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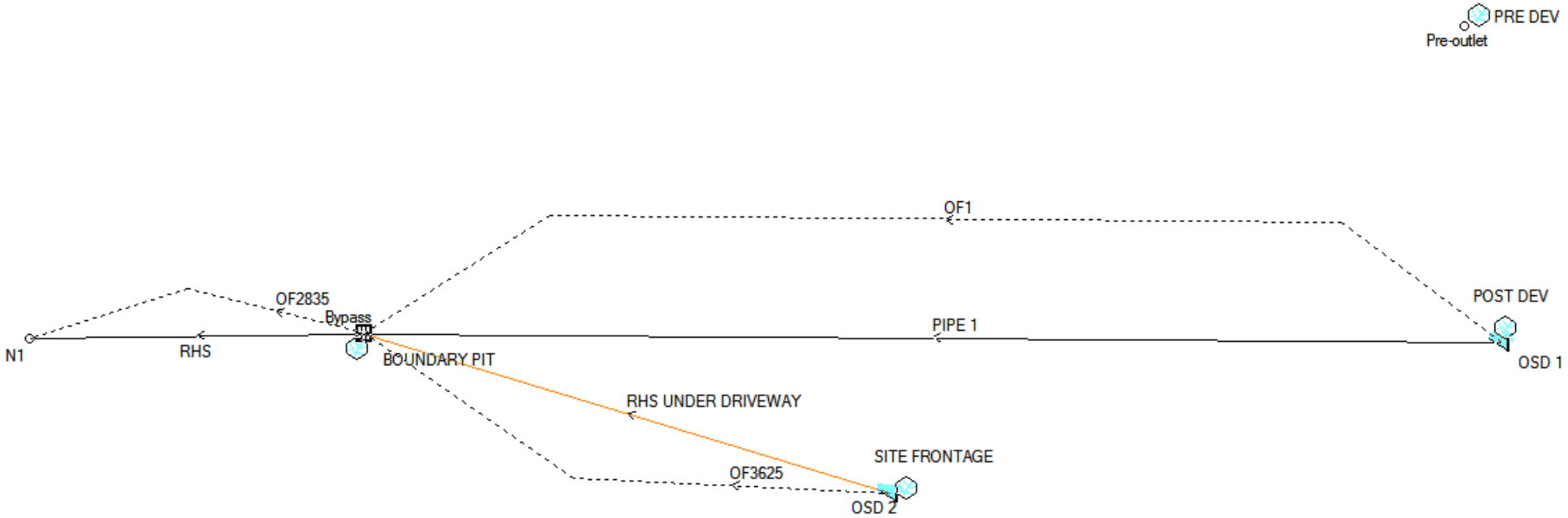
Job Number: **18NL157.DR01** Date: **25TH JULY 2018**

DRAINS MODEL PLAN AND RESULT

FOR 23-29 HARVEY STREET, MOOREBANK NSW

PROPOSED RESIDENTIAL FLAT BUILDING

Prepared by:
LOKA CONSULTING ENGINEERS PTY LTD


PRE DEV
Pre-outlet
OF1
OF2835
Bypass
POST DEV
PIPE 1
N1
RHS
BOUNDARY PIT
OSD 1
RHS UNDER DRIVEWAY
SITE FRONTAGE
OF3625
OSD 2

DATA

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
Pre-outlet	Node					20.07		0		987.808	-140.173		3		No	
BOUNDARY	OnGrade	NSW Dept.	RM.7 Grated Accesswa		1.5	20.5		0	0	898.658	-165.06	No	195185	1 x Ku	No	New
N1	Node					20.07		0		871.479	-165.453		447988		No	

DETENTION BASIN DETAILS

Name	Elev	Volume	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Length(m	id
OSD 1	20.26	0		Orifice		93	20.38			990.833	-165.833	No			3294
	20.38	0.01													
	21.15	1													
	21.7	83.5													
OSD 2	20.03	0		Orifice		25	20.11			941.241	-178.014	No			530535
	20.11	0.01													
	20.8	1.5													
	21	3.5													

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
PRE DEV	Pre-outlet	0.2745	50	50	0	2	5	0	68.46	68.46	0	7.36	7.36	0	0.015	0.035	0	0				1
POST DEV	OSD 1	0.2588	59.2	40.8	0	0	0	0	68.46	68.46	0	3.4	3.4	0	0.015	0.035	0	0				1
Bypass	BOUNDARY	0.0022	0	100	0	0	0	0	19.98	19.98	0	5.9	5.9	0	0.015	0.035	0	0				1
SITE FRONT	OSD 2	0.0158	29	71	0	0	0	0	34.47	34.47	0	2.176	2.176	0	0.015	0.035	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)	Rl (m)	Chg (m)	RL (m)	etc (m)
PIPE 1	OSD 1	BOUNDARY	30.85	20.26	19.95	1	uPVC, not u	225	242	0.01	NewFixed	1	OSD 1		0				
RHS	BOUNDARY	N1	5.65	19.95	0	353.1	RHS	0.2W x 0.1H		0.011	New	2	BOUNDARY		0				
RHS UNDEF	OSD 2	BOUNDARY	8.1	20.03	19.95	0.99	RHS	0.2W x 0.1H		0.011	Existing	1	OSD 2		0				

DETAILS of SERVICES CROSSING PIPES

Pipe	Chg (m)	Bottom Elev (m)	Height of S (m)	Chg (m)	Bottom Elev (m)	Height of S (m)	Chg (m)	Bottom Elev (m)	Height of S (m)	etc etc

CHANNEL DETAILS

Name	From	To	Type	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Base Width (m)	L.B. Slope (1:?)	R.B. Slope (1:?)	Manning n	Depth (m)	Roofed

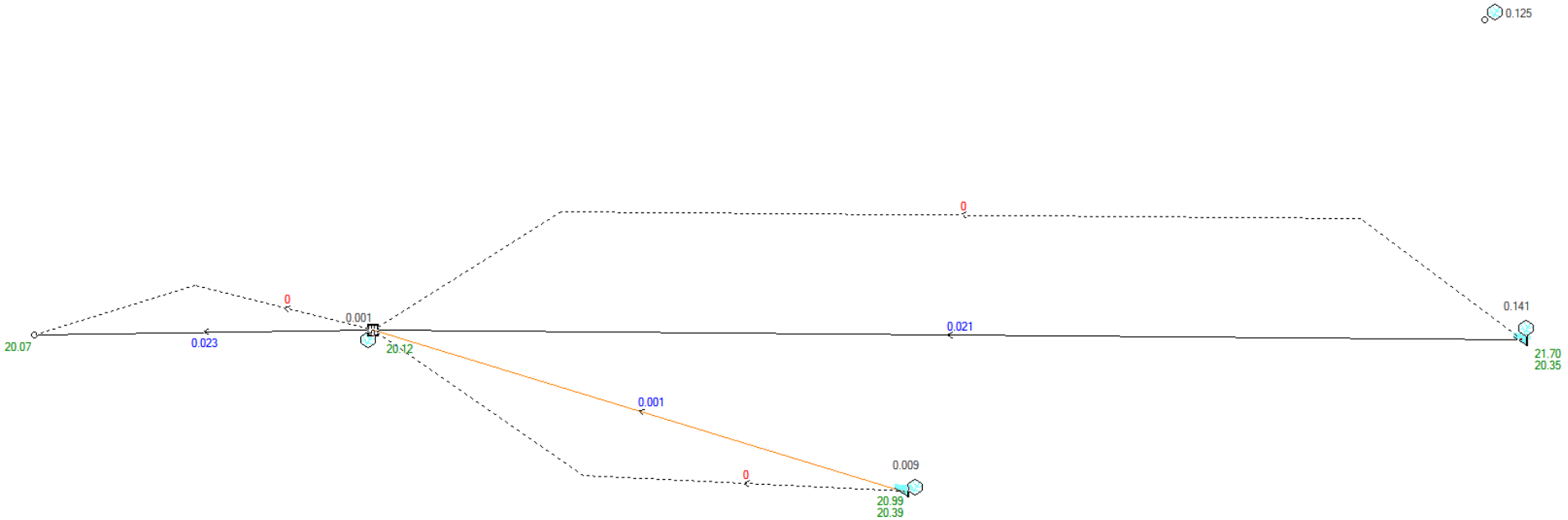
OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Depth Major Stor (m)	SafeDepth Minor Stor (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %	id
OF1	OSD 1	BOUNDARY	0.3	21.7	0.9	1.7	Dummy us	0.2	0.05	0.6	1	0	195210
OF2835	BOUNDARY	N1	0.1				Dummy us	0.2	0.05	0.6	1	0	526539
OF3625	OSD 2	BOUNDARY	0.1	21	0.9	1.7	Dummy us	0.2	0.05	0.6	1	0	530544

PIPE COVER DETAILS

Name	Type	Dia (mm)	Safe Cover	Cover (m)	
PIPE 1	uPVC, not u	242	0.6	-0.25	Unsafe
RHS	RHS	0	100	0.44	Unsafe
RHS UNDEF	RHS	0	100	-0.11	Unsafe

This model has no pipes with non-return valves


0.125
0
0
0.001
0.141
0.021
0.023
20.07
20.12
21.70
20.35
0.001
0.009
0
20.99
20.39

MAJOR

DRAINS results prepared from Version 2018.05

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Version 8 Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
BOUNDARY PIT	20.12		0.001		0.38	0	None
N1	20.07		0				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
PRE DEV	0.125	0.071	0.053	4.38	8.96	0	AR&R 100 year, 25 minutes storm, average 107 mm/h, Zone 1
POST DEV	0.141	0.092	0.048	2.26	3.76	0	AR&R 100 year, 5 minutes storm, average 217 mm/h, Zone 1
Bypass	0.001	0	0.001	0.92	1.52	0	AR&R 100 year, 5 minutes storm, average 217 mm/h, Zone 1
SITE FRONTAGE	0.009	0.003	0.006	1.71	2.85	0	AR&R 100 year, 5 minutes storm, average 217 mm/h, Zone 1

Outflow Volumes for Total Catchment (0.30 impervious + 0.26 pervious = 0.55 total ha)

Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)
AR&R 50 year, 5 minutes storm, average 196 mm/h, Zone 1	90.05	64.39 (71.5%)	45.25 (93.9%)	19.13 (45.7%)
AR&R 50 year, 15 minutes storm, average 125 mm/h, Zone 1	172.28	136.46 (79.2%)	89.28 (96.8%)	47.18 (58.9%)
AR&R 50 year, 25 minutes storm, average 97.0 mm/h, Zone 1	222.82	178.86 (80.3%)	116.33 (97.5%)	62.52 (60.4%)
AR&R 50 year, 1 hour storm, average 60.0 mm/h, Zone 1	330.78	268.30 (81.1%)	174.13 (98.3%)	94.17 (61.3%)
AR&R 100 year, 5 minutes storm, average 217 mm/h, Zone 1	99.69	74.08 (74.3%)	50.42 (94.5%)	23.66 (51.1%)
AR&R 100 year, 15 minutes storm, average 139 mm/h, Zone 1	191.58	155.73 (81.3%)	99.61 (97.1%)	56.12 (63.0%)
AR&R 100 year, 25 minutes storm, average 107 mm/h, Zone 1	245.79	201.78 (82.1%)	128.63 (97.8%)	73.15 (64.1%)
AR&R 100 year, 1 hour storm, average 66.0 mm/h, Zone 1	363.86	301.25 (82.8%)	191.84 (98.5%)	109.41 (64.7%)

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
PIPE 1	0.021	1.35	20.351	20.116	AR&R 100 year, 1 hour storm, average 66.0 mm/h, Zone 1
RHS	0.023	0.57	20.091	20.07	AR&R 100 year, 1 hour storm, average 66.0 mm/h, Zone 1
RHS UNDER DRIVEWAY	0.001	0.07	20.393	20.116	AR&R 100 year, 1 hour storm, average 66.0 mm/h, Zone 1

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

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
OF1	0	0	7.665	0	0	0	0	0
OF2835	0	0	7.665	0	0	0	0	0
OF3625	0	0	7.665	0	0	0	0	0

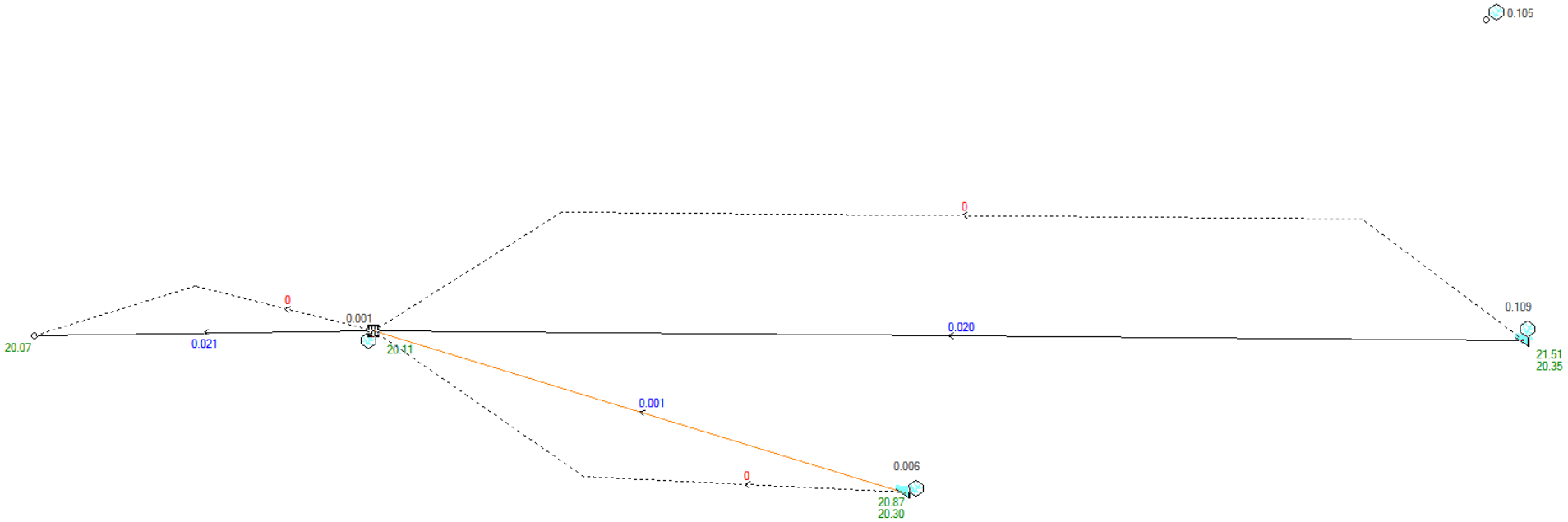
DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD 1	21.7	83.4	0.021	0.021	0
OSD 2	20.99	3.4	0.001	0.001	0

CONTINUITY CHECK for AR&R 100 year, 25 minutes storm, average 107 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
Pre-outlet	98.76	98.76	0	0
OSD 1	97.15	58.45	38.7	0
BOUNDARY PIT	62.48	62.31	0	0.3
N1	62.31	62.31	0	0
OSD 2	5.23	3.39	1.33	9.7

Run Log for 23 run at 18:18:31 on 25/7/2018
No water upwelling from any pit. Freeboard was adequate at all pits.
Flows were safe in all overflow routes.


0.105
0
0
0.001
0.109
0.020
20.07
0.021
20.11
21.51
20.35
0.001
0.006
0
20.87
20.30

MINOR

DRAINS results prepared from Version 2018.05

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Version 8 Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
BOUNDARY PIT	20.11		0.001		0.39	0	None
N1	20.07		0				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
PRE DEV	0.105	0.062	0.043	4.62	9.36	0	AR&R 20 year, 25 minutes storm, average 84.0 mm/h, Zone 1
POST DEV	0.109	0.07	0.04	3.3	5.49	0	AR&R 20 year, 25 minutes storm, average 84.0 mm/h, Zone 1
Bypass	0.001	0	0.001	1.34	2.22	0	AR&R 20 year, 25 minutes storm, average 84.0 mm/h, Zone 1
SITE FRONTAGE	0.006	0.002	0.004	2.5	4.16	0	AR&R 20 year, 25 minutes storm, average 84.0 mm/h, Zone 1

Outflow Volumes for Total Catchment (0.30 impervious + 0.26 pervious = 0.55 total ha)

Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)
AR&R 5 year, 5 minutes storm, average 131 mm/h, Zone 1	60.18	34.54 (57.4%)	29.27 (90.8%)	5.27 (18.8%)
AR&R 5 year, 15 minutes storm, average 84.0 mm/h, Zone 1	115.77	80.44 (69.5%)	59.03 (95.2%)	21.41 (39.8%)
AR&R 5 year, 25 minutes storm, average 65.0 mm/h, Zone 1	149.31	106.47 (71.3%)	76.98 (96.3%)	29.49 (42.5%)
AR&R 5 year, 1 hour storm, average 40.2 mm/h, Zone 1	221.62	160.78 (72.5%)	115.69 (97.5%)	45.08 (43.8%)
AR&R 10 year, 5 minutes storm, average 147 mm/h, Zone 1	67.53	41.89 (62.0%)	33.20 (91.8%)	8.68 (27.7%)
AR&R 10 year, 15 minutes storm, average 94.0 mm/h, Zone 1	129.56	94.07 (72.6%)	66.41 (95.7%)	27.67 (46.0%)
AR&R 10 year, 25 minutes storm, average 73.0 mm/h, Zone 1	167.69	124.60 (74.3%)	86.82 (96.7%)	37.78 (48.5%)
AR&R 10 year, 1 hour storm, average 45.0 mm/h, Zone 1	248.09	186.88 (75.3%)	129.86 (97.8%)	57.02 (49.5%)
AR&R 20 year, 5 minutes storm, average 169 mm/h, Zone 1	77.64	52.00 (67.0%)	38.61 (92.9%)	13.38 (37.1%)
AR&R 20 year, 15 minutes storm, average 108 mm/h, Zone 1	148.85	113.24 (76.1%)	76.74 (96.3%)	36.50 (52.8%)
AR&R 20 year, 25 minutes storm, average 84.0 mm/h, Zone 1	192.96	149.63 (77.5%)	100.35 (97.1%)	49.29 (55.0%)
AR&R 20 year, 1 hour storm, average 51.0 mm/h, Zone 1	281.16	219.57 (78.1%)	147.57 (98.0%)	72.00 (55.1%)

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
PIPE 1	0.02	1.32	20.347	20.109	AR&R 20 year, 1 hour storm, average 51.0 mm/h, Zone 1
RHS	0.021	0.53	20.088	20.07	AR&R 20 year, 1 hour storm, average 51.0 mm/h, Zone 1
RHS UNDER DRIVEWAY	0.001	0.06	20.299	20.109	AR&R 20 year, 1 hour storm, average 51.0 mm/h, Zone 1

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

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
OF1	0	0	0.256	0	0	0	0	
OF2835	0	0	0.256	0	0	0	0	
OF3625	0	0	0.256	0	0	0	0	

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD 1	21.51	54.4	0.02	0.02	0
OSD 2	20.87	2.2	0.001	0.001	0

CONTINUITY CHECK for AR&R 20 year, 25 minutes storm, average 84.0 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
Pre-outlet	72.93	72.93	0	0
OSD 1	72.54	54.95	17.59	0
BOUNDARY PIT	58.28	58.13	0	0.3
N1	58.13	58.13	0	0
OSD 2	3.74	2.9	0.58	6.9

Run Log for 23 run at 18:19:16 on 25/7/2018
No water upwelling from any pit. Freeboard was adequate at all pits.
Flows were safe in all overflow routes.