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Surveys, Setting-Out Civil Engineering Design

Site Investigation & Drainage Assessment

QUARRY ROAD

Gary Mackintosh Bsc
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Client:

Mr and Mrs Cochrane

Site Address:

Site B
Quarry Road
Lossiemouth

Planning Reference:

17/00941/APP

Date:

7th March 2022

Job Number:

GMC22-035

Company Information:

Assessment completed by:

Gary Mackintosh Bsc
GMCSurveys
34 Castle Street
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IV36 1PW
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Telephone: 07557431702

Introduction:

The proposals are to erect a new private dwelling within land located to the south of Quarry road as approved under planning ref: 17/00941/APP

The SEPA Flood Maps have been consulted and which highlight the existing site is not at risk of fluvial or pluvial flooding during a 1:200year event.

GMC Surveys were asked to carry out a site investigation to provide a drainage solution for the proposals.

Site Visit/Soil Conditions:

Excavations were carried out on 26th February 2022 to assess the soils for the use of sub surface soakaways as a method of surface water management.

The trial pits were excavated to depths of 1.7m.

The consisted of 300mm Topsoil overlying light brown, medium to loose, fine sands and rounded gravels proved to the depth of the excavations.

There was no evidence of fill material, 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
INF01	1.0m x 1.0m	0.9 – 1.7	1.19×10^{-4}m/s Or 0.428m/hr

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.

It is assumed due to site constraints and positioning, that the foul water will make a pumped connection to the public sewer located to the west of the site on quarry road.

It is proposed to install a new surface water soakaway within the garden grounds of the property to manage the flows from the overall contributing areas within the site.

Surface Water Disposal via Soakaway:

Please see attached surface water calculations detailing the requirement and suitability for a precast, perforated concrete soakaway ring with a diameter of 1200mm, a depth below invert level of the inlet of 1.0m and with a 300mm surround of 40mm clean stone. The soakaway has been sized based on a contributing area of 200m² (existing house with extra over to incorporate decking and driveway area if necessary) up to a 1:30 year 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

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Job No. GMC22-035			
Sheet no. 1			
Date 07/03/22			
Project Site B, Quarry Road, Lossiemouth	By GM	Checked	Approved
Title Surface Water Soakaway			

Concrete ring design:-

Ring diameter = 1200 mm
Percentage voids = 30.0
Climate change = 35%

Return period = 30 yrs
Imperm. area = 200m²
Infiltration factor = 0.428 m/hr

Depth below invert = 1m
Pit side length = 1.8m

Calculations :-

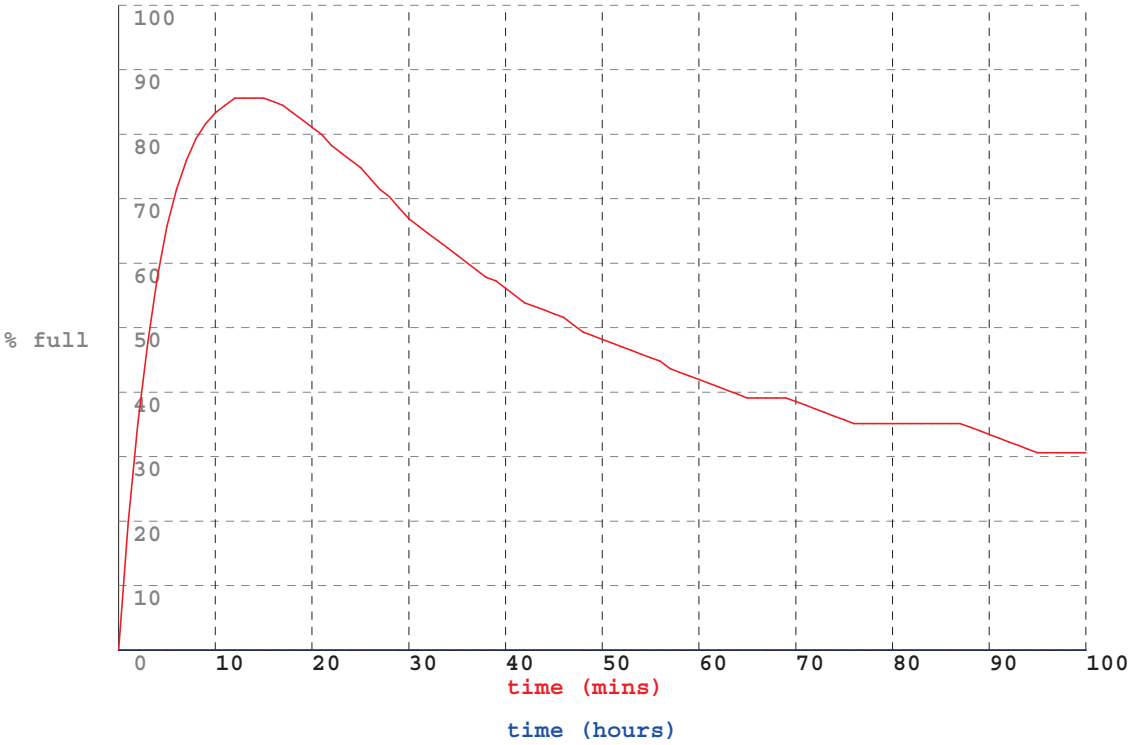
Surface area of soakaway to 50% depth - a_{s50} = Length of side x 4 x Depth/2 = 3.6 m² (base not included).

Outflow factor - OFact = a_{s50} x f =1.5408 m³/s where Infilt. factor (f)= 0.428 m/s

Soakaway ring storage volume - S_{actual} = Pi x (Ring diam/2000)² x depth = 1.1 m³

Gross soakaway pit storage volume - S_{pit} = Length of side² x depth = 3.2 m³

Nett soakaway pit storage volume - S_{nett} = Gross pit volume - infill (half depth) = 1.8 m³ (storage + void)



Required volume (S_{reqd}) = 1.5 m³

Available storage volume = 1.8 m³

Spare capacity = 0.25 m³

Emptying time to 50% volume = N/A hours

Soakaway emptying time OK.

Soakaway dimensions OK.

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Job No.	GMC22-035
Sheet no.	2
Date	07/03/22
Project	Site B, Quarry Road, Lossiemouth
Title	Soakaway data - 100 mins
By	GM
Checked	
Approved	

Duration	Rain mm/hr	Inflow m³	Outflow m³	Storage m³	Depth m	% full	Duration	Rain mm/hr	Inflow m³	Outflow m³	Storage m³	Depth m	% full
1	117.34	0.39	0.043	0.35	0.20	20	51	27.15	0.09	0.102	0.84	0.48	20
2	105.48	0.35	0.076	0.62	0.35	35	52	26.84	0.09	0.101	0.83	0.47	35
3	96.30	0.32	0.102	0.84	0.48	48	53	26.54	0.09	0.100	0.82	0.46	48
4	88.95	0.30	0.124	1.02	0.58	58	54	26.25	0.09	0.099	0.81	0.46	58
5	82.90	0.28	0.141	1.16	0.66	66	55	25.97	0.09	0.098	0.80	0.45	66
6	77.82	0.26	0.155	1.26	0.71	71	56	25.69	0.09	0.097	0.79	0.45	71
7	73.47	0.24	0.163	1.34	0.76	76	57	25.42	0.08	0.095	0.77	0.44	76
8	69.70	0.23	0.171	1.40	0.79	79	58	25.16	0.08	0.092	0.76	0.43	79
9	66.40	0.22	0.176	1.44	0.82	82	59	24.90	0.08	0.091	0.75	0.43	82
10	63.47	0.21	0.179	1.47	0.83	83	60	24.65	0.08	0.090	0.74	0.42	83
11	60.86	0.20	0.182	1.49	0.84	84	61	24.41	0.08	0.089	0.73	0.41	84
12	58.51	0.20	0.184	1.51	0.86	86	62	24.17	0.08	0.088	0.72	0.41	86
13	56.38	0.19	0.185	1.51	0.86	86	63	23.94	0.08	0.087	0.71	0.40	86
14	54.44	0.18	0.184	1.51	0.86	86	64	23.72	0.08	0.086	0.70	0.40	86
15	52.66	0.18	0.184	1.51	0.86	86	65	23.50	0.08	0.085	0.69	0.39	86
16	51.03	0.17	0.183	1.50	0.85	85	66	23.28	0.08	0.084	0.69	0.39	85
17	49.52	0.17	0.182	1.49	0.84	84	67	23.07	0.08	0.084	0.69	0.39	84
18	48.12	0.16	0.179	1.47	0.83	83	68	22.87	0.08	0.084	0.69	0.39	83
19	46.82	0.16	0.177	1.45	0.82	82	69	22.66	0.08	0.084	0.69	0.39	82
20	45.60	0.15	0.174	1.43	0.81	81	70	22.47	0.07	0.083	0.68	0.39	81
21	44.47	0.15	0.172	1.41	0.80	80	71	22.27	0.07	0.082	0.67	0.38	80
22	43.40	0.14	0.168	1.38	0.78	78	72	22.09	0.07	0.081	0.66	0.37	78
23	42.40	0.14	0.165	1.36	0.77	77	73	21.90	0.07	0.080	0.65	0.37	77
24	41.45	0.14	0.163	1.34	0.76	76	74	21.73	0.07	0.078	0.64	0.36	76
25	40.56	0.14	0.161	1.32	0.75	75	75	21.55	0.07	0.077	0.63	0.36	75
26	39.71	0.13	0.158	1.29	0.73	73	76	21.37	0.07	0.076	0.62	0.35	73
27	38.91	0.13	0.155	1.26	0.71	71	77	21.20	0.07	0.075	0.62	0.35	71
28	38.15	0.13	0.151	1.24	0.70	70	78	21.03	0.07	0.075	0.62	0.35	70
29	37.43	0.12	0.148	1.21	0.69	69	79	20.86	0.07	0.075	0.62	0.35	69
30	36.73	0.12	0.145	1.18	0.67	67	80	20.70	0.07	0.075	0.62	0.35	67
31	36.08	0.12	0.141	1.16	0.66	66	81	20.54	0.07	0.075	0.62	0.35	66
32	35.45	0.12	0.139	1.14	0.65	65	82	20.38	0.07	0.075	0.62	0.35	65
33	34.84	0.12	0.137	1.12	0.63	63	83	20.22	0.07	0.075	0.62	0.35	63
34	34.27	0.11	0.134	1.10	0.62	62	84	20.07	0.07	0.075	0.62	0.35	62
35	33.71	0.11	0.131	1.08	0.61	61	85	19.92	0.07	0.075	0.62	0.35	61
36	33.18	0.11	0.129	1.06	0.60	60	86	19.77	0.07	0.075	0.62	0.35	60
37	32.67	0.11	0.127	1.04	0.59	59	87	19.63	0.07	0.075	0.62	0.35	59
38	32.18	0.11	0.125	1.02	0.58	58	88	19.49	0.06	0.074	0.61	0.35	58
39	31.71	0.11	0.123	1.01	0.57	57	89	19.35	0.06	0.073	0.60	0.34	57
40	31.26	0.10	0.121	0.99	0.56	56	90	19.21	0.06	0.072	0.59	0.33	56
41	30.82	0.10	0.119	0.97	0.55	55	91	19.08	0.06	0.071	0.58	0.33	55
42	30.39	0.10	0.117	0.95	0.54	54	92	18.95	0.06	0.069	0.57	0.32	54
43	29.98	0.10	0.114	0.94	0.53	53	93	18.82	0.06	0.068	0.56	0.32	53
44	29.59	0.10	0.113	0.93	0.53	53	94	18.69	0.06	0.067	0.55	0.31	53
45	29.21	0.10	0.112	0.92	0.52	52	95	18.57	0.06	0.066	0.54	0.31	52
46	28.84	0.10	0.111	0.91	0.52	52	96	18.44	0.06	0.065	0.54	0.31	52
47	28.48	0.09	0.109	0.89	0.50	50	97	18.32	0.06	0.065	0.54	0.31	50
48	28.13	0.09	0.106	0.87	0.49	49	98	18.20	0.06	0.065	0.54	0.31	49
49	27.79	0.09	0.104	0.86	0.49	49	99	18.09	0.06	0.065	0.54	0.31	49
50	27.47	0.09	0.103	0.85	0.48	48	100	17.97	0.06	0.065	0.54	0.31	48

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Job No.	GMC22-035
Sheet no.	3
Date	07/03/22
Project	Site B, Quarry Road, Lossiemouth
Title	Soakaway data - 100 hours
By	GM
Checked	
Approved	

Duration	Rain mm/hr	Inflow m³	Outflow m³	Storage m³	Depth m	%full	Duration	Rain mm/hr	Inflow m³	Outflow m³	Storage m³	Depth m	% full
1	24.7	4.93	12.789	-	0.00	0	51	1.8	0.37	2.404	-	0.00	0
2	16.0	3.20	20.862	-	0.00	0	52	1.8	0.36	2.342	-	0.00	0
3	12.3	2.46	16.055	-	0.00	0	53	1.8	0.36	2.342	-	0.00	0
4	10.2	2.04	13.313	-	0.00	0	54	1.8	0.36	2.342	-	0.00	0
5	8.8	1.76	11.494	-	0.00	0	55	1.8	0.35	2.280	-	0.00	0
6	7.8	1.56	10.169	-	0.00	0	56	1.7	0.35	2.280	-	0.00	0
7	7.0	1.41	9.183	-	0.00	0	57	1.7	0.34	2.219	-	0.00	0
8	6.4	1.29	8.413	-	0.00	0	58	1.7	0.34	2.219	-	0.00	0
9	6.0	1.19	7.766	-	0.00	0	59	1.7	0.33	2.157	-	0.00	0
10	5.5	1.11	7.242	-	0.00	0	60	1.7	0.33	2.157	-	0.00	0
11	5.2	1.04	6.780	-	0.00	0	61	1.6	0.33	2.157	-	0.00	0
12	4.9	0.98	6.379	-	0.00	0	62	1.6	0.32	2.095	-	0.00	0
13	4.6	0.93	6.071	-	0.00	0	63	1.6	0.32	2.095	-	0.00	0
14	4.4	0.88	5.732	-	0.00	0	64	1.6	0.32	2.095	-	0.00	0
15	4.2	0.84	5.485	-	0.00	0	65	1.6	0.31	2.034	-	0.00	0
16	4.0	0.81	5.270	-	0.00	0	66	1.5	0.31	2.034	-	0.00	0
17	3.9	0.78	5.085	-	0.00	0	67	1.5	0.31	2.034	-	0.00	0
18	3.7	0.75	4.900	-	0.00	0	68	1.5	0.30	1.972	-	0.00	0
19	3.6	0.72	4.684	-	0.00	0	69	1.5	0.30	1.972	-	0.00	0
20	3.5	0.70	4.561	-	0.00	0	70	1.5	0.30	1.972	-	0.00	0
21	3.4	0.67	4.376	-	0.00	0	71	1.5	0.29	1.880	-	0.00	0
22	3.3	0.65	4.253	-	0.00	0	72	1.5	0.29	1.880	-	0.00	0
23	3.2	0.63	4.099	-	0.00	0	73	1.4	0.29	1.880	-	0.00	0
24	3.1	0.61	3.975	-	0.00	0	74	1.4	0.29	1.880	-	0.00	0
25	3.0	0.60	3.914	-	0.00	0	75	1.4	0.28	1.818	-	0.00	0
26	2.9	0.58	3.790	-	0.00	0	76	1.4	0.28	1.818	-	0.00	0
27	2.8	0.57	3.729	-	0.00	0	77	1.4	0.28	1.818	-	0.00	0
28	2.8	0.55	3.575	-	0.00	0	78	1.4	0.28	1.818	-	0.00	0
29	2.7	0.54	3.513	-	0.00	0	79	1.4	0.27	1.757	-	0.00	0
30	2.6	0.53	3.451	-	0.00	0	80	1.4	0.27	1.757	-	0.00	0
31	2.6	0.52	3.390	-	0.00	0	81	1.3	0.27	1.757	-	0.00	0
32	2.5	0.51	3.328	-	0.00	0	82	1.3	0.27	1.757	-	0.00	0
33	2.5	0.50	3.266	-	0.00	0	83	1.3	0.27	1.757	-	0.00	0
34	2.4	0.49	3.205	-	0.00	0	84	1.3	0.26	1.695	-	0.00	0
35	2.4	0.48	3.143	-	0.00	0	85	1.3	0.26	1.695	-	0.00	0
36	2.3	0.47	3.051	-	0.00	0	86	1.3	0.26	1.695	-	0.00	0
37	2.3	0.46	2.989	-	0.00	0	87	1.3	0.26	1.695	-	0.00	0
38	2.3	0.45	2.928	-	0.00	0	88	1.3	0.25	1.633	-	0.00	0
39	2.2	0.44	2.866	-	0.00	0	89	1.3	0.25	1.633	-	0.00	0
40	2.2	0.44	2.866	-	0.00	0	90	1.3	0.25	1.633	-	0.00	0
41	2.1	0.43	2.804	-	0.00	0	91	1.2	0.25	1.633	-	0.00	0
42	2.1	0.42	2.743	-	0.00	0	92	1.2	0.25	1.633	-	0.00	0
43	2.1	0.41	2.681	-	0.00	0	93	1.2	0.25	1.633	-	0.00	0
44	2.0	0.41	2.681	-	0.00	0	94	1.2	0.24	1.572	-	0.00	0
45	2.0	0.40	2.619	-	0.00	0	95	1.2	0.24	1.572	-	0.00	0
46	2.0	0.40	2.619	-	0.00	0	96	1.2	0.24	1.572	-	0.00	0
47	2.0	0.39	2.558	-	0.00	0	97	1.2	0.24	1.572	-	0.00	0
48	1.9	0.38	2.465	-	0.00	0	98	1.2	0.24	1.572	-	0.00	0
49	1.9	0.38	2.465	-	0.00	0	99	1.2	0.24	1.572	-	0.00	0
50	1.9	0.37	2.404	-	0.00	0	100	1.2	0.23	1.510	-	0.00	0

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Job No. GMC22-035			
Sheet no. 4			
Date 07/03/22			
Project Site B, Quarry Road, Lossiemouth	By GM	Checked	Approved
Title Hydrology data			

Location hydrological data (FSR):-

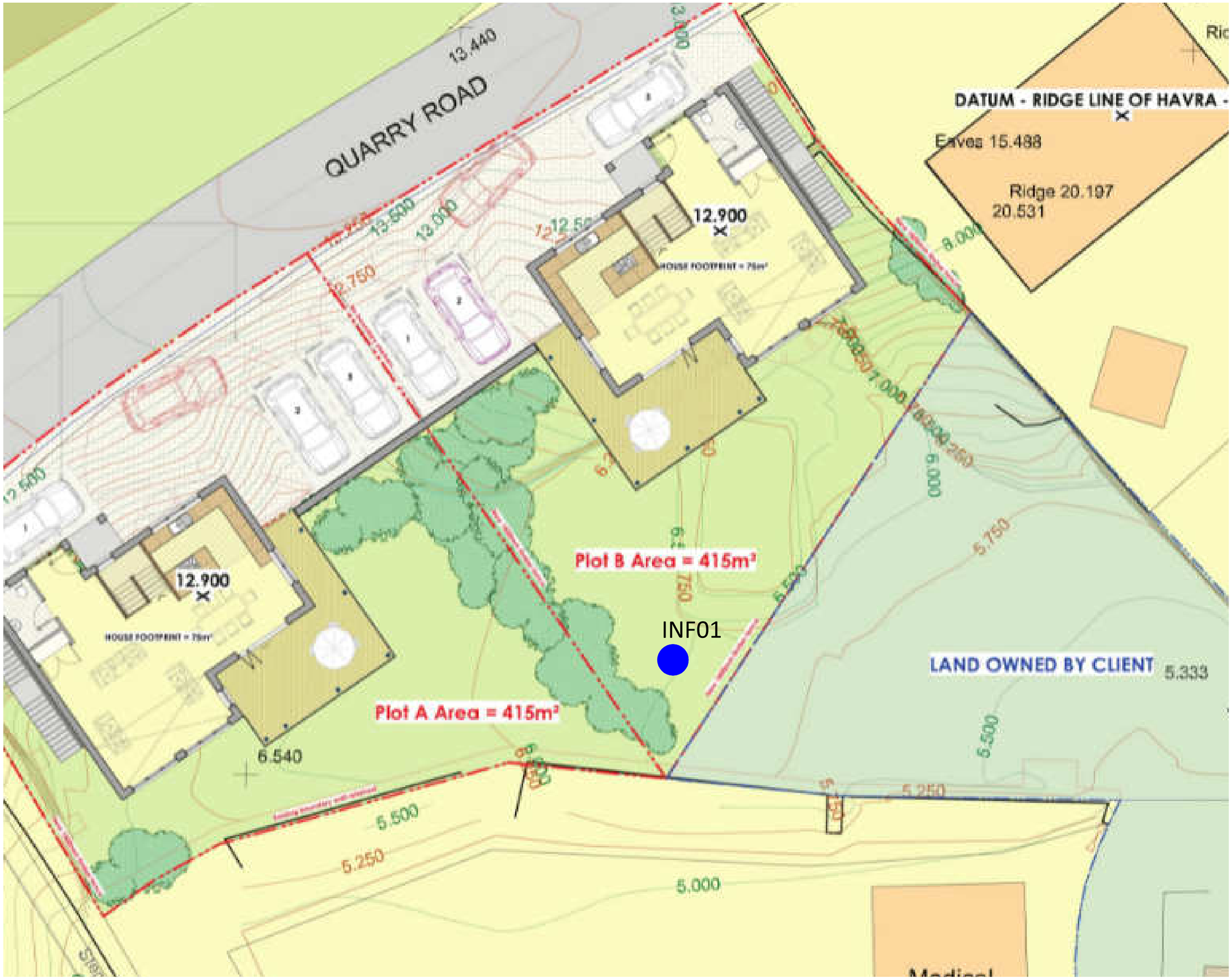
Location	= LOSSIEMOUTH	Grid reference	= NJ2370
M5-60 (mm)	= 12	r	= 0.26
Soil index	= 0.40	SAAR (mm/yr)	= 700
WRAP	= 3	Area = Scotland and N. Ireland	

Soil classification for WRAP type 3
i) Relatively impermeable soils in boulder and sedimentary clays, and in alluvium, especially in eastern England;
ii) Permeable soils with shallow ground water in low-lying areas;
iii) Mixed areas of permeable and impermeable soils, in approximately equal proportions.

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 and Mrs Cochrane
C/O CM Design

SITE:
Site B
Quarry Road, Lossiemouth

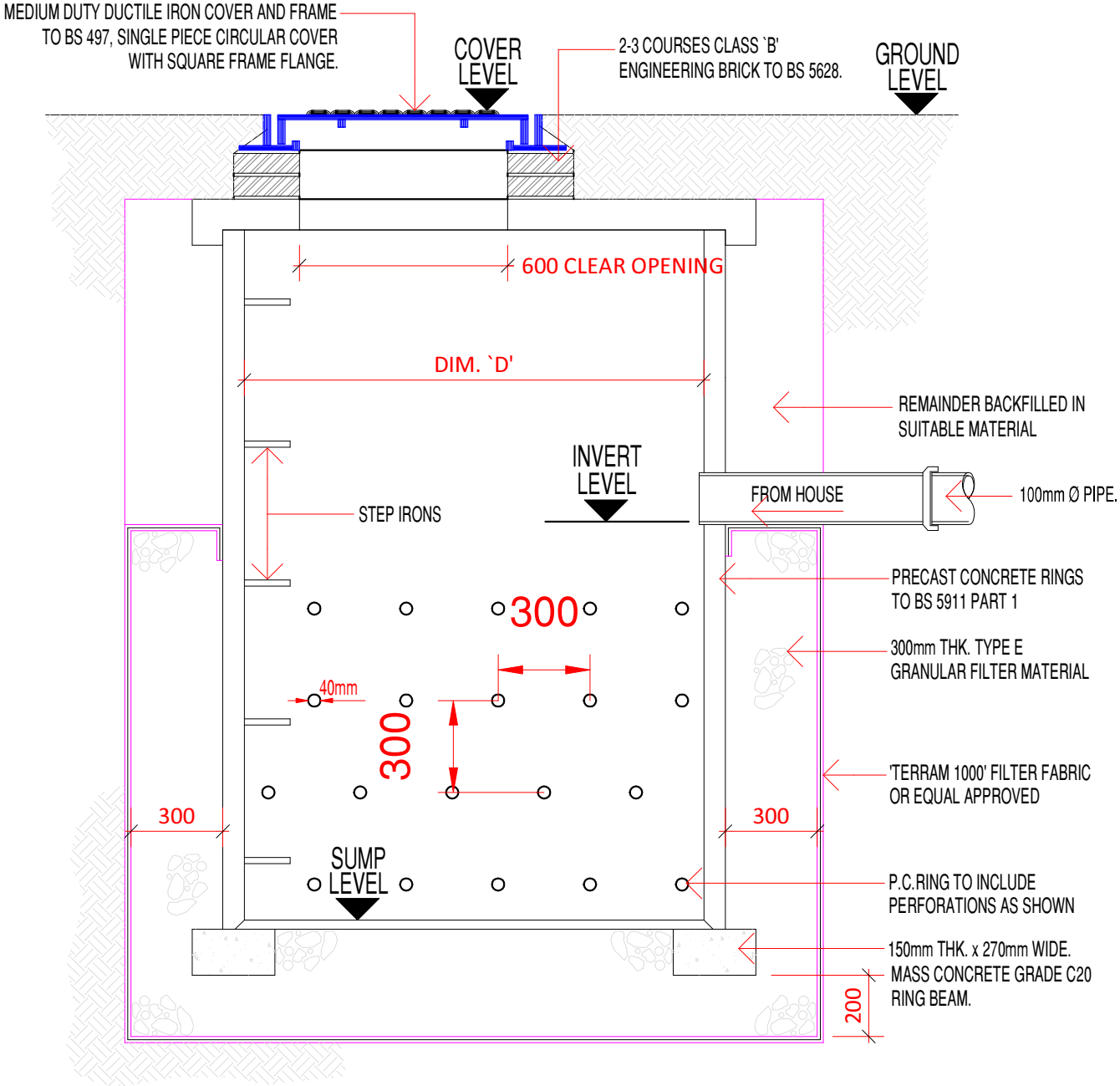
TITLE: Test Hole Location

SCALE AT A4:	DATE:	DRAWN:	CHECKED:
NTS	MAR22	GM	
PROJECT NO:	DRAWING NO:		REVISION:
GMC22-035	Appendix A		-

APPENDIX B

Surface Water Soakaway Detail/Certificate

PRECAST CONCRETE SOAKAWAY



SECTION THROUGH RAINWATER SOAKAWAY

REV:	DESCRIPTION:	BY:	DATE:

STATUS: ISSUE

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CLIENT:
Mr and Mrs Cochrane
C/O CM Design

SITE:
Site B
Quarry Road, Lossiemouth

TITLE:
Soakaway Details

SCALE AT A4:	DATE:	DRAWN:	CHECKED:
NTS	MAR22	GM	

PROJECT NO:	DRAWING NO:	REVISION:
GMC22-035	Appendix B	-

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Surveys,Setting Out Civil Engineering Design

Certificate For Proposed Sub – Surface Soakaways
Surface Water

Applicants Name: Mr and Mrs Cochrane
Address: C/O CM Design, South Guildry Street, Elgin
Site Address: Site B, Quarry Road, Lossiemouth
Date of Tests: 26th February 2022
Weather Conditions: Overcast/Dry

Trial Pit Test – Surface Water:

Depth of Excavation: 1.7m
Water Table Present: No

Infiltration Test:

Location: INF01
Infiltration Test Zone: 0.9 – 1.7mbgl
Infiltration Rate (m/s): 1.19 x 10^{-4}m/s or 0.428m/hr
Contributing Area: 200m2
Soakaway Size: 1200mm Diam Perforated Concrete Soakaway ring with 1.0m depth below the inlet and 300mm surround of 40mm Clean Stone

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:7th March 2022

Company: GMC Surveys, 34 Castle Street, Forres, Morayshire. IV36 1PW

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