



# Mixed-use Development at Magee Barracks, Kildare

Phase 1 - Planning Application

## Water Services Design Report

July 2019

**GARLAND**  
Concepts Realised

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Description of Change	Originator	Rev	Approval	Date
Initial Release	SR/ JN	0	KR	28/2/18
Revised Release	SR/ JN	1	KR	5/3/2018
Revised Release	SR/ JN	2	KR	13/3/2018
Revised Release	SR/ JN	3	KR	14/3/2018
Revised Release	SR/ JN	4	KR	16/3/2018
Revised Release	SR/JN	5	KR	22/10/2018
Revised Release	CR/BM	6	KR	26/6/2019

## 1. INTRODUCTION

This report has been prepared by Garland to describe the sustainable urban drainage (SUDS) proposals (storm water and foul drainage) for the Phase 1 development of the Magee Barracks site, the extent of which is described in the accompanying planning documents.

## 2. SURFACE WATER DRAINAGE

### 2.1 Existing Drainage on the Site

The existing site is a disused army barracks in Kildare town centre consisting of a number of hardstanding parade grounds surrounded by numerous buildings and open space. A CCTV investigation of the existing surface water drains on site was undertaken by McBreen Environmental in 2016. The investigation showed that the existing drains on site are “combined” drains, allowing both foul water and surface water from the barracks site to drain into the public foul sewerage system. There are no watercourses or separate surface water sewers draining the site itself, with unsewered parts of the site draining naturally to ground.

### 2.2 Existing Drainage in Kildare Town

Recent surveys and site investigations concluded that properties along Hospital Street, in close proximity to the proposed Magee Barracks development, are all serviced by a combined sewer within Hospital Street.

A small area/section of Hospital Street, to the front of the proposed Magee Barracks development entrance, is serviced by a designated surface water network and drains to an existing land drain to the back of the Health Services Clinic.

Garland Drawing R1831-1028 illustrates the existing infrastructure as described above.

### 2.3 Drainage Design Intent

It is our intention to discharge surface water run-off from the site to the existing combined sewer network within Hospital Street. The existing discharge from the site connects to this combined sewer.

The existing peak discharge from the Magee Barracks development has been calculated as 293 l/s. Upon completion of this development, the discharge to this combined sewer will be significantly reduced. This design intent is further described and elaborated on in the text below.

Should Kildare County Council condition that the surface water discharge to a designated surface water network, the current design has sufficient grade and levels

available to be able to sufficiently connect to the designated surface water network as mentioned above.

## 2.4 Sustainable Urban Drainage System Design

The proposed sustainable urban drainage system for the Phase 1 development has been designed in accordance with the CIRIA SUDS Manual 2015 and GSDS. The key objectives of the SUDS system design, in compliance with those guidance documents, are summarised as follows;

### 1. Designing for Water Quantity

#### 1a. Volume control - small events;

- mimic greenfield situation where possible;
- provide min. 5mm rainfall interception where possible;

#### 1b. Volume control – large events;

- design for 100 yr return period storm event – no flooding;
- limit outflows from the site to  $Q_{bar}$  or  $2l/s/a$ , whichever is greater;

### 2. Designing for Water Quality

#### 2a. Prevent runoff to receiving waters for small storm events;

- initial flush of pollutants is captured
- min. guide of 5mm rainfall interception provided

#### 2b. Treat runoff to prevent negative impacts

- Protect receiving waters from accidental spills/ high pollution loadings
- Reduce long term chronic pollution from urban environment

To enable design of the proposed SUDS system, a number of site investigations were undertaken on the site over the last two years, including 19 no. infiltration tests. All infiltration tests were undertaken in accordance with the recommendations of CIRIA C753 and BRE DG365. The results of the site investigation and infiltration tests are discussed in detail in Chapter 9 of the EIS and the infiltration test results are included in Appendix A of this report. Garland drawing R1831 – 1006 illustrates the infiltration test results and the extent of good infiltration across the Magee Barracks site as per the site investigations conducted.

The soil layers within the soil profiles, that were consistent with good infiltration can be described as *'Grey brown slightly silty sand subangular to subrounded fine to coarse GRAVEL of varied lithologies with high cobble content. Sand is fine to coarse. Cobbles are subangular of varied lithologies.'* This profile was present in all of the soil profiles at the infiltration test locations. The majority of the infiltration tests on site failed as a

result of these test being carried out at a depth where the soil layer was identified to have clays present.

The site investigations and soil profiles confirm that direct infiltration to ground is possible when infiltrating to the soil layer described above. We have therefore proposed a tiered system of SUDS measures that aim to meet the key objectives of GDSDS and the CIRIA SUDS Manual.

There are a wide variety of SUDS measures that can be used to achieve compliance with the objectives outlined. The SUDS measures proposed in this case have been selected based on a holistic approach to site development, taking into consideration the following key constraints;

- Variability of ground conditions;
- Town centre location;
- Housing density requirements;
- Usability and amenity of the open space;
- Health and safety for children and residents;
- Ongoing maintenance and taking-in-charge considerations of the local authority.

The proposed SUDS system for Phase 1 of this development is therefore summarised below and a detailed layout provided on GARLAND Drainage Drawings (Layout Drawings Ref. R1831-1002). Schematics are provided hereafter.

All SUDS elements have been designed to cater for the 100 year return period storm event, including a 20% allowance for increased flows due to climate change;

- Storm water from all roofs and parking areas will discharge directly into permeable paving systems with stone below to provide quality control and some limited local storage. A permeable membrane is proposed to allow for maximum infiltration to ground. Should the sub soil present be saturated or insufficient to allow infiltration to ground, the system would act as a temporary “tank” and discharge to the internal surface water network until such time that infiltration is possible again. Outflows from permeable paving areas will be via “fin drains” and 110mm outfall pipes to the adjacent storm network. Attenuation up to the 100 year RP design storm event will be provided via underground soakaway systems, Wavin AquaCell infiltration units or similar approved by Kildare County Council, on the downstream pipe network, as described hereafter.
- Storm water from roads will be collected using a traditional gully and pipe network. There are a number of separate pipe networks proposed around the site. Each storm network will discharge to an underground soakaway system

discharging to ground. These systems have been designed to be located at such a depth that would allow maximum filtration into the soil layers that were consistent with good infiltration as described above. Refer to Garland drawing R1831-1039 for soakaway design levels in relation to the soil profiles present. The infiltration rate at the proposed soakaway locations are in our professional judgement deemed to be suitable. The road drainage and overflows from the permeable paving system will discharge directly to ground via an infiltration tank, sized to cater for the 100 year design storm event.

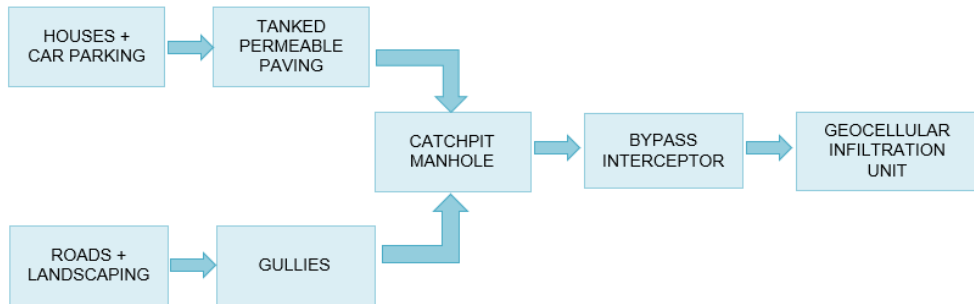


Figure 1: Surface Water Network S1 - S8

- Storm water from the Cancer Treatment Centre, Magee Square, Creche and the spine road will be managed by means of both infiltration (where suitable) and attenuation with controlled discharge to the public network. The surface water drainage measures for these areas was included in the previous planning application for the Cancer Treatment Centre, reference no. 18149, granted permission by Kildare County Council. The overall proposed peak discharge from the overall site to the downstream public network is 2/s. As discussed previously in this report, this is a significant reduction from the existing peak discharge of 293 l/s (foul and surface water) to the existing combined network within Hospital Street. The surface water discharge manhole will be designed so as to allow for the future connection to a designated surface water network.

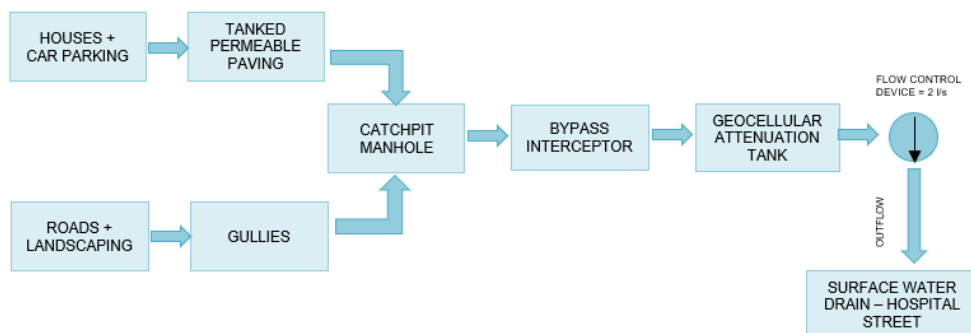


Figure 2: Surface Water Network Draining to Hospital Street

- The design of the storm water network and SDUS systems was based on the following factors for the developed site;
  - Roofs; 100% impermeable area
  - Roads; 100% impermeable area
  - Permeable Paving (in-situ soil assumed saturated); 100% impermeable area
  - Hard landscaping; 80% impermeable area
  - Soft landscaping; 5% impermeable area
- The proposed peak discharge from the overall site to the downstream public storm network is 2l/s. This complies with guidance in GSDSDS and the CIRIA SUDS manual whereby a rate of approx. 2l/s/ha is recommended to provide a conservative design and prevent downstream flooding of watercourses. Due to the variability of the ground conditions and the size of the site (<50ha) we consider that this rate of 2l/s/ha provide a more robust design approach than an estimate of Qbar (the mean annual flood) for the site.
- As there is a capacity restriction on the downstream M7 carrier pipe to which storm flows from this catchment are discharging, the low flow rate of 2/s from the overall site will ensure that there is limited impact on the carrier drain and, as discussed previously, a significant reduction from the calculated discharge from the existing Magee Barracks site. A study has recently been carried out by Kildare Road Design Office to determine the available capacity which can be reserved for storm flows from development in the catchment. The publication of this study is yet to be released however, correspondence with Mr. John Grealish from Kildare County Council National Roads Office (KCC NRO) confirmed that the KCC NRO had no objections to the proposed peak flow discharge. The previous design and submission of this application concluded a peak flow discharge to the network in question to be 27 l/s. This has since been significantly reduced by means of alternative SUDS measures (infiltration as described above) across the Magee Barracks development. The aforementioned correspondence has been added to this report as Appendix B. The proposed development, therefore, represents a significant reduction in the volume of storm water that would be discharged to the public combined system in a 1 in 100 year storm event compared to the discharge from the site.

## 2.5 Design of the Permeable Paving System

Pervious pavements provide a pavement suitable for pedestrian and traffic while allowing rainwater to infiltrate through the surface into the structural layers beneath. The water is temporarily stored beneath the overlying surface before infiltration to the sub-surface or discharge to a downstream surface water outfall if the ground is impermeable. Treatment processes that occur within the surface structure, the subsurface matrix (including soil layers) and the geotextile layers include filtration, adsorption, biodegradation and sedimentation.

Permeable pavements have a surface that is formed of material that is itself impervious to water but the pavement is laid to provide a void space through the surface to the sub-base below (CIRIA, 2016). The type of permeable paving system proposed in this case is a Type B system as indicated in Figure 20.13 from the CIRIA SUDS Manual 2016.

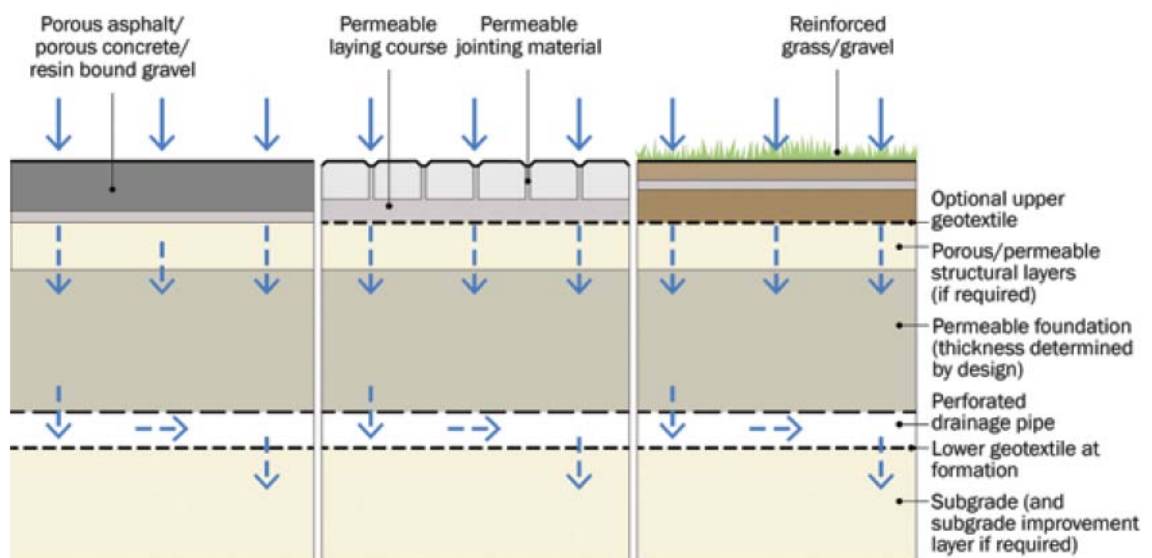


Figure 20.13 Pervious pavement system types: Type B – partial infiltration

For this development, permeable paving designers “Formpave” have prepared a detailed proposal for the recommended system. This system will not provide attenuation for the 100 year event, but instead this will be provided in the geocellular tank downstream of the storm sewer network. The reason for this is the complexity, cost and difficulty involved in attempting to throttle the individual flow rates from private properties. The impermeable area of the roofs and permeable car parking areas have therefore been accounted for in the downstream network and attenuation tank calculations. The proposed build up, typical inlet detail and typical fin drain outlet detail for the permeable paving system are shown on Garland’s Drainage Drawing R1831-1032.



## 2.6 Design of Infiltration Tank System

Soakaways/ Infiltration Tanks are excavations that are filled with a void-forming material that allows temporary storage of water before it soaks into the ground. Many soakaways for large developments are now constructed with geocellular units which provide good overall storage capacity compared to stone fill (CIRIA, 2016).

Throughout surface water Network Zones 1 to 8, it is proposed to drain the storm water to ground by means of an underground infiltration tank made from geocellular units.

The indicative layout of the proposed infiltration tank for Storm Network S1 is shown on Garland's drainage layout drawings R1831-1002 with a standard detail drawing provided on Garland's Drainage Drawing R1831-1032 and specific design levels of the soakaway systems in relation to soil profiles indicating good infiltration on drawing R1831-1039. This infiltration tank has been sized for the critical design storm duration during a 100 year return period storm event (incl 20% climate change) based on the contributing catchment. The design calculations are provided in Appendix C. The design was undertaken using hydraulic modelling software WinDes which allows for critical design storm duration analysis.

We note that in attempting to achieve compliance with the CIRIA SUDS Manual and GDSDS it is necessary to design SUDS systems which rely, ultimately, on on-site confirmation of infiltration rates at final formation level. It is therefore impossible to fully "de-risk" the design of a SUDS system at planning stage, with designs, site layouts and levels for housing developments often changing continuously throughout the Planning Process. It is therefore fully necessary for the Engineer/ Hydrologist to make a professional judgement on the basis of a Stage 1 site investigation and to then complete the final design of the infiltration system based on a Stage 2 site investigation at detailed design stage. As stated previously, a Stage 2 site investigation (to Eurocode 7) will be undertaken in advance of the final detailed design of the infiltration system to ensure this infiltration rate is representative of the conditions at final formation level.

The geocellular attenuation/infiltration tanks proposed on the site are Wavin "Aqua Cell" type system with 95% porosity. The tanks have been sized based on the critical storm duration for the 100 year return period storm event (incl 20% climate change allowance). A bypass interceptor and catchpit will be located upstream of the attenuation tanks as previously described. Figure 13.1 illustrates the typical soakaway detail to be as per the CIRIA SUDS Manual.

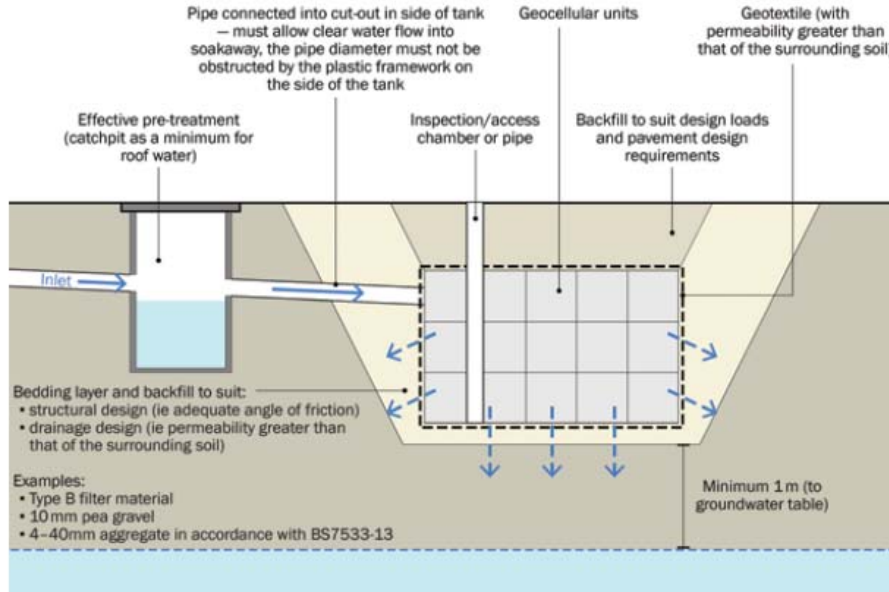


Figure 13.1 Soakaway details (including a pre-treatment system)

A summary of the catchment areas, volumes and outflow rates for each of the attenuation tanks is provided in Table 1 for ease of reference.

**Table 1 – Summary of Storm Water Attenuation/ Infiltration Zones**

Storm Network Zone	Impermeable Area Drained (ha)	Draining To On-Site Location	Attenuation/ Infiltration Volume Provided (m3)	Outfall Point Downstream	Peak Discharge Rate to DS Network (l/s)	Bypass Interceptor Size
S1	1.337	Infiltration Zone S1	912	Infiltrates to Ground at Magee Gardens	-	NSBE020
S2	0.796	Infiltration Zone S2	725	Infiltrates to Ground at Parade Park	-	NSBE015
S3	0.665	Infiltration Zone S3	512	Infiltrates to Ground at Coolmoney Square	-	NSBE015
S4	1.192	Infiltration Zone S4	936	Infiltrates to Ground at Coolmoney Square	-	NSBE020
S5	0.341	Infiltration Zone S5	296	Infiltrates to Ground at Parade Park	-	NSBP004
S6	0.397	Infiltration Zone S6	375.2	Infiltrates to Ground at Linear Park	-	NSBP006
S7	0.444	Infiltration Zone S7	420	Infiltrates to Ground at Linear Park	-	NSBP006
S8	0.786	Infiltration Zone S8	936	Infiltrates to Ground at Coolmoney Square	-	NSBE015
S9	0.536	Attenuation Zone S1	144	Hospital Street Combined SW Ntwk	2.0	NSBE010

## 2.7 Design of Road Drainage Collection Network

The storm drainage from the roads and footpaths will be collected in gullies and discharged via a traditional storm pipe network to the attenuation/ infiltration tanks as described above. There are a number of separate networks proposed and each will discharge will to a separate infiltration system located in the open space areas adjacent to the road network in question.

This storm pipe networks have been designed in accordance with IS EN 12056, IS EN 752 and the Greater Dublin Strategic Drainage Study. The design was completed using hydraulic modelling software WinDes which uses the UK Modified Rational Method, in which the peak flow  $Q$  is determined for a storm of critical duration using the following equation:

$$Q = 3.61 \times C_v \times i \times A_i$$

$C_v$  = run-off coefficient (0.75),  $i$  = rainfall intensity,  $A_i$  = impermeable area

The following assumptions were made in the design:

- The maximum discharge of surface water (SW) from an area occurs when the duration of the storm is equal to the time of concentration ( $t_c$ ) of the area.  $t_c$  = time of entry + (length of drain ÷ full bore velocity of flow).
- Time of entry ( $t_e$ ) = 4 minutes.
- Colebrook-White effective roughness ( $K_s$ ) = 0.6mm for Surface Water Sewers

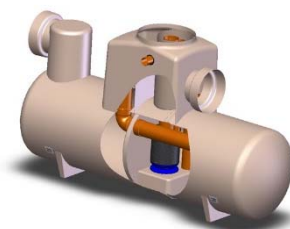
The layout of the proposed road drainage networks is shown on Garland Drainage Drawing R1831-1002. The design calculations for each network are provided in Appendix D. The water quality protection measures that are proposed as part of this road drainage system before discharge to the attenuation/ infiltration tanks as described in Section 2.8 below.

## 2.8 Water Quality Protection

A number of water quality protection measures are proposed on the road drainage system, as follows;

- Road gullies on the road network will remove of initial heavy solids that can be washed into the drainage network – e.g. leaves, stones, heavy grit, etc;
- Bypass interceptors are proposed upstream of all underground tanks for removal of any petrol/ oil contaminants that are washed into the drainage network;
- Catchpits are also proposed upstream of all underground tanks to allow settlement of suspended solids washed into the pipe system.

The bypass interceptors proposed are Klargester Class 2 bypass interceptor, or similar approved, sized based



on the drainage area discharging to each pipe network. A typical example of the proposed interceptor shown below, with locations indicate on Garland's Drainage Drawing.

A catchpit is also proposed upstream of all underground tanks to act as a pre-treatment system as shown in Figure 13.1 from the SUDS manual. This will allow sediment and silt which was passed through the drainage system to settle out, thus reducing the risk of clogging.

### 3. FOUL DRAINAGE

The proposed foul sewer network layout for the development is shown on GARLAND Drainage Drawings R1831-1000, 1001 and 1009. It is proposed to provide two new gravity foul sewer systems – a northern (Foul Network F1) and a southern system (Foul Network F2) – on the Phase 1 site. The southern system will discharge to the existing foul sewer on Hospital Street (MH Ex. F1) and allowance has been made for discharge from future developments. The northern system will discharge to the existing foul network within Ruanbeg Crescent Street in the neighbourhood of Ruanbeg Manor.

A pre-connection enquiry was lodged with Irish Water for the development outlining the proposed flows and loads which would be associated with the development. This application was to undertaken determine if there is adequate capacity in the existing public foul sewer network to cater for this development. Irish Water has reviewed the pre-connection enquiry and had confirmed the feasibility of the proposed foul connection of foul flows for the development to the public network. Irish Water has also issued Garland with a Statement of Design Acceptance for the foul sewer design. The aforementioned Irish water approvals has been included in this report within Appendix E.

The proposed internal foul drainage network for the development has been designed in accordance with **Irish Water Code of Practice December 2017** and IS EN 12056/ IS EN 752 using hydraulic modelling software WinDes which uses the Colebrook White equation. The design calculations for the same are included in Appendix F.

There are 2 no. existing combined public sewers on the site which traverse the existing Magee barracks site. These sewers are proposed to be diverted through the development via a single 600 diameter sewer that will provide same capacity as the existing sewers – refer to Garland's drainage drawings R1831-1009. The final details of this proposed diversion, including the width of permanent wayleave required, will be finalised with Irish Water as part of the connection application for the development once planning is granted.

The existing foul pumped rising main from the school will also be diverted as part of the development and will now discharge into the proposed foul system as shown on Garland's drainage drawings R1831-1009. The flows from the school have been allowed for in the design of the proposed foul drainage system.

#### 4. WATER SUPPLY

The proposed water supply network layout for the development is shown on GARLAND Watermain Drawings R1831- 1003. It is proposed to lay a new 200mm diameter trunk watermain from Hospital Street to the northern boundary of the Phase 1 development. Phase 2 of this development will connect to this trunk main, and when completed join up with the existing Kildare Town water network within Melitta Road. The water main distribution system for the proposed development will connect to the existing 10" diameter DI watermain on Hospital Street. A new bulk water meter is to be installed at this connection point. Individual houses will have separate connections to the distribution main via service connections and boundary boxes. Individual service boundary boxes will be in compliance with Irish Water Code of Practice.

A pre-connection enquiry was lodged with Irish Water for the development outlining the proposed water demands which would be associated with the development. This application was undertaken to determine if adequate capacity was available in the existing public water network to service the development. Irish Water has reviewed the pre-connection enquiry and had confirmed the feasibility of the proposed water connection for the development to the public network. Irish Water has also issued Garland with a Statement of Design Acceptance for water network design. The aforementioned Irish water approvals has been included in this report within Appendix E.

The proposed internal water supply network for the development has been designed in accordance with **Irish Water Code of Practice December 2017**.

# APPENDICES



**APPENDIX A**

**Infiltration Test Results**

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**S.I. Ltd Contract No: 5448**

Client: RKD Architects  
Engineer: Garland  
Contractor: Site Investigations Ltd

**Magee Barracks**  
**Kildare, Co. Kildare**  
**Site Investigation Report**

Prepared by:

.....  
Stephen Letch

Issue Date:	09/02/2018
Status	Final
Revision	1

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Appendices:

1. Soakaway Test Results
  2. Survey Data
-

## **1. Introduction**

In May 2017 and on the instructions of Garland, Site Investigations Ltd (SIL) was appointed to complete a ground investigation at Magee Barracks, Kildare, Co. Kildare. The investigation was for a new residential development on the site and was completed on behalf of the Client, RKD Architects. Following this investigation, SIL were then requested to complete further infiltration testing on the site to test for possible areas for storm water soakaways. This report covers this additional testing.

The fieldworks comprised a programme of soakaway tests. All fieldwork was carried out in accordance with BS 5930:2015, Engineers Ireland GI Specification and Related Document 2<sup>nd</sup> Edition 2016 and Eurocode 7: Geotechnical Design.

This report presents the factual geotechnical data obtained from the field testing.

## **2. Fieldwork**

The fieldworks were started and completed in February 2018 and comprised the following:

- 9 No. soakaway tests

### **2.1. Soakaway Tests**

9 No. soakaway tests were completed using a wheeled excavator and they were logged by SIL geotechnical engineer. The soakaway test is used to identify possible areas for storm water drainage. The pit was filled with water and the level of the groundwater was recorded over time. As stipulated by BRE Special Digest 365, the pit should be filled three times and that the final cycle is used to provide the infiltration rate. The time taken for the water level to fall from 75% volume to 25% volume is required to calculate the rate of infiltration. However, if the water level does not fall at a steady rate then the test is deemed to have failed and the area is unsuitable for storm water drainage.

The soakaway logs are presented in Appendix 1.

### **2.2. Surveying**

Following the completion of the works, a survey of the exploratory hole locations was completed using a GeoMax GPS Rover. The data is provided along with a site plan in Appendix 2.

**Appendix 1**  
**Soakaway Test Results**

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# SOAKAWAY TEST

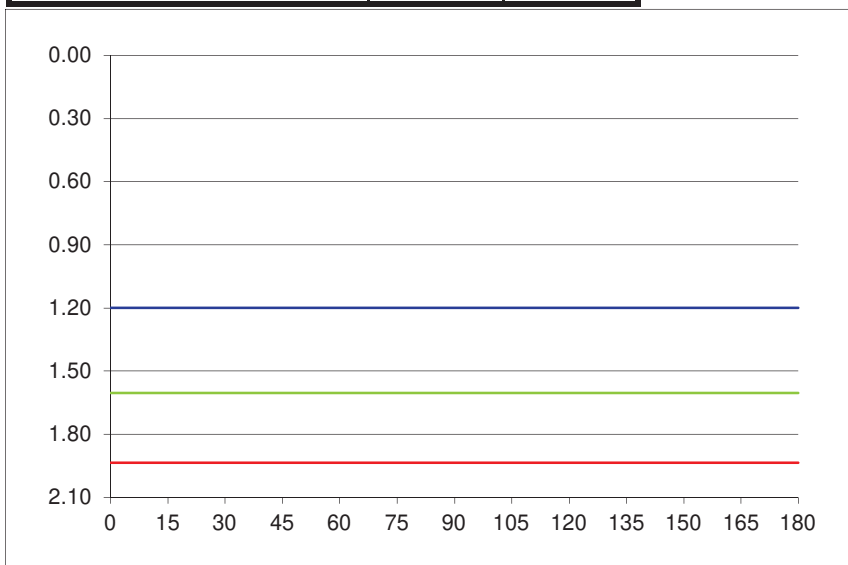


<b>Project Reference:</b>	5448
<b>Contract name:</b>	Magee Barracks
<b>Location:</b>	Kildare, Co. Kildare
<b>Test No:</b>	SA01
<b>Date:</b>	01/02/2018

<b>Ground Conditions</b>		
From	To	
0.00	0.10	TOPSOIL.
0.10	0.50	MADE GROUND: grey brown silty sandy gravel with high cobble content and some red brick fragments.
0.50	0.60	MADE GROUND: black sandy gravelly silty clay.
0.60	1.40	Firm brown slightly sandy slightly gravelly silty CLAY with low cobble content.
1.40	2.10	Firm light brown slightly sandy gravelly silty CLAY with high cobble and low boulder content.

Elapsed Time (mins)	Fall of Water (m)
0	1.20
0.5	1.20
1	1.20
1.5	1.20
2	1.20
2.5	1.20
3	1.20
3.5	1.20
4	1.20
4.5	1.20
5	1.20
6	1.20
7	1.20
8	1.20
9	1.20
10	1.20
12	1.20
14	1.20
16	1.20
18	1.20
20	1.20
25	1.20
30	1.20
40	1.20
50	1.20
60	1.20
90	1.20
120	1.20
150	1.20
180	1.20

<b>Pit Dimensions (m)</b>		
Length (m)	2.30	m
Width (m)	0.50	m
Depth	2.10	m
<b>Water</b>		
Start Depth of Water	1.44	m
Depth of Water	0.66	m
75% Full	1.61	m
25% Full	1.94	m
75%-25%	0.33	m
Volume of water (75%-25%)	<b>0.38</b>	m <sup>3</sup>
Area of Drainage	<b>11.76</b>	m <sup>2</sup>
Area of Drainage (75%-25%)	<b>3.00</b>	m <sup>2</sup>
<b>Time</b>		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	<b>N/A</b>	min
Time 75% to 25% (sec)	<b>N/A</b>	sec



**f = Fail or**

**Fail**

**m/min**

**m/s**

# SOAKAWAY TEST

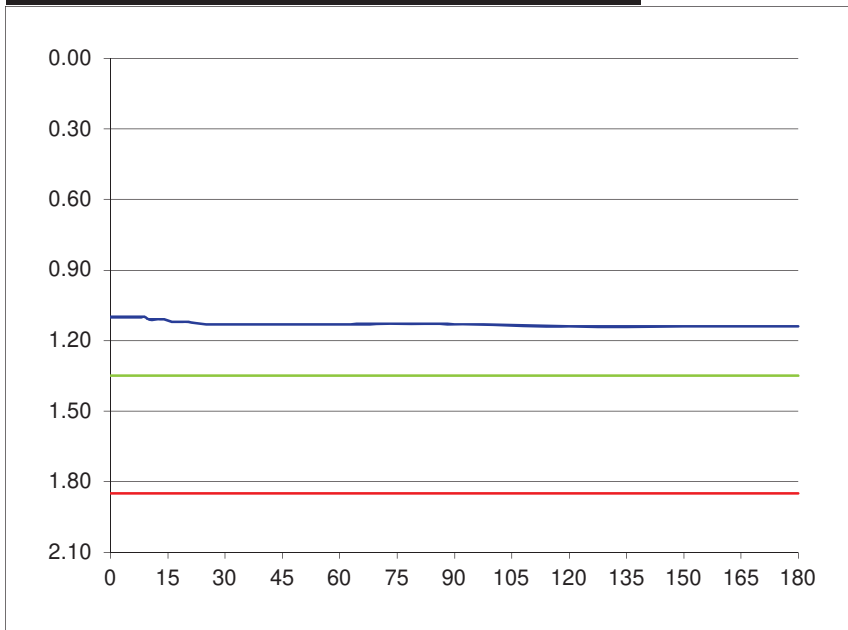


<b>Project Reference:</b>	5448
<b>Contract name:</b>	Magee Barracks
<b>Location:</b>	Kildare, Co. Kildare
<b>Test No:</b>	SA02
<b>Date:</b>	01/02/2018

<b>Ground Conditions</b>		
From	To	
0.00	0.10	TOPSOIL.
0.10	0.50	MADE GROUND: brown slightly sandy gravelly silty clay with medium cobble content and some red brick fragments.
0.50	0.70	Firm brown slightly sandy slightly gravelly silty CLAY.
0.70	2.10	Firm grey brown slightly sandy gravelly silty CLAY with low cobble content.

Elapsed Time (mins)	Fall of Water (m)
0	1.10
0.5	1.10
1	1.10
1.5	1.10
2	1.10
2.5	1.10
3	1.10
3.5	1.10
4	1.10
4.5	1.10
5	1.10
6	1.10
7	1.10
8	1.10
9	1.10
10	1.11
12	1.11
14	1.11
16	1.12
18	1.12
20	1.12
25	1.13
30	1.13
40	1.13
50	1.13
60	1.13
90	1.13
120	1.14
150	1.14
180	1.14

<b>Pit Dimensions (m)</b>		
Length (m)	2.20	m
Width (m)	0.50	m
Depth	2.10	m
<b>Water</b>		
Start Depth of Water	1.10	m
Depth of Water	1.00	m
75% Full	1.35	m
25% Full	1.85	m
75%-25%	0.50	m
Volume of water (75%-25%)	<b>0.55</b>	m <sup>3</sup>
Area of Drainage	<b>11.34</b>	m <sup>2</sup>
Area of Drainage (75%-25%)	<b>3.80</b>	m <sup>2</sup>
<b>Time</b>		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	<b>N/A</b>	min
Time 75% to 25% (sec)	<b>N/A</b>	sec



**f =** Fail or Fail  
m/min m/s

Fail  
m/s

# SOAKAWAY TEST



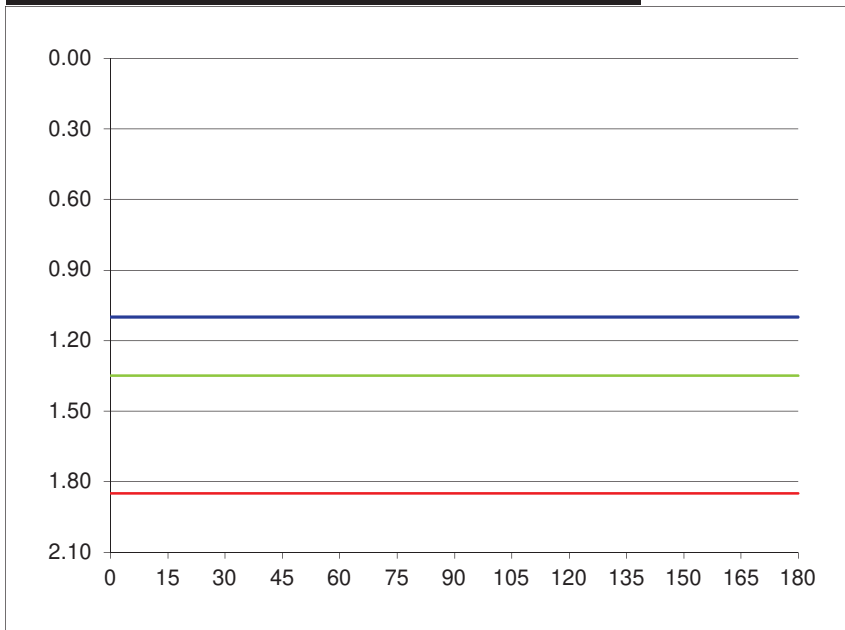
<b>Project Reference:</b>	5448
<b>Contract name:</b>	Magee Barracks
<b>Location:</b>	Kildare, Co. Kildare
<b>Test No:</b>	SA03
<b>Date:</b>	01/02/2018

### Ground Conditions

From	To	
0.00	0.90	MADE GROUND: black grey silty sandy gravel with medium cobble content and some ash, glass, red brick and scrap metal fragments.
0.90	1.70	MADE GROUND: grey brown grey slightly sandy gravelly silty clay with high cobble content and some red brick fragments.
1.70	2.10	Firm grey brown sandy slightly gravelly silty CLAY.

Elapsed Time (mins)	Fall of Water (m)
0	1.10
0.5	1.10
1	1.10
1.5	1.10
2	1.10
2.5	1.10
3	1.10
3.5	1.10
4	1.10
4.5	1.10
5	1.10
6	1.10
7	1.10
8	1.10
9	1.10
10	1.10
12	1.10
14	1.10
16	1.10
18	1.10
20	1.10
25	1.10
30	1.10
40	1.10
50	1.10
60	1.10
90	1.10
120	1.10
150	1.10
180	1.10

Pit Dimensions (m)		
Length (m)	2.40	m
Width (m)	0.50	m
Depth	2.10	m
Water		
Start Depth of Water	1.10	m
Depth of Water	1.00	m
75% Full	1.35	m
25% Full	1.85	m
75%-25%	0.50	m
Volume of water (75%-25%)	<b>0.60</b>	m <sup>3</sup>
Area of Drainage	<b>12.18</b>	m <sup>2</sup>
Area of Drainage (75%-25%)	<b>4.10</b>	m <sup>2</sup>
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	<b>N/A</b>	min
Time 75% to 25% (sec)	<b>N/A</b>	sec



**f =** Fail or Fail  
m/min m/s



# SOAKAWAY TEST



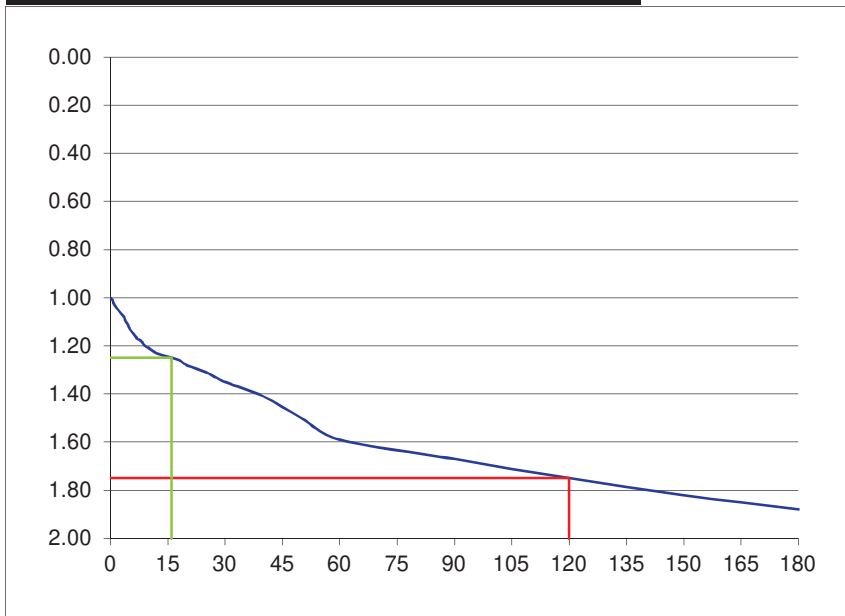
<b>Project Reference:</b>	5448
<b>Contract name:</b>	Magee Barracks
<b>Location:</b>	Kildare, Co. Kildare
<b>Test No:</b>	SA04
<b>Date:</b>	01/02/2018

### Ground Conditions

From	To	
0.00	0.10	TOPSOIL.
0.10	0.40	MADE GROUND: brown silty sandy gravel with some red brick fragments.
0.40	0.70	Firm brown slightly sandy slightly gravelly silty CLAY.
0.70	1.70	Firm grey slightly sandy slightly gravelly silty CLAY.
1.70	2.00	Firm light brown slightly sandy slightly gravelly silty CLAY.

Elapsed Time (mins)	Fall of Water (m)
0	1.00
0.5	1.01
1	1.03
1.5	1.04
2	1.05
2.5	1.06
3	1.07
3.5	1.08
4	1.10
4.5	1.11
5	1.13
6	1.15
7	1.17
8	1.18
9	1.20
10	1.21
12	1.23
14	1.24
16	1.25
18	1.26
20	1.28
25	1.31
30	1.35
40	1.41
50	1.50
60	1.59
90	1.67
120	1.75
150	1.82
180	1.88

Pit Dimensions (m)	
Length (m)	2.10 m
Width (m)	0.40 m
Depth	2.00 m
Water	
Start Depth of Water	1.00 m
Depth of Water	1.00 m
75% Full	1.25 m
25% Full	1.75 m
75%-25%	0.5 m
Volume of water (75%-25%)	<b>0.42</b> m <sup>3</sup>
Area of Drainage	<b>10</b> m <sup>2</sup>
Area of Drainage (75%-25%)	<b>3.34</b> m <sup>2</sup>
Time	
75% Full	16 min
25% Full	120 min
Time 75% to 25%	<b>104</b> min
Time 75% to 25% (sec)	<b>6240</b> sec



$f = \frac{0.00121}{\text{m/min}}$ or $\frac{2.02E-05}{\text{m/s}}$
---

# SOAKAWAY TEST



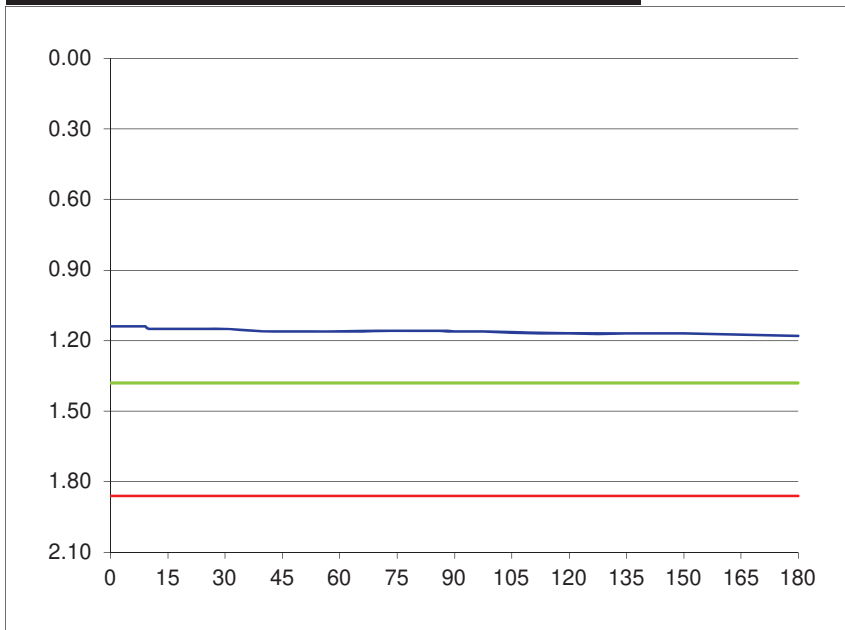
<b>Project Reference:</b>	5448
<b>Contract name:</b>	Magee Barracks
<b>Location:</b>	Kildare, Co. Kildare
<b>Test No:</b>	SA05
<b>Date:</b>	01/02/2018

### Ground Conditions

From	To	
0.00	0.10	TOPSOIL.
0.10	0.20	MADE GROUND: grey concrete.
0.20	0.40	MADE GROUND: grey brown silty sandy gravel with high cobble content.
0.40	0.80	Soft light grey slightly sandy slightly gravelly silty CLAY.
0.80	2.10	Firm light brown slightly sandy gravelly silty CLAY with low cobble content.

Elapsed Time (mins)	Fall of Water (m)
0	1.14
0.5	1.14
1	1.14
1.5	1.14
2	1.14
2.5	1.14
3	1.14
3.5	1.14
4	1.14
4.5	1.14
5	1.14
6	1.14
7	1.14
8	1.14
9	1.14
10	1.15
12	1.15
14	1.15
16	1.15
18	1.15
20	1.15
25	1.15
30	1.15
40	1.16
50	1.16
60	1.16
90	1.16
120	1.17
150	1.17
180	1.18

Pit Dimensions (m)		
Length (m)	2.40	m
Width (m)	0.50	m
Depth	2.10	m
Water		
Start Depth of Water	1.14	m
Depth of Water	0.96	m
75% Full	1.38	m
25% Full	1.86	m
75%-25%	0.48	m
Volume of water (75%-25%)	<b>0.58</b>	m <sup>3</sup>
Area of Drainage	<b>12.18</b>	m <sup>2</sup>
Area of Drainage (75%-25%)	<b>3.98</b>	m <sup>2</sup>
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	<b>N/A</b>	min
Time 75% to 25% (sec)	<b>N/A</b>	sec



**f = Fail m/min** or **Fail m/s**

# SOAKAWAY TEST



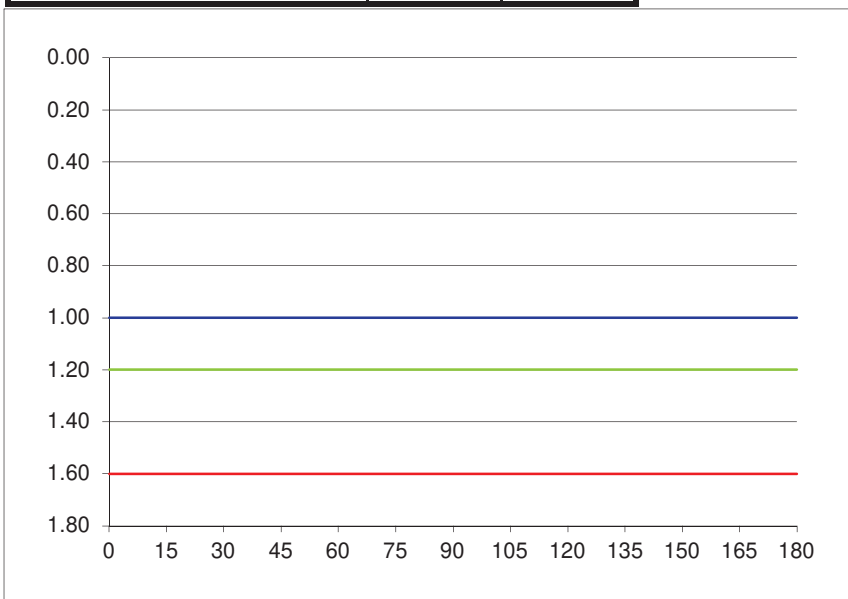
<b>Project Reference:</b>	5448
<b>Contract name:</b>	Magee Barracks
<b>Location:</b>	Kildare, Co. Kildare
<b>Test No:</b>	SA06
<b>Date:</b>	02/02/2018

## Ground Conditions

From	To	
0.00	0.05	MADE GROUND: tarmacadam.
0.05	0.25	MADE GROUND: grey brown silty sandy gravel with high cobble content and some red brick fragments.
0.25	0.95	Firm light brown slightly sandy slightly gravelly silty CLAY.
0.95	1.80	Firm light brown slightly sandy gravelly silty CLAY with medium cobble content.
1.80		Obstruction - boulders.

Elapsed Time (mins)	Fall of Water (m)
0	1.00
0.5	1.00
1	1.00
1.5	1.00
2	1.00
2.5	1.00
3	1.00
3.5	1.00
4	1.00
4.5	1.00
5	1.00
6	1.00
7	1.00
8	1.00
9	1.00
10	1.00
12	1.00
14	1.00
16	1.00
18	1.00
20	1.00
25	1.00
30	1.00
40	1.00
50	1.00
60	1.00
90	1.00
120	1.00
150	1.00
180	1.00

Pit Dimensions (m)		
Length (m)	3.10	m
Width (m)	0.50	m
Depth	1.80	m
Water		
Start Depth of Water	1.00	m
Depth of Water	0.80	m
75% Full	1.20	m
25% Full	1.60	m
75%-25%	0.40	m
Volume of water (75%-25%)	<b>0.62</b>	m <sup>3</sup>
Area of Drainage	<b>12.96</b>	m <sup>2</sup>
Area of Drainage (75%-25%)	<b>4.43</b>	m <sup>2</sup>
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	<b>N/A</b>	min
Time 75% to 25% (sec)	<b>N/A</b>	sec



**f =** Fail m/min or Fail m/s

# SOAKAWAY TEST



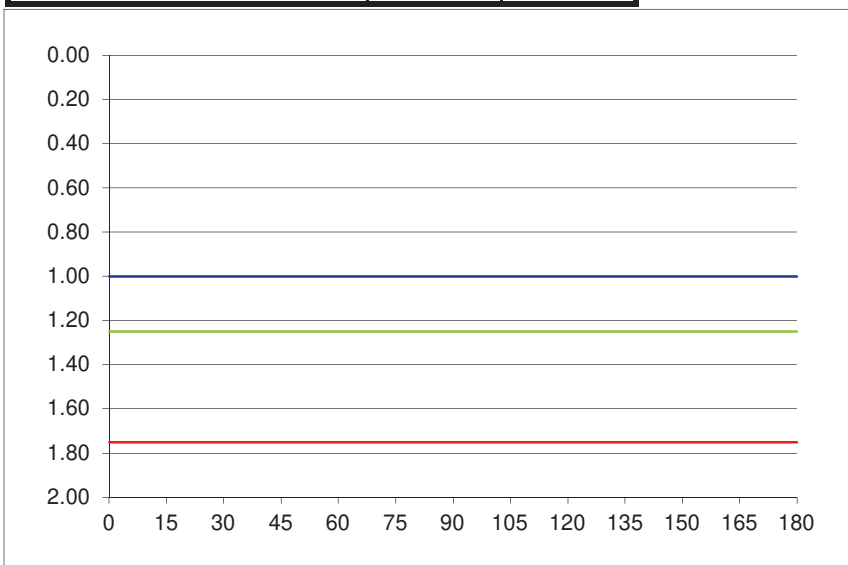
<b>Project Reference:</b>	5448
<b>Contract name:</b>	Magee Barracks
<b>Location:</b>	Kildare, Co. Kildare
<b>Test No:</b>	SA07
<b>Date:</b>	02/02/2018

### Ground Conditions

From	To	
0.00	0.05	MADE GROUND: tarmacadam.
0.05	0.25	MADE GROUND: brown silty sandy gravel with high cobble content and some red brick fragments.
0.25	0.35	Soft grey slightly sandy slightly gravelly silty CLAY.
0.35	1.10	Firm light brown slightly sandy slightly gravelly silty CLAY.
1.10	2.10	Firm light brown slightly sandy slightly gravelly silty CLAY with medium cobble and low boulder content.

Elapsed Time (mins)	Fall of Water (m)
0	1.00
0.5	1.00
1	1.00
1.5	1.00
2	1.00
2.5	1.00
3	1.00
3.5	1.00
4	1.00
4.5	1.00
5	1.00
6	1.00
7	1.00
8	1.00
9	1.00
10	1.00
12	1.00
14	1.00
16	1.00
18	1.00
20	1.00
25	1.00
30	1.00
40	1.00
50	1.00
60	1.00
90	1.00
120	1.00
150	1.00
180	1.00

Pit Dimensions (m)		
Length (m)	3.10	m
Width (m)	0.50	m
Depth	2.00	m
Water		
Start Depth of Water	1.00	m
Depth of Water	1.00	m
75% Full	1.25	m
25% Full	1.75	m
75%-25%	0.50	m
Volume of water (75%-25%)	<b>0.78</b>	m <sup>3</sup>
Area of Drainage	<b>14.40</b>	m <sup>2</sup>
Area of Drainage (75%-25%)	<b>5.15</b>	m <sup>2</sup>
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	<b>N/A</b>	min
Time 75% to 25% (sec)	<b>N/A</b>	sec



**f =** Fail m/min or Fail m/s

# SOAKAWAY TEST

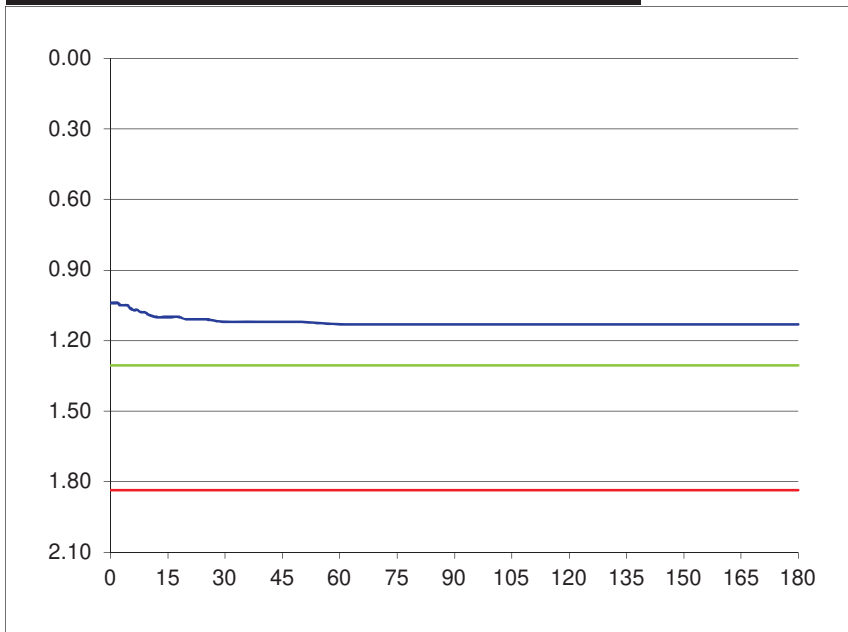


<b>Project Reference:</b>	5448
<b>Contract name:</b>	Magee Barracks
<b>Location:</b>	Kildare, Co. Kildare
<b>Test No:</b>	SA08
<b>Date:</b>	02/02/2018

<b>Ground Conditions</b>		
From	To	
0.00	0.30	TOPSOIL.
0.40	1.20	MADE GROUND: grey brown sandy gravelly silty clay with high cobble content and some red brick fragments.
1.20	1.80	Firm brown slightly sandy slightly gravelly silty CLAY.
1.80	2.10	Firm grey brown slightly sandy gravelly silty CLAY with low cobble content.

Elapsed Time (mins)	Fall of Water (m)
0	1.04
0.5	1.04
1	1.04
1.5	1.04
2	1.04
2.5	1.05
3	1.05
3.5	1.05
4	1.05
4.5	1.05
5	1.06
6	1.07
7	1.07
8	1.08
9	1.08
10	1.09
12	1.10
14	1.10
16	1.10
18	1.10
20	1.11
25	1.11
30	1.12
40	1.12
50	1.12
60	1.13
90	1.13
120	1.13
150	1.13
180	1.13

<b>Pit Dimensions (m)</b>		
Length (m)	3.30	m
Width (m)	0.50	m
Depth	2.10	m
<b>Water</b>		
Start Depth of Water	1.04	m
Depth of Water	1.06	m
75% Full	1.305	m
25% Full	1.835	m
75%-25%	0.53	m
Volume of water (75%-25%)	<b>0.8745</b>	m <sup>3</sup>
Area of Drainage	<b>15.96</b>	m <sup>2</sup>
Area of Drainage (75%-25%)	<b>5.678</b>	m <sup>2</sup>
<b>Time</b>		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	<b>N/A</b>	min
Time 75% to 25% (sec)	<b>N/A</b>	sec



**f = Fail** or **Fail**  
m/min m/s

**Fail**  
m/s

# SOAKAWAY TEST



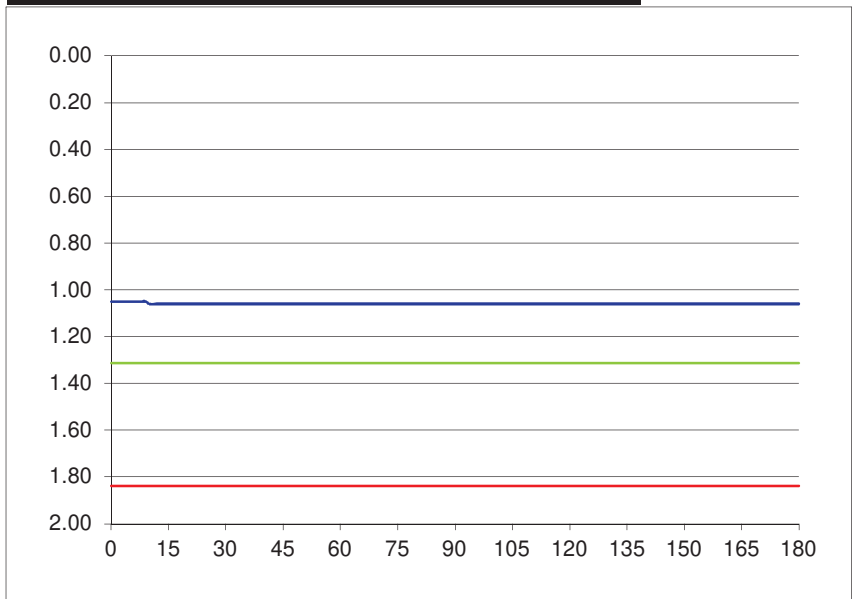
<b>Project Reference:</b>	5448
<b>Contract name:</b>	Magee Barracks
<b>Location:</b>	Kildare, Co. Kildare
<b>Test No:</b>	SA09
<b>Date:</b>	02/02/2018

## Ground Conditions

From	To	
0.00	0.40	TOPSOIL.
0.40	0.70	MADE GROUND: brown sandy gravelly silty clay with low cobble content.
0.70	0.90	MADE GROUND: black silty sandy gravel with low cobble content and some ash, red brick, glass and scrap metal fragments.
0.90	1.80	Firm brown slightly sandy slightly gravelly silty CLAY.
1.80	2.10	Firm light brown slightly sandy gravelly silty CLAY with low cobble content.

Elapsed Time (mins)	Fall of Water (m)	Pit Dimensions (m)		
		Length (m)	Width (m)	Depth (m)
0	1.05	3.00	0.50	2.10
0.5	1.05			
1	1.05			
1.5	1.05			
2	1.05			
2.5	1.05			
3	1.05			
3.5	1.05			
4	1.05			
4.5	1.05			
5	1.05			
6	1.05			
7	1.05			
8	1.05			
9	1.05			
10	1.06			
12	1.06			
14	1.06			
16	1.06			
18	1.06			
20	1.06			
25	1.06			
30	1.06			
40	1.06			
50	1.06			
60	1.06			
90	1.06			
120	1.06			
150	1.06			
180	1.06			

Pit Dimensions (m)		
Length (m)	3.00	m
Width (m)	0.50	m
Depth	2.10	m
Water		
Start Depth of Water	1.05	m
Depth of Water	1.05	m
75% Full	1.31	m
25% Full	1.84	m
75%-25%	0.53	m
Volume of water (75%-25%)	<b>0.79</b>	m <sup>3</sup>
Area of Drainage	<b>14.70</b>	m <sup>2</sup>
Area of Drainage (75%-25%)	<b>5.18</b>	m <sup>2</sup>
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	<b>N/A</b>	min
Time 75% to 25% (sec)	<b>N/A</b>	sec



**f =** Fail m/min or Fail m/s

**Appendix 2**  
**Survey Data**

---

## Survey Data

Location	Irish Transverse Mercator		Elevation	Irish National Grid	
	Easting	Northing		Easting	Northing
<b>Soakaways</b>					
ST01	673536.999	712495.042	97.33	273602.392	212463.819
ST02	673541.493	712371.464	98.26	273606.888	212340.214
ST03	673648.675	712278.792	100.77	273714.094	212247.523
ST04	673461.579	712423.157	98.35	273526.956	212391.918
ST05	673366.195	712521.941	98.55	273431.551	212490.723
ST06	673496.308	712243.132	101.78	273561.694	212211.854
ST07	673523.073	712239.760	101.66	273588.465	212208.481
ST08	673395.906	712159.591	100.24	273461.270	212128.294
ST09	673374.752	712167.292	99.99	273440.112	212135.997



Legend Key

 Locations By Type - OP

Contract No:	5448
Contract Name:	Magee Barracks
Location:	Kildare, Co. Kildare
Client:	RKD Architects
Engineer:	Garland
Title:	Site Plan
Scale:	1:2500
Drawn By:	SL



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# Ground Investigations Ireland

## Magee Barracks

### Ground Investigation Report

#### **DOCUMENT CONTROL SHEET**

Project Title	Magee Barracks
Engineer	Garland Consultancy
Client	Formation Group PLC
Project No	6109-08-16
Document Title	Ground Investigation Report

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
A	Final	A McDonnell	F McNamara	F McNamara	Dublin	31/08/16

## **APPENDIX 1 - Site Location Plan**



INFILTRATION TEST No	IRISH TRANSVERSE MERCATOR (ITM)	
	X VALUE	Y VALUE
01	672789	712559
02	672724	712524
03	672617	712417
04	672517	712368
05	672379	712174
06	672285	712188
07	672285	712188
08	672601	712517
09	672640	712686
10	672789	712784



**NOTES**

1. THE DRAWINGS FOR THIS PROJECT SHALL BE THE ORIGINAL DRAWINGS AND ALL REVISIONS SHALL BE MADE TO THE ORIGINAL DRAWINGS.
2. DO NOT SCALE THE DRAWINGS. DIMENSIONS SHALL BE TAKEN FROM THE DIMENSION LINES AND NOT FROM THE OBJECTS.
3. DIMENSIONS TO DIMENSION LINES SHALL BE TAKEN FROM THE DIMENSION LINES AND NOT FROM THE OBJECTS.
4. ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE NOTED.
5. THE DIMENSIONS OF THE OBJECTS SHALL BE TAKEN FROM THE DIMENSION LINES.

**LEGEND**

INFILTRATION TEST

NO.	REVISION	DATE	BY	CHKD BY

**ARCHITECTS**

**GARLAND**

1100 W. 10TH STREET, SUITE 1000  
 OMAHA, NE 68102  
 TEL: 402.551.8800 FAX: 402.551.8801  
 WWW.GARLANDARCHITECTS.COM

**STATUS**

**FOR CONSTRUCTION**

DATE: 10/07/18  
 AT SCALE: 3/32" = 1'-0"

DRAWN BY: J.C.  
 CHECKED BY: J.C.  
 DATE: 10/07/18  
 AT SCALE: 3/32" = 1'-0"

DESIGNED BY: J.C.  
 CHECKED BY: J.C.  
 DATE: 10/07/18  
 AT SCALE: 3/32" = 1'-0"

NO. 002

REV. A

## **APPENDIX 4 – Soakaway Test Records**

### Magee Barracks - Soakaway Tests

Elapsed Time (mins)	Fall of Water (m)	Start depth to water
0	<b>-0.200</b>	
5	-0.380	
10	-0.480	
15	-0.560	
20	-0.600	
25	-0.740	
35	-0.860	
40	-1.000	
45	-1.100	
60	-1.300	

Start depth to water  
0.20

Depth of Hole  
1.300

Length of pit (m)  
1.800

Width of pit (m)  
0.400

Length of pit (m)  
1.800

Width of pit (m)  
0.400

Diff  
1.100

**75% full**  
**0.475**

**25%full**  
**1.025**

75-25Ht (m)  
0.550

**Vp75-25 (m3)**  
**0.40**

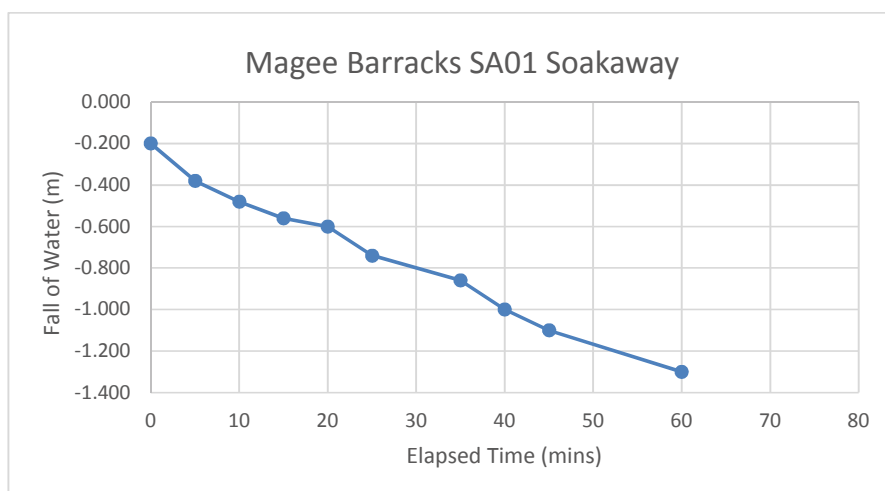
50%Eff Dpth  
0.550

**ap50 (m2)**  
**3.14**

**1860**

**tp75-25 seconds (from graph)**

**f = 0.0000678 m/s**



Magee Barracks - Soakaway Tests

Elapsed Time (mins)	Fall of Water (m)
0	-0.330
8	-0.360
18	-0.380
28	-0.400
43	-0.430
58	-0.470
78	-0.470
108	-0.490
123	-0.490
138	-0.490
153	-0.500
168	-0.500
183	-0.500
198	-0.500
213	-0.500

Start depth to water

Start depth to water  
0.33

Depth of Hole  
1.300

Length of pit (m)  
1.500

Width of pit (m)  
0.400

Length of pit (m)  
1.500

Width of pit (m)  
0.400

Diff  
0.970

75% full  
0.5725

25%full  
1.0575

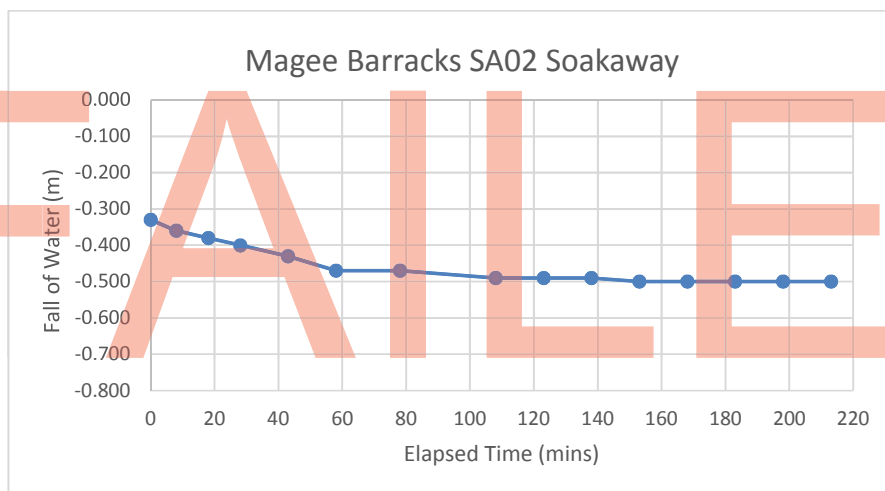
75-25Ht (m)  
0.485

Vp75-25 (m3)  
0.29

50%Eff Dpth  
0.485

ap50 (m2)  
2.443

tp75-25 seconds (from graph)



### Magee Barracks - Soakaway Tests

Elapsed Time (mins)	Fall of Water (m)	Start depth to water
0	<b>-0.870</b>	
1	-0.930	
2	-1.000	
3	-1.050	
4	-1.100	
6	-1.150	
8	-1.200	
11	-1.300	

Start depth to water      Depth of Hole  
 0.87                              1.300

Length of pit (m)          Width of pit (m)  
 1.400                              0.420

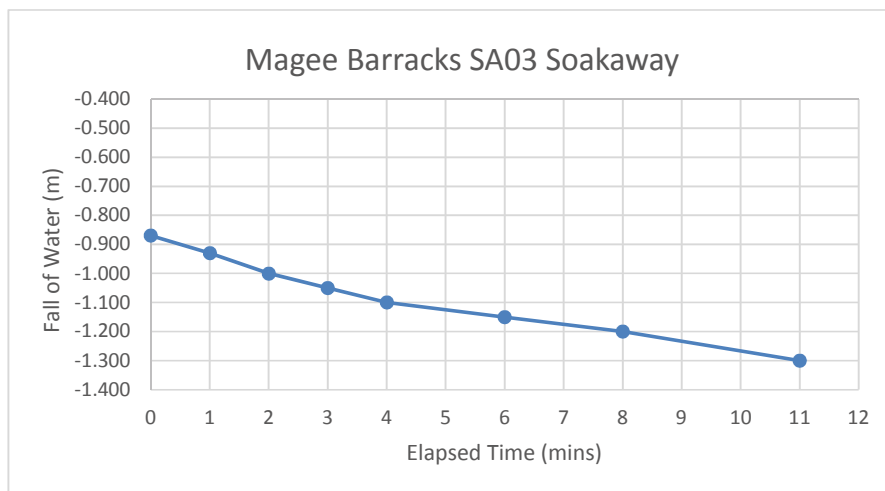
Length of pit (m)          Width of pit (m)          Diff          **75% full**    **25%full**  
 1.400                              0.420          0.430          **0.9775**    **1.1925**

75-25Ht (m)          **Vp75-25 (m3)**  
 0.215                              **0.13**

50%Eff Dpth          **ap50 (m2)**  
 0.215                              **1.3706**

**351**                              **tp75-25 seconds (from graph)**

**f =                              0.0002628                              m/s**





Magee Barracks - Soakaway Tests

Elapsed Time (mins)	Fall of Water (m)
0	-0.590
20	-0.720
40	-0.850
60	-0.890
80	-0.900
105	-1.000
120	-1.080
140	-1.120
150	-1.160
170	-1.200
190	-1.230
200	-1.260
210	-1.270
220	-1.270
250	-1.290
300	-1.320
340	-1.350

Start depth to water

Start depth to water  
0.59

Depth of Hole  
1.600

Length of pit (m)  
1.550

Width of pit (m)  
0.400

Length of pit (m)  
1.550

Width of pit (m)  
0.400

Diff  
1.010

75% full  
0.8425

25%full  
1.3475

75-25Ht (m)  
0.505

Vp75-25 (m3)  
0.31

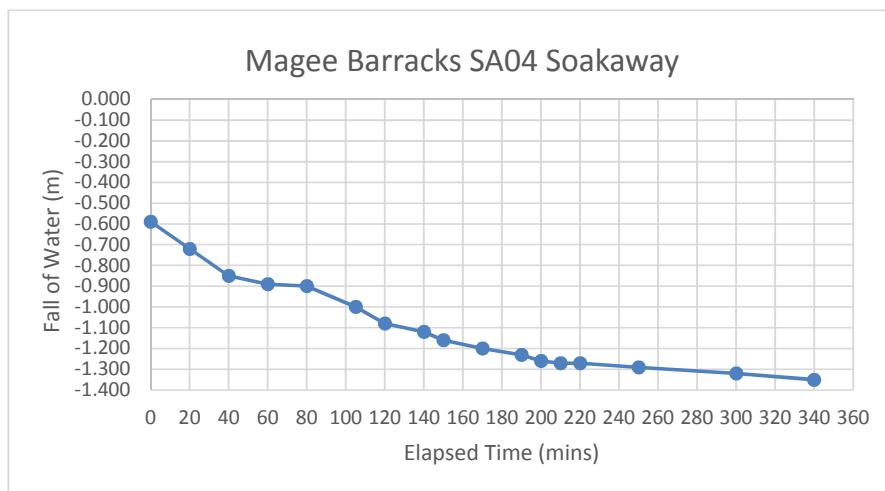
50%Eff Dpth  
0.505

ap50 (m2)  
2.5895

17280

tp75-25 seconds (from graph)

**f = 0.0000070 m/s**



Magee Barracks - Soakaway Tests

Elapsed Time (mins)	Fall of Water (m)
0	<b>-0.700</b>
5	-0.740
10	-0.780
15	-0.800
20	-0.830
35	-0.860
55	-0.870
80	-0.910
95	-0.960
105	-0.980
125	-1.010
145	-1.050
180	-1.060
195	-1.080
220	-1.080
235	-1.080

Start depth to water

Start depth to water  
0.70

Depth of Hole  
1.800

Length of pit (m)  
1.500

Width of pit (m)  
0.400

Length of pit (m)  
1.500

Width of pit (m)  
0.400

Diff  
1.100

**75% full**  
**0.975**

**25%full**  
**1.525**

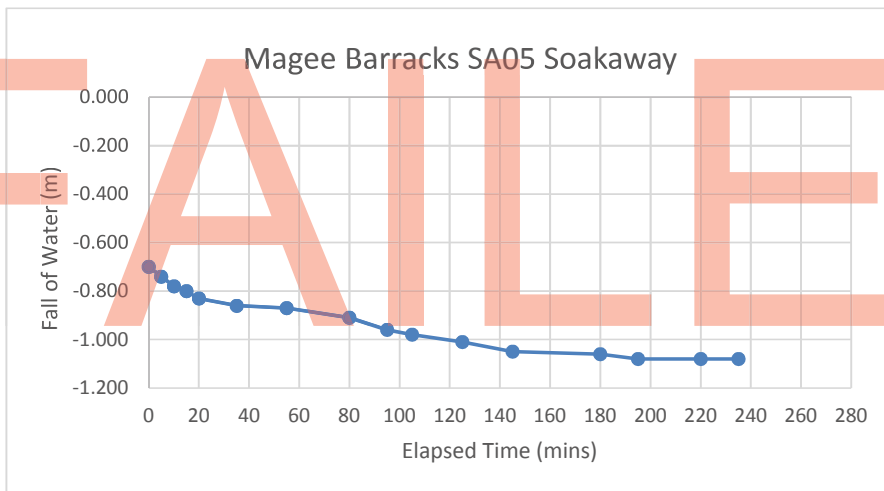
75-25Ht (m)  
0.550

**Vp75-25 (m3)**  
**0.33**

50%Eff Dpth  
0.550

**ap50 (m2)**  
**2.69**

**tp75-25 seconds (from graph)**



Magee Barracks - Soakaway Tests

Elapsed Time (mins)	Fall of Water (m)
0	<b>-0.400</b>
15	-0.490
25	-0.620
35	-0.720
50	-0.800
65	-0.840
80	-0.870
95	-0.900
110	-0.940
125	-0.970
140	-0.980
150	-1.000
160	-1.000
170	-1.010
200	-1.010
250	-1.010

Start depth to water

Start depth to water  
-0.40

Depth of Hole  
1.450

Length of pit (m)  
1.300

Width of pit (m)  
0.450

Length of pit (m)  
1.300

Width of pit (m)  
0.450

Diff  
1.850

75% full  
0.0625

25%full  
0.9875

75-25Ht (m)  
0.925

Vp75-25 (m3)  
0.54

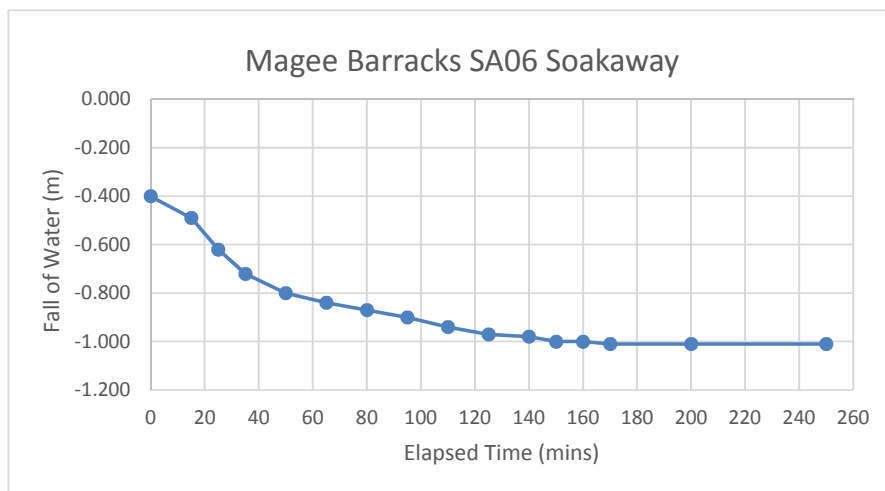
50%Eff Dpth  
0.925

ap50 (m2)  
3.8225

6840

tp75-25 seconds (from graph)

**f = 0.0000207 m/s**



### Magee Barracks - Soakaway Tests

Elapsed Time (mins)	Fall of Water (m)	Start depth to water
0	<b>-0.600</b>	
10	-0.720	
20	-0.850	
40	-0.910	
50	-0.980	
60	-1.070	
70	-1.150	
80	-1.200	
90	-1.250	
100	-1.280	
130	-1.300	
200	-1.350	
240	-1.360	

Start depth to water  
0.60

Depth of Hole  
1.600

Length of pit (m)  
1.600

Width of pit (m)  
0.430

Length of pit (m)  
1.600

Width of pit (m)  
0.430

Diff  
1.000

**75% full**  
**0.85**

**25%full**  
**1.35**

75-25Ht (m)  
0.500

**Vp75-25 (m3)**  
**0.34**

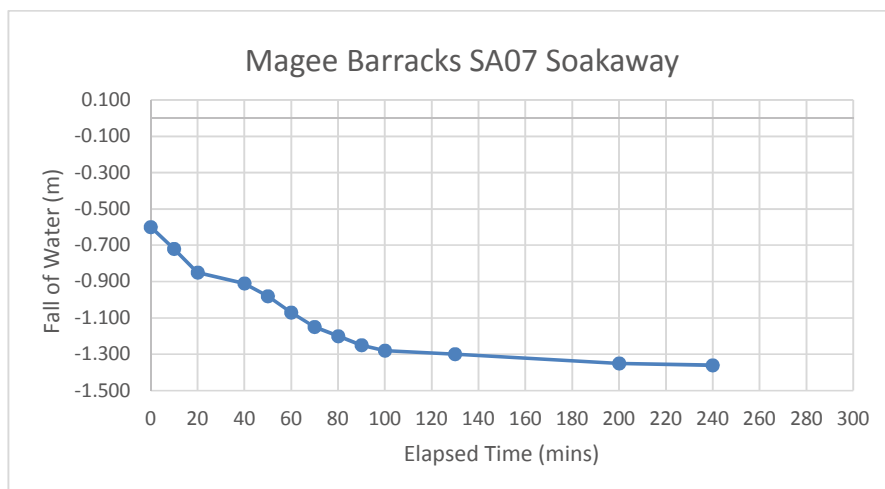
50%Eff Dpth  
0.500

**ap50 (m2)**  
**2.718**

**10800**

**tp75-25 seconds (from graph)**

**f = 0.0000117 m/s**



Magee Barracks - Soakaway Tests

Elapsed Time (mins)	Fall of Water (m)
0	-0.800
15	-0.900
30	-0.970
40	-1.010
55	-1.050
90	-1.120
110	-1.200
135	-1.200
160	-1.230
180	-1.240
195	-1.250
210	-1.250
225	-1.250
240	-1.260
270	-1.260
300	-1.260

Start depth to water

Start depth to water  
0.80

Depth of Hole  
1.800

Length of pit (m)  
1.700

Width of pit (m)  
0.400

Length of pit (m)  
1.700

Width of pit (m)  
0.400

Diff  
1.000

75% full  
1.05

25%full  
1.55

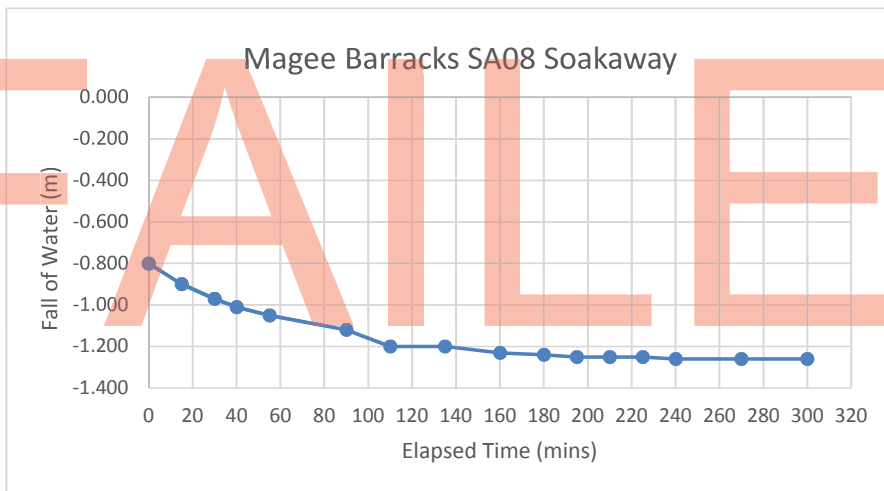
75-25Ht (m)  
0.500

Vp75-25 (m3)  
0.34

50%Eff Dpth  
0.500

ap50 (m2)  
2.78

tp75-25 seconds (from graph)



FAILED

Magee Barracks - Soakaway Tests

Elapsed Time (mins)	Fall of Water (m)
0	<b>-0.500</b>
12	-0.520
22	-0.540
42	-0.560
62	-0.580
87	-0.590
102	-0.590
132	-0.590
162	-0.600
192	-0.600
212	-0.600
232	-0.600
252	-0.600
272	-0.600
292	-0.600

Start depth to water

Start depth to water  
0.50

Depth of Hole  
1.500

Length of pit (m)  
1.400

Width of pit (m)  
0.400

Length of pit (m)  
1.400

Width of pit (m)  
0.400

Diff  
1.000

75% full  
0.75

25%full  
1.25

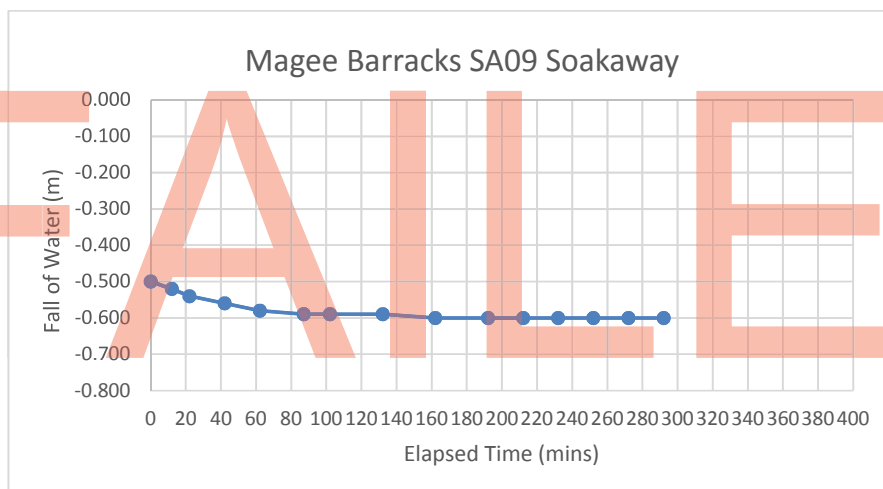
75-25Ht (m)  
0.500

Vp75-25 (m3)  
0.28

50%Eff Dpth  
0.500

ap50 (m2)  
2.36

tp75-25 seconds (from graph)



FAILED

Magee Barracks - Soakaway Tests

Elapsed Time (mins)	Fall of Water (m)
0	<b>-0.300</b>
10	-0.340
20	-0.360
30	-0.400
40	-0.420
50	-0.450
55	-0.470
80	-0.490
105	-0.520
135	-0.550
165	-0.580
195	-0.600
210	-0.620
230	-0.650
245	-0.670
275	-0.670

Start depth to water

Start depth to water  
0.30

Depth of Hole  
1.300

Length of pit (m)  
1.700

Width of pit (m)  
0.360

Length of pit (m)  
1.700

Width of pit (m)  
0.360

Diff  
1.000

**75% full**  
**0.55**

**25%full**  
**1.05**

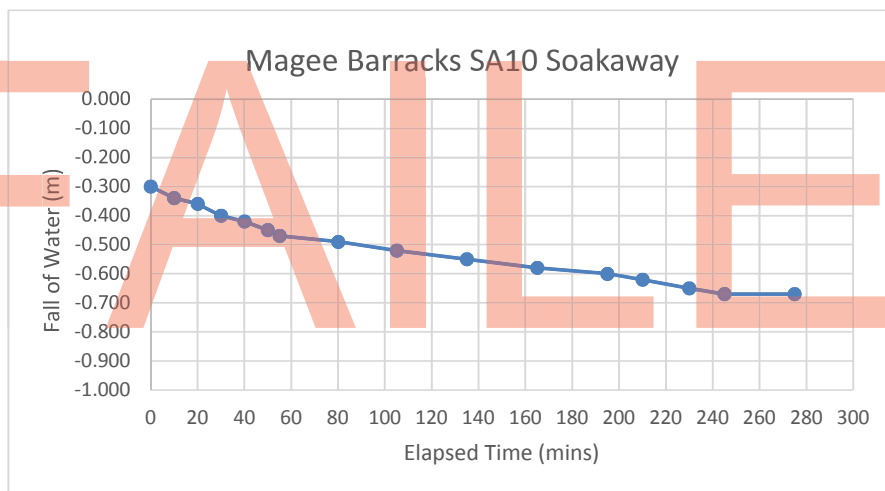
75-25Ht (m)  
0.500

**Vp75-25 (m3)**  
**0.31**

50%Eff Dpth  
0.500

**ap50 (m2)**  
**2.672**

**tp75-25 seconds (from graph)**



FAILED

**APPENDIX B**  
**Previous Correspondence**



## Ben Mong

---

**From:** John Grealish <jgrealish@kildarenrdo.com>  
**Sent:** Thursday 24 January 2019 17:46  
**To:** Ben Mong  
**Cc:** Cathal Rigney  
**Subject:** RE: Kildare - TII carrier pipe

Ben,  
I refer to previous emails and correspondence dated 9<sup>th</sup> January  
Kildare NRO has no objection to the proposed peak flow discharge of 27l/s from the former Magee Barracks site, to the carrier pipe installed as part of the M7 Kildare Town Bypass Scheme, as set out in your correspondence dated 9<sup>th</sup> January 2019.

This is conditional on

1. A satisfactory maintenance regime being put in place to ensure that all attenuation proposals are regularly maintained and operating effectively.
2. A flow measurement device being installed to record discharge flows from the site. The flow measurement device is to be maintained for a period of 5 years after completion of construction with measurement data being forwarded to the council on a monthly basis. Details of the type of measurement device and its location to be agreed with the council prior to commencement of construction.

I cannot confirm TII,s position, however it is my understanding that they are a statutory consultee under the process.

I trust this is satisfactory.

Regards,

**John Grealish**, BE CEng MIEI  
Chartered Engineer  
A/Senior Engineer

**Kildare County Council National Roads Office** | Block B, Maudlins, Naas, County Kildare W91 T864  
**Office Ph:** +353 (0) 45 988 900 | **Direct line:** +353 (0) 45 988 917 | **Fax:** +353 (0) 45 875 845  
**email:** [jgrealish@kildarenrdo.com](mailto:jgrealish@kildarenrdo.com)



\*\*\*\*\*

Tá an ríomhphost seo príobháideach agus ní ceadmhach úsáid an ríomhphost seo d'éinne ach don té ar seoladh chuige é. D'Fhéadfadh go mbeadh eolas inti atá faoi phribhléid agus rúnda de réir an dlí. Munar duit an ríomhphost seo, déan teagmhail leis an seoltóir comh luath agus is féidir. D'fhéadfadh nach iad tuairimí Chomhairle Chontae Chill Dara na tuairimí curtha in iúl ins an ríomhphost seo.

Déanann Comhairle Chontae Chill Dara iarracht na ríomhphoist a chosaint ó víris. Mar sin féin, moltar duit gach ríomhphost a scanadh mar ní ghlacann an Comhairle aon dliteanas i leith damáiste dod' chórais.

\*\*\*\*\*

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**From:** Ben Mong [mailto:ben.mong@garlandconsultancy.com]  
**Sent:** Tuesday 22 January 2019 11:42  
**To:** John Grealish  
**Cc:** Cathal Rigney  
**Subject:** RE: Kildare - TII carrier pipe

Hi John

My apologies for only getting back to you now.

James Naughton has recently left Garland. Cathal Rigney and I will be dealing with the Magee Barracks development in future.

We met up with David Hall on 10 January 2019, the meeting was very positive. David confirmed that he requires a formal written confirmation from TII in relation to the capacity of the carrier pipe under the M7 motorway in order to support the planning application.

With reference to our previous letter sent to you on 9 January 2019 (e-mail below and letter attached), have you perhaps had an opportunity to prepare the response requested?

Regards,

Ben Mong



Garland House, T +353 1 496 4322  
28-30 Rathmines Park, E [ben.mong@garlandconsultancy.com](mailto:ben.mong@garlandconsultancy.com)  
Rathmines,  
Dublin 6, Ireland

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**From:** John Grealish <jgrealish@kildarenrdo.com>  
**Sent:** Thursday 10 January 2019 15:06  
**To:** Ben Mong <ben.mong@garlandconsultancy.com>  
**Cc:** Joan Cullivan <joan.cullivan@garlandconsultancy.com>; James Naughton <james.naughton@garlandconsultancy.com>  
**Subject:** RE: Kildare - TII carrier pipe

Ban,  
I have been tied up with meetings for most of the morning. If you are still in the area I can meet with you later today.  
If you want to schedule a meeting for another time let me know. I have meetings most of tomorrow but Monday is ok.

Regards,

**John Grealish**, BE CEng MIEI  
Chartered Engineer  
A/Senior Engineer

**Kildare County Council National Roads Office** | Block B, Maudlins, Naas, County Kildare W91 T864  
**Office Ph:** +353 (0) 45 988 900 | **Direct line:** +353 (0) 45 988 917 | **Fax:** +353 (0) 45 875 845  
**email:** [jgrealish@kildarenrdo.com](mailto:jgrealish@kildarenrdo.com)



\*\*\*\*\*

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Déanann Comhairle Chontae Chill Dara iarracht na ríomhphoist a chosaint ó víris. Mar sin féin, moltar duit gach ríomhphost a scanadh mar ní ghlacann an Comhairle aon dliteanas i leith damáiste dod' chórais.

\*\*\*\*\*

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**From:** Ben Mong [<mailto:ben.mong@garlandconsultancy.com>]  
**Sent:** Wednesday 9 January 2019 15:32  
**To:** John Grealish  
**Cc:** Joan Cullivan; James Naughton  
**Subject:** RE: Kildare - TII carrier pipe

John

With reference to previous discussions and correspondence with regards to the carrier pipe capacity report, herewith please find attached a formal request letter with clarification as to why the information required is considered to be crucial to the progress and grant of the planning application for the Magee Barracks development.

We have a meeting scheduled with David Hall for tomorrow at 12h00. If at all possible, we would be grateful if we could meet up with you to discuss the aforementioned and attached letter either before or after the meeting. Please let me know whether this would be possible.

Kind Regards,

Ben Mong



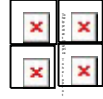
Garland House,  
28-30 Rathmines Park,  
Rathmines,  
Dublin 6, Ireland

T +353 1 496 4322  
E [ben.mong@garlandconsultancy.com](mailto:ben.mong@garlandconsultancy.com)

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**From:** James Naughton <[james.naughton@garlandconsultancy.com](mailto:james.naughton@garlandconsultancy.com)>  
**Sent:** Wednesday 2 January 2019 08:31  
**To:** John Grealish <[jgrealish@kildarenrdo.com](mailto:jgrealish@kildarenrdo.com)>  
**Cc:** Ben Mong <[ben.mong@garlandconsultancy.com](mailto:ben.mong@garlandconsultancy.com)>; Joan Cullivan <[joan.cullivan@garlandconsultancy.com](mailto:joan.cullivan@garlandconsultancy.com)>  
**Subject:** RE: Kildare - TII carrier pipe

John,

Happy New Year to you, further to the email below could you please forward the capacity report or relevant extract at your earliest convenience.

Thank you in advance,

Regards,

James Naughton



Garland House,  
28-30 Rathmines Park,  
Rathmines,  
Dublin 6, Ireland

T +353 1 496 4322  
E [james.naughton@garlandconsultancy.com](mailto:james.naughton@garlandconsultancy.com)

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**From:** James Naughton  
**Sent:** 18 December 2018 11:52  
**To:** John Grealish  
**Cc:** Ben Mong; Joan Cullivan  
**Subject:** RE: Kildare - TII carrier pipe

John,

Further to emails from my colleague Sarah Ryan below. Has the carrier pipe capacity report been finalised? If so, can you please forward a copy.

Regards,

James Naughton



Garland House,  
28-30 Rathmines Park,  
Rathmines,

T +353 1 496 4322  
E [james.naughton@garlandconsultancy.com](mailto:james.naughton@garlandconsultancy.com)

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---

**From:** Sarah Ryan  
**Sent:** 24 May 2018 11:28  
**To:** John Grealish  
**Cc:** James Naughton  
**Subject:** Kildare - TII carrier pipe

Hi John  
I hope you are well – just wondering if there is any update on the carrier pipe capacity report that was with TII.  
Many thanks

Regards,

Sarah Ryan



Riverfront,  
Howleys Quay,  
Limerick, Ireland

T +353 61 319708  
M +353 86 0239382  
E [sarah.ryan@garlandconsultancy.com](mailto:sarah.ryan@garlandconsultancy.com)

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**APPENDIX C**

**Infiltration Tank Calculations**

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 1525 minutes

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
15 Summer	1.7	1.7	98.2897	0.4237	229.4	O K
30 Summer	2.3	2.3	98.4413	0.5752	311.4	O K
60 Summer	2.9	2.9	98.5953	0.7293	394.9	O K
120 Summer	3.6	3.6	98.7628	0.8968	485.6	O K
180 Summer	4.0	4.0	98.8638	0.9978	540.3	O K
240 Summer	4.3	4.3	98.9368	1.0708	579.9	O K
360 Summer	4.7	4.7	99.0363	1.1703	633.7	O K
480 Summer	4.9	4.9	99.1018	1.2358	669.1	O K
600 Summer	5.1	5.1	99.1467	1.2808	693.4	O K
720 Summer	5.2	5.2	99.1777	1.3117	710.4	O K
960 Summer	5.4	5.4	99.2152	1.3492	730.5	O K
1440 Summer	5.6	5.6	99.2622	1.3962	755.9	O K
2160 Summer	5.7	5.7	99.3007	1.4347	777.0	O K
2880 Summer	5.8	5.8	99.3142	1.4482	784.3	O K
4320 Summer	5.7	5.7	99.3032	1.4372	778.4	O K
5760 Summer	5.6	5.6	99.2697	1.4037	760.2	O K
7200 Summer	5.4	5.4	99.2282	1.3622	737.7	O K
8640 Summer	5.3	5.3	99.1848	1.3187	714.1	O K
10080 Summer	5.1	5.1	99.1418	1.2758	690.9	O K
15 Winter	1.9	1.9	98.3402	0.4742	256.9	O K
30 Winter	2.6	2.6	98.5103	0.6443	348.9	O K
60 Winter	3.3	3.3	98.6833	0.8173	442.6	O K
120 Winter	4.0	4.0	98.8713	1.0053	544.3	O K
180 Winter	4.5	4.5	98.9848	1.1188	605.9	O K
240 Winter	4.8	4.8	99.0673	1.2013	650.4	O K
360 Winter	5.2	5.2	99.1797	1.3137	711.3	O K


Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	91.99	23
30 Summer	62.66	38
60 Summer	40.00	68
120 Summer	24.90	126
180 Summer	18.72	186
240 Summer	15.26	244
360 Summer	11.41	364
480 Summer	9.27	482
600 Summer	7.89	602
720 Summer	6.91	720
960 Summer	5.61	914
1440 Summer	4.18	1136
2160 Summer	3.11	1516
2880 Summer	2.52	1932
4320 Summer	1.87	2732
5760 Summer	1.51	3568
7200 Summer	1.28	4328
8640 Summer	1.12	5184
10080 Summer	1.00	5944
15 Winter	91.99	23
30 Winter	62.66	37
60 Winter	40.00	66
120 Winter	24.90	124
180 Winter	18.72	182
240 Winter	15.26	240
360 Winter	11.41	356

Summary of Results for 100 year Return Period (+20%)

Storm Duration (mins)	Maximum Filtration (1/s)	Maximum Outflow (1/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
480 Winter	5.5	5.5	99.2542	1.3882	751.6	O K
600 Winter	5.8	5.8	99.3062	1.4402	779.8	O K
720 Winter	5.9	5.9	99.3437	1.4777	800.1	O K
960 Winter	6.1	6.1	99.3902	1.5242	825.4	O K
1440 Winter	6.3	6.3	99.4312	1.5652	847.5	O K
2160 Winter	6.4	6.4	99.4622	1.5962	864.4	O K
2880 Winter	6.4	6.4	99.4597	1.5937	863.0	O K
4320 Winter	6.2	6.2	99.4127	1.5467	837.5	O K
5760 Winter	5.9	5.9	99.3462	1.4802	801.4	O K
7200 Winter	5.6	5.6	99.2762	1.4102	763.7	O K
8640 Winter	5.4	5.4	99.2092	1.3432	727.3	O K
10080 Winter	5.1	5.1	99.1463	1.2803	693.2	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
480 Winter	9.27	472
600 Winter	7.89	586
720 Winter	6.91	698
960 Winter	5.61	914
1440 Winter	4.18	1154
2160 Winter	3.11	1604
2880 Winter	2.52	2072
4320 Winter	1.87	2944
5760 Winter	1.51	3808
7200 Winter	1.28	4616
8640 Winter	1.12	5448
10080 Winter	1.00	6256



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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S1 Trench Soakaway	
Date Thursday 25 April 2019 File S1 - TRENCH SOAKAWAY.SRC	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	


Rainfall Details

Region	SCOT+NI	Shortest Storm (mins)	15
Return Period (years)	100	Longest Storm (mins)	10080
M5-60 (mm)	17.000	Summer Storms	Yes
Ratio-R	0.300	Winter Storms	Yes
Cv (Summer)	0.750	Climate Change %	+20
Cv (Winter)	0.840		

Time / Area Diagram

Total Area (ha) = 1.337

Time (mins)	Area (ha)	Time (mins)	Area (ha)
from:	to:	from:	to:
0	4	4	8
	0.904		0.433

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S1 Trench Soakaway	
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ENCAD	Source Control W.11.3	

**Trench Soakaway Details**

Infil Coef - Base (m/hr)	0.000000	Invert Level (m)	97.866
Infil Coef - Sides (m/hr)	0.074520	Cover Level (m)	100.297
Safety Factor	2.0	Slope (1:x)	0.0
Porosity	0.95	Cap Volume (m)	99.466
Width (m)	3.0	Cap Infiltration (m)	99.466
Length (m)	190.0		

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 4439 minutes


Storm Duration (mins)	Maximum Filtration (1/s)	Maximum Outflow (1/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
15 Summer	0.3	0.3	98.6753	0.3182	137.0	O K
30 Summer	0.5	0.5	98.7903	0.4332	186.5	O K
60 Summer	0.6	0.6	98.9088	0.5517	237.5	O K
120 Summer	0.7	0.7	99.0413	0.6843	294.5	O K
180 Summer	0.8	0.8	99.1248	0.7678	330.5	O K
240 Summer	0.9	0.9	99.1883	0.8313	357.7	O K
360 Summer	1.0	1.0	99.2813	0.9243	397.7	O K
480 Summer	1.1	1.1	99.3493	0.9923	427.0	O K
600 Summer	1.1	1.1	99.4028	1.0458	450.1	O K
720 Summer	1.2	1.2	99.4468	1.0898	469.0	O K
960 Summer	1.2	1.2	99.5153	1.1583	498.4	O K
1440 Summer	1.3	1.3	99.6053	1.2483	537.2	O K
2160 Summer	1.4	1.4	99.6788	1.3217	568.8	O K
2880 Summer	1.5	1.5	99.7133	1.3562	583.8	O K
4320 Summer	1.5	1.5	99.7567	1.3997	602.5	O K
5760 Summer	1.5	1.5	99.7822	1.4252	613.3	O K
7200 Summer	1.6	1.6	99.7952	1.4382	618.9	O K
8640 Summer	1.6	1.6	99.7992	1.4422	620.7	O K
10080 Summer	1.6	1.6	99.7977	1.4407	620.0	O K
15 Winter	0.4	0.4	98.7138	0.3567	153.5	O K
30 Winter	0.5	0.5	98.8423	0.4852	208.9	O K
60 Winter	0.7	0.7	98.9753	0.6183	266.0	O K
120 Winter	0.8	0.8	99.1238	0.7668	329.9	O K
180 Winter	0.9	0.9	99.2173	0.8603	370.3	O K
240 Winter	1.0	1.0	99.2883	0.9313	400.8	O K
360 Winter	1.1	1.1	99.3928	1.0358	445.6	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	91.99	23
30 Summer	62.66	38
60 Summer	40.00	68
120 Summer	24.90	128
180 Summer	18.72	186
240 Summer	15.26	246
360 Summer	11.41	366
480 Summer	9.27	486
600 Summer	7.89	604
720 Summer	6.91	724
960 Summer	5.61	964
1440 Summer	4.18	1442
2160 Summer	3.11	2160
2880 Summer	2.52	2688
4320 Summer	1.87	3372
5760 Summer	1.51	4104
7200 Summer	1.28	4904
8640 Summer	1.12	5784
10080 Summer	1.00	6560
15 Winter	91.99	23
30 Winter	62.66	38
60 Winter	40.00	68
120 Winter	24.90	126
180 Winter	18.72	184
240 Winter	15.26	244
360 Winter	11.41	362

Summary of Results for 100 year Return Period (+20%)

Storm Duration (mins)	Maximum Filtration (1/s)	Maximum Outflow (1/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
480 Winter	1.2	1.2	99.4693	1.1123	478.6	O K
600 Winter	1.3	1.3	99.5298	1.1728	504.6	O K
720 Winter	1.3	1.3	99.5788	1.2218	525.9	O K
960 Winter	1.4	1.4	99.6563	1.2993	559.1	O K
1440 Winter	1.5	1.5	99.7587	1.4017	603.3	O K
2160 Winter	1.6	1.6	99.8457	1.4887	640.7	O K
2880 Winter	1.7	1.7	99.8897	1.5327	659.6	O K
4320 Winter	1.7	1.7	99.9262	1.5692	675.3	O K
5760 Winter	1.7	1.7	99.9472	1.5902	684.3	O K
7200 Winter	1.7	1.7	99.9502	1.5932	685.7	O K
8640 Winter	1.7	1.7	99.9427	1.5857	682.4	O K
10080 Winter	1.7	1.7	99.9287	1.5717	676.4	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
480 Winter	9.27	480
600 Winter	7.89	596
720 Winter	6.91	714
960 Winter	5.61	948
1440 Winter	4.18	1412
2160 Winter	3.11	2080
2880 Winter	2.52	2736
4320 Winter	1.87	3456
5760 Winter	1.51	4328
7200 Winter	1.28	5264
8640 Winter	1.12	6144
10080 Winter	1.00	7064

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S2 Trench Soakaway	
Date Thursday 25 April 2019 File S2 - TRENCH SOAKAWAY.SRC	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	


Rainfall Details

Region	SCOT+NI	Shortest Storm (mins)	15
Return Period (years)	100	Longest Storm (mins)	10080
M5-60 (mm)	17.000	Summer Storms	Yes
Ratio-R	0.300	Winter Storms	Yes
Cv (Summer)	0.750	Climate Change %	+20
Cv (Winter)	0.840		

Time / Area Diagram

Total Area (ha) = 0.796

Time (mins)	Area (ha)	Time (mins)	Area (ha)
from:	to:	from:	to:
0	4	4	8
	0.543		0.253

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S2 Trench Soakaway	
Date Thursday 25 April 2019 File S2 - TRENCH SOAKAWAY.SRC	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	

**Trench Soakaway Details**

Infil Coef - Base (m/hr)	0.000000	Invert Level (m)	98.357
Infil Coef - Sides (m/hr)	0.025200	Cover Level (m)	101.470
Safety Factor	2.0	Slope (1:x)	0.0
Porosity	0.95	Cap Volume (m)	99.957
Width (m)	3.0	Cap Infiltration (m)	99.957
Length (m)	151.0		

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 2380 minutes

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
15 Summer	0.5	0.5	96.4448	0.3757	114.3	O K
30 Summer	0.7	0.7	96.5803	0.5112	155.4	O K
60 Summer	0.9	0.9	96.7188	0.6498	197.5	O K
120 Summer	1.1	1.1	96.8718	0.8028	244.0	O K
180 Summer	1.3	1.3	96.9663	0.8973	272.8	O K
240 Summer	1.4	1.4	97.0363	0.9673	294.1	O K
360 Summer	1.5	1.5	97.1363	1.0673	324.4	O K
480 Summer	1.6	1.6	97.2063	1.1373	345.7	O K
600 Summer	1.7	1.7	97.2588	1.1898	361.6	O K
720 Summer	1.8	1.8	97.2993	1.2303	373.9	O K
960 Summer	1.8	1.8	97.3563	1.2873	391.3	O K
1440 Summer	1.9	1.9	97.4153	1.3462	409.3	O K
2160 Summer	2.0	2.0	97.4622	1.3932	423.5	O K
2880 Summer	2.0	2.0	97.4907	1.4217	432.2	O K
4320 Summer	2.1	2.1	97.5147	1.4457	439.5	O K
5760 Summer	2.1	2.1	97.5127	1.4437	438.9	O K
7200 Summer	2.0	2.0	97.4977	1.4287	434.3	O K
8640 Summer	2.0	2.0	97.4752	1.4062	427.6	O K
10080 Summer	2.0	2.0	97.4498	1.3807	419.8	O K
15 Winter	0.6	0.6	96.4903	0.4212	128.0	O K
30 Winter	0.8	0.8	96.6418	0.5727	174.0	O K
60 Winter	1.0	1.0	96.7968	0.7278	221.3	O K
120 Winter	1.3	1.3	96.9683	0.8993	273.4	O K
180 Winter	1.4	1.4	97.0748	1.0058	305.7	O K
240 Winter	1.5	1.5	97.1533	1.0843	329.7	O K
360 Winter	1.7	1.7	97.2658	1.1968	363.8	O K


Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	91.99	23
30 Summer	62.66	38
60 Summer	40.00	68
120 Summer	24.90	126
180 Summer	18.72	186
240 Summer	15.26	244
360 Summer	11.41	364
480 Summer	9.27	484
600 Summer	7.89	602
720 Summer	6.91	722
960 Summer	5.61	962
1440 Summer	4.18	1402
2160 Summer	3.11	1712
2880 Summer	2.52	2080
4320 Summer	1.87	2900
5760 Summer	1.51	3744
7200 Summer	1.28	4544
8640 Summer	1.12	5360
10080 Summer	1.00	6152
15 Winter	91.99	23
30 Winter	62.66	37
60 Winter	40.00	66
120 Winter	24.90	124
180 Winter	18.72	182
240 Winter	15.26	242
360 Winter	11.41	358

Summary of Results for 100 year Return Period (+20%)

Storm Duration (mins)	Maximum Filtration (1/s)	Maximum Outflow (1/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
480 Winter	1.8	1.8	97.3448	1.2758	387.8	O K
600 Winter	1.9	1.9	97.4042	1.3352	405.8	O K
720 Winter	2.0	2.0	97.4502	1.3812	419.9	O K
960 Winter	2.1	2.1	97.5167	1.4477	440.1	O K
1440 Winter	2.2	2.2	97.5897	1.5207	462.3	O K
2160 Winter	2.2	2.2	97.6312	1.5622	474.9	O K
2880 Winter	2.3	2.3	97.6577	1.5887	483.0	O K
4320 Winter	2.3	2.3	97.6632	1.5942	484.7	O K
5760 Winter	2.2	2.2	97.6377	1.5687	476.9	O K
7200 Winter	2.2	2.2	97.5997	1.5307	465.4	O K
8640 Winter	2.1	2.1	97.5567	1.4877	452.3	O K
10080 Winter	2.1	2.1	97.5123	1.4432	438.7	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
480 Winter	9.27	476
600 Winter	7.89	592
720 Winter	6.91	708
960 Winter	5.61	934
1440 Winter	4.18	1372
2160 Winter	3.11	1756
2880 Winter	2.52	2192
4320 Winter	1.87	3112
5760 Winter	1.51	3984
7200 Winter	1.28	4896
8640 Winter	1.12	5712
10080 Winter	1.00	6560



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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S3 Trench Soakaway	
Date Thursday 25 April 2019 File S3 - TRENCH SOAKAWAY.SRC	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	


Rainfall Details

Region	SCOT+NI	Shortest Storm (mins)	15
Return Period (years)	100	Longest Storm (mins)	10080
M5-60 (mm)	17.000	Summer Storms	Yes
Ratio-R	0.300	Winter Storms	Yes
Cv (Summer)	0.750	Climate Change %	+20
Cv (Winter)	0.840		

Time / Area Diagram

Total Area (ha) = 0.665

Time (mins)	Area (ha)	Time (mins)	Area (ha)
from:	to:	from:	to:
0	4	4	8
	0.503		0.162

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S3 Trench Soakaway	
Date Thursday 25 April 2019 File S3 - TRENCH SOAKAWAY.SRC	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	

Trench Soakaway Details

Infil Coef - Base (m/hr)	0.000000	Invert Level (m)	96.069
Infil Coef - Sides (m/hr)	0.074520	Cover Level (m)	98.794
Safety Factor	2.0	Slope (1:x)	0.0
Porosity	0.95	Cap Volume (m)	97.669
Width (m)	5.0	Cap Infiltration (m)	97.669
Length (m)	64.0		

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 2515 minutes


Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
15 Summer	0.9	0.9	94.4618	0.3687	205.0	O K
30 Summer	1.2	1.2	94.5943	0.5012	278.7	O K
60 Summer	1.6	1.6	94.7308	0.6378	354.3	O K
120 Summer	1.9	1.9	94.8808	0.7878	437.8	O K
180 Summer	2.2	2.2	94.9743	0.8813	489.6	O K
240 Summer	2.3	2.3	95.0433	0.9503	528.2	O K
360 Summer	2.6	2.6	95.1423	1.0493	583.2	O K
480 Summer	2.8	2.8	95.2123	1.1193	622.0	O K
600 Summer	2.9	2.9	95.2648	1.1718	651.2	O K
720 Summer	3.0	3.0	95.3058	1.2128	674.0	O K
960 Summer	3.1	3.1	95.3648	1.2718	706.7	O K
1440 Summer	3.3	3.3	95.4273	1.3342	741.6	O K
2160 Summer	3.4	3.4	95.4738	1.3807	767.4	O K
2880 Summer	3.5	3.5	95.5038	1.4107	783.9	O K
4320 Summer	3.5	3.5	95.5307	1.4377	799.1	O K
5760 Summer	3.5	3.5	95.5322	1.4392	799.8	O K
7200 Summer	3.5	3.5	95.5202	1.4272	793.1	O K
8640 Summer	3.5	3.5	95.5007	1.4077	782.4	O K
10080 Summer	3.4	3.4	95.4773	1.3842	769.4	O K
15 Winter	1.0	1.0	94.5063	0.4132	229.5	O K
30 Winter	1.4	1.4	94.6548	0.5617	312.1	O K
60 Winter	1.8	1.8	94.8073	0.7143	396.8	O K
120 Winter	2.2	2.2	94.9758	0.8828	490.5	O K
180 Winter	2.4	2.4	95.0803	0.9873	548.7	O K
240 Winter	2.6	2.6	95.1583	1.0653	592.0	O K
360 Winter	2.9	2.9	95.2698	1.1768	653.9	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	91.99	23
30 Summer	62.66	38
60 Summer	40.00	68
120 Summer	24.90	128
180 Summer	18.72	186
240 Summer	15.26	246
360 Summer	11.41	366
480 Summer	9.27	484
600 Summer	7.89	604
720 Summer	6.91	724
960 Summer	5.61	962
1440 Summer	4.18	1440
2160 Summer	3.11	1756
2880 Summer	2.52	2132
4320 Summer	1.87	2940
5760 Summer	1.51	3752
7200 Summer	1.28	4544
8640 Summer	1.12	5368
10080 Summer	1.00	6160
15 Winter	91.99	23
30 Winter	62.66	37
60 Winter	40.00	66
120 Winter	24.90	126
180 Winter	18.72	184
240 Winter	15.26	242
360 Winter	11.41	360

Summary of Results for 100 year Return Period (+20%)

Storm Duration (mins)	Maximum Filtration (1/s)	Maximum Outflow (1/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
480 Winter	3.1	3.1	95.3483	1.2553	697.7	O K
600 Winter	3.2	3.2	95.4078	1.3147	730.8	O K
720 Winter	3.4	3.4	95.4548	1.3617	756.7	O K
960 Winter	3.5	3.5	95.5227	1.4297	794.4	O K
1440 Winter	3.7	3.7	95.5992	1.5062	837.1	O K
2160 Winter	3.8	3.8	95.6427	1.5497	861.3	O K
2880 Winter	3.9	3.9	95.6712	1.5782	877.0	O K
4320 Winter	3.9	3.9	95.6822	1.5892	883.1	O K
5760 Winter	3.9	3.9	95.6622	1.5692	872.0	O K
7200 Winter	3.8	3.8	95.6282	1.5352	853.2	O K
8640 Winter	3.7	3.7	95.5887	1.4957	831.2	O K
10080 Winter	3.6	3.6	95.5468	1.4537	807.9	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
480 Winter	9.27	476
600 Winter	7.89	594
720 Winter	6.91	708
960 Winter	5.61	936
1440 Winter	4.18	1382
2160 Winter	3.11	1948
2880 Winter	2.52	2220
4320 Winter	1.87	3120
5760 Winter	1.51	4032
7200 Winter	1.28	4904
8640 Winter	1.12	5792
10080 Winter	1.00	6648

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S4 Trench Soakaway	
Date Friday 10 May 2019 File S4 - TRENCH SOAKAWAY.SRC	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	


Rainfall Details

Region	SCOT+NI	Shortest Storm (mins)	15
Return Period (years)	100	Longest Storm (mins)	10080
M5-60 (mm)	17.000	Summer Storms	Yes
Ratio-R	0.300	Winter Storms	Yes
Cv (Summer)	0.750	Climate Change %	+20
Cv (Winter)	0.840		

Time / Area Diagram

Total Area (ha) = 1.192

Time (mins)	Area (ha)	Time (mins)	Area (ha)
from:	to:	from:	to:
0	4	4	8
	0.677		0.515

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S4 Trench Soakaway	
Date Friday 10 May 2019 File S4 - TRENCH SOAKAWAY.SRC	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	

**Trench Soakaway Details**

Infil Coef - Base (m/hr)	0.000000	Invert Level (m)	94.093
Infil Coef - Sides (m/hr)	0.072720	Cover Level (m)	97.085
Safety Factor	2.0	Slope (1:x)	0.0
Porosity	0.95	Cap Volume (m)	95.693
Width (m)	5.0	Cap Infiltration (m)	95.693
Length (m)	117.0		

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 3647 minutes

Storm Duration (mins)	Maximum Filtration (1/s)	Maximum Outflow (1/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
15 Summer	0.2	0.2	98.4468	0.3337	58.7	O K
30 Summer	0.2	0.2	98.5673	0.4542	79.8	O K
60 Summer	0.3	0.3	98.6913	0.5782	101.6	O K
120 Summer	0.4	0.4	98.8293	0.7163	125.9	O K
180 Summer	0.4	0.4	98.9163	0.8033	141.2	O K
240 Summer	0.5	0.5	98.9813	0.8683	152.6	O K
360 Summer	0.5	0.5	99.0768	0.9638	169.4	O K
480 Summer	0.6	0.6	99.1458	1.0328	181.5	O K
600 Summer	0.6	0.6	99.1998	1.0868	191.0	O K
720 Summer	0.6	0.6	99.2433	1.1303	198.6	O K
960 Summer	0.6	0.6	99.3093	1.1963	210.3	O K
1440 Summer	0.7	0.7	99.3928	1.2798	224.9	O K
2160 Summer	0.7	0.7	99.4533	1.3402	235.5	O K
2880 Summer	0.7	0.7	99.4852	1.3722	241.1	O K
4320 Summer	0.8	0.8	99.5257	1.4127	248.3	O K
5760 Summer	0.8	0.8	99.5452	1.4322	251.7	O K
7200 Summer	0.8	0.8	99.5507	1.4377	252.7	O K
8640 Summer	0.8	0.8	99.5477	1.4347	252.2	O K
10080 Summer	0.8	0.8	99.5397	1.4267	250.7	O K
15 Winter	0.2	0.2	98.4872	0.3742	65.7	O K
30 Winter	0.3	0.3	98.6217	0.5087	89.4	O K
60 Winter	0.3	0.3	98.7608	0.6478	113.8	O K
120 Winter	0.4	0.4	98.9153	0.8023	141.0	O K
180 Winter	0.5	0.5	99.0128	0.8998	158.2	O K
240 Winter	0.5	0.5	99.0863	0.9733	171.0	O K
360 Winter	0.6	0.6	99.1928	1.0798	189.8	O K


Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	91.99	23
30 Summer	62.66	38
60 Summer	40.00	68
120 Summer	24.90	128
180 Summer	18.72	186
240 Summer	15.26	246
360 Summer	11.41	366
480 Summer	9.27	486
600 Summer	7.89	604
720 Summer	6.91	724
960 Summer	5.61	964
1440 Summer	4.18	1442
2160 Summer	3.11	2140
2880 Summer	2.52	2428
4320 Summer	1.87	3156
5760 Summer	1.51	3976
7200 Summer	1.28	4760
8640 Summer	1.12	5616
10080 Summer	1.00	6448
15 Winter	91.99	23
30 Winter	62.66	38
60 Winter	40.00	68
120 Winter	24.90	126
180 Winter	18.72	184
240 Winter	15.26	244
360 Winter	11.41	360

Summary of Results for 100 year Return Period (+20%)

Storm Duration (mins)	Maximum Filtration (1/s)	Maximum Outflow (1/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
480 Winter	0.6	0.6	99.2708	1.1578	203.5	O K
600 Winter	0.7	0.7	99.3313	1.2183	214.1	O K
720 Winter	0.7	0.7	99.3803	1.2673	222.8	O K
960 Winter	0.7	0.7	99.4558	1.3427	236.0	O K
1440 Winter	0.8	0.8	99.5517	1.4387	252.9	O K
2160 Winter	0.8	0.8	99.6262	1.5132	266.0	O K
2880 Winter	0.8	0.8	99.6577	1.5447	271.5	O K
4320 Winter	0.8	0.8	99.6922	1.5792	277.6	O K
5760 Winter	0.9	0.9	99.7012	1.5882	279.1	O K
7200 Winter	0.8	0.8	99.6927	1.5797	277.7	O K
8640 Winter	0.8	0.8	99.6747	1.5617	274.5	O K
10080 Winter	0.8	0.8	99.6512	1.5382	270.3	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
480 Winter	9.27	478
600 Winter	7.89	596
720 Winter	6.91	714
960 Winter	5.61	944
1440 Winter	4.18	1402
2160 Winter	3.11	2060
2880 Winter	2.52	2676
4320 Winter	1.87	3292
5760 Winter	1.51	4216
7200 Winter	1.28	5120
8640 Winter	1.12	6048
10080 Winter	1.00	6864



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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S5 Trench Soakaway	
Date Friday 10 May 2019 File S5 - TRENCH SOAKAWAY.SRC	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	


Rainfall Details

Region	SCOT+NI	Shortest Storm (mins)	15
Return Period (years)	100	Longest Storm (mins)	10080
M5-60 (mm)	17.000	Summer Storms	Yes
Ratio-R	0.300	Winter Storms	Yes
Cv (Summer)	0.750	Climate Change %	+20
Cv (Winter)	0.840		

Time / Area Diagram

Total Area (ha) = 0.341

Time (mins) from:	Time (mins) to:	Area (ha)	Time (mins) from:	Time (mins) to:	Area (ha)
0	4	0.208	4	8	0.133

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S5 Trench Soakaway	
Date Friday 10 May 2019 File S5 - TRENCH SOAKAWAY.SRC	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	

**Trench Soakaway Details**

Infil Coef - Base (m/hr)	0.000000	Invert Level (m)	98.113
Infil Coef - Sides (m/hr)	0.025200	Cover Level (m)	101.699
Safety Factor	2.0	Slope (1:x)	0.0
Porosity	0.95	Cap Volume (m)	99.713
Width (m)	2.5	Cap Infiltration (m)	99.713
Length (m)	74.0		

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 5039 minutes


Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
15 Summer	0.2	0.2	97.2017	0.3067	68.4	O K
30 Summer	0.2	0.2	97.3127	0.4177	93.0	O K
60 Summer	0.3	0.3	97.4273	0.5322	118.5	O K
120 Summer	0.3	0.3	97.5548	0.6598	147.0	O K
180 Summer	0.4	0.4	97.6363	0.7413	165.1	O K
240 Summer	0.4	0.4	97.6978	0.8028	178.8	O K
360 Summer	0.4	0.4	97.7883	0.8933	199.0	O K
480 Summer	0.5	0.5	97.8553	0.9603	213.9	O K
600 Summer	0.5	0.5	97.9083	1.0133	225.7	O K
720 Summer	0.5	0.5	97.9518	1.0568	235.4	O K
960 Summer	0.6	0.6	98.0203	1.1253	250.7	O K
1440 Summer	0.6	0.6	98.1128	1.2178	271.3	O K
2160 Summer	0.6	0.6	98.1923	1.2972	289.0	O K
2880 Summer	0.7	0.7	98.2327	1.3377	298.0	O K
4320 Summer	0.7	0.7	98.2757	1.3807	307.6	O K
5760 Summer	0.7	0.7	98.3032	1.4082	313.7	O K
7200 Summer	0.7	0.7	98.3197	1.4247	317.4	O K
8640 Summer	0.7	0.7	98.3277	1.4327	319.2	O K
10080 Summer	0.7	0.7	98.3297	1.4347	319.6	O K
15 Winter	0.2	0.2	97.2388	0.3437	76.6	O K
30 Winter	0.2	0.2	97.3627	0.4677	104.2	O K
60 Winter	0.3	0.3	97.4908	0.5958	132.8	O K
120 Winter	0.4	0.4	97.6343	0.7393	164.7	O K
180 Winter	0.4	0.4	97.7253	0.8303	185.0	O K
240 Winter	0.4	0.4	97.7943	0.8993	200.3	O K
360 Winter	0.5	0.5	97.8958	1.0008	223.0	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	91.99	23
30 Summer	62.66	38
60 Summer	40.00	68
120 Summer	24.90	126
180 Summer	18.72	186
240 Summer	15.26	246
360 Summer	11.41	364
480 Summer	9.27	484
600 Summer	7.89	604
720 Summer	6.91	724
960 Summer	5.61	964
1440 Summer	4.18	1442
2160 Summer	3.11	2160
2880 Summer	2.52	2880
4320 Summer	1.87	3504
5760 Summer	1.51	4264
7200 Summer	1.28	5040
8640 Summer	1.12	5872
10080 Summer	1.00	6664
15 Winter	91.99	23
30 Winter	62.66	37
60 Winter	40.00	66
120 Winter	24.90	124
180 Winter	18.72	184
240 Winter	15.26	242
360 Winter	11.41	360

Summary of Results for 100 year Return Period (+20%)

Storm Duration (mins)	Maximum Filtration (1/s)	Maximum Outflow (1/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
480 Winter	0.5	0.5	97.9708	1.0758	239.7	O K
600 Winter	0.6	0.6	98.0303	1.1353	253.0	O K
720 Winter	0.6	0.6	98.0798	1.1848	263.9	O K
960 Winter	0.6	0.6	98.1568	1.2618	281.1	O K
1440 Winter	0.7	0.7	98.2617	1.3667	304.5	O K
2160 Winter	0.7	0.7	98.3542	1.4592	325.1	O K
2880 Winter	0.7	0.7	98.4047	1.5097	336.3	O K
4320 Winter	0.8	0.8	98.4447	1.5497	345.2	O K
5760 Winter	0.8	0.8	98.4702	1.5752	351.0	O K
<b>7200 Winter</b>	<b>0.8</b>	<b>0.8</b>	<b>98.4802</b>	<b>1.5852</b>	<b>353.1</b>	<b>O K</b>
8640 Winter	0.8	0.8	98.4787	1.5837	352.8	O K
10080 Winter	0.8	0.8	98.4702	1.5752	350.9	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
480 Winter	9.27	478
600 Winter	7.89	596
720 Winter	6.91	714
960 Winter	5.61	950
1440 Winter	4.18	1414
2160 Winter	3.11	2096
2880 Winter	2.52	2764
4320 Winter	1.87	3888
5760 Winter	1.51	4440
<b>7200 Winter</b>	<b>1.28</b>	<b>5336</b>
8640 Winter	1.12	6304
10080 Winter	1.00	7160

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S6 Trench Soakaway	
Date Thursday 25 April 2019 File S6 - TRENCH SOAKAWAY.SRC	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	


Rainfall Details

Region	SCOT+NI	Shortest Storm (mins)	15
Return Period (years)	100	Longest Storm (mins)	10080
M5-60 (mm)	17.000	Summer Storms	Yes
Ratio-R	0.300	Winter Storms	Yes
Cv (Summer)	0.750	Climate Change %	+20
Cv (Winter)	0.840		

Time / Area Diagram

Total Area (ha) = 0.397

Time (mins)	Area (ha)	Time (mins)	Area (ha)
from:	to:	from:	to:
0	4	4	8
	0.331		0.066

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S6 Trench Soakaway	
Date Thursday 25 April 2019 File S6 - TRENCH SOAKAWAY.SRC	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	

**Trench Soakaway Details**

Infil Coef - Base (m/hr)	0.000000	Invert Level (m)	96.895
Infil Coef - Sides (m/hr)	0.025200	Cover Level (m)	99.671
Safety Factor	2.0	Slope (1:x)	0.0
Porosity	0.95	Cap Volume (m)	98.495
Width (m)	3.5	Cap Infiltration (m)	98.495
Length (m)	67.0		

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 5006 minutes

Storm Duration (mins)	Maximum Filtration (1/s)	Maximum Outflow (1/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
15 Summer	0.2	0.2	95.7803	0.3832	76.5	O K
30 Summer	0.2	0.2	95.9188	0.5217	104.0	O K
60 Summer	0.3	0.3	96.0613	0.6643	132.6	O K
120 Summer	0.4	0.4	96.2213	0.8243	164.4	O K
180 Summer	0.4	0.4	96.3223	0.9253	184.6	O K
240 Summer	0.4	0.4	96.3993	1.0023	199.9	O K
360 Summer	0.5	0.5	96.5123	1.1153	222.5	O K
480 Summer	0.5	0.5	96.5958	1.1988	239.2	O K
600 Summer	0.6	0.6	96.6618	1.2648	252.3	O K
720 Summer	0.6	0.6	96.7163	1.3192	263.2	O K
960 Summer	0.6	0.6	96.8017	1.4047	280.2	O K
1440 Summer	0.7	0.7	96.9167	1.5197	303.2	O K
2160 Summer	0.7	0.7	97.0157	1.6187	322.9	O K
2880 Summer	0.7	0.7	97.0657	1.6687	332.9	O K
4320 Summer	0.8	0.8	97.1197	1.7227	343.7	O K
5760 Summer	0.8	0.8	97.1537	1.7567	350.4	O K
7200 Summer	0.8	0.8	97.1742	1.7772	354.5	O K
8640 Summer	0.8	0.8	97.1837	1.7867	356.5	O K
10080 Summer	0.8	0.8	97.1862	1.7892	357.0	O K
15 Winter	0.2	0.2	95.8263	0.4292	85.6	O K
30 Winter	0.3	0.3	95.9813	0.5842	116.5	O K
60 Winter	0.3	0.3	96.1413	0.7443	148.5	O K
120 Winter	0.4	0.4	96.3203	0.9233	184.2	O K
180 Winter	0.5	0.5	96.4338	1.0368	206.8	O K
240 Winter	0.5	0.5	96.5198	1.1228	224.0	O K
360 Winter	0.6	0.6	96.6468	1.2498	249.3	O K


Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	91.99	23
30 Summer	62.66	38
60 Summer	40.00	68
120 Summer	24.90	128
180 Summer	18.72	186
240 Summer	15.26	246
360 Summer	11.41	366
480 Summer	9.27	484
600 Summer	7.89	604
720 Summer	6.91	724
960 Summer	5.61	964
1440 Summer	4.18	1442
2160 Summer	3.11	2160
2880 Summer	2.52	2880
4320 Summer	1.87	3504
5760 Summer	1.51	4256
7200 Summer	1.28	5040
8640 Summer	1.12	5872
10080 Summer	1.00	6664
15 Winter	91.99	23
30 Winter	62.66	37
60 Winter	40.00	68
120 Winter	24.90	126
180 Winter	18.72	184
240 Winter	15.26	242
360 Winter	11.41	362

Summary of Results for 100 year Return Period (+20%)

Storm Duration (mins)	Maximum Filtration (1/s)	Maximum Outflow (1/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
480 Winter	0.6	0.6	96.7403	1.3432	268.0	O K
600 Winter	0.6	0.6	96.8147	1.4177	282.8	O K
720 Winter	0.7	0.7	96.8757	1.4787	295.0	O K
960 Winter	0.7	0.7	96.9722	1.5752	314.2	O K
1440 Winter	0.8	0.8	97.1032	1.7062	340.4	O K
2160 Winter	0.8	0.8	97.2182	1.8212	363.3	O K
2880 Winter	0.8	0.8	97.2807	1.8837	375.8	O K
4320 Winter	0.9	0.9	97.3297	1.9327	385.6	O K
5760 Winter	0.9	0.9	97.3622	1.9652	392.0	O K
7200 Winter	0.9	0.9	97.3737	1.9767	394.3	O K
8640 Winter	0.9	0.9	97.3717	1.9747	393.9	O K
10080 Winter	0.9	0.9	97.3607	1.9637	391.8	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
480 Winter	9.27	480
600 Winter	7.89	596
720 Winter	6.91	714
960 Winter	5.61	950
1440 Winter	4.18	1414
2160 Winter	3.11	2096
2880 Winter	2.52	2764
4320 Winter	1.87	3888
5760 Winter	1.51	4440
7200 Winter	1.28	5336
8640 Winter	1.12	6232
10080 Winter	1.00	7160



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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S7 Trench Soakaway	
Date Friday 10 May 2019 File S7 - TRENCH SOAKAWAY.SRC	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	


Rainfall Details

Region	SCOT+NI	Shortest Storm (mins)	15
Return Period (years)	100	Longest Storm (mins)	10080
M5-60 (mm)	17.000	Summer Storms	Yes
Ratio-R	0.300	Winter Storms	Yes
Cv (Summer)	0.750	Climate Change %	+20
Cv (Winter)	0.840		

Time / Area Diagram

Total Area (ha) = 0.444

Time (mins) from:	Time (mins) to:	Area (ha)	Time (mins) from:	Time (mins) to:	Area (ha)
0	4	0.341	4	8	0.103

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S7 Trench Soakaway	
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ENCAD	Source Control W.11.3	

**Trench Soakaway Details**

Infil Coef - Base (m/hr)	0.000000	Invert Level (m)	95.397
Infil Coef - Sides (m/hr)	0.025200	Cover Level (m)	99.016
Safety Factor	2.0	Slope (1:x)	0.0
Porosity	0.95	Cap Volume (m)	97.397
Width (m)	3.5	Cap Infiltration (m)	97.397
Length (m)	60.0		

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 2756 minutes


Storm Duration (mins)	Maximum Filtration (1/s)	Maximum Outflow (1/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
15 Summer	0.1	0.1	93.5107	0.4497	34.4	O K
30 Summer	0.2	0.2	93.6727	0.6118	46.8	O K
60 Summer	0.2	0.2	93.8388	0.7778	59.5	O K
120 Summer	0.3	0.3	94.0228	0.9618	73.6	O K
180 Summer	0.3	0.3	94.1378	1.0768	82.3	O K
240 Summer	0.4	0.4	94.2233	1.1623	88.9	O K
360 Summer	0.4	0.4	94.3458	1.2847	98.3	O K
480 Summer	0.4	0.4	94.4332	1.3722	104.9	O K
600 Summer	0.4	0.4	94.4992	1.4382	110.0	O K
720 Summer	0.5	0.5	94.5517	1.4907	114.0	O K
960 Summer	0.5	0.5	94.6282	1.5672	119.8	O K
1440 Summer	0.5	0.5	94.7142	1.6532	126.4	O K
2160 Summer	0.5	0.5	94.7732	1.7122	131.0	O K
2880 Summer	0.5	0.5	94.8117	1.7507	133.9	O K
4320 Summer	0.6	0.6	94.8512	1.7902	136.9	O K
5760 Summer	0.6	0.6	94.8592	1.7982	137.5	O K
7200 Summer	0.6	0.6	94.8502	1.7892	136.8	O K
8640 Summer	0.5	0.5	94.8317	1.7707	135.4	O K
10080 Summer	0.5	0.5	94.8072	1.7462	133.5	O K
15 Winter	0.2	0.2	93.5647	0.5037	38.5	O K
30 Winter	0.2	0.2	93.7463	0.6853	52.4	O K
60 Winter	0.3	0.3	93.9323	0.8713	66.6	O K
120 Winter	0.3	0.3	94.1388	1.0778	82.4	O K
180 Winter	0.4	0.4	94.2673	1.2063	92.3	O K
240 Winter	0.4	0.4	94.3632	1.3022	99.6	O K
360 Winter	0.4	0.4	94.5012	1.4402	110.1	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	91.99	23
30 Summer	62.66	38
60 Summer	40.00	68
120 Summer	24.90	128
180 Summer	18.72	186
240 Summer	15.26	246
360 Summer	11.41	366
480 Summer	9.27	486
600 Summer	7.89	604
720 Summer	6.91	724
960 Summer	5.61	962
1440 Summer	4.18	1440
2160 Summer	3.11	1824
2880 Summer	2.52	2192
4320 Summer	1.87	2980
5760 Summer	1.51	3800
7200 Summer	1.28	4616
8640 Summer	1.12	5448
10080 Summer	1.00	6256
15 Winter	91.99	23
30 Winter	62.66	38
60 Winter	40.00	68
120 Winter	24.90	126
180 Winter	18.72	184
240 Winter	15.26	242
360 Winter	11.41	360

Summary of Results for 100 year Return Period (+20%)

Storm Duration (mins)	Maximum Filtration (1/s)	Maximum Outflow (1/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
480 Winter	0.5	0.5	94.5997	1.5387	117.7	O K
600 Winter	0.5	0.5	94.6747	1.6137	123.4	O K
720 Winter	0.5	0.5	94.7342	1.6732	128.0	O K
960 Winter	0.5	0.5	94.8217	1.7607	134.7	O K
1440 Winter	0.6	0.6	94.9247	1.8637	142.5	O K
2160 Winter	0.6	0.6	94.9892	1.9282	147.4	O K
2880 Winter	0.6	0.6	95.0222	1.9612	150.0	O K
4320 Winter	0.6	0.6	95.0467	1.9857	151.9	O K
5760 Winter	0.6	0.6	95.0307	1.9697	150.6	O K
7200 Winter	0.6	0.6	94.9967	1.9357	148.0	O K
8640 Winter	0.6	0.6	94.9537	1.8927	144.7	O K
10080 Winter	0.6	0.6	94.9067	1.8457	141.2	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
480 Winter	9.27	478
600 Winter	7.89	594
720 Winter	6.91	710
960 Winter	5.61	940
1440 Winter	4.18	1386
2160 Winter	3.11	2008
2880 Winter	2.52	2252
4320 Winter	1.87	3160
5760 Winter	1.51	4088
7200 Winter	1.28	4968
8640 Winter	1.12	5800
10080 Winter	1.00	6664

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S8 Trench Soakaway (25%)	
Date Friday 10 May 2019 File S8 - TRENCH SOAKAWAY ...	Designed By B Mong Checked By	
ENCAD		Source Control W.11.3


**Rainfall Details**

Region	SCOT+NI	Shortest Storm (mins)	15
Return Period (years)	100	Longest Storm (mins)	10080
M5-60 (mm)	17.000	Summer Storms	Yes
Ratio-R	0.300	Winter Storms	Yes
Cv (Summer)	0.750	Climate Change %	+20
Cv (Winter)	0.840		

**Time / Area Diagram**

Total Area (ha) = 0.200

Time (mins)	Area (ha)	Time (mins)	Area (ha)
from:	to:	from:	to:
0	4	4	8
	0.103		0.097

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S8 Trench Soakaway (25%)	
Date Friday 10 May 2019 File S8 - TRENCH SOAKAWAY ...	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	

**Trench Soakaway Details**

Infil Coef - Base (m/hr)	0.000000	Invert Level (m)	93.061
Infil Coef - Sides (m/hr)	0.042120	Cover Level (m)	96.396
Safety Factor	2.0	Slope (1:x)	0.0
Porosity	0.95	Cap Volume (m)	95.061
Width (m)	3.5	Cap Infiltration (m)	95.061
Length (m)	23.0		

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 3422 minutes

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
15 Summer	0.3	0.3	93.4888	0.4277	101.5	O K
30 Summer	0.5	0.5	93.6428	0.5817	138.1	O K
60 Summer	0.6	0.6	93.8013	0.7403	175.8	O K
120 Summer	0.7	0.7	93.9773	0.9163	217.6	O K
180 Summer	0.8	0.8	94.0883	1.0273	243.9	O K
240 Summer	0.9	0.9	94.1713	1.1103	263.7	O K
360 Summer	1.0	1.0	94.2918	1.2308	292.3	O K
480 Summer	1.0	1.0	94.3792	1.3182	313.0	O K
600 Summer	1.1	1.1	94.4467	1.3857	329.1	O K
720 Summer	1.1	1.1	94.5007	1.4397	341.9	O K
960 Summer	1.2	1.2	94.5827	1.5217	361.4	O K
1440 Summer	1.3	1.3	94.6837	1.6227	385.4	O K
2160 Summer	1.3	1.3	94.7537	1.6927	402.0	O K
2880 Summer	1.3	1.3	94.7937	1.7327	411.6	O K
4320 Summer	1.4	1.4	94.8427	1.7817	423.2	O K
5760 Summer	1.4	1.4	94.8637	1.8027	428.2	O K
7200 Summer	1.4	1.4	94.8672	1.8062	428.9	O K
8640 Summer	1.4	1.4	94.8597	1.7987	427.2	O K
10080 Summer	1.4	1.4	94.8462	1.7852	423.9	O K
15 Winter	0.4	0.4	93.5397	0.4787	113.7	O K
30 Winter	0.5	0.5	93.7123	0.6513	154.7	O K
60 Winter	0.6	0.6	93.8903	0.8293	196.9	O K
120 Winter	0.8	0.8	94.0878	1.0268	243.8	O K
180 Winter	0.9	0.9	94.2118	1.1508	273.3	O K
240 Winter	1.0	1.0	94.3048	1.2438	295.4	O K
360 Winter	1.1	1.1	94.4402	1.3792	327.6	O K


Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	91.99	23
30 Summer	62.66	38
60 Summer	40.00	68
120 Summer	24.90	128
180 Summer	18.72	188
240 Summer	15.26	246
360 Summer	11.41	366
480 Summer	9.27	486
600 Summer	7.89	606
720 Summer	6.91	724
960 Summer	5.61	964
1440 Summer	4.18	1442
2160 Summer	3.11	2056
2880 Summer	2.52	2364
4320 Summer	1.87	3112
5760 Summer	1.51	3920
7200 Summer	1.28	4752
8640 Summer	1.12	5536
10080 Summer	1.00	6360
15 Winter	91.99	23
30 Winter	62.66	38
60 Winter	40.00	68
120 Winter	24.90	126
180 Winter	18.72	184
240 Winter	15.26	244
360 Winter	11.41	362

Summary of Results for 100 year Return Period (+20%)

Storm Duration (mins)	Maximum Filtration (1/s)	Maximum Outflow (1/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
480 Winter	1.1	1.1	94.5387	1.4777	350.9	O K
600 Winter	1.2	1.2	94.6147	1.5537	369.0	O K
720 Winter	1.3	1.3	94.6762	1.6152	383.6	O K
960 Winter	1.3	1.3	94.7692	1.7082	405.7	O K
1440 Winter	1.4	1.4	94.8867	1.8257	433.6	O K
2160 Winter	1.5	1.5	94.9732	1.9122	454.2	O K
2880 Winter	1.5	1.5	95.0067	1.9457	462.2	O K
4320 Winter	1.5	1.5	95.0497	1.9887	472.4	O K
5760 Winter	1.6	1.6	95.0547	1.9937	473.5	O K
7200 Winter	1.5	1.5	95.0382	1.9772	469.6	O K
8640 Winter	1.5	1.5	95.0107	1.9497	463.1	O K
10080 Winter	1.5	1.5	94.9767	1.9157	455.0	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
480 Winter	9.27	478
600 Winter	7.89	596
720 Winter	6.91	712
960 Winter	5.61	944
1440 Winter	4.18	1400
2160 Winter	3.11	2056
2880 Winter	2.52	2620
4320 Winter	1.87	3284
5760 Winter	1.51	4200
7200 Winter	1.28	5112
8640 Winter	1.12	5968
10080 Winter	1.00	6856



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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S8 Trench Soakaway (75%)	
Date Friday 10 May 2019 File S8 - TRENCH SOAKAWAY ...	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	


**Rainfall Details**

Region	SCOT+NI	Shortest Storm (mins)	15
Return Period (years)	100	Longest Storm (mins)	10080
M5-60 (mm)	17.000	Summer Storms	Yes
Ratio-R	0.300	Winter Storms	Yes
Cv (Summer)	0.750	Climate Change %	+20
Cv (Winter)	0.840		

**Time / Area Diagram**

Total Area (ha) = 0.590

Time (mins)	Area (ha)	Time (mins)	Area (ha)
from:	to:	from:	to:
0	4	4	8
	0.309		0.281

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S8 Trench Soakaway (75%)	
Date Friday 10 May 2019 File S8 - TRENCH SOAKAWAY ...	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	

**Trench Soakaway Details**

Infil Coef - Base (m/hr)	0.000000	Invert Level (m)	93.061
Infil Coef - Sides (m/hr)	0.042120	Cover Level (m)	96.396
Safety Factor	2.0	Slope (1:x)	0.0
Porosity	0.95	Cap Volume (m)	95.061
Width (m)	4.0	Cap Infiltration (m)	95.061
Length (m)	62.5		

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 5165 minutes


Storm Duration (mins)	Maximum Filtration (1/s)	Maximum Outflow (1/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
15 Summer	0.4	0.4	93.4872	0.4262	135.3	O K
30 Summer	0.6	0.6	93.6408	0.5797	184.0	O K
60 Summer	0.8	0.8	93.7993	0.7383	234.2	O K
120 Summer	0.9	0.9	93.9748	0.9138	290.0	O K
180 Summer	1.0	1.0	94.0853	1.0243	325.0	O K
240 Summer	1.1	1.1	94.1683	1.1073	351.4	O K
360 Summer	1.3	1.3	94.2888	1.2278	389.6	O K
480 Summer	1.3	1.3	94.3762	1.3152	417.3	O K
600 Summer	1.4	1.4	94.4437	1.3827	438.8	O K
720 Summer	1.5	1.5	94.4982	1.4372	456.0	O K
960 Summer	1.6	1.6	94.5807	1.5197	482.2	O K
1440 Summer	1.7	1.7	94.6822	1.6212	514.5	O K
2160 Summer	1.7	1.7	94.7537	1.6927	537.0	O K
2880 Summer	1.8	1.8	94.7937	1.7327	549.9	O K
4320 Summer	1.8	1.8	94.8432	1.7822	565.6	O K
5760 Summer	1.8	1.8	94.8652	1.8042	572.5	O K
7200 Summer	1.9	1.9	94.8692	1.8082	573.8	O K
8640 Summer	1.8	1.8	94.8627	1.8017	571.7	O K
10080 Summer	1.8	1.8	94.8497	1.7887	567.5	O K
15 Winter	0.5	0.5	93.5383	0.4772	151.5	O K
30 Winter	0.7	0.7	93.7103	0.6493	206.1	O K
60 Winter	0.8	0.8	93.8878	0.8268	262.3	O K
120 Winter	1.0	1.0	94.0848	1.0238	324.9	O K
180 Winter	1.2	1.2	94.2088	1.1478	364.2	O K
240 Winter	1.3	1.3	94.3018	1.2408	393.7	O K
360 Winter	1.4	1.4	94.4372	1.3762	436.7	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	91.99	23
30 Summer	62.66	38
60 Summer	40.00	68
120 Summer	24.90	128
180 Summer	18.72	188
240 Summer	15.26	246
360 Summer	11.41	366
480 Summer	9.27	486
600 Summer	7.89	606
720 Summer	6.91	724
960 Summer	5.61	964
1440 Summer	4.18	1442
2160 Summer	3.11	2060
2880 Summer	2.52	2372
4320 Summer	1.87	3116
5760 Summer	1.51	3920
7200 Summer	1.28	4752
8640 Summer	1.12	5536
10080 Summer	1.00	6360
15 Winter	91.99	23
30 Winter	62.66	38
60 Winter	40.00	68
120 Winter	24.90	126
180 Winter	18.72	184
240 Winter	15.26	244
360 Winter	11.41	362

Summary of Results for 100 year Return Period (+20%)

Storm Duration (mins)	Maximum Filtration (1/s)	Maximum Outflow (1/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m <sup>3</sup> )	Status
480 Winter	1.5	1.5	94.5352	1.4742	467.8	O K
600 Winter	1.6	1.6	94.6117	1.5507	492.0	O K
720 Winter	1.7	1.7	94.6732	1.6122	511.5	O K
960 Winter	1.7	1.7	94.7667	1.7057	541.2	O K
1440 Winter	1.9	1.9	94.8847	1.8237	578.7	O K
2160 Winter	2.0	2.0	94.9732	1.9122	606.8	O K
2880 Winter	2.0	2.0	95.0082	1.9472	617.8	O K
4320 Winter	2.0	2.0	95.0512	1.9902	631.5	O K
5760 Winter	2.0	2.0	95.0577	1.9967	633.5	O K
7200 Winter	2.0	2.0	95.0422	1.9812	628.7	O K
8640 Winter	2.0	2.0	95.0157	1.9547	620.2	O K
10080 Winter	2.0	2.0	94.9827	1.9217	609.8	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
480 Winter	9.27	478
600 Winter	7.89	596
720 Winter	6.91	712
960 Winter	5.61	944
1440 Winter	4.18	1400
2160 Winter	3.11	2056
2880 Winter	2.52	2628
4320 Winter	1.87	3284
5760 Winter	1.51	4208
7200 Winter	1.28	5112
8640 Winter	1.12	5968
10080 Winter	1.00	6856

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S8 Trench Soakaway 100%	
Date Friday 10 May 2019 File S8 - TRENCH SOAKAWAY ...	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	


**Rainfall Details**

Region	SCOT+NI	Shortest Storm (mins)	15
Return Period (years)	100	Longest Storm (mins)	10080
M5-60 (mm)	17.000	Summer Storms	Yes
Ratio-R	0.300	Winter Storms	Yes
Cv (Summer)	0.750	Climate Change %	+20
Cv (Winter)	0.840		

**Time / Area Diagram**

Total Area (ha) = 0.786

Time (mins)	Area (ha)	Time (mins)	Area (ha)
from:	to:	from:	to:
0	4	4	8
	0.412		0.374


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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S8 Trench Soakaway 100%	
Date Friday 10 May 2019 File S8 - TRENCH SOAKAWAY ...	Designed By B Mong Checked By	
ENCAD	Source Control W.11.3	

**Trench Soakaway Details**

Infil Coef - Base (m/hr)	0.000000	Invert Level (m)	93.061
Infil Coef - Sides (m/hr)	0.042120	Cover Level (m)	96.396
Safety Factor	2.0	Slope (1:x)	0.0
Porosity	0.95	Cap Volume (m)	95.061
Width (m)	4.0	Cap Infiltration (m)	95.061
Length (m)	83.5		

## APPENDIX D

# Surface water Network Calculations

Thomas Garland & Partners		Page 1
Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S1 Surface Water Network	
Date Thursday 25 April 2019 File R1831 - S1 Surface Ne...	Designed By B Mong Checked By	
ENCAD	System1 W.11.3	

**STORM SEWER DESIGN by the Modified Rational Method**

**Global Variables**

Pipe Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.PIP  
 Manhole Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.MHS

Location - Scotland & Ireland

Return Period (years)	5
M5-60 (mm)	17.000
Ratio R	0.300
Maximum Rainfall (mm/hr)	150
Foul Sewage (l/s/ha)	0.00
O'flow Setting (*Foul only)	0
Volumetric Runoff Coeff.	0.75
Add Flow / Climate Change (%)	20
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	5.000
Min Cover Depth for Optimisation (m)	1.200
Min Vel for Auto Design Only (m/s)	0.75
Min Slope for Optimisation (1:X)	500
Minimum Outfall Invert (m)	0.000
Ground Level at Outfall (m)	100.297
Outfall Manhole Name	S SOAKAWAY 1
Outfall Manhole Dia/Length (mm)	1250
Outfall Manhole Width (mm)	0

Designed with Level Inverts


**Network Design Table**

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	36.27	0.181	200.0	0.215	4.00	0.0	0.600	o	300
2.000	27.55	0.276	100.0	0.083	4.00	0.0	0.600	o	225
1.001	74.29	0.371	200.2	0.398	0.00	0.0	0.600	o	450
1.002	55.27	0.553	100.0	0.293	0.00	0.0	0.600	o	450
1.003	62.49	1.562	40.0	0.348	0.00	0.0	0.600	o	450
1.004	4.97	0.025	199.6	0.000	0.00	0.0	0.600	o	525
1.005	2.53	0.013	199.2	0.000	0.00	0.0	0.600	o	525

**Network Results Table**

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E.Area (ha)	E.DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
1.000	69.0	4.5	101.771	0.215	0.0	0.0	8.0	1.11	78.3	48.2
2.000	70.1	4.4	101.913	0.083	0.0	0.0	3.2	1.31	52.0	18.9
1.001	64.6	5.4	101.590	0.696	0.0	0.0	24.4	1.43	227.9	146.2
1.002	62.6	5.9	101.219	0.989	0.0	0.0	33.5	2.03	323.4	201.2
1.003	61.2	6.2	100.666	1.337	0.0	0.0	44.3	3.22	512.5	266.1
1.004	61.0	6.2	99.104	1.337	0.0	0.0	44.3	1.58	342.4	266.1
1.005	60.9	6.3	99.079	1.337	0.0	0.0	44.3	1.58	342.8	266.1



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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S1 Surface Water Network	
Date Thursday 25 April 2019 File R1831 - S1 Surface Ne...	Designed By B Mong Checked By	
ENCAD	System1 W.11.3	

Time Area Diagram

Time From (mins)	Time To (mins)	Area (ha)
0	4	0.904
4	8	0.433

Total Area Contributing (ha) = 1.337

Total Pipe Volume (m<sup>3</sup>) = 35.827

PIPELINE SCHEDULES

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	o	300	S MH1	102.900	101.771	0.829	1050
2.000	o	225	S MH7	103.342	101.913	1.204	1050
1.001	o	450	S MH2	103.255	101.590	1.216	1350
1.002	o	450	S MH3	103.254	101.219	1.585	1350
1.003	o	450	S MH4	102.202	100.666	1.086	1350
1.004	o	525	S MH5	100.428	99.104	0.800	1500
1.005	o	525	S MH6	100.341	99.079	0.738	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	36.27	200.0	S MH2	103.255	101.590	1.366	1350
2.000	27.55	100.0	S MH2	103.255	101.638	1.393	1350
1.001	74.29	200.2	S MH3	103.254	101.219	1.585	1350
1.002	55.27	100.0	S MH4	102.202	100.666	1.086	1350
1.003	62.49	40.0	S MH5	100.428	99.104	0.875	1500
1.004	4.97	199.6	S MH6	100.341	99.079	0.738	1500
1.005	2.53	199.2	S SOAKAWAY 1	100.297	99.066	0.706	1250

MANHOLE SCHEDULES

M/Hole Number	Cover Level (m)	M/Hole Depth (m)	M/Hole Diam.,L*W (mm)	Pipes Out			Pipes In		
				PN	IL.(m)	D (mm)	PN	IL.(m)	D (mm)
S MH1	102.900	1.129	1050	1.000	101.771	300			
S MH7	103.342	1.429	1050	2.000	101.913	225			
S MH2	103.255	1.666	1350	1.001	101.590	450	1.000 2.000	101.590 101.638	300 225
S MH3	103.254	2.035	1350	1.002	101.219	450	1.001	101.219	450
S MH4	102.202	1.536	1350	1.003	100.666	450	1.002	100.666	450
S MH5	100.428	1.325	1500	1.004	99.104	525	1.003	99.104	450
S MH6	100.341	1.263	1500	1.005	99.079	525	1.004	99.079	525
S SOAKAWAY 1	100.297	1.231	1250		OUTFALL		1.005	99.066	525

Garland House  
28-30 Rathmines Park  
Rathmines Dublin 6

R1831 - Magee Barracks  
Phase 1  
S1 Surface Water Network



Date Thursday 25 April 2019  
File R1831 - S1 Surface Ne...

Designed By B Mong  
Checked By

ENCAD

System1 W.11.3

Setting Out Information (True Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH1	1050		673301.424	712395.090	
2.000	S MH7	1050		673260.291	712346.291	
1.001	S MH2	1350		673278.049	712367.359	
1.002	S MH3	1350		673334.850	712319.482	
1.003	S MH4	1350		673370.471	712361.743	
1.004	S MH5	1500		673410.747	712409.524	
1.005	S MH6	1500		673414.512	712406.279	

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.005	S SOAKAWAY 1	1250		673416.481	712404.690	

Garland House  
28-30 Rathmines Park  
Rathmines Dublin 6

R1831 - Magee Barracks  
Phase 1  
S1 Surface Water Network



Date Thursday 25 April 2019  
File R1831 - S1 Surface Ne...

Designed By B Mong  
Checked By


ENCAD

System1 W.11.3

Setting Out Information (Site Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH1	1050		673301.424	712395.090	
2.000	S MH7	1050		673260.291	712346.291	
1.001	S MH2	1350		673278.049	712367.359	
1.002	S MH3	1350		673334.850	712319.482	
1.003	S MH4	1350		673370.471	712361.743	
1.004	S MH5	1500		673410.747	712409.524	
1.005	S MH6	1500		673414.512	712406.279	

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.005	S SOAKAWAY 1	1250		673416.481	712404.690	

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S2 Surface Water Network	
Date Thursday 25 April 2019 File R1831 - S2 Surface Ne...	Designed By B Mong Checked By	
ENCAD	System1 W.11.3	

**STORM SEWER DESIGN by the Modified Rational Method**

**Global Variables**

Pipe Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.PIP  
 Manhole Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.MHS

Location - Scotland & Ireland

Return Period (years)	5
M5-60 (mm)	17.000
Ratio R	0.300
Maximum Rainfall (mm/hr)	150
Foul Sewage (l/s/ha)	0.00
O'flow Setting (*Foul only)	0
Volumetric Runoff Coeff.	0.70
Add Flow / Climate Change (%)	20
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	5.000
Min Cover Depth for Optimisation (m)	1.200
Min Vel for Auto Design Only (m/s)	0.75
Min Slope for Optimisation (1:X)	500
Minimum Outfall Invert (m)	0.000
Ground Level at Outfall (m)	101.470
Outfall Manhole Name	S SOAKAWAY 2
Outfall Manhole Dia/Length (mm)	1250
Outfall Manhole Width (mm)	0


Designed with Level Inverts

**Network Design Table**

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	40.55	0.203	200.0	0.221	4.00	0.0	0.600	o	300
1.001	56.11	0.281	200.0	0.218	0.00	0.0	0.600	o	375
2.000	41.67	0.208	200.0	0.171	4.00	0.0	0.600	o	225
2.001	50.57	0.253	200.0	0.167	0.00	0.0	0.600	o	300
2.002	15.80	0.079	199.9	0.019	0.00	0.0	0.600	o	300
1.002	6.11	0.031	199.8	0.000	0.00	0.0	0.600	o	450
1.003	3.01	0.015	199.6	0.000	0.00	0.0	0.600	o	450

**Network Results Table**

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E.Area (ha)	E.DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
1.000	68.7	4.6	100.086	0.221	0.0	0.0	7.7	1.11	78.3	46.0
1.001	65.0	5.3	99.884	0.439	0.0	0.0	14.4	1.28	141.1	86.5
2.000	67.9	4.8	100.143	0.171	0.0	0.0	5.9	0.92	36.6	35.2
2.001	64.2	5.5	99.935	0.338	0.0	0.0	11.0	1.11	78.3	65.8
2.002	63.1	5.8	99.682	0.357	0.0	0.0	11.4	1.11	78.3	68.3
1.002	62.8	5.8	99.603	0.796	0.0	0.0	25.3	1.43	228.2	151.6
1.003	62.6	5.9	99.572	0.796	0.0	0.0	25.3	1.44	228.3	151.6

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S2 Surface Water Network	
Date Thursday 25 April 2019 File R1831 - S2 Surface Ne...	Designed By B Mong Checked By	
ENCAD	System1 W.11.3	

Time Area Diagram

Time From (mins)	Time To (mins)	Area (ha)
0	4	0.543
4	8	0.253

Total Area Contributing (ha) = 0.796

Total Pipe Volume (m<sup>3</sup>) = 16.862

PIPELINE SCHEDULES

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	o	300	S MH8	101.516	100.086	1.129	1050
1.001	o	375	S MH9	101.714	99.884	1.455	1350
2.000	o	225	S MH12	101.265	100.143	0.897	1050
2.001	o	300	S MH13	101.441	99.935	1.206	1050
2.002	o	300	S MH14	101.408	99.682	1.426	1050
1.002	o	450	S MH10	101.573	99.603	1.520	1350
1.003	o	450	S MH11	101.472	99.572	1.449	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	40.55	200.0	S MH9	101.714	99.884	1.530	1350
1.001	56.11	200.0	S MH10	101.573	99.603	1.595	1350
2.000	41.67	200.0	S MH13	101.441	99.935	1.281	1050
2.001	50.57	200.0	S MH14	101.408	99.682	1.426	1050
2.002	15.80	199.9	S MH10	101.573	99.603	1.670	1350
1.002	6.11	199.8	S MH11	101.472	99.572	1.449	1350
1.003	3.01	199.6	S SOAKAWAY 2	101.470	99.557	1.463	1250



MANHOLE SCHEDULES

M/Hole Number	Cover Level (m)	M/Hole Depth (m)	M/Hole Diam.,L*W (mm)	Pipes Out			Pipes In		
				PN	IL.(m)	D (mm)	PN	IL.(m)	D (mm)
S MH8	101.516	1.429	1050	1.000	100.086	300			
S MH9	101.714	1.830	1350	1.001	99.884	375	1.000	99.884	300
S MH12	101.265	1.122	1050	2.000	100.143	225			
S MH13	101.441	1.506	1050	2.001	99.935	300	2.000	99.935	225
S MH14	101.408	1.726	1050	2.002	99.682	300	2.001	99.682	300
S MH10	101.573	1.970	1350	1.002	99.603	450	1.001	99.603	375
							2.002	99.603	300
S MH11	101.472	1.899	1350	1.003	99.572	450	1.002	99.572	450
S SOAKAWAY 2	101.470	1.913	1250		OUTFALL		1.003	99.557	450

Garland House  
28-30 Rathmines Park  
Rathmines Dublin 6

R1831 - Magee Barracks  
Phase 1  
S2 Surface Water Network



Date Thursday 25 April 2019  
File R1831 - S2 Surface Ne...

Designed By B Mong  
Checked By

ENCAD

System1 W.11.3

Setting Out Information (True Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH8	1050		673450.161	712219.342	
1.001	S MH9	1350		673438.477	712258.169	
2.000	S MH12	1050		673555.343	712253.672	
2.001	S MH13	1050		673523.483	712280.527	
2.002	S MH14	1050		673484.833	712313.134	
1.002	S MH10	1350		673474.637	712301.069	
1.003	S MH11	1350		673479.315	712297.131	

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.003	S SOAKAWAY 2	1250		673481.619	712295.189	

Garland House  
28-30 Rathmines Park  
Rathmines Dublin 6

R1831 - Magee Barracks  
Phase 1  
S2 Surface Water Network



Date Thursday 25 April 2019  
File R1831 - S2 Surface Ne...

Designed By B Mong  
Checked By

ENCAD

System1 W.11.3

Setting Out Information (Site Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH8	1050		673450.161	712219.342	
1.001	S MH9	1350		673438.477	712258.169	
2.000	S MH12	1050		673555.343	712253.672	
2.001	S MH13	1050		673523.483	712280.527	
2.002	S MH14	1050		673484.833	712313.134	
1.002	S MH10	1350		673474.637	712301.069	
1.003	S MH11	1350		673479.315	712297.131	

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.003	S SOAKAWAY 2	1250		673481.619	712295.189	

**STORM SEWER DESIGN by the Modified Rational Method**

**Global Variables**

Pipe Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.PIP  
 Manhole Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.MHS

Location - Scotland & Ireland

Return Period (years)	5
M5-60 (mm)	17.000
Ratio R	0.300
Maximum Rainfall (mm/hr)	150
Foul Sewage (l/s/ha)	0.00
O'flow Setting (*Foul only)	0
Volumetric Runoff Coeff.	0.75
Add Flow / Climate Change (%)	20
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	5.000
Min Cover Depth for Optimisation (m)	1.200
Min Vel for Auto Design Only (m/s)	0.75
Min Slope for Optimisation (1:X)	500
Minimum Outfall Invert (m)	0.000
Ground Level at Outfall (m)	98.794
Outfall Manhole Name	S SOAKAWAY 3
Outfall Manhole Dia/Length (mm)	1250
Outfall Manhole Width (mm)	0


Designed with Level Inverts

**Network Design Table**

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	62.82	2.199	28.6	0.285	4.00	0.0	0.600	o	225
2.000	66.32	0.332	200.0	0.293	4.00	0.0	0.600	o	300
1.001	33.18	0.830	40.0	0.087	0.00	0.0	0.600	o	300
1.002	7.03	0.035	199.8	0.000	0.00	0.0	0.600	o	450
1.003	4.35	0.022	200.3	0.000	0.00	0.0	0.600	o	450

**Network Results Table**

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E.Area (ha)	E.DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
1.000	69.7	4.4	100.354	0.285	0.0	0.0	10.8	2.46	97.7	64.6
2.000	66.6	5.0	98.680	0.293	0.0	0.0	10.6	1.11	78.3	63.5
1.001	65.5	5.2	98.155	0.665	0.0	0.0	23.6	2.49	176.3	141.7
1.002	65.2	5.3	97.326	0.665	0.0	0.0	23.6	1.43	228.2	141.7
1.003	64.9	5.4	97.290	0.665	0.0	0.0	23.6	1.43	227.9	141.7

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S3 Surface Water Network	
Date Thursday 25 April 2019 File R1831 - S3 Surface Ne...	Designed By B Mong Checked By	
ENCAD	System1 W.11.3	

Time Area Diagram

Time From (mins)	Time To (mins)	Area (ha)
0	4	0.503
4	8	0.162

Total Area Contributing (ha) = 0.665

Total Pipe Volume (m<sup>3</sup>) = 11.341

PIPELINE SCHEDULES

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	o	225	S MH19	101.807	100.354	1.228	1050
2.000	o	300	S MH15	100.108	98.680	1.128	1050
1.001	o	300	S MH16	99.697	98.155	1.242	1050
1.002	o	450	S MH17	98.965	97.326	1.189	1350
1.003	o	450	S MH18	98.880	97.290	1.140	1350






Downstream Manhole


PN	Length (m)	Slope (1:X)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	62.82	28.6	S MH16	99.697	98.155	1.317	1050
2.000	66.32	200.0	S MH16	99.697	98.349	1.049	1050
1.001	33.18	40.0	S MH17	98.965	97.326	1.339	1350
1.002	7.03	199.8	S MH18	98.880	97.290	1.140	1350
1.003	4.35	200.3	S SOAKAWAY 3	98.794	97.269	1.075	1250

MANHOLE SCHEDULES

M/Hole Number	Cover Level (m)	M/Hole Depth (m)	M/Hole Diam., L*W (mm)	Pipes Out			Pipes In		
				PN	IL. (m)	D (mm)	PN	IL. (m)	D (mm)
S MH19	101.807	1.453	1050	1.000	100.354	225			
S MH15	100.108	1.428	1050	2.000	98.680	300			
S MH16	99.697	1.542	1050	1.001	98.155	300	1.000 2.000	98.155 98.349	225 300
S MH17	98.965	1.639	1350	1.002	97.326	450	1.001	97.326	300
S MH18	98.880	1.590	1350	1.003	97.290	450	1.002	97.290	450
S SOAKAWAY 3	98.794	1.525	1250		OUTFALL		1.003	97.269	450





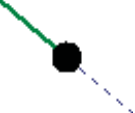
Setting Out Information (True Coordinates)


PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH19	1050		673322.469	712419.922	
2.000	S MH15	1050		673413.668	712425.207	
1.001	S MH16	1050		673362.955	712467.953	
1.002	S MH17	1350		673384.341	712493.325	
1.003	S MH18	1350		673378.963	712497.858	


PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.003	S SOAKAWAY 3	1250		673375.640	712500.659	



Setting Out Information (Site Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH19	1050		673322.469	712419.922	
2.000	S MH15	1050		673413.668	712425.207	
1.001	S MH16	1050		673362.955	712467.953	
1.002	S MH17	1350		673384.341	712493.325	
1.003	S MH18	1350		673378.963	712497.858	

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.003	S SOAKAWAY 3	1250		673375.640	712500.659	

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S4 Surface Water Network	
Date Friday 10 May 2019 File R1831 - S4 Surface Ne...	Designed By B Mong Checked By	
ENCAD	System1 W.11.3	

**STORM SEWER DESIGN by the Modified Rational Method**

**Global Variables**

Pipe Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.PIP  
 Manhole Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.MHS

Location - Scotland & Ireland

Return Period (years)	5
M5-60 (mm)	17.000
Ratio R	0.300
Maximum Rainfall (mm/hr)	150
Foul Sewage (l/s/ha)	0.00
O'flow Setting (*Foul only)	0
Volumetric Runoff Coeff.	0.75
Add Flow / Climate Change (%)	20
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	5.000
Min Cover Depth for Optimisation (m)	1.200
Min Vel for Auto Design Only (m/s)	0.75
Min Slope for Optimisation (1:X)	500
Minimum Outfall Invert (m)	0.000
Ground Level at Outfall (m)	97.085
Outfall Manhole Name	S SOAKAWAY 4
Outfall Manhole Dia/Length (mm)	1250
Outfall Manhole Width (mm)	0


Designed with Level Inverts

**Network Design Table**

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	34.72	0.347	100.0	0.109	4.00	0.0	0.600	o	225
2.000	22.34	0.223	100.0	0.159	4.00	0.0	0.600	o	225
1.001	56.04	0.841	66.7	0.188	0.00	0.0	0.600	o	300
1.002	62.25	0.311	200.0	0.223	0.00	0.0	0.600	o	375
3.000	63.01	1.575	40.0	0.135	4.00	0.0	0.600	o	225
1.003	59.55	0.298	200.0	0.176	0.00	0.0	0.600	o	450

**Network Results Table**

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E.Area (ha)	E.DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
1.000	69.6	4.4	97.184	0.109	0.0	0.0	4.1	1.31	52.0	24.7
2.000	70.5	4.3	97.059	0.159	0.0	0.0	6.1	1.31	52.0	36.4
1.001	67.0	4.9	96.836	0.456	0.0	0.0	16.5	1.93	136.3	99.3
1.002	63.1	5.7	95.995	0.679	0.0	0.0	23.2	1.28	141.1	139.3
3.000	69.2	4.5	97.476	0.135	0.0	0.0	5.1	2.07	82.5	30.4
1.003	60.3	6.4	95.684	0.990	0.0	0.0	32.3	1.43	228.1	193.9


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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S4 Surface Water Network	
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ENCAD		System1 W.11.3

Network Design Table

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
4.000	64.25	0.321	200.0	0.188	4.00	0.0	0.600	o	300
1.004	11.42	0.083	136.9	0.014	0.00	0.0	0.600	o	450
1.005	6.18	0.010	618.1	0.000	0.00	0.0	0.600	o	600

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E.Area (ha)	E.DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
4.000	66.8	5.0	95.708	0.188	0.0	0.0	6.8	1.11	78.3	40.8
1.004	59.8	6.5	95.386	1.192	0.0	0.0	38.6	1.74	276.1	231.7
1.005	59.4	6.6	95.303	1.192	0.0	0.0	38.6	0.97	274.9	231.7


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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S4 Surface Water Network	
Date Friday 10 May 2019 File R1831 - S4 Surface Ne...	Designed By B Mong Checked By	
ENCAD	System1 W.11.3	

Time Area Diagram

Time From (mins)	Time To (mins)	Area (ha)
0	4	0.677
4	8	0.515

Total Area Contributing (ha) = 1.192

Total Pipe Volume (m<sup>3</sup>) = 33.187

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S4 Surface Water Network	
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ENCAD	System1 W.11.3	

PIPELINE SCHEDULES

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	o	225	S MH20	98.616	97.184	1.208	1050
2.000	o	225	S MH26	98.660	97.059	1.375	1050
1.001	o	300	S MH21	98.220	96.836	1.084	1050
1.002	o	375	S MH22	97.583	95.995	1.212	1350
3.000	o	225	S MH27	99.402	97.476	1.701	1200
1.003	o	450	S MH23	97.031	95.684	0.897	1350
4.000	o	300	S MH28	97.183	95.708	1.175	1050
1.004	o	450	S MH24	96.819	95.386	0.982	1350
1.005	o	600	S MH25	97.096	95.303	1.193	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	34.72	100.0	S MH21	98.220	96.836	1.159	1050
2.000	22.34	100.0	S MH21	98.220	96.836	1.159	1050
1.001	56.04	66.7	S MH22	97.583	95.995	1.287	1350
1.002	62.25	200.0	S MH23	97.031	95.684	0.972	1350
3.000	63.01	40.0	S MH23	97.031	95.900	0.906	1350
1.003	59.55	200.0	S MH24	96.819	95.386	0.982	1350
4.000	64.25	200.0	S MH24	96.819	95.387	1.132	1350
1.004	11.42	136.9	S MH25	97.096	95.303	1.343	1500
1.005	6.18	618.1	S SOAKAWAY 4	97.085	95.293	1.192	1250

Garland House  
28-30 Rathmines Park  
Rathmines Dublin 6

R1831 - Magee Barracks  
Phase 1  
S4 Surface Water Network



Date Friday 10 May 2019

Designed By B Mong

File R1831 - S4 Surface Ne...

Checked By

ENCAD

System1 W.11.3

MANHOLE SCHEDULES

M/Hole Number	Cover Level (m)	M/Hole Depth (m)	M/Hole Diam.,L*W (mm)	Pipes Out			Pipes In		
				PN	IL.(m)	D (mm)	PN	IL.(m)	D (mm)
S MH20	98.616	1.433	1050	1.000	97.184	225			
S MH26	98.660	1.600	1050	2.000	97.059	225			
S MH21	98.220	1.384	1050	1.001	96.836	300	1.000 2.000	96.836 96.836	225 225
S MH22	97.583	1.587	1350	1.002	95.995	375	1.001	95.995	300
S MH27	99.402	1.926	1200	3.000	97.476	225			
S MH23	97.031	1.347	1350	1.003	95.684	450	1.002 3.000	95.684 95.900	375 225
S MH28	97.183	1.475	1050	4.000	95.708	300			
S MH24	96.819	1.432	1350	1.004	95.386	450	1.003 4.000	95.386 95.387	450 300
S MH25	97.096	1.793	1500	1.005	95.303	600	1.004	95.303	450
S SOAKAWAY 4	97.085	1.792	1250		OUTFALL		1.005	95.293	600

Garland House  
28-30 Rathmines Park  
Rathmines Dublin 6

R1831 - Magee Barracks  
Phase 1  
S4 Surface Water Network



Date Friday 10 May 2019  
File R1831 - S4 Surface Ne...

Designed By B Mong  
Checked By

ENCAD

System1 W.11.3

Setting Out Information (True Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH20	1050		673430.886	712549.454	
2.000	S MH26	1050		673394.111	712505.825	
1.001	S MH21	1050		673408.509	712522.906	
1.002	S MH22	1350		673451.355	712486.791	
3.000	S MH27	1200		673458.338	712398.491	
1.003	S MH23	1350		673498.951	712446.673	
4.000	S MH28	1050		673586.459	712450.798	
1.004	S MH24	1350		673537.332	712492.208	
1.005	S MH25	1500		673546.986	712498.303	

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.005	S SOAKAWAY 4	1250		673552.977	712499.821	

Garland House  
28-30 Rathmines Park  
Rathmines Dublin 6

R1831 - Magee Barracks  
Phase 1  
S4 Surface Water Network



Date Friday 10 May 2019  
File R1831 - S4 Surface Ne...

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ENCAD


System1 W.11.3

Setting Out Information (Site Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH20	1050		673430.886	712549.454	
2.000	S MH26	1050		673394.111	712505.825	
1.001	S MH21	1050		673408.509	712522.906	
1.002	S MH22	1350		673451.355	712486.791	
3.000	S MH27	1200		673458.338	712398.491	
1.003	S MH23	1350		673498.951	712446.673	
4.000	S MH28	1050		673586.459	712450.798	
1.004	S MH24	1350		673537.332	712492.208	
1.005	S MH25	1500		673546.986	712498.303	

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.005	S SOAKAWAY 4	1250		673552.977	712499.821	



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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S5 Surface Water Network	
Date Friday 10 May 2019 File R1831 - S5 Surface Ne...	Designed By B Mong Checked By	
ENCAD	System1 W.11.3	

**STORM SEWER DESIGN by the Modified Rational Method**

**Global Variables**

Pipe Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.PIP  
 Manhole Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.MHS

Location - Scotland & Ireland

Return Period (years)	5
M5-60 (mm)	17.000
Ratio R	0.300
Maximum Rainfall (mm/hr)	150
Foul Sewage (l/s/ha)	0.00
O'flow Setting (*Foul only)	0
Volumetric Runoff Coeff.	0.75
Add Flow / Climate Change (%)	20
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	5.000
Min Cover Depth for Optimisation (m)	1.200
Min Vel for Auto Design Only (m/s)	0.75
Min Slope for Optimisation (1:X)	500
Minimum Outfall Invert (m)	0.000
Ground Level at Outfall (m)	101.699
Outfall Manhole Name	S SOAKAWAY 5
Outfall Manhole Dia/Length (mm)	1250
Outfall Manhole Width (mm)	0


Designed with Level Inverts

**Network Design Table**

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	37.11	0.186	200.0	0.121	4.00	0.0	0.600	o	225
1.001	68.40	0.342	200.0	0.182	0.00	0.0	0.600	o	300
2.000	37.19	0.186	200.0	0.038	4.00	0.0	0.600	o	225
1.002	15.95	0.070	227.6	0.000	0.00	0.0	0.600	o	300
1.003	4.22	0.012	348.4	0.000	0.00	0.0	0.600	o	375

**Network Results Table**

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E.Area (ha)	E.DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
1.000	68.3	4.7	99.923	0.121	0.0	0.0	4.5	0.92	36.6	26.9
1.001	63.3	5.7	99.737	0.303	0.0	0.0	10.4	1.11	78.3	62.3
2.000	68.3	4.7	99.899	0.038	0.0	0.0	1.4	0.92	36.6	8.4
1.002	62.2	6.0	99.395	0.341	0.0	0.0	11.5	1.04	73.4	68.9
1.003	61.9	6.0	99.325	0.341	0.0	0.0	11.5	0.96	106.6	68.9

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S5 Surface Water Network	
Date Friday 10 May 2019 File R1831 - S5 Surface Ne...	Designed By B Mong Checked By	
ENCAD		System1 W.11.3

Time Area Diagram

Time From (mins)	Time To (mins)	Area (ha)
0	4	0.208
4	8	0.133

Total Area Contributing (ha) = 0.341

Total Pipe Volume (m<sup>3</sup>) = 9.382

PIPELINE SCHEDULES

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	o	225	S MH29	101.344	99.923	1.197	1050
1.001	o	300	S MH30	102.114	99.737	2.077	1200
2.000	o	225	S MH33	101.354	99.899	1.230	1050
1.002	o	300	S MH31	101.706	99.395	2.011	1200
1.003	o	375	S MH32	101.694	99.325	1.994	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	37.11	200.0	S MH30	102.114	99.737	2.152	1200
1.001	68.40	200.0	S MH31	101.706	99.395	2.011	1200
2.000	37.19	200.0	S MH31	101.706	99.713	1.768	1200
1.002	15.95	227.6	S MH32	101.694	99.325	2.069	1350
1.003	4.22	348.4	S SOAKAWAY 5	101.699	99.313	2.011	1250

MANHOLE SCHEDULES

M/Hole Number	Cover Level (m)	M/Hole Depth (m)	M/Hole Diam., L*W (mm)	Pipes Out			Pipes In		
				PN	IL. (m)	D (mm)	PN	IL. (m)	D (mm)
S MH29	101.344	1.421	1050	1.000	99.923	225			
S MH30	102.114	2.377	1200	1.001	99.737	300	1.000	99.737	225
S MH33	101.354	1.455	1050	2.000	99.899	225			
S MH31	101.706	2.311	1200	1.002	99.395	300	1.001	99.395	300
				2.000	99.713		2.000	99.713	225
S MH32	101.694	2.369	1350	1.003	99.325	375	1.002	99.325	300
S SOAKAWAY 5	101.699	2.386	1250		OUTFALL		1.003	99.313	375

Garland House  
 28-30 Rathmines Park  
 Rathmines Dublin 6

R1831 - Magee Barracks  
 Phase 1  
 S5 Surface Water Network



Date Friday 10 May 2019  
 File R1831 - S5 Surface Ne...

Designed By B Mong  
 Checked By

ENCAD

System1 W.11.3

Setting Out Information (True Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH29	1050		673611.493	712197.974	
1.001	S MH30	1200		673587.578	712169.602	
2.000	S MH33	1050		673559.243	712242.120	
1.002	S MH31	1200		673535.277	712213.688	
1.003	S MH32	1350		673529.507	712228.561	

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.003	S SOAKAWAY 5	1250		673526.215	712231.196	

Garland House  
28-30 Rathmines Park  
Rathmines Dublin 6

R1831 - Magee Barracks  
Phase 1  
S5 Surface Water Network



Date Friday 10 May 2019  
File R1831 - S5 Surface Ne...

Designed By B Mong  
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ENCAD

System1 W.11.3

Setting Out Information (Site Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH29	1050		673611.493	712197.974	
1.001	S MH30	1200		673587.578	712169.602	
2.000	S MH33	1050		673559.243	712242.120	
1.002	S MH31	1200		673535.277	712213.688	
1.003	S MH32	1350		673529.507	712228.561	

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.003	S SOAKAWAY 5	1250		673526.215	712231.196	

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S6 Surface Water Network	
Date Thursday 25 April 2019 File R1831 - S6 Surface Ne...	Designed By B Mong Checked By	
ENCAD	System1 W.11.3	

**STORM SEWER DESIGN by the Modified Rational Method**

**Global Variables**

Pipe Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.PIP  
 Manhole Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.MHS

Location - Scotland & Ireland

Return Period (years)	5
M5-60 (mm)	17.000
Ratio R	0.300
Maximum Rainfall (mm/hr)	150
Foul Sewage (l/s/ha)	0.00
O'flow Setting (*Foul only)	0
Volumetric Runoff Coeff.	0.75
Add Flow / Climate Change (%)	20
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	5.000
Min Cover Depth for Optimisation (m)	1.200
Min Vel for Auto Design Only (m/s)	0.75
Min Slope for Optimisation (1:X)	500
Minimum Outfall Invert (m)	0.000
Ground Level at Outfall (m)	99.671
Outfall Manhole Name	S SOAKAWAY 6
Outfall Manhole Dia/Length (mm)	1250
Outfall Manhole Width (mm)	0


Designed with Level Inverts

**Network Design Table**

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	80.98	1.620	50.0	0.397	4.00	0.0	0.600	o	300
1.001	4.43	0.022	199.8	0.000	0.00	0.0	0.600	o	375

**Network Results Table**

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E.Area (ha)	E.DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
1.000	68.7	4.6	99.736	0.397	0.0	0.0	14.8	2.23	157.5	88.6
1.001	68.4	4.7	98.117	0.397	0.0	0.0	14.8	1.28	141.2	88.6

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Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S6 Surface Water Network	
Date Thursday 25 April 2019 File R1831 - S6 Surface Ne...	Designed By B Mong Checked By	
ENCAD		System1 W.11.3

Time Area Diagram

Time From (mins)	Time To (mins)	Area (ha)
0	4	0.331
4	8	0.066

Total Area Contributing (ha) = 0.397

Total Pipe Volume (m<sup>3</sup>) = 6.214



PIPELINE SCHEDULES

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	o	300	S MH34	101.172	99.736	1.135	1050
1.001	o	375	S MH35	99.508	98.117	1.016	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	80.98	50.0	S MH35	99.508	98.117	1.091	1350
1.001	4.43	199.8	S SOAKAWAY 6	99.671	98.095	1.201	1250

MANHOLE SCHEDULES

M/Hole Number	Cover Level (m)	M/Hole Depth (m)	M/Hole Diam.,L*W (mm)	Pipes Out			Pipes In		
				PN	IL.(m)	D (mm)	PN	IL.(m)	D (mm)
S MH34	101.172	1.435	1050	1.000	99.736	300			
S MH35	99.508	1.391	1350	1.001	98.117	375	1.000	98.117	300
S SOAKAWAY 6	99.671	1.576	1250		OUTFALL		1.001	98.095	375

Garland House  
 28-30 Rathmines Park  
 Rathmines Dublin 6

R1831 - Magee Barracks  
 Phase 1  
 S6 Surface Water Network



Date Thursday 25 April 2019  
 File R1831 - S6 Surface Ne...

Designed By B Mong  
 Checked By

ENCAD




System1 W.11.3

Setting Out Information (True Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH34	1050		673616.909	712204.301	
1.001	S MH35	1350		673669.097	712266.216	

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.001	S SOAKAWAY 6	1250		673665.706	712269.074	

Setting Out Information (Site Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH34	1050		673616.909	712204.301	
1.001	S MH35	1350		673669.097	712266.216	
PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.001	S SOAKAWAY 6	1250		673665.706	712269.074	

**STORM SEWER DESIGN by the Modified Rational Method**

**Global Variables**

Pipe Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.PIP  
 Manhole Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.MHS

Location - Scotland & Ireland

Return Period (years)	5
M5-60 (mm)	17.000
Ratio R	0.300
Maximum Rainfall (mm/hr)	150
Foul Sewage (l/s/ha)	0.00
O'flow Setting (*Foul only)	0
Volumetric Runoff Coeff.	0.75
Add Flow / Climate Change (%)	20
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	5.000
Min Cover Depth for Optimisation (m)	1.200
Min Vel for Auto Design Only (m/s)	0.75
Min Slope for Optimisation (1:X)	500
Minimum Outfall Invert (m)	0.000
Ground Level at Outfall (m)	99.016
Outfall Manhole Name	S SOAKAWAY 7
Outfall Manhole Dia/Length (mm)	1250
Outfall Manhole Width (mm)	0


Designed with Level Inverts

**Network Design Table**

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	63.16	0.605	104.4	0.072	4.00	0.0	0.600	o	225
2.000	60.00	1.200	50.0	0.188	4.00	0.0	0.600	o	225
1.001	17.72	0.102	173.9	0.051	0.00	0.0	0.600	o	300
3.000	39.32	0.197	200.0	0.133	4.00	0.0	0.600	o	225
1.002	8.71	0.044	199.8	0.000	0.00	0.0	0.600	o	375
1.003	5.10	0.026	199.8	0.000	0.00	0.0	0.600	o	375

**Network Results Table**

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E.Area (ha)	E.DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
1.000	67.5	4.8	98.233	0.072	0.0	0.0	2.6	1.28	50.9	15.8
2.000	69.1	4.5	98.828	0.188	0.0	0.0	7.0	1.85	73.7	42.2
1.001	66.3	5.1	97.628	0.311	0.0	0.0	11.2	1.19	84.1	67.0
3.000	68.1	4.7	97.263	0.133	0.0	0.0	4.9	0.92	36.6	29.4
1.002	65.7	5.2	97.066	0.444	0.0	0.0	15.8	1.28	141.2	94.8
1.003	65.4	5.3	97.023	0.444	0.0	0.0	15.8	1.28	141.2	94.8


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Garland House 28-30 Rathmines Park Rathmines Dublin 6	File: R1831 - Garland Surf... Network: Network Surface W...	
Date Friday 10 May 2019 File R1831 - S7 Surface Ne...	Designed By alan.manthe Checked By	
ENCAD	System1 W.11.3	

Network Design Table

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
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Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E.Area (ha)	E.DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
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Thomas Garland & Partners		Page 3
Garland House 28-30 Rathmines Park Rathmines Dublin 6	File: R1831 - Garland Surf... Network: Network Surface W...	
Date Friday 10 May 2019 File R1831 - S7 Surface Ne...	Designed By alan.manthe Checked By	
ENCAD	System1 W.11.3	

Time Area Diagram

Time From (mins)	Time To (mins)	Area (ha)
0	4	0.341
4	8	0.103

Total Area Contributing (ha) = 0.444

Total Pipe Volume (m<sup>3</sup>) = 9.238

PIPELINE SCHEDULES

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	o	225	S MH36	99.663	98.233	1.206	1050
2.000	o	225	S MH40	100.829	98.828	1.776	1200
1.001	o	300	S MH37	99.037	97.628	1.109	1050
3.000	o	225	S MH41	98.463	97.263	0.975	1050
1.002	o	375	S MH38	98.856	97.066	1.415	1350
1.003	o	375	S MH39	98.915	97.023	1.517	1350

Downstream Manhole







PN	Length (m)	Slope (1:X)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	63.16	104.4	S MH37	99.037	97.628	1.184	1050
2.000	60.00	50.0	S MH37	99.037	97.628	1.184	1050
1.001	17.72	173.9	S MH38	98.856	97.526	1.030	1350
3.000	39.32	200.0	S MH38	98.856	97.067	1.565	1350
1.002	8.71	199.8	S MH39	98.915	97.023	1.517	1350
1.003	5.10	199.8	S SOAKAWAY 7	99.016	96.997	1.644	1250




MANHOLE SCHEDULES







M/Hole Number	Cover Level (m)	M/Hole Depth (m)	M/Hole Diam.,L*W (mm)	Pipes Out			Pipes In		
				PN	IL.(m)	D (mm)	PN	IL.(m)	D (mm)
S MH36	99.663	1.431	1050	1.000	98.233	225			
S MH40	100.829	2.001	1200	2.000	98.828	225			
S MH37	99.037	1.409	1050	1.001	97.628	300	1.000	97.628	225
							2.000	97.628	225
S MH41	98.463	1.200	1050	3.000	97.263	225			
S MH38	98.856	1.790	1350	1.002	97.066	375	1.001	97.526	300
							3.000	97.067	225
S MH39	98.915	1.892	1350	1.003	97.023	375	1.002	97.023	375
S SOAKAWAY 7	99.016	2.019	1250		OUTFALL		1.003	96.997	375


Setting Out Information (True Coordinates)


PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH36	1050		673658.362	712263.946	
2.000	S MH40	1200		673571.400	712258.781	
1.001	S MH37	1050		673610.066	712304.654	
3.000	S MH41	1050		673566.455	712341.418	
1.002	S MH38	1350		673596.531	712316.084	
1.003	S MH39	1350		673602.145	712322.744	

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.003	S SOAKAWAY 7	1250		673598.249	712326.028	

Setting Out Information (Site Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH36	1050		673658.362	712263.946	
2.000	S MH40	1200		673571.400	712258.781	
1.001	S MH37	1050		673610.066	712304.654	
3.000	S MH41	1050		673566.455	712341.418	
1.002	S MH38	1350		673596.531	712316.084	
1.003	S MH39	1350		673602.145	712322.744	

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.003	S SOAKAWAY 7	1250		673598.249	712326.028	

Thomas Garland & Partners		Page 1
Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S8 Surface Water Network	
Date Friday 10 May 2019 File R1831 - S8 Surface Ne...	Designed By B Mong Checked By	
ENCAD	System1 W.11.3	

**STORM SEWER DESIGN by the Modified Rational Method**

**Global Variables**

Pipe Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.PIP  
 Manhole Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.MHS

Location - Scotland & Ireland

Return Period (years)	5
M5-60 (mm)	17.000
Ratio R	0.300
Maximum Rainfall (mm/hr)	150
Foul Sewage (l/s/ha)	0.00
O'flow Setting (*Foul only)	0
Volumetric Runoff Coeff.	0.75
Add Flow / Climate Change (%)	20
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	5.000
Min Cover Depth for Optimisation (m)	1.200
Min Vel for Auto Design Only (m/s)	0.75
Min Slope for Optimisation (1:X)	500
Minimum Outfall Invert (m)	0.000
Ground Level at Outfall (m)	96.396
Outfall Manhole Name	S SOAKAWAY 8
Outfall Manhole Dia/Length (mm)	1250
Outfall Manhole Width (mm)	0


Designed with Level Inverts

**Network Design Table**

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	112.50	0.407	276.3	0.350	4.00	0.0	0.600	o	375
1.001	32.24	1.612	20.0	0.188	0.00	0.0	0.600	o	375
1.002	45.37	0.907	50.0	0.127	0.00	0.0	0.600	o	375
1.003	53.33	0.267	200.0	0.121	0.00	0.0	0.600	o	450
1.004	17.82	0.713	25.0	0.000	0.00	0.0	0.600	o	450
1.005	8.54	0.043	200.1	0.000	0.00	0.0	0.600	o	450

**Network Results Table**

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E.Area (ha)	E.DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
1.000	63.2	5.7	98.610	0.350	0.0	0.0	12.0	1.09	119.8	71.9
1.001	62.6	5.9	98.203	0.538	0.0	0.0	18.2	4.07	449.2	109.5
1.002	61.4	6.2	96.591	0.665	0.0	0.0	22.1	2.57	283.6	132.6
1.003	58.9	6.8	95.684	0.786	0.0	0.0	25.1	1.43	228.1	150.5
1.004	58.7	6.8	95.417	0.786	0.0	0.0	25.1	4.08	648.8	150.5
1.005	58.3	6.9	94.704	0.786	0.0	0.0	25.1	1.43	228.0	150.5


Thomas Garland & Partners		Page 2
Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S8 Surface Water Network	
Date Friday 10 May 2019 File R1831 - S8 Surface Ne...	Designed By B Mong Checked By	
ENCAD	System1 W.11.3	

Time Area Diagram

Time From (mins)	Time To (mins)	Area (ha)
0	4	0.412
4	8	0.374

Total Area Contributing (ha) = 0.786

Total Pipe Volume (m<sup>3</sup>) = 33.671

Thomas Garland & Partners		Page 3
Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks Phase 1 S8 Surface Water Network	
Date Friday 10 May 2019 File R1831 - S8 Surface Ne...	Designed By B Mong Checked By	
ENCAD	System1 W.11.3	

PIPELINE SCHEDULES

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	o	375	S MH42	99.264	98.610	0.279	1350
1.001	o	375	S MH43	99.880	98.203	1.302	1350
1.002	o	375	S MH44	98.323	96.591	1.357	1350
1.003	o	450	S MH45	97.600	95.684	1.467	1350
1.004	o	450	S MH46	97.064	95.417	1.197	1350
1.005	o	450	S MH47	96.431	94.704	1.276	1350


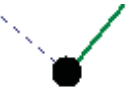




Downstream Manhole


PN	Length (m)	Slope (1:X)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	112.50	276.3	S MH43	99.880	98.203	1.302	1350
1.001	32.24	20.0	S MH44	98.323	96.591	1.357	1350
1.002	45.37	50.0	S MH45	97.600	95.684	1.542	1350
1.003	53.33	200.0	S MH46	97.064	95.417	1.197	1350
1.004	17.82	25.0	S MH47	96.431	94.704	1.276	1350
1.005	8.54	200.1	S SOAKAWAY 8	96.396	94.661	1.285	1250

MANHOLE SCHEDULES

M/Hole Number	Cover Level (m)	M/Hole Depth (m)	M/Hole Diam.,L*W (mm)	Pipes Out			Pipes In		
				PN	IL.(m)	D (mm)	PN	IL.(m)	D (mm)
S MH42	99.264	0.654	1350	1.000	98.610	375			
S MH43	99.880	1.677	1350	1.001	98.203	375	1.000	98.203	375
S MH44	98.323	1.732	1350	1.002	96.591	375	1.001	96.591	375
S MH45	97.600	1.917	1350	1.003	95.684	450	1.002	95.684	375
S MH46	97.064	1.647	1350	1.004	95.417	450	1.003	95.417	450
S MH47	96.431	1.726	1350	1.005	94.704	450	1.004	94.704	450
S SOAKAWAY 8	96.396	1.735	1250		OUTFALL		1.005	94.661	450

Setting Out Information (True Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH42	1350		673424.290	712416.085	
1.001	S MH43	1350		673510.387	712343.672	
1.002	S MH44	1350		673531.256	712368.241	
1.003	S MH45	1350		673560.496	712402.931	
1.004	S MH46	1350		673594.869	712443.710	
1.005	S MH47	1350		673608.493	712432.227	

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.005	S SOAKAWAY 8	1250		673602.570	712426.069	



Garland House  
28-30 Rathmines Park  
Rathmines Dublin 6

R1831 - Magee Barracks  
Phase 1  
S8 Surface Water Network



Date Friday 10 May 2019  
File R1831 - S8 Surface Ne...

Designed By B Mong  
Checked By

ENCAD

System1 W.11.3

Setting Out Information (Site Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S MH42	1350		673424.290	712416.085	
1.001	S MH43	1350		673510.387	712343.672	
1.002	S MH44	1350		673531.256	712368.241	
1.003	S MH45	1350		673560.496	712402.931	
1.004	S MH46	1350		673594.869	712443.710	
1.005	S MH47	1350		673608.493	712432.227	

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.005	S SOAKAWAY 8	1250		673602.570	712426.069	

## **APPENDIX E**

# **Irish Water Feasibility and Statement of Design Acceptance**

Columbia Estates Management (IE)  
Garland  
Garland House  
28-30 Rathmines Park  
Dublin 6



Uisce Éireann  
Bosca OP 6000  
Baile Átha Cliath 1  
Éire

Irish Water  
PO Box 6000  
Dublin 1  
Ireland

T: +353 1 89 25000  
F: +353 1 89 25001  
[www.water.ie](http://www.water.ie)

28 May 2019

Dear Sir/Madam,

**Re: Customer Reference No 026936066 pre-connection enquiry - Subject to contract | Contract denied  
Connection for 656 unit domestic, Creche, 3 retails units & Cancer Treatment Centre at Magee Barracks site**

Irish Water has reviewed your pre-connection enquiry in relation to water and wastewater connections at Magee Barracks Dublin Road Kildare . Based upon the details that you have provided with your pre-connection enquiry and on the capacity currently available in the network(s), as assessed by Irish Water, we wish to advise you that, subject to a valid connection agreement being put in place, your proposed connection to the Irish Water network(s) can be facilitated.

#### **Strategic Housing Development**

Irish Water notes that the scale of this development dictates that it is subject to the Strategic Housing Development planning process. Therefore:

- A. In advance of submitting your full application to An Bord Pleanála for assessment, you must have reviewed this development with Irish Water and received a Statement of Design Acceptance in relation to the layout of water and wastewater services.
- B. You are advised that this correspondence does not constitute an offer in whole or in part to provide a connection to any Irish Water infrastructure and is provided subject to a connection agreement being signed and appropriate connection fee paid at a later date.
- C. In advance of submitting this development to An Bord Pleanála for full assessment, the developer is required to have entered into a Project Works Services Agreement to deliver investigations to confirm the available capacity and to determine the full extent of any upgrades which may be required to be completed to Irish Water infrastructure.

#### **Wastewater**

A Project Works Services Agreement is required to confirm the available capacity and to determine the full extent of any upgrades which may be required to be completed to the wastewater network.

Our records indicate the presence of foul pipework traversing the subject site - note that it will be necessary to comply with Irish Water's wayleave and/or diversion requirements in relation to this infrastructure. Please refer to <https://www.water.ie/connections/developer-services/diversions/>.

This assessment relates to foul discharge only and does not incorporate accepting any storm discharge from the subject site. Surface water should not be discharged via a foul or combined system.

In the case of wastewater connections this assessment does not confirm that a gravity connection achievable. Therefore a suitably sized pump station may be required to be installed on your site. All infrastructure should be designed and installed in accordance with the Irish Water Code of Practice.

## **Water**

A water connection for the development is feasible without network upgrades.

All infrastructure should be designed and installed in accordance with the Irish Water Codes of Practice and Standard Details. A design proposal for the water and/or wastewater infrastructure should be submitted to Irish Water for assessment. Prior to submitting your planning application, you are required to submit these detailed design proposals to Irish Water for review.

A connection agreement can be applied for by completing the connection application form available at **[www.water.ie/connections](http://www.water.ie/connections)**. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities.

If you have any further questions, please contact Fionán Ginty from the design team on 018925734 or email [fginty@water.ie](mailto:fginty@water.ie). For further information, visit **[www.water.ie/connections](http://www.water.ie/connections)**

Yours sincerely,

**Maria O'Dwyer**  
**Connections and Developer Services**

**Stiúrthóirí / Directors:** Mike Quinn (Chairman), Jerry Grant, Cathal Marley, Brendan Murphy, Michael G. O'Sullivan  
**Oifig Chláraithe / Registered Office:** Teach Colvill, 24-26 Sráid Thalbóid, Baile Átha Cliath 1, D01 NP86 / Colvill House, 24-26 Talbot Street, Dublin 1, D01 NP86  
Is cuideachta ghníomhaíochta ainmnithe atá faoi theorainn scaireanna é Uisce Éireann / Irish Water is a designated activity company, limited by shares.  
**Uimhir Chláraithe in Éirinn / Registered in Ireland No.:** 530363

Columbia Estates Management Limited c/o Ben Mong,  
Garland Consulting Engineers,  
Garland House,  
28-30 Rathmines Park,  
Dublin 6

29 May 2019

**Uisce Éireann**  
Bosca OP 448  
Oifig Sheachadta  
na Cathrach Theas  
Cathair Chorcaí

**Irish Water**  
PO Box 448  
South City  
Delivery Office  
Cork City

[www.water.ie](http://www.water.ie)

**Re: Design Submission for Housing Development at Magee Barracks, Dublin Road, Kildare (the “Development”) (the “Design Submission”) / Cust17398/CUSTO182467.**

Dear Ben,

Many thanks for your recent Design Submission.

We have reviewed your proposal for the connection(s) at the Development. Based on the information provided, which included the documents outlined in Appendix A to this letter, Irish Water has no objection to your proposals.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before you can connect to our network you must sign a connection agreement with Irish Water. This can be applied for by completing the connection application form at [www.water.ie/connections](http://www.water.ie/connections). Irish Water’s current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities (CRU) ([https://www.cru.ie/document\\_group/irish-waters-water-charges-plan-2018/](https://www.cru.ie/document_group/irish-waters-water-charges-plan-2018/)).

You the Customer (including any designers/contractors or other related parties appointed by you) is entirely responsible for the design and construction of all water and/or wastewater infrastructure within the Development which is necessary to facilitate connection(s) from the boundary of the Development to Irish Water’s network(s) (the “**Self-Lay Works**”), as reflected in your Design Submission. Acceptance of the Design Submission by Irish Water does not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

If you have any further questions, please contact your Irish Water Representative

Name: Fionán Ginty  
Phone: 01 8925734  
Email: [fginty@water.ie](mailto:fginty@water.ie)

Yours sincerely,



**Maria O’Dwyer**

**Connections and Developer Services**

## Appendix A

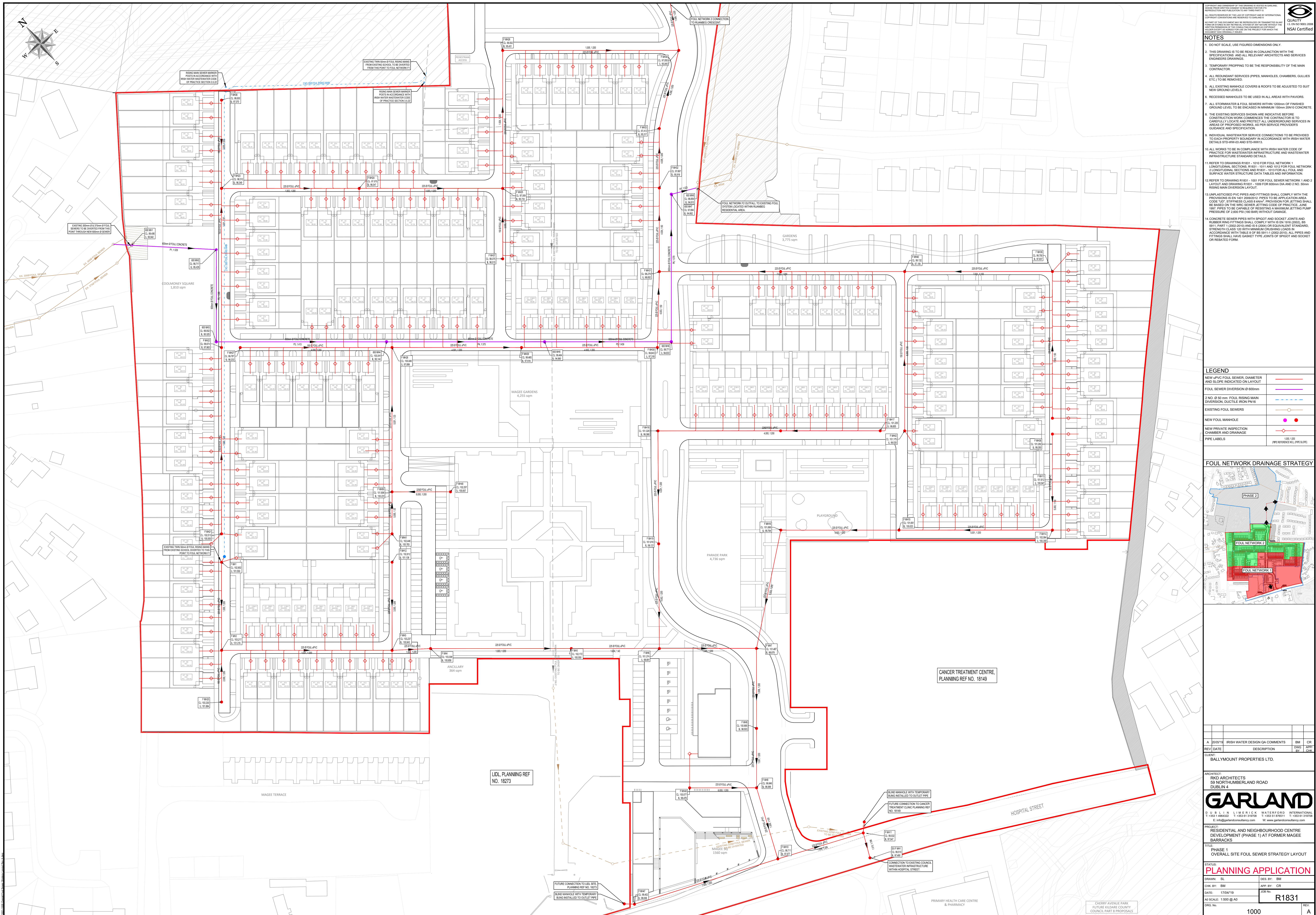
### Document Title & Revision

- R1831-1000-A Phase 1 Overall Site Foul Sewer Strategy Layout
- R1831-1001-A Foul Sewer Network 1 and 2 Layout
- R1831-1003-A Phase 1 Water main Layout
- R1831-1010-A Phase 1 Foul Network 1 Longitudinal Sections
- R1831-1012-A Phase 1 Foul Network 2 Longitudinal Sections
- R1831-1015-1<sup>st</sup> Phase 1 Overall Site Foul Sewer Strategy Layout
- R1831-A0-1<sup>st</sup> Site Location Layout
- GAR-ISD-101-A Infrastructure Standard Details (WW-03/ WW-04)
- GAR-ISD-104-A Infrastructure Standard Details (WW-12/ WW-13)

**Standard Details/Code of Practice Exemption: N/A**

For further information, visit [www.water.ie/connections](http://www.water.ie/connections)

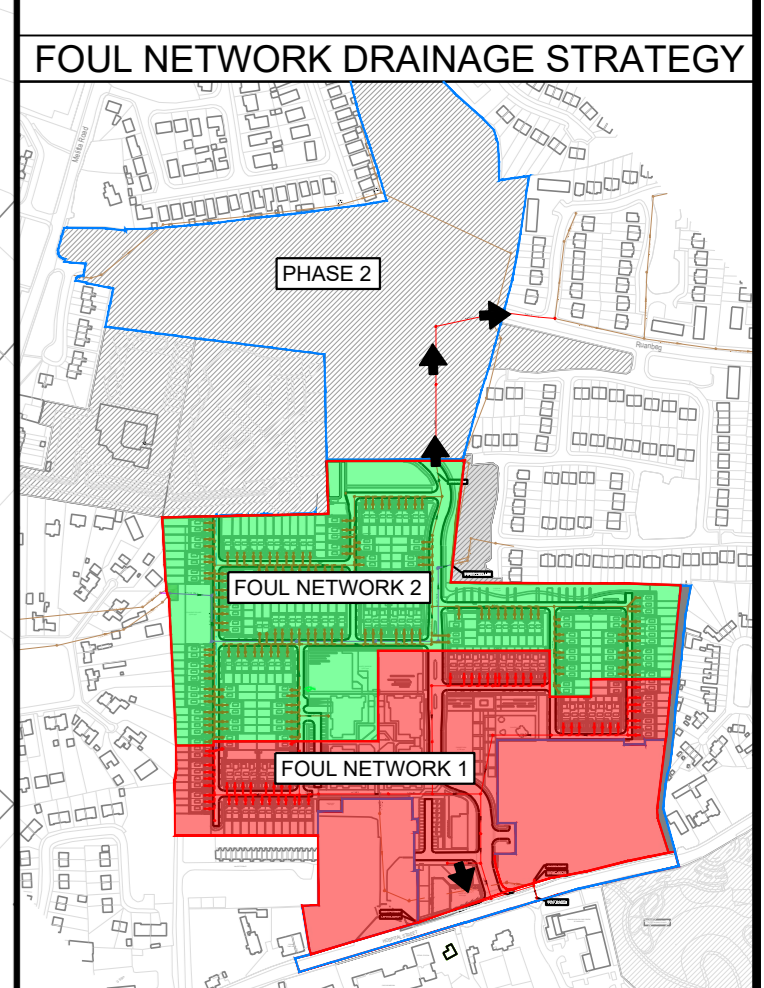
*Notwithstanding any matters listed above, the Customer (including any appointed designers/contractors, etc.) is entirely responsible for the design and construction of the Self-Lay Works. Acceptance of the Design Submission by Irish Water will not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.*



- NOTES**
- DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
  - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SPECIFICATIONS AND ALL RELEVANT ARCHITECTS AND SERVICES ENGINEERS DRAWINGS.
  - TEMPORARY PROPPING TO BE THE RESPONSIBILITY OF THE MAIN CONTRACTOR.
  - ALL EXISTING SERVICES (PIPES, MANHOLES, CHAMBERS, GULLIES ETC.) TO BE REMOVED.
  - ALL EXISTING MANHOLE COVERS & ROOFS TO BE ADJUSTED TO SUIT NEW GROUND LEVELS.
  - RECESSED MANHOLES TO BE USED IN ALL AREAS WITH PATIORS.
  - ALL STORMWATER & FOUL SEWERS WITHIN 100mm OF FINISHED GROUND LEVEL TO BE ENCASED IN MINIMUM 100mm 20N TO CONCRETE.
  - THE EXISTING SERVICES SHOWN ARE INDICATIVE BEFORE CONSTRUCTION WORK COMMENCES THE CONTRACTOR TO CAREFULLY LOCATE AND PROTECT ALL UNDERGROUND SERVICES IN AREAS OF PROPOSED WORKS, AS PER SERVICE PROVIDERS GUIDANCE AND SPECIFICATION.
  - INDIVIDUAL WASTEWATER SERVICE CONNECTIONS TO BE PROVIDED TO EACH PROPERTY BOUNDARY IN ACCORDANCE WITH IRISH WATER DETAILS STD-WW-03 AND STD-WW-13.
  - ALL EXISTING SERVICES SHOWN ARE INDICATIVE BEFORE CONSTRUCTION WORK COMMENCES THE CONTRACTOR TO CAREFULLY LOCATE AND PROTECT ALL UNDERGROUND SERVICES IN AREAS OF PROPOSED WORKS, AS PER SERVICE PROVIDERS GUIDANCE AND SPECIFICATION.
  - REFER TO DRAWINGS R1831-1001 FOR FOUL NETWORK 1 & 2 LONGITUDINAL SECTIONS, R1831-1011 AND 1021 FOR FOUL NETWORK 2 LONGITUDINAL SECTIONS AND R1831-1031 AND 1041 FOR FOUL AND SURFACE WATER STRUCTURE DATA TABLES AND INFORMATION.
  - REFER TO DRAWING R1831-1001 FOR FOUL NETWORK 1 AND 2 LAYOUT AND DRAWING R1831-1009 FOR 600mm DIA AND 2 NO. 200mm RISING MAN DIVERSION LAYOUT.
  - UNPLANTICED PVC PIPES AND FITTINGS SHALL COMPLY WITH THE PROVISIONS IN EN 1401:2002. PIPES TO BE APPLICATION AREA CODE 'M' STIFFNESS CLASS 3 ANH'. PROVISION FOR SETTING SHALL BE BASED ON THE WIND UPLIFT SETTING CODE OF PRACTICE, JUNE 1997. PIPES TO BE CAPABLE OF RESISTING A MAXIMUM SETTING PUMP PRESSURE OF 2.00 BAR (10.00 METRE WATER HEAD).
  - CONCRETE SEWER PIPES WITH SPOUT AND SOCKET JOINTS AND RUBBER RING FITTINGS SHALL COMPLY WITH EN 1916:2002, BS 991 PART 1 (2002-2016) AND BS 1200:2010. ALL PIPES AND FITTINGS SHALL HAVE GASKET TYPE JOINTS OF SPOUT AND SOCKET OR REATED FORM.

**LEGEND**

NEW UPVC FOUL SEWER, DIAMETER AND SLOPE INDICATED ON LAYOUT	—
FOUL SEWER DIVERSION Ø 600mm	—
2 NO. Ø 50 mm FOUL RISING MAN DIVERSION, DUCTILE IRON PN16	—
EXISTING FOUL SEWERS	—
NEW FOUL MANHOLE	●
NEW PRIVATE INSPECTION CHAMBER AND DRAINAGE	○
PIPE LABELS	—



REV	DATE	DESCRIPTION	BY	CHK
A	05/05/16	IRISH WATER DESIGN QA COMMENTS	BM	CR

CLIENT: BALLYMOUNT PROPERTIES LTD.

ARCHITECT: RFD ARCHITECTS, 59 NORTHUMBERLAND ROAD, DUBLIN 4

**GARLAND**  
DUBLIN ENGINEERING WATERFORD INTERNATIONAL  
T: +353 1 4046212 F: +353 1 3107818 T: +353 1 818111 T: +353 1 3107818  
E: info@garlandconsultancy.com W: www.garlandconsultancy.com

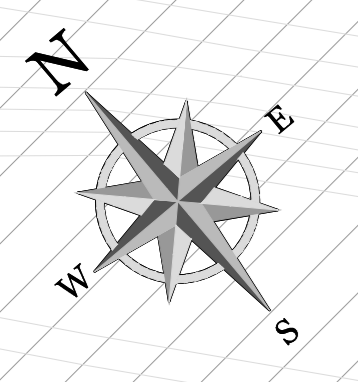
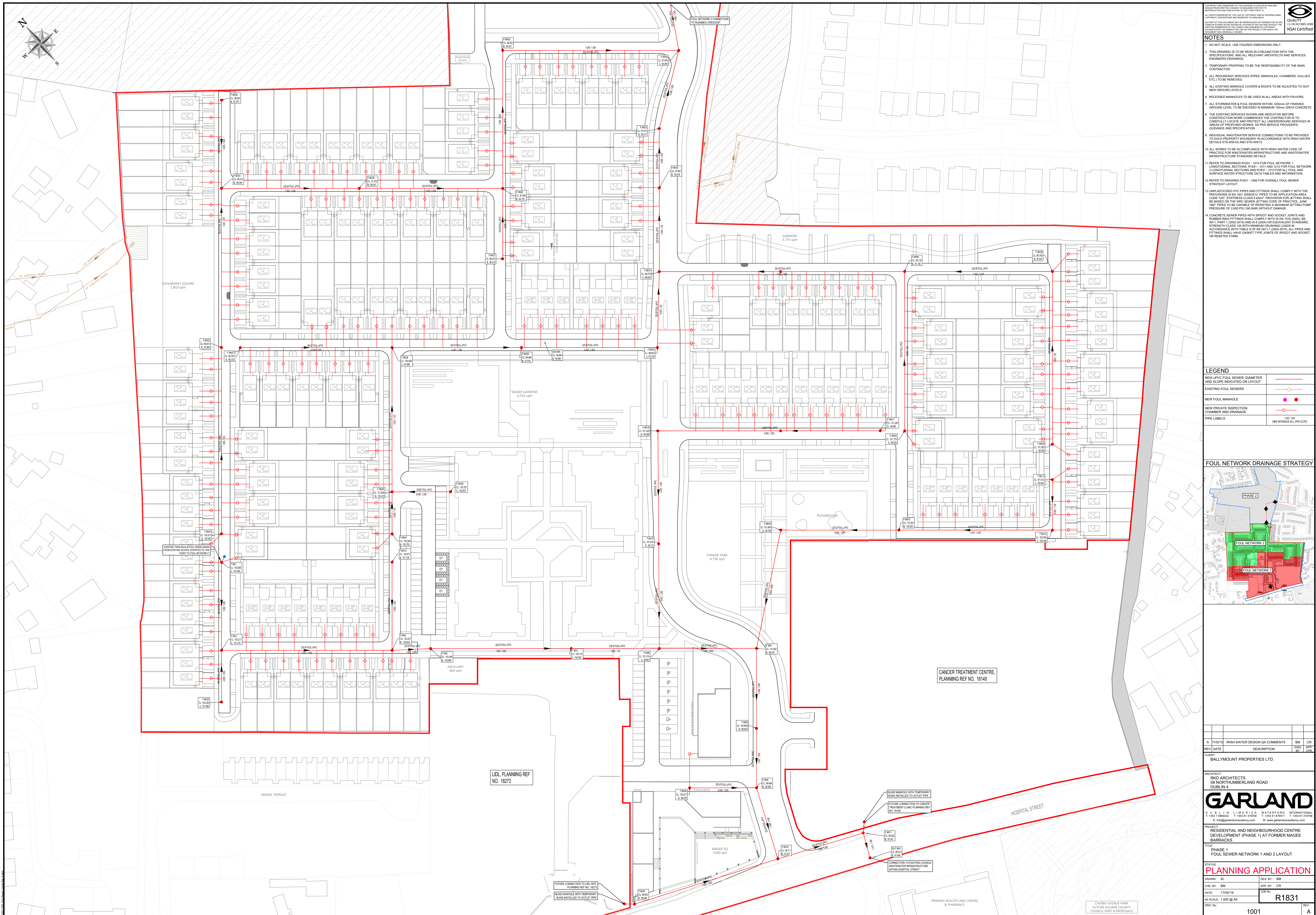
PROJECT: RESIDENTIAL AND NEIGHBOURHOOD CENTRE DEVELOPMENT (PHASE 1) AT FORMER MAGEE BARRACKS

TITLE: PHASE 1 OVERALL SITE FOUL SEWER STRATEGY LAYOUT

STATUS: **PLANNING APPLICATION**

DRAWN: SL	DES. BY: BM
CHK. BY: BM	APP. BY: CR
DATE: 17/04/19	JOB NO.
AD SCALE: 1:500 @ A0	<b>R1831</b>
DRG. No:	REV:

1000

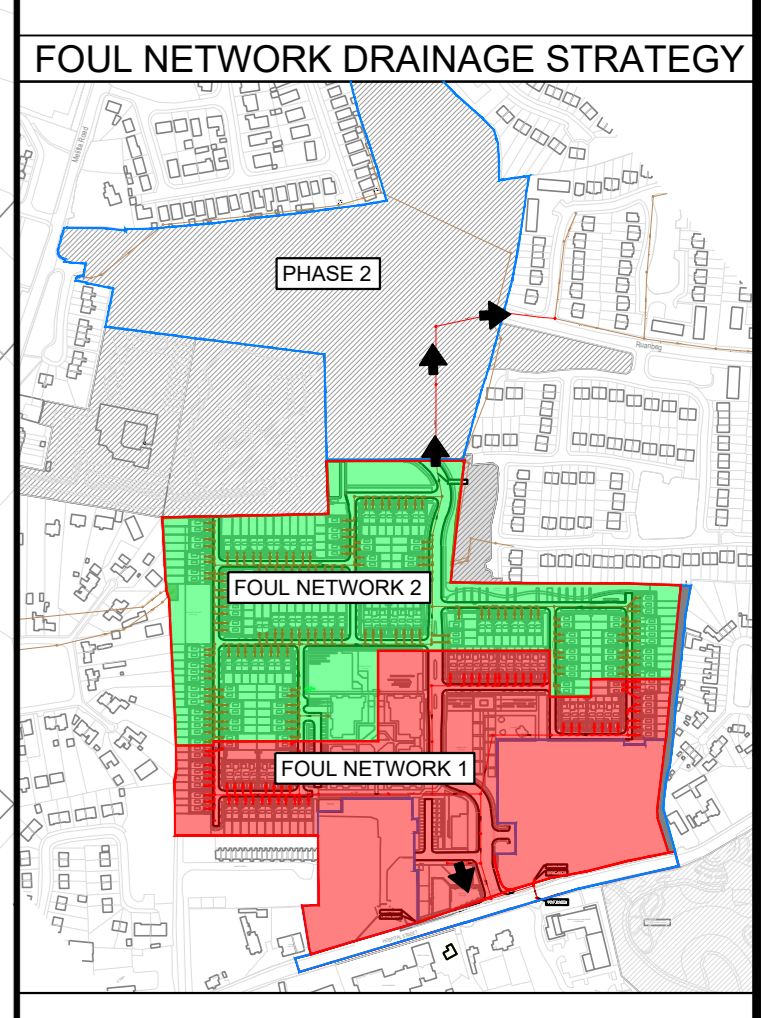


QUALITY  
NSAI Certified

- NOTES**
- DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
  - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SPECIFICATIONS AND ALL RELEVANT ARCHITECTS AND SERVICES ENGINEERS DRAWINGS.
  - TEMPORARY PROPPING TO BE THE RESPONSIBILITY OF THE MAIN CONTRACTOR.
  - ALL REDUNDANT SERVICES (PIPES, MANHOLES, CHAMBERS, GULLIES ETC.) TO BE REMOVED.
  - ALL EXISTING MANHOLE COVERS & ROOFS TO BE ADJUSTED TO SUIT NEW GROUND LEVELS.
  - RECESSED MANHOLES TO BE USED IN ALL AREAS WITH FINISHES.
  - ALL STORMWATER & FOUL SEWERS WITHIN 100mm OF FINISHED GROUND LEVEL TO BE ENCASED IN MINIMUM 100mm CONCRETE.
  - THE EXISTING SERVICES SHOWN ARE INDICATIVE BEFORE CONSTRUCTION WORK COMMENCES THE CONTRACTOR TO CAREFULLY LOCATE AND PROTECT ALL UNDERGROUND SERVICES IN AREAS OF PROPOSED WORKS, AS PER SERVICE PROVIDERS GUIDANCE AND SPECIFICATION.
  - INDIVIDUAL WASTEWATER SERVICE CONNECTIONS TO BE PROVIDED TO EACH PROPERTY BOUNDARY IN ACCORDANCE WITH IRISH WATER DETAILS STD-WW-03 AND STD-WW-13.
  - ALL WORKS TO BE IN COMPLIANCE WITH IRISH WATER CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE AND WASTEWATER INFRASTRUCTURE STANDARD DETAILS.
  - REFER TO DRAWINGS R181 - 1010 FOR FOUL NETWORK 1 LONGITUDINAL SECTIONS, R181 - 1011 AND 1012 FOR FOUL NETWORK 2 LONGITUDINAL SECTIONS AND R181 - 1013 FOR ALL FOUL AND SURFACE WATER STRUCTURE DATA TABLES AND INFORMATION.
  - REFER TO DRAWING R181 - 1000 FOR OVERALL FOUL SEWER STRATEGY OF LAYOUT.
  - UNLESS SPECIFIED PVC PIPES AND FITTINGS SHALL COMPLY WITH THE PROVISIONS IN EN 1401 2006/2012. PIPES TO BE APPLICATION AREA CODE 'S2' STRENGTH CLASS BAWN. PROTECTORS, SETTING SHALL BE BASED ON THE WRC SEWER SETTING CODE OF PRACTICE, JUNE 1997. PIPES TO BE CAPABLE OF RESISTING A MAXIMUM JETTING PUMP PRESSURE OF 2,000 PSI (138 BAR) WITHOUT DAMAGE.
  - CONCRETE SEWER PIPES WITH SPIGOT AND SOCKET JOINTS AND RUBBER RING FITTINGS SHALL COMPLY WITH EN 1916 2002, BS 5911 PART 1 (2002-2010) AND IS 12004 (OR EQUIVALENT STANDARD, STRENGTH CLASS 'S2' WITH MAXIMUM CRACKING 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.

**LEGEND**

NEW UPVC FOUL SEWER, DIAMETER AND SLOPE INDICATED ON LAYOUT	
EXISTING FOUL SEWERS	
NEW FOUL MANHOLE	
NEW PRIVATE INSPECTION CHAMBER AND DRAINAGE	
PIPE LABELS	REFERENCING PIPESIZE



REV	DATE	DESCRIPTION	DWG	APP'D	CR
A	17/04/19	IRISH WATER DESIGN QA COMMENTS	BM		CR

CLIENT: BALLYMOUNT PROPERTIES LTD.

ARCHITECT: PRCD ARCHITECTS  
59 NORTHUMBERLAND ROAD  
DUBLIN 4

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E: info@garlandconsultancy.com W: www.garlandconsultancy.com

PROJECT: RESIDENTIAL AND NEIGHBOURHOOD CENTRE DEVELOPMENT (PHASE 1) AT FORMER MAGEE BARRACKS

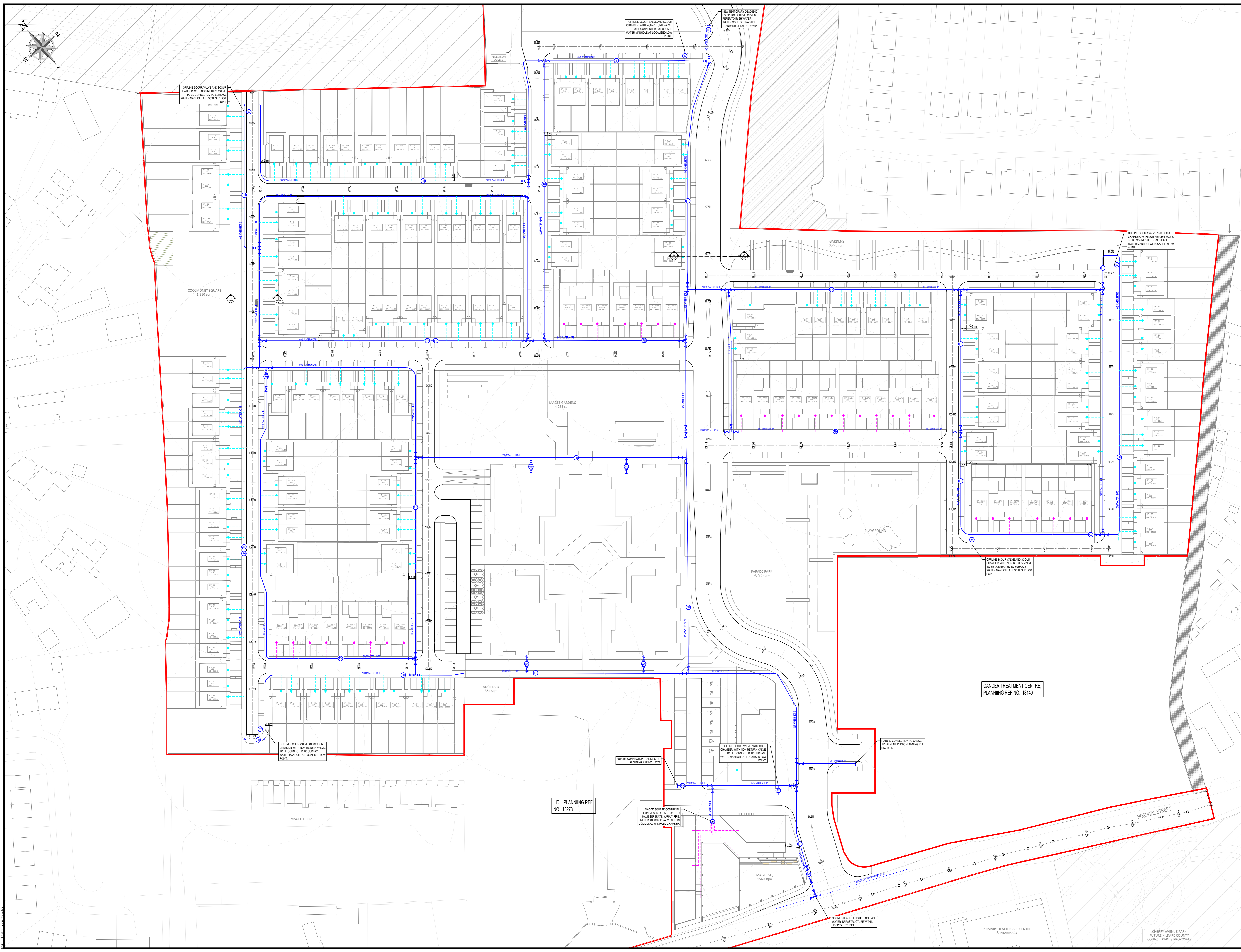
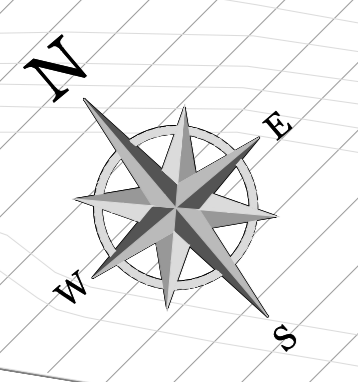
TITLE: PHASE 1 FOUL SEWER NETWORK 1 AND 2 LAYOUT

STATUS: **PLANNING APPLICATION**

DRAWN: SL	DES. BY: BM
CHEK BY: BM	APP. BY: CR
DATE: 17/04/19	JOB NO: R1831
AD SCALE: 1:500 @ A0	REV: A

1001



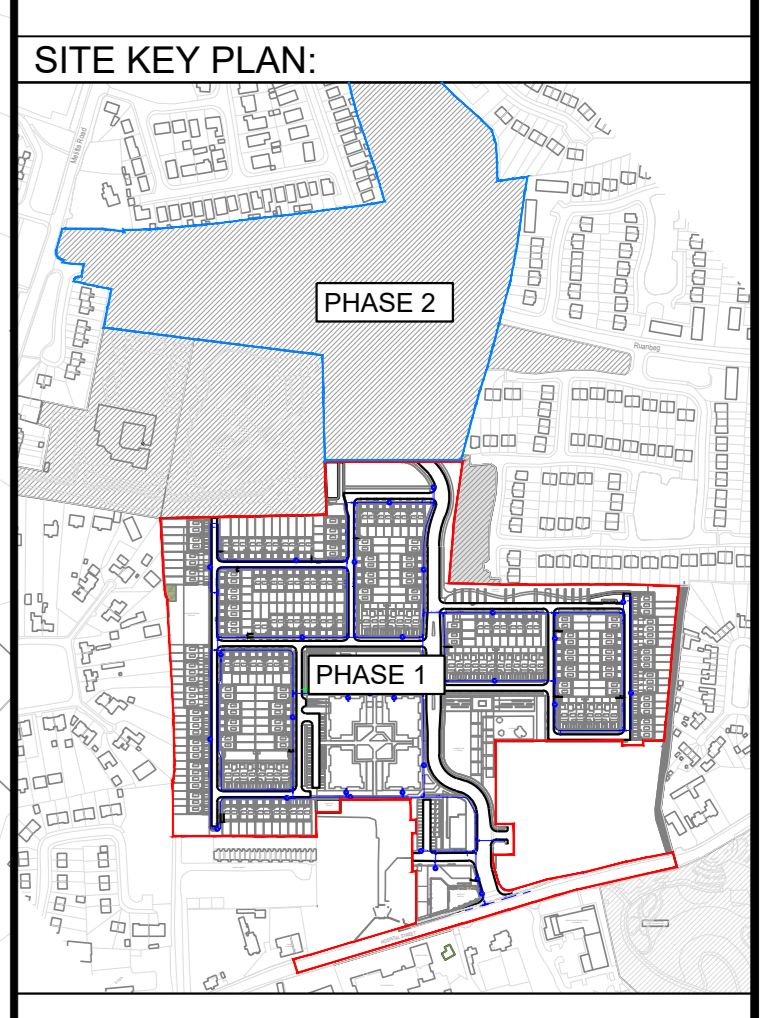


QUALITY  
NSAI Certified

- NOTES**
- DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
  - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SPECIFICATIONS AND ALL RELEVANT ARCHITECTS AND SERVICES ENGINEERS DRAWINGS.
  - DRAWINGS SHALL BE CHECKED BY CONTRACTOR AND ANY DISCREPANCIES (DIMENSIONS) SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE WORK IS COMMENCED. PIPE FALLS TO BE AS SPECIFIED. ILS AND CLS SUBJECT TO SITE REVIEW.
  - TEMPORARY PROPPING TO BE THE RESPONSIBILITY OF THE MAIN CONTRACTOR.
  - THIS DRAWING TO BE READ IN CONJUNCTION WITH THE ARCHITECTS DRAWINGS AND SPECIFICATIONS.
  - THE EXISTING SERVICES SHOWN ARE INDICATIVE BEFORE CONSTRUCTION WORK COMMENCES. THE CONTRACTOR IS TO CAREFULLY LOCATE AND PROTECT ALL UNDERGROUND SERVICES IN AREAS OF PROPOSED WORKING, AS PER SERVICE PROVIDERS GUIDANCE AND SPECIFICATION.
  - ALL WORKS TO BE IN COMPLIANCE WITH IRISH WATER CODE OF PRACTICE FOR WATER AND WASTEWATER INFRASTRUCTURE AND WATER AND WASTEWATER INFRASTRUCTURE STANDARDS DETAILS.
  - REFER TO DRAWING R1831-1008 FOR RELEVANT SERVICES CROSS SECTIONS.

**LEGEND**

EXISTING COUNCIL WATERMAIN	---
NEW WATERMAIN, HDPE SDR17 PIPE	---
NEW SLUICE VALVE	⊕
NEW FIRE HYDRANT	⊕
NEW AIR VALVE 50mm	⊕
NEW BULK DEVELOPMENT METER	⊕
NEW OFFLINE SCOUR VALVE AND SCOUR CHAMBER	⊕
NEW TEMPORARY WATERMAIN BLANK END	---
NEW HOUSE CONNECTION PN12.5 PER 25mm Ø WITH BOUNDARY BOX	---
NEW DUPLEX UNITS' CONNECTION PN12.5 PER 50mm Ø WITH COMMUNAL BOUNDARY BOX	---
ROAD CENTRE LINE WITH ROAD LEVEL	---
40m RADIUS COVERAGE OF FIRE HYDRANT	---



REV	DATE	DESCRIPTION	DWG	APP	CHK
A	17/05/18	IRISH WATER DESIGN QA COMMENTS	JC	JN	

ARCHITECT:  
RFD ARCHITECTS  
59 NORTHUMBERLAND ROAD  
DUBLIN 4

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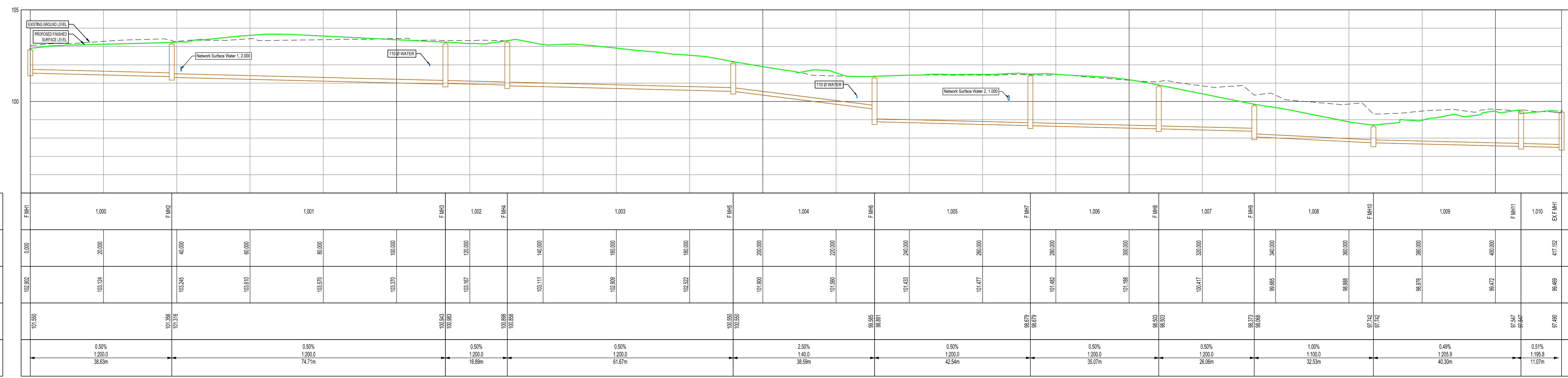
PROJECT:  
RESIDENTIAL AND NEIGHBOURHOOD CENTRE  
DEVELOPMENT (PHASE 1) AT FORMER MAGEE  
BARRACKS

TITLE:  
PHASE 1  
WATERMAIN LAYOUT

STATUS:  
**PLANNING APPLICATION**

DRAWN: SL	DES. BY: BM
CHK. BY: BM	APP. BY: CR
DATE: 17/04/19	JOB NO:
AS SCALE: 1:500 @ A0	<b>R1831</b>
DRG. NO:	REV.:

- NOTES**
- DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
  - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SPECIFICATIONS AND ALL RELEVANT ARCHITECTS AND SERVICES ENGINEERS DRAWINGS.
  - TEMPORARY PROPPING TO BE THE RESPONSIBILITY OF THE MAIN CONTRACTOR.
  - REFER TO DRAWING R1831-1001 FOR PHASE 1 FOUL NETWORK 1 AND LAYOUT.
  - ALL EXISTING MANHOLE COVERS & ROOFS TO BE ADJUSTED TO SUIT NEW GROUND LEVELS.
  - RECESSED MANHOLES TO BE USED IN ALL AREAS WITH PAVERS.
  - ALL SURFACE WATER & FOUL SEWERS WITHIN 100mm OF FINISHED GROUND LEVEL TO BE ENCASED IN MINIMUM 100mm 20MPa CONCRETE.
  - ALL WORKS TO BE IN COMPLIANCE WITH IRISH WATER CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE AND WASTEWATER INFRASTRUCTURE STANDARD DETAILS.

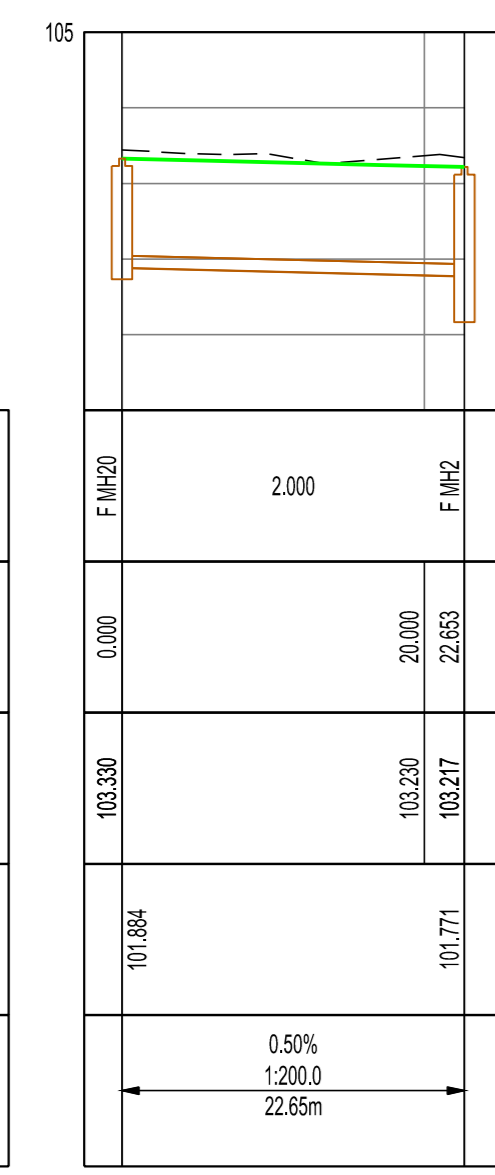


LONGSECTION F MH1 TO EX F MH1  
FROM 0.000 TO 418.064

SCALES:  
Horizontal 1:500  
Vertical 1:100

DATUM 95.000

REFERENCE	F.MH1	1.000	F.MH2	1.001	F.MH3	1.002	F.MH4	1.003	F.MH5	1.004	F.MH6	1.005	F.MH7	1.006	F.MH8	1.007	F.MH9	1.008	F.MH10	1.009	F.MH11	EX F.MH1
DISTANCE (m)	0.000	20.000	40.000	60.000	80.000	100.000	120.000	140.000	160.000	180.000	200.000	240.000	260.000	280.000	300.000	320.000	340.000	360.000	380.000	400.000	417.52	
GROUND LEVEL	102.802	103.124	103.245	103.305	103.370	103.370	103.111	102.808	102.522	101.900	101.603	101.277	101.482	101.188	100.817	99.995	99.888	99.895	99.875	99.472	99.469	
PIPE INVERT LEVEL	97.126	97.146	97.116	97.145	97.145	97.145	97.145	97.145	97.145	97.145	97.145	97.145	97.145	97.145	97.145	97.145	97.145	97.145	97.145	97.145	97.145	
SLOPE / LENGTH	0.50% 1,200.0 34.57m		0.50% 1,200.0 74.71m		0.50% 1,200.0 14.98m		0.50% 1,200.0 41.57m		2.50% 1,40.0 34.59m		0.50% 1,200.0 42.56m		0.50% 1,200.0 15.07m		0.50% 1,200.0 20.08m		1.00% 1,100.0 32.33m		0.40% 1,200.0 45.33m		0.51% 1,199.8 11.07m	

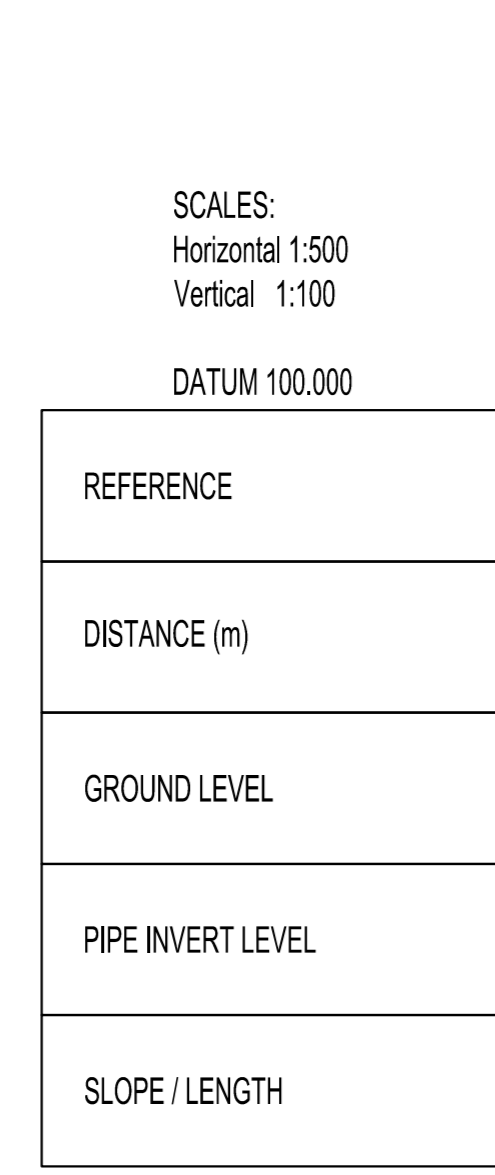


LONGSECTION F MH20 TO F MH2  
FROM 0.000 TO 22.653

SCALES:  
Horizontal 1:500  
Vertical 1:100

DATUM 100.000

REFERENCE	F.MH20	2.000	F.MH2
DISTANCE (m)	0.000	20.000	22.653
GROUND LEVEL	103.330	103.330	103.217
PIPE INVERT LEVEL	101.684	101.771	101.771
SLOPE / LENGTH	0.50% 1,200.0 32.26m		

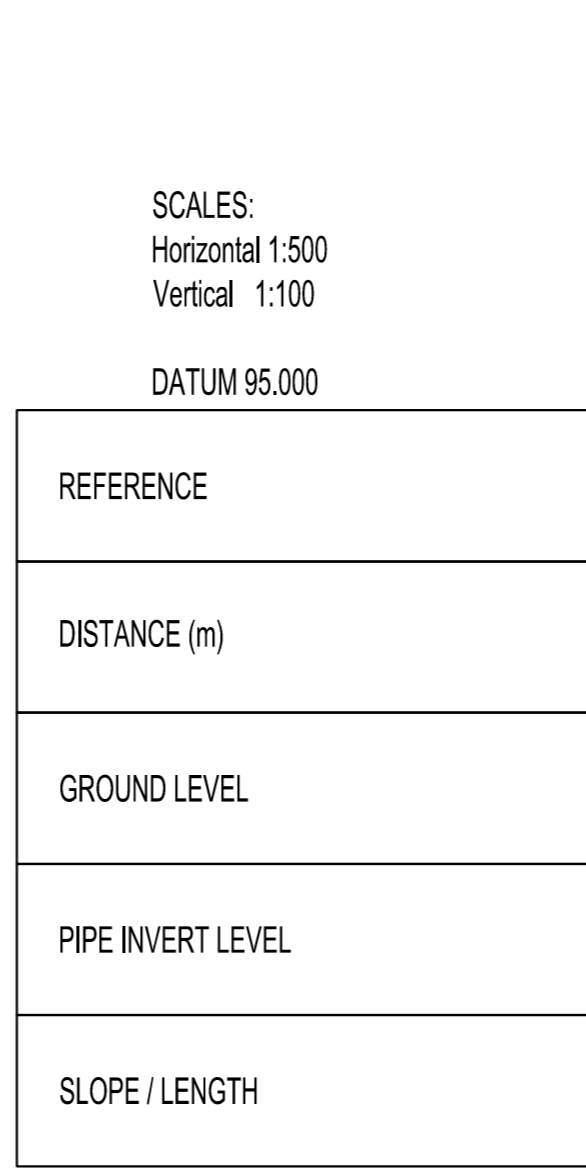


LONGSECTION F MH2 TO F MH3  
FROM 0.000 TO 38.651

SCALES:  
Horizontal 1:500  
Vertical 1:100

DATUM 100.000

REFERENCE	F.MH2	3.000	F.MH3
DISTANCE (m)	0.000	20.000	38.651
GROUND LEVEL	103.312	103.313	103.227
PIPE INVERT LEVEL	101.126	101.843	101.843
SLOPE / LENGTH	0.50% 1,200.0 38.65m		

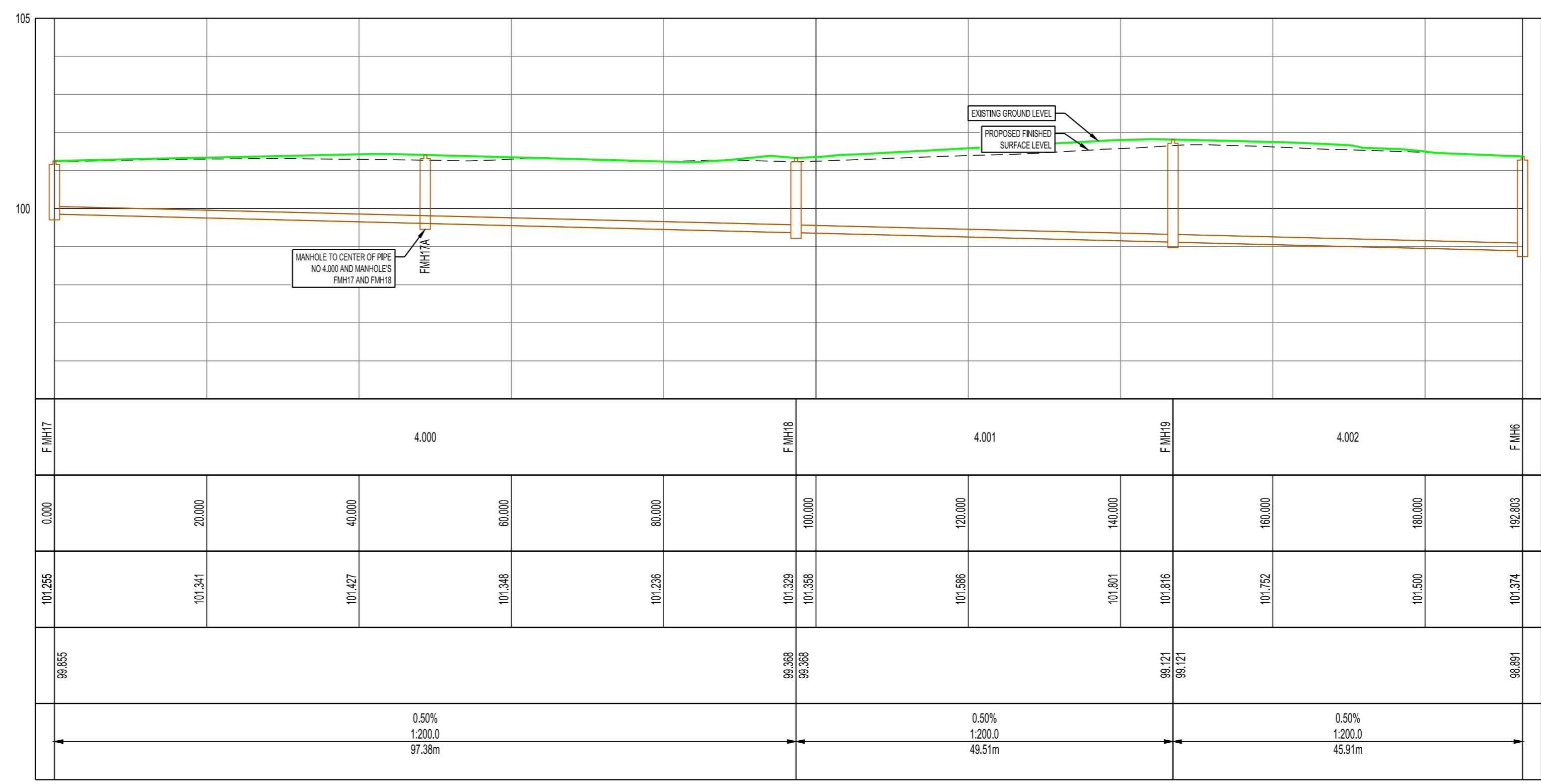


LONGSECTION F MH7 TO F MH6  
FROM 0.000 TO 192.833

SCALES:  
Horizontal 1:500  
Vertical 1:100

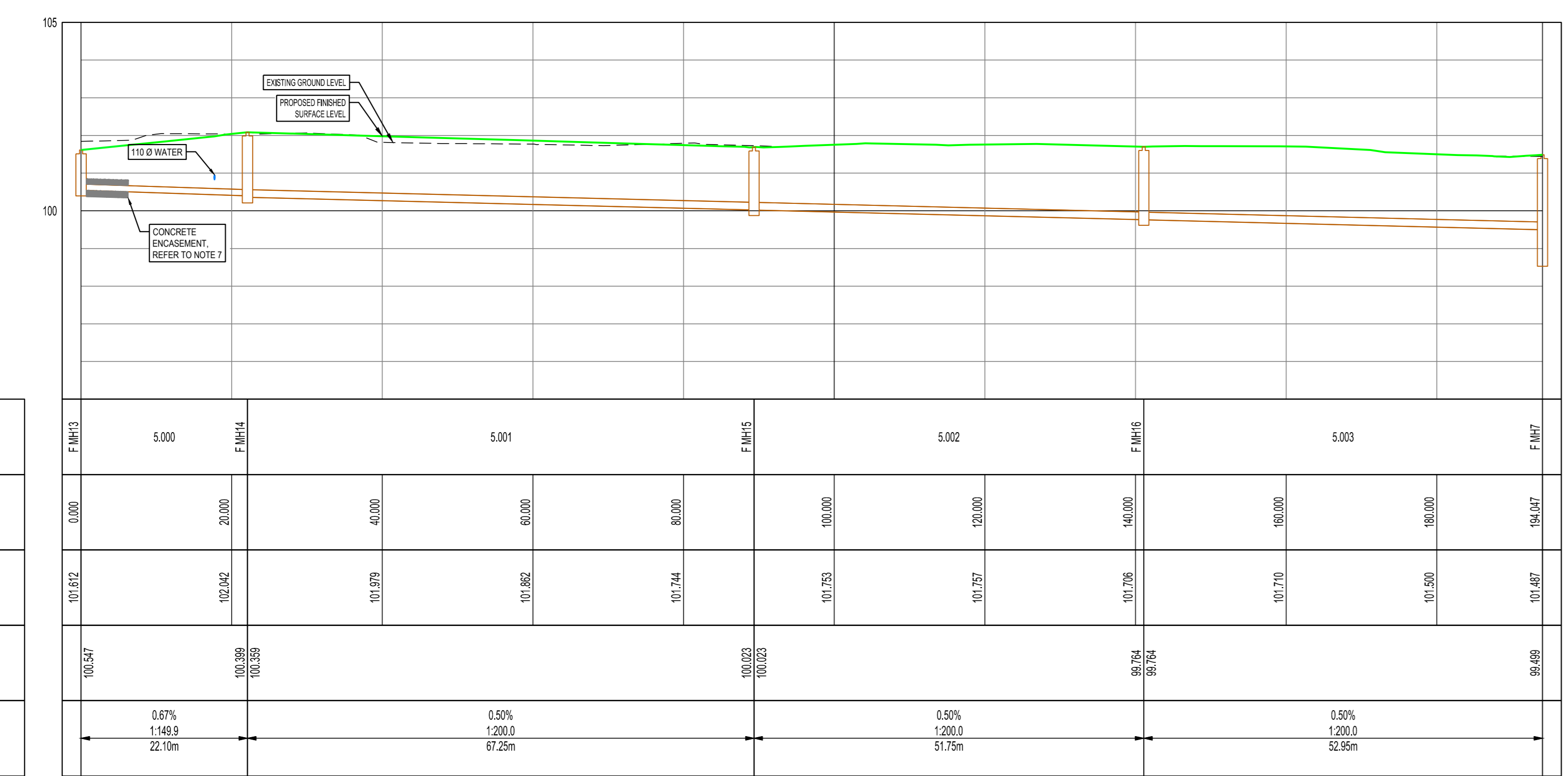
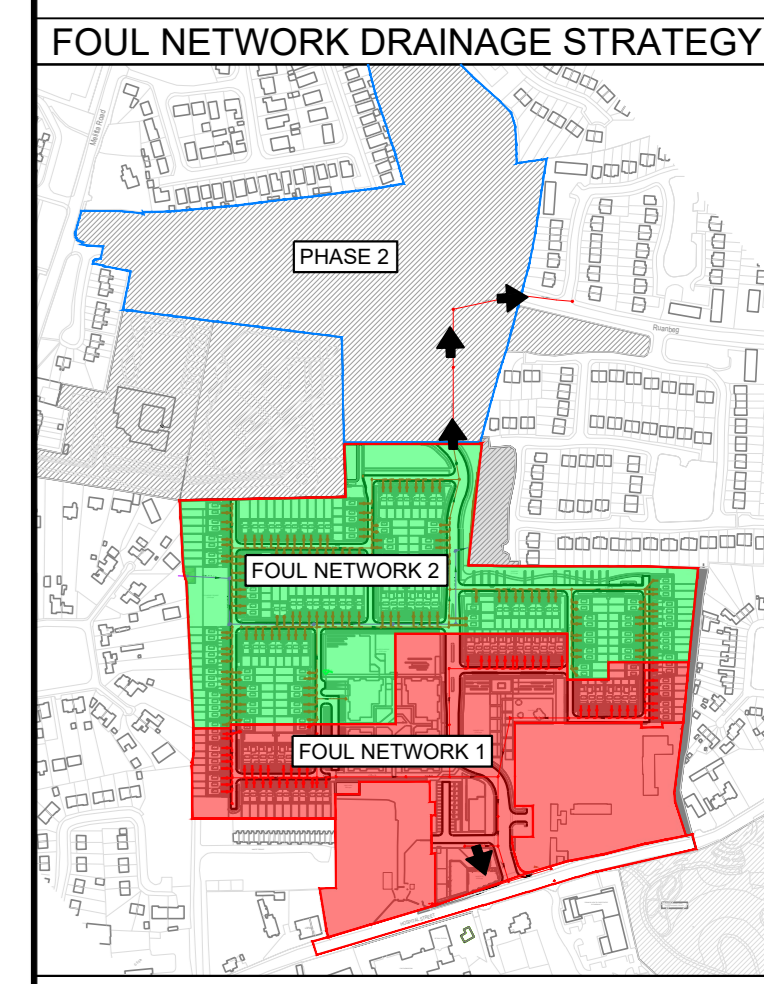
DATUM 95.000

REFERENCE	F.MH7	4.000	F.MH6
DISTANCE (m)	0.000	20.000	192.833
GROUND LEVEL	101.295	101.241	101.427
PIPE INVERT LEVEL	98.856	98.856	98.856
SLOPE / LENGTH	0.50% 1,200.0 37.36m		



**LEGEND**

EXISTING GROUND LEVEL	---
PROPOSED FINISHED SURFACE LEVEL	---

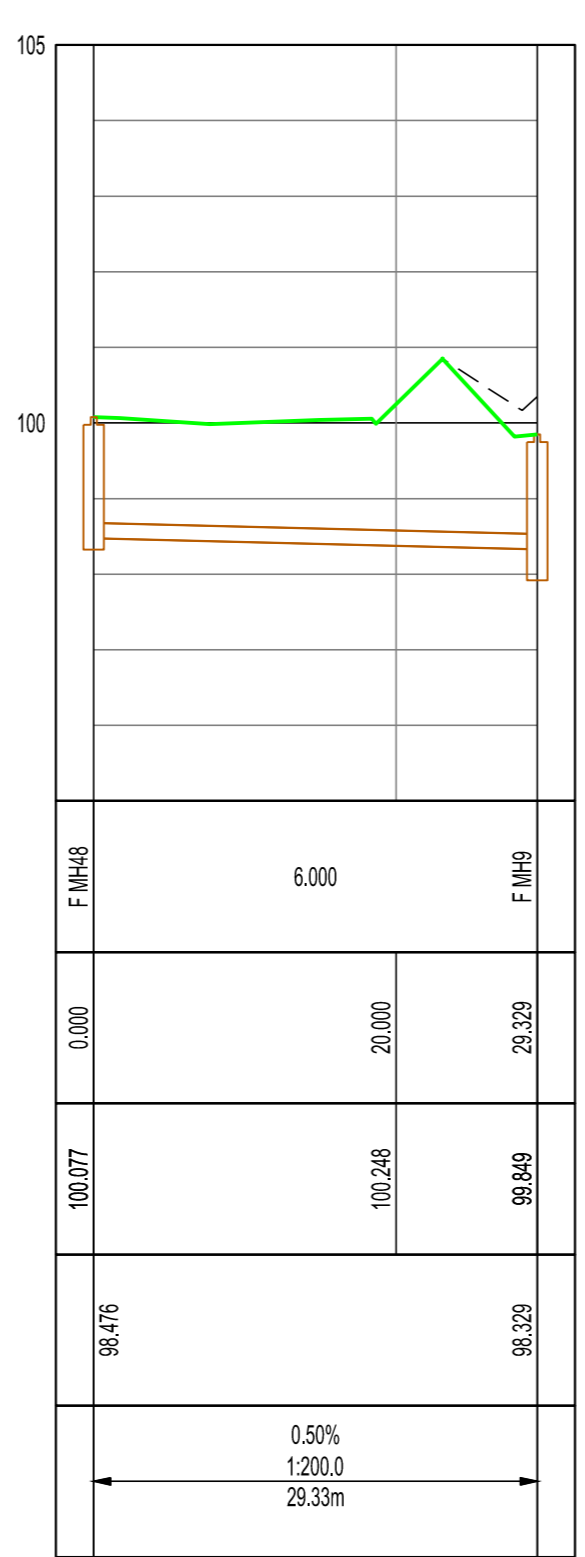


LONGSECTION F MH13 TO F MH7  
FROM 0.000 TO 194.047

SCALES:  
Horizontal 1:500  
Vertical 1:100

DATUM 95.000

REFERENCE	F.MH13	5.000	F.MH4	5.001	F.MH5	5.002	F.MH6	5.003	F.MH7
DISTANCE (m)	0.000	20.000	40.000	60.000	80.000	100.000	120.000	140.000	194.047
GROUND LEVEL	102.547	102.942	102.973	102.865	102.746	102.323	102.152	101.706	101.487
PIPE INVERT LEVEL	100.392	100.392	100.392	100.392	100.392	100.392	100.392	100.392	100.392
SLOPE / LENGTH	0.67% 1,149.0 22.10m		0.50% 1,200.0 67.25m		0.50% 1,200.0 51.75m		0.50% 1,200.0 52.95m		

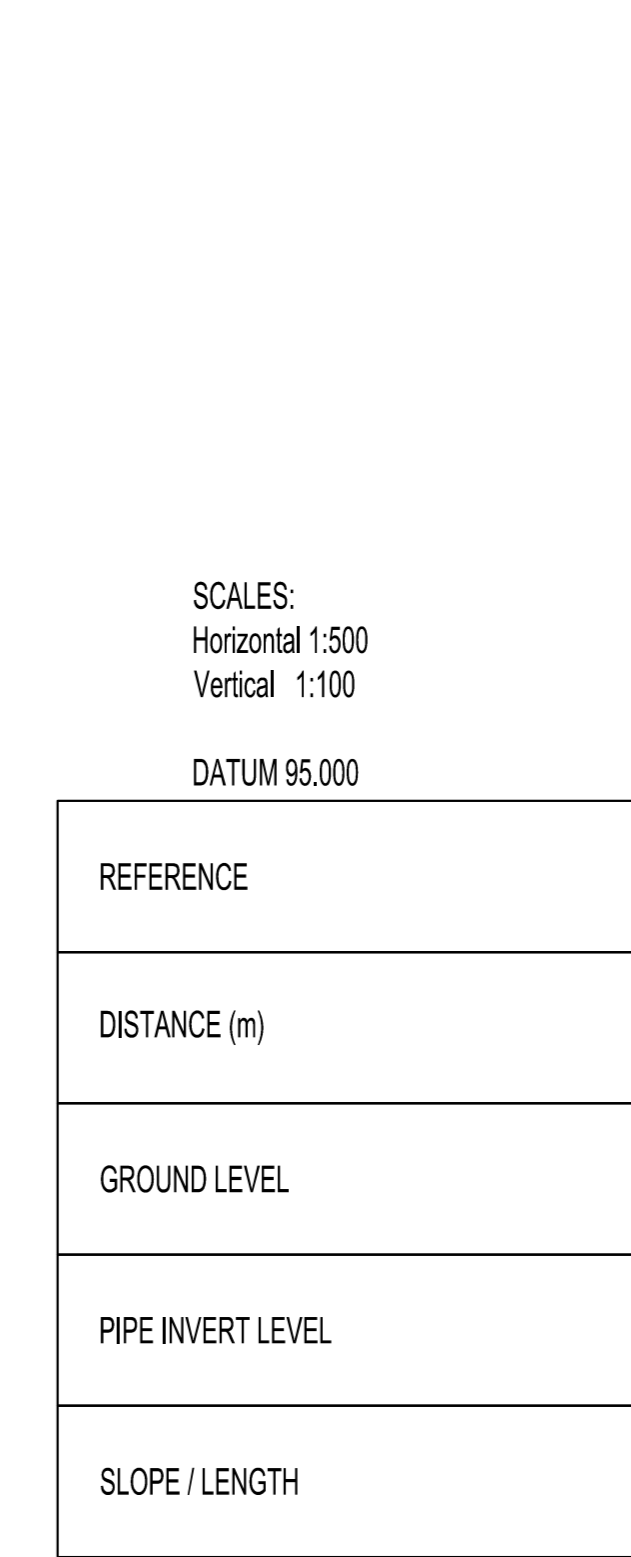


LONGSECTION F MH8 TO F MH9  
FROM 0.000 TO 29.329

SCALES:  
Horizontal 1:500  
Vertical 1:100

DATUM 95.000

REFERENCE	F.MH8	6.000	F.MH9
DISTANCE (m)	0.000	20.000	29.329
GROUND LEVEL	100.077	100.246	99.858
PIPE INVERT LEVEL	98.115	98.115	98.115
SLOPE / LENGTH	0.50% 1,200.0 29.33m		



LONGSECTION F MH47 TO F MH10  
FROM 0.000 TO 65.851

SCALES:  
Horizontal 1:500  
Vertical 1:100

DATUM 95.000

REFERENCE	F.MH47	7.000	F.MH10
DISTANCE (m)	0.000	20.000	65.851
GROUND LEVEL	98.425	98.252	98.172
PIPE INVERT LEVEL	98.108	98.108	98.108
SLOPE / LENGTH	0.50% 1,200.0 65.85m		

REV	DATE	DESCRIPTION	BY	CHK
A	17/04/19	IRISH WATER DESIGN QA COMMENTS	JC	BM

CLIENT: BALLYMOUNT PROPERTIES LTD.

ARCHITECT: RKD ARCHITECTS  
59 NORTHUMBERLAND ROAD  
DUBLIN 4

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E: info@garlandconsultancy.com W: www.garlandconsultancy.com

PROJECT: RESIDENTIAL AND NEIGHBOURHOOD CENTRE DEVELOPMENT (PHASE 1) AT FORMER MAGEE BARRACKS

TITLE: PHASE 1 FOUL NETWORK 1 LONGITUDINAL SECTIONS

DATE: 17/04/19

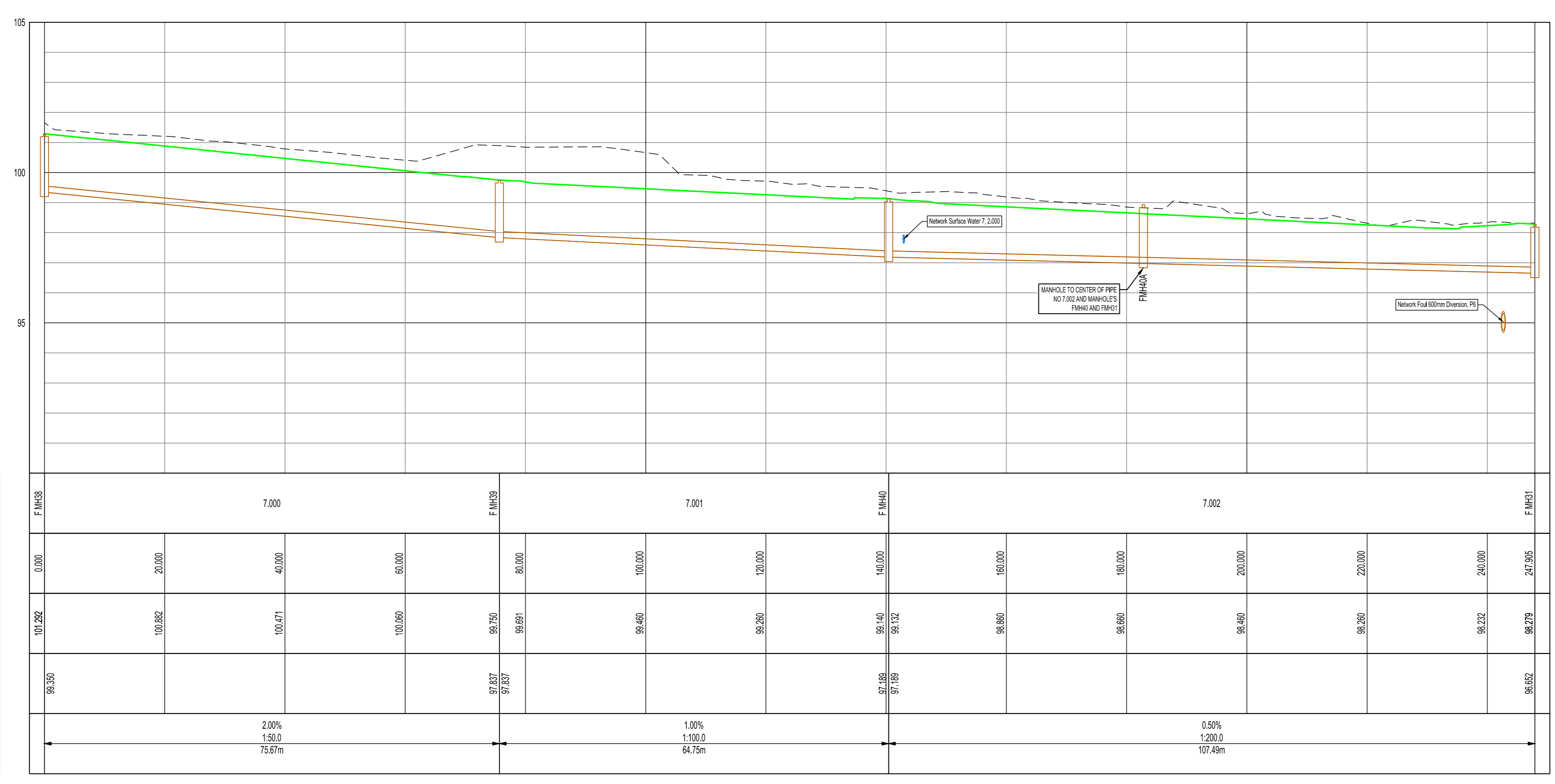
AS SCALE: 1:500

REV: 1010

**PLANNING APPLICATION**

R1831

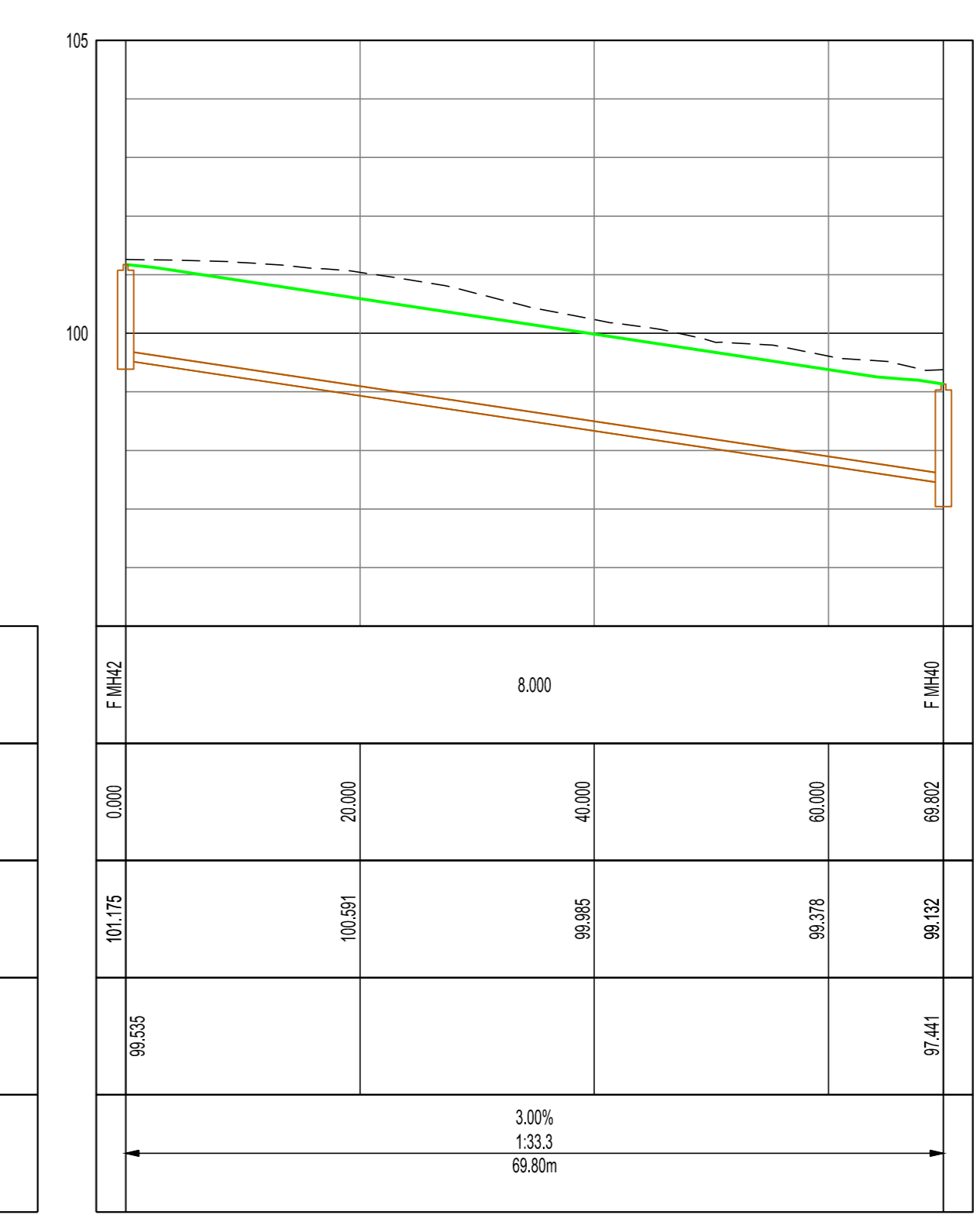
- NOTES**
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  - TEMPORARY PROPPING TO BE THE RESPONSIBILITY OF THE MAIN CONTRACTOR.
  - REFER TO DRAWING R1811 - 1001 FOR PHASE 1 FOUL NETWORK 1 AND 2 LAYOUT.
  - ALL EXISTING MANHOLE COVERS & ROOFS TO BE ADJUSTED TO SUIT NEW GROUND LEVELS.
  - RECESSED MANHOLES TO BE USED IN ALL AREAS WITH PAVERS.
  - ALL SURFACE WATER & FOUL SEWERS WITHIN 1200mm OF FINISHED GROUND LEVEL TO BE ENCASED IN MINIMUM 200mm 20/10 CONCRETE.
  - ALL WORKS TO BE IN COMPLIANCE WITH IRISH WATER CODE OF PRACTICE FOR WASTE WATER INFRASTRUCTURE AND WASTEWATER INFRASTRUCTURE STANDARD DETAILS.



LONGSECTION F MH38 TO F MH31  
FROM 0.000 TO 247.955

SCALES:  
Horizontal 1:500  
Vertical 1:100  
DATUM 90.000

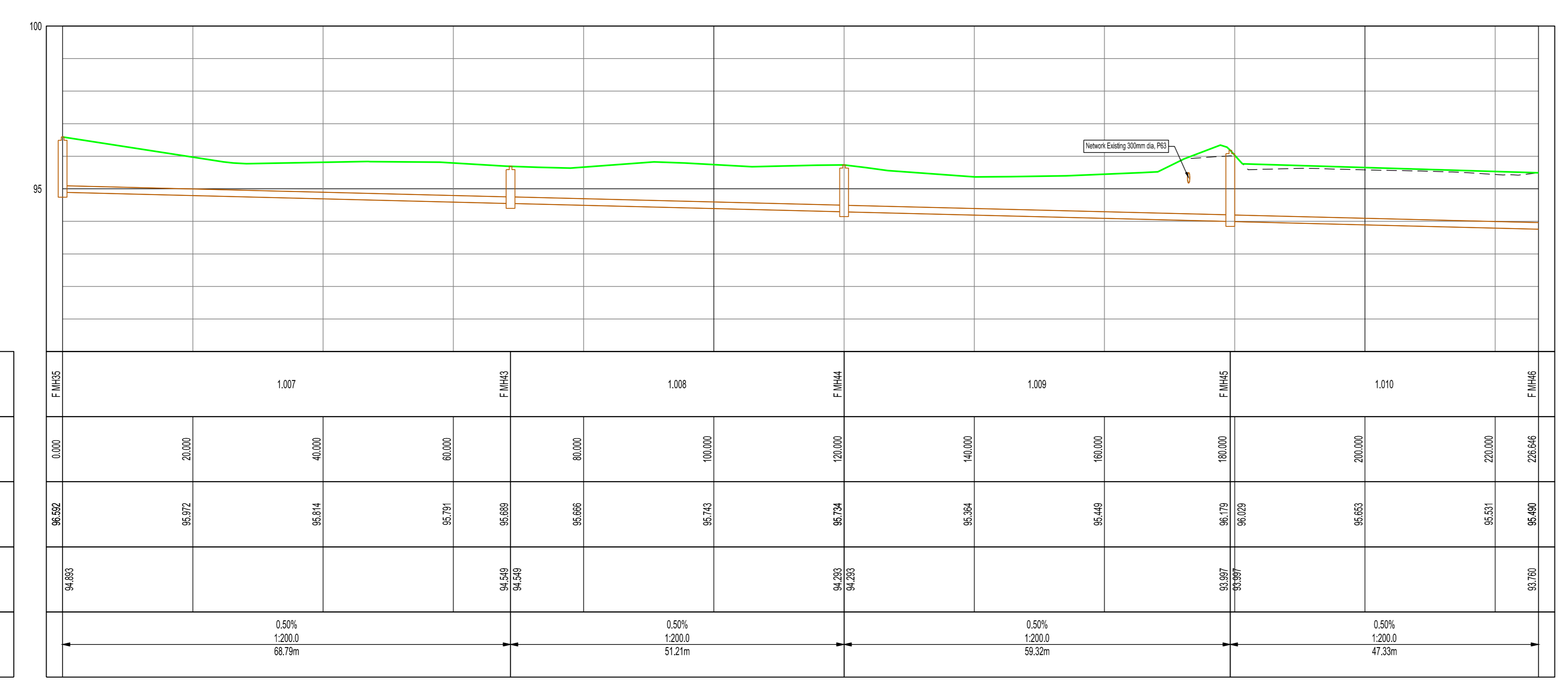
REFERENCE	F MH38	7.000	F MH35	7.001	F MH34	7.002	F MH31
DISTANCE (m)	0.000	20.000	40.000	60.000	80.000	100.000	120.000
GROUND LEVEL	107.926	107.982	107.471	107.296	99.730	99.691	98.460
PIPE INVERT LEVEL	98.326			97.937	97.939		97.106
SLOPE / LENGTH		2.20% 75.67m			1.00% 64.75m		0.50% 107.49m



LONGSECTION F MH42 TO F MH40  
FROM 0.000 TO 68.802

SCALES:  
Horizontal 1:500  
Vertical 1:100  
DATUM 95.000

REFERENCE	F MH42	8.000	F MH40
DISTANCE (m)	0.000	20.000	68.802
GROUND LEVEL	107.175	107.591	98.132
PIPE INVERT LEVEL	98.535		97.141
SLOPE / LENGTH		3.00% 68.80m	



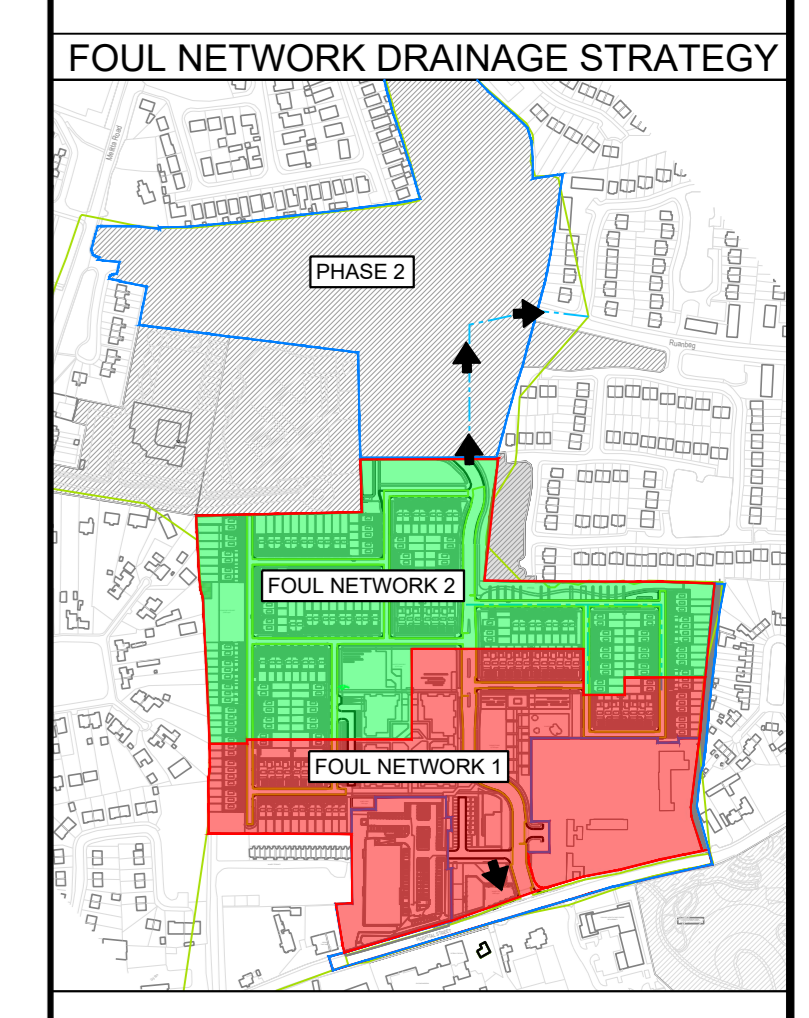
LONGSECTION F MH45 TO F MH46  
FROM 0.000 TO 226.646

SCALES:  
Horizontal 1:500  
Vertical 1:100  
DATUM 90.000

REFERENCE	F MH45	1.007	F MH44	1.008	F MH43	1.010	F MH46
DISTANCE (m)	0.000	20.000	40.000	60.000	80.000	100.000	120.000
GROUND LEVEL	96.492	96.973	96.814	95.791	95.899	95.698	95.142
PIPE INVERT LEVEL	94.889			94.545	94.524		94.093
SLOPE / LENGTH		0.50% 1.200% 88.78m			0.50% 1.200% 51.21m		0.50% 1.200% 47.33m

**LEGEND**

EXISTING GROUND LEVEL	---
PROPOSED FINISHED SURFACE LEVEL	---



REV	DATE	DESCRIPTION	DWG	APP
A	17/04/19	IRISH WATER DESIGN QA COMMENTS	JC	BM

CLIENT: BALLYMOUNT PROPERTIES LTD.

ARCHITECT:  
RKD ARCHITECTS  
58 NORTHUMBERLAND ROAD  
DUBLIN 4

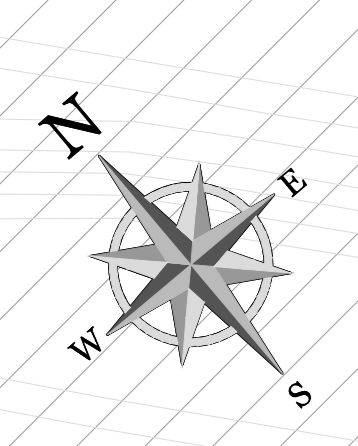
**GARLAND**  
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PROJECT:  
RESIDENTIAL AND NEIGHBOURHOOD CENTRE  
DEVELOPMENT (PHASE 1) AT FORMER MAGEE  
BARRACKS

TITLE:  
PHASE 1  
FOUL NETWORK 2  
LONGITUDINAL SECTIONS (SHEET 2 OF 2)

STATUS:  
**PLANNING APPLICATION**

DRAWN: SL DES: BM  
CHK: BY: BM APP: BY: CR  
DATE: 17/04/19 JOB No:  
AD SCALE: 1:500 @ A0 **R1831**  
REV: A



QUALITY ASSURANCE  
NSAI Certified

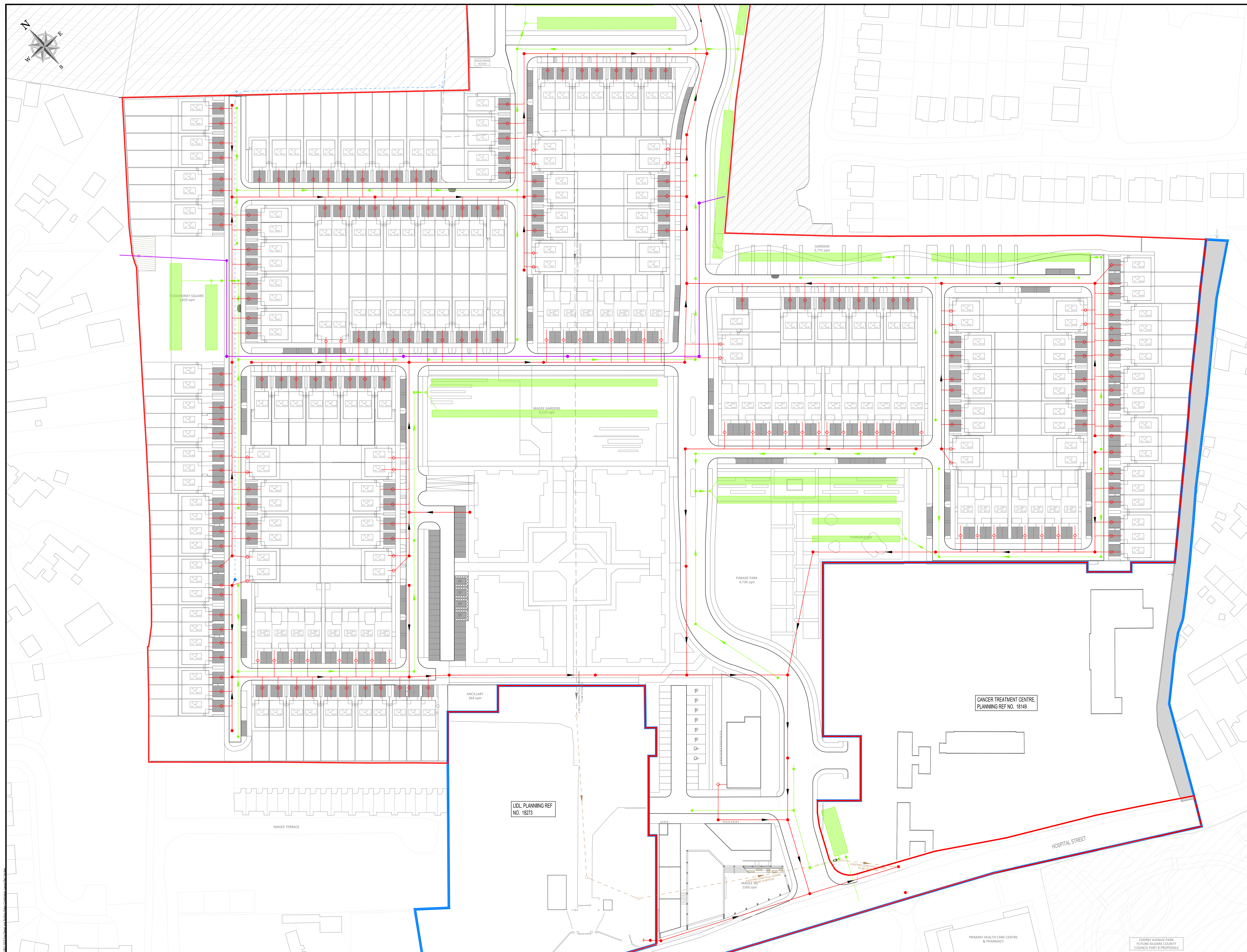
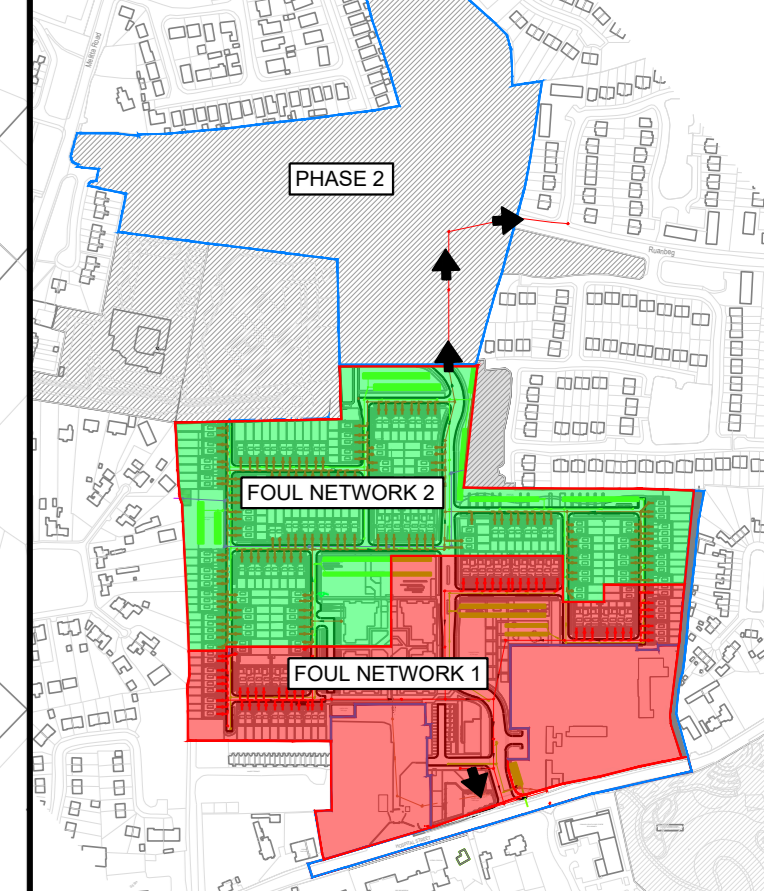
**NOTES**

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- TEMPORARY PROPPING TO BE THE RESPONSIBILITY OF THE MAIN CONTRACTOR.
- ALL REDUNDANT SERVICES (PIPES, MANHOLES, CHAMBERS, GULLIES ETC) TO BE REMOVED.
- ALL EXISTING MANHOLE COVERS & ROOFS TO BE ADJUSTED TO SUIT NEW GROUND LEVELS.
- RECESSED MANHOLES TO BE USED IN ALL AREAS WITH PAVINGS.
- ALL STORMWATER & FOUL SEWERS WITHIN 150mm OF FINISHED GROUND LEVEL TO BE ENCASED IN MINIMUM 100mm 20M10 CONCRETE.
- THE EXISTING SERVICES SHOWN ARE INDICATIVE BEFORE CONSTRUCTION WORK COMMENCES. THE CONTRACTOR IS TO CAREFULLY LOCATE AND PROTECT ALL UNDERGROUND SERVICES IN AREAS OF PROPOSED WORKS, AS PER SERVICE PROVIDER'S GUIDANCE AND SPECIFICATION.
- INDIVIDUAL WASTEWATER SERVICE CONNECTIONS TO BE PROVIDED TO EACH PROPERTY BOUNDARY IN ACCORDANCE WITH IRISH WATER DETAILS S10-W1003 AND S10-W1004.
- ALL WORKS TO BE IN COMPLIANCE WITH IRISH WATER CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE AND WASTEWATER INFRASTRUCTURE STANDARD DETAILS.
- REFER TO DRAWINGS R1831 - 1010 FOR FOUL NETWORK 1 LONGITUDINAL SECTIONS, R1831 - 1011 AND 1012 FOR FOUL NETWORK 2 LONGITUDINAL SECTIONS AND R1831 - 1013 FOR ALL FOUL AND SURFACE WATER STRUCTURE DATA TABLES AND INFORMATION.
- REFER TO DRAWING R1831 - 1001 FOR FOUL SEWER NETWORK 1 AND 2 LAYOUT AND DRAWING R1831 - 1002 FOR 600mm DIA AND 2 NO. 50mm RISING MAN DIVERSION LAYOUT.
- UNPLASTICISED PVC PIPES AND FITTINGS SHALL COMPLY WITH THE PROVISIONS IN BS 4571 (2002) PART 1 (2002-2010) AND BS 4571 PART 2 (2002-2010) AND BS 4571 PART 3 (2002-2010) AND BS 4571 PART 4 (2002-2010). ALL PIPES AND FITTINGS SHALL HAVE GASKET TYPE JOINTS OF SPOT AND SOCKET OR REBATED FORM.
- CONCRETE SEWER PIPES WITH SPOT AND SOCKET JOINTS AND SUBMERGED FITTINGS SHALL COMPLY WITH BS 5911 (2002) BS 5911 PART 1 (2002-2010) AND BS 5911 PART 2 (2002-2010). ALL PIPES AND FITTINGS SHALL HAVE GASKET TYPE JOINTS OF SPOT AND SOCKET OR REBATED FORM.

**LEGEND**

NEW UPVC FOUL SEWER	—
FOUL SEWER DIVERSION Ø 600mm	—
2 NO. Ø 50mm FOUL RISING MAN DIVERSION	—
EXISTING FOUL SEWERS	—
NEW FOUL MANHOLE	●
NEW PRIVATE INSPECTION CHAMBER AND DRAINAGE	—
PIPE LABELS	—

**FOUL NETWORK DRAINAGE STRATEGY**



LOCKMONEY SQUARE  
1,910 sqm

MAGEE GARDENS  
4,236 sqm

GARDENS  
3,775 sqm

PARADE PARK  
4,736 sqm

ANCILLARY  
368 sqm

LIDL PLANNING REF  
NO. 18273

CANCER TREATMENT CENTRE,  
PLANNING REF NO. 18149

MAGEE TERRACE

HOSPITAL STREET

PRIMARY HEALTH CARE CENTRE  
& PHARMACY

CHERRY AVENUE PARK  
FUTURE RILDARE COUNTY  
COUNCIL PART 8 PROPOSALS

REV	DATE	DESCRIPTION	DWG	APP

CLIENT:  
BALLYMOUNT PROPERTIES LTD.

ARCHITECT:  
RKD ARCHITECTS  
59 NORTHUMBERLAND ROAD  
DUBLIN 4

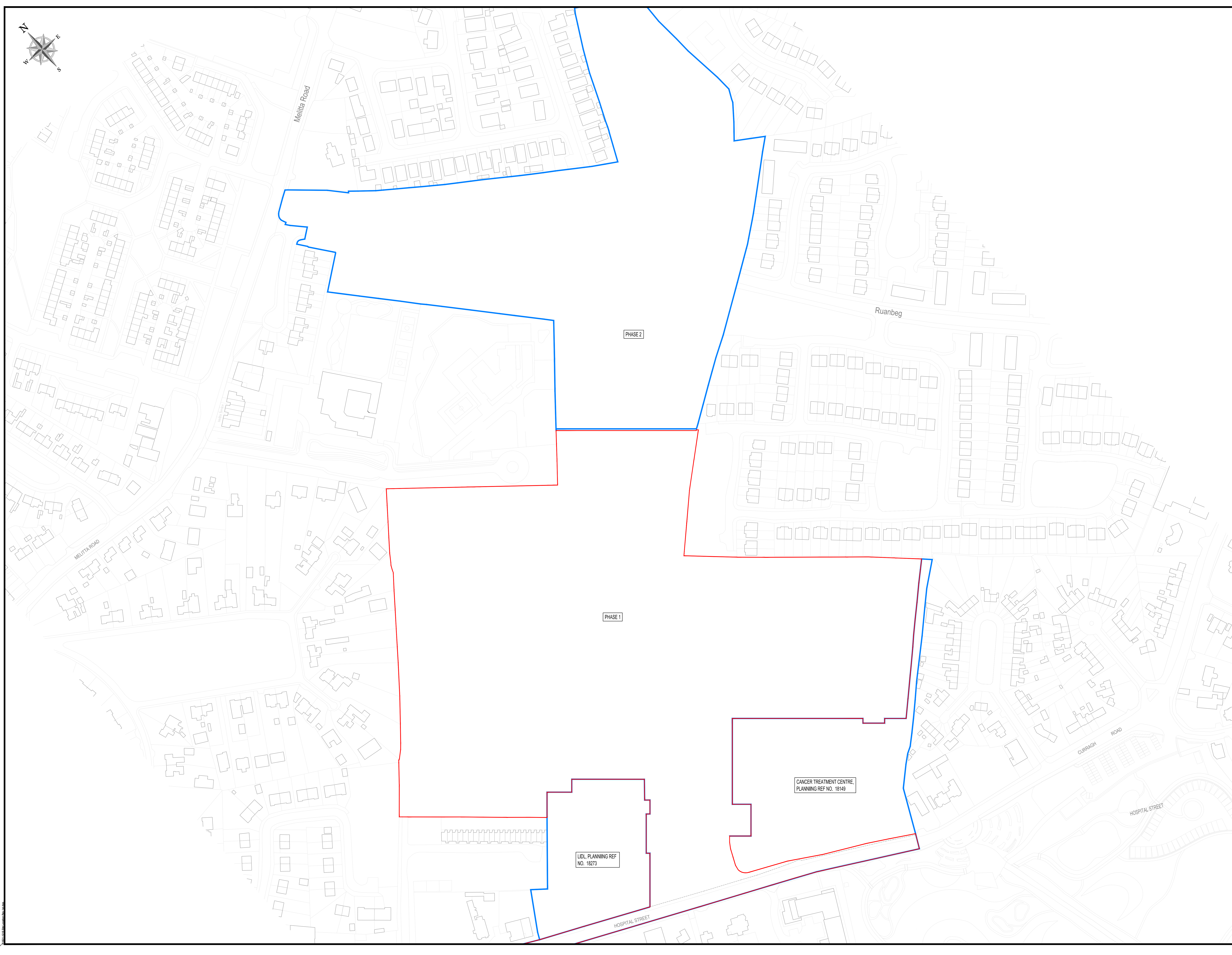
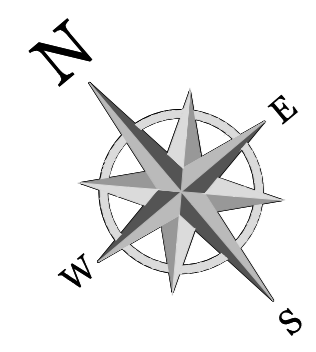
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PROJECT:  
RESIDENTIAL AND NEIGHBOURHOOD CENTRE  
DEVELOPMENT (PHASE 1) AT FORMER MAGEE  
BARRACKS

TITLE:  
PHASE 1  
OVERALL SITE FOUL SEWER STRATEGY LAYOUT

STATUS:  
**FOR INFORMATION**

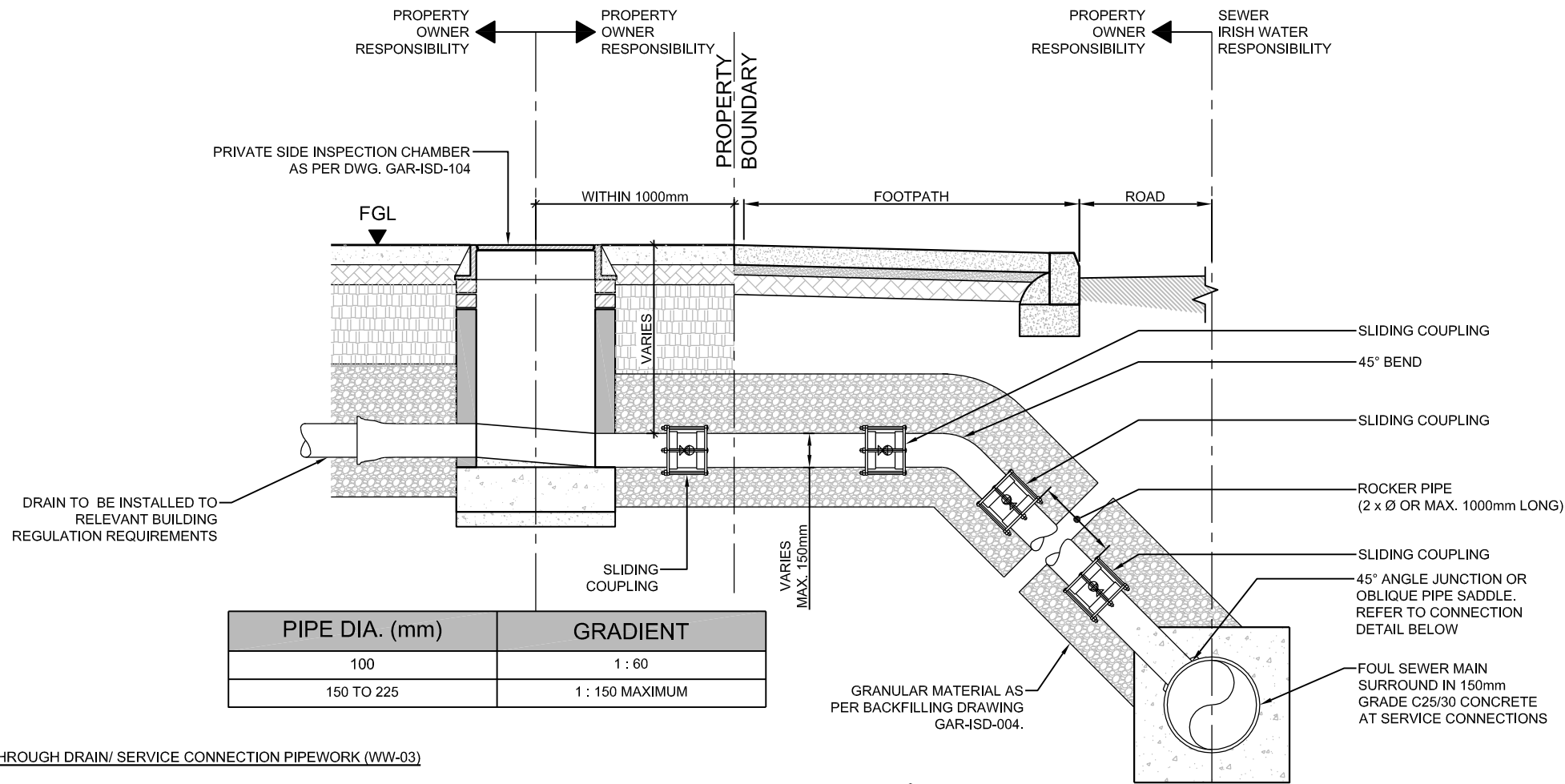
DRAWN: SL DES BY: BM  
CHK BY: BM APP BY: CR  
DATE: 17/05/19 JOB NO:  
AD SCALE: 1:500 @ AD R1831  
DWG NO: 1015 REV: 1st



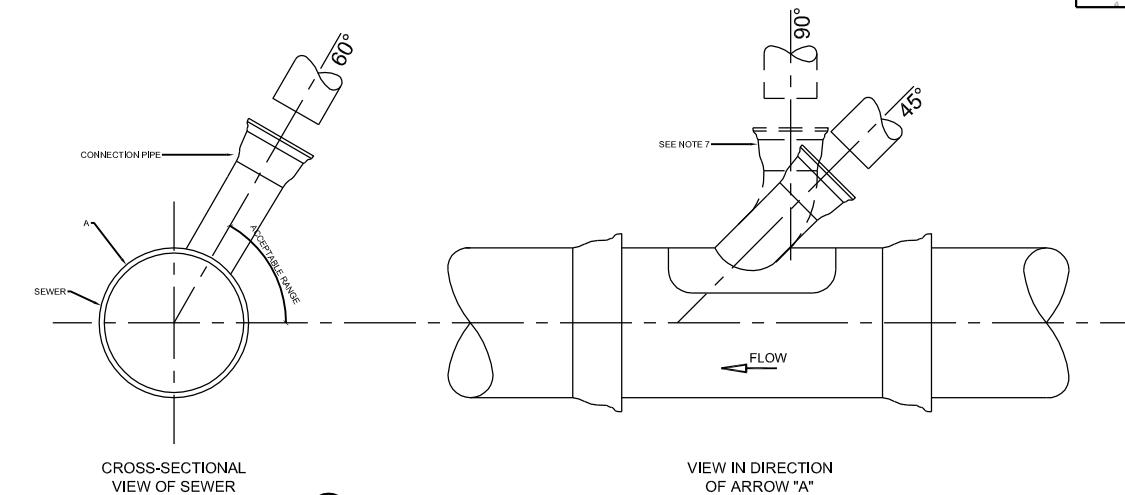
Garland has prepared this document in accordance with the standards and quality control procedures set out in the GARLAND Quality Management System. It is the responsibility of the client to ensure that the information contained herein is accurate and that the project is completed in accordance with the relevant planning and building regulations. The client should ensure that the information contained herein is accurate and that the project is completed in accordance with the relevant planning and building regulations. The client should ensure that the information contained herein is accurate and that the project is completed in accordance with the relevant planning and building regulations.

**NOTES**

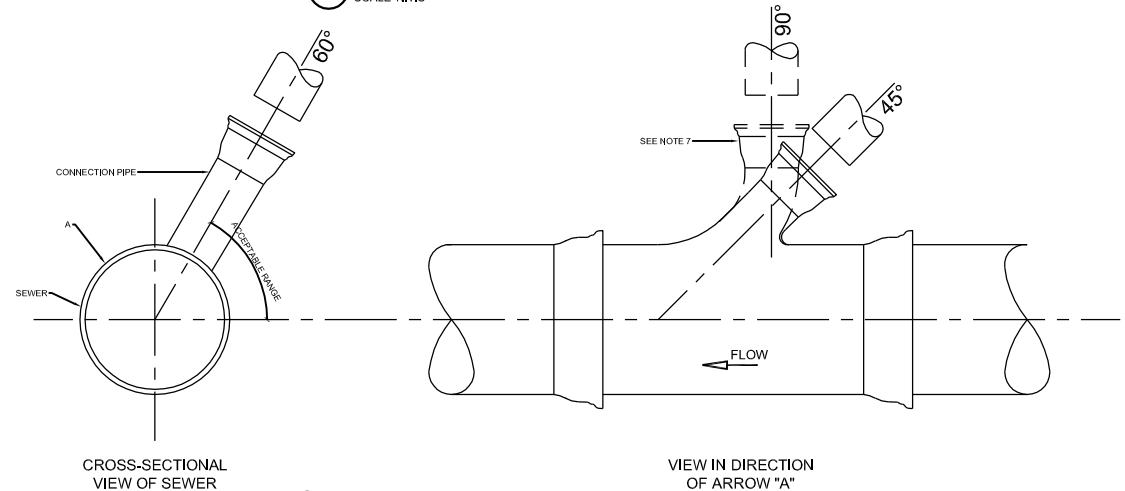
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REV	DATE	DESCRIPTION	DWG	APP
CLIENT	BALLYMOUNT PROPERTIES LTD.			
ARCHITECT	RKD ARCHITECTS 59 NORTHUMBERLAND ROAD DUBLIN 4			
<p><b>GARLAND</b> DUBLIN LIMERICK WATERFORD INTERNATIONAL T: +353 1 494622 F: +353 81 319708 T: +353 81 319708 T: +353 81 319708 E: info@garlandconsultancy.com W: www.garlandconsultancy.com</p>				
PROJECT	RESIDENTIAL AND NEIGHBOURHOOD CENTRE DEVELOPMENT (PHASE 1) AT FORMER MAGEE BARRACKS			
TITLE	SITE LOCATION LAYOUT			
STATUS	<b>FOR INFORMATION</b>			
DRAWN	SL	DES. BY	EM	
CHK. BY	BM	APP. BY	CR	
DATE	17/04/19	JOB NO.	R1831	
AD. SCALE	1:1000	REV.	1st	
DRG. NO.	A0			



TYPICAL SECTION THROUGH DRAIN/ SERVICE CONNECTION PIPEWORK (WW-03)  
SCALE N.T.S



APPROVED 45° SADDLE CONNECTION  
SCALE N.T.S



45° JUNCTION CONNECTION  
SCALE N.T.S

TYPICAL SEWER/ SERVICE PIPE CONNECTION (WW-04)  
SCALE N.T.S

DETAIL NOTES

- DRAIN AND SERVICE CONNECTIONS (WW-003)**
1. AN INSPECTION CHAMBER SHOULD BE LOCATED AT OR WITHIN 1m OF THE PROPERTY BOUNDARY AT THE UPSTREAM END OF EACH SERVICE CONNECTION ON THE PRIVATE SIDE OF THE CURTILAGE. IF PRACTICABLE, CONSULT WITH IW ON ALTERNATIVE LOCATIONS.
  2. ANY PIPE AND ASSOCIATED ACCESS UPSTREAM OF THE POINT OF CONNECTION TO A PUBLIC SEWER WITHIN THE CONFINES OF A PRIVATE BOUNDARY IS A PRIVATE DRAIN AND SHOULD BE CONSTRUCTED IN ACCORDANCE WITH BUILDING REGULATIONS.
- TYPICAL SEWER/SERVICE PIPE CONNECTION (WW-004)**
3. AS FAR AS PRACTICABLE, JUNCTIONS AND SERVICE CONNECTIONS SHALL BE BUILT IN FOR ALL PLANNED USERS WHEN THE SEWER IS BEING CONSTRUCTED, WHERE IT IS NECESSARY TO MAKE A POST-CONSTRUCTION CONNECTION THE DEVELOPER SHALL BRING THE SEWER TO THE INSPECTION CHAMBER, INSTALL THE INSPECTION CHAMBER AND SEAL THE UPSTREAM END UNTIL THE CONNECTION IS REQUIRED.
  4. THE VERTICAL ANGLE BETWEEN THE SERVICE CONNECTING PIPE AND THE HORIZONTAL SHALL BE GREATER THAN 0° AND NOT MORE THAN 60°.
  5. WHERE THE CONNECTION IS BEING MADE TO A SEWER WITH A NOMINAL INTERNAL DIAMETER OF 300mm DIAMETER OR LESS, CONNECTIONS SHALL BE MADE USING 45° ANGLE JUNCTIONS.
  6. WHERE THE CONNECTION IS BEING MADE TO A SEWER WITH A NOMINAL INTERNAL DIAMETER GREATER THAN 300mm :
    - A) IF THE DIAMETER OF THE CONNECTING PIPE IS GREATER THAN HALF THE DIAMETER OF THE SEWER, AN ACCESS MANHOLE SHALL BE CONSTRUCTED TO FORM THE CONNECTION POINT; OR,
    - B) IF THE DIAMETER OF THE CONNECTING PIPE IS LESS THAN OR EQUAL TO HALF THE DIAMETER OF THE SEWER, THEN THE CONNECTION SHALL BE MADE USING A PREFORMED SADDLE FITTING WITH A SLOW BEND BETWEEN THE SADDLE AND THE CONNECTING SEWER/DRAIN .
  7. CONNECTIONS MADE WITH SADDLE FITTINGS SHALL BE MADE BY CUTTING AND SAFELY REMOVING A CORE FROM THE PIPE AND JOINTING THE SADDLE FITTING TO THE PIPE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ENSURE A WATERTIGHT JOINT, THE CONNECTING PIPE SHALL NOT PROTRUDE INTO THE SEWERS.
  8. THE USE OF 90° CONNECTIONS TO THE SEWER MAY BE ALLOWED SUBJECT TO IRISH REVIEW, PROVIDED THE SADDLE OR BRANCH INCORPORATES A SWEEP TEE CONNECTION TOWARDS THE DIRECTION OF FLOW.

H:\GARLAND\CURRENT\STANDARD INFRASTRUCTURE\DETAILS\WW-03\WATER\WATER\GAR-ISD-101.DWG - JAN 2016.DWG

Sheet Title:  
INFRASTRUCTURE STANDARD DETAILS  
(WW-03/ WW-04)

Sheet No. **GAR-ISD-101** Rev. **A**

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**QUALITY**  
I.S. EN ISO 9001:2008  
NSAI Certified



**APPENDIX F**

**Foul Sewer Network Calculations**



**FOUL SEWERAGE DESIGN**

**Global Variables**

Pipe Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.PIP  
 Manhole Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.MHS

Industrial Flow (l/s/ha)	0.00
Industrial Peak Flow Factor	0.00
Flow Per Person (l/per/day)	150.00
Persons per House	2.70
Domestic (l/s/ha)	0.00
Domestic Peak Flow Factor	6.00
O'flow Setting (*Foul only)	0
Add Flow / Climate Change (%)	10
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	5.000
Min Cover Depth for Optimisation (m)	1.200
Min Vel for Auto Design Only (m/s)	0.75
Min Slope for Optimisation (1:X)	500
Minimum Outfall Invert (m)	0.000
Ground Level at Outfall (m)	99.470
Outfall Manhole Name	EX F MH1
Outfall Manhole Dia/Length (mm)	1250
Outfall Manhole Width (mm)	0

Designed with Level Inverts

**Network Design Table**

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Hse	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	38.63	0.193	200.0	0.000	7	6.0	1.500	o	225
2.000	22.65	0.113	199.9	0.000	2	0.0	1.500	o	150
1.001	74.71	0.374	200.0	0.000	27	0.0	1.500	o	225
3.000	38.63	0.193	200.0	0.000	27	0.0	1.500	o	225
1.002	16.89	0.084	200.1	0.000	2	0.0	1.500	o	225
1.003	61.67	0.308	200.0	0.000	0	0.0	1.500	o	225
1.004	38.59	0.965	40.0	0.000	34	0.0	1.500	o	225

**Network Results Table**

PN	US/IL (m)	E.Area (ha)	E.DWF (l/s)	E.Hse	Infil. (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
1.000	101.550	0.000	6.0	7	0.6	70	0.64	0.81	32.2	6.8
2.000	101.884	0.000	0.0	2	0.0	9	0.16	0.62	10.9	0.1
1.001	101.356	0.000	6.0	36	0.7	75	0.67	0.81	32.2	7.7
3.000	101.263	0.000	0.0	27	0.1	25	0.34	0.81	32.2	0.8
1.002	100.983	0.000	6.0	65	0.8	79	0.69	0.81	32.2	8.6
1.003	100.898	0.000	6.0	65	0.8	79	0.69	0.81	32.2	8.6
1.004	100.590	0.000	6.0	99	0.9	56	1.26	1.82	72.3	9.7

Network Design Table

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Hse	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
4.000	97.38	0.487	200.0	0.000	24	0.0	1.500	o	225
4.001	49.51	0.248	200.0	0.000	34	0.0	1.500	o	225
4.002	45.91	0.230	200.0	0.000	0	0.0	1.500	o	225
1.005	42.54	0.213	200.0	0.000	0	0.0	1.500	o	225
5.000	42.10	0.211	200.0	0.000	9	0.0	1.500	o	150
5.001	67.25	0.305	220.5	0.000	14	0.0	1.500	o	225
5.002	51.75	0.259	200.0	0.000	0	0.0	1.500	o	225
5.003	52.95	0.265	200.0	0.000	0	0.0	1.500	o	225
1.006	35.07	0.175	200.0	0.000	0	0.0	1.500	o	225
1.007	26.06	0.130	200.0	0.000	0	0.0	1.500	o	225
6.000	29.33	0.147	200.1	0.000	0	0.5	1.500	o	225
1.008	32.53	0.325	100.0	0.000	0	0.0	1.500	o	225
7.000	65.85	0.329	200.0	0.000	0	0.1	1.500	o	225
1.009	39.15	0.196	200.1	0.000	0	0.0	1.500	o	225
1.010	11.31	0.057	200.2	0.000	0	2.5	1.500	o	225

Network Results Table

PN	US/IL (m)	E.Area (ha)	E.DWF (l/s)	E.Hse	Infil. (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
4.000	99.855	0.000	0.0	24	0.1	24	0.33	0.81	32.2	0.7
4.001	99.368	0.000	0.0	58	0.2	36	0.43	0.81	32.2	1.8
4.002	99.121	0.000	0.0	58	0.2	36	0.43	0.81	32.2	1.8
1.005	98.891	0.000	6.0	157	1.0	93	0.74	0.81	32.2	11.5
5.000	100.538	0.000	0.0	9	0.0	17	0.26	0.62	10.9	0.3
5.001	100.328	0.000	0.0	23	0.1	24	0.31	0.77	30.7	0.7
5.002	100.023	0.000	0.0	23	0.1	23	0.32	0.81	32.2	0.7
5.003	99.764	0.000	0.0	23	0.1	23	0.32	0.81	32.2	0.7
1.006	98.679	0.000	6.0	180	1.1	96	0.75	0.81	32.2	12.2
1.007	98.503	0.000	6.0	180	1.1	96	0.75	0.81	32.2	12.2
6.000	98.476	0.000	0.5	0	0.1	21	0.30	0.81	32.2	0.6
1.008	98.329	0.000	6.5	180	1.2	81	0.98	1.15	45.6	12.7
7.000	98.006	0.000	0.1	0	0.0	10	0.18	0.81	32.2	0.1
1.009	97.677	0.000	6.6	180	1.2	99	0.76	0.81	32.2	12.8
1.010	97.481	0.000	9.1	180	1.4	110	0.80	0.81	32.2	15.6

PIPELINE SCHEDULES

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	o	225	F MH1	102.902	101.550	1.127	1050
2.000	o	150	F MH20	103.331	101.884	1.297	1050
1.001	o	225	F MH2	103.217	101.356	1.636	1200
3.000	o	225	F MH12	102.812	101.263	1.324	1050
1.002	o	225	F MH3	103.237	100.983	2.029	1200
1.003	o	225	F MH4	103.308	100.898	2.185	1200
1.004	o	225	F MH5	102.172	100.590	1.357	1050
4.000	o	225	F MH17	101.255	99.855	1.175	1050
4.001	o	225	F MH18	101.329	99.368	1.736	1200
4.002	o	225	F MH19	101.816	99.121	2.470	1200
1.005	o	225	F MH6	101.374	98.891	2.257	1200
5.000	o	150	F MH13	101.202	100.538	0.513	1050
5.001	o	225	F MH14	102.085	100.328	1.532	1200
5.002	o	225	F MH15	101.691	100.023	1.443	1050
5.003	o	225	F MH16	101.699	99.764	1.710	1200
1.006	o	225	F MH7	101.487	98.679	2.584	1200
1.007	o	225	F MH8	100.895	98.503	2.166	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	38.63	200.0	F MH2	103.217	101.356	1.636	1200
2.000	22.65	199.9	F MH2	103.217	101.771	1.297	1200
1.001	74.71	200.0	F MH3	103.237	100.983	2.029	1200
3.000	38.63	200.0	F MH3	103.237	101.070	1.942	1200
1.002	16.89	200.1	F MH4	103.308	100.898	2.185	1200
1.003	61.67	200.0	F MH5	102.172	100.590	1.357	1050
1.004	38.59	40.0	F MH6	101.374	99.625	1.523	1200
4.000	97.38	200.0	F MH18	101.329	99.368	1.736	1200
4.001	49.51	200.0	F MH19	101.816	99.121	2.470	1200
4.002	45.91	200.0	F MH6	101.374	98.891	2.257	1200
1.005	42.54	200.0	F MH7	101.487	98.679	2.584	1200
5.000	42.10	200.0	F MH14	102.085	100.328	1.607	1200
5.001	67.25	220.5	F MH15	101.691	100.023	1.443	1050
5.002	51.75	200.0	F MH16	101.699	99.764	1.710	1200
5.003	52.95	200.0	F MH7	101.487	99.500	1.763	1200
1.006	35.07	200.0	F MH8	100.895	98.503	2.166	1200
1.007	26.06	200.0	F MH9	99.849	98.373	1.251	1050

PIPELINE SCHEDULES

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
6.000	o	225	F MH48	100.077	98.476	1.376	1050
1.008	o	225	F MH9	99.849	98.329	1.295	1050
7.000	o	225	F MH47	99.402	98.006	1.170	1050
1.009	o	225	F MH10	98.711	97.677	0.809	1050
1.010	o	225	F MH11	99.523	97.481	1.817	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
6.000	29.33	200.1	F MH9	99.849	98.329	1.295	1050
1.008	32.53	100.0	F MH10	98.711	98.004	0.482	1050
7.000	65.85	200.0	F MH10	98.711	97.677	0.809	1050
1.009	39.15	200.1	F MH11	99.523	97.481	1.816	1200
1.010	11.31	200.2	EX F MH1	99.470	97.425	1.820	1250

MANHOLE SCHEDULES

M/Hole Number	Cover Level (m)	M/Hole Depth (m)	M/Hole Diam.,L*W (mm)	Pipes Out			Pipes In		
				PN	IL. (m)	D (mm)	PN	IL. (m)	D (mm)
F MH1	102.902	1.352	1050	1.000	101.550	225			
F MH20	103.331	1.447	1050	2.000	101.884	150			
F MH2	103.217	1.861	1200	1.001	101.356	225	1.000	101.356	225
							2.000	101.771	150
F MH12	102.812	1.549	1050	3.000	101.263	225			
F MH3	103.237	2.254	1200	1.002	100.983	225	1.001	100.983	225
							3.000	101.070	225
F MH4	103.308	2.410	1200	1.003	100.898	225	1.002	100.898	225
F MH5	102.172	1.582	1050	1.004	100.590	225	1.003	100.590	225
F MH17	101.255	1.400	1050	4.000	99.855	225			
F MH18	101.329	1.961	1200	4.001	99.368	225	4.000	99.368	225
F MH19	101.816	2.695	1200	4.002	99.121	225	4.001	99.121	225
F MH6	101.374	2.482	1200	1.005	98.891	225	1.004	99.625	225
							4.002	98.891	225
F MH13	101.202	0.663	1050	5.000	100.538	150			
F MH14	102.085	1.757	1200	5.001	100.328	225	5.000	100.328	150
F MH15	101.691	1.668	1050	5.002	100.023	225	5.001	100.023	225
F MH16	101.699	1.935	1200	5.003	99.764	225	5.002	99.764	225
F MH7	101.487	2.809	1200	1.006	98.679	225	1.005	98.679	225
							5.003	99.500	225
F MH8	100.895	2.391	1200	1.007	98.503	225	1.006	98.503	225
F MH48	100.077	1.601	1050	6.000	98.476	225			
F MH9	99.849	1.520	1050	1.008	98.329	225	1.007	98.373	225
							6.000	98.329	225
F MH47	99.402	1.395	1050	7.000	98.006	225			
F MH10	98.711	1.034	1050	1.009	97.677	225	1.008	98.004	225
							7.000	97.677	225
F MH11	99.523	2.042	1200	1.010	97.481	225	1.009	97.481	225
EX F MH1	99.470	2.045	1250		OUTFALL		1.010	97.425	225

Garland House  
28-30 Rathmines Park  
Rathmines Dublin 6

R1831 - Magee Barracks  
F1 Network



Date Wednesday 24 April 2019  
File R1831 - F1 Foul Netwo...

Designed By BM / SL  
Checked By








ENCAD

System1 W.11.3


Setting Out Information (True Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	F MH1	1050		673299.471	712396.735	
2.000	F MH20	1050		673259.975	712349.877	
1.001	F MH2	1200		673274.574	712367.198	
3.000	F MH12	1050		673356.598	712348.583	
1.002	F MH3	1200		673331.701	712319.046	
1.003	F MH4	1200		673345.097	712308.764	
1.004	F MH5	1050		673392.252	712269.017	
4.000	F MH17	1050		673557.270	712254.761	
4.001	F MH18	1200		673482.788	712317.497	
4.002	F MH19	1200		673451.121	712279.438	
1.005	F MH6	1200		673421.756	712244.148	
5.000	F MH13	1050		673614.044	712205.020	

Setting Out Information (True Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
5.001	F MH14	1200		673586.909	712172.835	
5.002	F MH15	1050		673535.488	712216.178	
5.003	F MH16	1200		673495.920	712249.529	
1.006	F MH7	1200		673454.321	712216.772	
1.007	F MH8	1200		673431.751	712189.934	
6.000	F MH48	1050		673392.531	712188.911	
1.008	F MH9	1050		673414.956	712170.009	
7.000	F MH47	1050		673341.182	712165.490	
1.009	F MH10	1050		673401.974	712140.177	
1.010	F MH11	1200		673437.958	712124.753	

Setting Out Information (True Coordinates)

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.010	EX F MH1	1250		673433.155	712114.514	



Garland House  
28-30 Rathmines Park  
Rathmines Dublin 6

R1831 - Magee Barracks  
F1 Network



Date Wednesday 24 April 2019  
File R1831 - F1 Foul Netwo...

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Checked By









ENCAD

System1 W.11.3


Setting Out Information (Site Coordinates)


PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	F MH1	1050		673299.471	712396.735	
2.000	F MH20	1050		673259.975	712349.877	
1.001	F MH2	1200		673274.574	712367.198	
3.000	F MH12	1050		673356.598	712348.583	
1.002	F MH3	1200		673331.701	712319.046	
1.003	F MH4	1200		673345.097	712308.764	
1.004	F MH5	1050		673392.252	712269.017	
4.000	F MH17	1050		673557.270	712254.761	
4.001	F MH18	1200		673482.788	712317.497	
4.002	F MH19	1200		673451.121	712279.438	
1.005	F MH6	1200		673421.756	712244.148	
5.000	F MH13	1050		673614.044	712205.020	

Setting Out Information (Site Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
5.001	F MH14	1200		673586.909	712172.835	
5.002	F MH15	1050		673535.488	712216.178	
5.003	F MH16	1200		673495.920	712249.529	
1.006	F MH7	1200		673454.321	712216.772	
1.007	F MH8	1200		673431.751	712189.934	
6.000	F MH48	1050		673392.531	712188.911	
1.008	F MH9	1050		673414.956	712170.009	
7.000	F MH47	1050		673341.182	712165.490	
1.009	F MH10	1050		673401.974	712140.177	
1.010	F MH11	1200		673437.958	712124.753	

Setting Out Information (Site Coordinates)

PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.010	EX F MH1	1250		673433.155	712114.514	

<b>Thomas Garland &amp; Partners</b>		<b>Page 1</b>
Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks F2 Network	
Date Wednesday 24 April 2019 File R1831 - Foul Network ...	Designed By BM / SL Checked By	
ENCAD	System1 W.11.3	

**FOUL SEWERAGE DESIGN**

**Global Variables**

Pipe Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.PIP  
 Manhole Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.MHS

```

Industrial Flow (l/s/ha)                0.00
Industrial Peak Flow Factor              0.00
Flow Per Person (l/per/day)             150.00
Persons per House                        2.70
Domestic (l/s/ha)                       0.00
Domestic Peak Flow Factor                6.00
O'flow Setting (*Foul only)              0
Add Flow / Climate Change (%)            10
Minimum Backdrop Height (m)              0.000
Maximum Backdrop Height (m)              5.000
Min Cover Depth for Optimisation (m)      1.200
Min Vel for Auto Design Only (m/s)        0.75
Min Slope for Optimisation (1:X)          500
Minimum Outfall Invert (m)                0.000
Ground Level at Outfall (m)               95.490
Outfall Manhole Name                      F MH46
Outfall Manhole Dia/Length (mm)          1250
Outfall Manhole Width (mm)                0
  
```

Designed with Level Inverts

**Network Design Table**

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Hse	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	81.67	3.267	25.0	0.000	18	0.0	1.500	o	150
1.001	69.76	1.395	50.0	0.000	12	0.0	1.500	o	225
2.000	38.71	0.194	200.0	0.000	6	0.0	1.500	o	150
1.002	60.36	0.302	200.0	0.000	11	0.0	1.500	o	225
1.003	62.86	0.314	200.0	0.000	11	0.0	1.500	o	225
3.000	30.86	0.926	33.3	0.000	5	0.0	1.500	o	150
1.004	60.47	0.302	200.2	0.000	8	0.0	1.500	o	225

**Network Results Table**


PN	US/IL (m)	E.Area (ha)	E.DWF (l/s)	E.Hse	Infil. (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
1.000	100.930	0.000	0.0	18	0.1	14	0.65	1.76	31.0	0.6
1.001	97.663	0.000	0.0	30	0.1	19	0.57	1.63	64.6	0.9
2.000	97.070	0.000	0.0	6	0.0	14	0.22	0.62	10.9	0.2
1.002	96.268	0.000	0.0	47	0.1	33	0.41	0.81	32.2	1.5
1.003	95.966	0.000	0.0	58	0.2	36	0.43	0.81	32.2	1.8
3.000	96.515	0.000	0.0	5	0.0	9	0.39	1.52	26.9	0.2
1.004	95.589	0.000	0.0	71	0.2	40	0.46	0.81	32.2	2.2

Network Design Table

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Hse	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.005	77.15	0.386	200.0	0.000	8	0.0	1.500	o	225
4.000	66.51	0.333	200.0	0.000	14	0.0	1.500	o	150
5.000	18.40	0.552	33.3	0.000	3	0.0	1.500	o	150
6.000	25.62	0.128	200.0	0.000	27	0.0	1.500	o	225
5.001	63.27	1.898	33.3	0.000	4	0.0	1.500	o	225
4.001	56.74	0.284	200.0	0.000	5	0.0	1.500	o	225
4.002	59.55	0.298	200.0	0.000	14	0.0	1.500	o	225
4.003	33.29	0.666	50.0	0.000	3	0.0	1.500	o	225
7.000	64.30	1.286	50.0	0.000	20	0.0	1.500	o	225
7.001	64.75	0.673	96.3	0.000	0	0.0	1.500	o	225
8.000	69.80	2.094	33.3	0.000	10	0.0	1.500	o	150
7.002	107.49	0.525	204.8	0.000	8	0.0	1.500	o	225
4.004	36.65	0.733	50.0	0.000	5	0.0	1.500	o	225
4.005	26.09	0.130	200.1	0.000	3	0.0	1.500	o	225
4.006	35.29	0.353	100.0	0.000	0	0.0	1.500	o	225
1.006	30.36	0.152	200.0	0.000	0	0.0	1.500	o	225
1.007	71.41	0.357	200.0	0.000	281	0.0	1.500	o	225

Network Results Table

PN	US/IL (m)	E.Area (ha)	E.DWF (l/s)	E.Hse	Infil. (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
1.005	95.287	0.000	0.0	79	0.2	42	0.48	0.81	32.2	2.4
4.000	98.232	0.000	0.0	14	0.0	21	0.29	0.62	10.9	0.4
5.000	100.783	0.000	0.0	3	0.0	7	0.33	1.52	26.9	0.1
6.000	100.657	0.000	0.0	27	0.1	25	0.34	0.81	32.2	0.8
5.001	100.231	0.000	0.0	34	0.1	18	0.68	1.99	79.2	1.1
4.001	97.899	0.000	0.0	53	0.1	35	0.42	0.81	32.2	1.6
4.002	97.616	0.000	0.0	67	0.2	39	0.45	0.81	32.2	2.1
4.003	97.318	0.000	0.0	70	0.2	28	0.74	1.63	64.6	2.2
7.000	99.203	0.000	0.0	20	0.1	16	0.50	1.63	64.6	0.6
7.001	97.917	0.000	0.0	20	0.1	18	0.40	1.17	46.5	0.6
8.000	99.535	0.000	0.0	10	0.0	12	0.49	1.52	26.9	0.3
7.002	97.244	0.000	0.0	38	0.1	30	0.38	0.80	31.8	1.2
4.004	96.652	0.000	0.0	113	0.3	36	0.86	1.63	64.6	3.5
4.005	95.919	0.000	0.0	116	0.3	51	0.53	0.81	32.2	3.6
4.006	95.789	0.000	0.0	116	0.3	43	0.68	1.15	45.6	3.6
1.006	94.901	0.000	0.0	195	0.5	66	0.62	0.81	32.2	6.0
1.007	94.749	0.000	0.0	476	1.3	107	0.79	0.81	32.2	14.7

Thomas Garland & Partners		Page 3
Garland House 28-30 Rathmines Park Rathmines Dublin 6	R1831 - Magee Barracks F2 Network	
Date Wednesday 24 April 2019 File R1831 - Foul Network ...	Designed By BM / SL Checked By	
ENCAD	System1 W.11.3	

Network Design Table

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Hse	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.008	71.41	0.357	200.0	0.000	0	0.0	1.500	o	225
1.009	20.26	0.101	200.0	0.000	0	0.0	1.500	o	225
1.010	47.33	0.237	200.0	0.000	0	0.0	1.500	o	225

Network Results Table

PN	US/IL (m)	E.Area (ha)	E.DWF (l/s)	E.Hse	Infil. (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
1.008	94.392	0.000	0.0	476	1.3	107	0.79	0.81	32.2	14.7
1.009	94.035	0.000	0.0	476	1.3	107	0.79	0.81	32.2	14.7
1.010	93.934	0.000	0.0	476	1.3	107	0.79	0.81	32.2	14.7

PIPELINE SCHEDULES

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	o	150	F MH21	102.513	100.930	1.434	1050
1.001	o	225	F MH22	99.674	97.663	1.786	1200
2.000	o	150	F MH36	98.630	97.070	1.410	1050
1.002	o	225	F MH23	98.312	96.268	1.819	1200
1.003	o	225	F MH24	97.575	95.966	1.384	1050
3.000	o	150	F MH37	98.075	96.515	1.410	1050
1.004	o	225	F MH25	97.009	95.589	1.195	1050
1.005	o	225	F MH26	96.832	95.287	1.320	1050
4.000	o	150	F MH27	99.787	98.232	1.405	1050
5.000	o	150	F MH41	102.446	100.783	1.513	1200
6.000	o	225	F MH49	102.257	100.657	1.375	1050
5.001	o	225	F MH50	101.906	100.231	1.450	1050
4.001	o	225	F MH28	100.049	97.899	1.925	1200
4.002	o	225	F MH29	99.465	97.616	1.624	1200
4.003	o	225	F MH30	99.843	97.318	2.300	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
1.000	81.67	25.0	F MH22	99.674	97.663	1.861	1200
1.001	69.76	50.0	F MH23	98.312	96.268	1.819	1200
2.000	38.71	200.0	F MH23	98.312	96.876	1.286	1200
1.002	60.36	200.0	F MH24	97.575	95.966	1.384	1050
1.003	62.86	200.0	F MH25	97.009	95.652	1.132	1050
3.000	30.86	33.3	F MH25	97.009	95.589	1.270	1050
1.004	60.47	200.2	F MH26	96.832	95.287	1.320	1050
1.005	77.15	200.0	F MH34	97.055	94.901	1.929	1200
4.000	66.51	200.0	F MH28	100.049	97.899	2.000	1200
5.000	18.40	33.3	F MH50	101.906	100.231	1.525	1050
6.000	25.62	200.0	F MH50	101.906	100.529	1.152	1050
5.001	63.27	33.3	F MH28	100.049	98.333	1.491	1200
4.001	56.74	200.0	F MH29	99.465	97.616	1.625	1200
4.002	59.55	200.0	F MH30	99.843	97.318	2.300	1200
4.003	33.29	50.0	F MH31	98.279	96.652	1.402	1050

PIPELINE SCHEDULES

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
7.000	o	225	F MH38	101.059	99.203	1.631	1200
7.001	o	225	F MH39	99.750	97.917	1.609	1200
8.000	o	150	F MH42	101.175	99.535	1.490	1050
7.002	o	225	F MH40	99.132	97.244	1.663	1200
4.004	o	225	F MH31	98.279	96.652	1.402	1050
4.005	o	225	F MH32	97.667	95.919	1.523	1200
4.006	o	225	F MH33	97.412	95.789	1.398	1050
1.006	o	225	F MH34	97.055	94.901	1.929	1200
1.007	o	225	F MH35	96.592	94.749	1.618	1200
1.008	o	225	F MH43	95.467	94.392	0.849	1050
1.009	o	225	F MH44	95.548	94.035	1.287	1050
1.010	o	225	F MH45	96.179	93.934	2.021	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH No.	C.Level (m)	I.Level (m)	C.Depth (m)	MH DIAM., L*W (mm)
7.000	64.30	50.0	F MH39	99.750	97.917	1.609	1200
7.001	64.75	96.3	F MH40	99.132	97.244	1.663	1200
8.000	69.80	33.3	F MH40	99.132	97.441	1.541	1200
7.002	107.49	204.8	F MH31	98.279	96.719	1.335	1050
4.004	36.65	50.0	F MH32	97.667	95.919	1.523	1200
4.005	26.09	200.1	F MH33	97.412	95.789	1.398	1050
4.006	35.29	100.0	F MH34	97.055	95.436	1.394	1200
1.006	30.36	200.0	F MH35	96.592	94.749	1.618	1200
1.007	71.41	200.0	F MH43	95.467	94.392	0.849	1050
1.008	71.41	200.0	F MH44	95.548	94.035	1.287	1050
1.009	20.26	200.0	F MH45	96.179	93.934	2.021	1200
1.010	47.33	200.0	F MH46	95.490	93.697	1.568	1250





MANHOLE SCHEDULES

M/Hole Number	Cover Level (m)	M/Hole Depth (m)	M/Hole Diam.,L*W (mm)	Pipes Out			Pipes In		
				PN	IL.(m)	D (mm)	PN	IL.(m)	D (mm)
F MH21	102.513	1.584	1050	1.000	100.930	150			
F MH22	99.674	2.011	1200	1.001	97.663	225	1.000	97.663	150
F MH36	98.630	1.560	1050	2.000	97.070	150			
F MH23	98.312	2.044	1200	1.002	96.268	225	1.001	96.268	225
				2.000	96.876	150			
F MH24	97.575	1.609	1050	1.003	95.966	225	1.002	95.966	225
F MH37	98.075	1.560	1050	3.000	96.515	150			
F MH25	97.009	1.420	1050	1.004	95.589	225	1.003	95.652	225
				3.000	95.589	150			
F MH26	96.832	1.545	1050	1.005	95.287	225	1.004	95.287	225
F MH27	99.787	1.555	1050	4.000	98.232	150			
F MH41	102.446	1.663	1200	5.000	100.783	150			
F MH49	102.257	1.600	1050	6.000	100.657	225			
F MH50	101.906	1.675	1050	5.001	100.231	225	5.000	100.231	150
				6.000	100.529	225	6.000	100.529	225
F MH28	100.049	2.150	1200	4.001	97.899	225	4.000	97.899	150
				5.001	98.333	225	5.001	98.333	225
F MH29	99.465	1.850	1200	4.002	97.616	225	4.001	97.616	225
F MH30	99.843	2.525	1200	4.003	97.318	225	4.002	97.318	225
F MH38	101.059	1.856	1200	7.000	99.203	225			
F MH39	99.750	1.834	1200	7.001	97.917	225	7.000	97.917	225
F MH42	101.175	1.640	1050	8.000	99.535	150			
F MH40	99.132	1.888	1200	7.002	97.244	225	7.001	97.244	225
				8.000	97.441	150	8.000	97.441	150
F MH31	98.279	1.627	1050	4.004	96.652	225	4.003	96.652	225
				7.002	96.719	225	7.002	96.719	225
F MH32	97.667	1.748	1200	4.005	95.919	225	4.004	95.919	225
F MH33	97.412	1.623	1050	4.006	95.789	225	4.005	95.789	225
F MH34	97.055	2.154	1200	1.006	94.901	225	1.005	94.901	225
				4.006	95.436	225	4.006	95.436	225
F MH35	96.592	1.843	1200	1.007	94.749	225	1.006	94.749	225
F MH43	95.467	1.074	1050	1.008	94.392	225	1.007	94.392	225
F MH44	95.548	1.512	1050	1.009	94.035	225	1.008	94.035	225
F MH45	96.179	2.246	1200	1.010	93.934	225	1.009	93.934	225

MANHOLE SCHEDULES

M/Hole Number	Cover Level (m)	M/Hole Depth (m)	M/Hole Diam.,L*W (mm)	PN	Pipes Out IL.(m)    D (mm)	PN	Pipes In IL.(m)    D (mm)
F MH46	95.490	1.793	1250		OUTFALL	1.010	93.697    225

Garland House  
28-30 Rathmines Park  
Rathmines Dublin 6

R1831 - Magee Barracks  
F2 Network



Date Wednesday 24 April 2019  
File R1831 - Foul Network ...

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Setting Out Information (True Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	F MH21	1050		673307.495	712406.255	
1.001	F MH22	1200		673360.128	712468.698	
2.000	F MH36	1050		673430.034	712551.632	
1.002	F MH23	1200		673405.063	712522.054	
1.003	F MH24	1050		673451.215	712483.153	
3.000	F MH37	1050		673479.409	712419.024	
1.004	F MH25	1050		673499.277	712442.642	
1.005	F MH26	1050		673538.271	712488.858	
4.000	F MH27	1050		673366.402	712463.410	
5.000	F MH41	1200		673364.620	712358.105	
6.000	F MH49	1050		673396.071	712355.662	
5.001	F MH50	1050		673376.480	712372.175	

Garland House  
28-30 Rathmines Park  
Rathmines Dublin 6

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System1 W.11.3

Setting Out Information (True Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
4.001	F MH28	1200		673417.257	712420.548	
4.002	F MH29	1200		673460.643	712383.980	
4.003	F MH30	1200		673506.171	712345.600	
7.000	F MH38	1200		673618.522	712210.331	
7.001	F MH39	1200		673659.966	712259.488	
8.000	F MH42	1050		673565.464	712247.853	
7.002	F MH40	1200		673610.456	712301.219	
4.004	F MH31	1050		673528.270	712370.494	
4.005	F MH32	1200		673551.878	712398.522	
4.006	F MH33	1050		673568.691	712418.468	
1.006	F MH34	1200		673597.279	712439.152	
1.007	F MH35	1200		673612.449	712465.449	

Setting Out Information (True Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.008	F MH43	1050		673671.437	712505.696	
1.009	F MH44	1050		673730.426	712545.942	
1.010	F MH45	1200		673742.230	712529.480	
PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.010	F MH46	1250		673774.590	712494.945	

Garland House  
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System1 W.11.3

Setting Out Information (Site Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	F MH21	1050		673307.495	712406.255	
1.001	F MH22	1200		673360.128	712468.698	
2.000	F MH36	1050		673430.034	712551.632	
1.002	F MH23	1200		673405.063	712522.054	
1.003	F MH24	1050		673451.215	712483.153	
3.000	F MH37	1050		673479.409	712419.024	
1.004	F MH25	1050		673499.277	712442.642	
1.005	F MH26	1050		673538.271	712488.858	
4.000	F MH27	1050		673366.402	712463.410	
5.000	F MH41	1200		673364.620	712358.105	
6.000	F MH49	1050		673396.071	712355.662	
5.001	F MH50	1050		673376.480	712372.175	

Garland House  
28-30 Rathmines Park  
Rathmines Dublin 6

R1831 - Magee Barracks  
F2 Network



Date Wednesday 24 April 2019  
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System1 W.11.3

Setting Out Information (Site Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
4.001	F MH28	1200		673417.257	712420.548	
4.002	F MH29	1200		673460.643	712383.980	
4.003	F MH30	1200		673506.171	712345.600	
7.000	F MH38	1200		673618.522	712210.331	
7.001	F MH39	1200		673659.966	712259.488	
8.000	F MH42	1050		673565.464	712247.853	
7.002	F MH40	1200		673610.456	712301.219	
4.004	F MH31	1050		673528.270	712370.494	
4.005	F MH32	1200		673551.878	712398.522	
4.006	F MH33	1050		673568.691	712418.468	
1.006	F MH34	1200		673597.279	712439.152	
1.007	F MH35	1200		673612.449	712465.449	

Setting Out Information (Site Coordinates)

PN	USMH No	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.008	F MH43	1050		673671.437	712505.696	
1.009	F MH44	1050		673730.426	712545.942	
1.010	F MH45	1200		673742.230	712529.480	
PN	DSMH No	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.010	F MH46	1250		673774.590	712494.945	



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