Our Ref: D6643/03

Chris Cockerline
Partner Construction
Durhamgate Suite 1
Green Lane
Spennymoor
County Durham
DL16 6FY

Date: 3rd December 2015

Dear Chris,

NANNY MARR ROAD, DARFIELD
SOAKAWAY TESTING

Introduction

Dunelm Geotechnical and Environmental was appointed by Partner Construction and Peveril Securities Ltd to carry out a soakaway investigation on land at Nanny Marr Road, Darfield.

The purpose of the investigation was to provide information on the subsurface conditions at the site for installing soakaways.

This letter report details the study to determine the infiltration characteristics of the superficial deposits.

Infiltration drainage systems rely on the infiltration properties of the surrounding soils to facilitate natural drainage of water within the unsaturated zone that lies above the groundwater table. The system disposes of storm water by providing detention storage during a storm and allowing the water to infiltrate into the underlying soil or rock. The system must be designed so that infiltration occurs quickly enough to be able to deal with the next storm event without overloading the design capacity.

The hydraulic parameters for soakaway systems are based on field permeability tests, and on information provided in the trial pits excavated as part of the investigation.

Soil Infiltration Tests

The purpose of the tests was to determine the soil infiltration rate of the strata identified in the trial pits. This information is required in order to design the infiltration drainage system.

No details of the proposed development are available, however it is assumed the system will dispose of storm water run-off generated from the roof areas and possibly the estate roads.

The fieldwork was carried out based on the advice contained in BRE Digest 365. For the purpose of this report, the design is based on the lowest value of the soil infiltration rate calculated from the successful field tests.

Fieldwork

Two trial pits (designated TPs SA 1 and SA 2) were excavated by a mini digger to a maximum depth of 1.55m below ground level (bgl) on 2nd December 2015.

Trial pit SA 1 was excavated on the eastern side of the site within the proposed residential area and trial pit SA 2 was excavated on the western side of the site within the proposed commercial

area. Both pits were terminated in a granular horizon comprising yellow gravelly fine to coarse SAND (highly weathered sandstone). The trial pit logs are attached to this letter.

A plan showing the position of the trial pits is attached to this letter report.

Test Procedure

Following the guidance in BRE Digest 365, the trial pits were filled with water. The water in the pit was allowed to drain to near empty or empty, and the water level recorded at intervals from the time of filling.

Groundwater

Groundwater was absent from the trial pits.

Infiltration Test Results

Calculations to determine the soil infiltration rate (permeability) of the soil were carried out and the calculated soil infiltration rates are listed below:

Trial Pit No.	Initial Water Depth (m)	Soil Infiltration Rate *f* (m/sec)
TP SA 1	0.78	2.12×10^{-4}
TP SA 2	0.44	2.18×10^{-4}

The calculation sheets are attached to this letter report.

Yours sincerely,

Sarah Crick
On behalf of Dunelm Geotechnical and Environmental Ltd.

DUNELM GEOTECHNICAL & ENVIRONMENTAL	**Contract:** **Nanny Marr Road, Darfield**		
	Drawing Title: **Soakaway Locations**		
Drawing No: **D6643**	**Date:** **December 2015**	**Scale:** **NTS**	**Drawn by:** **SC**

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. SA1

Contract No.: D6643

Site: Nanny Marr Road, Darfield

Scale 1:25

Client: Partner Construction and Peveril Securities Ltd

Logged By: AS

Sheet 1 of 1

Method: Mini Digger

Checked By: SC

Dates: 02/12/2015

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
				MADE GROUND: Brown slightly gravelly slightly gravelly clay. Gravel is angular to sub angular, fine to coarse of sandstone, mudstone and brick. Fragments of glass noted.	0.20			
				MADE GROUND: Yellow sandy gravel. Gravel is angular to subrounded, fine to coarse of dolomite. Occasional cobbles of dolomite.				
				Yellow brown slightly gravelly fine to coarse SAND. Gravel is fine to coarse, angular to subangular of sandstone. (Possible weathered sandstone).	1.23			
				End of Trial Pit at 1.53 m	1.53			

1 2 3 4 5

Remarks	Ground Water (m)		Excavation Details	Orientation
1) Soakaway test undertaken once excavation complete, prior to backfilling. 2) No groundwater encountered.	Depth Strike	Remarks	Dimensions: 0.50m x 1.70m	A B C D °
			Stability: Stable	
			Weather: Dry	
			Remarks: Mini Digger	

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. SA2

Contract No.: D6643

Site: Nanny Marr Road, Darfield

Scale 1:25

Client: Partner Construction and Peveril Securities Ltd

Logged By: AS

Sheet 1 of 1

Method: Mini Digger

Checked By: SC

Dates: 02/12/2015

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
				MADE GROUND: Brown slightly sandy, slightly gravelly clay. Gravel is fine to coarse, angular to subrounded of sandstone, mudstone and brick.	0.20			
				MADE GROUND: Yellow brown sandy gravel with high cobble content. Gravel is fine to coarse, angular to subrounded of dolomite. Cobbles are angular to subrounded of dolomite.	0.40			
				Yellow brown slightly clayey, slightly gravelly fine to coarse SAND. Gravel is fine to coarse, angular of sandstone. (Possible weathered sandstone).				
			1					
				End of Trial Pit at 1.55 m	1.55			
			2					
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1) Soakaway test undertaken once excavation complete, prior to backfilling. 2) No groundwater encountered.	Depth Strike	Remarks	Dimensions: 0.50m x 1.90m	A B C D °
			Stability: Side walls unstable	
			Weather: Dry	
			Remarks: Mini Digger	

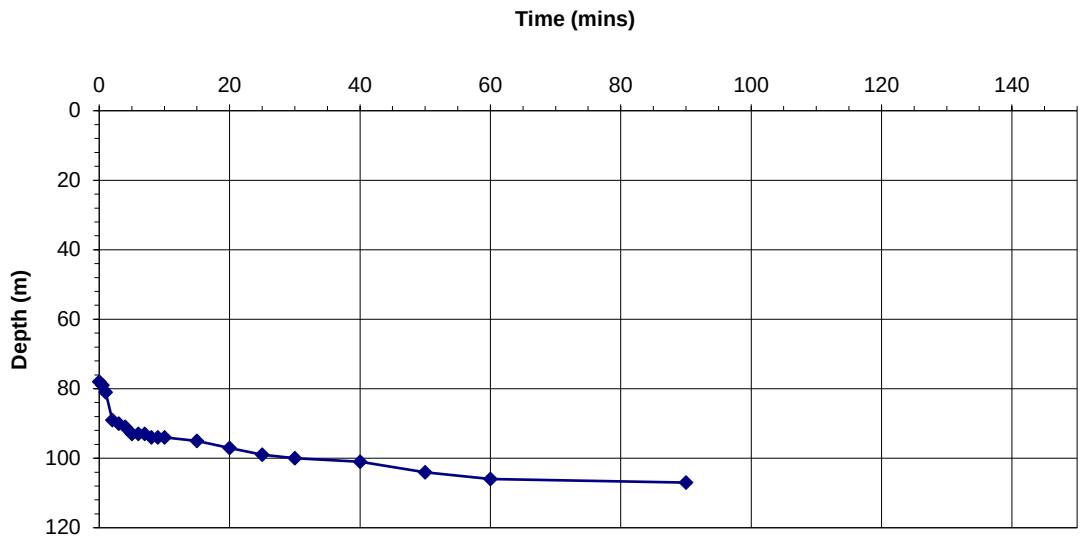
SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 1991
BRE Digest 365, Figure 2, Page 5

Client:	**Partner Construction and Peveril Securities Ltd**				
Site:	**Nanny Marr Road**				
Job No:	**D6643**				
Pit No:	**SA1**		**Test No:**	**1**	

CALCULATION OF SOIL INFILTRATION RATE

Time (min)	Depth (m)
0	78
0.5	79
1	81
2	89
3	90
4	91
5	93
6	93
7	93
8	94
9	94
10	94
15	95
20	97
25	99
30	100
40	101
50	104
60	106
90	107

Pit Dimensions	
Length (m) =	1.70
Width (m) =	0.50
Depth (m) =	1.53
Depth at start of test (m) =	78.000
Depth at end of test (m)=	107.000
75% level (m)=	85.250
50% Effective Depth	14.500
25% level (m)=	99.750
Base area of pit (m^2) =	0.850
Vp_{75-25} (m^3) =	12.325
a_{p50} (m^2) =	64.650
From the graph:	
tp 75 (min) =	1
tp 25 (min) =	16
Soil infiltration rate, f, (m/s) =	**2.12E-04** **normal test**
Input by:	**AS** **Date:** **2.12.15**
Checked by:	**SC** **Date:** **3.12.15**



SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 1991
BRE Digest 365, Figure 2, Page 5

Client:	**Partner Construction and Peveril Securities Ltd**				
Site:	**Nanny Marr Road**				
Job No:	**D6643**				
Pit No:	**SA1**		**Test No:**	**1**	

CALCULATION OF SOIL INFILTRATION RATE

Time (min)	Depth (m)
0	44
0.5	48
1	51
2	55
3	59
4	62
5	65
6	67
7	70
8	74
9	74
10	76
15	84
20	85
25	86
30	87
40	88
50	88
60	90
90	96

Pit Dimensions		
	Length (m) =	1.90
	Width (m) =	0.50
	Depth (m) =	1.55

Depth at start of test (m) =	44.000
Depth at end of test (m)=	96.000
75% level (m)=	57.000
50% Effective Depth	26.000
25% level (m)=	83.000
Base area of pit (m^2) =	0.950
Vp_{75-25} (m^3) =	24.700
a_{p50} (m^2) =	125.750

From the graph:	
tp 75 (min) =	1
tp 25 (min) =	16

Soil infiltration rate, f, (m/s) =	**2.18E-04**	**normal test**

Input by:	**AS**	**Date:**	**2.12.15**
Checked by:	**SC**	**Date:**	**3.12.15**