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Crozier Geotechnical Consultants is a division of PJC Geo-Engineering Pty Ltd

Geotechnical Assessment for Storm Water Design

CLIENT: Missionary Sisters of the Blessed Virgin Mary, Queen of the World

PROJECT: Stormwater Disposal for Proposed New Dwelling

ADDRESS: 140 Ocean Street, Narrabeen **Date:** 3rd April 2020

Project No.: 2020-067

1. Proposed Development:

This report details the results of in-situ infiltration carried out for the design of a stormwater disposal system at 140 Ocean Street, Narrabeen, NSW. The investigation was undertaken by Crozier Geotechnical at the request of Edward Bennet on behalf of the client Missionary Sisters of the Blessed Virgin Mary, Queen of the World.

2. Site Geology:

Reference to the Sydney 1: 100,000 Geological Series sheet (9130) indicates that the site is underlain by medium to fine 'marine' sand and windblown quartz sand, minor shell content, inter-dune silt and fine sand.

3. Fieldwork:

3.1 Procedures:

The fieldwork was conducted on the 2nd April 2020 and comprised an inspection of the site and adjacent properties by a Geotechnical Engineer from Crozier Geotechnical Consultants (CGC). The investigation included a photographic record of site conditions and the drilling of an augered borehole (BH1) at the rear of the site, using a hand auger to investigate sub-surface geology.

An in-situ infiltration test was conducted at the rear of the site, using a modified version of the Australian Standard AS1289.6.7.2 - 2000 Falling Head Permeability Method.

Dynamic Cone Penetrometer (DCP) testing was carried out adjacent to the borehole (BH1), in accordance with AS1289.6.3.2 – 1997, "Determination of the penetration resistance of a soil – "9kg Dynamic Cone Penetrometer test" to estimate near surface soil conditions.

This testing was conducted for the estimation of in-situ soil stormwater infiltration/absorption rates and stormwater disposal only.

3.2 Site Description:

The site is located on the west side of Ocean Street, within very gentle west dipping topography. The site is currently occupied by a single storey clad dwelling, located towards the front of the property. A concrete driveway from the road leads to a fibro garage on the south eastern side of the site, with an unsealed car parking area located in front of the dwelling, on the eastern side of the site. The rear of the site contains a large grassed lawn beyond a paved patio area and garden bed with palm trees, there is also a metal shed in the rear south west corner of the site.

The neighbouring property to the north (No. 142 Ocean Street) consists of a one and two storey clad and brick dwelling, the residence had undergone alterations and additions to the existing brick structure as the second storey is weatherboard, likely being a modern addition. The dwelling is located on the central portion of the property; the rear of the property consists of a small grassed lawn and metal shed on the common boundary. The property is at a similar ground level to the site, along the common boundary.

The neighbouring property to the south (No.134-138 Ocean Street) consists of modern two storey rendered town houses, with six town house lawns extending towards the common boundary. The complex is designed with townhouses along the perimeter of the site and a common garden space in the middle, there is also an underground basement car-park with access from the southern side of the site on Albemarle Street. The property is at a similar ground level to the site, along the common boundary.

The neighbouring property to the west (No.53-55 Lagoon Street) consists of modern two storey rendered town houses, with small grassed lawns extending to the common boundary. The complex has an underground basement garage accessed from the front of the site off Lagoon Street.

3.3 Data Review:

A review of the Bureau of Meteorology Rainfall Observations for the nearest site (Collaroy – Long Reef Golf Club) suggests the site received ≈ 141mm of rainfall in the 28 days preceding the investigation. This is close to the mean for this area.

3.4 Site Testing:

The infiltration test was undertaken at the rear of the site approximately 5.3m from the western boundary and 4.1m from the northern boundary. A 104mm diameter test hole was excavated to 2.34m depth within a dune sand deposit. This test hole was saturated for 90 minutes prior to testing, which then determined an average vertical infiltration rate of **1.11** litres per second per square metre

Borehole 1 (BH1) was drilled approximately 1.1m south west from the location of the infiltration test location. The auger drilled to a depth of 3.9m and did not meet refusal.
The following is a summary of the results of Borehole 1:

- TOPSOIL: very loose, dark brown, fine to medium grained, moist, silty sand with some plant roots were identified to 0.50m depth
- SAND: medium dense, brown, fine to medium grained, moist, sand with some sandstone gravel being encountered at depth 3.6m.

A free standing groundwater table was not identified within Borehole 1.

Dynamic Cone Penetrometer (DCP) tests were undertaken approximately 0.8m adjacent to BH1. The test (DCP1) identified topsoil at the surface which graded dune sand below 0.45m depth.

4. COMMENTS:

The investigation identified a sandy topsoil layer (≤0.50m) which grades to dune sand below 0.60m depth. The sand layer remained relatively stable throughout the test and cemented sand was encountered near the base of the borehole. BH1 did not encounter auger refusal, and drilling was terminated at 3.9m depth. A freestanding groundwater table was not observed during drilling.

The results of the percolation test conducted at 2.34m depth in the dune sand indicated a vertical infiltration rate of **0.99** litres per second per square metre. The horizontal permeability of this soil horizon was not measured however it is considered to be very similar to the vertical permeability due to limited variations in the sand horizons.

The infiltration rate and subsurface conditions make this property suitable for a standard stormwater absorption dispersal system.

Careful consideration must be given to the properties (and basements) at lower elevation than the discharge level of the disposal system to ensure no adverse impact to adjacent property footings. The stormwater dispersal system should be assessed as per the Hydraulic Engineers design requirements.

In summary:

1. Depth to water table: Not encountered.
2. Determined vertical Infiltration rate: **0.99** L/sec/m².
3. Suggested Long term infiltration rate: **1.00** L/sec/m².
4. Minimum distance of stormwater disposal from boundaries: ≥ 2m
5. The use of any waterproofing to protect underground areas: Not Applicable
6. Any special requirements for the design of walls or footings on site in relation to stormwater: None
7. The data from this report should not be re-interpreted for use in site classification or foundation design.

Prepared by:
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Engineer

Reviewed by:
Kieron Nicholson
Senior Engineering Geologist

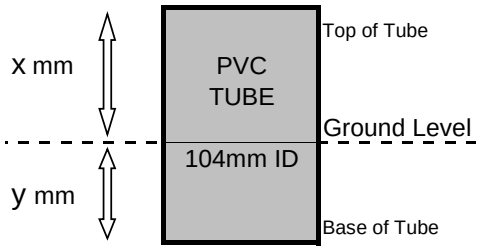
FIELD TEST INFILTRATION REPORT

CLIENT: Missionary Sisters of the Blessed Virgin Mary, Queen of the World — 2/04/2020 — BORE No.: 1

PROJECT: Demolition of existing site structure and construction of new multi dwelling house — 2020-067 — SHEET: 1 of 1

LOCATION: 140 Ocean Street, Narrabeen — R.L. =8.32m

Test Setup



x mm = 680

y mm = 2340

Saturation start time: 10:10

Start Test Time: 11:41

(*Minimum saturation is 1.0 hrs)

Test Number: 1

Time from Start (minutes)	Depth from Top (mm)	Difference between readings
0	0	
5	1150	1150
10	1850	700
15	2180	330
20	2470	290
25	2720	250
30		
35		
40		
45		
50		
55		
60		

Test Number: 2

Time from Start (minutes)	Depth from Top (mm)	Difference between readings
0	0	
5	1120	1120
10	1830	710
15	2270	440
20	2670	400
25	2730	60
30		
35		
40		
45		
50		
55		
60		

Test Number: 3

	Time from Start (minutes)	Depth from Top (mm)	Difference between readings	
	0	0		
	5	970	970	
	10	1580	610	
300	15	2190	610	333
300	20	2320	130	333
300	25	2600	280	333
	30	2730	130	
	35			
	40			
	45			
	50			
	55			
	60			

Test Number: 4

	Time from Start (minutes)	Depth from Top (mm)	Difference between readings
	0		
	5		
	10		
	15		
370	20		
	25		
	30		
	35		
	40		
	45		
	50		

Determine **W** mm / sec fall in pipe

W mm/sec x **8.495** to get **X** ml/sec

X x **117.7** to get **Y** ml/sec/m²

Y ÷ **1000** to get **Z** L / sec / m²

0

RIG: NA — DRILLER: AC — LOGGED: JC

TYPE OF BORING: Hand auger

GROUND WATER OBSERVATIONS: No free groundwater found

REMARKS: — CHECKED: TMC

BOREHOLE LOG

CLIENT: Missionary Sisters of the Blessed Virgin Mary, Queen of the World

DATE: 2/04/2020

BORE No.: 1

PROJECT: Demolition of existing site structure and construction of new multi dwelling house

PROJECT No.: 2020-067

SHEET: 1 of 1

LOCATION: 140 Ocean Street, Narrabeen

SURFACE LEVEL: RL= 8.32m

Depth (m)	Classification	Description of Strata **PRIMARY SOIL** - consistency / density, colour, grainsize or plasticity, moisture condition, soil type and secondary constituents, other remarks	Sampling		In Situ Testing	
			Type	Tests	Type	Results
0.00		TOPSOIL: Very loose, dark brown, fine to medium grained, moist, silty sand with some plant roots				
0.50		SAND: medium dense, brown, fine to medium grained, moist, sand				
0.70		...light brown				
1.40		...orange brown				
3.10		...pale orange brown		3.10		
			D			
				3.30		
3.60		...with weak sandstone gravel				
				3.80		
			D			
3.90				3.90		
		End of borehole @ 3.9m depth				

RIG: N/A

DRILLER: AC

METHOD: Hand Auger

LOGGED: JC

GROUND WATER OBSERVATIONS: Not encountered during auger drilling

REMARKS:

CHECKED: TMC

DYNAMIC PENETROMETER TEST SHEET

CLIENT: Missionary Sisters of the Blessed Virgin Mary, Queen of the World

DATE: 2/04/2020

PROJECT: Demolition of existing site structure and construction of new multi dwelling house

PROJECT No.: 2020-067

LOCATION: 140 Ocean Street, Narrabeen

SHEET: 1 of 1

	Test Location							
Depth (m)	DCP1							
0.00 - 0.15	1							
0.15 - 0.30	1							
0.30 - 0.45	2							
0.45 - 0.60	3							
0.60 - 0.75	3							
0.75 - 0.90	3							
0.90 - 1.05	3							
1.05 - 1.20	3							
1.20 - 1.35	4							
1.35 - 1.50	4							
1.50 - 1.65	4							
1.65 - 1.80	4							
1.80 - 1.95	4							
1.95 - 2.10	3							
2.10 - 2.25	4							
2.25 - 2.40	4							
2.40 - 2.55	2							
2.55 - 2.70	3							
2.70 - 2.85	3							
2.85 - 3.00	4							

TEST METHOD: AS 1289. F3.2, CONE PENETROMETER

REMARKS:

(B) Test hammer bouncing upon refusal on solid object

-- No test undertaken at this level due to prior excavation of soils