



Ibrahim Stormwater Consultants



REF : M6194-662327

STORMWATER DESIGN CALCULATIONS

36 DALLEY STREET,

QUEENSCLIFF

FOR MR DANIEL JONATHON DALLA

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M6194-662327 -DRAINS.DRN

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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 = **0.0346** ha **346** sq.mImpervious Area Pre Development = **113** sqm

Percentage Impervious Pre Development = 33% assumed

Impervious Area POST Development = **154** sqm

Percentage Impervious POST Development = 45%

Catchment directed through OSD A = **125.9** sqm 81.7 %

OSD Bypass Areas :	Impervious	28.15 sqm	22.3 %
	Pervious	97.9 sqm	77.7 %
	Total	126.05 sqm	

Area bypassing OSD B = **94.1** sqmSlope of Site = **7.8** % Time of Concentration t_c =Effective Flow Length = **38.0** m 1 min. 1:5Hortons n = **0.1** 1 min. 1:100FFL of house = **19.06** mRoof Gutter Level = **21.65** mInvert of Outlet = **17.3** mRaintank Pad Level = **17.88** mFreeboard to Roof Gutter= **1.755** m

Detention A

Volume Required 2.20 cu.m

Total Area 3.89 sq.m

Stage Storage-Discharge Relationship

Stage	Storage Area	Avg. Depth	Storage
(m)	(sq.m)	(m)	(cu.m)
19.21	0	0	0.000
19.51	3.9	0.300	1.170
19.78	3.9	0.57	2.203

Invert of pit = 19.21 m

Orifice Dia. = **50** mm

Max. Water Level achieved = 19.780 m

Storage achieved 2.22 cu.m

Detention B

Volume Required 9.56 cu.m

Total Area 18.00 sq.m

Stage Storage-Discharge Relationship

Stage	Storage Area	Avg. Depth	Storage
(m)	(sq.m)	(m)	(cu.m)
17.35	0	0	0.000
17.75	0.36	0.300	0.110
17.80	18.0	0.013	0.340
18.30	18.0	0.53	9.560

Invert of pit = 17.35 m

Orifice Dia. = **40** mm

Max. Water Level achieved = 18.150 m

Storage achieved 6.79 cu.m

Basix Allowance

Raintank Basix = **4990** LRaintank Provided = **5190** L

Water Level in Tank RL for Basix = 19.21 m = orifice IL. Depth=1.334m

0% OSD Compensation = 1111 L

Net OSD required 1111 L -RL. 19.78 m

Nominal tank Volume used = **7860** LTotal Tank Height = **2.020** m TOP OF TANK.=19.9mOverflow to ---> **OSD**, then Level Spreader

Trench Length = 7 m x 1 rows x 0.2 m wide

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					17.875		0			444	-153	8																		
Level Spreader	OnGrade	Sutherland grat	Grated pit with 0.9 m x 0.		1.5	17.65		0	0		618.441	-210.487	No	566686	1 x Ku																
Dummy Node	Node					17.35		0			664.978	-235.87		45																	
Roof	Node					21.65		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	17.35	0.00	0.3	Orifice		40	17.37				571.865	-185.735	No		36990																
	17.75	0.36																													
	17.80	18.00																													
	18.30	18.00																													
OSD -1	19.21	3.9	0	Orifice		50	19.2338168				558	-103	No		5																
	19.51	3.9																													
	19.78	3.9																													
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	Gutter Multiplier	Rainfall								
Pre Site	Pre	0.0346	0	100	0	0	0	0	0	38.0	38.0	0.0	7.8	7.8	0.00	0.00	0.33	0	0				1								
Ground -2	Ground	0.0126	22.3	77.7	0	0	0	0	0	25.0	25.0	0.0	7.8	7.8	0.00	0.01	0.33	0	0				1								
bypass-2	Level Spre	0.0094	0	100	0	0	0	0	0	38.0	38.0	0.0	4.8	4.8	0.00	0.00	0.33	0	0				1								
Roof Area	Roof	0.0126	100	0	0	0	0	0	0	21.0	0.0	0.0	20.0	0.0	0.00	0.01	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)												
Pipe2	Ground	OSD -2	45	17.65	17.35	1.44	uPVC, not un	150	154		0.03 NewFixed	1	Ground		0																
Pipe4	OSD -2	Level Spreader	5	17.35	17.25	2	uPVC, not un	150	154		0.03 NewFixed	1	OSD -2		0																
Pipe5	Level Spre	Dummy Node	5	17.25	17.15	2	uPVC, not un	225	230		0.03 New	1	Level Sprn		0																
Pipe1	Roof	OSD -1	20	21.15	19.21	1	uPVC, not un	150	154		0.03 NewFixed	1	Roof		0																
Pipe3	OSD -1	OSD -2	10	19.21	17.45	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)																								
CHANNEL DETAILS																															
Name	From	To	Type	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Base Width (m)	L.B. Slope	R.B. Slope	Manning	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 (m)	SafeDepth Minor (m)	Safe Stor DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing	id																		
OSD Overflow	OSD -2	Level Spreader	1	18.3	7	1.7	Pathway 6 m	0.1	0.05	0.4	1	0	37044																		

1.3 DRAINS Summary of Pre & Post Developed Discharges

5 YEAR

DRAINS results prepared from Version 2023.11.8726.15750								
PIT / NODE DETAILS								
Version 8								
Name	Max HGL	Max Pond HGL	Max Surface Flow (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint	
Ground	17.89			0.004				
Level Spreader	17.3			0.002	0.35		0 None	
Dummy Node	17.18			0				
Roof	21.18			0.006				
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	0.007		0	0.007	0	10.73	0 20% AEP, 15 min burst, Storm 5	
Ground -2	0.003		0.001	0.002	0.95	7.78	0 20% AEP, 10 min burst, Storm 8	
bypass-2	0.002		0	0.002	0	13.17	0 20% AEP, 20 min burst, Storm 10	
Roof Area	0.005		0.005	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	0.003		0.18	17.887	17.883	20% AEP, 10 min burst, Storm 8		
Pipe4	0.002		0.43	17.673	17.303	20% AEP, 45 min burst, Storm 10		
Pipe5	0.004		1.19	17.303	17.181	20% AEP, 20 min burst, Storm 10		
Pipe1	0.006		2.16	21.18	19.443	20% AEP, 5 min burst, Storm 1		
Pipe3	0.002		0.55	19.255	17.883	20% AEP, 20 min burst, Storm 4		
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
OSD Overflow	0		0	0.268	0	0	0	0
Sheet flow	0		0	0.268	0	0	0	0
DETENTION BASIN DETAILS								
Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level			
OSD -2	17.88		1.9	0.002	0.002	0		
OSD -1	19.44		0.9	0.002	0.002	0		
Run Log for DRAINS v2023.11.8726.15750 - M11648-608068-Drains								
{color\bl\red\green\blue0;\red192\green\blue0;}Run Log for DRAINS v2023.11.8726.15750 - M11648-608068-Drains.drm run at 08:27:58 on 31/5/2024 using Watercom Drains v2023.11.8726.15750								
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 2023.11.8726.15750

PIT / NODE DETAILS

Version 8						
Name	Max HGL	Max Pond HGL	Max Surface Flow (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow Constraint
Ground	18.16		0.009			
Level Spreader	17.32		0.005		0.33	0 None
Dummy Node	17.19		0			
Roof	21.19		0.011			

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	0.018	0	0.018	0	7.92		0 1% AEP, 10 min burst, Storm 7
Ground -2	0.007	0.002	0.005	0.76	6.16		0 1% AEP, 10 min burst, Storm 7
bypass-2	0.004	0	0.004	0	9.17		0 1% AEP, 10 min burst, Storm 9
Roof Area	0.009	0.009	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	0.007		0.37 18.157	18.154	1% AEP, 10 min burst, Storm 7
Pipe4	0.003		0.36 17.843	17.32	1% AEP, 45 min burst, Storm 6
Pipe5	0.007		1.39 17.32	17.19	1% AEP, 10 min burst, Storm 3
Pipe1	0.01		2.62 21.189	19.777	1% AEP, 5 min burst, Storm 1
Pipe3	0.004		0.21 19.53	18.154	1% AEP, 20 min burst, Storm 10

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 Wid	Max V	Due to Storm
OSD Overflow	0	0	0.843	0	0	0	0	0
Sheet flow	0	0	0.843	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	18.15		6.8 0.003	0.003	0
OSD -1	19.78		2.2 0.004	0.004	0

Run Log for DRAINS v2023.11.8726.15750 - M11648-608068-Drains

{color:blue;text-decoration:underline;}Run Log for DRAINS v2023.11.8726.15750 - M11648-608068-Drains.drn run at 16:46:34 on 31/5/2024 using Watercom Drains v2023.11.8726.15750

No water upwelling from any pit.
Freeboard was adequate at all pits.

Flows were safe in all overflow routes.