# Appendix E Wastewater Network Calculations

## FOUL SEWERAGE DESIGN

### Design Criteria for Foul Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

| | | | |
|---|---|---|---|
| Industrial Flow (l/s/ha) | 0.00 | Add Flow / Climate Change (%) | 0 |
| Industrial Peak Flow Factor | 0.00 | Minimum Backdrop Height (m) | 0.200 |
| Flow Per Person (l/per/day) | 150.00 | Maximum Backdrop Height (m) | 1.500 |
| Persons per House | 3.00 | Min Design Depth for Optimisation (m) | 1.200 |
| Domestic (l/s/ha) | 0.00 | Min Vel for Auto Design only (m/s) | 0.75 |
| Domestic Peak Flow Factor | 6.00 | Min Slope for Optimisation (1:X) | 500 |

Designed with Level Soffits

### Network Design Table for Foul Network 1

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | Houses | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 16.887 | 0.281 | 60.0 | 0.000 | 4 | 0.0 | 1.500 | o | 150 | Pipe/Conduit | |
| 1.001 | 48.710 | 0.325 | 150.0 | 0.000 | 15 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 2.000 | 29.813 | 0.497 | 60.0 | 0.000 | 5 | 0.0 | 1.500 | o | 150 | Pipe/Conduit | |
| 1.002 | 23.011 | 0.153 | 150.0 | 0.000 | 3 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 3.000 | 63.432 | 1.617 | 39.2 | 0.000 | 13 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.003 | 10.099 | 0.067 | 150.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.004 | 40.787 | 0.272 | 150.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.005 | 5.463 | 0.036 | 150.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.006 | 15.502 | 0.103 | 150.0 | 0.000 | 3 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |

### Network Results Table

| PN | US/IL (m) | Σ Area (ha) | Σ Base Flow (l/s) | Σ Hse | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|
| 1.000 | 79.225 | 0.000 | 0.0 | 4 | 0.0 | 1.13 | 20.0 | 0.1 |
| 1.001 | 78.944 | 0.000 | 0.0 | 19 | 0.0 | 0.94 | 37.2 | 0.6 |
| 2.000 | 79.232 | 0.000 | 0.0 | 5 | 0.0 | 1.13 | 20.0 | 0.2 |
| 1.002 | 78.619 | 0.000 | 0.0 | 27 | 0.0 | 0.94 | 37.2 | 0.8 |
| 3.000 | 80.124 | 0.000 | 0.0 | 13 | 0.0 | 1.84 | 73.0 | 0.4 |
| 1.003 | 78.466 | 0.000 | 0.0 | 40 | 0.0 | 0.94 | 37.2 | 1.3 |
| 1.004 | 78.398 | 0.000 | 0.0 | 40 | 0.0 | 0.94 | 37.2 | 1.3 |
| 1.005 | 78.126 | 0.000 | 0.0 | 40 | 0.0 | 0.94 | 37.2 | 1.3 |
| 1.006 | 78.090 | 0.000 | 0.0 | 43 | 0.0 | 0.94 | 37.2 | 1.3 |

## Network Design Table for Foul Network 1

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | Houses | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.000 | 48.363 | 0.806 | 60.0 | 0.000 | 8 | 0.0 | 1.500 | o | 150 | Pipe/Conduit | |
| 4.001 | 18.845 | 0.126 | 150.0 | 0.000 | 5 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 4.002 | 6.271 | 0.042 | 150.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 5.000 | 26.953 | 0.449 | 60.0 | 0.000 | 10 | 0.0 | 1.500 | o | 150 | Pipe/Conduit | |
| 5.001 | 21.378 | 0.356 | 60.0 | 0.000 | 6 | 0.0 | 1.500 | o | 150 | Pipe/Conduit | |
| 5.002 | 9.158 | 0.317 | 28.9 | 0.000 | 3 | 0.0 | 1.500 | o | 150 | Pipe/Conduit | |
| 4.003 | 54.800 | 0.865 | 63.3 | 0.000 | 10 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.007 | 28.629 | 0.191 | 150.0 | 0.000 | 4 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 6.000 | 21.830 | 0.364 | 60.0 | 0.000 | 10 | 0.0 | 1.500 | o | 150 | Pipe/Conduit | |
| 6.001 | 22.810 | 0.228 | 100.0 | 0.000 | 6 | 0.0 | 1.500 | o | 150 | Pipe/Conduit | |
| 6.002 | 8.020 | 0.080 | 100.0 | 0.000 | 0 | 0.0 | 1.500 | o | 150 | Pipe/Conduit | |
| 6.003 | 48.192 | 0.321 | 150.0 | 0.000 | 8 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 6.004 | 6.565 | 0.044 | 150.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 6.005 | 41.246 | 0.275 | 150.0 | 0.000 | 2 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 6.006 | 41.190 | 0.342 | 120.5 | 0.000 | 6 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.008 | 4.987 | 0.033 | 150.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.009 | 35.966 | 0.240 | 150.0 | 0.000 | 7 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |

## Network Results Table

| PN | US/IL (m) | Σ Area (ha) | Σ Base Flow (l/s) | Σ Hse | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|
| 4.000 | 80.466 | 0.000 | 0.0 | 8 | 0.0 | 1.13 | 20.0 | 0.3 |
| 4.001 | 79.660 | 0.000 | 0.0 | 13 | 0.0 | 0.94 | 37.2 | 0.4 |
| 4.002 | 79.534 | 0.000 | 0.0 | 13 | 0.0 | 0.94 | 37.2 | 0.4 |
| 5.000 | 80.615 | 0.000 | 0.0 | 10 | 0.0 | 1.13 | 20.0 | 0.3 |
| 5.001 | 80.166 | 0.000 | 0.0 | 16 | 0.0 | 1.13 | 20.0 | 0.5 |
| 5.002 | 79.809 | 0.000 | 0.0 | 19 | 0.0 | 1.63 | 28.9 | 0.6 |
| 4.003 | 79.493 | 0.000 | 0.0 | 42 | 0.0 | 1.44 | 57.4 | 1.3 |
| 1.007 | 77.987 | 0.000 | 0.0 | 89 | 0.0 | 0.94 | 37.2 | 2.8 |
| 6.000 | 80.688 | 0.000 | 0.0 | 10 | 0.0 | 1.13 | 20.0 | 0.3 |
| 6.001 | 80.324 | 0.000 | 0.0 | 16 | 0.0 | 0.88 | 15.5 | 0.5 |
| 6.002 | 80.096 | 0.000 | 0.0 | 16 | 0.0 | 0.88 | 15.5 | 0.5 |
| 6.003 | 78.785 | 0.000 | 0.0 | 24 | 0.0 | 0.94 | 37.2 | 0.8 |
| 6.004 | 78.464 | 0.000 | 0.0 | 24 | 0.0 | 0.94 | 37.2 | 0.8 |
| 6.005 | 78.420 | 0.000 | 0.0 | 26 | 0.0 | 0.94 | 37.2 | 0.8 |
| 6.006 | 78.145 | 0.000 | 0.0 | 32 | 0.0 | 1.05 | 41.6 | 1.0 |
| 1.008 | 77.796 | 0.000 | 0.0 | 121 | 0.0 | 0.94 | 37.2 | 3.8 |
| 1.009 | 77.762 | 0.000 | 0.0 | 128 | 0.0 | 0.94 | 37.2 | 4.0 |

## Network Design Table for Foul Network 1

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | Houses | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.010 | 28.295 | 0.337 | 84.0 | 0.000 | 11 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 7.000 | 38.814 | 0.647 | 60.0 | 0.000 | 2 | 0.0 | 1.500 | o | 150 | Pipe/Conduit | |
| 1.011 | 30.222 | 0.151 | 200.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.012 | 23.905 | 0.120 | 200.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.013 | 28.617 | 0.143 | 200.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.014 | 27.855 | 0.139 | 200.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.015 | 25.484 | 0.127 | 200.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.016 | 33.220 | 0.166 | 200.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.017 | 45.963 | 0.230 | 200.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.018 | 47.280 | 0.236 | 200.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.019 | 33.863 | 0.169 | 200.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.020 | 32.527 | 0.163 | 200.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.021 | 17.172 | 0.086 | 200.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.022 | 41.031 | 0.205 | 200.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.023 | 9.194 | 0.046 | 200.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.024 | 4.314 | 0.022 | 200.0 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.025 | 29.064 | 0.150 | 193.8 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |
| 1.026 | 36.885 | 0.150 | 245.9 | 0.000 | 0 | 0.0 | 1.500 | o | 225 | Pipe/Conduit | |

## Network Results Table

| PN | US/IL (m) | Σ Area (ha) | Σ Base Flow (l/s) | Σ Hse | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|
| 1.010 | 77.523 | 0.000 | 0.0 | 139 | 0.0 | 1.25 | 49.8 | 4.3 |
| 7.000 | 76.841 | 0.000 | 0.0 | 2 | 0.0 | 1.13 | 20.0 | 0.1 |
| 1.011 | 74.886 | 0.000 | 0.0 | 141 | 0.0 | 0.81 | 32.2 | 4.4 |
| 1.012 | 74.735 | 0.000 | 0.0 | 141 | 0.0 | 0.81 | 32.2 | 4.4 |
| 1.013 | 74.616 | 0.000 | 0.0 | 141 | 0.0 | 0.81 | 32.2 | 4.4 |
| 1.014 | 74.473 | 0.000 | 0.0 | 141 | 0.0 | 0.81 | 32.2 | 4.4 |
| 1.015 | 74.333 | 0.000 | 0.0 | 141 | 0.0 | 0.81 | 32.2 | 4.4 |
| 1.016 | 74.206 | 0.000 | 0.0 | 141 | 0.0 | 0.81 | 32.2 | 4.4 |
| 1.017 | 74.040 | 0.000 | 0.0 | 141 | 0.0 | 0.81 | 32.2 | 4.4 |
| 1.018 | 73.810 | 0.000 | 0.0 | 141 | 0.0 | 0.81 | 32.2 | 4.4 |
| 1.019 | 73.574 | 0.000 | 0.0 | 141 | 0.0 | 0.81 | 32.2 | 4.4 |
| 1.020 | 73.404 | 0.000 | 0.0 | 141 | 0.0 | 0.81 | 32.2 | 4.4 |
| 1.021 | 73.242 | 0.000 | 0.0 | 141 | 0.0 | 0.81 | 32.2 | 4.4 |
| 1.022 | 73.156 | 0.000 | 0.0 | 141 | 0.0 | 0.81 | 32.2 | 4.4 |
| 1.023 | 72.951 | 0.000 | 0.0 | 141 | 0.0 | 0.81 | 32.2 | 4.4 |
| 1.024 | 72.905 | 0.000 | 0.0 | 141 | 0.0 | 0.81 | 32.2 | 4.4 |
| 1.025 | 72.770 | 0.000 | 0.0 | 141 | 0.0 | 0.82 | 32.7 | 4.4 |
| 1.026 | 72.620 | 0.000 | 0.0 | 141 | 0.0 | 0.73 | 29.0 | 4.4 |

# Appendix F Applicant's Response to MCC Section 247 Meeting Comments

| Comments from Section 247 Meeting with Meath City & County Council | Applicant's Response |
|---|---|
| **Traffic and Transport** | |
| TTA required. | An interim TTA has been provided by the Applicant's Traffic Engineer Systra.<br>A Stage 1 Road Safety Audit will be provided with the final Planning Application. |
| Single access, with omission of 5th arm, is a better arrangement. | The traffic survey data has identified that the existing roundabout to the south of the site is operating over capacity and creates queuing in excess of 250m to 300m along the existing R125 to the west of the roundabout. Systra have designed a new signalised junction to replace the existing roundabout and also realign the Ballybin Road as a 4th arm to the new junction. A new development access is proposed off the realigned Ballybin Road. |
| Need to co-ordinate the inclusion of the Part 8 cycle infrastructure emphasised. | The Part 8 cycle infrastructure has been incorporated into the new signalised junction layout. |
| Noted that the dwellings appeared to be as close as possible to the R125, stating MCC's preference for this to be the case. Importance of passive surveillance noted. | Noted. |
| Preference is for access via Fox Lodge Manor. | As noted above, the traffic survey data identified significant queuing along the R125 to the west of the existing roundabout which extends beyond the existing Fox Lodge Manor entrance. Access to the lands via Fox Lodge Manor would only serve to increase the queuing. |
| Higher accident rates (x2.5) along the 250m of road to the front of the site. | This is likely as a result of the queuing lengths identified during the traffic surveys. The proposed signalised junction will provide a safer road network for all road users. |
| Internal layout and permeability is improved. | Pedestrian priority and permeability have been provided throughout the site with uncontrolled pedestrian crossing points provided throughout the site as illustrated on the Site Layout Plan Engineering drawing 2334-DOB-XX-SI-DR-C-0501 |
| Noted the need for DMURS compliance. Specifically cited the need for 2.5m wide footpaths at key locations / stretches of road, and also remarked upon the possible segregation of cyclists from the road along the "local road". | Refer to the DMURS Statement of Consistency in Section 7.3 above. |
| Queried proposed boundary treatment along Ballybin road. | Refer to the Landscape Architects drawings for boundary treatment. |
| Noted the need to consider and accommodate connectivity to the north-eastern lands. | Connectivity to the north-eastern lands has been considered in the proposed layout. In addition, the realigned Ballybin Road affords connectivity for the north eastern lands. |
| Highlighted the CDP's car and cycle parking standards. | Please refer to the architect's documents for compliance with the car and cycle parking standards. |
| **Water Services** | |
| Noted the "good addition of nature-based" solutions to address surface water. Highlighted this as a preferred | |

| | |
|---|---|
| approach<br><br>• Detention basins should have a profile of 1:4/1:5.<br><br>• No update on previous Irish Water / Uisce Éireann comments. | <br><br>Detention basins have been designed with a profile of 1:4.<br><br>An updated COF has been received from Uisce Eireann. |

# Appendix G Pre-Planning Consultations with Meath Co. Co. Water Services

Marshall Yards Development Company Limited

# Large-Scale Residential Development at Ballybin Road, Ratoath,Co. Meath

## Applicant's Response to LRD Opinion Items 4(b), 5, 6, 10, 11, 13 and 19 (Planning Submission)

2334-DOB-XX-SI-RP-C-0005

June 2024

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# Document Control

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| Document: | | Applicant's Response to LRD Opinion (Planning Submission) | | | |
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| | | | | | |

# Contents

# 1 Introduction

Donnachadh O'Brien & Associates Consulting Engineers Ltd. (DOBA) have been instructed by the Client, Marshall Yards Development Company Limited, to prepare a Response to the LRD Opinion Report received from Meath Co. Co. pertaining to a proposed Large Scale Residential Development (LRD) on lands at Ballybin Road, Ratoath, Co. Meath. This response report addresses **LRD Opinion Items 4(b), 5, 6, 10, 11, 13 & 19** and should be read in conjunction with the responses by other Design Team members as outlined in **Table 1** below.

**Table 1** Summary of Applicant's Response to LRD Opinion Items

| **Meath County Council LRD Opinion Item** | **Applicant's Principal Design Team Member Responsible for Response** |
|---|---|
| Item 1 – AA/ NIS | Enviroguide Consulting |
| Item 1.1 - Zoning/Density/Phasing | John Fleming Architects / Thornton O'Connor Town Planning/ Donnachadh O'Brien & Associates |
| Item 1.2 - Design, Layout including Residential Unit Mix | John Fleming Architects / Niall Montgomery + Partners Architects/ Thornton O'Connor Town Planning/ GNet3D |
| Item 2 - Landscaping | Niall Montgomery + Partners Architects / Charles McCorkell Arboriculture Consultancy |
| Item 3 – Social Infrastructure Assessment | Thornton O'Connor Town Planning |
| Item 4 (a,c) – Environmental Assessment | Enviroguide Consulting / ENX (for (c)) |
| Item 4 (b) – Environmental Assessment | Donnachadh O'Brien & Associates / Charles McCorkell Arboriculture Consultancy |
| Item 5 – Flood Risk Management | Donnachadh O'Brien & Associates |
| Item 6 – Surface Water Management | Donnachadh O'Brien & Associates |
| Item 7 – Archaeology | John Cronin & Associates |
| Item 8 – Broadband | ENX |
| Item 9 - Housing – Part V, Universal Design, Design | John Fleming Architects/ / Marshall Yards Development Company Ltd. |
| Item 10 – Transportation | Donnachadh O'Brien & Associates |
| Item 11 – Water and Wastewater | Donnachadh O'Brien & Associates |
| Item 12 – Public Lighting | ENX |
| Item 13 – CEMP / Waste Management | Donnachadh O'Brien & Associates |

| | |
|---|---|
| Item 14 – Taking In Charge / Management Company | John Fleming Architects / Marshall Yards Development Company Ltd. |
| Item 15 – Fire Safety | John Cronin & Associates / Thornton O'Connor Town Planning |
| Item 16 – Energy Efficiency | ENX |
| Item 17 – Public Artwork | Niall Montgomery + Partners Architects |
| Item 18 – Estate Name | Thornton O'Connor Town Planning |
| Item 19 – Electrical Infrastructure / Telcom Services | Donnachadh O'Brien & Associates |

# 2 Response to LRD Opinion

## 2.1 Environmental Assessment

### 2.1.1 MCC LRD Opinion Item 4(b)

*Management of the trees and hedgerows should form part of the Landscape Management Plan, where it is proposed to retain them on the site. Mitigation and monitoring proposal should be included in the CEMP and an appropriate management plan should be submitted with the application.*

2.1.1.1 Applicant's Response

Where it is proposed to retain trees and hedgerows on site, the management of these features has been included in the Landscape Management Plan, submitted by Charles McCorkell Arboricultural Consultancy under separate cover with the Planning Application documentation.
Mitigation and monitoring proposals have been included in the Construction Management Plan (CMP).

The aim of the management plan is to ensure that a high standard of management is carried out post-construction to conserve and enhance the amenity, biodiversity, and landscape value of the site and local area in the short, medium, and long-term.

To successfully achieve the Aim of the Tree and Hedgerow Management Plan, the main objectives are as follows:

- Maintain existing trees & hedgerows – Carry out appropriate management works in the form of pruning and maintenance to improve the structure and health of the existing trees and hedgerows.
- Enhance existing tree groups – Carry out new planting with a diverse variety of native trees, shrubs and wildflowers to enhance the biodiversity and landscape character of the southern and eastern tree groups to make them more resilient to pests, diseases and climate change.
- Enhance existing hedgerow links – Carry out new native hedgerow planting to enhance existing hedgerows to improve green corridors and habitats across the site.
- Protect & enhance ecology – Maintain and enhance wildlife habitats, manage invasive species (if required), and improve local flora and fauna.

We would note that the full management plan, including all mitigation and maintenance measures can be found in Section 3 of the Arboricultural Report, submitted under separate cover.

The Arborist mitigation plan includes the following measures:

Tree planting is proposed to mitigate the loss of trees and must be carried out and maintained as specified by the Landscape Architect. All new tree planting must be carried out in accordance with BS

8545:2014 Trees: from nursery to independence in the landscape. Recommendations. New tree planting should take into consideration the mature growing size of the trees proposed, to ensure that a harmonious relationship between trees and buildings and hard surfaces can be sustained for the long term, without the need for unnecessary pruning works or removals.

## Flooding

### 2.1.2 MCC LRD Opinion Item 5(b)

*The applicant shall provide confirmation that the proposed services corridor, to the east of the proposed residential development, that passes through flood zones A & B will not create a flow channel for flood waters to infiltrate through and increase flood risk elsewhere.*

#### 2.1.2.1 Applicant's Response

No amendments to the existing road and ground levels are proposed in this area. In addition, fully sealed manhole covers will be utilized in Flood Zone A to reduce the risk of floodwater entering the wastewater network. As such, the extension of the wastewater network along Ballybin Road will not have any impact on the existing flooding.

### 2.1.3 MCC LRD Opinion Item 5(c)

*The applicant shall provide confirmation that any proposed works in flood zones A & B shall not increase flood risk in that area due to change in levels or displacement of potential flood waters.*

#### 2.1.3.1 Applicant's Response

It is noted that the subject foul outfall route is proposed within Flood Zone A & B, however, no level changes are proposed within this area. The remediation works are proposed to have the outfall routes restored to their original levels and surface type. There will therefore be no increase in flood risk due to these works.

### 2.1.4 MCC LRD Opinion Item 5(d)

*The applicant shall provide confirmation that any proposed works will not modify the existing culvert over the Broadmeadow River, south of the subject site. If the existing culvert is to be modified, the applicant shall carry out hydraulic modelling of the Broadmeadow River and confirm the locations of flood zones A & B. If any of the proposed works are located in flood zones A & B and have the potential to reduce the existing floodplain capacity at this location, the applicant shall have to provide suitable compensatory storage that will have to be to the written agreement of the Environment department.*

#### 2.1.4.1 Applicant's Response

We can confirm that no works are proposed which will modify the culvert over the Broadmeadow River. The existing culvert is to be retained in its current location and the existing road levels over the culvert are also to be retained. As such, the existing floodplain capacity is not being impacted by the proposed works.

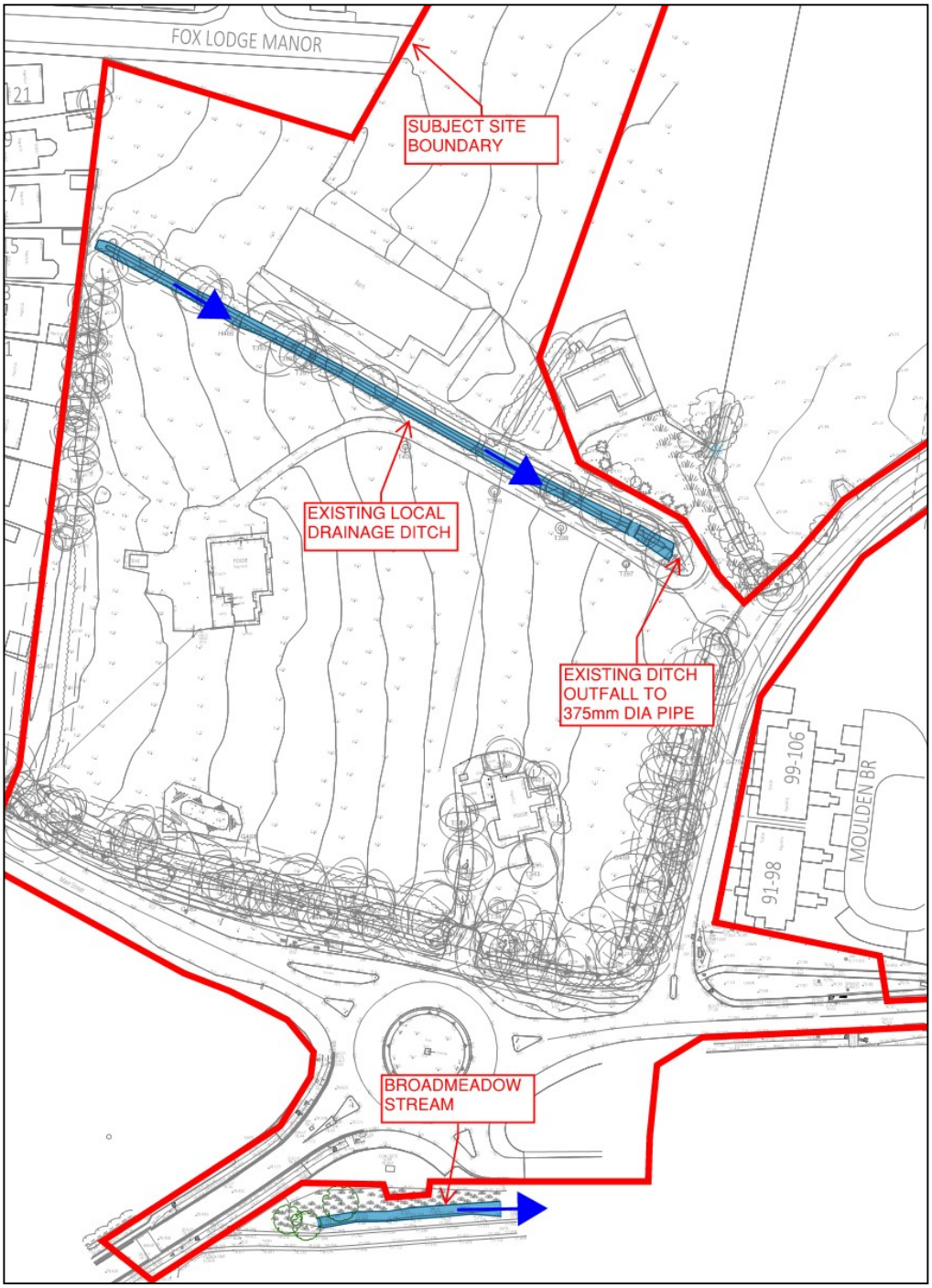
### 2.1.5 MCC LRD Opinion Item 5(e)

*The applicant shall submit a detailed assessment of all the existing drainage ditches and watercourses that surround the subject site and the surrounding lands that will confirm catchment areas, flow directions, existing culvert details. A detailed topographical survey of the existing drainage ditches and watercourses shall be carried out and be submitted as part of the planning application.*

#### 2.1.5.1 Applicant's Response

We would note that there is only 1 ditch traversing the subject site. This drainage ditch serves as a local land drain providing overland drainage for the subject lands as well as serving as a watercourse for the access roads to the existing dwellings on the subject site. As part of the design strategy, it is proposed that the existing dwellings and infrastructure be demolished. The drainage ditch will therefore become redundant at this stage and will be filled in. The Broadmeadow River traverses the application boundary along the south, however, as this is a well-established stream, there are no works proposed to it other than providing a surface water outfall. In addition, the surrounding lands to the north and west are lower than the subject site – i.e. the runoff from these lands discharges in a northerly and easterly direction away from the application site.

The below Figure will provide clarity on the subject site and surrounding existing infrastructure:




### 2.1.6 MCC LRD Opinion Item 5(f)

*If there is potential for lands in the vicinity of the subject site to discharge into or contribute run-off to the proposed surface water system, the proposed design should take this into account.*

#### 2.1.6.1 Applicant's Response

It is noted that a portion of the external road discharges through the subject lands and has been accommodated within the overall surface water design strategy and provides attenuation of same. As

noted in response to Item 5 (e) above, the lands to the north and east of the subject site fall away from the site and do not discharge through the application site.

### 2.1.7 MCC LRD Opinion Item 5(g)

*The flood consultant shall provide confirmation that the proposed surface water system does not increase flood risk for the proposed development or the surrounding areas.*

#### 2.1.7.1 Applicant's Response

We can confirm that a very conservative approach is followed and agreed with the Local Authority Water Services Department. An overall flow restriction of 2.0 l/s/Ha has been accommodated within the design strategy, which is generally lower than the current greenfield/agricultural run-off from the subject lands. Therefore, the post-development flows from the site to the receiving watercourse reduce flood risk.

### 2.1.8 MCC LRD Opinion Item 5(h)

*Justification Test to be applied to the proposed development.*

#### 2.1.8.1 Applicant's Response

The Applicant refers the Planning Authority to the updated Donnachadh O'Brien & Associates Site Specific Flood Risk Assessment (SSFRA) submitted under separate cover with the Planning Application documentation for the Justification Test.

### 2.1.9 MCC LRD Opinion Item 5(i)

*Detail overland flow plans to be provided for assessment and shall take account of potential development of nearby lands also.*

#### 2.1.9.1 Applicant's Response

The Applicant has provided a pre and post-development over-land flood routing drawing with the Planning Application documentation, namely 2334-DOB-XX-SI-DR-C-0260.

### 2.1.10 MCC LRD Opinion Item 5 (j)

*(j) The applicant shall submit a revised SSFRA to address the above-mentioned issues.*

#### 2.1.10.1 Applicant's Response

The Applicant has submitted a revised Site Specific Flood Risk Assessment (SSFRA), namely 2334-DOB-XX-SI-RP-C-0002, with the Planning Application documentation.

## 2.2 Surface Water

### 2.2.1 MCC LRD Opinion Item 6(b)

*The applicant shall ensure that minimum cover on the surface water pipeline is in accordance with the below-mentioned guidelines.*

2.2.1.1 Applicant's Response

The Applicant confirms that the design strategy for surface water drainage allows for a minimum cover on Surface Water sewers throughout the development of 1.2m as illustrated on the DOBA drawing 2334-DOB-XX-SI-DR-C-1400 Proposed Surface Water Drainage Longsection, submitted under separate cover with the Planning Application documentation.

### 2.2.2 MCC LRD Opinion Item 6(c)

*The applicant shall provide clarification of the soil values and SAAR values used in the surface water design.*

2.2.2.1 Applicant's Response

The sitewide soil values used are based on the FSR Soil type map which indicate that 10% of the subject site is located within Soil Type 1 and 90% of the subject site catchment area is within Soil Type 2. The SAAR value used is 846mm from Met Eireann.

### 2.2.3 MCC LRD Opinion Item 6(d)

*Discharge from the site to be restricted to 2 l/s/ha due to existing flooding downstream of the site.*

2.2.3.1 Applicant's Response

The site-wide surface water drainage model and strategy have been amended to allow for a restricted outfall of 2.0 l/s/Ha from the site itself as requested. **Figure 1** below is an extract from the DOBA Infrastructure Design Report (IDR) submitted under separate cover with the Panning Application documentation.

| | | |
|---|---|---|
| **Standard Average Annual Rainfall (SAAR)** | 846 | mm |
| **Soil Index** | 0.285 | |
| **Total Drained Area** | 3.782 | Hectares (ha) |
| **Storm Return Period** | 100 | Years |
| **Permissible Outflow per hectare, QBAR** | 2.0 | l/s/ha |
| *** Total Permissible Outflow** | 7.70 | l/s |

**Figure 1** Extract from DOBA IDR

### 2.2.4 MCC LRD Opinion Item 6(e)

*The applicant shall clarify the run-off coefficients used in the surface water design and provide a table showing a breakdown of the contributing areas.*

#### 2.2.4.1 Applicant's Response

The run-off coefficients outlined in **Table 2** below have been adopted in the design of the surface water drainage system for the site and are fully in compliance with the standards set out in the Greater Dublin Strategic Drainage Study (GDSDS) Table 11.4.

**Table 2** Run-off coefficients

| Contributing Area | Hardstanding Area | Run-off Coefficient |
|---|---|---|
| **Hardstanding Surfacing** (incl. Roads, Footpaths and ancillary areas) | 1.0661 Ha | 80% |
| **Roof Areas** | 0.7221 Ha | 95% |
| **Green Areas** (Incl. Public open spaces) | 1.9938 | 28.5% |

### 2.2.5 MCC LRD Opinion Item 6(f)

*The applicant shall provide confirmation of the catchment area of the adjacent public road and provide details of the sizing of the attenuation system for same.*

#### 2.2.5.1 Applicant's Response

The DOBA drawings 2334-DOB-XX-SI-DR-C-0200, 0201 and 0202 submitted under separate cover with the Planning Application documentation illustrate the sub-catchment areas of the adjacent public road. The sizing of the attenuation associated with each sub-catchment is also illustrated on these drawings.

### 2.2.6 MCC LRD Opinion Item 6(g)

*The proposed attenuation systems detail to be agreed with the Environment Department. It was noted that the proposed attenuation system beside the proposed creche had a potential depth of 1m of water during the 1 in 100-year rainfall event. Max depth of water to be 300mm during the 1 in 100-Impermebale year rainfall event.*

#### 2.2.6.1 Applicant's Response

The Applicant would welcome a condition to agree the attenuation system details with the Environment Department post grant of planning. Additionally, the Applicant notes that the design of the proposed scheme has developed since the LRD Opinion meeting and the inclusion of a creche no

longer forms part of the proposals. The updated surface water drainage design includes a maximum 300mm depth of water, not 1.0m, in the deepest detention basin for a 1:100-year storm event including climate change. Please refer to the Surface Water Calculations appended to the DOBA Infrastructure Design Report (IDR) namely 2334-DOB-XX-SI-RP-C-0001 submitted under separate cover with the Planning Application documentation.

### 2.2.7 MCC LRD Opinion Item 6(h)

*It was noted that there is poor infiltration on site. The applicant shall size all attenuation without infiltration.*

#### 2.2.7.1 Applicant's Response

The Applicant has sized all attenuation systems without infiltration. Please refer to the Surface Water Calculations appended to the DOBA Infrastructure Design Report (IDR) namely 2334-DOB-XX-SI-RP-C-0001 submitted under separate cover with the Planning Application documentation.

### 2.2.8 MCC LRD Opinion Item 6(i)

*Attenuation storage in permeable paving is not to be used as part of the attenuation storage for the 1 in 100-year rainfall event.*

#### 2.2.8.1 Applicant's Response

The Applicant confirms that the permeable paving has NOT been used as part of the attenuation storage for the 1 in 100-year rainfall event. The site-wide permeable paving, tree pits, and rain gardens are designed as "flow-through" structures, and not attenuation structures, to reduce the rate of runoff from impermeable surfaces. Please refer to the Surface Water Calculations appended to the DOBA Infrastructure Design Report (IDR) namely 2334-DOB-XX-SI-RP-C-0001 submitted under separate cover with the Planning Application documentation.

### 2.2.9 MCC LRD Opinion Item 6(j)

*Impermeable liners on attenuation systems are not acceptable to the planning authority.*

#### 2.2.9.1 Applicant's Response

The Applicant confirms that impermeable liners on attenuation systems are not proposed. The Applicant has dealt with this matter through pre-planning consultations held between the Applicant and Meath Co. Co. Water Services. Please refer to the Pre-Planning Consultations held between the Applicant and the Planning Authority which is appended to the DOBA Infrastructure Design Report

(IDR) namely 2334-DOB-XX-SI-RP-C-0001 submitted under separate cover with the Planning Application documentation.

### 2.2.10 MCC LRD Opinion Item 6(k)

*The applicant shall provide road long sections for the proposed site showing proposed road gradients and ensuring no ponding of surface water will occur on the proposed roads.*

#### 2.2.10.1 Applicant's Response

The Applicant has provided road long sections for the proposed site showing proposed road gradients as illustrated on the DOBA drawing 2334-DOB-XX-SI-DR-C-1405 and 1406 submitted under separate cover with the Planning Application documentation. Low points along these roads have been provided with double road gullies to prevent ponding as illustrated on the DOBA drawing 2234-DOB-XX-SI-DR-C-0200, 0201 and 0202.

### 2.2.11 MCC LRD Opinion Item 6(l)

*The applicant shall provide details of the driveway drainage infiltration blanket.*

#### 2.2.11.1 Applicant's Response

The Applicant has provided details of the driveway drainage infiltration blanket on the DOBA drawing 2334-DOB-XX-SI-DR-C-0250 submitted under separate cover with the Planning Application documentation.

### 2.2.12 MCC LRD Opinion Item 6(m)

*As per the Greater Dublin Strategic Drainage Study, Volume 3 Environmental Management, soakaways shall not be constructed within 5 metres of the foundations of the buildings or under a road.*

#### 2.2.12.1 Applicant's Response

Soakaways are only proposed to the 2 detached units located east of the realigned Ballybin Road and are located 5 metres from the foundations of the proposed buildings and are not proposed beneath a road.

### 2.2.13 MCC LRD Opinion Item 6(n)

*The applicant shall locate Class 1 petrol/oil separators upstream of the proposed attenuation systems.*

2.2.13.1 Applicant's Response

The Applicant has located the proposed Petrol Interceptors upstream of the attenuation systems as illustrated on the DOBA drawing 2334-DOB-XX-SI-DR-C-0200, 0200 and 0201 submitted under separate cover with the Planning Application documentation.

### 2.2.14 MCC LRD Opinion Item 6(o)

*The principles of the SuDS 'Management Train' has been applied to the design for the surface water management scheme which has been proposed for the subject development. Meath Co Co Environment Flooding-Surface Water Section would like to see greater use of larger scale source control measures within a more compliant design.*

2.2.14.1 Applicant's Response

The Applicant has adopted Nature Based and Filtration System SuDS source control measures extensively across the proposed development as outlined in **Table 3** below. As there is no infiltration proposed on the site arising from unfavourable infiltration rates following site specific BRE365 testing, infiltration system source control SuDS measures do not apply. Therefore, the Applicant has adopted those source control measures which apply to the site. The SuDS measures not adopted per the table below include green and blue roofs (only suited to flat roof apartment buildings), green walls (only suited to commercial buildings) and bioswales (which cannot be adopted due to site space constraints).

**Table 3** SuDS source control

| Sustainable Urban Drainage System | Source Control | Proposed for the Scheme (Y/N) | Rationale for the provision or otherwise of proposed SuDS measures |
|---|---|---|---|
| **Nature Based SuDS** | | | |
| Bioretention Areas | ● | Y | Bioretention areas shall be utilised throughout the proposed development |
| Bioswales | ● | N | Bioswales are not proposed as a source control NBS SuDS measures for this project and instead the SuDS design has opted for other viable alternative source control |
| Rain Gardens | ● | Y | Raingardens shall be adopted within the proposed development with surface water discharge from backyards conveyed to the same. |
| Green/ Blue Roofs | ● | N | Green and/ or Blue Roofs do not suit pitched housing units such as those proposed. Green and/ or Blue Roofs suit high density apartment buildings with flat roofs. Other viable alternative nature based source control SuDS measures have been adopted. |
| Green Walls | ● | N | Green walls are not proposed as part of this development as there are other alternative viable Nature Based SuDS solutions |

| | | | |
|---|---|---|---|
| | | | available to the Applicant. |
| Tree Pits | ● | Y | Tree Pits are proposed as source control NBS SuDS measures for this project. |
| **Infiltration System SuDS** | | | |
| Unlined tree pits-trenches | ● | N | Ground investigations returned unfavourable rates of infiltration on site and hence filtration system SuDS shall be incorporated. Therefore, infiltration source control measures cannot be applied to this site. |
| Unlined permeable paving | ● | N | |
| Infiltration trenches | ● | N | |
| **Filtration System SuDS** | | | |
| Filter Drains | ● | Y | Ground investigations returned unfavourable rates of infiltration on site and hence filtration system SuDS shall be incorporated. |
| Filter Strips | ● | Y | |
| Lined Permeable Paving | ● | Y | |

### 2.2.15 MCC LRD Opinion Item 6(p)

*The applicant has proposed to discharge surface water to existing surface water drain to the south of the site. The applicant shall engage with and secure the written permission of the Municipal District Engineer for access to any surface water drain. The applicant shall undertake any remedial works to the existing surface water drainage network which the Municipal District Engineer considers necessary to facilitate the discharge from the proposed development.*

#### 2.2.15.1 Applicant's Response

The Applicant confirms that the Local District Engineers will be contacted at the relevant stage prior to the commencement of these proposed drainage works.

### 2.2.16 MCC LRD Opinion Item 6(q)

*All work shall comply fully with the Greater Dublin Strategic Drainage Study (GDSDS) Regional Drainage Policies Volume 2, for New Developments.*

#### 2.2.16.1 Applicant's Response

Noted and adopted throughout the design process.

### 2.2.17 MCC LRD Opinion Item 6(r)

*All work shall comply fully with the Greater Dublin Regional Code of Practice for Drainage Works Volume 6.*

#### 2.2.17.1 Applicant's Response

Noted and adopted throughout the design process.

### 2.2.18 MCC LRD Opinion Item 6(s)

*The applicant shall revise the proposed surface water system, taking into account the above items and resubmit for agreement in writing with the Environment department.*

#### 2.2.18.1 Applicant's Response

Noted. The Applicant has submitted revised layouts and associated design under separate cover with the Planning Application documentation. The applicable documents are as follows;

- 2334-DOB-XX-SI-RP-C-0001 Infrastructure Design Report
- 2334-DOB-XX-SI-DR-C-0200, 0201 & 0202 Proposed Surface Water Drainage Layout Plans
- 2334-DOB-XX-SI-DR-C-0250 Proposed SuDS Details
- 2334-DOB-XX-SI-DR-C-1000 Proposed Typical Drainage Details
- 2334-DOB-XX-SI-DR-C-1200 Proposed Attenuation Details
- 2334-DOB-XX-SI-DR-C-1400 Proposed Surface Water Longitudinal Sections

## 2.3 Transportation

### 2.3.1 MCC LRD Opinion Item 10(a)

*Accessibility and Integration:*

*i. The Applicant is requested to confirm the width of the paths at green areas and the cycle tracks along the main roads adjacent to the proposed development.*

*ii. The Applicant is requested to incorporate the existing bus stops on R-125 Main Street, west of the proposed junction, in the proposed layout.*

2.3.1.1 Applicant's Response

i. The width of the paths at green areas and the cycle tracks along the main roads adjacent to the proposed development are 2m in accordance with DMURS as illustrated on the DOBA Proposed Site Layout drawing 2334-DOB-XX-SI-DR-C-0500, 0501 and 0502.

ii. The Applicant has incorporated the existing bus stop on the R125 Main Street west of the proposed junction as illustrated on the DOBA Proposed Site Layout drawing 2334-DOB-XX-SI-DR-C-0500 and 0501.

### 2.3.2 MCC LRD Opinion Item 10(b)

*Traffic Assessment*

*i. The Applicant should provide details of the queue length survey at all junctions.*

*ii. The Applicant should assess the impacts of the proposed development in the signal-controlled junction between the Ratoath Outer Relief Road, Main Street R125 and Moulden Bridge. In particular it is known that traffic queues, particularly during the PM period, frequent extend from this junction eastwards along the R125 Ashbourne Road for some distance. The Applicant will be required to demonstrate that the proposed development does not exacerbate this issue. The two signalised junctions may require a linked system to ensure the most efficient movement of traffic.*

2.3.2.1 Applicant's Response

i. Details of the queue length survey at all junctions has been included in the Transport Assessment prepared by the Applicant's Traffic Engineer, Systra, and submitted under separate cover with the Planning Application documentation.

ii. The Transport Assessment prepared by the Applicant's Traffic Engineer, Systra, has assessed the impacts of the proposed development in the signal-controlled junction between the Ratoath Outer Relief Road, Main Street R125 and Moulden Bridge.

### 2.3.3 MCC LRD Opinion Item 10 (c)

*Construction*

*i. The Applicant should provide an Outline Construction Traffic Management Plan (CTMP) at the planning application stage.*

*ii. The Applicant is requested to submit an outline Construction Phasing Plan for agreement with Meath County Council. The construction of the road infrastructure can be completion in tandem with the development of the site. It is recommended that the initial phase of the development, i.e. Phase 1, containing no more than 50% of the residential units, should incorporate all of the Transportation Infrastructure identified within the red line boundary including the signalised junction, Ballybin road realignment, footpaths, cycleways, public lighting, drainage etc.*

2.3.3.1 Applicant's Response

i. The Applicant has provided an Outline Construction Traffic Management Plan (CTMP) within the Construction Management Plan (CMP) 2334-DOB-XX-SI-RP-C-0003 and is submitted under separate cover with the Planning Application documentation.

ii. The Applicant has provided an outline Construction Phasing Plan of the proposed realigned Ballybin Road and new signalised junction and is submitted under separate cover with the Planning Application documentation. The Transportation Infrastructure external to the residential development site, i.e. signalised junction, Ballybin Road realignment, footpaths, cycleways, public lighting, drainage, etc. will be provided as part of Phase 1 delivery and will be constructed prior to occupation of the 71st residential unit on site. Notwithstanding this, the Applicant is willing to accept a condition to agree a phasing and delivery strategy with the Planning Authority prior to commencement of development.

### 2.3.4 MCC LRD Opinion Item 10(d)

*Access Junction*

*i. The Applicant is requested to provide visibility splays drawings, including forward visibility, for both access points in line with DMURS.*

*ii. The Applicant is requested to accommodate right-turning cycle movements into the proposed residential development on the southbound cycle track along the realigned Ballybin Road.*

*iii. The Applicant shall provide details of the proposed road, cycle tracks and footpath widths in the drawings.*

*iv. The Applicant is requested to provide details of the connection from the proposed Ballybin Road with the existing road.*

*v. The Applicant is requested to provide details of the accommodation works at the proposed unutilised section of the Ballybin Road.*

*vi. The Applicant should provide details of the corner radii at the proposed junction.*

*vii. The Applicant shall design the signal-controlled junction fully in accordance with the Cycle Design Manual.*

*viii. The Applicant shall design the signal-controlled junction to facilitate west bound right turning movements from the R-125 onto the Ballybin Road.*

2.3.4.1 Applicant's Response

i. The Applicant has provided visibility splay drawings including forward visibility splays for both access points in line with DMURS as illustrated on the DOBA drawings 2334-DOB-XX-SI-DR-C-0550.

ii. The Applicant has accommodated right-turning cycle movements off the Ballybin Road into the proposed development via the adoption of detail TL403 Standard Cycle Track Crossing Side Road with Priority as illustrated on the DOBA drawings 2334-DOB-XX-SI-DR-C-0500 and 0501.

iii. The Applicant has provided the widths of the proposed road, cycle tracks and footpaths on the DOBA drawings 2334-DOB-XX-SI-DR-C-0500, 0501 and 0502.

iv. The Applicant has provided details of the connection from the proposed Ballybin Road with the existing Road as illustrated on the DOBA drawings 2334-DOB-XX-SI-DR-C-0500, 0501 and 0502.

v. The Applicant proposes to re-purpose the unutilised section of the existing Ballybin Road following the realignment works as a shared Vulnerable Road User (VRU) surface as illustrated on the DOBA drawings 2334-DOB-XX-SI-DR-C-0500, 0501 and 0502. The Applicant notes that the Architect and Landscape Architects materials, submitted under separate cover, also illustrate the works proposed to this section of the Ballybin Road in detail.

vi. The Applicant has provided details of the corner radii at the proposed junction as illustrated on the DOBA drawing 2334-DOB-XX-SI-DR-C-0500 and 0501.

vii. The Applicant confirms that the signal controlled junction has been designed fully in accordance with the latest revision of the NTA Cycle Design Manual.

viii. The Applicant has designed the signal-controlled junction to facilitate west bound right turning movements from the R125 onto the Ballybin Road as illustrated on the DOBA drawings 2334-DOB-XX-SI-DR-C-0500, 0501, 0502 and detailed within the Systra Transport Assessment.

### 2.3.5 MCC LRD Opinion Item 10(e)

*Road Safety:*

*i. The Applicant is requested to submit a stage 1 Road Safety Audit.*

*ii. The Applicant is requested to undertake a DMURS Street Design Audit.*

2.3.5.1 Applicant's Response

i. A Stage 1 Road Safety Audit has been completed by Traffico and is submitted under separate cover with the Planning Application documentation.

ii. The Applicant has completed a DMURS Street Design Audit and is submitted as DOBA Report 2234-DOB-XX-SI-RP-C-0006 under separate cover with the Planning Application documentation.

### 2.3.6 MCC LRD Opinion Item 10(f)

*Bicycle Parking:*

*i. The Applicant should provide a dedicated drawing outlining the locations of the proposed bicycle parking facilities. This drawing should also be supplemented with further detail on the proposed bicycle stores (resident and visitor stores) including plan, elevation and section details of the proposed stores.*

2.3.6.1 Applicant's Response

i. The Architect, JFA, has provided a dedicated drawing outlining the locations of the proposed bicycle parking facilities submitted under separate cover with the Planning Application documentation. The drawing provides detail on the proposed bicycle stores (resident and visitor stores) including plan, elevation and section details of the proposed stores.

### 2.3.7 MCC LRD Opinion Item 10(g)

*Internal Street Layout:*

*i. The Applicant is requested to provide a DMURS Statement demonstrating compliance with DMURS.*

ii. *The Applicant is requested to provide detailed roads drawings demonstrating that they have applied appropriate geometry for the development access junction and all internal junctions in accordance with the DMURS and the Cycle Design Manual.*

iii. *The Applicant should provide details of dropped kerbs provided on the crossing points within the proposed development.*

iv. *It has been noted on the preliminary layout (drawing 2334-DOB-XX-SI-DR-C-0501) that perpendicular parking bays on the northern end of the development are located close to a junction. It is recommended that the Applicant review the layout of the parking bays against swept path analysis, junction visibility splay analysis and stopping sight distance analysis to ensure that potential conflict areas are mitigated.*

v. *It is noted that there is a distinct lack of vehicle permeability between the proposed development site and the adjacent neighbourhoods. In particular it would appear that there is clear potential to connect the proposed development site to the adjacent Fox Lodge housing estate. This connection would also increase permeability within the area for pedestrians and cyclists. The Applicant is requested to provide a revised site layout providing this connection.*

2.3.7.1 Applicant's Response

i. The Applicant has provided a DMURS Statement of Consistency demonstrating compliance with DMURS and has been submitted under separate cover with the Planning Application documentation.

ii. The Applicant has provided detailed roads drawings in the form of DOBA drawings 2234-DPB-XX-SI-DR-C-0500, 0501 and 0502 demonstrating that the appropriate geometry for the development access junction and all internal junctions in accordance with the DMURS and the Cycle Design Manual have been applied.

iii. The Applicant has provided details of dropped kerbs on the crossing points within the proposed development as illustrated on the DOBA drawings 2334-DOB-XX-SI-DR-C-1100 Proposed Typical Siteworks Details.

iv. The Applicant has reviewed the layout of all parking bays against swept path analysis, junction visibility splay analysis and stopping sight distance analysis and has ensured that potential conflict areas are mitigated.

v. The Applicant has considered the permeability between the proposed development and the existing Fox Lodge estate and notes that a vehicular connection is not appropriate. Instead, a VRU link is proposed through the integrated/combined public open space. The position of a potential vehicular link between the existing and proposed development will give rise to additional traffic movements directly adjacent to the existing creche, which is not desirable. The inclusion of the vehicular link will impact on the open space in this area

while additional through traffic would impact on the existing residential amenity and risk the development being opposed by existing residents. The proposed VRU link will instead protect the existing open space provision and existing residential amenity.

### 2.3.8 MCC LRD Opinion Item 10(h)

*Other:*

*i. The Applicant is requested to submit a Taking in Charge drawing in accordance with MCC Taking In Charge Policy document. In particular materials implemented in the creation of Home-zone streets requires careful consideration. The Applicant should liaise with the Local Authority in this regard.*

*ii. The Applicant is requested to submit a MMP with the application.*

2.3.8.1 Applicant's Response

vi. The Architect, JFA, have submitted a Taking in Charge drawing in accordance with MCC Taking In Charge Policy document.

vii. The Applicant's Traffic Engineer, Systra, have provided a Mobility Management Plan (MMP) and is submitted under separate cover with the Planning Application documentation.

## 2.4 Water & Wastewater

### 2.4.1 MCC LRD Opinion Item 11(a)

*Uisce Éireann has stated that a Confirmation of Feasibility (COF) - was issued by Irish Water on 1st March for the subject application, though this is over 12 months old. A revised COF will be required, should the application be submitted after 01/09/2024. It states that a water connection is feasible, subject to c.120m of 150mm diameter main from the proposed development to the existing off take on the 355mm HDPE main. The costs must be borne fully by the developer. A wastewater connection is feasible. There is an existing IW sewer 295m to the east of the proposed development. The exact location and diameter of the sewer would have to be confirmed on site. The exact detail of the connection to the IW wastewater network will form part of the connection agreement. At connection applicate stage the applicant is requested to provide a topographical survey and design which tries to minimise/eliminate the need for a Pumping Station.*

2.4.1.1 Applicant's Response

Uisce Eireann has provided a Confirmation of Feasibility dated 20 June 2024 which has been appended to the DOBA Infrastructure Design Report (IDR) 2334-DOB-XX-SI-RP-C-0001 submitted under separate cover with the Planning Application documentation.

### 2.4.2 MCC LRD Opinion Item 11(b)

*A Statement of Design Acceptance shall be obtained from Uisce Éireann and included with full LRD application.*

2.4.2.1 Applicant's Response

Uisce Éireann have provided a Statement of Design Acceptance (SoDA) which is appended to the DOBA Infrastructure Design Report 2334-DOB-XX-SI-RP-C-0001 submitted under separate cover with the Planning Application documentation.

### 2.4.3 MCC LRD Opinion Item 11(c)

*Should the need for an on-site pumping station on the application site be established, the applicant is invited to submit revised layout proposals to MCC, for its consideration, prior to lodging a planning application.*

2.4.3.1 Applicant's Response

The proposed development does not require a Wastewater Pumping Station (WwPS) and instead a gravity discharge to the receiving public wastewater sewer is achieved as illustrated on the DOBA drawings 2334-DOB-XX-SI-DR-C-0300, 0301 and 0302.

### 2.4.4 MCC LRD Opinion Item 11(d)

*Confirmation of available capacity in the Moulden Bridge pumping station to accommodate the proposed development.*

#### 2.4.4.1 Applicant's Response

The Applicant has liaised with Uisce Éireann who have noted the following with respect to the capacity of the Moulden Bridge pumping station:

- There is sufficient storage capacity at Moulden Bridge WWPS (Wastewater Pumping Station) to accommodate this development. Uisce Eireann are currently carrying out a detailed assessment on the operational functionality (Mechanical and Electrical) of the WWPS. This detailed assessment will be completed by Q4 2024 (this may be subject to change), and any operational upgrade requirements (If any) will be known at this stage.
- The applicant will be required to fund a relevant portion of these mechanical and electrical upgrades (If required). The fee will be calculated at Connection Application Stage.

## 2.5 CEMP/Waste Management

### 2.5.1 MCC LRD Opinion Item 13(a)

*Please submit a Construction Environmental Management Plan (CEMP) and Waste Management Plan. This will need to take account of any mitigation proposed in the AA, EcIA, Arboricultural Assessment, or other environmental assessments, etc. The applicant has obligations under the Waste Management Act 1996 as amended with details to be included in the CEMP. The CEMP must address extremes of weather, impacts on receptors and mitigation; and should be kept as a live document, communicated to all relevant personnel on site. Where relevant, consultation with the Environment Department regarding the CEMP of Meath County Council may be required.*

*The applicant is also referred to EPA (2021) Best Practice Guidelines for the preparation of Resource & Waste Management Plans for Construction & Demolition Projects (see Section 3.1 on pages 9 and 10 of the document and Text box 2 and 33 ).*

#### 2.5.1.1 Applicant's Response

The Applicant can confirm that the formal planning submission will include both a Planning Stage Construction Management Plan as well as an Operational Waste Management Plan. We would further note that these documents take all of the recommendations and mitigation measures of the wider Design Team Members into account.

## 2.6 Electrical Infrastructure/ Telcom Services

### 2.6.1 MCC LRD Opinion Item 19

*The proposed development should not interfere with electricity infrastructure including overhead cables across/ through the site, and it is advised that the applicant consults directly with ESB Networks, Telecom providers, etc. and incorporates any proposals into the layout submitted for the planning application.*

2.6.1.1 Applicant's Response

Please refer to the Donnachadh O'Brien and Associates Drawing No's 2334-DOB-XX-SI-DR-C-0810-0812 for the proposed ESB undergrounding and diversion works at the subject site. These drawings have been prepared in conjunction with the project Mechanical and Electrical Engineers, ENX Consulting Engineering. The Applicant can further confirm that ESB will be consulted at the detailed design stage in order to discuss further details and requirements of the proposed works.

# Ratoath LRD

# Applicant's Response to Math Co. Co. Surface Water & Flooding Queries raised during the LRD Opinion Meeting

## Meeting Request with MCC

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS
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# SW Agenda

- Poor Drainage on Site / Groundwater  / Permeable Liner
- Permeable Paving and Rain Gardens (flow through structures)
- Soil Type / SAAR / Qbar
- Runoff Coefficients / Catchments
- Longitudinal Road Sections / Ponding
- Attenuation Design

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

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- Attenuation Design

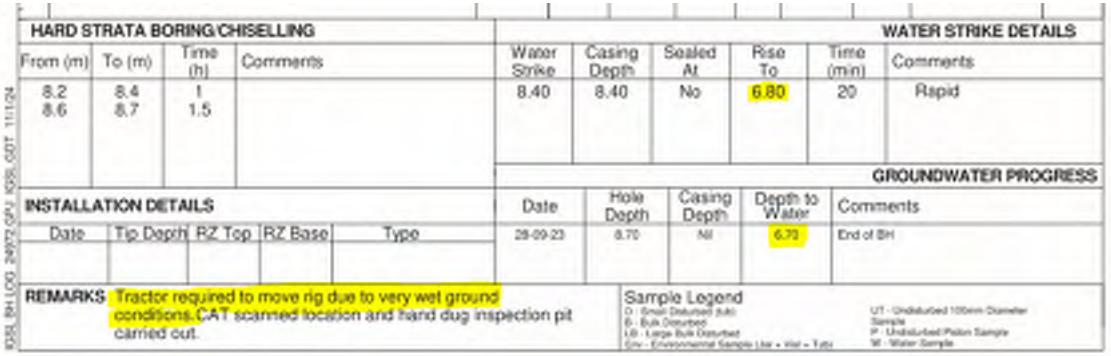
DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

Three soakaway tests were conducted on the site. The tests were carried out in the overburden soils within open excavations. The test pits were excavated into the indigenous firm and firm to stiff brown sandy gravelly CLAY with cobbles. The impermeable nature of the soils may account for the negligible to non-existent infiltration rates obtained.

It is likely that such soils would not be suitable for conventional soakaways being classified as offering only very low to practically impermeable natural infiltration (Table 2).

**Table 2 – Measured infiltration rates (f) expressed as exposed area (metre) per unit time (minute)**

| Soakaway Test No. | Depth of Test (m bgl) | *f* (m/min) | *f* (m/sec) |
|---|---|---|---|
| TP/SA02 | 1.50 | 0.000014 m/min | 2.33E -07 m/sec |
| TP/SA07 | 2.0 | 0.0 m/min | 0.0 m/sec |
| TP/SA12 | 1.50 | 0.0 m/min | 0.0 m/sec |



HARD STRATA BORING/CHISELLING

| From (m) | To (m) | Time (h) | Comments |
|---|---|---|---|
| 8.2 | 8.4 | 1 | |
| 8.6 | 8.7 | 1.5 | |

WATER STRIKE DETAILS

| Water Strike | Casing Depth | Sealed At | Rise To | Time (min) | Comments |
|---|---|---|---|---|---|
| 8.40 | 8.40 | No | 6.80 | 20 | Rapid |

GROUNDWATER PROGRESS

| Date | Hole Depth | Casing Depth | Depth to Water | Comments |
|---|---|---|---|---|
| 28-09-23 | 8.70 | Nil | 6.70 | End of BH |

INSTALLATION DETAILS

| Date | Tip Depth | RZ Top | RZ Base | Type |
|---|---|---|---|---|

REMARKS: Tractor required to move rig due to very wet ground conditions.CAT scanned location and hand dug inspection pit carried out.

Sample Legend

- BRE365 Digest tests failed / confirmed very poor infiltration

- Groundwater strikes were at variable depths, encountered in BH02 at 6.70m and in BH03 at 2.10m below existing ground level. A number of trial pits were noted as dry.

- Permeable liners will be replaced with impermeable liners in the detailed drawings for the deeper SuDS systems. The shallower SuDS features will be left unsealed to avail of any infiltration - not included in the design

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& ASSOCIATES CONSULTING ENGINEERS

- Poor Drainage on Site / Groundwater / Permeable Liner
- Permeable Paving and Rain Gardens (flow through structures)
- Soil Type / SAAR / Qbar
- Runoff Coefficients / Catchments
- Longitudinal Road Sections / Ponding

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The following SuDS Features have been modelled as “flow through” structures to reduce the rate of runoff from impermeable areas (for Interception only and not for attenuation):

- Rain Gardens (in private curtilage)

- Permeable Paving

- Tree Pits

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& ASSOCIATES CONSULTING ENGINEERS

- Poor Drainage on Site / Groundwater  / Permeable Liner
- Permeable Paving and Rain Gardens (flow through structures)
- Soil Type / SAAR / Qbar
- Runoff Coefficients / Catchments
- Longitudinal Road Sections / Ponding
- Attenuation Design

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Eastin and Northing Irish Grid Co-ordinates

| east | north | Annual Average Rainfall(mm) |
|---|---|---|
| 303000 | 252000 | 816 |

**Table 5/1 Runoff potential and soil classes**

| General soil description | Runoff potential | Soil class |
|---|---|---|
| Well drained sandy, loamy or earthy peat soils<br>Less permeable loamy soils over clayey soils on plateaux adjacent to very permeable soils in valleys | Very low | $S_1$ |
| Very permeable soils (e.g. gravel, sand) with shallow groundwater<br>Permeable soils over rocks<br>Moderately permeable soils some with slowly permeable subsoils | Low | $S_2$ |
| Very fine sands, silts and sedimentary clays<br>Permeable soils (e.g. gravel, sand) with shallow groundwater in low lying areas<br>Mixed areas of permeable and impermeable soils in similar proportions | Moderate | $S_3$ |
| Clayey or loamy soils | High | $S_4$ |
| Soils of the wet uplands:<br>Bare rocks or cliffs<br>Shallow, permeable rocky soils on steep slopes<br>Peats with impermeable layers at shallow depth | Very high | $S_5$ |

$$QBAR_{rural} = 0.00108AREA^{0.89}SAAR^{1.17}SOIL^{2.17}$$

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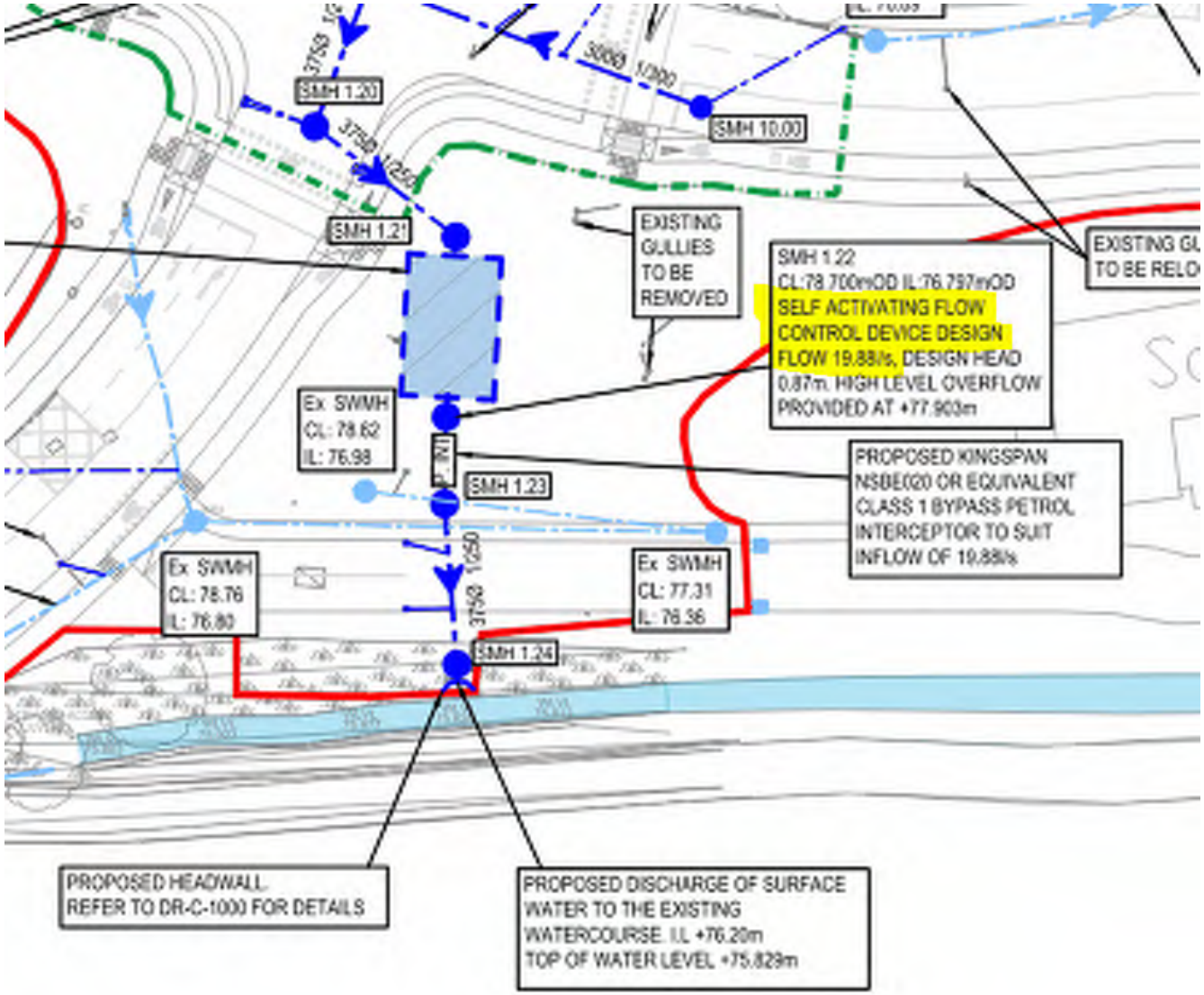
## 4.5 Estimation of Proposed Greenfield Runoff Rate

In accordance with the IH24 method, the greenfield runoff for existing undeveloped sites measuring less than 50Ha can be estimated adopting the following formula and the total permissible outflow has been calculated in **Table 1** below based on a Soil Type 4 in accordance with TII DN-DNG-03064 Table 5/1, where $Qbar_{rural}(m^3/s)=0.00108x(Area)^{0.89}(SAAR)^{1.17}(SOIL)^{2.17}$

**Table 1** Qbar calculation

| | | |
|---|---|---|
| **Standard Average Annual Rainfall (SAAR)** | 816 | mm |
| **Soil Index** | 0.45 | |
| **Total Drained Area** | 3.782 | Hectares (ha) |
| **Storm Return Period** | 100 | Years |
| **Permissible Outflow per hectare, QBAR** | 5.3 | l/s/ha |
| * **Total Permissible Outflow** | 19.88 | l/s |

| Soil Class | WRAP | Runoff | SOIL |
|---|---|---|---|
| Soil Class | WRAP | Runoff | SOIL |
| 1 | Very high | Very low | 0.15 |
| 2 | High | Low | 0.30 |
| 3 | Moderate | Moderate | 0.40 |
| 4 | Low | High | 0.45 |
| 5 | Very low | Very high | 0.50 |

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- Poor Drainage on Site / Groundwater  / Permeable Liner
- Permeable Paving and Rain Gardens (flow through structures)
- Soil Type / SAAR / Qbar
- Runoff Coefficients / Catchments
- Longitudinal Road Sections / Ponding
- Attenuation Design

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The following runoff coefficients have been assumed for the design:

- Roof Areas - 95% (Additional 10% added for Urban Creep)
- Paved Areas - 80%
- Green Area - 45% (SOIL Type 4)

- Catchment Areas highlighted on the following page:


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N

0 5 10 15 20 25 m
SCALE 1:500 @ A0

## SURVEY NOTES

- TOPOGRAPHICAL SURVEY BASED ON EXISTING LEVELS FROM 3rd PARTY SPECIALIST. DOB & ASSOCIATES TAKES NO RESPONSIBILITY FOR ACCURACY OF SURVEY INFORMATION.
- MAIN CONTRACTOR TO ESTABLISH INDEPENDENTLY ORDANCE DATUM ON SITE FOR LEVELS TO MAILIN HEAD DATUM AND CO-ORDINATES FOR SETTING OUT TO NATIONAL GRID.
- MAIN CONTRACTOR TO VERIFY ALL UNDERGROUND SERVICES ON THE SITE INCLUDING ALL ANOMALIES NOTED ON THE GPR SURVEY AND TO TAKE ALL NECESSARY PRECAUTIONS PRIOR TO ANY EXCAVATIONS ON THE SITE.
- REFER TO M&E ENGINEERS DRAWINGS FOR DIVERSION / DEMOLITION OF ALL UNDERGROUND ELECTRICAL CABLES / DUCTS, TELECOM DUCTS, LIGHTING DUCTS, OIL LINES ETC.

## NOTES:

1. FOR STANDARD DOBA NOTES REFER TO DRAWING 2334-DOB-XX-SI-DR-S-0001 & S-0002
2. REFER TO ARCHITECTS DRAWINGS FOR ALL SITE & APPLICATION BOUNDARIES
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT'S & ENGINEER'S DRAWINGS AND SPECIFICATIONS.
4. USE FIGURED DIMENSIONS ONLY. DO NOT SCALE
5. REFER TO SURVEY DRAWINGS FOR EXISTING SERVICES LAYOUTS AND MANHOLE INFORMATION
6. ALL EXISTING SURFACES TO BE REINSTATED FOLLOWING DIVERSION OF SERVICES/CONSTRUCTION OF NEW SERVICES
7. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND LEVELS WITH ARCHITECTURAL DRAWINGS PRIOR TO START OF CONSTRUCTION. ANY DISCREPANCIES TO BE NOTIFIED TO THE ENGINEER & ARCHITECT FOR RESOLUTION
8. CONTRACTOR TO ENSURE ALL WATER & WASTEWATER RELATED WORKS ARE IN ACCORDANCE WITH THE IRISH WATER WATER INFRASTRUCTURE & WASTEWATER INFRASTRUCTURE CODE OF PRACTICE & STANDARD DETAILS DOCUMENTS
9. TESTING OF ALL GRAVITY SEWERS AND MANHOLES TO BE IN ACCORDANCE WITH IRISH WATER CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE SECTION 4.10 TESTING OF GRAVITY SEWERS & MANHOLES

## SURFACE WATER LEGEND:

- EX. SURFACE WATER SEWER
- SMH — EX. SURFACE WATER MANHOLE
- SIC — EX. SURFACE WATER INSPECTION CHAMBER
- EX. WATER COURSE
- EX. SURFACE WATER SEWER TO BE DECOMMISSIONED
- PR. SURFACE WATER SEWER
- SMH — PR. SURFACE WATER MANHOLE
- SIC — PR. SURFACE WATER INSPECTION CHAMBER
- SAJ — PR. SURFACE WATER ACCESS JUNCTION
- PR. ROAD GULLY
- PR. ATTENUATION TANK
- PR. PERMEABLE PAVING
- PR. FILTER DRAIN
- PR. DRAINAGE CHANNEL
- PR. BIORETENTION AREA/SWALE
- P_INT — PR. PETROL INTERCEPTOR
- PR. TREE PIT DISCHARGING TO MAIN SW DRAINAGE
- PROPOSED SOAKAWAY

## CATCHMENT LEGEND:

- SUB-CATCHMENT 1
- SUB-CATCHMENT 2
- SUB-CATCHMENT 3
- SUB-CATCHMENT 4
- SUB-CATCHMENT 5

1.0m DEPTH X 1.2m WIDE FILTER DRAIN CONSISTING OF 225mm DIA. PERFORATED PIPE WITH PERFORATIONS FACING UPWARDS LAID AT 1:200 FALLS WRAPPED IN CL. 505B 40% VOID STONE. MANHOLE TO BE PROVIDED WITH A PERFORATED LID TO INTERCEPT OVERLAND FLOWS AND DISCHARGE TO ADJACENT SW NETWORK.

29m³ ABOVE GROUND DETENTION BASIN WITH PROPOSED UNDERGROUND ATTENUATION TANK (STORMTECH MC3500 WITH 67% VOIDS OR SIMILAR APPROVED) PROVIDING 144m³ OF STORAGE. TOP OF WATER LEVEL FOR 1:100yr STORM +79.579mOD

PROPOSED PERMEABLE PAVING TO CAR PARKING BAYS ILLUSTRATED THUS

SMH 2.03
CL:81.460mOD IL:79.720mOD SELF ACTIVATING FLOW CONTROL DEVICE DESIGN FLOW 18.5l/s, DESIGN HEAD 0.700m. HIGH LEVEL OVERFLOW PROVIDED AT +81.190m

SMH 1.05
CL:80.350mOD IL:78.069mOD SELF ACTIVATING FLOW CONTROL DEVICE DESIGN FLOW 16.5l/s, DESIGN HEAD 1.100m. HIGH LEVEL OVERFLOW PROVIDED AT +79.603m

46m³ ABOVE GROUND DETENTION BASIN WITH PROPOSED UNDERGROUND ATTENUATION TANK (STORMTECH MC3500 WITH 67% VOIDS OR SIMILAR APPROVED) PROVIDING 272m³ OF STORAGE. TOP OF WATER LEVEL FOR 1:100yr STORM +79.142mOD

SMH 1.11
CL:80.082mOD IL:77.592mOD SELF ACTIVATING FLOW CONTROL DEVICE DESIGN FLOW 15l/s, DESIGN HEAD 1.750m. HIGH LEVEL OVERFLOW PROVIDED AT +79.483m

10m³ ABOVE GROUND DETENTION BASIN WITH PROPOSED UNDERGROUND ATTENUATION TANK (STORMTECH MC3500 WITH 67% VOIDS OR SIMILAR APPROVED) PROVIDING 36m³ OF STORAGE. TOP OF WATER LEVEL FOR 1:100yr STORM +78.729mOD

SMH 6.02
CL:79.612mOD IL:77.247mOD SELF ACTIVATING FLOW CONTROL DEVICE DESIGN FLOW 4.8l/s, DESIGN HEAD 1.00m. HIGH LEVEL OVERFLOW PROVIDED AT +78.739m

HIGH LEVEL OVERFLOW FROM PERMEABLE PAVING AT +77.90m

89m³ ABOVE GROUND DETENTION BASIN WITH PROPOSED UNDERGROUND ATTENUATION TANK (STORMTECH MC3500 WITH 67% VOIDS OR SIMILAR APPROVED) PROVIDING 348m³ OF STORAGE. TOP OF WATER LEVEL FOR 1:100yr STORM +78.188mOD

SMH 1.16
CL:79.617mOD IL:76.686mOD SELF ACTIVATING FLOW CONTROL DEVICE DESIGN FLOW 29l/s, DESIGN HEAD 2.50m. HIGH LEVEL OVERFLOW PROVIDED AT +78.161m

PROPOSED SOAKAWAY. HIGH LEVEL OVERFLOW AT +77.90m

EXISTING GULLIES TO BE RELOCATED

EXISTING SURFACE WATER DRAINAGE TO BE REMOVED

EXISTING GULLIES TO BE REMOVED

PROPOSED UNDERGROUND ATTENUATION TANK (STORMTECH MC4500 WITH 67% VOIDS OR SIMILAR APPROVED) PROVIDING 163m³ OF STORAGE. TOP OF WATER LEVEL FOR 1:100yr STORM +77.905mOD

EXISTING GULLIES TO BE REMOVED

SMH 1.22
CL:78.700mOD IL:76.797mOD SELF ACTIVATING FLOW CONTROL DEVICE DESIGN FLOW 19.88l/s, DESIGN HEAD 0.87m. HIGH LEVEL OVERFLOW PROVIDED AT +77.903m

EXISTING GULLIES TO BE RELOCATED

EXISTING SURFACE WATER DRAINAGE TO BE RETAINED

PROPOSED KINGSPAN NSBE020 OR EQUIVALENT CLASS 1 BYPASS PETROL INTERCEPTOR TO SUIT INFLOW OF 19.88l/s

PROPOSED HEADWALL. REFER TO DR-C-1000 FOR DETAILS

PROPOSED DISCHARGE OF SURFACE WATER TO THE EXISTING WATERCOURSE. I.L +76.20m TOP OF WATER LEVEL +75.829m

EXISTING GULLIES TO BE RELOCATED

EXISTING SURFACE WATER DRAINAGE TO BE RETAINED

EXISTING GULLIES TO BE RETAINED

Ex SWMH CL: 76.95 IL: 75.52

Ex SWMH

Ex SWMH CL: 78.04 IL: 76.89

Ex SWMH CL: 78.62 IL: 76.98

Ex SWMH CL: 78.76 IL: 76.80

Ex SWMH CL: 77.31 IL: 76.36

Ex SWMH CL: 78.56 IL: 77.56

Ex SWMH CL: 78.41 IL: 76.85

REFER TO SHEET 2

REFER TO SHEET 2

NOTE 1: MANHOLE COVER LEVELS ARE APPROXIMATE. ACTUAL COVER LEVELS SHOULD MATCH SURROUNDING FINISHED GROUND LEVELS U.N.O.

NOTE 2: PIPES WITH LESS COVER THAN
- 600mm FOR GRASSED AREAS
- 900mm FOR FOOTPATHS
- 1200mm FOR ROADS

TO BE SURROUNDED IN 150mm CONCRETE PROTECTION IN ACCORDANCE WITH IRISH WATER STANDARD DETAIL STD-WW-07

NOTE 3: ALL MANHOLE COVERS LOCATED IN GRASS AREAS TO BE SURROUNDED (Min. 200mm SURROUND) IN 100mm THK C20/25 CONCRETE APRON

## SURFACE WATER MATERIAL TO BE IN ACCORDANCE WITH GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS

- UNPLASTICISED P.V.C. PIPES MUST COMPLY WITH THE "PROVISIONAL SPECIFICATION FOR SOIL PIPES, DRAINS, SEWERS & FITTINGS MADE OF UNPLASTICISED P.V.C." ISSUED BY THE DEPARTMENT OF THE ENVIRONMENT.
- B.S. 8005: PART 1 - SEWERAGE OR EQUIVALENT;
- B.S. 8010: PART 2 - PIPELINES ON LAND OR EQUIVALENT: DESIGN, CONSTRUCTION & INSTALLATION;
- B.S. 5955: PART 6 CODE OF PRACTICE FOR THE INSTALLATION OF UNPLASTICISED P.V.C. PIPEWORK FOR GRAVITY DRAINS & SEWERS OR EQUIVALENT
- EN1401 - UNPLASTICISED P.V.C. SEWER PIPE SPECIFICATION
- B.S.4514 - UNPLASTICISED P.V.C. SOIL PIPE SPECIFICATION
- DoEHLG 'SITE DEVELOPMENT WORKS' & SECTION H OF THE BUILDING REGULATIONS

SURFACE WATER DRAINAGE MANHOLE SCHEDULE

| REF: | CL: | IL: | NOTES: |
|---|---|---|---|
| SMH 1.00 | 79.978 | 78.455 | |
| SMH 1.01 | 80.467 | 78.331 | |
| SMH 1.02 | 80.067 | 78.061 | |
| SMH 1.03 | 80.273 | 78.001 | |
| SMH 1.04 | 80.291 | 77.950 | |
| SMH 1.05 | 80.375 | 77.921 | B.D. FROM SMH2.04 @ 78.916 |
| SMH 1.06 | 79.923 | 77.824 | |
| SMH 1.07 | 79.566 | 77.775 | |
| SMH 1.08 | 79.400 | 77.727 | |
| SMH 1.09 | 79.500 | 77.563 | |
| SMH 1.10 | 79.500 | 77.509 | |
| SMH 1.11 | 79.992 | 77.305 | B.D. FROM SMH5.04 @ 78.417 |
| SMH 1.12 | 79.654 | 77.207 | |
| SMH 1.13 | 79.430 | 76.995 | B.D. FROM SMH7.07 @ 78.018 |
| SMH 1.14 | 79.450 | 76.959 | |
| SMH 1.15 | 79.335 | 76.894 | |
| SMH 1.16 | 79.616 | 76.701 | |
| SMH 1.17 | 78.614 | 76.656 | |
| SMH 1.18 | 78.493 | 76.594 | |
| SMH 1.19 | 78.734 | 76.556 | B.D. FROM SMH9.02 @ 77.443 |
| SMH 1.20 | 78.538 | 76.517 | |
| SMH 1.21 | 78.500 | 76.473 | |
| SMH 1.22 | 78.700 | 76.420 | |
| SMH 1.23 | 78.261 | 76.297 | |
| SMH 1.24 | 77.530 | 76.209 | |
| HEADWALL | 77.530 | 76.200 | |
| SMH 2.00 | 81.437 | 80.037 | |
| SMH 2.01 | 81.583 | 79.949 | |
| SMH 2.02 | 81.830 | 79.797 | B.D. FROM SMH4.00 @ 80.345 |
| SMH 2.03 | 81.401 | 79.720 | |
| SMH 2.04 | 80.821 | 79.622 | B.D. FROM SMH2.03 @ 79.600 |
| SMH 3.00 | 79.564 | 78.139 | |
| SMH 4.00 | 81.954 | 80.429 | |
| SMH 5.00 | 82.186 | 80.209 | |
| SMH 5.01 | 81.708 | 80.076 | |
| SMH 5.02 | 81.319 | 79.468 | B.D. FROM SMH5.01 @ 79.958 |
| SMH 5.03 | 81.288 | 79.447 | |
| SMH 5.04 | 80.640 | 78.543 | B.D. FROM SMH5.03 @ 79.318 |
| SMH 6.00 | 79.025 | 77.468 | |
| SMH 6.01 | 79.354 | 77.369 | |
| SMH 6.02 | 79.612 | 77.251 | |
| SMH 7.00 | 82.102 | 79.815 | |
| SMH 7.01 | 81.806 | 79.702 | |
| SMH 7.02 | 81.573 | 79.586 | |
| SMH 7.03 | 81.505 | 79.568 | |
| SMH 7.04 | 80.977 | 78.893 | B.D. FROM SMH7.03 @ 79.435 |
| SMH 7.05 | 80.567 | 78.787 | |
| SMH 7.06 | 80.479 | 78.265 | B.D. FROM SMH7.05 @ 78.768 |
| SMH 7.07 | 79.712 | 78.093 | |
| SMH 8.00 | 78.473 | 77.075 | |
| SMH 8.01 | 78.969 | 76.973 | |
| SMH 8.02 | 78.896 | 76.680 | |
| SMH 8.03 | 78.681 | 76.770 | |
| SMH 9.00 | 81.520 | 79.819 | |
| SMH 9.01 | 81.012 | 79.012 | B.D. FROM SMH9.00 @ 79.642 |
| SMH 9.02 | 80.179 | 77.877 | B.D. FROM SMH9.01 @ 78.722 |
| SMH 10.00 | 78.140 | 76.689 | |
| SMH 11.00 | 75.200 | 74.070 | |

ISSUED FOR LRD OPINION

| Rev. | Note | Date | Drawn | Check |
|---|---|---|---|---|
| S2.P03 | ISSUED FOR LRD OPINION | 27.03.2024 | NQ | AL |
| S2.P02 | DRAFT ISSUE | 21.03.2024 | NQ | AL |
| S2.P01 | DRAFT ISSUE | 14.03.2024 | NQ | AL |

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UNIT 5C ELM HOUSE MILLENNIUM PARK NAAS CO. KILDARE
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Client: MARSHALL YARDS DEVELOPMENT COMPANY LTD.

Project: RESIDENTIAL DEVELOPMENT AT RATOATH, CO. MEATH

Drawing Title: PROPOSED SURFACE WATER DRAINAGE LAYOUT - SHEET 1

| Drawn By: | Checked By: | Approved By: | Date: | Scale: | Sheet Size: |
|---|---|---|---|---|---|
| RR | PD | DOB | MARCH 2023 | 1:500 | A0 |

| Project Number: | Drawing Number: | Status Code: | Rev Number: |
|---|---|---|---|
| DOBA2334 | 2334-DOB-XX-SI-DR-C-0201 | S2 | P03 |

- Poor Drainage on Site / Groundwater  / Permeable Liner
- Permeable Paving and Rain Gardens (flow through structures)
- Soil Type / SAAR / Qbar
- Runoff Coefficients / Catchments
- Longitudinal Road Sections / Ponding
- Attenuation Design

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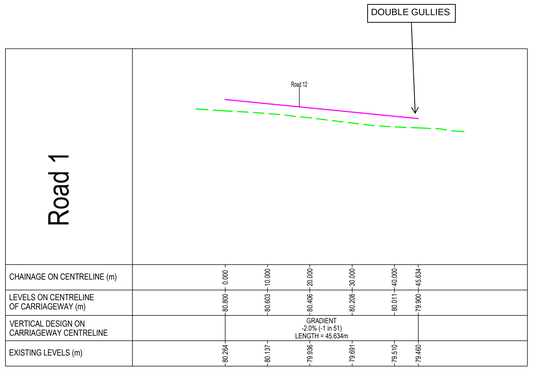
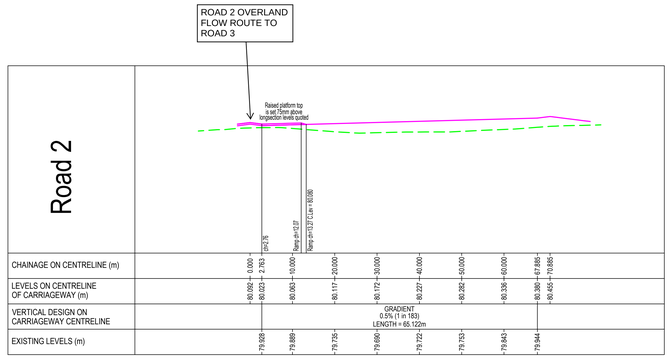
& ASSOCIATES CONSULTING ENGINEERS

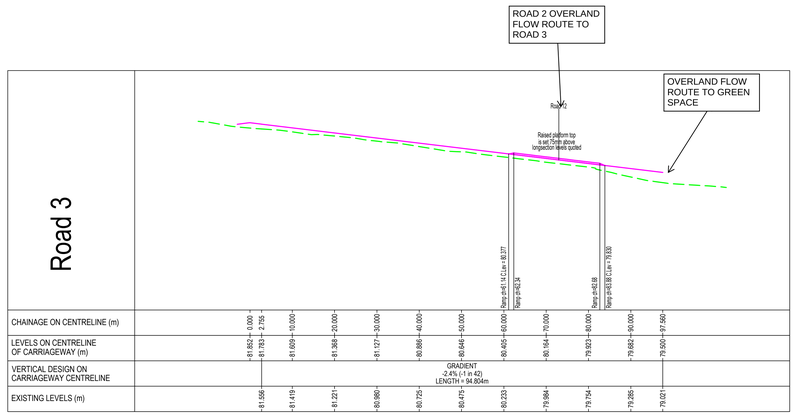
## Road 1



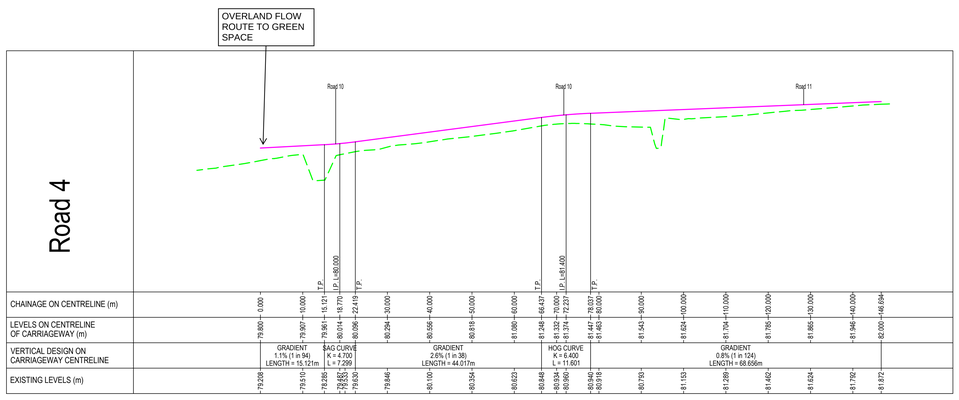

## Road 2



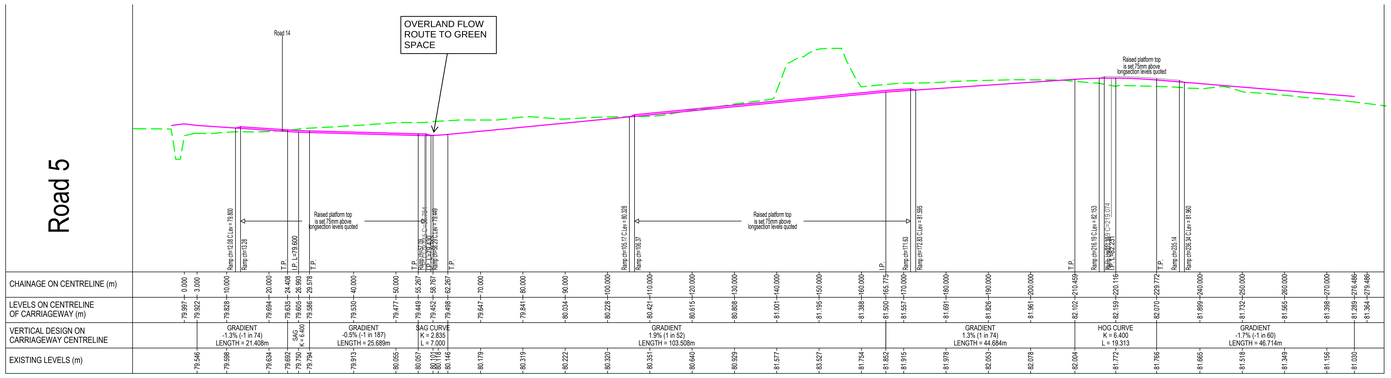

## Road 3



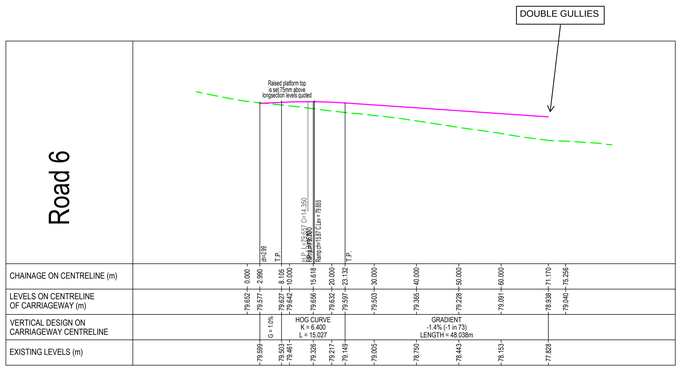

## Road 4




## Road 5




## Road 6




LEGEND:

- PROPOSED SURFACE WATER
- PROPOSED FOUL WATER
- PROPOSED GROUND/ ROAD LEVEL
- EXISTING GROUND PROFILE

GENERAL NOTES:

1. FOR STANDARD DOBA NOTES REFER TO DRAWING 2334-DOB-XX-SI-DR-S-0001 & S-0002
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S DRAWINGS AND SPECIFICATIONS.
3. USE FIGURED DIMENSIONS ONLY. DO NOT SCALE
4. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND LEVELS WITH ENGINEERING DRAWINGS PRIOR TO START OF CONSTRUCTION. ANY DISCREPANCIES TO BE NOTIFIED TO THE ENGINEER FOR RESOLUTION.
5. CONTRACTOR IS RESPONSIBLE FOR ANY NECESSARY CONDITION SURVEY OF THE WORKS AREA, PUBLIC ROADS AND RETURN TO ORIGINAL CONDITION FOLLOWING WORKS
6. CONTRACTOR TO ALLOW FOR SCANNING AND GPR SURVEY OF THE SITE FOR ANY UNDERGROUND SERVICES PRIOR TO WORKS. REFER TO PUBLIC UTILITIES DRAWINGS FOR APPROXIMATE LOCATION OF EXISTING SERVICES

**FOR INFORMATION ONLY**

| Rev. | Note | Date | Drawn | Check |
|---|---|---|---|---|
| S2.P01 | ISSUED FOR INFORMATION | 02.05.2024 | EC | AL |

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| | |
|---|---|
| Client: | MARSHALL YARDS DEVELOPMENT COMPANY LTD. |
| Project: | RESIDENTIAL DEVELOPMENT AT RATOATH Co. MEATH |
| Drawing Title: | PROPOSED ROAD LONGITUDINAL SECTIONS |

| Drawn By: | Checked By: | Approved By: | Date: | Scale: | Sheet Size: |
|---|---|---|---|---|---|
| EC | AL | DOB | MAR 2024 | H 1:500,V 1:100 | A0 |

| Project Number: | Drawing Number: | Status Code: | Rev Number: |
|---|---|---|---|
| DOBA2334 | 2334-DOB-XX-SI-DR-C-1405 | S2 | P01 |

## NOTES:

1. FOR STANDARD DOBA NOTES REFER TO DRAWING 2334-DOB-XX-SI-DR-S-0001 & S-0002
2. REFER TO ARCHITECTS DRAWINGS FOR ALL SITE & APPLICATION BOUNDARIES
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT'S & ENGINEER'S DRAWINGS AND SPECIFICATIONS.
4. USE FIGURED DIMENSIONS ONLY. DO NOT SCALE
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8. CONTRACTOR TO ENSURE ALL WATER & WASTEWATER RELATED WORKS ARE IN ACCORDANCE WITH THE IRISH WATER WATER INFRASTRUCTURE & WASTEWATER INFRASTRUCTURE CODE OF PRACTICE & STANDARD DETAILS DOCUMENTS
9. TESTING OF ALL GRAVITY SEWERS AND MANHOLES TO BE IN ACCORDANCE WITH IRISH WATER CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE SECTION 4.10 TESTING OF GRAVITY SEWERS & MANHOLES

## LEGEND:

- PROPOSED BUILDING
- PROPOSED ROADWAY (REFER TO DR-C-1100 DETAIL 1 AND 2)
- PROPOSED ROAD - HOME ZONE / SHARED SURFACE (REFER TO DR-C-1100 DETAIL 3)
- PROPOSED CONCRETE FOOTPATH (REFER TO DR-C-1100 DETAIL 4)
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N

0 5 10 15 20 25 m
SCALE 1:500 @ A0

FOX LODGE ROAD
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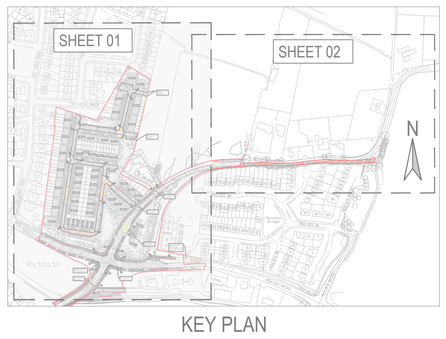
PART 8 - PROPOSED RATOATH PEDESTRIAN AND CYCLE SCHEME BY OTHERS. PROPOSED WORKS BY OTHERS SHOWN FOR COORDINATION PURPOSES ONLY.

REFER TO SHEET 2

POST-DEVELOPMENT OVERLAND FLOOD ROUTES

REFER TO SHEET 2

ISSUED FOR LRD OPINION




KEY PLAN

| Rev. | Note | Date | Drawn | Check |
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| S2.P03 | ISSUED FOR LRD OPINION | 27.03.2024 | NQ | AL |
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DONNACHADH O'BRIEN & ASSOCIATES CONSULTING ENGINEERS
UNIT 5C ELM HOUSE MILLENNIUM PARK NAAS CO. KILDARE
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INFO@DOBA.IE WWW.DOBA.IE

| | |
|---|---|
| Client: | MARSHALL YARDS DEVELOPMENT COMPANY LTD. |
| Project: | RESIDENTIAL DEVELOPMENT AT RATOATH, CO. MEATH |
| Drawing Title: | PROPOSED SITE LAYOUT SHEET 1 |

| Drawn By: | Checked By: | Approved By: | Date: | Scale: | Sheet Size: |
|---|---|---|---|---|---|
| RR | PD | DOB | MARCH 2023 | 1:500 | A0 |

| Project Number: | Drawing Number: | Status Code: | Rev Number: |
|---|---|---|---|
| DOBA2334 | 2334-DOB-XX-SI-DR-C-0501 | S2 | P03 |

- Poor Drainage on Site / Groundwater  / Permeable Liner
- Permeable Paving and Rain Gardens (flow through structures)
- Soil Type / SAAR / Qbar
- Runoff Coefficients / Catchments
- Longitudinal Road Sections / Ponding
- Attenuation Design

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The attenuation design parameters are as follows:

- 1% AEP Storm Event
- 20% climate change
- 10% Urban Creep added to roof areas
- 500mm freeboard to the nearest lowest FFL

Extracts from the Infordrainage calculations highlighting these parameters are included in the following slides.

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

| DOBA 2334: Residential Zone lands at Ratoath Surface Water Calculations | Date: 08/03/2024 | | |
|---|---|---|---|
| | Designed by: EC | Checked by: | Approved By: |
| Report Details: Type: Inflow Summary Storm Phase: Surface Network 1 | Company Address: | | |

RUNOFF COEFFICIENTS

| Inflow Label | Conne To | | Area (ha) | Percentage Impervious (%) | Urban Creep (%) | Adjusted Percentage Impervious (%) | Area Analyzed (ha) |
|---|---|---|---|---|---|---|---|
| 1.000 - 80.65m | Raingarden 23 | Time of Concentration | 0.008 | 45 | 0 | 45.0 | 0.004 |
| 1.000 - 82.38m | Raingarden 23 | Time of Concentration | 0.008 | 45 | 0 | 45.0 | 0.004 |
| 1.000 - 84.62m | Porous Paving 62 | Time of Concentration | 0.008 | 45 | 0 | 45.0 | 0.004 |
| 1.000 - 101.49m | Raingarden 23 | Time of Concentration | 0.010 | 45 | 0 | 45.0 | 0.005 |
| 1.000 - 173.56m | Porous Paving 62 | Time of Concentration | 0.017 | 95 | 10 | 104 | |
| 1.000 - 173.82m | Porous Paving 62 | Time of Concentration | 0.017 | 95 | 10 | 104 | |
| 1.000 - 204.23m | Tree Pit 1 | Time of Concentration | 0.020 | 80 | 0 | 80.0 | 0.016 |
| 1.000 - 211.79m | Porous Paving 62 | Time of Concentration | 0.021 | 80 | 0 | 80.0 | 0.017 |
| 1.000 - 358.50m | Raingarden 23 | Time of Concentration | 0.036 | 45 | 0 | 45.0 | 0.016 |
| 1.001 - 11.48m | Porous Paving 55 | Time of Concentration | 0.001 | 80 | 0 | 80.0 | 0.001 |
| 1.001 - 11.51m | Porous Paving 57 | Time of Concentration | 0.001 | 80 | 0 | 80.0 | 0.001 |
| 1.001 - 11.53m | Tree Pit 7 | Time of Concentration | 0.001 | 80 | 0 | 80.0 | 0.001 |
| 1.001 - 11.57m | Porous Paving 58 | Time of Concentration | 0.001 | 80 | 0 | 80.0 | 0.001 |
| 1.001 - 11.59m | Porous Paving 52 | Time of Concentration | 0.001 | 80 | 0 | 80.0 | 0.001 |
| 1.001 - 11.63m | Porous Paving 59 | Time of Concentration | 0.001 | 80 | 0 | 80.0 | 0.001 |
| 1.001 - 11.64m | Porous Paving 51 | Time of Concentration | 0.001 | 80 | 0 | 80.0 | 0.001 |
| 1.001 - 11.68m | Tree Pit 6 | Time of Concentration | 0.001 | 80 | 0 | 80.0 | 0.001 |
| 1.001 - 14.06m | Porous Paving 50 | Time of Concentration | 0.001 | 80 | 0 | 80.0 | 0.001 |
| 1.001 - 19.68m | Porous Paving 60 | Time of Concentration | 0.002 | 80 | 0 | 80.0 | 0.002 |
| 1.001 - 22.04m | Porous Paving 57 | Time of Concentration | 0.002 | 80 | 0 | 80.0 | 0.002 |
| 1.001 - 23.03m | Porous Paving 56 | Time of Concentration | 0.002 | 80 | 0 | 80.0 | 0.002 |
| 1.001 - 23.06m | Porous Paving 49 | Time of Concentration | 0.002 | 80 | 0 | 80.0 | 0.002 |
| 1.001 - 23.16m | Porous Paving 60 | Time of Concentration | 0.002 | 80 | 0 | 80.0 | 0.002 |
| 1.001 - 23.35m | Porous Paving 52 | Time of Concentration | 0.002 | 80 | 0 | 80.0 | 0.002 |
| 1.001 - 25.20m | Porous Paving 56 | Time of Concentration | 0.003 | 80 | 0 | 80.0 | 0.002 |
| 1.001 - 29.46m | Porous Paving 56 | Time of Concentration | 0.003 | 80 | 0 | 80.0 | 0.002 |
| 1.001 - 30.35m | Porous Paving 51 | Time of Concentration | 0.003 | 45 | 0 | 45.0 | 0.001 |
| 1.001 - 32.76m | Raingarden 22 | Time of Concentration | 0.003 | 45 | 0 | 45.0 | 0.001 |
| 1.001 - 34.91m | Porous Paving 60 | Time of Concentration | 0.003 | 80 | 0 | 80.0 | 0.003 |
| 1.001 - 35.77m | Porous Paving 54 | Time of Concentration | 0.004 | 80 | 0 | 80.0 | 0.003 |
| 1.001 - 36.21m | Raingarden 25 | Time of Concentration | 0.004 | 45 | 0 | 45.0 | 0.002 |
| 1.001 - 37.50m | Porous Paving 62 | Time of Concentration | 0.004 | 80 | 0 | 80.0 | 0.003 |
| 1.001 - 37.75m | Porous Paving 60 (1) | Time of Concentration | 0.004 | 80 | 0 | 80.0 | 0.003 |

URBAN CREEP ADDED TO ROOF AREAS



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| DOBA 2334: Residential Zone lands at Ratoath Surface Water Calculations | Date: 08/03/2024 | | |
|---|---|---|---|
| | Designed by: EC | Checked by: | Approved By: |
| Report Title: Rainfall Analysis Criteria | Company Address: | | |

| | |
|---|---|
| Runoff Type | Dynamic |
| Output Interval (mins) | 5 |
| Time Step | Default |
| Urban Creep | Use Catchment Values |
| Junction Flood Risk Margin (mm) | 200 |
| Perform No Discharge Analysis | ☐ |

## Rainfall

### FSR 100 yr

Type: FSR

| | |
|---|---|
| Region | Scotland and Ireland |
| M5-60 (mm) | 15.1 |
| Ratio R | 0.275 |
| Summer | ☑ |
| Winter | ☑ |

### Return Period

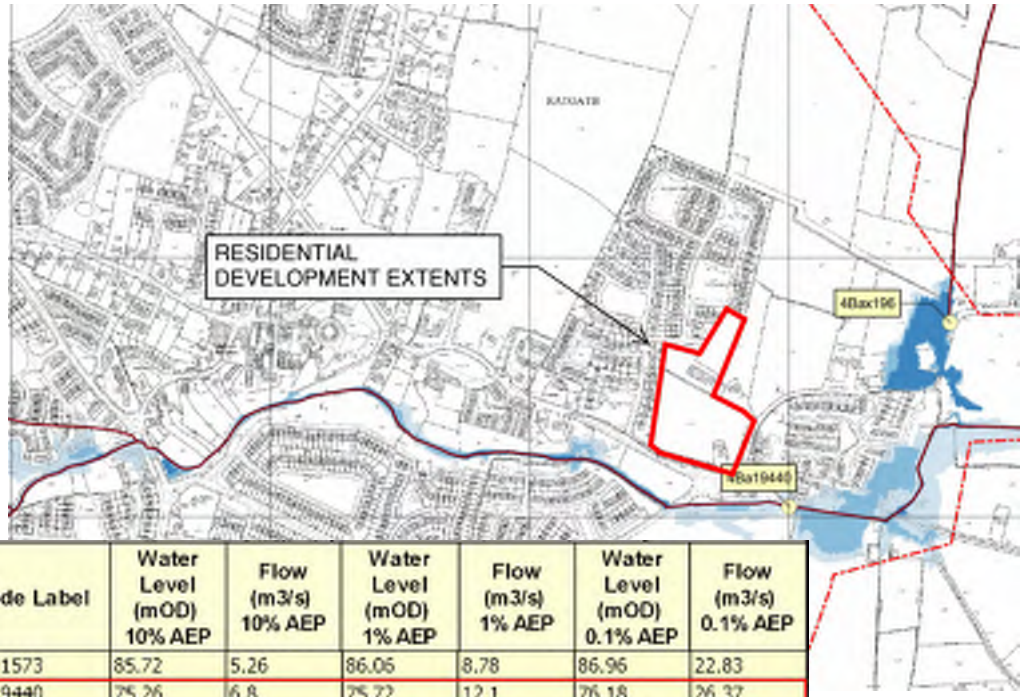
| Return Period (years) | Increase Rainfall (%) |
|---|---|
| 100.0 | 20.000 |

← 100 Yr EVENT + 20% CC

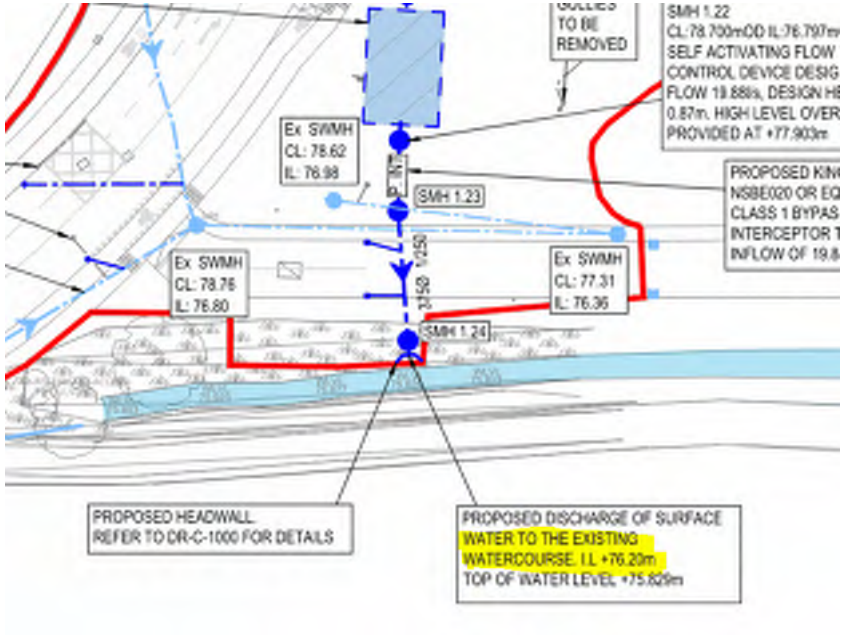
### Storm Durations

| Duration (mins) | Run Time (mins) |
|---|---|
| 15 | 30 |
| 30 | 60 |
| 60 | 120 |
| 120 | 240 |
| 180 | 360 |
| 240 | 480 |
| 360 | 720 |
| 480 | 960 |
| 600 | 1200 |
| 720 | 1440 |
| 960 | 1920 |
| 1440 | 2880 |
| 2160 | 4320 |
| 2880 | 5760 |
| 4320 | 8640 |
| 5760 | 11520 |
| 7200 | 14400 |
| 8640 | 17280 |
| 10080 | 20160 |

The 0.1% AEP Flood Level at node 4Ba19440 is +76.18m. The final discharge level of the proposed SW network is at +76.20m i.e. a free flowing outfall during a 1:1000 year storm event




| Node Label | Water Level (mOD) 10% AEP | Flow (m3/s) 10% AEP | Water Level (mOD) 1% AEP | Flow (m3/s) 1% AEP | Water Level (mOD) 0.1% AEP | Flow (m3/s) 0.1% AEP |
|---|---|---|---|---|---|---|
| 4Ba21573 | 85.72 | 5.26 | 86.06 | 8.78 | 86.96 | 22.83 |
| 4Ba19440 | 75.26 | 6.8 | 75.72 | 12.1 | 76.18 | 26.37 |
| 4Bax196 | 75.29 | 0.12 | 75.34 | 0.12 | 75.46 | 0.13 |
| 4Bay961 | 88.22 | 0.19 | 88.4 | 0.18 | 89.03 | 0.18 |

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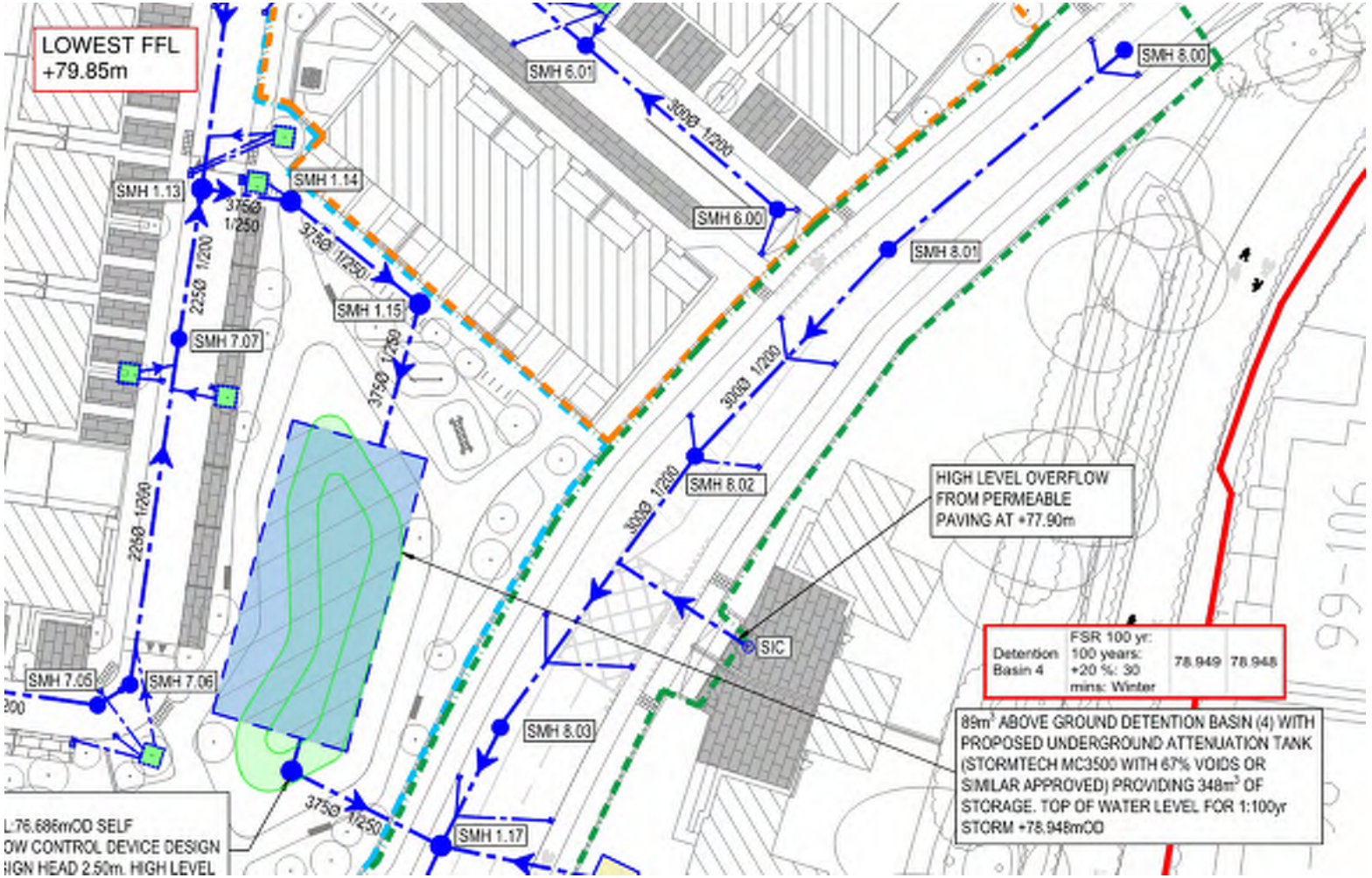


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# Flooding Agenda

- Residential Development in Flood Zone C
- Wastewater gravity discharge entering Flood Zone A & B
- Justification Test
- Rising Groundwater / S.I. Report
- SW Exceedance Route
- Existing Drainage Ditch

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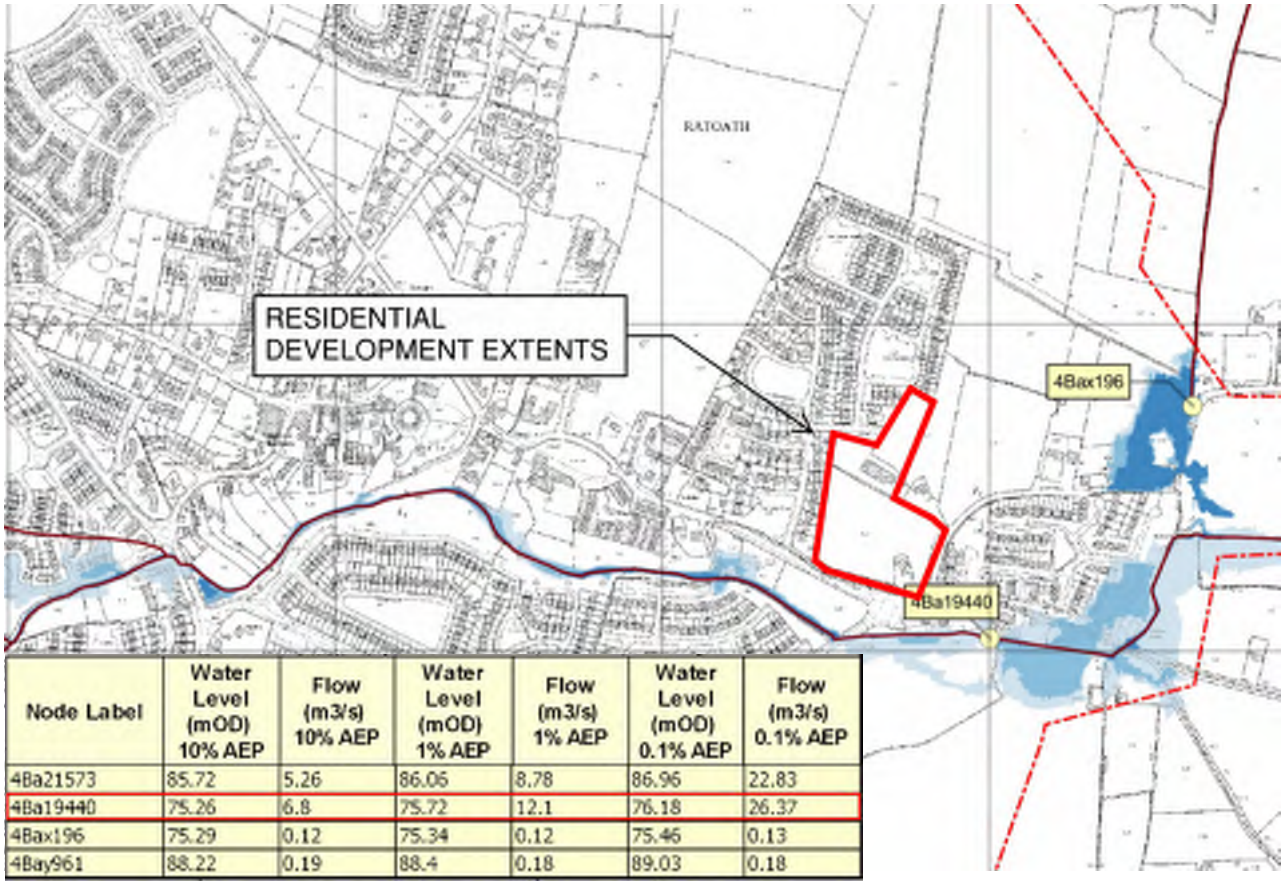
The lowest development Finished Floor Level is +79.30m and the lowest road level is +79.00m. The 0.1% AEP Flood Level at node 4Ba19440 is +76.18m.




| Node Label | Water Level (mOD) 10% AEP | Flow (m3/s) 10% AEP | Water Level (mOD) 1% AEP | Flow (m3/s) 1% AEP | Water Level (mOD) 0.1% AEP | Flow (m3/s) 0.1% AEP |
|---|---|---|---|---|---|---|
| 4Ba21573 | 85.72 | 5.26 | 86.06 | 8.78 | 86.96 | 22.83 |
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| 4Bax196 | 75.29 | 0.12 | 75.34 | 0.12 | 75.46 | 0.13 |
| 4Bay961 | 88.22 | 0.19 | 88.4 | 0.18 | 89.03 | 0.18 |

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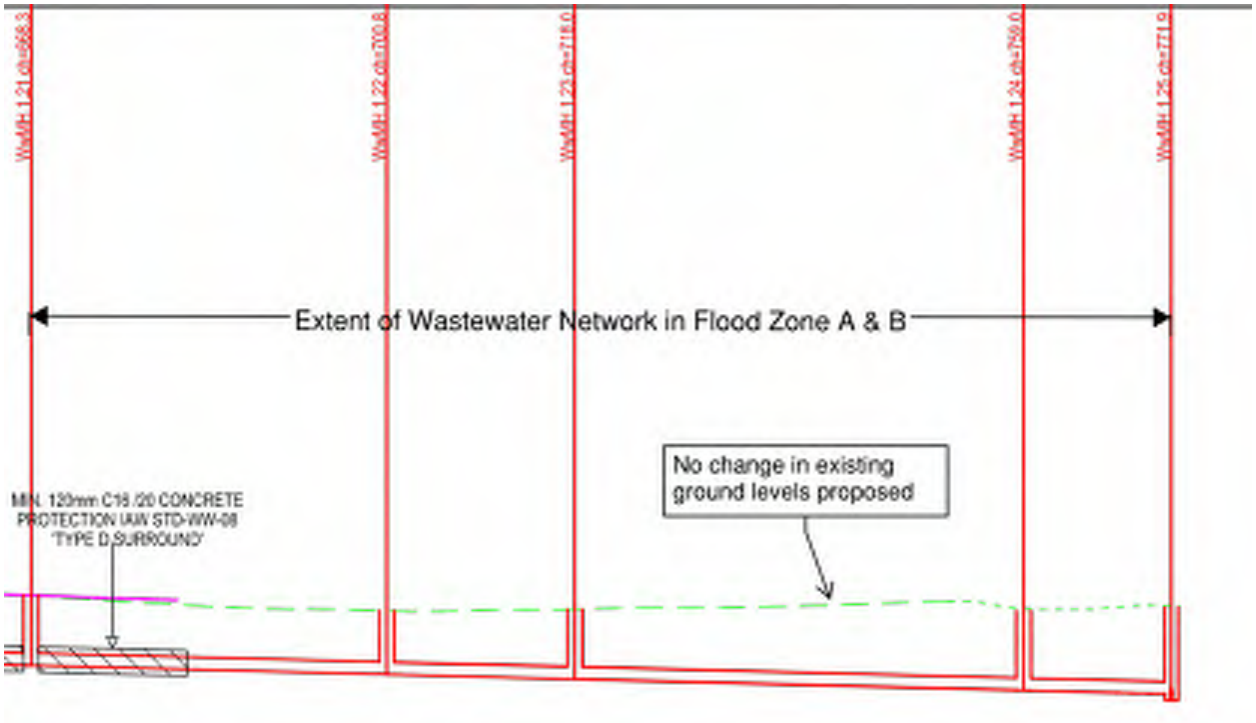
The nearest gravity wastewater network to the site is approx. 365m to the east along Ballybin Road. A small portion of the existing road is located in Flood Zone A & B along which the network extension is being constructed. No amendments to the existing road levels are proposed.




DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

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The Justification Test is not required for the residential portion of the development as it is located in Flood Zone C and is appropriate - in accordance with Table 3.2 of the Flood Risk Management Guidelines

| | Flood Zone A | Flood Zone B | Flood Zone C |
|---|---|---|---|
| Highly vulnerable development (including essential infrastructure) | Justification Test | Justification Test | Appropriate |
| Less vulnerable development | Justification Test | Appropriate | Appropriate |
| Water-compatible development | Appropriate | Appropriate | Appropriate |

Table 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

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& ASSOCIATES CONSULTING ENGINEERS

We have provided a response to the Justification Test for the exension of the gravity wastewater network:

1. Subject Lands are zoned residential
2 (i) The development will not increase flood risk elsewhere road levels are to remain as existing
2(ii) As above, the road levels will remain as existing
2(iii) Sealed manhole covers are to be installed on the new wastewater manholes located in Flood Zone A/B
2 (iv) The new wastewater network will serve future residential development

**Box 5.1 Justification Test for development management (to be submitted by the applicant)**

When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
   - (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;
   - (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;
   - (iii) The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and
   - (iv) The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: See section 5.27 in relation to major development on zoned lands where sequential approach has not been applied in the operative development plan.

Refer to section 5.28 in relation to minor and infill developments.

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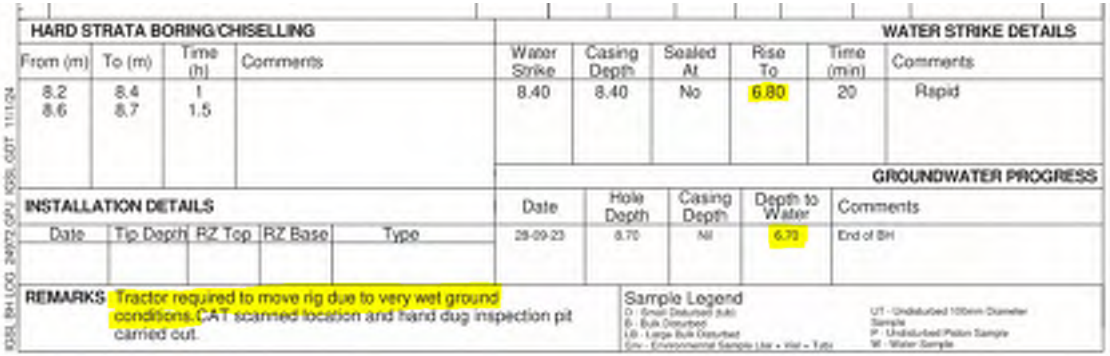
& ASSOCIATES CONSULTING ENGINEERS

A groundwater strike in BH02 noted a rapid rise in the water level from 8.40m below existing ground levels to 6.70m below existing ground level. The highest recorded ground water level was noted at 2.10m below existing ground level in BH03. As such, we would deem the risk from groundwater flooding to be low.
Impermeable liners will be installed on deeper undergound SuDS features to mitigate against infiltration from high groundwater.



**HARD STRATA BORING/CHISELLING**

| From (m) | To (m) | Time (h) | Comments |
|---|---|---|---|
| 8.2 | 8.4 | 1 | |
| 8.6 | 8.7 | 1.5 | |

**WATER STRIKE DETAILS**

| Water Strike | Casing Depth | Sealed At | Rise To | Time (min) | Comments |
|---|---|---|---|---|---|
| 8.40 | 8.40 | No | 6.80 | 20 | Rapid |

**GROUNDWATER PROGRESS**

| Date | Hole Depth | Casing Depth | Depth to Water | Comments |
|---|---|---|---|---|
| 28-09-23 | 8.70 | Nil | 6.70 | End of BH |

**INSTALLATION DETAILS**

| Date | Tip Depth | RZ Top | RZ Base | Type |
|---|---|---|---|---|
| | | | | |

**REMARKS** Tractor required to move rig due to very wet ground conditions. CAT scanned location and hand dug inspection pit carried out.

Sample Legend

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample Use • Vial = 1 pc
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

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## NOTES:

1. FOR STANDARD DOBA NOTES REFER TO DRAWING 2334-DOB-XX-SI-DR-S-0001 & S-0002
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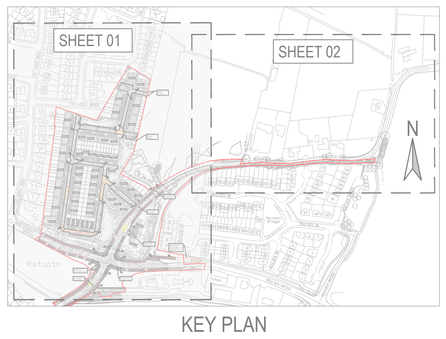


KEY PLAN

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INFO@DOBA.IE WWW.DOBA.IE

| | |
|---|---|
| Client: | MARSHALL YARDS DEVELOPMENT COMPANY LTD. |
| Project: | RESIDENTIAL DEVELOPMENT AT RATOATH, CO. MEATH |
| Drawing Title: | PROPOSED SITE LAYOUT SHEET 1 |

| Drawn By: | Checked By: | Approved By: | Date: | Scale: | Sheet Size: |
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| RR | PD | DOB | MARCH 2023 | 1:500 | A0 |

| Project Number: | Drawing Number: | Status Code: | Rev Number: |
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| DOBA2334 | 2334-DOB-XX-SI-DR-C-0501 | S2 | P03 |

- Residential Development in Flood Zone C
- Wastewater gravity discharge entering Flood Zone A & B
- Justification Test
- Rising Groundwater / S.I. Report
- SW Exceedance Route
- Existing Drainage Ditch

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& ASSOCIATES CONSULTING ENGINEERS

The existing field boundary drain receives runoff from the agricultural lands at present. The drain is to be backfilled as part of the proposed development.

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

## SURVEY NOTES

- TOPOGRAPHICAL SURVEY BASED ON EXISTING LEVELS FROM 3rd PARTY SPECIALIST. DOB & ASSOCIATES TAKES NO RESPONSIBILITY FOR ACCURACY OF SURVEY INFORMATION.
- MAIN CONTRACTOR TO ESTABLISH INDEPENDENTLY ORDANCE DATUM ON SITE FOR LEVELS TO MAILIN HEAD DATUM AND CO-ORDINATES FOR SETTING OUT TO NATIONAL GRID.
- MAIN CONTRACTOR TO VERIFY ALL UNDERGROUND SERVICES ON THE SITE INCLUDING ALL ANOMALIES NOTED ON THE GPR SURVEY AND TO TAKE ALL NECESSARY PRECAUTIONS PRIOR TO ANY EXCAVATIONS ON THE SITE.
- REFER TO M&E ENGINEERS DRAWINGS FOR DIVERSION / DEMOLITION OF ALL UNDERGROUND ELECTRICAL CABLES / DUCTS, TELECOM DUCTS, LIGHTING DUCTS, OIL LINES ETC.

## SURVEY LEGEND

| | |
|---|---|
| AJ | ARMSTRONG JUNCTION |
| AV | AIR VALVE |
| BB | BOTTOM OF BANK |
| BLD | BOLLARD |
| CATV | CABLE TV |
| CL | COVER LEVEL |
| EIR | EIR MANHOLE |
| EP | ELECTRICITY POLE |
| ESB | ELECTRICITY SERVICE COVER |
| FCE | FENCE |
| FL | FLOOR LEVEL |
| FH | FIRE HYDRANT |
| GAS | GAS SERVICE COVER |
| GY | GULLY |
| HYD | HYDRANT |
| HGE | HEDGE |
| IC | INSPECTION CHAMBER |
| IL | INVERT LEVEL |
| KB | KERB |
| KBBOT | KERB BOTTOM |
| KBTOP | KERB TOP |
| LS | LAMP STANDARD |
| LVL | LEVEL |
| MH | MANHOLE |
| SB | SLOPE BOTTOM |
| SP | SIGNPOST |
| ST | SLOPE TOP |
| SV | SLUICE VALVE |
| TB | TOP OF BANK |
| TL | TRAFFIC LIGHT |
| TOW | TOP OF WALL |
| TP | TELEGRAPH POLE |
| UTO | UNABLE TO OPEN |
| UTS | UNABLE TO SURVEY |
| V | VALVE |
| WLVL | WATER LEVEL |
| WM | WATER METRE |
| WV | WATER VALVE |

## BS5837:2012 Tree Categorisation

**Category A**
Trees of high quality with an estimated remaining life expectancy of at least 40 years

**Category B**
Trees of moderate quality with an estimated life expectancy of at least 20 years

**Category C**
Trees of low quality with an estimated life expectancy of at least 10 years, or young trees with a stem diameter below 150mm

**Category U**
Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years

**Key**

Root Protection Areas
The minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the trees viability.

Tree, Shrub or Hedgerow Group.

T2 — Reference Number for Tree, Group or Hedgerow.

N

0 5 10 15 20 25 m
SCALE 1:500 @ A0

EXISTING BOUNDARY DRAIN TERMINATES AT THE SITE BOUNDARY

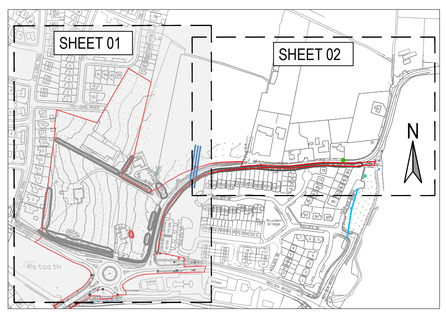
EXISTING SITE CONTOURS FALL TOWARDS THE BOUNDARY DRAIN

EXISTING BOUNDARY DRAIN IS PIPED OFF SITE

REFER TO SHEET 2

Ratoath
Ráth Tó

KEY PLAN

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| Rev. | Note | Date | Drawn | Check |
|---|---|---|---|---|
| S2.P05 | ISSUED FOR INFORMATION | --.05.2024 | RR | AL |
| S2.P04 | ISSUED FOR INFORMATION | 15.04.2024 | SP | AL |
| S2.P03 | ISSUED FOR LRD OPINION | 27.03.2024 | NQ | AL |
| S2.P02 | DRAFT ISSUE | 21.03.2024 | NQ | AL |
| S2.P01 | DRAFT ISSUE | 14.03.2024 | NQ | AL |

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Client: MARSHALL YARDS DEVELOPMENT COMPANY LTD.

Project: RESIDENTIAL DEVELOPMENT AT RATOATH, CO. MEATH

Drawing Title: EXISTING SITE LAYOUT - SHEET 1

| Drawn By: | Checked By: | Approved By: | Date: | Scale: | Sheet Size: |
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| RR | AL | DOB | SEPT' 2023 | 1:500 | A0 |

| Project Number: | Drawing Number: | Status Code: | Rev Number: |
|---|---|---|---|
| DOBA2334 | 2334-DOB-XX-SI-DR-C-0002 | S2 | P05 |

# Ratoath LRD

## SW and Flooding Responses to Meath Co Co

Meeting 10th May 2024

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A | Unit 5C Elm House, Millennium Park, Naas, Co. Kildare, W91P9P8
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# SW Agenda

- Online Review of Infodrainage Software
- Cover to SW pipes
- 2 l/s/ha vs Qbar from GDSDS
- Impact of 2 l/s/ha discharge on development
- Net reduction in discharge post development
- Catchment of existing public road
- Unlined Attenuation justification / Site Investigation

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& ASSOCIATES CONSULTING ENGINEERS

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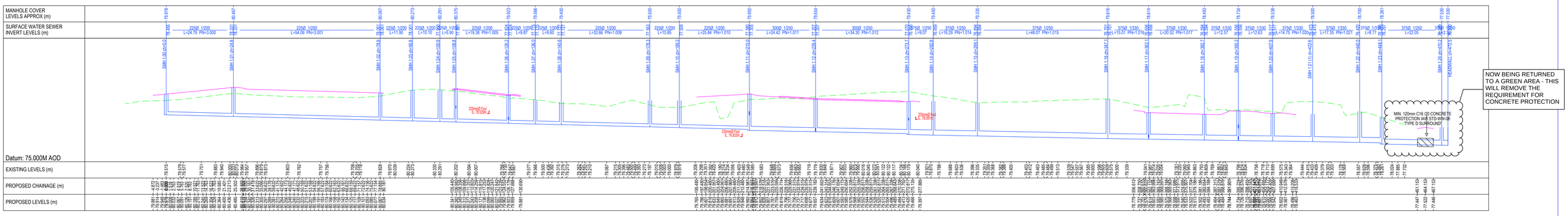


## PROPOSED LONGITUDINAL SECTION SMH 1.00 - HEADWALL
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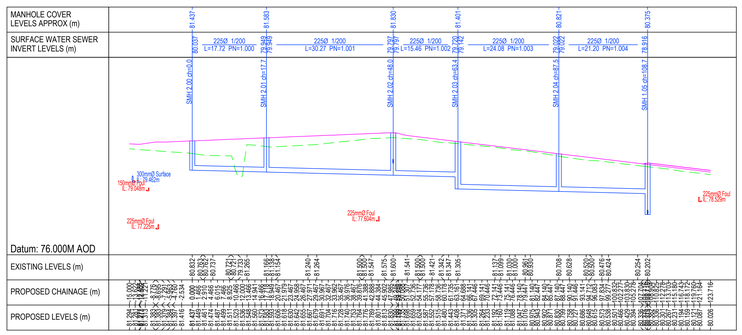


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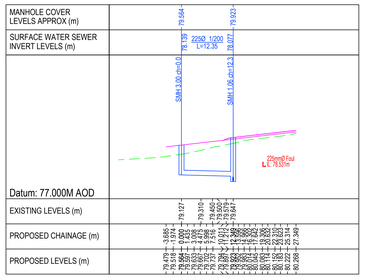


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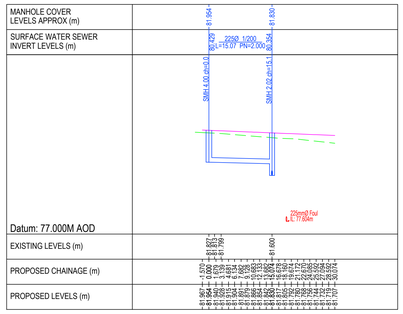


## PR. LONGITUDINAL SECTION SMH 4.00 - SMH 2.02
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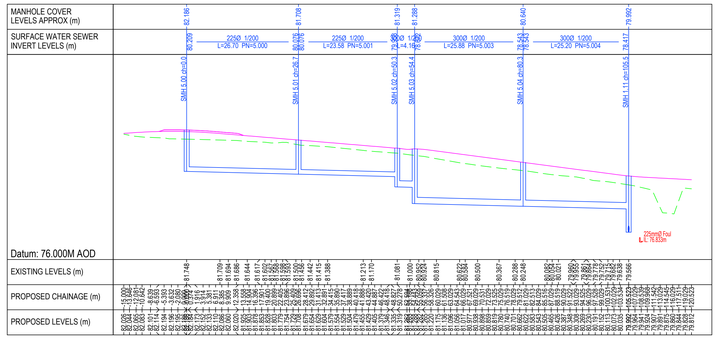


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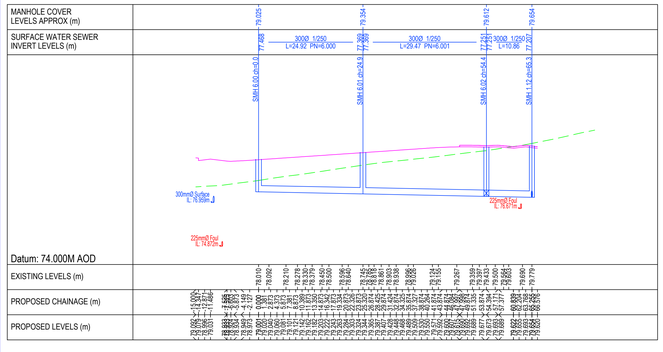


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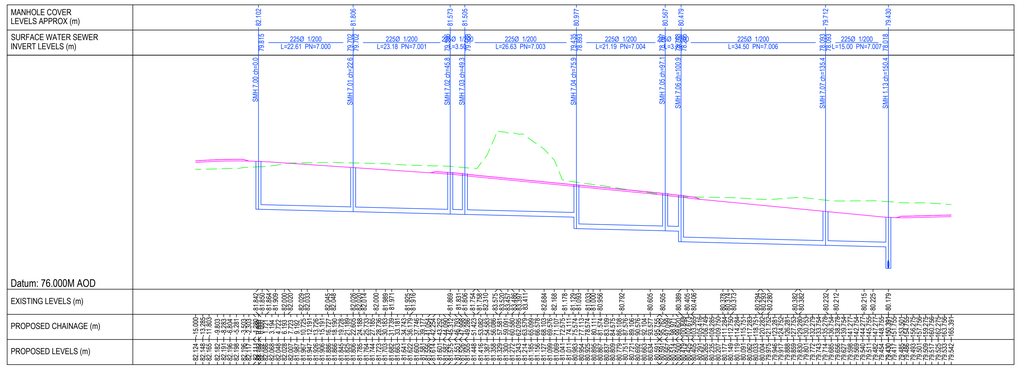


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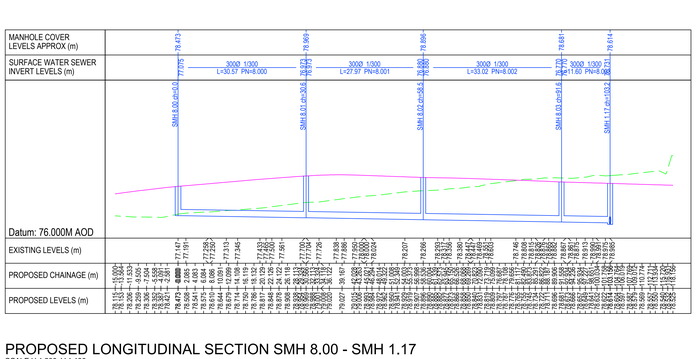


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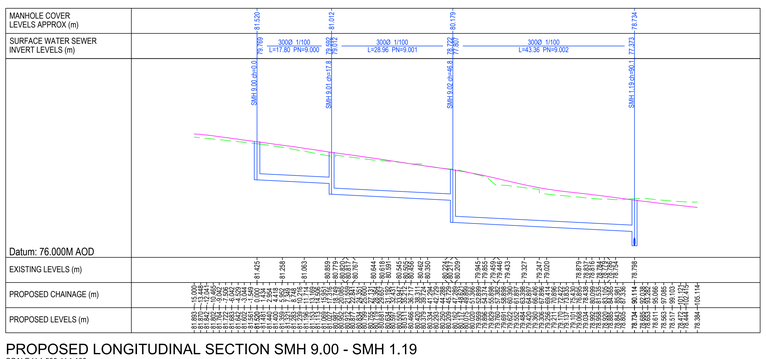


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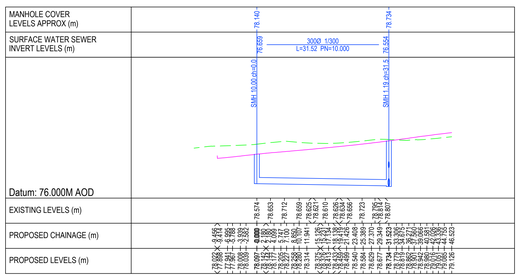


## PROPOSED LONGITUDINAL SECTION SMH 10.00 - SMH 1.19
SCALE H 1:500, V 1:100

LEGEND:

- PROPOSED SURFACE WATER
- PROPOSED FOUL WATER
- PROPOSED GROUND/ ROAD LEVEL
- EXISTING GROUND PROFILE

GENERAL NOTES:

1. FOR STANDARD DOBA NOTES REFER TO DRAWING 2334-DOB-XX-SI-DR-S-0001 & S-0002
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S DRAWINGS AND SPECIFICATIONS.
3. USE FIGURED DIMENSIONS ONLY. DO NOT SCALE
4. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND LEVELS WITH ENGINEERING DRAWINGS PRIOR TO START OF CONSTRUCTION. ANY DISCREPANCIES TO BE NOTIFIED TO THE ENGINEER FOR RESOLUTION.
5. CONTRACTOR IS RESPONSIBLE FOR ANY NECESSARY CONDITION SURVEY OF THE WORKS AREA, PUBLIC ROADS AND RETURN TO ORIGINAL CONDITION FOLLOWING WORKS
6. CONTRACTOR TO ALLOW FOR SCANNING AND GPR SURVEY OF THE SITE FOR ANY UNDERGROUND SERVICES PRIOR TO WORKS, REFER TO PUBLIC UTILITIES DRAWINGS FOR APPROXIMATE LOCATION OF EXISTING SERVICES

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|---|---|---|---|---|
| S2.P03 | ISSUED FOR INFORMATION | 10.05.2024 | RR | AL |
| S2.P02 | ISSUED FOR LRD OPINION | 27.03.2024 | NQ | AL |
| S2.P01 | ISSUED FOR INFORMATION | 14.03.2024 | EC | AL |

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| | |
|---|---|
| Client: | MARSHALL YARDS DEVELOPMENT COMPANY LTD. |
| Project: | RESIDENTIAL DEVELOPMENT AT RATOATH Co. MEATH |
| Drawing Title: | PROPOSED SW LONGITUDINAL SECTIONS |

| Drawn By: | Checked By: | Approved By: | Date: | Scale: | Sheet Size: |
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| EC | AL | DOB | MAR 2024 | H 1:500,V 1:100 | A0 |

| Project Number: | Drawing Number: | Status Code: | Rev Number: |
|---|---|---|---|
| DOBA2334 | 2334-DOB-XX-SI-DR-C-1400 | S2 | P03 |

- Online Review of Infodrainage Software
- Cover to SW pipes
- 2 l/s/ha vs Qbar from GDSDS
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volumes of storage, particularly deep ponds, have limited benefits. It is becoming clear that long residence times can result in the production of high levels of ammonia, due to anearobic conditions in the sediments, which is very poisonous to river crustaceans and fish.

Shallow ponds, although providing less opportunity for these conditions, have a number of limitations. These are:

- For any given volume, the shallower the pond the larger is the area needed;
- Plants will grow in depths of up to around 1m. This depth of open water cannot be guaranteed for shallow ponds. This implies increased maintenance and also reduced aesthetic value of the pond.

It is therefore recommended that a figure of 15 mm of rainfall is used for the Dublin region to determine the permanent pool volume, until research provides clear evidence as to what constitutes best practice.

It should be noted that the Standard Percentage Runoff (SPR) indices for SOIL are different in the Flood Studies Report (FSR) from the values in the Winter Rainfall Acceptance Potential (WRAP) map (from the Wallingford Procedure). This formula is generally applied using the WRAP values, but the difference is not worth debating.

Flows from large storms should be diverted around treatment facilities, with only runoff from ordinary events being treated. However as retention ponds are used to provide both treatment and also hydraulic attenuation for extreme events, careful design is needed to prevent resuspension of sediments.

The design of pond water levels should take account of winter levels of groundwater. Lining a pond (if needed to protect the a sensitive groundwater area from pollution) where ground water levels are high in winter, should ensure that the design pond water level is higher than the groundwater or else the pond liner will “float” up. If the pond is not to be lined, the groundwater level in summer needs to be known to determine the likely minimum water level in dry summer periods. The range of the pond water level in the seasons should be taken into account in its design, particularly its impact on barrier planting vegetation. The fact that the water level may drop below the outlet control is not necessarily a problem as no direct runoff to the watercourse reflects the normal greenfield response in dry summer periods.

Although water quality and hydraulic design features are the principle focus when designing the drainage system, it is important to maximise the environmental benefits of any design. Thus appropriate use of vegetation borders to ponds using native plants which support local fauna is to be considered whenever designing a system. The gradient of the ground at the edge of the pond should be designed to be fairly flat even though this may not be the most efficient hydraulic solution and require some additional land.

Guidance on best practice design of retention ponds is available from SuDS design manuals. It is inappropriate to use environmental criteria as primary design criteria. However environmental benefits need to be considered when developing the design proposals.

#### *6.3.1.2.2 River Regime Protection*

Rural runoff to rivers, when it occurs, is slow. To try and replicate this, urban runoff must be heavily constrained. Unrestrained runoff causes high velocities and erosion, affecting the morphology of the channel and the flora and fauna in the river.

Relevant design criterion to address this issue is to:

- Restrain the rate of discharge to the receiving water to that of greenfield runoff for the site.

A range of formulae exist for predicting greenfield runoff. The simplest and the one considered most appropriate for applying to this criterion was developed by the Institute of Hydrology in their report 124 "Flood estimation for small catchments", 1994.

The work was based on 71 small rural catchments. A regression equation was produced to calculate $QBAR_{rural}$ the mean annual flood.

$$QBAR_{rural} = 0.00108AREA^{0.89}SAAR^{1.17}SOIL^{2.17}$$

where:

$QBAR_{rural}$ is the mean annual flood flow from a rural catchment in $m^3/s$.

AREA is the area of the catchment in $km^2$.

SAAR is the standard average annual rainfall for the period 1941 to 1970 in mm.

SOIL is the soil index, which is a composite index determined from soil survey maps that accompany the Flood Studies Report.

QBAR can be factored using the Flood Studies Report regional growth curve for Ireland to produce peak flood flows for a number of return periods. Information on growth curves for UK and Ireland is available in Flood Studies Supplementary Report (FSSR) 14, 1987 produced by the Institute of Hydrology.

There is some indication that the Irish growth curve is not applicable for some Dublin rivers. Preliminary work carried out on the Carrickmines, Shanganagh and Tolka rivers has resulted in an alternative growth curve being proposed. The FSSR 14 growth curves together with the proposed regional curve for Dublin are shown in appendix C. These will be updated in due course when more research is made into this issue.

The formula for determining the peak greenfield runoff rate should not be applied to areas less than 50 hectares. As many developments are smaller than this size this constraint is avoided by calculating QBAR for 50 hectares and linearly interpolating flow rates for smaller areas.

#### *6.3.1.3 River Flooding Protection*

River flooding has serious consequences for affected properties and therefore return periods of 100 years are usually applied to determine the extent of floodplains and the risk to properties adjacent to watercourses. A return period of 200 years is normally recommended where flooding risk from the sea is possible. Flooding in rivers is exacerbated by urban runoff, particularly in catchments with a high degree of urbanisation. The floodplains provide a finite volume of storage, so not only is the rate of runoff from urban areas needing to be controlled, but also limiting the increase in volume of runoff compared to greenfield conditions should also be considered.

Relevant design criteria to address river flooding are to:

- Restrain the excess volume of runoff from urban developments to that of greenfield runoff;
- Avoid development on the floodplain.

#### *6.3.1.4 Excess Urban Runoff Volume*

It is important to realise that many river flood events are the result of multiple rainfall events and therefore it is unwise to try and design for the discharge to take place before or after the flood wave passing down the river. If all catchments are developed on the basis of reflecting the rural behaviour prior to development, both in terms of rate of runoff and volume of runoff, it is likely that the river will be protected effectively.

This additional volume of stormwater runoff is not a flooding issue in "normal" (frequent) rainfall events as long as runoff rates from sites are constrained. However in extreme events, where flooding is likely to occur in the river, it is important to limit this runoff volume. This can be achieved in the design of the drainage system by spilling from the attenuation storage system to an area which will drain very slowly, preferably by infiltration. As this is a rare event, by definition, this might be to a park or football field with appropriate land drainage provision at low points. This storage might be termed "long term" storage for river flood protection.

The river floodplain should generally be used as open space for ecological reasons as well as being a river flood corridor for extreme events. Planned development or even storage in the floodplain should generally be avoided. This is partly due to the fact that the storage attenuation system is bypassed by being flooded, and also creates a problem in terms of maintenance (depending on how frequently it is flooded). The likely consequence is that large volumes of sediment will be deposited in the storage systems by the floodwater when this occurs.

To achieve the necessary volumes of long term stored runoff, the return period at which runoff will start to pass to such an area will need to take place for events less than the 100 year event. However if flooding of the area occurs more often than say once in 10 years then the level of service for that public open space may be considered to be inadequate.

In some situations it might not be possible to achieve this approach. Also it requires detailed technical analysis to enable this to be designed accurately. The alternative is to provide for this volume in the form of infiltration which comes into effect for all storm events. This not only has the advantage of simplicity of design, but also provides good environmental benefits in terms of base flow support for rivers, and reduced runoff for small events (which replicates greenfield runoff). It should be noted that infiltration in extreme wet periods will be less effective than at other times, so infiltration storage should only be used where groundwater levels are known not to rise to the levels of the proposed infiltration units. Although detailed calculations can be carried out to establish the infiltration volumes needed by taking account of infiltration rates of the soil at the site, the soil moisture state during particularly wet periods will tend to be saturated and antecedent conditions may reduce the available storage volume. It is therefore suggested that the volume of storage normally provided as infiltration to meet this criterion is equal to the calculated value of the additional runoff volume. Detailed analysis, if carried out, can reduce this volume by taking into account the infiltration that will take place during the critical duration event.

It is possible that "long term" storage cannot be provided at certain sites. In these situations it is recommended that QBAR is used as the attenuation storage control requirement to ensure sufficient runoff is retained on site for extreme events. This will tend to be a less economic solution, but is the only way to ensure that urban runoff does not exacerbate flooding in a river. Where QBAR is a value which is less than 2 l/s/ha it is recommended that this figure is used to prevent excessive cost. Studies by HR Wallingford "Storage requirements for rainfall runoff from greenfield development sites" SR580 / SR591, 2002 showed that attenuation throttle rates needed to be less than 3 l/s/ha to be effective in limiting discharges to rivers during flooding.

In summary protection against river flooding by the provision of "long term" storage can be catered for in 3 ways:

1. Temporary flood storage spilling excess stormwater runoff to an infiltration area – probably public open space;

2. Provision of infiltration for excess stormwater runoff to come into effect for most or all events;

3. Attenuation storage designed with a limiting discharge throttle rate of QBAR for all extreme events (up to 100 years).

Assessment of the "long term" storage volume is detailed in section 6.7

Appendix E provides a worked example for illustration.

| Criteria | Sub-criterion | Return Period (Years) | Design Objective |
|---|---|---|---|
| Criterion 1<br><br>River water quality protection | 1.1 | <1 | Interception storage of at least 5mm, and preferably 10mm, of rainfall where runoff to the receiving water can be prevented. |
| | 1.2 | <1 | Where initial runoff from at least 5mm of rainfall cannot be intercepted, treatment of runoff (treatment volume) is required.<br><br>Retention pond (if used) to have minimum pool volume equivalent to 15mm rainfall. |
| Criterion 2<br><br>River regime protection | 2.1 | 1 | Discharge rate equal to 1 year greenfield site peak runoff rate or 2l/s/ha, whichever is the greater. Site critical duration storm to be used to assess attenuation storage volume. |
| | 2.2 | 100 | Discharge rate equal to 1 in 100 year greenfield site peak runoff rate. Site critical duration storm to be used to assess attenuation storage volume. |
| Criterion 3<br><br>Level of service (flooding) for the site | 3.1 | 30 | No flooding on site except where specifically planned flooding is approved. Summer design storm of 15 or 30 minutes are normally critical. |
| | 3.2 | 100 | No internal property flooding.<br><br>Planned flood routing and temporary flood storage accommodated on site for short high intensity storms. Site critical duration events. |
| | 3.3 | 100 | No internal property flooding.<br><br>Floor levels at least 500mm above maximum river level and adjacent on-site storage retention. |
| | 3.4 | 100 | No flooding of adjacent urban areas. Overland flooding managed within the development. |

| Criteria | Sub-criterion | Return Period (Years) | Design Objective |
|---|---|---|---|
| Criterion 4<br><br>River flood protection<br><br>(criterion 4.1, or 4.2 or 4.3 to be applied) | 4.1 | 100 | "Long-term" floodwater accommodated on site for development runoff volume which is in excess of the greenfield runoff volume.<br><br>Temporary flood storage drained by infiltration on a designated flooding area brought into operation by extreme events only.<br><br>100 year, 6 hour duration storm to be used for assessment of the additional volume of runoff. |
| | 4.2 | 100 | Infiltration storage provided equal in volume to "long term" storage. Usually designed to operate for all events.<br><br>100year, 6 hour duration storm to be used for assessment of the additional volume of runoff. |
| | 4.3 | 100 | Maximum discharge rate of QBAR or 2 l/s/ha, whichever is the greater, for all attenuation storage where separate "long term" storage cannot be provided. |

***Table 6.3 Criteria for New Development Drainage***

This process should be an integral part of design.

## 6.4 Hydraulic Design of Drainage Components - General

The design of a storm sewer network and determining its performance requires the use of network modelling tools, rainfall information based on the Flood Studies Report (FSR) and detailed network and ground level information. As climate change is now accepted as taking place, a precautionary position has been taken to cater for its effects. Details of these allowances are contained in the Regional Policy on Climate Change.

The design of a stormwater drainage system is expected to involve the use of SuDS. However in nearly all situations, pipes will also be involved to provide much of the conveyance of the runoff. The attenuation aspects of SuDS, together with the perception of possible premature failure of SuDS, need to be taken into consideration in the design of the supporting pipe system. Risk of sewer system failure can be due to:

- Structural failure;
- Pipe sedimentation / blockage;
- Inadequate capacity.

Design of sewers must therefore consider design for:

- Online Review of Infodrainage Software
- Cover to SW pipes
- 2 l/s/ha vs Qbar from GDSDS
- Impact of 2 l/s/ha discharge on development
- Net reduction in discharge post development
- Catchment of existing public road
- Unlined Attenuation justification / Site Investigation

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

## SURVEY NOTES

- TOPOGRAPHICAL SURVEY BASED ON EXISTING LEVELS FROM 3rd PARTY SPECIALIST. DOB & ASSOCIATES TAKES NO RESPONSIBILITY FOR ACCURACY OF SURVEY INFORMATION.
- MAIN CONTRACTOR TO ESTABLISH INDEPENDENTLY ORDANCE DATUM ON SITE FOR LEVELS TO MAILIN HEAD DATUM AND CO-ORDINATES FOR SETTING OUT TO NATIONAL GRID.
- MAIN CONTRACTOR TO VERIFY ALL UNDERGROUND SERVICES ON THE SITE INCLUDING ALL ANOMALIES NOTED ON THE GPR SURVEY AND TO TAKE ALL NECESSARY PRECAUTIONS PRIOR TO ANY EXCAVATIONS ON THE SITE.
- REFER TO M&E ENGINEERS DRAWINGS FOR DIVERSION / DEMOLITION OF ALL UNDERGROUND ELECTRICAL CABLES / DUCTS, TELECOM DUCTS, LIGHTING DUCTS, OIL LINES ETC.

## NOTES:

1. FOR STANDARD DOBA NOTES REFER TO DRAWING 2334-DOB-XX-SI-DR-S-0001 & S-0002
2. REFER TO ARCHITECTS DRAWINGS FOR ALL SITE & APPLICATION BOUNDARIES
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4. USE FIGURED DIMENSIONS ONLY. DO NOT SCALE
5. REFER TO SURVEY DRAWINGS FOR EXISTING SERVICES LAYOUTS AND MANHOLE INFORMATION
6. ALL EXISTING SURFACES TO BE REINSTATED FOLLOWING DIVERSION OF SERVICES/CONSTRUCTION OF NEW SERVICES
7. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND LEVELS WITH ARCHITECTURAL DRAWINGS PRIOR TO START OF CONSTRUCTION. ANY DISCREPANCIES TO BE NOTIFIED TO THE ENGINEER & ARCHITECT FOR RESOLUTION
8. CONTRACTOR TO ENSURE ALL WATER & WASTEWATER RELATED WORKS ARE IN ACCORDANCE WITH THE IRISH WATER WATER INFRASTRUCTURE & WASTEWATER INFRASTRUCTURE CODE OF PRACTICE & STANDARD DETAILS DOCUMENTS
9. TESTING OF ALL GRAVITY SEWERS AND MANHOLES TO BE IN ACCORDANCE WITH IRISH WATER CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE SECTION 4.10 TESTING OF GRAVITY SEWERS & MANHOLES

## SURFACE WATER LEGEND:

- EX. SURFACE WATER SEWER
- SMH — EX. SURFACE WATER MANHOLE
- SIC — EX. SURFACE WATER INSPECTION CHAMBER
- EX. WATER COURSE
- EX. SURFACE WATER SEWER TO BE DECOMMISSIONED
- PR. SURFACE WATER SEWER
- SMH — PR. SURFACE WATER MANHOLE
- SIC — PR. SURFACE WATER INSPECTION CHAMBER
- SAJ — PR. SURFACE WATER ACCESS JUNCTION
- PR. ROAD GULLY
- PR. ATTENUATION TANK
- PR. PERMEABLE PAVING
- PR. FILTER DRAIN
- PR. DRAINAGE CHANNEL
- PR. BIORETENTION AREA/SWALE
- P. INT — PR. PETROL INTERCEPTOR
- PR. TREE PIT DISCHARGING TO MAIN SW DRAINAGE
- PROPOSED SOAKAWAY

## CATCHMENT LEGEND:

- SUB-CATCHMENT 1
- SUB-CATCHMENT 2
- SUB-CATCHMENT 3
- SUB-CATCHMENT 4
- SUB-CATCHMENT 5

NOTE 1: MANHOLE COVER LEVELS ARE APPROXIMATE. ACTUAL COVER LEVELS SHOULD MATCH SURROUNDING FINISHED GROUND LEVELS U.N.O.

NOTE 2: PIPES WITH LESS COVER THAN
- 600mm FOR GRASSED AREAS
- 900mm FOR FOOTPATHS
- 1200mm FOR ROADS

TO BE SURROUNDED IN 150mm CONCRETE PROTECTION IN ACCORDANCE WITH IRISH WATER STANDARD DETAIL STD-WW-07

NOTE 3: ALL MANHOLE COVERS LOCATED IN GRASS AREAS TO BE SURROUNDED (Min. 200mm SURROUND) IN 100mm THK C20/25 CONCRETE APRON

## SURFACE WATER MATERIAL TO BE IN ACCORDANCE WITH GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS

- UNPLASTICISED P.V.C. PIPES MUST COMPLY WITH THE "PROVISIONAL SPECIFICATION FOR SOIL PIPES, DRAINS, SEWERS & FITTINGS MADE OF UNPLASTICISED P.V.C." ISSUED BY THE DEPARTMENT OF THE ENVIRONMENT.
- B.S. 8005: PART 1 - SEWERAGE OR EQUIVALENT;
- B.S. 8010: PART 2 - PIPELINES ON LAND OR EQUIVALENT: DESIGN, CONSTRUCTION & INSTALLATION;
- B.S. 5955: PART 6 CODE OF PRACTICE FOR THE INSTALLATION OF UNPLASTICISED P.V.C. PIPEWORK FOR GRAVITY DRAINS & SEWERS OR EQUIVALENT
- EN1401 - UNPLASTICISED P.V.C. SEWER PIPE SPECIFICATION
- B.S.4514 - UNPLASTICISED P.V.C. SOIL PIPE SPECIFICATION
- DoEHLG 'SITE DEVELOPMENT WORKS' & SECTION H OF THE BUILDING REGULATIONS

### SURFACE WATER DRAINAGE MANHOLE SCHEDULE

| REF: | CL: | IL: | NOTES: |
|---|---|---|---|
| SMH 1.00 | 79.978 | 78.455 | |
| SMH 1.01 | 80.467 | 78.396 | |
| SMH 1.02 | 80.067 | 78.061 | |
| SMH 1.03 | 80.273 | 78.001 | |
| SMH 1.04 | 80.291 | 77.950 | |
| SMH 1.05 | 80.375 | 77.921 | B.D. FROM SMH2.04 @ 78.916 |
| SMH 1.06 | 79.923 | 77.824 | |
| SMH 1.07 | 79.566 | 77.775 | |
| SMH 1.08 | 79.400 | 77.727 | |
| SMH 1.09 | 79.500 | 77.563 | |
| SMH 1.10 | 79.500 | 77.509 | |
| SMH 1.11 | 79.992 | 77.305 | B.D. FROM SMH5.04 @ 78.417 |
| SMH 1.12 | 79.654 | 77.207 | |
| SMH 1.13 | 79.430 | 76.995 | B.D. FROM SMH7.07 @ 78.018 |
| SMH 1.14 | 79.450 | 76.959 | |
| SMH 1.15 | 79.335 | 76.894 | |
| SMH 1.16 | 79.616 | 76.701 | |
| SMH 1.17 | 78.614 | 76.656 | |
| SMH 1.18 | 78.493 | 76.594 | |
| SMH 1.19 | 78.734 | 76.554 | B.D. FROM SMH9.02 @ 77.443 |
| SMH 1.20 | 78.538 | 76.517 | |
| SMH 1.21 | 78.500 | 76.473 | |
| SMH 1.22 | 78.700 | 76.420 | |
| SMH 1.23 | 78.261 | 76.297 | |
| SMH 1.24 | 77.530 | 76.209 | |
| HEADWALL | 77.530 | 76.200 | |
| SMH 2.00 | 81.437 | 80.037 | |
| SMH 2.01 | 81.583 | 79.949 | |
| SMH 2.02 | 81.830 | 79.797 | B.D. FROM SMH4.00 @ 80.345 |
| SMH 2.03 | 81.401 | 79.142 | B.D. FROM SMH2.03 @ 79.720 |
| SMH 2.04 | 80.821 | 79.022 | |
| SMH 3.00 | 79.564 | 78.139 | |
| SMH 4.00 | 81.954 | 80.429 | |
| SMH 5.00 | 82.186 | 80.209 | |
| SMH 5.01 | 81.708 | 80.076 | |
| SMH 5.02 | 81.319 | 79.466 | B.D. FROM SMH5.01 @ 79.958 |
| SMH 5.03 | 81.288 | 78.672 | |
| SMH 5.04 | 80.640 | 78.543 | B.D. FROM SMH5.03 @ 79.318 |
| SMH 6.00 | 79.025 | 77.468 | |
| SMH 6.01 | 79.354 | 77.369 | |
| SMH 6.02 | 79.612 | 77.251 | |
| SMH 7.00 | 82.102 | 79.815 | |
| SMH 7.01 | 81.806 | 79.702 | |
| SMH 7.02 | 81.573 | 79.586 | |
| SMH 7.03 | 81.505 | 79.568 | |
| SMH 7.04 | 80.977 | 78.893 | B.D. FROM SMH7.03 @ 79.435 |
| SMH 7.05 | 80.567 | 78.787 | |
| SMH 7.06 | 80.479 | 78.265 | B.D. FROM SMH7.05 @ 78.768 |
| SMH 7.07 | 79.712 | 78.093 | |
| SMH 8.00 | 78.473 | 77.075 | |
| SMH 8.01 | 78.969 | 76.973 | |
| SMH 8.02 | 78.896 | 76.880 | |
| SMH 8.03 | 78.681 | 76.770 | |
| SMH 9.00 | 81.520 | 79.789 | |
| SMH 9.01 | 81.012 | 79.012 | B.D. FROM SMH9.00 @ 79.642 |
| SMH 9.02 | 80.179 | 77.807 | B.D. FROM SMH9.01 @ 78.722 |
| SMH 10.00 | 78.145 | 76.659 | |
| SMH 11.00 | 75.200 | 74.070 | |

REFER TO SHEET 2

ISSUED FOR PLANNING

| Rev. | Note | Date | Drawn | Check |
|---|---|---|---|---|
| S2.P04 | ISSUED FOR INFORMATION | 10.05.2024 | EC | AL |
| S2.P03 | ISSUED FOR LRD OPINION | 27.03.2024 | NQ | AL |
| S2.P02 | DRAFT ISSUE | 21.03.2024 | NQ | AL |
| S2.P01 | DRAFT ISSUE | 14.03.2024 | NQ | AL |

DONNACHADH O'BRIEN & ASSOCIATES CONSULTING ENGINEERS
UNIT 5C ELM HOUSE MILLENNIUM PARK NAAS CO. KILDARE
P +353 45 984 042
INFO@DOBA.IE WWW.DOBA.IE

| | |
|---|---|
| Client: | MARSHALL YARDS DEVELOPMENT COMPANY LTD. |
| Project: | RESIDENTIAL DEVELOPMENT AT RATOATH, CO. MEATH |
| Drawing Title: | PROPOSED SURFACE WATER DRAINAGE LAYOUT - SHEET 1 |

| Drawn By: | Checked By: | Approved By: | Date: | Scale: | Sheet Size: |
|---|---|---|---|---|---|
| RR | PD | DOB | MARCH 2023 | 1:500 | A0 |

| Project Number: | Drawing Number: | Status Code: | Rev Number: |
|---|---|---|---|
| DOBA2334 | 2334-DOB-XX-SI-DR-C-0201 | S2 | P04 |

- Online Review of Infodrainage Software
- Cover to SW pipes
- 2 l/s/ha vs Qbar from GDSDS
- Impact of 2 l/s/ha discharge on development
- Net reduction in discharge post development
- Catchment of existing public road
- Unlined Attenuation justification / Site Investigation

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

Existing Road Area

| Storm Event | Connection Type | Upstream Cover Elevation (m) | Max. US Water Elevation (m) | Max. Flow Depth (m) | Discharge Volume (m³) | Max. Velocity (m/s) | Flow / Capacity | Max. Flow (L/s) | Status |
|---|---|---|---|---|---|---|---|---|---|
| FSR: 1 years: +0 %: 15 mins: Winter | Pipe | 78.734 | 77.363 | 0.110 | 11.633 | 1.0 | 0.28 | 22.5 | OK |
| FSR: 5 years: +0 %: 15 mins: Winter | Pipe | 78.734 | 77.393 | 0.140 | 17.607 | 1.1 | 0.43 | 34.3 | OK |
| FSR: 30 years: +0 %: 15 mins: Winter | Pipe | 78.734 | 77.433 | 0.177 | 25.801 | 1.2 | 0.63 | 50.4 | OK |
| FSR: 100 years: +0 %: 15 mins: Winter | Pipe | 78.734 | 77.471 | 0.212 | 33.379 | 1.2 | 0.81 | 65.1 | OK |

Existing Site Area

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

Project *Ratoath*
Project No *DOBA2334*
Title: *Existing*
Calcs By *EC* Date: 29/01/2024

***PRELIMINARY SURFACE WATER STORAGE ESTIMATE (NO LONG TERM STORAGE)***

**Catchment Characteristics** Greenfield Runoff Flows (Sites < 50 Ha) denotes Input Value

| | | | |
|---|---|---|---|
| Standard Average Annual Rainfal (SAAR) = | 846 | mm | |
| Soil Index = | 0.45 | | |
| Total Site Area = | 3.4780 | Hectares (ha) | |
| Storm Return Period = | 100 | Years | |
| Permissible Outflow per hectare, QBAR = | 5.5 | l/s/ha | |
| * Total Permissible Outflow= | 19.07 | l/s | |
| Outflow limited to greater of QBAR and 2l/s | 19.07 | l/s | |
| Proposed Impermeable Area: | | | |
| Hardstanding | 0.0000 | ha | @ 80 % Impermeable |
| Roofs | 0.0000 | ha | @ 95 % Impermeable |
| Proposed Open Space | 3.4780 | ha | @ 40 % Impermeable |

Soil Classification for Runoff Potential
*Based on FSR Maps*

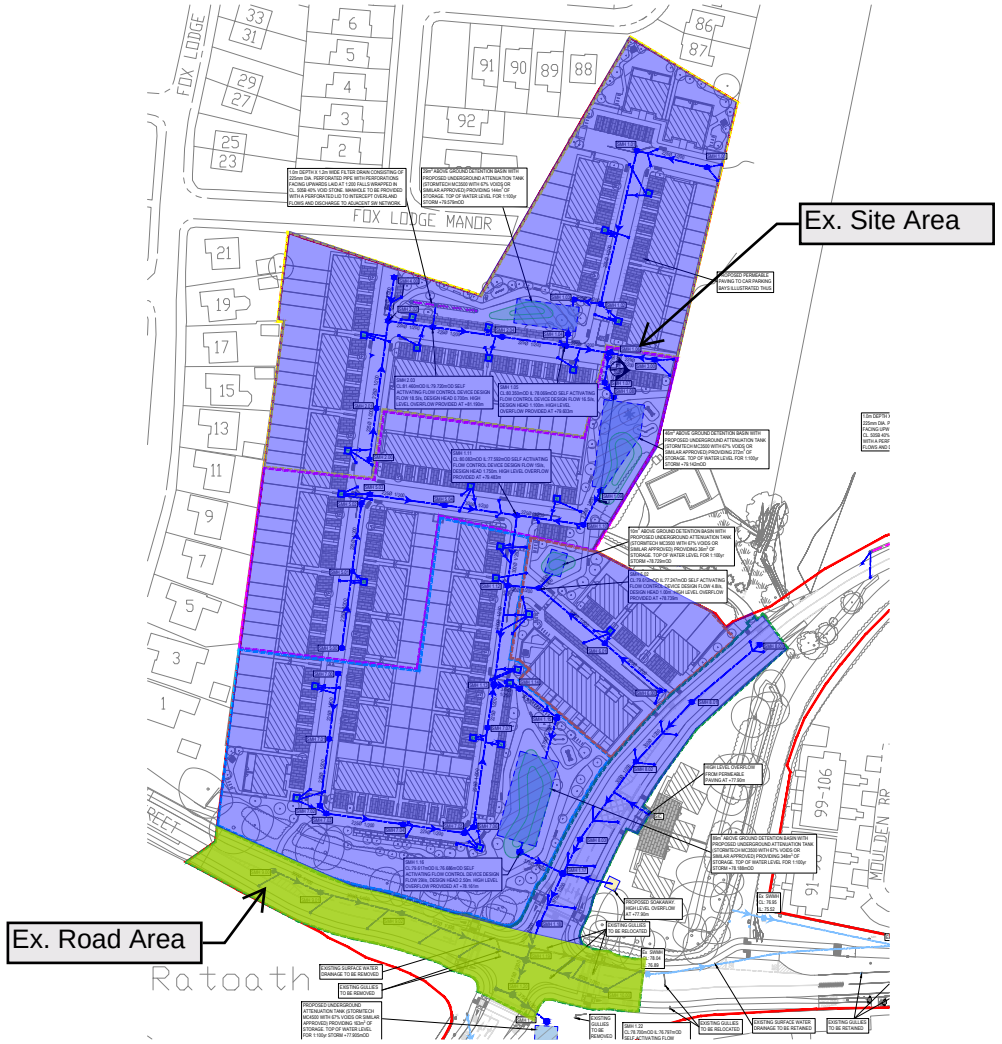
| | | |
|---|---|---|
| Soil 1 | 0 | % |
| Soil 2 | 0 | % |
| Soil 3 | 0 | % |
| Soil 4 | 100 | % |
| Soil 5 | 0 | % |

Infiltration

Pre Dev. Discharge = 22.5 + 19.07
= 41.57l/s

Post Dev. Discharge = 19.88 l/s

REDUCTION = 21.69 l/s



- Online Review of Infodrainage Software
- Cover to SW pipes
- 2 l/s/ha vs Qbar from GDSDS
- Impact of 2 l/s/ha discharge on development
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DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

# 24972 - Residential Development at Ratoath

Exploratory Hole Location Plan - DWG01

**Legend**

- Cable Percussion Borehole
- Dynamic Probe
- Trial Pit
- Trial Pit w/ Soakaway Test (to BRE365)
- Trial Pit w/ CBR

| Exploratory Hole No. | Water Struck **m bgl** | Stratum Description | Rate of Flow | Remarks / Stratum of water ingress (m OD) |
|---|---|---|---|---|
| BH02 | **8.40** | Very stiff black slightly sandy very gravelly silty CLAY with some cobbles and occasional boulders | Rapid – water rose to **6.80m** in 20min | Water was noted at **6.70m** bgl in the borehole upon removal of the drill casing (28-09-23) |

DP01
TP/CBR01
BH01
DP02
TP04
DP03
TP03/CBR02
TP/SA02
BH02

WATER LEVEL IDENTIFIED AFTER CASING REMOVED @ +74.93m

Google Earth



N

80 m

# 24972 - Residential Development at Ratoath

Exploratory Hole Location Plan - DWG02

**Legend**

- Cable Percussion Borehole
- Dynamic Probe
- Trial Pit
- Trial Pit w/ Soakaway Test (to BRE365)
- Trial Pit w/ CBR


| | | | | |
|---|---|---|---|---|
| BH05 | - | - | - | Water was noted at **2.80m** bgl in the borehole upon removal of the drill casing (04-10-23) |

N

0 5 10 15 20 25 m
SCALE 1:500 @ A0

## SURVEY NOTES

- TOPOGRAPHICAL SURVEY BASED ON EXISTING LEVELS FROM 3rd PARTY SPECIALIST.. DOB & ASSOCIATES TAKES NO RESPONSIBILITY FOR ACCURACY OF SURVEY INFORMATION.
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9. TESTING OF ALL GRAVITY SEWERS AND MANHOLES TO BE IN ACCORDANCE WITH IRISH WATER CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE SECTION 4.10 TESTING OF GRAVITY SEWERS & MANHOLES

## SURFACE WATER LEGEND:

- EX. SURFACE WATER SEWER
- SMH — EX. SURFACE WATER MANHOLE
- SIC — EX. SURFACE WATER INSPECTION CHAMBER
- EX. WATER COURSE
- EX. SURFACE WATER SEWER TO BE DECOMMISSIONED
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- PR. PERMEABLE PAVING
- PR. FILTER DRAIN
- PR. DRAINAGE CHANNEL
- PR. BIORETENTION AREA/SWALE
- P. INT — PR. PETROL INTERCEPTOR
- PR. TREE PIT DISCHARGING TO MAIN SW DRAINAGE
- PROPOSED SOAKAWAY

## CATCHMENT LEGEND:

- CATCHMENT BOUNDARY
- CATCHMENT 1
- CATCHMENT 2
- CATCHMENT 3
- CATCHMENT 4
- CATCHMENT 5

- DoEHLG 'SITE DEVELOPMENT WORKS' & SECTION H OF THE BUILDING REGULATIONS

### TRIAL PIT RECORD

REPORT NUMBER 24972

CONTRACT: Residential Development at Ratoath
TRIAL PIT NO.: TP02 | SHEET: Sheet 1 of 1
LOGGED BY: OK | CO-ORDINATES: 702,765.87 E 751,828.06 N | DATE STARTED: 12/10/2023 | DATE COMPLETED: 12/10/2023
CLIENT: Glenveagh Homes | GROUND LEVEL (m): 80.73 | EXCAVATION METHOD: JCB 8ton
ENGINEER: DOBA

| Geotechnical Description | Legend | Depth (m) | Elevation | Water Strike | Sample Ref | Type | Depth | Vane Test (KPa) | Hand Penetrometer (KPa) |
|---|---|---|---|---|---|---|---|---|---|
| TOPSOIL: Soft brown sandy gravelly CLAY with rootlets and a low cobble content. Sand is fine to medium. Gravel is subangular to subrounded medium to coarse. Cobbles are subangular to subrounded. | | 0.20 | 80.53 | | | | | | |
| Soft to firm brown slightly sandy gravelly CLAY with a medium cobble content and a low boulder content. Sand is fine. Gravel is subrounded to rounded medium to coarse. Cobbles are subrounded to rounded. Boulders are angular to subrounded. | | 0.70 | 80.03 | | AA191079 | B | 0.60-0.70 | | |
| Firm to stiff brown slightly sandy gravelly CLAY with a medium cobble content and a low boulder content. Sand is fine. Gravel is subrounded to rounded medium to coarse. Cobbles are subrounded to rounded. Boulders are angular to subrounded. | | | | | | | | | |
| Stiff brownish grey slightly sandy gravelly CLAY with a high cobble content and a low boulder content. Sand is fine. Gravel is subrounded to rounded fine to coarse. Cobbles are angular to subrounded. Boulders are angular to subrounded (up to 400mm). | | 2.10 | 78.63 | | AA191080 | B | 1.90-2.20 | | |
| Stiff dark grey slightly sandy gravelly CLAY with a high cobble content and a medium bouder content. Sand is fine. Gravel is subrounded to rounded medium to coarse. Cobbles are angular to subrounded. Boulders are subrounded to rounded (up to 400mm). | | 2.90 | 77.83 | | AA191081 | B | 2.90-3.20 | | |
| End of Trial Pit at 3.30m | | 3.30 | 77.43 | | | | | | |

Groundwater Conditions: Dry
Stability: Good
General Remarks:

1.0m DEPTH X 1.2m W… 225mm DIA. PERFOR… FACING UPWARDS … CL. 505B 40% VOID S… WITH A PERFORATE… FLOWS AND DISCHA… TANK … yr

### TRIAL PIT RECORD

REPORT NUMBER 24972

CONTRACT: Residential Development at Ratoath
TRIAL PIT NO.: TP10 | SHEET: Sheet 1 of 1
LOGGED BY: OK | CO-ORDINATES: 702,753.00 E 751,673.00 N | DATE STARTED: 13/10/2023 | DATE COMPLETED: 13/10/2023
CLIENT: Glenveagh Homes | GROUND LEVEL (m): | EXCAVATION METHOD: JCB 8ton
ENGINEER: DOBA

| Geotechnical Description | Legend | Depth (m) | Elevation | Water Strike | Sample Ref | Type | Depth | Vane Test (KPa) | Hand Penetrometer (KPa) |
|---|---|---|---|---|---|---|---|---|---|
| TOPSOIL: Soft brown sandy gravelly CLAY with rootlets and a low cobble content. Sand is fine to medium. Gravel is subangular to subrounded medium to coarse. Cobbles are subangular to subrounded. | | 0.20 | | | | | | | |
| Soft and soft to firm brown sandy gravelly CLAY. Sand is fine. Gravel is angular to subrounded medium to coarse. | | 0.65 | | | | | | | |
| Firm to stiff brown sandy gravelly CLAY with a high cobble content and a low boulder content. Sand is fine. Gravel is angular to subrounded medium to coarse. Cobbles are angular to subrounded. Boulders are angular to subrounded. | | | | | AA191092 | B | 0.70-0.80 | | |
| | | | | | AA191093 | B | 1.50-1.60 | | |
| Stiff becoming very stiff brown sandy gravelly CLAY with a high cobble content and a low boulder content. Sand is fine. Gravel is angular to subrounded medium to coarse. Cobbles are angular to subrounded. Boulders are angular to subrounded. | | 1.75 | | | AA191094 | B | 2.10-2.20 | | |
| Obstruction<br>End of Trial Pit at 2.40m | | 2.40 | | | | | | | |

Groundwater Conditions: Dry
Stability: Good
General Remarks: Pit ended on obstruction / possible rockhead

### TRIAL PIT RECORD

REPORT NUMBER 24972

CONTRACT: Residential Development at Ratoath
TRIAL PIT NO.: TP05 | SHEET: Sheet 1 of 1
LOGGED BY: OK | CO-ORDINATES: 702,761.83 E 751,752.13 N | DATE STARTED: 13/10/2023 | DATE COMPLETED: 13/10/2023
CLIENT: Glenveagh Homes | GROUND LEVEL (m): | EXCAVATION METHOD: JCB 8ton
ENGINEER: DOBA

| Geotechnical Description | Legend | Depth (m) | Elevation | Water Strike | Sample Ref | Type | Depth | Vane Test (KPa) | Hand Penetrometer (KPa) |
|---|---|---|---|---|---|---|---|---|---|
| TOPSOIL: Soft brown sandy gravelly CLAY with rootlets and a low cobble content. Sand is fine to medium. Gravel is subangular to subrounded medium to coarse. Cobbles are subangular to subrounded.<br>Firm to stiff brown slightly sandy gravelly CLAY with a high cobble content and a low boulder content. Sand is fine. Gravel is angular to subangular medium to coarse. Cobbles are angular to subangular. Boulders are angular to subrounded. | | 0.25 | | | AA191089 | B | 0.60-0.70 | | |
| Stiff brownish grey slightly sandy gravelly CLAY with a high cobble content and a low boulder content. Sand is fine. Gravel is angular to subangular medium to coarse. Cobbles are angular to subrounded. Boulders are angular to subrounded (up to 350mm). | | 2.00 | | | AA191090 | B | 2.20-2.30 | | |
| Stiff and very stiff dark grey slightly sandy gravelly CLAY with a high cobble content and a low boulder content. Sand is fine to medium. Gravel is is subangular to angular. Cobbles are angular to subangular. Boulders are subangular to rounded (up to 450mm). | | 2.90 | | | AA191091 | B | 3.10-3.20 | | |
| End of Trial Pit at 3.40m | | 3.40 | | | | | | | |

Groundwater Conditions: Dry
Stability: Good
General Remarks:

### GEOTECHNICAL BORING RECORD

REPORT NUMBER 24972

CONTRACT: Ratoath Housing Development , Co.Meath
BOREHOLE NO.: BH04 | SHEET: Sheet 1 of 1
CO-ORDINATES: 702,686.00 E 751,692.00 N | RIG TYPE: Dando 2000 | BOREHOLE DIAMETER (mm): 200 | BOREHOLE DEPTH (m): 4.90 | DATE COMMENCED: 29/09/2023 | DATE COMPLETED: 29/09/2023
GROUND LEVEL (m AOD):
CLIENT: Glenveagh | SPT HAMMER REF. NO.: SA7 | ENERGY RATIO (%): 74.07 | BORED BY: DT | PROCESSED BY: F.C
ENGINEER: DOBA

| Depth (m) | Description | Legend | Elevation | Depth (m) | Sample Ref | Sample Type | Depth (m) | Recovery | Field Test Results | Standpipe Details |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | TOPSOIL | | | 0.20 | | | | | | |
| 1 | Soft to firm mottled brown sandy slightly gravelly SILT/CLAY | | | 1.60 | AA204460 | B | 1.00 | | N = 10 (1, 2, 2, 2, 3, 3) | |
| 2 | Stiff grey sandy gravelly SILT/CLAY with occasional cobbles | | | 2.50 | AA204461 | B | 2.00 | | N = 19 (2, 3, 4, 5, 5, 5) | |
| 3 | Stiff to very stiff black sandy gravelly CLAY with some cobbles | | | | AA204462 | B | 3.00 | | N = 24 (4, 5, 5, 6, 6, 7) | |
| 4 | | | | | AA204463 | B | 4.00 | | N = 50/150 mm (17, 8, 25, 25) | |
| 5 | Obstruction<br>End of Borehole at 4.90 m | | | 4.90 | | | | | N = 50/75 mm (25, 50) | |

HARD STRATA BORING/CHISELLING

| From (m) | To (m) | Time (h) | Comments |
|---|---|---|---|
| 4.1 | 4.2 | 1 | |
| 4.8 | 4.9 | 1.5 | |

WATER STRIKE DETAILS

| Water Strike | Casing Depth | Sealed At | Rise To | Time (min) | Comments |
|---|---|---|---|---|---|
| | | | | | No water strike |

INSTALLATION DETAILS

| Date | Tip Depth | RZ Top | RZ Base | Type |
|---|---|---|---|---|
| | | | | |

GROUNDWATER PROGRESS

| Date | Hole Depth | Casing Depth | Depth to Water | Comments |
|---|---|---|---|---|
| | | | | |

REMARKS: Tractor required to move rig due to very wet ground conditions.CAT scanned location and hand dug inspection pit carried out.

Sample Legend: D - Small Disturbed (tub); B - Bulk Disturbed; LB - Large Bulk Disturbed; Env - Environmental Sample (Jar + Vial + Tub); UT - Undisturbed 100mm Diameter Sample; P - Undisturbed Piston Sample; W - Water Sample

### GEOTECHNICAL BORING RECORD

REPORT NUMBER 24972

CONTRACT: Ratoath Housing Development , Co.Meath
BOREHOLE NO.: BH03 | SHEET: Sheet 1 of 1
CO-ORDINATES: 702,778.00 E 751,706.00 N | RIG TYPE: Dando 2000 | BOREHOLE DIAMETER (mm): 200 | BOREHOLE DEPTH (m): 3.40 | DATE COMMENCED: 02/10/2023 | DATE COMPLETED: 03/10/2023
GROUND LEVEL (m AOD):
CLIENT: Glenveagh | SPT HAMMER REF. NO.: SA7 | ENERGY RATIO (%): 74.07 | BORED BY: DT | PROCESSED BY: F.C
ENGINEER: DOBA

| Depth (m) | Description | Legend | Elevation | Depth (m) | Ref. Number | Sample Type | Depth (m) | Recovery | Field Test Results | Standpipe Details |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | TOPSOIL | | | 0.20 | | | | | | |
| 1 | Soft mottled brown sandy slightly gravelly SILT/CLAY | | | 1.40 | AA204465 | B | 1.00 | | N = 7 (0, 2, 2, 1, 2, 2) | |
| 2 | Very stiff grey/brown sandy gravelly CLAY and occasional cobbles | | | 2.30 | AA204466 | B | 2.00 | | N = 48 (5, 4, 5, 4, 8, 31) | |
| 3 | Dense grey clayey/silty sandy fine to coarse angular GRAVEL with occasional cobbles | | | 3.40 | AA204467 | B | 3.00 | | N = 50/75 mm (25, 50)<br>N = 50/75 mm (25, 50) | |
| 4 | Obstruction<br>End of Borehole at 3.40 m | | | | | | | | | |

HARD STRATA BORING/CHISELLING

| From (m) | To (m) | Time (h) | Comments |
|---|---|---|---|
| 3 | 3.1 | 0.5 | |
| 3.3 | 3.4 | 1.5 | |

WATER STRIKE DETAILS

| Water Strike | Casing Depth | Sealed At | Rise To | Time (min) | Comments |
|---|---|---|---|---|---|
| 2.40 | 2.40 | No | 2.10 | 20 | Slow |

GROUNDWATER PROGRESS

INSTALLATION DETAILS

| Date | Tip Depth | RZ Top | RZ Base | Type |
|---|---|---|---|---|
| 03-10-23 | 3.40 | 1.00 | 3.40 | 50mm SP |

| Date | Hole Depth | Casing Depth | Depth to Water | Comments |
|---|---|---|---|---|
| 03-10-23 | 3.40 | Nil | 2.20 | End of BH |

REMARKS: Tractor required to move rig due to very wet ground conditions.CAT scanned location and hand dug inspection pit carried out.

Sample Legend: D - Small Disturbed (tub); B - Bulk Disturbed; LB - Large Bulk Disturbed; Env - Environmental Sample (Jar + Vial + Tub); UT - Undisturbed 100mm Diameter Sample; P - Undisturbed Piston Sample; W - Water Sample

### TRIAL PIT RECORD

REPORT NUMBER 24972

CONTRACT: Residential Development at Ratoath
TRIAL PIT NO.: TP12 | SHEET: Sheet 1 of 1
LOGGED BY: OK | CO-ORDINATES: 702,772.00 E 751,636.00 N | DATE STARTED: 16/10/2023 | DATE COMPLETED: 16/10/2023
CLIENT: Glenveagh Homes | GROUND LEVEL (m): | EXCAVATION METHOD: JCB 8ton
ENGINEER: DOBA

| Geotechnical Description | Legend | Depth (m) | Elevation | Water Strike | Sample Ref | Type | Depth | Vane Test (KPa) | Hand Penetrometer (KPa) |
|---|---|---|---|---|---|---|---|---|---|
| TOPSOIL: Soft brown sandy gravelly CLAY with rootlets and a low cobble content. Sand is fine to medium. Gravel is subangular to subrounded medium to coarse. Cobbles are subangular to subrounded.<br>Firm occaisonally firm to stiff brown sandy gravelly CLAY with a high cobble content and a low boulder content. Sand is fine. Gravel is angular to subangular medium to coarse. Cobbles are angular to subangular. Boulders are angular to subangular (up to 450mm). | | 0.20 | | | AA192351 | B | 0.70-0.80 | | |
| Stiff light brown to brown sandy gravelly CLAY with a high cobble content and a low boulder content. Sand is fine to medium. Gravel is angular to subangular medium to coarse. Cobbles are angular to subangular. Boulders are angular to subangular. | | 1.80 | | | AA192352 | B | 1.90-2.10 | | |
| Obstruction<br>End of Trial Pit at 2.20m | | 2.20 | | | | | | | |

Groundwater Conditions: Dry
Stability: Good
General Remarks: Pit ended on obstruction / possible rockhead

### GEOTECHNICAL BORING RECORD

REPORT NUMBER 24972

CONTRACT: Ratoath Housing Development , Co.Meath
BOREHOLE NO.: BH05 | SHEET: Sheet 1 of 1
CO-ORDINATES: 702,819.33 E 751,646.87 N | RIG TYPE: Dando 2000 | BOREHOLE DIAMETER (mm): 200 | BOREHOLE DEPTH (m): 3.20 | DATE COMMENCED: 04/10/2023 | DATE COMPLETED: 04/10/2023
GROUND LEVEL (m AOD): 77.75
CLIENT: Glenveagh | SPT HAMMER REF. NO.: SA7 | ENERGY RATIO (%): 74.07 | BORED BY: DT | PROCESSED BY: F.C
ENGINEER: DOBA

| Depth (m) | Description | Legend | Elevation | Depth (m) | Ref. Number | Sample Type | Depth (m) | Recovery | Field Test Results | Standpipe Details |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | TOPSOIL | | 77.55 | 0.20 | | | | | | |
| 1 | Soft to firm mottled brown sandy gravelly CLAY | | | | AA204468 | B | 0.50 | | | |
| | | | | | AA204469 | U | 1.00 | 100%rec 20 blows | N = 7 (1, 2, 1, 2, 2, 2) | |
| 2 | Stiff grey/brown sandy gravelly SILT/CLAY with occasional cobbles | | 76.45 | 1.30 | AA204470 | B | 1.50 | | | |
| | | | | | AA204471 | B | 2.00 | | N = 25 (2, 3, 5, 7, 8, 5) | |
| 3 | Dense grey fine to coarse angular GRAVEL with occasional cobbles | | 74.75 | 3.00 | AA204472 | B | 3.00 | | N = 50/75 mm (25, 50) | |
| 4 | Obstruction<br>End of Borehole at 3.20 m | | 74.55 | 3.20 | | | | | | |

| | | | | |
|---|---|---|---|---|
| BH05 | - | - | - | Water was noted at **2.80m** bgl in the borehole upon removal of the drill casing (04-10-23) |

HARD STRATA BORING/CHISELLING

| From (m) | To (m) | Time (h) | Comments |
|---|---|---|---|
| 2 | 2.7 | 2 | |
| 3 | 3.2 | 1.5 | |

WATER STRIKE DETAILS

| Water Strike | Casing Depth | Sealed At | Rise To | Time (min) | Comments |
|---|---|---|---|---|---|
| | | | | | No water strike |

GROUNDWATER PROGRESS

INSTALLATION DETAILS

| Date | Tip Depth | RZ Top | RZ Base | Type |
|---|---|---|---|---|
| 04-10-23 | 3.20 | Nil | 2.80 | End of BH |

REMARKS: Tractor required to move rig due to very wet ground conditions.CAT scanned location and hand dug inspection pit carried out.

Sample Legend: D - Small Disturbed (tub); B - Bulk Disturbed; LB - Large Bulk Disturbed; Env - Environmental Sample (Jar + Vial + Tub); UT - Undisturbed 100mm Diameter Sample; P - Undisturbed Piston Sample; W - Water Sample

REFER TO …

### SURFACE WATER DRAINAGE MANHOLE SCHEDULE

| REF: | CL: | IL: | NOTES: |
|---|---|---|---|
| SMH 1.00 | 79.978 | 78.455 | |
| SMH 1.01 | 80.467 | 78.331 | |
| SMH 1.02 | 80.067 | 78.061 | |
| SMH 1.03 | 80.273 | 78.001 | |
| SMH 1.04 | 80.291 | 77.950 | |
| SMH 1.05 | 80.375 | 77.921 | B.D. FROM SMH2.04 @ 78.916 |
| SMH 1.06 | 79.923 | 77.824 | |
| SMH 1.07 | 79.566 | 77.775 | |
| SMH 1.08 | 79.400 | 77.727 | |
| SMH 1.09 | 79.500 | 77.563 | |
| SMH 1.10 | 79.500 | 77.509 | |
| SMH 1.11 | 79.992 | 77.305 | B.D. FROM SMH5.04 @ 78.417 |
| SMH 1.12 | 79.654 | 77.207 | |
| SMH 1.13 | 79.430 | 76.995 | B.D. FROM SMH7.07 @ 78.018 |
| SMH 1.14 | 79.450 | 76.959 | |
| SMH 1.15 | 79.335 | 76.894 | |
| SMH 1.16 | 79.616 | 76.701 | |
| SMH 1.17 | 78.614 | 76.656 | |
| SMH 1.18 | 78.493 | 76.594 | |
| SMH 1.19 | 78.734 | 76.556 | B.D. FROM SMH9.02 @ 77.443 |
| SMH 1.20 | 78.538 | 76.517 | |
| SMH 1.21 | 78.500 | 76.473 | |
| SMH 1.22 | 78.700 | 76.420 | |
| SMH 1.23 | 78.261 | 76.297 | |
| SMH 1.24 | 77.530 | 76.209 | |
| HEADWALL | 77.530 | 76.200 | |
| SMH 2.00 | 81.437 | 80.037 | |
| SMH 2.01 | 81.583 | 79.949 | |
| SMH 2.02 | 81.830 | 79.797 | B.D. FROM SMH4.00 @ 80.345 |
| SMH 2.03 | 81.401 | 79.720 | |
| SMH 2.04 | 80.821 | 79.022 | B.D. FROM SMH2.03 @ 79.600 |
| SMH 3.00 | 79.564 | 78.139 | |
| SMH 4.00 | 81.954 | 80.429 | |
| SMH 5.00 | 82.186 | 80.209 | |
| SMH 5.01 | 81.708 | 80.076 | |
| SMH 5.02 | 81.319 | 79.468 | B.D. FROM SMH5.01 @ 79.958 |
| SMH 5.03 | 81.288 | 79.447 | |
| SMH 5.04 | 80.640 | 78.543 | B.D. FROM SMH5.03 @ 79.318 |
| SMH 6.00 | 79.025 | 77.468 | |
| SMH 6.01 | 79.354 | 77.369 | |
| SMH 6.02 | 79.612 | 77.251 | |
| SMH 7.00 | 82.102 | 79.815 | |
| SMH 7.01 | 81.806 | 79.702 | |
| SMH 7.02 | 81.573 | 79.586 | |
| SMH 7.03 | 81.505 | 79.568 | |
| SMH 7.04 | 80.977 | 78.893 | B.D. FROM SMH7.03 @ 79.435 |
| SMH 7.05 | 80.567 | 78.787 | |
| SMH 7.06 | 80.479 | 78.265 | B.D. FROM SMH7.05 @ 78.768 |
| SMH 7.07 | 79.712 | 78.093 | |
| SMH 8.00 | 78.473 | 77.075 | |
| SMH 8.01 | 78.969 | 76.973 | |
| SMH 8.02 | 78.896 | 76.880 | |
| SMH 8.03 | 78.681 | 76.770 | |
| SMH 9.00 | 81.520 | 79.819 | |
| SMH 9.01 | 81.012 | 79.012 | B.D. FROM SMH9.00 @ 79.642 |
| SMH 9.02 | 80.179 | 77.877 | B.D. FROM SMH9.01 @ 78.722 |
| SMH 10.00 | 78.140 | 76.689 | |
| SMH 11.00 | 75.200 | 74.070 | |

ISSUED FOR LRD OPINION

| Rev. | Note | Date | Drawn | Check |
|---|---|---|---|---|
| S2.P03 | ISSUED FOR LRD OPINION | 27.03.2024 | NQ | AL |
| S2.P02 | DRAFT ISSUE | 21.03.2024 | NQ | AL |
| S2.P01 | DRAFT ISSUE | 14.03.2024 | NQ | AL |

DONNACHADH O'BRIEN & ASSOCIATES CONSULTING ENGINEERS
UNIT 5C ELM HOUSE MILLENNIUM PARK NAAS CO. KILDARE
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Client: MARSHALL YARDS DEVELOPMENT COMPANY LTD.
Project: RESIDENTIAL DEVELOPMENT AT RATOATH, CO. MEATH
Drawing Title: PROPOSED SURFACE WATER DRAINAGE LAYOUT - SHEET 1

| Drawn By: | Checked By: | Approved By: | Date: | Scale: | Sheet Size: |
|---|---|---|---|---|---|
| RR | PD | DOB | MARCH 2023 | 1:500 | A0 |

| Project Number: | Drawing Number: | Status Code: | Rev Number: |
|---|---|---|---|
| DOBA2334 | 2334-DOB-XX-SI-DR-C-0201 | S2 | P03 |

N

0 5 10 15 20 25 m
SCALE 1:500 @ A0

## SURVEY NOTES

- TOPOGRAPHICAL SURVEY BASED ON EXISTING LEVELS FROM 3rd PARTY SPECIALIST;. DOB & ASSOCIATES TAKES NO RESPONSIBILITY FOR ACCURACY OF SURVEY INFORMATION.
- MAIN CONTRACTOR TO ESTABLISH INDEPENDENTLY ORDANCE DATUM ON SITE FOR LEVELS TO MAILIN HEAD DATUM AND CO-ORDINATES FOR SETTING OUT TO NATIONAL GRID.
- MAIN CONTRACTOR TO VERIFY ALL UNDERGROUND SERVICES ON THE SITE INCLUDING ALL ANOMALIES NOTED ON THE GPR SURVEY AND TO TAKE ALL NECESSARY PRECAUTIONS PRIOR TO ANY EXCAVATIONS ON THE SITE.
- REFER TO M&E ENGINEERS DRAWINGS FOR DIVERSION / DEMOLITION OF ALL UNDERGROUND ELECTRICAL CABLES / DUCTS, TELECOM DUCTS, LIGHTING DUCTS, OIL LINES ETC.

## NOTES:

1. FOR STANDARD DOBA NOTES REFER TO DRAWING 2334-DOB-XX-SI-DR-S-0001 & S-0002
2. REFER TO ARCHITECTS DRAWINGS FOR ALL SITE & APPLICATION BOUNDARIES
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT'S & ENGINEER'S DRAWINGS AND SPECIFICATIONS.
4. USE FIGURED DIMENSIONS ONLY. DO NOT SCALE
5. REFER TO SURVEY DRAWINGS FOR EXISTING SERVICES LAYOUTS AND MANHOLE INFORMATION
6. ALL EXISTING SURFACES TO BE REINSTATED FOLLOWING DIVERSION OF SERVICES/CONSTRUCTION OF NEW SERVICES
7. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND LEVELS WITH ARCHITECTURAL DRAWINGS PRIOR TO START OF CONSTRUCTION. ANY DISCREPANCIES TO BE NOTIFIED TO THE ENGINEER & ARCHITECT FOR RESOLUTION
8. CONTRACTOR TO ENSURE ALL WATER & WASTEWATER RELATED WORKS ARE IN ACCORDANCE WITH THE IRISH WATER WATER INFRASTRUCTURE & WASTEWATER INFRASTRUCTURE CODE OF PRACTICE & STANDARD DETAILS DOCUMENTS
9. TESTING OF ALL GRAVITY SEWERS AND MANHOLES TO BE IN ACCORDANCE WITH IRISH WATER CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE SECTION 4.10 TESTING OF GRAVITY SEWERS & MANHOLES

1.0m DEPTH X 1.2m WIDE FILTER DRAIN CONSISTING OF 225mm DIA. PERFORATED PIPE WITH PERFORATIONS FACING UPWARDS LAID AT 1:200 FALLS WRAPPED IN CL. 505B 40% VOID STONE. MANHOLE TO BE PROVIDED WITH A PERFORATED LID TO INTERCEPT OVERLAND FLOWS AND DISCHARGE TO ADJACENT SW NETWORK.

29m³ ABOVE GROUND DETENTION BASIN WITH PROPOSED UNDERGROUND ATTENUATION TANK (STORMTECH MC3500 WITH 67% VOIDS OR SIMILAR APPROVED) PROVIDING 144m³ OF STORAGE. TOP OF WATER LEVEL FOR 1:100yr STORM +79.579mOD

NO WATER STRUCK IN TRIAL PIT TO 3.30m BELOW GROUND LEVEL

TP 02

SECTION D1-D1

IL +79.70m
I.L. +77.975m
2.40m

SMH 2.03
CL:81.460mOD IL:79.720mOD SELF ACTIVATING FLOW CONTROL DEVICE DESIGN FLOW 18.5l/s, DESIGN HEAD 0.700m. HIGH LEVEL OVERFLOW PROVIDED AT +81.190m

SMH 1.05
CL:80.350mOD IL:78.069mOD SELF ACTIVATING FLOW CONTROL DEVICE DESIGN FLOW 16.5l/s, DESIGN HEAD 1.100m. HIGH LEVEL OVERFLOW PROVIDED AT +79.603m

SECTION D2-D2

IL +79.25m
I.L. +77.630m
2.00m

46m³ ABOVE GROUND DETENTION BASIN WITH PROPOSED UNDERGROUND ATTENUATION TANK (STORMTECH MC3500 WITH 67% VOIDS OR SIMILAR APPROVED) PROVIDING 272m³ OF STORAGE. TOP OF WATER LEVEL FOR 1:100yr STORM +79.142mOD

SMH 1.11
CL:80.082mOD IL:77.592mOD SELF ACTIVATING FLOW CONTROL DEVICE DESIGN FLOW 15l/s, DESIGN HEAD 1.750m. HIGH LEVEL OVERFLOW PROVIDED AT +79.483m

NO WATER STRUCK IN TRIAL PIT TO 3.30m BELOW GROUND LEVEL

TP 05

SECTION D3-D3

IL +79.20m
I.L. +77.300m
1.90m

SMH 6.02
CL:79.612mOD IL:77.247mOD SELF ACTIVATING FLOW CONTROL DEVICE DESIGN FLOW 4.8l/s, DESIGN HEAD 1.00m. HIGH LEVEL OVERFLOW PROVIDED AT +78.739m

NO WATER STRUCK IN BOREHOLE TO 4.90m BELOW GROUND LEVEL

BH 04

NO WATER STRUCK IN TRIAL PIT TO 2.40m BELOW GROUND LEVEL

TP 10

SECTION D4-D4

IL +78.90m
2.40m
I.L. +76.760m
0.90m
Max. Groundwater level +75.90m

BH 05

89m³ ABOVE GROUND DETENTION BASIN WITH PROPOSED UNDERGROUND ATTENUATION TANK (STORMTECH MC3500 WITH 67% VOIDS OR SIMILAR APPROVED) PROVIDING 348m³ OF STORAGE. TOP OF WATER LEVEL FOR 1:100yr STORM +78.188mOD

NO WATER STRUCK IN BOREHOLE TO 3.20m BELOW GROUND LEVEL

WATER OBSERVED IN BOREHOLE AFTER TESTING AT 2.80m BELOW GROUND LEVEL

SMH 1.16
CL:79.617mOD IL:76.686mOD SELF ACTIVATING FLOW CONTROL DEVICE DESIGN FLOW 29l/s, DESIGN HEAD 2.50m. HIGH LEVEL OVERFLOW PROVIDED AT +78.161m

TP 12

NO WATER STRUCK IN TRIAL PIT TO 2.20m BELOW GROUND LEVEL

PROPOSED SOAKAWAY. HIGH LEVEL OVERFLOW AT +77.90m

EXISTING GULLIES TO BE RELOCATED

EXISTING SURFACE WATER DRAINAGE TO BE REMOVED

EXISTING GULLIES TO BE REMOVED

PROPOSED UNDERGROUND ATTENUATION TANK (STORMTECH MC4500 WITH 67% VOIDS OR SIMILAR APPROVED) PROVIDING 163m³ OF STORAGE. TOP OF WATER LEVEL FOR 1:100yr STORM +77.905mOD

SMH 1.22
CL:78.700mOD IL:76.797mOD SELF ACTIVATING FLOW CONTROL DEVICE DESIGN FLOW 19.88l/s, DESIGN HEAD 0.87m. HIGH LEVEL OVERFLOW PROVIDED AT +77.903m

EXISTING GULLIES TO BE RELOCATED

EXISTING SURFACE WATER DRAINAGE TO BE RETAINED

EXISTING GULLIES TO BE RETAINED

EXISTING GULLIES TO BE RELOCATED

EXISTING SURFACE WATER DRAINAGE TO BE RETAINED

PROPOSED KINGSPAN NSBE020 OR EQUIVALENT CLASS 1 BYPASS PETROL INTERCEPTOR TO SUIT INFLOW OF 19.88l/s

PROPOSED HEADWALL. REFER TO DR-C-1000 FOR DETAILS

PROPOSED DISCHARGE OF SURFACE WATER TO THE EXISTING WATERCOURSE. I.L +76.20m TOP OF WATER LEVEL +75.829m

REFER TO SHEET 2

REFER TO SHEET 2

## SURFACE WATER LEGEND:

- EX. SURFACE WATER SEWER
- SMH — EX. SURFACE WATER MANHOLE
- SIC — EX. SURFACE WATER INSPECTION CHAMBER
- EX. WATER COURSE
- EX. SURFACE WATER SEWER TO BE DECOMMISSIONED
- PR. SURFACE WATER SEWER
- SMH — PR. SURFACE WATER MANHOLE
- SIC — PR. SURFACE WATER INSPECTION CHAMBER
- SAJ — PR. SURFACE WATER ACCESS JUNCTION
- PR. ROAD GULLY
- PR. ATTENUATION TANK
- PR. PERMEABLE PAVING
- PR. FILTER DRAIN
- PR. DRAINAGE CHANNEL
- PR. BIORETENTION AREA/SWALE
- P. INT — PR. PETROL INTERCEPTOR
- PR. TREE PIT DISCHARGING TO MAIN SW DRAINAGE
- PROPOSED SOAKAWAY

## CATCHMENT LEGEND:

- SUB-CATCHMENT 1
- SUB-CATCHMENT 2
- SUB-CATCHMENT 3
- SUB-CATCHMENT 4
- SUB-CATCHMENT 5

NOTE 1: MANHOLE COVER LEVELS ARE APPROXIMATE. ACTUAL COVER LEVELS SHOULD MATCH SURROUNDING FINISHED GROUND LEVELS U.N.O.

NOTE 2: PIPES WITH LESS COVER THAN
- 600mm FOR GRASSED AREAS
- 900mm FOR FOOTPATHS
- 1200mm FOR ROADS

TO BE SURROUNDED IN 150mm CONCRETE PROTECTION IN ACCORDANCE WITH IRISH WATER STANDARD DETAIL STD-WW-07

NOTE 3: ALL MANHOLE COVERS LOCATED IN GRASS AREAS TO BE SURROUNDED (Min. 200mm SURROUND) IN 100mm THK C20/25 CONCRETE APRON

## SURFACE WATER MATERIAL TO BE IN ACCORDANCE WITH GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS

- UNPLASTICISED P.V.C. PIPES MUST COMPLY WITH THE "PROVISIONAL SPECIFICATION FOR SOIL PIPES, DRAINS, SEWERS & FITTINGS MADE OF UNPLASTICISED P.V.C." ISSUED BY THE DEPARTMENT OF THE ENVIRONMENT.
- B.S. 8005: PART 1 - SEWERAGE OR EQUIVALENT;
- B.S. 8010: PART 2 - PIPELINES ON LAND OR EQUIVALENT: DESIGN, CONSTRUCTION & INSTALLATION;
- B.S. 5955: PART 6 CODE OF PRACTICE FOR THE INSTALLATION OF UNPLASTICISED P.V.C. PIPEWORK FOR GRAVITY DRAINS & SEWERS OR EQUIVALENT
- EN1401 - UNPLASTICISED P.V.C. SEWER PIPE SPECIFICATION
- B.S.4514 - UNPLASTICISED P.V.C. SOIL PIPE SPECIFICATION
- DoEHLG 'SITE DEVELOPMENT WORKS' & SECTION H OF THE BUILDING REGULATIONS

SURFACE WATER DRAINAGE MANHOLE SCHEDULE

| REF: | CL: | IL: | NOTES: |
|---|---|---|---|
| SMH 1.00 | 79.978 | 78.455 | |
| SMH 1.01 | 80.467 | 78.331 | |
| SMH 1.02 | 80.067 | 78.061 | |
| SMH 1.03 | 80.273 | 78.001 | |
| SMH 1.04 | 80.291 | 77.950 | |
| SMH 1.05 | 80.375 | 77.921 | B.D. FROM SMH2.04 @ 78.916 |
| SMH 1.06 | 79.923 | 77.824 | |
| SMH 1.07 | 79.566 | 77.775 | |
| SMH 1.08 | 79.400 | 77.727 | |
| SMH 1.09 | 79.500 | 77.563 | |
| SMH 1.10 | 79.500 | 77.509 | |
| SMH 1.11 | 79.992 | 77.305 | B.D. FROM SMH5.04 @ 78.417 |
| SMH 1.12 | 79.654 | 77.207 | |
| SMH 1.13 | 79.430 | 76.995 | B.D. FROM SMH7.07 @ 78.018 |
| SMH 1.14 | 79.450 | 76.959 | |
| SMH 1.15 | 79.335 | 76.894 | |
| SMH 1.16 | 79.616 | 76.701 | |
| SMH 1.17 | 78.614 | 76.656 | |
| SMH 1.18 | 78.493 | 76.594 | |
| SMH 1.19 | 78.734 | 76.556 | B.D. FROM SMH9.02 @ 77.443 |
| SMH 1.20 | 78.538 | 76.517 | |
| SMH 1.21 | 78.500 | 76.473 | |
| SMH 1.22 | 78.700 | 76.420 | |
| SMH 1.23 | 78.261 | 76.297 | |
| SMH 1.24 | 77.530 | 76.209 | |
| HEADWALL | 77.530 | 76.200 | |
| SMH 2.00 | 81.437 | 80.037 | |
| SMH 2.01 | 81.583 | 79.949 | |
| SMH 2.02 | 81.630 | 79.797 | B.D. FROM SMH4.00 @ 80.345 |
| SMH 2.03 | 81.401 | 79.720 | |
| SMH 2.04 | 80.821 | 79.022 | B.D. FROM SMH2.03 @ 79.600 |
| SMH 3.00 | 79.564 | 78.139 | |
| SMH 4.00 | 81.954 | 80.429 | |
| SMH 5.00 | 82.186 | 80.209 | |
| SMH 5.01 | 81.708 | 80.076 | |
| SMH 5.02 | 81.319 | 79.468 | B.D. FROM SMH5.01 @ 79.958 |
| SMH 5.03 | 81.288 | 79.447 | |
| SMH 5.04 | 80.640 | 78.543 | B.D. FROM SMH5.03 @ 79.318 |
| SMH 6.00 | 79.025 | 77.468 | |
| SMH 6.01 | 79.354 | 77.369 | |
| SMH 6.02 | 79.612 | 77.251 | |
| SMH 7.00 | 82.102 | 79.815 | |
| SMH 7.01 | 81.806 | 79.702 | |
| SMH 7.02 | 81.573 | 79.586 | |
| SMH 7.03 | 81.505 | 79.568 | |
| SMH 7.04 | 80.977 | 78.893 | B.D. FROM SMH7.03 @ 79.435 |
| SMH 7.05 | 80.567 | 78.787 | |
| SMH 7.06 | 80.479 | 78.265 | B.D. FROM SMH7.05 @ 78.768 |
| SMH 7.07 | 79.712 | 78.093 | |
| SMH 8.00 | 78.473 | 77.075 | |
| SMH 8.01 | 78.969 | 76.973 | |
| SMH 8.02 | 78.896 | 76.680 | |
| SMH 8.03 | 78.681 | 76.770 | |
| SMH 9.00 | 81.520 | 79.819 | |
| SMH 9.01 | 81.012 | 79.012 | B.D. FROM SMH9.00 @ 79.642 |
| SMH 9.02 | 80.179 | 77.877 | B.D. FROM SMH9.01 @ 78.722 |
| SMH 10.00 | 78.140 | 76.689 | |
| SMH 11.00 | 75.200 | 74.070 | |

ISSUED FOR LRD OPINION

| Rev. | Note | Date | Drawn | Check |
|---|---|---|---|---|
| S2.P03 | ISSUED FOR LRD OPINION | 27.03.2024 | NQ | AL |
| S2.P02 | DRAFT ISSUE | 21.03.2024 | NQ | AL |
| S2.P01 | DRAFT ISSUE | 14.03.2024 | NQ | AL |

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| | |
|---|---|
| Client: | MARSHALL YARDS DEVELOPMENT COMPANY LTD. |
| Project: | RESIDENTIAL DEVELOPMENT AT RATOATH, CO. MEATH |
| Drawing Title: | PROPOSED SURFACE WATER DRAINAGE LAYOUT - SHEET 1 |

| Drawn By: | Checked By: | Approved By: | Date: | Scale: | Sheet Size: |
|---|---|---|---|---|---|
| RR | PD | DOB | MARCH 2023 | 1:500 | A0 |

| Project Number: | Drawing Number: | Status Code: | Rev Number: |
|---|---|---|---|
| DOBA2334 | 2334-DOB-XX-SI-DR-C-0201 | S2 | P03 |

# Appendix H Pre-Planning Consultations with Meath Co. Co. Transportation Services

**Alan Lambe**

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**From:** Paul Doyle | DOBA <paul.doyle@doba.ie> on behalf of Paul Doyle | DOBA
**Sent:** Friday 31 May 2024 13:46
**To:** jmcgarvey@meathcoco.ie
**Cc:** Justin Farrelly; Colm McEldowney; Sadhbh O'Connor TOC; Daniel Moody TOC; Alan Lambe; Andy Kotze; Emmanuel Chaona; Steven Livingstone Systra; Angus Spence Systra
**Subject:** Rathoath LRD | Applicant's Response to MCC S32B Roads Comments

Hi Joe,

Hope all is well. Thanks again for the commentary at the recent S32B Meeting held between Meath Co. Co. and the Applicant Marshall Yards Development Company Limited.

Further to the latest meeting, we have provided the following

1. **Applicant's Response** below in red to the MCC S32B meeting comments,
2. Link below to download the relevant updated **Civil Infrastructure drawings** for your review and comment via wetransfer (please let us know if you can't download these and need them uploaded to a MCC sharefile or other equivalent website)
3. **Signalised Construction Phasing** for the proposed new signalised junction of the Ballbyin Road/ R125/ The Avenue noting that all works external to the site (roads, footpaths, cycle tracks, signals, etc.) will be completed prior to occupation of the 71st unit of the development.
4. **Draft LRD Opinion response** to the Transportation Comments Items
5. Completed **Road Safety Audit**

# 1. Applicant's Response to MCC S32B Roads Comments

- JMcG noted a significant amount of infrastructure included with redline boundary
    - Noted

- JMcG noted that Ratoath experiences very significant PM peak westbound queues and extends back to the Motorway past the outer-relief road. If the Applicant is introducing new lights, do lights on outer relief road need to be linked?
    - The signalised junctions will be situated approximately 400m apart from each other. At this distance, there will be limited benefit from linking the junctions under a single controller. The modelling exercise undertaken indicates that mean maximum queuing for westbound traffic in the PM is 24.9 PCU – approximately 137m. This length of queue is not anticipated to interact with the relief road signalised junction. There will be a slight augmentation of queuing for westbound traffic on the R125 at the proposed signalised junction, however this simply reflects a better balancing of priorities for all traffic across the PM peak period.

- JMcG noted that t a high level, MCC welcome the proposals. Ballybin Road junction is problematic and causes a lot of problem. MCC here to work with Applicant based on what is put forward. Most efficient solution.
    - Ballybin Road is completely realigned and in line with latest Design Manuals. We would note that the construction of same (removal of roundabout, closure of Ballybin Road, etc) is proposed to be completed as per the attached Signalized Junction Phasing Sketches. The attached proposals are set out from an engineering perspective to create the least amount of disruption, however, we would note that during the construction stage, changes might occur and same would be discussed and agreed upon with MCC.

- JMcG noted that the Applicant is required to superimpose the proposed layout on permitted part 8 to ensure the proposed does not prejudice what is permitted.

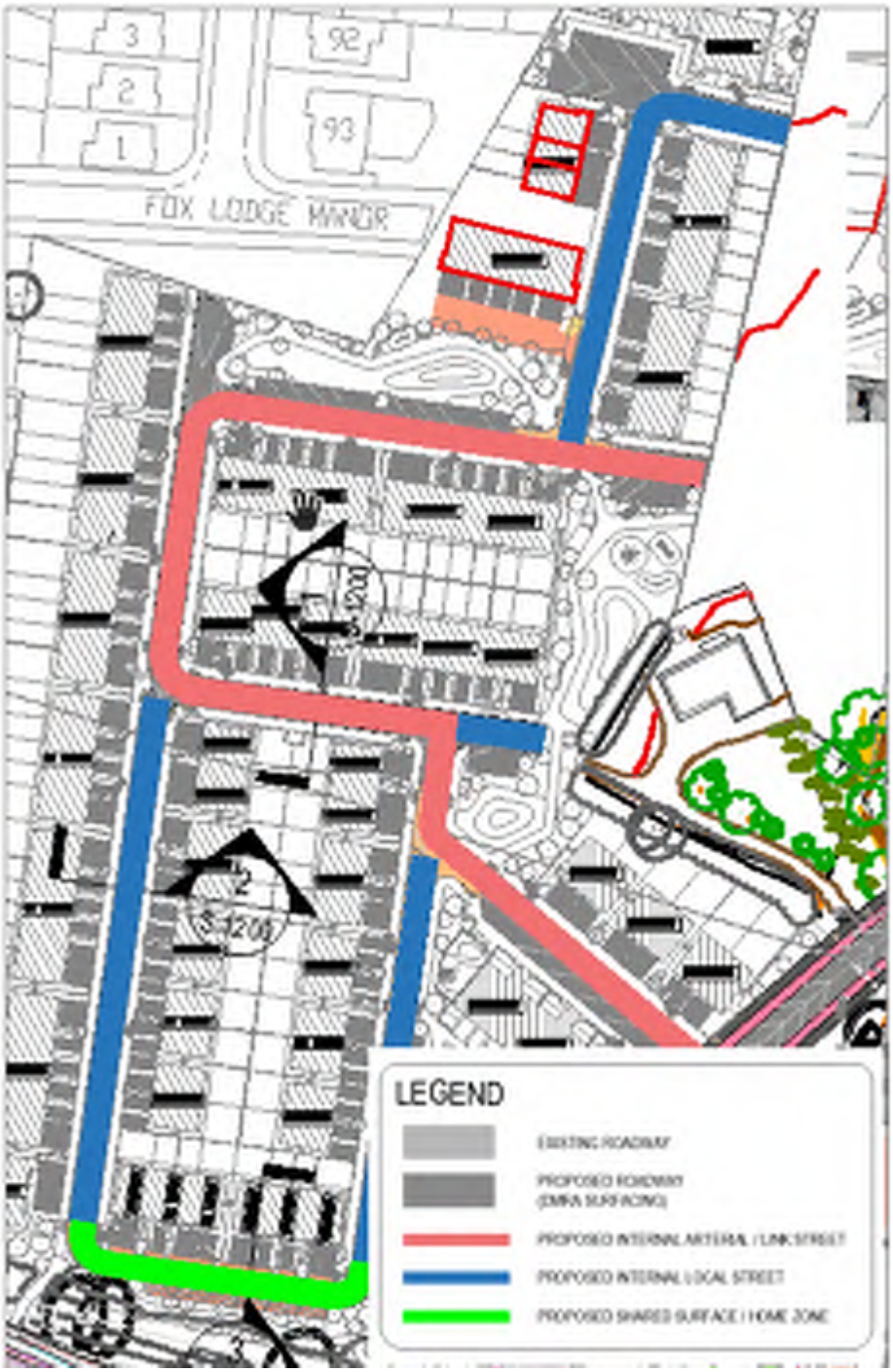
- The MCC Cycling Scheme Part 8 has been superimposed on DOBA Drawings No 510-512 and 520-522 which reflects the “pre-Part 8” and “post-part 8” scenarios and how both of these scenarios tie in with the current proposals.

- JMcG noted that bus stops to be relocated to the west of the junction. Bus routes that are already there that the service on these is maintained.
  - The proposed bus stop has been relocated to a suitable on-road location further West. Please refer to DOBA Drawings No. 500-502 Proposed Site Layout for ease of reference.

- JMcG noted that good walking and cycling infrastructure required as this is a commuter town.
  - Good pedestrian and cycling connectivity is proposed for the subject site. The proposed new junction is designed in accordance with the latest standards set out in the Cycle Design Manual. The internal infrastructure is all in compliance with the standards set out in the DMURS Manual with footpath widths minimum 2.0m. With regards to the new junction, the design allows for protected cycle routes. A standalone DMURS Statement/Audit will also be provided as part of the formal planning submission.

- JMcG noted that in terms of parking what is put forward is acceptable. MCC 's opinion that enough parking is provided. MMP to demonstrate enough parking is provided. Bus Stops are provided. Good cycle and pedestrian cycle infrastructure. Applicant must demonstrate site can be serviced from a car parking perspective. Mid-terrace units, Bicycle stores compatible with Apartment Guidelines.
  - Item being addressed by the Architect and will be submitted as part of the Planning Application .

- JMcG requested autotracking to demonstrate that Refuse Trucks are able to access all areas of the site.
  - The internal roads have been designed so that fire tenders / refuse trucks can easily access and turn around where required. Please refer to the Swept Path Analysis that has been carried out on DR-C-0700 series.
  -
- JMcG noted 2 Access points to the east of the site. Ensure these are designed as local streets for future access.
  - 2 No access roads have been provided along the east of the subject site. The southern access road was designed as a “Link Road”, whereas the northern road is designed to be a “Local Street”.
  - Please refer to the below sketch for ease of reference:




- JMcG referred to the Ballybin Road - if it is greenway it needs to be greenway to somewhere…road to be overlooked, well lit, encouraged to use it. Increasing VRUs through it. Crossing point relocated further south? Is it on the desire line to somewhere?
    - Ballybin road shown as a VRU route as per attached DR-C-0500
- DM noted that the Ballybin will be a longer term connection and the Applicant is not ignoring it and it will connect to future lands to the north. If it is a road to nowhere, could close it off subject to rights of way. MCC to revert on LRD opinion. To be agreed prior to planning application being lodged. Offline discussion t to occur.
    - Noted. VRU route shown per drawing DR-C-0500
- JMcG noted R125 approach westbound. Single lane and a right turn on approach to the junction.
    - Refer to DR-C-0500 and DR-C-0600 which illustrates lanes and right turn lanes.
- MHcG referred to the main access to the site. Show sightlines. Cycle design manual is the standard to be adhered to.
    - Adequate sightlines have been provided for the access road which is 45m for a 50kph road as illustrated on DR-C-0551.
- Systra noted quite a detailed approach to the  junction design. Had reviewed a straight ahead a right-hand turning lane. As far as operation of junction is concerned, 1 lane west bound, 2 lanes

east bound. JMcG noted that Systra are to include scenario of revised east arm scenarios and forward to MCC. Systra to send on presentation to MCC.

- We have attached a series of slides (refer to the **Ratoath Junctions Options Testing.pdf** document). that demonstrate the modelling results from the alternative junction arrangements Systra tested. These seek to address other comments from MCC, particularly those relating to the addition of right-turning lanes on the R125 and The Avenue.

## 2. Civil Infrastructure Drawings

**WeTransfer Link** https://we.tl/t-XBcKbzw6Gw

- 2334-DOB-XX-SI-DR-C-0500 - Proposed Site Layout Overall
- 2334-DOB-XX-SI-DR-C-0501 - Proposed Site Layout Sheet 1
- 2334-DOB-XX-SI-DR-C-0502 - Proposed Site Layout Sheet 2
- 2334-DOB-XX-SI-DR-C-0510 - Proposed VRU Infrastructure with Existing VRU Infrastructure Overall
- 2334-DOB-XX-SI-DR-C-0511 - Proposed VRU Infrastructure with Existing VRU Infrastructure Sheet 1
- 2334-DOB-XX-SI-DR-C-0512 - Proposed VRU Infrastructure with Existing VRU Infrastructure Sheet 2
- 2334-DOB-XX-SI-DR-C-0520 - Proposed VRU Infrastructure with MCC Part 8 Cycle Scheme Overall
- 2334-DOB-XX-SI-DR-C-0521 - Proposed VRU Infrastructure with MCC Part 8 Cycle Scheme Sheet 1
- 2334-DOB-XX-SI-DR-C-0522 - Proposed VRU Infrastructure with MCC Part 8 Cycle Scheme Sheet 2
- 2334-DOB-XX-SI-DR-C-0550 - Proposed Sightlines Overall
- 2334-DOB-XX-SI-DR-C-0551 - Proposed Sightlines Sheet 1
- 2334-DOB-XX-SI-DR-C-0552 - Proposed Sightlines Sheet 2
- 2334-DOB-XX-SI-DR-C-0600 - Proposed Road Markings and Signage
- 2334-DOB-XX-SI-DR-C-0700 - Proposed Vehicle Autotracks - Sheet 1
- 2334-DOB-XX-SI-DR-C-0701 - Proposed Vehicle Autotracks - Sheet 2
- 2334-DOB-XX-SI-DR-C-0702 - Proposed Vehicle Autotracks - Sheet 3
- 2334-DOB-XX-SI-DR-C-1200 – Proposed Road Type GA & Details
- 2334-DOB-XX-SI-DR-C-1600 – Proposed Road Cross Sections

## 3. Signalised Junction Construction Phasing

- **Signalised Junction Construction Phasing.pdf** document per WeTransfer link

## 4. LRD Opinion Response

- Draft LRD Opinion response to the Transportation Comments Items per WeTransfer link

## 5. Road Safety Audit

Completed Road Safety Audit with signed feedback form per WeTransfer link

Regards,

**Paul Doyle**
Associate Director

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**Please consider the environment before printing this e-mail**

# Appendix I DMURS Street Design Audit

Marshall Yards Development Company Limited

# Large-Scale Residential Development at Ballybin Road, Ratoath,Co. Meath

## Design Manual for Urban Roads and Streets
## Street Design Audit
## (Planning Submission)

2334-DOB-XX-SI-RP-C-0006

June 2024


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# Design Manual for Urban Roads and Streets

# Street Design Audit

# Residential Zone Lands at Ballybin Road, Ratoath, Co. Meath

2334-DOB-XX-SI-RP-C-0006

June 2024

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

# Document Control

| | | | | | |
|---|---|---|---|---|---|
| Document: | | Infrastructure Design Report (LRD Section 32B Submission) | | | |
| Project: | | Residential Zone Lands at Ballybin Road, Ratoath, Co. Meath | | | |
| Client: | | Marshall Yards Development Company Limited | | | |
| Job Number: | | DOBA2334 | | | |
| File Origin: | | Z:\Projects\DOB&A Projects\2023 Projects\DOBA 2334 – Marshall Yards Development Company Limited Ratoath\08 Reports & Specifications\8.1 Reports | | | |
| Document Checking: | | | | | |
| Author: | | Andy Kotze | | Signed: |  |
| Issue | Date | Status | Issued to | Copies | Checked for Issue |
| S2.P01 | 24/06/2024 | Issue 1 | Meath County Council | 1E | A. Lambe |
| | | | | | |

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

# Contents

# 1 Introduction

Donnachadh O'Brien & Associates Consulting Engineers Ltd. (DOBA) have been instructed by the Client, Marshall Yards Development Company Limited, to prepare a Design Manual for Urban Roads and Streets (DMURS) Street Design Audit to accompany a Planning Submission to Meath County Council (MCC) for the proposed Large Scale Residential Development (LRD) on lands at Ballybin Road, Ratoath, Co. Meath.

This document was requested by Meath County Council during the Section 247 and 32B submission pre planning discussions.

# 2 DMURS Audit

| **Connectivity** | | |
|---|---|---|
| **Key Issues** | **Key DMURS Reference.** | **Design Response** |
| Strategic routes/major desire lines been identified and are clearly incorporated into the design. | 3.1 – Integrated Street Network<br><br>3.2.1 – Movement Function<br><br>3.3.1 – Street layouts<br><br>3.3.4 - Wayfinding | The proposed development has been designed to encourage pedestrian and cyclist / active travel initiatives. Frequent pedestrian and cyclist connections are provided to the public roads around the perimeter of the site to encourage VRU movements from the proposed development. These include the development of 2 No. new multi-modal accesses off the proposed realigned Ballybin Road to serve the bisected residential site; 2 No. pedestrian access locations onto Main Street / R125 and 1 No. pedestrian access onto the realigned Ballybin Road. In addition, as part of the site development, it is proposed to provide connectivity to the neighbouring Fox Lodge Manor development to the northwest via dedicated footpaths through a new shared public open space. Crossing points including tactile paving are proposed at desire lines throughout the development.<br>The pedestrian linkages onto the R125 to the south will also provide access to the relocated bus stop to the south of the site along the R125 and therefore further promote the use of public transport.<br>A new 4-arm signalised junction is proposed to replace the existing roundabout along the R125 to the south of the development. The new signalised junction has been designed in accordance with the NTA Cycle Design Manual and includes protected and segregated cycling and pedestrian infrastructure. In addition, the proposed cycling and pedestrian infrastructure along the R125 has been designed to connect with the approved Ratoath Pedestrian and Cycle Scheme being delivered by Meath Co. Co. The connectivity is illustrated by the green arrows in the figure below: |

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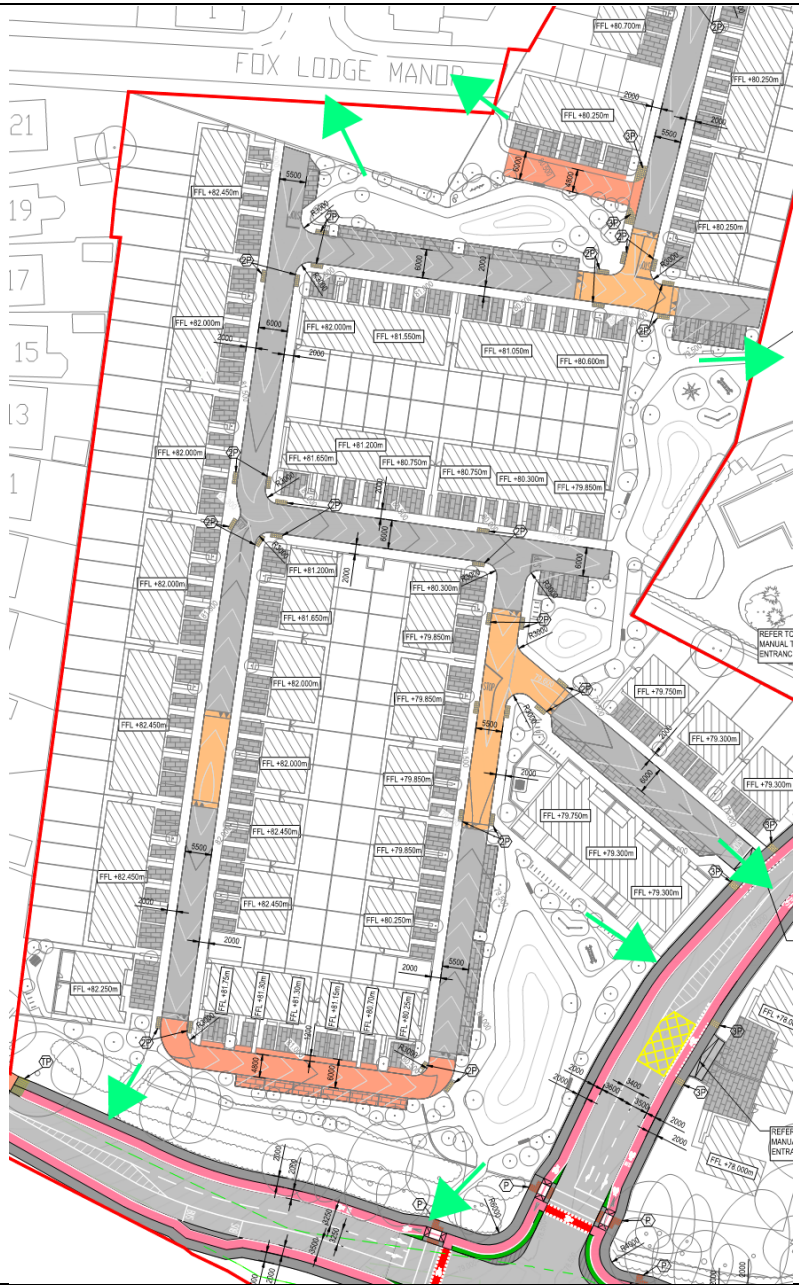

| | | |
|---|---|---|
| | | The street hierarchy for the proposed development has been achieved by providing the following:<br>• Arterial Link: The realignment of Ballybin Road provides an arterial linkage to the surrounding arterial roads and regional / national roads,<br>• Link Street: The main access street through the proposed development has been designed as a 6m wide street with 2m wide footpaths on each side. The link street is designed to facilitate future connections to adjacent lands.,<br>• Local Streets: The locals streets have been designed as 5.50m wide streets with 2m wide footpaths and these extend off the Link Street through the development and,<br>• A Home Zones is provided as a 4.80m carriageway and 1.20m refuge area and this extends off Local Streets,<br>A permeable street network is proposed for the subject site, as requested by Meath Co. Co. during pre-planning discussions. 2 no. cul-de-sacs exist where future provision has been made to connect to adjacent lands. |
| Multiple points of access are provided to the site/place, in particular for sustainable modes. | 3.3.1 – Street Layouts<br><br>3.3.3 – Retrofitting | Quality pedestrian crossings have been provided along desire lines at corners and junctions within the proposed development. All pedestrian crossings include dropped kerbs and associated tactile paving and are located at vertical deflections to prioritise pedestrian movements.<br>2 no. pedestrian connections are proposed to the R125 to the south of the site which will encourage the use of sustainable transport modes allowing access to the relocated bus stop along the R125.<br>The existing boundary wall with Fox Lodge Manor is to be removed to provide a shared open space between the proposed development and Fox Lodge Manor. The pedestrian connections included as part of the new green space will encourage pedestrian and cycling access to the existing Creche in Fox Lidge Manor.<br><br>The proposed 4-arm signalised junction has been designed with protected and segregated cycle lanes / pedestrian footpaths in accordance with the Cycle Design Manual. |
| | | |

| | | |
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| Accessibility throughout the site is maximized for pedestrians and cyclists, ensuring route choice. | 3.3.1 – Street Layouts<br><br>3.3.2 – Block Sizes<br><br>3.4.1 – Vehicle Permeability | The replacement of the existing roundabout with the new 4-arm signalised junction with associated protected cycle lanes and footpaths improves the pedestrian and cyclist connectivity in the surrounding road network.<br>2m wide footpaths are proposed throughout the development with dedicated crossings at corners and junctions including dropped kerns and tactile paving and include vertical deflections at the crossing locations to promote pedestrian priority.<br>The proposed development streets are to be shared between cyclists and vehicles. Slow Zone signage will be erected at the main entrance off the realigned Ballybin Road to encourage lower vehicle speeds and promote cyclist use.<br><br>Straight sections of road have been minimised by the introduction of vertical deflections and changes in priority of streets at junctions.<br><br>The internal road network is proposed as a "Slow Zone" with a posted speed limit of 30kph. The design has included various horizontal and vertical deflections, reduced corner radii and changes in priority at home zone areas along with signage throughout to naturally enforce lower operational speed. |
| Through movements by private vehicles on local streets are discouraged by an appropriate level of traffic calming measures. | 3.2.1 – Movement Function<br><br>3.2.2 – Place Context<br><br>3.4.1 – Vehicle Permeability | The proposed development is a destination. The proposed development streets do not offer a through road to adjacent developments. As such, the majority of vehicular movements within the development will be due to the residents who will be aware of the reduced speed limits being encouraged within the development.<br>The proposed roads hierarchy naturally encourages lower speeds due to the reduction in the width of the carriageway from the link street to the local street and to the shared surface / homezone. Furth traffic calming is proposed by means of on-street parking, reduced corner radii, vertical/horizontal deflections, and change in priority of streets. Further to this, the length of straight sections has been kept below 70m in length. |

| **Self-Regulating Street Environment** | | |
|---|---|---|
| **Key Issues** | **Key DMURS Reference.** | **Design Response** |
| A suitable range of design speeds have been applied with regard to context and function. | 3.2.1 – Movement Function.<br><br>3.2.3 – Place Context.<br><br>4.1.1 – A Balanced Approach to Speed | The realigned Ballybin Road has been designed as an Arterial Street with a 50kph posted speed limit. The road includes footpath and cycle track infrastructure on each side to encourage lower speeds.<br>The proposed development will have a posted speed limit of 30kph via the Slow Zone signage at the entrance. Further speed reduction measures have been adopted within the development including vertical/horizontal deflections, reduced corner radii and changes in priority at junctions to naturally reduce the operational speeds.<br>The proposed development has a single access road onto Ballybin Road to the east. In this instance, the development is a destination rather than a through road. |
| The street environment will facilitate the creation of a traffic-calmed environment via the use of 'softer' or passive measures. | 4.2.1 – Building Height and Street Width<br>4.2.2 – Street Trees<br>4.2.3 – Active Street Edges<br>4.2.4 – Signage and Line Marking<br>4.2.7 – Planting<br>4.4.2 – Carriageway Surfaces<br>4.4.9 - On-Street Parking<br>Advice Note 1 – Transitions and Gateways | A roads hierarchy has been designed with street widths reducing from a link street to a local street to a shared surface / home zone. Physical measures have also been included -vertical / horizontal deflections, reduced corner radii and changes in priority at junctions. The vertical deflections and home zone are proposed to be a different colour which will visually indicate the pedestrian priority.<br><br>Urban planting along the internal roads consisting of street trees will provide a height element to the streetscape which aids visual calming measures.<br><br>On-street parking has been provided throughout the development to increase driver awareness along these roads and naturally enforce speed by means psychological and physical measures. |

| | | |
|---|---|---|
| A suitable range of design standards/measures have been applied that are consistent with the applied design speeds. | 4.4.1 - Carriageway Widths<br>4.4.4 – Forward Visibility<br>4.4.5 – Visibility Splays<br>4.4.6 – Alignment and curvature<br>4.4.7 – Horizontal and Vertical Deflections<br>Advice Note 1 – Transitions and Gateways | The design standards set out in the DMURS have been applied for the proposed road infrastructure at the subject development with a focus on the carriageway widths for Link Roads, Local Streets, and Home Zones.<br><br>An internal forward visibility exercise has been conducted and reflected on Donnachadh O'Brien and Associates Drawings No. 2334-XX-SI-DR-C-0550-0552. These are based on an operational speed of 20 kph at the junctions and corners due to the additional speed reduction measures included in the design – vertical deflections at junctions / reduced corner radii at internal corners.<br><br>The realigned Ballybin Road upgrade consists of a 10 m-long transition gateway with surface colour changes which is directly in line with the TII Guidance documents. This will also have the appropriate road signs and markings to indicate same. |
| **Pedestrian and Cycling Environment** | | |
| **Key Issues** | **Key DMURS Reference.** | **Design Response** |
| The built environment contributes to the creation of a safe and comfortable pedestrian environment. | 4.2.1 – Building Height and Street Width<br>4.2.3 – Active Street Edges<br>4.2.5 – Street Furniture<br>4.4.9 - On-Street parking | The proposed design provides a sense of enclosure as expected with a housing development. The ratio achieved is approximately a 1:2/1:3 ratio achieving a moderate enclosure. Certain units throughout the development are dual aspect units and are closer to the road edge creating an Active Street Edge.<br>In addition to this, tree planting along the roads and verges has been maximized throughout.<br><br>The development provides a strong street presence, with on-street parallel parking spaces on the roads where it's required most, such |

| | | |
|---|---|---|
| | | as the access road entering the development. This will enforce the operational speed. |
| Junctions been designed to ensure the needs of pedestrians and cyclists are prioritised. | 4.3.2 - Pedestrian Crossings<br>4.3.3 – Corner Radii<br>4.4.3 - Junction Design<br>4.4.7 - Horizontal and Vertical Deflections | The proposed 4-arm signalised junction has been designed in accordance with the latest Cycle Design Manual standards and includes protected and segregated pedestrian and cycling infrastructure.<br>All the internal junctions have been reduced to 3.0m corner radii and pedestrian crossings located within the zone of intervisibility and desire lines. All of the junction visibility splays meet the 14m visibility splay for a 20 kph operational speed limit within the development due to the additional speed reduction measures included in the design. Please refer to Donnachadh O'Brien and Associates Drawings No. 2334-XX-SI-DR-C-0550-0552 for the Sightlines.<br>Pedestrian crossings have been located at vertical deflection locations and also include dropped kerbs and tactile paving. |
| Footpaths are continuous and wide enough to cater for the anticipated number of pedestrian movements. | 3.2.1 – Movement Function.<br>3.2.3 – Place Context.<br>4.2.5 – Street Furniture<br>4.3.1 - Footways, Verges and Strips<br>4.3.2 - Pedestrian Crossings | As part of the site development works, it is proposed to realign Ballybin Road and provide a new junction. The new pedestrian infrastructure is proposed to consist of 2.0m wide footpaths and 2.0m wide cycle tracks. We would note that these are fully segregated at the junction as set out in the Cycle Design Manual. It is proposed that all the internal development footpaths at the be 2.0m wide, which is larger than the minimum requirements<br>In addition to this, the "old" Ballybin Road is to be designed as a shared greenway.<br>. |

| Pedestrian and Cycling Environment (cont) | | |
|---|---|---|
| **Key Issues** | **Key DMURS Reference.** | **Response** |
| The particular needs of visually and mobility impaired users been identified and incorporated in the design. | 4.2.5 - Street Furniture<br>4.3.1 - Footways, Verges and Strips<br>4.2.5 - Street Furniture<br>4.3.2 - Pedestrian Crossings<br>4.3.4 - Pedestrianised and Shared Surfaces | In all cases has the designer been cognisant of the needs of visually/mobility impaired by ensuring all crossing locations have adequate tactile paving provision and dropped kerbs to allow for on-grade crossing. The new realigned junction also provides a segregated footpath with adequate crossing locations and tactile paving provision.<br>The design slope of footpaths/dropped kerbs have been designed in accordance with the relevant standards.<br><br>Street furniture and trees have been placed in adequate locations which provide the least obstruction and ensure that the footpath widths remain constant throughout the development |
| Cycling facilities will cater for cyclists of all ages and abilities. | 3.2.1 – Movement Function.<br>3.2.3 – Place Context.<br>4.3.5 - Cycle facilities. | The proposed 4-arm signalised junction includes segregated and protected cycling infrastructure in accordance with the Cycle Design Manual. The R125 has been designed with segregated cycle infrastructure and will connect to the Ratoath Pedestrian and Cycle Scheme being constructed by Meath Co. Co.<br>The proposed development internal streets are “slow zone” areas and will be shared between cyclists and motorists. |

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| **Visual Quality** | | |
|---|---|---|
| **Key Issues** | **Key Considerations and DMURS Ref:** | **Design Response** |
| The landscape plan responds to the street hierarchy and the value of the place. | 3.2.1 – Movement Function.<br>3.2.3 – Place Context.<br>4.2.2 – Street Trees<br>4.2.7 – Planting<br>Advice Note 1 – Transitions and Gateways | Donnachadh O'Brien and Associates have liaised with Meath County Council at the pre planning meetings to ensure that the infrastructure proposed meets the requirements of the Local Authority. In particular, the proposed signalised junction upgrade has been designed to complement the Ratoath Pedestrian and Cycle Scheme being constructed by the Local Authority.<br>Connections have been provided through public open spaces to the northwest and to the south which enhance pedestrian connectivity to the adjacent public roads and residential developments. |
| Street furniture is orderly placed. | 3.2.1 – Movement Function.<br>3.2.3 – Place Context.<br>4.2.5 - Street Furniture.<br>4.3.1 Footways, Verges and Strips | Street furniture have been placed at locations that are outside of pedestrian and mobility/visual impaired desire lines and to ensure that pedestrian facilities remain a constant width throughout. |
| The use of signage and line marking has been minimised. | 3.2.1 – Movement Function.<br>3.2.3 – Place Context.<br>4.2.4 - Signage and Line Marking. | Signage and line marking has been minimised within the proposed development streets to encourage a self-regulating development. Signage and line marking for the signalised junction upgrade and realigned Ballybin Road have been designed in accordance with the TII Guidance and standards. |
| Materials and finishes used throughout the scheme have been selected from a limited palette and respond to the value of the place? | 3.2.1 – Movement Function.<br>3.2.3 – Place Context.<br>4.2.6 – Materials and Finishes<br>4.2.8 – Historic Contexts.<br>4.3.2 – Pedestrian Crossings | The design proposes a change of materials and finishes at vertical deflections and shared surface / home zones to highlight the change in priority at these locations. Materials and finishes will be determined at the detailed design stage in agreement with Meath County Council. |

| | | |
|---|---|---|
| | 4.4.2 – Carriageway Surfaces<br>Advice Note 2 – Materials and Specifications | |

| **Additional Comments** |
|---|
| **N/A** |

# Appendix J Road Safety Audit Signed Feedback Form

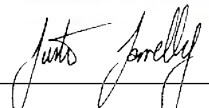
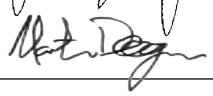
# Road Safety Audit Feedback Form

**Scheme:** Large Scale Residential Development at Ratoath, Co. Meath

**Audit Stage:** Stage 1 Road Safety Audit | **Audit Date:** 23rd May 2024

| Problem Reference (Section 3) | Designer Response Section | | | Audit Team Response Section |
|---|---|---|---|---|
| | Problem Accepted ( yes / no ) | Recommended Measure Accepted ( yes / no ) | Alternative Measures or Comments | Alternative Measures Accepted ( yes / no ) |
| 3.1 | Yes | Yes | A pedestrian crossing point has been added at the subject location. Please refer to the updated DOBA Drawing 2334-DOB-XX-SI-DR-C-0500-0502. | Comment noted with thanks. |
| 3.2 | Yes | Yes | The alignment of the road has been changed at a location immediately east of the proposed new junction and the pinch point has been removed. Please refer to the updated DOBA Drawing 2334-DOB-XX-SI-DR-C-0500-0502. | Comment noted with thanks. |
| 3.3 | Yes | Yes | The alignment of the footpath has been changed to be off-center from the crossing point at this junction. Please refer to the updated DOBA Drawing 2334-DOB-XX-SI-DR-C-0500-0502. | Comment noted with thanks. |
| 3.4 | Yes | Yes | The kerb radii immediately east of the Stop Sign have been increased to flatten out the approach angle and mitigate any possible conflicts. Please refer to the updated DOBA Drawing 2334-DOB-XX-SI-DR-C-0500-0502. | Comment noted with thanks. |

**The Designer should complete the Designer Response Section above, then fill out the designer details below and return the completed form to the Road Safety Audit Team for consideration and signing.*

| | | | | | |
|---|---|---|---|---|---|
| Designer's Name: | Andy Kotze | Designer's Signature: |  | Date: | 28/05/2024 |
| Employer's Name: | Justin Farrelly | Employer's Signature: |  | Date: | 28/05/2024 |
| Audit Team's Name: | Martin Deegan | Audit Team's Signature: |  | Date: | 31 May 2024 |