Groundwater Monitoring Well Installation - Infiltration Basin Earnshaw Street, Golden Beach

Prepared for:
Yolanda Burt
Transport and Infrastructure Policy
Regional Strategy and Planning
Sunshine Coast Council

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1.0 INTRODUCTION

Core Consultants Pty Ltd (Core) was requested by Sunshine Coast Council (SCC) (Yolanda Burt) to install a groundwater monitoring well within the infiltration basin located at Earnshaw Street, Golden Beach. The groundwater monitoring well was installed to access groundwater levels and fluctuations within the infiltration basin. The location of the site is shown on Plate 1.

2.0 SITE DESCRIPTION

The infiltration basin is located at the junction of Earnshaw Street and The Esplanade, Golden Beach. The site is owned and maintained by Sunshine Coast Council and is surrounded by parkland and recreational facilities with Pumicestone Passage located approximately 10 metres to the east. The infiltration basin is vegetated with a mixture of typical wetland species both native and introduced grasses and reeds.

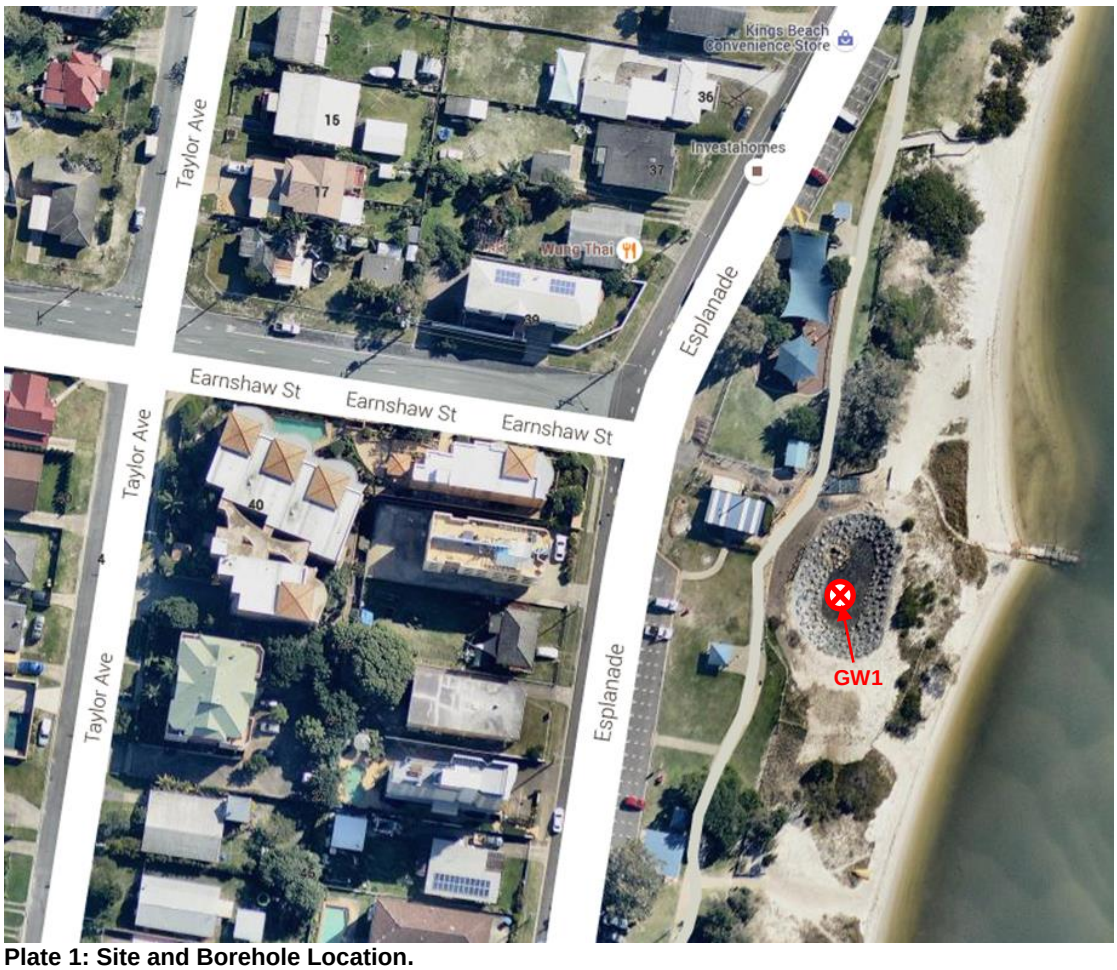

Plate 1: Site and Borehole Location.

3.0 INVESTIGATION METHODOLOGY

3.1 Field Investigation

To allow for ongoing groundwater level assessment within the infiltration basin, one groundwater monitoring well (designated GW1) was installed using hand coring/augering methods to a depth of approximately 0.7 m below ground level (m BGL) (refer Plate 1). Construction details of the groundwater monitoring well are shown in the attached borehole report. The well comprised 50 mm class 18 PVC screw jointed blank and screened sections machine slotted with 0.5mm aperture size. The groundwater monitoring well was completed with a lockable steel monument designed to blend in with the surrounding environment.

Following initial well installation, a LevelTROLL was installed to allow for continual groundwater level monitoring.

To determine approximate infiltration rates, Core conducted 'Falling Head Tests' within the groundwater monitoring well. The tests were undertaken at both low and high tide to identify any potential tidal influence on infiltration rates.

The fieldwork was carried out by an experienced environmental scientist from Core on 4 and 11 March 2016. The approximate location of the borehole was recorded using a hand-held GPS unit with a differential correction signal, having an accuracy of ± 3 m. Borehole coordinates are presented on the borehole reports and accompanying photographs in Appendix A. Subsurface conditions are discussed in Section 4.1.

4.0 RESULTS OF THE INVESTIGATION

4.1 Subsurface Conditions

The subsurface soil profile encountered within the infiltration basin generally consisted of:

- Organic Clay Silt: comprising very dark grey, very soft, low plasticity, clayey silt with abundant organics to depths of 0.05 m BGL; overlying
- Geo-fabric; overlying
- Sand: generally comprising grey, wet, medium dense, predominantly fine to medium grained sand to depth of investigation (0.75 m BGL)

No visual or olfactory evidence of contamination was observed within the sediment profiles during drilling/coring (Refer Appendix A).

It should be noted that very low to negligible levels of fine sediment was observed within the underlying sand material (most likely a result of the geo-fabric). This is further supported and confirmed by the results of the particle size distribution testing which are presented in Core's Sediment Analysis Report (Core Reference No: J000196-002-I-Rev0).

4.2 Falling Head Test Results

The results of the falling head tests are provided in Table 1 below.

Table 1: Falling Head Test Results

Location	Tidal Phase	Interpreted screened in-situ soils	Estimated Hydraulic Conductivity (K_h) (m/sec)
GW1	High Tide	Sands	3.1×10^{-4}
GW1	Low Tide	Sands	3.1×10^{-4}

These results are consistent with indicative k value ranges for clean sands which have a k value in the order of 10^{-3} m/s to 10^{-4} m/s.

5.0 CONCLUSION

Based on the results of this assessment, the hydraulic conductivity values of the sub surface sand material, encountered beneath the infiltration basin appear to be suitable to allow for sufficient infiltration. However, it should be noted that a good quality geo-fabric material was encountered at the base of the infiltration basin which was overlain with a layer of organic clay silt sediment. It is more than likely that the combination of organic clay silt sediment and the heavy duty geo-fabric material is having an adverse impact on the permeability on the infiltration basin in restricting excess water from permeating through the base of the basin.

It is recommended that Council develop and implement a regular (6 monthly) maintenance program for the removal and appropriate disposal of the surface sediments on top of the geo-fabric material and/or assess the replacement of the geo-fabric material with a product more suitable for the desired outcome.

6.0 LIMITATIONS

Should you require any further information please contact the undersigned. We draw your attention to the document, Limitations, which is included in Appendix D.

Core Consultants Pty Ltd

Yours sincerely,

Lyndon Gordon BSc (EnvSc (Hons)) MEIANZ CEnvP
Senior Environmental Scientist

Josh Mitchell BSc (EnvSc) MEIANZ CEnvP CPSS
Associate

LG/JM/lg

A.B.N. 75 603 384 050

APPENDIX A

Borehole Log and Well Construction Report

REPORT OF HAND AUGERED BOREHOLE: GW1

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SHEET: 1 OF 1

CLIENT: Sunshine Coast Council
PROJECT: Infiltration Basin
LOCATION: Earnshaw St, Golden Beach
JOB NO: J000196

COORDS: 512095.0 m E 7033997.0 m N MGA94 56
SURFACE RL: DATUM: AHD
INCLINATION: -90°
HOLE DIA: 100 mm HOLE DEPTH: 0.75 m

LOGGED: LG DATE: 4/3/16
CHECKED: JM DATE: 24/3/16

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	PIEZOMETER DETAILS
			-1.0									
			-0.5									Stickup
			0.0					ML	Clayey SILT dark grey, low plasticity clay, abundant organics		S	Backfill
		Groundwater encountered at 0.01 m depth		*0.05*				SP	SAND fine to medium grained, grey	W	MD	Bentonite Slotted screen Sand filter pack
			0.5						END OF HAND AUGER @ 0.75 m REFUSAL STANDPIPE INSTALLED			
			1.0									

This report of hand augered borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.

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EXPLANATION OF NOTES, ABBREVIATIONS & TERMS USED ON BOREHOLE AND TEST PIT REPORTS

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DRILLING/EXCAVATION METHOD

AS*	Auger Screwing	RD	Rotary blade or drag bit	NQ	Diamond Core - 47 mm
AD*	Auger Drilling	RT	Rotary Tricone bit	NMLC	Diamond Core - 52 mm
*V	V-Bit	RAB	Rotary Air Blast	HQ	Diamond Core - 63 mm
*T	TC-Bit, e.g. ADT	RC	Reverse Circulation	HMLC	Diamond Core – 63mm
HA	Hand Auger	PT	Push Tube	BH	Tractor Mounted Backhoe
ADH	Hollow Auger	CT	Cable Tool Rig	EX	Tracked Hydraulic Excavator
DTC	Diatube Coring	JET	Jetting	EE	Existing Excavation
WB	Washbore or Bailer	NDD	Non-destructive digging	HAND	Excavated by Hand Methods

PENETRATION/EXCAVATION RESISTANCE

L **Low resistance.** Rapid penetration possible with little effort from the equipment used.

M **Medium resistance.** Excavation/possible at an acceptable rate with moderate effort from the equipment used.

H **High resistance** to penetration/excavation. Further penetration is possible at a slow rate and requires significant effort from the equipment.

R **Refusal or Practical Refusal.** No further progress possible without the risk of damage or unacceptable wear to the digging implement or machine.

These assessments are subjective and are dependent on many factors including the equipment power, weight, condition of excavation or drilling tools, and the experience of the operator.

WATER

▽	Water level at date shown	◁	Partial water loss
▷	Water inflow	◀	Complete water loss

GROUNDWATER NOT OBSERVED	The observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave in of the borehole/test pit.
GROUNDWATER NOT ENCOUNTERED	The borehole/test pit was dry soon after excavation. However, groundwater could be present in less permeable strata. Inflow may have been observed had the borehole/test pit been left open for a longer period.

SAMPLING AND TESTING

SPT	Standard Penetration Test to AS1289.6.3.1-2004
4,7,11 N=18	4,7,11 = Blows per 150mm. N = Blows per 300mm penetration following 150mm seating
30/80mm	Where practical refusal occurs, the blows and penetration for that interval are reported
RW	Penetration occurred under the rod weight only
HW	Penetration occurred under the hammer and rod weight only
HB	Hammer double bouncing on anvil
DS	Disturbed sample
BDS	Bulk disturbed sample
G	Gas Sample
W	Water Sample
FP	Field permeability test over section noted
FV	Field vane shear test expressed as uncorrected shear strength (s_v = peak value, s_r = residual value)
PID	Photoionisation Detector reading in ppm
PM	Pressuremeter test over section noted
PP	Pocket penetrometer test expressed as instrument reading in kPa
U63	Thin walled tube sample - number indicates nominal sample diameter in millimetres
WPT	Water pressure tests
DCP	Dynamic cone penetration test
CPT	Static cone penetration test
CPTu	Static cone penetration test with pore pressure (u) measurement

Ranking of Visually Observable Contamination and Odour (for specific soil contamination assessment projects)

R = 0	No visible evidence of contamination	R = A	No non-natural odours identified
R = 1	Slight evidence of visible contamination	R = B	Slight non-natural odours identified
R = 2	Visible contamination	R = C	Moderate non-natural odours identified
R = 3	Significant visible contamination	R = D	Strong non-natural odours identified

ROCK CORE RECOVERY

TCR = Total Core Recovery (%)

$$= \frac{\text{Length of core recovered}}{\text{Length of core run}} \times 100$$

SCR = Solid Core Recovery (%)

$$= \frac{\sum \text{Length of cylindrical core recovered}}{\text{Length of core run}} \times 100$$

RQD = Rock Quality Designation (%)

$$= \frac{\sum \text{Axial lengths of core} > 100 \text{ mm}}{\text{Length of core run}} \times 100$$

METHOD OF SOIL DESCRIPTION USED ON BOREHOLE AND TEST PIT REPORTS


FILL


GRAVEL (GP or GW)


SAND (SP or SW)


SILT (ML or MH)


CLAY (CL, CI or CH)


ORGANIC SOILS (OL or OH or Pt)


COBBLES or BOULDERS

Combinations of these basic symbols may be used to indicate mixed materials such as sandy clay.

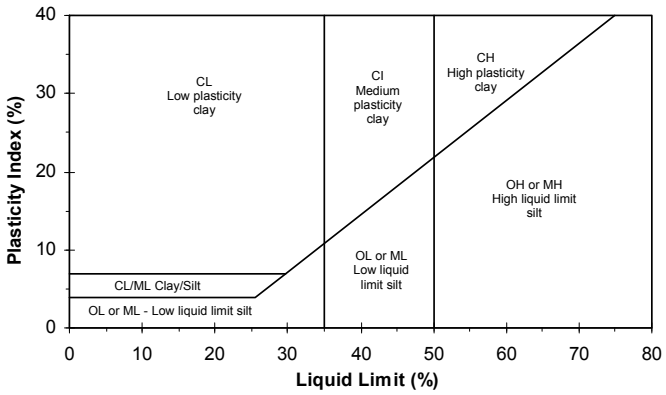
CLASSIFICATION AND INFERRED STRATIGRAPHY

Soil and Rock is classified and described in Reports of Boreholes and Test Pits using the preferred method given in AS1726 – 1993, (Amdt1 – 1994 and Amdt2 – 1994), Appendix A. The material properties are assessed in the field by visual/tactile methods.

Particle Size

Major Division	Sub Division	Particle Size
BOULDERS		> 200 mm
COBBLES		63 to 200 mm
GRAVEL	Coarse	20 to 63 mm
	Medium	6.0 to 20 mm
	Fine	2.0 to 6.0 mm
SAND	Coarse	0.6 to 2.0 mm
	Medium	0.2 to 0.6 mm
	Fine	0.075 to 0.2 mm
SILT		0.002 to 0.075 mm
CLAY		< 0.002 mm

Plasticity Properties



MOISTURE CONDITION

AS1726 - 1993

Symbol	Term	Description
D	Dry	Sands and gravels are free flowing. Clays & Silts may be brittle or friable and powdery.
M	Moist	Soils are darker than in the dry condition & may feel cool. Sands and gravels tend to cohere.
W	Wet	Soils exude free water. Sands and gravels tend to cohere.

CONSISTENCY AND DENSITY

AS1726 - 1993

Symbol	Term	Undrained Shear Strength
VS	Very Soft	0 to 12 kPa
S	Soft	12 to 25 kPa
F	Firm	25 to 50 kPa
St	Stiff	50 to 100 kPa
VSt	Very Stiff	100 to 200 kPa
H	Hard	Above 200 kPa

Symbol	Term	Density Index %	SPT "N" #
VL	Very Loose	Less than 15	0 to 4
L	Loose	15 to 35	4 to 10
MD	Medium Dense	35 to 65	10 to 30
D	Dense	65 to 85	30 to 50
VD	Very Dense	Above 85	Above 50

In the absence of test results, consistency and density may be assessed from correlations with the observed behaviour of the material.

SPT correlations are not stated in AS1726 – 1993, and may be subject to corrections for overburden pressure and equipment type.

APPENDIX B
Limitations

LIMITATIONS

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Core Consultants Pty Ltd. • T +61 7 5475 5900 • admin@coreconsult.com.au • **www.coreconsult.com.au** • ABN 75 603 384 050
55 Kingsford Smith Parade, Maroochydore, Queensland 4558, Australia • PO Box 5569, Maroochydore BC, QLD 4558