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SOIL INFILTRATION TEST REPORT

Proposed Two House Development

Test Location: The Bungalow, Newlands Road, Balgaddy , Lucan, Co. Dublin

Applicants: Edward Bennett & Paul Boyle

April 2022

PL Ref: SD22A/0008

Soil Infiltration Test Report

[redacted]

at

[redacted]

On behalf of

[redacted]

PL Ref SD22A/0008

Field Testing & Report Writing:

John Delaney [redacted]

Date: 19th April 2022

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1.0 SUMMARY

The results of the two soil infiltration tests conducted at a proposed development at The Bungalow, Newlands Road, Balgaddy, Lucan, Co. Dublin. No bedrock or water table concerns were encountered above 1.5m during the site investigation works. The ground conditions indicate that the subsoil strata is a suitable medium to both accept and infiltrate storm water. The following infiltration rates (f) were obtained from the two tests carried out on site.

Dwelling 1: f = 1.96164E-05m/sec

Dwelling 2: f = 1.89624E-05m/sec

Extreme rainfall intensity has been acquired from Met Eireann. The main dwelling roof area contributing to the design of the soakaway system from each dwelling is 99.24sqm. A 90% factor was applied due to the shape of the roof. The each driveway will be comprised of and will discharge to ground separately.

The soil infiltration rate was calculated area as follows:

Pit No.	Run-Off Element	Dimensions (m)	Storage Volume (35% void)
Dwelling 1 (TP#1)	Main House Roof	3 * 2 * 1.5	3.15m³
Dwelling 2 (TP#2)	Main House Roof	3 * 2 * 1.5	3.15m³

2.0 INTRODUCTION/SCOPE

Geoenvironmental Ltd were commissioned by the applicants (Eimear Bennett & Paul Boyle) to carry out two * Soil Infiltration Tests at a proposed development site. The applicants plans to construct 2 four bedroom, semi-detached dormer bungalows at this location. This report and associated drawings are to address items 2 & 3 of the request for further information correspondence from South Dublin County Council. This document contains information on the results of the soil infiltration tests conducted on site. The test procedure is as per the methodology set out in BRE digest No. 365. The tests were conducted on 15th April 2022.

3.0 INFILTRATION RATE TEST METHODOLOGY

The Soil Infiltration tests will be completed in accordance with th BRE Digest Guidance Document – Soakaway Design

- Each trial pit was excavated to 1.3-1.4 m deep
- Each trial pit was approximately 0.7m wide and 1m in length
- The dimensions of the trial pit were measured before each test is started
- The water inflow into the hole was by means of a skip and was rapid such that the pit was filled to its maximum effective depth in a short time as required.
- The water level and time were recorded when the test commenced
- The water level was monitored at intervals sufficiently close to clearly define water level versus time.

Figure 1.5: Pic showing water discharging quickly into trial pit

4.0 INFILTRATION TEST RESULTS

The followings show the calculations regarding the soil infiltration rate at each of the 2 test holes locations. The calculations as per the methodology & formulae set out in BRE 365 Digest

Table 1.0: Soil Infiltration Calculation

TP#1

Vol: 75% - 25% Full	0.459	m^3
a(75)	3.81	m^2
tp75-25	140	mins
f =	**1.8614E-05**	**m/sec**

TP 1 Inputs

Avg Width	0.7	m
Avg length	1	m
Avg Depth	1.8	m

100	1.8
75	0.975
50	0.65
25	0.325

TP#2

Vol: 75% - 25% Full	0.455	m3
a(75)	3.04p	m2
tp75-25	160	mins
f =	**1.80624E-05**	**m/sec**

TP 2 Inputs

Avg Width	0.75	m
Avg length	1.1	m
Avg Depth	1.8	

100	1.9
75	0.9
50	0.6
25	0.3

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5.0 SOAKAWAY DESIGN CALCULATIONS

5.1 Dwelling # 1 (northern site)

Total Roof Area= 99.24sqm

Roof Area : 99.24sqm * off co-efficient of 0.9 = 89.32 sqm

Q = as50 * f* D

Soakaway design to be 3m long * 2m width * 1.5m effective depth

as50 = 2 * (3 + 2) * (1.5 /2)
=7.79 m^2

f = 1.861*10^{-3} m/sec

AF = 1.4423* 10^{-4} m^3/sec

5.1 Dwelling # 2 (southern site)

Total Roof Area= 99.24sqm

Roof Area : 99.24sqm * off co-efficient of 0.9 = 89.32 sqm

Q = as50 * f* D

Soakaway design to be 3m long * 2m width * 1.5m effective depth

as50 = 2 * (3 + 2) * (1.5 /2)
=7.79 m^2

f = 1.80624*10^{-3} m/sec

AF = 1.3996* 10^{-4} m^3/sec

The capacity of the soakaway necessary to manage the resultant storm water run-off generated from the proposed dwelling is calculated by modelling site specific extreme rainfall data from a 1:100 year event over various daily durations. The volume of water to be managed is calculated by subtracting the outflow volume from the inflow volume The soakaway must be capable of managing the balance between the two for the optimum time duration where the volume of inflow is greater that the outflow. A void space of 35% assumed in soakaway Design. The modeling results are shown in Table 2 and 3 on the below.

Table 2.0: Soakaway Design Calculations (Dwelling 1)

Storm Duration	1:100 year rainfall	Total Run-off	Average Flow m/s	Storage Inflow	Outflow	Storage Requirement
15mins	26.7	2.39	0.0026	2.395	0.13	2.26
30mins	31.7	2.85	0.0016	2.851	0.26	2.57
1 hr	37.7	3.37	0.0009	3.367	0.52	2.85
2hr	44.8	4.00	0.0006	4.002	1.04	2.96
4hr	53.3	4.76	0.0003	4.761	2.08	2.68
6hr	59.0	5.27	0.0002	5.270	3.12	2.15
12hr	70.2	6.27	0.0001	6.270	[illegible]	0.04
24hr	83.5	7.46	0.0001	7.458	12.46	-5.00
48hr	104.3	[illegible]	[illegible]	9.316	[illegible]	-15.21

Table 3.0: Soakaway Design Calculations (Dwelling 2)

Storm Duration	1: 100 year rainfall	Total Run-off	Average Flow m/s	Storage Inflow	Outflow	Storage Requirement
15mins	26.7	2.39	0.0026	2.395	0.17	2.26
30mins	31.7	2.85	0.0016	2.831	0.25	2.58
1 hr	37.7	3.37	0.0009	3.367	0.50	2.86
2hr	44.8	4.00	0.0006	4.002	1.01	2.99
4hr	53.3	4.76	0.0003	4.761	2.02	2.75
6hr	59.0	5.27	0.0002	5.270	3.02	2.25
12hr	70.2	6.27	0.0001	6.275	6.05	0.22
24hr	83.5	7.46	0.0001	7.458	12.09	-4.63
48hr	104.3	9.32	0.0001	9.316	24.19	-14.87

6.0 SOAKAWAY VOLUME SIZE & EMPTYING TIME

The [illegible] of soakaway required to successfully manage the run-off from 50% of the main roof and hardstanding area in the case of a 1:00 yr 2 hr event is 2.96 and 2.99m^3 in respect of Dwelling 1 and Dwelling 2. This assumes that 40-60mm round stone will be used in the construction of the soakaway. The resultant void space or effective porosity is 0.35 (35% of overall construction).

Soakaway Size	Void Ratio	Max Volume Storage
2m^3	0.35	3.15m^3

Table 4.0: **Check on time of emptying half storage volume, t_{s50}**

Dwelling 1			
		Volume	3.15
	1.575	Constant	0.50
	[illegible]	As50	2.25
Seconds	[illegible]	t	[illegible]
Hrs	3.03		

Dwelling 2			
		Volume	3.93
	1.575	Constant	0.50
	[illegible]	As50	2.75
Seconds	[illegible]	t	[illegible]
Hrs	3.13		

Each of the two soakaway(s) will half empty within a 24 hr period in the unlikely scenario that another extreme rainfall event occurs on the the following day.

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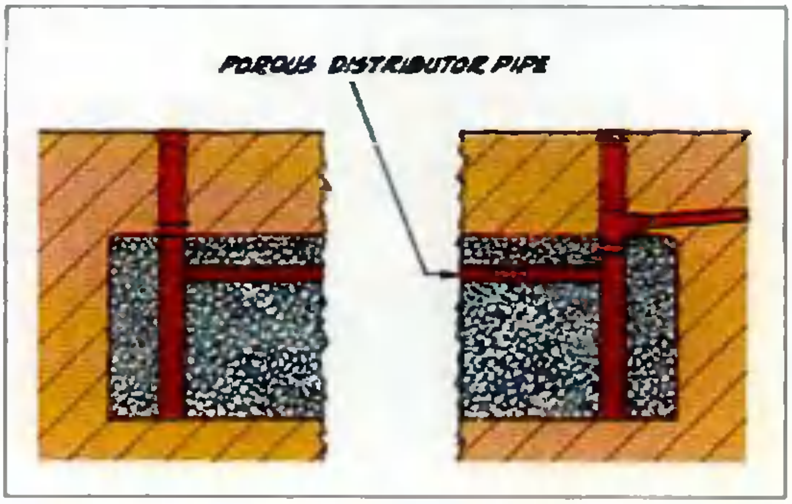
7.0 SOAKAWAY CONSTRUCTION DETAILS AND DESIGN LIFE

The soakaway should be located a minimum of 5m from any dwelling/building foundations. Each soakaway design assumes a trench style with a depth of 1.5m with granular material (40mm - 60mm, void ratio of 0.3) and surrounded with a geotextile membrane. The remaining 0.5m to surface can be backfilled with the excavated material (soil and subsoil)

The dimensions assume an effective depth of 1.5m below the distributor pipe. An inspection access well should be constructed at each end of the soakaway. The access should provide a clear view to the base of the soakaway, even when the soakaway is of the filled type. A 225 mm perforated pipe provides a suitable inspection well. The movement of suspended and floating material into the distributor pipe can be minimised by installing a wet well in the centre of the soakaway. The wet well can be constructed with a T-piece inlet fitted to the distributor pipe. The sustainability and design life of the soakaway is an important issue and the soakaway engineering design as set out above takes this into account:

- The design should ensure that the system if constructed properly should operate for a long period (20-50 years) before replacement or rehabilitation is needed
- The system should operate for between 1-5 years before significant maintenance activities are required

Figure 7.0: Trench type soakaway with horizontal distributor pipe



8.0 MAINTAINANCE GUIDANCE AND PROCEDURES

Soakaways can provide a long-term, effective method of disposal of stormwater from impermeable areas of several hundreds of square metres. Long-term maintenance and inspection must be considered during the design and construction process. Maintenance of silt traps, gully pots and interceptors will improve the long-term performance. The use of wet well chambers as proposed within the soakaway system will further assist in pollutant trapping and extending operating life. With wet well soakaways, vehicle mounted suction emptying and jetting equipment can be used, so suitable access to inspection covers must be provided. The covers of the wet well and inspection wells should be lifted and checked for the for silting or contamination. Any build-up of silt at the base of the soakaway can be removed manually during dry conditions when the soakaway is empty or pumped or out from the wet well. The key for maintenance components, required actions and frequency are set out in the Table 5.0.

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Table 5.0: Soakaway operation and maintenance requirements

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove sediments and debris from pre-treatment devices (gullies, silt traps) and floor of wet well/inspection chambers	Annually
	Cleaning of gutters and any filters on down pipes	Annually
	Trimming any roots that may be causing blockages	Annually / or as required
Occasional Maintenance	-	-
Remedial Actions	Reconstruct soakaway and/or replace or clean void fill if performance deteriorates or failure occurs	-
	Replacement of clogged geotextile	-
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

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Pic of TH 01

Pic of TH #2