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CONSULTING ENGINEERS
CIVIL | STRUCTURAL | PROJECT MANAGEMENT

SERVICES REPORT

Including :
Proposed Surface Water Discharge
Proposed Foul Water Discharge
Proposed Water Supply
Preliminary Flood Study

Project Reference: Proposed Housing Project
At Park, Knocknagree, Co. Cork
Client: Cork County Council

Project No.: 0600828

Design By: B.A. & G.R.

Date: Aug '24
Rev: 1

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List of Contents

Introduction

The subject lands of the application are located to the north of Knocknagree village. The site is a brownfield site. A public road serving the site complete with utilities was constructed a number of years ago. The site is a mix of private and public lands. This development is proposed for 7 housing units at the end of the public road constructed into the site.

Priority Geotechnical undertook a Site Assessment of the development for Cork County Council. The assessment included geotechnical and infiltration investigations by Priority and a utilities survey by Metroscan Ltd.

There are foul, storm, water, electric and telecom services in the public roadway serving the site.

It is proposed to install a new foul sewer in the new proposed development and connect to the foul sewer in the existing public road.

The geotechnical investigations included 2 infiltrations tests which gave results of 0.000647 & 0.000411m/sec. It is proposed to use a soakaway on the proposed green area to the south of the proposed houses, and east of the existing road serving the site, to discharge surface water run-off from the proposed development.

It is proposed to connect to the existing watermain in the public road serving the site.

It is proposed to connect telecom and power services serving the site to existing underground infrastructure serving in the public road serving the site.

The site is elevated and not at risk from flooding. A preliminary flood assessment is included in this report.

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Project				Job Ref.	
Proposed Housing at Park, Knocknagree				0600828	
Section				Sheet no./rev	
Surface Water Disposal					
Calc. By	Date	Chck'd by	Date	App'd by	Date
G.R.	Jul '24	BA	Jul '24		

SUDS Assessment

The site has been assessed for suitability for applying for SuDS (Sustainable Drainage Systems) measures for the development. The principal outcome of the study found that infiltration measures are suitable for the site.

SuDS measures have been considered as per the table below: -

Measure Considered	Assessment	Adopt
Rainwater Harvesting	Rainwater butts to be installed in the downpipes of the houses	Y
Green Roof	Due to the nature of the site a green roof would not be practical	N
Infiltration Systems	Soakaway proposed at approximately 2m depth	Y
Proprietary Treatment Systems	Not suitable due to Site type and scale	N
Filter Strips	Not suitable due to Site type and scale	N
Filter Drains	Not suitable due to Site type and scale	N
Swales	Not suitable due to Site type and scale	N
Bio-Retention Systems	Not suitable due to Site type and scale	N
Trees	Not extensive due to Site type and scale, some planting will be done on site	Y
Attenuation Storage Tanks	NA- it is not proposed to connect to a storm drain, therefore an attenuated flow is not required	N
Detention Basin	Not suitable due to site type and scale	N
Ponds & Wetlands	Not suitable due to site type and scale	N
Pervious Pavements	Not suitable due to scale of the site and the maintenance required	N

The surface water on the site will discharge to a soakaway via an oil interceptor. The soakaway will have a storage volume suitable for the infiltration test results.

Surface water runoff

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Exercise in looking at surface water drainage "effective area" runoff for the site.

Areas to be included in the "effective area" are surface areas of roofs, paths, roads, parking bays, lawns, gardens & green surfaces.

An impermeability factor of 1.0 is used for roofs, 0.9 is used for footpaths and hard standing areas, a factor of 0.2 is used for green areas and back gardens.

41720sqm of roofs x 1.0= 417sqm
1158sqm of footpaths and roads x 0.9= 1042sqm
1325sqm of green area contributing x 0.2= 265sqm

Overall Effective Runoff = Total Impermeable area = Ap = **1,724 m2**

Proposed to use Infiltration Pluvial Cube system which consists of modular polypropylene units, low flow maintenance and self-cleaning channels.

Note prior to discharge to the soakaway, the rainwater runoff from the proposed overall development is proposed to go through a hydrocarbon interceptor & silt trap.

Sewers carrying domestic surface water from this proposed housing developments shall have a sewer minimum sewer size of 225mm and the gradients are to achieve self cleansing velocities.

The soakaway design in accordance with BRE365 is as follows: -

Infiltration testing in accordance with BRE365 was carried out by Priority Geotechnical Ltd. The results of the testing were variable, from 0.000647m/sec and 0.000411m/sec (0.0247m/min). It is recommended to install a soakaway to approximately 1.8m depth in the green area to the south of the houses. The proposed soakaway is designed for a 10yr storm with 10% allowance for climate change. The proposed plan area of the soakaway is 7.5m x 5m and minimum required depth of the soakaway is 287mm, **therefore a 550mm deep system** is selected.

SOAKAWAY DESIGN

In accordance with CIRIA C753 SUDS

Tedds calculation version 2.0.05

Design rainfall intensity

Location of catchment area;	Other
Impermeable area drained to the system;	A = **1724.0** m^2
Return period;	Period = **10** yr
Ratio 60 min to 2 day rainfall of 5 yr return period;	r = **0.360**
5-year return period rainfall of 60 minutes duration;	M5_60min = **17.7** mm
Increase of rainfall intensity due to global warming;	$p_{climate}$ = **10** %

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Soakaway / infiltration trench details

Soakaway type;	Rectangular
Width of pit;	w = **5000** mm
Length of pit;	l =**7500** mm
Percentage free volume;	V_{free} = **95** %
Soil infiltration rate;	f = **411.×10^{-6}** m/s
Base area;	A_b = w × l = **37500000** mm^2
Perimeter;	P = 2 × (w + l) = **25000** mm
Coefficient b;	b = P × f / (A_b × V_{free}) = **1.04** hr^{-1}

Table equations (Eq. 25.4)

Rainfall intensity;	i = M10 / D
Coefficient a;	a = A_b / P - (A × i / (P × f))
Minimum depth required;	H = a × (e$^{(-bD)}$ - 1)

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	10 year rainfall, M10 (mm)	Intensity, i (mm/hr)	a (mm)	Min depth req (mm)
5;	0.36;	7.0;	1.18;	8.3;	99.09;	-3118;	258
10;	0.51;	9.9;	1.19;	11.8;	70.88;	-1804;	287
15;	0.62;	12.1;	1.19;	14.4;	57.66;	-1187;	271
30;	0.79;	15.4;	1.20;	18.4;	36.89;	-219;	89
60;	1.00;	19.5;	1.19;	23.2;	23.19;	419;	0
120;	1.22;	23.8;	1.18;	28.1;	14.04;	845;	0
240;	1.48;	28.8;	1.18;	34.0;	8.50;	1104;	0
360;	1.67;	32.5;	1.18;	38.3;	6.38;	1203;	0
600;	1.90;	37.0;	1.17;	43.4;	4.34;	1298;	0
1440;	2.42;	47.1;	1.16;	54.8;	2.28;	1394;	0

Minimum depth of soakaway;	H_{max} = **287** mm
Time to empty soakaway to half vol. - Eq.24.6(2);	t_{s50} = V_{free} × A_b / (f × P) × Ln((H_{max} + A_b / P) / (H_{max} / 2 + A_b / P)) = 4min 50s

PASS - Soakaway discharge time less than or equal to 24 hours

Design of collection system

The proposed surface water drainage proposal includes a gravity surface water collection system which incorporates an underground drainage pipe network.

All proposed drainage works is designed to comply with and be carried out in accordance with the current edition of the *Recommendations for site development works for Housing Areas* published by the *Department of Environment and Local Government.*
Drainage works also shall comply with Irish Water/Local Authority requirements.

C1/SfB (29)

NSAI Agrément

IRISH AGRÉMENT BOARD
CERTIFICATE NO. 18/0401

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Email: info@alderburgh.com

Pluvial Cube Attenuation and Infiltration Systems

Stürmen Sie Wasser Leitung System

NSAI Agrément (Irish Agrément Board) is designated by Government to carry out European Technical Approvals.

NSAI Agrément Certificates establish proof that the certified products are **'proper materials'** suitable for their intended use under Irish site conditions and in accordance with the **Building Regulations 1997 to 2017.**

PRODUCT DESCRIPTION:
This Certificate relates to the Pluvial Cube attenuation and infiltration system which comprises of modular polypropylene units which, in conjunction with a satisfactory civil engineering design, will act as either an attenuation or infiltration vessel as part of a sustainable drainage system.

The Pluvial Cube system consists of modular polypropylene units, low flow maintenance and self-cleaning channels.

USE:
The product is used as a subsurface stormwater management system, used for sub-surface water storage or as a soakaway to manage rain water run-off from impermeable surfaces. Subject to site conditions and restraints, the Pluvial Cube system modules can be built up to create the volumetric capacity required for

- Attenuation system
- Infiltration system.
- Or a combined attenuation/infiltration system.

MANUFACTURE AND MARKETING:
The product is manufactured and marketed by:

Alderburgh Ltd.
Solution House,
Dane Street,
Rochdale,
OL11 4EZ.
Tel: +44(0)1706 374416 Fax: 01706376785
Email:info@alderburgh.com

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NSAI Agrément

Part One / Certification 1

1.1 ASSESSMENT

In the opinion of NSAI Agrément, the Pluvial Cube system, if used in accordance with this Certificate, meets the requirements of the Building Regulations 1997 - 2017 as indicated in Section 1.2 of this Certificate.

1.2 BUILDING REGULATIONS 1997 to 2017

REQUIREMENT:

Part A – Structure

A1 - The Pluvial Cube system, as certified in this Certificate, can be designed to ensure that the combined dead and imposed loads are sustained and transmitted to the ground in compliance with CIRIA C737 *Structural and geotechnical design of modular geocellular drainage systems.*

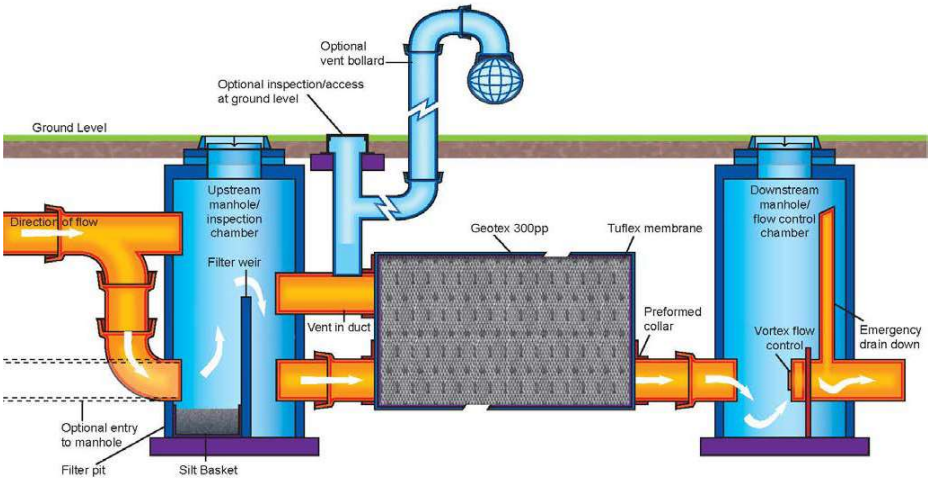
Part D - Materials & Workmanship

D3 – The Pluvial Cube system, as certified in this Certificate, is comprised of proper materials fit for their intended use (See Part 4 of this Certificate).

D1 – The Pluvial Cube system, as certified in this Certificate, meets the requirements of the building regulations for workmanship.

Part H – Drainage and waste water disposal.

H1 - The Pluvial Cube system, as certified in this Certificate, meets the requirements of the building regulations for the adequate disposal of surface water from the building.



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Project				Job Ref.	
Proposed Housing at Park, Knocknagree				0600828	
Section				Sheet no./rev	
Foul wastewater discharge					
Calc. By	Date	Chck'd by	Date	App'd by	Date
B.A.	Jul '24	B.A.	Jul '24		

Proposed Foul Wastewater discharge

The new site proposal includes 7 dwellings. As-built records and the Metroscan utility survey show a foul sewer in the public road serving the site. It is proposed to connect to this sewer for the development.

Sewers carrying domestic wastewater from this proposed housing development should be designed to carry a minimum wastewater volume of six times dry weather flows (6DWF).

Dry weather flows (DWF) is taken as 900 litres per dwelling (four persons per house and a per capita wastewater flow of 225 litres per head per day).

Total Dry weather flow (DWF) = 7 x 900/24/60/60 = 0.073l/s

Foul Pipe Network is designed to carry a minimum wastewater volume of six times dry weather flows (6DWF).

6 DWF = 6 x 0.073 = 0.4375 l/s

Typical Organic Loading :

TABLE 1: INFLOW WASTEWATER CHARACTERISTICS* FROM EPA STUDY (DOMESTIC SOURCES)

Parameter	Mean	Standard Deviation
SS	163	136
BOD_5	168	127
COD	389	310
$O\text{-}PO_4$	7.1	4.2
Total-N	40.6	19.0
NH_3-N	31.5	15.6
NO_3-N	0.25	0.41
NO_2-N	0.04	0.06
pH	7.5	0.5
Total-coli	1×10^8	2×10^8
E-coli	4×10^7	5×10^7

* all results in mg/l, except bacterial counts which are expressed in colony forming units, CFU per 100 ml

TABLE 2.2 TYPICAL CHARACTERISTICS OF URBAN WASTE WATER

Parameter	Concentration mg/l
BOD	100 - 300
COD	250 - 800
Suspended solids	100 - 350
Total nitrogen (as N)	20 - 85
Ammonia (NH_3 as N)	10 - 30
Organic phosphorus (as P)	1 - 2
Inorganic phosphorus (as P)	3 - 10
Oils, fats and grease	50 - 100
Total inorganic constituents (Na, Cl, Mg, S, Ca, K, Si, Fe)	100
Heavy metals (Cd, Cr, Cu, Pb, Hg, Ni, Ag, Zn)	<1mg/l each

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Project				Job Ref.	
Proposed Housing at Park				0600828	
Section				Sheet no./rev	
Water Supply				1	
Calc. By	Date	Chck'd by	Date	App'd by	Date
G.R.	Jul '24	B.A.	Jul '24		

Proposed Water Supply.

The new site proposal includes 7 dwellings. It is proposed to connect to existing watermains in the public road serving the site.
Please refer to proposed watermain layout.

The water demand includes: Average domestic daily demand in the development is established based on daily per-capita consumption, house occupancy, number of properties. For design purposes the average daily domestic demand is be based on a per-capita consumption of 225 l/person/day and an average occupancy ratio of 4 persons per dwelling.

7 dwellings :7x225x4

Total average daily demand = 6,300 litres

The average day/peak week demand should be taken a 1.25 times the average daily domestic demand.
Total average day/peak demand = 6,300 x 1.25 = 7,875 litres

The peak demand for sizing of the pipe network will normally be 2.1 times the average day, peak week demand.
Total average day/peak demand = 6,300 x 2.1 = 18,900 l/day or 0.219 l/sec

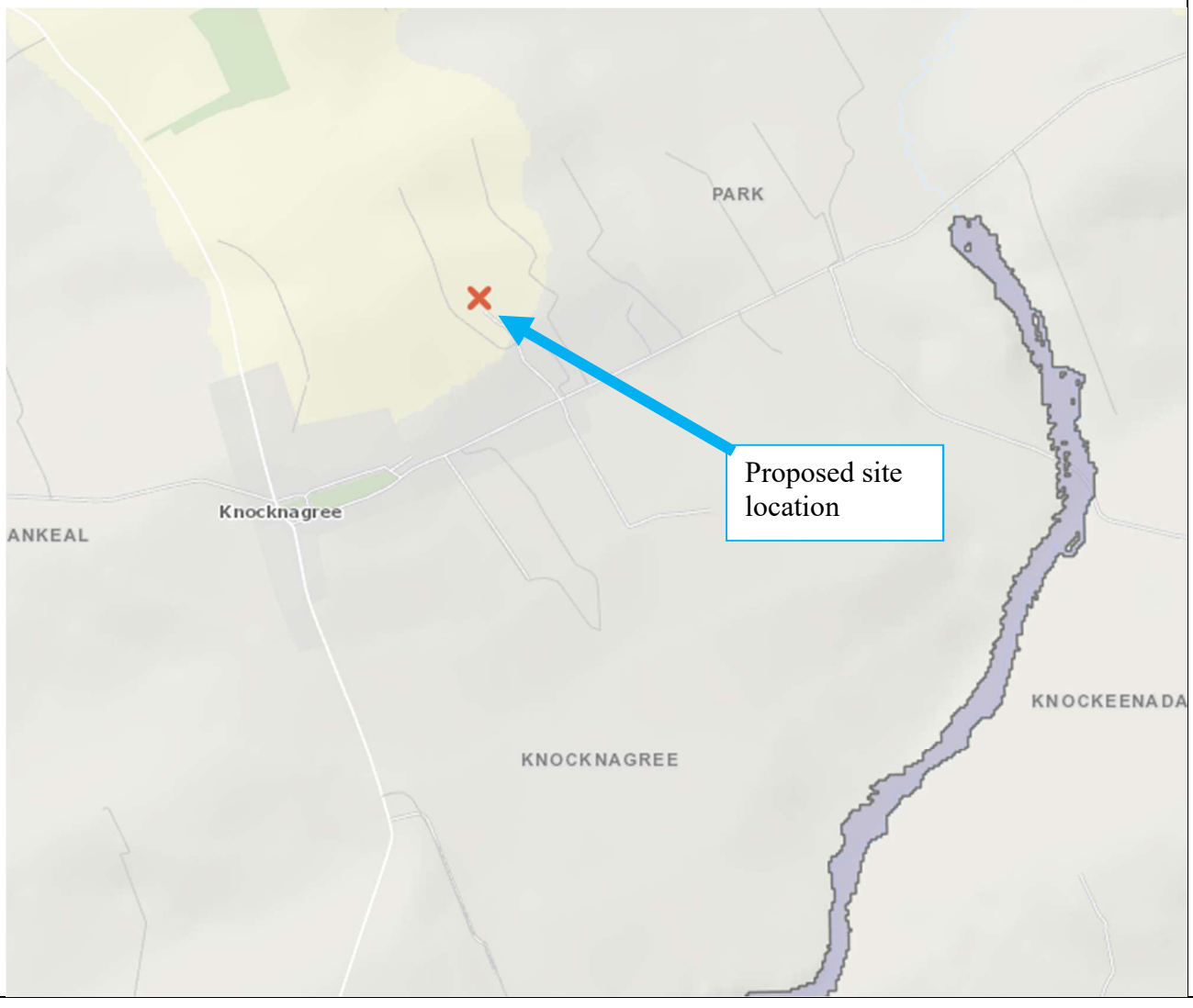
Preliminary Flood Risk Assessment

The site is not at risk from flooding.

The proposed development is approximately 50km from the sea and the site elevation is approximately 205m OD, hence tidal flooding is not a risk at this site.

The site is locally elevated within its environs, it approximately 15m higher than the public road about 150m to the south of the site, therefore pluvial flooding is not deemed a risk.

Fluvial flooding is not a risk at the site. There is a stream approximately 900m to the east of the site which has a floodplain, this is approximately 30m lower than the proposed site. See the following excerpt from floodinfo.ie which indicates the extent of possible fluvial floodings approximately 900m from the site.



Original Drawing Size A1

Notes

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15. DETAILS OF THE TREATMENT OF ALL EXISTING WATER SERVICES TO THE SITE SHALL BE AGREED WITH UISCE EIREANN/ CORK COUNTY COUNCIL WATER DEPT.
16. ALL ROAD AND FOOTWAY FITTING COVERS, SHALL BE MARKED TO INDICATE WHAT IS UNDERNEATH.
17. ALL WATERMAINS TO BE LAID TO CURRENT IRISH WATE STANDARDS. PLEASE REFER TO UISCE EIREANN CONNECTION AND DEVELOPER SERVICES WATER INFRASTRUCTURE STANDARD DETAILS DOCUMENT NUMBER IW-CDS-5020-01 & CODE OF PRACTICE FOR WATER INFRASTRUCTURE DOCUMENT NUMBER IW-CDS-5020-03.
18. WORKS TO BE CARRIED OUT IN ACCORDANCE WITH RECOMMENDATIONS FOR SITE DEVELOPMENT WORKS FOR HOUSING AREAS NOVEMBER 1998 AND IN ACCORDANCE WITH LATEST UISCE EIREANN SPECIFICATIONS AND SPECIFICATIONS OF ALL UTILITY PROVIDERS.
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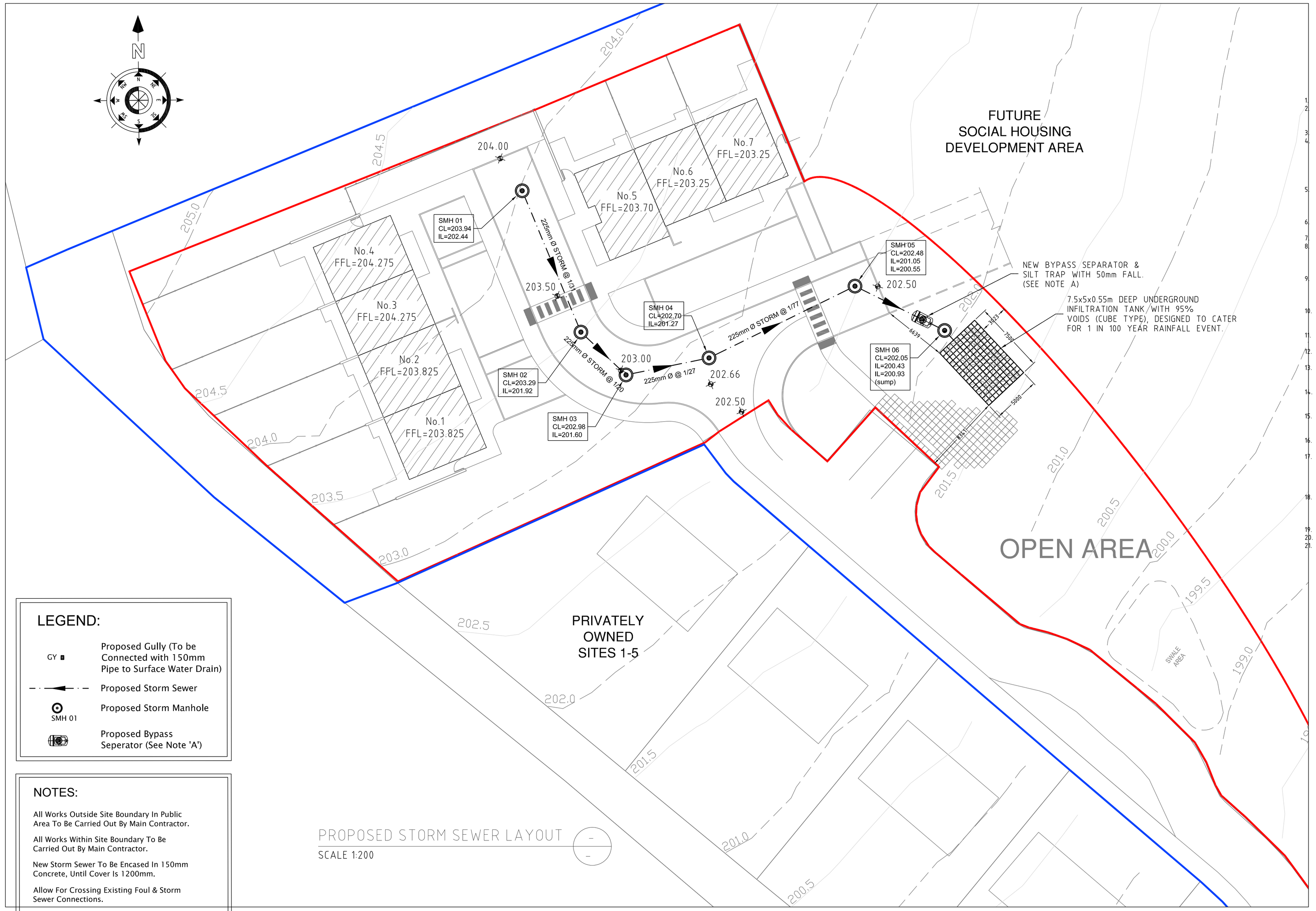

LEGEND:

GY	Proposed Gully (To be Connected with 150mm Pipe to Surface Water Drain)
	Proposed Storm Sewer
SMH 01	Proposed Storm Manhole
	Proposed Bypass Seperator (See Note 'A')

NOTES:

All Works Outside Site Boundary In Public Area To Be Carried Out By Main Contractor.

All Works Within Site Boundary To Be Carried Out By Main Contractor.

New Storm Sewer To Be Encased In 150mm Concrete, Until Cover Is 1200mm.

Allow For Crossing Existing Foul & Storm Sewer Connections.

Allow For Crossing Existing Utility Services.

NOTE 'A' - The Bypass Seperator Chosen Is To Be In Accordance With ISEN 858-1 & It's Design Is To Include The Necessary Volume Requirements For:

-Oil Seperation Capacity
-Silt Storage Capacity
-Oil Storage Volume
-Coalescer
The Bypass Seperator Chosen, Which Is To Be Agreed With The Clients Representative, Is To Be Of Roto-Moulded Chamber Construction & Is To Cater For An Impermeable Area Up To 1,000 sq.m².

PROPOSED STORM SEWER LAYOUT

SCALE 1:200

Rev	Date	Drawn	Description	Ch'k'd
PL	Aug. '24	GR	Issued for Planning	BA

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Client:
CORK COUNTY COUNCIL

Project:
Proposed 7 No. Housing Units
at Park, Knocknagree, Mallow,
Co. Cork.

Drawing Title:
Proposed Storm Sewer Layout

Designed:	BA	Drawn:	GR	Date:	Aug. '24
Eng Chk:	BA	Dwg. Chk:	BA	Scale:	1:200 @ A1
Project. No:	585				
Drawing No:	102			Status: Planning	Rev: PL

Original Drawing Size A1

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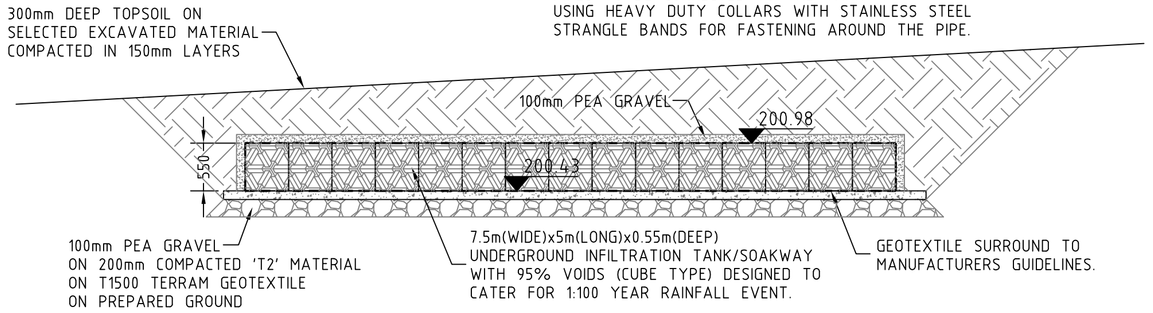
21. DIMENSIONS ARE IN MILLIMETRES.

NOTE:
INFILTRATION SYSTEM TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S GUIDELINES.



SECTION THRU' INFILTRATION TANK

SCALE 1:50

Rev	Date	Drawn	Description	Ch'k'd
PL	July '24	GR	Issued for Planning	BA

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CONSULTING ENGINEERS
CIVIL | STRUCTURAL | PROJECT MANAGEMENT

Client:
CORK COUNTY COUNCIL

Project :
Proposed 7 No. Housing Units
at Park, Knocknagree, Mallow,
Co. Cork.

Drawing Title :
Proposed Typ. Section Thru' Filtration Tank

Designed:	BA	Drawn:	GR	Date:	Aug. '24
Eng Chk:	BA	Dwg. Chk:	BA	Scale:	1:50 @ A1
Project. No:	585				
Drawing No:	103	Status:	Planning	Rev:	PL

Original Drawing Size A1

Notes

1. DO NOT SCALE DRAWING. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL, MECHANICAL/ELECTRICAL AND ENGINEERING DRAWINGS.
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5. ALL MATERIALS USED SHALL BE 'CE' MARKED IN ACCORDANCE WITH THE EU CONSTRUCTION PRODUCT REGULATIONS (CPR) (No.305/2011). REFER TO ANNEX IV OF THE REGULATIONS FOR THE LIST OF APPLICABLE PRODUCTS.
6. THIS DRAWING TO BE READ IN CONJUNCTION WITH RKA GENERAL CIVIL & STRUCTURAL SPECIFICATION.
7. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES IMMEDIATELY.
8. POSITIONS OF EXISTING MAIN SHOWN ON THIS DRAWING ARE INDICATIVE ONLY. ACTUAL POSITIONS OF PIPEWORK MUST BE ESTABLISHED ON SITE BY THE CONTRACTOR BY HAND DUG TRIAL HOLES.
9. RKA CONSULTING ENGINEERS WILL NOT ACCEPT ANY RESPONSIBILITY FOR THE POSITIONAL ACCURACY OF THE PLANT SHOWN ON THIS DRAWING NOR ANY OMMISSION FROM SAME OF SERVICE PIPES WHICH ARE NOT SHOWN ON THE PLAN.
10. CONTRACTOR TO ALLOW FOR LOCATING ALL EXISTING MAINS AS REQUIRED TO ACCOMMODATE DIVERSION AND/OR REPLACEMENT OF EXISTING SERVICES AS SHOWN ON THIS DRAWING.
11. CONTRACTOR TO ENSURE THAT WATER SUPPLIES ARE MAINTAINED TO ALL EXISTING USERS AT ALL TIMES DURING THE CONTRACT.
12. CONTRACTOR TO ALLOW FOR HAND DIGGING TO LOCATE EXISTING SERVICES AS REQUIRED.
13. CONTRACTOR TO KEEP FULL RECORDS OF POSITIONS OF ALL PIPEWORK AND CONNECTIONS AND ON COMPLETION, FULL AS-BUILT DRAWINGS TO BE PRODUCED BY THE CONTRACTOR.
14. LOCATION OF PROPOSED PIPEWORK ARE INDICATIVE ONLY. ALL WORKS TO BE AGREED WITH UISCE EIREANN AND EMPLOYERS REPRESENTATIVE.
15. DETAILS OF THE TREATMENT OF ALL EXISTING WATER SERVICES TO THE SITE SHALL BE AGREED WITH UISCE EIREANN/ CORK COUNTY COUNCIL WATER DEPT.
16. ALL ROAD AND FOOTWAY FITTING COVERS, SHALL BE MARKED TO INDICATE WHAT IS UNDERNEATH.
17. ALL WATERMAINS TO BE LAID TO CURRENT IRISH WATE STANDARDS. PLEASE REFER TO UISCE EIREANN CONNECTION AND DEVELOPER SERVICES WATER INFRASTRUCTURE STANDARD DETAILS DOCUMENT NUMBER IW-CDS-5020-01 & CODE OF PRACTICE FOR WATER INFRASTRUCTURE DOCUMENT NUMBER IW-CDS-5020-03.
18. WORKS TO BE CARRIED OUT IN ACCORDANCE WITH RECOMMENDATIONS FOR SITE DEVELOPMENT WORKS FOR HOUSING AREAS NOVEMBER 1998 AND IN ACCORDANCE WITH LATEST UISCE EIREANN SPECIFICATIONS AND SPECIFICATIONS OF ALL UTILITY PROVIDERS.
19. SETTING OUT TO BE THE RESPONSIBILITY OF THE CONTRACTOR.
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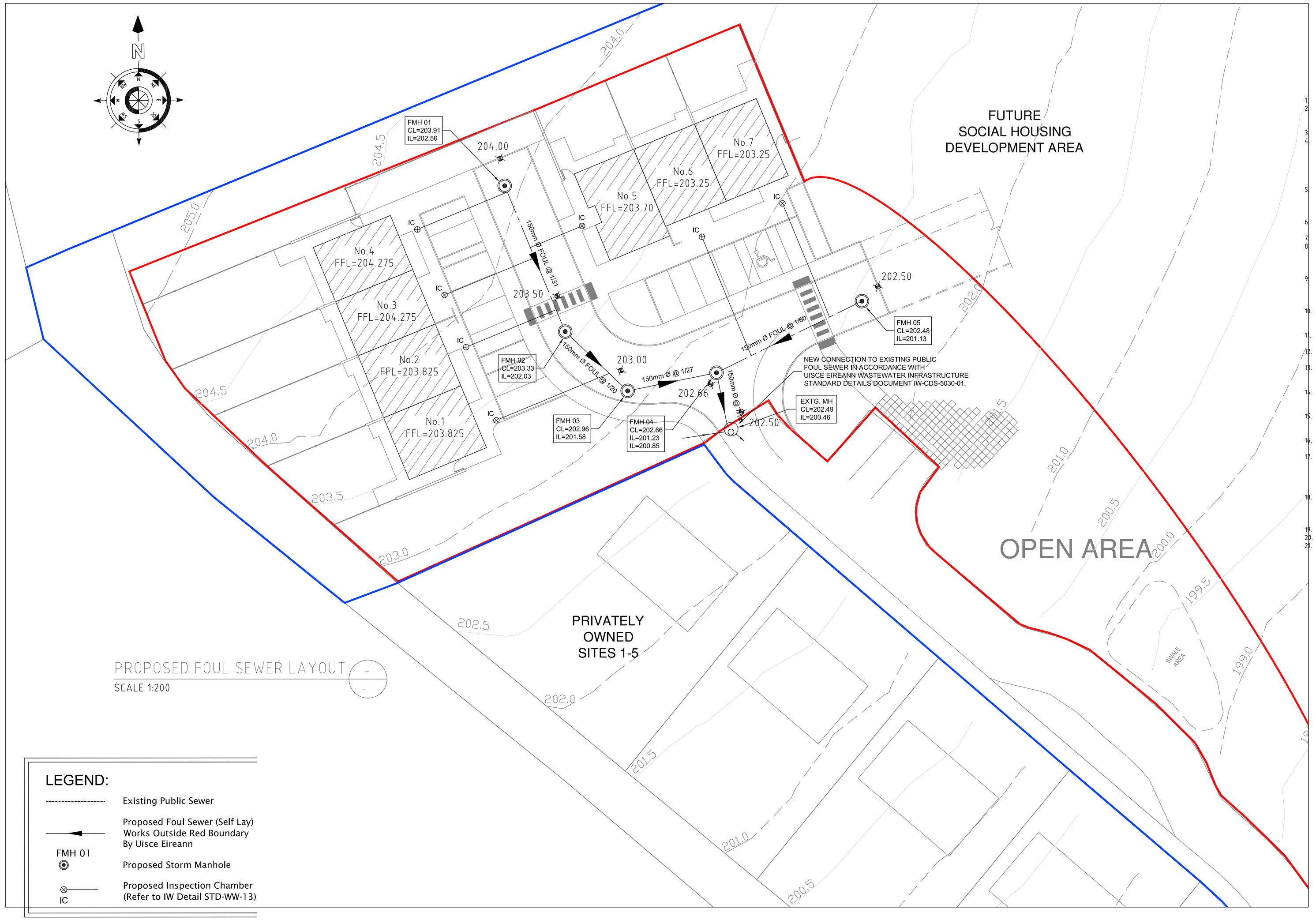
21. DIMENSIONS ARE IN MILLIMETRES.



PROPOSED FOUL SEWER LAYOUT

SCALE 1:200

LEGEND:

----------	Existing Public Sewer
◄———	Proposed Foul Sewer (Self Lay) Works Outside Red Boundary By Uisce Eireann
FMH 01 ◉	Proposed Storm Manhole
⊗——— IC	Proposed Inspection Chamber (Refer to IW Detail STD-WW-13)

NOTES:

All Works & Fittings To Be Carried Out In Accordance With Uisce Eireann Standards.

All Works Outside Site Boundary In Public Area To Be Carried Out By Uisce Eireann.

All Works Within Site Boundary To Be Carried Out By Main Contractor.

New Foul Sewer To Be Encased In 150mm Concrete, Until Cover Is 1200mm.

Allow For Crossing Existing Foul & Storm Sewer Connections.

Rev	Date	Drawn	Description	Ch'k'd
PL	Aug. '24	GR	Issued for Planning	BA

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CIVIL | STRUCTURAL | PROJECT MANAGEMENT

Client:

CORK COUNTY COUNCIL

Project :

Proposed 7 No. Housing Units
at Park, Knocknagree, Mallow,
Co. Cork.

Drawing Title :

Proposed Foul Sewer Layout

Designed:	BA	Drawn:	GR	Date:	Aug. '24
Eng Chk:	BA	Dwg. Chk:	BA	Scale:	1:200 @ A1
Project. No:	585				
Drawing No:	101			Status: Planning	Rev: PL

Original Drawing Size A1

Notes

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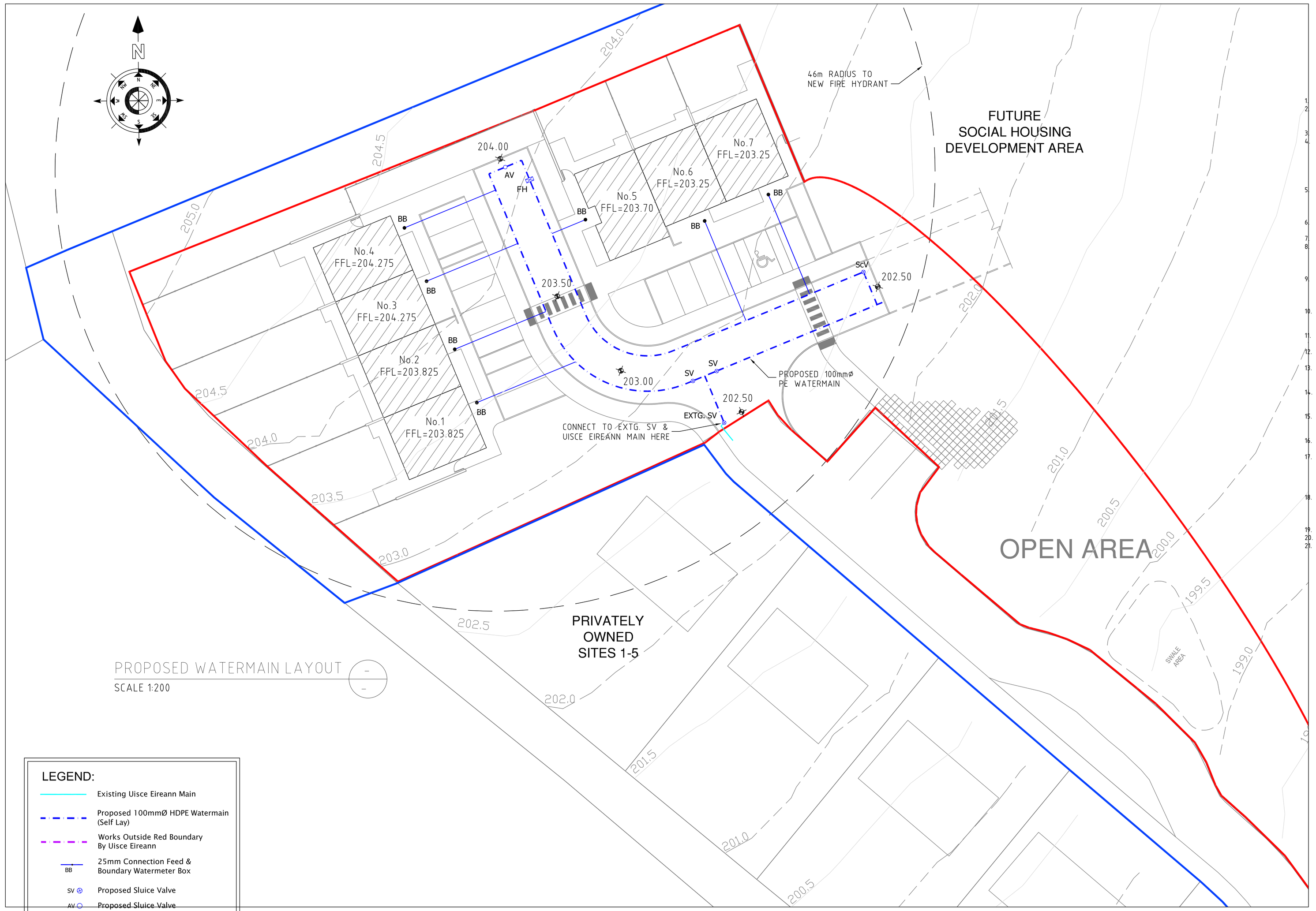

PROPOSED WATERMAIN LAYOUT

SCALE 1:200

LEGEND:

- Existing Uisce Eireann Main
- Proposed 100mmØ HDPE Watermain (Self Lay)
- Works Outside Red Boundary By Uisce Eireann
- BB — 25mm Connection Feed & Boundary Watermeter Box
- SV — Proposed Sluice Valve
- AV — Proposed Sluice Valve
- ScV — Proposed Scour Valve
- FH — Proposed Fire Hydrant
- WM — Proposed Water Meter

NOTES:

All Works & Fittings To Be Carried Out In Accordance With Uisce Eireann Standards.

All Works Outside Site Boundary In Public Area To Be Carried Out By Uisce Eireann.

All Works Within Site Boundary To Be Carried Out By Main Contractor.

Rev	Date	Drawn	Description	Ch'k'd
PL	Aug. '24	GR	Issued for Planning	BA

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Client:

CORK COUNTY COUNCIL

Project :

Proposed 7 No. Housing Units
at Park, Knocknagree, Mallow,
Co. Cork.

Drawing Title :

Proposed Watermain Layout

Designed:	BA	Drawn:	GR	Date:	Aug. '24
Eng Chk:	BA	Dwg. Chk:	BA	Scale:	1:200 @ A1
Project. No:	585				
Drawing No:	100			Status: Planning	Rev: PL