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Surveys, Setting-Out Civil Engineering Design

Site Investigation & Drainage Assessment

BLUEHILL

Gary Mackintosh Bsc
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Contents

Client:

Mr G Strathdee

Site Address:

Proposed Agricultural Building
Bluehill
Craigellachie

Planning Reference:

TBC

Date:

2nd April 2022

Job Number:

GMC22-060

Company Information:

Assessment completed by:

Gary Mackintosh Bsc
GMCSurveys
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Forres
Moray
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Introduction:

The proposals are to erect a new Agricultural Building within existing woodland located at Bluehill, by Craigellachie together with all associated infrastructure.

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

GMC Surveys have been asked to carry out a site investigation in order to provide a drainage solution for the proposals.

Soil Conditions:

Excavations were carried out on 1st April 2022 in order to assess the existing soils and their suitability for the use of sub surface soakaways as a method of surface water management.

The trial pits were excavated to depths of 2.2m.

The existing soils consist of 300 – 400mm Topsoil with some roots overlying light brown, dense, slightly clayey, silty Sands and sub-angular gravels, many cobbles and larger stone.

There was no evidence of contamination or water table present within the test hole and the natural soils have a minimum bearing capacity of 100kn/m².

Infiltration testing:

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

Infiltration Test	**Pit Dimensions (w/l)**	**Test Zone (mbgl)**	**Infiltration Rate (m/s)**
INF01	0.8m x 1.2m	1.0m – 2.2m	9.372×10^{-6}

Conclusion and Recommendations:

Based on the site investigation the ground conditions are suitable for the use of standard stone filled soakaways as a method of dispersal of surface waters, Therefore, it is proposed to install a new surface water soakaway to manage the runoff from the new roof area.

Surface Water Disposal via Soakaway:

Please see attached surface water calculations detailing the requirement and suitability of a standard stone filled soakaway with dimensions of 9.0m x 4.0m x 1.5m below the invert of the inlet. The soakaway has been sized to manage a contributing area of 300m² (new roof area with extra over) up to a 1:30year 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 16.53

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Job No.	Sheet no.	Date
GMC22-060	1	02/04/22

Project: Proposed Agri Shed, Bluehill, Craigellachie

Title: Surface Water Soakaway

By	Checked	Approved
GM		

Rectangular pit design data:-

Pit length = 9 m
Depth below invert = 1.5 m
Imperm. area = 300 m²
Return period = 30 yrs
Pit width = 4 m
Percentage voids = 30.0%
Infilt. factor = 0.000009 m/s
Climate change = 35%

Calculations :-

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

a_{s50} = 2 x (length + width) x depth/2 = 19.5 m²

Outflow factor : O = a_{s50} x Infiltration rate = 0.0001755 m/s

Soakaway storage volume : S_{actual} = length x width x depth x %voids/100 = 16.2 m³

Duration	Rainfall mm/hr	Inflow m³	Depth (hmax) m	Outflow m³	Storage m³
5 mins	108.3	2.7	0.25	0.05	2.65
10 mins	83.6	4.2	0.38	0.10	4.06
15 mins	69.4	5.2	0.47	0.16	5.05
30 mins	48.6	7.3	0.65	0.32	6.97
1 hrs	32.3	9.7	0.84	0.63	9.06
2 hrs	20.9	12.6	1.05	1.26	11.29
4 hrs	13.4	16.0	1.25	2.53	13.50
6 hrs	10.2	18.4	1.35	3.79	14.62
10 hrs	7.3	21.9	1.44	6.32	15.56
24 hrs	4.1	29.3	1.31	15.16	14.14

Actual volume : S_{actual} = 16.200 m³

Required volume : $S_{reqd.}$ = 15.560 m³

Soakaway volume storage OK.

Minimum required a_{s50} : 18.73 m²

Actual a_{s50} : 19.50 m²

Minimum depth required: 1.44 m

Time to maximum 10 hrs

Emptying time to 50% volume = t_{s50} = S_{reqd} x 0.5 / (a_{s50} x Infiltration rate) = 12:18 (hr:min))

Soakaway emptying time is OK.

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Job No. GMC22-060			
Sheet no. 2			
Date 02/04/22			
Project Proposed Agri Shed, Bluehill, Craigellachie	By GM	Checked	Approved
Title Surface Water Soakaway			

Location hydrological data (FSR):-

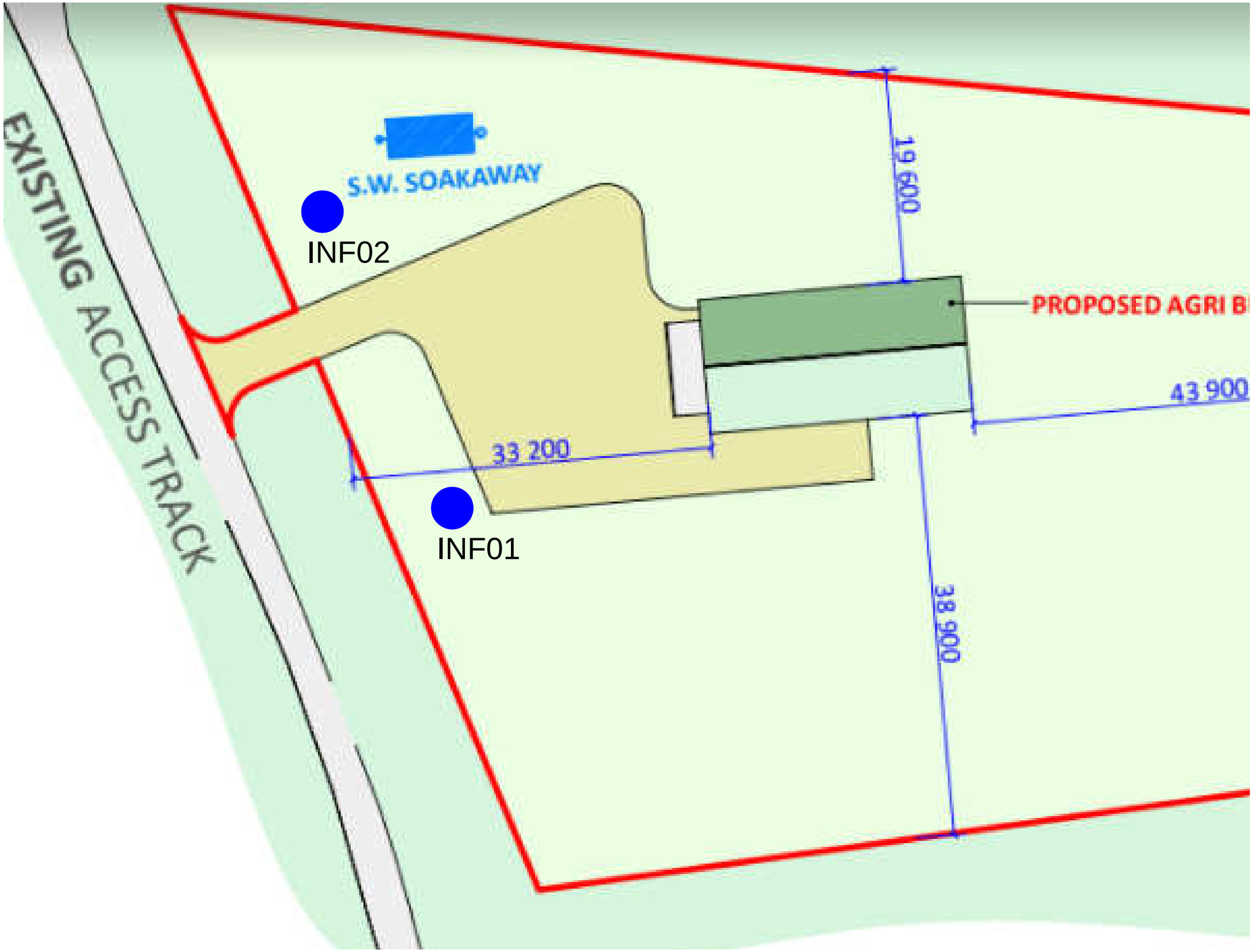
Location	= CRAIGELLACHIE	Grid reference	= NJ2844
M5-60 (mm)	= 15.8	r	= 0.25
Soil index	= 0.30	SAAR (mm/yr)	= 800
WRAP	= 2	Area = Scotland and N. Ireland	

Soil classification for WRAP type 2
i) Very permeable soils with shallow ground water;
ii) Permeable soils over rock or fragipan, commonly on slopes in western Britain associated with smaller areas of less permeable wet soils;
iii) Moderately permeable soils, some with slowly permeable subsoils.

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

APPENDIX A

Test Hole Location



REV:	DESCRIPTION:	BY:	DATE:

STATUS: ISSUE

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CLIENT:
MR G Strathdee
C/O S Reid Design

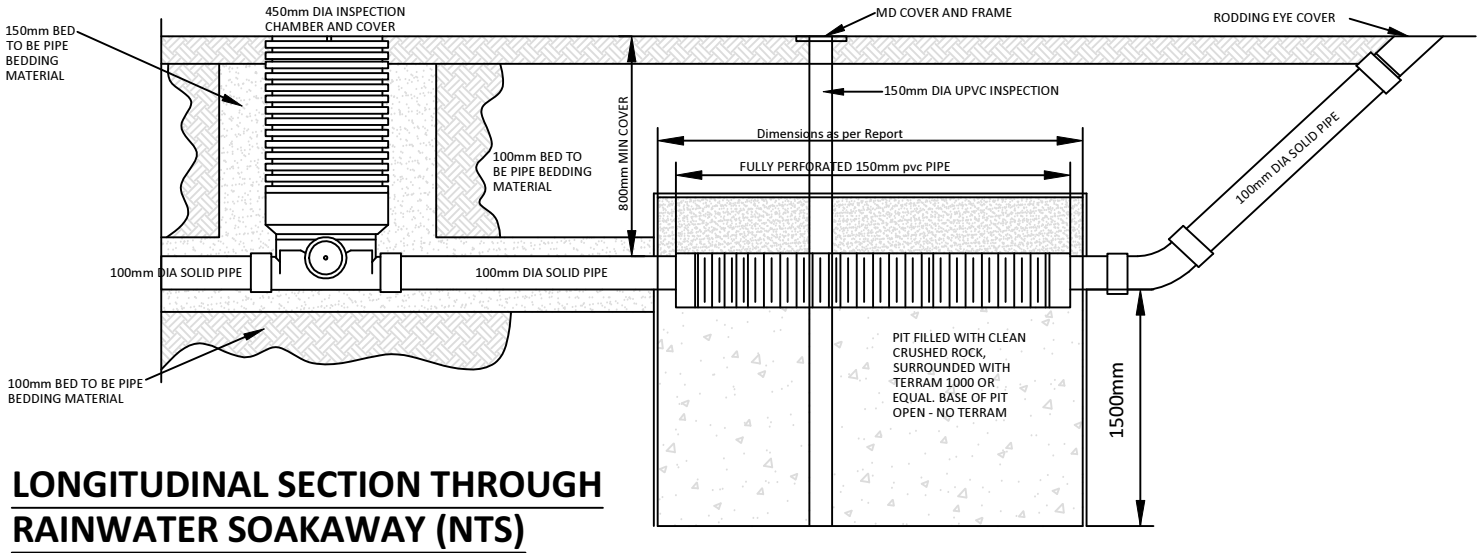
SITE:
Proposed Agricultural Building
Bluehill, Craigellachie

TITLE:
Test Hole Location

SCALE AT A4:	DATE:	DRAWN:	CHECKED:
NTS	APR22	GM	
PROJECT NO:	DRAWING NO:		REVISION:
GMC22-060	Appendix A		-

APPENDIX B

Surface Water Soakaway Detail/Certificate



LONGITUDINAL SECTION THROUGH RAINWATER SOAKAWAY (NTS)

REV:	DESCRIPTION:	BY:	DATE:

STATUS: ISSUE

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Proposed Agricultural Building
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TITLE:
Soakaway Details

SCALE AT A4:	DATE:	DRAWN:	CHECKED:
NTS	APR22	GM	

PROJECT NO:	DRAWING NO:	REVISION:
GMC22-060	Appendix B	-

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Certificate For Proposed Sub – Surface Soakaways
Surface Water

Applicants Name: Mr G Strathdee
Address: C/O S Reid Design, The Sma Glen, Rothes
Site Address: Proposed Agricultural Shed, Bluehill, Craigellachie
Date of Tests: 1st April 2022
Weather Conditions: Dry/Clear

Trial Pit Test – Surface Water:

Depth of Excavation: 2.2
Water Table Present: No

Infiltration Test:

Location: INF01
Infiltration Test Zone: 1.0 – 2.2mbgl
Infiltration Rate (m/s): 9.327×10^{-6}
Contributing Area: $300m^2$ (new roof area with Extra over)
Soakaway Size: 9.0m x 4.0m x 1.5m below the invert of the inlet.

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:2nd April 2022

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