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DOHERTY FINEGAN KELLY
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D09 W2V9

**South Dublin County Council**
**Land Use, Planning & Transportation Department**
**South Dublin County Council**
**County Hall Tallaght,**
**Dublin 24, D24 A3XC**
**planningdept@sdublincoco.ie**

**29 October 2022**

**Additional Information**

**Planning Reference: SD22A/0292 – Works at Healy Chemicals Ireland Ltd, HCL House, Second Avenue, Cookstown Industrial Estate, Tallaght, Dublin 24.**

***Dear Sir or Madam,***

Please find below(with 6 copies attached) Doherty Finegan Kelly's response to Additional Information request of 26th August 2022 - Planning Ref SD22A/0292, note we are responding to item no. 2 only – response to remaining items by others.

***South Dublin County Council Additional Information request No. 2***
*The information submitted with the application does not offer enough detail to make a full assessment with regards to drainage, therefore the applicant is requested to submit the following:*

*a) A report showing surface water attenuation calculations for proposed development. Show what surface water attenuation is required in m3 and show also what surface water attenuation is provided in m3. Surface water attenuation shall be provided by means of SuDS (Sustainable Drainage Systems).*

*b) A drawing showing what SuDS care proposed for the development. Examples of SuDS can be found in SuDS Guide on South Dublin County Council Website at sdcc-suds-explanatory-design-and- evaluation-guide.pdf.*

**DFK Response to Additional Information request No.2**

a) The proposed development includes an extension to the front of the existing building and the associated ancillary works. The proposed extension replaces the existing hardstanding surface.

The proposed additional roof area is to be constructed as a mono pitch roof draining into the gutter of the existing roof and we are proposing to include permeable paving and a planter within the new works which will reduce the hardstanding area of the development and in turn reduce the surface water run-off generated by the development

The storage volume for the new development as outlined below is minimal with the largest storage volume required being $0.35m^3$. As we are replacing an area of the existing hardstanding

surface with the proposed development and incorporating SUDs systems the storage volume required would be available within the existing network.

The allowable outflow for the whole site has been calculated and are as follows:

- QBAR = 0.65 l/sec
- 1 in 30 year return period = 1.36l/sec and
- 1 in 100 year return period = 1.69 l/sec

The Qbar calculation is based on a SOIL factor of 0.3 which corresponds with Soil Type 2 in the Flood Studies Report.

The full calculations are included in **Appendix I.**

**b)** The existing and proposed site layouts including details of the SuDs systems are shown on DFK **Drg. 22015-01.**

Please do not hesitate to contact me should you wish to discuss any of the above.

**SIGNED** _____

**Seán Gibbons**
**On behalf of Doherty Finegan Kelly**

# APPENDIX I

## SURFACE WATER + SUD'S CALCULATIONS

SURFACE WATER CALCULATIONS INDEX

- Return Period Rainfall Depths Table for Tallaght
- Site Catchment Characteristics
- Attenuation 30 year
- Attenuation 100 year
- Attenuation 30 year @ QBAR
- Attenuation 100 year @QABR

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 308322, Northing: 228473,

| | Interval | | Years | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DURATION | 6months, | 1year, | 2, | 3, | 4, | 5, | 10, | 20, | 30, | 50, | 75, | 100, | 150, | 200, | 250, | 500, |
| 5 mins | 2.6, | 3.8, | 4.5, | 5.5, | 6.2, | 6.8, | 8.7, | 10.9, | 12.4, | 14.6, | 16.5, | 18.0, | 20.4, | 22.3, | 23.9, | N/A , |
| 10 mins | 3.6, | 5.3, | 6.2, | 7.7, | 8.7, | 9.5, | 12.1, | 15.2, | 17.3, | 20.3, | 23.0, | 25.1, | 28.4, | 31.1, | 33.2, | N/A , |
| 15 mins | 4.2, | 6.2, | 7.3, | 9.0, | 10.2, | 11.2, | 14.3, | 17.9, | 20.4, | 23.9, | 27.1, | 29.6, | 33.5, | 36.5, | 39.1, | N/A , |
| 30 mins | 5.5, | 8.1, | 9.5, | 11.7, | 13.2, | 14.3, | 18.2, | 22.7, | 25.8, | 30.1, | 34.0, | 37.1, | 41.9, | 45.6, | 48.8, | N/A , |
| 1 hours | 7.3, | 10.5, | 12.3, | 15.1, | 16.9, | 18.4, | 23.3, | 28.9, | 32.7, | 38.0, | 42.8, | 46.6, | 52.4, | 57.0, | 60.8, | N/A , |
| 2 hours | 9.5, | 13.7, | 16.0, | 19.4, | 21.8, | 23.6, | 29.7, | 36.7, | 41.3, | 47.9, | 53.9, | 58.5, | 65.6, | 71.2, | 75.8, | N/A , |
| 3 hours | 11.2, | 16.0, | 18.6, | 22.6, | 25.3, | 27.4, | 34.3, | 42.2, | 47.5, | 54.9, | 61.6, | 66.8, | 74.8, | 81.1, | 86.3, | N/A , |
| 4 hours | 12.5, | 17.8, | 20.7, | 25.1, | 28.0, | 30.4, | 37.9, | 46.6, | 52.3, | 60.5, | 67.7, | 73.4, | 82.1, | 88.9, | 94.6, | N/A , |
| 6 hours | 14.7, | 20.8, | 24.1, | 29.1, | 32.5, | 35.1, | 43.8, | 53.6, | 60.1, | 69.3, | 77.5, | 83.8, | 93.6, | 101.3, | 107.6, | N/A , |
| 9 hours | 17.2, | 24.3, | 28.1, | 33.8, | 37.7, | 40.7, | 50.5, | 61.6, | 69.0, | 79.4, | 88.6, | 95.7, | 106.8, | 115.3, | 122.4, | N/A , |
| 12 hours | 19.3, | 27.1, | 31.3, | 37.6, | 41.8, | 45.1, | 55.9, | 68.1, | 76.1, | 87.4, | 97.4, | 105.2, | 117.2, | 126.5, | 134.2, | N/A , |
| 18 hours | 22.6, | 31.6, | 36.4, | 43.6, | 48.5, | 52.2, | 64.5, | 78.3, | 87.4, | 100.1, | 111.4, | 120.2, | 133.6, | 144.1, | 152.7, | N/A , |
| 24 hours | 25.4, | 35.3, | 40.6, | 48.5, | 53.8, | 57.9, | 71.4, | 86.4, | 96.4, | 110.2, | 122.6, | 132.1, | 146.7, | 158.0, | 167.3, | 200.0, |
| 2 days | 32.0, | 43.3, | 49.2, | 58.0, | 63.8, | 68.3, | 82.6, | 98.6, | 108.9, | 123.2, | 135.8, | 145.4, | 160.1, | 171.4, | 180.7, | 212.9, |
| 3 days | 37.3, | 49.8, | 56.2, | 65.6, | 71.8, | 76.6, | 91.8, | 108.5, | 119.2, | 134.0, | 146.9, | 156.8, | 171.8, | 183.3, | 192.7, | 225.0, |
| 4 days | 42.0, | 55.4, | 62.3, | 72.2, | 78.8, | 83.8, | 99.8, | 117.1, | 128.2, | 143.5, | 156.8, | 166.9, | 182.2, | 193.8, | 203.4, | 236.1, |
| 6 days | 50.3, | 65.2, | 72.8, | 83.8, | 90.9, | 96.4, | 113.5, | 132.0, | 143.8, | 159.9, | 173.8, | 184.3, | 200.2, | 212.3, | 222.1, | 255.7, |
| 8 days | 57.6, | 73.8, | 82.0, | 93.8, | 101.5, | 107.3, | 125.5, | 145.0, | 157.4, | 174.2, | 188.6, | 199.6, | 216.0, | 228.4, | 238.5, | 272.9, |
| 10 days | 64.2, | 81.7, | 90.5, | 102.9, | 111.0, | 117.2, | 136.3, | 156.7, | 169.6, | 187.0, | 202.0, | 213.2, | 230.2, | 242.9, | 253.3, | 288.4, |
| 12 days | 70.5, | 89.0, | 98.3, | 111.4, | 119.9, | 126.3, | 146.3, | 167.5, | 180.8, | 198.8, | 214.3, | 225.9, | 243.2, | 256.3, | 266.9, | 302.7, |
| 16 days | 82.2, | 102.6, | 112.7, | 127.0, | 136.1, | 143.1, | 164.5, | 187.1, | 201.3, | 220.3, | 236.5, | 248.7, | 266.9, | 280.5, | 291.6, | 328.7, |
| 20 days | 92.9, | 115.0, | 125.9, | 141.2, | 151.0, | 158.3, | 181.1, | 204.9, | 219.8, | 239.7, | 256.7, | 269.4, | 288.2, | 302.4, | 313.8, | 352.1, |
| 25 days | 105.6, | 129.5, | 141.2, | 157.7, | 168.2, | 176.0, | 200.2, | 225.4, | 241.1, | 262.0, | 279.7, | 292.9, | 312.6, | 327.3, | 339.1, | 378.7, |

NOTES:
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

| | | |
|---|---|---|
| | **Doherty Finegan Kelly**<br>***Consulting Structural & Civil Engineers,*** | **Botanic Court, 30 Botanic Road, Glasnevin,**<br>**Dublin 9**<br>**Tel: 8301852 / Fax: 8602265** |

| Project: | Design: ☑ | Telephone Log: ☐ |
|---|---|---|
| **Healy Chemicals Ireland Ltd** | Minutes: ☐ | Other Record: ☐ |

| Project No: | Element: | Prepared: | Checked: |
|---|---|---|---|
| **22015** | **Site Catchment Characteristics** | **SG** | **FD** |

Reference | Output:

## Site Catchment Characteristics

| | |
|---|---|
| Total Site Area | 3125 m² |
| Total Extension Area | 42 m² |
| Roof Drainage | 18 m² |
| Hardstanding | 9 m² |
| Porous Surfaces | 12 m² |
| Landscape | 2 m² |

| | |
|---|---|
| QBAR | 0.104 m³/sec |
| SAAR | 782.0 mm |
| SOIL | 0.3 |
| AREA ** | 0.50 km² |
| QBAR/ha (l/s/ha) | 2.075 |

** The area taken in calculating QBAR/ha is 50 ha in accordance with paragraph 6.6.1 of Vol 2 of the GDSDS.

| Location | Length | Width | Area |
|---|---|---|---|
| Roof | | | 18 m² |
| Hardstanding | | | 9 m² |
| | | | |
| | | | |
| | | | |
| | | TOTAL | 27 m² |

## Areas Contributing to Infiltration into:

| Location | Area |
|---|---|
| | |
| | |
| | |
| TOTAL | 0 m² |

| Location | Area |
|---|---|
| | |
| | |
| | |
| TOTAL | 0 m² |

| Location | Area |
|---|---|
| | |
| | |
| | |
| TOTAL | 0 m² |

| Location | Area |
|---|---|
| | |
| | |
| | |
| TOTAL | 0 m² |

| Location | Area |
|---|---|
| | |
| | |
| | |
| TOTAL | 0 m² |

| Location | Area |
|---|---|
| | |
| | |
| | |
| TOTAL | 0 m² |

## Allowable Outflow

| Growth Curve | 1 years | QBAR | 10 years | 30 years | 100 years |
|---|---|---|---|---|---|
| Multiplier | 0.85 | 1 | 1.7 | 2.1 | 2.6 |
| Allowable Outflow (l/s) | 0.55 | 0.65 | 1.10 | 1.36 | 1.69 |
| | | | | | |

## Tallaght Extreme Rainfall Matrix

RP5 60min= 18.4 mm RP5 2d= 68.3 mm ANNUAL RAINFALL= 782.0 mm

RETURN PERIOD ( YEARS )

| DURATION | 0.5 | 1 | 2 | 5 | 10 | 20 | 30 | 50 | 100 |
|---|---|---|---|---|---|---|---|---|---|
| 2 min | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5 min | 3.1 | 4.6 | 5.4 | 8.1 | 10.4 | 13.1 | 14.9 | 17.5 | 21.6 |
| 10 min | 4.3 | 6.4 | 7.4 | 11.4 | 14.5 | 18.2 | 20.8 | 24.4 | 30.1 |
| 15 min | 5.0 | 7.4 | 8.8 | 13.4 | 17.2 | 21.5 | 24.5 | 28.7 | 35.5 |
| 30 min | 6.6 | 9.7 | 11.4 | 17.2 | 21.8 | 27.2 | 31.0 | 36.1 | 44.5 |
| 60 min | 8.8 | 12.6 | 14.8 | 22.1 | 28.0 | 34.7 | 39.2 | 45.6 | 55.9 |
| 2 hr | 11.4 | 16.4 | 19.2 | 28.3 | 35.6 | 44.0 | 49.6 | 57.5 | 70.2 |
| 4 hr | 15.0 | 21.4 | 24.8 | 36.5 | 45.5 | 55.9 | 62.8 | 72.6 | 88.1 |
| 6 hr | 17.6 | 25.0 | 28.9 | 42.1 | 52.6 | 64.3 | 72.1 | 83.2 | 100.6 |
| 12 hr | 23.2 | 32.5 | 37.6 | 54.1 | 67.1 | 81.7 | 91.3 | 104.9 | 126.2 |
| 24 hr | 30.5 | 42.4 | 48.7 | 69.5 | 85.7 | 103.7 | 115.7 | 132.2 | 158.5 |
| 48 hr | 38.4 | 52.0 | 59.0 | 82.0 | 99.1 | 118.3 | 130.7 | 147.8 | 174.5 |
| 72 hr | 44.8 | 59.8 | 67.4 | 91.9 | 110.2 | 130.2 | 143.0 | 160.8 | 188.2 |

Allowance of 20% for Climate Change in accordance with GDSDS

| JOB NAME: Healy Chemicals Ireland Ltd | JOB NO:22015 | | |
|---|---|---|---|
| TITLE: ATTENUATION - (30 Yr Return Period) | | CALCS BY: SG | CHECK'D: FD |
| RCD. | | ISSUE. 1 | REV. 0 |

Doherty Finegan Kelly
30-32 Botanic Road, Glasnevin, Dublin 9
Tel: 830 1852, Fax: 860 2265, E-mail: mailroom@dfk.ie

# SURFACE WATER STORAGE

| | | | | |
|---|---|---|---|---|
| Storm Return Period = | 30 | Years | | |
| Total Site Area = | 0.3125 | Hectares (ha) | | |
| | | | | |
| Areas Contributing to Drainage System: | | | | |
| Roof Area = | 0.0018 | ha | @ | 95% Impermeable |
| Hardstanding = | 0.0009 | ha | @ | 90% Impermeable |
| Permeable areas = | 0.0000 | ha | @ | 0% Impermeable |
| Landscaping = | 0.0000 | ha | @ | 0% Impermeable |
| | | | | |
| **Total Impermeable Area =** | **0.0025** | **ha** | | |

**Site Location (Select from tabs below)** Tallaght

**Allowable Outflow =** 1.36 litres/sec

| Duration (min) | Rainfall 30 Year (mm) | Intensity (mm/hr) | Discharge Q (= 2.71Ai) (l/s) | Proposed Runoff ($m^3$) | Contiguous Land Runoff ($m^3$) | Total ** Runoff ($m^3$) | Allowable Outflow ($m^3$) | Storage Req'd ($m^3$) |
|---|---|---|---|---|---|---|---|---|
| 2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | -0.2 |
| 5 | 12.4 | 148.8 | 1.0 | 0.3 | 0.0 | 0.4 | 0.4 | 0.0 |
| 10 | 17.3 | 103.8 | 0.7 | 0.4 | 0.0 | 0.5 | 0.8 | -0.3 |
| 15 | 20.4 | 81.6 | 0.6 | 0.5 | 0.0 | 0.6 | 1.2 | -0.6 |
| 30 | 25.8 | 51.6 | 0.4 | 0.6 | 0.0 | 0.8 | 2.4 | -1.7 |
| 60 | 32.7 | 32.7 | 0.2 | 0.8 | 0.0 | 1.0 | 4.9 | -3.9 |
| 120 | 41.3 | 20.7 | 0.1 | 1.0 | 0.0 | 1.2 | 9.8 | -8.6 |
| 240 | 52.3 | 13.1 | 0.1 | 1.3 | 0.0 | 1.5 | 19.6 | -18.0 |
| 360 | 60.1 | 10.0 | 0.1 | 1.5 | 0.0 | 1.8 | 29.4 | -27.6 |
| 720 | 76.1 | 6.3 | 0.0 | 1.9 | 0.0 | 2.2 | 58.8 | -56.5 |
| 1440 | 96.4 | 4.0 | 0.0 | 2.4 | 0.0 | 2.8 | 117.5 | -114.7 |
| 2880 | 108.9 | 2.3 | 0.0 | 2.7 | 0.0 | 3.2 | 235.0 | -231.8 |
| 4320 | 119.2 | 1.7 | 0.0 | 2.9 | 0.0 | 3.5 | 352.5 | -349.0 |

** Includes 20% for climate change

**Storage required =** -0.04 $m^3$ $m^3$

***Oversized Pipe Requirements***

| Pipe dia. (mm) | Length (m) |
|---|---|
| 600 | 0 |
| 900 | 0 |
| 1050 | 0 |
| 1200 | 0 |
| 1500 | 0 |

***Twin Pipe Requirements***

| DIA (mm) | AREA/ PIPE ($m^2$) | TOTAL AREA ($m^2$) | LENGTH REQ'D (m) |
|---|---|---|---|
| 525 | 0.216 | 0.433 | 0 |
| 600 | 0.283 | 0.565 | 0 |
| 900 | 0.636 | 1.272 | 0 |
| 1050 | 0.866 | 1.732 | 0 |
| 1200 | 1.131 | 2.262 | 0 |

| JOB NAME: Healy Chemicals Ireland Ltd | JOB NO:22015 | | |
|---|---|---|---|
| TITLE: ATTENUATION - (100 Yr Return Period) | | CALCS BY: SG | CHECK'D: FD |
| RCD. | | ISSUE. 1 | REV. 0 |

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Tel: 830 1852, Fax: 860 2265, E-mail: mailroom@dfk.ie

# SURFACE WATER STORAGE

| | | | | | |
|---|---|---|---|---|---|
| Storm Return Period = | 100 | Years | | | |
| Total Site Area = | 0.3125 | Hectares (ha) | | | |
| | | | | | |
| Areas Contributing to Drainage System: | | | | | |
| Roof Area = | 0.0018 | ha | ..... @ | 95% | Impermeable |
| Hardstanding = | 0.0009 | ha | ..... @ | 90% | Impermeable |
| Permeable areas = | 0.0000 | ha | ..... @ | 0% | Impermeable |
| Landscaping = | 0.0000 | ha | ..... @ | 0% | Impermeable |
| | | | | | |
| **Total Impermeable Area =** | **0.0025** | **ha** | | | |

**Site Location (Select from tabs below)** Tallaght

**Allowable Outflow =** 1.69 litres/sec

| Duration (min) | Rainfall 100 Year (mm) | Intensity (mm/hr) | Discharge Q (= 2.71Ai) (l/s) | Proposed Runoff ($m^3$) | Contiguous Land Runoff ($m^3$) | Total ** Runoff ($m^3$) | Allowable Outflow ($m^3$) | Storage Req'd ($m^3$) |
|---|---|---|---|---|---|---|---|---|
| 2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | -0.2 |
| 5 | 18.0 | 216.0 | 1.5 | 0.4 | 0.0 | 0.5 | 0.5 | 0.0 |
| 10 | 25.1 | 150.6 | 1.0 | 0.6 | 0.0 | 0.7 | 1.0 | -0.3 |
| 15 | 29.6 | 118.4 | 0.8 | 0.7 | 0.0 | 0.9 | 1.5 | -0.6 |
| 30 | 37.1 | 74.2 | 0.5 | 0.9 | 0.0 | 1.1 | 3.0 | -1.9 |
| 60 | 46.6 | 46.6 | 0.3 | 1.1 | 0.0 | 1.4 | 6.1 | -4.7 |
| 120 | 58.5 | 29.3 | 0.2 | 1.4 | 0.0 | 1.7 | 12.2 | -10.4 |
| 240 | 73.4 | 18.4 | 0.1 | 1.8 | 0.0 | 2.2 | 24.3 | -22.2 |
| 360 | 83.8 | 14.0 | 0.1 | 2.1 | 0.0 | 2.5 | 36.5 | -34.0 |
| 720 | 105.2 | 8.8 | 0.1 | 2.6 | 0.0 | 3.1 | 73.0 | -69.9 |
| 1440 | 132.1 | 5.5 | 0.0 | 3.2 | 0.0 | 3.9 | 146.0 | -142.1 |
| 2880 | 145.4 | 3.0 | 0.0 | 3.6 | 0.0 | 4.3 | 292.0 | -287.7 |
| 4320 | 156.8 | 2.2 | 0.0 | 3.9 | 0.0 | 4.6 | 438.0 | -433.4 |

** Includes 20% for climate change

**Storage required =** 0.02 $m^3$ $m^3$

***Oversized Pipe Requirements***

| Pipe dia. (mm) | Length (m) |
|---|---|
| 600 | 0 |
| 900 | 0 |
| 1050 | 0 |
| 1200 | 0 |
| 1500 | 0 |

***Twin Pipe Requirements***

| DIA (mm) | AREA/ PIPE ($m^2$) | TOTAL AREA ($m^2$) | LENGTH REQ'D (m) |
|---|---|---|---|
| 525 | 0.216 | 0.433 | 0 |
| 600 | 0.283 | 0.565 | 0 |
| 900 | 0.636 | 1.272 | 0 |
| 1050 | 0.866 | 1.732 | 0 |
| 1200 | 1.131 | 2.262 | 0 |

| JOB NAME: Healy Chemicals Ireland Ltd | JOB NO:22015 | | |
|---|---|---|---|
| TITLE: ATTENUATION @ QBAR- (30 Yr Return Period) | | CALCS BY: SG | CHECK'D: FD |
| RCD. | | ISSUE. 1 | REV. 0 |

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Tel: 830 1852, Fax: 860 2265, E-mail: mailroom@dfk.ie

# SURFACE WATER STORAGE

| | | | | | |
|---|---|---|---|---|---|
| Storm Return Period = | 30 | Years | | | |
| Total Site Area = | 0.3125 | Hectares (ha) | | | |
| | | | | | |
| Areas Contributing to Drainage System: | | | | | |
| Roof Area = | 0.0018 | ha | .....@ | 95% | Impermeable |
| Hardstanding = | 0.0009 | ha | .....@ | 90% | Impermeable |
| Permeable areas = | 0.0000 | ha | .....@ | 0% | Impermeable |
| Landscaping = | 0.0000 | ha | .....@ | 0% | Impermeable |
| | | | | | |
| **Total Impermeable Area =** | **0.0025** | **ha** | | | |

**Site Location (Select from tabs below)** Tallaght

**Allowable Outflow =** 0.65 litres/sec QBAR

| Duration (min) | Rainfall 30 Year (mm) | Intensity (mm/hr) | Discharge Q (= 2.71Ai) (l/s) | Proposed Runoff ($m^3$) | Contiguous Land Runoff ($m^3$) | Total ** Runoff ($m^3$) | Allowable Outflow ($m^3$) | Storage Req'd ($m^3$) |
|---|---|---|---|---|---|---|---|---|
| 2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | -0.1 |
| 5 | 12.4 | 148.8 | 1.0 | 0.3 | 0.0 | 0.4 | 0.2 | 0.2 |
| 10 | 17.3 | 103.8 | 0.7 | 0.4 | 0.0 | 0.5 | 0.4 | 0.1 |
| 15 | 20.4 | 81.6 | 0.6 | 0.5 | 0.0 | 0.6 | 0.6 | 0.0 |
| 30 | 25.8 | 51.6 | 0.4 | 0.6 | 0.0 | 0.8 | 1.2 | -0.4 |
| 60 | 32.7 | 32.7 | 0.2 | 0.8 | 0.0 | 1.0 | 2.3 | -1.4 |
| 120 | 41.3 | 20.7 | 0.1 | 1.0 | 0.0 | 1.2 | 4.7 | -3.5 |
| 240 | 52.3 | 13.1 | 0.1 | 1.3 | 0.0 | 1.5 | 9.4 | -7.8 |
| 360 | 60.1 | 10.0 | 0.1 | 1.5 | 0.0 | 1.8 | 14.0 | -12.3 |
| 720 | 76.1 | 6.3 | 0.0 | 1.9 | 0.0 | 2.2 | 28.1 | -25.8 |
| 1440 | 96.4 | 4.0 | 0.0 | 2.4 | 0.0 | 2.8 | 56.2 | -53.3 |
| 2880 | 108.9 | 2.3 | 0.0 | 2.7 | 0.0 | 3.2 | 112.3 | -109.1 |
| 4320 | 119.2 | 1.7 | 0.0 | 2.9 | 0.0 | 3.5 | 168.5 | -165.0 |

** Includes 20% for climate change

**Storage required =** 0.17 $m^3$ $m^3$

***Oversized Pipe Requirements***

| Pipe dia. (mm) | Length (m) |
|---|---|
| 600 | 1 |
| 900 | 0 |
| 1050 | 0 |
| 1200 | 0 |
| 1500 | 0 |

***Twin Pipe Requirements***

| DIA (mm) | AREA/ PIPE ($m^2$) | TOTAL AREA ($m^2$) | LENGTH REQ'D (m) |
|---|---|---|---|
| 525 | 0.216 | 0.433 | 0 |
| 600 | 0.283 | 0.565 | 0 |
| 900 | 0.636 | 1.272 | 0 |
| 1050 | 0.866 | 1.732 | 0 |
| 1200 | 1.131 | 2.262 | 0 |

| JOB NAME: Healy Chemicals Ireland Ltd | JOB NO:22015 | | |
|---|---|---|---|
| TITLE: ATTENUATION @ QBAR - (100 Yr Return Period) | | CALCS BY: SG | CHECK'D: FD |
| RCD. | | ISSUE. 1 | REV. 0 |

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# SURFACE WATER STORAGE

| | | | | |
|---|---|---|---|---|
| Storm Return Period = | 100 | Years | | |
| Total Site Area = | 0.3125 | Hectares (ha) | | |
| | | | | |
| Areas Contributing to Drainage System: | | | | |
| Roof Area = | 0.0018 | ha | @ 95% | Impermeable |
| Hardstanding = | 0.0009 | ha | @ 90% | Impermeable |
| Permeable areas = | 0.0000 | ha | @ 0% | Impermeable |
| Landscaping = | 0.0000 | ha | @ 0% | Impermeable |
| | | | | |
| **Total Impermeable Area =** | **0.0025** | **ha** | | |

**Site Location (Select from tabs below)** Tallaght

**Allowable Outflow =** 0.65 litres/sec QBAR

| Duration (min) | Rainfall 100 Year (mm) | Intensity (mm/hr) | Discharge Q (= 2.71Ai) (l/s) | Proposed Runoff ($m^3$) | Contiguous Land Runoff ($m^3$) | Total ** Runoff ($m^3$) | Allowable Outflow ($m^3$) | Storage Req'd ($m^3$) |
|---|---|---|---|---|---|---|---|---|
| 2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | -0.1 |
| 5 | 18.0 | 216.0 | 1.5 | 0.4 | 0.0 | 0.5 | 0.2 | 0.3 |
| 10 | 25.1 | 150.6 | 1.0 | 0.6 | 0.0 | 0.7 | 0.4 | 0.4 |
| 15 | 29.6 | 118.4 | 0.8 | 0.7 | 0.0 | 0.9 | 0.6 | 0.3 |
| 30 | 37.1 | 74.2 | 0.5 | 0.9 | 0.0 | 1.1 | 1.2 | -0.1 |
| 60 | 46.6 | 46.6 | 0.3 | 1.1 | 0.0 | 1.4 | 2.3 | -1.0 |
| 120 | 58.5 | 29.3 | 0.2 | 1.4 | 0.0 | 1.7 | 4.7 | -3.0 |
| 240 | 73.4 | 18.4 | 0.1 | 1.8 | 0.0 | 2.2 | 9.4 | -7.2 |
| 360 | 83.8 | 14.0 | 0.1 | 2.1 | 0.0 | 2.5 | 14.0 | -11.6 |
| 720 | 105.2 | 8.8 | 0.1 | 2.6 | 0.0 | 3.1 | 28.1 | -25.0 |
| 1440 | 132.1 | 5.5 | 0.0 | 3.2 | 0.0 | 3.9 | 56.2 | -52.3 |
| 2880 | 145.4 | 3.0 | 0.0 | 3.6 | 0.0 | 4.3 | 112.3 | -108.0 |
| 4320 | 156.8 | 2.2 | 0.0 | 3.9 | 0.0 | 4.6 | 168.5 | -163.9 |

** Includes 20% for climate change

**Storage required =** 0.35 $m^3$ $m^3$

***Oversized Pipe Requirements***

| Pipe dia. (mm) | Length (m) |
|---|---|
| 600 | 1 |
| 900 | 1 |
| 1050 | 0 |
| 1200 | 0 |
| 1500 | 0 |

***Twin Pipe Requirements***

| DIA (mm) | AREA/ PIPE ($m^2$) | TOTAL AREA ($m^2$) | LENGTH REQ'D (m) |
|---|---|---|---|
| 525 | 0.216 | 0.433 | 1 |
| 600 | 0.283 | 0.565 | 1 |
| 900 | 0.636 | 1.272 | 0 |
| 1050 | 0.866 | 1.732 | 0 |
| 1200 | 1.131 | 2.262 | 0 |