Stormwater Disposal Design BRE365/SuDS

STINGRAY ENVIRONMENTAL ENGINEERING
Protect Our Water

Reference Number: SEE-S422
Site: 46 Monastery Park, Clondalkin, D22, D22XF58
Easting X307459, Northing Y231472
Name: John Flood

October 2022

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Introduction

This report is based on the findings of a soil infiltration test as per BRE Digest 365, carried out by Stingray Environmental Engineering Ltd. on the 14th of October 2022.

As required by South Dublin County Council, this report provides recommendations for the storm water disposal system design in line with the requirements of *BRE365 Digest,* Sustainable drainage system (SuDS) as per requirements of the GDSDS (Greater Dublin Strategic Drainage study) Regional Drainage Policies Volume 2 New Development, August 2005.

1. Site Specific Information

Information supplied by client /architect

- Total Impermeable Area:

✓ **159m²**

Rainfall information

- Site Location: **46 Monastery Park, Clondalkin, D22, D22XF58, X307459, Y231472**

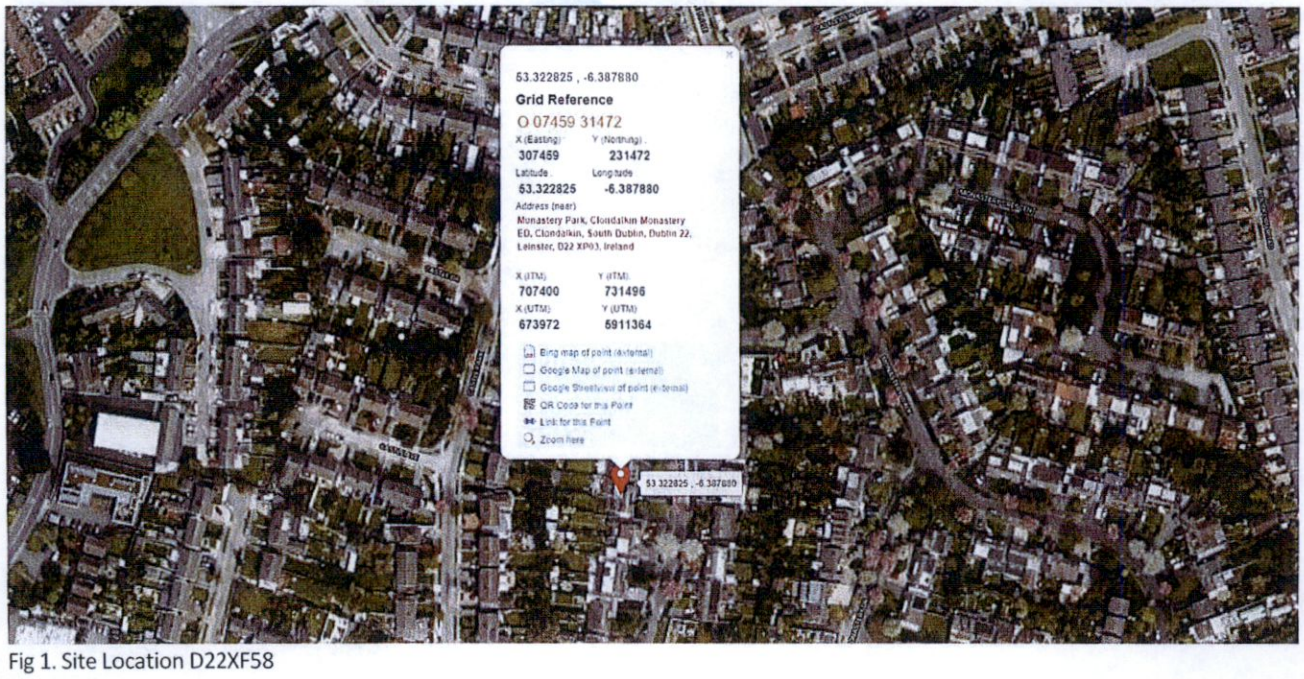

Fig 1. Site Location D22XF58

- Return period: **100 years + 20% climate changes.**
- Duration: **360min**
- Rainfall Depth (incl. 20% Climate Change):**89.76mm**

2. Infiltration test BRE Digest 365

- Dimensions of the infiltration test pit: **L 1200mm x W 600mm x D 1000mm**
- Effective depth adopted: **ED 600mm**

INFILTRATION TEST PIT

Soil Infiltration rate calculated as per BRE365 soakaway test:

- $f=V_{75-25}/ (a_{50}*t_{75-25}) =2.5\ E-05=$**0.000025m/sec**

where:

- V_{75-25}=1200mm*600mm*300mm=0.216m3
- $A_{50\ base}$=(2*1200mm*300mm) +(2*600mm*300mm) +(1*1200mm*600mm) =1.8m2
- Fill 1 t_{75-25}=65min=3900sec
- Fill 2 t_{75-25}=70min=4200sec
- Fill 3 t_{75-25}=80min=4800sec

	Date	T_{75}=Invert Level-150mm	T_{25}=Invert Level-450mm	T_{75-25}[min]
Fill1	14/10/2022	11:00	12:05	65
Fill2	14/10/2022	12:30	13:40	70
Fill3	14/10/2022	14:10	15:30	80

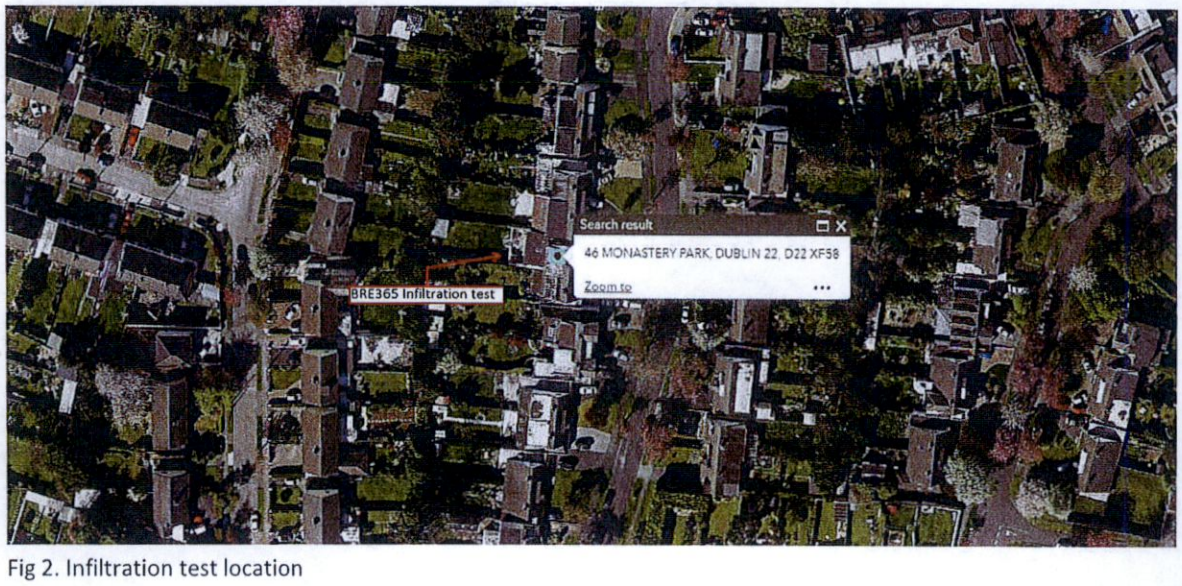

Fig 2. Infiltration test location

Fig 3. Site View West

Fig 4. Site View East

Fig 5. Site View South

Fig 6. Site View North

Fig 7. Infiltration test 14-10-2022

Fig 8. Infiltration test 14-10-2022

Fig 9. Infiltration test 14-10-2022

Fig 10. Infiltration test 14-10-2022

3. Sustainable Drainage System SuDS

We recommend the developer will implement an approved Sustainable Drainage System (SuDS) as per requirements of the GDSDS (Greater Dublin Strategic Drainage study) Regional Drainage Policies Volume 2 New Development, August 2005.

There is no stormwater/combine sewer available in vicinity of proposed site. (Details Appendix D).

The proposed storm water disposal system will drain to the ground via:

A). Soakaway System-total infiltration 40% void

- Total Infiltration designed for 100 years storm + 20% increase for climate change.
- For details, please refer to drawings 939-C01 & 939-C02 (Appendix A & B)
- Infiltration rates calculated as per BRE 365 f=2.5 E-05=0.000025m/sec

For full design details refer to section below:

a). Hydraulic Calculations-Soakaway system

PROPOSED SOAKAWAY

Impermeable surface drained to proposed soakaway:			159.0	m^2
Run-off Co-efficient:			0.90	
Soil infiltration rate:			0.000025	m / sec
Proposed soakaway size [L x W x ED]:	10.100	3.500	0.600	m
Storage volume provided in stone with 40% air voids:			8.48	m^3
as50 - Internal surface area to 50% effective depth:			8.16	m^2
Outflow infiltrating into the soil during rainfall:		0.00020400	x D	m^3

D = rainfall duration	Rainfall (100 year storm + 20% increase in depth (climate change) Return Period Rainfall Depths for sliding Durations Irish Grid: Easting: 307457, Northing: 231476	Inflow from impermeable surface	Outflow infiltrating into the soil during rainfall	Required storage volume
min.	mm	m^3	m^3	m^3
5	20.400	2.92	0.06	2.86
10	28.440	4.07	0.12	3.95
15	33.360	4.77	0.18	4.59
30	41.400	5.92	0.37	5.56
60	51.360	7.35	0.73	6.62
120	63.840	9.14	1.47	7.67
180	72.360	10.35	2.20	8.15
240	79.200	11.33	2.94	8.40
360	89.760	12.84	4.41	8.44
540	101.880	14.58	6.61	7.97
720	111.480	15.95	8.81	7.14
1,080	126.360	18.08	13.22	4.86
1,440	138.240	19.78	17.63	2.16
2,880	152.160	21.77	35.25	- 13.48
4,320	164.040	23.47	52.88	- 29.40
5,760	174.480	24.97	70.50	- 45.53
8,640	192.600	27.56	105.75	- 78.19
11,520	208.440	29.83	141.00	- 111.18
14,400	222.720	31.87	176.26	- 144.38
17,280	235.800	33.74	211.51	- 177.76
23,040	259.680	37.16	282.01	- 244.85
28,800	281.160	40.23	352.51	- 312.28
36,000	305.640	43.74	440.64	- 396.90

From table above, required storage volume is:	8.44	m^3
From table above, critical rainfall duration is:	6.0	hours

Checking on time of emptying half storage volume:

The soakaway should discharge from full to half-volume within 24 hours in readiness for subsequent storm inflow:

T =	5.8	hours

Fig 11. Hydraulic Calculations For Soakaway System 40% void- Total Infiltration

b). Proposed Drainage Layout

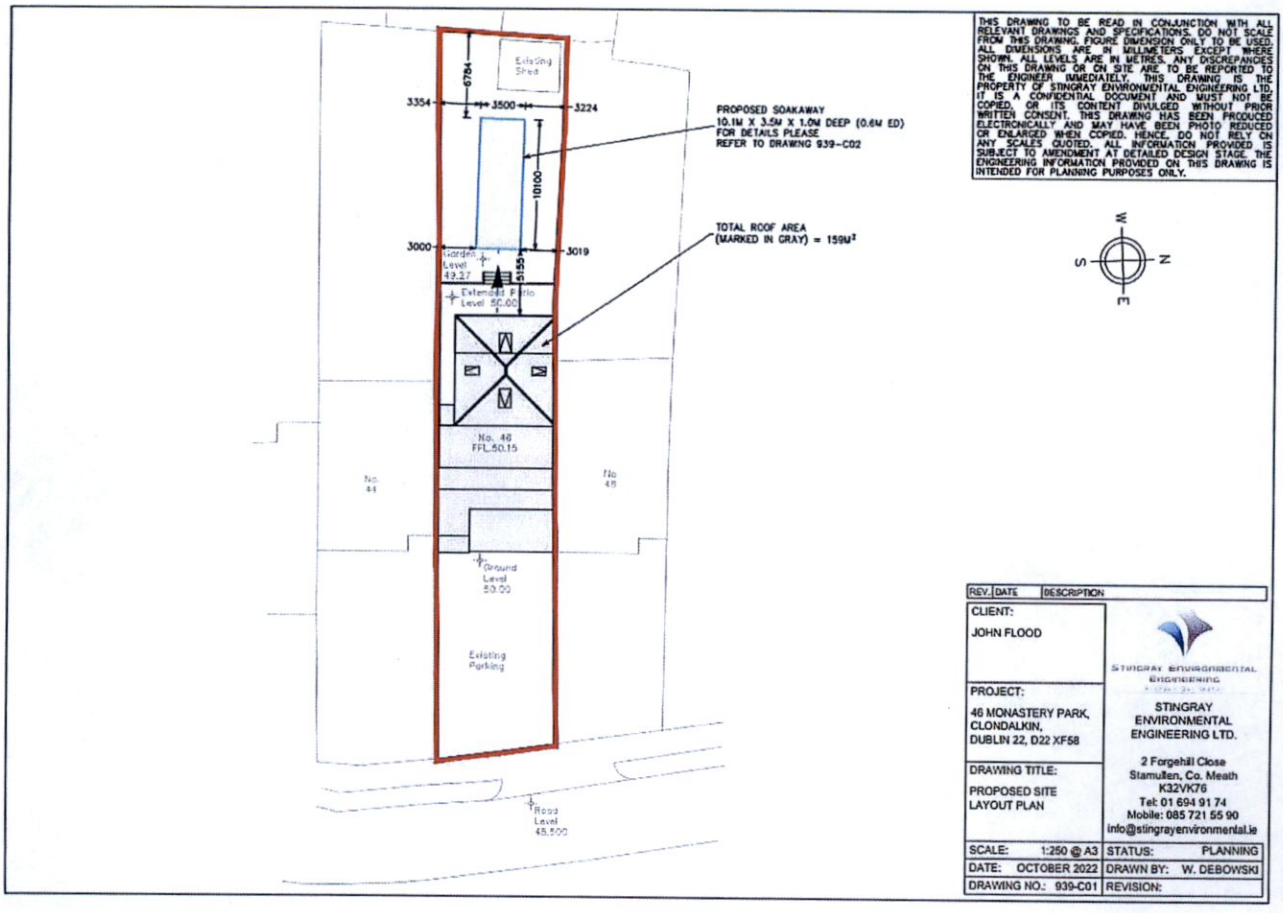

Fig 12. Proposed Drainage Layout

d). Proposed Soakaway System Details

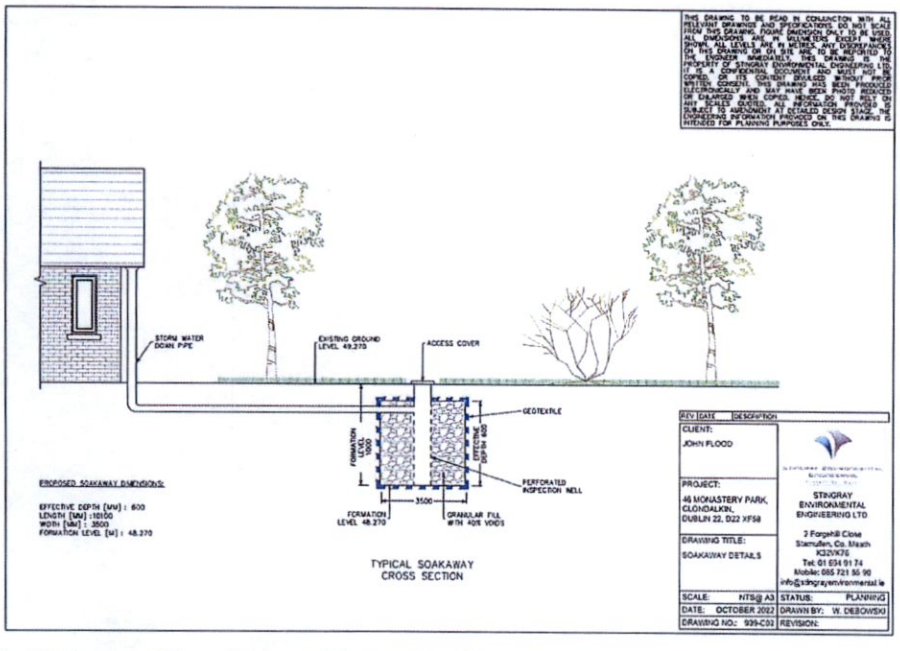

Fig 13. Proposed Stone Soakaway System Details

4. Recommendation

- It is the responsibility of the Project Supervisor (i.e. Engineer, Architect or other competent person) to ensure that the rainwater soakaway is located and installed in accordance with planning conditions and BRE 365 requirements.
- During the design process, a silt trap should be incorporated into any drains discharging into the soakaway system
- All elements of the soakaway should be effectively maintained by qualified service technicians/engineers

5. Important note

- The percentage run-off is taken as 100% from the drained area. No reduction is made to the design run-off volume discharged to the soakaway for loses due to surface wetting or the filling of puddles during the storm
- No allowance is made for the time taken for run-off to discharge to the soakaway. The required storage volume is calculated based on instantaneous discharge to the soakaway
- The outflow from the soakaway is underestimated. Higher infiltration rates occur at the greater depths of storage in practice, than are adopted in design, and because the outflow is calculated of the rainfall duration rather than of run off duration. The latter maybe considerably longer depending on the size and length of drains.
- This report is only valid on the time of site inspection. The author cannot be responsible for any changes that could occur as result of construction, remediation, adjustment works completed afterwards.
- Additional ground investigation works may still be necessary if further required by local authorities or the other governing bodies.

6. Summary

- The effective volume of the soakaway filled with granular material (40% void) is 8.48m3.
- Soakaway with minimum dimensions of W10100mm * L3500mm * ED 600mm to be constructed.
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Signed: *Waldemar Debowski* Date: 27 October 2022

Qualifications: B.Eng. P.Grad.Dips. FETAC Cert MIEI MIAH