## SURFACE WATER DRAINAGE – SOAKAWAY DESIGN

Proposed extension no 52 st. josephs road greenhills

Job Number: 2106

Date: 20 March 2022

Prepared by: Declan Murphy tech Eng. Civil structural, MSc applied BIM, PGDip BIM, PGcert BIM

---

### DESIGN PROPOSAL

Surface water roof runoff from the proposed development will be drained via the proposed surface water drainage system, which will consist of pervious pavement to the front of existing dwelling and 1 number soakaways located to the rear garden of the development as indicated on drawing A100-DR-A-D12-001 & A100-DR-A-D12-002

The design has been completed in accordance with BRE365 based on the total impermeable area outlined below and Met Eireann's Extreme Rainfall Return Period data.

---

### DESIGN METHOD

As per BRE 365, the design method for sizing a soakaway is based upon the equation of volumes: S = I – O where:

S = the required storage in the soakaway to balance temporarily inflow and outflow.

I = the inflow from the impermeable area drained to the soakaway during selected storm duration

O = the outflow infiltrating into the soil during rainfall (O = as50 × f × D)

as50 = the internal surface area of the soakaway to 50% effective storage depth (excluding the base area)

f = the soil infiltration rate determined in a soakage trial pit at the site

D = the storm duration.

---

### TOTAL IMPERMEABLE AREA

Soakaway to cater for two story dwelling flat roof extension and tiled roof (50m² including pitch allowance).

House to have permeable surface driveway at the front allowing direct discharge of rainfall into underlying soil.

With a raingarden to cater for small extension to the front.

All soak ways to be kept a minimum of 5m from buildings.

---

### MET EIREANN RAINFALL DATA

Rainfall Datasheet for Irish Grid: Easting: 311196, Northing: 230229– Provided by Met Eireann (included in Appendix C).

Return period selected = 30 years

Allowance for Climate Change = 10%

---

### SOIL INFILTRATION RATES

The infiltration rate of the sub soil was determined by excavating a test hole and carrying out an infiltration test in accordance with BRE 365. The tests were carried out on the 15/06/22. The test hole indicated No rock or ground water was encountered in the test hole.

Soil infiltration rate, f, as indicated by on-site test see calculation below

---

### SOAKAWAY TRENCH REQUIREMENTS

According to the BRE 365 method, the soakaway pit required was calculated to be:

1.0m Long x 1.0m Wide x 1.0m Deep.

Refer to calculation sheet in Appendix B for detailed calculation. And See drawing A100-DR-A-D12-002 for construction details

---

### SOAKAWAY SUMMARY

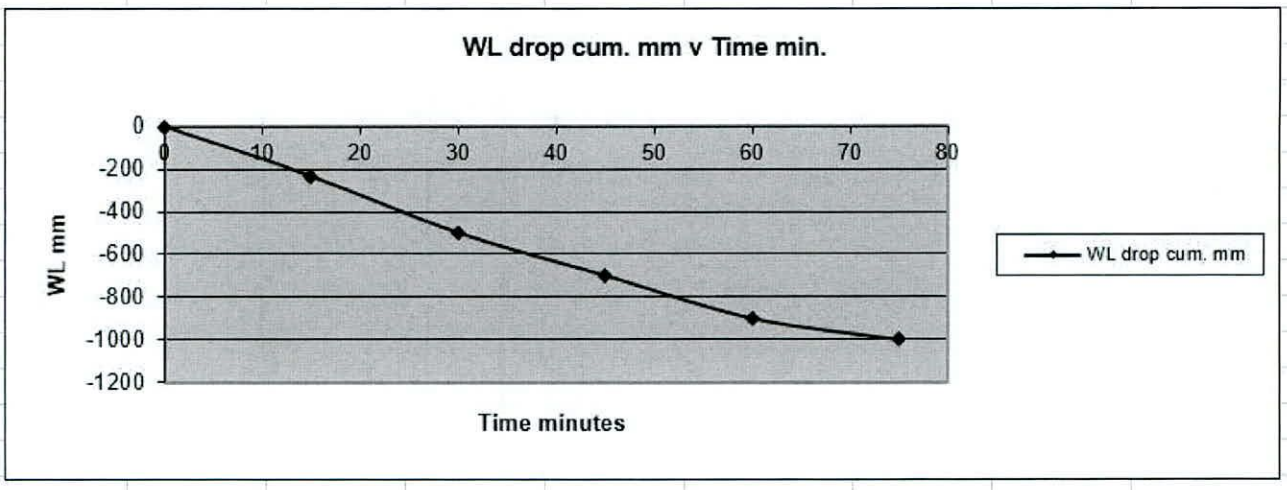
In summary, the proposed soakaways as indicated on drawing 2106 – A101 shall be constructed as outlined below:

## Appendix A - BRE 365 Infiltration Test

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Job No.** | **1** | **Job Name:** | | **planning application joseph's road** | | | |
| | | **Client:** | | **Darren** | | | |
| **Soil Infiltration Rate Trial** | | **No.** | 1 | **Date** | 04/06/2022 | | |
| | | L m | W m | Depth m | | | |
| Soakage trial pit | | **1** | **1** | **1** | | | |

| **Time** | **Time Elapsed** | **Time Elapsed** | **Time Interval** | **WL below GL** | **WL drop cum.** | **WL drop interval** | **WL drop per min.** |
|---|---|---|---|---|---|---|---|
| | **hh:mm** | **minutes** | **minutes** | **mm** | **mm** | **mm** | **mm/min** |
| **10:45** | 0 | 0 | 0 | **0** | 0 | 0 | |
| **11:00** | 0:15 | 15 | 15 | **-235** | -235 | -235 | -16 |
| **11:15** | 0:30 | 30 | 15 | **-500** | -500 | -265 | -18 |
| **11:30** | 0:45 | 45 | 15 | **-700** | -700 | -200 | -13 |
| **11:45** | 1:00 | 60 | 15 | **-900** | -900 | -200 | -13 |
| **12:00** | 1:15 | 75 | 15 | **-1000** | -1000 | -100 | -7 |
| | | Drop | Drop 75% | Drop 25% | Drop 75-25 | | |
| | | 1000 | 750 | 250 | 500 | | |
| | Time hrs | 1.25 | 0.81 | 0.27 | 0.55 | | |
| | Vp75 = | 0.5 m3 | | ap50 = | 3 m2 | | |
| | Soil infiltration rate f = | | 0.3049 m/hr | | | | |





## APPENDIX B soakaway sizing

### ge = 10%

Outflow = f x as50(excluding base) x D

| | | |
|---|---|---|
| Soakaway Length = | 1.0 m | |
| Soakaway Width = | 1.0 m | |
| Stone surround Voids | 0.3 | 30% |
| as50 (excluding base) | 2.0 m2 | |
| Depth Below Invert | 0.5 m | |
| Infiltration Rate(f) | 0.3049m/h | |
| Storage Provided | 2.0 m2 | |

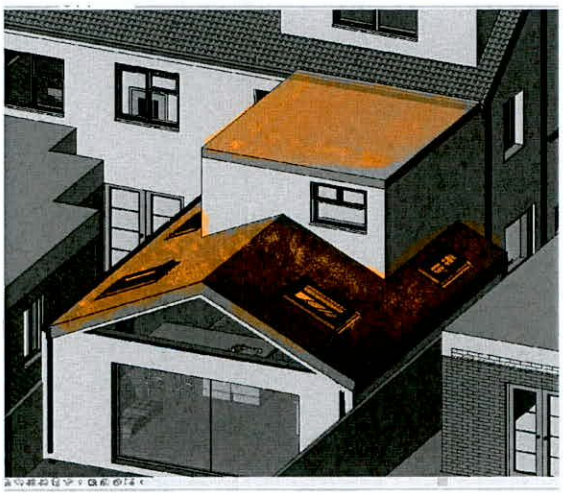
### Calculation of Storage Required in Soakaway

| Duration (hours) | Rainfall (mm) | Impermeable Area (m2) | Inflow (m3) | Ouflow (m3) | Storage Reqd ( S= I - O) | T to empty 0.5 S (hrs) | T to Empty 0.5 S < 24h | Is Sreq < S prov |
|---|---|---|---|---|---|---|---|---|
| 0.25 | 19.2 | 50 | 0.96 | 0.15245 | 0.80755 | 2.65 | Pass | Pass |
| 0.5 | 24 | 50 | 1.2 | 0.3049 | 0.8951 | 2.94 | Pass | Pass |
| 1 | 30.1 | 50 | 1.505 | 0.6098 | 0.8952 | 2.94 | Pass | Pass |
| 2 | 37.7 | 50 | 1.885 | 1.2196 | 0.6654 | 2.18 | Pass | Pass |
| 3 | 42.9 | 50 | 2.145 | 1.8294 | 0.3156 | 1.04 | Pass | Pass |
| 4 | 47.2 | 50 | 2.36 | 2.4392 | -0.0792 | -0.26 | Pass | Pass |
| 6 | 53.8 | 50 | 2.69 | 3.6588 | -0.9688 | -3.18 | Pass | Pass |
| 9 | 61.3 | 50 | 3.065 | 5.4882 | -2.4232 | -7.95 | Pass | Pass |
| 12 | 67.3 | 50 | 3.365 | 7.3176 | -3.9526 | -12.96 | Pass | Pass |
| 18 | 76.8 | 50 | 3.84 | 10.9764 | -7.1364 | -23.41 | Pass | Pass |
| 24 | 84.3 | 50 | 4.215 | 14.6352 | -10.4202 | -34.18 | Pass | Pass |

Provide Soakaway 1.0m Long x 1.0 m Wide x 1.0m Deep

Storage Provided = 2.0 m2 is greater than stroage required = .900 m2

Time to empty 50 % of Storage is less than 24 hrs - Yes



Impermeable area in Orange

Met Eireann

Return Period Rainfall Depths for sliding Durations

Irish Grid: Easting: 311196, Northing: 230229,

| rval | Years | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1year, | 2, | 3, | 4, | 5, | 10, | 20, | 30, | 50, | 75, | 100, | 150, | 200, | 250, | 500, |
| 3.6, | 4.3, | 5.2, | 5.9, | 6.4, | 8.2, | 10.3, | 11.7, | 13.7, | 15.5, | 16.9, | 19.1, | 20.9, | 22.3, | N/A , |
| 5.0, | 5.9, | 7.3, | 8.2, | 9.0, | 11.5, | 14.4, | 16.3, | 19.1, | 21.6, | 23.6, | 26.7, | 29.1, | 31.1, | N/A , |
| 5.9, | 7.0, | 8.6, | 9.7, | 10.6, | 13.5, | 16.9, | 19.2, | 22.5, | 25.4, | 27.7, | 31.4, | 34.2, | 36.6, | N/A , |
| 7.7, | 9.0, | 11.1, | 12.4, | 13.5, | 17.1, | 21.2, | 24.0, | 28.0, | 31.5, | 34.3, | 38.6, | 42.0, | 44.8, | N/A , |
| 10.1, | 11.7, | 14.2, | 15.9, | 17.3, | 21.7, | 26.7, | 30.1, | 34.8, | 39.1, | 42.4, | 47.5, | 51.5, | 54.9, | N/A , |
| 13.1, | 15.2, | 18.3, | 20.4, | 22.1, | 27.5, | 33.6, | 37.7, | 43.4, | 48.5, | 52.4, | 58.5, | 63.3, | 67.2, | N/A , |
| 15.3, | 17.7, | 21.2, | 23.6, | 25.5, | 31.6, | 38.4, | 42.9, | 49.3, | 55.0, | 59.3, | 66.1, | 71.3, | 75.7, | N/A , |
| 17.1, | 19.7, | 23.6, | 26.2, | 28.2, | 34.8, | 42.3, | 47.2, | 54.0, | 60.1, | 64.8, | 72.0, | 77.7, | 82.3, | N/A , |
| 20.0, | 22.9, | 27.3, | 30.3, | 32.6, | 40.0, | 48.3, | 53.8, | 61.4, | 68.2, | 73.4, | 81.4, | 87.5, | 92.6, | N/A , |
| 23.4, | 26.7, | 31.7, | 35.0, | 37.6, | 46.0, | 55.3, | 61.3, | 69.8, | 77.3, | 83.1, | 91.9, | 98.7, | 104.3, | N/A , |
| 26.1, | 29.8, | 35.2, | 38.8, | 41.7, | 50.7, | 60.8, | 67.3, | 76.5, | 84.5, | 90.7, | 100.2, | 107.4, | 113.4, | N/A , |
| 30.5, | 34.6, | 40.8, | 44.9, | 48.1, | 58.3, | 69.5, | 76.8, | 87.0, | 95.9, | 102.7, | 113.1, | 121.1, | 127.7, | N/A , |
| 34.0, | 38.6, | 45.3, | 49.8, | 53.2, | 64.3, | 76.4, | 84.3, | 95.3, | 104.8, | 112.1, | 123.3, | 131.9, | 138.9, | 163.2, |
| 41.4, | 46.5, | 54.0, | 58.9, | 62.6, | 74.6, | 87.5, | 95.9, | 107.3, | 117.3, | 124.8, | 136.3, | 145.1, | 152.2, | 176.8, |
| 47.3, | 52.8, | 60.9, | 66.2, | 70.2, | 82.9, | 96.6, | 105.4, | 117.3, | 127.7, | 135.5, | 147.4, | 156.4, | 163.7, | 188.8, |
| 52.4, | 58.4, | 67.0, | 72.6, | 76.8, | 90.2, | 104.5, | 113.7, | 126.1, | 136.8, | 144.9, | 157.1, | 166.4, | 173.9, | 199.5, |
| 61.4, | 68.0, | 77.5, | 83.6, | 88.3, | 102.8, | 118.2, | 128.0, | 141.3, | 152.6, | 161.2, | 174.1, | 183.8, | 191.7, | 218.4, |
| 69.3, | 76.5, | 86.7, | 93.3, | 98.2, | 113.7, | 130.2, | 140.5, | 154.5, | 166.4, | 175.4, | 188.8, | 199.0, | 207.2, | 234.9, |
| 76.5, | 84.2, | 95.0, | 102.0, | 107.3, | 123.7, | 140.9, | 151.8, | 166.4, | 178.8, | 188.2, | 202.2, | 212.7, | 221.2, | 249.8, |
| 83.2, | 91.3, | 102.8, | 110.1, | 115.7, | 132.8, | 150.9, | 162.2, | 177.4, | 190.3, | 200.0, | 214.4, | 225.3, | 234.0, | 263.5, |
| 95.5, | 104.4, | 117.0, | 125.0, | 131.0, | 149.6, | 169.0, | 181.1, | 197.3, | 211.1, | 221.4, | 236.7, | 248.1, | 257.4, | 288.4, |
| 106.9, | 116.5, | 130.0, | 138.6, | 145.0, | 164.8, | 185.5, | 198.3, | 215.4, | 229.9, | 240.7, | 256.8, | 268.8, | 278.5, | 310.8, |
| 120.1, | 130.5, | 145.1, | 154.3, | 161.2, | 182.4, | 204.4, | 218.1, | 236.2, | 251.5, | 262.9, | 279.8, | 292.5, | 302.6, | 336.4, |

ble

rived from a Depth Duration Frequency (DDF) Model

o:

2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',

load at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf