



Stormwater Drainage Development Application Report Residential Development 24 Aitken Avenue, Queenscliff

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1 Introduction

1.1 Background

Insync Services has been engaged by Manly Developments 2016 Pty Ltd, to provide a stormwater drainage concept design and report in association with the Development Application for the proposed residential development at 24 Aitken Avenue, Queenscliff.

The aim of this Development Application stormwater drainage report is as follows;

- To determine stormwater connection location.
- To determine on-site stormwater detention requirements in association with the proposed development.
- To determine Water Sensitive Urban Design initiatives for the development.

1.2 Proposed Development Description

The proposed residential development at 24 Aitken Avenue, Queenscliff, will provide for the following indicative facilities;

- 1 level of basement carparking
- 4 x 3 bedroom apartments

1.3 Existing Site Description

The overall site at 24 Aitken Avenue, Queenscliff, has an area of approximately 550m².

The site will be bounded by Queenscliff Avenue to the south, and existing residential developments to the west, north and east.

Natural topography provides a relatively level frontage along the southern boundary to Aitken Avenue.

Buildings and impervious area on the existing site account for approximately 60% of the total site area. All existing buildings on the site will be fully demolished.

2 Design Controls

2.1 Stormwater Controls

Stormwater controls described herein have been extracted from the Warringah Council On-Site Stormwater Detention Technical Specification.

2.2 Rainwater Re-Use Controls

A Basix Certificate is required to be submitted with all residential development types nominated under SEPP (Building Sustainability Index: Basix) 2004.

2.3 On-Site Stormwater Detention Controls

On-site stormwater detention controls for the required minimum on-site storage volumes have been determined in accordance with Council guidelines as follows;

- The site is eligible for on-site stormwater detention design in accordance with Table 2b of the Warringah Council On-Site Stormwater Detention Technical Specification. Specifically the requirements apply to sites with various impervious areas between 60% and 100% of the total site area.

2.4 Water Quality Controls

Water quality controls have been determined in accordance with Council guidelines as follows;

- As a minimum post developed stormwater quality should be improved from pre-development levels.

2.5 Rainfall Intensity

The development is located within the Warringah Council local government area, and is subject to the following rainfall intensities;

- 5 Year ARI storm of 10 minutes duration with a rainfall intensity of 130mm/hr.
- 20 Year ARI storm of 10 minutes duration with a rainfall intensity of 166mm/hr.
- 100 Year ARI storm of 10 minutes duration with a rainfall intensity of 213mm/hr.

3 Assessment Results

3.1 Site Stormwater Connection

A new kerb and gutter connection will be provided within Aitken Avenue to service the property. Stormwater drainage will extend from this connection via a gravity pipework to connect to the OSD Tank outlet via a transition pit located within the property boundary.

3.2 Stormwater System Description

The stormwater for the building shall be collected and conveyed to OSD located at high level within the basement carpark.

Stormwater will be discharged into a cartridge filter treatment chamber prior top overflow into the main OSD tank.

Permissible site discharge will be controlled by an orifice plate, from which point stormwater discharge will flow via gravity to the new kerb connection.

Overflow from the OSD tank will be via a weir located within the OSD tank which will bypass the orifice control. The stormwater will then have the ability to discharge through the stormwater system (which has capacity to accommodate the 1:100 year flow).

The OSD tank outlet shall be above top of kerb level at the point of discharge such that the tank is free draining.

All stormwater collected that is below the gravity system shall be conveyed to a stormwater pumping station located beneath the basement slab. The rising main from the pumps shall discharge back to the OSD tank.

3.3 OSD System

The OSD structure will be concrete cast in-situ and shall be at high level over the basement carpark. Entry to the various OSD tank chambers will be provided by 900mm square access covers located in the external communal area of ground floor.

A separate rainwater tank will be provided downstream of the OSD tank to collect and store rainwater. The rainwater tank will be located in the basement carpark.

An internal detention tank overflow weir will be provided to allow for full 100 year ARI overflow in the event of a control outlet blockage. Key dimensions of the stormwater detention tank are as follows;

The OSD tank facility has been designed using Table 2b of the Warringah Council On-Site Stormwater Detention Technical Specification.

- | | |
|------------------------------|---------------------|
| • Site Area | 550m ² |
| • Post-Developed Impervious | 60% to 100% |
| • Minimum Size of OSD Tank | 17.00m ³ |
| • Actual Size of OSD Tank | 17.00m ³ |
| • Permissible Site Discharge | 17.00L/s |
| • Overflow Level | RL 10.81 |
| • Orifice Centre | RL 10.20 |
| • Depth Of Water Over Outlet | 610mm |
| • Orifice Diameter | 103mm |

Performance Summary

3.4 Rainwater Reuse Tank

The volume of the Rainwater Tank will be 5,000L, in accordance with the requirements of Basix.

3.5 Rainwater Reuse System

In order to satisfy Council DCP requirements, the following will also apply to the rainwater reuse systems:

- Tanks will be fitted with screens to prevent debris/mosquito entry
- Rainwater will be used for irrigation
- Appropriate signage will be provided at fittings connected to tank supply
- Rainwater reuse system will have a mains back-up supply
- Tank overflow will be directed to the stormwater system

The rainwater reuse system shall be drawn from the tank and shall incorporate the following:

- Pump with pressure cell
- Automatic switch-over device to mains supply for periods of low rainfall
- Automatic backwash filter (50 micron)
- Bag filter (10 micron)
- Capped provision for irrigation service
- Connection to all external hose taps
- Adequate signage

Rainwater will be reused for irrigation only.

3.6 Water Quality

Water quality has been included as part of the overall stormwater management strategy for the development. Stormwater pollution will be dealt with via a series of 3 stormwater cartridge filters installed to treat run-off from whole site upstream of the OSD Tank. The filters shall be equal to "Stormwater 360 StormFilter" including 3 x 690mm Phosphosorb cartridge filters in a tank.

4 Appendix

4.1 On-Site Stormwater Detention (OSD) Checklist

4.2 Table 2b – SSR And PSD For Various Site Areas With Between 60 And 100% Impervious

4.3 Table 3 – Orifice Sized According To Depth Of Ponding And PSD

APPENDIX 8 – OSD Checklist



Warringah Council

On-site Stormwater Detention (OSD) Checklist

For Single Dwelling Residential Developments

This form is to be used to determine if OSD will be required for demolition and reconstruction, or construction of new single dwelling residential developments and **must be completed and included with the submission of any development application for these works**. Please read both sides of this form carefully for its applications, guidelines and definitions.

For assistance and support, please contact Council's Customer Service Centre on (02) 9942 2111.

Address of Proposed Development	
Address of proposed development	Lot DP (if applicable)
	No. 24 Street AITKEN AVENUE
	Suburb QUEENSCLIFF
PART 1 Exemption for properties that drain naturally away from the street	
Tick one only	Does the site fall naturally away from the street? Yes ☐ No ☒ If yes, stormwater drainage must be in accordance with Council's Policy No. PDS-POL 136 'Stormwater Drainage from Low Level Properties'. If no, proceed to the next part.
PART 2 Is the site area less than 450m ²	
Tick one only	Yes ☐ No ☒ If yes, OSD is not required. If no, proceed to next part.
PART 3 Exemption for Direct Discharge to Ocean	
Tick one only	Does the site of the development drain directly to the ocean without the need to pass through a drainage control structure such as a pipe, bridge, culvert, kerb and gutter or natural drainage system? Yes ☐ No ☒ If yes, OSD is not required. If no, proceed to the next part.

PART 4 Exemption for Flood Affected Areas	
Tick one only	Is the site of the development located within an established Flood Prone Land as referred to in the Warringah Local Environmental Plan? Refer to section 2.6 of Council's OSD Technical Specification. Yes ☐ No ☒ If yes, OSD is not required. If no, proceed to the next part.
PART 5 Determination of OSD Requirements	
3.1 Calculations	(a) Site area <u>550</u> m² x 0.40 = <u>220</u> m² (b) Proposed and remaining impervious area <u>550</u> m² OSD will not be required when (a) is greater than (b) Is OSD required for this development (tick one only) Yes ☒ No ☐ If yes, then a design in accordance with the Streamlined Method in Council's OSD Technical Specification is to be provided with the Development Application (refer to Clause 3.1.1) If no, OSD is not required.
Please view below examples	
3.2 Example	If the proposed combined impervious area is greater than 40% of the site area, then OSD is required. <i>Example 1:</i> Site Area = 600m² Total proposed & remaining impervious area = 290m² 600 x 0.4 = 240m² (290 > 240) OSD required <i>Example 2:</i> Site Area = 800m² Total proposed & remaining impervious area = 290m² 800 x 0.4 = 320m² (290 < 320) OSD is not required
DEFINITIONS	
Designed to help you fill out this application	Site area: This refers to the area of the land bounded by its existing or proposed boundaries. Impervious areas: This refers to driveways, pathways, paved areas, hardstand areas, roofed areas, garages and outbuildings that are proposed and to be retained. Where an existing structure is to be demolished to make way for a new dwelling, only the proposed impervious areas and remaining impervious areas are to be used in the calculations. No credit is given for existing impervious areas that are not retained.
NOTES	
Please read before filling out this form	- Other works, ancillary buildings, commercial, industrial, subdivisions and multiple occupancy developments are to comply with Council's OSD Technical Specification. - A reduction in the OSD volume required may be permitted. Refer to Council's "OSD Rainwater Re-use Policy for Single Residential Dwellings". If OSD is required, then a design for OSD in accordance with Council's "OSD Technical Specifications" is to be provided with the development application.

Table 2b: SSR and PSD for various site areas with between 60 and 100% impervious

total area of site	min. size of basin (SSR)	max. Q5 from existing site (PSD from basin)	max. Q100 from existing site	Max. overflow w from basin
M ²	m ³	l/s	l/s	l/s
200	5.5	7	13	6
250	6.8	9	16	7
300	8.2	11	19	8
350	9.5	12	22	10
400	10.9	14	25	11
450	12.9	15	28	13
500	15.0	16	30	14
550	17.0	17	33	15
600	19.0	18	36	18
650	21.1	20	39	19
700	23.3	21	41	20
750	25.4	22	43	21
800	27.5	23	45	22
850	29.1	24	47	23
900	30.8	25	49	24
950	32.4	26	51	25
1000	34.0	27	53	26
1050	35.7	29	56	27
1100	37.4	30	58	28
1150	39.1	32	61	29
1200	40.8	33	63	30

Note: Maximum concentrated discharge to kerb and gutter is 20 l/s

650	21.1	20	39	19
700	25.1	20	41	21
750	28.0	20	43	23
800	30.8	20	45	25
850	33.9	20	47	27
900	36.9	20	49	29
950	40.0	20	51	31
1000	43.0	20	53	33
1050	46.4	20	56	36
1100	49.8	20	58	38
1150	53.1	20	61	41
1200	56.5	20	63	43

Table 3: Orifice sized according to depth of ponding and PSD

PSD l/s	Depth of tank above centreline of orifice																			
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
2	55	46	42	39	37	35	34	33	32	31	30	30	29	28	28	28	27	27	26	26
3	67	57	51	48	45	43	41	40	39	38	37	36	36	35	34	34	33	33	32	32
4	78	65	59	55	52	50	48	46	45	44	43	42	41	40	40	39	38	38	37	37
5	87	73	66	62	58	56	54	52	50	49	48	47	46	45	44	44	43	42	42	41
6	95	80	72	67	64	61	59	57	55	54	52	51	50	49	48	48	47	46	46	45
7	103	87	78	73	69	66	63	61	59	58	57	55	54	53	52	51	51	50	49	49
8	110	93	84	78	74	70	68	65	64	62	60	59	58	57	56	55	54	53	53	52
9	117	98	89	83	78	75	72	69	67	66	64	63	61	60	59	58	58	57	56	55
10	123	104	94	87	82	79	76	73	71	69	68	66	65	64	63	62	61	60	59	58
11	129	109	98	91	86	82	79	77	75	73	71	69	68	67	66	65	64	63	62	61
12	135	113	102	95	90	86	83	80	78	76	74	72	71	70	69	67	66	65	65	64
13	140	118	107	99	94	90	86	83	81	79	77	75	74	73	71	69	68	67	66	66
14	146	122	111	103	97	93	90	87	84	82	80	78	77	75	74	73	72	71	70	69
15	151	127	115	107	101	96	93	90	87	85	83	81	79	78	77	75	74	73	72	71
16	156	131	118	110	104	99	96	93	90	88	85	84	82	80	79	78	77	76	75	74
17	160	135	122	113	107	103	99	95	93	90	88	86	85	83	82	80	79	78	77	76
18	165	139	125	117	110	106	102	98	95	93	91	89	87	85	84	83	81	80	79	78
19	170	143	129	120	113	108	104	101	98	95	93	91	89	88	86	85	84	82	81	80
20	174	146	132	123	116	111	107	104	100	98	96	94	92	90	88	87	86	85	83	82
21	178	150	136	126	119	114	110	106	103	100	98	96	94	92	91	89	88	87	85	84
22	183	154	139	129	122	117	112	109	105	103	100	98	96	94	93	91	90	89	87	86
23	187	157	142	132	125	119	115	111	108	105	102	100	98	97	95	93	92	91	89	88
24	191	160	145	135	128	122	117	113	110	107	105	102	100	99	97	95	94	93	91	90
25	195	164	148	138	130	124	120	116	112	109	107	105	102	101	99	97	96	94	93	92
26	198	167	151	140	133	127	122	118	115	112	109	107	105	103	101	99	98	96	95	94
27	170	154	143	135	129	124	120	117	114	111	109	107	105	103	101	100	98	97	96	96
28	173	156	146	138	132	127	122	119	116	113	111	108	106	105	103	101	100	99	97	97
29	176	159	148	140	134	129	125	121	118	115	113	110	108	107	105	103	102	100	99	99
30	179	162	151	143	136	131	127	123	120	117	115	112	110	108	107	105	104	102	101	101
31	182	165	153	145	138	133	129	125	122	119	116	114	112	110	108	107	105	104	102	102
32	185	167	156	147	141	135	131	127	124	121	118	116	114	112	110	108	107	105	104	104
33	188	170	158	150	143	137	133	129	126	123	120	118	116	114	112	110	109	107	106	106
34	191	172	160	152	145	140	135	131	128	125	122	120	117	115	113	112	110	109	107	107
35	194	175	163	154	147	142	137	133	129	126	124	121	119	117	115	113	112	110	109	109
36	196	177	165	156	149	144	139	135	131	128	125	123	121	119	117	115	113	112	110	110
37	199	180	167	158	151	146	141	137	133	130	127	125	122	120	118	117	115	113	112	112
38	202	182	170	160	153	148	143	139	135	132	129	126	124	122	120	118	116	115	113	113
39	204	185	172	163	155	149	145	140	137	133	131	128	126	124	122	120	118	116	115	115
40	207	187	174	165	157	151	146	142	138	135	132	130	127	125	123	121	120	118	116	116
41	210	189	176	167	159	153	148	144	140	137	134	131	129	127	125	123	121	119	118	118
42	212	192	178	169	161	155	150	146	142	139	136	133	130	128	126	124	122	121	119	119
43	215	194	180	171	163	157	152	147	144	140	137	134	132	130	128	126	124	122	121	121
44	217	196	183	173	165	159	154	149	145	142	139	136	133	131	129	127	125	124	122	122
45	220	198	185	175	167	161	155	151	147	143	140	138	135	133	131	129	127	125	123	123
46	222	201	187	177	169	162	157	152	148	145	142	139	136	134	132	130	128	126	125	125
47	224	203	189	178	170	164	159	154	150	147	143	141	138	136	133	131	130	128	126	126
48	227	205	191	180	172	166	160	156	152	148	145	142	139	137	135	133	131	129	128	128
49	229	207	193	182	174	168	162	157	153	150	146	143	141	138	136	134	132	131	129	129
50	231	209	195	184	176	169	164	159	155	151	148	145	142	140	138	136	134	132	130	130

Min. 375 mm diameter outlet pipe

Min. 300 mm diameter outlet pipe

For orifice diameters less than 50 mm, a 90 mm diameter plastic pipe may be used as the outlet pipe from the basin.

Discharge allowed to kerb is not to exceed 20 l/s

Flow through the orifice is based on the equation

$$Q = C A \sqrt{(2 g H)} \times 10^3$$

$$d = \sqrt{(4 A / \pi)} \times 10^3$$

Q = the flowrate in litres per second

Where

C = 0.6 for a circular, square cut edged orifice

H = the depth of ponding from the centreline of the orifice to the upper water surface level in metres

A = the area of the orifice in square metres

g = 9.81 metres per second per second (gravity)

 $\pi = 3.1416$

d = the diameter of the orifice in millimetres