



**GROUND ASSESSMENT  
&  
DRAINAGE RECOMMENDATION REPORT**

**PROPOSED NEW DWELLINGHOUSES  
LAND AT BRIDGE OF ALFORD  
ALFORD  
ABERDEENSHIRE**

***Client:***

John Gordon & Co.

***Agents:***

Mike Strachan

***Report Issued:***

19 March 2018

**S. A. M<sup>c</sup>Gregor**  
**Fairmead, Tough, Alford, Aberdeenshire, AB33 8EQ**

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BRIDGE OF ALFORD  
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ABERDEENSHIRE**

**INTRODUCTION**

At the request of Mike Strachan on behalf of John Gordon & Co a ground assessment was undertaken for the proposed development site on land at Bridge of Alford, Aberdeenshire.

It is proposed to erect two new dwellinghouses on the site.

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

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

**SITE LOCATION & BRIEF DESCRIPTION**

The proposed development site is on land to the north-east of Bridge of Alford, on land all under the ownership of the applicants. Access is from the A944 and local roads, OS NGR NJ 56121, 17595, see Fig. 1. General Location Plan in Appendix A.

The site is currently unoccupied agricultural ground and covered by grass and topsoil and is generally level with a slight fall to the south.

The site is un-serviced however electricity, water supply and telephone are nearby; there is no mains drainage available.

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

The nearest surface watercourses are a series of surface water drains all joining the River Don to the south of the site.

**SITE WORK**

***Trial Pits***

On the 21<sup>st</sup> February 2018, a back-actor excavator with a 0.70m 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 test holes were decided on site considering the land topography and indicative house locations on the proposed plots; see Fig. 2. Test Location Plan along with the ground conditions encountered on the trial pit logs all under Appendix A.

### ***Percolation & Infiltration Testing***

Testing was not undertaken due water seepages into the trial pits and the encountered ground water table.

## **GROUND ASSESSMENT**

### **Published Geology**

The British Geological Survey 1:50,000 maps indicate that the site is overlain by Alluvium – clay, silt, sand and gravel. Superficial Deposits formed up to 2 million years ago, during the Quaternary Period. The site is underlain by the Syllavethy Pluton – Quartz-diorite. Igneous bedrock formed approximately 444 to 485 million years ago, during the Ordovician Period.

### **Encountered Ground Conditions**

**Topsoil:** The site is overlain by topsoil 200-400mm in thickness.

**Natural Sub-Soils:** The underlying sub-soils have an upper mantle of dense orange brown gravelly sand with some cobbles to around 0.90m becoming stiff blue grey silty sand and gravel and proved to the maximum investigated depth of 1.40m.

**Bedrock:** Bedrock was not encountered during the investigation.

### **Ground Water Observations**

Groundwater seepages and water table evidence were observed from around 0.70-1.40m below existing ground levels.

## **DISCUSSION**

### ***Sub-Soils***

The relatively high groundwater table meant that the underlying clays would have poor draining properties.

### ***Groundwater***

The natural groundwater table was encountered between 0.70-1.40m and therefore any proposals for the discharge of both the foul and surface waters from the site must consider protective measures for the water environment.

### ***Sewage Treatment***

Connection to the mains sewer is not available for this development. Considering the proposed development layout, it is considered that the most suitable option is for a private sewage treatment system.

### ***Foul Water Discharge***

There is a high groundwater table therefore secondary treatment is required prior to the discharge of foul waters. A standard sub-surface stone-filled soakaway (infiltration system) is not considered suitable for the discharge of foul waters from the proposed sewage treatment system directly to the ground.

It is therefore proposed to provide secondary treatment by means of a high-performance package sewage treatment plant (PSTP) and discharge to the nearby watercourse.

**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 as 'Very Low', see summary below: -

**SIA Summary: -**

Land Use Type	<b>Residential Roofing</b> (& permeable gravel hardstanding)
Pollution Hazard Level	<b>Very Low</b>
Pollution Hazard Indices	TSS 0.2 Metals 0.2 Hydrocarbons 0.05
Surface Water Protection (SuDS) Component 1 Proposed 1	<b>Filter Drains</b>
SuDS Pollution Mitigation Indices	TSS 0.4 Metals 0.4 Hydrocarbons 0.4
Groundwater Protection Type	<b>None</b>
Combined Pollution Mitigation Indices	TSS 0.4 Metals 0.4 Hydrocarbons 0.4
Acceptability of Pollution Mitigation	TSS <b>Sufficient</b> Metals <b>Sufficient</b> Hydrocarbons <b>Sufficient</b>

**Surface Water Disposal**

The investigation carried out concludes that the underlying strata are not suitable for direct discharge to the ground.

For the discharge of the run-off waters from the site to a receiving surface waterbody 1 level/component for SuDS is required; it is proposed to install filter drains prior to discharge.

**DRAINAGE RECOMMENDATIONS**

**Sewage Treatment & Foul Water Discharge**

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, a discharge system must be designed and constructed in accordance with the requirements of SEPA and WAT-RM-03, Sewage Discharges to Surface Waters.

It is recommended to install a package sewage treatment plants (PSTPs) tested and certified to EN12566 Part 3.

The proposed development comprises 4-bedroom dwellinghouses. Therefore, each PSTP should have the capacity to serve a population of 6 p.e. (population equivalent).

The level of treatment required for the sewage discharge to a watercourse is determined using the following table from WAT-RM-03, Dec 2014: Section 4.2.2.

**Table 1 Registration look up table for sewage discharges to watercourses**

Dilution range:		Treatment / standards required
Anticipated/Existing Pollution Pressure	No Anticipated/Existing Pollution Pressure	
>400:1	>400:1	Primary / Septic tank (with partial soakaway)
100:1 - 400:1	30:1 - 400:1	Secondary treatment designed to produce effluent with a mean BOD concentration $\leq 20\text{mg/l}$
30:1 - 100:1	10:1 - 30:1	Secondary: designed to produce effluent with a mean ammonia concentration $\leq 5\text{mg/l}$
<30:1	<10:1	Enhanced treatment or refuse

It is considered that the receiving water, the burn has a dilution range of 10:1 - 30:1. This may require verification by SEPA.

In line with the SEPA guidance it is required to install a partial soakaway prior to discharge to a watercourse, see the following table: -

Proposed Development	Population Equivalent, PE (as defined in BW COP:18.11/13)	Min. Base Area (m <sup>2</sup> ) With Secondary Treatment (PSTP)
Each New Dwellinghouse	<b>6</b> (4-bedrooms)	Minimum Required by SEPA is <b>25m<sup>2</sup></b>

**SEPA**

The following table indicates SEPA's required treatment standard for the discharge from the treatment system prior to discharge to the watercourse.

	BOD (mg/l)	SS (mg/l)	NH <sub>4</sub> -N (mg/l)
Treatment / Standard Required	<b>20</b>	<b>30</b>	<b>5</b>

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

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.

**Surface Water Disposal**

The quantity of the discharge must also be controlled to ensure that the proposed development does not increase the pre-development flow of the watercourse.

The size of the proposed filter drain prior to discharge to the watercourse is based on the impermeable surface area of the development i.e. the roof area of the new house, see table below: -

<b>Impermeable Area (m<sup>2</sup>)</b>	<b>New Bioretention Pond Width x Length x Storage depth (m)</b>	<b>Discharge</b>
New House Roof Areas Up to <b>150m<sup>2</sup></b>	3.00 x 6.00 x 0.50 With 300mm filter stone base	50mm diameter combined outlet drain to the watercourse.

All the above dimensions are based on a 30-year return period of storm duration of 60 minutes. 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 and filter drain construction shown on Figs. 4 and 5 along with the certificates all in Appendix A.

**SYSTEM MAINTENANCE**

**Package Sewage Treatment Plant (PSTP)**

The PSTP should be fully maintained in accordance with the manufacturer’s literature, should be regularly inspected by the house owner and ‘desludged’ (emptied) when appropriate to ensure solids and silts do not ‘clog’ the soakaway.

**Soakaways/Filter Drains**

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. Silt traps should be installed before surface waters enter the soakaway where there are large paved/tarmac covered impermeable areas. The silt taps should be regularly inspected and emptied.

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:

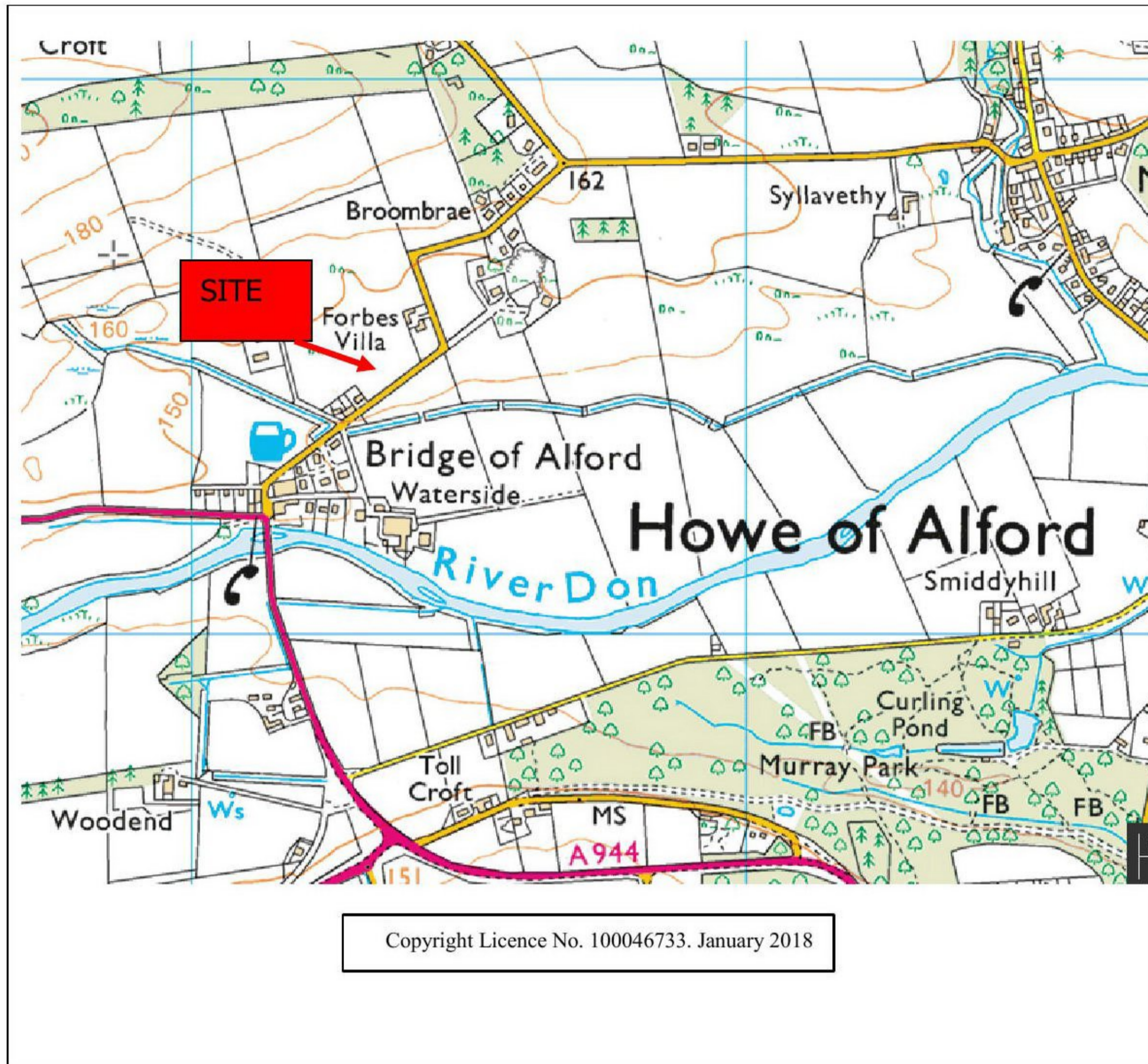
- 
- 50m from any spring, well or borehole used as drinking water supply
- 10m horizontally from any water course (including any inland or coastal waters), permeable drain (including culvert), road or railway
- 5m from a building
- 5m from a boundary *(unless the adjacent land owner under certain circumstances may legally agree to the soakaway being within 5m as long as it is not detrimental to the neighbouring property)*

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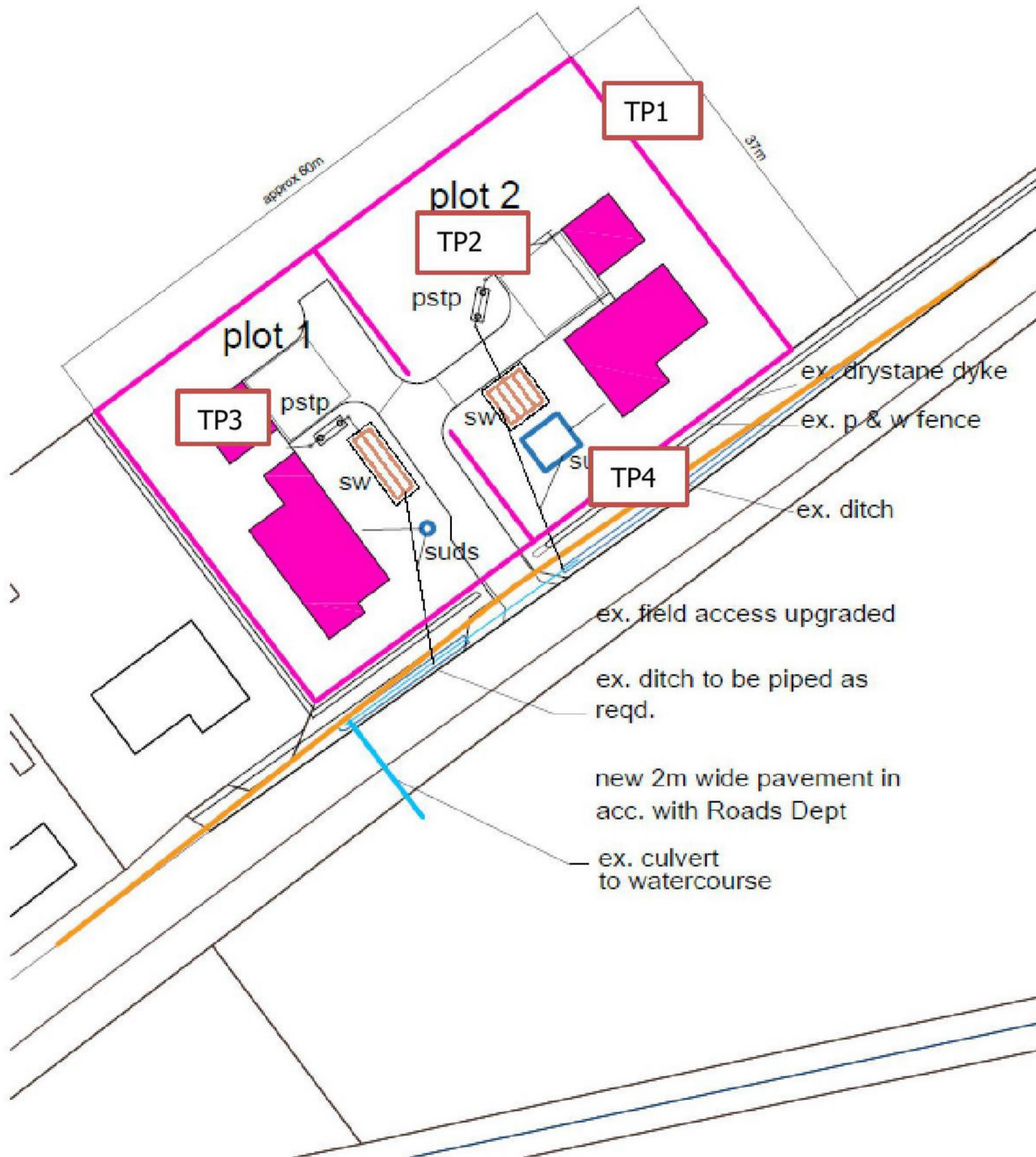


**Fig. 1. GENERAL & SITE LOCATION PLANS**



## Fig. 2. TEST LOCATION PLAN

Extract from Mike Strachan Drawing



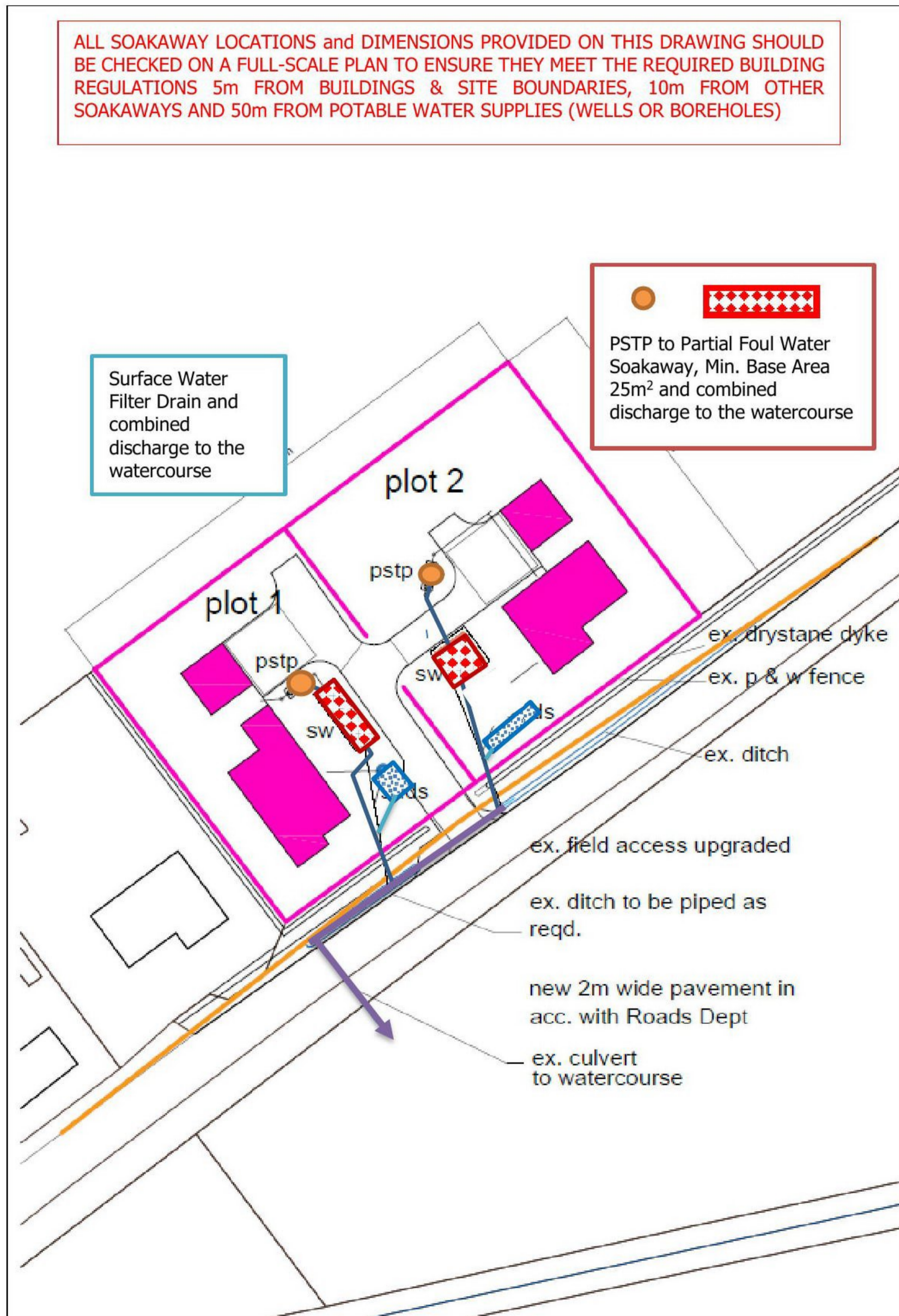






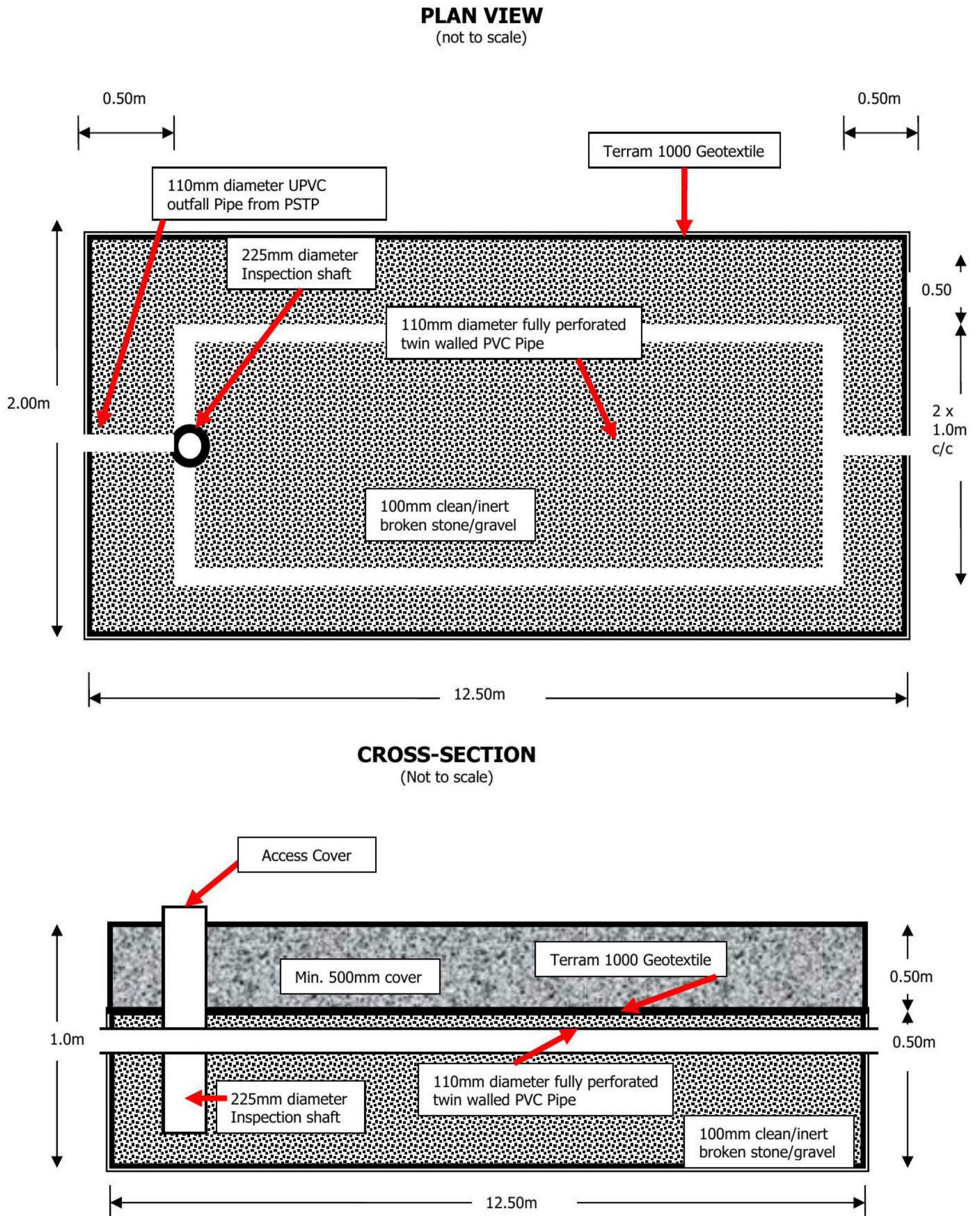


**Fig. 3. INDICATIVE SITE DRAINAGE LAYOUT**



Extract from Mike Strachan Drawing

**Fig. 4. Indicative Stone-Filled Soakaway Construction**





## CERTIFICATE FOR PROPOSED FOUL WATER SUB-SURFACE PARTIAL 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 John Gordon & Co.....  
(name of person applying for planning permission)

Site Address 2 New Houses, Land Bridge of Alford, Alford, Aberdeenshire

Date of Test.....21<sup>st</sup> February 2018 Time.....from 10.30 Weather ...Dry and Sunny....

### Encountered Ground Conditions

**Topsoil:** The site is overlain by topsoil 200-300mm in thickness.

**Natural Sub-Soils:** The underlying sub-soils have an upper mantle of dense orange brown gravelly sand with some cobbles to around 0.90m becoming stiff blue grey silty sand and gravel and proved to the maximum investigated depth of 1.40m.

**Bedrock:** Bedrock was not encountered during the investigation.

### Ground Water Observations

Groundwater seepages were observed from around 1.10-1.40m below existing ground levels.

**Wells:** no wells within 50m

Depth of Drains: ...1.00m..... Depth of Excavations:.. Up to 1.60m.....

### Percolation Testing

### Plot 1 & 2

Time Taken (mean of three times), s

n/a

Soil Percolation Value, Vp, s/mm

n/a high ground water table

Population Equivalent

6 (4-bedroom)..

### Minimum Floor Area of Soakaway

**25m<sup>2</sup> partial soakaway with PSTP**  
Discharge to watercourse

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...19 March 2018

Name / Company

S. A. McGregor

Address

Fairmead, Tough Alford, Aberdeenshire, AB33 8EQ

Qualification

B.Eng (Civil Engineering).

## CERTIFICATE FOR PROPOSED SURFACE WATER SOAKAWAY

Applicant's Name John Gordon & Co.....  
(name of person applying for planning permission)

Site Address 2 New Houses, Land Bridge of Alford, Alford, Aberdeenshire

Date of Test.....21<sup>st</sup> February 2018 Time.....from 10.30 Weather ...Dry and Sunny....

### Encountered Ground Conditions

**Topsoil:** The site is overlain by topsoil 200-300mm in thickness.

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**Bedrock:** Bedrock was not encountered during the investigation.

### Ground Water Observations

Groundwater seepages were observed from around 1.10-1.40m below existing ground levels.

**Wells:** no wells within 50m

Depth of Drains: ...1.00m..... Depth of Excavations:.. Up to 1.70m.....

### Infiltration Test

### Plot 1 & 2

Infiltration Test Zones

n/a

Average Soil Infiltration Rate,  $f$  m/s

n/a high groundwater table

Surface Areas of Development

Up to 150m<sup>2</sup>...(Each house & garage)

### Recommendation: -

#### Filter Drain & discharge to watercourse

6m x 3m )  
OR ) x 0.50m depth with 300mm stone filter depth and discharge  
4.30m x 4.30m ) 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 taking into account the recommendations in the aforementioned standards.

Signed .....  
Name / Company S. A. McGregor  
Address Fairmead, Tough, Alford, Aberdeenshire, AB33 8EQ

Date...19 March 2018

Qualification                      B.Eng (Civil Engineering).