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# gmsurveys

Surveys, Setting-Out Civil Engineering Design

## Site Investigation & Drainage Assessment

WESTER ALLIGAN

Gary Mackintosh Bsc  
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***Client:***

Mr G Henderson

***Site Address:***

Proposed Private Dwelling

Wester Alligan

By Torridon

***Planning Reference:***

TBC

***Date:***

23<sup>rd</sup> August 2021

***Job Number:***

GMC21-023

***Company Information:***

Assessment completed by:

Gary Mackintosh Bsc

**GMCSurveys**

34 Castle Street

Forres

Moray

IV36 1PW

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***Introduction:***

The proposed site is located to the south of Wester Alligan, by Torridon and the proposals are to erect a single private dwelling and associated infrastructure.

The SEPA Flood Maps have been consulted which indicate that there is no risk of fluvial or pluvial flooding within the site up to a 1:200year event.

GMC Surveys were asked to carry out a site investigation in order to determine the existing soils and provide a drainage solution for the proposed site.

***Soil Conditions:***

Excavations were carried out on 20<sup>th</sup> August 2021 to assess the existing ground conditions and carry out infiltration and percolation testing for the dispersal of foul and surface waters via soakaways.

The trial pits were excavated to depths of 1.5m. The pits were left open and no ground water was encountered.

The ground conditions encountered consisted of 300mm topsoil overlying light brown turning orange, dense, fine Sands with some small, rounded gravels proved to the depth of the excavations.

The trial pits were left open and there was no evidence of contamination or ground water within the trial pits.

Trial Pit Locations can be found in Appendix A.

### ***Percolation/Soakaway Testing:***

Percolation testing was carried out in full accordance with BS6297: 2007 + A1: 2008 and as described in Section 3.9 of the Scottish Building Standards Technical Handbook (Domestic). The results can be found in the table below.

	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	Mean
<b>Date of Test</b>	<b>20/08/21</b>	<b>20/08/21</b>	<b>20/08/21</b>	
THo1	N/A	N/A	N/A	N/A
THo2	7740s	8580s	8580s	7740s
<b>Average Soil Vp</b>				<b>51.60/mm</b>

### ***Infiltration testing:***

Infiltration testing was carried out in full accordance with BRE digest 365. The results can be found in the table below.

<b>Infiltration Test</b>	<b>Pit Dimensions (w/l)</b>	<b>Test Zone (mbgl)</b>	<b>Infiltration Rate (m/s)</b>
INF01	1.0m x 1.0m	0.8 – 1.5	$9.88 \times 10^{-6}$

### ***Conclusion and Recommendations:***

Based on the onsite investigations it can be confirmed that the underlying soils are suitable for the use of standard stonefilled soakaways as a drainage solution for both foul and surface waters.

The Vp rate is above the maximum threshold of 15s/mm therefore a standard septic tank would be suitable for use.

### ***Foul Water Discharge via Soakaway:***

Soil Percolation Value – 51.60s/mm

No of Persons (4bed) – 5PE

Min Base Area ( $A=Vp \times PE \times 0.25$ ) = **64.5m<sup>2</sup>**

This can be provided with dimensions of **10.75m x 6.0m x 0.45m** below the invert level of the pipe. The soakaway dimensions may be altered to provide a better fit within the plot ensuring that the base area of m<sup>2</sup> is maintained.

### ***Surface Water Dispersal via Soakaway:***

Please see attached surface water calculations detailing the requirement and suitability for soakaway dimensions of **7.0m x 4.0m at a depth of 1.5m** below the invert level based on the proposed contributing area of 180m<sup>2</sup> (Roof area with extra over) up to a 1 in 30year event with 35% allowance for climate change.

Soakaway Details can be found in Appendix B.

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 and any inland and coastal waters, permeable drain (including culvert), road or railway
- 5m from a building or boundary



MasterDrain  
SW 16.10

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Job No. <b>GMC21-023</b>		
Sheet no. <b>1</b>		
Date <b>23/08/21</b>		
By <b>GM</b>	Checked	Approved

Project **Site by Wester Alligan, Torridon**  
Title **Surface Water Soakaway**

**Rectangular pit design data:-**

Pit length = 7 m	Pit width = 4 m
Depth below invert = 1.5 m	Percentage voids = 30.0%
Imperm. area = 180 m <sup>2</sup>	Infiltr. factor = 0.00001 m/s
Return period = 30 yrs	Climate change = 35%

**Calculations :-**

Surface area of soakaway to 50% storage depth (not inc. base):-

$$a_{s50} = 2 \times (\text{length} + \text{width}) \times \text{depth}/2 = 16.5 \text{ m}^2$$

Outflow factor :  $O = a_{s50} \times \text{Infiltration rate} = 0.000165 \text{ m/s}$

Soakaway storage volume :  $S_{\text{actual}} = \text{length} \times \text{width} \times \text{depth} \times \% \text{voids}/100 = 12.6 \text{ m}^3$

Duration	Rainfall mm/hr	Inflow m <sup>3</sup>	Depth (hmax) m	Outflow m <sup>3</sup>	Storage m <sup>3</sup>
5 mins	91.9	1.4	0.16	0.05	1.32
10 mins	74.8	2.2	0.25	0.10	2.14
15 mins	64.6	2.9	0.33	0.15	2.76
30 mins	48.5	4.4	0.48	0.30	4.07
1 hrs	34.7	6.2	0.67	0.59	5.64
2 hrs	24.1	8.7	0.89	1.19	7.48
4 hrs	16.5	11.9	1.13	2.38	9.51
6 hrs	13.2	14.2	1.27	3.56	10.67
10 hrs	9.9	17.8	1.42	5.94	11.91
24 hrs	6.0	26.1	1.41	14.26	11.87

Actual volume :  $S_{\text{actual}} = 12.600 \text{ m}^3$

Required volume :  $S_{\text{reqd.}} = 11.910 \text{ m}^3$

Soakaway volume storage OK.

Minimum required  $a_{s50}$  : 15.60 m<sup>2</sup>

Actual  $a_{s50}$  : 16.50 m<sup>2</sup>

Minimum depth required: 1.42 m

Time to maximum 10 hrs

Emptying time to 50% volume =  $t_{s50} = S_{\text{reqd}} \times 0.5 / (a_{s50} \times \text{Infiltration rate}) = 10:01 \text{ (hr:min)}$

Soakaway emptying time is OK.



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Job No. <b>GMC21-023</b>		
Sheet no. <b>2</b>		
Date <b>23/08/21</b>		
By <b>GM</b>	Checked	Approved

Project <b>Site by Wester Alligan, Torridon</b>
Title <b>Surface Water Soakaway</b>

**Location hydrological data (FSR):-**

Location	=	TORRIDON	Grid reference	=	NG9056
M5-60 (mm)	=	17	r	=	0.16
Soil index	=	0.50	SAAR (mm/yr)	=	1800
WRAP	=	5	Area	=	Scotland and N. Ireland

Soil classification for WRAP type 5

Soils of wet uplands -

- i) with peaty or humose surface horizons and impermeable layers at shallow depth;
- ii) deep raw peat associated with gentle upland slopes or basin sites;
- iii) bare rock cliffs and screes;
- iv) shallow, permeable rocky soils on steep slopes.

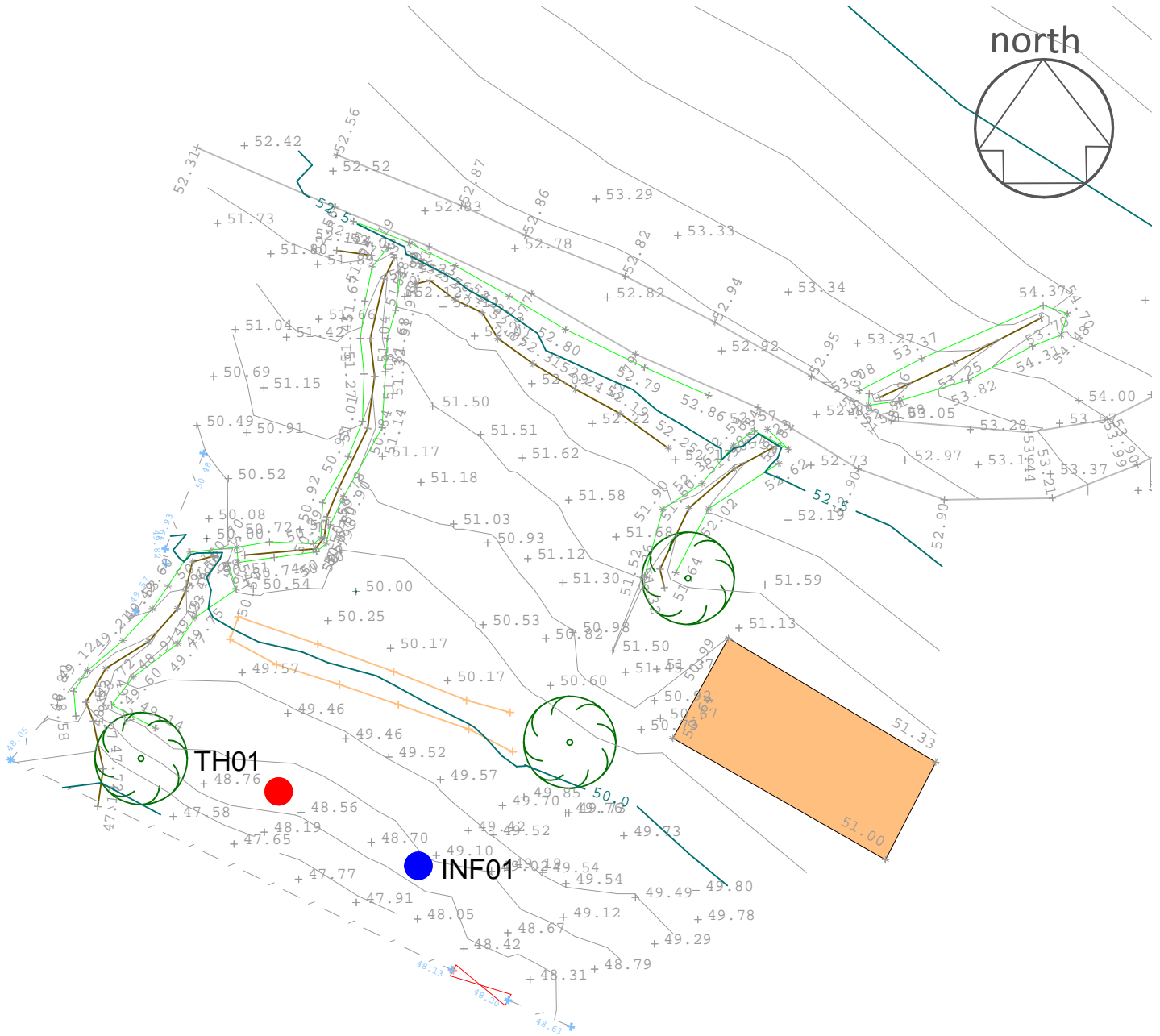
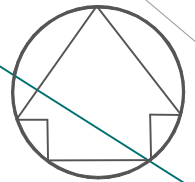
N.B. The rainfall rates are calculated using the location specific values above in accordance with the Wallingford procedure.

**APPENDIX A**

Topographic/Testhole Location



north



REV:	DESCRIPTION:	BY:	DATE:
STATUS:		ISSUE	

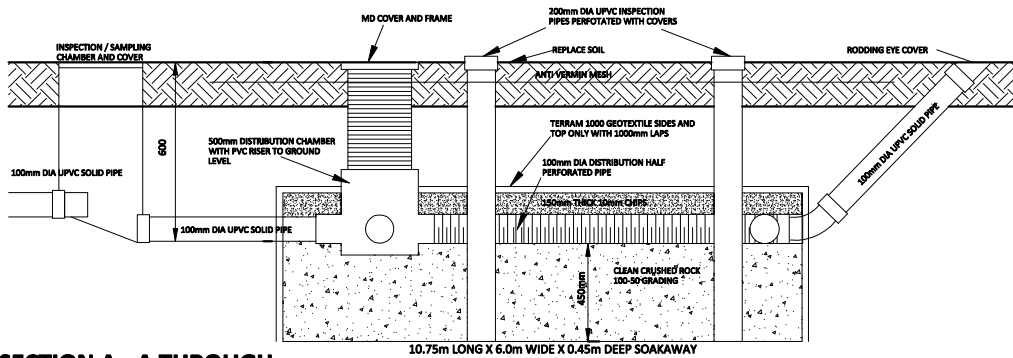
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CLIENT:  
 Mr G Henderson  
 C/O S Reid Design

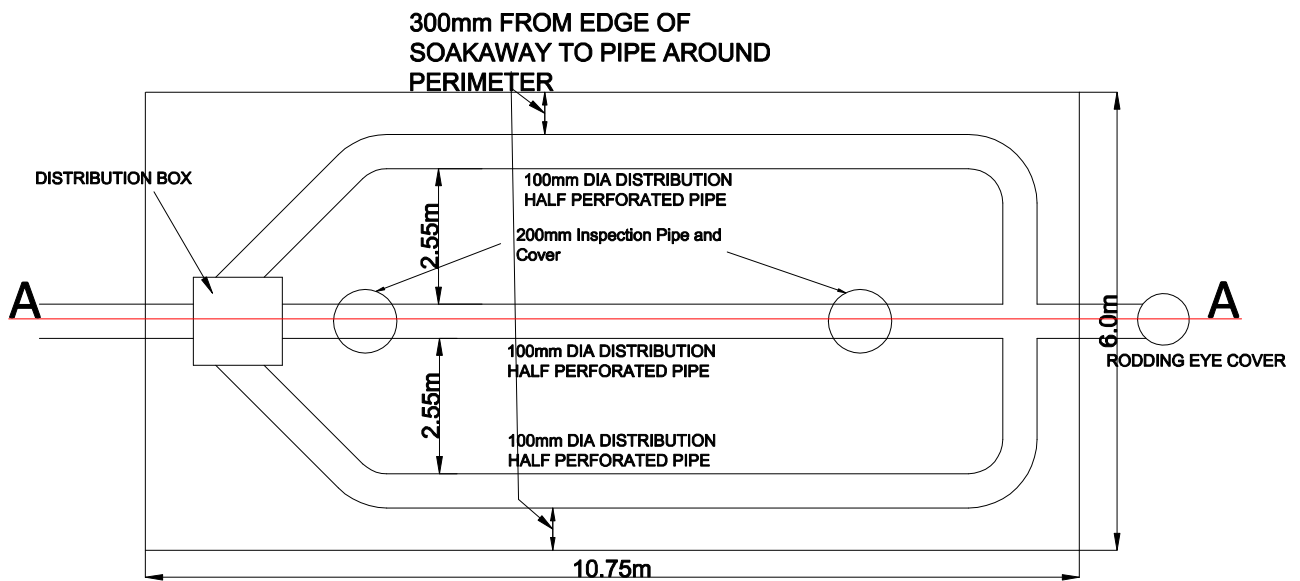
SITE:		Site at Wester Alligan By Torridon	
TITLE:		Test Hole Location	
SCALE AT A4:	DATE:	DRAWN:	CHECKED:
NTS	AUG21	GM	
PROJECT NO:	DRAWING NO:	REVISION:	
GMC21-023	Appendix A	-	

## **APPENDIX B**

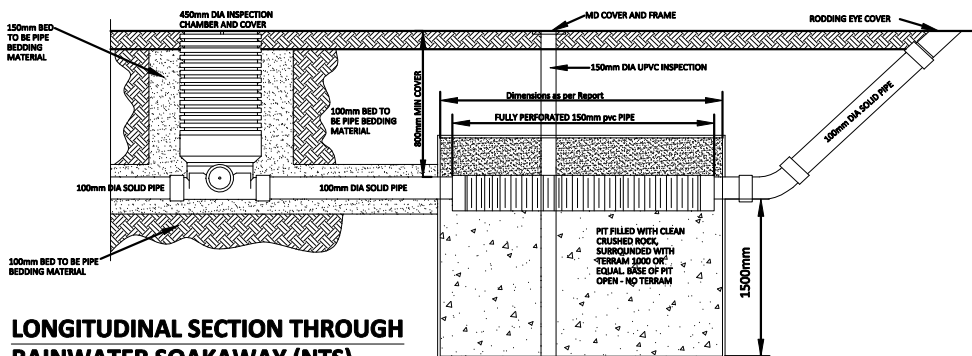
### Indicative Soakaway Details



**SECTION A - A THROUGH  
FOUL WATER SOAKAWAY (NTS)**



**PLAN VIEW  
SOAKAWAY ARRANGEMENTS (NTS)**



**LONGITUDINAL SECTION THROUGH  
RAINWATER SOAKAWAY (NTS)**

REV:	DESCRIPTION:	BY:	DATE:
STATUS:		ISSUE	

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CLIENT:  
Mr G Henderson  
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SITE: Site at Wester Alligan  
By Torridon

TITLE: Soakaway Details

SCALE AT A4: NTS	DATE: AUG21	DRAWN: GM	CHECKED:
PROJECT NO: GMC21-023	DRAWING NO: Appendix B	REVISION:	-

**Certificate For Proposed Sub – Surface Soakaways**  
**Foul Water**

Applicants Name: Mr G Henderson  
Address: C/O S Reid Design  
Site Address: Site at Wester Alligan  
Date of Tests: 20<sup>th</sup> August 2021  
Weather Conditions: Overcast/Dry

**Percolation Test/Soakaway Sizing:**

	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	Mean
<b>Date of Test</b>	<b>20/08/21</b>	<b>20/08/21</b>	<b>20/08/21</b>	
TH01	N/A	N/A	N/A	N/A
TH02	7740s	8580s	8580s	7740s
<b>Average Soil Vp</b>				<b>51.60/mm</b>

Location: TP1  
Average Soil Vp: 51.60s/mm  
PE: 5  
Base Area (min): 64.50m<sup>2</sup>

I hereby certify that I have carried out the above tests in full accordance with BS6297: 2007 + A1: 2008 and as described in Section 3.9 of the Scottish Building Standards Technical Handbook (Domestic).

Signed: G Mackintosh      Gary Mackintosh BSc.      Date: 23<sup>rd</sup> August 2021

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**Certificate For Proposed Sub – Surface Soakaways**  
**Surface Water**

Applicants Name: Mr G Henderson  
Address: C/O S Reid Design  
Site Address: Site at Wester Alligan, Torridon  
Date of Tests: 20<sup>th</sup> August 2021  
Weather Conditions: Overcast, Dry

**Trial Pit Test – Surface Water:**

Depth of Excavation: 1.5  
Water Table Present: No

**Infiltration Test:**

Location: INF01  
Infiltration Test Zone: 0.8 – 1.5mbgl  
Infiltration Rate (m/s):  $9.88 \times 10^{-6}$   
Contributing Area: 180m<sup>2</sup>  
Soakaway Size: 7.0m x 4.0m x 1.5 below the invert of the pipe (30year)

I hereby certify that I have carried out the above tests in accordance with the procedures specified in BRE Digest 365:1991.

Signed: G Mackintosh      Gary Mackintosh BSc.      Date: 23<sup>rd</sup> August 2021

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