

Geotechnical Assessment for Storm Water Design

CLIENT: Wesley Dose

Date: 16th April 2020

PROJECT: Onsite disposal of stormwater via absorption

Project No.: 2020-076

ADDRESS: 8 Cooksey Avenue, Freshwater

1. Proposed Development:

This report details the results of investigation including in-situ infiltration testing carried out for the design of a stormwater disposal system at No. 8 Cooksey Avenue, Freshwater. The investigation was undertaken by Crozier Geotechnical Consultants at the request of the client Wesley Dose.

2. Site Geology:

Reference to the Sydney 1: 100,000 Geological Series sheet (9130) indicates that the site is underlain by Hawkesbury Sandstone (Rh) which is of Triassic age. The rock unit typically comprises of medium to coarse grained quartz sandstone with minor lenses of shale and laminite. There was evidence of a sandstone outcrop at surface level adjacent to the site on the eastern side of Cooksey Avenue.

3. Fieldwork:

3.1 Procedures:

The fieldwork was conducted on the 15th April 2020 and comprised of 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 adjacent to the borehole, using a modified version of the Australian Standard AS1289.6.7.2 - 2000 Falling Head Permeability Method.

Four Dynamic Cone Penetrometer (DCP) tests were carried out around the borehole location, in accordance with AS1289.6.3.2 of 1997, to determine the penetration resistance of a soil to 60kg 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 Cooksey Avenue, within very gentle west dipping topography, with approximately 2° slope. The site is currently occupied by a single storey brick dwelling, located in the centre of the property. The front of the site contains a grassed lawn with a small brick wall, pedestrian access is located down the southern side of the site. The rear of the site is occupied by an external brick structure and a grassed lawn. Both structures on the site appear to have been constructed in the 1970s era, with no notable signs of any cracking or settlement evident. All rainwater guttering and pipes from the

main structure appear to lead underground to an unknown disposal system, however the external brick structure at the rear of the property had a dilapidated and no longer functioning guttering system.

The neighbouring property to the north (No. 10 Cooksey Avenue) consists of a modern two storey clad and rendered dwelling. The dwelling is located on the central portion of the property, with the rear of the property consisting of a small grassed lawn and swimming pool closer to northern boundary. The property is at a similar ground level to the site, along the common boundary.

The neighbouring property to the south (No.6 Cooksey Avenue) consists of a modern one and two storey clad residence, with a ground floor garage and small retaining structure at the front of the property. The rear of the property has a swimming pool close to the common boundary with the site and large trees closer to the adjacent boundary. The property is at a similar ground level to the site, along the common boundary.

The neighbouring property to the west (No.21 Wyadra Avenue) consists of two storey brick residence; it is of similar construction to that of the site. The property has a large garden in its northern portion, with a brick extension off the house constructed within a 4 meter proximity to the common boundary. The gentle slope of the site runs downhill towards this property.

3.3 Data Review:

A review of the Bureau of Meteorology Rainfall Observations for the nearest site (Collaroy ó Long Reef Golf Club) suggests the site received € 54.4mm of rainfall in the 28 days preceding the investigation. This is below the mean April rainfall of 104mm for this area.

3.4 Site Testing:

The infiltration test was undertaken at the rear of the site approximately 3.1m from the southern boundary and 2.4m from the brick garage structure. A 104mm diameter test hole was excavated to 0.6m depth fill to the surface of the underlying natural soil. This test hole was saturated for 65 minutes prior to testing, which was undertaken for a further 3 hours which determined an average vertical infiltration rate of **0.13** litres per second per square metre.

Borehole 1 (BH1) was drilled approximately 0.5m from the location of the infiltration test location. The auger drilled to a depth of 1.0m and refused with borehole collapse on interpreted very low strength sandstone.

The following is a summary of the results of Borehole 1:

- **TOPSOIL/ FILL:** very loose, dark brown, fine to medium grained, moist, silty sand with some plant rootlets was identified to 0.20m depth
- **FILL:** very loose, brown, fine to medium grained, moist, sand with some concrete fragments were identified to depth 0.60m
- **SAND:** very loose, grey brown, coarse grained, moist to wet, sand, identified to depth 0.7m
- **SANDSTONE:** Extremely low strength, extremely weathered, grey brown, coarse grained, wet, sandstone, encountered until auger refusal on interpreted very low strength sandstone bedrock at a depth of 1.0m.

Groundwater was observed at 0.7m depth, the borehole was left open for a one hour period. The groundwater was measured to rise to a depth of 0.65m below surface level after the one hour time period.

Four Dynamic Cone Penetrometer (DCP) tests were undertaken within an approximate 1.2m perimeter of the infiltration test location. The DCP tests identified very loose topsoil and fill, with an average refusal depth of approximately 0.95m.

4. COMMENTS:

The investigation identified a sandy topsoil fill layer (0.20m) which grades to sandy fill (0.60m) before a thin band of coarse sand (0.70m) was encountered which grades to interpreted extremely low strength rock before refusal at 1.0m depth on interpreted very low strength sandstone bedrock. Significant seepage was observed at a depth of 0.70m below surface level.

The results of the percolation test conducted at 0.60m depth in the natural sand indicated a vertical infiltration rate of **0.13** litres per second per square metre. The horizontal permeability of this soil horizon was not measured, however it is considered likely to be slightly higher due to the natural depositional conditions and is currently providing significant seepage over the bedrock surface.

The infiltration rate and subsurface conditions appear to make this property unsuitable for a standard design absorption disposal system, however it may be possible via an enlarged absorption system or a more likely dispersion trench pending the Hydraulic Engineer's designs requirements. Onsite disposal will have no detrimental stability concerns for the site or adjacent properties.

The neighbouring property to the rear and down slope of the site contains a residential house to the south-west of the site and then open lawns and gardens directly to the west.

In summary:

1. Depth to water table: >5m expected. Significant seepage below 0.70m
2. Determined vertical Infiltration rate: **0.13** L/sec/m².
3. Suggested Long term infiltration rate: **0.10** L/sec/m².
4. Minimum distance of stormwater disposal from boundaries: × 5m
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:



Josh Cotton
Engineer

Reviewed by:



Troy Crozier
Principal
MAIG. RPGeo; 10197

BOREHOLE LOG

CLIENT: Wesley Dose

DATE: 15/04/2020

BORE No.: 1

PROJECT: Onsite disposal of stormwater via absorption

PROJECT No.: 2020-076

SHEET: 1 of 1

LOCATION: 8 Cooksey Avenue Freshwater

SURFACE LEVEL: RL= 41.4m

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						
0.20		TOPSOIL: Very loose, dark brown, fine to medium grained, moist, silty sand with some rootlets		0.10		
			D	0.20		
0.60		FILL: Very loose, dark brown, fine to medium grained, moist, sand with concrete fragments	D	0.40		
0.65		SAND: Very loose, grey brown, coarse grained, moist to wet, sand				
0.70		...groundwater				
0.80		...loose, grey brown, wet, sand with friable zones of possible extremely weathered sandstone				
1.00		...saturated	D	0.80		
				0.90		
				0.95		
			D	1.00		
		BOREHOLE COLLAPSE AND REFUSAL @ 1.0m on interpreted very low strength sandstone bedrock				

RIG: N/A

DRILLER: BS

METHOD: Hand Auger

LOGGED: JC

GROUND WATER OBSERVATIONS: Groundwater observed at @0.7m depth

REMARKS: Borehole left open for 1 hour post-drilling and water raised to 0.65m depth

CHECKED: TMC

DYNAMIC PENETROMETER TEST SHEET

CLIENT: Wesley Dose

DATE: 15/04/2020

PROJECT: Onsite disposal of stormwater via absorption

PROJECT No.: 2020-076

LOCATION: 8 Cooksey Avenue Freshwater

SHEET: RL= 41.4m

Depth (m)	Test Location							
	DCP1	DCP2	DCP3	DCP4				
0.00 - 0.15	1	1	1	1				
0.15 - 0.30	1	-	1	2				
0.30 - 0.45	2	2	1	2				
0.45 - 0.60	-	1	10	2				
0.60 - 0.75	1	6	6 B* @0.7m	1				
0.75 - 0.90	1	7		10 B* @0.9m				
0.90 - 1.05	13 B* @ 1.03m	4 B* @0.92m						
1.05 - 1.20								
1.20 - 1.35								
1.35 - 1.50								
1.50 - 1.65								
1.65 - 1.80								
1.80 - 1.95								
1.95 - 2.10								
2.10 - 2.25								
2.25 - 2.40								
2.40 - 2.55								
2.55 - 2.70								
2.70 - 2.85								
2.85 - 3.00								

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