



NOTE
CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

STRUCTURAL & CIVIL
INSTRUCTMECHANICAL, ELECTRICAL, DRY FIRE & ESD
WOOD & GRIEVE ENGINEERS

HYDRAULIC & WET FIRE
MEDLAND ENGINEERING

URFACE DESIGN

TRAFFIC
SON GROUP

QUANTITY SURVEYOR
SIDER LEVETT BUCKNALL

VERTICAL TRANSPORTATION
ORMAN DISNEY & YOUNG

PROJECT MANAGER

AVILLS PROJECT MANAGEMENT

CLIENT _____

PROJECT _____

ORGANISATIONS RELOCATION
(SHORT)
MILTON ST LEONARDS, SYDNEY

IN PROJECT NUMBER

DRAWING KEY

TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

SCALE @ A1
125

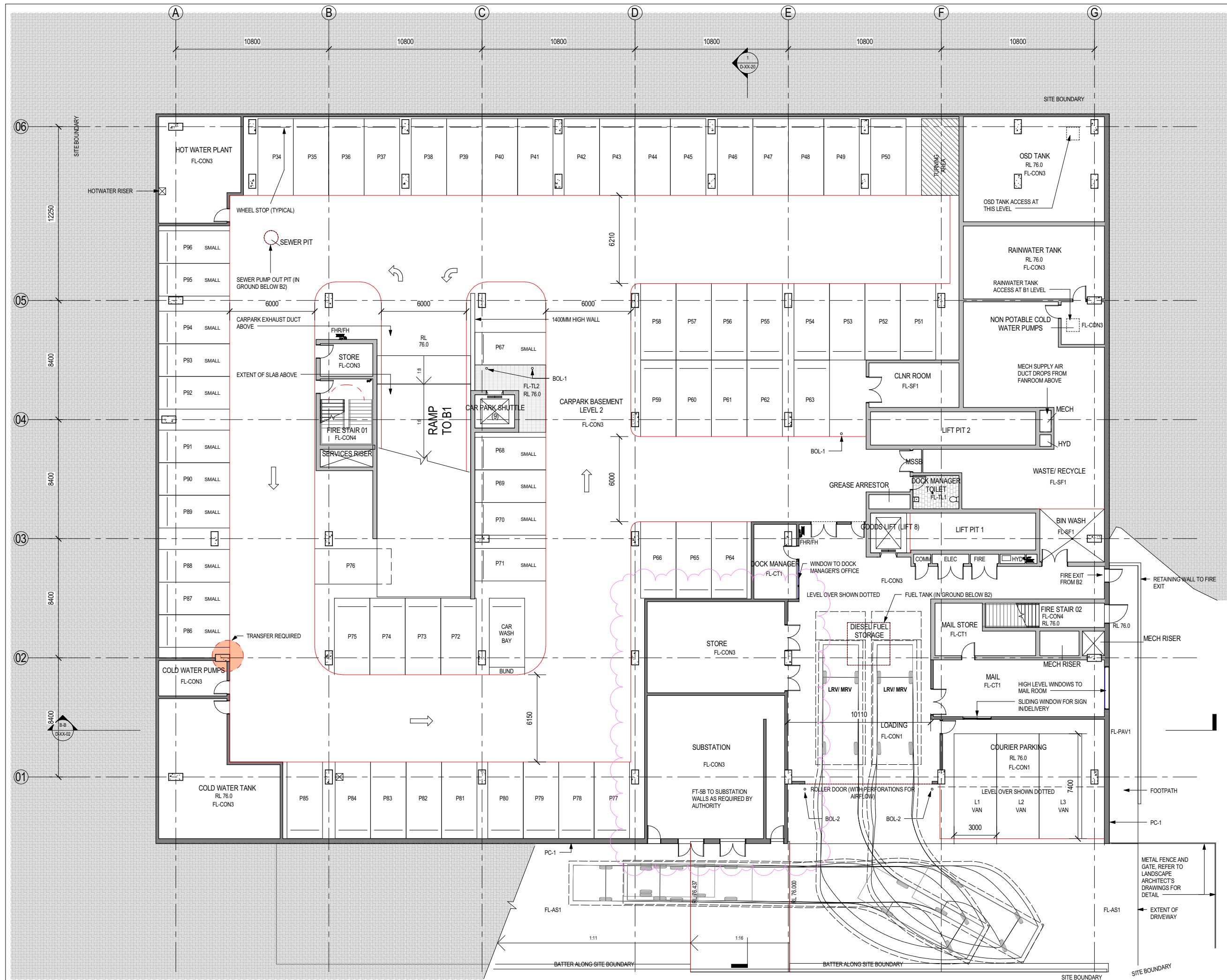
STATUS

FOR TENDER DRAWING

GA PLAN - BASEMENT LEVEL

	ISSUE
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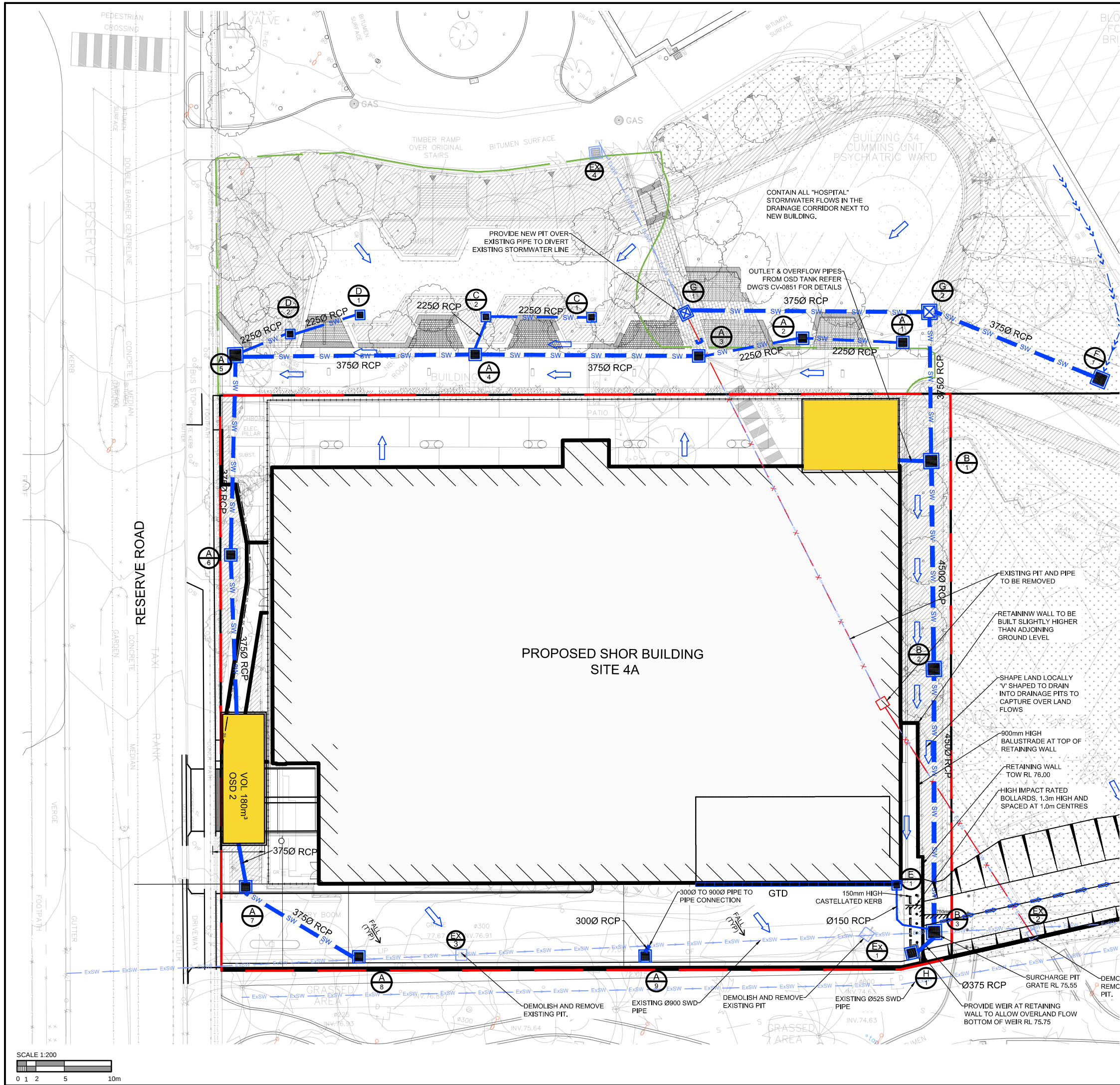
AR-D-BZ-ZU	D
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C:\REVIT_LOCAL2016\1609521.000-AR-Base Building_rvider.rvt 18/10/2017 12:02:57 PM

ATTACHMENT C

STORMWATER MANAGEMENT PLAN, SITE 3D MODEL
& DRIVEWAY DESIGN



FOR CONTINUATION REFER SHEET CV-0201

- LEGEND**
- SHOR SITE BOUNDARY
 - EXISTING DRAINAGE PIT WITH GRATED COVER
 - EXISTING STORMWATER DRAIN
 - PROPOSED DRAINAGE PIT WITH INFILL TYPE LID
 - PROPOSED DRAINAGE PIT WITH GRATED COVER
 - PROPOSED STORMWATER DRAIN
 - PROPOSED SUBSOIL DRAIN
 - PROPOSED OSD TANK
 - OVERLAND FLOW DIRECTION
 - BASEMENT CAR PARK OUTLINE
 - WORKS EXTERNAL TO SHOR SITE
 - EXISTING PIPE TO BE REMOVED
 - PROPOSED STORMWATER PIT REFER TO DRAWING CV-0950 FOR DETAILS
 - PROPOSED CATCH DRAIN



rev	date	description	dwn	chk
E	25.07.17	DRAFT ISSUE	IM	ER
D	07.06.17	ISSUE FOR TENDER	IM	ER
C	23.05.17	ISSUE FOR TENDER	IM	ER
B	19.05.17	ISSUE FOR TENDER	IM	ER
A	24.02.17	ISSUE FOR TENDER	IM	GP
2	21.02.17	DRAFT ISSUE	IM	GP
1	09.02.17	DRAFT ISSUE	IM	GP

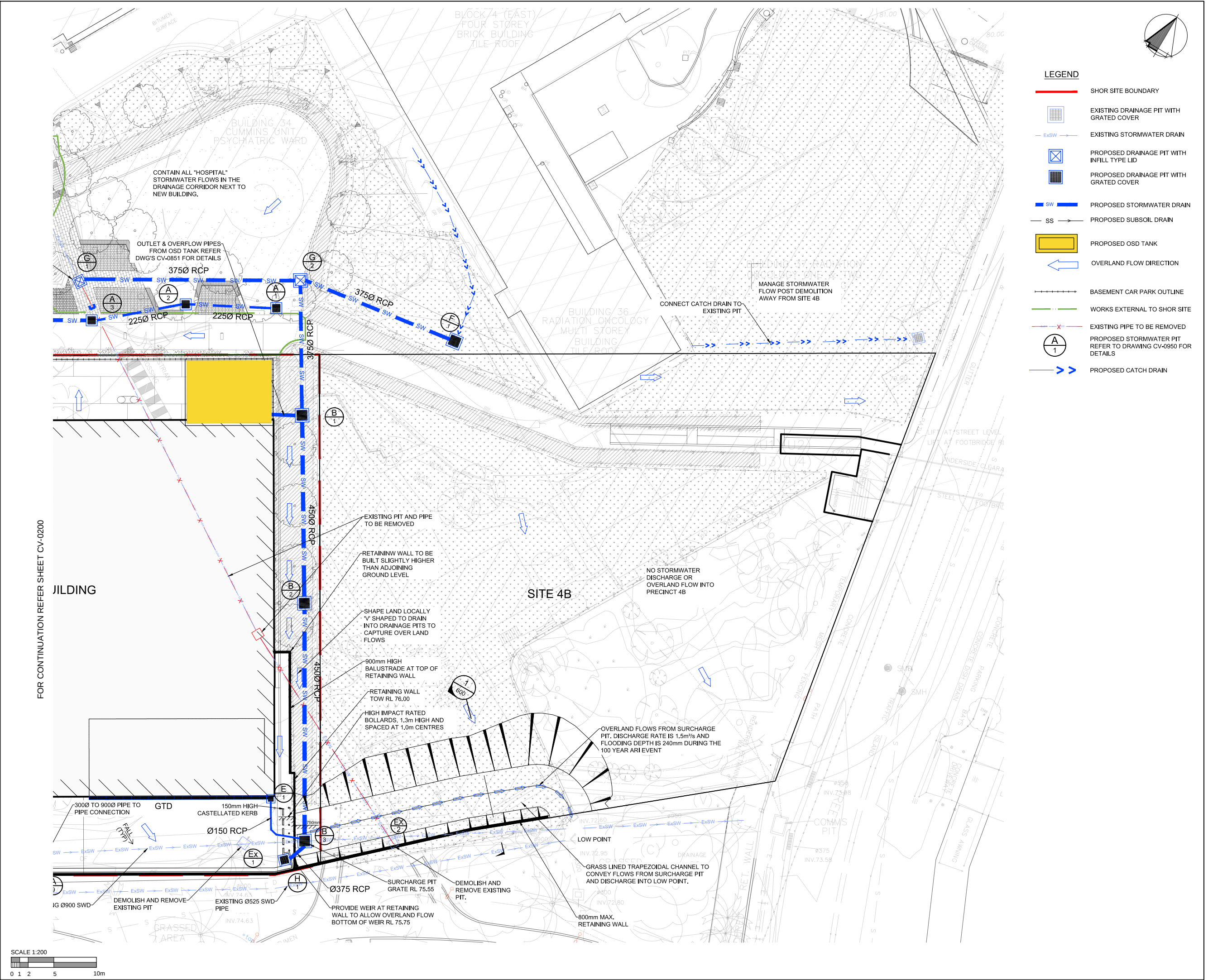
enstruct group pty ltd
Level 4, 2 Glen Street
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ST LEONARDS HEALTH ORGANISATIONS RELOCATION (SHOR)
ST LEONARDS, SYDNEY

STORMWATER MANAGEMENT PLAN SHEET 1

DRAFT ISSUE			
Scale at A1 1:200	Drawn by IM	Checked GP	Date FEB-17
Project no. 5391	Drawing no. CV-0200	Rev. E	



E	25.07.17	DRAFT ISSUE	IM	ER
D	07.06.17	ISSUE FOR TENDER	IM	ER
C	22.05.17	ISSUE FOR TENDER	IM	ER
B	19.05.17	ISSUE FOR TENDER	IM	ER
A	24.02.17	ISSUE FOR TENDER	IM	GP
1	21.02.17	DRAFT ISSUE	IM	GP
rev	date	description	dm	chk

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drawing title

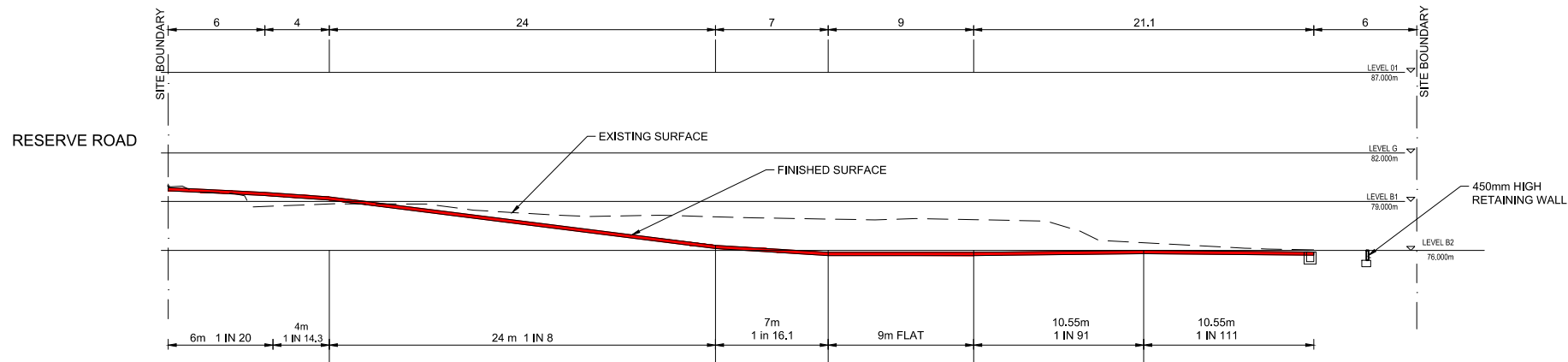
STORMWATER MANAGEMENT PLAN SHEET 2

status

DRAFT ISSUE

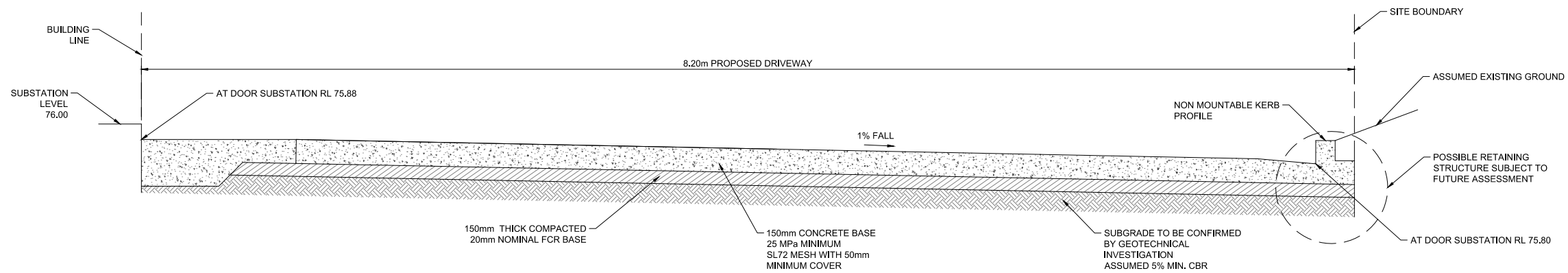
scale at A1 1:200	drawn by IM	checked GP	date FEB-17
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project no. 5391	drawing no. CV-0201	rev. E
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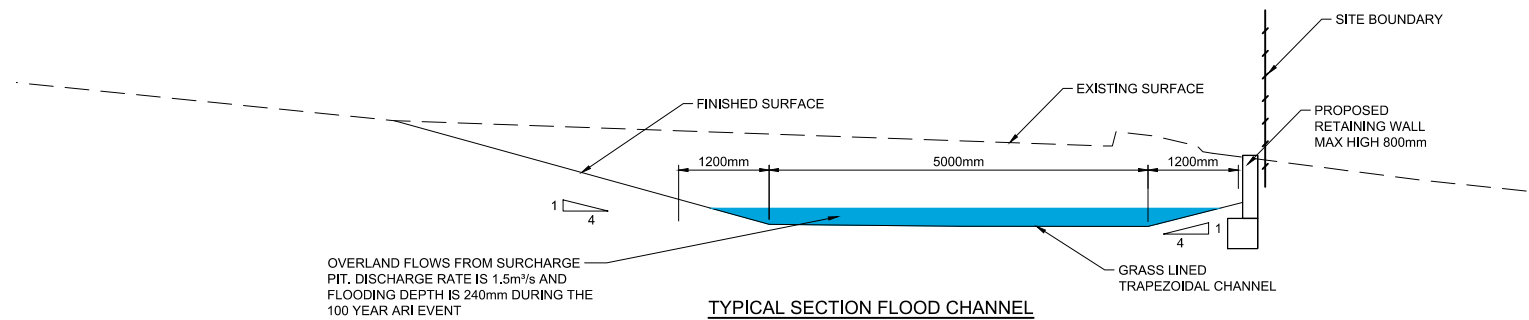
LANEWAY LONG SECTION ALONG BUILDING EDGE

SCALE 1:200



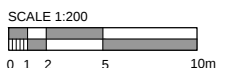
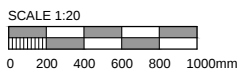
TYPICAL SECTION LANEWAY AT SUBSTATION

SCALE 1:20



TYPICAL SECTION FLOOD CHANNEL

SECTION 1
SCALE 1:50



rev	date	description	dm	ch'k
D	25.07.17	DRAFT ISSUE	IM	ER
C	07.06.17	ISSUE FOR TENDER	IM	ER
B	22.05.17	ISSUE FOR TENDER	IM	ER
A	24.02.17	ISSUE FOR TENDER	IM	GP
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project
ST LEONARDS HEALTH ORGANISATIONS RELOCATION (SHOR)
ST LEONARDS, SYDNEY

drawing title
ROAD LONG SECTION

status
DRAFT ISSUE

scale at A1
1:200, 20

drawn by
IM

checked
GP

date
FEB-17

project no.
5391

drawing no.
CV-0600

rev.
D

ATTACHMENT D

DRAINS MODELLING INPUT AND OUTPUT

Job ROYAL NORTH SHORE HOSPITA
SHOR
With OSD System
DRAINS Modelling

Design ER
Date Nov-17
Checked QE
Date Nov-17

Calculation Sheet
Office Sydney
Job No 5391

ROYAL NORTH SHORE HOSPITAL

SHOR

DEVELOPED (WITH OSD) SCENARIO

enstruct

DRAINS OUTPUT

November 2017

DRAINS File Path:	P:\1-5300\5391\00 - Enstruct Documents\0.3 - Analysis\Civil\Stormwater\DRAINS\5391_Developed_01_with OSD_V9.DRN
DRAINS Version:	DRAINS Version 2017.11 - 26 Oct 2017
Modeler's Name:	Eric Ruiz
Description:	Developed Model - With OSD

PIT / NODE DETAILS										Version 13									
Name	Type	Family	Size	Ponding Volume (cu.m)	Pressure Change Coeff. Ku	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Loss	Inflow Hydrograph	Pit is			
E1	OnGrade	Surface Inlet Pits	900x900		3	75.87		0	0.5	53433.76	-7118.751	No	18216214	1 x Ku	No	New			
B3	OnGrade	Surface Inlet Pits	900x900		1.5	75.61		0	0.5	69223.42	-10124.85	No	18216212	1 x Ku	No	New			
EX2	OnGrade	Surface Inlet Pits	900x900		1.5	75.6		0	0.5	83822.96	-9611.15	No	21114010	1 x Ku	No	Existing			
SURCHARGE	Node					75.9		0		87682.63	-9147.378		21114012		No				
B1	OnGrade	Surface Inlet Pits	900x900		4	79.11		0	0.5	69400.87	42035.554	No	18216223	1 x Ku	No	New			
B2	OnGrade	Surface Inlet Pits	900x900		1.5	77.5		0	0.5	69138.41	14760.896	No	18216211	1 x Ku	No	New			
RESERVE1	Node					83.5		0		-12945	73891.623		18216620		No				
EX4	OnGrade	Surface Inlet Pits	600x900		1.5	84.65		0	0	34562.79	73023.057	No	19324609	1 x Ku	No	Existing			
G1	OnGrade	Surface Inlet Pits	900x900		1.5	82.45		0	0.5	39127.45	63408.844	No	22588513	1 x Ku	No	New			
G2	OnGrade	Surface Inlet Pits	900x900		1.5	82.41		0	0.5	68101.58	62434.378	No	22588514	1 x Ku	No	New			
A1	OnGrade	Downpipe			4.5	82.12		0	0.5	63748.96	56912.404	No	19432650	1 x Ku	No	New			
A2	OnGrade	Surface Inlet Pits	450x450		2.5	82.09		0	0.5	54575.99	57107.297	No	19600852	1 x Ku	No	New			
A3	OnGrade	Surface Inlet Pits	600x600		2.5	81.79		0	0.5	47559.83	48843.824	No	18216209	1 x Ku	No	New			
A4	OnGrade	Surface Inlet Pits	600x900		2	81.78		0	0.5	17611.76	48887.48	No	18216207	1 x Ku	No	New			
A5	OnGrade	Surface Inlet Pits	600x600		2	81.77		0	0.5	-4268.772	48661.924	No	18216206	1 x Ku	No	New			
A6	OnGrade	Surface Inlet Pits	900x900		2	80.97		0	0.5	-4671.551	29622.246	No	18216218	1 x Ku	No	New			
A7	OnGrade	Surface Inlet Pits	900x900		2	79.77		0	0.5	-3829.613	-4894.339	No	18216216	1 x Ku	No	New			
A8	OnGrade	Surface Inlet Pits	900x900		1.5	78.61		0	0.5	8732.831	-12606.13	No	19600832	1 x Ku	No	New			
EX3	OnGrade	Surface Inlet Pits	900x900		1.5	77.85		0	0.5	19248.34	-12339.66	Yes	21114008	1 x Ku	No	Existing			
H1A	Node					75.8		0		41026.67	-11246.48		28480004		No				
EX1	OnGrade	Surface Inlet Pits	900x900		1.5	75.9		0	0.5	62579.6	-10130.87	Yes	21114009	1 x Ku	No	Existing			
C1	Sag	Surface Inlet Pits	450x450	5	4	82.46		0.2	0	31980.85	57194.609	No	19600853	1 x Ku	No	New			
C2	Sag	Surface Inlet Pits	450x450	5	2	82.43		0	0.5	20530.48	57419.126	No	19600854	1 x Ku	No	New			
D1	Sag	Surface Inlet Pits	450x450	5	4	82.47		0	0.5	8182.046	56970.052	No	19600855	1 x Ku	No	New			
D2	Sag	Surface Inlet Pits	450x450	5	2	82.11		0.2	0	-3717.354	56287.56	No	19600858	1 x Ku	No	New			
LEFT	Node					80		0		20368.83	-34884.3		19664651		No				
RIGHT	Node					82		0		147104.2	36565.988		19664655		No				
END	Node					75.3		0		101626	-6164.086		19791499		No				
EX5	OnGrade	Surface Inlet Pits	900x900		4	79.78		0	0.5	87707.84	51806.201	No	21113924	1 x Ku	No	New			
H1	OnGrade	NSW RTA SA Inlet	SA1		4	75.75		0	0.5	69110.63	-12944.49	No	21114034	1 x Ku	No	New			
EX6	Node					78.6		0		141769.7	61123.656		22588695		No				
EASTERN EDGE	Node					75		0		132043.7	21184.389		28245403		No				
OUT	Node					74.5		0		132282.8	-3199.538		28245404		No				
A9	OnGrade	Surface Inlet Pits	600x600		1.5	75.79		0	0	39853.79	-12678.75	No	28480002	1 x Ku	No	New			

DETENTION BASIN DETAILS																			
Name	Elev	Surf. Area	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Length	id				
OSD1	76	74		Orifice		140		76.2		64073.79	42425.341	No			18216261				
	79.5	74																	
OSD2	77.425	70		Orifice		118		77.61		-4166.388	7351.837	No			19285665				
	79.7	70																	

SUB-CATCHMENT DETAILS																						
Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%)	Grass Slope %	Supp Slope %	Paved Rough	Grass Rough	Supp Rough	Lag Time or Factor	Gutter Length (m)	Gutter Slope %	Gutter FlowFactor	Rainfall Multiplier
CAT_E1	E1	0.0061	100	0	0	5	0	0	0	0	0								0			1
CAT_OSD1	OSD1	0.342	100	0	0	5		5	0	0	0								0			1
CAT_B2	B2	0.03	5	95	0	5		5	0	0	0								0			1
CAT_EX4	EX4	0.89	85	15	0	7		7	0		0								0			1
CAT_G1	G1	0.01	25	75	0	5		5	0		0								0			1
CAT_G2	G2	0.35	85	15	0	7		7	0		0								0			1
CAT_A1	A1	0.065	35	65	0	5		5	0		0								0			1
CAT_A2	A2	0.065	35	65	0	5		5	0		0								0			1
CAT_A3	A3	0.0173	100	0	0	5		0	0		0								0			1
CAT_A4	A4	0.0147	100	0	0	5		0	0		0								0			1
CAT_A5	A5	0.0175	100	0	0	5		0	0		0								0			1
CAT_A6	A6	0.0021	50	50	0	5		5	0		0								0			1
CAT_A7	A7	0.022	100	0	0	5		0	0		0								0			1
CAT_A8	A8	0.012	100	0	0	5		0	0		0								0			1
CAT_C1	C1	0.0188	35	65	0	5		5	0		0								0			1
CAT_C2	C2	0.0188	35	65	0	5		5	0		0								0			1
CAT_D1	D1	0.0229	35	65	0	5		5	0		0								0			1
CAT_D2	D2	0.0229	35	65	0	5		5	0		0								0			1
CAT_LEFT	LEFT	0.3	65	35	0	10		10	0		0								0			1
CAT_RIGHT	RIGHT	0.3421	60	40	0	5		5	0		0								0			1
CAT_F1	F1	0.05	90	10	0	5		5	0		0								0			1
CAT_H1	H1	0.031	50	50	0	5		5	0		0								0			1
CAT_EASTERN EDGE	EASTERN EDGE	0.03	95	5	0	5		5	0		0								0			1
CAT_A9	A9	0.025	50	50	0	5		5	0		0								0			1

PIPE DETAILS																			
Name	From	To	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Type	Dia (mm)	I.D. (mm)	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg (m)	RI (m)	Chg (m)	RL (m)	etc (m)
C2-EX1	E1	B3	8.5	75.24	74.8	5.18	uPVC, under roads, 1% minimum slope	150	154	0.012	New	1	E1		0				
B3-EX2	B3	EX2	10.5	73.622	73.37	2.4	Concrete, under roads, 1% minimum slope	900	900	0.013	Existing	1	B3		0				
EX2-SUR	EX2	SURCHARGE	3	73.37	73.31	2	Concrete, under roads, 0.5% minimum slope	900	900	0.013	Existing	1	EX2		0				
OSD1-B1	OSD1	B1	6	76	75.94	1	Concrete, not under roads, 1% minimum slope	375	375	0.013	New/Fixed	1	OSD1		0				
B1-B2	B1	B2	22.5	75.89	75.665	1	Concrete, under roads, 0.5% minimum slope	450	450	0.013	New	1	B1		0				
B2-B3	B2	B3	28	75.615	74.8	2.91	Concrete, under roads, 1% minimum slope	450	450	0.013	New	1	B2		0				
EX4-CAP	EX4	G1	27	83.8	80.65	11.67	Concrete, not under roads, 0.5% minimum slope	375	375	0.013	Existing	1	EX4		0				
G1-G2	G1	G2	26	80.6	80.34	1	Concrete, not under roads, 1% minimum slope	375	375	0.013	New	1	G1		0				
G2-B1	G2	B1	16	78.48	76.08	15	Concrete, not under roads, 1% minimum slope	375	375	0.013	New	1	G2		0				
A1-A2	A1	A2	13	81.25	81.12	1	Concrete, not under roads, 1% minimum slope	225	225	0.013	New	1	A1		0				
A2-A3	A2	A3	8.7	81.07	80.983	1	Concrete, not under roads, 0.5% minimum slope	225	225	0.013	New	1	A2		0				
A3-A4	A3	A4	25.7	80.933	80.676	1	Concrete, not under roads, 0.5% minimum slope	375	375	0.013	New	1	A3		0				
A4-A5	A4	A5	24.5	80.476	80.231	1	Concrete, not under roads, 0.5% minimum slope	375	375	0.013	New	1	A4		0				
A5-A6	A5	A6	21.5	80.181	79.966	1	Concrete, not under roads, 1% minimum slope	375	375	0.013	New	1	A5		0				
A6-OSD2	A6	OSD2	19	79.916	79.2	3.77	Concrete, under roads, 0.5% minimum slope	375	375	0.013	New/Fixed	1	A6		0				
OSD2-A7	OSD2	A7	4	77.425	77.385	1	Concrete, under roads, 1% minimum slope	375	375	0.013	New/Fixed	1	OSD2		0				
A7-A8	A7	A8	14.3	77.335	76.6	5.14	Concrete, under roads, 1% minimum slope	375	375	0.013	New	1	A7		0				
A8-EX3	A8	EX3	11	75.25	74.95	2.73	Concrete, under roads, 1% minimum slope	900	900	0.013	Existing	1	A8		0				
EX3-H1A	EX3	H1A	20	74.95	74.416	2.67	Concrete, under roads, 1% minimum slope	900	900	0.013	Existing	1	EX3		0				
H1A-EX1	H1A	EX1	23.3	74.416	73.794	2.67	Concrete, under roads, 1% minimum slope	900	900	0.013	Existing	1	H1A		0				
EX1-B3	EX1	B3	7	73.79	73.622	2.4	Concrete, under roads, 1% minimum slope	900	900	0.013	Existing	1	EX1		0				
C1-C2	C1	C2	10.8	81.75	81.642	1	Concrete, not under roads, 1% minimum slope	225	225	0.013	New	1	C1		0				
C2-A4	C2	A4	4	81.592	81.1	12.3	Concrete, not under roads, 1% minimum slope	225	225	0.013	New	1	C2		0				
D1-D2	D1	D2	12.1	81.65	81.529	1	Concrete, not under roads, 1% minimum slope	225	225	0.013	New	1	D1		0				
D2-A5	D2	A5	4.1	81.479	81.233	6	Concrete, not under roads, 1% minimum slope	225	225	0.013	New	1	D2		0				
F1-G2	F1	G2	20	78.8	78.6	1	Concrete, not under roads, 1% minimum slope	375	375	0.013	New	1	F1		0				
EX5-A8	EX5	A8	20	76.11	75.25	4.3	Concrete, under roads, 1% minimum slope	900	900	0.013	Existing	1	EX5		0				
H1-B3	H1	B3	3.7	74.847	74.81	1	Concrete, under roads, 1% minimum slope	375	375	0.013	New	1	H1		0				
A9-H1A	A9	H1A	5	74.89	74.84	1	Concrete, under roads, 1% minimum slope	300	300	0.013	New	1	A9		0				

enstruct	PROJECT		ROYAL NORTH SHORE HOSPITAL - SHOR					JOB No		5391	
	TITLE		100 YEAR ARI - RESULTS					PREPARED		ER	
								CHECKED		QE	
										DATE	
										DATE	
										8/11/2017	
										8/11/2017	
DRAINS File Path:		P:\j1-5300\5391\00 - Enstruct Documents\0.3 - Analysis\Civil\Stormwater\DRAINS\5391_Developed_01_with OSD_V9.DRN									
DRAINS Version:		DRAINS Version 2017.11 - 26 Oct 2017									
Modeller's Name:		Eric Ruiz									
Description:		Developed Model - With OSD									
DRAINS results prepared from Version 2017.11											
PIT / NODE DETAILS					Version 8						RESULTS 100 YEAR ARI
Name		Max HGL	Max Pond	Max Surface	Max Pond	Min	Overflow	Constraint			
			HGL	Flow Arriving	Volume	Freeboard	(cu.m/s)				
				(cu.m/s)	(cu.m)	(m)					
E1		75.62		0.004		0.25	0	Inlet Capacity			
B3		75.61		0.145		0	2.071	Outlet System			
EX2		75.59		2.071		0.01	1.754	Inlet Capacity			
SURCHARGE		75.51		0							
B1		78.06		0		1.05	0	None			
B2		76.57		0.02		0.93	0.004	Inlet Capacity			
EX4		84.2		0.575		0.45	0.377	Inlet Capacity			
G1		81.28		0.007		1.17	0.001	Inlet Capacity			
G2		79.73		0.227		2.68	0.116	Inlet Capacity			
A1		82.04		0.044		0.08	0	None			
A2		81.63		0.044		0.46	0.029	Inlet Capacity			
A3		81.17		0.041		0.62	0.019	Inlet Capacity			
A4		80.91		0.03		0.87	0.008	Inlet Capacity			
A5		80.69		0.02		1.08	0.008	Inlet Capacity			
A6		80.33		0.009		0.64	0.001	Inlet Capacity			
A7		78.29		0.016		1.48	0.002	Inlet Capacity			
A8		78.28		0.011		0.33	0.001	Inlet Capacity			
EX3		77.43		0		0.42		None			
H1A		76.49		0							
EX1		76.26		0		0		Outlet System			
C1		81.86	82.5	0.013	0.5	0.6	0	Inlet Capacity			
C2		81.74	82.47	0.013	0.5	0.69	0	Inlet Capacity			
D1		81.77	82.52	0.016	0.5	0.7	0	Inlet Capacity			
D2		81.65	82.16	0.016	0.5	0.46	0	Inlet Capacity			
F1		79.77		0.149		0.01	0.095	Inlet Capacity			
EX5		78.5		0							
H1		75.73		0.224		0.02	0.142	Inlet Capacity			
A9		75.79		0.017		0	0.201	Outlet System			
SUB-CATCHMENT DETAILS											
Name		Max	Paved	Grassed	Paved	Grassed	Supp.	Due to Storm			
		Flow Q	Max Q	Max Q	Tc	Tc	Tc				
		(cu.m/s)	(cu.m/s)	(cu.m/s)	(min)	(min)	(min)				
CAT_E1		0.004	0.004	0	5	0	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_OSD1		0.244	0.244	0	5	5	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_B2		0.02	0.001	0.019	5	5	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_EX4		0.575	0.498	0.078	7	7	0	AR&R 100 year, 20 minutes storm, average 159 mm/h, Zone 1			
CAT_G1		0.007	0.002	0.005	5	5	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_G2		0.226	0.196	0.031	7	7	0	AR&R 100 year, 20 minutes storm, average 159 mm/h, Zone 1			
CAT_A1		0.044	0.016	0.028	5	5	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_A2		0.044	0.016	0.028	5	5	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_A3		0.012	0.012	0	5	0	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_A4		0.011	0.011	0	5	0	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_A5		0.013	0.013	0	5	0	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_A6		0.001	0.001	0.001	5	5	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_A7		0.016	0.016	0	5	0	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_A8		0.009	0.009	0	5	0	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_C1		0.013	0.005	0.008	5	5	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_C2		0.013	0.005	0.008	5	5	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_D1		0.016	0.006	0.01	5	5	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_D2		0.016	0.006	0.01	5	5	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_LEFT		0.178	0.121	0.058	10	10	0	AR&R 100 year, 20 minutes storm, average 159 mm/h, Zone 1			
CAT_RIGHT		0.238	0.147	0.091	5	5	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_F1		0.035	0.032	0.003	5	5	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_H1		0.021	0.011	0.01	5	5	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_EASTERN EDGE		0.021	0.02	0.001	5	5	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
CAT_A9		0.017	0.009	0.008	5	5	0	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1			
Outflow Volumes for Total Catchment (2.07 impervious + 0.64 pervious = 2.71 total ha)											
Storm		Total Rainfall	Total Runoff	Impervious Runoff	Pervious Runoff						
		cu.m	cu.m (Runoff %)	cu.m (Runoff %)	cu.m (Runoff %)						
AR&R 100 year, 5 minutes storm, average 266 mm/h, Zone 1		598.66	520.80 (87.0%)	436.78 (95.5%)	84.02 (59.5%)						
AR&R 100 year, 10 minutes storm, average 209 mm/h, Zone 1		941.61	850.27 (90.3%)	698.83 (97.1%)	151.44 (68.2%)						
AR&R 100 year, 15 minutes storm, average 179 mm/h, Zone 1		1212.7	1109.82 (91.5%)	905.97 (97.8%)	203.84 (71.3%)						
AR&R 100 year, 20 minutes storm, average 159 mm/h, Zone 1		1437.3	1324.32 (92.1%)	1077.60 (98.1%)	246.72 (72.8%)						
AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1		1629.12	1506.07 (92.4%)	1224.17 (98.3%)	281.90 (73.4%)						
AR&R 100 year, 30 minutes storm, average 133 mm/h, Zone 1		1796.5	1664.84 (92.7%)	1352.07 (98.5%)	312.76 (73.8%)						
AR&R 100 year, 45 minutes storm, average 108 mm/h, Zone 1		2199.89	2047.08 (93.1%)	1660.31 (98.8%)	386.77 (74.5%)						
AR&R 100 year, 1 hour storm, average 92.8 mm/h, Zone 1		2509.23	2339.82 (93.2%)	1896.69 (98.9%)	443.13 (74.9%)						
AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1		2974.64	2778.99 (93.4%)	2252.33 (99.1%)	526.66 (75.1%)						
AR&R 100 year, 2 hours storm, average 61.5 mm/h, Zone 1		3326.76	3109.25 (93.5%)	2521.41 (99.2%)	587.85 (74.9%)						
AR&R 100 year, 4.5 hours storm, average 36.6 mm/h, Zone 1		4459.59	4151.79 (93.1%)	3387.09 (99.4%)	764.71 (72.7%)						
AR&R 100 year, 9 hours storm, average 23.5 mm/h, Zone 1		5727.18	5257.00 (91.8%)	4355.51 (99.5%)	901.48 (66.7%)						
PIPE DETAILS											
Name		Max Q	Max V	Max U/S	Max D/S	Due to Storm					
		(cu.m/s)	(m/s)	HGL (m)	HGL (m)						
C2-EX1		0.004	0.21	75.62	75.61	AR&R 100 year, 5 minutes storm, average 266 mm/h, Zone 1					
B3-EX2		0.489	0.77	75.591	75.588	AR&R 100 year, 9 hours storm, average 23.5 mm/h, Zone 1					
EX2-SUR		0.631	0.99	75.536	75.51	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
OSD1-B1		0.066	0.6	78.063	78.061	AR&R 100 year, 1 hour storm, average 92.8 mm/h, Zone 1					
B1-B2		0.373	2.35	76.939	76.573	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
B2-B3		0.386	2.43	76.122	75.61	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
EX4-CAP		0.198	4.6	83.955	81.281	AR&R 100 year, 20 minutes storm, average 159 mm/h, Zone 1					
G1-G2		0.204	2	81.021	80.666	AR&R 100 year, 20 minutes storm, average 159 mm/h, Zone 1					
G2-B1		0.375	3.39	78.971	78.061	AR&R 100 year, 15 minutes storm, average 179 mm/h, Zone 1					
A1-A2		0.044	1.12	81.758	81.633	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
A2-A3		0.06	1.61	81.341	81.183	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
A3-A4		0.079	2.26	81.066	80.912	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
A4-A5		0.116	1.05	80.848	80.694	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
A5-A6		0.156	1.42	80.554	80.331	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
A6-OSD2		0.163	3.05	80.099	79.55	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1					
OSD2-A7		0.042	0.38	78.319	78.295	AR&R 100 year, 2 hours storm, average 61.5 mm/h, Zone 1					
A7-A8		0.052	0.47	78.284	78.278	AR&R 100 year, 2 hours storm, average 61.5 mm/h, Zone 1					
A8-EX3		1.953	3.07	77.557	77.435	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
EX3-H1A		1.953	3.07	76.714	76.486	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
H1A-EX1		1.768	2.78	76.486	76.265	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
EX1-B3		1.768	2.78	75.674	75.61	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
C1-C2		0.012	3.12	81.785	81.737	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
C2-A4		0.024	2.67	81.655	81.163	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
D1-D2		0.015	2.79	81.693	81.648	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
D2-A5		0.03	2.35	81.559	81.313	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
F1-G2		0.075	0.68	79.739	79.731	AR&R 100 year, 15 minutes storm, average 179 mm/h, Zone 1					
EX5-A8		1.911	3	78.499	78.278	AR&R 100 year, 2 hours storm, average 61.5 mm/h, Zone 1					
H1-B3		0.081	0.73	75.63	75.61	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1					
A9-H1A		0.011	0.15	75.79	76.486	AR&R 100 year, 5 minutes storm, average 266 mm/h, Zone 1					
CHANNEL DETAILS											
Name		Max Q	Max V			Due to Storm					
		(cu.m/s)	(m/s)								

OVERFLOW ROUTE DETAILS												
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm				
OF_E1EX1	0	0	0	0	0	0	0					
OF_B3EX2	2.071	2.071	0	0.236	0.74	5.74	3.16	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1				
OF_SUREND	1.754	1.754	0	0.269	0.44	8.57	1.63	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1				
OF_B1B2	0	0	0	0	0	0	0					
OF-B2B3	0.004	0.004	2098560	0.037	0.02	0.29	0.66	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1				
OF_EX4RES	0.377	0.377	0	0.048	0.05	11.5	1.02	AR&R 100 year, 20 minutes storm, average 159 mm/h, Zone 1				
OF_G1G2	0.001	0.001	0	0.016	0	0.38	0.18	AR&R 100 year, 1 hour storm, average 92.8 mm/h, Zone 1				
OF_G2F1	0.116	0.116	0	0.133	0.07	3.19	0.54	AR&R 100 year, 20 minutes storm, average 159 mm/h, Zone 1				
OF_A1A2	0	0	0	0	0	0	0					
OF_A2A3	0.029	0.029	519030.25	0.028	0.02	4	0.54	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1				
OF_A3A4	0.019	0.019	0	0.077	0.02	1.85	0.27	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1				
OF_A4A5	0.008	0.008	0	0.056	0.01	1.35	0.22	AR&R 100 year, 20 minutes storm, average 159 mm/h, Zone 1				
OF_A5A6	0.008	0.008	0	0.019	0.01	1.92	0.41	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1				
OF_A6A7	0.001	0.001	0	0.017	0.01	0.19	0.49	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1				
OF_OSD2A7	0	0	0	0	0	0	0					
OF_A7A8	0.002	0.002	0	0.007	0	4.06	0.17	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1				
OF_A8H1	0.001	0.001	0	0.018	0.01	0.21	0.59	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1				
OF_C1C2	0	0	0	0	0	0	0					
OF_C2D1	0	0	1.2244E+26	0	0	0	0					
OF_D1D2	0	0	0	0	0	0	0					
OF_D2A5	0	0	0	0	0	0	0					
OF_F1EX6	0.095	0.095	0	0.124	0.06	2.96	0.52	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1				
OF_H1B3	0.142	0.142	0	0.029	0.02	9.14	0.85	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1				
OF_B2-B3	0.021	0.021	0	0.073	0.07	0.58	1.01	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1				
OF_H1BH1	0.201	0.201	0	0.129	0.14	3.43	1.11	AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1				
DETENTION BASIN DETAILS												
Name	Max WL	MaxVol	Max Q	Max Q	Max Q							
			Total	Low Level	High Level							
OSD1	78.89	213.8	0.066	0.066	0							
OSD2	79.55	148.8	0.042	0.042	0							
CONTINUITY CHECK for AR&R 100 year, 1.5 hours storm, average 73.3 mm/h, Zone 1												
Node	Inflow	Outflow	Storage Change	Difference								
	(cu.m)	(cu.m)	(cu.m)	%								
E1	6.65	6.65	0	0								
B3	9215.44	9215.17	0	0								
EX2	9215.16	9215.29	0	0								
SURCHARGE	3356.36	3356.36	0	0								
OSD1	372.64	347.37	25.28	0								
B1	1175.84	1175.42	0	0								
B2	1200.59	1200.43	0	0								
RESERVE1	473.01	473.01	0	0								
EX4	934.44	934.34	0	0								
G1	470.25	470.46	0	0								
G2	964.85	963.76	0	0.1								
A1	59.68	59.66	0	0								
A2	119.34	119.38	0	0								
A3	138.23	138.22	0	0								
A4	188.8	188.77	0	0								
A5	249.94	250.34	0	-0.2								
A6	252.35	252.3	0	0								
OSD2	251.93	221.56	30.37	0								
A7	245.9	245.79	0	0								
A8	7954.08	7954.48	0	0								
EX3	7953.71	7953.83	0	0								
H1A	7287.09	7287.23	0	0								
EX1	7287.23	7287.23	0	0								
C1	17.26	17.29	0	-0.2								
C2	34.55	34.56	0	0								
D1	21.03	21.06	0	-0.1								
D2	42.08	42.1	0	0								
LEFT	298.99	298.99	0	0								
RIGHT	336.67	336.67	0	0								
END	5858.92	5858.92	0	0								
F1	188.45	188.44	0	0								
EX5	7695	7695.23	0	0								
H1	721.24	721.2	0	0								
EX6	61.54	61.54	0	0								
EASTERN EDGE	32.29	32.29	0	0								
OUT	32.29	32.29	0	0								
A9	23.94	23.94	0	0								

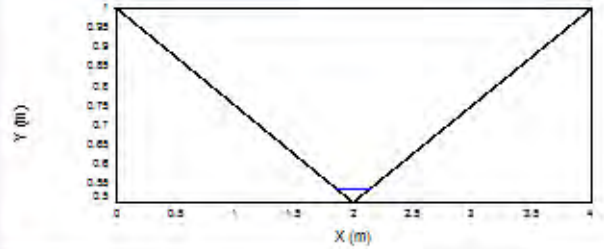
Run Log for 5391_Developed_01_with OSD_V9.drn run at 11:02:31 on 8/11/2017
Upwelling occurred at: A9, B3
Freeboard was less than 0.15m at H1, EX2, F1, A1
The maximum flow in these overflow routes is unsafe: OF_B3EX2

**OVERLAND FLOW PATH ALONG THE EASTERN BOUNDARY OF SITE 4A
(50% BLOCKAGE OF PITS)**

Overflow Route OF-B2B3

Basic Data | Cross Section Data

Shape: Swale with 1:4 sideslopes



Safe Depths and Flow Rates

☒ Use default values for this cross section

☐ You specify

Safe Depth for Major Storms (m) 0.45

Safe Depth for Minor Storms (m) 0.3

Safe Depth x Velocity (sq.m/sec) 1

% of downstream catchment flow carried by this channel 0

Channel slope (%) 8

Calc Slope

For Major Storms:
Safe flow = 1.386 cu.m/s
Maximum flow = 0.004 cu.m/s
Corresponding velocity = 0.66 m/s
Maximum depth = 0.037 m
Maximum flow width = 0.29 m
Maximum D x V = 0.02 sq.m/sec

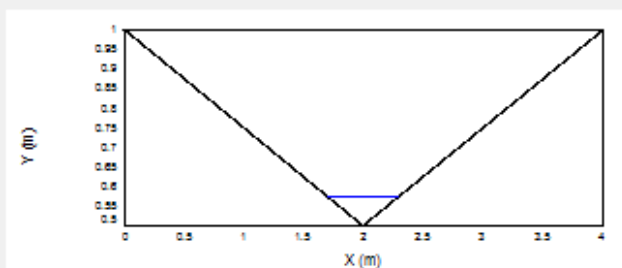
OVERLAND FLOW PATH ALONG THE EASTERN BOUNDARY OF SITE 4A (100% BLOCKAGE OF PITS)

Overflow Route OF_B2-B3



Basic Data | Cross Section Data

Shape Swale with 1:4 sideslopes



Safe Depths and Flow Rates

☒ Use default values for this cross section

☐ You specify

Safe Depth for Major Storms (m)

0.45

Safe Depth for Minor Storms (m)

0.3

Safe Depth x Velocity (sq.m/sec)

1

% of downstream
catchment flow carried
by this channel

0

Channel slope (%)

8

Calc Slope

For Major Storms:

Safe flow = 1.386 cu.m/s

Maximum flow = 0.021 cu.m/s

Corresponding velocity = 1.01 m/s

Maximum depth = 0.073 m

Maximum flow width = 0.58 m

Maximum D x V = 0.07 sq.m/sec

ATTACHMENT E

SEDIMENT AND EROSION CONTROL PLAN