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Surveys, Setting-Out Civil Engineering Design

**Site Investigation & Drainage
Assessment**

ELGIN ROAD, LOSSIEMOUTH

Gary Mackintosh Bsc
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Client:



Site Address:

Proposed Skate Park
Elgin Road
Lossiemouth

Planning Reference:

For Planning

Date:

27th June 2019

Job Number:

0525

Company Information:

Assessment completed by:

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Introduction:

The proposals are to construct a new skate park facility within open ground located adjacent to the A941 Elgin Road, Lossiemouth. The site is to be located to the south of the existing play area and to the east of the fenced football pitches associated with Lossiemouth High School.

The SEPA Flood Maps have been consulted which indicate that there is no risk of fluvial or pluvial flooding within the area of the proposed park however a significant area of potential surface water flood risk is indicated to the south west of the park during a 1:200year event.

At this stage there has been no formal or provisional layout provided. An area measuring 35m by 50m has been indicated within which the new park will be constructed covering a percentage of this area.

GMC Surveys have been asked to provide a report which demonstrates that surface water can be managed within the site boundaries with no detrimental impact to the surrounding areas.

Soil Conditions:

Excavations were carried out using a mechanical digger to assess the existing ground conditions and carry out infiltration for the dispersal of foul and surface waters via soakaways.

The trial pits were excavated to depths of 1.6m. The pits were left open and no ground water was encountered.

The existing ground conditions consisted of 300mm Topsoil overlying light brown medium to fine loose slightly gravelly sands 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.

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)
TH01	0.8m x 1.0m	0.5 – 1.2	1.04×10^{-4}
TH02	1.0m x 1.0m	0.8 – 1.6	6.35×10^{-5}

Conclusion and Recommendations:

The infiltration rates encountered within the proposed site area indicate that dispersal of surface waters to the existing ground will be a suitable method of management within the site.

Without a formal layout, a contributing area can only be assumed within this report. As noted within the introduction, there is significant surface water flood risk indicated to the south and west of the proposed site which lies at a lower level therefore it is recommended that any surface water management devices be sized to accommodate flows up to and including a 1:200year event to ensure there is no impact from the new development to the surrounding area.

Assuming approximately 50% of the overall site area is to be developed into hardstanding, the contributing area can be considered as 875m².

Please see calculation sheets below detailing the requirement for a standard stonefilled soakaway with dimensions of 35m in length x 3.0m in width x 0.8m depth below the invert of the inlet. These dimensions are based on the average infiltration rate of 8.38×10^{-5} , a contributing area of 875m² and providing storage up to and including a 1:200year event with 30% allowance for climate change.

As noted this is purely indicative at this stage and a formal design will require to be carried out once the full details of the skate park have been established. It is however reasonable to assume that a soakaway of these dimensions could be accommodated within the site dimensions of 50m x 35m. The device sizing could be further reduced by the splitting of the soakaways or the use of alternative soakaway construction such as cellular storage crates. It is also reasonable to

assume that an infiltration basin could be accommodated within the site boundary dependant on the final layout.

The site area and test hole locations have been provided within Appendix A and the indicative soakaway construction used for the calculations within this report is shown within 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.	0525		
Sheet no.	1		
Date	03/07/19		
By	GM	Checked	Approved

MasterDrain
SW 16.10

Project **Proposed Skate Park, Lossiemouth**
Title **Indicative Soakaway Sizing**

Rectangular pit design data:-

Pit length	= 35 m	Pit width	= 3 m
Depth below invert	= .8 m	Percentage voids	= 30.0%
Imperm. area	= 875 m ²	Infilt. factor	= 0.000084 m/s
Return period	= 200 yrs	Climate change	= 30%

Calculations :-

Surface area of soakaway to 50% storage depth (not inc. base):-
 $a_{s50} = 2 \times (\text{length} + \text{width}) \times \text{depth}/2 = 30.4 \text{ m}^2$

Outflow factor : $O = a_{s50} \times \text{Infiltration rate} = 0.0025536 \text{ m/s}$

Soakaway storage volume : $S_{\text{actual}} = \text{length} \times \text{width} \times \text{depth} \times \% \text{voids}/100 = 25.2 \text{ m}^3$

Duration	Rainfall mm/hr	Inflow m ³	Depth (hmax) m	Outflow m ³	Storage m ³
5 mins	114.7	8.3	0.24	0.76	7.57
10 mins	89.6	13.0	0.36	1.53	11.49
15 mins	75.0	16.4	0.45	2.30	14.11
30 mins	53.2	23.3	0.59	4.60	18.68
1 hrs	36.1	31.6	0.71	9.19	22.39
2 hrs	23.3	40.8	0.71	18.39	22.43
4 hrs	14.7	51.4	0.46	36.77	14.64
6 hrs	11.1	58.4	0.10	55.16	3.28
10 hrs	7.8	68.4	0.00	91.93	0.00
24 hrs	4.2	88.7	0.00	220.63	0.00

Actual volume : $S_{\text{actual}} = 25.200 \text{ m}^3$

Required volume : $S_{\text{reqd.}} = 22.430 \text{ m}^3$

Soakaway volume storage OK.

Minimum required a_{s50} : 27.06 m²

Actual a_{s50} : 30.40 m²

Minimum depth required: 0.71 m

Time to maximum 2 hrs

Emptying time to 50% volume = $t_{s50} = S_{\text{reqd}} \times 0.5 / (a_{s50} \times \text{Infiltration rate}) = 01:13 \text{ (hr:min)}$

Soakaway emptying time is OK.



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Job No.	0525		
Sheet no.	2		
Date	03/07/19		
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GM			

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SW 16.10

Project	Proposed Skate Park, Lossiemouth		
Title	Indicative Soakaway Sizing		

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

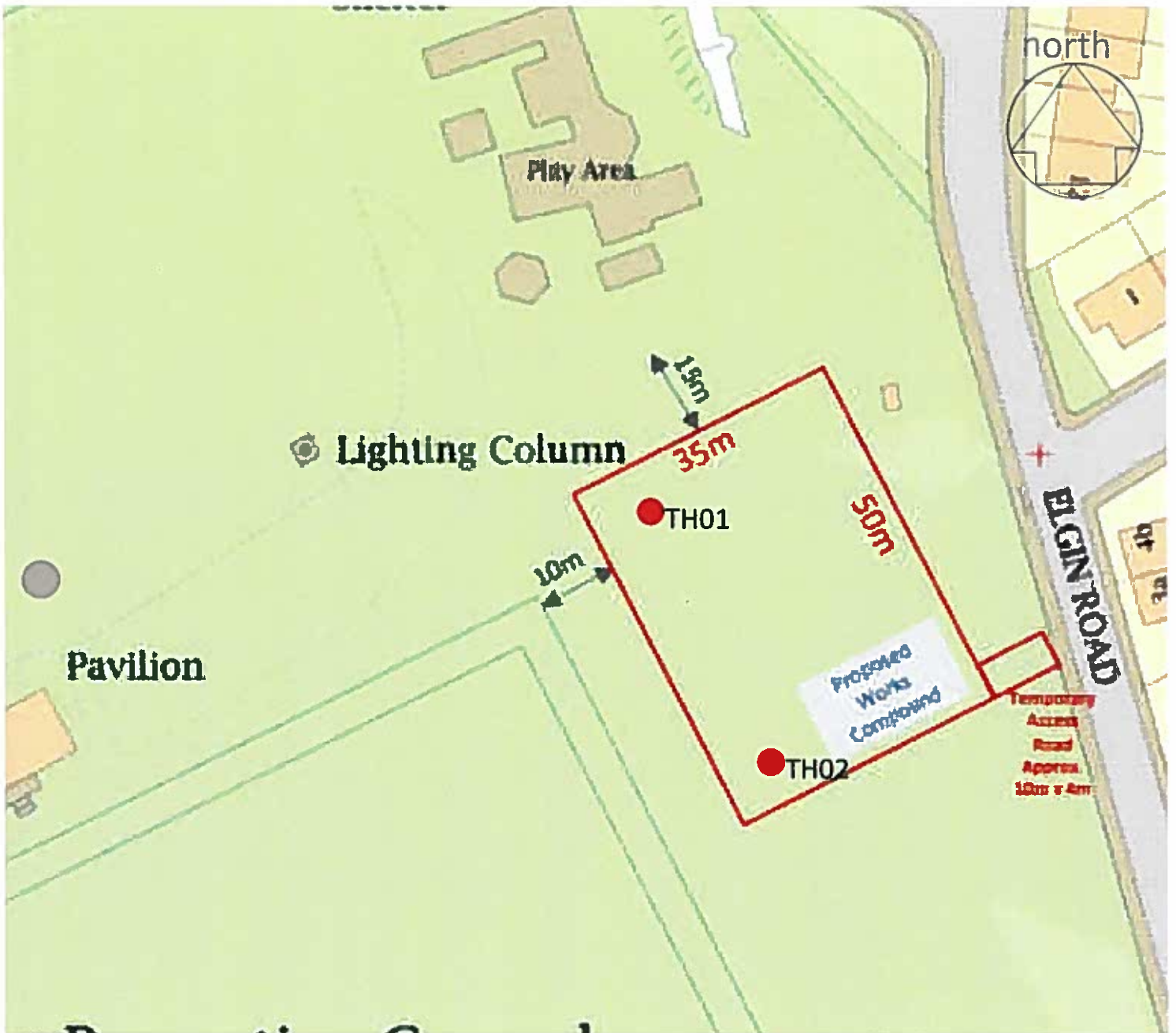
Soil classification for WRAP type 3

- 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

Site/Testhole Location



REV.	DESCRIPTION	BY:	DATE:
STATUS ISSUE			

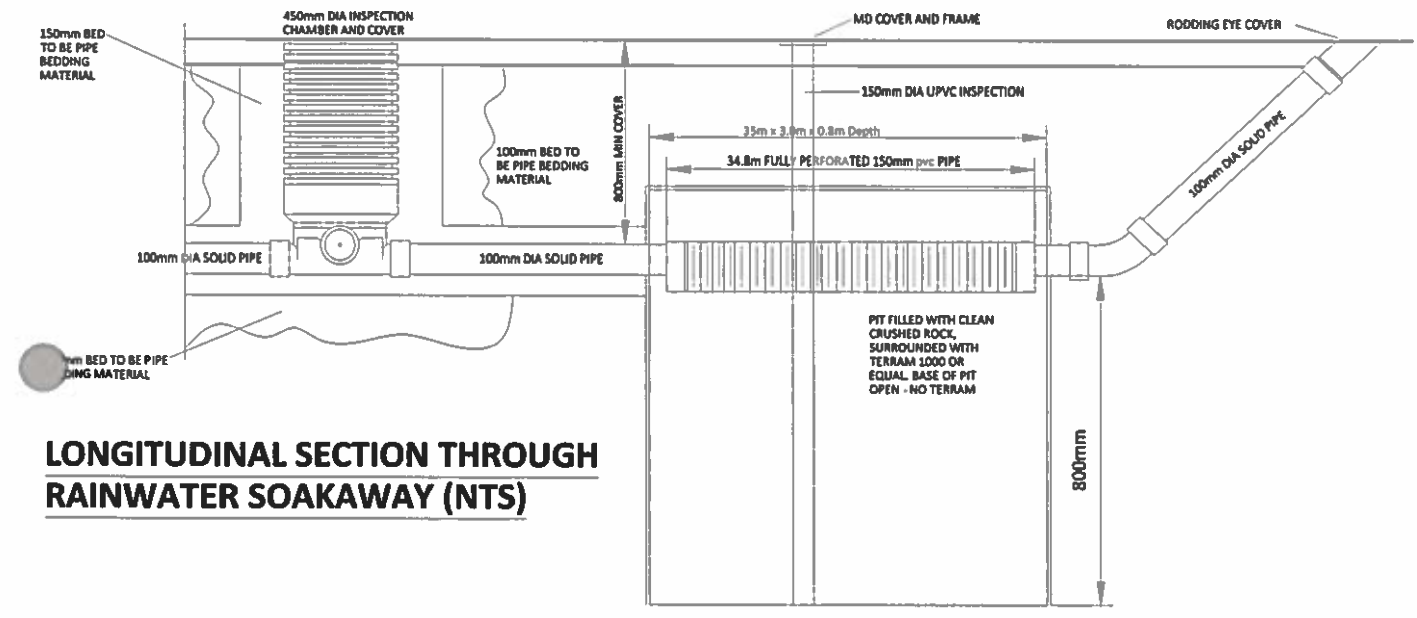
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CLIENT
Mr M Malcolm

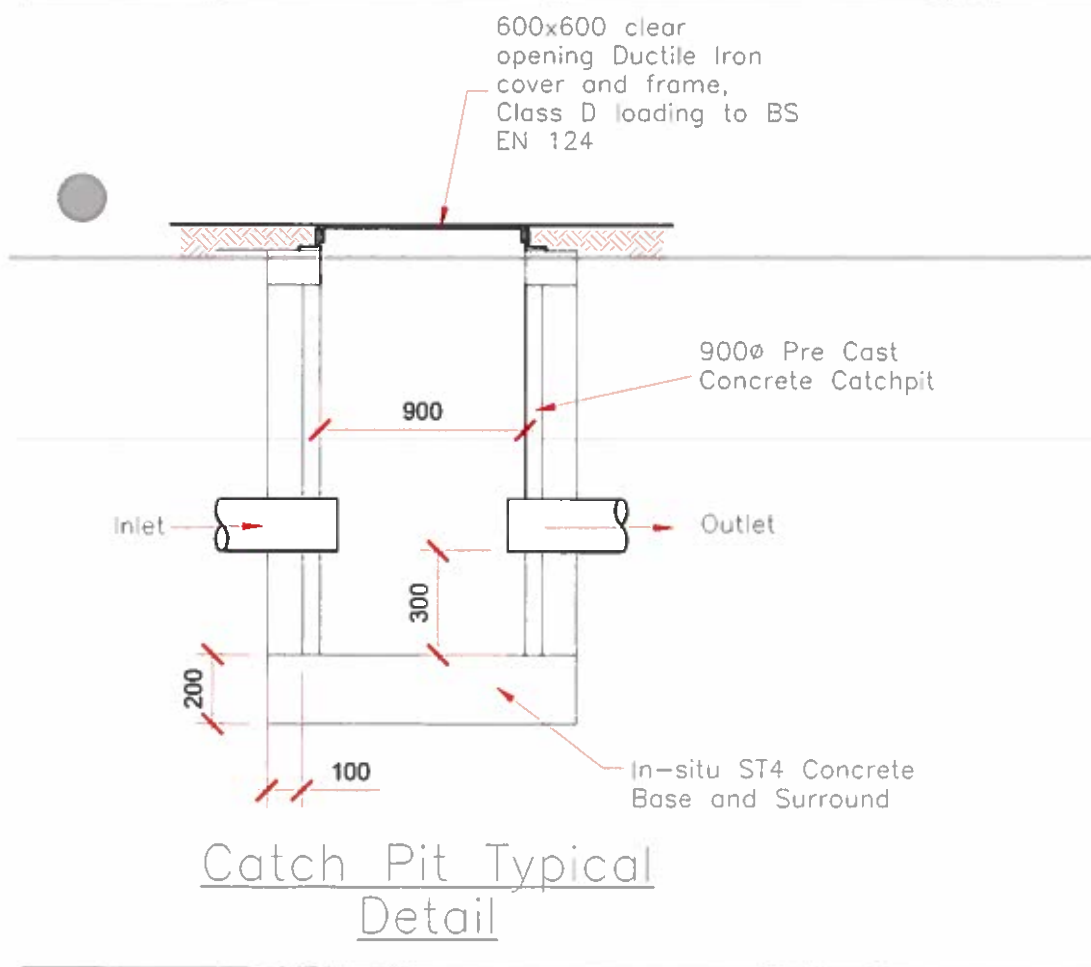
SITE Proposed Skate Park Lossiemouth			
TITLE Test Hole Locations			
SCALE AT AS NTS	DATE JUN19	DRAWN GM	CHECKED
PROJECT NO. 0525	DRAWING NO. Appendix A	REVISION -	

APPENDIX B

Soakaway Details



LONGITUDINAL SECTION THROUGH RAINWATER SOAKAWAY (NTS)



Catch Pit Typical Detail

REV:	DESCRIPTION:	BY:	DATE:
STATUS:		ISSUE	

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SITE: **Proposed Skate Park Llossiemouth**
 TITLE: **Soakaway Details**

SCALE: A4	DATE:	DRAWN:	CHECKED:
NTS	JUN19	GM	
PROJECT NO:	DRAWING NO:	REVISION:	
0525	Appendix B		

