

S.A. MCGREGOR



**GROUND ASSESSMENT
&
DRAINAGE RECOMMENDATION REPORT**

**PROPOSED 2 NEW DWELLINGHOUSES
BURNSIDE POULTRY UNITS
CLINTERTY
ABERDEEN
AB21 0TT**

Client:

Graham Buchan

Agents:

Annie Kenyon Architects

Report Issued:

31st January 2017

S. A. McGregor
Fairmead, Tough, Alford, Aberdeenshire, AB33 8EQ

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GROUND ASSESSMENT & DRAINAGE RECOMMENDATION REPORT

PROPOSED 2 NEW DWELLINGHOUSES BURNSIDE POULTRY UNITS CLINTERTY ABERDEENSHIRE AB21 0TT

INTRODUCTION

At the request of Annie Kenyon Architects Ltd., and on behalf of their client Graham Buchan visits were made to the proposed development site on land at Burnside, Clinterty.

It is proposed to erect 2 new dwellinghouses (4-bedroom and 5-bedroom) on the site.

The purpose of the visit was to carry out a ground investigation in order to determine the nature of the materials underlying the site and in particular to undertake the following: -

- to carry out Percolation Testing to assess the suitability of the underground strata for the discharge of effluent from a septic tank to the ground via a designed sub-surface soakaway system
- to carry out Infiltration Testing for the design of a surface water disposal system
- to assess sub-soils ground bearing capacity for foundation design

SITE LOCATION & BRIEF DESCRIPTION

The proposed development site is on land at Burnside Poultry Units, Clinterty, on land all under the ownership of the applicants. Access to the site is from the A96 and local roads, OS NGR NJ 84511, 11149 (approx. centre of site), see Fig. 1. General & Site Location Plans in Appendix A.

The proposed development sites are partially occupied by former poultry units, now redundant, and with adjacent pasture overlain by grass.

The site is relatively level with a very gentle slope down towards the south.

The site is currently serviced by electricity, mains water supply and telephone. There is mains sewer available.

There are no wells used for the supply of potable water within 50m of the site.

SITE WORK

Trial Pits

On the 13th December 2016, a tracked excavator with a 0.50m bucket excavated trial pits to order to assess the underlying ground conditions and 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 determined on site taking into account the proposed site layout and the topography of the site and are indicated on Fig. 2. Proposed Site Layout & Test Location Plan in Appendix A.

Percolation Testing

Percolation testing was carried out in test holes adjacent to observation trial pits FW1 and FW2 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 tabulated below: -

Date of Testing 13 th December 2016	FW1	FW2
Average time taken for water to drain 3 times in each sump hole (middle 150mm)	4470	5370
Depth of Water Table below Ground Level (m)	>2.20	>2.20
Average Soil Percolation Value, V_p, s/mm	29.8	35.8

Infiltration Testing

Infiltration testing was only carried out in trial pits SW1 and SW2 in full accordance with BRE Digest 365, the test results are tabulated below: -

Trial Pit No.	Pit Dimensions (W x L)m	Test Zone (m b egl)	In-Fill	Soil Infiltration Rate, f (m/s)
SW1	0.50 x 1.50	0.50 – 1.50	Open	1.11×10^{-5}
SW2	0.50 x 1.20	0.50 – 1.50	Open	9.25×10^{-6}

GROUND ASSESSMENT

Published Geology

The British Geological Survey 1:50,000 Superficial and Bedrock maps have no record of the Quaternary deposits of the area. The site is underlain by the Aberdeen Formation (Diamicton – Psammite and Semipelite) Metamorphic Bedrock formed approximately 542 to 1000 million years ago, during the Dalradian Period.

Encountered Ground Conditions

Topsoil

The site is overlain by grass and topsoil 500mm - 800mm in thickness.

Natural Sub-Soils

The underlying natural sub-soils are loose and medium dense orange brown and grey silty to very silty sands and gravels (completely weathered rock) becoming dense and proved to the maximum investigated depth of 2.00m.

Bedrock

In-tact bedrock was not encountered during the investigation.

Groundwater Observations

Groundwater was not encountered during the investigation or observed during the monitoring period. No visual indication (no seepages or discoloration) of the seasonally high or fluctuating ground water table was seen in the strata above the encountered depths of 2.00m.

DISCUSSION

Sub-Soils

The silty sandy gravelly nature of the underlying soils and the test results confirmed the moderate draining properties of the sub-soils.

Sewage Treatment

The soil percolation values, V_p , are between 15-120 s/mm and therefore standard septic tanks are considered suitable for this development. A septic tank with a minimum capacity of 3,750 litres is suitable for a population of up to 6 persons.

Foul Water Discharge

A sub-surface stone-filled soakaway (infiltration system) is considered suitable for the discharge of foul waters from the proposed sewage treatment system.

The soakaway should comply with the Domestic Technical Handbook (para. 3.9.2) which sets out guidance on design and in accordance with the requirements of SEPA Regulatory Method (WAT-RM-04) Indirect Sewage Discharges to Groundwater.

Surface Water Disposal

The disposal of surface waters from a new development needs to be assessed in terms of both the quantity and the quality of the discharge for Building Regulations and SEPA.

DRAINAGE RECOMMENDATIONS

Foul Water Discharge

In order 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.

Using the soil percolation values, and in accordance with the regulations the minimum base area, A , for the foul water sub-surface soakaway is derived from $A = V_p \times PE \times 0.25$, see the following table: -

Proposed Development	Population Equivalent, PE (as defined in BW COP:18.11/13)	Min. Base Area (m ²)	With Secondary Treatment (m ²)
Plot 1 New Dwelling House	6 (up to 4-bedroom)	30	24
Plot 2 New Dwelling House	7 (up to 5-bedroom)	63	50

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 model is the most suitable for the proposed development and the potential population equivalent of the dwelling house.

SEPA

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

Surface Water Disposal

The disposal of surface waters from a new development need to be assessed in terms of both the quantity and the quality of the discharge for Building Regulations and SEPA. The quality of the discharge has been assessed using the SIA Tool as summarised below: -

Step 1	Runoff Area Land Use Description	Residential Roofing
	Pollution Hazard Level	Very Low
	Pollution Hazard Indices	TSS 0.2 Metals 0.2 Hydrocarbons 0.05
Step 2A	SuDS Component Description (for discharge to waterbody) Component 1	None
	Aggregated Surface Water Pollution Mitigation Index	TSS 0 Metals 0 Hydrocarbons 0 No discharge to waterbody
Step 2B	SuDS Component Description (for discharge to the groundwater) Component 1	Infiltration Trench (with min. 300mm depth of filter material)
	Pollution Hazard Indices	TSS 0.4 Metals 0.4 Hydrocarbons 0.4
	Groundwater Protection Pollution Mitigation Index	TSS 0.4 Metals 0.4 Hydrocarbons 0.4
Step 2C	Combined Pollution Mitigation Indices for the Runoff Area	TSS 0.4 Metals 0.4 Hydrocarbons 0.4
Step 2D	Sufficiency of Pollution Mitigation Indices	TSS Sufficient Metals Sufficient Hydrocarbons Sufficient

The size of the proposed infiltration trench (stone-filled sub-surface soakaway) is based on the impermeable surface area of the development i.e. the new dwellinghouse roof areas.

Soakaway Design

Using the soil infiltration rates calculated the following optimum dimensions for the soakaway are shown on the following table: -

Impermeable Area (m ²)	Width (m)	Length (m)	Storage depth (m)	Half-Empty Time (Hours)
New House 1 Roof Area Up to 155m ²	1.00	22.7	1.50	3.59
	2.00	12.0		6.43
	3.00	8.2		8.22
	4.00	6.0		9.08
New House 2 Roof Area Up to 240m ²	1.00	35.90	1.50	4.38
	2.00	18.00		8.14
	3.00	12.80		10.93
	4.00	9.70		12.72
	5.00	7.70		13.67

Indicative Drainage Layout

The indicative soakaway locations are shown on Fig 3. with sketches indicating soakaway construction shown on Fig. 4 and the certificates for proposed soakaways are all attached in Appendix A.

DRAINAGE MAINTENANCE & SERVICING

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 sewage treatment system 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 as long as they are not allowed to silt up nor the pipework to be blocked.

A silt trap should be installed prior to the discharge of surface water to the soakaway and specifically designed to retain sediment in a separate zone so that the sediment will not be re-suspended. The trap should be readily easy for access for maintenance.

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 in particular 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 a building
- 5m from a boundary (*unless the adjacent land owner under certain circumstances may legally agree to the soakaway being within 5m as long as it is not detrimental to the neighbouring property*)

FOUNDATION RECOMMENDATIONS

Safe Bearing Capacity

The medium dense to dense nature of the underlying silty sands and gravels have a safe bearing capacity of 150kN/m² for the design of standard strip footings.

APPENDIX A

Site Plans	Fig. 1 General & Site Location Plans Fig. 2. Indicative Site Layout & Test Location Plan
Trial Pit Logs	FW1, FW2, SW1 & SW2
Drainage	Fig. 3 Proposed Drainage Layout Fig. 4 Indicative Soakaway Construction Sketch
Certificates	Foul Water Discharge Surface Water Disposal

Fig. 1. GENERAL & SITE LOCATION PLANS

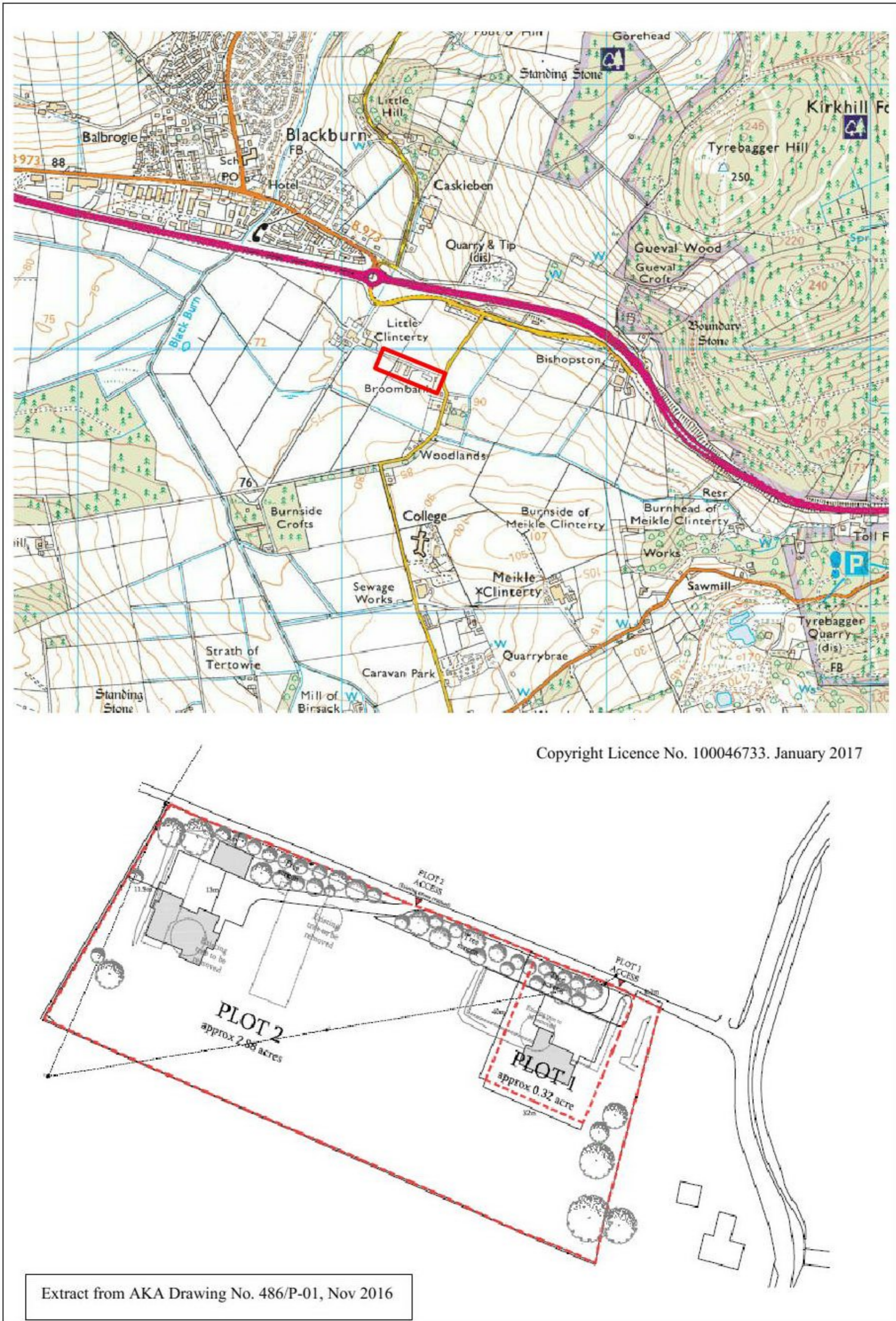
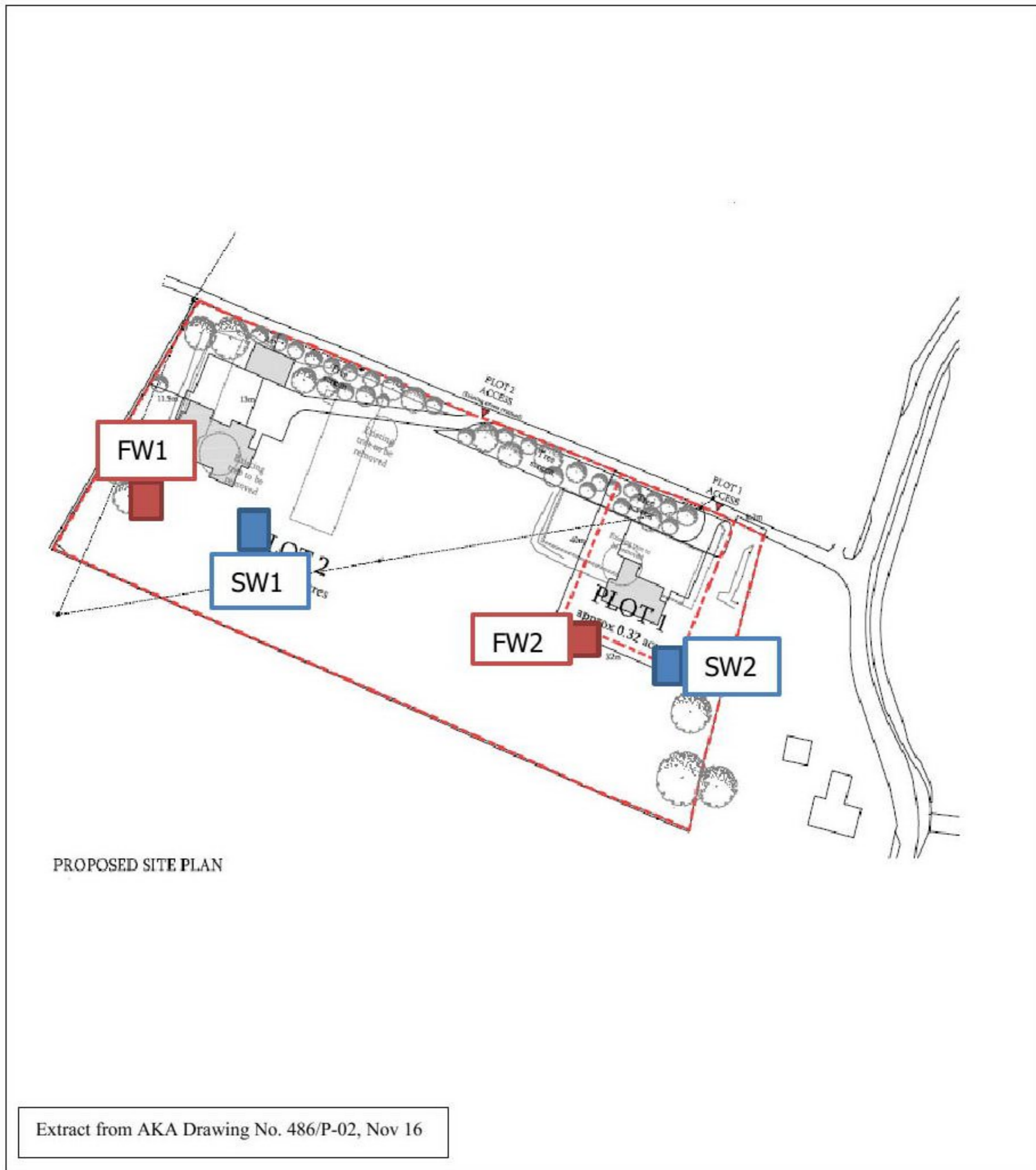


Fig. 2. INDICATIVE SITE LAYOUT & TEST LOCATION PLAN



Excavation Method		Dimensions		Ground Level (mOD)		Client		Trial Pit Number																															
Tracked excavator with 0.50m bucket		0.40 x 1.90m				Graham Buchan		FW1																															
		Location		Dates		Architect		Job Number																															
		See site plan		13/12/2016-15/12/2016		Annie Kenyon Architects Ltd.		1806/16																															
Sheet		Depth (m)		Sample / Tests		Water Depth (m)		Field Records																															
1/1																																							
Level (mOD)		Depth (m) (Thickness)		Description		Legend		Water																															
		0.50		TOPSOIL																																			
		0.50		Medium dense grey very silty very gravelly SAND																																			
		0.90		Dense coarse orange SAND																																			
		2.00		Complete at 2.00m																																			
				Percolation testing in adjacent test holes at 1.00m																																			
				No groundwater ingress																																			
Plan					Remarks																																		
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Scale (approx)		Logged By		Figure No.																																			
1:20		SAM		1806/16.FW1																																			

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Excavation Method		Dimensions		Ground Level (mOD)		Client		Trial Pit Number	
Tracked excavator with 0.50m bucket		0.40 x 1.80m				Graham Buchan		FW2	
		Location		Dates		Architect		Job Number	
		See site plan		13/12/2016-15/12/2016		Annie Kenyon Architects Ltd.		1806/16	
								Sheet	
								1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
						TOPSOIL			
					(0.80)				
					0.80	Loose to medium dense orange brown silty very gravelly SAND			
			Percolation testing in adjacent test holes at 1.00m		(0.50)				
					1.30	Dense grey brown coarse SAND and sub-angular to sub-rounded GRAVEL			
					(0.70)				
			No groundwater ingress		2.00	Complete at 2.00m			
Plan						Remarks			
						Scale (approx)		Logged By	
						1:20		SAM	
								Figure No.	
								1806/16.FW2	

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Excavation Method		Dimensions		Ground Level (mOD)		Client		Trial Pit Number									
Tracked excavator with 0.50m bucket		0.50 x 1.50m				Graham Buchan		SW1									
		Location		Dates		Architect		Job Number									
		see site plan		13/12/2016		Annie Kenyon Architects Ltd.		1806/16									
Depth (m)		Sample / Tests		Water Depth (m)		Field Records		Level (mOD)		Depth (m) (Thickness)		Description		Legend		Water	
						Infiltration test zone 0.50-1.50m				0.60		Grass TOPSOIL		[Hatched Pattern]			
						No groundwater ingress				0.60		Medium dense grey brown silty SAND and GRAVEL		[Dotted Pattern]			
										1.10		Dense orange coarse SAND		[Dotted Pattern]			
										1.50		Complete at 1.50m					
Plan										Remarks							
[Grid of dots]																	
										Scale (approx)		Logged By		Figure No.			
										1:20		SAM		1806/16.SW1			

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Excavation Method		Dimensions		Ground Level (mOD)		Site		Trial Pit Number																																																													
Tracked excavator with 0.50m bucket		0.50 x 1.20m				Burnside, Clinterty		SW2																																																													
		Location		Dates		Client		Job Number																																																													
		see site plan		13/12/2016		Graham Buchan		1806/16																																																													
						Architect		Sheet																																																													
						Annie Kenyon Architects Ltd.		1/1																																																													
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					(0.50)	Grass TOPSOIL																																																															
			Infiltration test zone 0.50-1.50m		0.50 (0.30)	Medium dense orange grey brown silty SAND																																																															
					0.80 (0.70)	Dense grey brown coarse SAND																																																															
			No groundwater ingress		1.50	Complete at 1.50m																																																															
Plan						Remarks																																																															
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Fig. 3. PROPOSED DRAINAGE LAYOUT

NOT TO SCALE- ALL SOAKAWAY DIMENSIONS PROVIDED ON THIS DRAWING SHOULD BE CHECKED ON A FULL-SCALE PLAN TO ENSURE THEY MEET THE REQUIRED BUILDING REGULATIONS 50m FROM WELLS & BOREHOLES, 5m FROM BUILDINGS AND SITE BOUNDARIES AND 10m FROM OTHER SOAKAWAYS, DRAINS AND WATERCOURSES

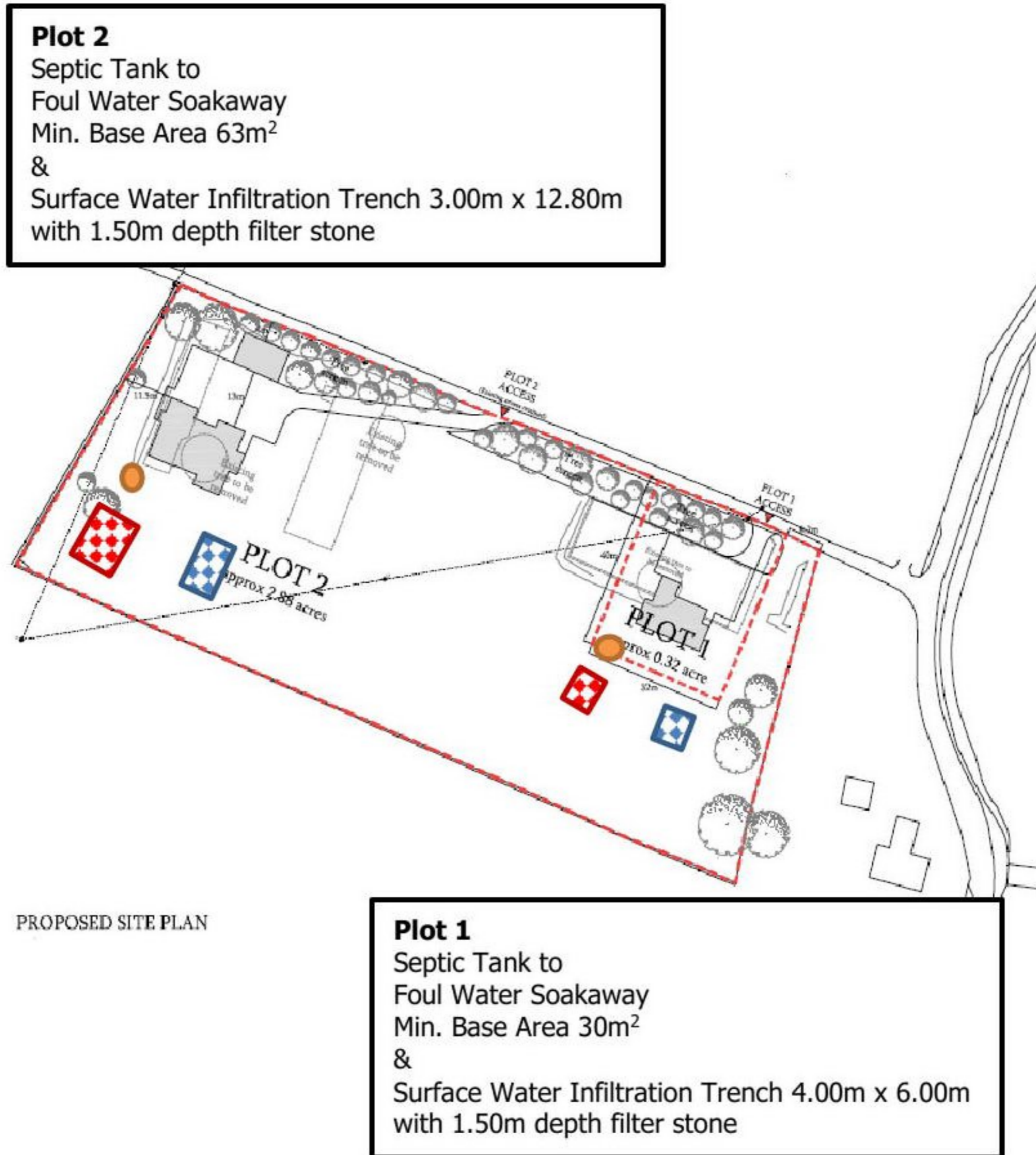
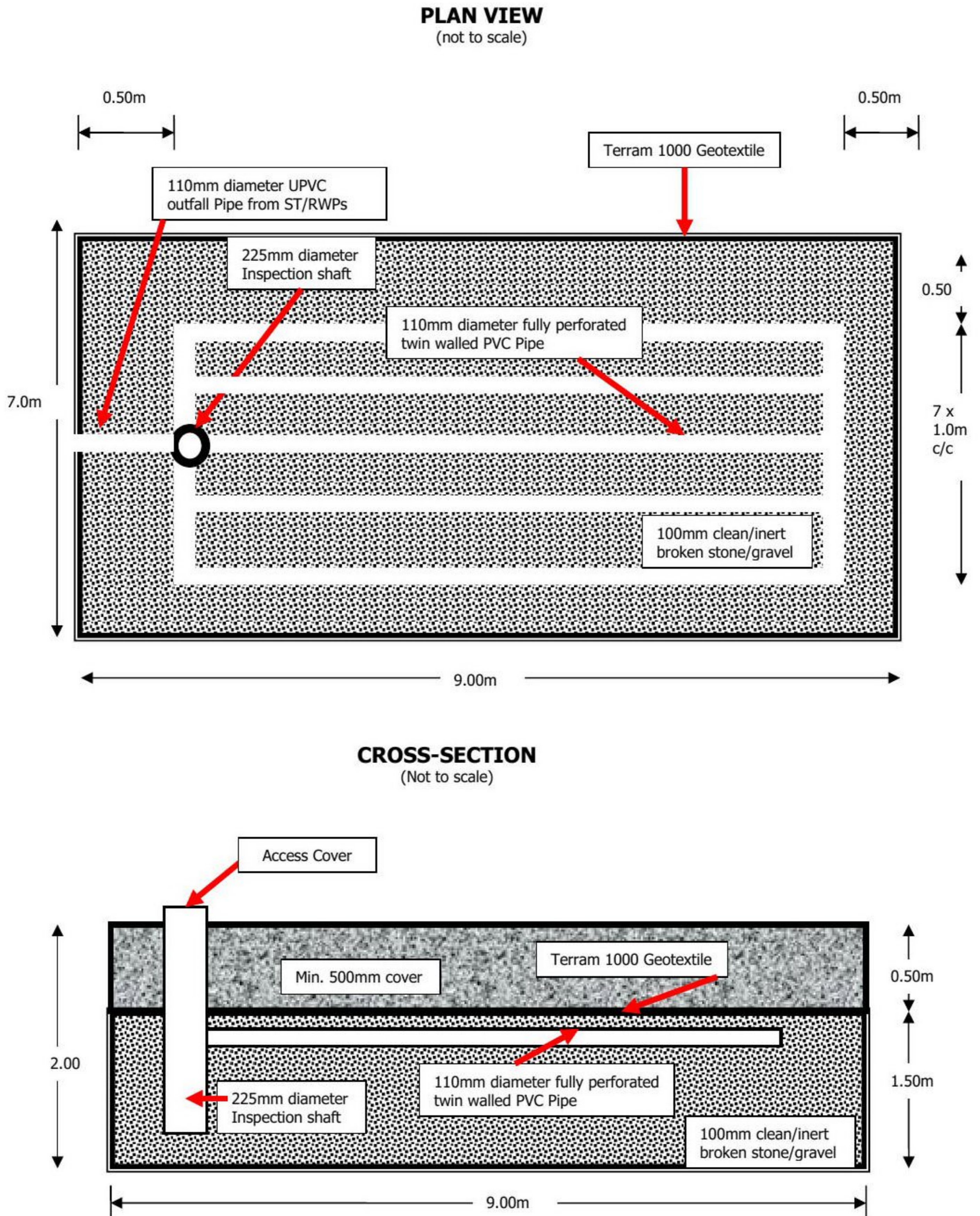


Fig. 4. Indicative Stone-Filled Soakaway Construction (63m²)



CERTIFICATE FOR PROPOSED FOUL WATER SUB-SURFACE 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
- and
2. A percolation test must be carried out to determine the area of the ground required.

Certificate

Applicant's Name Graham Buchan.....
(name of person applying for planning permission)

Address: 2 New Houses, Burnside Poultry Units, Clinterty, AB21 0TT

Date of Test:.....13th December 2016 Time:.....from 11.30 Weather: ...Raining....

Encountered Ground Conditions

Topsoil: The site is overlain by grass and topsoil 500mm - 800mm in thickness.

Natural Sub-Soils: The underlying natural sub-soils are loose and medium dense orange brown and grey silty to very silty sands and gravels (completely weathered rock) becoming dense and proved to the maximum investigated depth of 2.00m.

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

Groundwater Observations

Groundwater was not encountered during the investigation or observed during the monitoring period. No visual indication (no seepages or discoloration) of the seasonally high or fluctuating ground water table was seen in the strata above the encountered depths of 2.00m.


Wells : no wells supplying potable water within 50m of the site

Depth of Drain ...1.00m..... Depth of Excavation ...up to 2.00m.....

Percolation Test

	PLOT 1	PLOT2
Time Taken (mean of three times), s	4470	5370
Soil Percolation Value, Vp, s/mm	29.8	35.8
Population Equivalent	up to 6 (4-bedroom)	up to 7 (5-bedroom)
Minimum Floor Area of Soakaway	30m²	63m²

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 ... 
Name / Company S. A. McGregor
Address Fairmead, Tough Alford, Aberdeenshire, AB33 8EQ
Qualification B.Eng(Civil Engineering).

Date...31st January 2017

CERTIFICATE FOR PROPOSED SURFACE WATER DISPOSAL

Applicant's Name Graham Buchan.....
(name of person applying for planning permission)

Address: 2 New Houses, Burnside Poultry Units, Clinterty, AB21 0TT

Date of Test:.....13th December 2016 Time:.....from 11.30 Weather: ...Raining....

Encountered Ground Conditions

Topsoil: The site is overlain by grass and topsoil 500mm - 800mm in thickness.

Natural Sub-Soils: The underlying natural sub-soils are loose and medium dense orange brown and grey silty to very silty sands and gravels (completely weathered rock) becoming dense and proved to the maximum investigated depth of 2.00m.

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

Groundwater Observations

Groundwater was not encountered during the investigation or observed during the monitoring period. No visual indication (no seepages or discoloration) of the seasonally high or fluctuating ground water table was seen in the strata above the encountered depths of 2.00m.

Wells : no wells supplying potable water within 50m of the site

Depth of Drain ...0.50m..... Depth of Excavation ...up to 1.50m.....

Infiltration Test

	PLOT 1	PLOT 2
Infiltration Test Zones	0.50 – 1.50	0.50 – 1.50
Soil Infiltration Rate, <i>f</i> m/s	1.11x10⁻⁵	9.25x10⁻⁶
Surface Areas of Development	up to 155m ²	up to 240m ²


Recommendation Options: -

Stone-filled Sub-Surface Infiltration Trench

PLOT 1 4.00m x 6.00m with 1.50m filtration stone storage depth

PLOT 2 3.00m x 12.80m with 1.50m filtration stone storage depth

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 taking into account the recommendations in the aforementioned standards.

Signed ...  Date...31st January 2017
Name / Company S. A. M^cGregor
Address Fairmead, Tough, Alford, Aberdeenshire, AB33 8EQ
Qualification B.Eng(Civil Engineering).