# ENGINEERING SERVICES REPORT – PLANNING SUBMISSION

## Farganstown Social Housing

## Engineering Services Report – Planning Submission

MDC0641
ENGINEERING
SERVICES
REPORT
PLANNING SUBMISSION
A03
6th October 2020

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## Document status

| Version | Purpose of document | Authored by | Reviewed by | Approved by | Review date |
|---|---|---|---|---|---|
| A01 | Draft for comment | CW | EG | RT | 02/04/2019 |
| A02 | Draft for comment | CW | EG | CW | 05/10/2020 |
| A03 | Planning Submission | CW | EG | CW | 06/10/2020 |

## Approval for issue

| | | |
|---|---|---|
| Cormac Woods | Cormac Woods | 6 October 2020 |

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# Contents

**1 INTRODUCTION ..... 1**

**2 DRAINAGE AND WATERMAIN ..... 3**

2.1 Foul Sewer ..... 3

2.2 Surface Water ..... 6

2.3 Watermain ..... 6

**3 INTERNAL ROAD DESIGN: ..... 7**

## Tables

Table 1: Proposed Foul Loadings ..... 5

## Figures

Figure 1 Farganstown Social Housing - Proposed Site Plan ..... 2

Figure 2 Temporary Foul Sump /Pumping Station -Typical Details ..... 4

## Appendices

Appendix A Surface Water Drawing ..... 9

Appendix B Foul Water Drawing ..... 11

Appendix C Watermain Drawing ..... 13

Appendix D Surface Water Attenuation Calculations ..... 15

# 1 INTRODUCTION

This Engineering Services Report has been prepared by RPS to support the Part 8 planning application for the proposed social housing development at Farganstown, Co. Meath. This development forms part of the overall masterplan for the residential development of the Farganstown lands. This report should be read in conjunction with the Flood Risk Assessment submitted under separate cover. Full size drainage and watermain design drawings have been submitted as part of this application and are also appended as A3 drawings as part of this report.

This report outlines the design intent and rationale adapted for foul and surface water collection and discharge from the site. A watermain layout and a brief description of road design is also included.

The development site is located north of Old Road, Farganstown, Navan, Co. Meath, and measures c. 1.7 hectares. The proposed development is bounded by agricultural land and small watercourses to the south and east, and a new road development (LDR6) to the north and east.

The proposed development comprises 84 social housing units, the provision of associated car park spaces, new entrance onto a consented, but yet to be constructed, Local Distributor Road (LDR), landscaping, lighting, and all associated development works. The proposed development is dependent on the construction of the abovementioned Local Infrastructure Housing Activation Fund (LIHAF) LDR6, linking the R153 with the Boyne Road. This new road is known as LDR6 and has been designed by a separate set of consultants acting for Meath County Council. Watermain and foul drainage infrastructure to serve the various masterplan residential developments in the Farganstown area will be delivered with this road.

The main elements of the subject social housing development are as follows:

1. construction of 84 units comprising 34 no. one-bedroom apartments, 38 no. two-bedroom apartments, 2 no. three-bedroom houses, 6 no. three-bedroom houses and 4 no. four-bedroom houses;
2. provision of 131 no. car park spaces;
3. internal roads and hardstanding;
4. the construction of 1 no. new vehicular entrance onto a consented LDR6;
5. landscaping, including planting;
6. circa 0.34 ha open space;
7. watercourse exclusion wall;
8. public lighting; and
9. all associated development works.

In terms of building form the 84 units comprise 2 apartment blocks (both four storeys high), 1 terrace of 3 storey duplex units with the remaining units comprising semi-detached 2 storey houses.

Subject to confirmation by intrusive site investigation the substructure to all buildings is likely to comprise traditional reinforced concrete strip foundations founded on the competent clay bearing stratum at 2 to 2.5m below existing ground level. We anticipate ground floor construction comprising a ground bearing concrete slab laid on well compacted hardcore.

The apartment construction is likely to comprise loadbearing masonry walls with precast floor units. Duplex construction is likely to comprise loadbearing masonry with timber ecojoist flooring (at second floor within dwelllings) and the separating suspended first floor between dwellings comprising precast concrete for fire and acoustic reasons. The semi-detached house construction will comprise traditional masonry walls with suspended timber first floor and traditional timber truss roofing.

**Figure 1 Farganstown Social Housing - Proposed Site Plan**

# 2 DRAINAGE AND WATERMAIN

The proposed housing development will have a completely separate network of foul and surface water sewer systems. The proposed foul and surface water drainage layout is arranged to work with the existing site slope and contours with all drainage falling north west with the natural slope of the site.

RPS met with Mr David O'Reilly, Executive Engineer with Meath County Council, Water Services Department on March 20th 2019 to review and discuss the drainage and water supply strategy proposed for the site full details of which are outlined below.

## 2.1 Foul Sewer

The foul drainage design typically comprises 225mmØ sewers placed around the perimeters of the buildings all directed and collected at the north end of the site. Refer to RPS drawing **MDC0641-RPS-00-FN-DR-C-DG1003** which shows the foul sewer layout. This drawing should be read in conjunction with the RPS standard manhole and pipe bedding detail drawings also included as part of this application.

In terms of Irish Water foul sewer infrastructure that will be installed with the Local Distributer Road RPS understands the following:

A new 750mm diameter foul sewer will drain north west towards Navan Foul Treatment plant which is located on the Boyne Road on the far side of the Navan-Droheghda railway line. We understand this sewer is being designed by Mott McDonald (consultants for Irish Water) to cater for the overall Farganstown development masterplan. We understand detailed design of the road itself has been completed from the R153 Kentstown road as far as the final roundabout before Navan-Drogheda railway line. We understand this extent of the new distributer road is out to tender and have obtained the DBFL consulting engineering design drawings of this road which includes service infrastructure. The new 750 diameter sewer will only be completed in its entirety when the new distributer road is completed across the railway line and connected into the Boyne road.

There is therefore a temporary case scenario when the new 750 diameter foul sewer is not live and to cater for this eventuality we understand that a local authority rising main (built with the new distributor road) will cater for new development in the Farganstown area in the interim. This rising main will be pumped south back to a high point just north of old road where it will change back to gravity discharge and outfall to the existing Kentstown road sewer.

The above information has been obtained from Mr Paul Barrell and David O'Reilly (MCC) and is shown on the DBFL Consulting Engineers drawings for the new distributor road as listed below.

TRA-04005-170192-0500-1---Drainage Layout General Arrangement Sheet 1

TRA-04005-170192-0500-2---Drainage Layout General Arrangement Sheet 2

TRA-04005-170192-0500-3---Drainage Layout General Arrangement Sheet 3

TRA-04005-170192-0500-4---Drainage Layout General Arrangement Sheet 4

The above 2 scenarios therefore means we have designed the new drainage layout for both these scenarios. In the eventual permanent case we have shown a final outfall connection from the development into the 750mm diameter sewer on the new distributor road. The position for this connection was advised by MCC with the design level taken from the abovementioned DBFL tender drawings (manhole reference F9 with an invert level of 49.02m.

For the interim case when the 750 diameter sewer is not live we have specified a foul sump complete with duty and standby pump sets. This sump is designed for 12 hour storage and will be fitted with telemetry and pump failure alarms. We suggest these alarms and telemetry are electronically linked to Irish Water/MCC telemetry to ensure a coordinated maintenance regime is established and that prompt action is taken in the unlikely event of any issues occurring. The design of this foul sump is in accordance with the Irish Water standard details for installations of this nature with a typical detail shown below.

The foul sewer layout and temporary sump is designed for the loadings outlined below with appropriate sewer falls providing the required self-cleansing velocities. Refer to RPS drawing **MDC0641-RPS-00-FN-DR-C-DG1003** for the proposed foul sewer layout as described above.

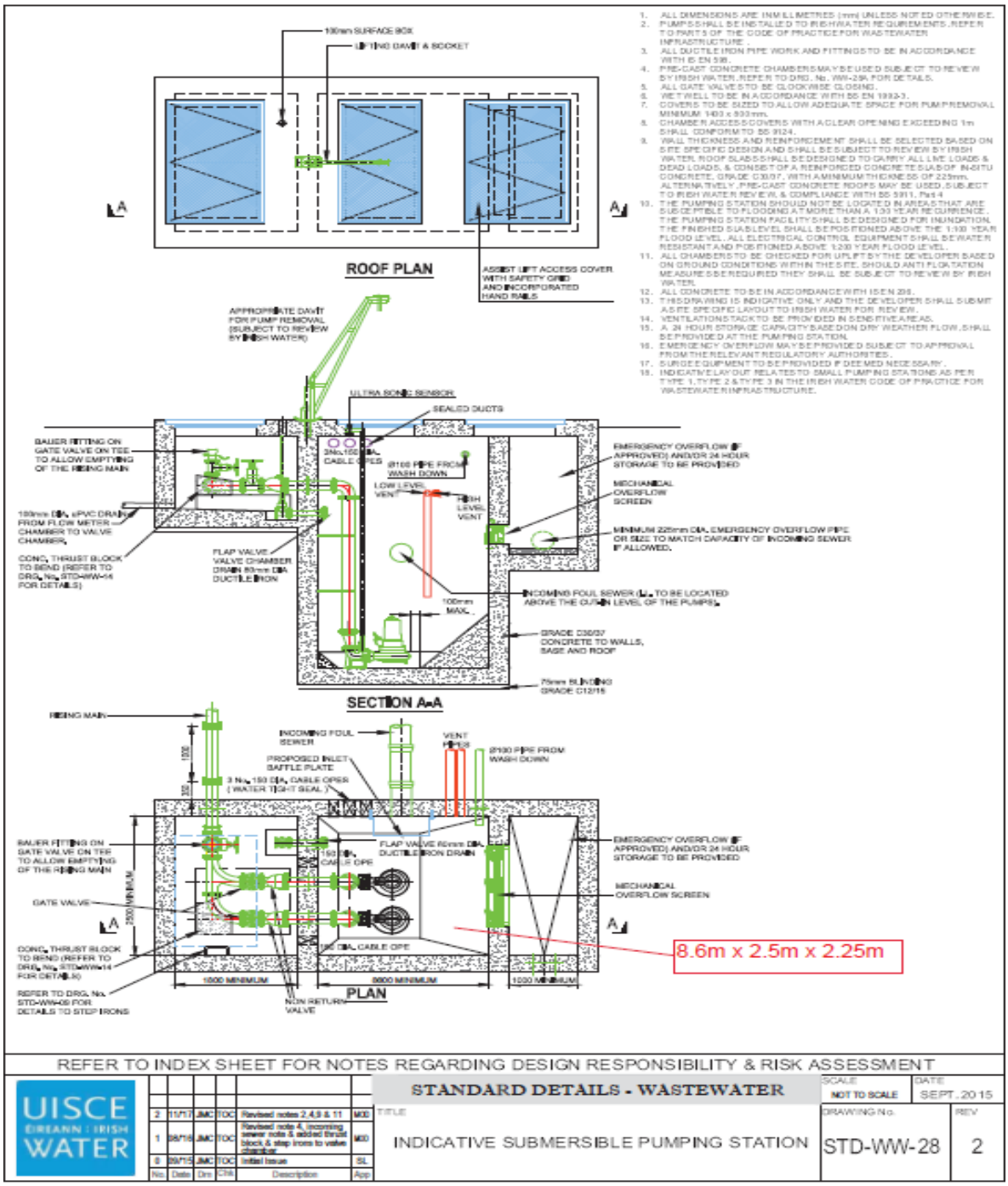



**Figure 2 Temporary Foul Sump /Pumping Station - Typical Details**

**Table 1: Proposed Foul Loading**

| Post Development - Residential | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Apartment | Units | G (l/ca/day) | P[1] (Persons) | PG (l/day) | I[2] | DWF[3] | SW[4] | $P_{fDom}$[5] | $DF_{Average}$[3] (l/day) | $DF_{Average}$[3] (l/s) | DFF[3] (l/day) | $DF_{Peak}$[3] (l/day) | $DF_{Peak}$[3] (l/s) |
| Apart Block 1 | | | | | | | 739 | | | | | | |
| Apart Block 2 | | | | | | | 739 | | | | | | |
| Duplex Block 3 | | | | | | | 518 | | | | | | |
| Houses | | | | | | | 646 | | | | | | |
| Total | **84** | 150 | 227 | 34020 | 3402 | 37422 | **2642** | 6 | 40064 | 0.46 | 207522 | 210164 | 2.43 |
| Notes | | | | | | | | | | | | | |
| 1 | Assume 2.7 persons per unit as per IW-CDS-5030-03 | | | | | | | | | | | | |
| 2 | Infiltration taken as 10% of Unit Consumption as per IW-CDS-5030-03 | | | | | | | | | | | | |
| 3 | Dry Weather Flow (DWF), Design Foul Flow and Design Flow Equations as per IW-CDS-5030-03 | | | | | | | | | | | | |
| 4 | SW taken as impermeable areas of ground floor of each building as per IW-CDS-5030-03 | | | | | | | | | | | | |
| 5 | Peaking Factors as per IW-CDS-5030-03 | | | | | | | | | | | | |

Table Note: In accordance with the Code of Practice for Wastewater Infrastructure

The foul discharge from the site is conservatively estimated as 2.43 litres/sec. All sewers on the proposed design have a minimum capacity of 40.781 litres/sec (225mmØ at 1:125) so can cater for this flow. In accordance with standard preplanning practice we have submitted a Pre-Connection Enquiry (PCE) form to Irish Water with the above discharge quantum outlined.

## 2.2 Surface Water

The layout of the proposed surface water collection system for the site is shown on RPS drawing **MDC0641-RPS-00-FN-DR-C-DG1002** contained in **Appendix B**. The surface water is collected in a separate system and will be discharged via gravity from the site at a maximum rate of **2.29 litres/sec/ha,** which equates to a maximum flow of approximately **4.07 litres/sec**. A hydro brake device (or similar) flow control device will be installed in the last manhole to ensure this rate is not exceeded.

It is the policy of the Local Authority to include Sustainable Urban Drainage Systems, SuDS, for all new applications, as such it is proposed to use a range of SuDS devises for the scheme.

SuDs proposals are as follows:

Low water usage appliances, to restrict potable water demand.

Attenuation storage with flow control device sized to contain a 1-in-100-year storm event and increased by 20% for predicted climate change to limit discharge from the site during extreme rainfall events.

The attenuation system will hold the required **1 in 100-year** storm event (plus 20% allowance for climate change) before discharging to the adjacent watercourse to the north of the site via a flow control device to limit the discharge rate to 4.07 litres/sec. The required attenuation tanks sizes are approximately 1200 $m^3$ for the entire site. A Class 1 by-pass petrol interceptor has been provided after the flow control device (and before the last manhole) on the attenuation system.

A flood risk assessment has been carried out and submitted separately as part of this planning application.

## 2.3 Watermain

A 100 mm ring main will be provided around the development as shown on RPS Drawing **MDC0641-RPS-00-FN-DR-C-DG1001** contained in Appendix D. This ring main will incorporate Fire Hydrants set out in compliance with the distances and spacings outlined in the Building Regulations. This ring main will connect to a new Irish Water watermain to be installed with the new distributor road with the connection point advised by MCC in accordance with the previously referenced DBFL design drawings for the distributor road. Sluice valves, Thrust blocks and water-meters will be provided in accordance with the Irish Water Code of Practice for Water Infrastructure. In accordance with standard practice a Pre-Connection Enquiry (PCE) form has been issued to Irish Water detailing the anticipated water demand etc.

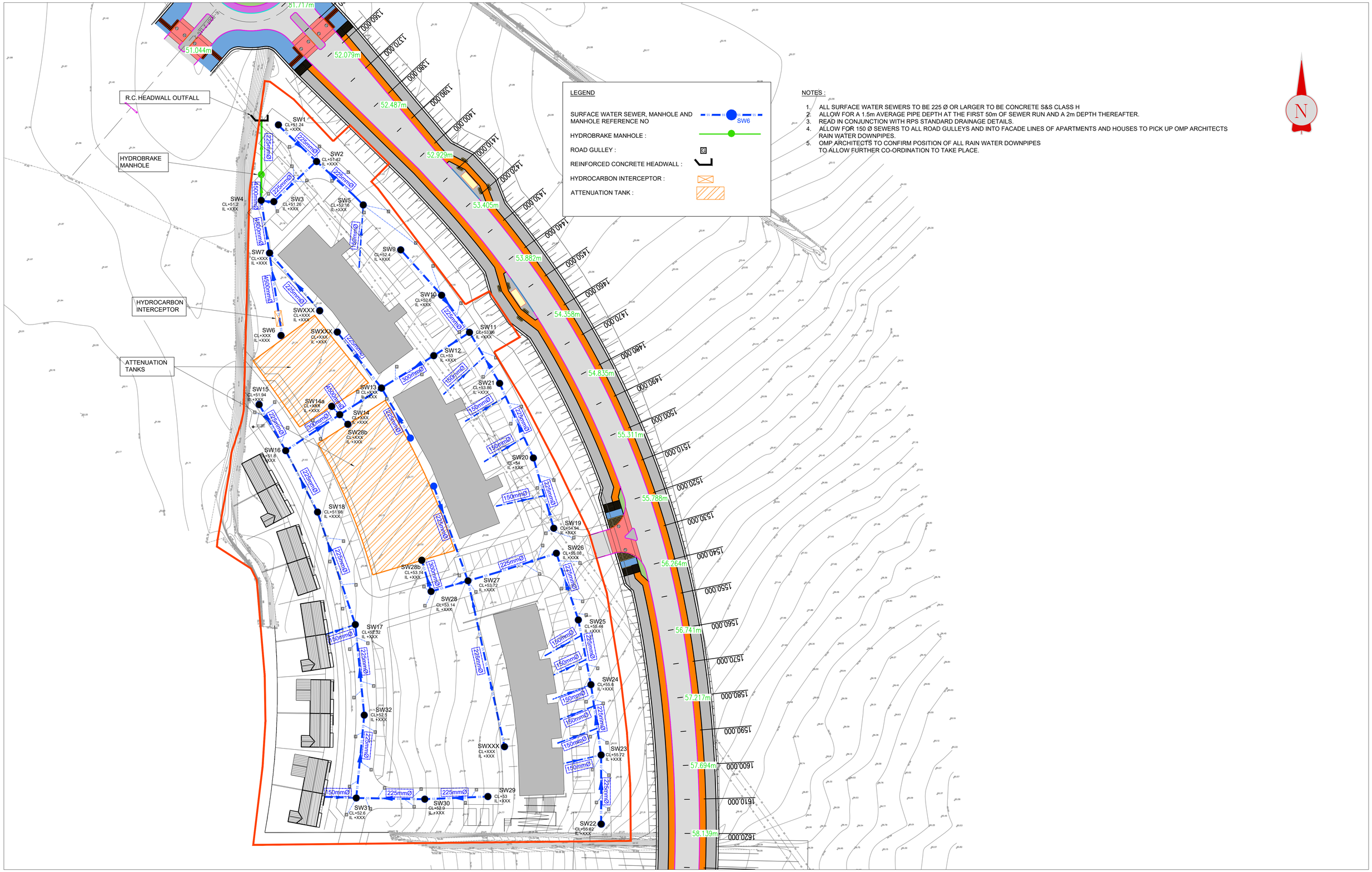
# 3 INTERNAL ROAD DESIGN

RPS have carried out a full civil engineering design of the internal roads serving the development to ensure the road geometry and layout is in full compliance with the Design Manual for Urban Roads and Streets. We have been advising OMP architects via completion of detailed horizontal and vertical alignment drawings which will be worked up into a tender and construction level of detail following the planning stage.

The starting point for the design of the road levels was the requirement to tie into the new distributor road at the eastern side of the site. The road levels shown on DBFL drawing **170192-9040 BOUND** were referenced with a 2.5% fall away from the distributor road central crest assumed for the tie in. We interpolated between the two road levels beside our site entrance to get 55.661m as our tie in level. We understand this tie in to the distributor road will be extinguished on completion of the overall residential masterplan for the Farganstown area.

# Appendix A

## Surface Water Drawing

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(v) All Levels refer to Ordnance Survey Datum, Malin Head.

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| S2 P01 | 29.03.19 | PB / CW | DRAFT ISSUE FOR COMMENT | RT |


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Model File Identifier

| | |
|---|---|
| Scale | 1:500 @ A1<br>1:1000 @ A3 |
| Created on | 29/03/2019 |
| Sheets | 1 OF 1 |
| Project | FARGANSTOWN HOUSING |
| Title | PROPOSED SURFACE WATER DRAINAGE LAYOUT |
| File Identifier | MDC0641RPS-00-FN-DR-C-DG1002.dwg |
| Status | S4 |
| Rev | P02 |

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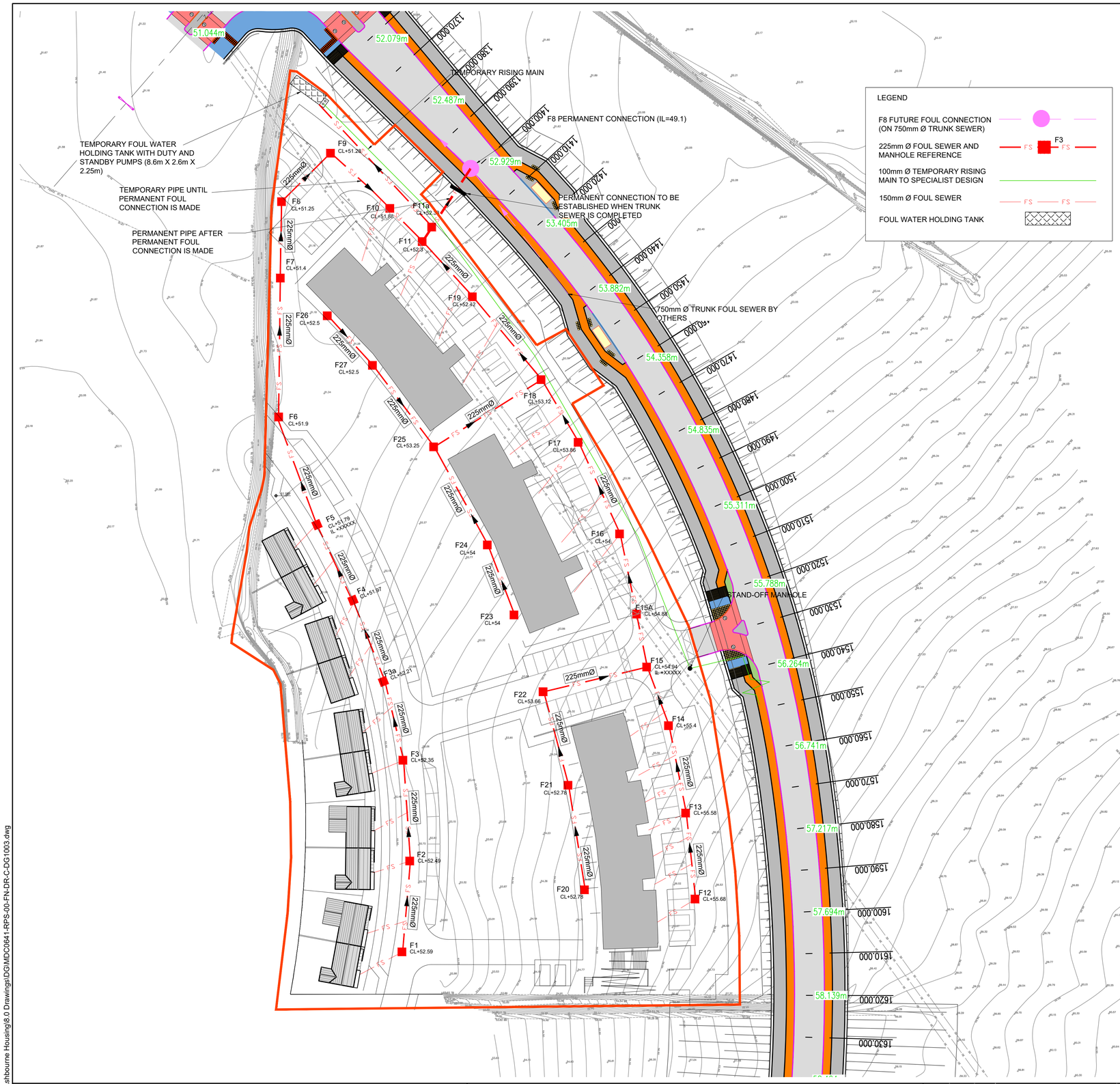
# Appendix B

## Foul Water Drawing




GENERAL NOTES :

ALL FOUL DRAINAGE IS TO COMPLY WITH IRISH WATER PUBLICATION: CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE DEC 2017

PERMISSIBLE FOUL SEWER PIPE TYPES :

-CONCRETE: CONCRETE SEWER PIPES WITH SPIGOT AND SOCKET JOINTS AND RUBBER RING FITTINGS SHALL COMPLY WITH IS EN 1916 (2002), BS 5911, PART 1 (2002 – 2010) AND IS 6 (2004) OR EQUIVALENT STANDARD. STRENGTH CLASS 120 WITH MINIMUM CRUSHING LOADS IN ACCORDANCE WITH TABLE 8 OF BS 5911-1 (2002- 2010). ALL PIPES AND FITTINGS SHALL HAVE GASKET TYPE JOINTS OF SPIGOT AND SOCKET OR REBATED FORM. (PIPE DIAMETERS 225MM AND ABOVE)

-UNPLASTICISED PVC; UPVC PIPES AND FITTINGS SHALL COMPLY WITH THE PROVISIONS IS EN 1401 2009/2012. PIPES TO BE APPLICATION AREA CODE "UD", STIFFNESS CLASS 8KN/M2 . PROVISION FOR JETTING SHALL BE BASED ON THE WRC SEWER JETTING CODE OF PRACTICE, JUNE 1997. PIPES TO BE CAPABLE OF RESISTING A MAXIMUM JETTING PUMP PRESSURE OF 2,600PSI (180 BAR) WITHOUT DAMAGE. (SEWER DIAMETERS 150MM UP TO 450MM, SERVICE CONNECTIONS OF 100MM DIAMETER);

ALLOW FOR A 1.75M AVERAGE PIPE DEPTH AT THE FIRST 50M OF SEWER RUN (FROM THE HEAD OF EACH SEWER RUN) AND A 2.25M DEPTH THEREAFTER.

THIS MARK UP IS TO BE READ IN CONJUNCTION WITH THE RPS STANDARD DRAINAGE DETAILS DRAWINGS.

ALLOW FOR 150 DIAMETER CONNECTOR SEWERS AT 1 IN 80 FALL TO APARTMENT BLOCKS AND HOUSES WITH EXTERNAL AJS LOCATED ADJACENT BUILDING FACADES

SUBFLOOR DRAINAGE TO COMPRISE 110 DIAMETER PIPES AT 1 IN 60 FALLS BY OTHERS.

IN THE PERMANENT CASE ON COMPLETION OF THE NEW DISTRIBUTER ROAD TO THE EAST FOUL WATER WILL DISCHARGE TO THE 750MM DIAMETER TRUNK SEWER THAT WILL GO IN WITH THE CONSTRUCTION OF THIS ROAD.

THE PROPOSED CONNECTION POINT IS AT MANHOLE F8 ON THIS TRUNK SEWER.

IN THE EVENT THIS HOUSING DEVELOPMENT IS COMPLETED IN ADVANCE OF THE DISTRIBUTOR ROAD THEN A FOUL WATER HOLDING TANK WILL BE PROVIDED (SIZED FOR 12 HOUR STORAGE) COMPLETE WITH DUTY AND STANDBY PUMP SETS COMPLETE WITH PUMP FAILURE ALARM, HIGH LEVEL ALARM AND LIFTING DERRIK. A RISING MAIN FROM THIS HOLDING TANK WILL PUMP FOUL WATER BACK SOUTH TOWARDS EXISTING LOCAL AUTHORITY INFRASTRUCTURE ON OLD ROAD (LOCATED JUST NORTH OF THE R153).

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meath county council

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| S2 P01 | 29.03.19 | PB / CW | DRAFT ISSUE FOR COMMENT | RT |


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Model File Identifier

| | |
|---|---|
| Scale | 1:500 @ A1<br>1:1000 @ A3 |
| Created on | 29/03/2019 |
| Sheets | 1 OF 1 |
| Project | FARGANSTOWN HOUSING |
| Title | PROPOSED FOUL WATER DRAINAGE LAYOUT |
| File Identifier | MDC0641RPS-00-FN-DR-C-DG1003.dwg |
| Status | S4 |
| Rev | P02 |

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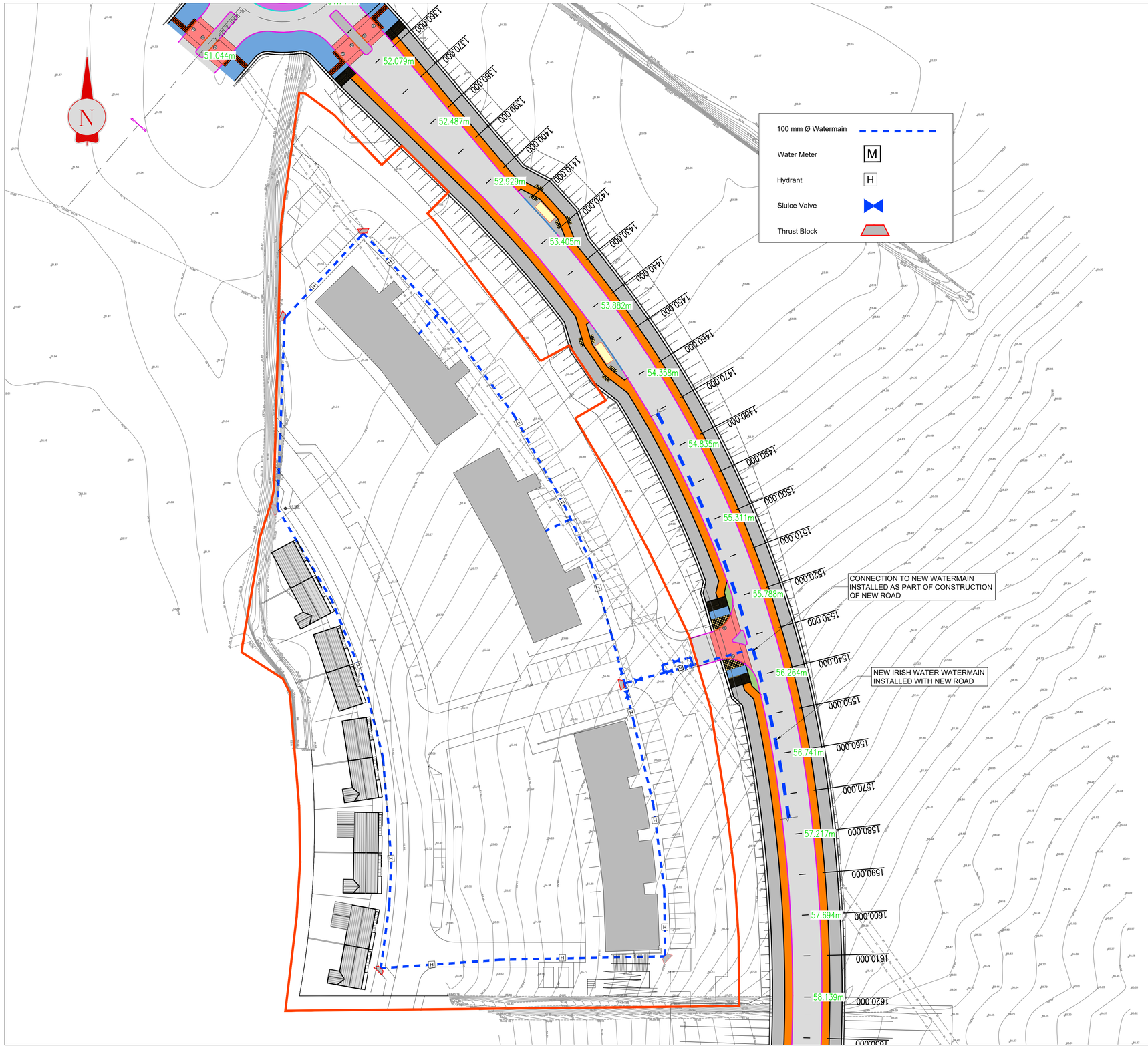
# Appendix C
## Watermain Drawing




GENERAL NOTES :

All houses to have an individual watermeter.

All apartment blocks to have individual sluice valve and watermeter.

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Model File Identifier

| | |
|---|---|
| Scale | 1:500 @ A1<br>1:1000 @ A3 |
| Created on | 29/03/2019 |
| Sheets | 1 OF 1 |
| Project | FARGANSTOWN HOUSING |
| Title | PROPOSED WATERMAIN GENERAL ARRANGEMENT |
| File Identifier | MDC0641RPS-00-FN-GE-C-DG1001.dwg |
| Status | S4 |
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# Appendix D
## Surface Water Attenuation Calculations

# Greenfield Runoff Calculations

**Equation:** IH 124 (Institute of Hydrology, Ref: **Report 124**)

$$QBAR_{rural} = 0.00108\, AREA^{0.89}\, SAAR^{1.17}\, SOIL^{2.17} \text{ and}$$
$$QBAR_{urban} = QBAR_{rural}(1 + URBAN)^{2NC}[1 + URBAN](21/CIND) - 0.31]$$

Note: The IH124 was scaled due to the catchment size of the development being less than 0.5km2

**Data:**

The following data was taken from MET Eireann websitet, GDSDS and UK SuDS website:

| | | |
|---|---|---|
| SAAR: | 850 | mm |
| Soil: | 0.3 | Soil Type 2 (As per FSR Soil Map and GDSDS Volume 2 Table 6.7) |
| Site Area: | 0.0178 | km2 |
| NC: | 0.716 | |
| CWI: | 120 | GDSDS Volume 2 |
| CIND: | 29.32 | |
| Urban: | 0 | |
| Area scale factor: | 0.0356 | Calcualted for sites less than 50ha |

**Calculation:**

| | | | | | | |
|---|---|---|---|---|---|---|
| **50 ha Qbar=** | 0.114361627 | m3/s | | | | |
| **Qbar=** | 0.004 | m3/s | **Qbar Urban =** | ~~0.002809~~ | m3/s | No Urban for this catchment |
| | 4.07 | l/s | | ~~2.809179~~ | l/s | |

| | | | |
|---|---|---|---|
| **Greenfield Runoff** | 2.29 | l/s/ha | As per GDSDS reccomendations to pick greenfield 1 year rate or 2l/s/ha whichever is larger |

| | | |
|---|---|---|
| 1 year Growth Factor | 0.85 | As per GDSDS guidance (Volume 2) |
| 2 year Growth Factor | 1 | As per GDSDS guidance (Volume 2) |
| 30 year Growth Factor | 2.1 | As per GDSDS guidance (Volume 2) |
| 100 year Growth Factor | 2.6 | As per GDSDS guidance (Volume 2) |

**Greenfield Limiting Discharges**

For the 1.78ha site, the total allowable Qbar = 4.071274 l/s

Based on GDSDS Volume 2 = 2.29 l/s/ha

| | | | | |
|---|---|---|---|---|
| 1 year | 3.46 | l/s | 3.5 | l/s/ha |
| 2 year | 4.07 | l/s | 4.1 | l/s/ha |
| 30 year | 8.55 | l/s | 8.5 | l/s/ha |
| **100 year** | 10.59 | l/s | 11 | l/s/ha |

# Attenuation Storage Required Calculations

| Time | Unit | Seconds | Rainfall (mm) 100 year [1] | Rainfall (mm) - 100 year 20% CC [2] | Area ($m^2$) | Volume Incoming (A1) $m^3$ | Outgoing Volume 2.29l/s for Area ($m^3$) | Storage Required ($m^3$) |
|---|---|---|---|---|---|---|---|---|
| 5 | mins | 300 | 12.9 | 15.48 | 16540 | 256 | 2 | 254 |
| 10 | mins | 600 | 18 | 21.6 | 16540 | 357 | 4 | 354 |
| 15 | mins | 900 | 21.2 | 25.44 | 16540 | 421 | 5 | 415 |
| 30 | mins | 1800 | 26.2 | 31.44 | 16540 | 520 | 11 | 509 |
| 1 | hours | 3600 | 32.4 | 38.88 | 16540 | 643 | 21 | 622 |
| 2 | hours | 7200 | 40 | 48 | 16540 | 794 | 43 | 751 |
| 3 | hours | 10800 | 45.3 | 54.36 | 16540 | 899 | 64 | 835 |
| 4 | hours | 14400 | 49.5 | 59.4 | 16540 | 982 | 86 | 897 |
| 6 | hours | 21600 | 56 | 67.2 | 16540 | 1111 | 129 | 983 |
| 9 | hours | 32400 | 63.4 | 76.08 | 16540 | 1258 | 193 | 1065 |
| 12 | hours | 43200 | 69.3 | 83.16 | 16540 | 1375 | 257 | 1118 |
| 18 | hours | 64800 | 78.4 | 94.08 | 16540 | 1556 | 386 | 1170 |
| **24** | **hours** | **86400** | **85.6** | **102.72** | **16540** | **1699** | **514** | **1185** |
| 2 | days | 172800 | 96.1 | 115.32 | 16540 | 1907 | 1029 | 879 |
| 3 | days | 259200 | 105.6 | 126.72 | 16540 | 2096 | 1543 | 553 |
| 4 | days | 345600 | 114.2 | 137.04 | 16540 | 2267 | 2058 | 209 |
| 6 | days | 518400 | 129.6 | 155.52 | 16540 | 2572 | 3087 | -514 |
| 8 | days | 691200 | 143.6 | 172.32 | 16540 | 2850 | 4115 | -1265 |
| 10 | days | 864000 | 156.5 | 187.8 | 16540 | 3106 | 5144 | -2038 |
| 12 | days | 1036800 | 168.6 | 202.32 | 16540 | 3346 | 6173 | -2827 |
| 16 | days | 1382400 | 191.2 | 229.44 | 16540 | 3795 | 8231 | -4436 |
| 20 | days | 1728000 | 212.2 | 254.64 | 16540 | 4212 | 10289 | -6077 |
| 25 | days | 2160000 | 236.9 | 284.28 | 16540 | 4702 | 12861 | -8159 |

**Note:**

[1] Rainfall data used from MET Rainfall Table for Site

[2] 20% climate change factor applied

| | |
|---|---|
| Storage required (m3) | **1184.56** |
| Storage provided | **1200.00** |