



www.fergusongeotechnical.com

Drainage Report,
Recommendations and
Associated Test Certificates

Site: Castlehill,
Birnie,
Elgin

C/O: Grant and Geoghegan
Elgin

Report Prepared: 29/03/2024,
Jack Ferguson
Drainage Consultant
Mobile: 07766691245
Email: info@fergusongeotechnical.com

Ferguson GeoTechnical Ltd, Failte, Ythanbank, Ellon, AB41 7TH

CONTENTS

Introduction

Site Location & Brief Description

Site Work

Trial Pits

Percolation Testing

Infiltration testing

Ground Assessment

Encountered Ground Conditions

Groundwater Observations

Published Geology

Discussion

Sub-Soils

Sewage Treatment

Foul Water Discharge

SUDs

Surface Water Disposal

Drainage Recommendations

Foul Water Discharge

Surface Water Disposal

Indicative Drainage Layout

System Maintenance

Sewage Treatment System

Regulations

Additional Information

Relevant Insurance

Author

Attachments

Site Location Plan & Satellite Imagery

Indicative Test Location Plan

Indicative Drainage Layout

Trial Pit Logs FWS1 & SWS1

Indicative Sub-Surface Soakaway Construction

Certificate - Foul Water Soakaway

Certificate - Surface Water Soakaway

Introduction

Following a request from Grant and Geoghegan on behalf of their client a site visit was made to a site at Castlehill, Birnie, Elgin.

At the site it is proposed that a new 2 bedroom holiday chalet will be created.

Our site visits were carried out in order to perform various ground analyse to determine what the underlying ground build up is and to perform the following:

Percolation Testing – This is to determine the suitability of the ground build-up for the disposal of effluent from a septic tank to the ground via a purpose built soakaway system.

Infiltration Testing – This is to enable the appropriate design of a surface water disposal system.

Site Location & Initial Information

For information as to the layout of the premises please see the attached images/drawing.

The site given its proximity to existing residences will have easy access to electricity, water and telephone. Although it should pointed out that there is no mains drainage available.

There are no open water sources which lie within 100 metres of the site. This can be seen in the attached visual information.

Site Work – Trial Pits

On the 18th of March 2024, various trial pits were excavated using a tracked digger with a 300mm wide bucket attached in order to allow for analysis of the ground build-up and conditions. Furthermore, this was also carried out in the area of the proposed foul and surface water sub-surface soakaways to allow for percolation and infiltration testing to occur adjacent to the trial pits.

The locations of both proposed soakaways can be seen on attached drawing(s).

Percolation Testing

Percolation testing was carried out adjacent to trial pits in accordance with BS6297: 2007+A1:2008 and as described in Section 3.9 of the Scottish Building Standards Technical Handbook (Domestic). The test results are as shown below: -

	FWS1
Average time taken for water to drain 3 times in each sump hole. (middle 150mm)	45 minutes (approx.)
Depth of Water Table below Ground Level (m)	>2
Average Soil Percolation Values, V_p , s/mm	18

Infiltration Testing

Infiltration testing was carried out adjacent to trial pit SWS1 in full accordance with BRE Digest 365. The test results are tabulated below: -

Trial Pit No.	Test Zone Depth (M)	In-Fill	Soil Infiltration Rate, f (m/s)
SWS1	0.5	Open	$f = 1.85 \times 10^{-5}$ m/s

Encountered Ground Conditions

The ground is of a sandy nature. Please refer to the trial pit logs for further information.

Ground Water Observations

Ground water was not observed during the site visits. Furthermore, no evidence of fluctuating water table levels or seasonally high water tables was found.

Published Geology

There are various sources of published geology available that cover the area this site is in. An example of which is the British geological survey 1:50,000 maps. However for a more accurate description of the actual site conditions please see the attached trial pit logs.

Discussion

Sub-Soils

Having excavated trial pits and carried out percolation and infiltration testing I can say that the nature of the sub-soil will allow for drainage of a sufficient nature to occur if a soak-away is installed at the correct depth.

Sewage Treatment

We recommend installing a septic tank that is designed for a population equivalent no lower than 5. This is because the water table was not found in excavations of 2 meters in depth and the percolation rate (Vp) is between the range defined as appropriate. Appropriate range of Vp values is between 15 – 100 as defined in BS 6297:2007+A1:2008.

This is based on one, two-bedroom residential building. As per the flows and loads document, the minimum population should be stated as 5. Consideration should be taken to establish that the septic tank can function properly with lower usage.

Foul Water Discharge

A sub-surface soakaway (infiltration system) is considered suitable for the discharge of foul waters from the septic tank directly to the ground. The soakaway should comply with the Domestic Technical Handbook (para. 3.9.2) which sets out guidance on design in accordance with the requirements of SEPA Regulatory Method (WAT-RM-04) Indirect Sewage Discharges to Groundwater.

Surface Water Disposal

The investigation carried out concludes that the ground build-up is considered suitable for the construction of an infiltration trench (soakaway) which will provide the one component of treatment for the surface waters from the roof areas of the dwellings prior to disposal directly to the ground.

Drainage Recommendation

Foul Water Discharge

We recommend the installation and use of a septic tank as the water table was not found in excavations of 2 meters in depth and the percolation rate (V_p) is between the range defined as appropriate.

The results from the onsite visits gave me the necessary information to calculate the percolation rate of $V_p = 18$ s/mm. Please see the table below which shows the results of calculations for the minimum base area of the proposed soakaways for the foul water discharge. This has been calculated in accordance with the regulations using the following equation: $A = V_p \times PE \times 0.25$, or minimum of area of 25 metres squared.

Proposed Development	Population Equivalent	Minimum Base Area (m ²)
2 bedroom dwelling	5	25

Surface Water Disposal

Having used the calculated soil infiltration rate, $f = 1.85 \times 10^{-5}$ m/s, the table below shows the optimised soakaway dimension. Please note, other length/width options are acceptable provide they meet the minimum volume of 8.8m³.

Impermeable Areas (m ²)	Width (m)	Length (m)	Storage depth (m)	Time to empty half storage (Hours)
107	2	4.4	1	3.09

Indicative Drainage Layout

Indicative soakaway locations can be seen in the attached drawings at the end of this report. Furthermore, indicative soakaway construction is also shown on in attached drawings at the end of this report.

System Maintenance

The septic tank should be fully maintained and done so in conjunction with the manufacturer's recommendations. Additionally the system should be inspected on a regular basis by the owner and emptied when needed to prevent a build-up of solids and silts which could prevent the soakaway from working properly.

Regulations

It should also be noted that there a multitude of regulations involving soakaways and effluent disposal. Examples of sources that provide information on this include BS 6297:2007+A1:2008 and BRE Digest 365.

Relevant Insurance

Employees of regulators/public authorities seeking proof of this company's professional indemnity and public liability insurance may do so by contacting the author using the details below. Furthermore, any information/questions about this report can also be answered by the author using the details below.

Author

Jack Ferguson

Mobile: 07766691245 Email: info@fergusongeotechnical.com

Drainage Consultant – Ferguson Geotechnical Ltd

BSc (Hons) Architectural Technology, Robert Gordon University

Attachments

Site Location Plan & Satellite Imagery

Indicative Test Location Plan

Indicative Drainage Layout

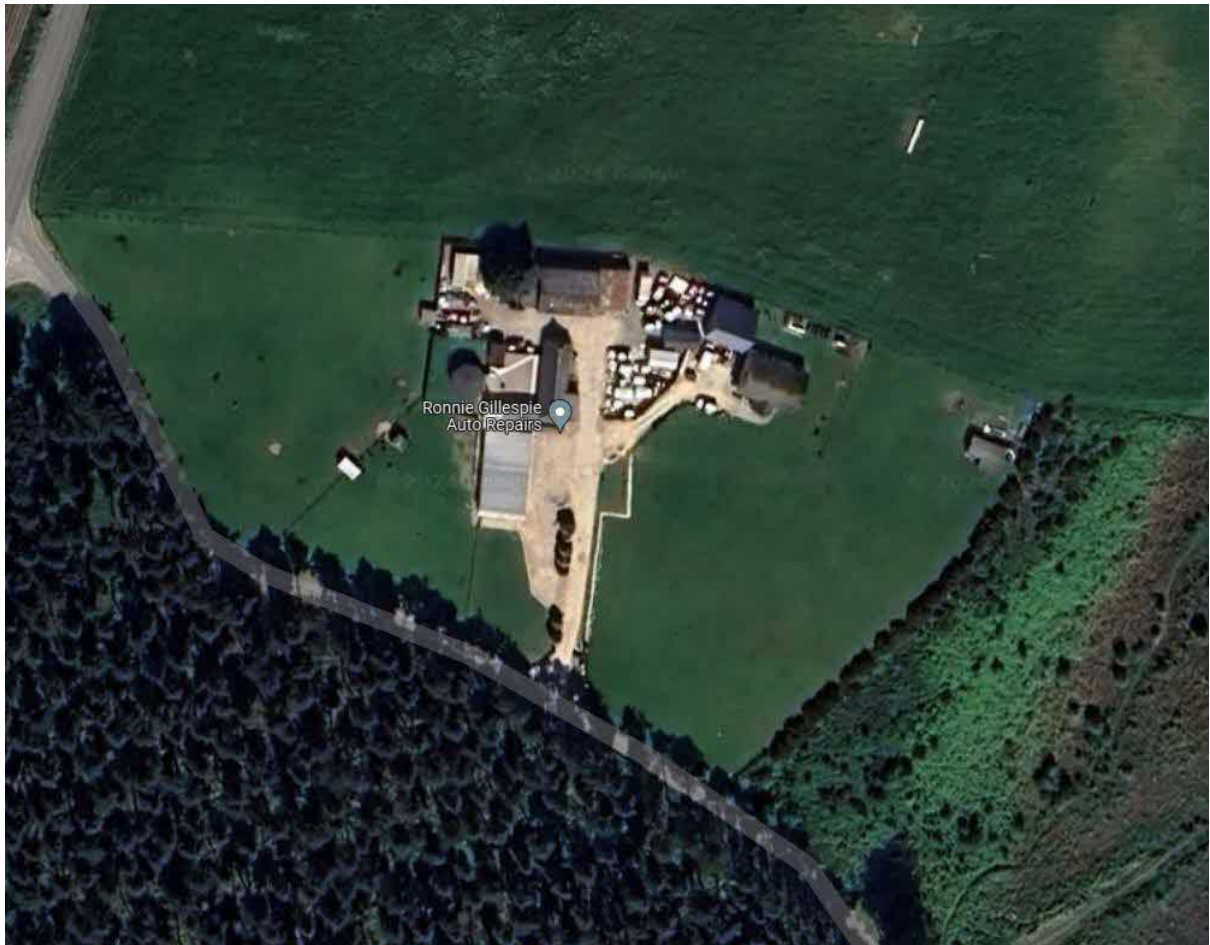
Trial Pit Logs FWS1 & SWS1

Indicative Sub-Surface Soakaway Construction

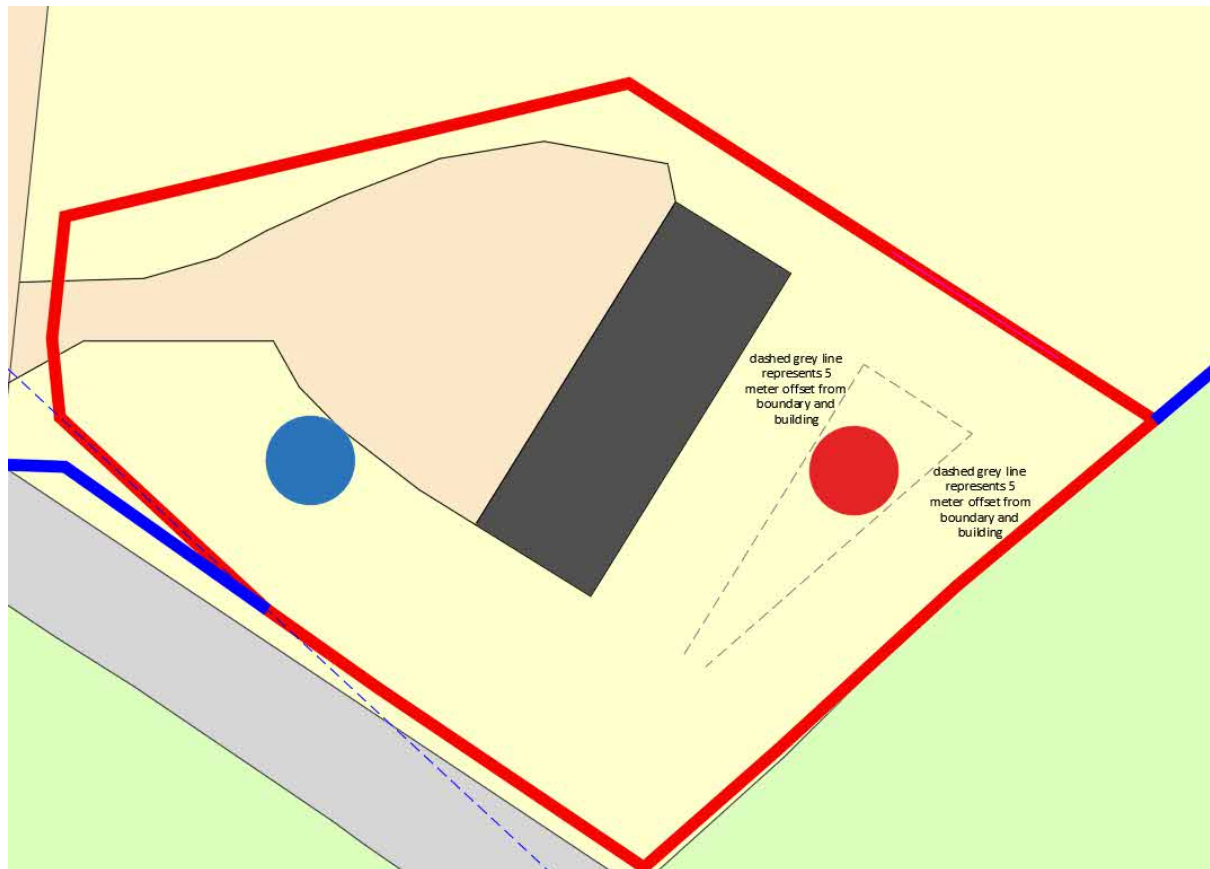
Certificate - Foul Water Soakaway

Certificate - Surface Water Soakaway

Site Location Plan & Satellite Imagery



Indicative Test Location Plan

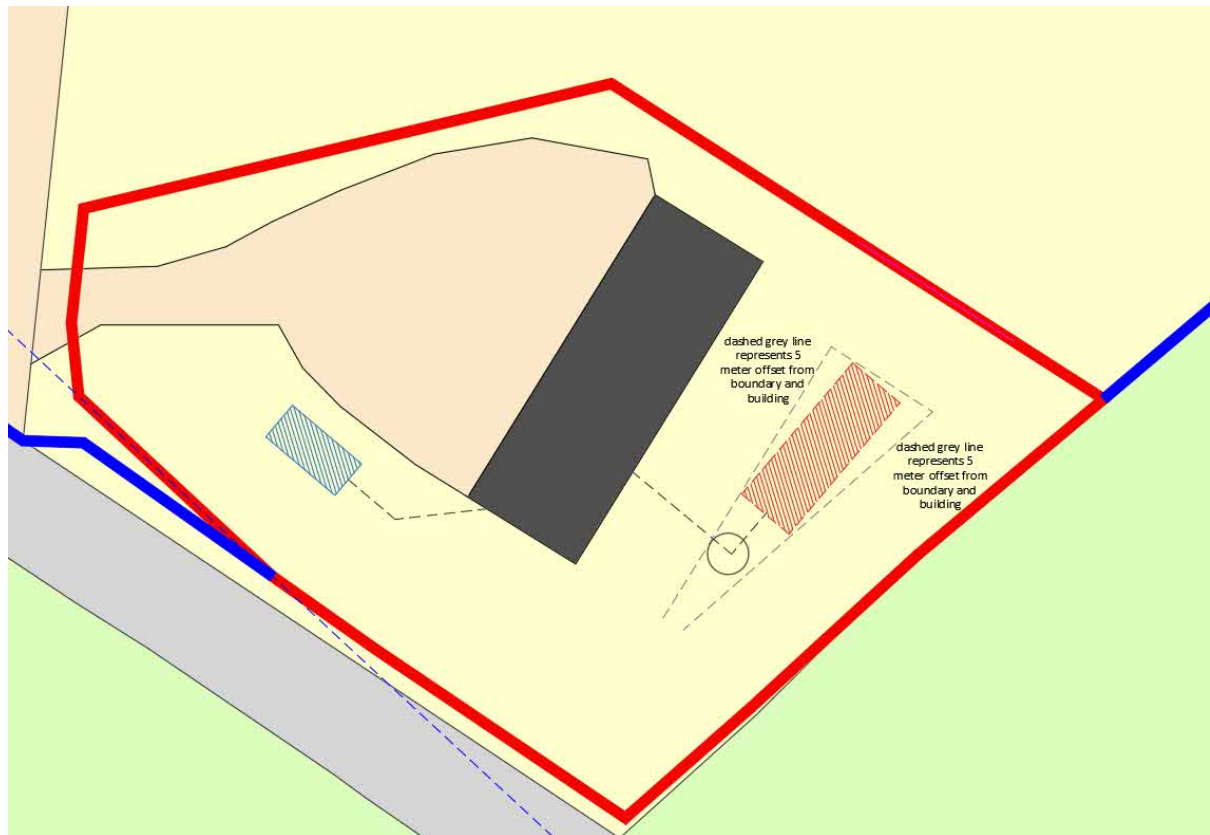


Key

Red Circle – Approximate Foul Water Soakaway Test Location(s)

Blue Circle – Approximate Surface Water Soakaway Test Location(s)

Indicative Drainage Layout



Key

Red Area – Proposed Foul Water Soakaway Location.

Blue Area – Proposed Surface Water Soakaway Location.

Please note this is an indicative location plan for the proposed soakaways and should not be used for scaling. Additionally the minimum sizes specified in the drainage recommendation section of the report should be used.



Ferguson

GEOTECHNICAL

Site:
Castlehill,
Birnie,
Elgin

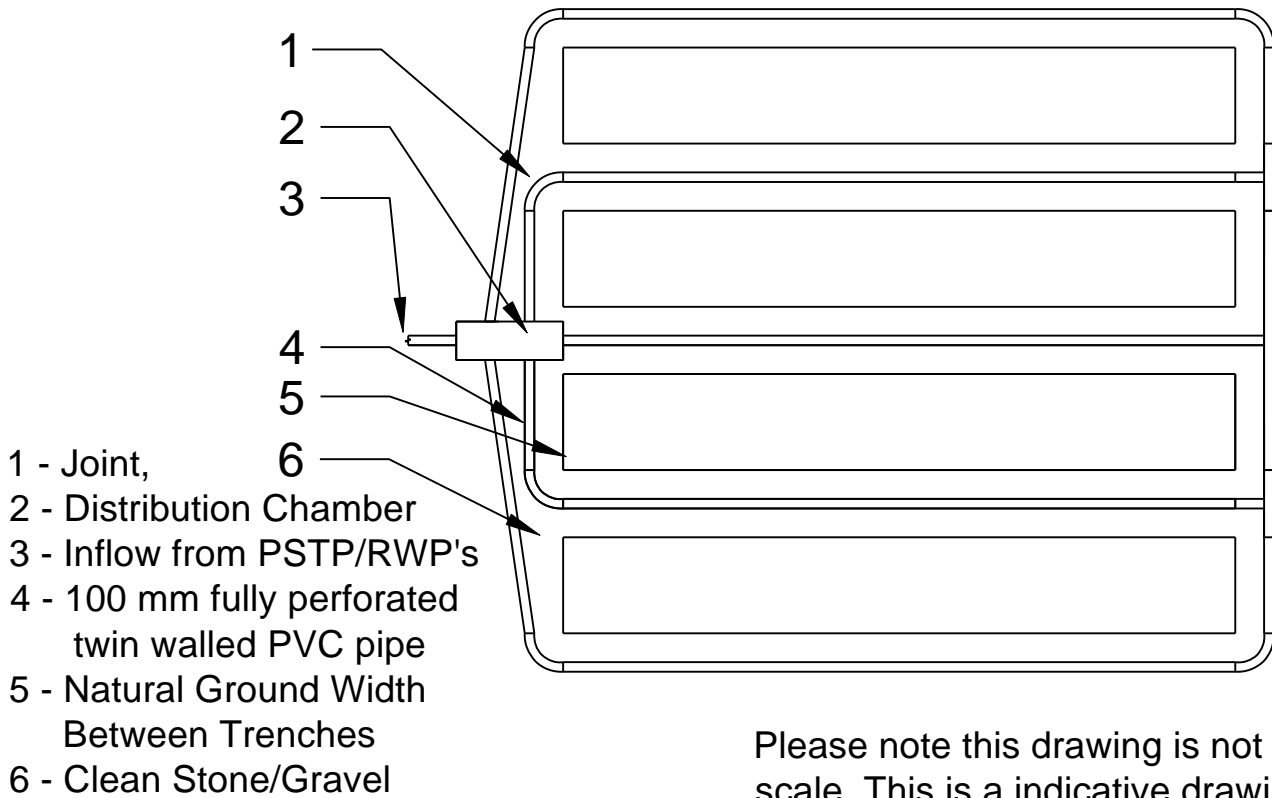
Trial Pit
No.
All Pits
Identical

Excavation Method: Digger with a 300mm bucket attached.		Dimension: 0.3 x 2 m	Dates: 18/03/2024		Practice: Grant and Geoghegan	Page: 1/2
Location: As seen on plan.						
Depth (m)	Sample/ Tests	Water Depth (m)	Field Records	Thickness (m)	Description	Water
			testing done. The water table was not encountered.	0.3	Top Soil	
				At least 1.7	SAND WITH STONE	
				Unknown	Water Table	
Comments				Author JF	Scale: Not to Scale.	Date: 18/03/24

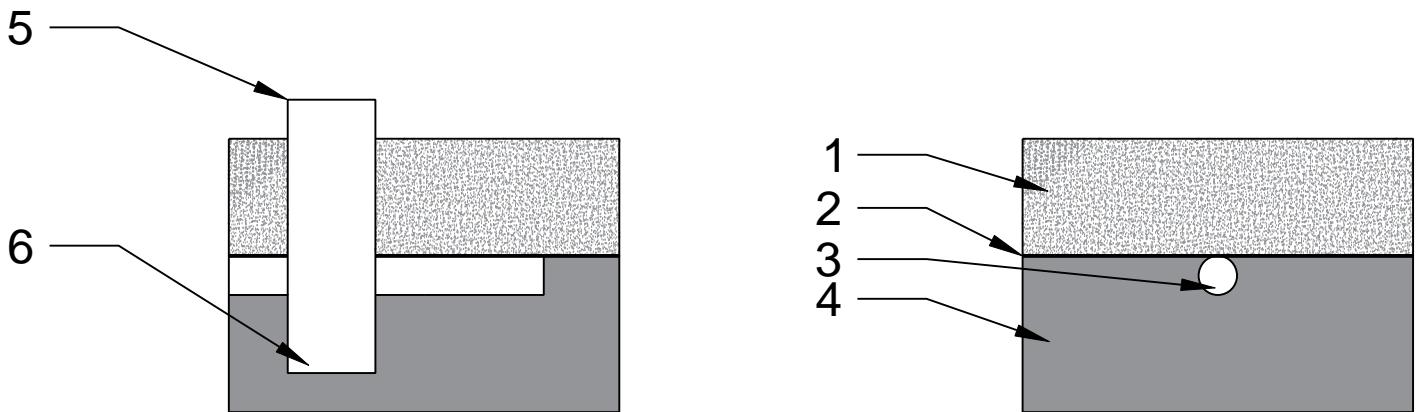
Photo of Trial Pit (both pits identical)



Indicative Layout - Plan View



Indicative Sectional Views



CERTIFICATE FOR PROPOSED FOUL WATER SUBSURFACE SOAKAWAY

Two tests are normally required to demonstrate the suitability of the proposed drainage scheme:

1. A trial pit must be excavated to a depth of 1 metre below the proposed invert of the drain to establish whether or not the water table will interfere with the operation of the soakaway.
2. A percolation test must be carried out to determine the area of the ground required.

Certificate

Applicant's name: Mr Ronnie Gillespie
(name of person applying for planning permission)

Address: c/o Grant and Geoghegan
Site address: Castlehill, Birnie, Elgin

.....
Date of test: 18/03/2024 Time: From 1:30PM Weather Conditions: Cold, Dry, Sunny

Encountered Ground Conditions

300mm Layer of Topsoil
At least 1700mm Layer of Sand with Stone

Ground Water Observations

The water table was not discovered, there was no visual indication of seasonally high or fluctuating ground water table in the strata.

Wells: No wells for the supply of potable water within 50m of the site.

Depth of Drains: 0.5m

Depth of Excavations: 2m

Percolation Test

FWS 1

Time Taken (mean of three times)	2700 s
Soil Percolation Value	Vp 18 s/m
Population Equivalent	5
Minimum Floor Area of Soakaway	25.00m ²

I hereby certify that I have carried out the above tests in accordance with procedures specified in British Standard BS6297:2007+ A1 2008, and in conjunction with the full requirements set out within the Domestic Scottish Building Standards Technical Handbook (Environmental Standard 3.9 Infiltration Systems), the results of which are tabulated above, and that the proposed drainage scheme detailed on the attached plans and report has been designed taking into account the recommendations in the aforementioned standards.

Signed:



Date: 29/03/2024

Name/Company: Ferguson Geotechnical Ltd, Jack Ferguson

Address: Failte, Ythanbank, Ellon, AB41 7TH

Qualification: BSc (Hons) Architectural Technology, Drainage Consultant

CERTIFICATE FOR PROPOSED SURFACE WATER SOAKAWAY

Applicant's Name: Mr Ronnie Gillespie
(name of person applying for planning permission)

Address: c/o Grant and Geoghegan

Site Address: Castlehill, Birnie, Elgin

Date of Test: 18/03/2024 Time: 1:30PM Weather: Cold, Dry & Sunny

Encountered Ground Conditions

300mm Layer of Topsoil
At least 1700mm Layer of Sandy with Stone

Ground Water Observations

The water table was not discovered, there was no visual indication of seasonally high or fluctuating ground water table in the strata.

Wells: No wells for the supply of potable water within 50m of the site.

Depth of Drains: 0.5m

Depth of Excavations: 2m

Infiltration Test

Infiltration Test Zones
Average Soil Infiltration Rate
Surface Areas of Development

SWS1

0.5m
 $f = 1.85 \times 10^{-5}$ m/s
107m²

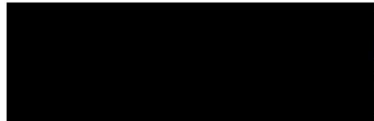
Recommendation: -

Stone-filled Infiltration Trench (Soakaway)

2.00m x 4.40m with 1.00m depth stone filter

I hereby certify that I have carried out the above tests and calculations in accordance with BRE Digest 365 and in conjunction with the full requirements set out within the Domestic Scottish Building Standards Technical Handbook. The results of which are tabulated above, and that the proposed drainage scheme detailed within this report has been designed considering the recommendations in the standards.

Signed:



Date: 29/03/2024

Name/Company: Ferguson Geotechnical Ltd, Jack Ferguson

Address: Failte, Ythanbank, Ellon, AB41 7TH

Qualification: BSc (Hons) Architectural Technology, Drainage Consultant