



Ibrahim Stormwater Consultants



REF : M6194-662327

STORMWATER DESIGN CALCULATIONS

AT 11 Shamrock Parade

Killarney Heights

FOR MR Tanks & MRS Hodges

Contents

- 1.0 Detention System Requirements**
 - 1.1 Storage-Area calcs.
 - 1.2 Data Files for Pre & Post Developed Conditions
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Files On Disk

M6194-662327 -DRAINS.DRN

- 2.0 Infiltration System Requirements**

Borehole Report suggests rock within close proximity so Level Spreader design proposed

1.0 Detention System Requirements

1.1 Storage-Area calcs.

DATA:

Site Area Assessed due to easements

Site Area = **0.0699** ha **699** sq.m

Impervious Area Pre Development = **300.9** sqm

Percentage Impervious Pre Development = **0%** assumed

Impervious Area POST Development = **329.9** sqm

Percentage Impervious POST Development = **47%**

Catchment directed through OSD A = **279.9** sqm **84.8 %**

OSD Bypass Areas :	Impervious	50 sqm	26.6 %
	Pervious	138.1 sqm	73.4 %
	Total	188.1 sqm	

Area bypassing OSD B = **231** sqm

Slope of Site =	5.5 %	Time of Concentration tc =	
Effective Flow Length =	38 m	1 min.	1:5
Hortons n=	0.1	1 min.	1:100

FFL of house =	89.61 m
Roof Gutter Level =	92.605 m
Invert of Outlet =	88.3 m
Raintank Pad Level =	88.85 m
Freeboard to Roof Gutter=	1.735 m

Detention A

Volume Required	12.36 cu.m
Total Area	9.25 sq.m

Stage Storage-Discharge Relationship

Stage	Storage Area	Avg. Depth	Storage
(m)	(sq.m)	(m)	(cu.m)
89.41	0	0	0.000
90.41	9.3	1.000	9.250
90.75	9.3	1.34	12.360

Invert of pit = **89.41** m
 Orifice Dia. = **40** mm
 Max. Water Level achieved = **90.710** m
 Storage achieved **11.99** cu.m

Basix Allowance

Raintank Basix = **3000** L
 Raintank Provided = **5220** L
 Water Level in Tank RL for Basix = **89.41** m = orifice IL. Depth=0.564m
 0% OSD Compensation = **5995** L
 Net OSD required **6769** L -RL. **90.71** m
 Nominal tank Volume used = **18690** L
 Total Tank Height = **2.020** m TOP OF TANK.=90.87m

Overflow to ---> **OSD**, then Level Spreader
 Trench Length = **6** m x **1** rows x **0.25** m wide

Detention B

Volume Required	18.29 cu.m
Total Area	38.50 sq.m

Stage Storage-Discharge Relationship

Stage	Storage Area	Avg. Depth	Storage
(m)	(sq.m)	(m)	(cu.m)
88.30	0	0	0.000
88.60	0.4	0.300	0.110
88.65	38.5	0.025	1.070
89.10	38.5	0.48	18.288

Invert of pit = **88.30** m
 Orifice Dia. = **40** mm
 Max. Water Level achieved = **89.020** m
 Storage achieved **15.23** cu.m

1.2 DRAINS Data File for Pre & Post Developed Conditions

PIT / NODE DETAILS			Version 9																		
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	Part Full Shock Loss								
Pre	Node					10		0			256	-139	2								
Ground	Node					88.85		0			444	-153	8								
Level S	OnGrade	Dummy	Dummy		1.5	88.6		0	0	618.441	-210.487	No	566686 1 x Ku								
Dummy Node	Node					88.3		0		664.978	-235.87		45								
Roof	Node					92.605		0		440	-74		9								
DETENTION BASIN DETAILS																					
Name	Elev	Surf. Area	Init Vol. (cu	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Leng id							
OSD -2	88.30	0.00	0.3	Orifice		40	88.32				571.865	-185.735	No	36990							
	88.60	0.36																			
	88.65	38.50																			
	89.10	38.50																			
OSD -1	89.41	9.3	0	Orifice		40	89.4341734				558	-103	No	5							
	90.41	9.3																			
	90.75	9.3																			
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
Pre Site	Pre	0.0699	0	100	0	0	0	0	0	38	38	0	5.5	5.5	0	0.01	0.33	0	0		
Ground -2	Ground	0.01881	26.6	73.4	0	0	0	0	0	25	25	0	5.5	5.5	0	0.01	0.33	0	0		
bypass-2	Level S	0.0231	0	100	0	0	0	0	0	38	38	0	3.0	3.0	0	0.01	0.33	0	0		
Roof Area	Roof	0.02799	100	0	0	0	0	0	0	21	0	0	20	0	0	0.01	0	0	0		
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)			
Pipe2	Ground	OSD -2	45	88.6	88.3	1.44	uPVC, not un	150	154	0.03	NewFixed	1	Ground	0							
Pipe4	OSD -2	Level S	5	88.3	88.2	2	uPVC, not un	150	154	0.03	NewFixed	1	OSD -2	0							
Pipe5	Level S	Dummy Node	5	88.2	88.1	2	uPVC, not un	225	230	0.03	New	1	Level Sprn	0							
Pipe1	Roof	OSD -1	20	92.105	89.61	1	uPVC, not un	150	154	0.03	NewFixed	1	Roof	0							
Pipe3	OSD -1	OSD -2	10	89.41	88.4	9.8	uPVC, not un	150	154	0.03	NewFixed	1	OSD -1	0							
DETAILS of SERVICES CROSSING PIPES																					
Pipe	Chg (m)	Bottom Elev (m)	Height of S Chg (m)	Bottom Elev (m)	Height of Chg (m)	Bottom Elev (m)	Height of S etc (m)	Bottom Elev (m)	Height of S etc (m)												
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 (m)	SafeDepth Major Storm (m)	SafeDepth Minor Storm (m)	SafeDepth V (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %	id							
OSD Overflow	OSD -2	Level S	1	89.1	7	1.7	Pathway 6 m w	0.1	0.05	0.4	1	0	37044								
Level Spreader OF	Level S	Dummy Node	1				Dummy used to	0.2	0.05	0.6											

1.3 DRAINS Summary of Pre & Post Developed Discharges

5 YEAR

DRAINS results prepared from Version 2023.11.8718.30178

PIT / NODE DETAILS

Version 8

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
Ground	88.77		0.006				
Level S	88.26		0.004		0.34	0	None
Dummy Node	88.14		0				
Roof	92.14		0.013				

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 Site	0.013	0	0.013	1.46	11.92	0	20% AEP, 15 min burst, Storm 8
Ground -2	0.004	0.002	0.003	1.06	8.64	0	20% AEP, 10 min burst, Storm 8
bypass-2	0.004	0	0.004	1.86	15.16	0	20% AEP, 20 min burst, Storm 6
Roof Area	0.012	0.012	0	0.59	0	0	20% AEP, 5 min burst, Storm 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
Pipe2	0.004		0.22	88.774	88.759 20% AEP, 10 min burst, Storm 8
Pipe4	0.002		0.3	88.583	88.265 20% AEP, 1.5 hour burst, Storm 6
Pipe5	0.006		1.34	88.265	88.137 20% AEP, 20 min burst, Storm 7
Pipe1	0.012		3.4	92.142	90.081 20% AEP, 5 min burst, Storm 1
Pipe3	0.003		0.15	89.785	88.759 20% AEP, 45 min burst, Storm 9

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm
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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
OSD Overflow	0		0	0.268	0	0	0	0
Level Spreader OF	0		0	0.6	0	0	0	0

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q	Max Q	Max Q
			Total	Low Level	High Level
OSD -2	88.76		5	0.002	0.002
OSD -1	90.08		6.2	0.003	0.003

Run Log for Warringah-Twin OSD Level Spreader-Drains-2023

{\color{red}\green0\blue0;}Run Log for Warringah-Twin OSD Level Spreader-Drains-2023.drn - DRAINS run at 16:22:13 on 20/11/2023 using Watercom Drains v2023.11.8718.30178

No water upwelling from any pit.

Freeboard was adequate at all pits.

Flows were safe in all overflow routes.

100 YEAR

DRAINS results prepared from Version 2023.11.8718.30178

PIT / NODE DETAILS

Version 8

Name	Max HGL	Max Pond HGL	Max Surf Flow (cu.m/s)	Max Pond Arrivir Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
Ground	89.02			0.013			
Level S	88.29			0.011	0.31	0	None
Dummy Node	88.15			0			
Roof	92.15			0.025			

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 Site	0.035		0	0.035	1.08	8.8	0 1% AEP, 10 min burst, Storm 9
Ground -2	0.01	0.003	0.007		0.84	6.84	0 1% AEP, 10 min burst, Storm 7
bypass-2	0.01	0	0.01		1.39	11.32	0 1% AEP, 15 min burst, Storm 8
Roof Area	0.02	0.02	0	0.48	0		0 1% AEP, 5 min burst, Storm 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
Pipe2	0.01		0.55	89.025	89.018 1% AEP, 10 min burst, Storm 4
Pipe4	0.003		0.23	88.751	88.295 1% AEP, 2 hour burst, Storm 4
Pipe5	0.012		1.66	88.295	88.153 1% AEP, 15 min burst, Storm 2
Pipe1	0.021		3.98	92.155	90.715 1% AEP, 5 min burst, Storm 1
Pipe3	0.004		0.21	90.312	89.018 1% AEP, 45 min burst, Storm 6

CHANNEL DETAILS

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

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Widht	Max V	Due to Storm
OSD Overflow	0	0	0.843	0	0	0	0	0
Level Spreader Of	0	0	1.885	0	0	0	0	0

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD -2	89.02	14.9	0.003	0.003	0
OSD -1	90.71	12.1	0.004	0.004	0

Run Log for Warringah-Twin OSD Level Spreader-Drains-2023

{\color{red}\green{blue;\red192\green{blue;}}Run Log for Warringah-Twin OSD Level Spreader-Drains-2023.drn - DRAINS run at 16:21:31 on 20/11/2023 using Watercom Drains v2023.11.8718.30178

No water upwelling from any pit.
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