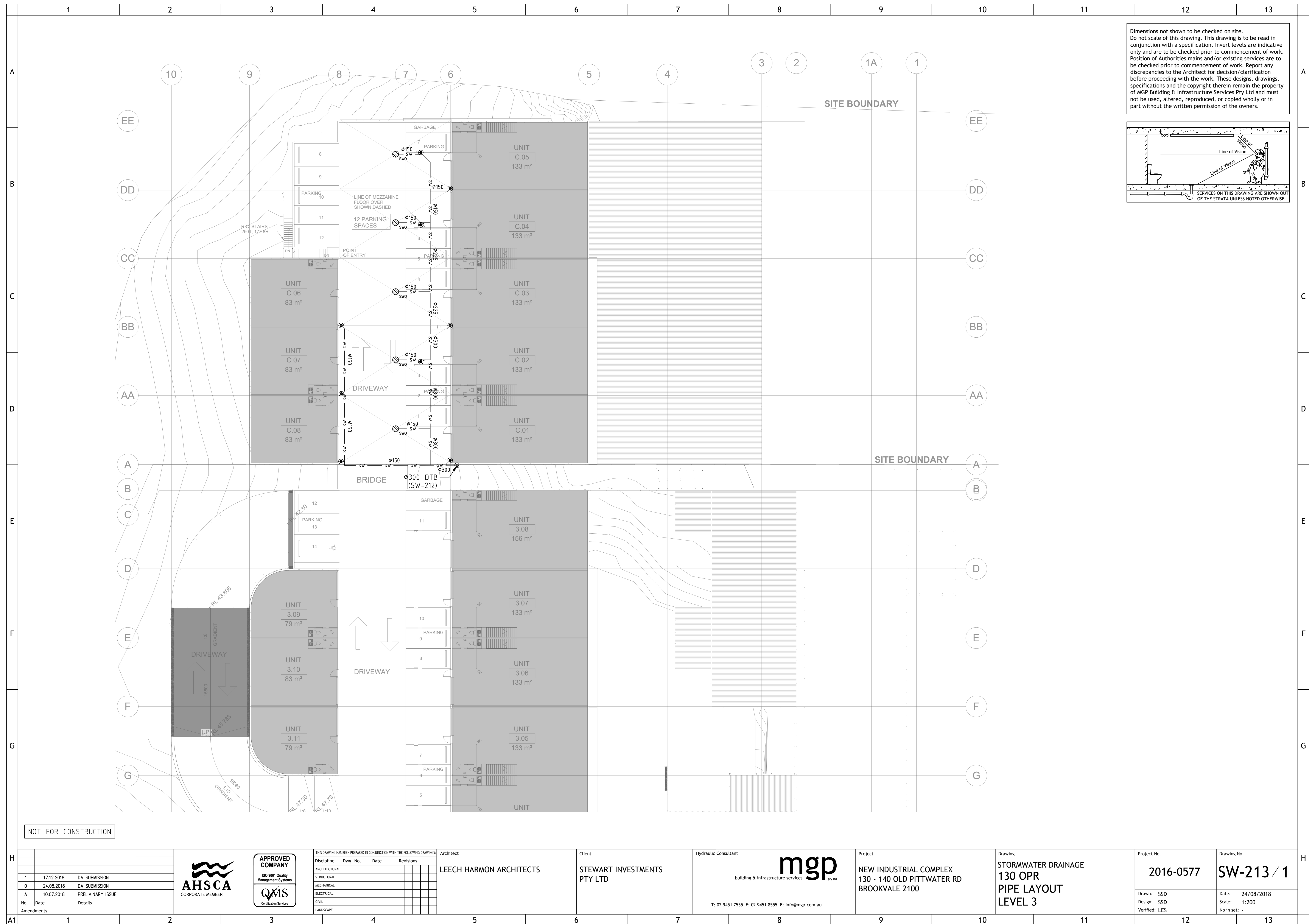
Project
NEW INDUSTRIAL COMPLEX
130 - 140 OLD PITTVATER RD
BROOKVALE 2100

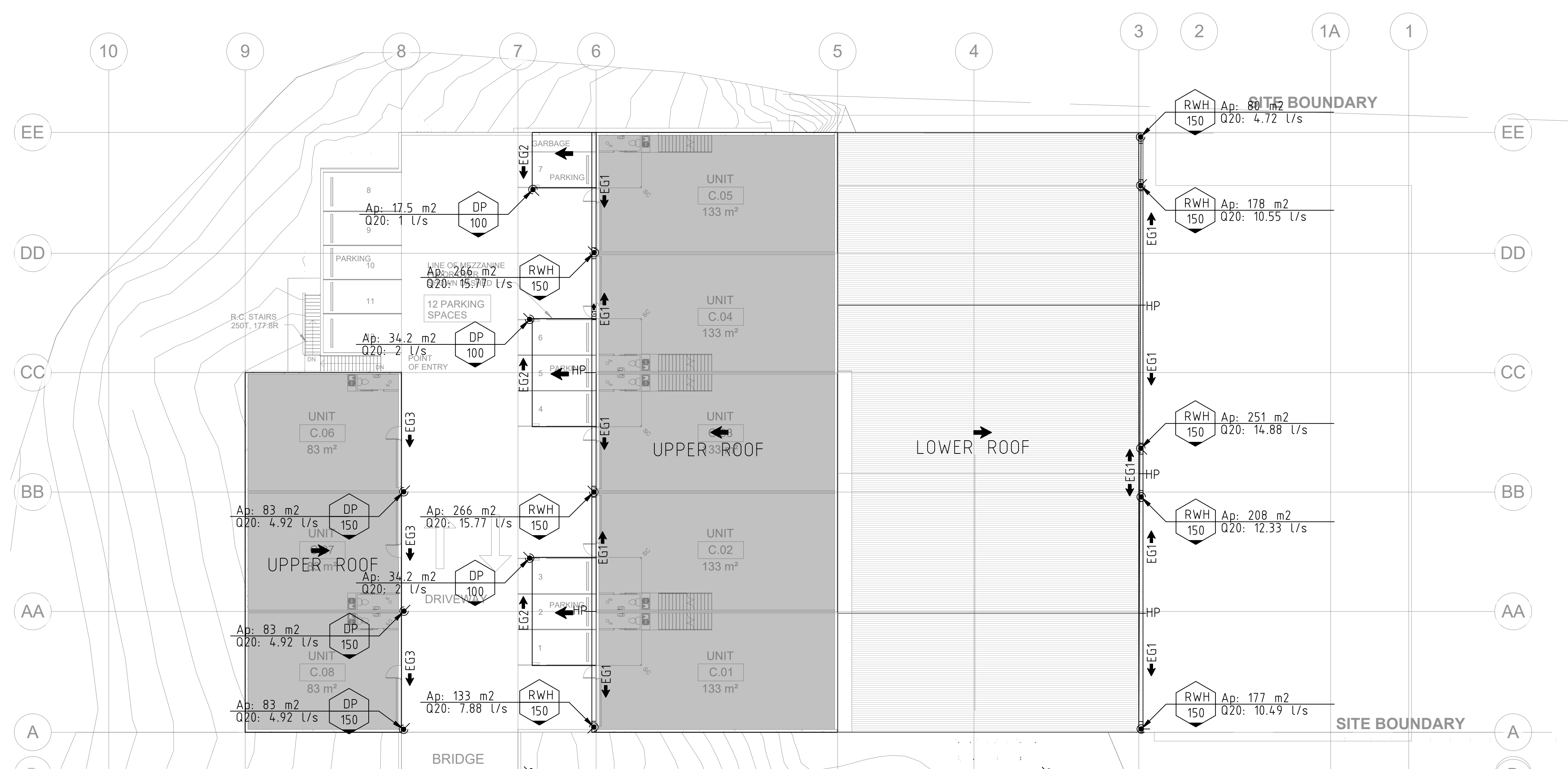
Drawing
STORMWATER DRAINAGE
130 OPR
PIPE LAYOUT
LEVEL 2A

Project No.
2016-0577

Drawing No.
SW-212 / 1

Drawn: SSD	Date: 24/08/2018
Design: SSD	Scale: 1:200
Verified: LES	No in set: -





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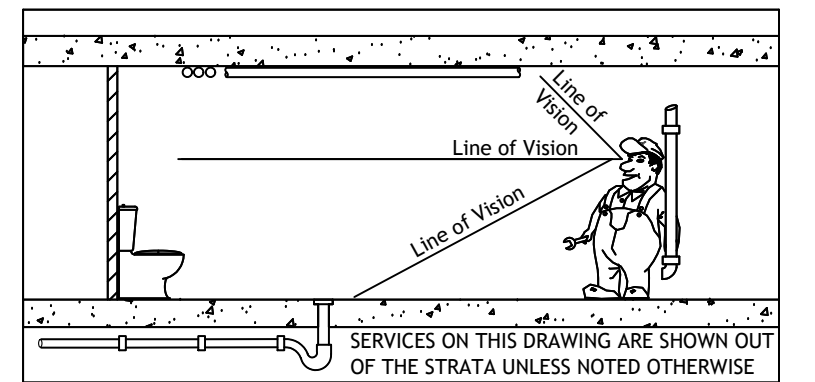


TABLE 1 - RAINWATER HEAD DESIGN
(20 YEAR ARI, 1:150 FALL)

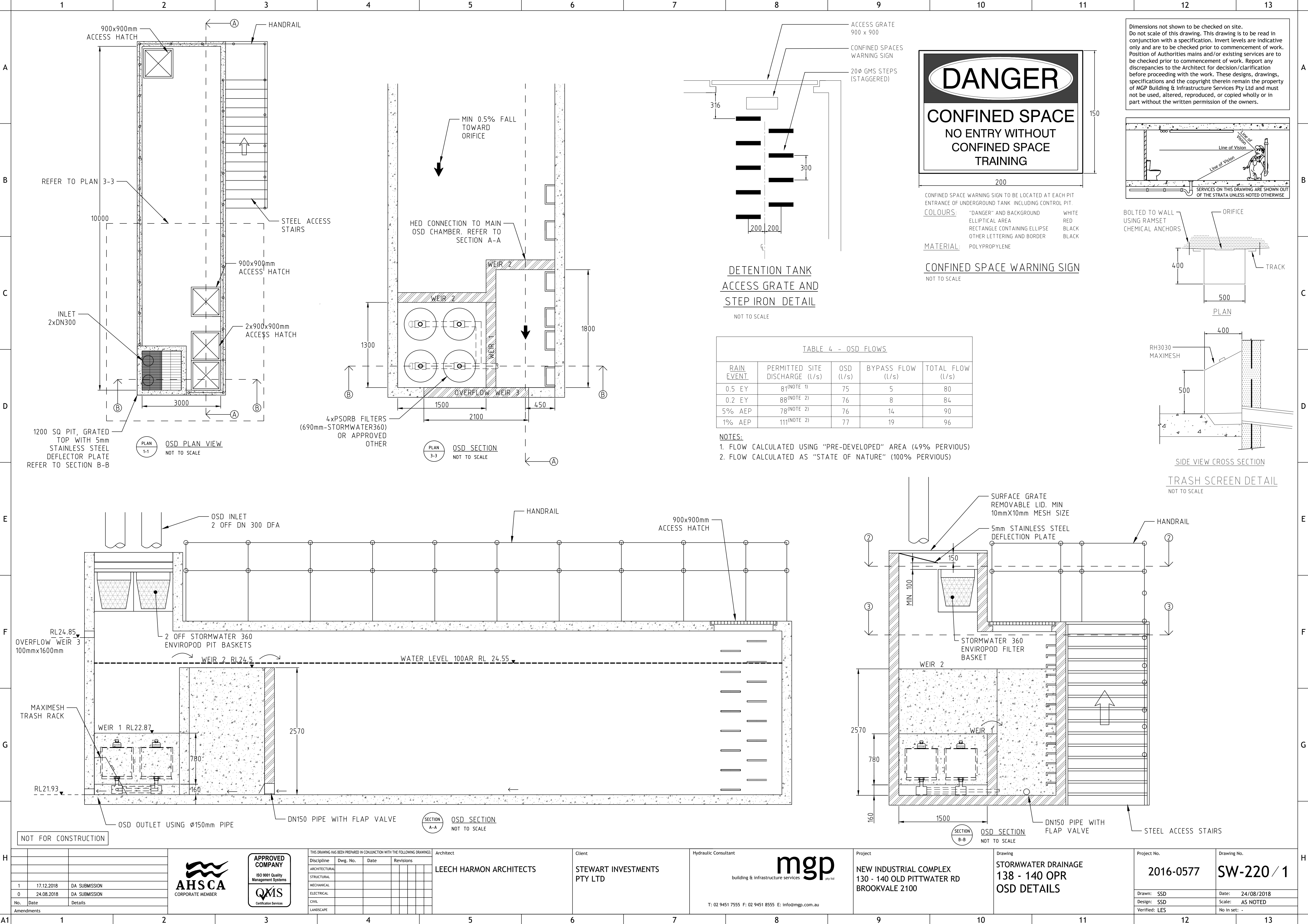
EAVES GUTTER LOCATION		EG1	EG2	EG3
ROOF SERVICE AREA (max)	A _p	311m ²	39m ²	104m ²
DOWNPIPE DIAMETER	DP	150mm	100mm	100mm
MIN CROSS SECTIONAL AREA	CSA	35,300mm ²	7800mm ²	18,000mm ²
GUTTER TYPE		LYSAGHT 300mm HALF ROUND OR APPROVED EQUIVALENT.	LYSAGHT 150mm HALF ROUND OR APPROVED EQUIVALENT.	LYSAGHT 250mm HALF ROUND OR APPROVED EQUIVALENT.
LENGTH OF RAINWATER HEAD	L _r	350mm	-	-
RAINWATER HEAD DEPTH	h _r	350mm	-	-
RAINWATER HEAD WIDTH (MIN)	W _{rh}	300mm	-	-

NOTES:

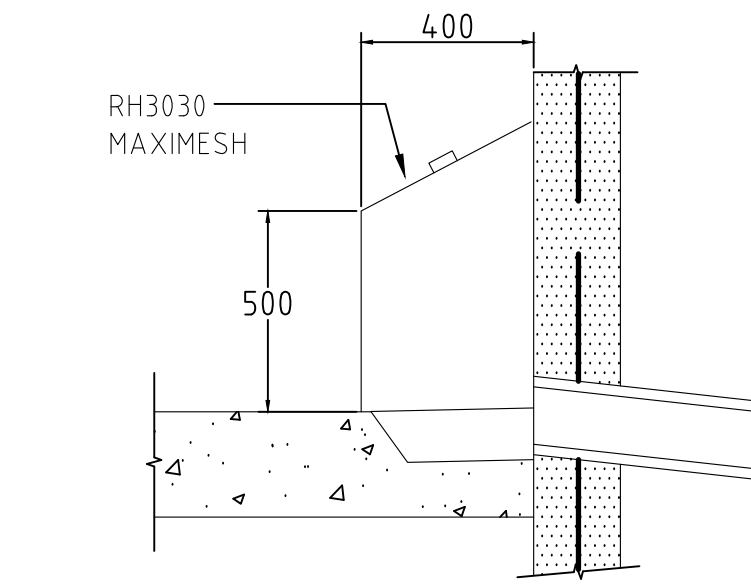
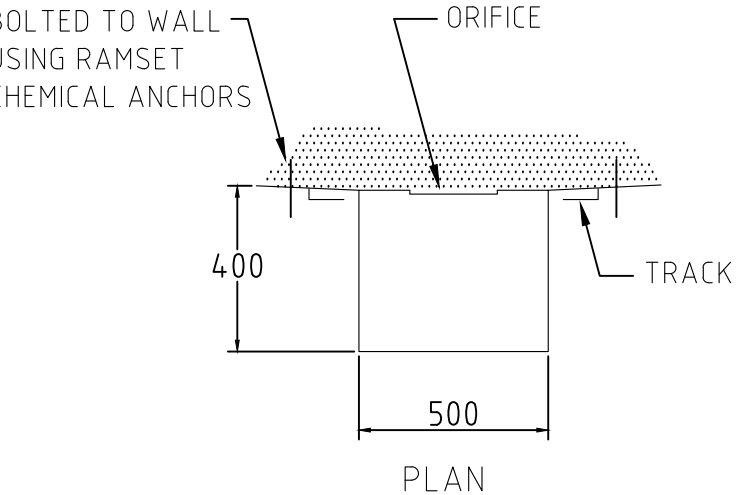
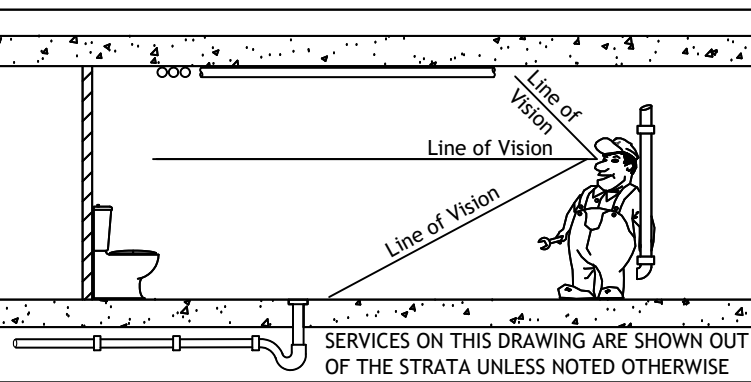
1. TOP OF RAINWATER HEAD TO BE SET MIN 25mm LOWER THAN INVERT OF GUTTER.
2. RAINWATER HEAD OVERFLOW WEIR TO BE SET 25mm BELOW SOLE OF GUTTER.
3. GUTTER AND RAINHEAD TO BE DESIGNED TO ARCHITECTURAL SPECIFICATION PROVIDED IT COMPLIES WITH THE MINIMUM DIMENSIONS IN TABLE 3.

NOT FOR CONSTRUCTION

[illegible]



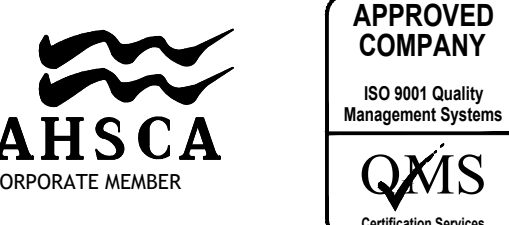
Dimensions not shown to be checked on site. Do not scale of this drawing. This drawing is to be read in conjunction with a specification. Invert levels are indicative only and are to be checked prior to commencement of work. Position of Authorities mains and/or existing services are to be checked prior to commencement of work. Report any discrepancies to the Architect for decision/clarification before proceeding with the work. These designs, drawings, specifications and the copyright therein remain the property of MGP Building & Infrastructure Services Pty Ltd and must not be used, altered, reproduced, or copied wholly or in part without the written permission of the owners.



TRASH SCREEN DETAIL
NOT TO SCALE

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No.	Date	Details
1	17.12.2018	DA SUBMISSION
0	24.08.2018	DA SUBMISSION
Amendments		



Discipline	Dwg. No.	Date	Revisions
ARCHITECTURAL			
STRUCTURAL			
MECHANICAL			
ELECTRICAL			
CIVIL			
LANDSCAPE			

Architect
LEECH HARMON ARCHITECTS

Client
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Project
NEW INDUSTRIAL COMPLEX
130 - 140 OLD PITTVATER RD
BROOKVALE 2100

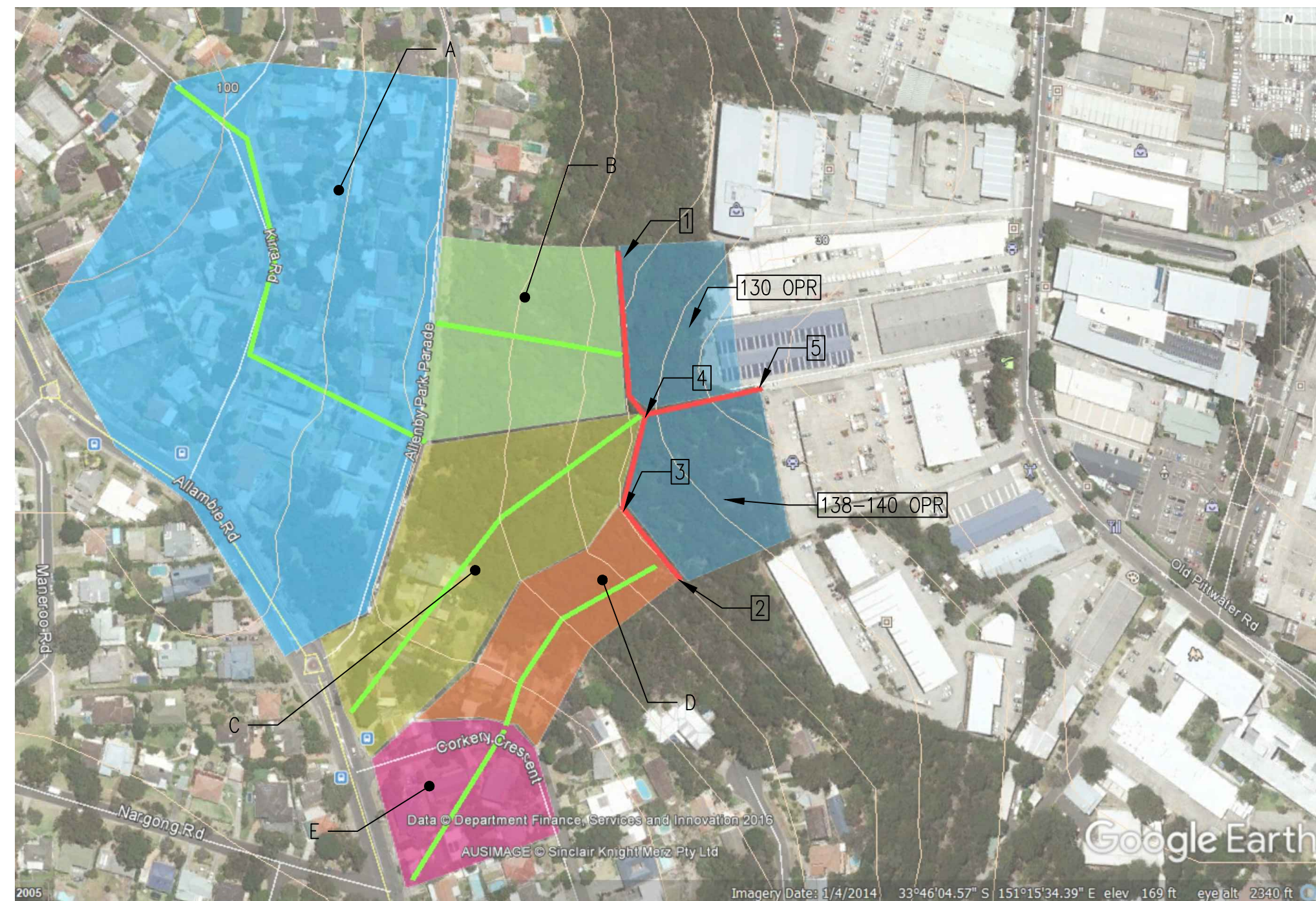
Drawing
STORMWATER DRAINAGE
138 - 140 OPR
OSD DETAILS

Project No. 2016-0577	Drawing No. SW-220 / 1
Drawn: SSD	Date: 24/08/2018
Design: SSD	Scale: AS NOTED
Verified: LES	No in set: -

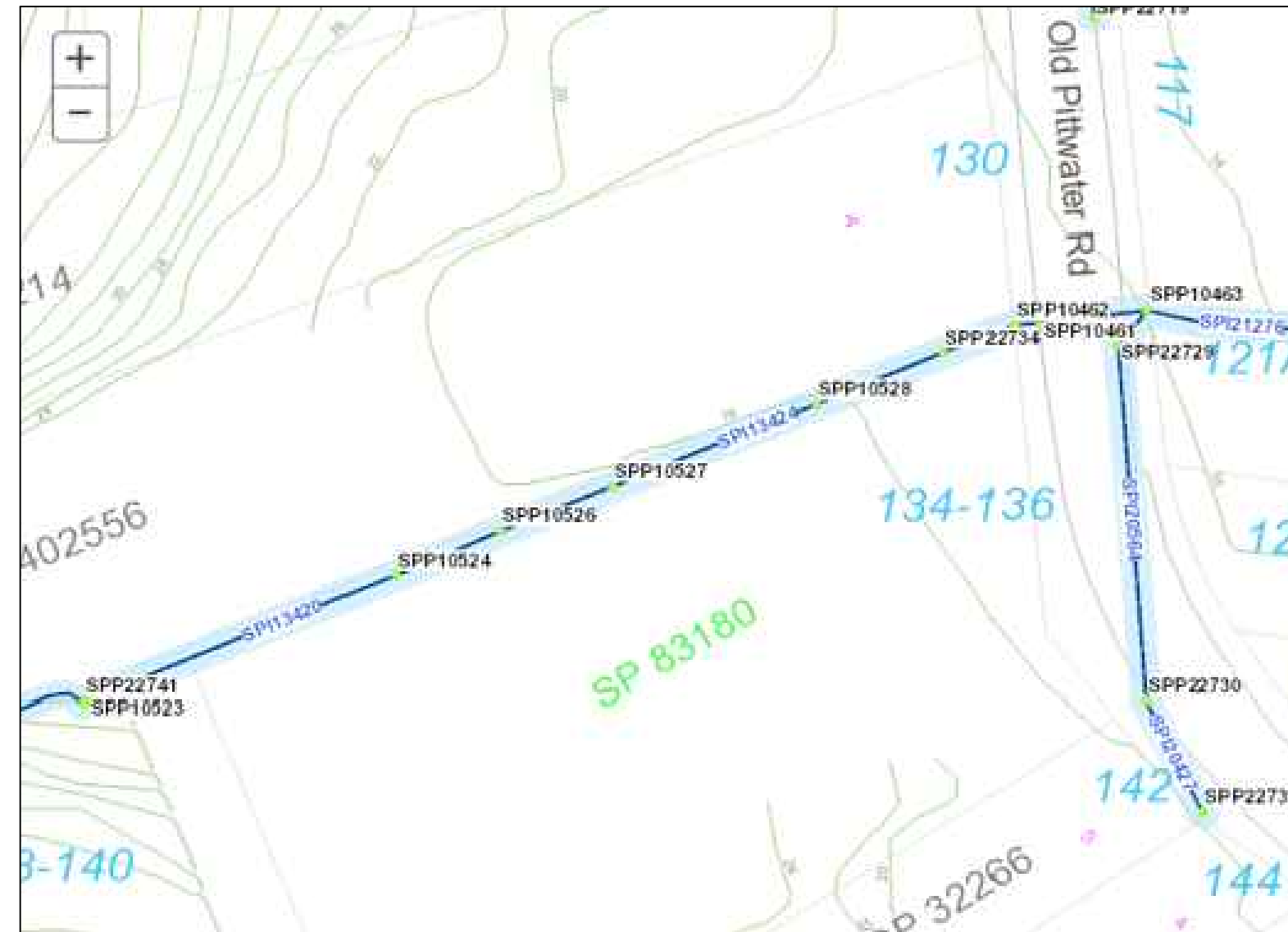
CATCHMENT PARAMETERS

Catchment: A		Area	39,164 m2
B	107	Impervious	80 %
n	0.015	Pervious	20 %
L	251	Tc	6.67 minutes
S	7.97	Fall 20 m	
tc	6.67 minutes		
Catchment: B		Area	9,428 m2
B	107	Impervious	- %
n	0.045	Pervious	100 %
L	96	Tc	11.06 minutes
S	31.25	Fall 30 m	
tc	11.06 minutes		
Catchment: C		Area	12,412 m2
B	107	Impervious	50 %
n	0.035	Pervious	50 %
L	215	Tc	12.82 minutes
S	16.28	Fall 35 m	
tc	12.82 minutes		
Catchment: D		Area	5,612 m2
B	107	Impervious	30 %
n	0.035	Pervious	70 %
L	113	Tc	9.10 minutes
S	30.97	Fall 35 m	
tc	9.10 minutes		
Catchment: E		Area	5,000 m2
B	107	Impervious	80 %
n	0.015	Pervious	20 %
L	82	Tc	4.22 minutes
S	12.20	Fall 10 m	
tc	4.22 minutes		
Catchment: CDE		Area	23,024 m2
		Impervious	52.00 %
		Pervious	48 %
		Tc	13.32 minutes
Catchment: AB		Area	48,592 m2
		Impervious	64.48 %
		Pervious	36 %
		Tc	17.73 minutes

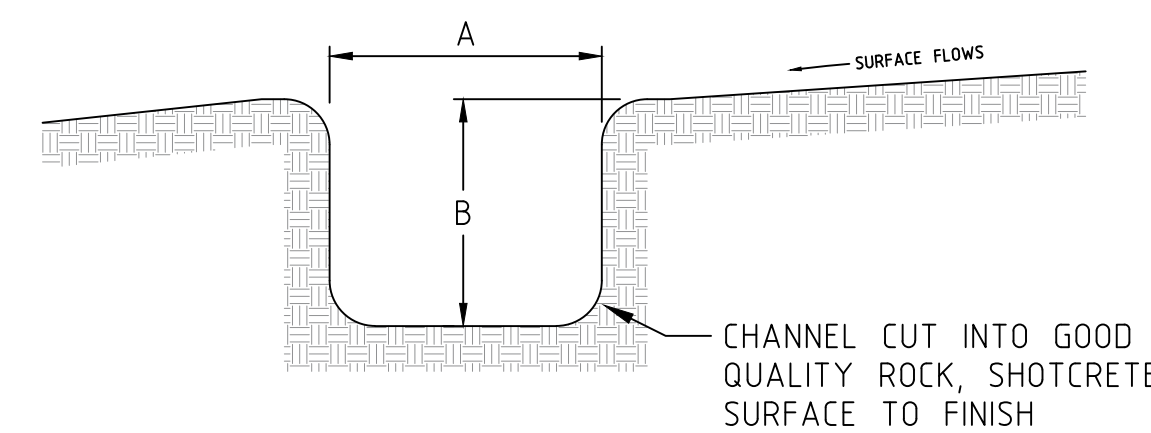
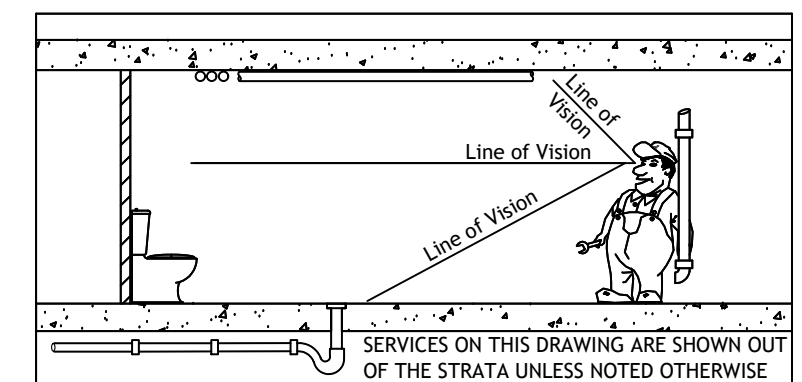
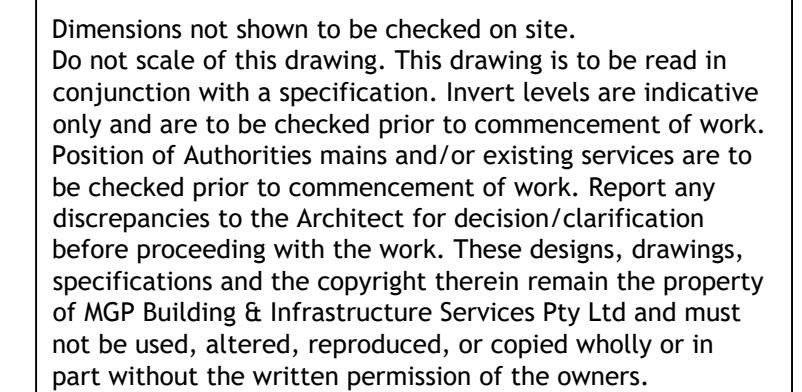
	Catchment Flows (m3/s)			
Catchment	20% AEP	5% AEP	2% AEP	1% AEP
Catchment: A	1.23	1.78	2.11	2.4
Catchment: B	0.153	0.267	0.336	0.934
Catchment: C	0.261	0.4	0.496	0.571
Catchment: D	0.139	0.213	0.265	0.305
Catchment: E	0.189	0.269	0.323	0.367
Catchment: AB	0.98	1.43	1.74	1.99
Catchment: CDE	0.48	0.73	0.90	1.03
138-140 OPR - 100% Impervious	0.25	0.35	0.41	0.46
130 OPR - 100% Impervious	0.20	0.28	0.33	0.37



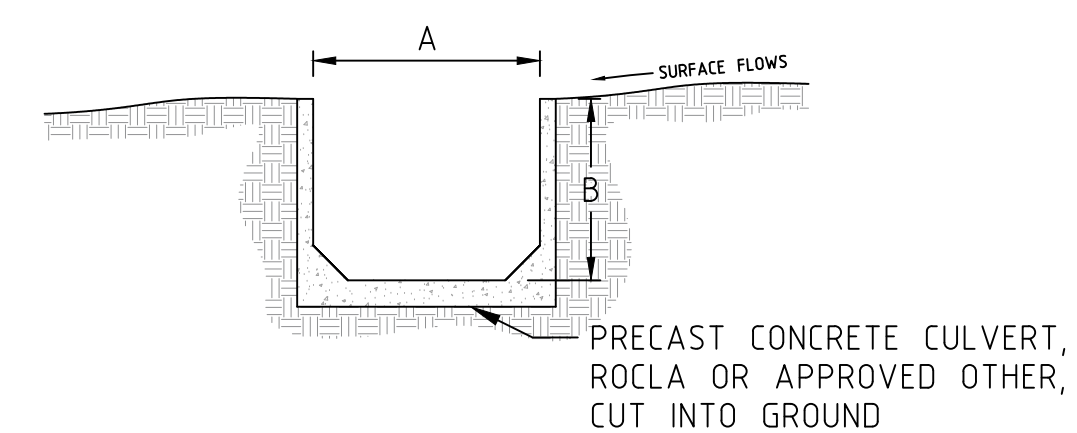
CATCHMENT PLAN
NOT TO SCALE



EXISTING COUNCIL INFRASTRUCTURE
NOT TO SCALE



CHANNEL IN COMPETENT ROCK
NOT TO SCALE



PRECAST CHANNEL
NOT TO SCALE

DIMENSIONS

TYPE 1: A = 1200mm, B = 900mm (1% FALL)
TYPE 2: A = 1200mm, B = 1200mm (1% FALL)
TYPE 3: A = 1500mm, B = 1200mm (1% FALL)

INCLUDES 500mm FREEBOARD TO TWL (1% AEP)

Friend's Equation

Friend's Equation

$$t_c = \frac{BnL^{0.333}}{S^{0.2}}$$

where;

B = Const (72 US Units, 107 metric)

S = Average catchment slope (Percent, %)

L = Length of overland flow (ft, m)

n = Horton's roughness (similar but not identical to Manning's n)

Paved 0.015

Bare Soil .0275

Poorly Grassed .035

Average Grass .045

Dense grass 0.06

	Channel Peak Flows (m3/s)			
Channel Location	20% AEP	5% AEP	2% AEP	1% AEP
1 (Upstream 138-140 OPR)	0.33	0.48	0.59	0.67
2 (Upstream 130 OPR)	0.98	1.43	1.74	1.99
3 (138-140 Council asset joins)	0.48	0.73	0.90	1.03
4 (130-140 Junction)	1.46	2.16	2.64	3.02
5 (At Head Wall)	1.91	2.78	3.38	3.85

CAPACITY OF 900mm DIA MAIN

ASSUME PIPE FOLLOWS GROUND CONTOURS BETWEEN PITS

ASSUME 600mm COVER

UPSTREAM IL20.65 mAHD

DOWNSTREAM IL14.60 mAHD

DISTANCE 151m

GRADE 4%

USING COLEBROOK-WHITE EQUATION FOR CIRCULAR PIPES

FLOWING FULL

 $K=0.6$

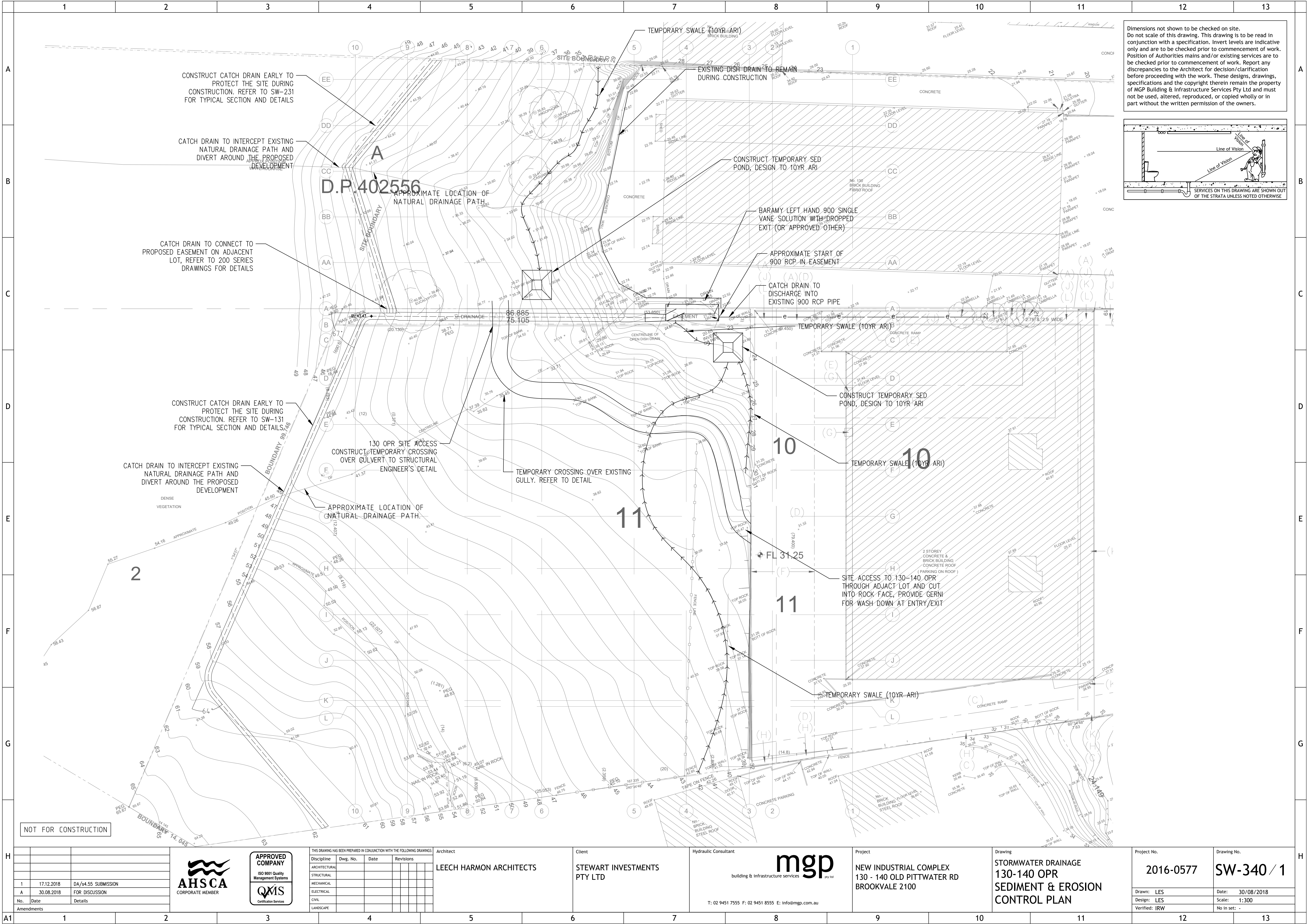
DIA=900mm

PIPE CAPACITY IS $4\text{m}^3/\text{s}$ (PIPE HAS SUFFICIENT CAPACITY)

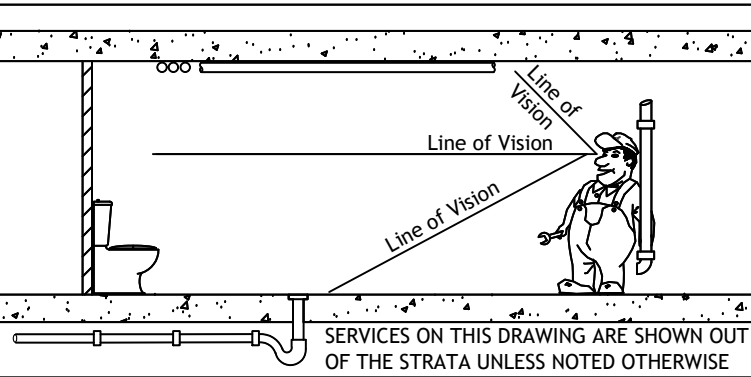
CHANNEL DIMENSIONS (MANNINGS)

Location of Open Channel	Roughness of Channel Surface (n)	Depth of Flow / Channel (A,R)	Width of Flow / Channel (A,R)	Slope of Channel as a Grade (S)	Discharge Capacity of Channel (Q)	Discharge Velocity of Channel (Q/A)	Flow Depth + Energy (Depth)
	n	m	m	1 in Grade	l/s	m/s	m
Location 1	0.012	0.230	1.200	100	695	2.518	0.553
Location 2	0.012	0.490	1.200	100	2045	3.477	1.106
Location 3	0.012	0.310	1.200	100	1075	2.890	0.736
Location 4	0.012	0.530	1.500	100	3037	3.820	1.274
Location 5	0.012	0.630	1.500	100	3853	4.077	1.477

[illegible]



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1	17.12.2018	DA/s4.55 SUBMISSION
A	30.08.2018	FOR DISCUSSION
No.	Date	Details
Amendments		



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Project
**NEW INDUSTRIAL COMPLEX
130 - 140 OLD PITTVATER RD
BROOKVALE 2100**

Drawing
**STORMWATER DRAINAGE
130-140 OPR
SEDIMENT & EROSION
CONTROL PLAN**

Project No.
2016-0577

Drawing No.
SW-340 / 1

Drawn: LES	Date: 30/08/2018
Design: LES	Scale: 1:300
Verified: IRW	No in set: -