PUNCH
consulting engineers

182134 - Residential Development, Shanganagh Castle, Co. Dublin

Engineering Planning Report

January 2020

Document Control

Document Number: 182134-EPR-PL0

Revision	Description	Date	Prepared	Checked	Approved
PR0	DRAFT	09/12/2019	Damien Egan	Mark Richardson	Leonard Brennan
PL0	Planning Issue	15/01/2020	Damien Egan	Mark Richardson	Leonard Brennan

Table of Contents

1 Introduction

This report was prepared to accompany a part 10 application for a proposed development on a site located at Shanganagh, Shankill, Co. Dublin. The site location is shown in Figure 1-1 below.

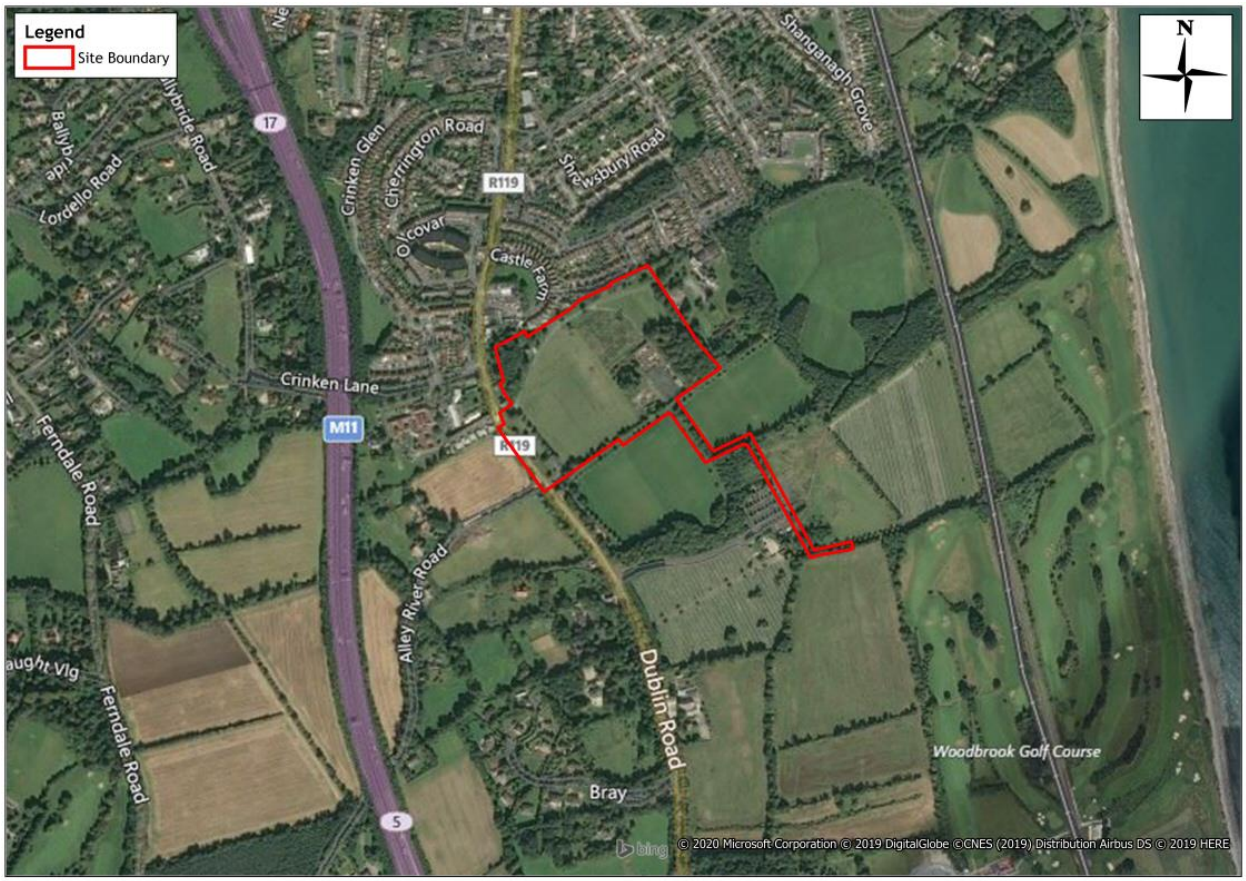

Figure 1-1: Location of the proposed development (site boundary indicated in red)

The existing site is predominantly meadowlands with part of the site formerly used for allotments and an existing pond in the south-east of the site. The southeast corner of the site is occupied by a greenhouse and Parks Department compound. The site generally falls from the east and west towards the existing pond which is located in the southwest portion of the site. The site falls from 29.76 mAOD to the north to 24.07 mAOD along the south east boundary.

The site is 9.69 hectares in area and is bounded by Shanganagh Castle to the east, Castle Farm residential estate to the north, the R119 Dublin Road to the west and greenfield areas to the south.

1.1 Proposed Development

The proposed works are outlined in a series of architectural drawings prepared by ABK Architects and engineering drawings prepared by PUNCH Consulting Engineers and supplied as part of the planning documentation.

The proposed development will be residential in nature and will consist of 597 residential units and a creche, as well as associated site development works. An extract from the proposed site layout is shown in Figure 1-2. Please refer to Appendix A for a copy of the full drawing.

Figure 1-2: Proposed Site Layout

1.2 Phasing

The development is to be constructed in stages. Refer architectural documentation for proposed staging arrangement. The proposed phasing will comprise 4 stages as follows:

- Phase 1 will consist of 51 house units and the creche;
- Phase 2 will consist of blocks A, B, C and D totalling 230 units;
- Phase 3 will consist of blocks E and F totalling 144 units;
- Phase 4 will consist of blocks G and H totalling 172 units.

2 Foul Water Drainage Design

2.1 Existing Foul Water Drainage

Record drawings provided by Dún Laoghaire-Rathdown County Council indicate that there are no foul water sewers within the site. There are existing 225mm concrete foul sewers in the Castle Farm estate to the north of the site. Please refer to Appendix B for Dún Laoghaire-Rathdown County Council record drawings illustrating the existing foul drainage arrangement. An extract is shown in Figure 2-1 below

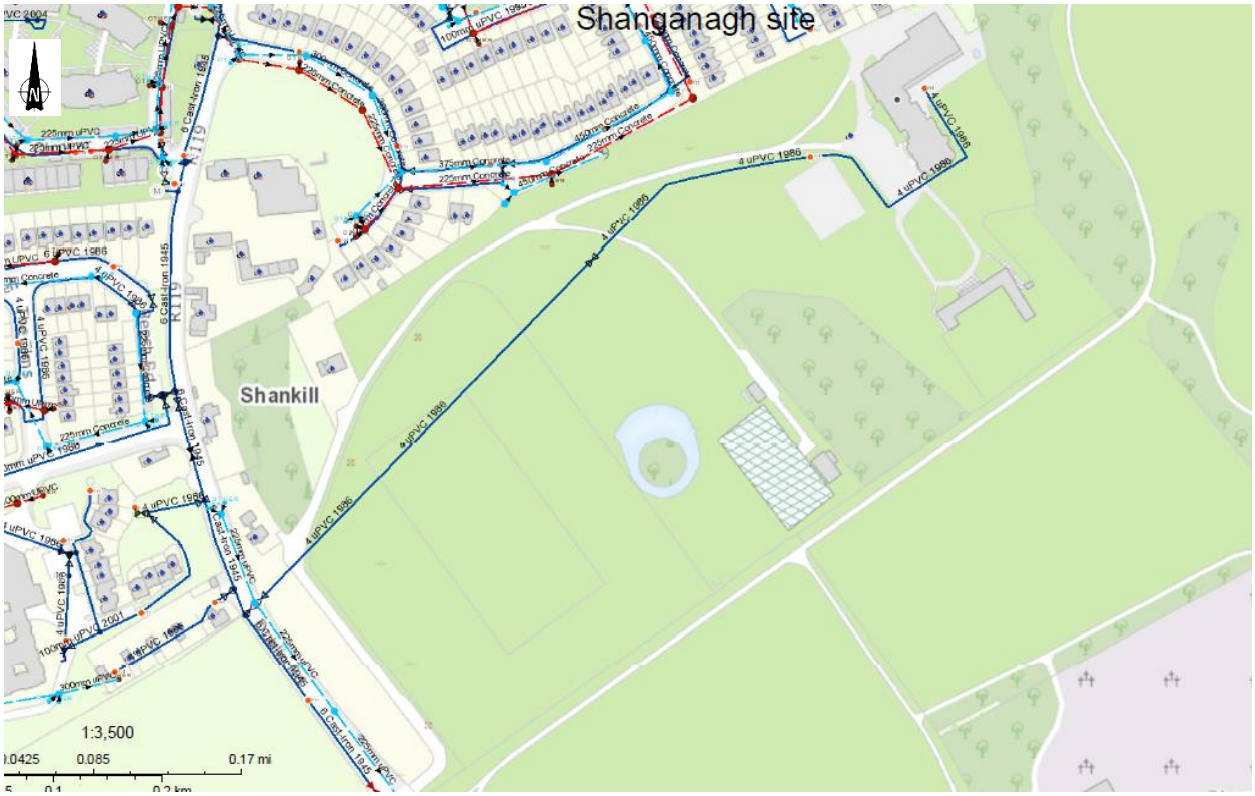

Figure 2-1: Existing foul drainage surrounding the site (Extract from Irish Water records)

A topographical and Ground Penetrating Radar (GPR) survey of the site was carried out by Murphy Surveys in March 2019. The survey shows a 150mm uPVC foul sewer running through the northern portion of the site. The sewer originates from the existing building in the north-west of the site and flows in a general north-east direction. The survey was unable to trace the full sewer, but it is assumed to discharge to the estate to the north of the site.

2.2 Proposed Foul Water Drainage

The proposed foul water sewers have been designed using Causeway Flow software in accordance with the DOE's "*Recommendations for Site Development Works for Housing Areas*". The foul loading has been calculated in accordance with "Code of Practice for Wastewater Infrastructure" (particularly clause 36, Appendix C and Appendix D) published by Irish Water.

It is proposed that the foul sewer will discharge by gravity to the proposed Woodbrook development to the south of the site. The foul drainage from the Shanganagh development will fall by gravity towards the south of the site. It will then fall by gravity south through the existing parkland and through the grounds of Shanganagh cemetery before discharging to the proposed Woodbrook development. Please see PUNCH Drawings no. 182-134-001, 182-134-002 and 182-134-003 for more detail of the proposed route. This has been agreed with the Woodbrook development (please see Appendix E for letter of consent) and the flows from both developments will then be pumped north. A wayleave will be provided for the foul route south from the development.

The existing 150mm foul sewer to the north of the site described in Section 2.1 above is to be demolished as part of the proposed development. The sewer services the existing building to the north-east of the site. As such the proposed foul drainage network for the site will provide a connection for this building to replace the sewer being removed. For more detail please refer to PUNCH drawing 182-134-001.

As described in Section 1.2 above the proposed development is to be constructed in 4 phases. The foul sewerage discharge route to Woodbrook is to be constructed prior to occupancy of any constructed component of development.

Table 2-1 describes the foul water drainage design parameters used. summarises the peak flows for the development. Note that to calculate peak flow a peaking factor of 3 was used for the residential portion of the development and a factor of 6 for the creche in accordance with Appendix C of the Irish Water *"code of practice for wastewater infrastructure"*.

Table 2-1: Foul Water Drainage Design Parameters

Description	Value
Residential Flow Rate	150 l/per/day
Persons per Dwelling	2.7
Creche	90 l/per/day
Infiltration Allowance	10%
Peaking Factor	6 DWF Creche 3.0 DWF Residential
Minimum Self Cleansing Velocity	0.75m/s
Minimum Pipe Diameter	150mm

Table 2-2: Foul Water Drainage Design Calculations

Category	Quantity	Flow Rate	Daily Flow (l/day)	DWF (l/s)	Design Peak Flow (l/s)
Residential	597 units =>1612 persons	165 l/per/day	265,964	3.078	9.235
Creche	27 staff 107 children	99 l/per/day	13,266	0.154	0.924
Total			**279,230**	**3.232**	**10.159**

On the basis of the above tables, the development will have a DWF of 3.232 l/s and a peak water demand of 10.159 l/s. Detailed Causeway Flow calculations are enclosed in Appendix C.

A Pre-Connection Enquiry Form has been issued to Irish Water in relation to the proposed development. Irish water has provided a response, advising that the waste water connections is feasible without any infrastructure upgrade. Please refer to Appendix D for Irish Water confirmation of feasibility.

3 Watermain Design

3.1 Existing Watermain

Record drawings provided by Dún Laoghaire-Rathdown County Council indicate that there is an existing uPVC watermain crossing the site. The watermain serves the existing Shanganagh Castle and originates on the Dublin Road. There are existing uPVC watermains in the Castle Farm estate to the north of the site. There is an existing cast-iron watermain running along the Dublin Road to the west. The aforementioned main crossing the site is fed from this cast-iron main. Please refer to Appendix B for Dún Laoghaire-Rathdown County Council Record Drawings illustrating the existing foul drainage arrangement. An extract is shown in Figure 3-1 below.

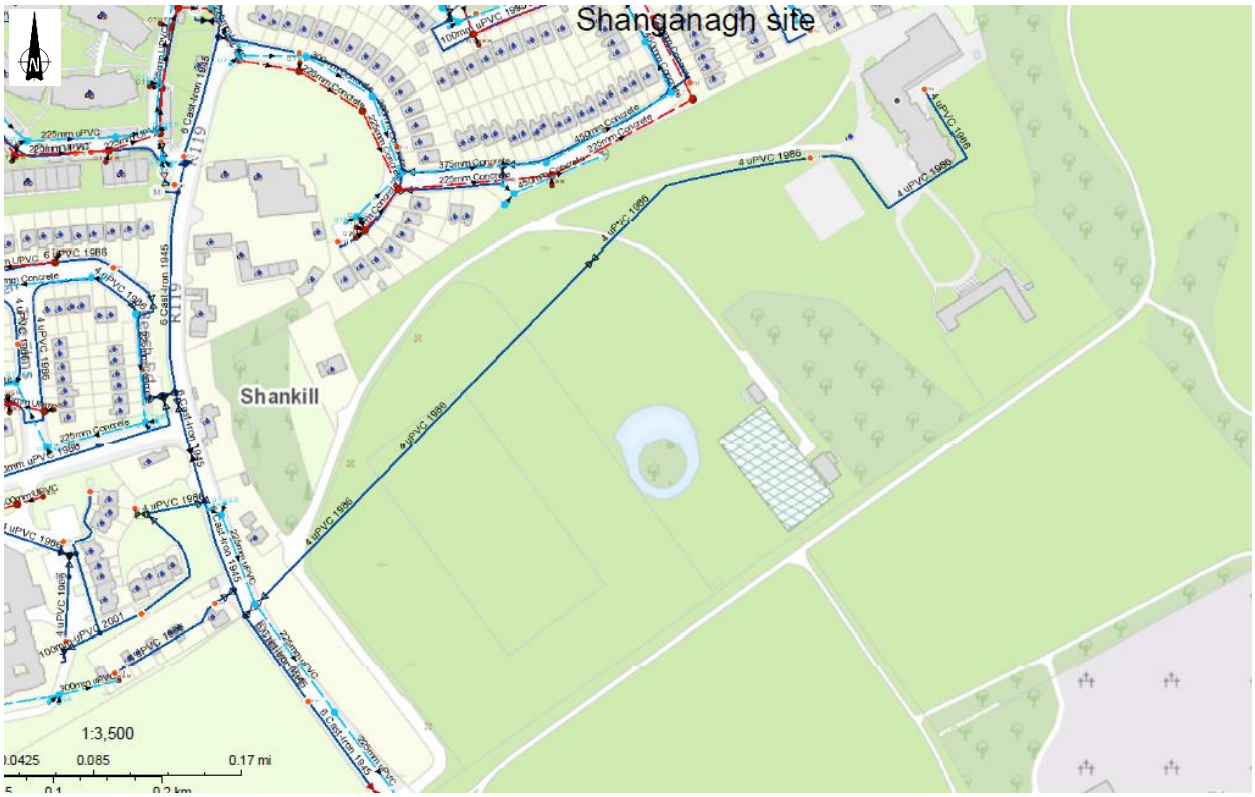

Figure 3-1: Existing watermain surrounding the site (Extract from Irish Water records)

The topographical survey carried out by Murphy Surveys confirms that there is a watermain crossing the site.

3.2 Proposed Watermain

It is generally accepted that the design loading for foul drainage can be used to evaluate an approximation of the water demand on the site. With reference to Irish Water's Code of Practice for Water Infrastructure, the average daily flow is calculated as the number of persons multiplied by the flow rate per person. The average day peak week flow is taken to be 1.25 x the average flow, and the peak demand is taken to be the average day peak week flow multiplied by a peaking factor of 5.

Table 3-1 describes the watermain design parameters used. Table 3-2 summarises the peak flows for the development.

Table 3-1: Watermain Design Parameters

Description	Value
Residential Flow Rate	150 l/per/day
Persons per Dwelling	2.7
Creche	90 l/per/day
Average Demand	1.25 DWF
Peak Demand	5 DWF

Table 3-2: Watermain Design Calculation

Category	Quantity	Flow Rate	Daily Flow (l/day)	DWF (l/s)	Average Demand (1.25DWF) (l/s)	Peak Demand (5DWF) (l/s)
Residential	597 units =>1612 persons	150 l/per/day	241,800	2.799	3.499	17.495
Creche	27 staff 107 children	90 l/per/day	12,060	0.14	0.175	0.875
Total			**253,860**	**2.939**	**3.674**	**18.37**

On the basis of the above tables, the development will have an increase in Dry Weather Flow of 2.939 l/s, average water demand of 3.674 l/s and a peak water demand of 18.37l/s.

It is proposed to construct a 180mm diameter PE100 SDR11 watermain to serve the proposed development based on the above calculated demand. The proposed watermain will connect to a new watermain implemented by Irish Water in 2019 located in the Dublin Road to the west of the site. Please refer to PUNCH drawing 182-134-005.

The existing watermain on site is to be diverted as part of the works as the watermain currently services Shanganagh Castle. The existing watermain on site is to be demolished as part of the development. The existing main will connect to the new proposed watermain near the eastern boundary of the site as shown on PUNCH drawing 182-134-005.

This feed will provide potable and firefighting water to the proposed development. A bulk water meter shall be provided at the site boundary at the location of the proposed connection to the existing

watermain. The watermain layout has been designed in accordance with "Irish Water Code of Practice for Water Infrastructure". All watermains are to be constructed in accordance with Irish Water Code of Practice and the Local Authority's requirements. Fire coverage is to be reviewed and certified by the fire consultant.

To reduce the water demand on Local Authority water supplies and to reduce the foul discharge from the development, water conservation measures will be incorporated in the sanitary facilities throughout the development, e.g. dual flush toilets, monobloc low volume push taps and waterless urinals.

A Pre-Connection Enquiry Form has been issued to Irish Water in relation to the proposed development. Irish water has provided a response, advising that water servicing is feasible without any infrastructure upgrade. Please refer to Appendix D for Irish Water confirmation of feasibility

4 Surface Water Drainage Design

The proposed surface water drainage has been detailed in a separate Stormwater Impact Assessment report prepared by PUNCH Consulting Engineers. This report accompanies this application.

5 Flooding

A Site-Specific Flood Risk Assessment has been undertaken by PUNCH Consulting Engineers for the development which accompanies this planning submission.

6 Roads and Access

The following reports regarding Roads and Access have been prepared and are included as part of this planning submission:

i. Traffic and Transport Assessment prepared by PUNCH Consulting Engineers
ii. Road Safety Audit completed by CST Group
iii. Travel Plan prepared by PUNCH Consulting Engineers

Appendix A Proposed Site Layout

Note: A1 drawing reduced to A3 printed size. Refer to architect's package for full size drawing

1 Site Layout

1 : 1000

Revision	Date	Description

STATUS OF DRAWING

PLANNING

ALL DIMENSIONS TO BE TAKEN FROM ARCHITECTS DRAWINGS
DISCREPANCIES TO BE REFERRED TO THE ARCHITECT FOR CLARIFICATION

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Project: Shanganagh Castle Housing

Comhairle Contae Chontae County Council

Title: Proposed Site Layout

Scale: 1 : 1000 @ A1 Date: 24/01/20 By:MB Chk: JP

Drawing number: 778 / PA 1120

Status/Rev

Appendix B Existing Record Drawings

© Ordnance Survey Ireland | © Ordnance Survey Ireland |

10/3/2018 3:17:32 PM

Legend

Stormwater Gravity Mains (Irish Water Owned)
- Surface

Stormwater Gravity Mains (Non-Irish Water Owned)
- Surface

Storm Manholes
- Cascade
- Catchpit
- Hatchbox
- Lamphole
- Standard
- Other; Unknown

Storm Inlets
- Gully
- Standard
- Other; Unknown

Storm Fittings
- Vent/Col
- Other; Unknown

Storm Discharge Points
- Outfall
- Overflow
- Soakaway
- Other; Unknown

Storm Culverts

Storm Clean Outs

Sewer Gravity Mains (Irish Water owned)
- Combined
- Foul
- Overflow
- Unknown

Sewer Gravity Mains (Non-Irish Water owned)
- Combined
- Foul
- Overflow
- Unknown

A3

Olcovar

Castle Farm

BEECH ROAD

DUBLIN ROAD

Allies River Road

Kilcock Church (in ruins)

Crosses (site of)

Kilturk Park

Sports Ground

PLANT REQUESTED FROM eircom emaps CBYD SERVICE

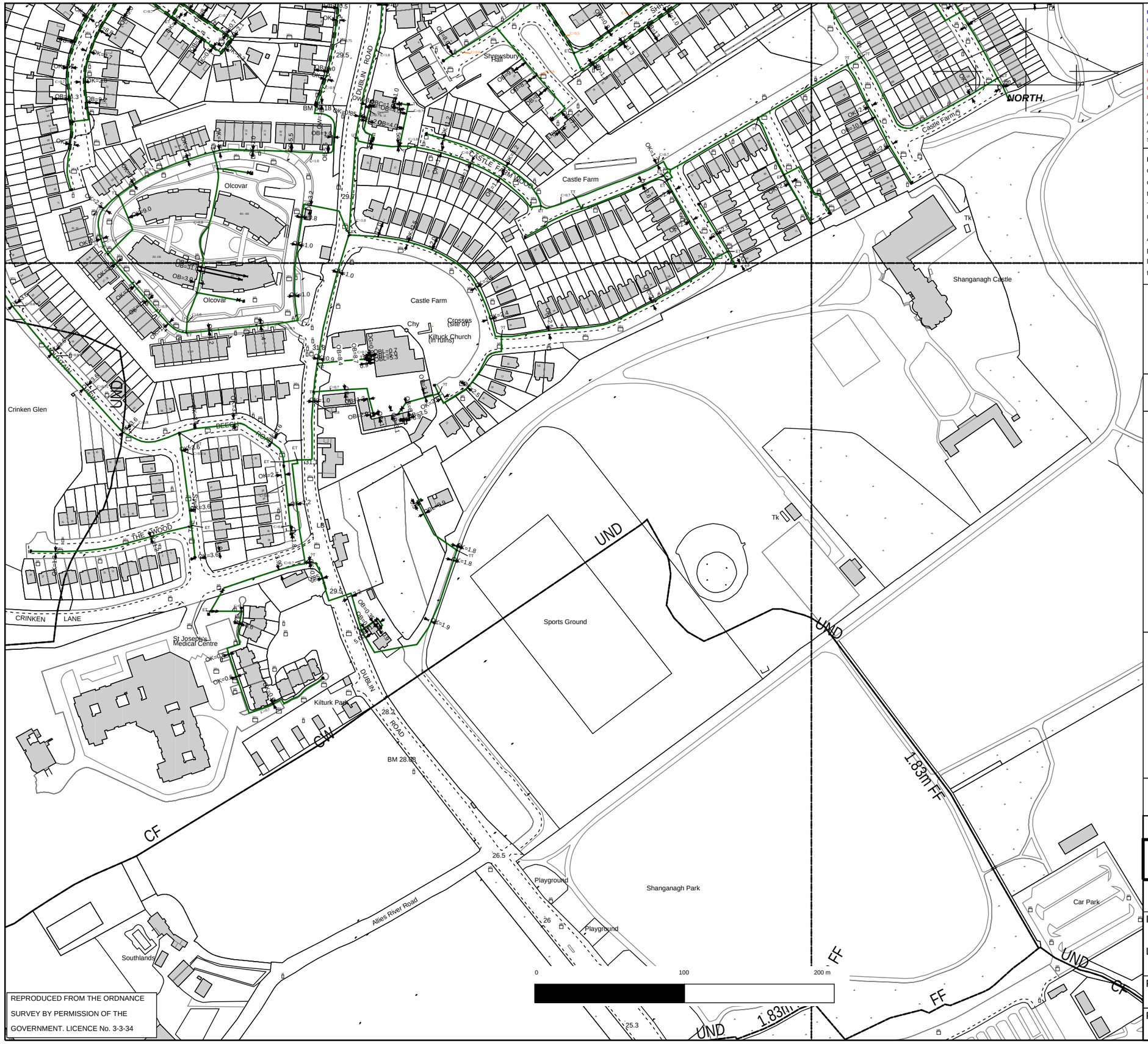
https://cbyd.emaps.eircom.ie/

Scale: 1:1500

Irish National Grid Co-Ordinates
Centre XY: 325488 m, 220964 m

Date
03/10/2018

emaps CBYD



REPRODUCED FROM THE ORDNANCE SURVEY BY PERMISSION OF THE GOVERNMENT. LICENCE No. 3-3-34

Important Safety Notice:
Damage to gas pipelines can result in serious injury or death. Gas network information is provided as a general guide. The exact location and depth of medium or low pressure distribution gas pipes must be verified on site by carrying out necessary investigations, including, for example, hand digging trial holes along the route of the pipe.
Service pipes are not generally shown but their presence should always be anticipated.

High pressure transmission pipelines are shown in red. If a transmission pipeline is identified within 10m of any intended excavations then work must not proceed before GNI has been consulted. The true location and depth of a transmission pipeline must be verified on site by a representative of GNI. Contact can be made through 1850 427 747.

All work in the vicinity of the gas network must be completed in accordance with the current edition of the Health & Safety Authority publication, Code of Practice For Avoiding Danger From Underground Services which is available from the Health and Safety Authority (1890 289 389) or can be downloaded at www.hsa.ie.

Legal Notice:
Gas Networks Ireland (GNI) and its affiliates, accept no responsibility for the accuracy of any information contained in this document including data concerning location and technical designation of the gas distribution and transmission network (the Information). The Information should not be relied on for accurate distance or depth of cover measurements.

Any representations and warranties, express or implied, are excluded to the fullest extent permitted by law. No liability shall be accepted for any loss or damage including, without limitation, direct, indirect or consequential loss, arising out of or in connection with the use or re-use of the Information.

- Aurora Telecom Fibre Optic Cable
- Aurora Telecom Duct
- Aurora Telecom Sub-duct
- Aurora Telecom Inserted Gas Pipe

Contact Aurora Telecom on 1850-427-399 or (01)203-0120.

- Transmission Pipe (High Pressure)
- Transmission Pipe (Construction Issue)
- Distribution Pipe (Medium Pressure)
- Distribution Pipe (Low Pressure)
- Service Pipe (Medium Pressure)
- Service Pipe (Low Pressure)
- Strategic Pipe (Medium Pressure)
- Strategic Pipe (Low Pressure)
- Inserted Pipe (Medium Pressure)
- Inserted Pipe (Low Pressure)
- Distribution Pipe (Abandoned)

.C=?	Cover (depth in meters)		Pressure Monitor
CP	CP Test Point		Protection (Sleeve)
	End Cap		Protection (Slabbing)
	Hot Tap		Reducer
	Installation		Service Terminator
	Valve		Tee
	Mains Verification **		Transition

** Please contact GNI on 1850-427747 for specific information.

Design Department - DUBLIN

Aurora TELECOM

GAS NETWORK INFORMATION

Issue: Punch

Location: Shanganagh

Plot Date:	Contact:
03/10/2018	DE
Plotted by:	**Scale:**
AA	1:2500

ESB Networks

TITLE: 20180831-038_A3

COLOUR CODE:

- BLACK - 38KV & HIGHER VOLTAGE OVERHEAD LINES
- GREEN - MV(10KV/20KV) OVERHEAD LINES
- BLUE - LV (400V/230V) OVERHEAD LINES
- CYAN - 38KV & HIGHER VOLTAGE UNDERGROUND CABLE ROUTES
- RED - MV/LV (10KV/20KV/400V/230V) UNDERGROUND CABLE ROUTES

DATE: 31-Aug-2018

** SCALE: 1:2000

** SCALE WHEN PRINTED ON AN A3 PAGE
XY COORDINATES DISPLAYED IN IRISH GRID COORDINATE SYSTEM

WARNING

THIS MAP INDICATES THE APPROXIMATE LOCATION OF ESB TRANSMISSION (400KV, 220KV, 110KV, 38KV) AND DISTRIBUTION (20KV, 10KV, 230V/400V) UNDERGROUND CABLES AND OVERHEAD LINES IN THE GENERAL AREA OF THE PROPOSED WORKS. ESB NETWORKS TAKES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE MAP. IT IS THE USER'S RESPONSIBILITY TO INDEPENDENTLY VERIFY THE INFORMATION AND THE LOCATION OF UNDERGROUND CABLES AND OVERHEAD LINES. LOW VOLTAGE (230V/400V) SERVICE CABLES (E.G. HOUSE SERVICES, FACTORY/SHOP SERVICES, PUBLIC LIGHTING LAMP SERVICES, ETC) ARE NOT INCLUDED BUT THEIR PRESENCE SHOULD BE ANTICIPATED. THE DEPTHS OF UNDERGROUND CABLES MUST NEVER BE ASSUMED. ADDITIONAL MORE DETAILED INFORMATION IS AVAILABLE FOR HIGH VOLTAGE TRANSMISSION UNDERGROUND CABLES (38KV, 110KV, 220KV, 400KV) FROM THE LOCAL ESB NETWORKS TRANSMISSION REPRESENTATIVE - SEE ATTACHED LIST FOR CONTACT DETAILS OR CALL 1850 372 757. NO WORK SHOULD BE CARRIED OUT IN THE VICINITY OF 38KV OR HIGHER VOLTAGE UNDERGROUND CABLES WITHOUT PRIOR CONSULTATION WITH ESB NETWORKS. BEFORE ANY MECHANICAL EXCAVATION IS UNDERTAKEN, THE ACTUAL LOCATION OF ALL UNDERGROUND ELECTRICITY CABLES MUST BE ESTABLISHED AND VERIFIED ON THE SITE USING: (A) UP-TO-DATE MAP RECORDS; (B) CABLE LOCATER EQUIPMENT OPERATED IN BOTH POWER AND RADIO MODES; (C) CAREFUL HAND DIGGING OF TRIAL HOLES USING 'SAFE DIGGING PRACTICE'. REFER ALSO TO 'HSA CODE OF PRACTICE FOR AVOIDING DANGER FROM UNDERGROUND SERVICES'. ESB TAKES NO RESPONSIBILITY FOR AND SHALL BEAR NO LIABILITY, HOWSOEVER ARISING, IN RELATION TO ANY DAMAGE, INJURY/DEATH OR LOSS OF SUPPLY AS A RESULT OF DAMAGE OR INTERFERENCE WITH ITS NETWORKS.

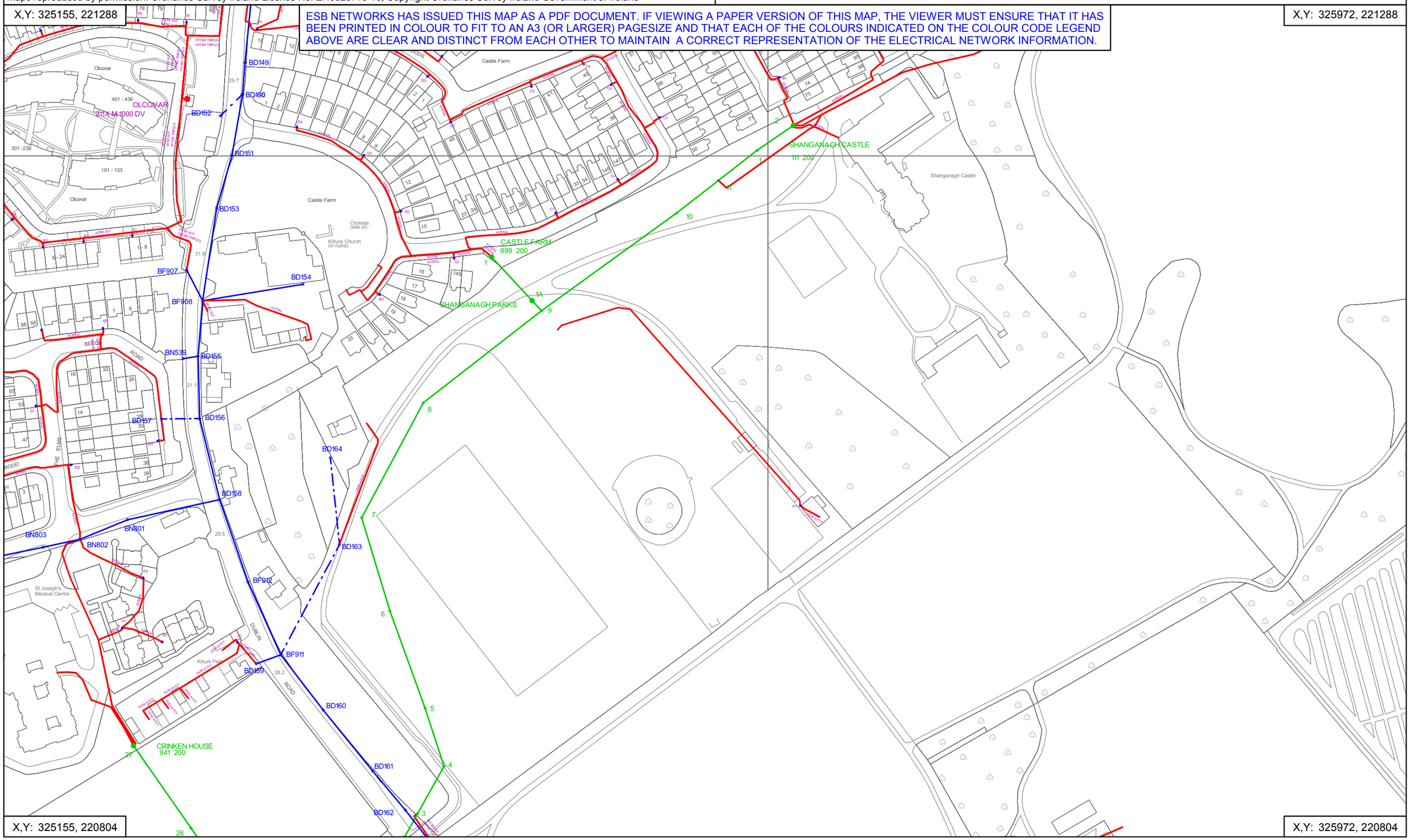
ESB NETWORKS HAS ISSUED THIS MAP AS A PDF DOCUMENT. IF VIEWING A PAPER VERSION OF THIS MAP, THE VIEWER MUST ENSURE THAT IT HAS BEEN PRINTED IN COLOUR TO FIT TO AN A3 (OR LARGER) PAGESIZE AND THAT EACH OF THE COLOURS INDICATED ON THE COLOUR CODE LEGEND ABOVE ARE CLEAR AND DISTINCT FROM EACH OTHER TO MAINTAIN A CORRECT REPRESENTATION OF THE ELECTRICAL NETWORK INFORMATION.

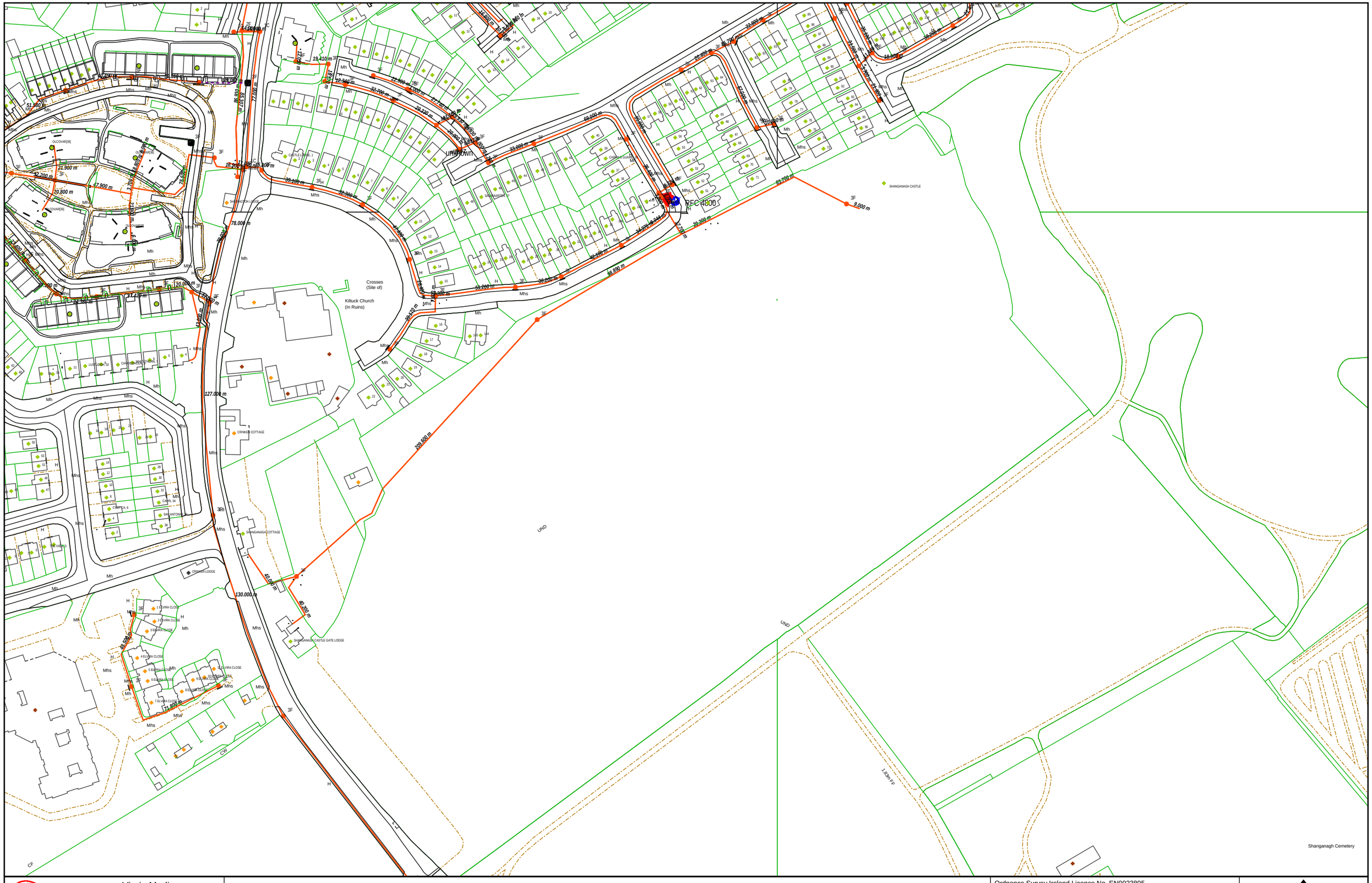
X,Y: 325155, 221288

X,Y: 325972, 221288

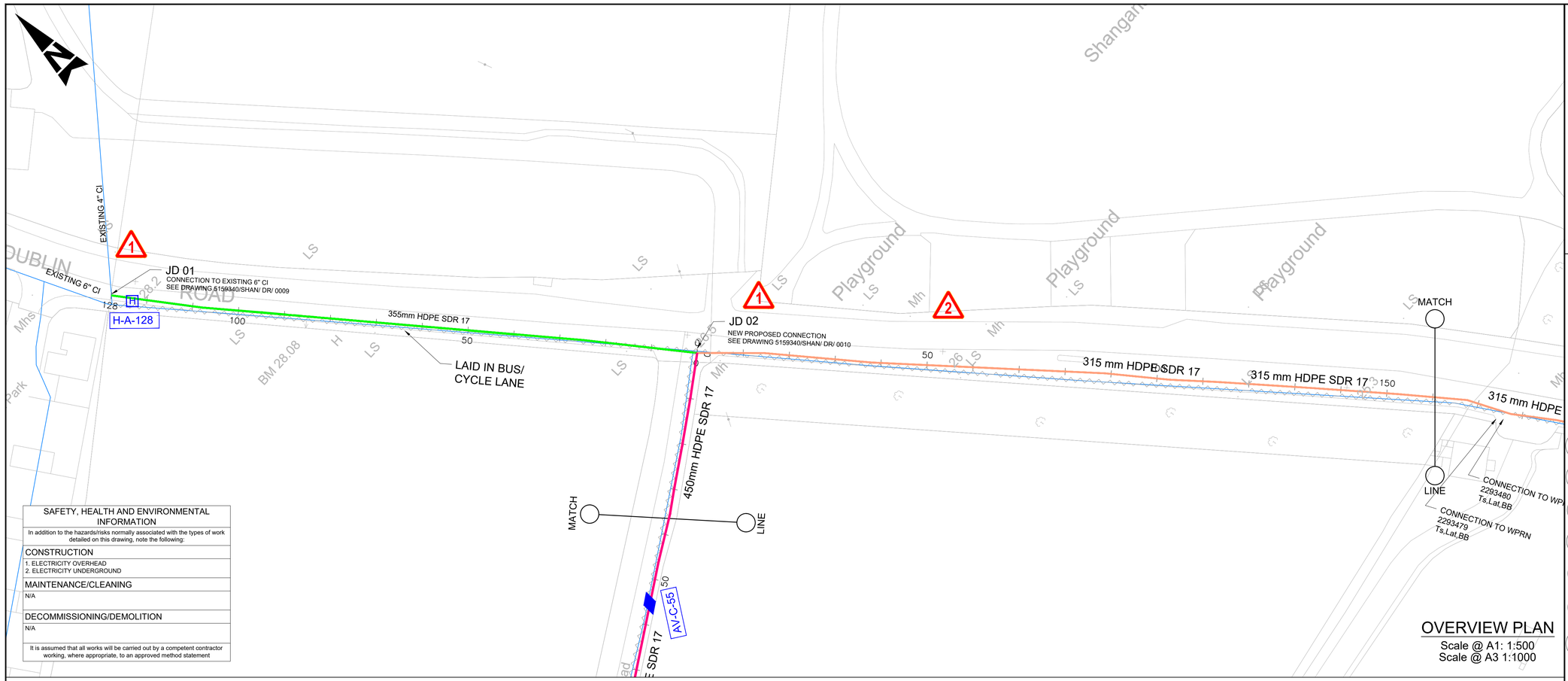
X,Y: 325155, 220804

X,Y: 325972, 220804





Virgin Media Unit 6 & 7 Broomhill Business Park Tallaght 24	PROJECT NAME DESIGNED BY:	Ordnance Survey Ireland Licence No. EN0023805 (c) Ordnance Survey Ireland and Government of Ireland Produced on: 05/09/2018	@ A3



A1

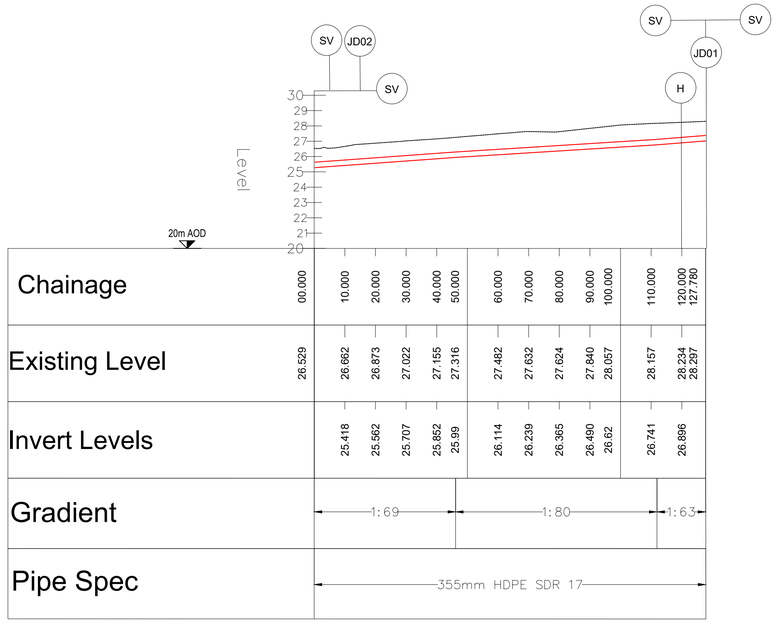
DO NOT SCALE

100 0 10

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:
CONSTRUCTION
1. ELECTRICITY OVERHEAD 2. ELECTRICITY UNDERGROUND
MAINTENANCE/CLEANING
N/A
DECOMMISSIONING/DEMOLITION
N/A
It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

OVERVIEW PLAN

Scale @ A1: 1:500
Scale @ A3 1:1000



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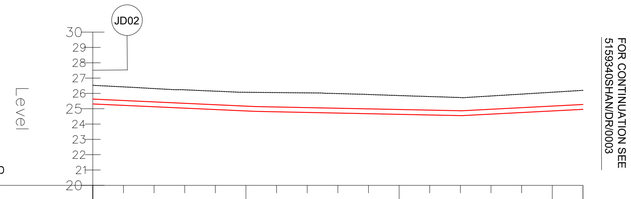
Existing Level	26.529	26.662	26.873	27.022	27.155	27.316	27.482	27.632	27.624	27.840	28.057	28.157	28.234 28.297
Invert Levels		25.418	25.562	25.707	25.852	25.99	26.114	26.239	26.365	26.490	26.62	26.741	26.896
Gradient		1:69					1:80					1:63	
Pipe Spec		355mm HDPE SDR 17											

SECTION JD02 -JD01

Scale Horizontal : 1:1000
Scale Vertical1:1200



Chainage	00.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000
Existing Level	26.529	26.426	26.315	26.233	26.147	26.074	26.054	26.034	25.987	25.928	25.860	25.795	25.730	25.833	25.955	26.077	26.200
Invert Levels		25.221	25.129	25.038	24.946	24.85	24.798	24.757	24.716	24.675	24.63	24.593	24.552	24.648	24.752	24.86	24.96
Gradient		1:109					1:224					1:97					
Pipe Spec		315mm HDPE SDR 17															

SECTION JD02-JD04

Scale Horizontal : 1:1000
Scale Vertical1:1200

Notes:
1. All dimensions are in millimetres unless otherwise stated.
2. Levels where shown are in metres and relate to the Ordnance Survey Datum Malin Head.
3. All pipework and fittings to be installed as per I.W. Water Network Management Programme Standard Details -
4. Water. STD-WNMP-01 to 51.
5. Positions of existing utility assets where shown, are for information only. High risk utility hazards are shown only. Refer to utility records pack and verify postitions of assets on site prior to commencing any excavations.
6. Existing pipe sizes are based on Irish Water records. Positions are approximate only.
7. Safe Digging Practices to be adopted in accordance with HSA COP for Avoiding Danger From Underground Services and relevant Method Statements.
8. Offline fittings are to be positioned within roadside verges and footpaths on public property only.
9. Thrust restraint is required at connections from HPPE pipes to any existing or proposed pipelines with push-fit joints (AC, DI, CI, PVC). Refer to STD-WNMP-28 rev1.
10. Where barrier pipe is shown on the construction drawing, all associated pipework fittings, connectors and sealants must be suitable for use in contaminated land up to the property boundary.

LEGEND

- PROPOSED 450mm HDPE SDR 17
- PROPOSED 355mm HDPE SDR 17
- PROPOSED 315mm HDPE SDR 17
- EXISTING WATER MAIN
- EXISTING WATER MAIN -TO BE ABANDONED
- EXISTING 200mm DI WATER MAIN
- POTENTIAL HAZARD
- Me / Me-xxxx — FLOW METER
- SV / SV-xxxx — SLUICE VALVE
- H / H-xxxx — HYDRANT
- WO / WO-xxxx / WH — WASHOUT HYDRANT
- AV / AV-xxxx — AIR CONTROL VALVE
- ScV / ScV-xxxx — SCOUR VALVE
- PRV / PRV-xxx — PRESSURE REDUCING VALVE
- Ts — TAPPING SADDLE
- Lat — SERVICE LATERAL
- BB — BOUNDARY BOX

Purpose: DETAILED DESIGN

Rev	Description	By	Date	Chk'd	Auth
C	REVISED LABELS	DB	13/03/19	SJB	GMcA
B	DETAILED DESIGN	DB	12/02/19	SJB	GMcA
A	INFORMATION	DB	11/18	SJB	GMcA

ATKINS
Member of the SNC-Lavalin Group

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1st Floor Technology House, Parkmore Technology Park, Galway
Tel (+353) 091 786 050 Fax (+353) 091 779 830

Client: GMC Utilities Group / UISCE ÉIREANN : IRISH WATER

Project: WATER NETWORK MANAGEMENT SHANKILL TO SHANGANAGH

Title: ROUTE PLAN AND SECTION
355mm HDPE MAIN , 315mm HDPE MAIN

Original Scale	Design/Drawn	Checked	Authorised
A1 @ 1:500 A3 @ 1: 1000	DB Date 22/11/18	SJB Date 22/11/18	GMcA Date 22/11/18

Status	Drawing Number	Rev
DD	5159340/SHAN/DR/0002	C

File: 5159340_SHAN_DR_0001-0008.dwg Plotted by: dbaldwin2k
Date: Mar 13, 2019 - 2:57pm

\\SIEDBAFS01\Project-Data\5159340\6 Dwgs-Graphics\61 AutoCad\Shankill\5159340_SHAN_DR_0001-0008.dwg

Appendix C Causeway Foul Water Drainage Design Calculations

Design Settings

Frequency of use (kDU)	0.00	Minimum Velocity (m/s)	0.75
Flow per dwelling per day (l/day)	2673	Connection Type	Level Soffits
Domestic Flow (l/s/ha)	0.0	Minimum Backdrop Height (m)	0.000
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	1.200
Additional Flow (%)	0	Include Intermediate Ground	x

Nodes

Name	Dwellings	Add Inflow (l/s)	Cover Level (m)	Manhole Type	Easting (m)	Northing (m)	Depth (m)
F1-0			26.316	1 STANDARD	725388.292	721139.078	1.425
F1-1	11		26.216	1 STANDARD	725400.134	721147.444	1.567
F1-2			26.247	1 STANDARD	725417.317	721157.679	1.698
F1-3	12		26.020	1 STANDARD	725435.696	721168.379	1.577
F2-0	19		26.678	1 STANDARD	725500.459	721194.662	1.424
F2-1			26.232	1 STANDARD	725480.455	721188.272	1.083
F2-2	6		26.181	1 STANDARD	725468.071	721184.316	1.097
F1-4	3		26.027	1 STANDARD	725457.032	721176.616	1.698
F1-5	18		26.120	1 STANDARD	725493.664	721127.216	2.091
F1-6	30		26.045	1 STANDARD	725499.027	721119.985	2.061
F1-7	61		25.299	1 STANDARD	725440.390	721076.502	1.680
F1-8	38		26.251	1 STANDARD	725384.163	721034.806	2.982
F3-0	8		26.377	1 STANDARD	725372.443	721126.943	1.425
F3-1	2		27.184	1 STANDARD	725353.156	721111.036	2.649
F3-2	1		27.926	1 STANDARD	725340.479	721098.257	3.481
F4-0	65		28.399	1 STANDARD	725283.020	721027.943	1.425
F4-1		0.9	28.819	1 STANDARD	725306.033	721062.143	2.532
F4-2	7		28.525	1 STANDARD	725322.625	721078.003	4.215
F1-9			26.558	1 STANDARD	725365.126	721020.689	3.408
F5-0	26		27.083	1 STANDARD	725333.917	720997.493	1.425
F5-1			27.220	1 STANDARD	725302.763	720974.391	2.855
F6-0	1		27.385	1 STANDARD	725265.246	720971.171	1.425
F6-1			27.354	1 STANDARD	725265.039	720962.177	1.544
F5-2	26		27.301	1 STANDARD	725268.224	720948.778	3.151
F5-3	26		27.117	1 STANDARD	725287.201	720923.189	3.099
F5-4			26.939	1 STANDARD	725305.071	720899.093	3.071
F5-5	26		26.584	1 STANDARD	725324.886	720913.786	2.839
F5-6	56		26.149	1 STANDARD	725361.835	720941.186	2.864
F1-10			25.883	1 STANDARD	725401.997	720970.969	3.042
F7-0	60		24.767	1 STANDARD	725429.993	720933.216	1.425
F1-11	95		25.525	1 STANDARD	725404.529	720967.555	2.705
F1-12			24.480	1 STANDARD	725444.691	720997.338	1.895
F1-13			24.850	1 STANDARD	725486.238	720941.311	2.605
F1-14			24.100	1 STANDARD	725542.286	720983.473	2.221
F1-15			24.100	1 STANDARD	725584.343	720927.516	2.571
F1-16			23.550	1 STANDARD	725611.080	720891.943	2.244
F1-17			24.750	1 STANDARD	725673.298	720924.019	3.794
F1-18			24.680	1 STANDARD	725684.510	720903.366	3.842
F1-19			23.520	1 STANDARD	725731.389	720830.361	3.116
F1-20			23.100	1 STANDARD	725768.604	720766.469	3.066
F1-21			21.490	1 STANDARD	725795.294	720723.721	1.708
F1-22			23.000	1 STANDARD	725812.228	720727.657	3.546
EXFMH			23.025	1 STANDARD	725813.905	720722.694	3.670

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
F1.000	F1-0	F1-1	14.499	1.500	24.891	24.649	0.242	60.0	225
F1.001	F1-1	F1-2	20.000	1.500	24.649	24.549	0.100	200.0	225
F1.002	F1-2	F1-3	21.267	1.500	24.549	24.443	0.106	200.0	225
F1.003	F1-3	F1-4	22.871	1.500	24.443	24.329	0.114	200.0	225
F2.000	F2-0	F2-1	21.000	1.500	25.254	25.149	0.105	200.0	225
F2.001	F2-1	F2-2	13.001	1.500	25.149	25.084	0.065	200.0	225
F2.002	F2-2	F1-4	13.459	1.500	25.084	25.017	0.067	200.9	225
F1.004	F1-4	F1-5	61.500	1.500	24.329	24.029	0.300	205.0	225
F1.005	F1-5	F1-6	9.003	1.500	24.029	23.984	0.045	200.1	225
F1.006	F1-6	F1-7	73.000	1.500	23.984	23.619	0.365	200.0	225
F1.007	F1-7	F1-8	70.000	1.500	23.619	23.269	0.350	200.0	225
F1.008	F1-8	F1-9	23.700	1.500	23.269	23.150	0.119	199.2	225
F3.000	F3-0	F3-1	25.000	1.500	24.952	24.535	0.417	60.0	225
F3.001	F3-1	F3-2	18.000	1.500	24.535	24.445	0.090	200.0	225
F3.002	F3-2	F4-2	27.000	1.500	24.445	24.310	0.135	200.0	225
F4.000	F4-0	F4-1	41.222	1.500	26.974	26.287	0.687	60.0	225
F4.001	F4-1	F4-2	22.953	1.500	26.287	26.172	0.115	200.0	225
F3.003	F4-2	F1-9	71.353	1.500	24.310	23.953	0.357	200.0	225
F1.009	F1-9	F1-10	61.900	1.500	23.150	22.841	0.309	200.3	225
F5.000	F5-0	F5-1	38.785	1.500	25.658	24.365	1.293	30.0	225
F5.001	F5-1	F5-2	43.000	1.500	24.365	24.150	0.215	200.0	225
F6.000	F6-0	F6-1	8.996	1.500	25.960	25.810	0.150	60.0	225
F6.001	F6-1	F5-2	13.772	1.500	25.810	25.741	0.069	200.0	225
F5.002	F5-2	F5-3	31.858	1.500	24.150	24.018	0.132	241.3	225
F5.003	F5-3	F5-4	29.999	1.500	24.018	23.868	0.150	200.0	225

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Depth (mm)
F1.000	1.483	59.0	0.0	1.200	1.342	0.000	0	0.0	0.0	0
F1.001	0.810	32.2	0.3	1.342	1.473	0.000	11	0.0	0.0	16
F1.002	0.810	32.2	0.3	1.473	1.352	0.000	11	0.0	0.0	16
F1.003	0.810	32.2	0.7	1.352	1.473	0.000	23	0.0	0.0	23
F2.000	0.810	32.2	0.6	1.199	0.858	0.000	19	0.0	0.0	22
F2.001	0.810	32.2	0.6	0.858	0.872	0.000	19	0.0	0.0	22
F2.002	0.808	32.1	0.8	0.872	0.785	0.000	25	0.0	0.0	24
F1.004	0.800	31.8	1.6	1.473	1.866	0.000	51	0.0	0.0	34
F1.005	0.810	32.2	2.1	1.866	1.836	0.000	69	0.0	0.0	39
F1.006	0.810	32.2	3.1	1.836	1.455	0.000	99	0.0	0.0	47
F1.007	0.810	32.2	5.0	1.455	2.757	0.000	160	0.0	0.0	59
F1.008	0.812	32.3	6.1	2.757	3.183	0.000	198	0.0	0.0	66
F3.000	1.483	59.0	0.2	1.200	2.424	0.000	8	0.0	0.0	11
F3.001	0.810	32.2	0.3	2.424	3.256	0.000	10	0.0	0.0	16
F3.002	0.810	32.2	0.3	3.256	3.990	0.000	11	0.0	0.0	16
F4.000	1.483	59.0	2.0	1.200	2.307	0.000	65	0.0	0.0	29
F4.001	0.810	32.2	2.9	2.307	2.128	0.000	65	0.0	0.9	46
F3.003	0.810	32.2	3.5	3.990	2.380	0.000	83	0.0	0.9	50
F1.009	0.809	32.2	9.6	3.183	2.817	0.000	281	0.0	0.9	84
F5.000	2.100	83.5	0.8	1.200	2.630	0.000	26	0.0	0.0	16
F5.001	0.810	32.2	0.8	2.630	2.926	0.000	26	0.0	0.0	25
F6.000	1.483	59.0	0.0	1.200	1.319	0.000	1	0.0	0.0	4
F6.001	0.810	32.2	0.0	1.319	1.335	0.000	1	0.0	0.0	6
F5.002	0.737	29.3	1.6	2.926	2.874	0.000	53	0.0	0.0	36
F5.003	0.810	32.2	2.4	2.874	2.846	0.000	79	0.0	0.0	42

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
F5.004	F5-4	F5-5	24.668	1.500	23.868	23.745	0.123	200.6	225
F5.005	F5-5	F5-6	46.000	1.500	23.745	23.285	0.460	100.0	225
F5.006	F5-6	F1-10	50.000	1.500	23.285	22.900	0.385	130.0	225
F1.010	F1-10	F1-11	4.250	1.500	22.841	22.820	0.021	200.0	225
F7.000	F7-0	F1-11	42.750	1.500	23.342	22.839	0.503	85.0	225
F1.011	F1-11	F1-12	50.000	1.500	22.820	22.585	0.235	212.8	225
F1.012	F1-12	F1-13	69.751	1.500	22.585	22.245	0.340	205.1	225
F1.013	F1-13	F1-14	70.136	1.500	22.245	21.879	0.366	191.6	225
F1.014	F1-14	F1-15	70.000	1.500	21.879	21.529	0.350	200.0	225
F1.015	F1-15	F1-16	44.501	1.500	21.529	21.306	0.223	199.6	225
F1.016	F1-16	F1-17	70.000	1.500	21.306	20.956	0.350	200.0	225
F1.017	F1-17	F1-18	23.500	1.500	20.956	20.838	0.118	199.2	225
F1.018	F1-18	F1-19	86.760	1.500	20.838	20.404	0.434	199.9	225
F1.019	F1-19	F1-20	73.940	1.500	20.404	20.034	0.370	199.8	225
F1.020	F1-20	F1-21	50.396	1.500	20.034	19.782	0.252	200.0	225
F1.021	F1-21	F1-22	17.385	1.500	19.782	19.454	0.328	53.0	225
F1.022	F1-22	EXFMH	5.239	1.500	19.454	19.355	0.099	53.0	225

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Depth (mm)
F5.004	0.809	32.2	2.4	2.846	2.614	0.000	79	0.0	0.0	42
F5.005	1.148	45.6	3.2	2.614	2.639	0.000	105	0.0	0.0	41
F5.006	1.006	40.0	5.0	2.639	2.758	0.000	161	0.0	0.0	54
F1.010	0.810	32.2	14.6	2.817	2.480	0.000	442	0.0	0.9	106
F7.000	1.245	49.5	1.9	1.200	2.461	0.000	60	0.0	0.0	30
F1.011	0.785	31.2	19.4	2.480	1.670	0.000	597	0.0	0.9	128
F1.012	0.800	31.8	19.4	1.670	2.380	0.000	597	0.0	0.9	127
F1.013	0.828	32.9	19.4	2.380	1.996	0.000	597	0.0	0.9	124
F1.014	0.810	32.2	19.4	1.996	2.346	0.000	597	0.0	0.9	126
F1.015	0.811	32.2	19.4	2.346	2.019	0.000	597	0.0	0.9	126
F1.016	0.810	32.2	19.4	2.019	3.569	0.000	597	0.0	0.9	126
F1.017	0.812	32.3	19.4	3.569	3.617	0.000	597	0.0	0.9	125
F1.018	0.810	32.2	19.4	3.617	2.891	0.000	597	0.0	0.9	126
F1.019	0.810	32.2	19.4	2.891	2.841	0.000	597	0.0	0.9	126
F1.020	0.810	32.2	19.4	2.841	1.483	0.000	597	0.0	0.9	126
F1.021	1.578	62.8	19.4	1.483	3.321	0.000	597	0.0	0.9	86
F1.022	1.578	62.8	19.4	3.321	3.445	0.000	597	0.0	0.9	86

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
F1.000	14.499	60.0	225	1 STANDARD	26.316	24.891	1.200	26.216	24.649	1.342
F1.001	20.000	200.0	225	1 STANDARD	26.216	24.649	1.342	26.247	24.549	1.473
F1.002	21.267	200.0	225	1 STANDARD	26.247	24.549	1.473	26.020	24.443	1.352
F1.003	22.871	200.0	225	1 STANDARD	26.020	24.443	1.352	26.027	24.329	1.473

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
F1.000	F1-0	1200	Manhole	1 STANDARD	F1-1	1200	Manhole	1 STANDARD
F1.001	F1-1	1200	Manhole	1 STANDARD	F1-2	1350	Manhole	1 STANDARD
F1.002	F1-2	1350	Manhole	1 STANDARD	F1-3	1200	Manhole	1 STANDARD
F1.003	F1-3	1200	Manhole	1 STANDARD	F1-4	1200	Manhole	1 STANDARD

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
F2.000	21.000	200.0	225	1 STANDARD	26.678	25.254	1.199	26.232	25.149	0.858
F2.001	13.001	200.0	225	1 STANDARD	26.232	25.149	0.858	26.181	25.084	0.872
F2.002	13.459	200.9	225	1 STANDARD	26.181	25.084	0.872	26.027	25.017	0.785
F1.004	61.500	205.0	225	1 STANDARD	26.027	24.329	1.473	26.120	24.029	1.866
F1.005	9.003	200.1	225	1 STANDARD	26.120	24.029	1.866	26.045	23.984	1.836
F1.006	73.000	200.0	225	1 STANDARD	26.045	23.984	1.836	25.299	23.619	1.455
F1.007	70.000	200.0	225	1 STANDARD	25.299	23.619	1.455	26.251	23.269	2.757
F1.008	23.700	199.2	225	1 STANDARD	26.251	23.269	2.757	26.558	23.150	3.183
F3.000	25.000	60.0	225	1 STANDARD	26.377	24.952	1.200	27.184	24.535	2.424
F3.001	18.000	200.0	225	1 STANDARD	27.184	24.535	2.424	27.926	24.445	3.256
F3.002	27.000	200.0	225	1 STANDARD	27.926	24.445	3.256	28.525	24.310	3.990
F4.000	41.222	60.0	225	1 STANDARD	28.399	26.974	1.200	28.819	26.287	2.307
F4.001	22.953	200.0	225	1 STANDARD	28.819	26.287	2.307	28.525	26.172	2.128
F3.003	71.353	200.0	225	1 STANDARD	28.525	24.310	3.990	26.558	23.953	2.380
F1.009	61.900	200.3	225	1 STANDARD	26.558	23.150	3.183	25.883	22.841	2.817
F5.000	38.785	30.0	225	1 STANDARD	27.083	25.658	1.200	27.220	24.365	2.630
F5.001	43.000	200.0	225	1 STANDARD	27.220	24.365	2.630	27.301	24.150	2.926
F6.000	8.996	60.0	225	1 STANDARD	27.385	25.960	1.200	27.354	25.810	1.319
F6.001	13.772	200.0	225	1 STANDARD	27.354	25.810	1.319	27.301	25.741	1.335
F5.002	31.858	241.3	225	1 STANDARD	27.301	24.150	2.926	27.117	24.018	2.874
F5.003	29.999	200.0	225	1 STANDARD	27.117	24.018	2.874	26.939	23.868	2.846
F5.004	24.668	200.6	225	1 STANDARD	26.939	23.868	2.846	26.584	23.745	2.614
F5.005	46.000	100.0	225	1 STANDARD	26.584	23.745	2.614	26.149	23.285	2.639
F5.006	50.000	130.0	225	1 STANDARD	26.149	23.285	2.639	25.883	22.900	2.758
F1.010	4.250	200.0	225	1 STANDARD	25.883	22.841	2.817	25.525	22.820	2.480
F7.000	42.750	85.0	225	1 STANDARD	24.767	23.342	1.200	25.525	22.839	2.461

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
F2.000	F2-0	1200	Manhole	1 STANDARD	F2-1	1200	Manhole	1 STANDARD
F2.001	F2-1	1200	Manhole	1 STANDARD	F2-2	1200	Manhole	1 STANDARD
F2.002	F2-2	1200	Manhole	1 STANDARD	F1-4	1200	Manhole	1 STANDARD
F1.004	F1-4	1200	Manhole	1 STANDARD	F1-5	1350	Manhole	1 STANDARD
F1.005	F1-5	1350	Manhole	1 STANDARD	F1-6	1350	Manhole	1 STANDARD
F1.006	F1-6	1350	Manhole	1 STANDARD	F1-7	1200	Manhole	1 STANDARD
F1.007	F1-7	1200	Manhole	1 STANDARD	F1-8	1350	Manhole	1 STANDARD
F1.008	F1-8	1350	Manhole	1 STANDARD	F1-9	1350	Manhole	1 STANDARD
F3.000	F3-0	1200	Manhole	1 STANDARD	F3-1	1200	Manhole	1 STANDARD
F3.001	F3-1	1200	Manhole	1 STANDARD	F3-2	1200	Manhole	1 STANDARD
F3.002	F3-2	1200	Manhole	1 STANDARD	F4-2	1350	Manhole	1 STANDARD
F4.000	F4-0	1200	Manhole	1 STANDARD	F4-1	1350	Manhole	1 STANDARD
F4.001	F4-1	1350	Manhole	1 STANDARD	F4-2	1350	Manhole	1 STANDARD
F3.003	F4-2	1350	Manhole	1 STANDARD	F1-9	1350	Manhole	1 STANDARD
F1.009	F1-9	1350	Manhole	1 STANDARD	F1-10	1350	Manhole	1 STANDARD
F5.000	F5-0	1200	Manhole	1 STANDARD	F5-1	1350	Manhole	1 STANDARD
F5.001	F5-1	1350	Manhole	1 STANDARD	F5-2	1350	Manhole	1 STANDARD
F6.000	F6-0	1200	Manhole	1 STANDARD	F6-1	1200	Manhole	1 STANDARD
F6.001	F6-1	1200	Manhole	1 STANDARD	F5-2	1350	Manhole	1 STANDARD
F5.002	F5-2	1350	Manhole	1 STANDARD	F5-3	1350	Manhole	1 STANDARD
F5.003	F5-3	1350	Manhole	1 STANDARD	F5-4	1350	Manhole	1 STANDARD
F5.004	F5-4	1350	Manhole	1 STANDARD	F5-5	1350	Manhole	1 STANDARD
F5.005	F5-5	1350	Manhole	1 STANDARD	F5-6	1350	Manhole	1 STANDARD
F5.006	F5-6	1350	Manhole	1 STANDARD	F1-10	1350	Manhole	1 STANDARD
F1.010	F1-10	1350	Manhole	1 STANDARD	F1-11	1350	Manhole	1 STANDARD
F7.000	F7-0	1200	Manhole	1 STANDARD	F1-11	1350	Manhole	1 STANDARD

Pipeline Schedule

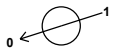
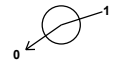
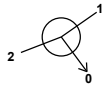
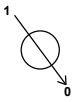
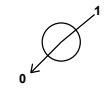
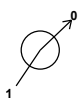
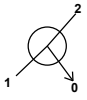
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
F1.011	50.000	212.8	225	1 STANDARD	25.525	22.820	2.480	24.480	22.585	1.670
F1.012	69.751	205.1	225	1 STANDARD	24.480	22.585	1.670	24.850	22.245	2.380
F1.013	70.136	191.6	225	1 STANDARD	24.850	22.245	2.380	24.100	21.879	1.996
F1.014	70.000	200.0	225	1 STANDARD	24.100	21.879	1.996	24.100	21.529	2.346
F1.015	44.501	199.6	225	1 STANDARD	24.100	21.529	2.346	23.550	21.306	2.019
F1.016	70.000	200.0	225	1 STANDARD	23.550	21.306	2.019	24.750	20.956	3.569
F1.017	23.500	199.2	225	1 STANDARD	24.750	20.956	3.569	24.680	20.838	3.617
F1.018	86.760	199.9	225	1 STANDARD	24.680	20.838	3.617	23.520	20.404	2.891
F1.019	73.940	199.8	225	1 STANDARD	23.520	20.404	2.891	23.100	20.034	2.841
F1.020	50.396	200.0	225	1 STANDARD	23.100	20.034	2.841	21.490	19.782	1.483
F1.021	17.385	53.0	225	1 STANDARD	21.490	19.782	1.483	23.000	19.454	3.321
F1.022	5.239	53.0	225	1 STANDARD	23.000	19.454	3.321	23.025	19.355	3.445

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
F1.011	F1-11	1350	Manhole	1 STANDARD	F1-12	1350	Manhole	1 STANDARD
F1.012	F1-12	1350	Manhole	1 STANDARD	F1-13	1350	Manhole	1 STANDARD
F1.013	F1-13	1350	Manhole	1 STANDARD	F1-14	1350	Manhole	1 STANDARD
F1.014	F1-14	1350	Manhole	1 STANDARD	F1-15	1350	Manhole	1 STANDARD
F1.015	F1-15	1350	Manhole	1 STANDARD	F1-16	1350	Manhole	1 STANDARD
F1.016	F1-16	1350	Manhole	1 STANDARD	F1-17	1350	Manhole	1 STANDARD
F1.017	F1-17	1350	Manhole	1 STANDARD	F1-18	1350	Manhole	1 STANDARD
F1.018	F1-18	1350	Manhole	1 STANDARD	F1-19	1350	Manhole	1 STANDARD
F1.019	F1-19	1350	Manhole	1 STANDARD	F1-20	1350	Manhole	1 STANDARD
F1.020	F1-20	1350	Manhole	1 STANDARD	F1-21	1350	Manhole	1 STANDARD
F1.021	F1-21	1350	Manhole	1 STANDARD	F1-22	1350	Manhole	1 STANDARD
F1.022	F1-22	1350	Manhole	1 STANDARD	EXFMH	1350	Manhole	1 STANDARD

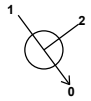
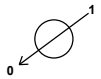
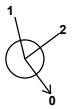
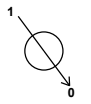
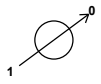
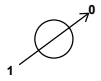
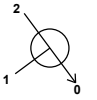
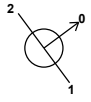
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
F1-0	725388.292	721139.078	26.316	1.425	1200				
						0	F1.000	24.891	225
F1-1	725400.134	721147.444	26.216	1.567	1200	1	F1.000	24.649	225
									
						0	F1.001	24.649	225
F1-2	725417.317	721157.679	26.247	1.698	1350	1	F1.001	24.549	225
									
						0	F1.002	24.549	225
F1-3	725435.696	721168.379	26.020	1.577	1200	1	F1.002	24.443	225
									
						0	F1.003	24.443	225
F2-0	725500.459	721194.662	26.678	1.424	1200				
						0	F2.000	25.254	225

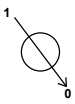
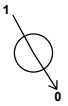
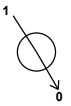
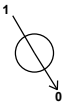
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
F2-1	725480.455	721188.272	26.232	1.083	1200	1	F2.000	25.149	225
									
						0	F2.001	25.149	225
F2-2	725468.071	721184.316	26.181	1.097	1200	1	F2.001	25.084	225
									
						0	F2.002	25.084	225
F1-4	725457.032	721176.616	26.027	1.698	1200	1	F2.002	25.017	225
						2	F1.003	24.329	225
									
						0	F1.004	24.329	225
F1-5	725493.664	721127.216	26.120	2.091	1350	1	F1.004	24.029	225
									
						0	F1.005	24.029	225
F1-6	725499.027	721119.985	26.045	2.061	1350	1	F1.005	23.984	225
									
						0	F1.006	23.984	225
F1-7	725440.390	721076.502	25.299	1.680	1200	1	F1.006	23.619	225
									
						0	F1.007	23.619	225
F1-8	725384.163	721034.806	26.251	2.982	1350	1	F1.007	23.269	225
									
						0	F1.008	23.269	225
F3-0	725372.443	721126.943	26.377	1.425	1200				
						0	F3.000	24.952	225
F3-1	725353.156	721111.036	27.184	2.649	1200	1	F3.000	24.535	225
									
						0	F3.001	24.535	225
F3-2	725340.479	721098.257	27.926	3.481	1200	1	F3.001	24.445	225
									
						0	F3.002	24.445	225
F4-0	725283.020	721027.943	28.399	1.425	1200				
						0	F4.000	26.974	225
F4-1	725306.033	721062.143	28.819	2.532	1350	1	F4.000	26.287	225
									
						0	F4.001	26.287	225
F4-2	725322.625	721078.003	28.525	4.215	1350	1	F4.001	26.172	225
						2	F3.002	24.310	225
									
						0	F3.003	24.310	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
F1-9	725365.126	721020.689	26.558	3.408	1350		1	F3.003	23.953	225
							2	F1.008	23.150	225
							0	F1.009	23.150	225
F5-0	725333.917	720997.493	27.083	1.425	1200		0	F5.000	25.658	225
F5-1	725302.763	720974.391	27.220	2.855	1350		1	F5.000	24.365	225
							0	F5.001	24.365	225
F6-0	725265.246	720971.171	27.385	1.425	1200		0	F6.000	25.960	225
F6-1	725265.039	720962.177	27.354	1.544	1200		1	F6.000	25.810	225
							0	F6.001	25.810	225
F5-2	725268.224	720948.778	27.301	3.151	1350		1	F6.001	25.741	225
							2	F5.001	24.150	225
							0	F5.002	24.150	225
F5-3	725287.201	720923.189	27.117	3.099	1350		1	F5.002	24.018	225
							0	F5.003	24.018	225
F5-4	725305.071	720899.093	26.939	3.071	1350		1	F5.003	23.868	225
							0	F5.004	23.868	225
F5-5	725324.886	720913.786	26.584	2.839	1350		1	F5.004	23.745	225
							0	F5.005	23.745	225
F5-6	725361.835	720941.186	26.149	2.864	1350		1	F5.005	23.285	225
							0	F5.006	23.285	225
F1-10	725401.997	720970.969	25.883	3.042	1350		1	F5.006	22.900	225
							2	F1.009	22.841	225
							0	F1.010	22.841	225
F7-0	725429.993	720933.216	24.767	1.425	1200		0	F7.000	23.342	225
F1-11	725404.529	720967.555	25.525	2.705	1350		1	F7.000	22.839	225
							2	F1.010	22.820	225
							0	F1.011	22.820	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
F1-12	725444.691	720997.338	24.480	1.895	1350	1	F1.011	22.585	225
									
						0	F1.012	22.585	225
F1-13	725486.238	720941.311	24.850	2.605	1350	1	F1.012	22.245	225
									
						0	F1.013	22.245	225
F1-14	725542.286	720983.473	24.100	2.221	1350	1	F1.013	21.879	225
									
						0	F1.014	21.879	225
F1-15	725584.343	720927.516	24.100	2.571	1350	1	F1.014	21.529	225
									
						0	F1.015	21.529	225
F1-16	725611.080	720891.943	23.550	2.244	1350	1	F1.015	21.306	225
									
						0	F1.016	21.306	225
F1-17	725673.298	720924.019	24.750	3.794	1350	1	F1.016	20.956	225
									
						0	F1.017	20.956	225
F1-18	725684.510	720903.366	24.680	3.842	1350	1	F1.017	20.838	225
									
						0	F1.018	20.838	225
F1-19	725731.389	720830.361	23.520	3.116	1350	1	F1.018	20.404	225
									
						0	F1.019	20.404	225
F1-20	725768.604	720766.469	23.100	3.066	1350	1	F1.019	20.034	225
									
						0	F1.020	20.034	225
F1-21	725795.294	720723.721	21.490	1.708	1350	1	F1.020	19.782	225
									
						0	F1.021	19.782	225
F1-22	725812.228	720727.657	23.000	3.546	1350	1	F1.021	19.454	225
									
						0	F1.022	19.454	225
EXFMH	725813.905	720722.694	23.025	3.670	1350	1	F1.022	19.355	225
									

Appendix D Irish Water Pre-connection Correspondence

Damien Egan
Punch Consulting Engineers
97 Henry Street
Co.Limerick
V94YC2H
Ireland

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

26 September 2019

Dear Damien Egan,

Re: Connection Reference No CDS19005159 pre-connection enquiry -
Subject to contract | Contract denied

Connection for Housing Development of 680 units at Shanganagh Park, Shankill, Co.Dublin.

Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at Shanganagh Park, Shankill, Co.Dublin.

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 subject to following:

Water

- In order to accommodate the proposed connection, upgrade works are required to increase capacity of the Irish Water network. Irish Water currently has a project underway (Woodbrook-Shanganagh Network Extension) which will provide the necessary upgrades and capacity. After completion of the Project, the Development could be supplied from a new 300 mm ID water main on Dublin Road. The Project is scheduled to be completed by Q1 2020 (this may be subject to change)
- There is an existing Irish Water 100 mm PE watermain crossing the site. In relation to your proposal to upsize the main, please be advised that existing connections outside of the site boundaries have to be maintained.

Wastewater

- Connection will be via the Foul Pumping Station and Rising Main being delivered as a part of the Woodbrook Development in agreement with Irish Water
- All relevant infrastructures within the Woodbrook Development will need to be completed and operational.
- Provision of a Deed of Easement will be required for pipelines through third party lends.

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:

- In advance of submitting your full application to An Bord Pleanala 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.
- 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.

All infrastructure should be designed and installed in accordance with the Irish Water Codes of Practice and Standard Details.

A connection agreement can be applied for by completing the connection application form available at **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 Marina Zivanovic Byrne from the design team on 01 89 25991 or email mzbyrne@water.ie. For further information, visit **www.water.ie/connections.**

Yours sincerely,

Maria O'Dwyer

Connections and Developer Services

Appendix E Letter of Consent Regarding Foul Pumping Strategy

Castlethorn

Ms Catherine Keenan
Director of Housing
Dún Laoghire Rathdown County Council
County Hall
Marine Road
Dun Laoghaire
Co. Dublin

18th December 2019

Re: Letter of Consent re Planning Application - Shanganagh Castle Lands Residential Development

Dear Ms. Keenan,

I am writing to you on behalf of Aeval Unlimited Company. I wish to confirm that Aeval Unlimited Company consents to the inclusion in the Dún Laoghaire-Rathdown County Council's Part 10 Planning Application for development of the Shanganagh Castle lands for the future connection and use of the proposed foul and surface water drainage services on Aeval's Strategic Housing Development on the Woodbrook lands, ABP Ref. ABP-305844-19, as shown on Punch Consulting Engineers Drawing no. 182134/SK114 Rev B dated 7.11.19 including the surface water and foul drainage from the Shanganagh Castle Development lands (Irish Water reference CDS19005159), subject to the following conditions:

1. The proposed connections will be coordinated with the development of the Woodbrook Strategic Housing Development – Phase 1.

2. A detailed site survey shall be carried out to determine the exact location and depth of these services.

3. A Licence Agreement will be entered into prior to any works being carried out on Aeval lands, if required.

4. Agreement between the parties on the pro-rata sharing of the costs of the provision of the required shared services.

Yours sincerely,

Hugh O'Neill
Aeval Unlimited Company

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Usher House, Main Street, Dundrum, Dublin 14, D14 N7Y8.
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VAT No. 6438719V

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