

# S.A. MCGREGOR



GROUND ASSESSMENT REPORT  
&  
DRAINAGE RECOMMENDATIONS

PROPOSED NEW DWELLINGHOUSE  
PLOT 3, LAND AT BOIG  
TARLAND  
ABERDEENSHIRE  
AB34 4US

*Agents:* Gerry Robb

*Client:* Mr C Muirden

*Contract No.* 584A/11/20

*Report Issued:* 6 January 2021

## CONTENTS

Introduction

Site Location & Brief Description

Note

Site Work

*Trial Pits*

*Percolation Testing*

*Infiltration Testing*

Ground Assessment

*Published Geology*

*Encountered Ground Conditions*

*Ground Water Observations*

Discussion

Drainage Recommendations

*Foul Water Discharge*

*Surface Water Disposal*

*Indicative Soakaways*

*System Maintenance*

*Sewage Treatment System*

*Soakaways*

Regulations

## APPENDIX A

Site Plans	Fig. 1. General & Site Location Plans Fig. 2. Test Location Plan
Trial Pit Logs	FW1 & SW1
Drainage	Fig. 3. Indicative Drainage Layout Fig. 4. Indicative Sub-Surface Soakaway Construction
Certificates	Foul Water Soakaways Surface Water Soakaway

GROUND ASSESSMENT &  
DRAINAGE RECOMMENDATION REPORT  
PROPOSED NEW DWELLINGHOUSE  
PLOT 3, LAND AT BOIG  
TARLAND  
ABERDEENSHIRE  
AB34 4US

INTRODUCTION

At the request of Gerry Robb, on behalf of Mr C. Muirden, this report is presented for the new planning application on by Gerry Robb on behalf of Mr C. Muirden for Plot 3, land at Boig, Tarland, Aberdeenshire.

It is proposed to erect a new dwellinghouse and detached garage on the site.

The development was approved in October 2015, Ref. APP/2015/1698 and this report now refers to Plot 3.

There have been no changes to the site that would effect the original ground investigation undertaken by S A McGregor in 2011.

The ground investigation determined the nature of the materials underlying the area of the site and undertook the following: -

percolation testing to assess the suitability of the underground strata for the disposal of effluent from a sewage treatment system to the ground via a designed sub-surface soakaway system

infiltration testing for the disposal design for surface waters from the proposed development

SITE LOCATION & BRIEF DESCRIPTION

The site is located on land at Boig Steading, north of Tarland with access from the B9119 and local roads on land all under the ownership of the applicant, OS Grid Ref NO 347102 807660 (approx. centre of site), see Fig. 1. General & Site Location Plans.

The site is currently overlain by compacted gravels and soils, grass and partially occupied by the former silage storage pits. The site boundaries are unmarked.

The site is currently serviced by electricity and water with telephone nearby; there is no mains drainage available for this site; all nearby properties are served by private sewage treatments systems.

There are no known wells supplying potable water within 50m of the site.

There are no watercourses within 10m of the site.

NOTE

There have been no changes to the site that would be detrimental to the ground assessment, testing and following design.

## SITE WORK

### *Trial Pits*

Between the 25<sup>th</sup> May and 30<sup>th</sup> August 2011 a back-actor excavator with 0.90m bucket excavated trial pits to carry out an assessment of the underlying ground conditions, to carry out percolation and infiltration testing in the areas of the potential foul and surface water sub-surface soakaways.

The locations of the trial pits were decided on site and are indicated on Fig. 2. Indicative Site Layout & Test Location Plan in Appendix A.

### *Percolation Testing*

Percolation testing was carried out in test holes adjacent to observation trial pits FW3 in accordance with Section 3.9 of the Scottish Building Standards Technical Handbook (Domestic) and SEPA WAT-RM-04. The test results are shown on the following table: -

Date of Testing 25/5 – 30/8/2011	FW3
Average time taken for water to drain 3 times in each sump hole (middle 150mm)	4480
Depth of Water Table below Ground Level (m)	>2.50m
Soil Percolation Values, $V_p$ , s/mm	30

### *Infiltration Testing*

Infiltration tests were carried out in trial pit SW3 in accordance with BRE Digest 365. The test results are tabulated below: -

Trial Pit No.	Pit Dimensions (W x L)m	Test Zone (mbegl)	In-Fill	Soil Infiltration Rate, $f$ (m/s)
SW3	0.90 x 1.10	1.00 – 2.00	Open	$1.11 \times 10^{-5}$

## GROUND ASSESSMENT

### *Published Geology*

The British Geological Survey 1:50,000 Quaternary and Solid maps indicate that the site is overlain by Till, Devensian (Diamicton – clay, silt, sand and gravel) formed up to 2 million years ago during the Quaternary Period. The site is underlain by Tarland Intrusion (Norite and Gabbronorite) Igneous bedrock formed 444 to 485 million years ago in the Ordovician Period.

### *Encountered Ground Conditions*

**Topsoil:** Topsoil was encountered either from existing ground levels or directly below any made ground. The maximum encountered thickness/depth of the topsoil was 400mm/0.80m.

**Natural Sub-Soils:** The natural underlying sub-soils are generally silty sandy gravelly clays becoming less cohesive and more sandy with increased depths with cobbles and some boulders throughout.

The clays encountered varied in strength for soft to stiff in colour with oranges, purples and greys, brown and grey browns. This variation is typical of the completely weathered schistose/granitic rock types. They clays were proved to depths of around 2.30-2.40m.

**Bedrock:** In-tact bedrock was not encountered during this investigation however there was less weathering below 1.80m.

### *Groundwater Observations*

Groundwater was not encountered during the investigation nor observed during the monitoring period. No visual (no seepages or discoloration) indication of the seasonally high or fluctuating ground water table was seen in the strata above the encountered depths of 1.80m.

## DISCUSSION

### *Sub-Soils*

The silty gravelly nature of the underlying strata and the results from the percolation and infiltration testing confirmed the moderate draining properties of the sub-soils.

### *Sewage Treatment*

The soil percolation value,  $V_p > 15$  s/mm and a septic tank is suitable for the development, however due to nearby properties and to further protect the water environment it is recommended to install a package sewage treatment plant (PSTP) for the proposed development. A septic tank or PSTP with a minimum 3,800-litre capacity is required for a 4-bedroom house with a population, PE = 6.

### *Foul Water Discharge*

A sub-surface stone-filled soakaway (infiltration system) is considered suitable for the discharge of foul waters from a septic tank or PSTP 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.

### *SuDS*

The disposal of surface waters from the dwellinghouse needs to be assessed in terms of both the quantity and the quality of the discharge for Building Regulations and SEPA. Using the SIA tool, the land use run-off quality has been determined, see summary below: -

### *SIA Summary: -*

Land Use Type	Residential Roofing	Residential Parking & Driveway
Pollution Hazard Level	Very Low	Low
Pollution Hazard Indices		
TSS	0.2	0.5
Metals	0.2	0.4
Hydrocarbons	0.05	0.4
SuDS Component Proposed	None	
Component 1	(not discharging to watercourse)	
SuDS Pollution Mitigation Indices		
TSS	0.4	0.4
Metals	0.4	0.4
Hydrocarbons	0.4	0.4
Groundwater Protection Type	Infiltration Trench	Silt Trap for TSS Minimum 300mm permeable gravel finish
Combined Pollution Mitigation Indices		
TSS	0.4	0.4
Metals	0.4	0.4
Hydrocarbons	0.4	0.4
Acceptability of Pollution Mitigation		
TSS	Sufficient	Sufficient
Metals	Sufficient	Sufficient
Hydrocarbons	Sufficient	Sufficient

*Surface Water Disposal*

The investigation carried out concludes that the underlying strata are considered suitable for the construction of an infiltration trench for the surface water run-off from the roof areas and permeable driveways/parking areas for the proposed development prior to disposal to the ground.

**DRAINAGE RECOMMENDATIONS**

*Foul Water Discharge via a Sub-Surface Stone-filled Soakaway*

To comply with the Domestic Technical Handbook (para. 3.9.2) which sets out guidance on how proposals may meet the Building Standards set out in the Building (Scotland) Regulations 2004, an infiltration system must be designed and constructed in accordance with the requirements of SEPA.

The average soil percolation value,  $Vp = 30s/mm$  in accordance with the regulations the minimum base area, A, is derived from  $A = Vp \times PE \times 0.25$ , or a minimum base area of  $25m^2$ , see the following table: -

Proposed Development	Population Equivalent, PE (as defined in BW COP:18.11/13)	Min. Base Area (m <sup>2</sup> )
New Dwellinghouse	5 (3-bedroom)	38

Full details of the proposed sewage treatment system will be made available to the Building Standards Officer once it has been determined after consultation with suppliers which models are the most suitable for the proposed development.

*SEPA*

The sewage treatment system and discharge will require to be registered with SEPA under CAR.

*Surface Water Disposal*

The size of the proposed surface water soakaway is based on the impermeable surface areas of the development i.e. the house roof areas.

Using the soil infiltration rate,  $f = 1.11 \times 10^{-5} m/s$  in Table 2. the optimum dimensions for the surface water infiltration trench (soakaway) are shown on the following table: -

Impermeabl Area (m <sup>2</sup> )	Width (m)	Length (m)	Storage depth (m)	Half Empty Time (hrs)
New House & Garage Roof Areas Up to 252m <sup>2</sup>	1.00	13.50	1.70	3.49
	2.00	7.00		5.83
	3.00	4.70		6.84
	3.50	4.00		6.97

These dimensions are based on a 1 in 200-year storm event with +20% climates change.  
 Calculations have been carried out in accordance with BRE Digest 365.

*Indicative Drainage Layout*

The indicative drainage layout is shown on Fig 3. with indicative soakaway construction shown on Fig. 4. along with the certificates all in Appendix A.

## SYSTEM MAINTENANCE

### *Sewage Treatment System*

All servicing and maintenance should be undertaken in full accordance with the manufacturer's literature or by a responsible qualified person. The PSTP should be regularly inspected and 'desludged' (emptied) when appropriate to ensure solids and silts do not 'clog' the soakaway or make their way to the discharge outlet.

### *Soakaways*

The soakaways are designed for the life time of the proposed development if they are not allowed to silt up nor the pipework to be blocked.

If a soakaway fails to due blockages or silting it should be excavated and reconstructed with fresh clean stone, new pipework and renewed terram.

During the development of the site, and the excavation of the soakaways, should any field drains be found within 10m of the soakaway they should be realigned or relocated accordingly.

## REGULATIONS

SEPA and Building Regulations require that infiltration systems (soakaways) are located at least:

-

50m from any spring, well or borehole used as drinking water supply

10m horizontally from any water course (including any inland or coastal waters), permeable drain (including culvert), road or railway

5m from all buildings

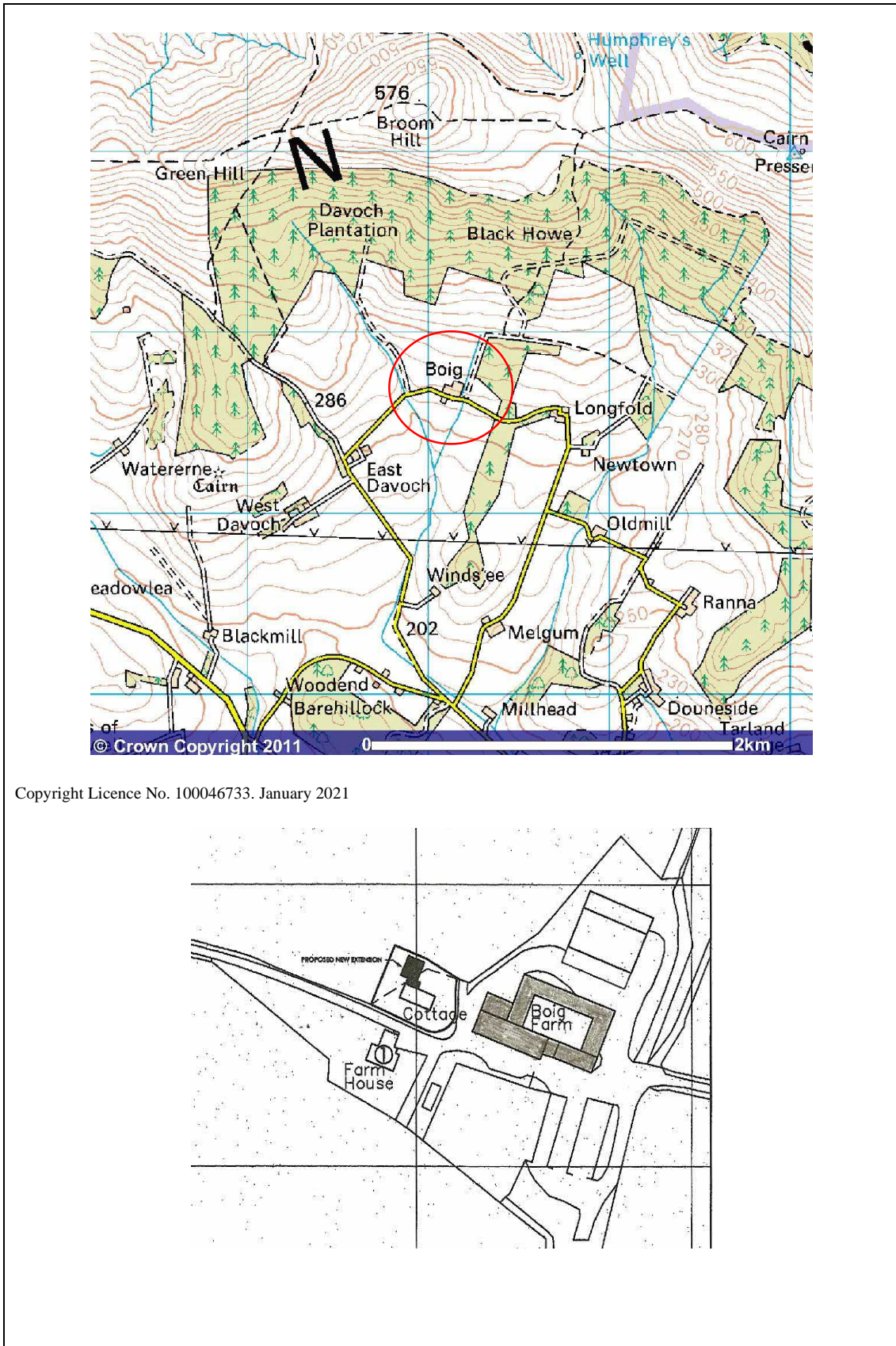
5m from boundaries (*reduced distance to boundaries may also be subject to agreement from adjacent land owners where the soakaway is considered not to be detrimental to the adjacent property*)

## APPENDIX A

Site Plans	Fig. 1. General & Site Location Plans Fig. 2. Test Location Plan
Drainage	Fig. 3. Indicative Drainage Layout Fig. 4. Indicative Sub-Surface Soakaway Construction
Certificates	Foul Water Discharge Surface Water Disposal

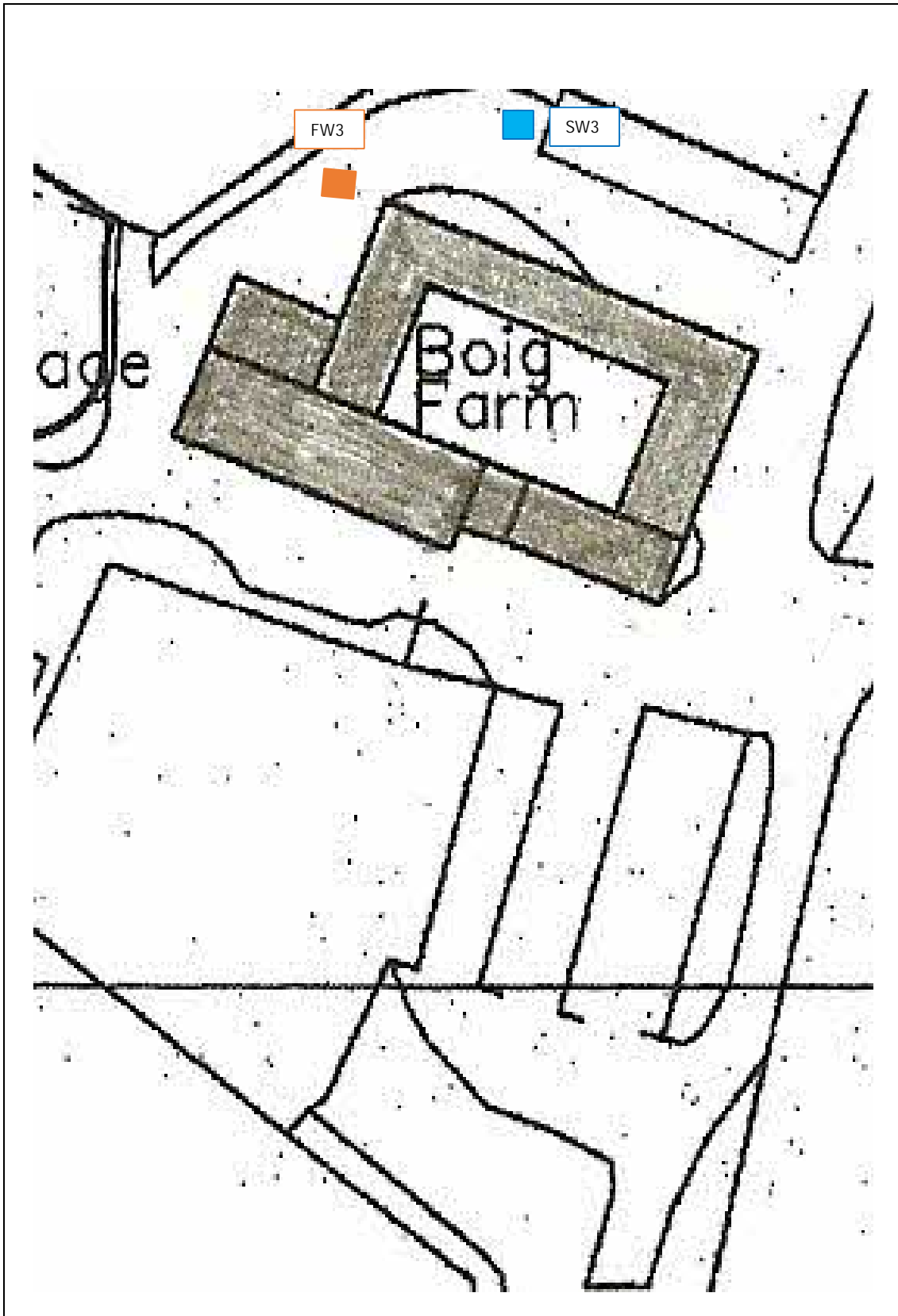


Fig. 1. GENERAL & SITE LOCATION PLANS



Copyright Licence No. 100046733. January 2021

Fig. 2. ORIGINAL TEST LOCATION PLAN





<b>S. A. M'Gregor</b> Geotechnical & Environmental On-Site Services					Site Boig Steadings, Tarland		Trial Pit Number <b>SW3</b>	
Excavation Method Back-actor excavator with 0.90m bucket		Dimensions 0.90m x 1.15m		Ground Level (mOD)	Client The MacRobert Trust		Job Number 584A/11	
		Location See site plan		Dates 25/05/2011	Engineer Robb Keir Design		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.30	MADE GROUND - layer of imported soils, some mesh and rope		
					0.30	Original TOPSOIL		
					0.70	Firm to stiff orange silty sandy gravelly CLAY		
			Infiltration Test zone from 1.00-2.00m		0.80			
					1.50	Firm grey brown silty very sandy very gravelly CLAY with cobbles and boulders		
			No ground water ingress		2.00	Complete at 2.00m		
<b>Plan</b>					<b>Remarks</b>			
. .					. .			
					<b>Scale (approx)</b> 1:20	<b>Logged By</b> SAM	<b>Figure No.</b> 584A/11.SW3	

Produced by the GEOTECHNICAL DATABASE SYSTEM (GEODASY) (C) all rights reserved

Fig. 3. INDICATIVE DRAINAGE LAYOUT

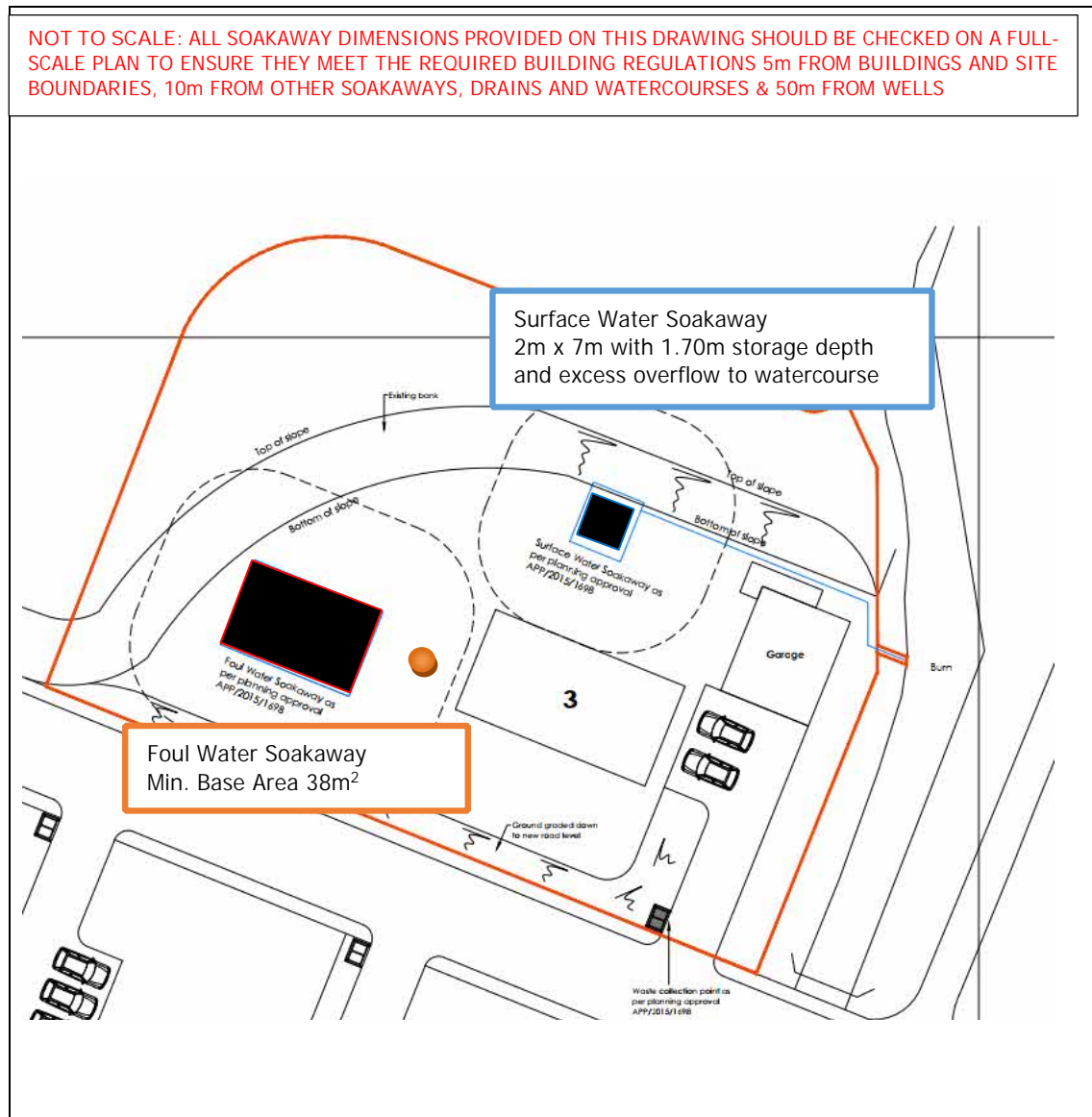
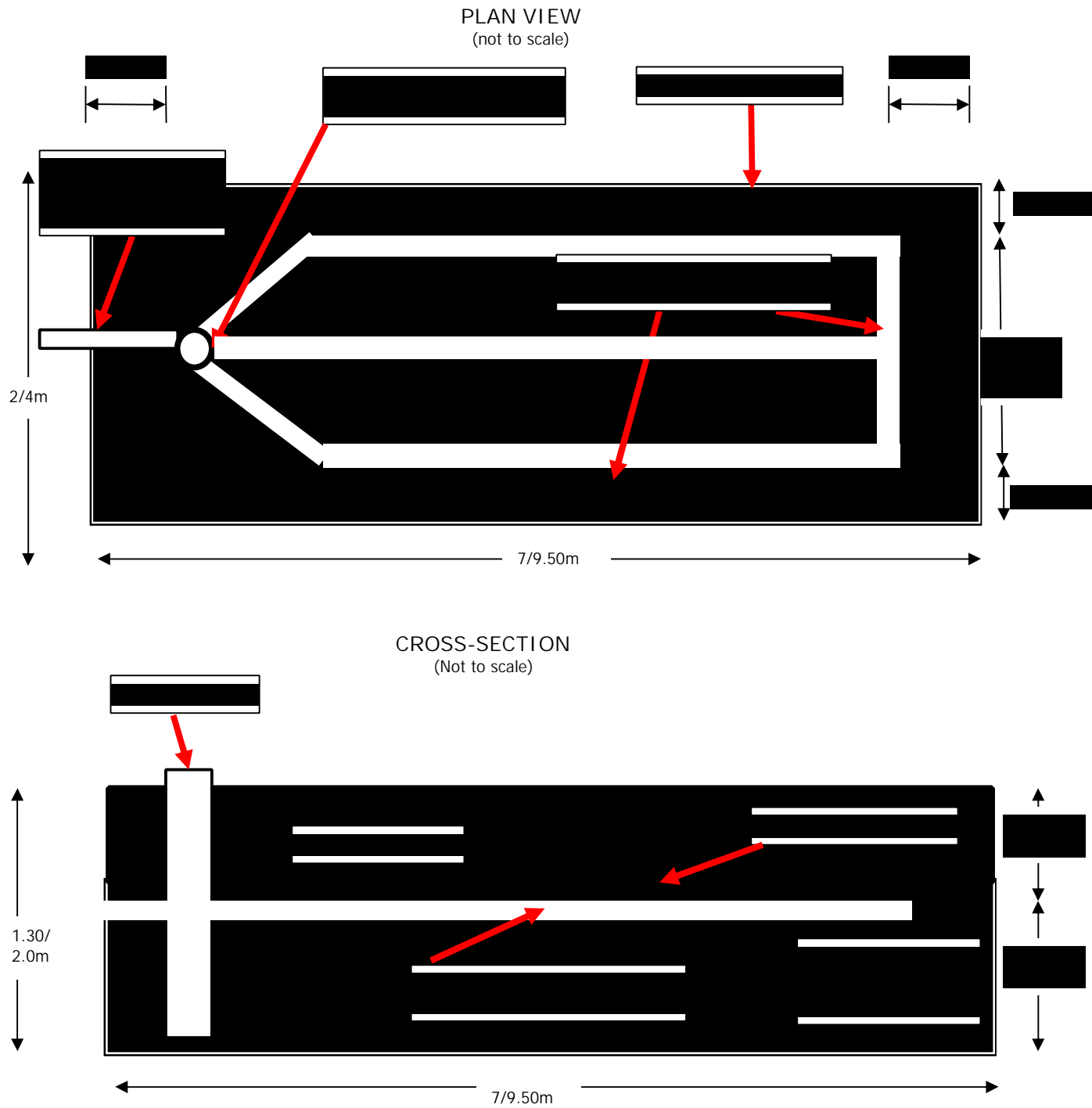


Fig. 4. INDICATIVE SOAKAWAY CONSTRUCTION (sketch only, not to scale)



## CERTIFICATE FOR PROPOSED FOUL WATER SUB-SURFACE DISCHARGE

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 the water table will interfere with the operation of the soakaway  
and
2. A percolation test must be carried out to determine the area of the ground required.

### Certificate

**Client:** Mr C. Muirden

**Agents:** Gerry Robb

**Site Address:** New House, Plot 3, Boig, Tarland, Aberdeenshire, AB34 4US

**Date of Test:** 25<sup>th</sup> May – 30<sup>th</sup> August 2011

**Weather:** Light rain

### ***Encountered Ground Conditions***

**Topsoil:** Topsoil was encountered either from existing ground levels or directly below any made ground. The maximum encountered thickness/depth of the topsoil was 400mm/0.80m.

**Natural Sub-Soils:** The natural underlying sub-soils are generally silty sandy gravelly clays becoming less cohesive and more sandy with increased depths with cobbles and some boulders throughout.

The clays encountered varied in strength for soft to stiff in colour with oranges, purples and greys, brown and grey browns. This variation is typical of the completely weathered schistose/granitic rock types. They clays were proved to depths of around 2.30-2.40m.

**Bedrock:** In-tact bedrock was not encountered during this investigation.

### ***Groundwater Observations***

Groundwater was not encountered during the investigation nor observed during the monitoring period. No visual (no seepages or discoloration) indication of the seasonally high or fluctuating ground water table was seen in the strata above the encountered depths of 1.80m.

**Wells:** no known wells used for supply of potable water within 50m of site.

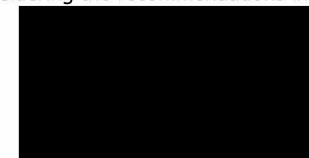
### **Percolation Tests**

### **FW3**

Depth of Drains	1.00m
Depth of Excavations	2.00m
Time Taken (mean of three times), secs	4480
Average Soil Percolation Values, Vp, s/mm	30
Population Equivalent	5 (3-bedroom)
Minimum Floor Area of Soakaway	<b>38m<sup>2</sup></b>

I hereby certify that I have carried out the above assessment in accordance with procedures specified within the Domestic Scottish Building Standards Technical Handbook (Environmental Standard 3.9 Infiltration Systems) and SEPA A WAT-RM-04, the results of which are tabulated above, and that the proposed drainage scheme detailed on the attached plans and report has been designed considering the recommendations in the standards and regulatory standards.

Signed  
Name / Company  
Address  
Qualification



S. A. McGregor  
Serenje, Kingsford Steadings, Alford, Aberdeenshire, AB33 8HN  
B.Eng (Civil Engineering).

Date...06 January 2021

## CERTIFICATE FOR PROPOSED SURFACE WATER DISPOSAL

**Client:** Mr C Muirden  
**Agents:** Gerry Robb  
**Site Address:** New House, Plot 3, Boig, Tarland, Aberdeenshire, AB34 4US.  
**Date of Test:** 24<sup>th</sup> October 2020 **Weather:** Light rain

### ***Encountered Ground Conditions***

**Topsoil:** Topsoil was encountered either from existing ground levels or directly below any made ground. The maximum encountered thickness/depth of the topsoil was 400mm/0.80m.

**Natural Sub-Soils:** The natural underlying sub-soils are generally silty sandy gravelly clays becoming less cohesive and more sandy with increased depths with cobbles and some boulders throughout.

The clays encountered varied in strength for soft to stiff in colour with oranges, purples and greys, brown and grey browns. This variation is typical of the completely weathered schistose/granitic rock types. They clays were proved to depths of around 2.30-2.40m.

**Bedrock:** In-tact bedrock was not encountered during this investigation.

### ***Groundwater Observations***

Groundwater was not encountered during the investigation nor observed during the monitoring period. No visual (no seepages or discoloration) indication of the seasonally high or fluctuating ground water table was seen in the strata above the encountered depths of 1.80m.

**Wells:** no known wells used for supply of potable water within 50m of site.

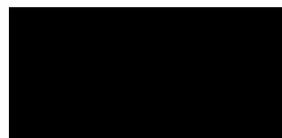
<b>Infiltration Test</b>	<b>SW3</b>
Infiltration Test Zone (m)	1.00-2.00
Soil Infiltration Rate, $f$ (m/s)	$1.11 \times 10^{-5}$
Surface Area of Development	up to <b>252m<sup>2</sup></b>

### ***Surface Water Stone-filled Infiltration Trench (Soakaway)***

**2m x 7m with 1.70m stone storage depth & excess overflow to watercourse.**

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  
Name / Company  
Address  
Qualification



S. A. M<sup>c</sup>Gregor  
Serenje, Kingsford Steadings, Alford, Aberdeenshire, AB33 8HN  
B.Eng (Civil Engineering).

Date...06 January 2021