



## **Proposed Storage Building**

At:

Overton Farm, Berefold, Ellon, AB41 8EL

## **Surface Drainage Design Report**

For:

Mr and Dr Smith

Date: June 2021

Our Ref: 7735-21

**Proposed Storage Building**  
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## Surface Drainage Design Report

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### Document Properties

Revision	Details	Issue Date
01	First Issue	15/06/2021

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### For and on behalf of Campbell of Doune Limited

**Campbell of Doune Limited**  
Registered Office: Macfarlane Gray House, Castlecraig Business Park, Springbank Road, STIRLING, FK7 7WT  
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## **Proposed Storage Building**

Overton Farm, Berefold, Ellon, AB41 8EL

### **Surface Drainage Design Report**

## **1 Overview**

It is proposed to build a storage building at Overton Farm, Ellon. The storage building forms part of a single dwelling house development (House applied for separately). The surface water drained from the new building roof is to be routed to a new trench soakaway structure. All surface discharge is to be infiltrated into the native soil.

The SUDS system has been designed in accordance with the latest issue of CIRIA C753 (The SUDS Manual), Sewers for Scotland 4<sup>th</sup> Edition, and Aberdeenshire Council's Supplementary DIA Guidance for Developers and Regulators document.

## **2 Design Parameters**

New Building Roof Area = 0.012 Ha (incl. 10% Creep factor)

VP = 14 secs/mm (Site porosity testing – Refer to SI)

Soakaway Structure – Trench Soakaway

Outflow Control – N/A

Overflow Control – N/A

Climate Change Allowance - +40%

## **3 Critical Storm Event**

1 in 200-year Critical Rainfall Event

- + 40% Climate Change Allowance

## **4 Flood Risk**

1 in 200-year Critical Rainfall Event

- + 40% Climate Change Allowance

## **5 Calculations**

Modelled using Micro Drainage 2016

Modelled using FSR rainfall data for site location.

200-year Attenuation trench modelled for winter 120 min rainfall event - worst case scenario

## **Surface Drainage Design Report**

# **6 Drainage Arrangement**

Refer to drawing no. 7735-21-301 for full layout and details.

Trench properties:

- Trench extension geometry – 8.0L x 2.0W x 0.9D (m)
- Trench Void Ratio – 0.3
- Max 200Y Volume – 3.5m<sup>3</sup>
- Max depth (200Y) – 0.738m (462mm below finished ground level)

# **7 Flood Risk**

200-year peak flood inflow is attenuated on site without detriment to properties, within or without the development site.

The site does not appear to be at risk from surface water, costal or river flooding as confirmed by the SEPA Flood Maps.

# **8 Water Quality**

SEPA Simple Index Approach Tool indicates sufficient pollution mitigation with a trench soakaway system for roof runoff. Summary table included within the appendices.

# **9 Notes**


Soakaway system is to be in accordance with CIRIA C753 (The SUDS Manual) and thereafter maintained in accordance with the operation and maintenance requirements.

No groundwater encountered during the site investigation.

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**Surface Drainage Design Report**


**Appendix A: Soakaway Calculations**

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78 King Street Crieff PH7 3HB	Soakaway Design Proposed Storage Building Overton Farm, Ellon	
Date 15/06/2021 12:10 File Overton Farm Soakaway.SRCX	Designed by M.W Checked by H.C	
XP Solutions	Source Control 2020.1	

Flood Routing through Storage Facility

Event: 120 min Winter


Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Volume (m <sup>3</sup> )	Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Volume (m <sup>3</sup> )
2	8.800	0.000	0.0	0.0	0.0	88	9.534	0.734	0.7	0.9	3.5
4	8.802	0.002	0.1	0.0	0.0	90	9.529	0.729	0.6	0.9	3.5
6	8.806	0.006	0.2	0.0	0.0	92	9.522	0.722	0.5	0.9	3.5
8	8.812	0.012	0.3	0.0	0.1	94	9.513	0.713	0.5	0.8	3.4
10	8.820	0.020	0.3	0.0	0.1	96	9.504	0.704	0.4	0.8	3.4
12	8.828	0.028	0.4	0.0	0.1	98	9.494	0.694	0.4	0.8	3.3
14	8.836	0.036	0.4	0.0	0.2	100	9.484	0.684	0.4	0.8	3.3
16	8.845	0.045	0.4	0.1	0.2	102	9.473	0.673	0.4	0.8	3.2
18	8.853	0.053	0.4	0.1	0.3	104	9.463	0.663	0.4	0.8	3.2
20	8.861	0.061	0.4	0.1	0.3	106	9.453	0.653	0.4	0.8	3.1
22	8.869	0.069	0.4	0.1	0.3	108	9.444	0.644	0.4	0.8	3.1
24	8.876	0.076	0.4	0.1	0.4	110	9.434	0.634	0.4	0.8	3.0
26	8.884	0.084	0.4	0.1	0.4	112	9.425	0.625	0.4	0.7	3.0
28	8.892	0.092	0.4	0.1	0.4	114	9.415	0.615	0.3	0.7	3.0
30	8.901	0.101	0.5	0.1	0.5	116	9.405	0.605	0.3	0.7	2.9
32	8.911	0.111	0.5	0.1	0.5	118	9.394	0.594	0.2	0.7	2.8
34	8.922	0.122	0.6	0.1	0.6	120	9.380	0.580	0.1	0.7	2.8
36	8.935	0.135	0.7	0.2	0.6	122	9.365	0.565	0.0	0.7	2.7
38	8.949	0.149	0.8	0.2	0.7	124	9.349	0.549	0.0	0.7	2.6
40	8.966	0.166	0.9	0.2	0.8	126	9.333	0.533	0.0	0.6	2.6
42	8.985	0.185	1.0	0.2	0.9	128	9.317	0.517	0.0	0.6	2.5
44	9.006	0.206	1.2	0.2	1.0	130	9.302	0.502	0.0	0.6	2.4
46	9.031	0.231	1.3	0.3	1.1	132	9.287	0.487	0.0	0.6	2.3
48	9.058	0.258	1.4	0.3	1.2	134	9.273	0.473	0.0	0.6	2.3
50	9.087	0.287	1.6	0.3	1.4	136	9.259	0.459	0.0	0.5	2.2
52	9.120	0.320	1.7	0.4	1.5	138	9.246	0.446	0.0	0.5	2.1
54	9.154	0.354	1.9	0.4	1.7	140	9.233	0.433	0.0	0.5	2.1
56	9.191	0.391	2.0	0.5	1.9	142	9.220	0.420	0.0	0.5	2.0
58	9.229	0.429	2.1	0.5	2.1	144	9.208	0.408	0.0	0.5	2.0
60	9.269	0.469	2.1	0.6	2.3	146	9.196	0.396	0.0	0.5	1.9
62	9.308	0.508	2.2	0.6	2.4	148	9.184	0.384	0.0	0.5	1.8
64	9.347	0.547	2.1	0.7	2.6	150	9.173	0.373	0.0	0.4	1.8
66	9.383	0.583	2.1	0.7	2.8	152	9.162	0.362	0.0	0.4	1.7
68	9.416	0.616	2.0	0.7	3.0	154	9.151	0.351	0.0	0.4	1.7
70	9.445	0.645	1.9	0.8	3.1	156	9.141	0.341	0.0	0.4	1.6
72	9.470	0.670	1.7	0.8	3.2	158	9.131	0.331	0.0	0.4	1.6
74	9.491	0.691	1.6	0.8	3.3	160	9.121	0.321	0.0	0.4	1.5
76	9.508	0.708	1.4	0.8	3.4	162	9.112	0.312	0.0	0.4	1.5
78	9.521	0.721	1.3	0.9	3.5	164	9.103	0.303	0.0	0.4	1.5
80	9.530	0.730	1.2	0.9	3.5	166	9.094	0.294	0.0	0.3	1.4
82	9.536	0.736	1.0	0.9	3.5	168	9.085	0.285	0.0	0.3	1.4
84	9.538	0.738	0.9	0.9	3.5	170	9.077	0.277	0.0	0.3	1.3
86	9.537	0.737	0.8	0.9	3.5	172	9.069	0.269	0.0	0.3	1.3

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174	9.061	0.261	0.0	0.3	1.3	260	8.873	0.073	0.0	0.1	0.3
176	9.053	0.253	0.0	0.3	1.2	262	8.871	0.071	0.0	0.1	0.3
178	9.046	0.246	0.0	0.3	1.2	264	8.868	0.068	0.0	0.1	0.3
180	9.039	0.239	0.0	0.3	1.1	266	8.866	0.066	0.0	0.1	0.3
182	9.032	0.232	0.0	0.3	1.1	268	8.865	0.065	0.0	0.1	0.3
184	9.025	0.225	0.0	0.3	1.1	270	8.863	0.063	0.0	0.1	0.3
186	9.018	0.218	0.0	0.3	1.0	272	8.861	0.061	0.0	0.1	0.3
188	9.012	0.212	0.0	0.3	1.0	274	8.859	0.059	0.0	0.1	0.3
190	9.006	0.206	0.0	0.2	1.0	276	8.857	0.057	0.0	0.1	0.3
192	9.000	0.200	0.0	0.2	1.0	278	8.856	0.056	0.0	0.1	0.3
194	8.994	0.194	0.0	0.2	0.9	280	8.854	0.054	0.0	0.1	0.3
196	8.988	0.188	0.0	0.2	0.9	282	8.852	0.052	0.0	0.1	0.3
198	8.983	0.183	0.0	0.2	0.9	284	8.851	0.051	0.0	0.1	0.2
200	8.977	0.177	0.0	0.2	0.9	286	8.849	0.049	0.0	0.1	0.2
202	8.972	0.172	0.0	0.2	0.8	288	8.848	0.048	0.0	0.1	0.2
204	8.967	0.167	0.0	0.2	0.8	290	8.847	0.047	0.0	0.1	0.2
206	8.962	0.162	0.0	0.2	0.8	292	8.845	0.045	0.0	0.1	0.2
208	8.957	0.157	0.0	0.2	0.8	294	8.844	0.044	0.0	0.1	0.2
210	8.953	0.153	0.0	0.2	0.7	296	8.843	0.043	0.0	0.1	0.2
212	8.948	0.148	0.0	0.2	0.7	298	8.841	0.041	0.0	0.0	0.2
214	8.944	0.144	0.0	0.2	0.7	300	8.840	0.040	0.0	0.0	0.2
216	8.940	0.140	0.0	0.2	0.7	302	8.839	0.039	0.0	0.0	0.2
218	8.936	0.136	0.0	0.2	0.7	304	8.838	0.038	0.0	0.0	0.2
220	8.932	0.132	0.0	0.2	0.6	306	8.837	0.037	0.0	0.0	0.2
222	8.928	0.128	0.0	0.2	0.6	308	8.836	0.036	0.0	0.0	0.2
224	8.924	0.124	0.0	0.1	0.6	310	8.835	0.035	0.0	0.0	0.2
226	8.920	0.120	0.0	0.1	0.6	312	8.834	0.034	0.0	0.0	0.2
228	8.917	0.117	0.0	0.1	0.6	314	8.833	0.033	0.0	0.0	0.2
230	8.914	0.114	0.0	0.1	0.5	316	8.832	0.032	0.0	0.0	0.2
232	8.910	0.110	0.0	0.1	0.5	318	8.831	0.031	0.0	0.0	0.1
234	8.907	0.107	0.0	0.1	0.5	320	8.830	0.030	0.0	0.0	0.1
236	8.904	0.104	0.0	0.1	0.5	322	8.829	0.029	0.0	0.0	0.1
238	8.901	0.101	0.0	0.1	0.5	324	8.828	0.028	0.0	0.0	0.1
240	8.898	0.098	0.0	0.1	0.5	326	8.827	0.027	0.0	0.0	0.1
242	8.895	0.095	0.0	0.1	0.5	328	8.826	0.026	0.0	0.0	0.1
244	8.892	0.092	0.0	0.1	0.4	330	8.826	0.026	0.0	0.0	0.1
246	8.889	0.089	0.0	0.1	0.4	332	8.825	0.025	0.0	0.0	0.1
248	8.887	0.087	0.0	0.1	0.4	334	8.824	0.024	0.0	0.0	0.1
250	8.884	0.084	0.0	0.1	0.4	336	8.823	0.023	0.0	0.0	0.1
252	8.882	0.082	0.0	0.1	0.4	338	8.823	0.023	0.0	0.0	0.1
254	8.879	0.079	0.0	0.1	0.4	340	8.822	0.022	0.0	0.0	0.1
256	8.877	0.077	0.0	0.1	0.4	342	8.821	0.021	0.0	0.0	0.1
258	8.875	0.075	0.0	0.1	0.4	344	8.821	0.021	0.0	0.0	0.1


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346	8.820	0.020	0.0	0.0	0.1	432	8.806	0.006	0.0	0.0	0.0
348	8.820	0.020	0.0	0.0	0.1	434	8.805	0.005	0.0	0.0	0.0
350	8.819	0.019	0.0	0.0	0.1	436	8.805	0.005	0.0	0.0	0.0
352	8.818	0.018	0.0	0.0	0.1	438	8.805	0.005	0.0	0.0	0.0
354	8.818	0.018	0.0	0.0	0.1	440	8.805	0.005	0.0	0.0	0.0
356	8.817	0.017	0.0	0.0	0.1	442	8.805	0.005	0.0	0.0	0.0
358	8.817	0.017	0.0	0.0	0.1	444	8.805	0.005	0.0	0.0	0.0
360	8.816	0.016	0.0	0.0	0.1	446	8.805	0.005	0.0	0.0	0.0
362	8.816	0.016	0.0	0.0	0.1	448	8.804	0.004	0.0	0.0	0.0
364	8.815	0.015	0.0	0.0	0.1	450	8.804	0.004	0.0	0.0	0.0
366	8.815	0.015	0.0	0.0	0.1	452	8.804	0.004	0.0	0.0	0.0
368	8.815	0.015	0.0	0.0	0.1	454	8.804	0.004	0.0	0.0	0.0
370	8.814	0.014	0.0	0.0	0.1	456	8.804	0.004	0.0	0.0	0.0
372	8.814	0.014	0.0	0.0	0.1	458	8.804	0.004	0.0	0.0	0.0
374	8.813	0.013	0.0	0.0	0.1	460	8.804	0.004	0.0	0.0	0.0
376	8.813	0.013	0.0	0.0	0.1	462	8.804	0.004	0.0	0.0	0.0
378	8.813	0.013	0.0	0.0	0.1	464	8.803	0.003	0.0	0.0	0.0
380	8.812	0.012	0.0	0.0	0.1	466	8.803	0.003	0.0	0.0	0.0
382	8.812	0.012	0.0	0.0	0.1	468	8.803	0.003	0.0	0.0	0.0
384	8.811	0.011	0.0	0.0	0.1	470	8.803	0.003	0.0	0.0	0.0
386	8.811	0.011	0.0	0.0	0.1	472	8.803	0.003	0.0	0.0	0.0
388	8.811	0.011	0.0	0.0	0.1	474	8.803	0.003	0.0	0.0	0.0
390	8.811	0.011	0.0	0.0	0.1	476	8.803	0.003	0.0	0.0	0.0
392	8.810	0.010	0.0	0.0	0.0	478	8.803	0.003	0.0	0.0	0.0
394	8.810	0.010	0.0	0.0	0.0	480	8.803	0.003	0.0	0.0	0.0
396	8.810	0.010	0.0	0.0	0.0	482	8.803	0.003	0.0	0.0	0.0
398	8.809	0.009	0.0	0.0	0.0	484	8.803	0.003	0.0	0.0	0.0
400	8.809	0.009	0.0	0.0	0.0	486	8.803	0.003	0.0	0.0	0.0
402	8.809	0.009	0.0	0.0	0.0	488	8.802	0.002	0.0	0.0	0.0
404	8.809	0.009	0.0	0.0	0.0	490	8.802	0.002	0.0	0.0	0.0
406	8.808	0.008	0.0	0.0	0.0	492	8.802	0.002	0.0	0.0	0.0
408	8.808	0.008	0.0	0.0	0.0	494	8.802	0.002	0.0	0.0	0.0
410	8.808	0.008	0.0	0.0	0.0	496	8.802	0.002	0.0	0.0	0.0
412	8.808	0.008	0.0	0.0	0.0	498	8.802	0.002	0.0	0.0	0.0
414	8.807	0.007	0.0	0.0	0.0	500	8.802	0.002	0.0	0.0	0.0
416	8.807	0.007	0.0	0.0	0.0	502	8.802	0.002	0.0	0.0	0.0
418	8.807	0.007	0.0	0.0	0.0	504	8.802	0.002	0.0	0.0	0.0
420	8.807	0.007	0.0	0.0	0.0	506	8.802	0.002	0.0	0.0	0.0
422	8.807	0.007	0.0	0.0	0.0	508	8.802	0.002	0.0	0.0	0.0
424	8.806	0.006	0.0	0.0	0.0	510	8.802	0.002	0.0	0.0	0.0
426	8.806	0.006	0.0	0.0	0.0	512	8.802	0.002	0.0	0.0	0.0
428	8.806	0.006	0.0	0.0	0.0	514	8.802	0.002	0.0	0.0	0.0
430	8.806	0.006	0.0	0.0	0.0	516	8.802	0.002	0.0	0.0	0.0




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518	8.802	0.002	0.0	0.0	0.0	556	8.801	0.001	0.0	0.0	0.0
520	8.802	0.002	0.0	0.0	0.0	558	8.801	0.001	0.0	0.0	0.0
522	8.801	0.001	0.0	0.0	0.0	560	8.801	0.001	0.0	0.0	0.0
524	8.801	0.001	0.0	0.0	0.0	562	8.801	0.001	0.0	0.0	0.0
526	8.801	0.001	0.0	0.0	0.0	564	8.801	0.001	0.0	0.0	0.0
528	8.801	0.001	0.0	0.0	0.0	566	8.801	0.001	0.0	0.0	0.0
530	8.801	0.001	0.0	0.0	0.0	568	8.801	0.001	0.0	0.0	0.0
532	8.801	0.001	0.0	0.0	0.0	570	8.801	0.001	0.0	0.0	0.0
534	8.801	0.001	0.0	0.0	0.0	572	8.801	0.001	0.0	0.0	0.0
536	8.801	0.001	0.0	0.0	0.0	574	8.801	0.001	0.0	0.0	0.0
538	8.801	0.001	0.0	0.0	0.0	576	8.801	0.001	0.0	0.0	0.0
540	8.801	0.001	0.0	0.0	0.0	578	8.801	0.001	0.0	0.0	0.0
542	8.801	0.001	0.0	0.0	0.0	580	8.801	0.001	0.0	0.0	0.0
544	8.801	0.001	0.0	0.0	0.0	582	8.801	0.001	0.0	0.0	0.0
546	8.801	0.001	0.0	0.0	0.0	584	8.801	0.001	0.0	0.0	0.0
548	8.801	0.001	0.0	0.0	0.0	586	8.801	0.001	0.0	0.0	0.0
550	8.801	0.001	0.0	0.0	0.0	588	8.801	0.001	0.0	0.0	0.0
552	8.801	0.001	0.0	0.0	0.0	590	8.801	0.001	0.0	0.0	0.0
554	8.801	0.001	0.0	0.0	0.0	592	8.800	0.000	0.0	0.0	0.0


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78 King Street Crieff PH7 3HB	Soakaway Design Proposed Storage Building Overton Farm, Ellon	
Date 15/06/2021 12:10 File Overton Farm Soakaway.SRCX	Designed by M.W Checked by H.C	
XP Solutions	Source Control 2020.1	

Summary of Results for 200 year Return Period (+40%)

Half Drain Time : 47 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	9.223	0.423	0.5	2.0	O K
30 min Summer	9.346	0.546	0.6	2.6	O K
60 min Summer	9.436	0.636	0.8	3.1	O K
120 min Summer	9.483	0.683	0.8	3.3	O K
180 min Summer	9.480	0.680	0.8	3.3	O K
240 min Summer	9.463	0.663	0.8	3.2	O K
360 min Summer	9.419	0.619	0.7	3.0	O K
480 min Summer	9.376	0.576	0.7	2.8	O K
600 min Summer	9.338	0.538	0.6	2.6	O K
720 min Summer	9.305	0.505	0.6	2.4	O K
960 min Summer	9.252	0.452	0.5	2.2	O K
1440 min Summer	9.176	0.376	0.4	1.8	O K
2160 min Summer	9.106	0.306	0.4	1.5	O K
2880 min Summer	9.059	0.259	0.3	1.2	O K
4320 min Summer	9.003	0.203	0.2	1.0	O K
5760 min Summer	8.969	0.169	0.2	0.8	O K
7200 min Summer	8.946	0.146	0.2	0.7	O K
8640 min Summer	8.929	0.129	0.2	0.6	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	102.015	0.0	17
30 min Summer	72.448	0.0	30
60 min Summer	48.331	0.0	44
120 min Summer	30.946	0.0	78
180 min Summer	23.618	0.0	112
240 min Summer	19.440	0.0	146
360 min Summer	14.728	0.0	210
480 min Summer	12.075	0.0	274
600 min Summer	10.343	0.0	336
720 min Summer	9.111	0.0	398
960 min Summer	7.454	0.0	520
1440 min Summer	5.616	0.0	764
2160 min Summer	4.229	0.0	1124
2880 min Summer	3.453	0.0	1496
4320 min Summer	2.590	0.0	2204
5760 min Summer	2.110	0.0	2936
7200 min Summer	1.799	0.0	3672
8640 min Summer	1.579	0.0	4408

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XP Solutions	Source Control 2020.1	

Summary of Results for 200 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	8.916	0.116	0.1	0.6	O K
15 min Winter	9.274	0.474	0.6	2.3	O K
30 min Winter	9.415	0.615	0.7	3.0	O K
60 min Winter	9.509	0.709	0.8	3.4	O K
<b>120 min Winter</b>	<b>9.538</b>	<b>0.738</b>	<b>0.9</b>	<b>3.5</b>	<b>O K</b>
180 min Winter	9.515	0.715	0.9	3.4	O K
240 min Winter	9.480	0.680	0.8	3.3	O K
360 min Winter	9.409	0.609	0.7	2.9	O K
480 min Winter	9.349	0.549	0.7	2.6	O K
600 min Winter	9.299	0.499	0.6	2.4	O K
720 min Winter	9.258	0.458	0.5	2.2	O K
960 min Winter	9.195	0.395	0.5	1.9	O K
1440 min Winter	9.113	0.313	0.4	1.5	O K
2160 min Winter	9.043	0.243	0.3	1.2	O K
2880 min Winter	9.001	0.201	0.2	1.0	O K
4320 min Winter	8.952	0.152	0.2	0.7	O K
5760 min Winter	8.925	0.125	0.1	0.6	O K
7200 min Winter	8.907	0.107	0.1	0.5	O K
8640 min Winter	8.894	0.094	0.1	0.5	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	1.415	0.0	5136
15 min Winter	102.015	0.0	17
30 min Winter	72.448	0.0	30
60 min Winter	48.331	0.0	48
<b>120 min Winter</b>	<b>30.946</b>	<b>0.0</b>	<b>84</b>
180 min Winter	23.618	0.0	120
240 min Winter	19.440	0.0	154
360 min Winter	14.728	0.0	220
480 min Winter	12.075	0.0	286
600 min Winter	10.343	0.0	348
720 min Winter	9.111	0.0	412
960 min Winter	7.454	0.0	532
1440 min Winter	5.616	0.0	778
2160 min Winter	4.229	0.0	1144
2880 min Winter	3.453	0.0	1500
4320 min Winter	2.590	0.0	2208
5760 min Winter	2.110	0.0	2944
7200 min Winter	1.799	0.0	3672
8640 min Winter	1.579	0.0	4408

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Summary of Results for 200 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
10080 min Winter	8.884	0.084	0.1	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
10080 min Winter	1.415	0.0	5096

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Rainfall Details


Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	200	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	15.000	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.012

**Time (mins) Area**  
**From: To: (ha)**

0      4    0.012

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Model Details

Storage is Online Cover Level (m) 10.000

Trench Soakaway Structure

Infiltration Coefficient Base (m/hr) 0.00000	Trench Width (m) 2.0
Infiltration Coefficient Side (m/hr) 0.25700	Trench Length (m) 8.0
Safety Factor 1.2	Slope (1:X) 0.0
Porosity 0.30	Cap Volume Depth (m) 0.000
Invert Level (m) 8.800	Cap Infiltration Depth (m) 0.000

78 King Street  
Crieff  
PH7 3HB

Soakaway Design  
Proposed Storage Building  
Overton Farm, Ellon

Date 15/06/2021 12:10  
File Overton Farm Soakaway.SRCX

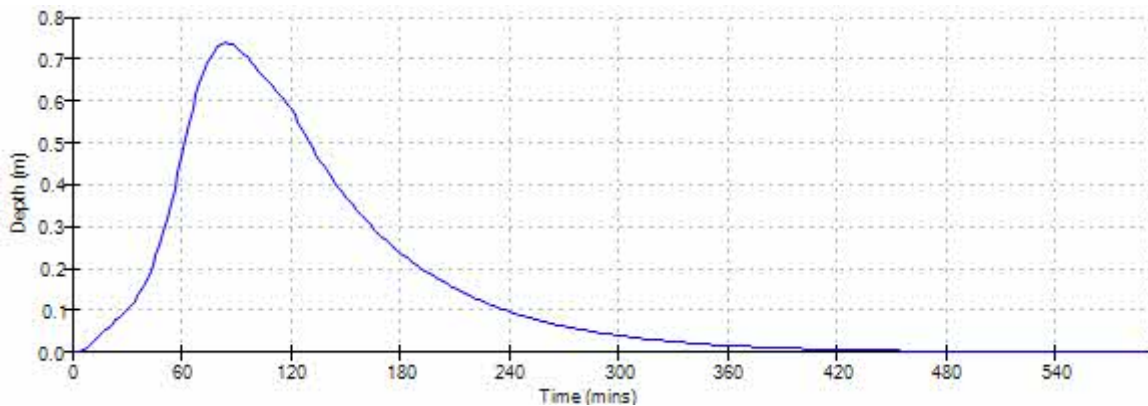
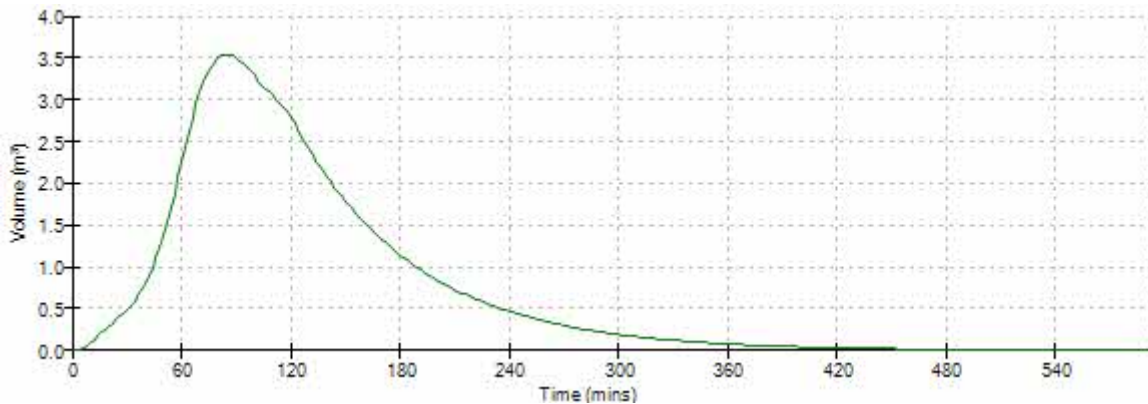
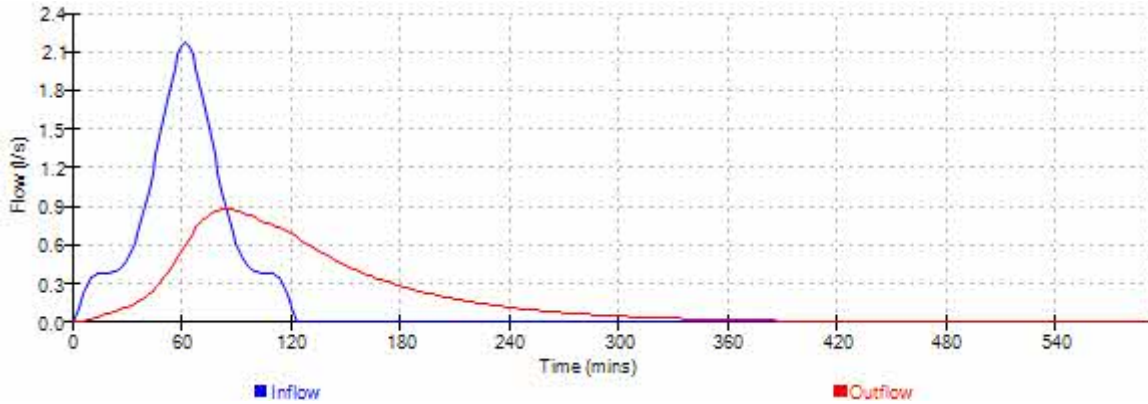
Designed by M.W  
Checked by H.C



XP Solutions

Source Control 2020.1

Event: 120 min Winter



**Proposed Storage Building**  
Overton Farm, Berefold, Ellon, AB41 8EL

**Surface Drainage Design Report**

**Appendix B: SIA Tool Summary**



**SIMPLE INDEX APPROACH:  
SUMMARY TABLE**



HRW shall not be liable for any direct or indirect damage claim, loss, cost, expense or liability howsoever arising out of the use or impossibility to use the tools, even when HRW has been informed of the possibility of the same. The user hereby indemnifies HRW from and against any damage claim, loss, expense or liability resulting from any action taken against HRW that is related in any way to the use of the tool or any reliance made in respect of the output of such use by any person whatsoever. HRW does not guarantee that the tool's functions meet the requirements of any person, nor that the tool is free from errors.

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Residential roofing				
Pollution Hazard Level	Very low				
Pollution Hazard Indices					
TSS	0.2				
Metals	0.2				
Hydrocarbons	0.05				
SuDS components proposed					
Component 1	None				
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Groundwater protection type	Infiltration trench with suitable depth of filtration material underlain by 300 mm minimum depth of soils with good contamination attenuation potential	All designs must include a minimum of 1 m unsaturated depth of subsoil or aquifer material between the infiltration surface and the maximum likely groundwater level. Infiltration components should always be preceded by upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate lined zone, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events	The infiltration trench must include a suitable depth filtration layer that provides treatment (ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20mm gravel). The underlying soils must provide good contaminant attenuation potential (eg as recommended in Sniffer 2008 (a) and (b) / Scott Wilson (2010) or other appropriate guidance). Alternative depth and soil combinations must provide equivalent protection to the underlying groundwater		
Groundwater protection Pollution Mitigation Indices					
TSS	0.4				
Metals	0.4				
Hydrocarbons	0.4				
Combined Pollution Mitigation Indices					
TSS	0.4				
Metals	0.4				
Hydrocarbons	0.4				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

**Note: In order to meet both Water Quality criteria set out in the SuDS Manual (Chapter 4), Interception should be delivered for all impermeable areas wherever possible. Interception delivery and treatment may be met by the same components, but Interception requires separate evaluation.**

Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England

**Proposed Storage Building**  
Overton Farm, Berefold, Ellon, AB41 8EL

**Surface Drainage Design Report**

**Appendix C: Site Investigation Summary**

**S.A. MCGREGOR**



GROUND ASSESSMENT  
&  
DRAINAGE RECOMMENDATION REPORT

PROPOSED NEW DWELLINGHOUSES  
OVERTON FARM  
BEREFOLD  
ELLON  
ABERDEENSHIRE

*Applicant:* Mr & Dr Smith

*Agent:* Rachael Walker Architects

*Contract No. :* 2167

*Report Issued:* 23 March 2020

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### Introduction

### Site Location & Brief Description

*Note*

### Site Work

*Trial Pits*

*Percolation Testing*

*Infiltration Testing*

### Ground Assessment

*Published Geology*

*Encountered Ground Conditions*

*Ground Water Observations*

### Discussion

*Sub-Soils*

*Sewerage Treatment*

*Foul Water Discharge*

*SuDS*

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### Drainage Recommendations

*Foul Water Discharge*

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*Indicative Drainage Layout*

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*Soakaways*

### Regulations

## APPENDIX A

Site Plans	Fig. 1. General & Site Location Plans
	Fig. 2. Test Location Plan
Trial Pit Logs	FW1-3 & SW1-2
Drainage	Fig. 3. Indicative Drainage Layout
	Fig. 4. Indicative Sub-Surface Soakaway Construction
Certificates	Foul Water Soakaways
	Surface Water Soakaway

GROUND ASSESSMENT  
&  
DRAINAGE RECOMMENDATION REPORT  
PROPOSED NEW DWELLINGHOUSES  
OVERTON FARM  
BEREFOLD  
ELLON  
ABERDEENSHIRE

INTRODUCTION

At the request of Rachael Walker Architects and behalf of Mr and Dr Smith this report is presented for the new planning application for the proposed development at Overton Farm, Berefold, Ellon.

This report is updated from the original S A McGregor report dated June 2018.

It is proposed to erect new dwellinghouses on the site of the former farm buildings.

The ground investigation determined the nature of the materials underlying the area of land for the proposed drainage and undertook the following: -

Percolation testing to assess the suitability of the underground strata for the disposal of effluent from a sewage treatment system to the ground via a designed sub-surface soakaway system

Infiltration testing for the disposal design for surface waters from the proposed development

SITE LOCATION & BRIEF DESCRIPTION

The development site is located on land to the north-west of Overton House south of Berefold near Ellon with access from off the A948 and local roads on land all under the ownership of the applicant, OS Grid Ref NJ 96925, 34274 (approx. centre of site), see Fig. 1. General & Site Location Plans.

The site of the former farm buildings has associated 'open' land immediately adjacent to the north. The site boundaries are defined by the public road to the west.

The site is un-serviced however mains water, electricity and telephone are nearby; there is no mains drainage available for this development. All nearby properties are served by private sewage treatment and discharge systems.

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

There are no surface watercourses within 10m of the site.

*Note*

There have been no changes to the site that are detrimental to the original ground investigation and the site assessment and drainage design recommendations.

**SITE WORK**

*Trial Pits*

On the 24<sup>th</sup> May 2018, a back-actor excavator with a 1.0m bucket excavated trial pits to carry out an assessment of the underlying ground conditions, 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 decided on site and are indicated on Fig. 2. Indicative Site Layout & Test Location Plan in Appendix A.

*Percolation Testing*

Percolation testing was carried out in test holes adjacent to observation trial pit FW3 in accordance with Section 3.9.2 of the Scottish Building Standards Technical Handbook (Domestic); the test results are shown on the following table: -

Date of Testing 24 <sup>th</sup> May 2018	FW3
Average time taken for water to drain 3 times in each sump hole (middle 150mm)	2100
Depth of Water Table below Ground Level (m)	1.80m
Soil Percolation Values, Vp, s/mm	14

*Infiltration Testing*

Infiltration testing was carried out in trial pit SW2 in accordance with BRE Digest 365; the test results are tabulated below: -

Trial Pit No.	Pit Dimensions (W x L)m	Test Zone (mbegl)	In-Fill	Soil Infiltration Rate, f (m/s)
SW2	0.50 x 1.20	1.50-2.50	Open	2.38 x 10 <sup>-5</sup>

**GROUND ASSESSMENT**

*Published Geology*

The British Geological Survey 1:50,000 Superficial and Solid maps indicate that the site may be overlain by Banchory Till Formation (Diamicton – clay, silt, sand and gravel) superficial deposits formed up to 2 million years ago during the Quaternary Period. The site is underlain by the Ellon Formation (Psammite and Semipelite) metamorphic bedrock formed approximately 541 to 1000 million years ago during the Dalradian Period.

*Encountered Ground Conditions*

Made Ground & Topsoil: The area in front of the steadings is overlain by 100mm thick concrete slab. The field to the west is overlain by 300mm of topsoil.

Natural Sub-Soils: In FW1, FW2 and SW1 the natural underlying sub-soils are described as soft brown clays becoming firm to stiff, very silty, very sandy with gravels and cobbles and some boulders. In FW3 and SW2 below 1.80m the strata becomes a very sandy silt with gravel and cobbles proved to 2.30m.

Bedrock: Bedrock was not encountered during this investigation.

*Groundwater Observations*

Groundwater was not encountered during the investigation nor observed during the monitoring period. No visual (no seepages or discoloration) indication of the seasonally high or fluctuating ground water table was seen in the strata above the encountered depths of 2.30m.

**DISCUSSION**

*Sub-Soils*

The sandy silty nature of the underlying soils in FW3 and SW1 and the results from the percolation and infiltration testing confirmed the moderate to well-draining properties of the sub-soils.

*Sewage Treatment*

The soil percolation value,  $V_p < 15$  s/mm and therefore secondary treatment is required prior to discharge. It is recommended to install Package Sewage Treatment Plants (PSTPs) for each dwelling.

*Foul Water Discharge*

A sub-surface stone-filled soakaway (infiltration system) is considered suitable for the discharge of foul waters from a septic tank directly to the ground. The soakaway should comply with the Domestic Technical Handbook (para. 3.9.2) which sets out guidance on design in accordance with the requirements of SEPA Regulatory Method (WAT-RM-04) Indirect Sewage Discharges to Groundwater.

*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, see summary below: -

Land Use Type	Residential Roofing	Residential Parking & Driveway
Pollution Hazard Level	Very Low	Low
Pollution Hazard Indices		
TSS	0.2	0.5
Metals	0.2	0.4
Hydrocarbons	0.05	0.4
SuDS Component Proposed	None (not discharging to watercourse)	
Component 1		
SuDS Pollution Mitigation Indices		
TSS	0.4	0.4
Metals	0.4	0.4
Hydrocarbons	0.4	0.4
Groundwater Protection Type	Infiltration Trench	Silt Trap for TSS Minimum 300mm permeable gravel finish
Combined Pollution Mitigation Indices		
TSS	0.4	0.4
Metals	0.4	0.4
Hydrocarbons	0.4	0.4
Acceptability of Pollution Mitigation		
TSS	Sufficient	Sufficient
Metals	Sufficient	Sufficient
Hydrocarbons	Sufficient	Sufficient

*Surface Water Disposal*

The investigation carried out concludes that the underlying strata are considered suitable for the construction of an infiltration trench for the surface water run-off from the roof areas and permeable driveways/parking areas for the proposed development prior to disposal to the ground.

## DRAINAGE RECOMMENDATIONS

### *Foul Water Discharge via a Sub-Surface Stone-filled Soakaway*

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 average soil percolation value,  $V_p = 14s/mm$  and in accordance with the regulations the minimum base area, A, is derived from  $A = 3.6 \times PE$ , see the following table: -

Proposed Development	Population Equivalent, PE (as defined in BW COP:18.11/13)	PSTPS to Shared Foul Water Soakaway Min. Base Area, (m <sup>2</sup> )
2 New Dwellinghouses	13 8 (6-bed) + 5 (2-bed)	47

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 models are the most suitable for the proposed development.

### *SEPA*

The proposed sewage treatment system and discharge will require to be registered with SEPA under CAR. It is recommended to apply for the registration at Building Warrant stage to ensure the proposals are approved by SEPA to ensure completion certification.

### *Surface Water Disposal*

The size of the proposed surface water soakaway is based on the impermeable surface areas of the development i.e. the house roof areas.

Using the soil infiltration rate,  $f = 2.38 \times 10^{-5} m/s$  the optimum dimensions for the surface water infiltration trench (soakaway) are shown on the following table: -

Impermeable Area (m <sup>2</sup> )	Width (m)	Length (m)	Storage depth (m)	Half Empty Time (hrs)
House 1 + 2 And Dutch Barn Roof Areas Up to 830m <sup>2</sup>	1.00 2.00 3.00 6.00 8.00	60.30 32.00 21.80 11.00 8.20	1.50	1.72 3.29 4.61 6.79 7.09

These 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 construction shown on Fig. 4. along with the certificates all in Appendix A.



## SYSTEM MAINTENANCE

### *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 PSTP 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 if they are not allowed to silt up nor the pipework to be blocked.

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 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

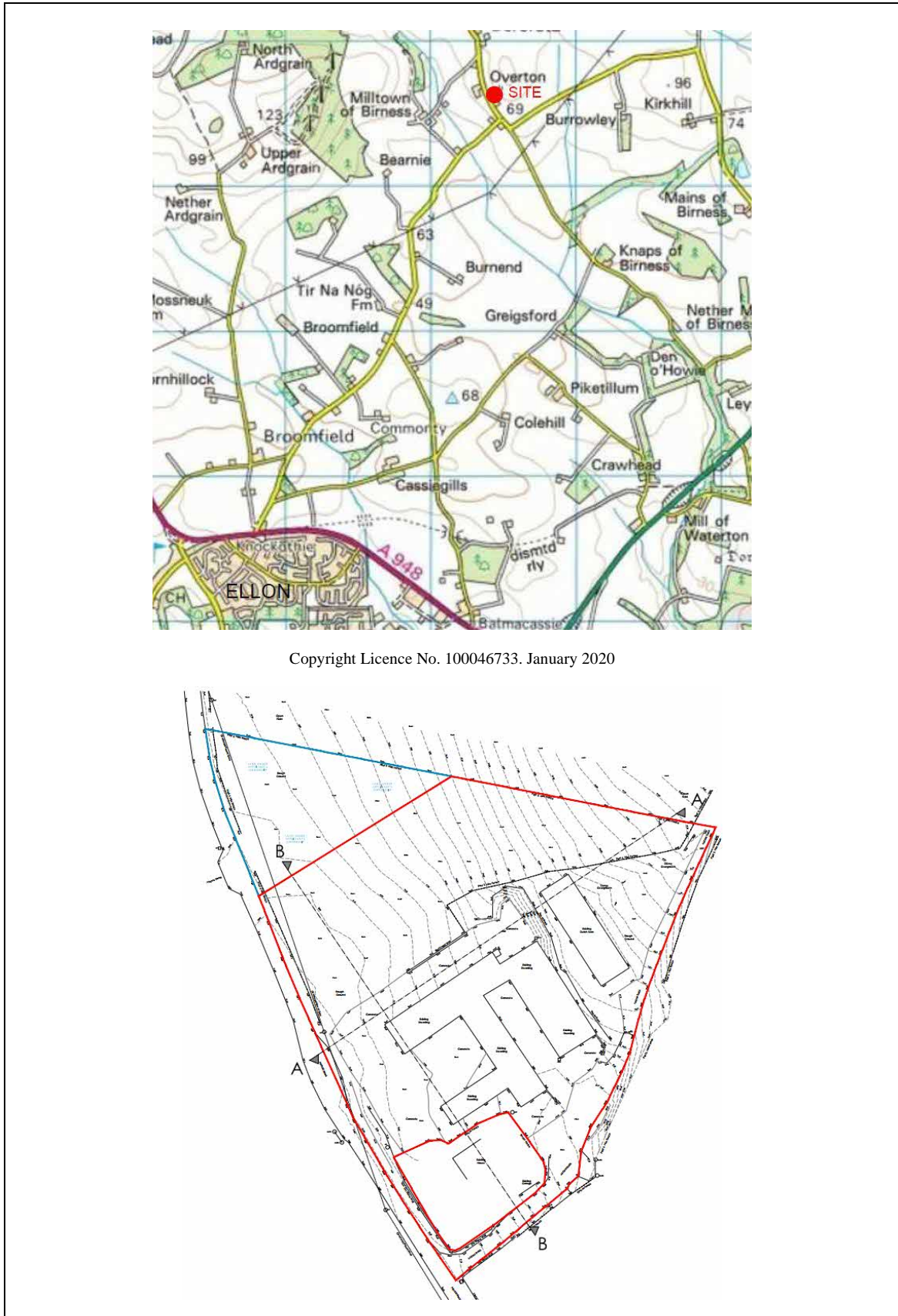
5m from all buildings

5m from boundaries (*reduced distance to boundaries may also be subject to agreement from adjacent land owners where the soakaway is considered not to be detrimental to the adjacent property*)

## APPENDIX A

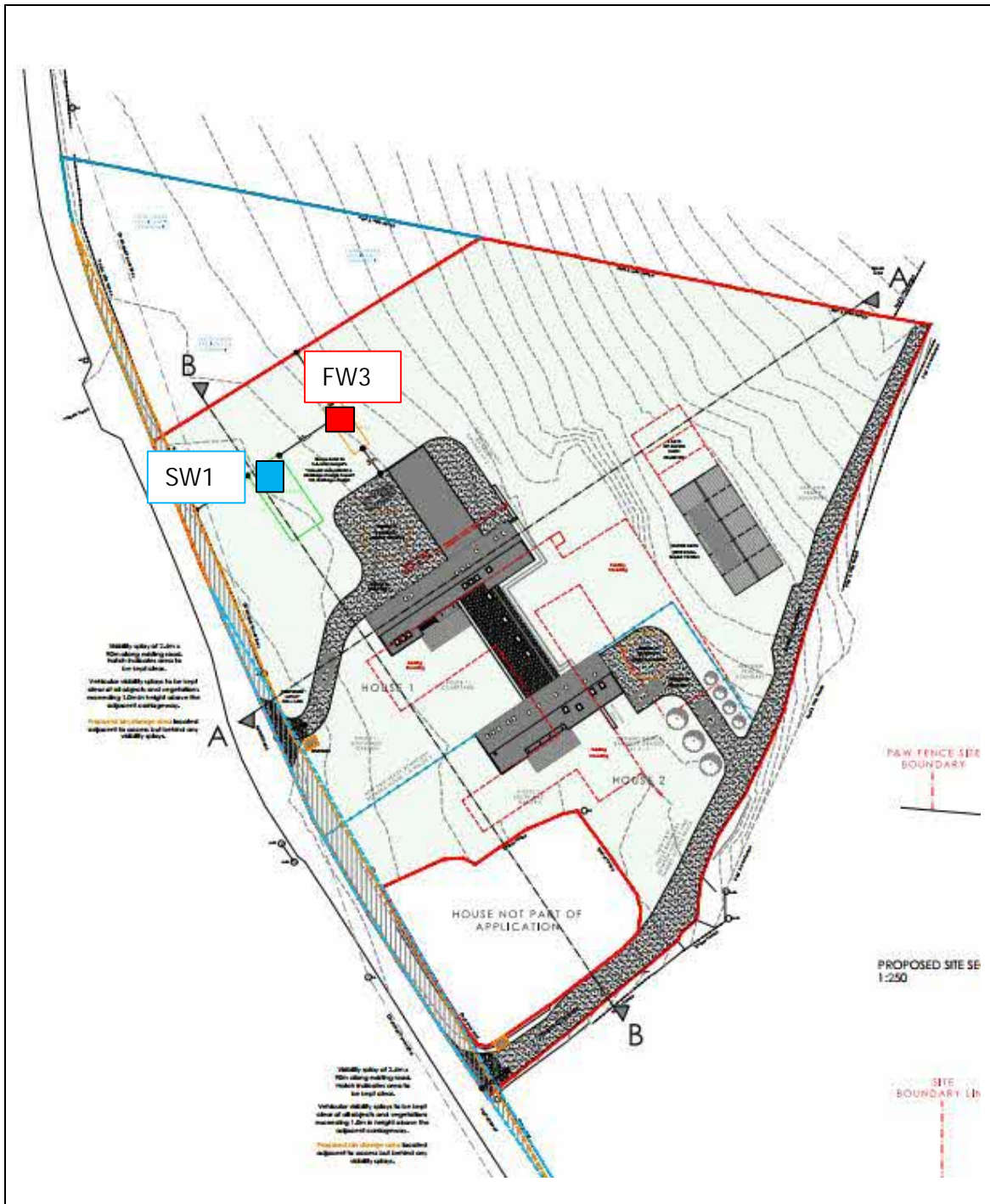
Site Plans	Fig. 1. General & Site Location Plans Fig. 2. Test Location Plan
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Certificates	Foul Water Soakaways Surface Water Soakaway

Fig. 1. GENERAL & SITE LOCATION PLANS








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Fig. 2. TEST LOCATION PLAN






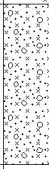
Extract from RWA Drawing No. 067/PL-06, March 2020

				<b>S.A. MCGREGOR</b>		<b>Site</b> Overton Farm, Ellon		<b>Trial Pit Number</b> <b>FW1</b>	
<b>Excavation Method</b> Wheeled Digger		<b>Dimensions</b> 0.70 x 2.10m		<b>Ground Level (mOD)</b>		<b>Client</b> For FRP Advisory LLP		<b>Job Number</b> 2167/18	
		<b>Location</b> see site plan		<b>Dates</b> 24/05/2018		<b>Architect</b> Lippe Architects		<b>Sheet</b> 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
					0.30	TOPSOIL			
					0.40	Soft brown grey mottled very silty sandy CLAY with gravel and cobbles			
					0.60	Stiff red brown CLAY with some rounded cobbles and boulders			
					0.90	Soft brown silty sandy gravelly CLAY with cobbles			
					2.20	Complete at 2.20m			
<b>Plan</b>						<b>Remarks</b>			
. .						. .			
				<b>Scale (approx)</b> 1:20		<b>Logged By</b> SAM		<b>Figure No.</b> 2167/18.FW1	

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 <b>S.A. MCGREGOR</b> <small>GEOTECHNICAL &amp; ENVIRONMENTAL GROUND SERVICES</small>				<b>Site</b> Overton Farm, Ellon		<b>Trial Pit Number</b> <b>FW2</b>			
<b>Excavation Method</b> Wheeled Digger		<b>Dimensions</b> 0.70 x 2.40m		<b>Ground Level (mOD)</b>		<b>Client</b> For FRP Advisory LLP			
		<b>Location</b> see site plan		<b>Dates</b> 24/05/2018		<b>Architect</b> Lippe Architects			
						<b>Job Number</b> 2167/18			
						<b>Sheet</b> 1/1			
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
					0.40	TOPSOIL			
					0.40	Stiff grey CLAY			
					0.90	Stiff red silty sandy gravelly CLAY with some cobbles			
					2.00	Complete at 2.00m			
<b>Plan</b> .				<b>Remarks</b>      				<b>Scale (approx)</b> 1:20	
				<b>Logged By</b> SAM		<b>Figure No.</b> 2167/18.FW2			

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 <b>S.A. MCGREGOR</b> <small>GEOTECHNICAL &amp; ENVIRONMENTAL GROUND SERVICES</small>				<b>Site</b> Overton Farm, Ellon		<b>Trial Pit Number</b> <b>FW3</b>			
<b>Excavation Method</b> Wheeled Digger		<b>Dimensions</b> 0.70 x 2.40m		<b>Ground Level (mOD)</b>		<b>Client</b> For FRP Advisory LLP			
		<b>Location</b> see site plan		<b>Dates</b> 24/05/2018		<b>Architect</b> Lippe Architects			
						<b>Job Number</b> 2167/18			
						<b>Sheet</b> 1/1			
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
					0.40	TOPSOIL			
					0.40	Soft red grey brown mottled SILT and CLAY			
					0.80				
					1.20	Soft brown very sandy SILT with cobbles			
					0.60				
					1.80	Complete at 1.80m			
<b>Plan</b> .				<b>Remarks</b>      					
				<b>Scale (approx)</b> 1:20		<b>Logged By</b> SAM		<b>Figure No.</b> 2167/18.FW3	

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				<b>S.A. MCGREGOR</b>		<b>Site</b> Overton Farm, Ellon		<b>Trial Pit Number</b> SW1	
<b>Excavation Method</b> Wheeled Digger		<b>Dimensions</b> 0.70 x 2.4m		<b>Ground Level (mOD)</b>		<b>Client</b> For FRP Advisory LLP		<b>Job Number</b> 2167/18	
		<b>Location</b> see site plan		<b>Dates</b> 24/05/2018		<b>Architect</b> Lippe Architects		<b>Sheet</b> 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
					0.50	MADE GROUND - concrete			
					0.50	Stiff grey CLAY			
					0.90	Stiff red silty, sandy, gravelly CLAY with some cobbles			
					2.00	Complete at 2.00m			
<b>Plan</b>						<b>Remarks</b>			
. .									
				<b>Scale (approx)</b> 1:20		<b>Logged By</b> SAM		<b>Figure No.</b> 2167/18.SW1	

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Fig. 3. PROPOSED DRAINAGE LAYOUT

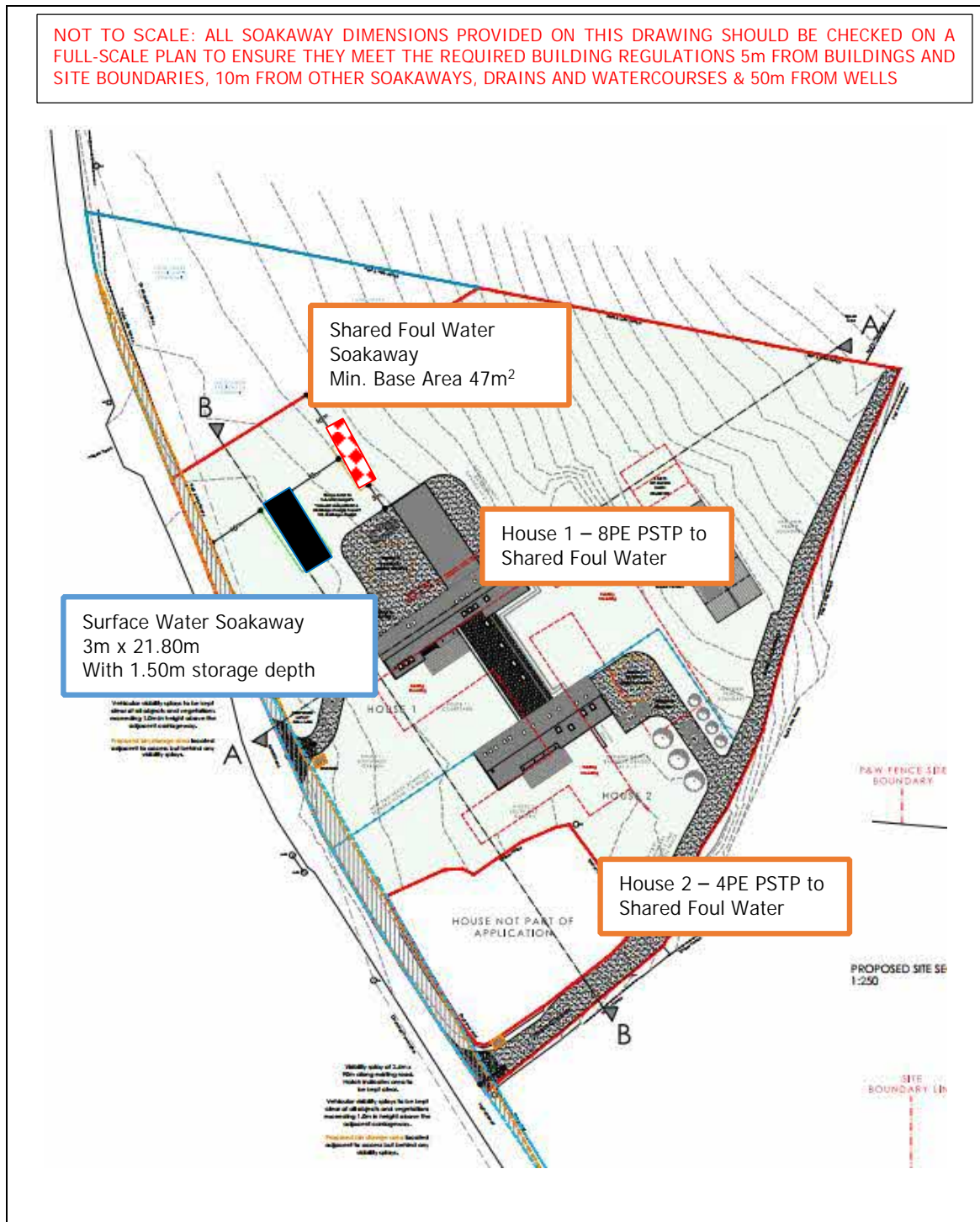
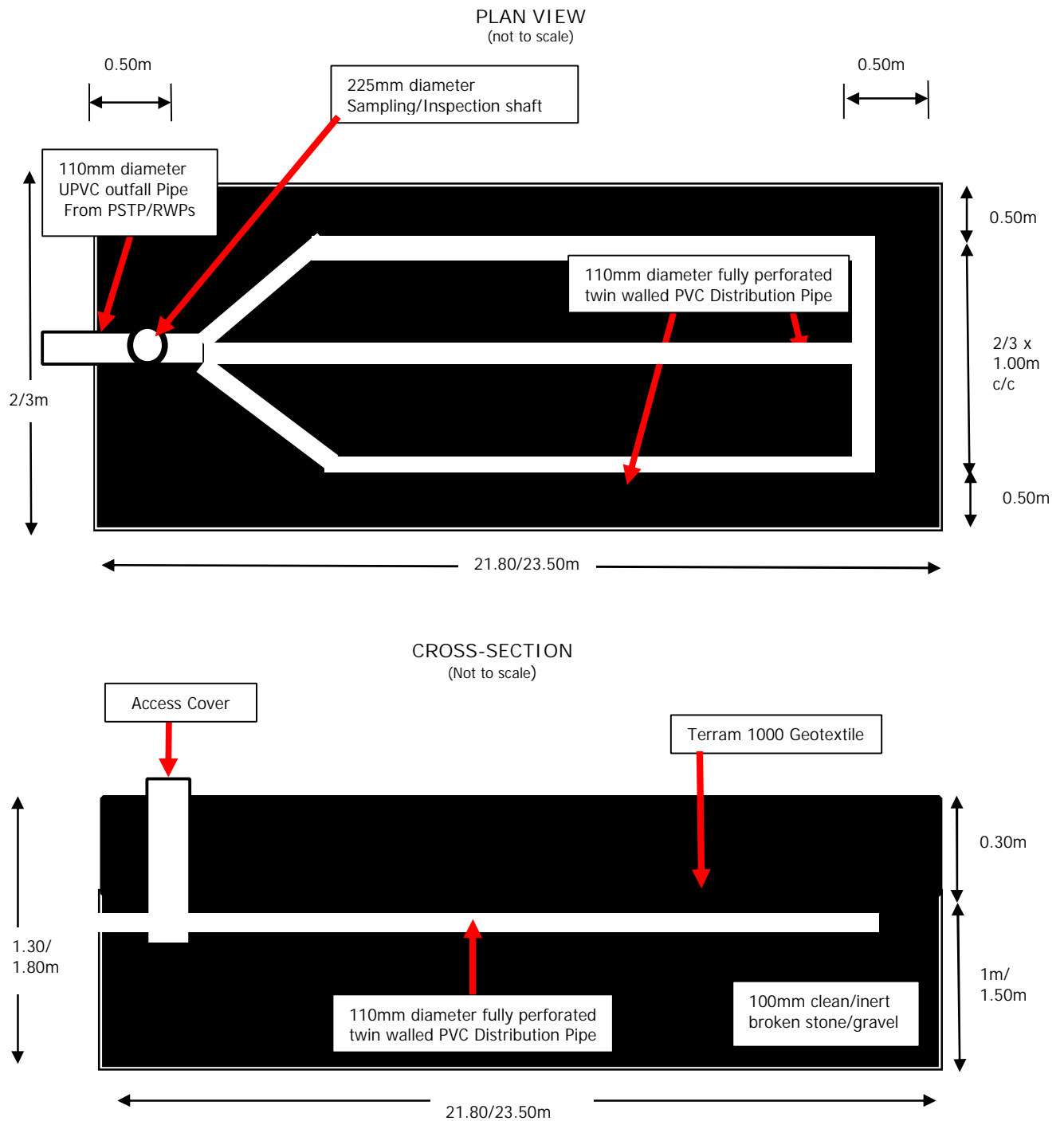


Fig. 4. INDICATIVE SURFACE SOAKAWAY CONSTRUCTION



## 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 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: Mr & Dr Smith  
Address: c/o Rachael Walker Architects  
Site Address: 2 New Houses, Overton Farm, Berefold, Ellon  
Date of Test: 24<sup>th</sup> May 2018 Weather: Sunny

### **Encountered Ground Conditions**

**Made Ground & Topsoil:** The area in front of the steadings is overlain by 100mm thick concrete slab. The field to the west is overlain by 300mm of topsoil. **Natural Sub-Soils:** In FW1, FW2 and SW1 the natural underlying sub-soils are described as soft brown clays becoming firm to stiff, very silty, very sandy with gravels and cobbles and some boulders. In FW3 and SW2 below 1.80m the strata becomes a very sandy silt with gravel and cobbles proved to 2.50m. **Bedrock:** Bedrock was not encountered during this investigation.

### **Groundwater Observations**

Groundwater was not encountered during the investigation nor observed during the monitoring period. No visual (no seepages or discoloration) indication of the seasonally high or fluctuating ground water table was seen in the strata above the encountered depths of 2.50m.

**Wells:** no known wells used for supply of potable water within 50m of site.

Depth of Drains: .....1.00m Depth of Excavations: ..up to 1.80m.....

### **Percolation Tests**

### **FW3**

Time Taken (mean of three times), secs 2100

Average Soil Percolation Values,  $V_p$ , s/mm 14

Population Equivalent 13

Minimum Floor Area of Soakaway **47m<sup>2</sup>**  
**with Treatment Plants ONLY**

I hereby certify that I have carried out the above assessment in accordance with procedures specified within the Domestic Scottish Building Standards Technical Handbook (Environmental Standard 3.9 Infiltration Systems) and SEPA A WAT-RM-04, the results of which are tabulated above, and that the proposed drainage scheme detailed on the attached plans and report has been designed considering the recommendations in the standards and regulatory standards.

Signed  Date...23 March 2020  
Name / Company S. A. McGregor  
Address Serenje, Kingsford Steadings, Alford, Aberdeenshire, AB33 8HN  
Qualification B.Eng (Civil Engineering).

