ENGINEERING DESIGN REPORT

Ballinacurra Mill LRD scheme, County Cork

December 2025

Contents

This report should be read in conjunction with the submitted Engineering and Architectural Design Drawings

1. INTRODUCTION

PROJECT: **BALLINACURRA MILL LRD SCHEME, COUNTY CORK**

CLIENT: **Ballinacurra Project Limited Partnership**

PROPOSED DEVELOPMENT: 128 residential units, Including creche, retail and commercial.

MHL Consulting Engineers have been engaged by Ballinacurra Project Limited Partnership to provide design consultancy services for the civil engineering elements associated with a proposed development of 128 residential units, including creche, retail and commercial, to be determined by way of the Strategic Infrastructure Application process to An Bord Pleanála. The proposed site is located along the Main Estate Roads & Rose Lawn and between the Minor Estate Roads & Isolated Paths, and the Junction R629/Geragh Road/Rose Lawn and the Junction R629/Development Access in Ballinacurra LRD Scheme, Midleton and is highlighted in **Figure 1.1** below.

Figure 1.1: Site location

2. ROADS

PROJECT: **BALLINACURRA MILL LRD SCHEME, COUNTY CORK**

CLIENT: **Ballinacurra Project Limited Partnership**

PROPOSED DEVELOPMENT: 128 residential units, Including creche, retail and commercial.

Internal Estate Roads

The internal estate roads have been designed in accordance with the Design Manual for Urban Roads and Streets (DMURS). In general, a maximum gradient of 6.4% and minimum gradient of 1.5% was used for all internal estate roads. Due to the sloped nature of the site, a gradient of 2.7% was required for a short section of Estates Road 3 for the area featuring no direct access to dwellings. The design team has ensured that the lengths of road necessitating a gradient of 6.4% were kept to a minimum.

Figure 2.1: Overall proposed estate roads (refer to MHL drawings 23072HD-SL-P01 to 23072HD-SL-P03)

Figure 2.2: Overall proposed estate roads (refer to MHL drawings 23072HD-SL-P01 to 23072HD-SL-P03)

The parameters for a design speed of 20km/h were used to produce the horizontal and vertical alignments in accordance with the standards set out in Design Manual for Urbans Roads and Streets (DMURS), as required per Objective 5.16 in the Cork City Development Plan 2015-2021. Table 4.3 in DMURS outlines the minimum requirement for horizontal and vertical curvature for a 20km/h road. The minimum value used for horizontal curvature is 11.5m. To produce a robust design regarding the vertical alignment it is prudent to use K-values relating to a 40km/h road, 4.1 for a crest curve and 2.6 for a sag curve. **Figure 2.1 and Figure 2.2** highlight each of the internal roads and corresponds with **Table 2.1** which highlights the maximum and minimum design parameters used.

Estate Roads Design	Max Gradient	Min Gradient	Max K	Min K	Junction Approach Gradient
Main Access Road	5.0%	0.7%	16.1	5.3	-3.0%
Road 1	5.4%	0.8%	12.5	3.9	-3.6%
Road 2	6.7%	6.7%	N/A	N/A	6.7%
Road 3	2.7%	1.0%	31.7	31.7	2.7%
Road 4	-5.2%	5.2%	N/A	N/A	-5.2%
Road 5	-5.2%	-3.2%	8.2	8.2	-5.2%
Road 6	4.6%	4.6%	20.8	20.8	4.6%
Road 8	3.3%	1.8%	18.7	5.7	3.3%
Reference Document: ➢ Design Manual for Urban Roads and Streets 2019					

Table 2.1: Internal Estate Roads Design

3. TRAFFIC AND PEDESTRIAN MANAGEMENT

PROJECT: **BALLINACURRA MILL LRD SCHEME, COUNTY CORK**

CLIENT: **Ballinacurra Project Limited Partnership**

PROPOSED DEVELOPMENT: 128 residential units, Including creche, retail and commercial.

An overview of traffic calming and pedestrian connectivity throughout the site is presented in **Figure 3.1** below. Shared surface streets with road widths of 3.0m and minimum road radii per DMURS are proposed at selected internal roads. Appropriate surface treatments, such as paving, will be used on these roads to serve as a reminder to motorists that they are in a shared space requiring low speeds. The site is well located in terms of connectivity with pedestrian footpaths which provide a link to public transport and local services such as retail stores, the local creche, and the Village Centre in Ballincurra.

Figure 3.2 presents proposed public realm works on the L96302 including a 2.0m footpath either side of the carriageway, staggered parallel parking, and a 5.0m carriageway. Further public realm improvements include for a proposed speed ramp and raised pedestrian crossing and a proposed uncontrolled pedestrian crossing at the priority T-junction with the R629. It is expected that the provision of the above public realm improvement works will urbanise the area, resulting in a reduction in traffic speed in the area which will be a road safety gain.

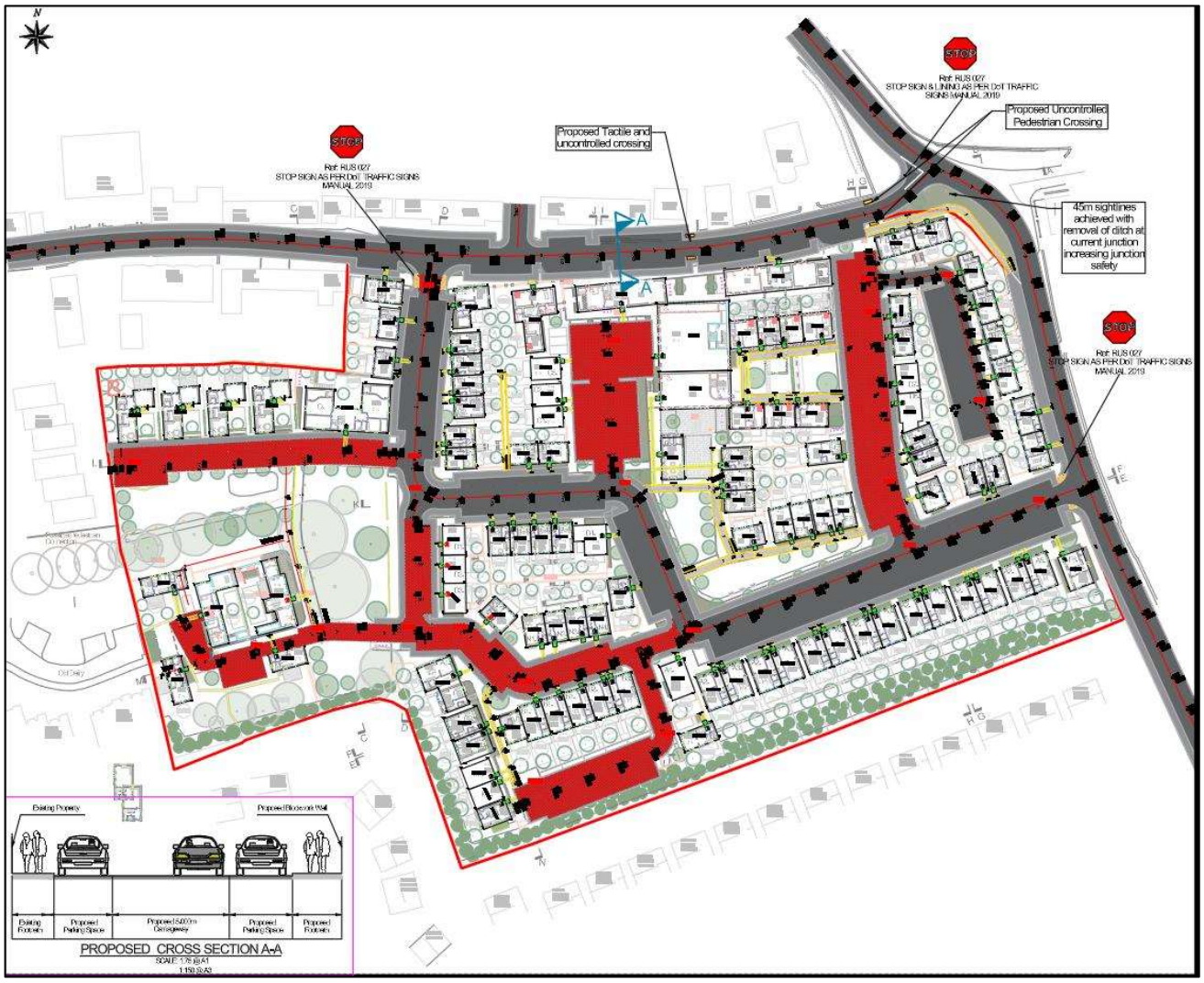


Figure 3.1: Traffic Calming & Pedestrian Connectivity

Figure 3.2: Proposed Pedestrian/Cycle Connectivity Improvement Measures along the L96302

Currently a footpath is provided on the L96302, opposite the development site, which connects as far as L3625. It is proposed to provide a segregated footpath and cycle lane on the development side of the L3625 to further enhance connectivity and create a safer environment for all road users.

It is noted that the Midleton- Ballinacurra Cycleway Scheme which encompasses the R630 is complete in the proximity to the proposed site. These works began in 2023. Phase 1 of this scheme will be complete following the construction of this development which connects Ballinacurra, Midleton and Water Rock. Based on the completion of this scheme a future target year modal shift of 30% was agreed with the Council Transport Department. The extent of this scheme is shown below. This scheme will tie in with the Cork to Youghal Greenway which will allow for greater use of sustainable forms of transport.

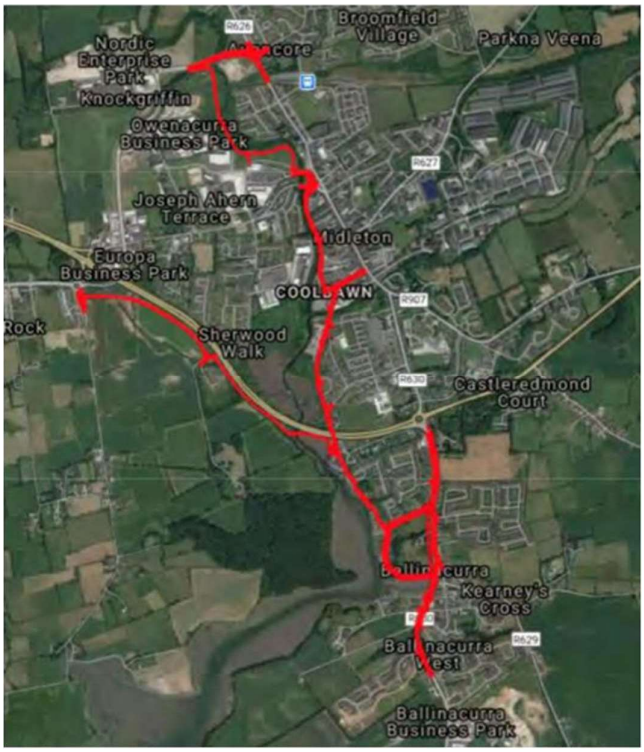


Fig 3.3: Midleton to Ballnacurra Pedestrian Cycle Scheme

Future connectivity to adjoining lands is also proposed at several locations within the site. These will be provided to ensure future connectivity to the creche, and retail element of the scheme is available.

Internally within the scheme, each developed area has multiple options of connectivity for each of the different modes of travel, maximising accessibility to the various amenities provided as part of the scheme, as set out in further detail in Landscape Architect's drawings submitted with the application. The quality of these routes has been carefully considered to ensure their viability in terms of desire lines and to ensure users will feel comfortable and safe when availing of these facilities.

A separate Traffic & Transport Assessment (TTA) report is included with this submittal for review. The TTA assesses & quantifies how the proposed development will impact upon the surrounding roads network.

4. SITE INVESTIGATION

PROJECT: **BALLINACURRA MILL LRD SCHEME, COUNTY CORK**

CLIENT: **Ballinacurra Project Limited Partnership**

PROPOSED DEVELOPMENT: 128 residential units, Including creche, retail and commercial.

As part of the design for the proposed development, comprehensive site investigations were carried out by PGL PRIORITY on the proposed site in September 2023. In total, site investigation consisted of 4 No. trial pits to measure the depth of soil and rock, and 2 No. infiltration pits to measure the on-site infiltration rate. The investigation also included laboratory testing on samples taken from trial pits. The results of investigation indicate a shallow water table at the south of the site. No bedrock was encountered during the course of the study.

Figure 4.1 & **Figure 4.2** below highlight the test locations of the site investigation.

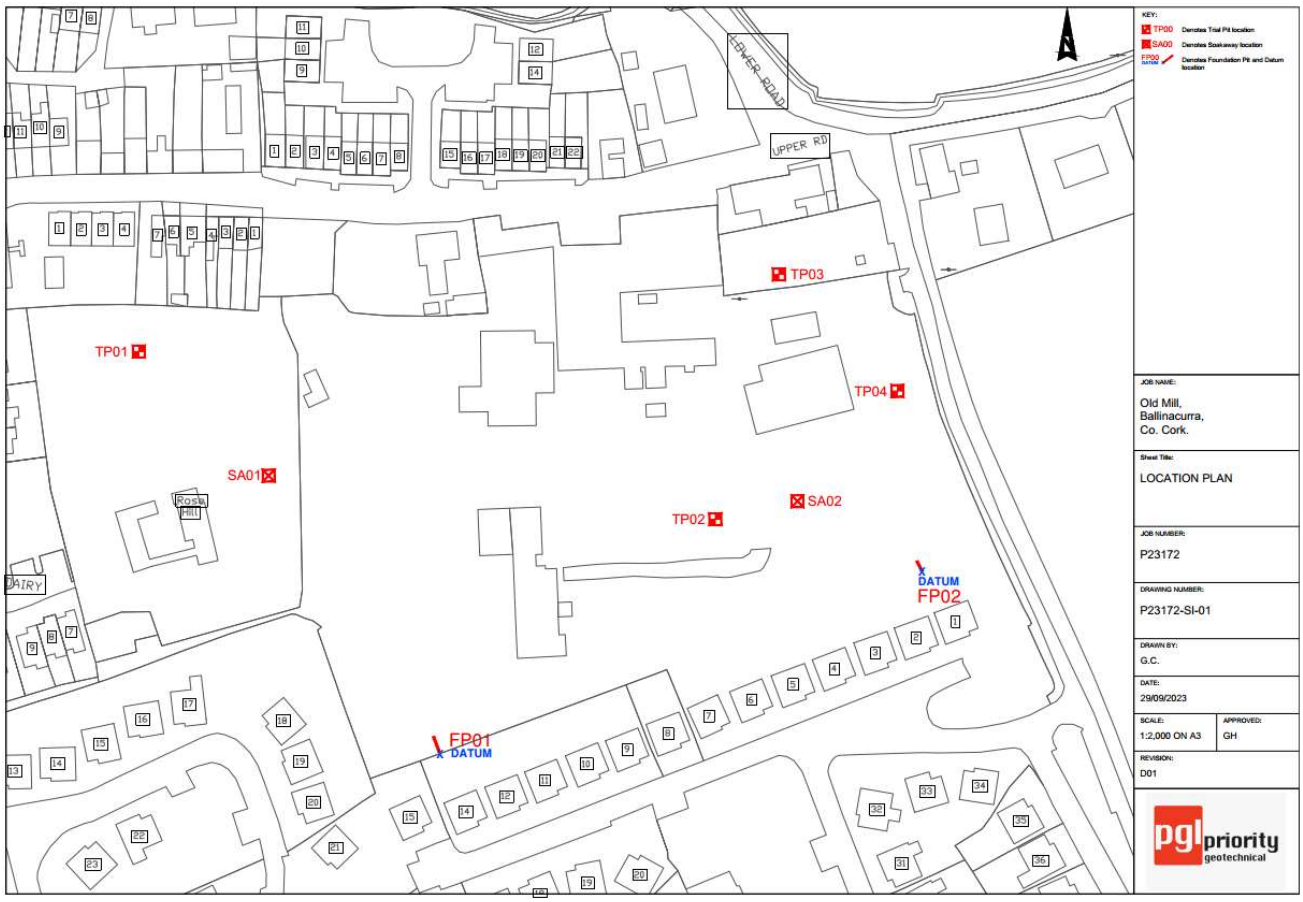


Figure 4.1: Site investigation locations

The complete results and logs of the site investigations are included in appendices of this report. A full Site Investigation Factual and Interpretative Report will be included as part of full application.

Site Investigation - Storm design

With regards to the design of the storm water network, it was found that the chances of an infiltration are very low. This result, in combination with a known history of localised flooding, informed the design team that soak pits should not be utilised as a method of catering for surface water within the site. Rather, the decision was made to utilise several attenuation tanks with a designed flow control of less than greenfield run-off (QBar). See

extract from infiltration test results in **Figure 4.2** and 4.3 below. The infiltration tests were carried out in accordance with BRE Digest 365.

BRE 365 Soakway Test

P23154 **Old Mill Ballinacurra** **27/09/2023**

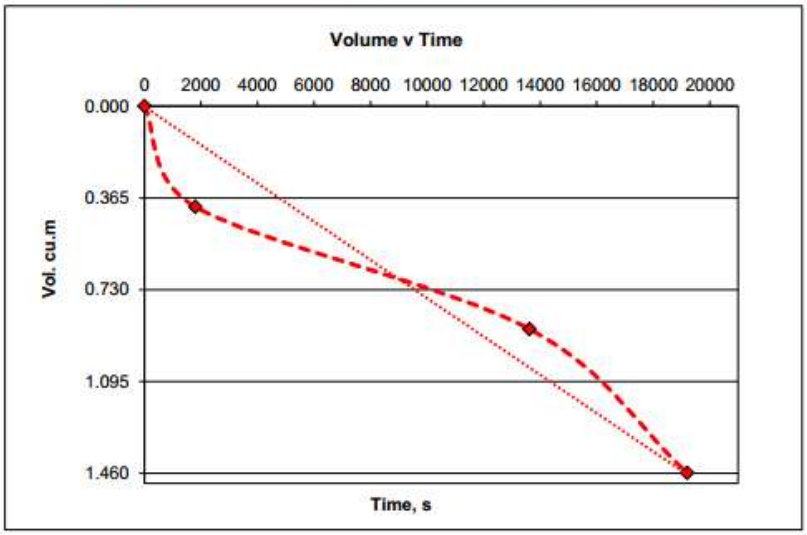
Test 1 **SA01** E588728.859 N571675.861 8.289mOD

l, m	**2.200**	b, m	**1.300**	d, m	**2.000**
l_base, m	**2.200**			d_eff, m	**0.790**
l_eff, m	**2.200**				

	Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
Start: 12:00:00	0	1.210	0	0.79	0.00	0.000
	30	1.350	1800	0.65	0.14	0.400
	227	1.520	13620	0.48	0.31	0.887
End: 17:20:00	320	1.720	19200	0.28	0.51	1.459

Area	2.860 m^2	$V_{p75\text{-}25\ theory}$	volume	1.1297	m^3
50% Area_eff, a_{p50}	5.625 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	0.7293	m^3
50% Area_act, a_{p50}	4.645 m^2	$t_{p\ 75\text{-}\ 25\ actual}$	time	9600	s

Infiltration Coefficient *f* 1.64E-05 ms^-1



NOTES:

Pit assumed unsaturated. Moderate stability
Infiltration calculated over actual fall recorded.

Figure 4.2: Infiltration test results – P23154

BRE 365 Soakway Tes

P23154 **Old Mill Ballinacurra** **27/09/2023**

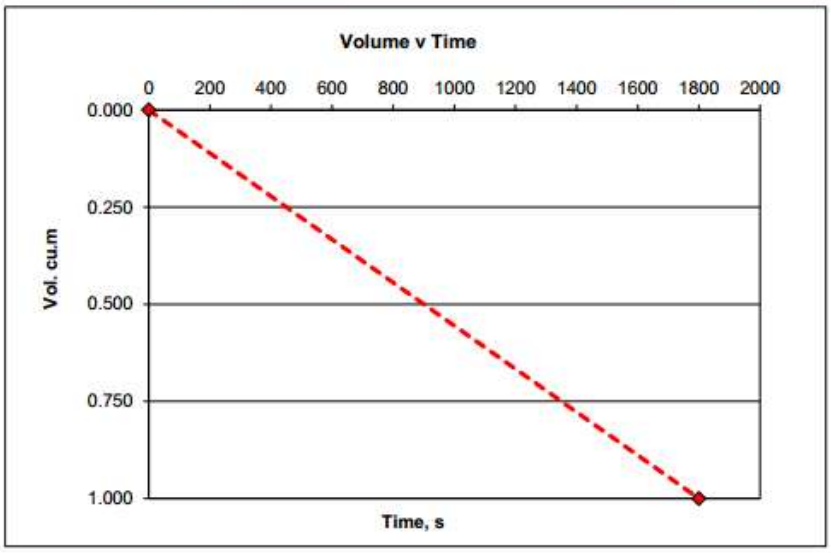
Test 1 **SA02** E588888.642 N571668.141 8.648mOD

l, m	**2.200**	b, m	**1.300**	d, m	**2.000**
l_base, m	**2.200**			d_eff, m	**0.350**
l_eff, m	**2.200**				

	Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
Start: 11:15:00	0	1.650	0	0.35	0.00	0.000
End: 11:45:00	30	2.000	1800	0.00	0.35	1.000

Area	2.860 m^2	$V_{p75\text{-}25\ theory}$	volume	0.5005	m^3
50% Area_eff, a_{p50}	4.085 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	0.5005	m^3
50% Area_act, a_{p50}	4.085 m^2	$t_{p\ 75\text{-}25\ actual}$	time	900	s

Infiltration Coefficient *f* 1.36E-04 ms^-1



NOTES:

Pit assumed unsaturated. Moderate stability
Infiltration calculated over actual fall recorded.
Water bowser drained in full 1000 lt (1.0cu.m) in 30 minutes.

Figure 4.3: Infiltration test results – P23154

Site Investigation - Road design

The site investigation bore holes and trial pits have informed the design team of the depth and strength of subsoil throughout the site. No rock was encountered during the site investigation. From this information an approximate volume of cut and fill material needed to construct the proposed development has been determined. The samples taken from each pit also went through a series of lab testing to examine the re-usability of the subsoil. The results of these tests have been included in the Site Investigation Interpretive Report completed by Priority Geotechnical, which has been submitted as part of the application documentation.

It was found that the volume of subsoil to be excavated is approx. 26,307.54 m^3 with the volume of fill required being approx. 8,771.59 m^3. All excavated subsoil will be considered for suitability to be used as fill on site. No hazardous material was uncovered during the site investigation. It is proposed that excavated material generated on site shall be treated as necessary for use as general fill around the site. As a result of the assessment of several soil samples taken from the trial pits, the grading capability of the subsoils has been assessed as follows:

Topsoil was 100mm to 400mm thick, overlay mixed glacial deposits; slightly sandy slightly gravelly SILT, very gravelly SAND and (slightly) silty very sandy GRAVEL with low Cobble contents were encountered up to 1.5m below existing ground level (bgl) to 4.5m bgl. Limestone Boulders were encountered below a depth 1.8m at TP01.

Groundwater levels may be subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions, tidal variations etc. The duration trial excavations remain open may not allow for equilibrium groundwater level to be established in cohesive deposits. The groundwater regime should be assessed from standpipe well installations where available.

The full results from this analysis has been included as a part of the application documentation.

Extracts from trial pit and borehole logs generated by Priority Geotechnical are highlighted in **Figure 4.4** below. The full log information is included in the attached appendices.

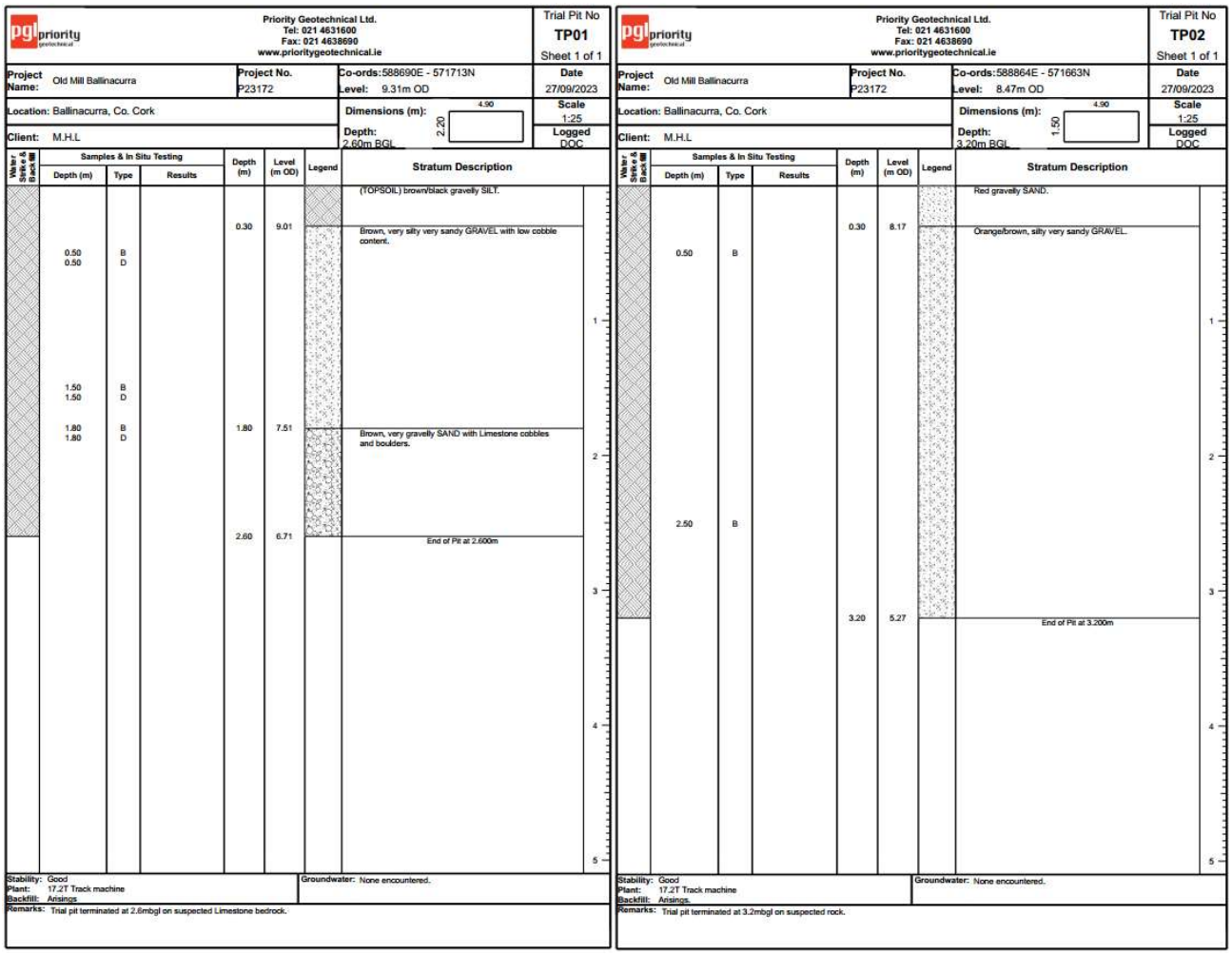


Figure 4.4: Trial Pit 01 and Trial Pit 02 logs

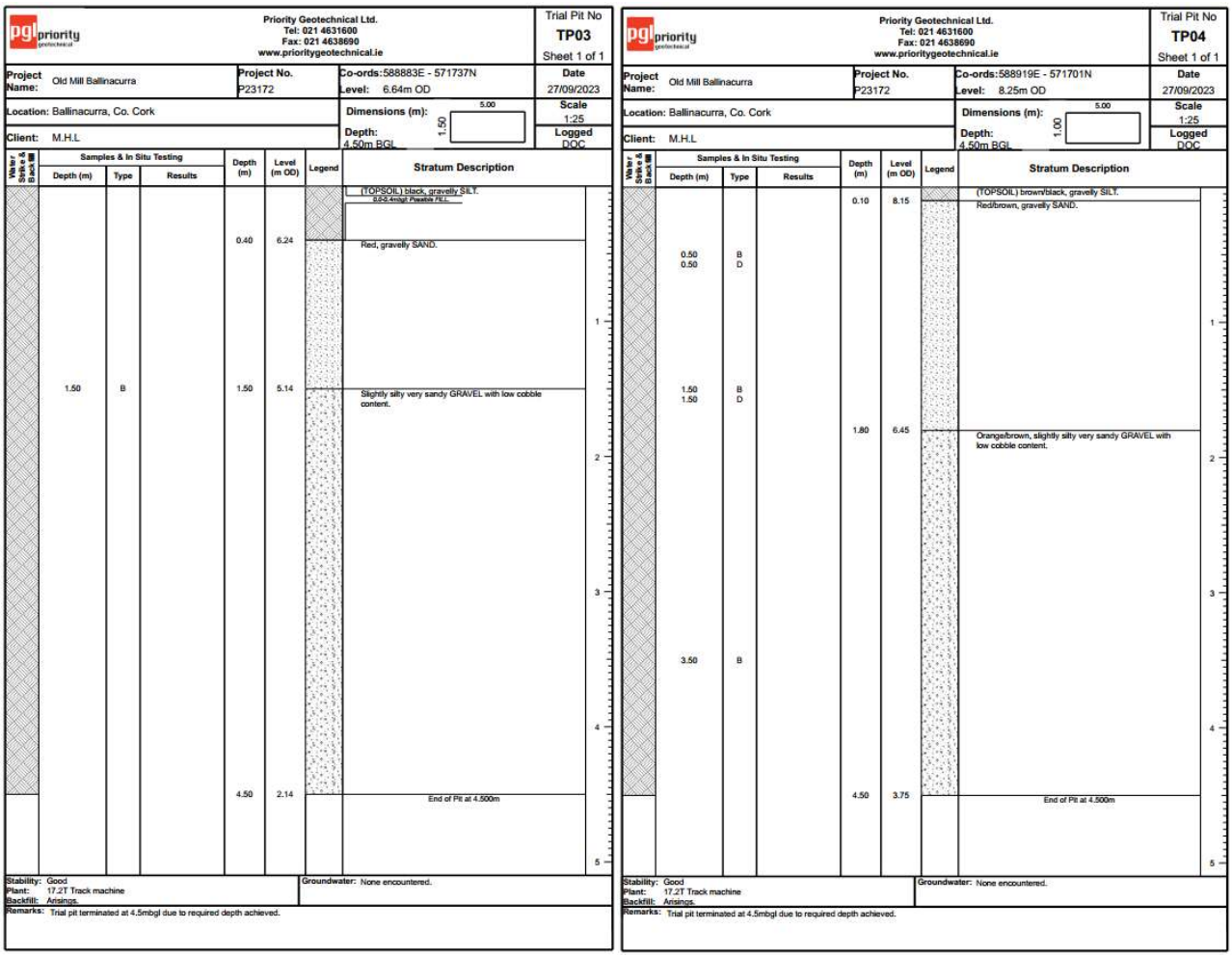


Figure 4.5: Trial Pit 03 and Trial Pit 04 logs

5. STORM WATER NETWORK

Storm design: (Return Period 1:100 with a 20% Climate Change Factor)

PROJECT: **BALLINACURRA MILL LRD SCHEME, COUNTY CORK**

CLIENT: **Ballinacurra Project Limited Partnership**

PROPOSED DEVELOPMENT: 128 residential units, Including creche, retail and commercial.

The proposed surface water drainage system is in accordance with Sustainable Urban Drainage Systems (SUDS) principles and divides the site into three (3) drainage catchments: all of which are proposed for attenuation utilising a number of reinforced concrete attenuation tanks. The proposed surface water drainage system for the development is to be carried out via two storm sewer networks. Storm network 1 includes the western extents of the proposed development while Storm Network 2 includes for the eastern extents of the proposed development. Each attenuation system is designed with a controlled flow rate of less than the greenfield run-off rate for the catchment area. This results in an overall discharge from the site of 6.99 l/s for Storm Network 1 and 2.65 l/s for Storm Network 2 which are less than the greenfield run-off of 15.53 l/s. The attenuated systems for Storm Network 1 will ultimately discharge into the existing stream north of the development via the public storm sewer present on Rose Lane while the attenuated systems for Storm Network 2 are to discharge into the public storm sewer present on the R629 northeast of the development, refer to **Figure 5.2**.

The pipe diameters of storm sewer network 1 were calculated to provide adequate capacity for the development and are shown in **Table 5.1** below. The minimum gradient in the development storm sewer network is 1/200. The maximum gradient in the development storm sewer network is 1/14.

The pipe diameters of storm sewer network 2 were calculated to provide adequate capacity for the development and are shown in **Table 5.2** below. The minimum gradient in the development storm sewer network is 1/200. The maximum gradient in the development storm sewer network is 1/22.

Petrol Interceptors will be located before stormwater sewers enter attenuation tanks to avoid the build up of petrol in attenuation tanks as well as silt traps to avoid the out falling of silt to the existing river.

Figure 5.1: Proposed storm/foul lines, attenuation tank, and flood storage tank locations

The storm-runs generally flow in a northerly direction to the five proposed attenuation tanks. The design of the attenuation tanks was informed by the actual site greenfield run-off rate for each catchment using HR Wallingford Methodology IH124. However, in order to produce a robust design, the surface water run-off rate has been restricted further for each tank. Details of the attenuation tanks design and sizes are included in **Table 5.3** below. Attenuation tanks have been designed for a storm return period of 1 in 100 year and with a 20% climate change factor.

One outfall is proposed from the surface water network to tie into the existing storm sewer running along R629 Lower Rd. As stated previously in this section, and shown in **Figure 5.2**, the development surface water from Storm Network 1 will ultimately discharge into the nearby stream to the north of the L96302.

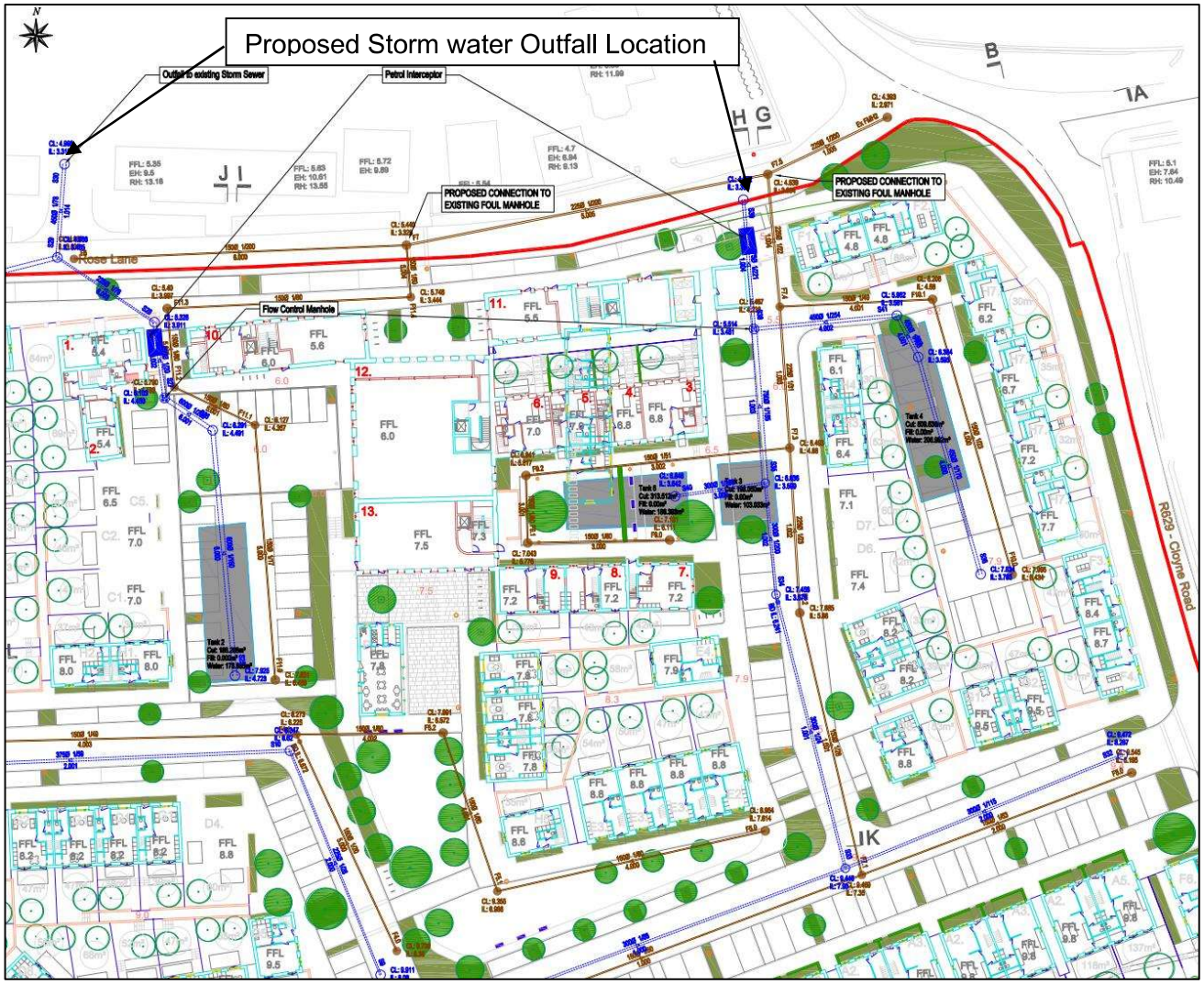


Figure 5.2: Proposed outfall from proposed surface water network

Layout details of the stormwater network can be found in drawings **23072HD-OPN-P01, 23072HD-OPN-P02** and **23072HD-OPN-P03**. Longsections of the stormwater network are presented in drawings **23072HD-SLS-P01**, **23072HD-SLS-P02, 23072HD-SLS-P03**, and **23072HD-SLS-P04**.

Pipe No.	Upstream MH ID	Downstream MH Node	Length (m)	Dia (mm)	Vel (m/s)	Outflow (l/s)	£ Area (ha)
1.000	S1	S2	39.733	0.225	1.224	25.475	0.081
1.001	S2	S3	8.464	0.225	1.061	31.948	0.012
1.002	S3	S4	19.967	0.225	0.925	36.768	0.027
1.003	S4	S5	33.197	0.225	1.816	71.407	0.093
1.004	S5	S6	22.896	0.300	1.458	94.226	0.063
1.005	S6	S7	13.515	0.300	3.247	97.303	0.013
1.006	S7	S12	38.500	0.375	1.451	114.769	0.054
2.000	S8	S9	11.131	0.225	1.124	14.778	0.042
2.001	S9	S10	35.413	0.225	2.571	43.058	0.080
2.002	S10	S12	57.557	0.375	0.001	0.075	0.116
1.007	S12	S21	12.115	0.375	0.002	0.189	0.008
3.000	S13	S15	36.574	0.225	-0	-0.008	0.087
4.000	S14	S15	26.400	0.225	0.298	7.07	0.027

3.001	S15	S16	30.037	0.225	0.000	0.015	0.074
3.002	S16	S19	16.656	0.225	0.000	0.014	0.009
5.000	S17	S18	34.743	0.225	2.601	34.771	0.098
5.001	S18	S19	7.473	0.225	0.000	0.007	0.000
3.003	S19	S20	12.739	0.225	0.001	0.021	0.000
3.004	S20	S21	25.741	0.300	0.000	0.024	0.043
1.008	S21	S22	11.072	0.600	0.001	0.195	0.000
1.009	S22	S23	22.425	0.750	0.368	0.219	0.068
1.010	S23	S24	31.212	0.750	0.202	28.324	0.077
1.011	S24	S29	21.636	0.600	0.566	4.896	0.000
6.000	S25	S26	34.849	0.600	0.002	0.501	0.155
6.001	S26	S27	8.185	0.600	0.001	0.276	0.021
6.002	S27	S28	10.808	0.450	0.489	0.691	0.034
6.003	S28	S29	16.509	0.225	0.510	0.691	0.000
1.012	S29	S30	13.236	0.450	0.856	5.423	0.000

Table 5.1: Storm Sewer Network 1 design output

Pipe No.	Upstream MH ID	Downstream MH Node	Length (m)	Dia (mm)	Vel (m/s)	Outflow (l/s)	£ Area (ha)
1.000	S31	S33	47.385	0.3	1.763	63.793	0.164
2.000	S32	S33	42.369	0.3	1.317	53.812	0.147
1.001	S33	S34	39.925	0.3	3.494	130.858	0.046
1.002	S34	S35	15.832	0.3	1.034	49.028	0.039
3.000	S40	S35	12.906	0.3	0.009	0.643	0.071
1.003	S35	S38	23.551	0.75	0.142	6.915	0.106
4.000	S36	S37	37.537	0.45	0.440	2.412	0.009
4.001	S37	S38	22.848	0.45	0.131	4.052	
1.004	S9	S11	16.633	0.375	0.489	1.85	0.024

Table 5.2: Storm Sewer Network 2 design output

Attenuation tank ID	Catchment (m^2)	Storage volume required (m^3)
AT-1	4,600	392
AT-2	2,100	179
AT-3	970	104
AT-4	2,400	207
AT-5	2,950	497
AT-6	2,200	187

Table 5.3: Storm water attenuation tank design and sizing

The construction of the storm sewer pipe network shall be in accordance with BS EN 752:2008 - drain and sewer systems outside buildings.

6. FOUL WATER NETWORK

Foul design

PROJECT: **BALLINACURRA MILL LRD SCHEME, COUNTY CORK**

CLIENT: **Ballinacurra Project Limited Partnership**

PROPOSED DEVELOPMENT: 128 residential units, Including creche, retail and commercial.

Each person is assumed to consume 150 litres of water per day.
Dry Weather Flow (DWF) = 450 litres/dwelling/day (2.7 persons per dwelling with a 10%-unit consumption allowance).
Design for Peak Flow (6 X DWF) = 2,700 litres/dwelling/day (to account for surges in the consumption at peak times leading to surcharges in the pipe network).

For each pipe run, the accumulative number of households contributing to that section of pipework is used to calculate the design flow. Contributions from the creche, retail unit, and café with offices were also determined and included in the design.

The calculated foul pipe diameters to provide adequate capacity for the development are shown in **Table 6.1** below.

Layout details of the foul network can be found in drawings **23072HD-OPN-P01, 23072HD-OPN-P02**and **23072HD-OPN-P03**. Longsections of the foul network are presented in drawings **23072HD-WWLS-P01**, **23072HD-WWLS-P02**, and **23072HD-WWLS-P03**.

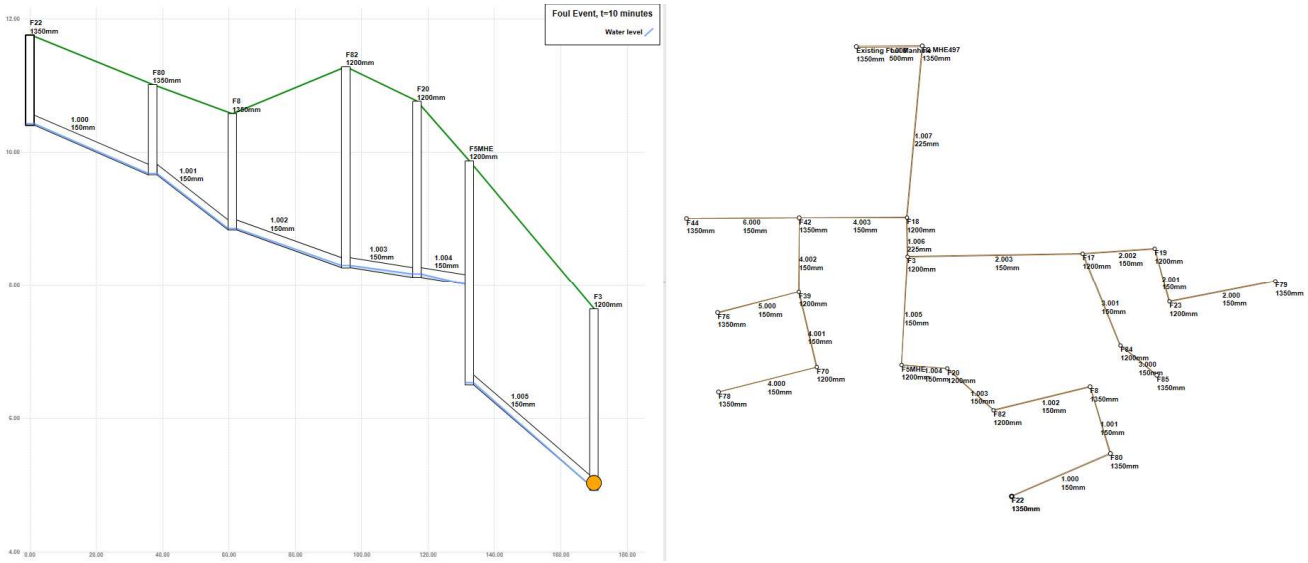


Figure 6.1: Typical Output profile plot and graph from foul sewer analysis package

The construction of the foul sewer pipe network shall be in accordance with Uisce Eireann Code of Practice for Wastewater Infrastructure Doc IW-CDS-5030-03.

Name	US Node	DS Node	Length (m)	Dia (mm)	Vel (m/s)	Flow (l/s)
1.000	F22	F80	37.010	150	1.684	0.9
1.001	F80	F8	24.005	150	2.223	1.0
1.002	F8	F82	34.197	150	1.533	1.0
1.003	F82	F20	21.440	150	0.955	1.9
1.004	F20	F5MHE	15.780	150	0.954	2.2
1.005	F5MHE	F3	37.530	150	2.402	2.2
2.000	F79	F23	37.091	150	1.532	0.0
2.001	F23	F19	19.043	150	1.534	1.1
2.002	F19	F17	24.843	150	1.533	1.4
3.000	F85	F84	16.151	150	1.951	0.7
3.001	F84	F17	34.391	150	3.125	0.9
2.003	F17	F3	60.238	150	1.568	1.9
1.006	F3	F18	13.445	225	3.357	3.3
4.000	F78	F70	34.861	150	1.533	0.5
4.001	F70	F39	26.603	150	1.534	1.0
5.000	F76	F39	28.808	150	1.887	0.5
4.002	F39	F42	25.732	150	1.531	1.5
6.000	F44	F42	38.772	150	3.344	0.5
4.003	F42	F18	37.083	150	0.956	1.8
1.007	F18	F2 MHE497	59.179	225	1.066	4.0
1.008	F2 MHE497	Existing Foul Manhole	22.703	500	1.768	4.3

Table 6.1: Foul design output

As per the confirmation of feasibility received from Uisce Eireann there is sufficient capacity in the local wastewater network to accommodate the proposed units in this scheme.

7. WATERMAIN NETWORK

Water design

PROJECT: **BALLINACURRA MILL LRD SCHEME, COUNTY CORK**

CLIENT: **Ballinacurra Project Limited Partnership**

PROPOSED DEVELOPMENT: 128 residential units, Including creche, retail and commercial.

A 100mm diameter HDPE watermain is proposed to supply potable water to all units and fire hydrants within the development. The proposed pipe network has no dead ends with loops serving a minimum of 4 units in accordance with Uisce Eireann Code of Practice for Water Infrastructure Doc IW-CDS-5020-03.

The 100mm mains will be connected to the existing mainline present on the R629 and L96302, respectively.

Figure 7.1: Watermain layout for Section of Proposed Development

Layout details of the watermain network can be found in drawings **23072HD-WM-P01**, **23072HD-WM-P02**, **23072HD-WM-P03**, and **23072HD-WM-P04**.

The construction of the water supply pipe network shall be in accordance with Uisce Eireann Code of Practice for Water Infrastructure Doc IW-CDS-5020-03. Service layout distances to comply with Uisce Eireann Detail STD-W-11.

A Pre-Connection Enquiry Form and Statement of Design Acceptance has been submitted to Uisce Eireann to progress connection details. The response from Irish Water is included in **Appendix A & Appendix E** of this report.

As per the confirmation of feesibility received from Uisce Eireann 110m of the existing watermain requires an upgrade and as part of this upgrade it will be developed in conjuncton with Uisce Eireann to ensure the that the flow will achieve the Fire Authority Requirements. This will be agreed with Uisce Eireann and the Fire Authority at connection application stage during construction.

8. PUBLIC LIGHTING

Public Lighting design

PROJECT: **BALLINACURRA MILL LRD SCHEME, COUNTY CORK**

CLIENT: **Ballinacurra Project Limited Partnership**

PROPOSED DEVELOPMENT: 128 residential units, Including creche, retail and commercial.

A public lighting design report and associated drawing have been included as part of this planning submission. The public lighting design for the development has been designed in compliance with the following standards and guidelines;

- BS 5489-1: Code of Practice for the design of road lighting Part 1 - Lighting of roads and public amenity areas (2020)
- EN 13201-1: Road Lighting Part 1 - Guidelines on Selection of Lighting Classes (2014)
- EN 13201-2: Road lighting Part 2 - Performance requirements (2015)
- Cork County Council: Public Lighting Manual and Product Specification (2023)
- Institution of Lighting Professionals: Guidance Note 01/21 - The Reduction of Obtrusive Light (2021)
- Institution of Lighting Professionals: Guidance Note 08/18 - Bats and artificial lighting in the UK (2018)

The design was carried out using Lighting Reality Pro which is a specialized software package for lighting designers. The software is used to create standards-compliant plans for streetlights and outdoor areas, offering real-time calculations, integrated manufacturer data and tools to meet ecological needs, helping professionals design efficient and compliant public lighting systems.

The following is a non-exhaustive list of compliance notes for the public lighting layout;

- No trees shall be planted within 10m of lighting columns on the same side of the road or in such a manner that the foliage is likely to obstruct the light in the future.
- Hinged columns to be installed where accessibility by a maintenance vehicle is not viable.
- The minimum clearance from edge of carriageway to face of lighting columns shall be 0.8m as per Table 2 from BS 5489 for a design speed of <50km/hr.
- Columns are to have a double locked framed door and should be multisided galvanised to Cork County Council specification.
- Public lighting to be fed from new power supply connections.
- All Lanterns within the estate are to be Warm White 2700°K with a peak wavelength greater than 550nm

The public lighting design contained 7no. design grids which are listed below in **Figure 8.1**

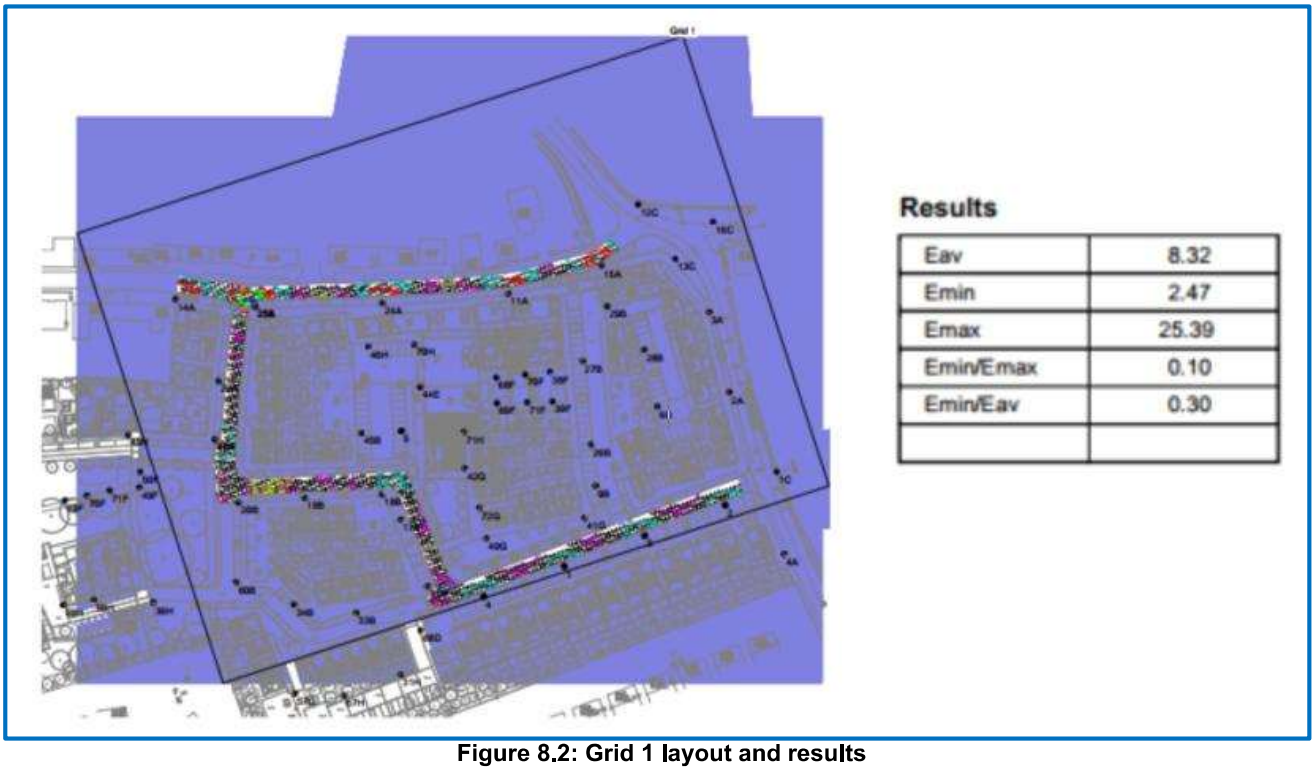
LIGHTING CLASSIFICATION
GRID 1: Main Estate Roads & Rose Lawn - P3
GRID 2: R629 - C4
GRID 3: Minor Estate Roads & Isolated Paths- P4
GRID 4: Junction R629/Geragh Road/Rose Lawn- C3
GRID 5: Junction R629/Development Access- C3
Grid 6: Rose Hill House & Parkland Cul de Sac- P5
Grid 7: Southern Cul De Sac - P5

Figure 8.1: Lighting Classification Table

GRID 1

Grid 1 contains the design for the Main Estate Roads & Paths as well as Rose Lawn which is the public road to the north of the site. The Lighting Classification applied to these areas is P3. P3 requires an E average of between 7.5 lux & 10 lux with an E minimum of 1.5 lux and a uniformity of at least 0.2.

The grid is shown below in **Figure 8.2** with the areas highlighted and results for the grid also shown.



Results

Eav	8.32
Emin	2.47
Emax	25.39
Emin/Emax	0.10
Emin/Eav	0.30

Figure 8.2: Grid 1 layout and results

GRID 2

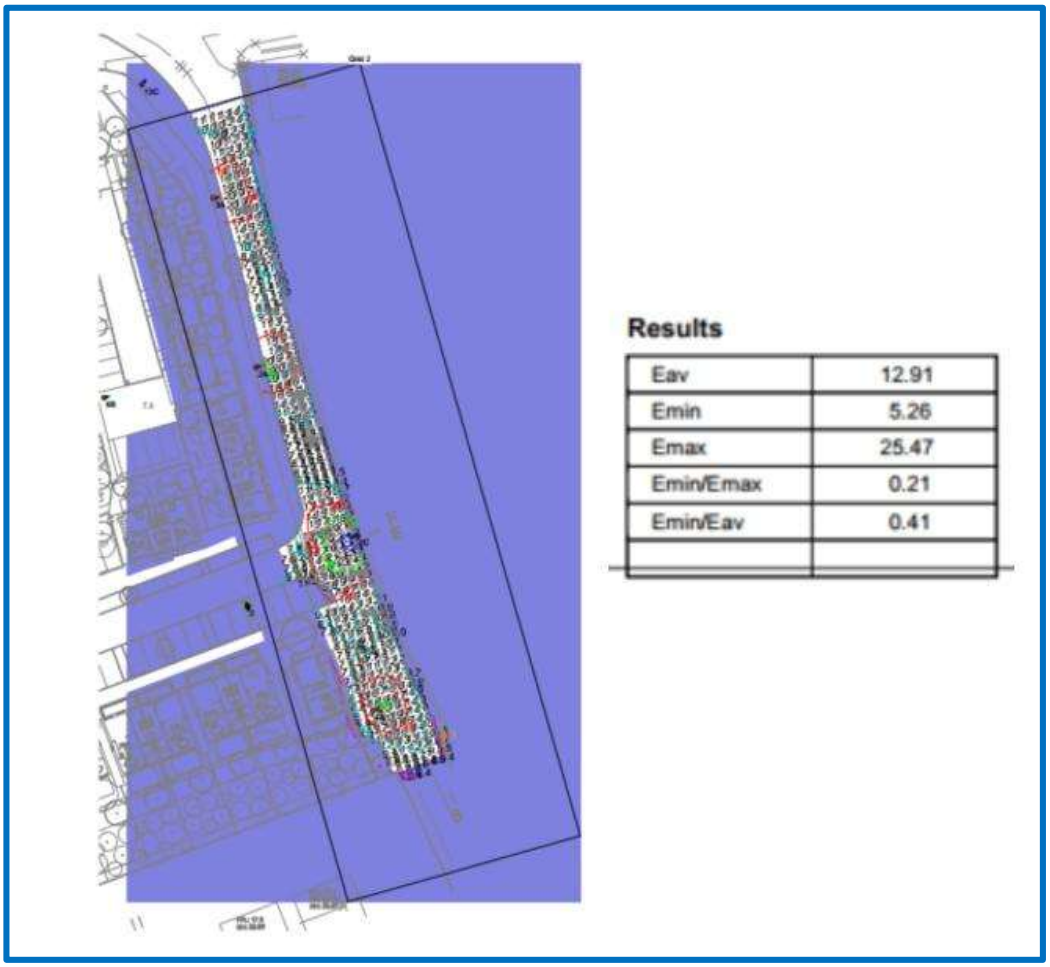
Grid 2 contains the design for the R629 road which is the public road to the east of the site. The speed limit on this section of the R629 is within the 50km/hr zone. Table A.3 from BS 5489-1 gives the lighting class for roads with speed limits below 40mph (64km/hr). A traffic flow of Low to Moderate has been chosen for the R629. This gives a Lighting Classification of M4/C4.

Table A.3 Lighting classes for traffic routes ($v \leq 40$ mph)

Traffic flow	Lighting class		
	Dual carriageway		Single carriageway
	Junction density: high	Junction density: low	
High to very high [A]	ME3b or M3	ME4a or M4	ME3b or M3
Low to moderate [B]	ME4a or M4	ME5 or M5	ME4a or M4
Very low [C]	ME5 or M5	ME6 or M6	ME5 or M5

Figure 8.3: Table A.3 (BS 5489-1)

M4/C4 requires an E average of at least 10 lux and a uniformity of at least 0.4. The grid is shown overleaf in **Figure 8.4** with the areas highlighted and results for the grid also shown.



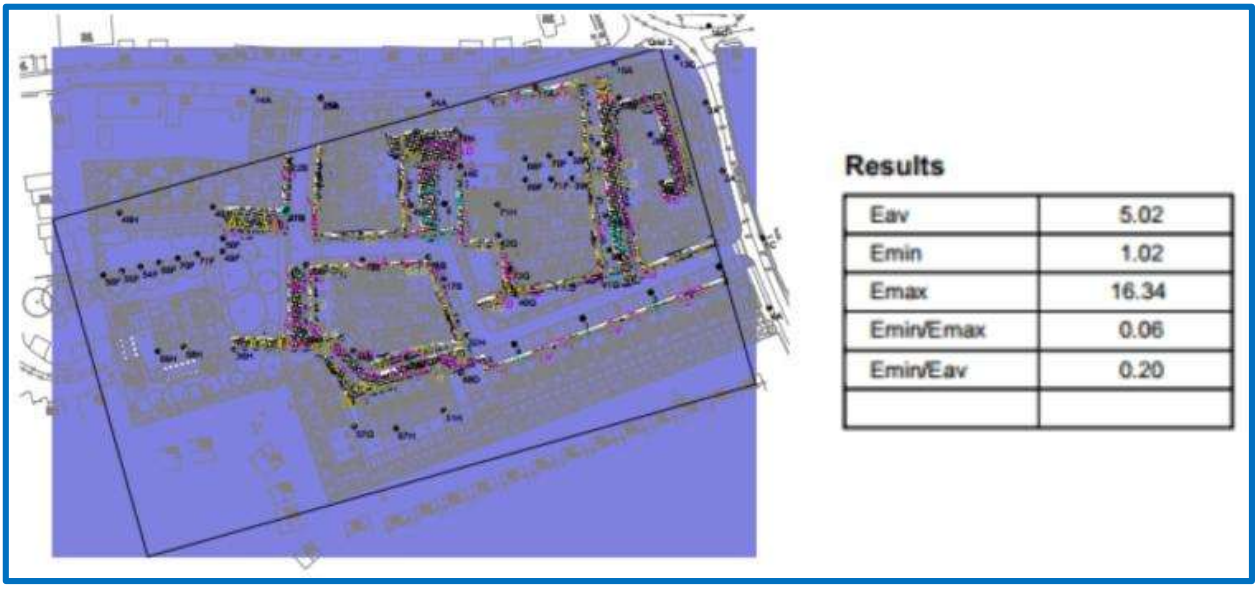
Results

Eav	12.91
Emin	5.26
Emax	25.47
Emin/Emax	0.21
Emin/Eav	0.41

Figure 8.4: Grid 2 layout and results

GRID 3

Grid 3 contains the design for the minor estate roads and isolated paths. The Lighting Classification applied to these areas is P4. P4 requires an E average of between 5.0 lux & 7.5 lux with an E minimum of 1.0 lux and a uniformity of at least 0.2. The grid is shown below in **Figure 8.5** with the areas highlighted and results for the grid also shown.



Results

Eav	5.02
Emin	1.02
Emax	16.34
Emin/Emax	0.06
Emin/Eav	0.20

Figure 8.5: Grid 3 layout and results

GRID 4

Grid 4 contains the design for the staggered junction intersection between the R629 Road/Geragh Road & Rose Lawn to the north east of the site. As this is classified as a Conflict Zone, a Lighting Classification of one step higher than the Lighting Class on the major road (R629) has been applied. This results in a step of from the M4/C4 class to a M3/C3 class for this intersection. M3/C3 requires an E average of at least 15 lux and a uniformity of at least 0.4. The grid is shown below in **Figure 8.6** with the areas highlighted and results for the grid also shown.

Figure 8.6: Grid 4 layout and results

GRID 5

Grid 4 contains the design for the development access onto the R629 Road. As this is classified as a Conflict Zone, a Lighting Classification of one step higher than the Lighting Class on the major road (R629) has been applied. This results in a step of from the M4/C4 class to a M3/C3 class for this intersection. M3/C3 requires an E average of at least 15 lux and a uniformity of at least 0.4. The grid is shown below in **Figure 8.7** with the areas highlighted and results for the grid also shown.

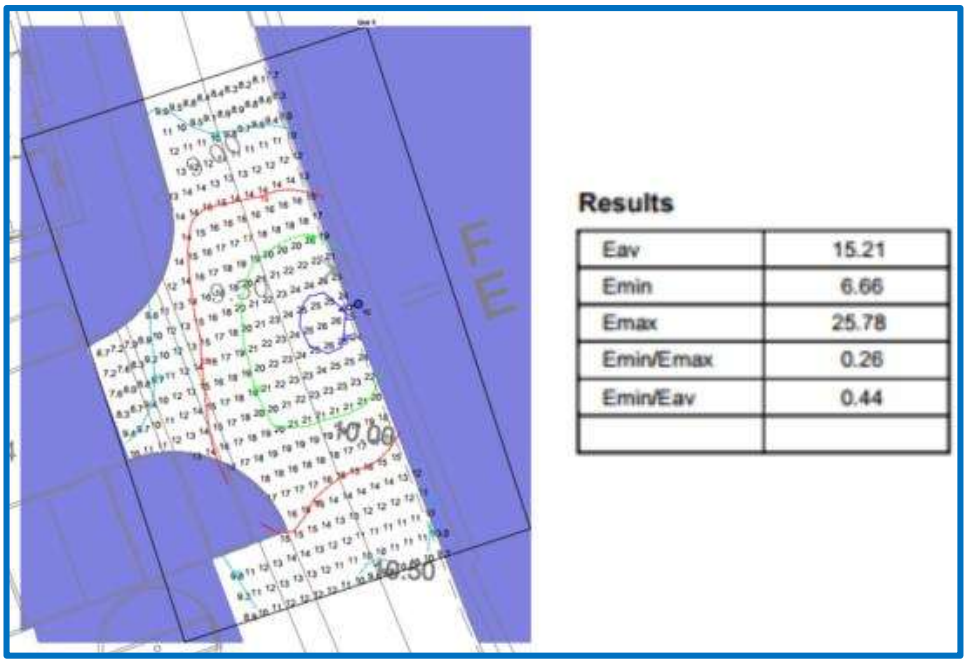


Figure 8.7: Grid 5 layout and results

GRID 6

Grid 6 contains the design for the private gated area of Rose Hill House as well as the home zone cul de sac in the parklands area in the north west of the development. The private gated area of Rose Hill House serves 5no. units while the home zone area to the north west serves 4no. units. Due to the sensitive nature of these areas from a heritage, parklands and ecological point of view, a Lighting Classification of P5 has been applied. P5 requires an E average of between 3.0 lux & 5.0 lux with an E minimum of 0.6 lux and a uniformity of at least 0.2. The grid is shown below in **Figure 8.8** with the areas highlighted and results for the grid also shown.

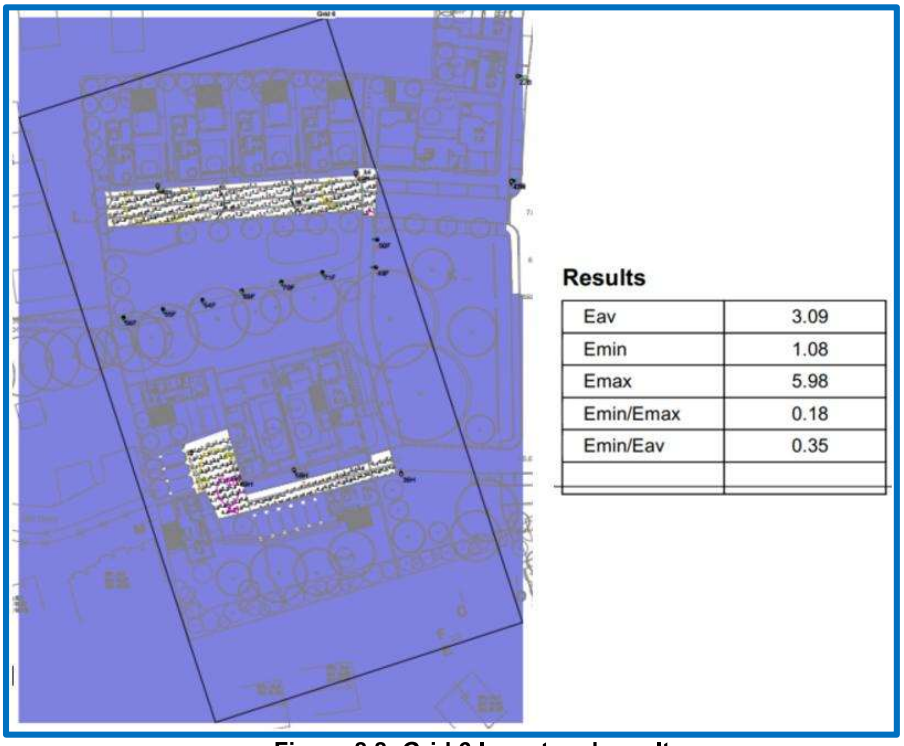


Figure 8.8: Grid 6 layout and results

GRID 7

Grid 7 contains the design for the home zone cul de sac in the south of the development. Due to the sensitive nature of this area from an ecological point of view, a Lighting Classification of P5 has been applied. P5 requires an E average of between 3.0 lux & 5.0 lux with an E minimum of 0.6 lux and a uniformity of at least 0.2. The grid is shown below in **Figure 8.9** with the areas highlighted and results for the grid also shown.

Figure 8.9: Grid 7 layout and results

9. FLOOD RISK ASSESSMENT

PROJECT: **BALLINACURRA MILL LRD SCHEME, COUNTY CORK**

CLIENT: **Ballinacurra Project Limited Partnership**

PROPOSED DEVELOPMENT: 128 residential units, Including creche, retail and commercial.

Planning guidelines on flood risk and development have been published by the OPW and Department of Environment, Heritage, and Local Government (DoEHLG). The below sections summarise how the developments design was assessed in accordance with the main principals of the guidelines.

SEQUENTIAL APPROACH

The sequential approach makes use of flood zones for river and coastal flooding, as described below:

Zone A High probability. This zone defines areas with the highest risk of flooding from of flooding. For river flooding it is defined as more than 1% probability or more than 1 in 100 years, and for coastal flooding it is defined as 0.5% probability or more than 1 in 200 years.

Zone B Moderate probability. This zone defines areas with a moderate risk of flooding. For river flooding it is defined as 0.1% to 1% probability or between 1 in 100 and 1 in 1000 years, and for coastal flooding 0.1% and 0.5% probability or between 1 in 200 and 1 in 1000 years.

Zone C Low probability. This zone defines areas with a low risk of flooding less than 0.1% probability or less than 1 in 1000.

The flood zones are then to be looked at with the vulnerability of the buildings proposed.

- Highly Vulnerable Hospitals, Garda stations, homes, motorways etc.
- Less Vulnerable commercial, retail, offices etc.
- Water Compatible Marina's, green areas

A sequential approach is then taken to assess the most favourable location for the development based on its vulnerability.

Zone A Water Compatible or Justification Test
Zone B Less Vulnerable if no other lands are available or highly vulnerable with Justification Test
Zone C Any development

DEVELOPMENT SEQUENTIAL TEST

Coastal Flood Risk
There is no risk associated with coastal flooding for this site as general ground levels for the site (circa 5.00m – 10.00m OD) are much higher than expected extreme coastal flood levels.

Fluvial Flood Risk
Fluvial flooding is the result of a river exceeding its capacity and excess water spilling out onto the adjacent floodplain.

Myplan.ie map incorporates many different sets of spatial information, including OPW Flood Mapping data (fluvial, pluvial, coastal flooding data and groundwater flood extents).

Figure 9.1 is an extract from www.floodinfo.ie and indicates that there is no fluvial flooding threat to the site of the proposed development.

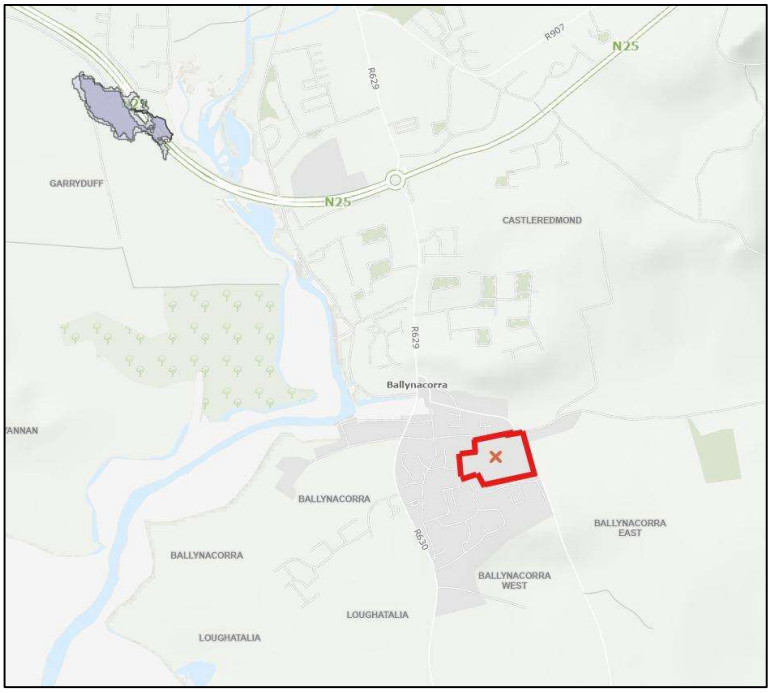


Figure 9.1: Fluvial flood map in the vicinity of the proposed site (outlined in red)

While the Ballinacorra Stream is in close proximity to the proposed site, as seen on the flood maps the stream poses no threat to the proposed site due to level differences.

Pluvial Flooding

The OPW Flood Hazard Mapping Website is a record of historic flood events, and this database indicates that High Tides and Strong Winds. Flooding caused by a combination of south-easterly winds and high tides. Flooding occurred on Monday morning 03rd Feb at high tide. Main Street (L3624), South Quay (L96303) and the local road from Main Street to the R630 (L3657) were all flooded including 2 no. houses on South Quay (4 and 5 Quay Place). On Tuesday evening04th Feb flooding occurred again at high tide. Again, Main Street, South Quay and L3657 were all flooded. No records of houses flooding a second time., see **Figure 9.2** below.

Figure 9.2: Historical flood events in surrounding area

The flood is as a result of the event in Ballinacurra Village, Midleton, Co. Cork. National Grid Reference: started on 3rd. February 2014 and ended on 5th. February 2014.

Figure 9.3 below shows the expected extent of flooding for each of the risk categories from 10% to 0.1% AEP Flood Events.

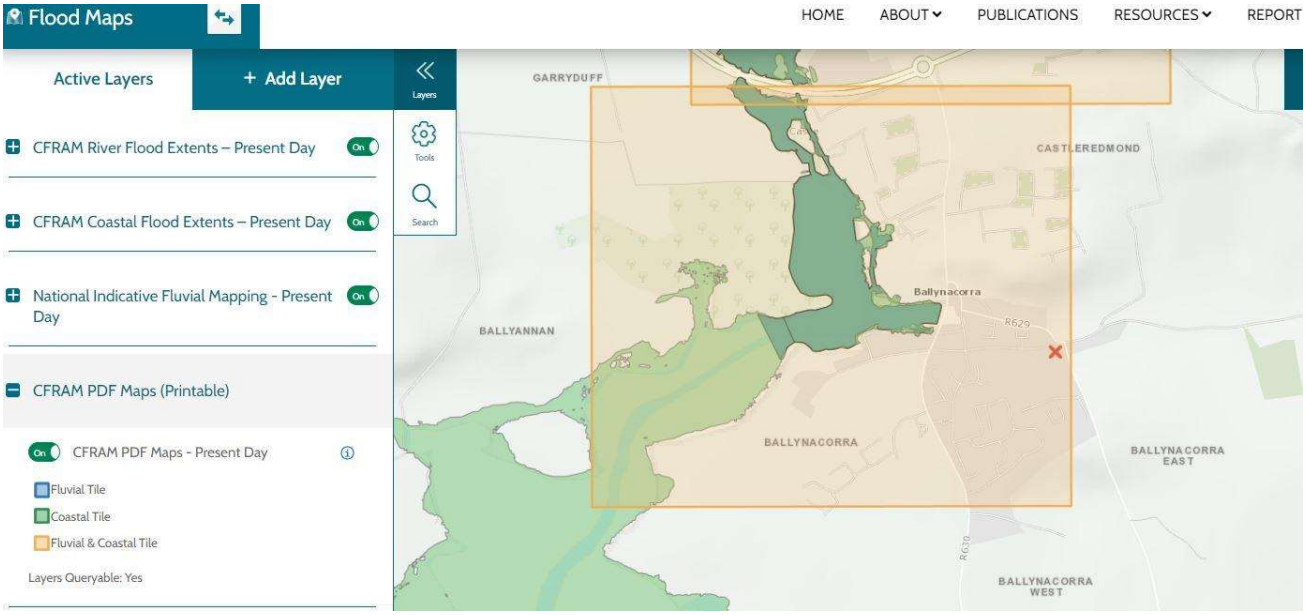


Figure 9.3: Flood Extent Mapping from the Lee CFRAMS Study

It is noted that the site of the proposed development has not been affected by the historical flood events nor is it vulnerable to predicted flood events as part of the Lee CFRAMS study. Evident from the mapping is that the adjoining residential scheme, Senandale, is vulnerble and will continue to be at risk unless remedial measures are put in place.

The following diagram indicates the location of rivers and streams in the vicinity of the site. **Figure 9.5** shows the historic 6 inch mapping for the area which does not include the man-made land drain running through the site. The stream running on the western boundary of the site is indicated on the historic map and hence a review of the catchment of this stream was undertaken. **Figure 9.6** is an extract from the OPW online map system which includes details of this stream. Evident from this map is the contributing catchment of 1.135 km², which is significantly less than the lower limit of 5 km² used to determine if watercourses are included in the CFRAMS model. The conclusion is that this northern stream running adjacent to the site was not included in the CFRAMS model and, therefore, the results of **Figure 9.3** relating to the site may be incomplete.

Figure 9.4 below presents the location and direction of the existing watercourses in relation to the site.

Figure 9.4: Location and direction of watercourses in relation to site

Figure 9.5: 6'' Historic Map of the area

Development Drainage

The proposed surface water drainage design proposes to discharge below QBAR for all rainfall events up to and including the 1 in 100-year storm event plus 20% climate change as discussed and agreed with the Cork County Council's Drainage Department. This exceeds the climate change factor of 10% required as part of GDSDS. As is evident from the HR Wallingford Greenfield Runoff Estimation tool (refer to **Appendix D**), the proposed discharge rate of 15.53 l/s is considerably lower than the 30-year and 100-year greenfield runoff rates and represents a substantial reduction in the peak run-off rates from the site. Furthermore, additional SuDS elements are proposed in areas where the designed layout, topography and ground conditions allow, which have not been included when sizing of the attenuation tanks. Specifically, a series of 'floodable' basins is proposed within the main greenspace serving the site that will restrict the volumes entering the stream on the western boundary.

All positive storm drainage within the site is being redirected to a proposed storm sewer on the L96302 where it will ultimately outfall to the West Ballynacora stream north of the development or to the existing public sewer

northeast of the site on the R629. The result is that the proposed control is very conservative and will result in a reduced flood risk downstream.

Figure 9.6 below presents the proposed layout for the storm network which includes for the six attenuation tanks distributed throughout the development.

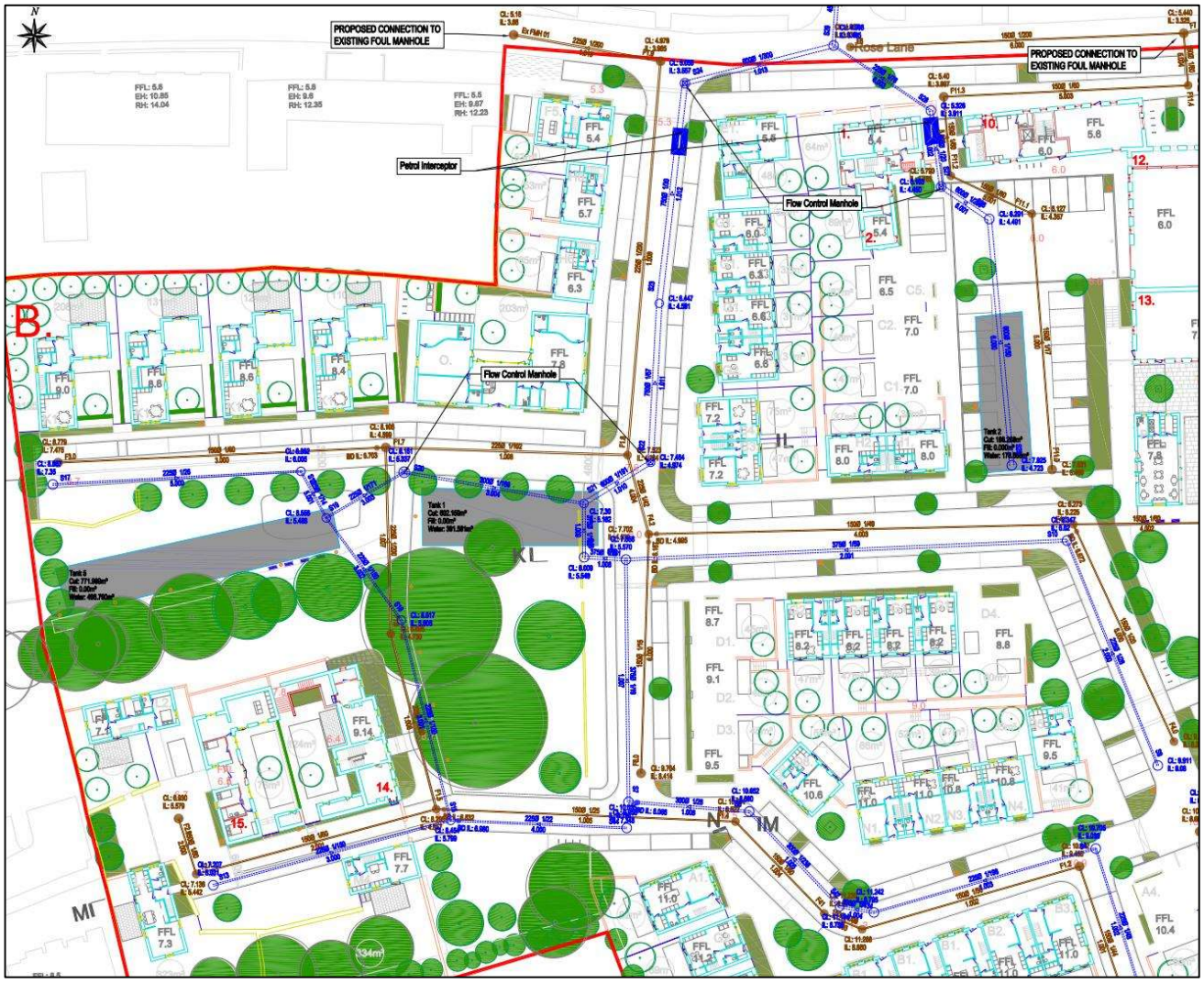


Figure 9.6: Proposed storm/foul lines, attenuation tank, and flood storage tank locations

Complete layout details of the stormwater network can be found in drawings **23072HD-OPN-P01, 23072HD-OPN-P02** and **23072HD-OPN-P03**. Layout and cross-section details of the proposed flood storage system are provided in drawings **23072HD-SLS-P01**, **23072HD-SLS-P02,** and **23072HD-SLS-P03**.

Flood Risk Assessment Conclusions

The site has been assessed in accordance with the Flood Risk Management Guidelines. As part of the sequential test, the OPW flood hazard maps, and the draft OPW Preliminary Catchment Flood Risk Assessment Maps were consulted.

Other sources of flood risk have been investigated including development drainage, however, there were no water bodies identified as a source of flood waters that could potentially impact the site. To mitigate any risk, measures including compensatory flood storage, and attenuated surface water drainage have been proposed. These measures will remove the risk of flooding occuring within the development site or the site impacting on the wider area.

For the aforementioned reasons, the development is deemed appropriate in the proposed site location.

10. NZEB COMPLIANCE

PROJECT: BALLINACURRA MILL LRD SCHEME, COUNTY CORK

CLIENT: Ballinacurra Project Limited Partnership

PROPOSED DEVELOPMENT: 128 residential units, Including creche, retail and commercial.

This document provides an overview of the developments energy strategy and relates to the sustainability and energy targets proposed for the project. The development must approach the energy design in an efficient manner that reduces energy demand initially through passive strategies such as an efficient envelope which in turn reduces the energy demands relating to items such as the heating system. This initial approach in reducing the energy demand significantly aids the project in obtaining the required energy goals. Performance criteria relating to the development's envelope are set out in the following document.

The energy systems design must also focus on specifying energy efficient equipment to ensure the day to day running of the energy systems are optimised to further enhance energy savings and the related energy cost. Specifications relating to efficient heating, lighting and auxiliary equipment are set out in the document.

The report sets out to demonstrate a number of methodologies in Energy Efficiency, Conservation and Renewable Technologies that will be employed in part or in combination with each other for this development. These techniques will be employed to achieve compliance with the building regulations Part L and NZEB standards currently in public consultation.

BUILDING ENERGY RATING

As of 2006 all domestic buildings that were newly built and existing buildings that are for sale or rent require a BER (Building Energy Rating) certificate. The actual building energy rating is based on the primary energy used for one year and is classified on a scale of A1 to G with A1 being the most energy efficient. It also gives the anticipated carbon emissions for a year's occupation based on the type of fuel that the systems use. In order to identify Primary energy consumption of the building, the BER assesses energy consumed under the following headings:

- Building type (house, apartment etc)
- Building orientation
- Thermal envelope (insulation levels of the façade, roofs, ground floor etc)
- Air Permeability (how much air infiltrates into the building through the façade)
- Heating systems (what type of heat source is used and how efficient)
- Ventilation (what form of ventilation is used. Natural vent, mixed mode mechanical ventilation)
- Fan and pump efficiency (how efficient are the pumps and fans)
- Domestic hot water generation (is a high efficiency boiler used)
- Lighting systems (how efficient is the lighting in the building

Through the specification of an energy efficient façade and HVAC systems, the energy consumption of the building will be reduced compared to a set baseline. This ensures the environmental and economic impact of the operation of the building is reduced. The key philosophy of this plan is to reduce energy consumption by firstly limiting the energy needed by improving the buildings insulation. The second step is to utilise energy in the most efficient way through the selection and installation of energy efficient plant and equipment. The final step is to introduce energy from renewable sources to reduce the burden on Fossil Fuels.

BUILDING SERVICES (M&E) OVERVIEW

Heating & Ventilation systems

Various options for heating of residential units will be considered including include possible gas boilers, heat pumps or exhaust air heat pumps.

Air source heat pumps utilize low grade heat from external ambient air and transfer heat to heating system pipework. These systems operate with very high efficiencies (>400%) which provides significant carbon reductions in comparison to a traditional boiler system.

Gas heating options would comprise a high efficiency gas boiler for provision of heating and hot water. Photovoltaic panels would be installed in conjunction with the gas boiler option to achieve the Part L renewable energy requirements.

Exhaust air heat pumps utilise an exhaust air heat pump type system for heating, hot water and ventilation of the individual units. This will re-cycle the heat from your house's ventilation system. These machines are ideal for more compact air-tight low energy or passive homes. Air is drawn through ducts to the heatpump from the bathrooms, utility and kitchen areas. The cold waste air is discharged to outside through another duct, and condensation to a drain. Additional heat generated internally from lighting, people and domestic appliances is also utilised through heat recovery.

For every unit of electricity used to operate the heat pump, up to four to five units of heat are generated. Therefore, for every unit of electricity used to generate heat, 4-5 (400-500%) units of heat are produced. Efficiencies in order of 600% may also be achieved depending on ambient conditions.

Photovoltaic panels are best suited to sites which have an unobstructed southerly and south-easterly elevations. PV is particularly suitable due where there is a simultaneous requirement for heating, hot water and electrical demand. The on-site generation of electricity can supplement the electrical requirement for lighting, motors, etc & reduce the electrical demand and from the grid.

Applying this to each dwelling would considerably reduce the demand from the grid and consequently reduce losses and emissions from power stations. Such is the benefit of on site or distributed generation, the DEAP model determines that each kWh offset from PV equates to circa 2.5 times the thermal equivalent and reduces CO2 emissions by some 0.47Kg/kWh generated.

Lighting

All lighting to be energy efficient with provision made for low energy lamps such as Compact Fluorescent Lamps (CFLs) which use 80% less electricity and last up to 10 times longer than ordinary light bulbs in the dwellings.

11. FIRE SAFETY

PROJECT: BALLINACURRA MILL LRD SCHEME, COUNTY CORK

CLIENT: Ballinacurra Project Limited Partnership

PROPOSED DEVELOPMENT: 128 residential units, Including creche, retail and commercial.

The scheme has been designed in compliance with Technical Guidance Document B of the Building Regulations. The various design drawings and documents have been developed to align with these requirements. Refer in particular to overall site layout drawings and water services design drawings. The water services have been designed in accordance with Irish Water Standard Details.

Appendices

APPENDIX A

Irish Water Pre-connection response