

An architectural rendering of a modern residential development. The scene features a multi-story brick building with large windows and balconies on the left. In the center, there is a parking lot with several cars and a few people walking. To the right, a green lawn area contains a playground with colorful equipment. The background shows a clear blue sky and some trees. The entire image is overlaid with a semi-transparent green filter.

APPENDIX 02

Project Description

- Appendix 2-1 – Engineering Design Report – MHL & Associates
- Appendix 2-2 – Construction Environmental Management Plan - MHL & Associates
- Appendix 2-3 - Construction Traffic Management Plan - MHL & Associates
- Appendix -2-4 – Road Safety Audit - MHL & Associates
- Appendix 2-5 – Proposed Site Layout – Deady Gahan Architects

ENGINEERING DESIGN REPORT

Cloghroe Development Cloghroe Cork January 2022



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

1. INTRODUCTION

PROJECT: CLOGHROE DEVELOPMENT, CLOGHROE, CORK

CLIENT: Cloghroe Development Limited

PROPOSED DEVELOPMENT: 198 residential units, a 42-child creche, a retail food store, and a café

MHL Consulting Engineers have been engaged by Cloghroe Development Limited to provide design consultancy services for the civil engineering elements associated with a proposed development of 198 residential units, a 42-child creche, a retail food store, and a café, to be determined by way of the Strategic Infrastructure Application process to An Bord Pleanála. The proposed site is located along the R617 in Cloghroe and is highlighted in Figure 1.1 below.

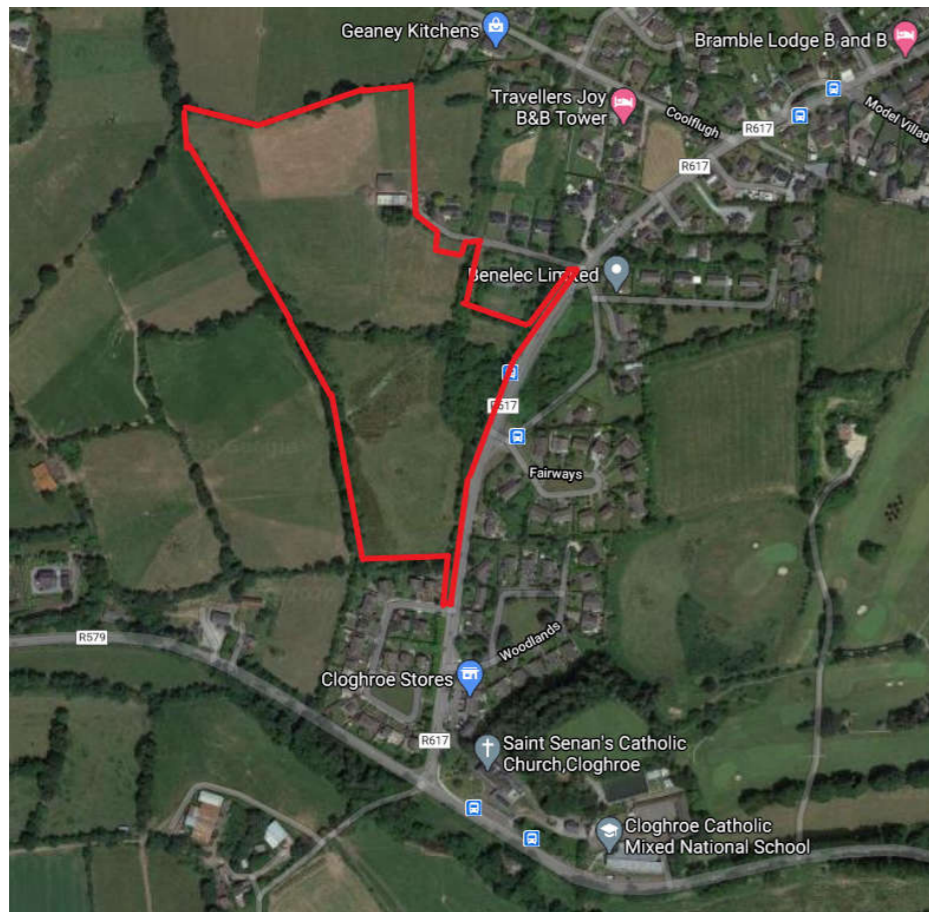


Figure 1.1: Site location

2. ROADS

PROJECT: CLOGHROE DEVELOPMENT, CLOGHROE, CORK

CLIENT: Cloghroe Development Limited

PROPOSED DEVELOPMENT: 198 residential units, a 42-child creche, a retail food store, and a café

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 5% and minimum gradient of 0.6% was used for all internal estate roads. Due to the sloped nature of the site, a gradient of 8.3% was required for short sections of Estates Roads 1 and 3 in areas featuring no direct access to dwellings. The design team has ensured that the lengths of road necessitating a gradient of 8.3% were kept to a minimum.



Figure 2.1: Overall proposed estate roads with cut and fill lines (refer to MHL drawing RL1-ERO-P01)

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 Urban 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 11m. 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 highlights 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	Junction Approach Length
Estate Road 1	8.3%	2.4%	30.0	5.0	2.5%/5.0%	64m/165m
Estate Road 2	5.0%	2.0%	5.0	5.0	2.0%/5.0%	60m/31m
Estate Road 3	8.3%	1.9%	5.0	3.0	1.9%/5.0%	110m/47m
Estate Road 4	5.0%	3.0%	10.0	5.0	3.0%	10m
Estate Road 5	3.0%	1.6%	30.0	30.0	3.0%/1.6%	20m/43m
Estate Road 6	0.6%	0.6%	-	-	0.6%	37m
Estate Road 7	0.6%	0.6%	-	-	0.6%	35m
Estate Road 8	1.0%	1.0%	-	-	1.0%	90m
Estate Road 9	0.7%	0.7%	-	-	0.6%/0.6%	39m/39m
Estate Road 10	0.6%	0.6%	-	-	0.6%	39m
Estate Road 11	0.6%	0.6%	-	-	0.6%	22m
Estate Road 12	0.6%	0.6%	-	-	0.6%	45m

Reference Document:
 ➤ Design Manual for Urban Roads and Streets 2019

Table 2.1: Internal Estate Roads Design

3. TRAFFIC AND PEDESTRIAN MANAGEMENT

PROJECT: CLOGHROE DEVELOPMENT, CLOGHROE, CORK

CLIENT: Cloghroe Development Limited

PROPOSED DEVELOPMENT: 198 residential units, a 42-child creche, a retail food store, and a café

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 5.0m 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 very well located in terms of connectivity to pedestrian footpaths which provide a link to public transport and local services such as retail stores, the Church, the Local National School, and the Village Centre in Tower.

Figure 3.2 presents proposed public realm works on the R617 including a 2.0m footpath, 1.0m grass verge, a 2.0m cycle lane, and a 3.25m reservation for a possible future bus lane to be provided as part of CMATS (Bus Connects). An off-road bus stop including bus shelter is also being proposed. 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

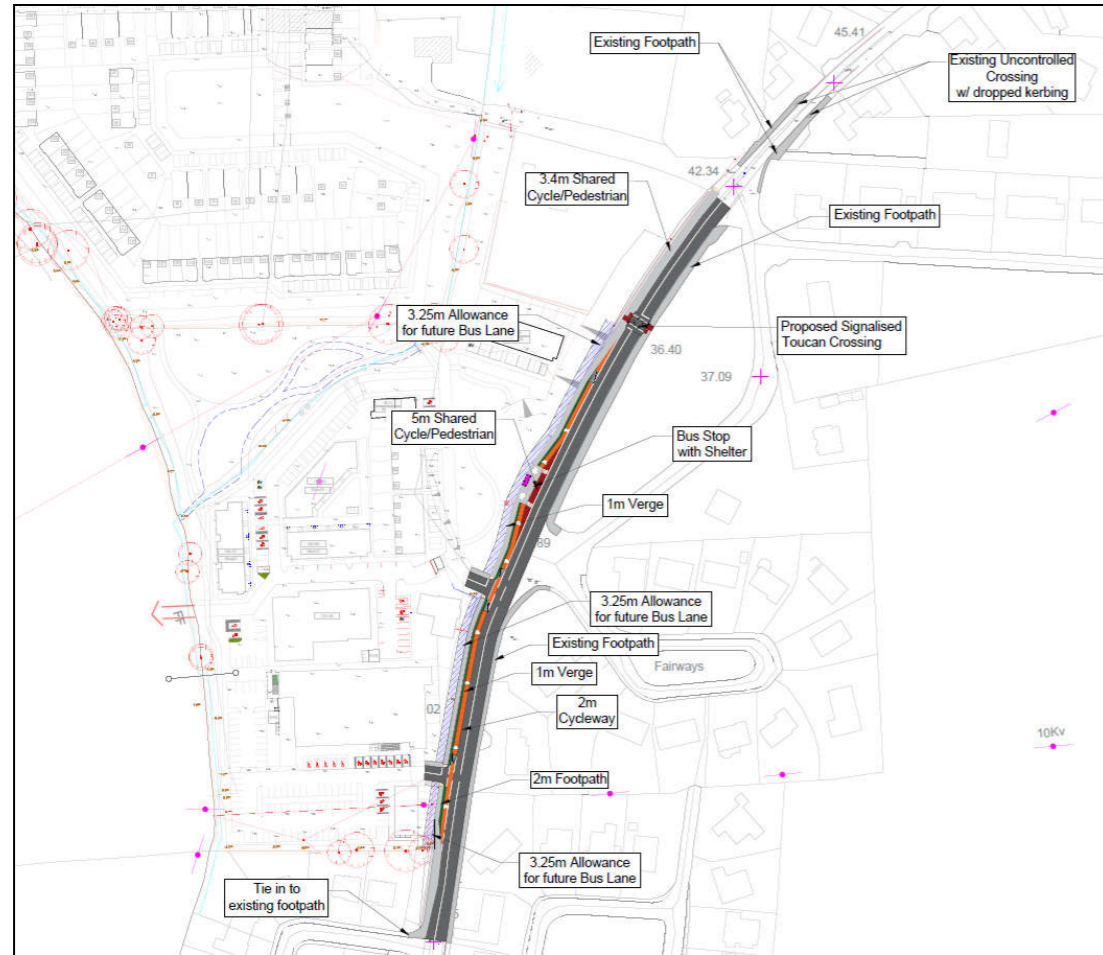


Figure 3.2: Proposed Pedestrian/Cycle Connectivity Improvement Measures along the R617

Currently a footpath is provided on the R617, opposite the development site, which connects as far as Blarney Village via Tower. Muskerry Golf Club is also accessible by footpath using a pedestrian entrance. It is proposed to provide a segregated footpath and cycle lane on the development side of the R617 to further enhance connectivity and create a safer environment for all road users.

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 Statement of Consistency for "Traffic and Transportation and Associated Infrastructure" and "DMURS Compliance" is included as a part of this submittal.

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: CLOGHROE DEVELOPMENT, CLOGHROE, CORK

CLIENT: Cloghroe Development Limited

PROPOSED DEVELOPMENT: 198 residential units, a 42-child creche, a retail food store, and a café

As part of the design for the proposed development, comprehensive site investigations were carried out by OCB Geotechnical on the green field site in September 2020. In total, site investigation consisted of 6 No. bore holes to measure the depth and strength of rock, 14 No. trial pits to measure the depth of soil and rock, 3 No. on-site CBR tests to measure the subgrade strength, and 3 No. infiltration pits to measure the on-site infiltration rate. The investigation also included laboratory testing on samples taken from trial pits and bore holes. 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.

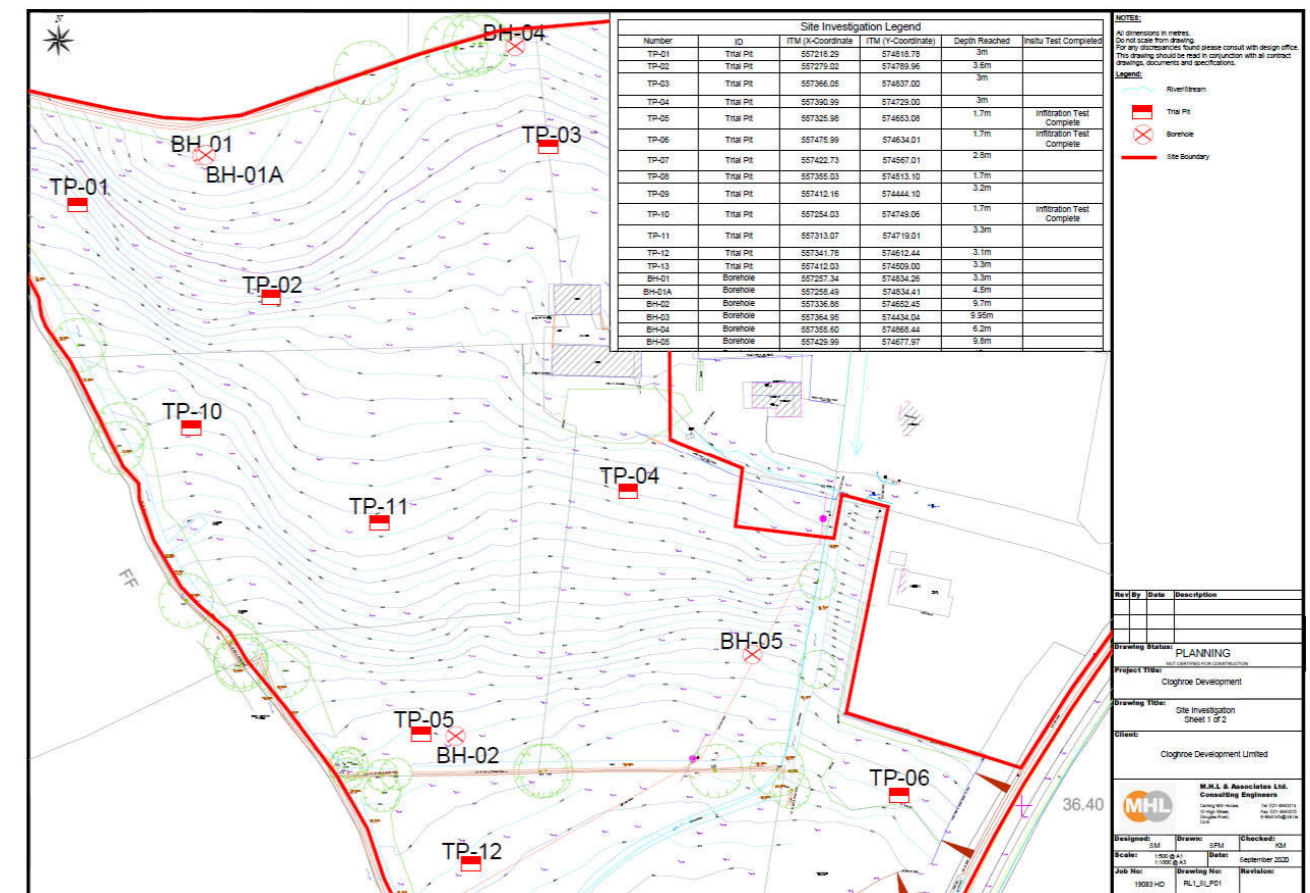


Figure 4.1: Site investigation locations

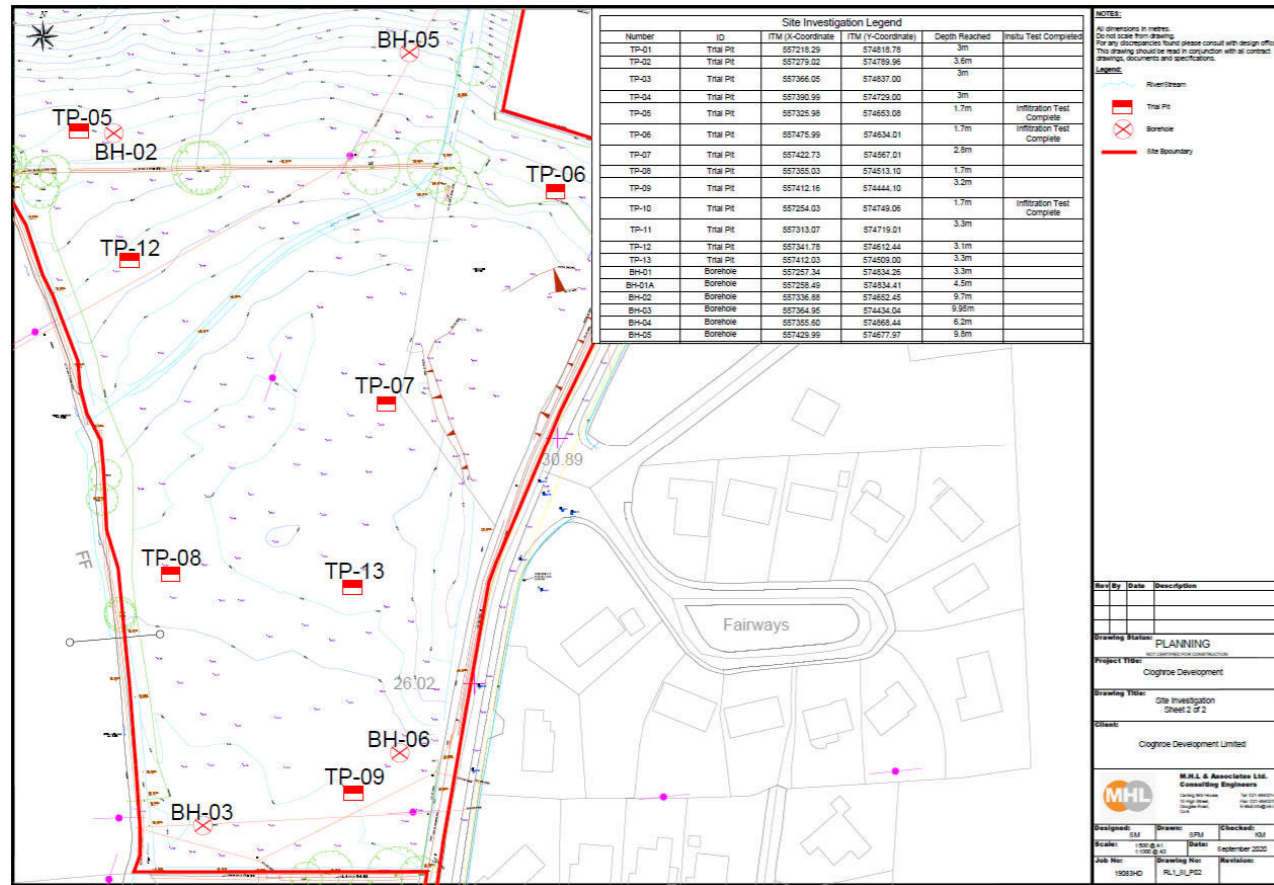


Figure 4.2: Site investigation locations

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.

In addition to the site investigation, the design team has consulted with Irish Hydrodata Limited to conduct hydraulic modelling of the stream running along the western boundary of the site. This study, which has encompassed the entire floodplain of the stream, has clarified the potential impact of flood storage within the site. The results of this study have been included as part of the application documentation.

Site Investigation - Storm design

With regards to the design of the storm water network, it was found that some soil infiltration was possible to the north of the site with no infiltration potential to the south. 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** below. The infiltration tests were carried out in accordance with BRE Digest 365.

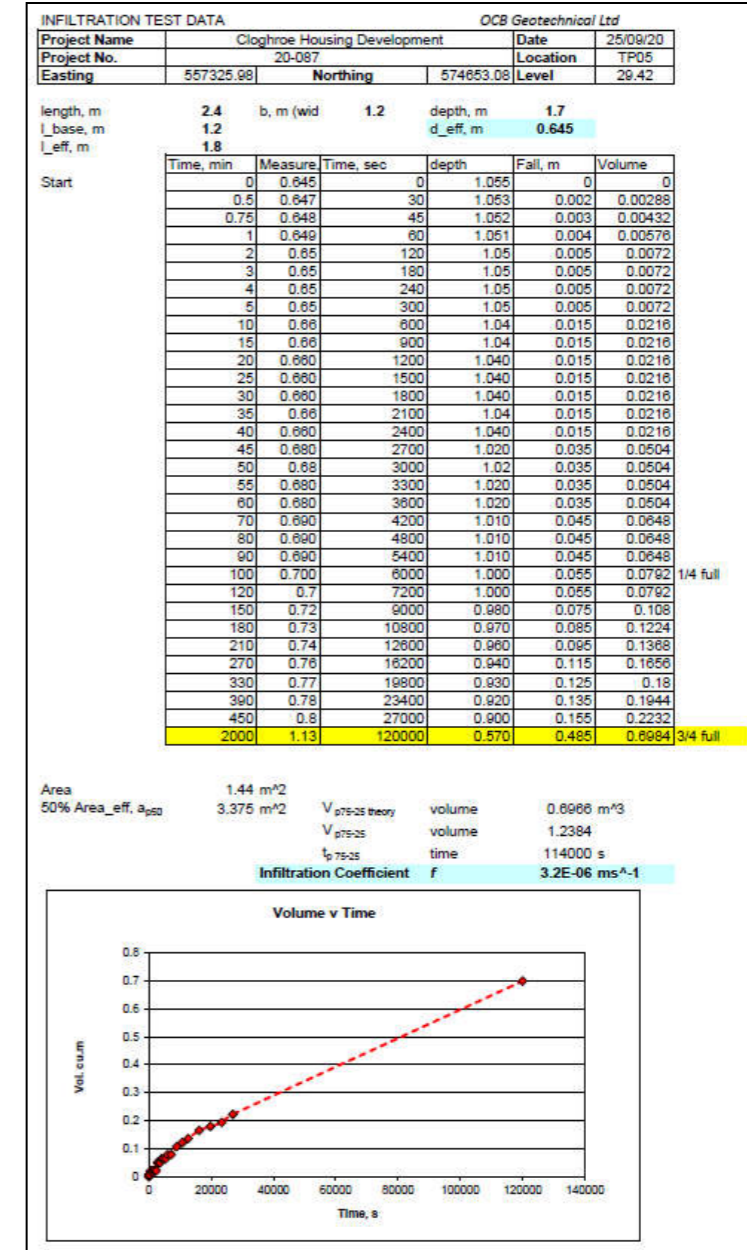


Figure 4.2: Infiltration test results – TP05

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 and borehole 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 OCB Geotechnical, which has been submitted as part of the application documentation.

It was found that the volume of subsoil to be excavated is approx. 9,700m³ with the volume of fill required being approx. 34,300m³. All excavated subsoil will be considered for suitability to be used as fill on site. 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:

- Made ground consisting of reworked clay fill extending to approximately 0.70m in depth. Foundations will transfer to below any Made Ground.
- Glacial till consisting of sandy gravelly clay, frequently with low cobble content, typically firm or stiff, and extending to depths of approximately 2.80m. Observed below the topsoil or made ground and atop the sands and gravels beneath. Estimated Allowable Bearing Pressure (ABP) ranges from 40-150 kPa.
- Fluvio-glacial deposits consisting of medium dense to very dense sands and gravels, extending to at least the depth of the borehole (4.50m – 10.00m). Estimated Allowable Bearing Pressure (ABP) ranges from 75-300 kPa..

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 OCB Geotechnical are highlighted in **Figure 4.3** below. The full log information is included in the attached appendices.

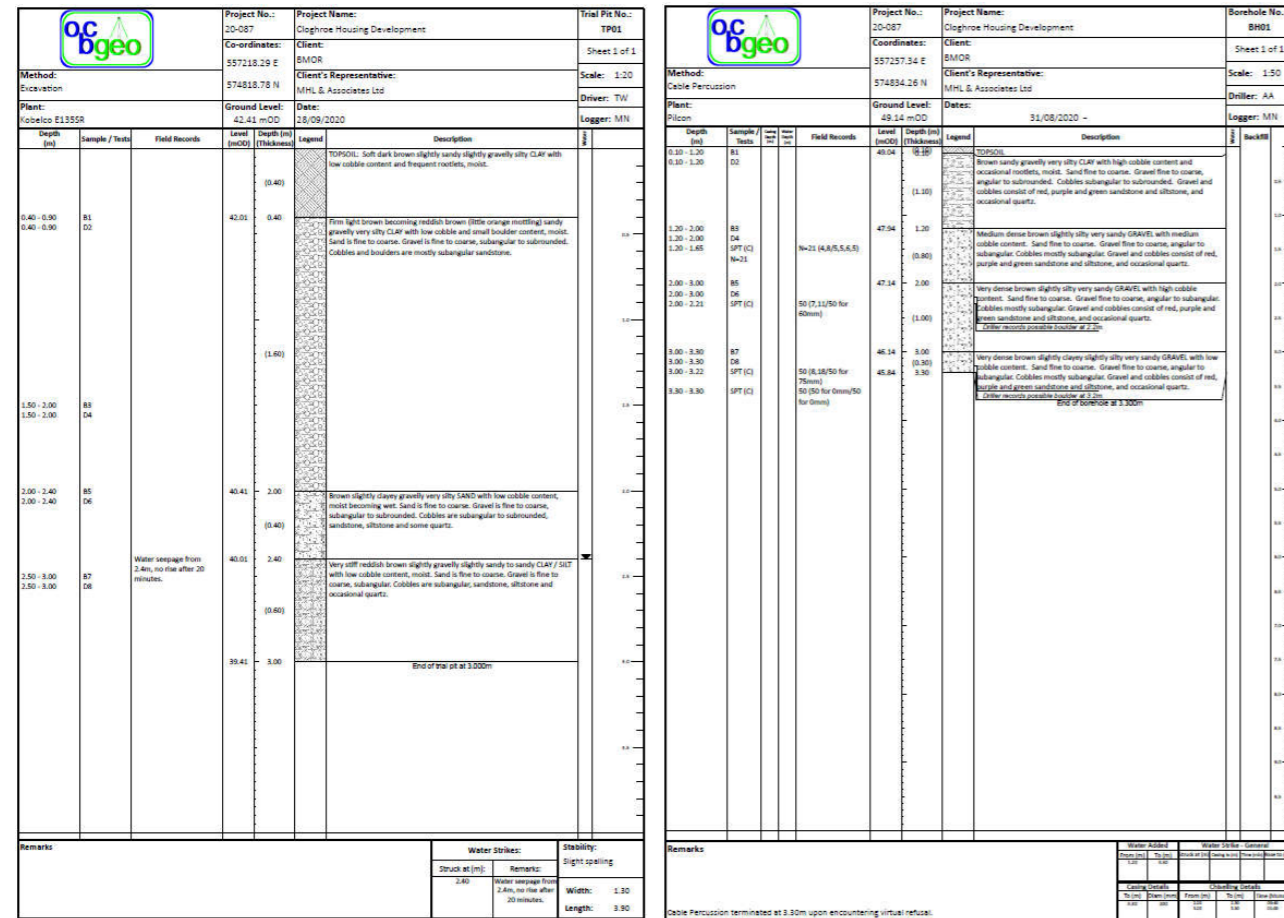


Figure 4.3: Trial Pit 01 and Bore Hole 01 logs

5. STORM WATER NETWORK

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

PROJECT: CLOGHROE DEVELOPMENT, CLOGHROE, CORK

CLIENT: Cloghroe Development Limited

PROPOSED DEVELOPMENT: 198 residential units, a 42-child creche, a retail food store, and a café

The proposed surface water drainage system is in accordance with Sustainable Urban Drainage Systems (SUDS) principles and divides the site into six (6) drainage catchments: all of which are proposed for attenuation utilising Stormtech Underground Chamber systems. 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 20.8 l/s which is less than the greenfield run-off of 25.29 l/s. The attenuated systems will ultimately discharge into the Owennagearah River downstream of the Currabeaha bridge via the public storm sewer present on the R617, refer to **Figure 5.2**.

The pipe diameters of the storm sewer 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 1/15.

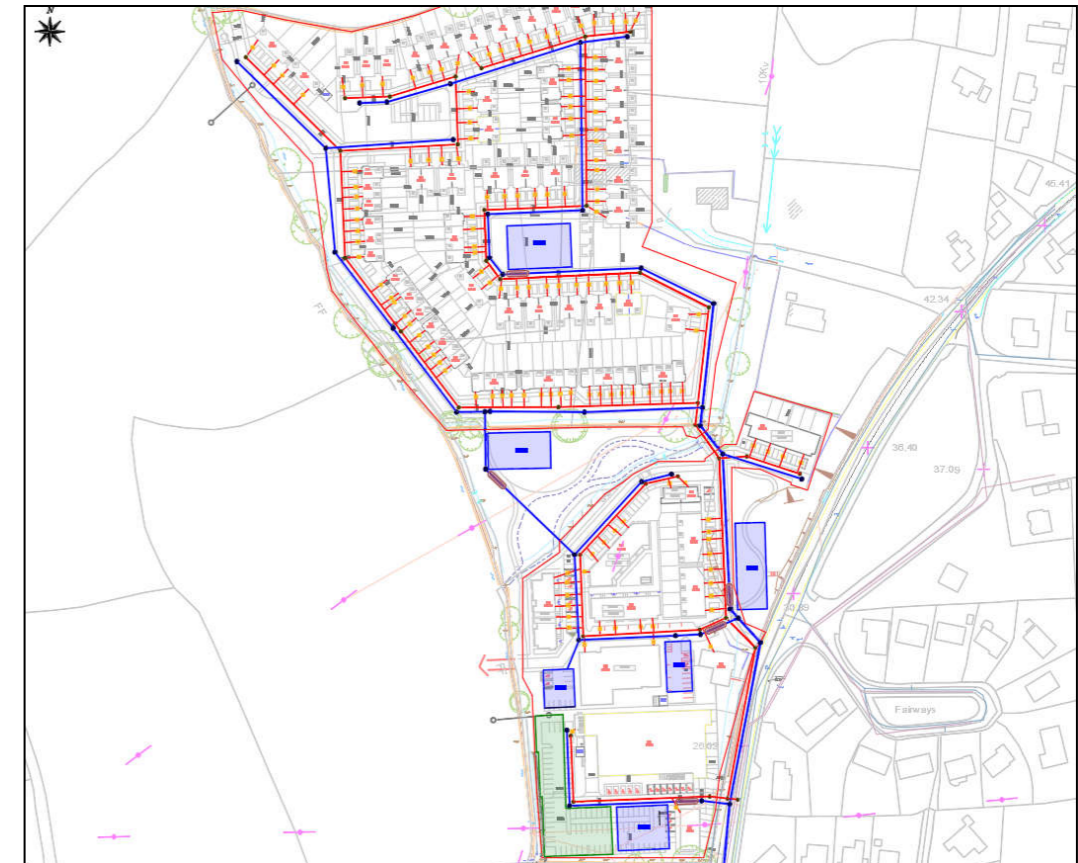


Figure 5.1: Proposed storm/foul lines, attenuation tank, and flood storage tank locations

The storm-runs generally flow in a south-easterly direction to the six 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 5.2** 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 R617 Blarney Rd. As stated previously in this section, and shown in **Figure 5.2**, the development surface water will

ultimately discharge into the Owennagearagh River to the east of the Currabeha Bridge. The proposed storm design greatly reduces the quantity of surface water from the development lands entering the stream running along the western boundary of the site.

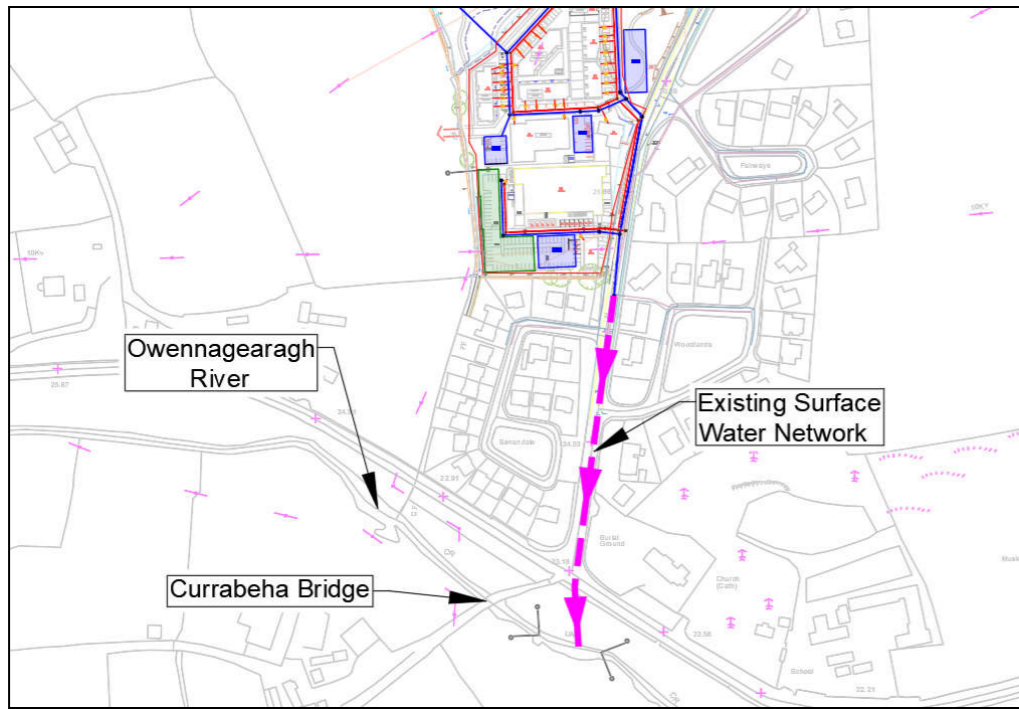


Figure 5.2: Proposed tie-in to existing surface water network

The existing land drain running from east to west through the centre of the site is to be expanded upon with the creation of two basins/wetland meadows prior to merging with the western boundary stream. In addition to slowing the velocity of surface water entering the western boundary stream, the basins provide for a good source of groundwater recharge.

Per Figure 5.1, a flood storage tank system incorporating Stormtech SC740 chambers is proposed at the southwest corner of the site. This system is proposed to accommodate for existing flood storage potential within the site during a 1000-year storm event. Refer to section 9 of this report for further detail.

Layout details of the stormwater network can be found in drawings RL1-OPN-P01 and RL1-OPN-P02. Longsections of the stormwater network are presented in drawings RL1-SLS-P01, RL1-SLS-P02, and RL1-SLS-P03.

Pipe Name	Upstream MH ID	Downstream MH Node	Length (m)	Dia (mm)	Vel (m/s)	Outflow (l/s)	Σ Area (ha)
S1.000	S1.000	S1.001	13.899	225	0.871	9.4	0.031
S1.001	S1.001	S1.002	33.712	225	0.842	18.0	0.060
S1.002	S1.002	S1.003	69.790	225	1.349	43.9	0.152
S1.003	S1.003	S1.004	85.667	225	3.075	120.4	0.422
S1.004	S1.004	S1.005	48.451	300	3.068	195.9	0.737
S1.005	S1.005	S1.006	22.196	300	3.234	227.7	0.863
S1.006	S1.006	S1.007	10.903	300	3.541	243.2	0.925
S1.007	S1.007	S1.008	70.834	300	1.526	7.2	0.961
S1.008	S1.008	S1.009	41.284	300	4.121	76.0	1.211
S1.009	S1.009	S1.010	53.387	375	4.042	80.4	1.228
S1.010	S1.010	S1.011	9.231	375	4.093	161.0	1.508

S1.011	S1.011	S1.012	18.480	375	2.282	161.3	1.508
S1.012	S1.012	S1.013	79.271	375	2.858	182.4	1.558
S1.013	S1.013	S1.014	6.223	450	0.906	11.3	1.838
S1.014	S1.014	S1.015	16.885	525	1.002	21.8	2.932
S1.015	S1.015	S4.003	84.036	525	1.065	21.3	2.932
S2.000	S2.000	S2.001	65.313	225	1.729	21.2	0.070
S2.001	S2.001	S2.002	53.310	225	3.370	85.6	0.283
S2.002	S2.002	S2.003	48.879	225	3.791	118.3	0.399
S2.003	S2.003	S2.004	53.715	225	4.202	145.3	0.489
S2.004	S2.004	S2.005	14.471	225	4.353	173.1	0.579
S2.005	S2.005	S2.006	29.312	300	4.478	181.8	0.579
S2.006	S2.006	S5.002	63.108	300		3.7	0.579
S3.000	S3.000	S2.001	63.425	225	0.000	0.0	0.000
S4.000	S4.000	S4.001	38.615	375	0.000	0.0	0.000
S4.001	S4.001	S4.002	67.549	375	2.100	46.7	0.150
S4.002	S4.002	S4.003	14.366	375		2.4	0.272
S4.003	S4.003	Existing Storm	43.228	525	1.222	20.2	3.265
S5.000	S5.000	S5.001	15.709	225	0.000	0.0	0.000
S5.001	S5.001	S5.002	50.615	225	0.490	0.6	0.002
S5.002	S5.002	S5.003	43.552	300	0.940	12.4	0.621
S5.003	S5.003	S5.004	49.508	375		4.9	0.792
S5.004	S5.004	S5.005	12.757	375		6.5	1.032
S5.005	S5.005	S1.014	21.089	375	1.025	19.9	1.094
S6.000	S6.000	S6.001	48.202	225	0.624	24.8	0.083
S6.001	S6.001	S1.010	60.344	225	1.314	47.5	0.166
S7.000	S7.000	S1.012	42.346	225	1.812	15.0	0.050

Table 5.1: Storm Sewer design output

Attenuation tank ID	Catchment (m ²)	Runoff area (m ²)		Storage volume required (m ³)
		Impervious area (100% runoff)	Green Area (10% runoff)	
AT-A	21,100	11,840	930	815
AT-B	12,300	6525	570	470
AT-C	10,980	6020	500	416
AT-D	8230	6450	180	471
AT-E	3850	3070	80	210
AT-F	4650	3390	130	235

Reference Document:
 ➤ CIRIA C697 2007: The Suds Manual

Table 5.2: 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: CLOGHROE DEVELOPMENT, CLOGHROE, CORK

CLIENT: Cloghroe Development Limited

PROPOSED DEVELOPMENT: 198 residential units, a 42-child creche, a retail food store, and a café

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 **RL1-OPN-P01** and **RL1-OPN-P02**. Longsections of the foul network are presented in drawings **RL1-FLS-P01**, **RL1-FLS-P02**, and **RL1-FLS-P03**.

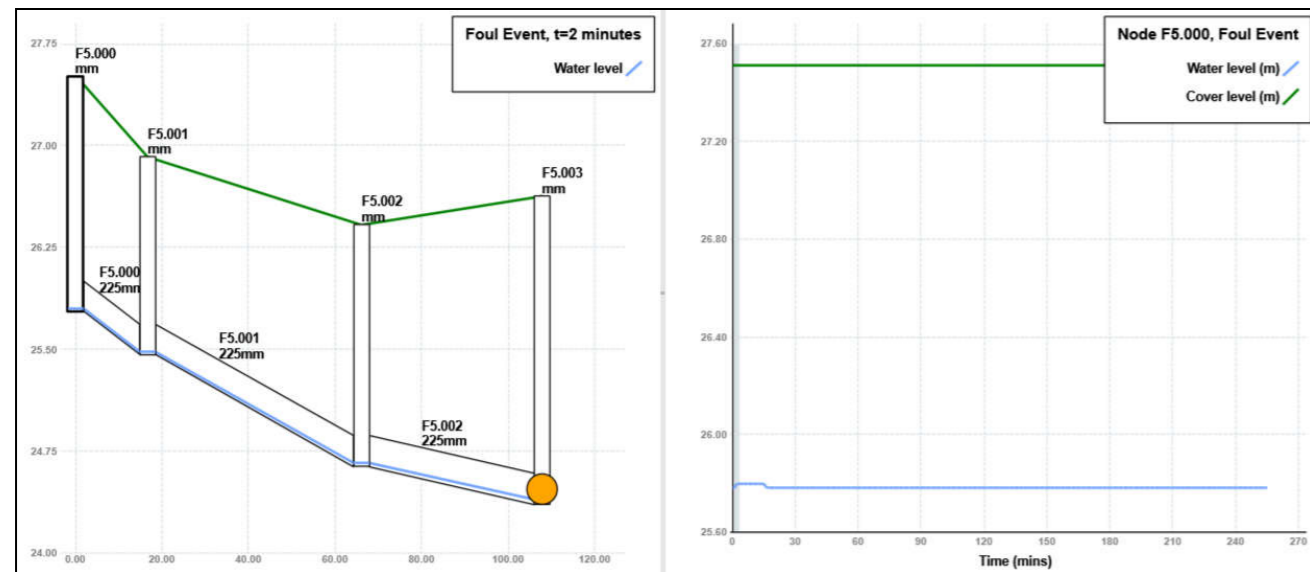


Figure 6.1: Typical Output profile plot and graph of F5.000 – F4.003 from foul sewer analysis package

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

Pipe ID	Upstream MH ID	Downstream MH ID	Length (m)	Dia (mm)	Vel (m/s)	Flow (l/s)
F1.000	F1.000	F1.001	23.006	150	1.546	1.2
F1.001	F1.001	F1.002	35.114	150	1.526	2.1
F1.002	F1.002	F1.003	34.681	150	1.879	3.3
F1.003	F1.003	F1.004	60.260	150	2.560	4.8
F1.004	F1.004	F1.005	54.684	150	2.562	5.4
F1.005	F1.005	F1.006	47.245	150	2.561	6.5
F1.006	F1.006	F1.007	48.769	150	2.562	7.1
F1.007	F1.007	F1.008	50.930	150	1.783	7.6
F1.008	F1.008	F2.008	71.353	150	0.826	8.5
F2.000	F2.000	F2.001	55.447	150	1.529	1.2
F2.001	F2.001	F2.002	86.484	225	2.582	4.3
F2.002	F2.002	F2.003	52.404	225	2.576	6.9
F2.003	F2.003	F2.004	25.921	225	2.517	7.5
F2.004	F2.004	F2.005	11.762	225	2.545	8.0
F2.005	F2.005	F2.006	71.555	225	2.733	8.2
F2.006	F2.006	F2.007	39.359	225	3.304	9.1
F2.007	F2.007	F2.008	49.127	225	3.301	9.1
F2.008	F2.008	F2.009	11.263	225	3.024	13.4
F2.009	F2.009	F2.010	20.986	225	3.189	13.5
F2.010	F2.010	F2.011	81.614	375	2.027	14.3
F2.011	F2.011	F2.012	21.348	375	2.895	15.4
F2.012	F2.012	F6.003	78.313	375	1.491	15.4
F3.000	F3.000	F1.004	67.954	225	3.304	1.2
F4.000	F4.000	F2.001	23.264	150	2.563	1.2
F5.000	F5.000	F5.001	16.763	225	2.125	1.2
F5.001	F5.001	F5.002	49.426	225	1.978	1.7
F5.002	F5.002	F5.003	41.681	225	1.243	3.0
F5.003	F5.003	F5.004	59.559	225	1.071	4.5
F5.004	F5.004	F2.011	14.842	225	1.035	5.4
F6.000	F6.000	F6.001	33.677	225	1.238	1.2
F6.001	F6.001	F6.002	69.743	225	1.085	1.2
F6.002	F6.002	F6.003	9.167	225	1.238	1.7
F6.003	F6.003	Ext Foul MH	5.227	375	1.285	15.6
F7.000	F7.000	F7.001	28.576	150	1.538	1.2
F7.001	F7.001	F2.010	14.114	150	1.532	2.8
Ext Pipe	Ext Foul MH	Ext MH 2	64.211	450	4.012	15.6

Table 6.1: Foul design output

Refer to **Appendix B** of this report for Irish Water statement of design acceptance letter received.

In order to accommodate the proposed connection, upgrade works to the existing pumps are required at the Cloghroe Wastewater Pumping Station. **Figure 6.2** shows the location of the pumping station in relation to the proposed development. The required works are classed as Exempted Development under Class 58 of the Planning and Development (Amendment) Regulations 2018 relating to the development by Irish Water, for the purpose of the provision of water services. Irish Water has confirmed that following the upgrades the pumping station will have sufficient capacity to adequately process the additional input from the operational demand of the proposed development.

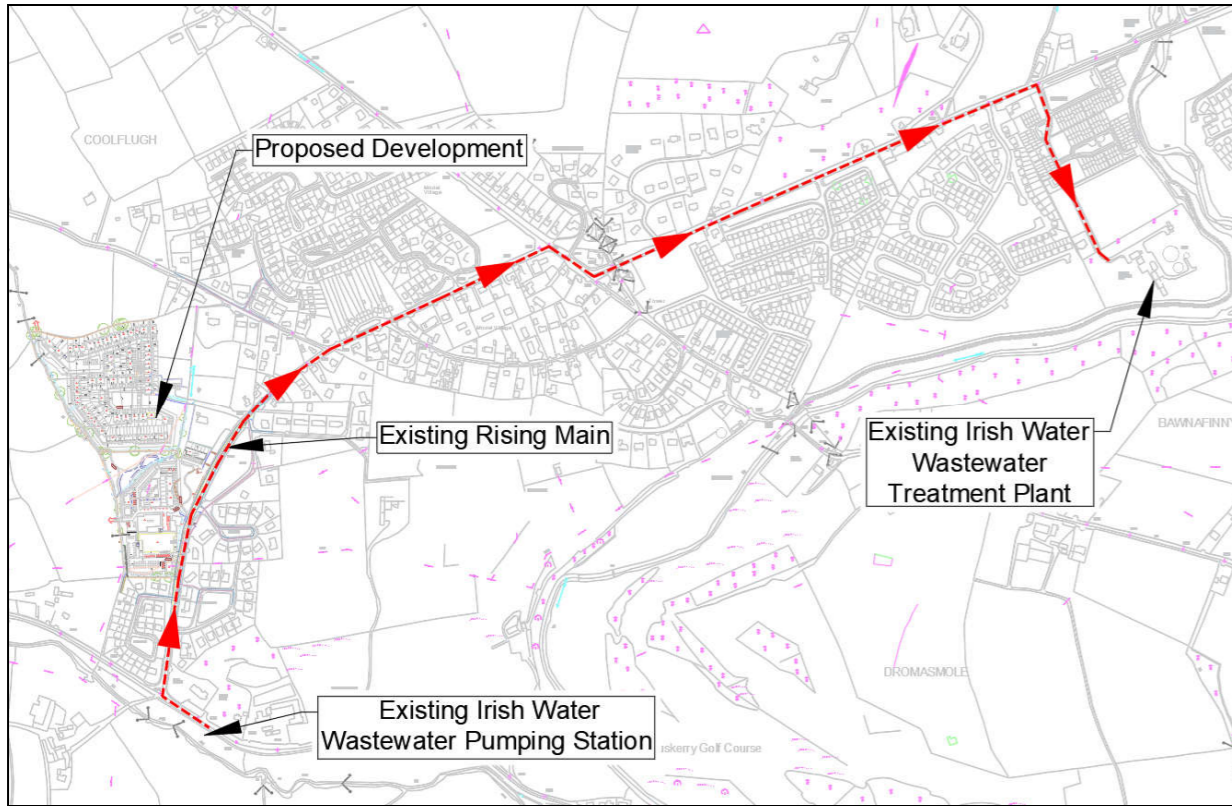


Figure 6.2: Location of existing Irish Water wastewater infrastructure

7. WATERMAIN NETWORK

Water design

PROJECT: CLOGHROE DEVELOPMENT, CLOGHROE, CORK

CLIENT: Cloghroe Development Limited

PROPOSED DEVELOPMENT: 198 residential units, a 42-child creche, a retail food store, and a café

A 150mm 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 Irish Water Code of Practice for Water Infrastructure Doc IW-CDS-5020-03.

The 150mm mains will be connected to the existing mainline present on R617.



Figure 7.1: Watermain layout

Layout details of the watermain network can be found in drawings **PHDC-PWM-P01, PHDC-PWM-P02, PHDC-PWM-P03, PHDC-PWM-P04, PHDC-PWM-P05, PHDC-PWM-P06, and PHDC-PWM-P07.**

The construction of the water supply pipe network shall be in accordance with Irish Water Code of Practice for Water Infrastructure Doc IW-CDS-5020-03. Service layout distances to comply with Irish Water Detail STD-W-11. A Statement of Design Acceptance from Irish Water has been received and included in **Appendix B** for the proposed design.

A Pre-Connection Enquiry Form has been submitted to Irish Water to progress connection details. The response from Irish Water is included in **Appendix A** of this report.

8. PUBLIC LIGHTING

PUBLIC LIGHTING DESIGN

PROJECT: CLOGHROE DEVELOPMENT, CLOGHROE, CORK

CLIENT: Cloghroe Development Limited

PROPOSED DEVELOPMENT: 198 residential units, a 42-child creche, a retail food store, and a café

A separate public lighting design report is included as part of the application documentation.

The public road lighting is designed to EN 13201 and British Standard BS 5489 utilising the "Lighting Reality Pro" software package. This design package is used to select an appropriate lantern type and to optimise the lighting design. The selected lantern is designed and manufactured to comply with EN 13201 with IP65 optic and 10 joules shock resistant gear housing. To meet with ecology requirements, in particular regarding potential bat activity, all installed lighting in the development will be Warm White (<3000K). Additionally, as agreed with the Cork City Council lighting department, minor estate roads will receive a step down in lighting classification to P4 instead of P3.

The design and selection of lighting columns is included in the public lighting design report. In response to the ecology report, all estate lighting columns are 6m high instead of 8m (or 10m) on the public roads.

In addition to internal estate roads, it is proposed to install a new public lighting scheme along the extent of the works as part of proposed public realm improvements.

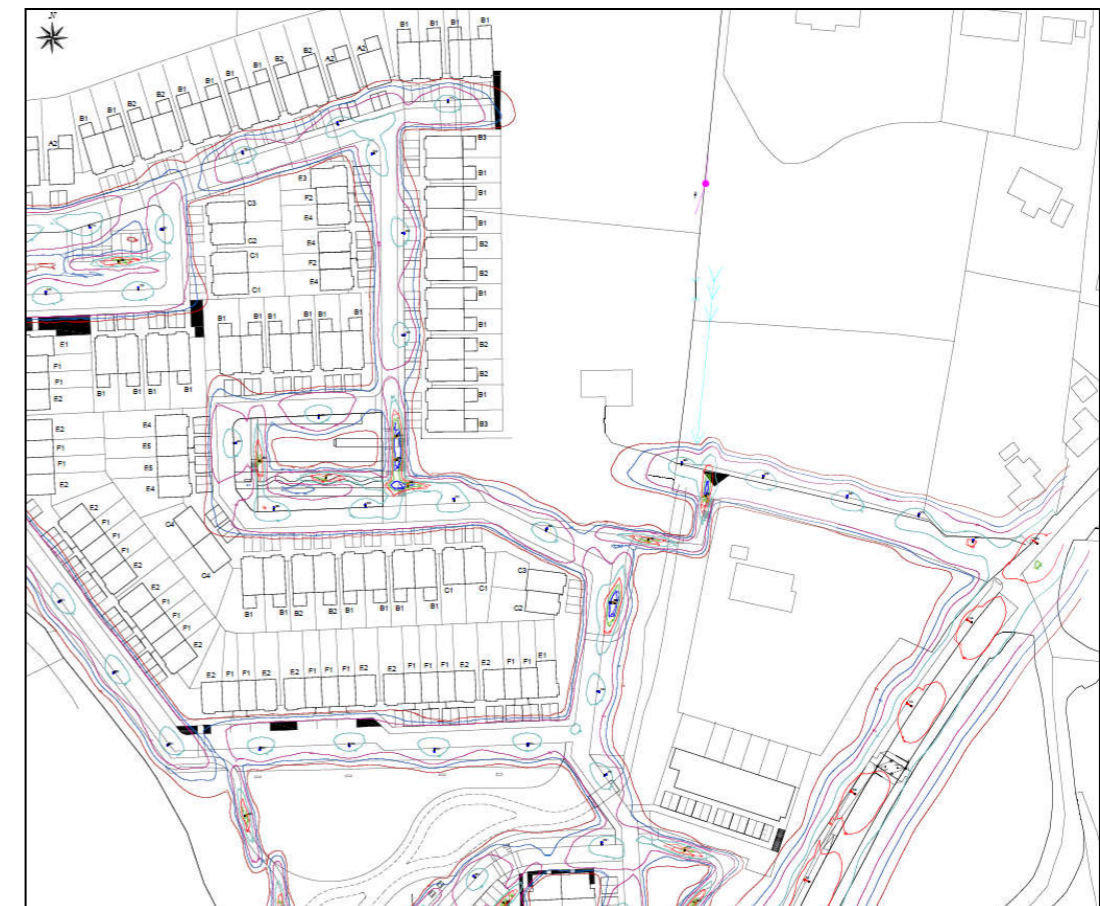


Figure 8.1: Public lighting layout to north-east of development

Full details of the public lighting network can be found in the separate public lighting report including with this submission and drawings **RL1-PPL-P01**, **RL1-PPL-P02**, and **RL1-PPL-P03**.

9. FLOOD RISK ASSESSMENT

PROJECT: CLOGHROE DEVELOPMENT, CLOGHROE, CORK

CLIENT: Cloghroe Development Limited

PROPOSED DEVELOPMENT: 198 residential units, a 42-child creche, a retail food store, and a café

Irish Hydrodata Limited (IHD) was commissioned to prepare a site specific flood risk assessment [SSFRA] for the proposed SHD. The completed assessment is included in a separate report submitted with the application documentation.

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 24.00m – 47.00m 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.myplan.ie and indicates that there is no fluvial flooding threat to the site of the proposed development.

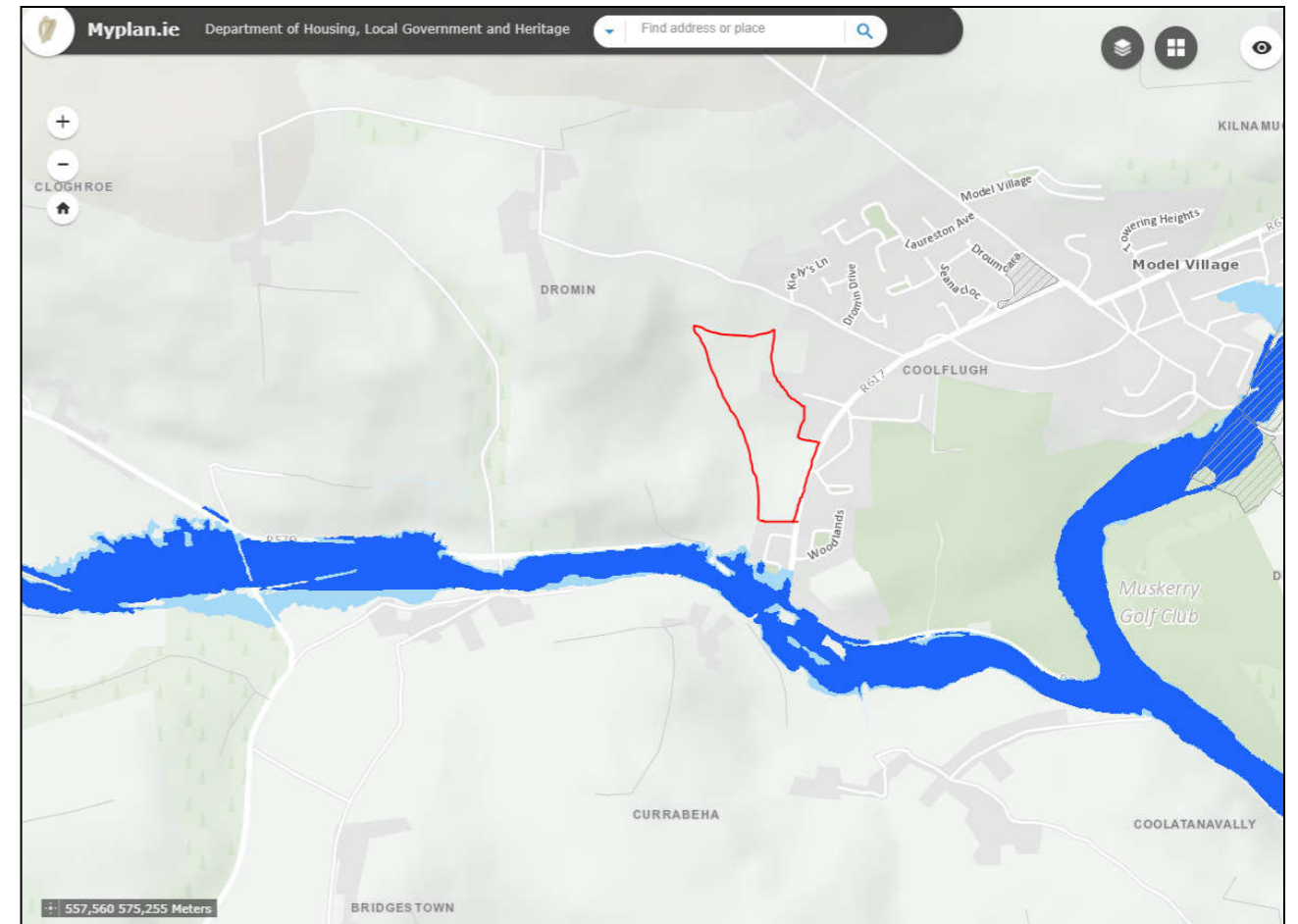


Figure 9.1: Fluvial flood map in the vicinity of the proposed site (outlined in red)

Pluvial Flooding

The OPW Flood Hazard Mapping Website is a record of historic flood events, and this database indicates that there is a recurring flood risk on the R579 and at its junction with the R617, see **Figure 9.2** below.

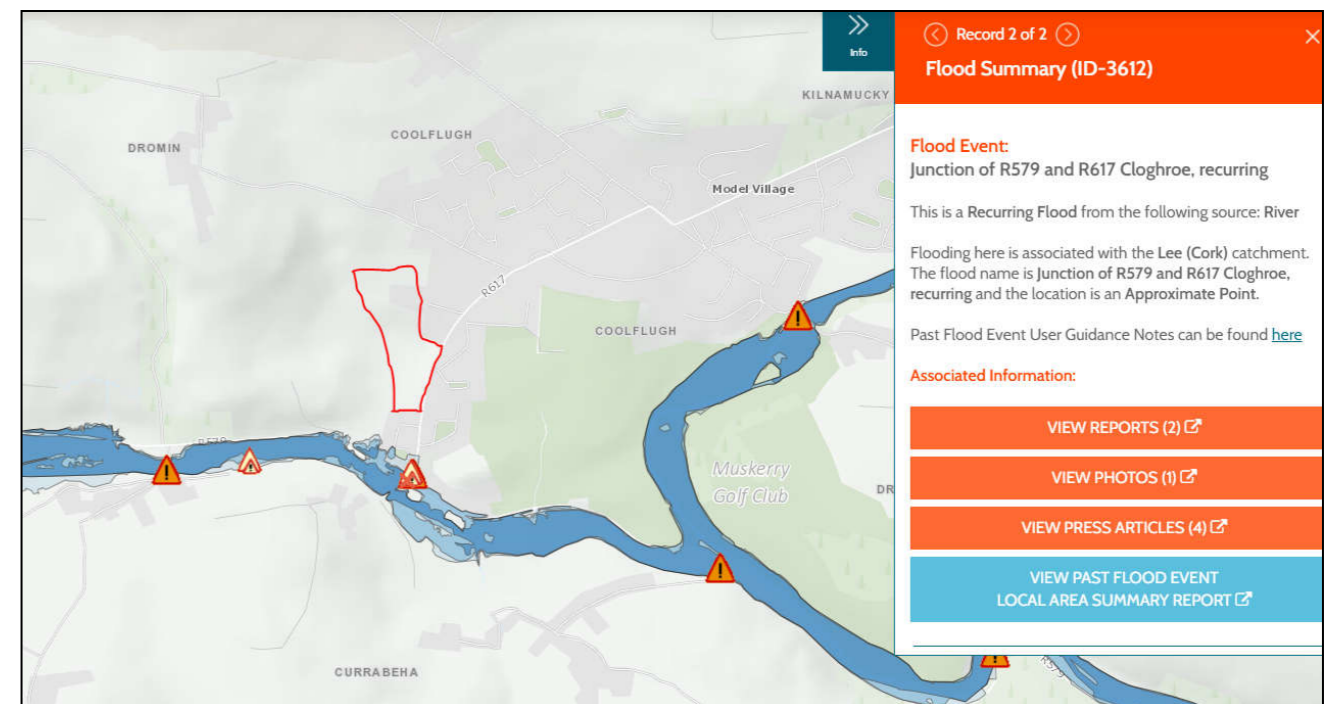


Figure 9.2: Historical flood events in surrounding area

The flood is as a result of the Owennagearagh River over topping its banks and has been further investigated as part of the Lee CFRAMS Study. **Figure 9.3** below shows the expected extent of flooding for each of the risk categories from 10% to 0.1% AEP Flood Events.

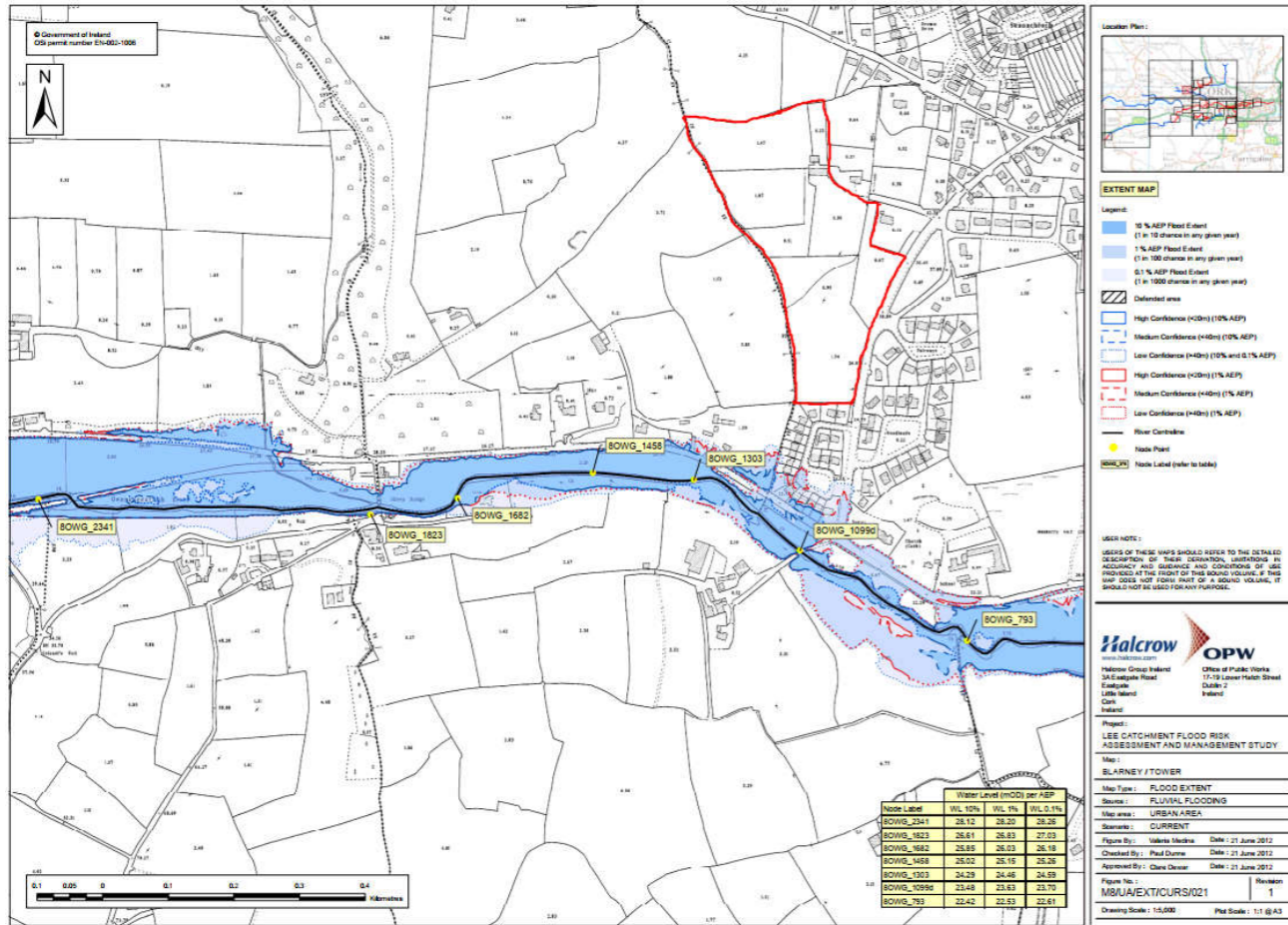


Figure 9.3: Flood Extent Mapping from the Lee CFRAMS Study

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 vulnerable 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.

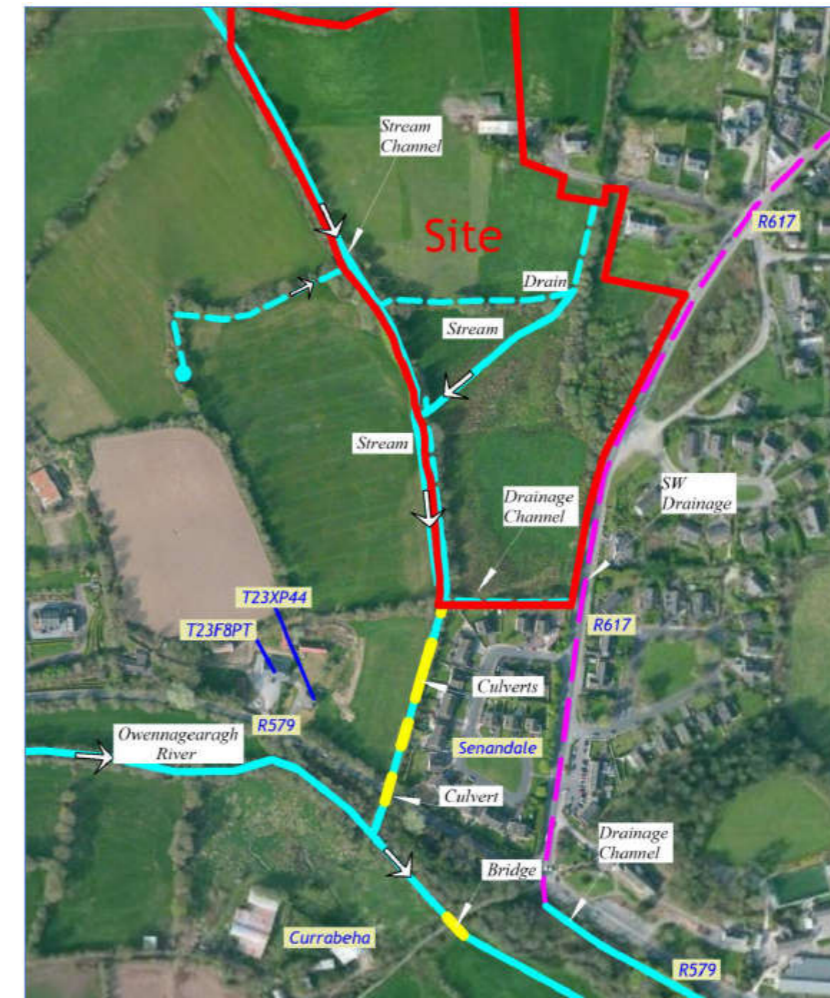


Figure 9.4: Location and direction of watercourses in relation to site

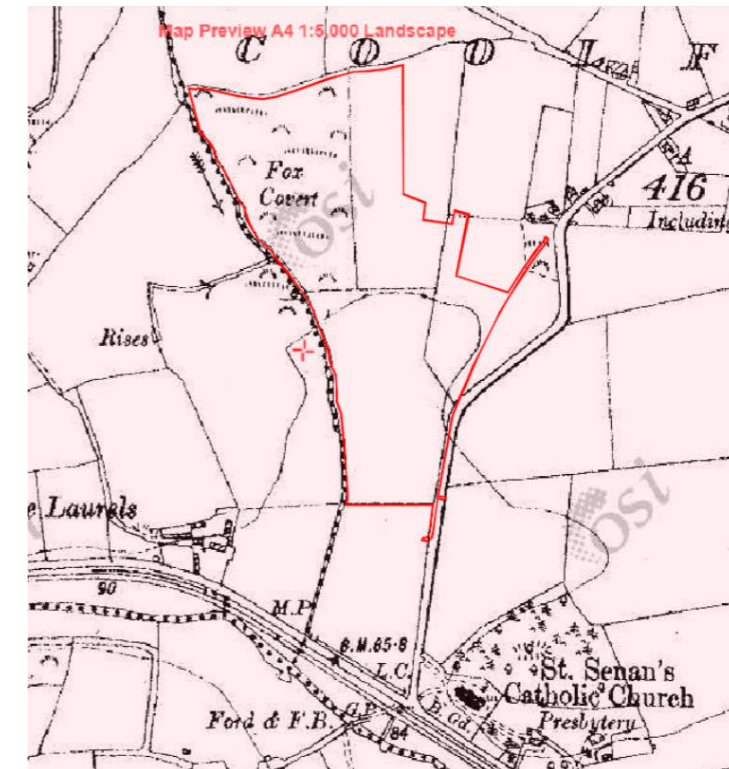


Figure 9.5: 6'' Historic Map of the area

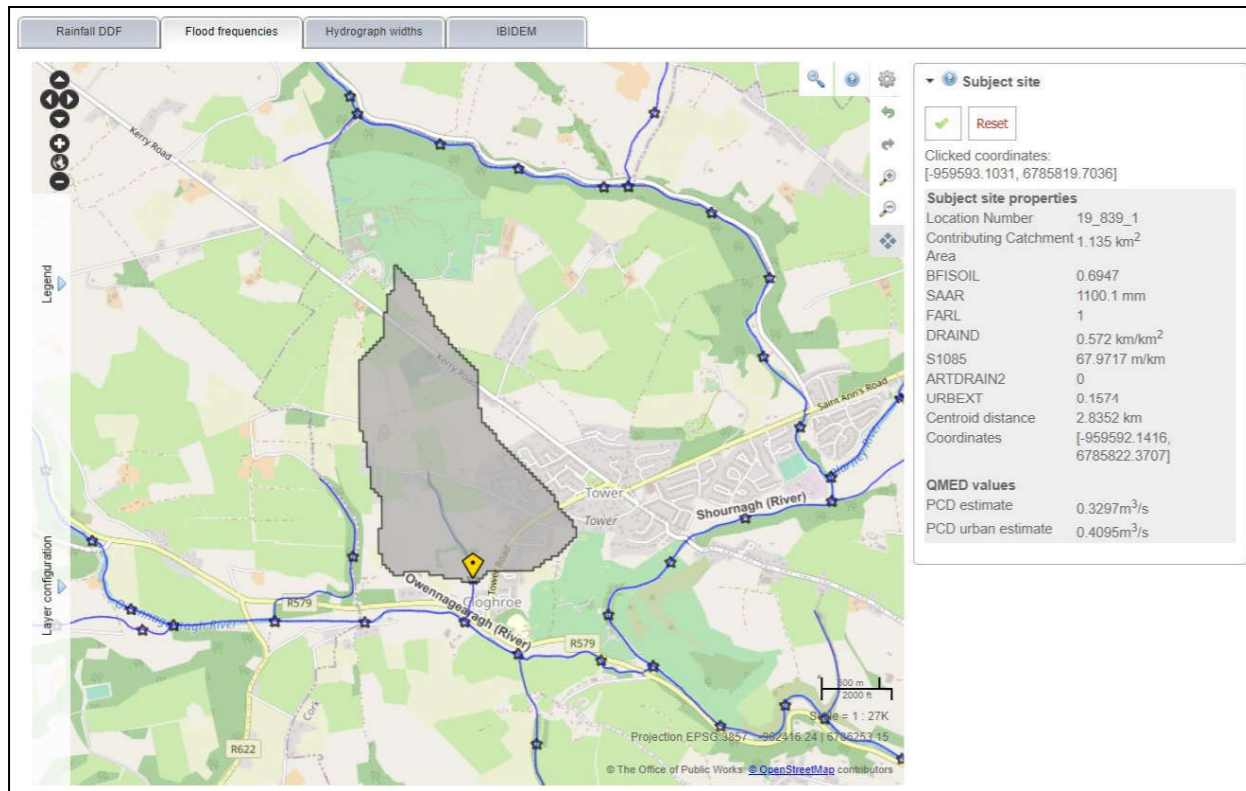


Figure 9.6: Catchment of stream running on the western boundary of the site



Figure 9.7: Flood mapping based on existing topography (stream flow at 0.1% AEPCC, river flow at 10m³/s)

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 City Council's Drainage Department. This exceeds the climate change factor of 10% required as part of GSDS. As is evident from the HR Wallingford Greenfield Runoff Estimation tool (refer to **Appendix G**), the proposed discharge rate of 20.8 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.

When the overall site area is included, the resulting reduction in runoff used in the design is considerable, from 25.3 l/s down to 20.8 l/s. All positive storm drainage within the site is being redirected to an existing storm sewer in the R617 where it will ultimately outfall to the Owennagearagh River downstream of the Currabeha Bridge, resulting in current peak fluvial flows from the site entering the western boundary stream being largely removed. The result is that the proposed control is very conservative and will result in a reduced flood risk downstream.

Flood Storage System

The southern part of the site is low-lying and subject to flooding during heavy rainfall, refer to **Figure 9.7** above. A flood storage network with a volume of 1,200 m³ is proposed as part of the proposed development at the southwest corner of the site to compensate for the loss of floodable area following construction. This system will take the form of a Stormtech subsurface unit that will allow the stream to flood as required, refer to **Figure 9.9**. This unit will be located beneath the car park area of the proposed retail unit. In addition to the compensatory flood storage, a headwall with non-return valve is proposed at the outfall of the existing land drain running along the southern boundary of the site. This land drain falls in a westerly direction towards the western boundary stream and is located along the boundary between the proposed retail car park and Senandale. This non-return valve will remove the risk of any flood waters from the western stream entering the land drain and thereafter flooding into Senandale.

Figure 9.8 below presents the proposed layout for the storm network and the proposed 1,200 m³ compensatory flood storage system (displayed in green) at the south-west corner of the site.

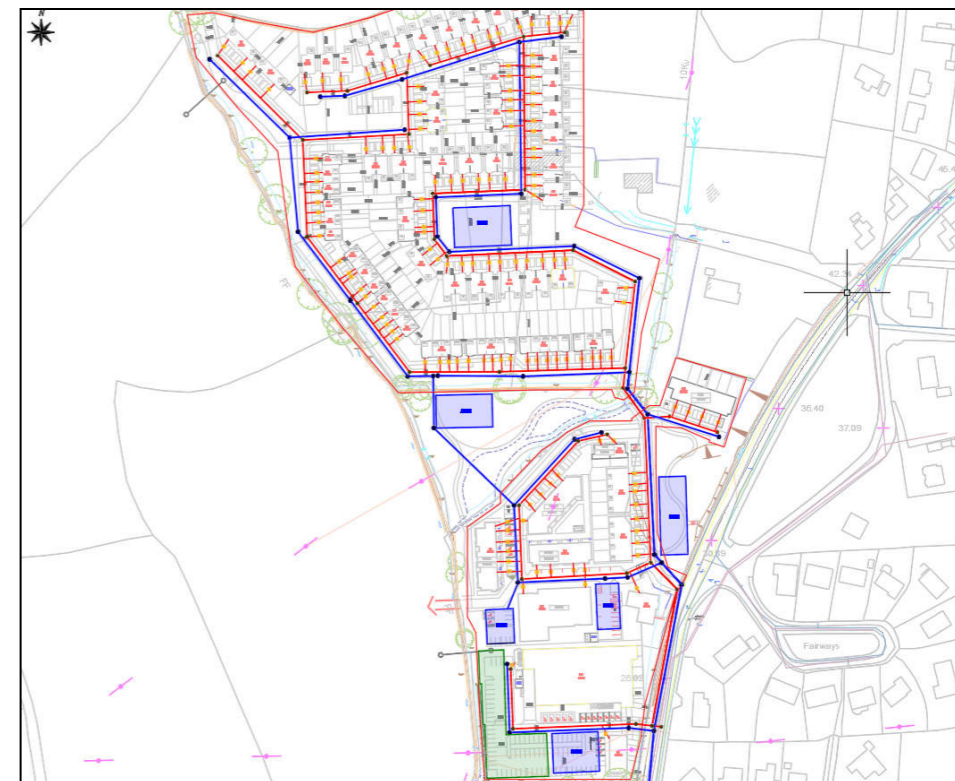


Figure 9.8: Proposed storm/foul lines, attenuation tank, and flood storage tank locations

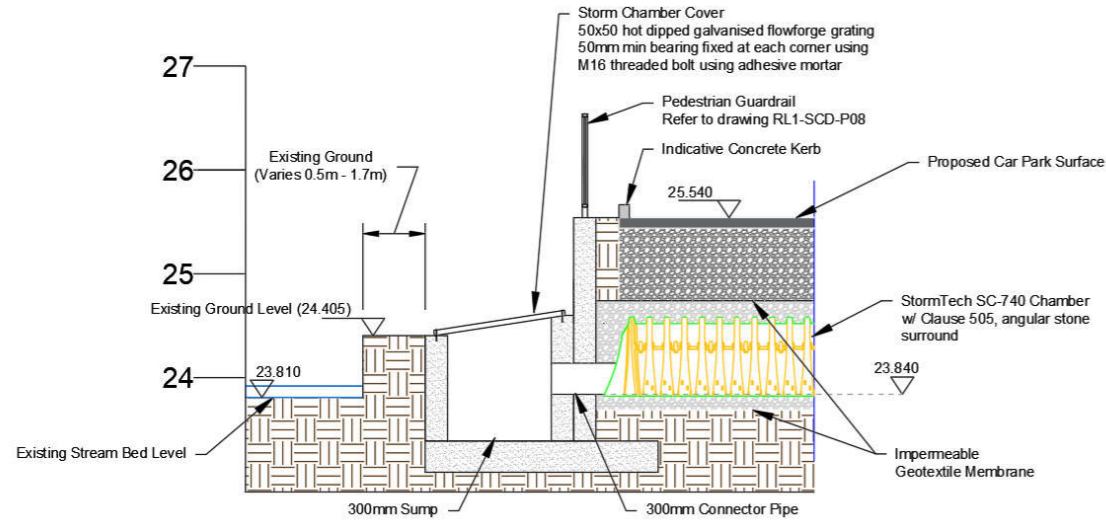


Figure 9.9: Cross-section of proposed flood storage with flood water receiving chamber

The proposed flood storage system is designed to manage the overflow from the western boundary stream during times of flooding and will provide protection to both the proposed development and adjoining properties in Senandale.

Figure 9.10 below presents the maximum flood level during a 0.1% AEPCC event when the proposed development is complete. It can be seen that flood waters previously evident at the north of Senandale, refer Figure 9.7, are no longer present. The flooding of Senandale emanating from the Owennagearagh River is still clearly visible.



Figure 9.10: Flood mapping with proposed development (stream flow at 0.1% AEPCC, river flow at 10m³/s)

Referring to the separate Site-Specific Flood Risk Assessment completed by Irish Hydrodata Limited, longitudinal water surface profile comparisons indicate a negligible change in water levels arising from the development. The influence of the Owennagearagh River on water levels is clearly evident, however, with water levels predicted to be 300mm above the R579 road level during a 0.1% AEPCC event. Sections through the northern section of the Senandale housing estate show current potential flood waters to be removed from the site and contained within the proposed flood storage tank, where the overall level increase will be 60mm, during the 0.1% AEP event. As a consequence of protecting Senandale and diverting conveyance flows west, water levels over a very localised region in the lands west of Senandale (designated Flood Zone A) can be seen to marginally increase by 20mm. This increase quickly drops further to the south towards the R579 when the Owennagearagh River levels dominate. The modelling indicates no measurable increase in flood risk to any Senandale properties or to the dwelling further west along R579.

Complete layout details of the stormwater network can be found in drawings RL1-OPN-P01 and RL1-OPN-P02. Layout and cross-section details of the proposed flood storage system are provided in drawings RL1-PFS-P01, RL1-PFS-P02, RL1-PFS-P03, and RL1-PFS-P04. Detail of the land drain outfall with non-return valve is provided on drawing RL1-SCD-P07.

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, the draft OPW Preliminary Catchment Flood Risk Assessment Maps, and the SSFRA by Irish Hydrodata Limited with comprehensive modelling have been consulted.

Other sources of flood risk have been investigated including development drainage, however, the stream along the western boundary was identified as the source of flood waters that could potentially impact the site and the adjoining Senandale estate. To mitigate this risk, measures including compensatory flood storage, headwall with non-return valve at southern boundary land drain, and attenuated surface water drainage have been proposed. These measures will remove the risk of flooding occurring within the development site and remove the existing flood risk to Senandale from the western boundary stream.

As a consequence of the above measures and the diversion of conveyance flows west, a marginal increase of 20mm in water levels on a localised region within Flood Zone A lands to the west of Senandale is predicted. There is no increased risk to any nearby properties or developable land.

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

10. NZEB COMPLIANCE**PROJECT: CLOGHROE DEVELOPMENT, CLOGHROE, CORK****CLIENT: Cloghroe Development Limited****PROPOSED DEVELOPMENT: 198 residential units, a 42-child creche, a retail food store, and a café**

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 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: CLOGHROE DEVELOPMENT, CLOGHROE, CORK

CLIENT: Cloghroe Development Limited

PROPOSED DEVELOPMENT: 198 residential units, a 42-child creche, a retail food store, and a café

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. Please note Irish Water's Statement of Design Acceptance included in Appendix B.

Appendices**APPENDIX A****Irish Water Pre-connection response**

SHANE MORIARTY
 CARRIG MOR HOUSE
 10 HIGH STREET, DOUGLAS ROAD
 Cork
 T12KC66

16 October 2020

Re: CDS20006124 pre-connection enquiry - Subject to contract | Contract denied
Connection for Multi/Mixed Use Development of 185 unit(s) at Cloghroe, Blarney, Co. Cork

Dear Sir/Madam,

Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at Cloghroe, Blarney, Co. Cork (the **Premises**). Based upon the details you have provided with your pre-connection enquiry and on our desk top analysis of the capacity currently available in the Irish Water network(s) as assessed by Irish Water, we wish to advise you that your proposed connection to the Irish Water network(s) can be facilitated at this moment in time.

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

submitting your full application to An Bord Pleanála for assessment, you must have reviewed this development with Irish Water and received a Statement of Design Acceptance in relation to the layout of water and wastewater services.

The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.

The map included below outlines the current Irish Water infrastructure adjacent to your site:

SERVICE	OUTCOME OF PRE-CONNECTION ENQUIRY <u>THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.</u>
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible Subject to upgrades
SITE SPECIFIC COMMENTS	
Water Connection	This Confirmation of Feasibility to connect to the Irish Water infrastructure does not extend to your fire flow requirements. Please note that Irish Water can not guarantee a flow rate to meet fire flow requirements and in order to guarantee a flow to meet the Fire Authority requirements, you should provide adequate fire storage capacity within your development.
Wastewater Connection	In order to accommodate the proposed connection at the Premises, upgrade works are required at the Cloghroe Waste Water Pumping Station. Irish Water does not currently have any plans to carry out the works required. Should you wish to have such upgrade works progressed, Irish Water will require you to provide a contribution of a relevant portion of the costs for the required upgrades, please contact Irish Water to discuss.
Strategic Housing Development	Irish Water notes that the scale of this development dictates that it is subject to the Strategic Housing Development planning process. In advance of



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Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided and does not accept any liability whatsoever arising from any errors or omissions. This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

General Notes:

- 1) The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. **The availability of capacity may change at any date after this assessment.**
- 2) This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.
- 3) The feedback provided is subject to a Connection Agreement/contract being signed at a later date.
- 4) A Connection Agreement will be required to commencing the connection works associated with the enquiry this can be applied for at <https://www.water.ie/connections/get-connected/>
- 5) A Connection Agreement cannot be issued until all statutory approvals are successfully in place.
- 6) Irish Water Connection Policy/ Charges can be found at <https://www.water.ie/connections/information/connection-charges/>
- 7) Please note the Confirmation of Feasibility does not extend to your fire flow requirements.
- 8) Irish Water is not responsible for the management or disposal of storm water or ground waters. You are advised to contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges
- 9) To access Irish Water Maps email datarequests@water.ie
- 10) All works to the Irish Water infrastructure, including works in the Public Space, shall have to be carried out by Irish Water.

If you have any further questions, please contact Marko Komso from the design team on 022 54611 or email mkomso@water.ie For further information, visit www.water.ie/connections.

Yours sincerely,



Maria O'Dwyer

Connections and Developer Services

APPENDIX B

Irish Water Statement of Design Acceptance



Shane Moriarty
Carrig Mor House
10 High Street
Douglas Road
Co. Cork T12KC66

26 January 2022

**Re: Design Submission for Cloghroe, Blarney, Co. Cork (the “Development”)
(the “Design Submission”) / Connection Reference No: CDS20006124**

Dear Shane Moriarty,

Many thanks for your recent Design Submission.

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

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

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

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

Name: Michael Galvin
Email: mgalvin@water.ie

Yours sincerely,

Yvonne Harris
Head of Customer Operations

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

Appendix A





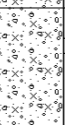
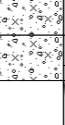



Document Title & Revision

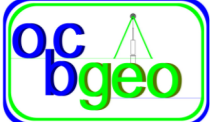
- | | |
|------------------------|--|
| • PHDC-PWM-P01 Rev. 02 | Proposed Watermain Sheet 1 of 7 |
| • PHDC-PWM-P02 Rev. 02 | Proposed Watermain Sheet 2 of 7 |
| • PHDC-PWM-P03 Rev. 02 | Proposed Watermain Sheet 3 of 7 |
| • PHDC-PWM-P04 Rev. 02 | Proposed Watermain Sheet 4 of 7 |
| • PHDC-PWM-P05 Rev. 02 | Proposed Watermain Sheet 5 of 7 |
| • PHDC-PWM-P06 Rev. 02 | Proposed Watermain Sheet 6 of 7 |
| • PHDC-PWM-P07 Rev. 02 | Proposed Watermain Sheet 7 of 7 |
| • RL1-OPN-P01 Rev. D | Overall Pipe Network Plan Sheet 1 of 2 |
| • RL1-OPN-P02 Rev. E | Overall Pipe Network Plan Sheet 2 of 2 |
| • RL1-FLS-P01 Rev. 02 | Foul Long Sections Sheet 1 of 3 |
| • RL1-FLS-P02 Rev. 02 | Foul Long Sections Sheet 2 of 3 |
| • RL1-FLS-P03 Rev. 02 | Foul Long Sections Sheet 3 of 3 |

For further information, visit www.water.ie/connections

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

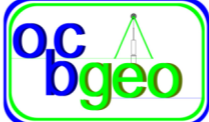
APPENDIX C
Site Investigation Bore Logs

				Project No.:	Project Name:	Borehole No.:																								
Method: Cable Percussion Plant: Pilcon				20-087	Cloghroe Housing Development	BH01																								
				Coordinates: 557257.34 E 574834.26 N		Client: BMOR Client's Representative: MHL & Associates Ltd	Sheet 1 of 1																							
				Ground Level: 49.14 mOD	Dates: 31/08/2020 -	Scale: 1:50 Driller: AA Logger: MN																								
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill																				
0.10 - 1.20	B1				49.04	0.10		TOPSOIL																						
0.10 - 1.20	D2					(1.10)		Brown sandy gravelly very silty CLAY with high cobble content and occasional rootlets, moist. Sand fine to coarse. Gravel fine to coarse, angular to subrounded. Cobbles subangular to subrounded. Gravel and cobbles consist of red, purple and green sandstone and siltstone, and occasional quartz.																						
1.20 - 2.00	B3				47.94	1.20		Medium dense brown slightly silty very sandy GRAVEL with medium cobble content. Sand fine to coarse. Gravel fine to coarse, angular to subangular. Cobbles mostly subangular. Gravel and cobbles consist of red, purple and green sandstone and siltstone, and occasional quartz.																						
1.20 - 2.00	D4			N=21 (4,8/5,5,6,5)		(0.80)		Very dense brown slightly silty very sandy GRAVEL with high cobble content. Sand fine to coarse. Gravel fine to coarse, angular to subangular. Cobbles mostly subangular. Gravel and cobbles consist of red, purple and green sandstone and siltstone, and occasional quartz.																						
1.20 - 1.65	SPT (C) N=21					(1.00)		Very dense brown slightly silty very sandy GRAVEL with high cobble content. Sand fine to coarse. Gravel fine to coarse, angular to subangular. Cobbles mostly subangular. Gravel and cobbles consist of red, purple and green sandstone and siltstone, and occasional quartz. <i>Driller records possible boulder at 2.2m.</i>																						
2.00 - 3.00	B5				47.14	2.00		Very dense brown slightly clayey slightly silty very sandy GRAVEL with low cobble content. Sand fine to coarse. Gravel fine to coarse, angular to subangular. Cobbles mostly subangular. Gravel and cobbles consist of red, purple and green sandstone and siltstone, and occasional quartz.																						
2.00 - 3.00	D6			50 (7,11/50 for 60mm)		(0.30)		Very dense brown slightly clayey slightly silty very sandy GRAVEL with low cobble content. Sand fine to coarse. Gravel fine to coarse, angular to subangular. Cobbles mostly subangular. Gravel and cobbles consist of red, purple and green sandstone and siltstone, and occasional quartz. <i>Driller records possible boulder at 3.2m.</i>																						
2.00 - 2.21	SPT (C)				45.84	3.30		Very dense brown slightly clayey slightly silty very sandy GRAVEL with low cobble content. Sand fine to coarse. Gravel fine to coarse, angular to subangular. Cobbles mostly subangular. Gravel and cobbles consist of red, purple and green sandstone and siltstone, and occasional quartz. <i>Driller records possible boulder at 3.2m.</i> End of borehole at 3.300m																						
3.00 - 3.30	B7				46.14	3.00																								
3.00 - 3.30	D8			50 (8,18/50 for 75mm)		(0.30)																								
3.00 - 3.22	SPT (C)				45.84	3.30																								
3.30 - 3.30	SPT (C)			50 (50 for 0mm/50 for 0mm)																										
Remarks Cable Percussion terminated at 3.30m upon encountering virtual refusal.																														
										<table border="1"> <thead> <tr> <th colspan="2">Water Added</th> <th colspan="4">Water Strike - General</th> </tr> <tr> <th>From (m)</th> <th>To (m)</th> <th>Struck at (m)</th> <th>Casing to (m)</th> <th>Time (min)</th> <th>Rose to (m)</th> </tr> </thead> <tbody> <tr> <td>1.20</td> <td>3.30</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Water Added		Water Strike - General				From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	1.20	3.30						
Water Added		Water Strike - General																												
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)																									
1.20	3.30																													
										<table border="1"> <thead> <tr> <th colspan="2">Casing Details</th> <th colspan="3">Chiselling Details</th> </tr> <tr> <th>To (m)</th> <th>Diam (mm)</th> <th>From (m)</th> <th>To (m)</th> <th>Time (hh:mm)</th> </tr> </thead> <tbody> <tr> <td>3.30</td> <td>200</td> <td>2.20</td> <td>2.30</td> <td>00:40</td> </tr> <tr> <td></td> <td></td> <td>3.20</td> <td>3.30</td> <td>01:00</td> </tr> </tbody> </table>	Casing Details		Chiselling Details			To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)	3.30	200	2.20	2.30	00:40			3.20	3.30	01:00
Casing Details		Chiselling Details																												
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)																										
3.30	200	2.20	2.30	00:40																										
		3.20	3.30	01:00																										

	Project No.: 20-087	Project Name: Cloghroe Housing Development	Borehole No.: BH01A
	Coordinates: 557258.49 E 574834.41 N	Client: BMOR Client's Representative: MHL & Associates Ltd	Sheet 1 of 1
Method: Cable Percussion		Dates: 02/09/2020 -	Scale: 1:50
Plant: Pilcon	Ground Level: 49.13 mOD		Driller: AA
			Logger: MN


Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.10 - 1.20	B1				49.03	(0.10)	TOPSOIL			
0.10 - 1.20	D2					(1.10)		Brown sandy gravelly very silty CLAY with high content of cobbles up to small boulder size and occasional rootlets, moist. Sand fine to coarse. Gravel fine to coarse, angular to subrounded. Cobbles subangular to subrounded. Gravel and cobbles consist of red, purple and green sandstone and siltstone, and occasional quartz.		
1.20 - 2.00	B3			50 (50 for 10mm/50 for 0mm)	47.93	1.20		Very dense brown slightly silty very sandy GRAVEL with high cobble content. Sand fine to coarse. Gravel fine to coarse, angular to subangular. Cobbles mostly subangular. Gravel and cobbles consist of red, purple and green sandstone and siltstone, and occasional quartz. <i>Driller records possible boulder at 1.2m.</i>		
1.20 - 2.00	D4									
1.20 - 1.21	SPT (C)									
2.00 - 3.00	B5			59 (7,9/59 for 170mm)		(1.80)		<i>Driller records possible boulder at 1.7m.</i>		
2.00 - 3.00	D6									
2.00 - 2.32	SPT (C)							<i>Driller records possible boulder at 2.3m.</i>		
3.00 - 4.00	B7			N=45 (7,7/11,13,10,11)	46.13	3.00		Dense brown slightly silty very sandy GRAVEL with medium cobble content. Sand fine to coarse. Gravel fine to coarse, angular to subangular. Cobbles mostly subangular. Gravel and cobbles consist of red, purple and green sandstone and siltstone, and occasional quartz. <i>Driller records possible boulder at 3.7m.</i>		
3.00 - 4.00	D8					(1.00)				
3.00 - 3.45	SPT (C)									
4.00 - 4.50	B9			N=55 (9,11/11,10,15,19)	45.13	4.00		Very dense brown slightly silty very sandy GRAVEL with high cobble content. Sand fine to coarse. Gravel fine to coarse, angular to subangular. Cobbles mostly subangular. Gravel and cobbles consist of red, purple and green sandstone and siltstone, and occasional quartz. <i>Driller records possible boulder at 4.5m.</i>		
4.00 - 4.50	D10					(0.50)				
4.00 - 4.45	SPT (C)									
4.50 - 4.50	SPT (C)			50 (50 for 0mm/50 for 0mm)	44.63	4.50		<i>Driller records possible boulder at 4.5m.</i> End of borehole at 4.500m		

Remarks Cable Percussion terminated at 4.50m upon encountering virtual refusal.	Water Added		Water Strike - General			
	From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
	1.20	4.50				
Casing Details		Chiselling Details				
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)		
4.50	200	1.20	1.30	00:40		
		1.70	1.80	00:30		
		2.30	2.40	00:30		

	Project No.: 20-087	Project Name: Cloghroe Housing Development	Borehole No.: BH02
	Coordinates: 557336.88 E 574652.45 N	Client: BMOR Client's Representative: MHL & Associates Ltd	Sheet 1 of 1
Method: Cable Percussion		Dates: 03/09/2020 - 07/09/2020	Scale: 1:50
Plant: Pilcon	Ground Level: 29.35 mOD		Driller: AA
			Logger: IH


Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.20 - 1.20	B1				29.14	(0.20)	TOPSOIL			
0.20 - 1.20	D2					(1.00)		Light brown slightly gravelly slightly sandy very silty CLAY with rootlets. Gravel is fine to coarse, angular to subangular. Sand is fine to coarse.		
1.20 - 1.80	B3			N=29 (0,1/4,7,9,9)	28.14	1.20		Stiff brown slightly sandy silty very gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular. Cobbles are angular to subangular.		
1.20 - 1.80	D4					(0.60)				
1.20 - 1.65	SPT (C)									
1.80 - 3.00	B5			N=13 (2,2/4,3,3,3)	27.54	1.80		Firm brown slightly sandy silty gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular. Cobbles are angular to subangular.		
1.80 - 3.00	D6					(1.20)				
2.00 - 2.45	SPT (C)									
3.00 - 4.00	B7			N=16 (3,4/4,4,4,4)	26.34	3.00		Stiff dark brown slightly sandy silty gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular. Cobbles are angular to subangular.		
3.00 - 4.00	D8					(1.00)				
3.00 - 3.45	SPT (C)									
4.00 - 5.00	B9			N=24 (5,5/5,5,8,6)	25.34	4.00		Medium Dense brown slightly silty sandy very clayey GRAVEL with medium cobble content and low small boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular. Cobbles and boulders are subangular.		
4.00 - 5.00	D10					(1.00)				
4.00 - 4.45	SPT (C)									
5.00 - 6.00	B11			N=35 (6,10/8,9,8,10)	24.34	5.00		Dense dark grey slightly silty clayey very sandy GRAVEL with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular. Cobbles are subangular.		
5.00 - 6.00	D12					(1.00)				
5.00 - 5.45	SPT (C)									
6.00 - 7.00	B13			N=54 (12,17/12,12,17,13)	23.34	6.00		Very Dense dark grey slightly clayey very sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subangular.		
6.00 - 7.00	D14					(2.00)				
6.00 - 6.45	SPT (C)									
7.00 - 8.00	B15			N=65 (10,10/14,19,16,16)	21.34	8.00		Very Dense dark grey slightly clayey very sandy GRAVEL with medium cobble content and low small boulder content. Sand is fine to coarse. Gravel is angular to subangular. Cobbles and boulders are angular to subangular.		
7.00 - 8.00	D16					(1.00)				
7.00 - 7.45	SPT (C)									
8.00 - 9.00	B17			N=54 (9,13/13,12,15,14)	20.34	9.00		Very Dense dark grey slightly clayey very sandy GRAVEL with medium cobble content. Sand is fine to coarse. Gravel is angular to subangular. Cobbles are angular to subangular.		
8.00 - 9.00	D18					(0.70)				
8.00 - 8.45	SPT (C)									
9.00 - 9.70	B19			N=54 (11,12/12,12,15,15)	19.64	9.70		Very Dense dark grey slightly clayey very sandy GRAVEL with medium cobble content. Sand is fine to coarse. Gravel is angular to subangular. Cobbles are angular to subangular.		
9.00 - 9.70	D20									
9.00 - 9.45	SPT (C)									
9.60 - 9.74	SPT (C)			50 (43 for 135mm/50 for 0mm)				End of borehole at 9.700m		

Remarks Cable Percussion terminated at 9.70m upon encountering virtual refusal.	Water Added		Water Strike - General			
	From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
	1.20	4.90	4.90	4.90	20	4.50
Casing Details		Chiselling Details				
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)		
9.70	200	9.60	9.70	01:00		

	Project No.: 20-087	Project Name: Cloghroe Housing Development	Borehole No.: BH03
	Coordinates: 557364.95 E 574434.04 N	Client: BMOR Client's Representative: MHL & Associates Ltd	Sheet 1 of 1
Method: Cable Percussion		Dates: 10/09/2020 - 11/09/2020	Scale: 1:50
Plant: Pilcon	Ground Level: 24.49 mOD		Driller: AA
			Logger: IH


Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.10 - 1.20	B1 D2				24.38	(0.10)	TOPSOIL	Mottled brown and light brown slightly sandy slightly gravelly silty CLAY with occasional rootlets. Sand is fine to coarse. Gravel is fine to coarse, subangular.		
1.20 - 2.00	B3 D4 SPT (C) N=16			N=16 (4,4/3,5,4,4)	23.28	1.20		Firm to Stiff brown slightly silty slightly gravelly sandy to very sandy CLAY with occasional rootlet fragments.		
2.00 - 2.60	B5 D6 SPT (C) N=16			N=16 (3,3/3,5,4,4)	21.88	2.60		Medium Dense purple / brown slightly silty clayey very sandy GRAVEL with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular. Cobbles are angular to subrounded.		
3.00 - 4.00	B7 D8 SPT (C) N=22			N=22 (2,5/4,7,6,5)	20.48	4.00		Loose purple / brown slightly silty clayey very sandy GRAVEL with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular. Cobbles are angular to subrounded.		
4.00 - 4.70	B9 D10 SPT (C) N=5			N=5 (0,1/0,1,2,2)	19.78	4.70		Loose purple / brown clayey SAND. Sand is fine to coarse.		
4.70 - 6.00	B11 D12 SPT (C) N=9			N=9 (1,2/2,2,3,2)	18.48	6.00		Loose to Medium Dense purple / brown slightly silty very gravelly SAND. Gravel is fine to coarse, subangular to subrounded. Sand is fine to coarse.		
6.00 - 7.00	B13 D14 SPT (C) N=10			N=10 (2,5/3,3,2,2)	17.48	7.00		Medium Dense reddish brown slightly clayey SAND. Sand is fine to coarse.		
7.00 - 8.00	B15 D16 SPT (C) N=17 U21			N=17 (3,4/6,4,3,4)	16.48	8.00		Medium Dense reddish brown slightly clayey gravelly SAND with low cobble content. Gravel is fine to coarse, subangular. Sand is fine to coarse. Cobbles are subangular to subrounded.		
8.00 - 9.00	B17 D18 SPT (C) N=17			N=17 (4,4/4,4,5,4)	15.48	9.00		Dense reddish brown slightly clayey gravelly SAND with medium cobble and low boulder content. Gravel is fine to coarse, subangular. Sand is fine to coarse. Cobbles and boulders are subangular to subrounded.		
9.00 - 9.50	B19 D20 SPT (C) N=31 SPT (C) N=38			N=31 (7,8/5,9,9,8) N=38 (8,11/9,10,10,9)	14.54	9.95		End of borehole at 9.950m		

Remarks Cable Percussion terminated upon reaching scheduled depth.	Water Added		Water Strike - General			
	From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
			0.60	2.60	20	0.50
			2.60	2.60	20	1.20
	Casing Details		Chiselling Details			
	To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)	
	9.95	200				

	Project No.: 20-087	Project Name: Cloghroe Housing Development	Borehole No.: BH04
	Coordinates: 557355.60 E 574868.44 N	Client: BMOR Client's Representative: MHL & Associates Ltd	Sheet 1 of 1
Method: Cable Percussion		Dates: 27/08/2020 - 31/08/2020	Scale: 1:50
Plant: Pilcon	Ground Level: 47.76 mOD		Driller: AA
			Logger: MN


Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 1.20	B1 D2					(1.20)		Brown slightly sandy gravelly very silty CLAY with low cobble content and occasional rootlets, moist. Sand fine to coarse. Gravel fine to coarse, angular to subrounded. Cobbles mostly subangular. Gravel and cobbles consist of red, purple and green sandstone and siltstone, and occasional quartz.		
1.20 - 2.00	B3 D4 SPT (C) N=14			N=14 (3,4/2,5,4,3)	46.56	1.20		Medium dense brown slightly clayey slightly silty very sandy GRAVEL with low cobble content. Sand fine to coarse. Gravel fine to coarse, angular to subangular. Cobbles mostly subangular. Gravel and cobbles consist of red, purple and green sandstone and siltstone, and occasional quartz.		
2.00 - 3.00	B5 D6 SPT (C) N=24	2.00	0.80	N=24 (5,5/5,7,6,6) 27-08-2020	45.76	2.00		Medium dense brown slightly silty very sandy GRAVEL with medium cobble content. Sand fine to coarse. Gravel fine to coarse, angular to subangular. Cobbles mostly subangular. Gravel and cobbles consist of red, purple and green sandstone and siltstone, and occasional quartz.		
3.00 - 4.00	B7 D8 SPT (C)			70 (4,12/70 for 90mm)	44.76	3.00		Very Dense to Dense brown slightly silty very sandy GRAVEL with medium, locally high, cobble content and a trace of slightly sandy gravelly silty clay pockets. Sand fine to coarse. Gravel fine to coarse, angular to subangular. Cobbles mostly subangular. Gravel and cobbles consist of red, purple and green sandstone and siltstone, occasional red conglomeratic sandstone, and occasional quartz. <i>Driller records possible boulder at 3.0m.</i>		
4.00 - 5.00	B9 D10 SPT (C) N=47	4.00	2.90	N=47 (3,5/11,12,11,13) 28-08-2020	42.76	5.00		Very dense brown slightly clayey slightly silty sandy GRAVEL with high cobble content and a trace of slightly sandy gravelly silty clay pockets. Sand fine to coarse. Gravel fine to coarse, angular to subangular. Cobbles mostly subangular. Gravel and cobbles consist of red, purple and green sandstone and siltstone, and occasional quartz.		
5.00 - 6.20	B11 D12 SPT (C) N=48			N=48 (4,5/9,12,14,13)	41.56	6.20		<i>Driller records possible boulder at 6.2m.</i> End of borehole at 6.200m		
6.00 - 6.20	SPT (C)			50 (6,9/50 for 50mm)						
6.20 - 6.20	SPT (C)	6.20		50 (50 for 0mm/50 for 0mm) 31-08-2020						

Remarks Cable Percussion terminated at 6.20m upon encountering virtual refusal.	Water Added		Water Strike - General			
	From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
			1.20	6.20		
	Casing Details		Chiselling Details			
	To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)	
	6.20	200				

	Project No.: 20-087	Project Name: Cloghroe Housing Development	Borehole No.: BH05
	Coordinates: 557429.99 E 574677.97 N	Client: BMOR Client's Representative: MHL & Associates Ltd	Sheet 1 of 1
Method: Cable Percussion	Ground Level: 30.74 mOD	Dates: 09/09/2020 - 10/09/2020	Scale: 1:50
Plant: Pilcon			Driller: AA
			Logger: IH


Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.10 - 1.20	B1				30.64	(0.10)	TOPSOIL			
0.10 - 1.20	D2					(1.10)		Light brown (light grey and yellow mottling) slightly sandy gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded.		
1.20 - 2.00	B3			N=18 (1,3/4,4,5,5)	29.54	1.20		Stiff light brown (light grey and yellow mottling) slightly sandy gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded.		
1.20 - 2.00	D4					(0.80)				
1.20 - 1.65	SPT (C) N=18									
2.00 - 2.30	B5			N=20 (4,7/5,4,5,6)	28.74	2.00		Stiff yellowish brown slightly sandy slightly silty gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular.		
2.00 - 2.30	D6					(0.30)				
2.00 - 2.45	SPT (C) N=20				28.44	2.30		Stiff light brown slightly silty sandy very gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular. Cobbles are angular to subangular.		
2.30 - 4.00	B7			N=29 (6,4/7,7,6,9)		(1.70)				
2.30 - 4.00	D8									
3.00 - 3.45	SPT (C) N=29									
4.00 - 5.00	B9			N=30 (5,7/9,7,6,8)	26.74	4.00		Dense light brown slightly silty clayey very sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular.		
4.00 - 5.00	D10					(1.00)				
4.00 - 4.45	SPT (C) N=30									
5.00 - 6.00	B11			N=46 (8,11/14,10,10,12)	25.74	5.00		Dense light brown slightly silty clayey very sandy GRAVEL with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular. Cobbles are angular.		
5.00 - 6.00	D12					(2.00)				
5.00 - 5.45	SPT (C) N=46									
6.00 - 7.00	B13			N=42 (9,11/10,9,9,14)		(2.00)				
6.00 - 7.00	D14									
6.00 - 6.45	SPT (C) N=42									
7.00 - 8.00	B15			N=50 (10,12/12,12,11,15)	23.74	7.00		Very Dense light brown slightly silty clayey very sandy GRAVEL with medium cobble and low small boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular. Cobbles are angular.		
7.00 - 8.00	D16					(1.00)				
7.00 - 7.45	SPT (C) N=50									
8.00 - 9.00	B17			N=51 (9,14/13,13,11,14)	22.74	8.00		Very Dense light greyish brown slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular.		
8.00 - 9.00	D18					(1.00)				
8.00 - 8.45	SPT (C) N=51									
9.00 - 9.80	B19			N=68 (12,12/12,17,20,19)	21.74	9.00		Very Dense light greyish brown slightly clayey sandy GRAVEL with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular. Cobbles are angular.		
9.00 - 9.80	D20					(0.80)				
9.00 - 9.45	SPT (C) N=68									
9.80 - 9.81	SPT (C)			50 (50 for 10mm/50 for 0mm)	20.94	9.80		End of borehole at 9.800m		

Remarks Cable Percussion terminated at 9.80m upon encountering virtual refusal.	Water Added		Water Strike - General			
	From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
			2.40	2.40	20	0.60
Casing Details		Chiselling Details				
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)		
9.80	200	9.80	9.80	01:00		






	Project No.: 20-087	Project Name: Cloghroe Housing Development	Borehole No.: BH06
	Coordinates: 557426.96 E 574456.90 N	Client: BMOR Client's Representative: MHL & Associates Ltd	Sheet 1 of 2
Method: Cable Percussion	Ground Level: 24.56 mOD	Dates: 14/09/2020 - 15/09/2020	Scale: 1:50
Plant: Pilcon			Driller: AA
			Logger: MN

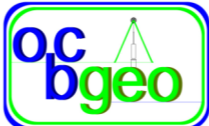



Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.10 - 1.00	B1				24.46	(0.10)	TOPSOIL			
0.10 - 1.00	D2					(0.90)		Driller Described: Brown / grey slightly gravelly sandy CLAY.		
1.00 - 1.80	B3			N=9 (2,1/2,3,2,2)	23.56	1.00		Driller Described: (Firm) Brown slightly gravelly sandy CLAY.		
1.00 - 1.80	D4					(0.80)				
1.20 - 1.65	SPT (C) N=9									
1.80 - 2.40	B5			N=11 (2,2/4,2,3,2)	22.76	1.80		Driller Described: (Firm) Grey / Purple slightly gravelly silty sandy CLAY.		
1.80 - 2.40	D6					(0.60)				
2.00 - 2.45	SPT (C) N=11									
2.40 - 3.00	B7			N=16 (2,2/3,3,5,5)	22.16	2.40		Driller Described: (Medium Dense) Sandy GRAVEL		
2.40 - 3.00	D8					(1.60)				
3.00 - 4.00	B9			N=18 (3,3/4,5,5,4)	20.56	4.00		Driller Described: (Medium Dense) Silty sandy gravelly CLAY.		
3.00 - 4.00	D10					(0.60)				
3.00 - 3.45	SPT (C) N=16									
4.00 - 4.60	B11			N=28 (3,5/5,5,8,10)	19.96	4.60		Driller Described: (Medium Dense to Dense) Very sandy GRAVEL.		
4.00 - 4.60	D12					(2.40)				
4.00 - 4.45	SPT (C) N=18									
4.60 - 6.00	B13			N=45 (2,7/8,14,13,10)		(2.40)				
4.60 - 6.00	D14									
5.00 - 5.45	SPT (C) N=28									
6.00 - 7.00	B15			N=48 (5,9/11,9,15,13)	17.56	7.00		Driller Described: (Dense to Very dense) Slightly silty very sandy CLAY.		
6.00 - 7.00	D16					(3.00)				
6.00 - 6.45	SPT (C) N=45									
7.00 - 8.00	B17			N=55 (7,7/10,14,14,17)		(3.00)				
7.00 - 8.00	D18									
7.00 - 7.45	SPT (C) N=48									
8.00 - 9.00	B19			N=58 (6,8/11,13,18,16)		(3.00)				
8.00 - 9.00	D20									
8.00 - 8.45	SPT (C) N=55									
9.00 - 10.00	B21									
9.00 - 10.00	D22									
9.00 - 9.45	SPT (C) N=58									
					14.56	10.00				

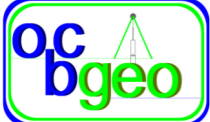




Remarks Cable Percussion terminated upon reaching scheduled depth.	Water Added		Water Strike - General			
	From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
			2.40	2.40	20	1.60
			4.60	2.40	20	2.00
Casing Details		Chiselling Details				
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)		
10.00	200					

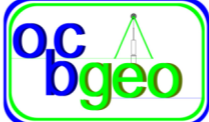





				Project No.: 20-087		Project Name: Cloghroe Housing Development		Borehole No.: BH06																																											
				Coordinates: 557426.96 E 574456.90 N		Client: BMOR Client's Representative: MHL & Associates Ltd		Sheet 2 of 2 Scale: 1:50 Driller: AA Logger: MN																																											
Method: Cable Percussion				Ground Level: 24.56 mOD		Dates: 14/09/2020 - 15/09/2020																																													
Plant: Pilcon																																																			
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill																																									
10.00 - 10.45	SPT (C) N=59			N=59 (8,10/14,11,17,17)				End of borehole at 10.000m																																											
<table border="1"> <tr> <td colspan="2">Water Added</td> <td colspan="4">Water Strike - General</td> </tr> <tr> <td>From (m)</td> <td>To (m)</td> <td>Struck at (m)</td> <td>Casing to (m)</td> <td>Time (min)</td> <td>Rose to (m)</td> </tr> <tr> <td></td> <td></td> <td>2.40</td> <td>2.40</td> <td>20</td> <td>1.60</td> </tr> <tr> <td></td> <td></td> <td>4.60</td> <td></td> <td>20</td> <td>2.00</td> </tr> <tr> <td colspan="2">Casing Details</td> <td colspan="4">Chiselling Details</td> </tr> <tr> <td>To (m)</td> <td>Diam (mm)</td> <td>From (m)</td> <td>To (m)</td> <td colspan="2">Time (hh:mm)</td> </tr> <tr> <td>10.00</td> <td>200</td> <td></td> <td></td> <td colspan="2"></td> </tr> </table>										Water Added		Water Strike - General				From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)			2.40	2.40	20	1.60			4.60		20	2.00	Casing Details		Chiselling Details				To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)		10.00	200				
Water Added		Water Strike - General																																																	
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)																																														
		2.40	2.40	20	1.60																																														
		4.60		20	2.00																																														
Casing Details		Chiselling Details																																																	
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)																																															
10.00	200																																																		
Remarks Cable Percussion terminated upon reaching scheduled depth.																																																			






APPENDIX D
Site Investigation Trial Pit Logs






		Project No.: 20-087	Project Name: Cloghroe Housing Development		Trial Pit No.: TP01		
		Co-ordinates: 557218.29 E 574818.78 N	Client: BMOR	Sheet 1 of 1			
Method: Excavation		Client's Representative: MHL & Associates Ltd	Scale: 1:20				
Plant: Kobelco E135SR		Ground Level: 42.41 mOD	Date: 28/09/2020	Driver: TW			
				Logger: MN			
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.40 - 0.90 0.40 - 0.90	B1 D2		42.01	0.40 (0.40)		TOPSOIL: Soft dark brown slightly sandy slightly gravelly silty CLAY with low cobble content and frequent rootlets, moist.	
1.50 - 2.00 1.50 - 2.00	B3 D4			0.40 (1.60)		Firm light brown becoming reddish brown (little orange mottling) sandy gravelly very silty CLAY with low cobble and small boulder content, moist. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded. Cobbles and boulders are mostly subangular sandstone.	0.5
2.00 - 2.40 2.00 - 2.40	B5 D6		40.41	2.00 (0.40)		Brown slightly clayey gravelly very silty SAND with low cobble content, moist becoming wet. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded. Cobbles are subangular to subrounded, sandstone, siltstone and some quartz.	2.0
2.50 - 3.00 2.50 - 3.00	B7 D8	Water seepage from 2.4m, no rise after 20 minutes.	40.01	2.40 (0.60)		Very stiff reddish brown slightly gravelly slightly sandy to sandy CLAY / SILT with low cobble content, moist. Sand is fine to coarse. Gravel is fine to coarse, subangular. Cobbles are subangular, sandstone, siltstone and occasional quartz.	2.5
			39.41	3.00		End of trial pit at 3.000m	3.0
Remarks			Water Strikes:		Stability: Slight spalling		
			Struck at (m):	Remarks:			
			2.40	Water seepage from 2.4m, no rise after 20 minutes.	Width: 1.30		
					Length: 3.90		

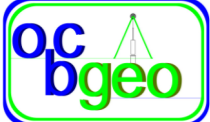
		Project No.: 20-087	Project Name: Cloghroe Housing Development		Trial Pit No.: TP02		
		Co-ordinates: 557279.02 E 574789.96 N	Client: BMOR	Sheet 1 of 1			
Method: Excavation		Client's Representative: MHL & Associates Ltd	Scale: 1:20				
Plant: Kobelco E135SR		Ground Level: 43.23 mOD	Date: 28/09/2020	Driver: TW			
				Logger: MN			
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.50 - 1.00 0.50 - 1.00	B1 D2		42.93	0.30 (0.20)		TOPSOIL: Soft dark brown slightly gravelly sandy very silty CLAY with frequent rootlets, moist.	
1.50 - 2.00 1.50 - 2.00	B3 D4		42.73	0.50 (1.90)		Orange brown slightly silty very gravelly SAND with low cobble content and occasional rootlets, moist. Sand is fine to coarse. Gravel is fine to coarse, subangular. Cobbles are subangular, sandstone, siltstone and occasional quartz. Brown silty very gravelly SAND with low cobble and small boulder content, moist. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded. Cobbles are subangular, sandstone, siltstone and occasional quartz.	0.5
2.60 - 3.10 2.60 - 3.10	B5 D6		40.83	2.40 (1.20)		Dark brown silty very gravelly SAND with low cobble and small boulder content, moist t wet. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded. Cobbles are subangular, sandstone, siltstone and occasional quartz.	2.5
			39.63	3.60		End of trial pit at 3.600m	3.0
Remarks			Water Strikes:		Stability: Slight spalling		
			Struck at (m):	Remarks:			
				None Encountered	Width: 1.30		
					Length: 3.80		

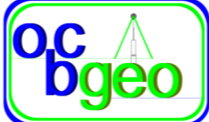
		Project No.: 20-087	Project Name: Cloghroe Housing Development		Trial Pit No.: TP03		
		Co-ordinates: 557366.05 E 574837.00 N	Client: BMOR Client's Representative: MHL & Associates Ltd		Sheet 1 of 1		
Method: Excavation		Ground Level: 44.24 mOD	Date: 28/09/2020		Scale: 1:20		
Plant: Kobelco E135SR					Driver: TW		
					Logger: MN		
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.60 - 1.10 0.60 - 1.10	B1 D2		43.94	0.30 (0.30)		TOPSOIL: Soft dark brown slightly sandy slightly gravelly silty CLAY with low cobble content and frequent rootlets, moist.	
			43.64	0.60 (0.30)		Firm light greyish brown sandy gravelly very silty CLAY with low cobble content and occasional rootlets, moist. Sand is fine to coarse. Gravel is fine to coarse, subangular. Cobbles are subangular, sandstone, siltstone and occasional quartz.	0.5
1.60 - 2.10 1.60 - 2.10	B3 D4			0.60 (1.70)		Firm becoming stiff orange brown and light greyish brown mottled sandy gravelly very silty CLAY with low to medium cobble content and low small boulder content, moist. Sand is fine to coarse. Gravel is fine to coarse, subangular. Cobbles and boulders are subangular, sandstone, siltstone and occasional quartz.	1.0
2.50 - 3.00 2.50 - 3.00	B5 D6		41.94	2.30 (0.70)		Brown silty very gravelly SAND with low cobble content, moist to wet. Sand is fine to coarse. Gravel is fine to coarse, mostly subangular. Cobbles are subangular, siltstone, sandstone and occasional quartz.	2.5
			41.24	3.00		End of trial pit at 3.000m	3.0
Remarks Water seepage from 2.8m, no rise after 20 minutes.			Water Strikes:		Stability:		
			Struck at (m): 2.80	Remarks: Water seepage from 2.8m, no rise after 20 minutes.	Slight spalling		Width: 1.30 Length: 4.40

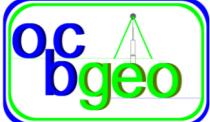










		Project No.: 20-087	Project Name: Cloghroe Housing Development		Trial Pit No.: TP04		
		Co-ordinates: 557390.99 E 574729.00 N	Client: BMOR Client's Representative: MHL & Associates Ltd		Sheet 1 of 1		
Method: Excavation		Ground Level: 37.96 mOD	Date: 25/09/2020		Scale: 1:20		
Plant: Kobelco E135SR					Driver: TW		
					Logger: MN		
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.40 - 0.90 0.40 - 0.90	B1 D2		37.66	0.30 (0.30)		TOPSOIL / SUBSOIL: Soft dark brown becoming greyish brown slightly sandy silty CLAY with occasional gravel and rootlets.	
			37.06	0.90 (0.60)		Firm light greyish brown and orange brown mottled slightly sandy slightly gravelly silty CLAY with low cobble content and occasional partially decayed rootlets, moist. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded. Cobbles are subangular.	0.5
0.90 - 1.15 0.90 - 1.15	B3 D4		36.81	1.15 (0.25)		Light brown clayey silty sandy GRAVEL with medium cobble content, moist Sand is fine to coarse. Gravel is fine to coarse, angular to subangular.	1.0
1.30 - 1.80 1.30 - 1.80	B5 D6			1.15 (1.25)		Stiff orange brown mottled light brownish grey slightly sandy slightly gravelly silty CLAY with low cobble content, moist.	1.5
2.40 - 2.90 2.40 - 2.90	B7 B8	Water seepage from 2.5m, slight pooling after 20 minutes.	35.56	2.40 (0.60)		Yellowish brown slightly clayey slightly silty very sandy GRAVEL with medium to high cobble and small boulder content, wet. Sand is fine to coarse. Gravel is fine to coarse, angular subangular. Cobbles and boulders are subangular, sandstone, siltstone and occasional quartz.	2.5
			34.96	3.00		End of trial pit at 3.000m	3.0
Remarks Water seepage from 2.5m, slight pooling after 20 minutes.			Water Strikes:		Stability:		
			Struck at (m): 2.50	Remarks: Water seepage from 2.5m, slight pooling after 20 minutes.	Slight spalling in gravel		Width: 1.30 Length: 4.70

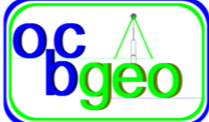








		Project No.: 20-087	Project Name: Cloghroe Housing Development		Trial Pit No.: TP05		
		Co-ordinates: 557325.98 E 574653.08 N	Client: BMOR Client's Representative: MHL & Associates Ltd		Sheet 1 of 1		
Method: Excavation		Ground Level: 29.42 mOD		Date: 24/09/2020	Scale: 1:20		
Plant: Kobelco E135SR					Driver: TW		
					Logger: MN		
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.30 - 0.80 0.30 - 0.80	B1 D2		29.17	0.25		TOPSOIL: Soft dark brown slightly sandy slightly gravelly silty CLAY with frequent rootlets, moist.	
				(0.55)		Firm light greyish brown with a little orange brown mottling slightly sandy slightly gravelly silty CLAY with low cobble content, moist. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded. Cobbles are subangular to subrounded, sandstone, siltstone and occasional quartz.	0.5
1.00 - 1.50 1.00 - 1.50	B3 D4		28.62	0.80		Brown with a little orange brown mottling slightly clayey slightly silty very gravelly SAND with low cobble and small boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded. Cobbles and boulders are mostly subangular, sandstone.	1.0
				(0.90)			1.5
		Steady inflow from 1.65m, rose from base to 1.65m depth after 20 minutes.	27.72	1.70		End of trial pit at 1.700m	2.0
							2.5
							3.0
							3.5
Remarks			Water Strikes:		Stability: Spalling below 0.8m Width: 1.15 Length: 2.40		
			Struck at (m):	Remarks:			
			1.65	Steady inflow from 1.65m, rose from base to 1.65m depth after 20 minutes.			






		Project No.: 20-087	Project Name: Cloghroe Housing Development		Trial Pit No.: TP06		
		Co-ordinates: 557475.99 E 574634.01 N	Client: BMOR Client's Representative: MHL & Associates Ltd		Sheet 1 of 1		
Method: Excavation		Ground Level: 28.80 mOD		Date: 25/09/2020	Scale: 1:20		
Plant: Kobelco E135SR					Driver: TW		
					Logger: MN		
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.30 - 0.80 0.30 - 0.80	B1 D2		28.55	0.25		TOPSOIL: Soft dark greyish brown sandy CLAY with occasional gravel and frequent rootlets, moist.	
				(0.55)		Soft becoming light brownish grey sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded. Cobbles are subangular, sandstone, siltstone and occasional quartz.	0.5
1.00 - 1.50 1.00 - 1.50	B3 D4		28.00	0.80		Firm brown gravelly very silty very sandy CLAY with medium cobble and low small boulder content, moist. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded. Cobbles and boulders are mostly subangular, sandstone.	1.0
				(0.90)			1.5
			27.10	1.70		End of trial pit at 1.700m	2.0
							2.5
							3.0
							3.5
Remarks			Water Strikes:		Stability: Slight spalling below 0.8m Width: 1.15 Length: 2.30		
			Struck at (m):	Remarks:			
				None Encountered			





		Project No.: 20-087	Project Name: Cloghroe Housing Development		Trial Pit No.: TP07		
		Co-ordinates: 557422.73 E 574567.01 N	Client: BMOR	Sheet 1 of 1			
Method: Excavation		Client's Representative: MHL & Associates Ltd	Scale: 1:20		Driver: TW		
Plant: Kobelco E135SR		Ground Level: 25.82 mOD	Date: 24/09/2020	Logger: MN			
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.15 - 0.50 0.15 - 0.50	B1 D2		25.67	(0.15) 0.15		TOPSOIL / MADE GROUND: Soft greyish brown slightly gravelly sandy silty clay with frequent rootlets, moist.	
				(0.35)		MADE GROUND: Soft light brown slightly gravelly sandy very silty Clay with low cobble and small boulder content and occasional rootlets, moist. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded. Cobbles and boulders are subangular, sandstone, siltstone and occasional quartz.	
0.70 - 1.20 0.70 - 1.20	B3 B4		25.32 25.12	0.50 (0.20) 0.70		FORMER TOPSOIL: Soft dark greyish brown slightly sandy slightly gravelly silty CLAY with occasional partially decayed rootlets, moist.	0.5
				(0.90)		STONE FIELD DRAIN - Along south side of TP (1.1m - 1.7m)	1.0
1.70 - 2.20 1.70 - 2.20	B5 D6	Rapid water inflow from west end of field drain at 1.6m. Rose to 0.45m after 20 minutes.	24.22	1.60		Firm grey sandy gravelly silty CLAY with low cobble content, moist to wet. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded. Cobbles are subangular, sandstone, siltstone and occasional quartz.	1.5
				(0.60)		Firm to stiff light grey to grey and locally pale yellow slightly sandy gravelly silty CLAY with low cobble and small boulder content, moist. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded. Cobbles are angular to subrounded, sandstone, siltstone, limestone and occasional quartz.	2.0
2.20 - 2.40 2.20 - 2.40	B7 D8		23.62	2.20			2.5
2.40 - 2.80 2.40 - 2.80	B9 D10		23.02	2.80			3.0
						End of trial pit at 2.800m	3.5
Remarks			Water Strikes:		Stability: Sides collapsing below groundwater		
			Struck at (m):	Remarks:			
			1.60	Rapid water inflow from west end of field drain at 1.6m. Rose to 0.45m after	Width: 1.30 Length: 4.70		




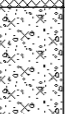
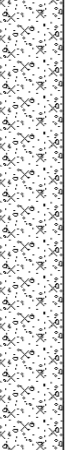
		Project No.: 20-087	Project Name: Cloghroe Housing Development		Trial Pit No.: TP08		
		Co-ordinates: 557355.03 E 574513.10 N	Client: BMOR	Sheet 1 of 1			
Method: Excavation		Client's Representative: MHL & Associates Ltd	Scale: 1:20		Driver: TW		
Plant: Kobelco E135SR		Ground Level: 25.30 mOD	Date: 24/09/2020	Logger: MN			
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.20 - 0.70 0.20 - 0.70	B1 D2		25.10	(0.20) 0.20		TOPSOIL: Soft dark brown slightly sandy slightly gravelly silty CLAY with frequent rootlets, moist.	
				(0.50)		Possible MADE GROUND: Firm light greyish brown with some reddish brown slightly sandy slightly gravelly to gravelly silty CLAY with low cobble content and occasional rootlets, moist becoming wet. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded. Cobbles are subangular to subrounded, sandstone, siltstone and occasional quartz.	0.5
1.00 - 1.50 1.00 - 1.50	B3 D4	Rapid water inflow from 0.8m, rose to 0.6m after 20 minutes.	24.60	0.70		Stiff reddish brown sandy gravelly clayey SILT with low cobble content, moist. Sand is fine to coarse. Gravel is fine to coarse, subangular. Cobbles are subangular, sandstone, siltstone and occasional quartz. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded. Cobbles are subangular to subrounded, sandstone, siltstone and occasional quartz. Possible former STONE FIELD DRAIN. Angular and tabular boulder-sized slabs of purple siltstone.	1.0
				(1.00)			1.5
						End of trial pit at 1.700m	2.0
							2.5
							3.0
							3.5
Remarks			Water Strikes:		Stability: Sides collapsing		
			Struck at (m):	Remarks:			
			0.80	Rapid water inflow from 0.8m, rose to 0.6m after 20 minutes.	Width: 1.60 Length: 4.50		






		Project No.: 20-087	Project Name: Cloghroe Housing Development		Trial Pit No.: TP09		
		Co-ordinates: 557412.16 E 574444.10 N	Client: BMOR Client's Representative: MHL & Associates Ltd		Sheet 1 of 1		
Method: Excavation		Ground Level: 24.42 mOD	Date: 24/09/2020		Scale: 1:20		
Plant: Kobelco E135SR					Driver: TW		
					Logger: MN		
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.60 - 1.10 0.60 - 1.10	B1 D2		24.22	0.20		TOPSOIL / SUBSOIL: Soft dark brown becoming greyish brown slightly sandy slightly gravelly silty CLAY with frequent rootlets, moist.	
						Firm becoming stiff light greyish brown with a little orange brown mottling slightly sandy slightly gravelly silty CLAY with low cobble content and occasional partially decayed rootlets, moist. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded. Cobbles are subangular to subrounded, sandstone, siltstone and occasional quartz.	0.5
				(1.20)			1.0
							1.5
1.70 - 2.20 1.70 - 2.20	B3 D4		23.02	1.40		Purplish brown silty fine SAND with occasional thin interbeds of fine sandy silt and slightly gravelly fine to medium sand, moist.	
							2.0
				(1.30)			2.5
2.70 - 3.20 2.70 - 3.20	B5 D6	Rapid water inflow from 2.7m, rose to 2.6m after 20 minutes.	21.72	2.70		Brown slightly silty very sandy GRAVEL with low cobble content, wet. Sand is fine to coarse. Gravel is fine to coarse, subangular. Cobbles are subangular, sandstone, siltstone and occasional quartz.	
							3.0
				(0.50)			3.5
			21.22	3.20		End of trial pit at 3.200m	
Remarks			Water Strikes:		Stability: Sides collapsing		
			Struck at (m):	Remarks:			
			2.70	Rapid water inflow from 2.7m, rose to 2.6m after 20 minutes.			
Remarks			Water Strikes:		Stability: Slight spalling below 1.0m		
			Struck at (m):	Remarks:			
			1.45	Steady water inflow from 1.45m, rose to 1.6m after 20 minutes.			
Remarks			Water Strikes:		Stability: Slight spalling below 1.0m		
			Struck at (m):	Remarks:			
			1.45	Steady water inflow from 1.45m, rose to 1.6m after 20 minutes.			

		Project No.: 20-087	Project Name: Cloghroe Housing Development		Trial Pit No.: TP10		
		Co-ordinates: 557254.03 E 574749.06 N	Client: BMOR Client's Representative: MHL & Associates Ltd		Sheet 1 of 1		
Method: Excavation		Ground Level: 36.71 mOD	Date: 25/09/2020		Scale: 1:20		
Plant: Kobelco E135SR					Driver: TW		
					Logger: MN		
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.60 - 1.10 0.60 - 1.10	B1 D2		36.46	0.25		TOPSOIL: Soft dark brown slightly and slightly gravelly CLAY with frequent rootlets, moist.	
						Firm light greyish brown with a little orange brown mottling slightly gravelly sandy very silty CLAY with low cobble content and occasional brown partially decayed rootlets, moist.	0.5
				(0.85)			1.0
1.10 - 1.45 1.10 - 1.45	B3 D4		35.61	1.10		Greyish brown slightly clayey slightly silty very sandy GRAVEL with low cobble content, moist becoming wet.	
							1.5
1.45 - 1.70 1.45 - 1.70	B5 D6	Steady water inflow from 1.45m, rose to 1.6m after 20 minutes.	35.26	1.45		Firm to stiff light brownish grey mottled orange brown sandy gravelly silty CLAY with medium cobble content and low small boulder content, moist.	
							2.0
				(0.25)			2.5
			35.01	1.70		End of trial pit at 1.700m	
Remarks			Water Strikes:		Stability: Slight spalling below 1.0m		
			Struck at (m):	Remarks:			
			1.45	Steady water inflow from 1.45m, rose to 1.6m after 20 minutes.			
Remarks			Water Strikes:		Stability: Slight spalling below 1.0m		
			Struck at (m):	Remarks:			
			1.45	Steady water inflow from 1.45m, rose to 1.6m after 20 minutes.			
Remarks			Water Strikes:		Stability: Slight spalling below 1.0m		
			Struck at (m):	Remarks:			
			1.45	Steady water inflow from 1.45m, rose to 1.6m after 20 minutes.			

		Project No.: 20-087	Project Name: Cloghroe Housing Development		Trial Pit No.: TP11		
		Co-ordinates: 557313.07 E 574719.01 N	Client: BMOR	Sheet 1 of 1			
Method: Excavation		Client's Representative: MHL & Associates Ltd		Scale: 1:20	Driver: TW		
Plant: Kobelco E135SR		Ground Level: 37.83 mOD	Date: 25/09/2020	Logger: MN			
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.50 - 1.00 0.50 - 1.00	B1 D2		37.58	0.25 (0.15)		TOPSOIL: Soft dark brown slightly sandy slightly gravelly silty CLAY with frequent rootlets, moist. Firm light greyish brown slightly sandy slightly gravelly silty CLAY with low cobble content and occasional rootlets, moist. Sand is fine to coarse. Gravel is fine to coarse, subangular. Cobbles are subangular, sandstone, siltstone and occasional quartz. Stiff brown / orange and light grey mottled sandy gravelly very silty CLAY with low cobble content, moist. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded. Cobbles are subangular, sandstone, siltstone and occasional quartz.	0.5
1.60 - 2.10 1.60 - 2.10	B3 D4		36.73	1.10 (0.20)		Brown clayey silty sandy GRAVEL with low to medium cobble content, moist. Sand is fine to coarse. Gravel is fine to coarse, subangular.	
2.30 - 2.80 2.30 - 2.80	B5 D6		36.53	1.30 (1.50)		Stiff orange brown and light grey to grey mottled slightly sandy gravelly silty CLAY with low cobble content, moist. Sand is fine to coarse. Gravel is fine to coarse, subangular. Cobbles are subangular, sandstone, siltstone and occasional quartz.	
2.80 - 3.30 2.80 - 3.30	B7 D8		35.03	2.80 (0.50)		Very stiff light grey mottled orange brown slightly sandy slightly gravelly silty CLAY, moist. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular. Cobbles are subangular, sandstone, siltstone and occasional quartz.	
			34.53	3.30	End of trial pit at 3.300m		
Remarks			Water Strikes:		Stability: Good		
			Struck at (m):	Remarks:			
					None Encountered		Width: 1.20 Length: 4.20

		Project No.: 20-087	Project Name: Cloghroe Housing Development		Trial Pit No.: TP12		
		Co-ordinates: 557341.78 E 574612.44 N	Client: BMOR	Sheet 1 of 1			
Method: Excavation		Client's Representative: MHL & Associates Ltd		Scale: 1:20	Driver: TW		
Plant: Kobelco E135SR		Ground Level: 27.43 mOD	Date: 24/09/2020	Logger: MN			
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.70 - 1.20 0.70 - 1.20	B1 D2		27.18	0.25 (1.15)		TOPSOIL: Soft dark brown becoming greyish brown slightly sandy slightly gravelly silty CLAY with frequent rootlets, moist. Firm becoming stiff light brownish grey with a little orange brown mottling slightly sandy slightly gravelly very silty CLAY with low cobble content and occasional rootlets, moist. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded. Cobbles are angular to subrounded.	0.5
1.60 - 2.10 1.60 - 2.10	B3 D4		26.03	1.40 (1.10)		Stiff purplish brown sandy gravelly very silty CLAY with low cobble content, moist. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded. Cobbles are angular to subrounded.	
2.50 - 2.70 2.50 - 2.70	B5 D6		24.93	2.50 (0.60)		Brown slightly clayey slightly silty very sandy GRAVEL with medium cobble content and with a thin dark partially cemented iron pan layer near the upper surfaces, moist becoming wet. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded. Cobbles are angular to subrounded.	
2.70 - 3.10 2.70 - 3.10	B7 D8	Steady water inflow from 2.8m, no rise after 20 minutes.	24.33	3.10	End of trial pit at 3.100m		
Remarks			Water Strikes:		Stability: Sides collapsing below 2.5m		
			Struck at (m):	Remarks:			
			2.80		Steady water inflow from 2.8m, no rise after 20 minutes.		Width: 1.20 Length: 5.50

		Project No.: 20-087	Project Name: Cloghroe Housing Development		Trial Pit No.: TP13		
		Co-ordinates: 557412.03 E 574509.00 N	Client: BMOR	Sheet 1 of 1			
Method: Excavation		Client's Representative: MHL & Associates Ltd		Scale: 1:20			
Plant: Kobelco E135SR		Ground Level: 25.59 mOD	Date: 24/09/2020	Driver: TW			
				Logger: MN			
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.50 - 1.00 0.50 - 1.00	B1 D2		25.39	0.20		TOPSOIL: Soft dark brown slightly sandy slightly gravelly silty CLAY with frequent rootlets, moist.	
						Possible MADE GROUND: Firm light greyish brown with some reddish brown slightly sandy slightly gravelly to gravelly silty CLAY with low cobble content and occasional rootlets, moist becoming wet. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded. Cobbles are subangular to subrounded, sandstone, siltstone and occasional quartz.	0.5
1.70 - 2.20 1.70 - 2.20	B3 D4		23.89	1.70		Brown slightly gravelly silty to very silty fine to medium SAND with occasional interbeds of slightly gravelly sandy silt, moist becoming wet. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Cobbles are angular to subangular, sandstone, siltstone and occasional quartz.	1.0
2.70 - 3.20 2.70 - 3.20	B5 D6	Seepage from 2.5m, no rise after 20 minutes.	22.39	3.20			1.5
						End of trial pit at 3.300m	2.0
							2.5
							3.0
							3.5
Remarks			Water Strikes:		Stability: Spalling below 1.7m		
			Struck at (m): 2.50	Remarks: Seepage from 2.5m, no rise after 20 minutes.			
			Width: 1.20				
			Length: 5.20				

		Project No.: 20-087	Project Name: Cloghroe Housing Development		Trial Pit No.: TP14		
		Co-ordinates: E N	Client: BMOR	Sheet 1 of 1			
Method: Excavation		Client's Representative: MHL & Associates Ltd		Scale: 1:20			
Plant: Kobelco E135SR		Ground Level: mOD	Date: 25/09/2020	Driver: TW			
				Logger: MN			
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.50 - 1.00 0.50 - 1.00	B1 D2			0.20		TOPSOIL: Soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets, moist.	
						Firm becoming stiff greyish brown becoming orange brown mottled slightly gravelly to gravelly sandy very silty CLAY with low cobble content, moist.	0.5
1.30 - 1.80 1.30 - 1.80	B3 D4	Water seepage from 1.4m, no rise after 20 minutes.		1.20		Brown with a little orange brown mottling slightly clayey slightly silty very sandy GRAVEL with low cobble content, moist to wet.	1.0
				(0.70)			1.5
				1.90		End of trial pit at 1.900m	2.0
							2.5
							3.0
							3.5
Remarks			Water Strikes:		Stability: Slight spalling below 1.2m		
			Struck at (m): 1.40	Remarks: Water seepage from 1.4m, no rise after 20 minutes.			
			Width: 1.20				
			Length: 2.90				

INFILTRATION TEST DATA

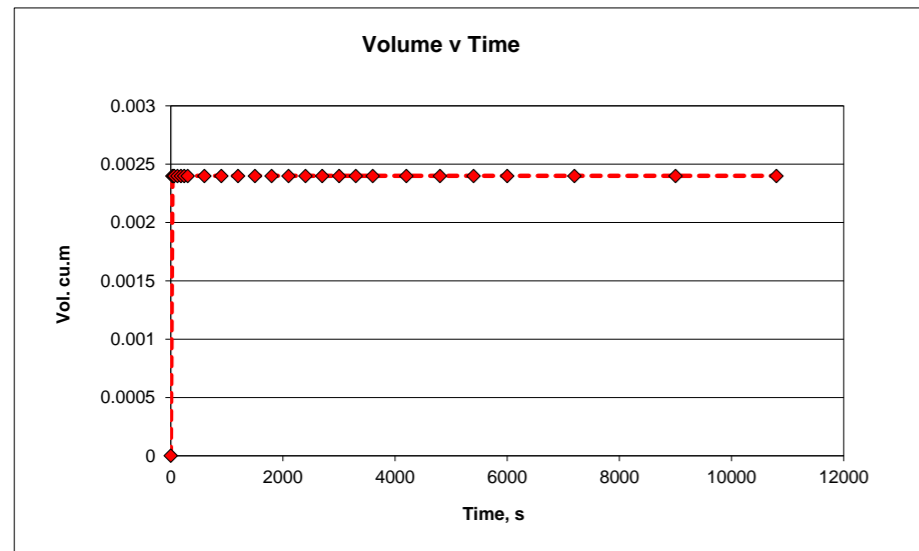
OCB Geotechnical Ltd

Project Name	Cloghroe Housing Development		Date	25/09/20	
Project No.	20-087		Location	TP06	
Easting	557475.99	Northing	574634.01	Level	28.804

length, m 2.3 b, m (wid 1.2 depth, m 1.5
 l_base, m 2 d_eff, m 0.7
 l_eff, m 2.15

Time, min	Measure	Time, sec	depth	Fall, m	Volume
Start					
0	0.700	0	0.8	0	0
0.5	0.701	30	0.799	0.001	0.0024
0.75	0.701	45	0.799	0.001	0.0024
1	0.701	60	0.799	0.001	0.0024
2	0.701	120	0.799	0.001	0.0024
3	0.701	180	0.799	0.001	0.0024
4	0.701	240	0.799	0.001	0.0024
5	0.701	300	0.799	0.001	0.0024
10	0.701	600	0.799	0.001	0.0024
15	0.701	900	0.799	0.001	0.0024
20	0.701	1200	0.799	0.001	0.0024
25	0.701	1500	0.799	0.001	0.0024
30	0.701	1800	0.799	0.001	0.0024
35	0.701	2100	0.799	0.001	0.0024
40	0.701	2400	0.799	0.001	0.0024
45	0.701	2700	0.799	0.001	0.0024
50	0.701	3000	0.799	0.001	0.0024
55	0.701	3300	0.799	0.001	0.0024
60	0.701	3600	0.799	0.001	0.0024
70	0.701	4200	0.799	0.001	0.0024
80	0.701	4800	0.799	0.001	0.0024
90	0.701	5400	0.799	0.001	0.0024
100	0.701	6000	0.799	0.001	0.0024
120	0.701	7200	0.799	0.001	0.0024
150	0.701	9000	0.799	0.001	0.0024
180	0.701	10800	0.799	0.001	0.0024

Area 2.4 m²
 50% Area_eff, a_{p50} 4.745 m² V_{p75-25 theory} volume 0.903 m³
 V_{p75-25} volume
 t_{p 75-25} time s
Infiltration Coefficient f ms⁻¹



NOTES:
 Water level did not fall sufficiently to calculate an Infiltration Coefficient

INFILTRATION TEST DATA

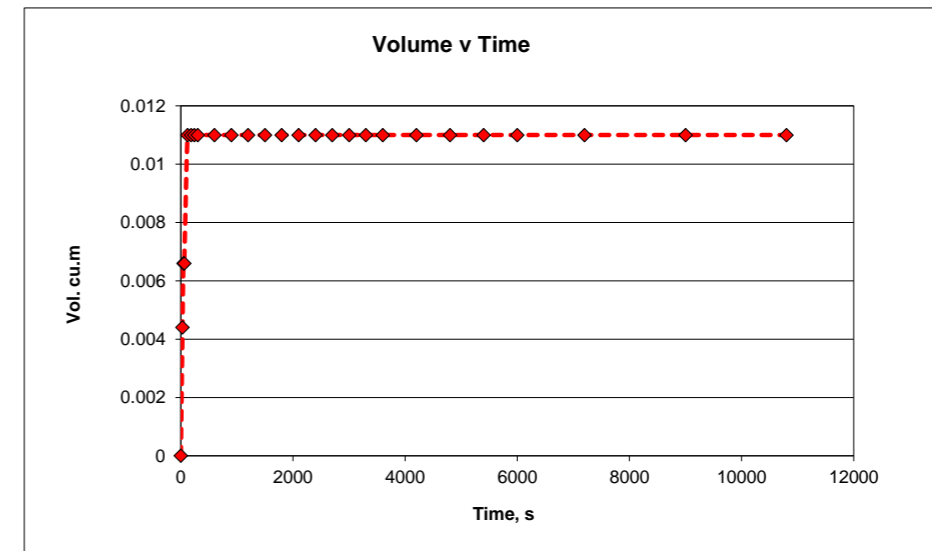
OCB Geotechnical Ltd

Project Name	Cloghroe Housing Development		Date	25/09/20	
Project No.	20-087		Location	TP10	
Easting	557254.03	Northing	574749.06	Level	36.711

length, m 2.2 b, m (wid 1.1 depth, m 1.6
 l_base, m 2 d_eff, m 0.6
 l_eff, m 2.1

Time, min	Measure	Time, sec	depth	Fall, m	Volume
Start					
0	0.585	0	1.015	0	0
0.5	0.587	30	1.013	0.002	0.0044
0.75	0.588	45	1.012	0.003	0.0066
1	0.588	60	1.012	0.003	0.0066
2	0.59	120	1.01	0.005	0.011
3	0.59	180	1.01	0.005	0.011
4	0.59	240	1.01	0.005	0.011
5	0.59	300	1.01	0.005	0.011
10	0.59	600	1.01	0.005	0.011
15	0.59	900	1.01	0.005	0.011
20	0.59	1200	1.010	0.005	0.011
25	0.59	1500	1.010	0.005	0.011
30	0.59	1800	1.010	0.005	0.011
35	0.59	2100	1.01	0.005	0.011
40	0.59	2400	1.010	0.005	0.011
45	0.59	2700	1.010	0.005	0.011
50	0.59	3000	1.01	0.005	0.011
55	0.59	3300	1.010	0.005	0.011
60	0.59	3600	1.010	0.005	0.011
70	0.59	4200	1.010	0.005	0.011
80	0.59	4800	1.010	0.005	0.011
90	0.59	5400	1.010	0.005	0.011
100	0.59	6000	1.010	0.005	0.011
120	0.59	7200	1.010	0.005	0.011
150	0.59	9000	1.010	0.005	0.011
180	0.59	10800	1.010	0.005	0.011

Area 2.2 m²
 50% Area_eff, a_{p50} 4.12 m² V_{p75-25 theory} volume 0.693 m³
 V_{p75-25} volume
 t_{p 75-25} time s
Infiltration Coefficient f ms⁻¹



NOTES:
 Water level did not fall sufficiently to calculate an Infiltration Coefficient

CBR TEST DATA

OCB Geotechnical Ltd

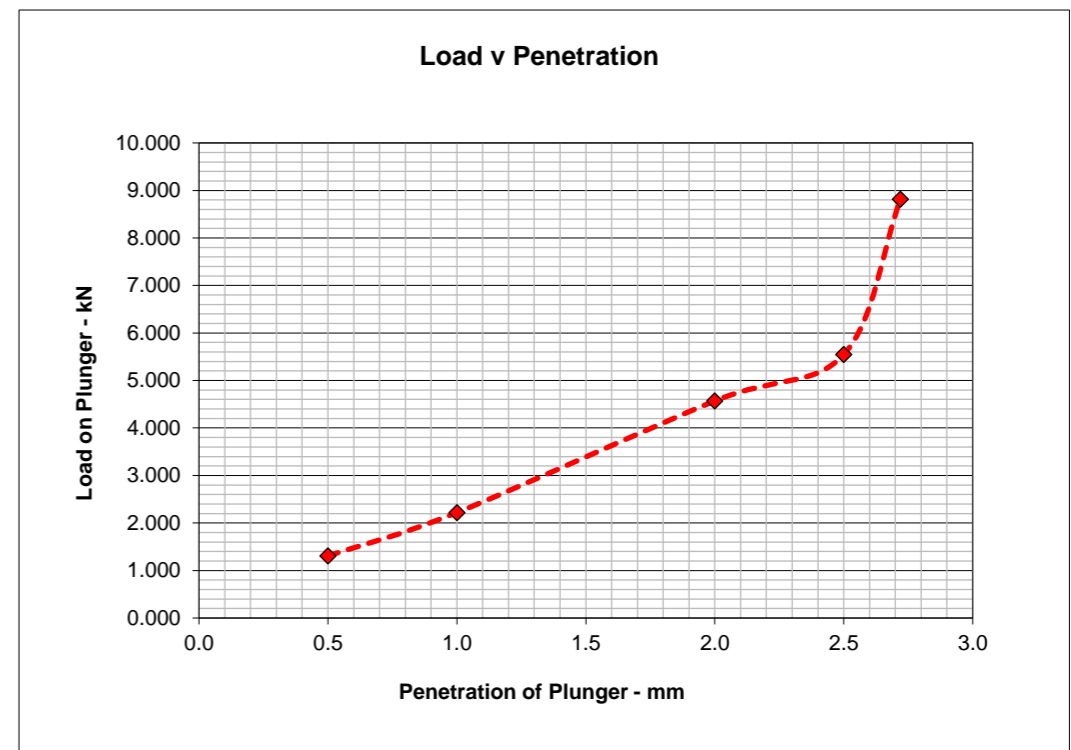
Project Name	Cloghroe Housing Development	Date	17/09/20
Project No.	20-087	Operator	GOC
Test Location	CBR1	Depth	0.385m

Penetration (mm)	Standard load (kg)	$I_{2.5} = \frac{\text{Load at 2.5mm penetration}}{1370} \times 100$
2.5	1370	
5	2055	$I_5 = \frac{\text{Load at 5mm penetration}}{2055} \times 100$
7.5	2630	
10	3180	
12.5	3600	

APPENDIX F

Site Investigation On-Site CBR Test Data

Penetration (mm)	Load Reading (Divisions)	Load Reading (kN)	Standard Load (Kg)	Load (Kg)	CBR (%)
0.5	40.0	1.305		133	
1	68.0	2.219		226	
2	140.0	4.569		466	
2.5	170.0	5.548	1370	566	41.30
3	270.0	8.812		899	



CBR TEST DATA

OCB Geotechnical Ltd

Project Name	Cloghroe Housing Development	Date	17/09/20
Project No.	20-087	Operator	GOC
Test Location	CBR2	Depth	0.385m

Penetration (mm)	Standard load (kg)	$I_{2.5} = \frac{\text{Load at 2.5mm penetration}}{1370} \times 100$
2.5	1370	
5	2055	$I_{5} = \frac{\text{Load at 5mm penetration}}{2055} \times 100$
7.5	2630	
10	3180	
12.5	3600	

Penetration (mm)	Load Reading (Divisions)	Load Reading (kN)	Standard Load (Kg)	Load (Kg)	CBR (%)
0.5	50.0	1.632		166	
1	55.0	1.795		183	
2	58.0	1.893		193	
2.5	60.0	1.958	1370	200	14.58
3	62.0	2.024		206	
4	64.0	2.089		213	
5	65.0	2.121	2055	216	10.53
7.5	69.0	2.252		230	
10	72.0	2.350		240	
15	75.0	2.448		250	
20	76.0	2.480		253	

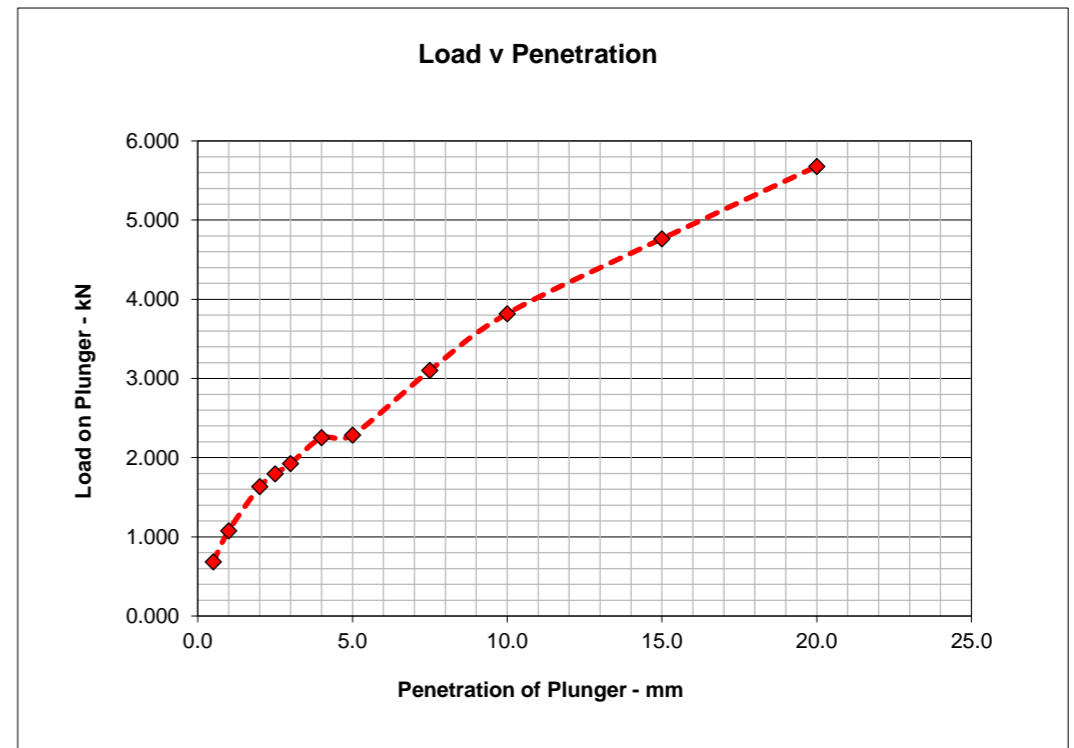
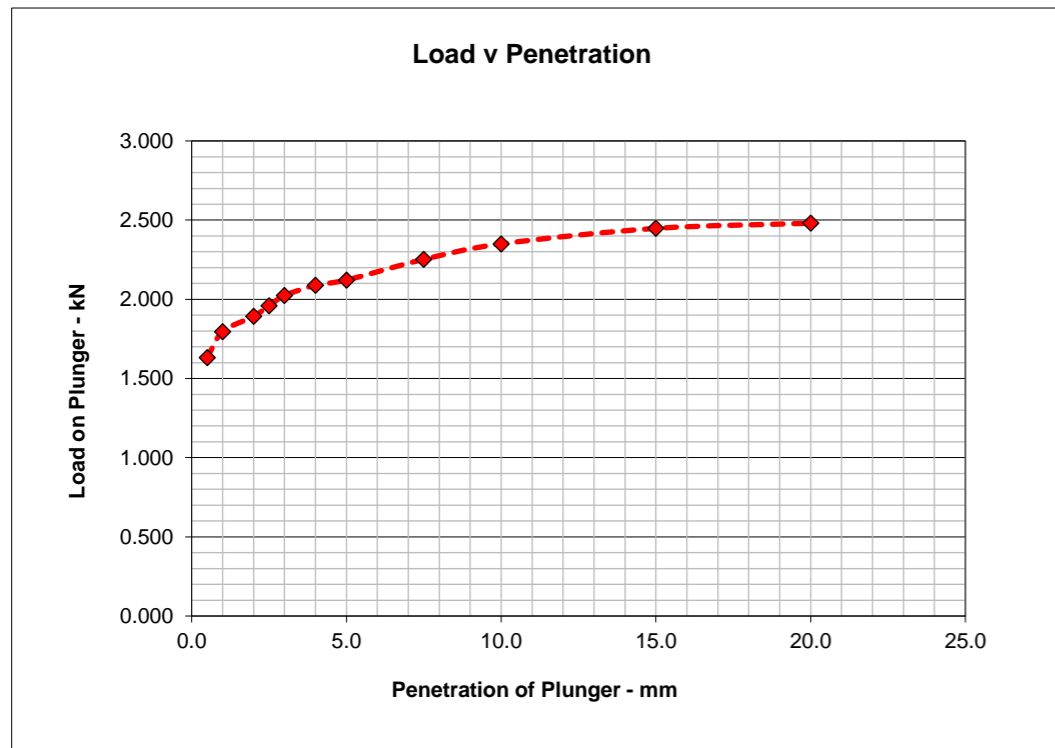
CBR TEST DATA

OCB Geotechnical Ltd

Project Name	Cloghroe Housing Development	Date	18/09/20
Project No.	20-087	Operator	GOC
Test Location	CBR3	Depth	0.385m

Penetration (mm)	Standard load (kg)	$I_{2.5} = \frac{\text{Load at 2.5mm penetration}}{1370} \times 100$
2.5	1370	
5	2055	$I_{5} = \frac{\text{Load at 5mm penetration}}{2055} \times 100$
7.5	2630	
10	3180	
12.5	3600	

Penetration (mm)	Load Reading (Divisions)	Load Reading (kN)	Standard Load (Kg)	Load (Kg)	CBR (%)
0.5	21.0	0.685		70	
1	33.0	1.077		110	
2	50.0	1.632		166	
2.5	55.0	1.795	1370	183	13.36
3	59.0	1.926		196	
4	69.0	2.252		230	
5	70.0	2.285	2055	233	11.34
7.5	95.0	3.101		316	
10	117.0	3.819		389	
15	146.0	4.765		486	
20	174.0	5.679		579	





Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

APPENDIX G

HR Wallingford Greenfield Runoff Estimation

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	1198	1198
Hydrological region:	13	13
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	1.65	1.65
Growth curve factor 100 years:	1.95	1.95
Growth curve factor 200 years:	2.15	2.15

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	25.29	25.29
1 in 1 year (l/s):	21.49	21.49
1 in 30 years (l/s):	41.73	41.73
1 in 100 year (l/s):	49.31	49.31
1 in 200 years (l/s):	54.37	54.37

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:

Longitude:

Reference:

Date:

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	1198	1198
Hydrological region:	13	13
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	1.65	1.65
Growth curve factor 100 years:	1.95	1.95
Growth curve factor 200 years:	2.15	2.15

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	7.21	7.21
1 in 1 year (l/s):	6.13	6.13
1 in 30 years (l/s):	11.9	11.9
1 in 100 year (l/s):	14.06	14.06
1 in 200 years (l/s):	15.5	15.5

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Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

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Site Details

Latitude:

Longitude:

Reference:

Date:

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	1198	1198
Hydrological region:	13	13
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	1.65	1.65
Growth curve factor 100 years:	1.95	1.95
Growth curve factor 200 years:	2.15	2.15

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

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(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	4.2	4.2
1 in 1 year (l/s):	3.57	3.57
1 in 30 years (l/s):	6.94	6.94
1 in 100 year (l/s):	8.2	8.2
1 in 200 years (l/s):	9.04	9.04

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Reference:

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Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	1198	1198
Hydrological region:	13	13
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	1.65	1.65
Growth curve factor 100 years:	1.95	1.95
Growth curve factor 200 years:	2.15	2.15

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

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Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	3.75	3.75
1 in 1 year (l/s):	3.19	3.19
1 in 30 years (l/s):	6.19	6.19
1 in 100 year (l/s):	7.32	7.32
1 in 200 years (l/s):	8.07	8.07

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Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	1198	1198
Hydrological region:	13	13
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	1.65	1.65
Growth curve factor 100 years:	1.95	1.95
Growth curve factor 200 years:	2.15	2.15

Notes

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Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	2.81	2.81
1 in 1 year (l/s):	2.39	2.39
1 in 30 years (l/s):	4.64	4.64
1 in 100 year (l/s):	5.48	5.48
1 in 200 years (l/s):	6.04	6.04

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Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

Site Details

Latitude:

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Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	1198	1198
Hydrological region:	13	13
Growth curve factor 1 year:	0.85	0.85
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(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	1.32	1.32
1 in 1 year (l/s):	1.12	1.12
1 in 30 years (l/s):	2.17	2.17
1 in 100 year (l/s):	2.57	2.57
1 in 200 years (l/s):	2.83	2.83

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Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
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Hydrological region:	13	13
Growth curve factor 1 year:	0.85	0.85
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Growth curve factor 100 years:	1.95	1.95
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Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	1.59	1.59
1 in 1 year (l/s):	1.35	1.35
1 in 30 years (l/s):	2.62	2.62
1 in 100 year (l/s):	3.1	3.1
1 in 200 years (l/s):	3.42	3.42

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Construction Environmental Management Plan

December 2021

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1.0 INTRODUCTION

1.1 Overview

The purpose of this Construction Environmental Management Plan is to provide details on the manner in which the proposed Cloghroe Strategic Housing Development (SHD) will implement measures, in a comprehensive and integrated approach to ensure protection of the environment during construction on site.

The report details the specific requirements that shall be addressed during construction phase of the project and includes the roles and responsibilities of individuals involved in the project. It identifies the environmental considerations associated with the construction process and outlines the work practices, management, mitigation and monitoring strategies which shall be implemented, as required to ensure the project is carried out in accordance with best practice, minimum impact on the surrounding environment and maximum safety throughout the duration of the scheme.

This plan includes the project's Construction and Demolition Waste Management Plan, which will ensure that optimum levels of waste reduction, reuse and recycling are achieved throughout the duration of the project.

1.2 Site Location

The application site, which is currently greenfield, is located within the Settlement Boundary of Tower as identified in the Blarney/Macroom Municipal District Local Area Plan adopted in 2017. Per the Cork City Council Boundary Extension 2019, the site location is now included within the Cork City Boundary. The site is located on the R617 Blarney Road in the village of Cloghroe. The site is bounded to the east by the R617 and to the south by the residential estate of Senandale.

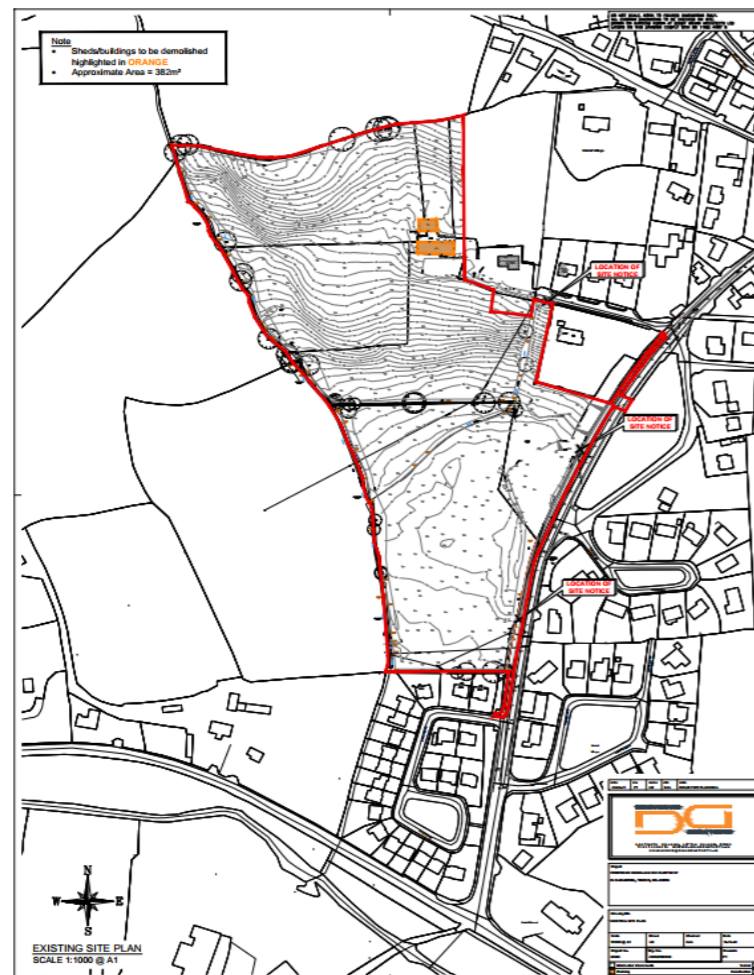


Figure 1.1: Site Location (boundary in red)

1.3 Scope

The subject development seeks planning permission for the following principal components:

- Construction of 198 residential units, a 42-child creche, a retail food store, a café, and associated green space.
- Demolition of 2 agricultural structures to the north of site (382 m²).
- On site vehicle streets with associated car parking provision.
- On site dedicated car park for retail unit.
- A mix of independent pedestrian and cyclist infrastructure together with shared street spaces
- Drainage and water supply infrastructure to accommodate the residential and commercial aspects of the site.
- Lighting, power and communications infrastructure to accommodate the residential and commercial aspects of the site.
- Public realm upgrades on R617 Blarney Road including footpath, cycle lane, signalised crossing, and relocation of existing bus stop.
- Flood defence works including flood storage provision.

The following figure presents the proposed site layout the subject of this planning application:



Figure 1.2: Proposed Site Layout

1.4 Site Specific Details

The site is situated on a north to south slope which slopes more steeply to the north of the site and more gently to the south. A stream flows in a southerly direction along the western boundary of the site with a land drain extending the southern boundary draining to the stream. The design involves the building up of the southern part of the site via fill to remove the flood risk from the stream impacting the development. A flood storage system is included in the proposed works to accommodate the displaced flood storage allowance. A balanced cut/fill approach was taken for the northern part of the site to minimise the need for any excavated material to be taken offsite during the works. Detailed cut/fill quantities have been provided for the scheme and are included in the accompanying Engineering Design Report. Preliminary Site investigation has been carried out to determine the reusability of excavated earthworks materials, groundwater profiles and seepage from cut areas on the site. This information has been used to inform an earthworks management plan details of which are included in this report.

This CEMP has been developed in response to recommendations made by the project ecologist.

In relation to health and safety issue, this CEMP has also been developed in accordance with health and safety provisions contained in the Safety Health and Welfare at Work (Construction) Regulations 2013, as amended, which transpose into Irish law obligations under Directive /-92/57/-EEC.

2.0 PROJECT RESPONSIBILITIES

2.1 Assignment of Responsibilities

The Contractor appointed by Cloghroe Development Ltd. to undertake the construction works, shall be responsible for implementing the project-specific Construction Environmental Management Plan (CEMP) incorporating the methodologies and measures described in this plan. To ensure the CEMP remains 'fit for purpose' for the duration of the project, the CEMP shall be reviewed and updated by the Project Manager during the life of the project.

The anticipated roles and responsibilities of the key parties involved in the implementing the CEMP are set out below.

Personnel	Role	Duties/Responsibilities
PROJECT MANAGER	Liaises with the Project Team in assigning duties and responsibilities in relation to the CEMP to individual members of the main contractor's project team.	<ul style="list-style-type: none"> • Implementing of the CEMP and • Implementing the Health and Safety Plan • Management of the construction project • Liaison with the client/developer • Liaison with the Project Team • Assigning duties and responsibilities in relation to the CEMP • Production of construction schedule • Materials procurement • Maintaining a site project diary
CONSTRUCTION MANAGER	Liaises with the Environmental Manager when preparing site works where there is a risk of environmental damage and manages the construction personnel and general works.	<ul style="list-style-type: none"> • Implementing the Construction Environmental Management Plan. • Assigned Project Management Duties. • Implementing the Health and Safety Plan under the direction of the PSCS • Liaison with the Process Contractors. • Monitoring the Construction Schedule. • Maintaining a Site Project Diary. • Assisting in maintaining the Site Queries and Complaints Register.
ENVIRONMENTAL MANAGER	Ensures that the CEMP is effectively implemented.	<ul style="list-style-type: none"> • Implementing the Environmental Procedures of the CEMP and updating it as necessary. • Management of all Environmental aspects of the Construction Works and Audit of Controls. • Review and Approval of Method Statements relating to Environmental aspects. • Ensuring Implementation of Mitigation Measures. • Training of Staff in all Environmental issues. • Liaison with Construction Manager.
PROJECT ECOLOGIST	The Project Ecologist will report to the Environmental Officer and is responsible for advising on all ecological monitoring activities	<p>The responsibilities and duties of the Project Ecologist will include the following:</p> <ul style="list-style-type: none"> • Ensure effective monitoring • Ensure effective implementation of any measures required as set out in the CEMP

ALL SITE PERSONNEL		<p>The site personnel appointed by the Contractor are responsible for:</p> <ul style="list-style-type: none"> • adhering to the relevant Environmental Control Measures and relevant site-specific Method Statements • adhering to the Health and Safety Plan • reporting immediately to the Environmental Manager and Construction Manager any incidents where there has been a breach of agreed procedures
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The Contractor shall designate a Site Engineer/Manager/Assistant Manager as the Construction Waste Manager and who will have overall responsibility for the implementation of the Project WMP.

The Waste Manager will have the authority to instruct all site personnel to comply with the specific provisions of the Plan.

A technically competent person will also be required to assess waste arisings and determine classification in accordance with the Hazardous Waste List.

At operational level, a foreman from the Contractor and appropriate personnel from each sub-contractor on the site shall be assigned the direct responsibility to ensure that the discrete operations stated in the Project WMP are performed on an on-going basis.

Where the need arises, the Contractor, shall employ the services of an approved Specialist Waste Management Sub-Contractor to assist with the safe management and disposal of contaminated waste materials. They shall specialize in the investigation of such material, the carrying out of sampling and testing of hazardous material and the preparation of treatment and disposal methodologies.

A report and method statement shall be finalised for the safe removal and disposal of the identified hazardous materials.

2.2 Reporting

The Site Manager / Project Manager is responsible for collating and maintaining all reporting, including all environmental and compliance documentation.

2.3 Training and Awareness

An initial Site Environmental Induction and ongoing Training will be provided to communicate the main provisions of the Environmental Plan to all Site Personnel.

Two-way communication will be encouraged to promote a culture of Environmental Protection. The the information which must be communicated to Site Staff includes:

- Environmental Procedures of the C.E.M.P.
- Environmental Buffers and Exclusion Zones
- Housekeeping of Materials and Waste Storage Areas
- Environmental Emergency Response Plan
- Reporting Procedures

2.4 Environmental Performance Indicators

The Project Contractor will record the key performance indicators for the site in gauging successful site management in the effective prevention of pollution and the protection of the environment. Environmental performance indicators will at a minimum include:

- Number of environmental accidents/incidents logged;
- Breach of procedure and corrective actions;
- Number of environmental complaints received;
- Results of dust monitoring;
- Results of noise and vibration monitoring, and
- Results of site audits.

2.5 Environmental Incidents / Complaints Procedure

In the unlikely event of an environmental incident, or breach of procedure, or where a complaint is received, the contributing factors shall be investigated, and remedial action taken as necessary. The Main Contractor will ensure that the following response actions will take place:

- The Project Manager must be informed of any incident, breach of procedure and/or complaint received, and details must be recorded in the incident/complaint register
- The Project Manager shall conduct/co-ordinate an investigation to determine the potential influence that could have led to the non-compliance.
- The Project Manager shall notify and liaise with the appropriate site personnel where required, e.g. Site Environmental Manager, Project Ecologist Project Archaeologist
- If necessary, the Project Manager will inform the appropriate regulatory authority. The appropriate regulatory authority will depend on the nature of the incident.
- The details of the incident will be recorded on an Incident / Complaints Form which is to record information such as the cause, extent, actions and remedial measures used following the incident/complaint. The form will also include any recommendations made to avoid re-occurrence of the incident.
- The Project Manager will be responsible for any corrective actions required as a result of the incident e.g. an investigative report, formulation of alternative construction methods or environmental sampling, and will instruct the Main Contractor as appropriate.
- The Site Project Manager is to ensure that the relevant environmental management plans/procedures are revised and updated as necessary.

2.6 Environmental Targets and Objectives

Targets

- Zero pollution incidents
- Segregation of site waste to include timber, general waste and other materials
- Completion of environmental checklists
- Fuel spill kits to be present on each site at all times
- Maintain all waste documentation including waste transfer notes, for all waste movements including contractors

Reporting Specific Objectives

- Environmental incidences to be reported to Site Manager without delay
- Documentation will be reported to the planning authority on a 4-weekly basis:
- Environmental incidents and nonconformities raised, including nature, status, corrective and preventive actions and potential for statutory intervention;

- Key environmental issues raised;
- Significant environmental incidents;
- Complaints and the current status of those complaints;
- Actions or interventions undertaken by enforcement bodies;

Site Specific Objectives

- Reduce waste, water and energy use on the project including within all of the site offices;
- Ensure that everyone complies with the environmental requirements;
- Reduce the carbon footprint of the development;
- Reduce the amount of construction waste and excavated material generated which goes to landfill;
- Zero pollution incidents onsite;
- Recycle construction waste where possible;
- Maximise beneficial reuse of the materials: and
- Ensure that all waste documentation (waste transfer docket, permits etc.) is available for inspection at the site office / in head office.

3.0 CONSTRUCTION MANAGEMENT

3.1 Introduction

3.1.1 Phasing of Works

The proposed application is for the delivery of 198 residential units, a 42-child creche, a retail food store, and café with apartments. A scheme plan showing the three proposed phases as well as the location of the proposed compound and the main construction access from R617 Blarney Road is shown in **Figure 3.1**. The expected duration of the proposed works will be approximately 4 years.

It is proposed to develop the site in three phases:

- Phase 1: Bulk excavation incl. demolition across the entire site extents, to take approximately 6 months to complete (site boundary noted in red in **Figure 3.1**).
- Phase 2: 82 Units including the proposed creche, retail food store and café in the South of the site, to take approximately 18 months to complete (noted in pink in **Figure 3.1**).
- Phase 3: 109 Units in the North of the site, to take approximately 24 months to complete (noted in green in **Figure 3.1**).

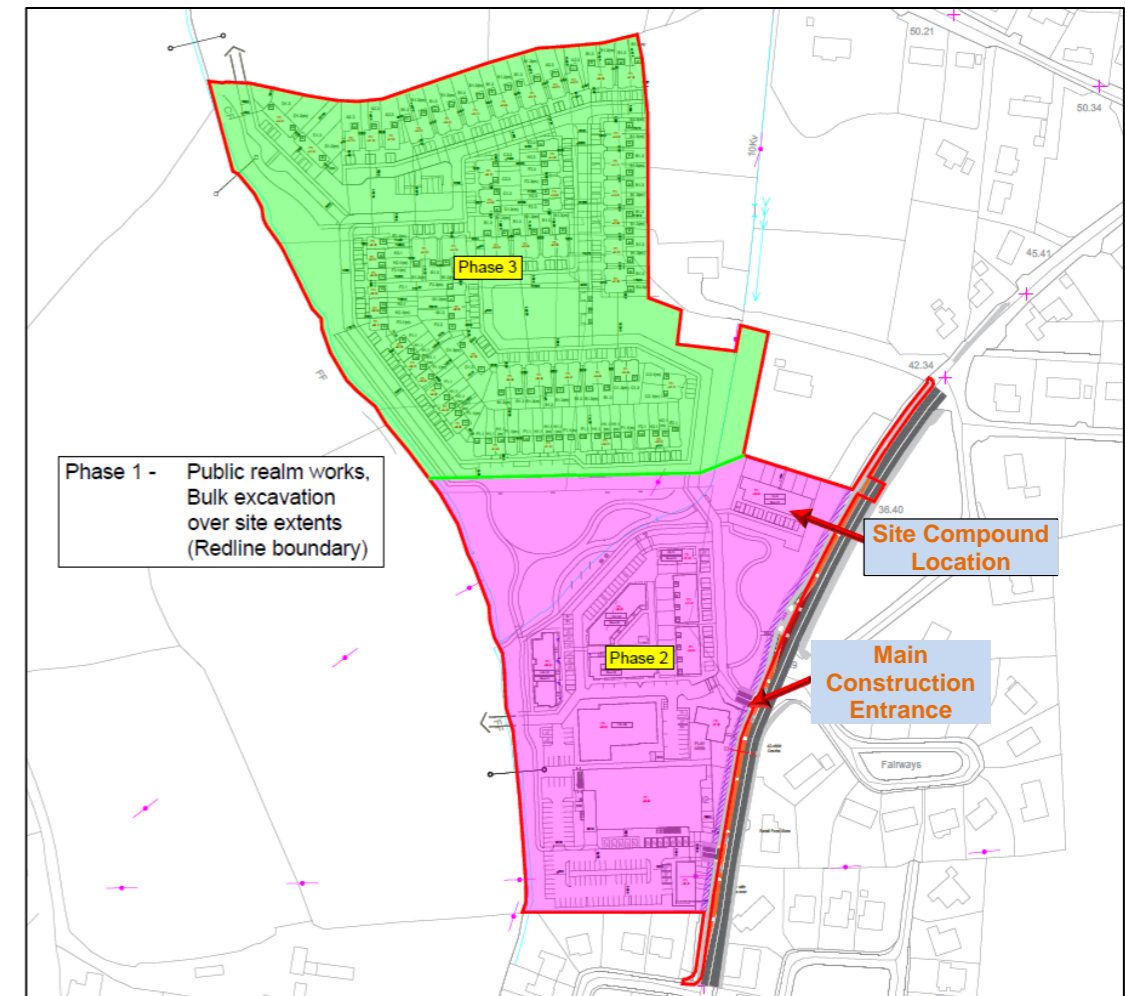


Figure 3.1: Phasing Diagram

3.1.2 Construction Stage Methodology

Having regard to the scope of the site works and processes, a detailed scheme of works is described in the following sub-sections.

3.1.2.1 Pre-commencement Activities

Before works commences a number of preparatory activities will be carried out. The following key works will be undertaken as part of the site preparation and pre-development activities:

- Prior to undertaking groundworks, a professional land surveyor shall be appointed to confirm existing ground levels. Existing ground levels on site range between 24.2m and 49.7m at the southern and north-eastern areas respectively.
- All onsite monitoring wells will be fully decommissioned by an experienced borehole specialist in accordance with relevant guidelines, 'Good practice for decommissioning redundant boreholes and wells' (UK Environment Agency, 2012).
- A programme of confirmatory archaeological investigations will be carried out by a suitably qualified archaeologist under a license issued by the National Monument Service. In the event that any sub-surface archaeological deposits, features or artefacts are identified during the investigations then their surfaces will be manually cleaned, recorded and left to remain in situ while the Planning Authority and the National Monument Service are consulted to determine further appropriate mitigation measures.

Enabling Works:

- The initial enabling works, to be carried out in accordance with this document, will enable the main access road off the R617 Blarney Road to facilitate construction access to the site.
- The demolition of 2 existing agricultural structures to the north of the site shall be completed with generated waste to be disposed of in accordance with Section 4 of this document.
- This will be followed by bulk excavation works to the north of the site. These works will include the creation of level platforms, accessible from the main access road, upon which the site compound and materials storage area will be constructed.
- Once the site compound is accessible, Tree Protection Fencing of at least 2.3m in height will be installed prior to other works commencing on site to avoid inadvertent felling or use of the ground under canopies for construction use. Fencing will be installed at 2m offsets from hedgerows to be retained (drawing L103) and will remain in place for the duration of construction. Fence panels shall be open mesh to ensure continued light and air circulation, with 150mm ground clearance to ensure continued small fauna movement. All trees and other vegetation to be retained shall be clearly marked on site.

Temporary Site Compound

Once the main entrance is in place and the bulk excavation has reached the appropriate stage, the temporary construction facilities will be established, ref. **Figure 3.2** and **Figure 4.1**.

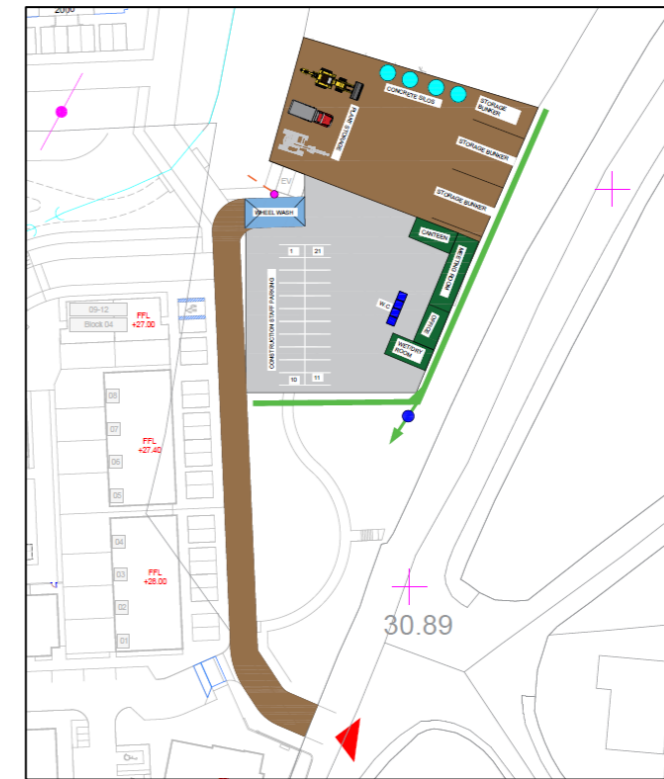


Figure 3.2: Site Compound Plan

These will include:

- Site offices, canteen and toilet / changing facilities c/w temporary water supplies and wastewater treatment unit.
- Secure compound and containers for storage of materials and plant.
- Temporary vehicle parking areas.
- Contained area for machinery refueling and construction chemical storage.
- Contained area for washing out of concrete and mortar trucks.
- Wheel-washing facilities for vehicles leaving the site.

A security/heras fencing will be provided at the main R617 Blarney Rd. entrance. All vehicles and personnel will be checked on entry to ensure no unauthorized access or fly-tipping will occur within the site. Heras fencing will also be provided on all boundaries to adjoining lands.

Water supply for the construction facilities will be taken from the mains supply which is adjacent the site. Power for the pumps and small power requirements for construction activities will be supplied from diesel generators until such time as the permanent site power supply is available.

3.1.2.2 Phased Based Construction

The following processes will be repeated for each phase of development and will be carried out in accordance with the requirements of this CEMP.

Bulk Excavation incl. Demolition Works:

- The demolition of 2 existing agricultural structures to the north of the site shall be incorporated in this phase. Waste material generated from the demolition works will be disposed of in accordance with Section 4 of this document.
- Following the demolition works, topsoil stripping will be completed. No soil will be stripped within 5m of the edge of stream. Given the history of pasture use, soil will be stripped to 350mm depth and stored as topsoil in stockpiles of no greater than 2m height, to ensure long term storage soil fertility. Soil

excavated at depths greater than 350mm will be stored separately as subsoil.

- The central attenuation basin will be constructed and planted in this phase of works to ensure adequate soil settlement and vegetation establishment prior to its use as stormwater attenuation. Following construction, fencing will be installed to protect the basin from interference during the ensuing construction works.
- Following the topsoil strip of phase 1, the main access road serving the development will be constructed to formation level. The bulk excavation work across the site will then be undertaken. Excavation undertaken to the north of the site will generate structural fill for the grading of the southern housing/commercial platforms. Any excess fill material generated will be stored locally to be used in later stages of development.
- Having established the desired site levels during the early works, the next phase of construction will involve the digging of the foundations for each of the buildings. The civil and structural design for each building will confirm the precise location and extent of foundations that are required to support each of the buildings. The foundations for each building will be excavated to the desired size and depth in preparation for the pouring of concrete..

Civil Works:

- The initial civil concrete works will involve the pouring of the foundations for each of the prepared buildings in this phase. Once the foundations are poured and have cured it will allow the building envelope to be erected.
- It is proposed that a concrete block construction process will be used which will involve the delivery of blockwork to site followed by external finishing material such as brickwork, plaster, and roof tiles.
- Construction materials will be sourced locally where practicable.
- Works on external services including water mains, foul sewers, storm sewers, roads, footpaths, electricity to include undergrounding of existing overhead lines, and public lighting will be carried out in conjunction with the completion of the units.
- All buildings will be constructed in accordance with current Building Regulations and certified by an appropriated qualified engineer during and after construction.

Landscaping:

- In tandem with the other construction activities being carried out on the buildings, elements of the sites landscaping plan will be progressed. The formation of landscape features will take place in parallel to the early works, utilising material excavated during the cut and fill exercise. As the site build progresses the landscape works will begin to focus on the soft landscaping aspects such as establishment of green zones and walkways, as well as planting of trees and shrubs in designated areas.
- Peripheral planting will be installed during the first planting season to ensure boundary interfaces are as robust as possible upon occupation.
- No herbicides will be used in the landscape preparation of the public open spaces, to minimise impact on natural drainage systems. The only use of herbicides will be in the private rear gardens prior to amenity grass installation.

3.1.2.3 Construction Impact Assessment

The potential impacts of the construction process have been considered by each separate discipline including materials and quantities associated with the re-grading works.

The following mitigation measures are proposed where potentially significant impacts have been identified:

- The moving and storage of excess material has been kept to a minimum and has informed the phased delivery of the scheme.
- Earthworks/ piling plant and delivery vehicles accessing the site will be confined to predetermined haul routes around the site for each phase of development.
- Excavated material shall be stored on-site to be re-used for later stages of the development.
- Salvaged topsoil is not to be stored more than 6 months if kept in piles more than 1m in height. To ensure healthy aerated soil, the stockpiling is to be rotated as required to meet this time restriction.
- The site investigations have identified that certain quantities of subsoil can be re-used as structural fill via soil strengthening methods. These works will be carried out on site within the designated area and measures shall be implemented within this area to control the run-off of storm water.
- Given the topography of the site control measures to protect surface waters from contamination will be put in place prior to the commencement of any site works.
- To avoid inadvertent felling, trees to be retained will be fenced off at the commencement of construction in line with British Standard 5837:2012 and National Road Authority 2006a guidelines.
- The mixed broadleaf woodland adjacent to the R617 will only be felled when the storm water attenuation tank is to be installed, to stagger the visual and environmental impact of felling. Tree lines south of the woodland will be felled first.
- All trees within 5m of the stream will be retained for habitat benefit and visual framework.

3.1.2.4 Control of Surface Water Run-off

The control measures relating to surface water run-off during the construction phase of the development shall follow best practice as recommended by CIRIA 2010 and ISO 14001:2015 – Environmental Management Systems and C741 Environmental good practice on site guide (4th edition) and CIRIA (2015) Coastal and marine environmental site guide (second edition) (C744).

Measures to be implemented will consist of:

- Surface water shall be directed to settlement ponds where topographically feasible. Where this is not practicable the surface water shall be allowed to percolate to ground and/or be removed by tanker to a designated wastewater treatment plant if excessive build-up of surface water on site occurs
- Protection of surface water gullies or drains using silt fences
- Use on-site bund structures (including incorporating existing ditches) on site to retain surface waters on site and to prevent runoff from the site. Bunds will be made up of adequately compacted material and visibly inspected during site audits to ensure they remain intact and functional.
- Minimal and short-term storage and the removal of excess materials (soil, stones, and construction wastes) off site in an efficient manner

- Daily checks of surface water regime on site and logging of same
- Works associated with excavations or earth moving not to be undertaken in periods of forecasted bad weather
- Drainage channels beside construction roadways to direct surface water to settlement areas and allow for natural percolation to ground
- Ensure good site management is maintained at all times during the construction phase including regular site clean-ups and use of appropriate bins.
- Chemicals or fuel/oils shall be stored in temporary bunded storage areas and plant is re-fuelled via delivery trucks in specific bunded re-fuelling areas, rather than the storage of large quantities of fuel on site in a designated bunded area. Bunds will be made up of adequately compacted material with impermeable membrane and visibly inspected during site audits to ensure they remain intact and functional. Straw mats shall also be implemented in the event of a spillage.
- No plant maintenance will be completed on site, any broken down plant will be removed from site to be fixed.
- Taps, nozzles or valves will be fitted with a lock system.
- The pouring of concrete, application of chemicals, painting or any other activity that has the possibility of being toxic to aquatic life shall be undertaken in a control and isolated manner, preventing the possibility of any pathway to a surface water source.

3.1.2.5 Biodiversity and Invasive Species

Biosecurity protocols shall be implemented during the proposed project to prevent the introduction of invasive species, in particular those listed on the 3rd Schedule of the EC (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011), to site and the further spread of diseases.

The following measures will be adopted:

1. All equipment intended to be used at the site shall be: -
 - i. power steam washed at a suitably high temperature or at least 65 degrees, or
 - ii. disinfected with an approved disinfectant, e.g. Virkon or an iodine-based product. It is important that the manufacturer's instructions are followed and if required, the correct contact times are allowed for during the disinfection process. Items that are difficult to soak shall be sprayed or wiped down with disinfectant.
2. During the duration of the proposed project, if equipment is removed off-site to be used elsewhere, the equipment shall be cleaned and disinfected prior to being brought back to the works area of the proposed project.
3. Appropriate facilities shall be used for the containment, collection, and disposal of material and/or water resulting from washing facilities of vehicles, equipment, and personnel.
4. Importation of materials shall comply with Regulation 49 of the EC (Birds and Natural Habitats) Regulations 2011.
5. Appropriate measures will be taken to ensure that trees and hedges being retained are protected in line with British Standard 5837:2012 and National Roads Authority 2006a guidelines. Protective fencing of at least 2.3m in height will be implemented.

6. To compensate for the loss of hedgerow and partial removal of woodland, substantial native tree and hedgerow planting will be established on the site. The planting schemes shall ensure connectivity to linear/ woodland habitats of bats in the wider landscape.
7. Construction lighting shall incorporate the use of accessories such as hoods, cowls, louvres, and shields to direct lighting away from all hedgerow/ treeline habitats to be retained during the bat activity period (April to September).
8. Removal of vegetation such as grassland, woodland, and hedgerow will be carried out outside the breeding bird season (March 1st to August 31st, inclusive).

3.2 Hours of Working (Hours of Site Operation)

Works will occur within the hours:

07.00am – 07.00pm* (Monday – Friday inclusive)

07.00am – 4.00pm* (Saturday)

There will be no work on Sunday and Bank Holidays.

** It is proposed that exceptionally, and with prior agreement of the planning authority, working hours may be extended and/or works may take place on a Sunday and/or Bank Holiday at times when critical elements of work need to be advanced. Longer working days can occur when there is a planned concrete pour. If extended working hours are required, these will be agreed in advance with the planning authority. Accordingly, traffic generated by core construction personnel will be mainly during the off-peaks and will not have a significant adverse impact on the road network.*

3.3 Site Storage

Materials for inclusion as part of the works will be stored generally within the allocated compound. No products will be placed outside of this area. Materials will be brought to site periodically to suit the programme for the works.

Earthworks arising will be stored within the identified space and will be sampled, processed and placed within the works or removed off site in accordance with the Waste Management Plan (Section 4 of this report). Storage spaces will be located away from the excavations/immediate works area, in an appropriate manner at a safe and stable location. The maximum height of temporary stockpiles is 3m.

3.4 Noise and Vibration

The control of noise and vibration during the construction phase shall comply with the general recommendations set out in the Code of Practice BS 5228-1:2009 +A1:2014: "Code of practice for noise and vibration control on construction and open sites" together with the specific requirements described below.

"Best practicable means" shall be used to minimise noise and vibration from the site and compound and shall pay particular attention to the selection of the most appropriate available plant to ensure that neighbourhood noise (as defined in BS 5228 Part I, Section 3) and vibration is kept to a minimum.

All vehicles and mechanical plant used for the purpose of the Works shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order. In addition, all diesel engine powered plant shall be fitted with effective air intake silences.

The noise level limits within the Site shall be as per **Table 3.1** below.

Day	Time	Level (dbA) (measured over any 1 hour period)	L. Max (dbA)
Monday-Friday inclusive	07:30 - 18:30	65 leq	75
Monday - Friday inclusive	18:30 - 22:00	60 leq*	65*
Saturday*	08:30 - 15:30	65 leq	75
Sunday* and Bank Holidays*	08:30 - 12:00	60 leq*	65*

*** Where agreed by the Planning Authority and/or necessary for emergency works.
Measurements will be taken and recorded using a Digital Seismograph and Sound Level Meters**

Table 3.1 Noise Levels

All compressors shall be "sound reduced" models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use. All ancillary pneumatic percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturers, and where available, dampened tools and accessories shall be used.

Machines in intermittent use shall be shut down in the intervening periods between work.

The start up of plant and vehicles shall occur sequentially rather than all together.

All internal haul routes within the site shall be well maintained and avoid steep gradients where possible.

All ancillary plant, such as generators and pumps, shall be positioned so as to cause minimum noise disturbance. If operating outside the normal working week or where the distance between a noise source and receiver is restricted, acoustic enclosures shall be provided. Barriers installed to provide screening will be located either close to the source of the noise (as with stationary plant) or close to the receptor. The height of the barrier will be in accordance with BS 5228-1.

Activities causing significant vibration will be located away from sensitive areas and/or isolated using resilient mountings where practicable.

The drop height of materials will be minimised to keep noise disturbance to a minimum.

Activities causing significant vibration will be located away from sensitive areas and/ or isolated using resilient mountings where practicable.

Times and noise levels at noise sensitive areas resulting from any operation during the construction phase, on or off the site, shall not exceed those listed in the Table above.

The distance between noise sources and noise-sensitive areas will be increased as much as is reasonably practicable.

A baseline noise monitoring programme has been completed by an independent consultant with attended noise monitoring having been carried out at a number of locations. Procedures and results of this aspect of the baseline noise monitoring programme will be in general in accordance with ISO 1996: Part 2: 2007 2.

During the construction and demolition phases, the development shall comply with British Standard 5228 'Noise Control on Construction and open sites Part 1. Code of practice for basic information and procedures for noise control.'

BS 5228 includes guidance on the various aspects of construction site noise mitigation, including, but not limited to:

- Liaison with neighbours
- Noise monitoring
- Hours of works
- Selection of quiet plant
- Control of noise sources and screening

Noise control audits will be conducted at regular intervals through the construction phase of the development. In the first instance it is envisaged that such audits will take place monthly. This is subject to review and the frequency of audits may be increased as deemed necessary.

The purpose of the audits will be to ensure that all appropriate steps are being taken to control construction noise emissions. To this end, audits will encompass the following:

- Implementation of hours of operation
- Opportunities for noise control 'at source'
- Optimum siting of plant items
- Avoidance of plant items being left to run unnecessarily
- Correct use of proprietary noise control measures
- Materials handling
- Maintenance
- Correct use of screening provided and opportunities for provision of additional screening

3.5 Dust Management Plan

All necessary steps shall be implemented to control dust caused by construction traffic. This will include measures such as:

- Wetting of haul road and storage areas;
- Covering or dousing of any dry, imported or excavated material;
- Reducing the duration for stockpiling in fill materials;
- Use of a wheelwash for construction traffic.

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. The following dust control measures have been formulated by drawing on best practice guidance from Ireland, the UK and the USA.

The key features of proposed dust management are:

- the specification of a site policy on dust;
- the identification of the site management responsibilities for dust;
- the implementation of documented systems for managing site practices and implementing management controls;
- the implementation of criteria by which the performance of the dust management plan can be assessed.

The objective is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

Hoarding or screens will be erected around works areas to prevent larger particles of dust from travelling off-site and impacting sensitive receptors.

The siting of construction activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions to minimise the potential for significant dust nuisance. In addition, good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or using effective control measures quickly before the potential for nuisance occurs:

- During working hours, technical staff shall be on site and available to monitor dust control methods;

- Complaint registers will be kept on site detailing any telephone calls and letters of complaint received about construction activities, together with details of any remedial actions carried out;
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust using best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed, and procedures implemented to rectify the problem. Specific dust control measures to be employed are highlighted below.

Site roads (particularly unpaved) can be a significant source of fugitive dust from construction sites if control measures are not in place. However, effective control measures shall be implemented. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions.

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles;
- Bowsers will be available during periods of dry weather throughout the construction period. The bower will operate during dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use;
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.
- Land clearing / earth-moving during periods of high winds and dry weather conditions can be a significant source of dust.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bower will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.

The location and moisture content of storage piles are important factors which determine their potential for dust emissions:

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency.

Spillage and blow-off of debris, aggregates and fine material onto public roads should be reduced to a minimum by employing the following measures:

- Vehicles delivering material with potential for dust emissions to an off-site location shall be enclosed or covered with tarpaulin always to restrict the escape of dust;
- Public roads outside the site shall be regularly inspected for cleanliness, as a minimum daily, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris.

- A wheel wash facility will be employed within the site so that traffic exiting the site compound will not generate dust or cause the build-up of aggregates and fine material in the public domain (refer **Figure 4.1 Site Storage Location**).

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, will contribute towards the achievement of no dust nuisance occurring during the construction phase.

3.6 Construction Access

Construction Access to the site will be from the R617 Blarney Road via the proposed main access road serving the site.

The main access road will be excavated to formation level and constructed to basecourse level which will be temporarily surface dressed subject to the completion of overall development. The main surface water drainage in this area will also be provided as part of the initial enabling works.

3.7 Liaison

The Project Manager, will be responsible for project strategic liaison whilst the Construction Manager will be responsible for day-to-day liaison and logistics for all the construction related activities. Both will be permanently based on site with the Project Manager the first point of contact for the project team and client/developer and the Construction Manager shall be the first point of contact for all concerns, issues and complaints. A display board will be erected outside the site, which as minimum will identify key personnel contact addresses and telephone numbers.

Newsletters, liaison meetings, progress photos, and organised site visits will be communication methods which shall be used to provide information to the public.

3.8 Site Specific Traffic Management Plans (TMP's)

A Construction Traffic Management Plan has been developed, is submitted with this planning application, and shall be agreed with Cork City Council Roads & Transportation Department.

All public roads, accesses, drains, ditches and grips will be kept clear of all dirt, mud and material arising from the execution and completion of the Works and suitable clearing equipment and labour will be provided by the Contractor for this purpose. Attention will also be given to the loading of lorries carrying bulk materials into the Site and spoil from the Site to ensure that these will not be overloaded or loaded in such a way that spillage is avoided. Any dirt or mud adhering to the tyres or chassis of any vehicles will be thoroughly cleaned off before the vehicle is permitted to leave the Site. In the case of delivery to the Site, vehicles will be thoroughly cleaned before they leave the point of collection. The Contractor will be equally responsible for the vehicles of his sub-contractors and suppliers and the like.

An automatic wheel-washing unit shall be installed and maintained at the entrance to the site (Refer to Site Compound Layout). This will be available for use at all times. Maintenance will include for cleaning out of the equipment and disposal of any material gathered within. The required equipment for supplying water and power to the wheel washing facility shall be made available and maintained in good working order. At the end of the construction phase, the wheel washing facilities shall be removed from site.

3.9 Complaints

The Complaints that may be received will be logged, assessed and appropriate action taken as soon as practicable. It will be critical to ensure that key issues are properly addressed from the outset to create a good working relationship and an integrated team approach to resolving potential issues before they arise.

3.10 Vehicle Movement & Deliveries

Deliveries will be co-ordinated to prevent queuing of vehicles which could adversely affect traffic

flow and to minimise disruption to local traffic. Deliveries will be timed and coordinated to avoid conflict with collection of waste, other deliveries (particularly adjoining landowners) and rush hour traffic (AM & PM peak hours as identified in the Traffic & Transportation report). Large deliveries will be scheduled outside peak hours to minimise disruption.

On occasion, with the agreement of the planning authority, out of hours deliveries and collections shall be implemented, for example, in relation to out-sized loads to facilitate the smooth continuation of works and minimise disruption.

Special consideration will be given to the busy drop off and collection times at St. Senan's Cloghroe National School. The school day begins at 8:50am, ending at 1:30pm for Junior/Senior infants and 2:30pm for classes I to VI.

Site staff will be encouraged to car-pool and to use public transport to reduce the number of vehicle movements entering and existing the site.

3.11 Site Security

As identified in the Site Compound Layout drawing access to the site will be strictly controlled with an on-site security person logging entry and exits. This will include all on-site personnel. These measures will be developed in conjunction with the Project Supervisor Construction Stage.

3.12 Road Safety

Measures to keep pedestrians and vehicles adequately separated will be implemented on-site. This is of particular importance for the proposed development, as it is proposed for the public to occupy the site as individual phases are complete.

The following actions will help be taken to keep pedestrians and vehicles apart:

- Entrances and exits - separate entry and exit gateways for pedestrians and vehicles shall be provided with a gate man in attendance to interface with the traffic and public to facilitate safe access and egress of vehicles.
- Walkways - firm, level, well-drained pedestrian walkways will be provided.
- Crossings - where walkways cross roadways, a clearly signed and lit crossing point shall be provided where drivers and pedestrians can see each other clearly;
- Visibility - drivers driving out onto public roads will be required to be able to see both ways along the footway before they move on to it;
- Obstructions - walkways shall be kept free of construction vehicles
- All workers shall be competent to operate the vehicles, machines and attachments they use on site.
- Personnel directing vehicle movements will be trained and authorized to do so. Access to vehicles will be managed and people alerted to the risk.

The following shall be provided on site during the construction phase:

- Aids for drivers - Mirrors, CCTV cameras or reversing alarms will be provided that can help drivers see movement all-round the vehicle;
- Banksman will be appointed to control manoeuvres and who are trained in the task;
- Lighting – The site will be properly lit so that drivers and pedestrians on shared routes can see each other easily. Lighting may be needed after

sunset or in bad weather;

- Clothing - Pedestrians on site will wear high visibility clothing.
- Signs and instructions
- All construction personnel, drivers and pedestrians shall be informed of the routes and traffic rules on site. Use standard road signs where appropriate.
- Induction training shall be provided for drivers, workers and visitors and send instructions out to visitors before their visit.
- All the construction vehicle drivers and supply chain personnel shall be competent and have relevant training and certification appropriate for their job.

3.13 Plant & Equipment

The typical Plant and Equipment to be employed during the construction works are listed in **Table 3.2** below.

Plant Item	Purpose
Hydraulic excavators - various	Excavation, substructures, drainage
Mobile cranes- various	Erection of buildings, movement of large materials and plant
Dumpers	Excavations, drainage, landscaping, movement of materials
Concrete saw cutting	Used for cutting concrete slabs in yard areas, building substructure and superstructures.
Volvo dump trucks	Removal of demolition materials off site
Ready-mix concrete trucks	Delivery of concrete to site for new structures, slabs, etc.
Pump unit for ready-mix concrete	For placement of concrete.
Vibrating rollers	Used for compacting stone in roads, yard areas, substructures etc
HGV – 20 foot trailers	Delivery of materials, steel, cladding, concrete blocks,
HGV – 40 foot trailers	Delivery of structural steel, cladding, large elements of new plant and equipment
Telescopic site handlers	Handling and moving materials on site
Road sweeping equipment	Management of dust and excavation residues on site and off site on road approaches.
Welding gear	Demolitions, erection of structural steel and in mechanical installations
Elevation platforms	For use by employees erecting steel, cladding and general construction at height.
Small tools – grinders, saws, drills, kango hammers, powerfloats, temporary lights, water pumps, concrete vibrators	For use during all stages of construction

Table 3.2 List of typical plant required for this Project

4.0 CONSTRUCTION & DEMOLITION WASTE ARISING & MANAGEMENT

4.1 Analysis of Waste Arising from the Construction Stage (including Demolition)

It is anticipated that a significant amount of material arising from the works will be classified for re-use as fill material under roads and pavements. The objective is to ensure the absolute minimum amount of material leaves the site as waste.

The following main waste arisings, including surplus materials, which are likely to be generated during the project are presented in **Table 4.1** hereunder.

Waste Type	European Waste Classification Code	Waste Classification
Concrete Kerbs	17 01 01	Non-hazardous
Concrete (ex. Roads)	17 01 01	Non-hazardous
Concrete (ex. Footpaths)	17 01 01	Non-hazardous
Soil and Stones	17 05 04	Non-hazardous
Scrap Metal	17 04 05	Non-hazardous
Bitumen/Tarmacadam	17 03 02	Non-hazardous
Surplus Cabling	17 04 11	Non-hazardous
Plastic Pipe Cut-offs	17 02 03	Non-hazardous
Biodegradable Garden and Parks Waste	20 02 01	Non-hazardous
Plastic Packaging	15 01 02	Non-hazardous
Paper and Cardboard Packaging	15 01 01	Non-hazardous
Mixed Municipal Waste	20 03 01	Non-hazardous
Waste construction material containing asbestos	17 06 05	Hazardous

Table 4.1 Main Waste Types & EWC Codes

For the purposes of this plan, it is assumed that all of the soil and stone waste arising from the project will be categorised as non-hazardous and will be kept on-site. Based on the site investigation report carried out by OCB Geotechnical, the movement of any excess material off site is not anticipated. Fill material generated on site will be strengthened to ensure it can be used as aggregate construction material on the development. Full laboratory analysis will be completed prior to the start of works to confirm exact soil strengthening requirements. Topsoil excavated will be stored for re-use on the site.

The demolition of 2 existing agricultural structures (corrugated metal sheds with steel frame on concrete foundations) to the north of the site is included within the project scope. Where asbestos is uncovered on site (waste classification code 17 06 05), the asbestos containing materials (ACM) will be double-bagged and removed from the site by a competent contractor and disposed of in accordance with the relevant policies and legislation.

During the construction phase, typical wastes arising include:

- Excavation wastes
- Construction waste from building materials such as Off Cuts of Metal and Insulation
- Pipe Off Cuts, Wrapping, Insulation, Weld Rods
- Materials Wrapping
- Oils, Filters and Cleaning Materials
- Food Waste, Packaging Materials, Dry Recyclables
- Metal, Wire
- Wash Out from Trucks

All wastes will be managed, collected, stored, and segregated in separate areas and removed off site by a licensed waste management contractor at regular intervals during the works. All concrete trucks will have to return to their respective yards for washout.

4.2 Types of Materials

As with most construction projects, the materials required for this development will include imported stone, masonry and concrete. The principal construction materials will be:

- Concrete, sub-structures, Ground Floor, Timber Floors.
- Steel reinforcement used in concrete.
- Structural steelwork used for equipment support, roof structure, hand railings.
- Partitions incorporating studwork and panelled walls.
- Secondary steel work.
- Masonry concrete block work.
- Stone fill.

4.3 Opportunities for Re-use/Recycling

Material arising from site clearance works will be stored at different locations according to material identification: (The following figure presents the proposed location of stockpiles generated from the different phases based on excess material being generated. **Table 4.2** presents the estimated quantities of materials to be generated within of development.):

- Stockpile 1 - excavated top-soils
- Stockpile 2 - excavated sub-soils suitable for reuse as structural fill
- Stockpile 3 - excavated materials unsuitable for reuse as structural fill

Removed topsoil will be kept separate from the general spoil. All turfs and topsoil will be stored on geotextile matting. Once deposited, the topsoil will be trafficked to the minimum possible extent to prevent damage and dusting.

Stockpiled sub-soils will be located in an area away from drainage ditches and will be bunded on the down gradient edges with a silt curtain or other suitable materials to reduce risk of silt run-off.

All excavated material is being proposed for the purposes of filling or general landscaping on site. However, should any surplus or rejected excavated material be generated, it is to be transported off the site to an approved waste facility. It will be tested in advance of disposal to verify the acceptability of the constituents.

Summary		
Description	Cut (m ³)	Fill (m ³)
Site extents	13199.43	34333.88

Cut Breakdown (m ³)		
Topsoil	Subsoil	Rock
3470.51	9728.92	0.00

Table 4.2 Breakdown of Materials to be generated

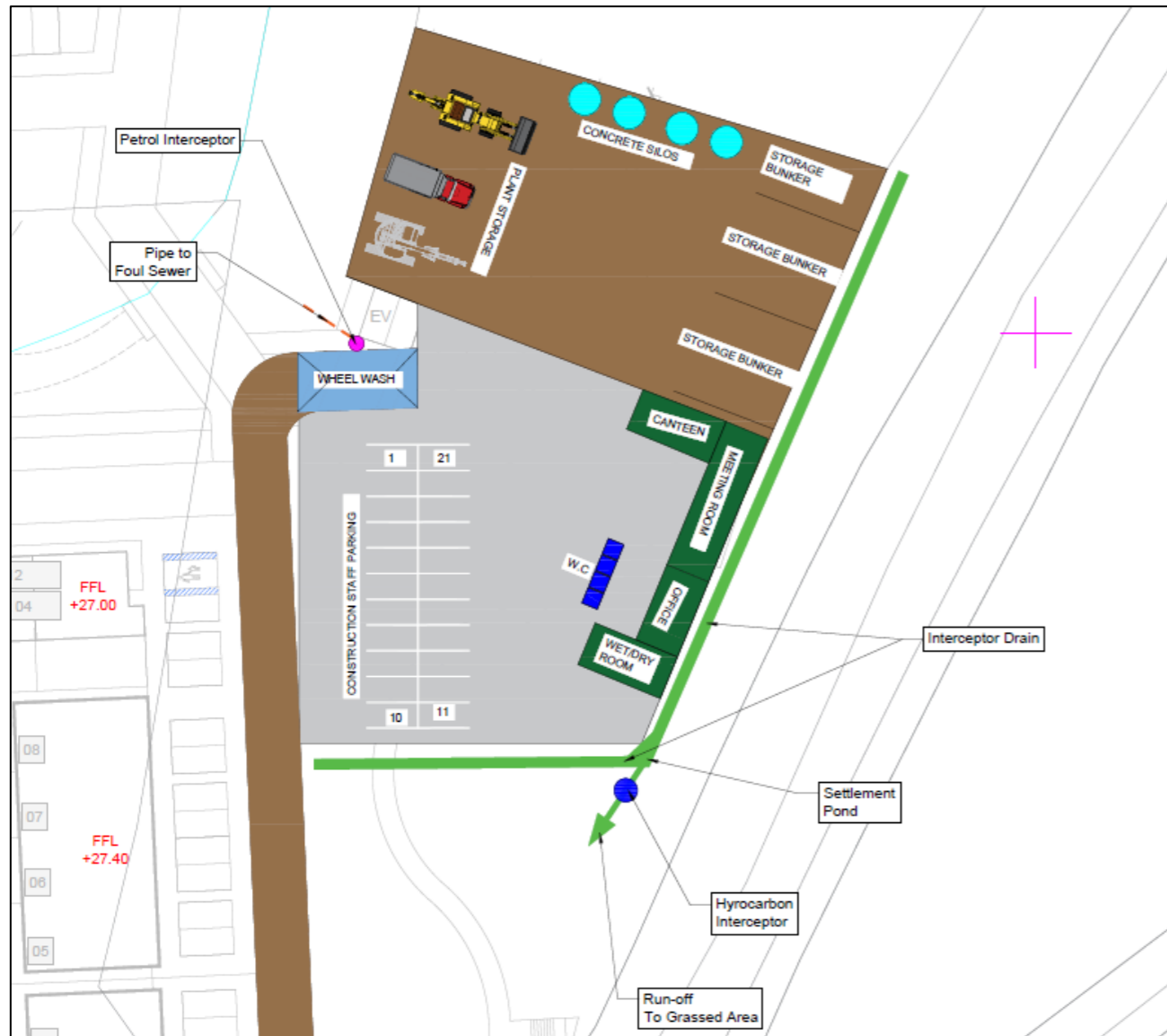


Figure 4.1: Site Storage Location

Based on the calculated quantities of cut and the fill requirements on the site approximately 30,000 cu.m of suitable structural fill material will be required at construction stage. This equates to approximately 1,500 HGV movements to the site during this phase of the works. Other construction stage deliveries include concrete, concrete blocks, timber, structural steel, reinforcing steel, road construction materials, finishing materials, subsurface drainage works (including attenuation and storage systems), public lighting columns, windows & doors which will be delivered to site at different phases of the scheme.

5.0 Environmental Issues & Management Requirements

An environmental review of the proposed scheme has been undertaken and Environmental Management procedures (EMPs) will be implemented for managing the environmental impacts of Activities associated with the development Project. (Refer to **Table 5.1 below and Appendix 1**). The environmental management procedures (EMPs) set out the principles to be adhered to and outline commitments and measures that are to be implemented during the works, so as to ensure that potential environmental impacts and disturbance to local residents will be minimized or eliminated.

The control measures will only be amended by improvement with regards to environmental protection and will take cognizance of any additional Environmental Commitments arising from planning conditions. The Contractor will ensure that plans/procedures are communicated to all site staff, including sub- contractors, through induction, training and at relevant meetings.

Ref:	Procedure:-
EMP-1	Fuel and Oil Management
EMP-2	Construction Traffic Management
EMP-3	Waste Management
EMP-4	Noise Management
EMP-5	Dust Management
EMP-6	Site Environmental Training and Awareness
EMP-7	Environmental Emergency Response
EMP-8	Monitoring and Auditing Procedure
EMP-9	Environmental Accidents, Incidents and Corrective Actions Procedure
EMP-10	Environmental Complaints Procedure
EMP-11	Odour Control Procedure
EMP-12	Light Pollution Control Measures
EMP-13	Surface Water Management and Run-off Control Measures

Table 5.1 Environmental Management Procedures (Refer Appendix 1)

Appendix 1- Environmental Management Procedures

EMP-1	Fuel and Oil Management
EMP-2	Construction Traffic Management
EMP-3	Waste Management
EMP-4	Noise Management
EMP-5	Dust Management
EMP-6	Site Environmental Training and Awareness
EMP-7	Environmental Emergency Response
EMP-8	Monitoring and Auditing Procedure
EMP-9	Environmental Accidents, Incidents and Corrective Actions Procedure
EMP-10	Environmental Complaints Procedure
EMP-11	Odour Control Procedure
EMP-12	Light Pollution Control Measures
EMP-13	Surface Water Management and Run-off Control Measures

EMP 1	FUEL AND OIL MANAGEMENT PROCEDURE
Purpose	Measures for the management of all fuels on site for the protection of ground and watercourses from any spills.
Responsibility of Control	Environmental Manager Construction Project Manager
Procedure	<p><u>Refueling</u></p> <ul style="list-style-type: none"> • Refueling will be carried out using 110% capacity double bunded mobile bowzers. The refueling bowser will be operated by trained personnel. The bowser will have spill containment equipment which the operators will be fully trained in using. • Plant nappies or absorbent mats to be place under refuelling point during all refueling to absorb drips. • Mobile bowzers, tanks and drums shall be stored in secure, impermeable storage area, away from drains and open water; • To reduce the potential for oil leaks, only vehicles and machinery will be allowed onto the site that are mechanically sound. An up to date service record will be required from the main contractor. • Potential leaks from delivery vehicles will be reduced by visually inspecting all vehicles for major leaks. • In the unlikely event of an oil leak or spill, the leak or spill will be contained immediately using oil spill kits; the nearby dirty water drain outlet will be blocked with an oil absorbent boom until the fuel/oil spill has been cleaned up and all oil and any contaminated material removed from the area. This contaminated material will be properly disposed of in a licensed facility. • The Environmental Manager will be immediately informed of the oil leak/spill, and will assess the cause and the management of the clean-up of the leak or spill. The Environmental Manager will inspect nearby drains for the presence of oil, and initiate the clean-up if necessary. • Immediate action will be facilitated by easy access to oil spill kits. An oil spill kit that includes absorbing pads and socks will be kept at the site compound and also in site vehicles and machinery. • Correct action in the event of a leak or spill will be facilitated by training all vehicle/machinery operators in the use of the spill kits and the correct containment and cleaning up of oil spills or leaks. This training will be provided by the Environmental Manager at site induction. • In the extremely unlikely event of a major oil spill, a company who provide a rapid response emergency service for major fuel spills will be immediately called for assistance, their contact details will be kept in the site office and in the spill kits kept in site vehicles and machinery. <p><u>Oil storage</u></p> <ul style="list-style-type: none"> • Fuel containers must be stored within a secondary containment system e.g. bund for static tanks or a drip tray for mobile stores; • Collision with oil stores will be prevented by locating oils within a steel container in a designated area of the site compound away from vehicle movements. • Leakages of oil from oil stores will be prevented by storing these oils in bunded tanks which have a capacity of 110% of the total volume of the stored oil. Ancillary equipment such as hoses and pipes will be contained within the bunded storage container. Taps, nozzles or valves will be fitted with a lock system.

	<ul style="list-style-type: none"> The volume of leakages will be prevented through monitoring oil storage tanks/drums for leaks and signs of damage. This will be carried out daily by the Environmental Manager. Long term storage of waste oils will not be allowed on site. These waste oils will be collected in leak-proof containers and removed from the site for disposal or recycling by an approved service provider.
Environmental Controls	<ul style="list-style-type: none"> Mobile bowsers, tanks and drums will be stored in secure, impermeable storage area, away from drains and open water. Fuel containers must be stored within a Secondary Containment System, e.g. bund for static tanks or a drip tray for mobile stores. Ancillary equipment such as hoses, pipes must be contained within the bund. Taps, nozzles or valves must be fitted with a Lock System. Fuel and Oil Stores including tanks and drums must be regularly inspected for leaks and signs of damage. Only designated Trained Operators are authorized to refuel plant on site and emergency spill kits will be present at equipment for all refueling events. Procedures and contingency plans will be set up to deal with emergency accidents or spills Suitable spill response materials and emergency instruction shall be available on site and staff shall have been adequately trained
Monitoring	<p>Daily visual inspection of storage areas for</p> <ul style="list-style-type: none"> Damage to containers or ancillary equipment Leakages Unlocked storage container

EMP 2	TRAFFIC MANAGEMENT
Purpose	Measures for the management of all traffic, including construction traffic and oversized loads, for the minimization of disturbance and nuisance to the local community.
Responsibility of Control	Construction Project Manager Construction Personnel
Procedures	<ul style="list-style-type: none"> Details of site access and any site traffic rules, including security, parking, loading and unloading, required speed or other relevant details. Details of equipment delivery. Site operating hours (including delivery). Communicating with the community, and the Local Authority the Gardaí where required.
Environmental Controls	<p>Public Road</p> <ul style="list-style-type: none"> In order to mitigate from a significant impact during peak traffic hours, the majority of staff will either arrive on-site before or after the peak morning traffic (08:00-09:00) and finish work before or after the evening peak traffic hours (17:00-18:00). The condition of the public road will be monitored on an on-going basis and a road sweeper provided to clean the public road if required. <p>Site Entrance</p> <ul style="list-style-type: none"> There will be no parking of any vehicles on the public road near the site entrance. Adequate parking will be provided on site for both employees and visitors. The condition of the site entrances will be monitored on an on-going basis and a road sweeper provided to clean the public road if required.
Monitoring	Daily checks

EMP 3	WASTE MANAGEMENT PROCEDURE
Purpose	Measures for the management of all wastes associated with the Project including all welfare facilities.
Responsibility of Control	Construction Project Manager Environmental Manager
Procedures	<p>The following wastes may be generated during the construction of the project:-</p> <ul style="list-style-type: none"> • Surplus excavated soils • Waste Fuels; Oil / Diesel • Paper / Cardboard • Non-Hazardous Office and Canteen Waste • Wastewater from Office and Welfare Facilities <p>Wastes must be segregated and stored in the allocated tanks, bins, skips or areas.</p> <p>Implement Storage Areas and organize the relevant Licensed Contractors for the appropriate waste collections.</p> <p>Ensure all Permits and Licenses are in place and maintain relevant copies in the Site Office.</p> <p>Wastewater from holding tanks must be collected by an appropriate Licensed Contractor.</p> <p>Construction materials must be stored and managed in a way which promotes waste minimization, including segregating materials for re-use as appropriate.</p>
Environmental Controls	Appropriate waste receptacles will be provided on site.
Monitoring	<p>Daily Visual inspection for</p> <ul style="list-style-type: none"> • Damage • Untidiness • Full skips

EMP 4	NOISE MANAGEMENT
Purpose	<p>Measures for the management of impacts surrounding areas to the site, nuisance noise and construction noise impacts.</p> <p>The objective of this plan is to provide a framework for construction noise and vibration management to ensure that noise and vibration levels at neighboring buildings remain within reasonable limits throughout the works.</p>
Responsibility of Control	Construction Project Manager Construction Personnel
Procedures	<p>Implement control measures to ensure that noise impacts are minimized. The following measures will be communicated to all Staff on site.</p> <ul style="list-style-type: none"> • All Plant and Machinery will be maintained to ensure noise and air emissions are minimized. • Only use required power and size of equipment • Fit engine exhausts with silencers • Operate equipment in a quiet and efficient manner • Do not leave equipment idling unnecessarily • Regularly inspect and maintain equipment • Use quiet reversing alarms/methods • Use designated routes and access points for deliveries
Environmental Controls	Adequate inspection of plant and equipment in operation shall be carried out to ensure that noise and vibration levels do not exceed the permitted levels.
Monitoring	Noise Monitoring at nearest sensitive receptors

EMP 5	DUST MANAGEMENT
Purpose	Measures for the management of impacts on air quality and nuisance dust
Responsibility of Control	Construction Project Manager
Procedures	<ul style="list-style-type: none"> • All Plant and Machinery will be maintained to reduce dust and airemissions. • Construction personnel must not leave any Plant and Machinery running unnecessarily. • To reduce dust and particular blown around site, dust suppression measures shall be implemented in prolonged, dry and windy spell including standard dust suppression (spraying), as required. • Stockpiles should be located at suitably sheltered areas to prevent erosion or weathering and shall be located away from drainage ditches. • Public roads in the vicinity of the site will be regularly inspected for cleanliness, and cleaned as necessary. • A temporary vehicle wheel wash facility will be installed in proximity to the site entrance. • The dust minimization control measures shall be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimization of dust through the use of best practice and procedures.
Environmental Controls	Adherence to dust management measures
Monitoring	Monthly dust deposition monitoring program to be undertaken

EMP 6	SITE ENVIRONMENTAL TRAINING AND AWARENESS PROCEDURE
Purpose	To describe measures for the training of all Site Personnel in the protection of the Environment and the relevant controls.
Responsibility of Control	Construction Project Manager
Procedures	<ul style="list-style-type: none"> ▪ Environmental awareness and training shall be achieved by: <ul style="list-style-type: none"> – Site induction, including relevant environmental issues. – Environmental posters and site notices. – Method statement and risk assessment briefings. – Toolbox talks, including instruction on incident response procedures. – Key project specific environmental issues briefings. ▪ All managers and supervisors will be briefed on the CEMP. ▪ Method Statements will be finalised for specific activities and will include all environmental protection and mitigation measures identified in this CEMP and emergency preparedness appropriate to the activity covered. ▪ Method Statement briefings will be given before personnel carry out key activities for the first time. ▪ Environmental Training Records are to be retained in the Site Office.
Environmental Controls	<ul style="list-style-type: none"> ▪ Site staff shall be competent to perform tasks that have the potential to cause a significant environmental impact. Competence is defined in terms of appropriate education, training and experience.
Monitoring	N/A

EMP 7	ENVIRONMENTAL EMERGENCY RESPONSE PLAN
Purpose	To describe Measures for the prevention of an Environmental Accident or Incident and the response required to minimize such an event.
Responsibility of Control	Construction Project Manager
Procedures	<p>In the unlikely event of an Environmental Emergency, all Personnel will react quickly and adhere to this Procedure. The following outlines some of the information, on the types of emergency, which must be communicated to Site Staff:-</p> <ul style="list-style-type: none"> • Release of Hazardous Substance – Fuel or Oil Spill • Flood Event – Extreme Rainfall Event • Environmental Buffers and Exclusion Zones Breach • Housekeeping of Materials and Waste Storage Areas Breach • Stop Work Orders due to Environmental Issue or Concern (threat to Archaeological or Ecological Feature) <p>If any of the above situations occur; the Plan is activated. The Construction Project Manager must be immediately informed and report to the scene. The Construction Project Manager must be aware of the:-</p> <ul style="list-style-type: none"> • Nature of the Situation – Brief Description of What Has Happened • Location of the Incident • Whether any Spill has been Released • Whether the Situation is under Control
Environmental Controls	All Personnel are to be inducted in the provisions of the Environmental Emergency Response Plan.
Monitoring	n/a

EMP 8	MONITORING AND AUDITING PROCEDURE
Purpose	To describe measures for Environmental Monitoring during the Construction Works and audit of control measures to ensure Environmental Protection.
Responsibility of Control	Construction Project Manager Construction Environmental Manager
Procedures	<p>All mitigation measures, any Planning Conditions and relevant Construction Methods will be monitored on site. The Appointed Contractor will provide Audit Checklists to ensure regular checks of the site's Control Measures for the ongoing protection of the environment.</p> <p>Monitoring is to be carried out in adherence with the following:-</p> <ul style="list-style-type: none"> • Fuel and Oil Management Plan • Waste Management plan • Dust Management Plan • Construction Noise Monitoring <p>Checklists for weekly or monthly Site Audits shall be finalised and the relevant Personnel informed of their duties. Checklists should include (but are not limited to) confirmation that fuel is stored appropriately, that management rules are adhered to, all environmental buffers are maintained, sediment control measures are in place and functioning.</p>
Environmental Controls	Compliance with site management rules
Monitoring	All Environmental Records, including completed Checklists, will be retained at the Site Office.

EMP 9	ENVIRONMENTAL ACCIDENTS, INCIDENTS AND CORRECTIVE ACTIONS PROCEDURE
Purpose	To describe measures for the recording, investigation and close-out of any Environmental Accidents or Incidents on the Site
Responsibility of Control	Project Manager Project Environmental Manager
Procedures	<p>Any Environmental Accidents and Incidents occurring on site during the Works must be reported, recorded and investigated. Any corrective actions must be put in place and closed out after an Accident or Incident occurs.</p> <p>Environmental Accidents and Incidents may include but are not limited to:-</p> <ul style="list-style-type: none"> • Accidents involving large spill of fuel (Emergency Response required). • Spills of fuel and oil (Minor) • Waste or rubbish left around the site (not in dedicated waste areas) • Failure of any control measures • Unplanned vehicle movement within a buffer zone. <p>If an Environmental Accident or Incident occurs, personnel must inform <u>Project Manager / Environmental Officer / Nominated Person</u> immediately.</p> <p>Once the situation is under control, the Environmental Accident or Incident must be recorded and the cause investigated. Any remedial action required must be taken to mitigate any damage and prevent a reoccurrence.</p> <p>Corrective actions must be communicated to Personnel and Sub-Contractors where relevant – particularly where it results in a change in procedure</p>
Environmental Controls	Compliance with site management rules
Monitoring	As required

EMP 10	ENVIRONMENTAL COMPLAINTS PROCEDURE
Purpose	To describe measures for the recording and resolving of complaints by Third Parties, including Local Residents or Members of the Public.
Responsibility of Control	Project Manager Project Environmental Manager
Procedures	<p>Any Environmental complaints received, whether internal or external, must be recorded and investigated. Immediate action must be taken as relevant to resolve Environmental complaints to avoid any nuisance to the Local Community or Environmental Damage.</p> <p>This Procedure includes;-</p> <ul style="list-style-type: none"> • Recording of any complaints to the Site Register incorporating communication from the Public. • Follow up by the relevant Site Representative – Environmental Officer. • Remedial Measures where required. • Ongoing communication with complainant to confirm resolution. • Any required Training or communication with Site Personnel and Sub-Contractors as a result.
Environmental Controls	Compliance with site management rules
Monitoring	n/a

EMP 11	ODOUR CONTROL PROCEDURE
Purpose	To describe measures to minimise potential for malodours emissions associated with the works
Responsibility of Control	Project Contractor Project Environmental Manager
Procedures	<ul style="list-style-type: none"> • Control potential odours during excavation by minimising the working surface area and covering with a clean fill as soon as practical • In the unlikely event that putrescent wastes/soils or materials be unearthed during excavation, a deodoriser might be needed to minimise emissions of malodorous gases to the atmosphere • Transport any odourous wastes in covered vehicles. • Ensure sedimentation ponds and drainage systems are functioning correctly to above becoming stagnant • Ensure sanitary facilities are appropriately maintained and Wastewater from holding tanks routinely collected and removed by an appropriate Licenced Contractor. • Ensure wastes are stored correctly in appropriate waste receptacles • Ensure all wastes, in particular food wastes, are removed from site at regular internal • Ensure all plant is in good working order.
Environmental Controls	Adherence to odour management measures and site management rules
Monitoring	n/a

EMP 12	LIGHT POLLUTION CONTROL MEASURES
Purpose	To describe measures to minimise obtrusive light associated with the works on local residents and other sensitive receptors
Responsibility of Control	Project Contractor
Procedures	<p>The following measures will be implemented, as required::</p> <ul style="list-style-type: none"> • Dim or switch off lights where it is safe to do so • Use low lighting equipment where feasible • Use of timers and sensors for switching off lights/ flood lights • Avoid flood lighting in areas adjacent to sensitive nearby receptors • Light shielding will be implemented where light glare is a nuisance • Outdoor artificial lighting for site security shall be designed to face downwards and inward to the site and oriented to avoid significant light spill by means of selection of appropriate fitting with filters/screens and with suitable Lux levels.
Environmental Controls	Adherence to light pollution controls and site management rules
Monitoring	n/a

EMP 13	SURFACE WATER MANAGEMENT AND RUN-OFF CONTROL MEASURES
Purpose	Measurements for the control and management of all surface waters associated with the site during construction
Responsibility of Control	Project Contractor
Procedures	<p>The following measures will be implemented:</p> <ul style="list-style-type: none"> • Implement erosion control to prevent runoff flowing across exposed ground and become polluted by sediments; • Intercept and divert clean water runoff away from construction site runoff to avoid cross-contamination of clean water with soiled water; • Implement the erosion and sediment controls before starting site clearance/construction works; • Minimise area of exposed ground by maintaining existing vegetation that would otherwise be subject to erosion in the vicinity of the development and keeping excavated areas to a minimum; • Install a series of silt fences or other appropriate silt retention measure where there is a risk of erosion runoff to watercourses from construction related activity particularly if working during prolonged wet weather period or if working during intense rainfall event; • Implement sediment control measures that includes for the prevention of runoff from adjacent intact ground that is for the separation of clean and 'dirty' water; • Install appropriate silt control measures such as silt-traps, check dams and sedimentation ponds; • Washout from concrete trucks and plant will not be permitted on site. • Provide recommendations for public road cleaning where needed particularly in the vicinity of drains; • Controls need to be regularly inspected and maintained otherwise a failure may result, such as a build-up of silt or tear in a fence, which will lead to water pollution so controls must work well until the vegetation has re-established; inspection and maintenance is critical after prolonged or intense rainfall; • Develop checklists for weekly Site Audits, which must be finalised by the Appointed Contractor and the relevant Personnel informed of their duties;
Environmental Controls	Adherence to surface water management and run-off control plan and site management rules
Monitoring	Daily visual inspection of controls to ensure appropriately operating

CONSTRUCTION TRAFFIC MANAGEMENT PLAN

Cloghroe Development
Cloghroe
Cork
December 2021

FOR: LONGVIEW ESTATES LTD.

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1.0 INTRODUCTION

MHL & Associates Ltd. have prepared this traffic management submission in support of a planning application for the Cloghroe Development in Cloghroe, Co. Cork. It is proposed that during the construction phase of the works, a traffic management plan be implemented for vehicles entering and exiting the site.

2.0 LOCAL ROAD NETWORK

The proposed site is located adjacent to the R617 as shown in **Figure 2.1**. The R617 regional road has an 50kmph speed limit and is approximately 7.5m wide as it runs alongside the development boundary. The proposed construction entrance will be via the future residential development entrance off the R617 at a location approximately 1km south of the village of Tower (refer **Figure 2.2**). The sightlines for the entrance, at a location 2.4m back from the stop line in accordance with TII Publication *DN-GEO-03060, Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade separated and compact grade separated junctions)*, are shown in Figure 2.3.

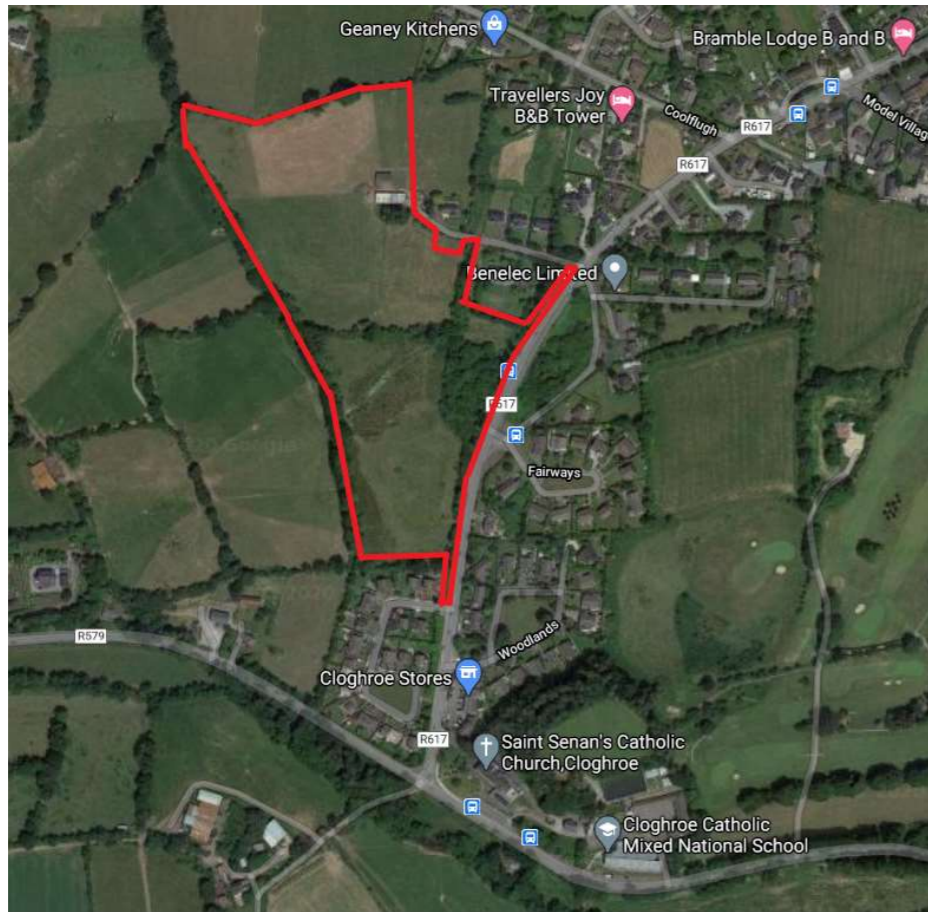


Figure 2.1 Site location

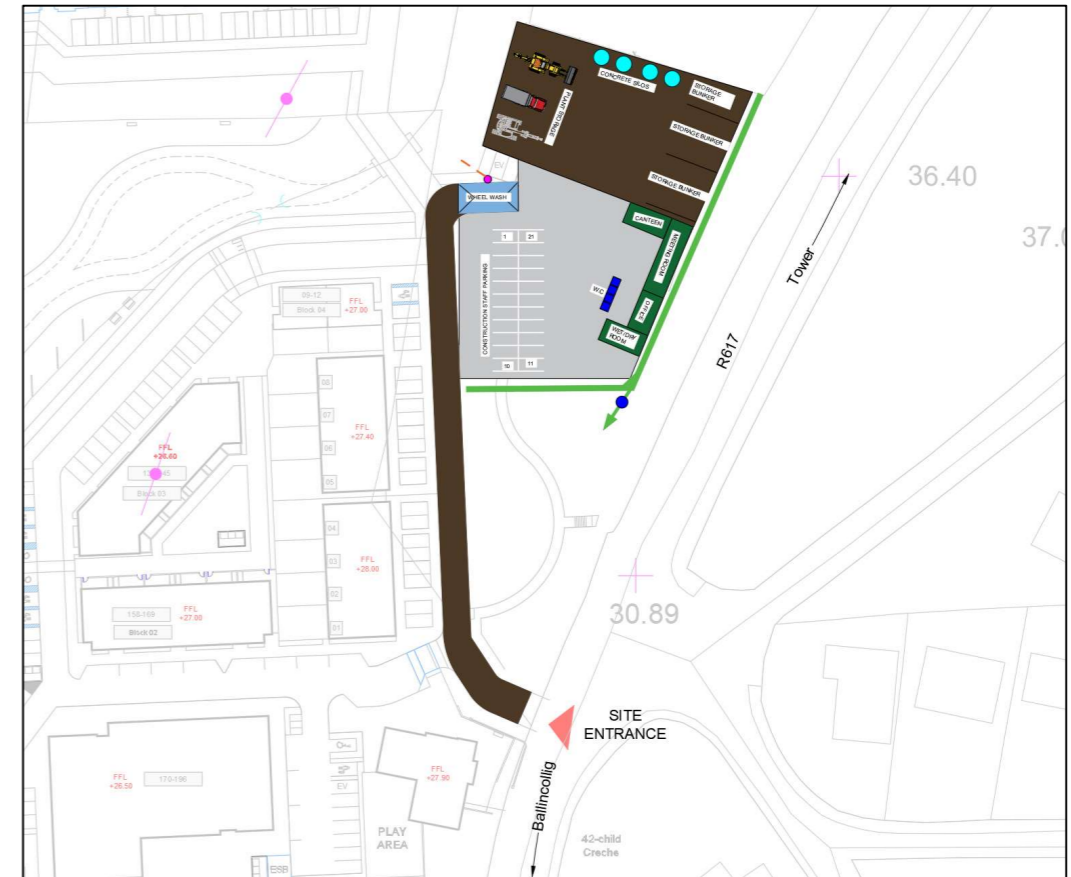


Figure 2.2: Construction Compound and Site Entrance location

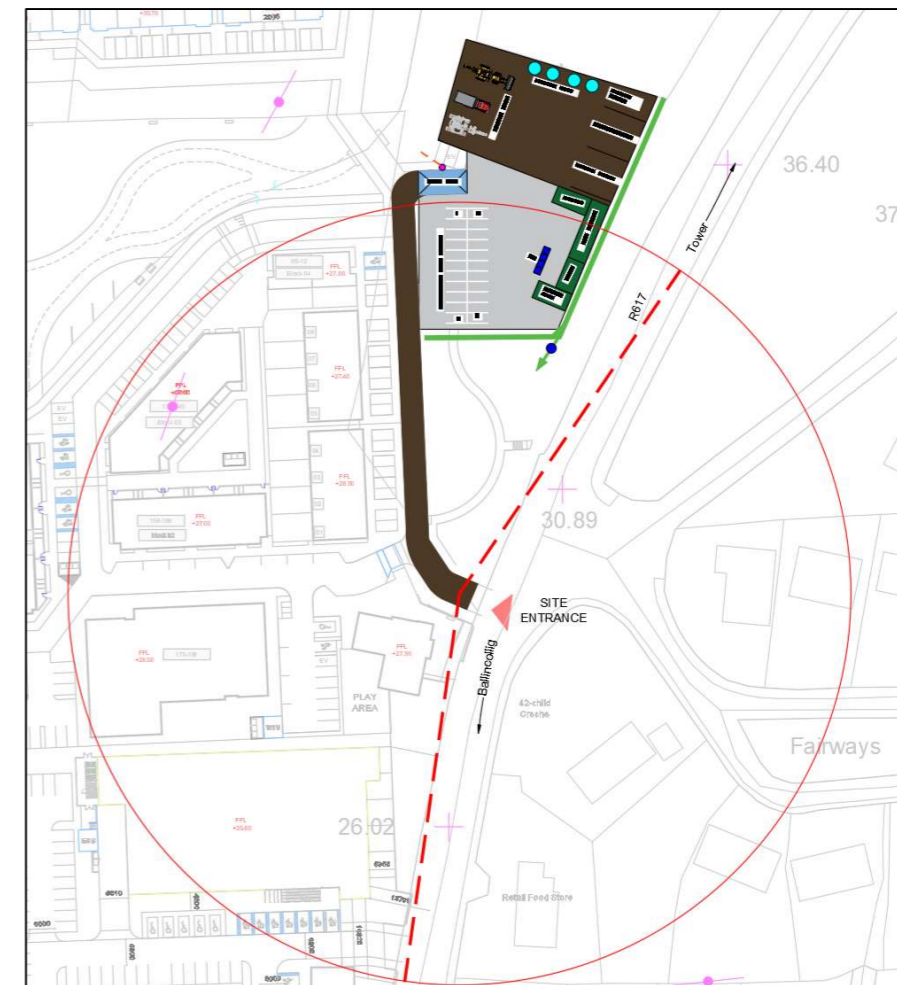


Figure 2.3: Sightlines at Site Entrance

3.0 TRAFFIC MANAGEMENT PLAN

3.1 CONSTRUCTION STAGE

The R617 regional road adjoining the site has a speed limit of 50kmph and so the traffic management requirements shall be in accordance with *Table 8.2.2.4* of the Traffic Signs Manual, shown in **Figure 3.1** below:

Design Parameter	Type A > 12 hours	Type B < 12 hours	Type C < 15 mins
Advance Warning Signage			
Sign Size (mm)	600	600	-
Sign Visibility (m)	50	50	50
Number of Signs	2	2	-
Cumulative Distance (m)	40	40	-
Distance between Advance Warning Signs (m)	20	20	-
Taper			
Lane Taper Rate ^A	1 in 5	1 in 5	-
Hard Shoulder Taper Rate ^A			-
Cones			
Cone Height (mm)	750	750	-
Taper Spacing (m) ^B	3	3	-
Longitudinal Spacing (m) ^B	3	3	-
Lamps (unlit areas only)			
Taper Spacing (m)	6	6	-
Longitudinal Spacing (m)	6	6	-
Safety Zones			
Longitudinal (m)	5	5	-
Lateral (m)	0.5	0.5	-
Lanes			
Lane Width (m) ^C	3 (2.5)	3 (2.5)	-
Two-way Roadway Width (m)	5	5	-

Figure 3.1: Table 8.2.2.4 from Chapter 8 of the Traffic Signs Manual

The traffic management plan to be in place during the construction works is provided in drawings *RL1-TMP-P01, P02, & P03* included in **Appendix A**. The warning signs along the road will remain in place for the duration of the site works. The use of stop-go measures will only be used in implements when necessary. The associated signage should only be employed when required. These measures will greatly reduce the risk associated with the construction of the development works.

Given the width of the existing R617 as it runs adjacent to the works, a temporary centre line will be introduced to facilitate existing traffic flow during construction.

The construction phase will accommodate for pedestrians via a lateral safety zone along the length of the public realm works. A temporary pedestrian crossing will be provided at the site entrance to facilitate safe crossing for pedestrians accessing the existing bus stop to the north of the entrance.

Figure 3.2 below shows the traffic management plan proposed at the site entrance.

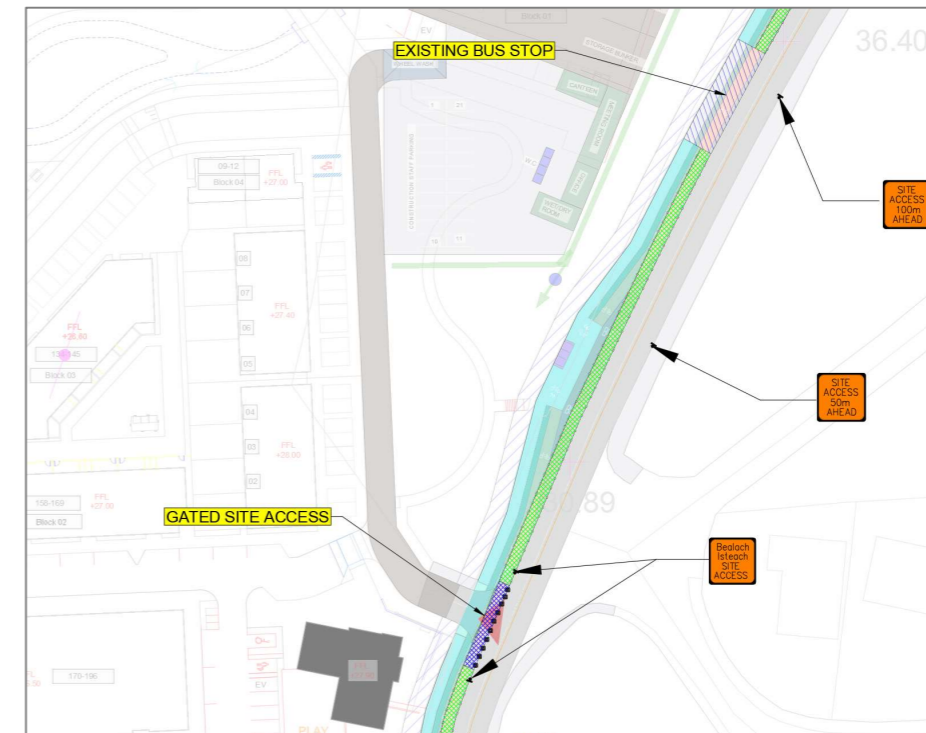


Figure 3.2: Traffic Management Plan at site entrance and public realm works (full details in Appendix A)

To ensure that a HGV can safely manoeuvre into the site, a swept path analysis was completed for the turning movements coming from both the Tower and Ballincollig directions. The completed analysis is shown in drawing *RL1-SPA-P01* included in **Appendix A**.

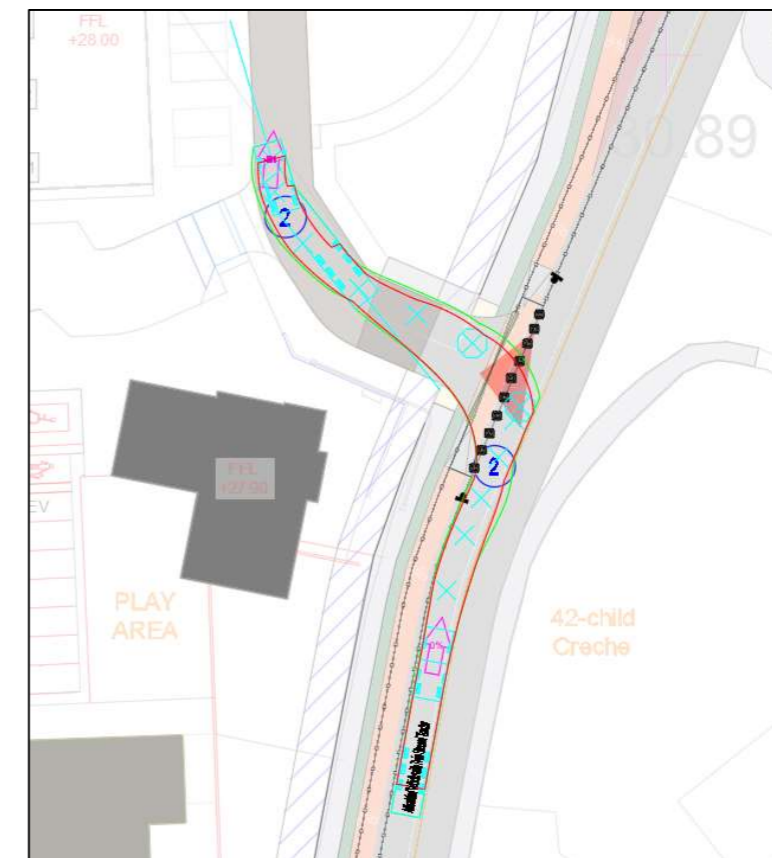


Figure 3.3: HGV swept path during a left turn movement into site

All deliveries will be controlled at the identified construction compound location. Materials will be offloaded within the proposed site compound using a teleporter and there will be a temporary lay down area used for the duration of the offload. The Contractor is to inform and educate all regular suppliers and all sub-contractors

and delivery drivers of the basic protocols. Site access, and the delivery of construction materials, will be carefully planned and managed throughout the construction works.

When delivery trucks enter the compound, the material can be delivered to the correct location within the site compound. Following unloading, the vehicle can then leave the site via the internal road network at a safe speed ensuring there is no risk of incidents involving pedestrians or other road users upon exit.

Similar practices shall be put in place for trucks removing excavated material / demolition waste from site. Provision for parking cars / vans etc. has been made within a designated area within the site compound (ref. **Figure 2.2**).

The Contractor will ensure that deliveries are coordinated on site so that trucks do not block the road outside the site. Delivery drivers will wear full PPE as per the site rules and sign the delivery rules at the controlled entrance gate. The site will be fenced and sealed with access gates secured at all times to prevent unauthorised access.

The following shall be applicable for the duration of the works:

- The contractor will be responsible for and make good any damage to existing roads or footpaths caused by his own contractor's or suppliers transport to and from the site.
- Wheel washing and road sweeping facilities shall be provided to ensure all public and private roads, footpaths are entirely free of excavated materials, debris, and rubbish at all times.
- The contractor must confine their activities to the area of the site occupied by the works and the construction compound during any particular phase of the development.
- Haul routes to and from the site will be defined and agreed with the Local Authority.
- No other entrance and egress points to the construction site, other than the designated entrance, will be used to minimize impact on external traffic.
- Where traffic signals are not in place, flagmen must be used to control the exit of construction vehicles from the site onto the public road where appropriate.
- Existing fire hydrants are to remain accessible.

Due regard will be paid to minimising any impacts by construction vehicles on the surrounding area. Particular emphasis will be on the following:

- Construction and delivery vehicles must be instructed to use only the approved and agreed means of access; and movement of construction vehicles must be restricted to these designated routes;
- Warning signs / Advanced warning signs to be installed at appropriate locations as shown in drawings RL1-TMP-P01, P02, & P03, in advance of the construction access locations;
- Speed limits of construction vehicles to be managed by appropriate signage, to promote low vehicular speeds within the site;
- Appropriate vehicles to be used to minimise environmental impacts from transporting construction material, for example the use of dust covers on trucks carrying dust producing material;
- Parking of site vehicles must be managed by the Contractor and must not be permitted on public road;
- A road sweeper is to be employed to clean the public roads adjacent to the site of any residual debris that may be deposited on the public roads leading away from the construction works;
- On site wheel washing will be undertaken for construction trucks and vehicles to prevent any debris from falling on the local roads;
- All vehicles are to be suitably serviced and maintained to avoid any leaks or spillage of oil, petrol, or diesel. Spill kits must be available on site. All scheduled maintenance carried out off-site must not be carried out on the public highway; and
- Safe and secure pedestrian facilities are to be provided along the R617 as shown in drawings RL1-TMP-P01, P02, & P03. The existing bus stop is to remain operational and protected from construction traffic up until a time when the new bus stop is completed/becomes operational.

Prior to start of construction, this prepared Traffic Management Plan or revised thereof will be agreed with Cork City Council's Transportation Department & An Garda Siochana to mitigate any impact of construction on the surrounding road network. The Contractor will confirm the Construction Stage Traffic Management Plan in accordance with the following guidance documents for the temporary control of traffic at road works:

- Construction & Environmental Management Plan, prepared by MHL & Associates Ltd., September 2021
- Traffic Signs Manual Chapter 8 Temporary Traffic Measures and Sign Roadworks (2019);
- Traffic Management Guidelines, Department of Transport (2003);
- Requirements of Cork City Council.

3.2 OPERATIONAL STAGE

The proposed future entrance has adequate sightlines to both east and west. A 90m sightline is achieved using a 2.4m set back from the road edge, as highlighted in figure 2.3. This sightline is appropriate for the R617's design speed of 60km/h (Ref. TII Publications *DN-GEO-03060, Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade separated and compact grade separated junctions)*).

4.0 MEASURES TO MINIMISE CONSTRUCTION VEHICLE MOVEMENTS

Construction vehicle movements are to be minimised through:

- Consolidation of delivery loads to/from the site and scheduling of large deliveries to site to occur outside of peak periods;
- Use of precast/prefabricated materials where possible;
- 'Cut' material generated by the construction works is to be re-used on site where possible, through various accommodation works;
- Adequate storage space on site will be provided;
- Car sharing among the construction staff following Covid-19 safety guidelines may be used to reduce traffic numbers.
- Public Transport: An information leaflet to all staff as part of their induction on site highlighting the location of the public transport services in the vicinity of the construction site.

5.0 CONCLUSIONS AND RECOMMENDATIONS

It is recommended that the construction stage traffic management plan be implemented for the duration of the works. The improvements to the roadside boundary will serve to improve visibility to and from the entrance and will improve road safety at the location.

In support of the proposed scheme, it should be noted that the new operational entrance will have adequate sightlines for the design road speed of the R617.

In conclusion, the proposed construction and operational entrances will operate within required safety parameters.

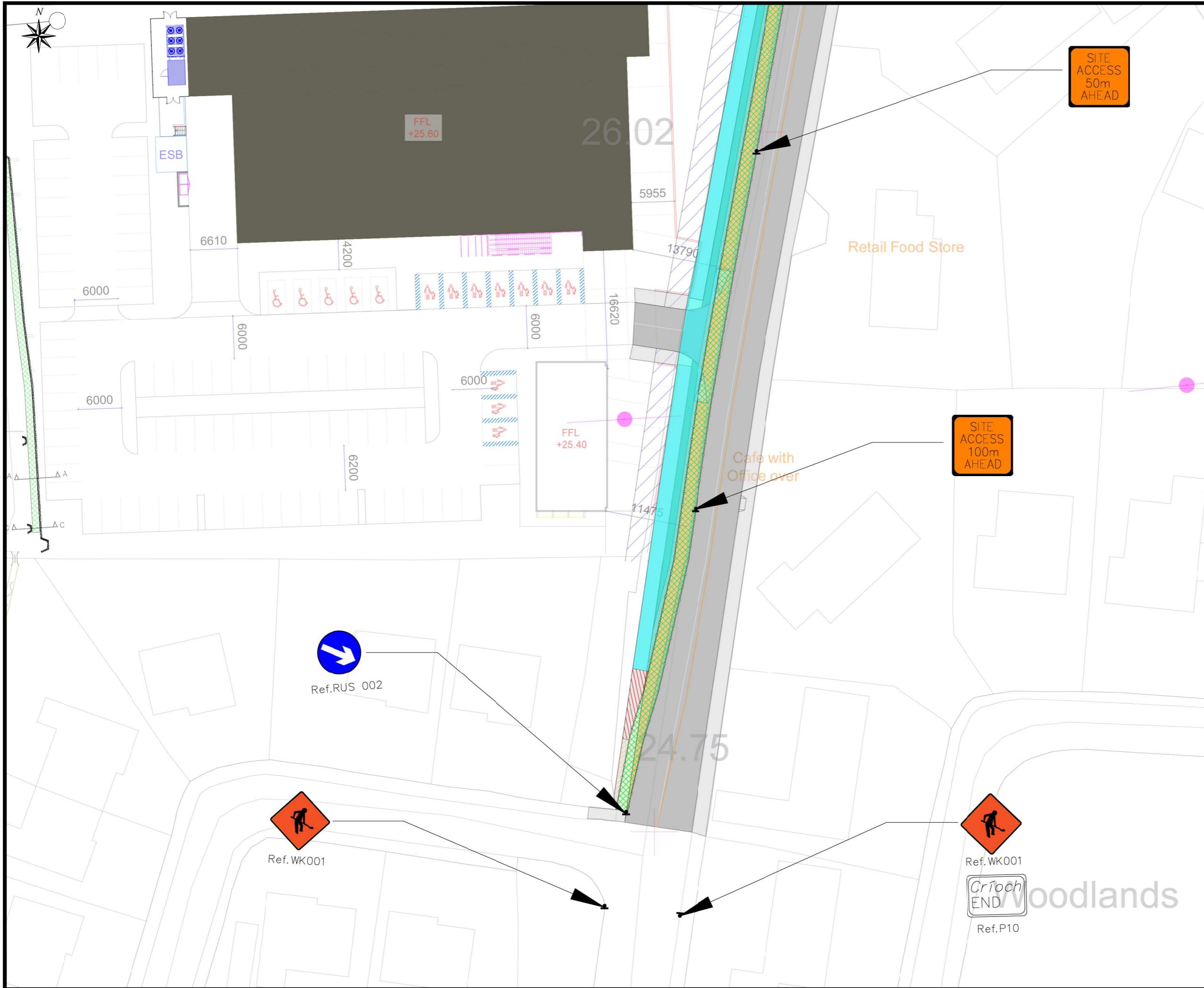
Appendix A – Drawings

RL1-TMP-P01 Traffic Management Plan Sheet 1 of 3

RL1-TMP-P02 Traffic Management Plan Sheet 2 of 3

RL1-TMP-P03 Traffic Management Plan Sheet 3 of 3

RL1-SPA-P01 Swept Path Analysis Sheet 1 of 1

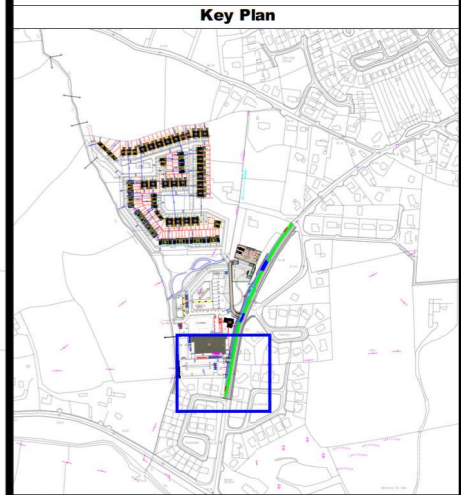


NOTES:
 All dimensions in metres.
 Do not scale from drawing.
 For any discrepancies found please consult with design office.
 This drawing should be read in conjunction with all contract drawings, documents and specifications.

Extents of contract

- Taper Area
- Longitudinal Safety Zone
- Works Area
- Lateral Safety Zone
- Existing Bus Stop
- Safety Barriers
- Sign Symbol
- Temporary Centre Line
- Traffic Cone

Note: Signs to be 600 x 600 (Standard) and 1200 x 1000 (Non standard) and made from retro reflective material



Rev By	Date	Description

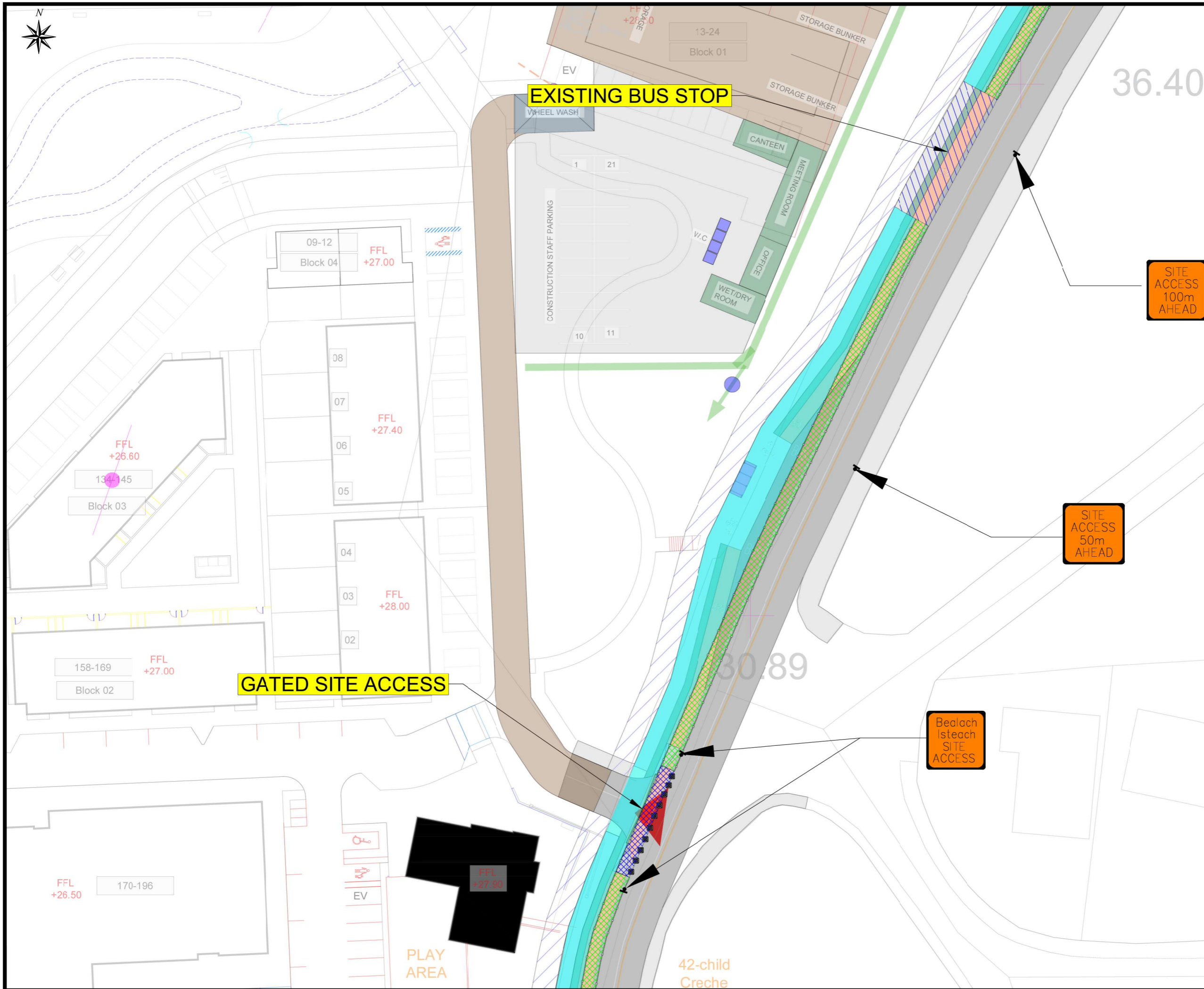
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NOT CERTIFIED FOR CONSTRUCTION

Project Title: Cloghroe Development

Drawing Title: Traffic Management Plan
 Sheet 1 of 3

Client: Cloghroe Development Limited

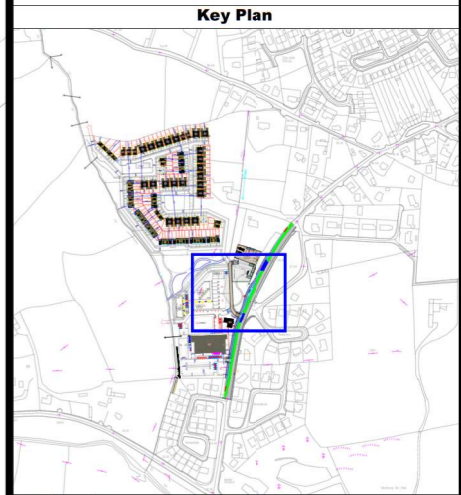
M.H.L. & Associates Ltd. Consulting Engineers		
<small>Carrig Mór House, 10 High Street, Douglas Road, Cork</small>		
<small>Tel: 021-4840214 Fax: 021-4840215 E-Mail: info@mhl.ie</small>		
Designed: SM	Drawn: SFM	Checked: KM
Scale: 1:250 @ A1	Date: Sept 2021	
Job No: 19083HD	Drawing No: RL1-TMP-P01	Revision: 00



NOTES:
 All dimensions in metres.
 Do not scale from drawing.
 For any discrepancies found please consult with design office.
 This drawing should be read in conjunction with all contract drawings, documents and specifications.

- Extents of contract**
- Taper Area
 - Longitudinal Safety Zone
 - Works Area
 - Lateral Safety Zone
 - Existing Bus Stop
 - Temporary Pedestrian Crossing
 - Safety Barriers
 - Sign Symbol
 - Temporary Centre Line
 - Traffic Cone

Note: Signs to be 600 x 600 (Standard) and 1200 x 1000 (Non standard) and made from retro reflective material



Rev	By	Date	Description

Drawing Status: **PLANNING**
 NOT CERTIFIED FOR CONSTRUCTION

Project Title: Cloghroe Development

Drawing Title: Traffic Management Plan
 Sheet 2 of 3

Client: Cloghroe Development Limited

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Consulting Engineers
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 Douglas Road,
 Cork
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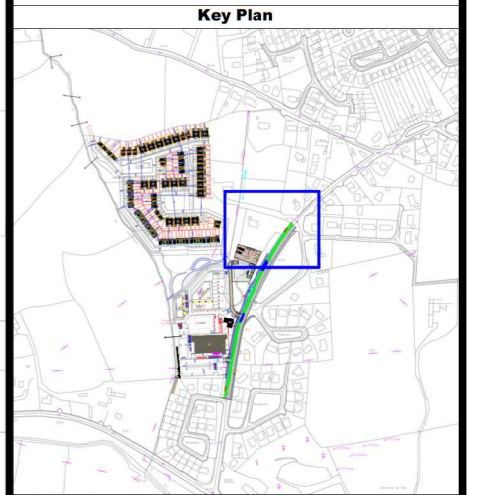
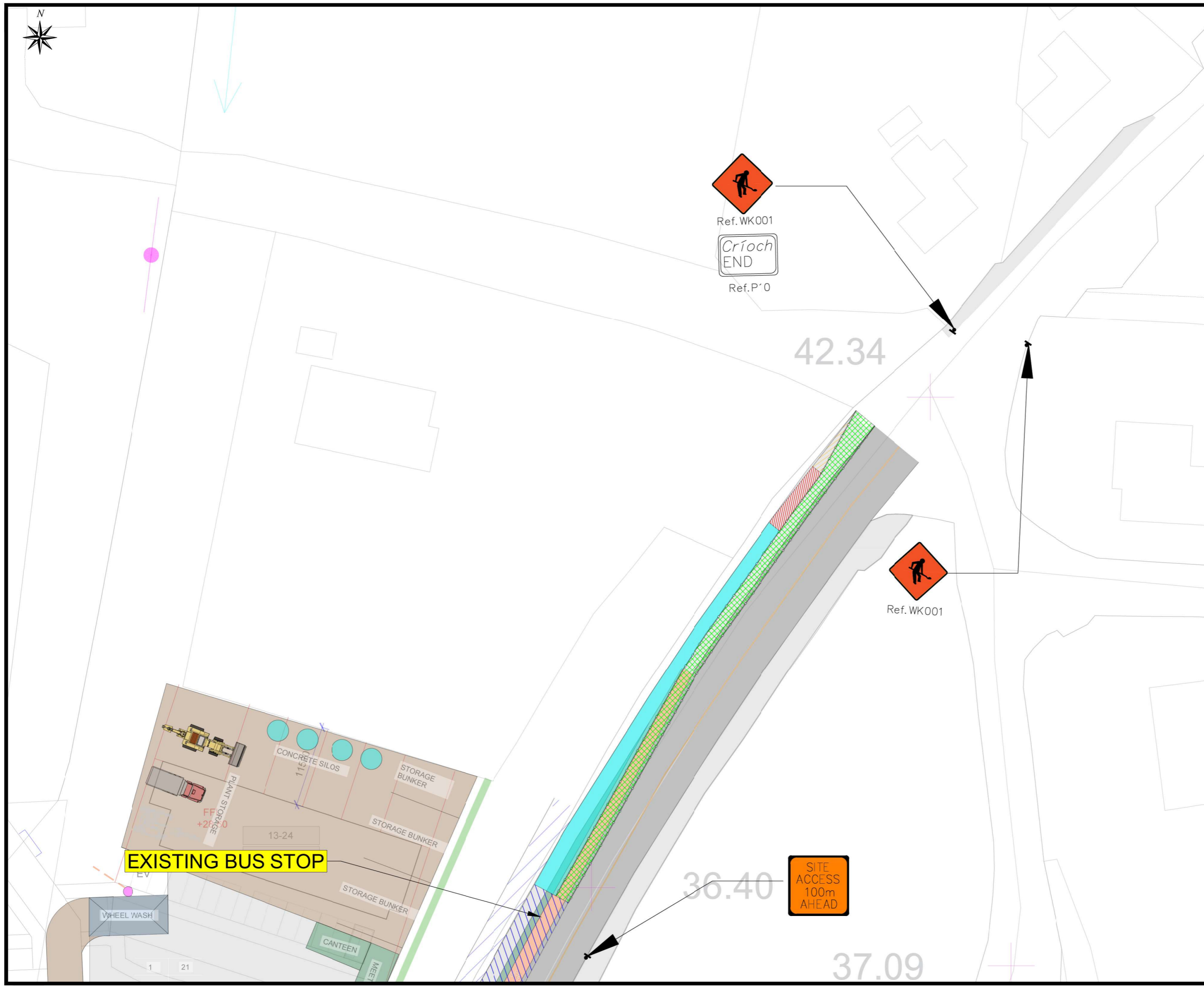
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Scale: 1:250 @ A1	Date: Sept 2021	
Job No: 19083HD	Drawing No: RL1-TMP-P02	Revision: 00



NOTES:
 All dimensions in metres.
 Do not scale from drawing.
 For any discrepancies found please consult with design office.
 This drawing should be read in conjunction with all contract drawings, documents and specifications.

- Extents of contract**
- Taper Area
 - Longitudinal Safety Zone
 - Works Area
 - Lateral Safety Zone
 - Existing Bus Stop
 - Safety Barriers
 - Sign Symbol
 - Temporary Centre Line
 - Traffic Cone

Note: Signs to be 600 x 600 (Standard) and 1200 x 1000 (Non standard) and made from retro reflective material



Rev By	Date	Description

Drawing Status: **PLANNING**
 NOT CERTIFIED FOR CONSTRUCTION

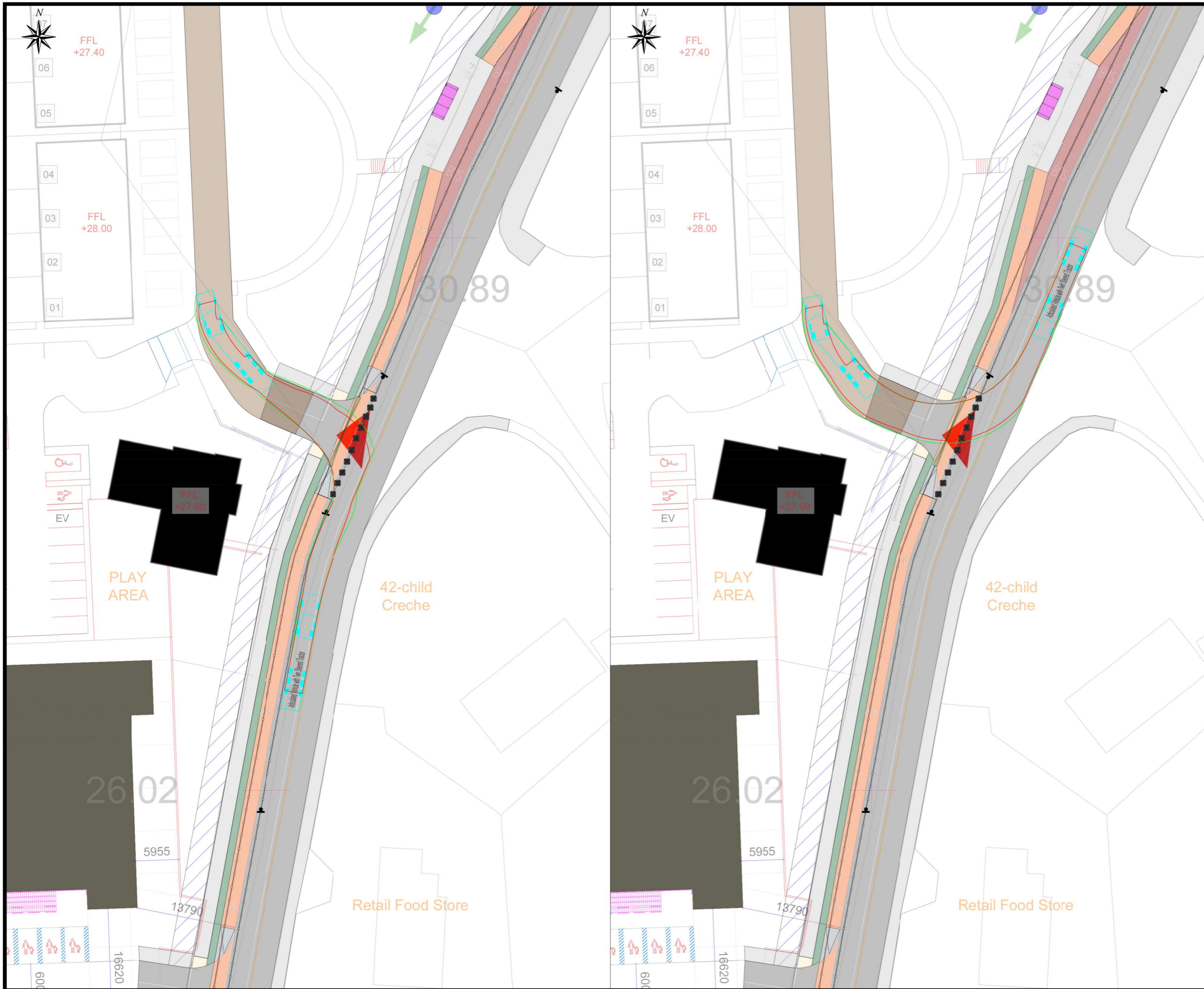
Project Title: Cloghroe Development

Drawing Title: Traffic Management Plan
 Sheet 3 of 3

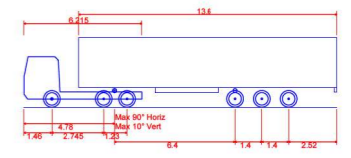
Client: Cloghroe Development Limited

M.H.L. & Associates Ltd.
Consulting Engineers
 Carrig Mór House,
 10 High Street,
 Douglas Road,
 Cork
 Tel: 021-4840214
 Fax: 021-4840215
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Designed: SM	Drawn: SFM	Checked: KM
Scale: 1:250 @ A1	Date: Sept 2021	
Job No: 19083HD	Drawing No: RL1-TMP-P03	Revision: 00

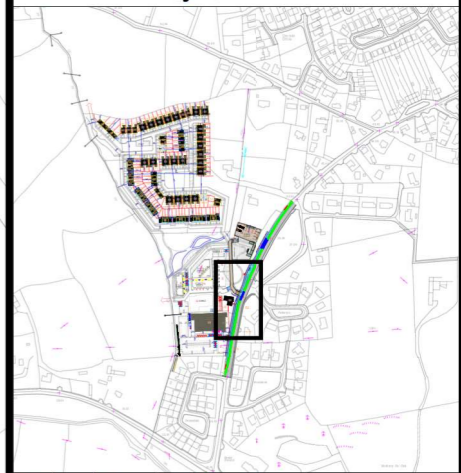


NOTES:
 All dimensions in metres.
 Do not scale from drawing.
 For any discrepancies found please consult with design office.
 This drawing should be read in conjunction with all contract drawings, documents and specifications.



Articulated Vehicle with Twin Steered Tractor
 Overall Length 16.500m
 Overall Width 2.550m
 Overall Body Height 3.591m
 Min Body Ground Clearance 0.425m
 Max Track Width 2.500m
 Lock-to-lock time 6.00s
 Curb to Curb Turning Radius 6.987m

Key Plan



Rev By	Date	Description

Drawing Status: PLANNING
 NOT CERTIFIED FOR CONSTRUCTION

Project Title: Cloghroe Development

Drawing Title: Swept Path Analysis
 Traffic Management Plan
 Sheet 1 of 1

Client: Cloghroe Development Limited

M.H.L. & Associates Ltd.
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Designed: SM	Drawn: SFM	Checked: KM
Scale: 1:200 @ A1	Date: Sept 2021	
Job No: 19083HD	Drawing No: RL1-SPA-PJ1	Revision: 00

ROAD SAFETY AUDIT – STAGE 1

Residential Development Cloghroe Cork June 2021



Document Control Sheet

Client	Cloghroe Development Ltd.
Project Title	Cloghroe Residential Development
Document Title	Road Safety Audit – Stage 1
Document No.	CRD_RSA1_D01
Job No.	19083HD

Revision	Status	Author	Reviewed By	Approved By	Date
01	Internal Draft	B Murphy	B. Loughrey	B Loughrey	23/06/2021
02	Client Issue	B Murphy	B. Loughrey	B Loughrey	23/06/2021

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Consulting Engineers**

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Cork.

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CONTENTS

1.0 INTRODUCTION 1

2.0 AUDIT ISSUES..... 3

3.0 AUDIT TEAM STATEMENT 5

APPENDIX A: DRAWINGS & DOCUMENTS SUBMITTED FOR INFORMATION 6

APPENDIX B: ROAD SAFETY AUDIT FEEDBACK FORM 7

1. INTRODUCTION

This report was prepared in response to a request from Cloghroe Developments Ltd. to carry out a Stage I Road Safety Audit on a proposed residential development at Cloghroe, Cork.

This Road Safety Audit (RSA) assesses the proposed development entrances and public realm improvement works associated with the scheme.

The purpose of the audit is to highlight road safety issues that exist or may be created by the proposal and should be addressed to mitigate against possible future accidents in the area. The intent is to improve the operational safety of the scheme for the benefit of all road users.

The speed limit of the R617 fronting the development is 50km/hr and features a wide carriageway with a downhill approach from the north.

The Audit Team consists of Brian Loughrey of MHL Consulting Engineers (team leader) and Brian Murphy (team member) of MHL Consulting Engineers. The two team members made a site visit during daylight hours in June 2021 when the weather was dry.

Information provided to assist the Audit included planning stage drawings of the proposed development as listed in Appendix A.



Fig 1: Site Location

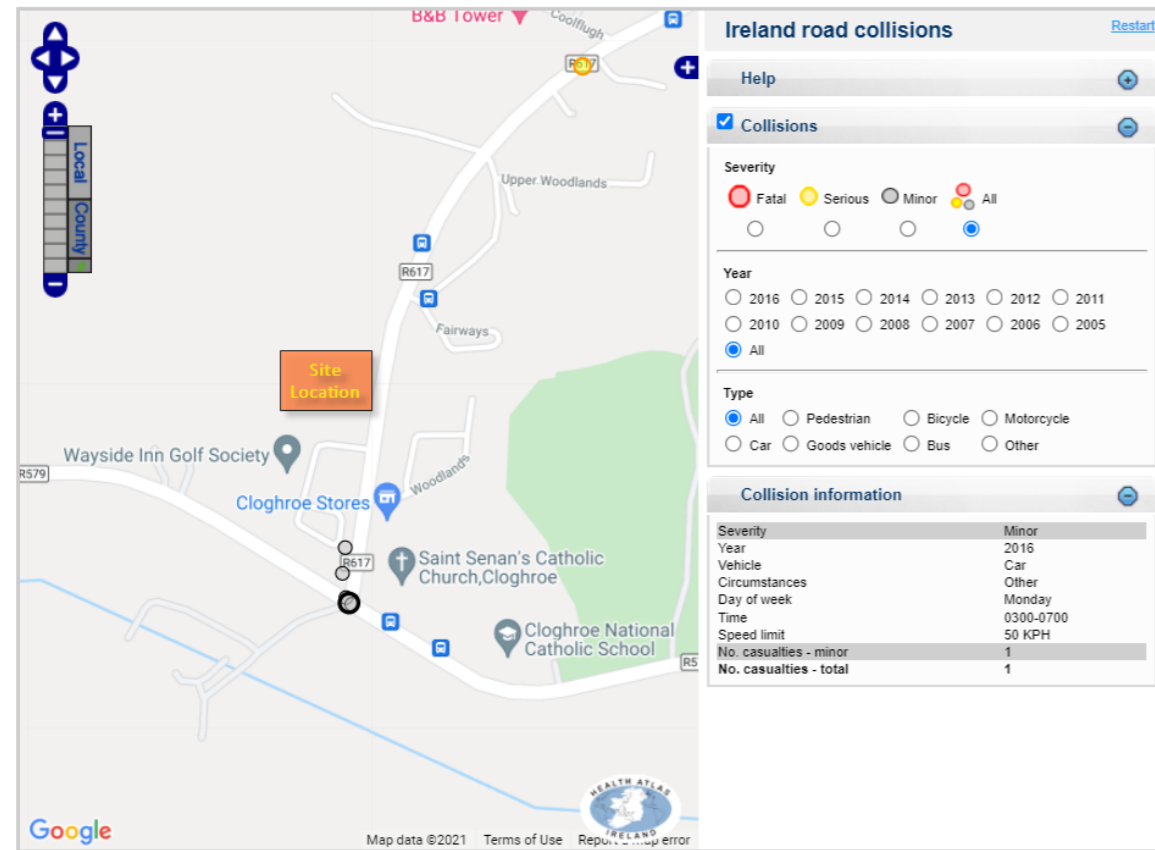


Fig 2: RSA Collision Map in vicinity of Site

No details of collision statistics were provided. The auditors consulted the RSA Road Collision Records, as published on the RSA website, in the vicinity of the site for the period 2005 to 2016 inclusive.

A number of minor collisions occurred in the wider area over the available 11-year period as shown in **Figure 2**.

The Audit has been carried out in accordance with the relevant sections of NRA HD 19/15, "Road Safety Audit". The scheme has not been examined or verified for compliance with any other standards or criteria. The team drove and walked the extent of the scheme and compiled a list of road safety problems and associated recommendations which are presented in this report.

An Audit Team Statement is included at the end of the Report.

2. AUDIT ISSUES

2.1 Problem: Cycle Track – Colour Contrast through junctions.

The drawings submitted for audit does not propose colour contrasted surfacing through proposed junctions. This could lead to collisions involving vehicles crossing over the cycle track and not being aware of cyclist priority through the junction.

Recommendation 1

Provide a contrasting surface treatment on the at grade section of cycle tacks through the proposed junctions in accordance with the National Cycle Manual. The provision of a colour contrasted surface through the junction will greatly enhance cyclist safety.

2.2 Problem: No Signage & Road Markings detailed on Cycle Track.

There are no details of signage or road markings relating to the cycle track on the drawings submitted for audit. Specifically, road markings and signage indicating the start and end of the track, shared space areas should be designed for. Failure to inform cyclists of a loss of priority at the end of the cycle facility could result in cyclists merging with mainline traffic in an uncontrolled manner.

Recommendation 2

Provide appropriate signage and road markings in accordance with the National Cycle Manual.

2.3 Problem: Ladder/Tramline Tactile Paving at bus stop.

Appropriate tactile paving should be installed in accordance with relevant design guidance in the vicinity of the bus stop to implement the intended shared space priority. This tactile paving will serve to ensure visually impaired or vulnerable pedestrians do not conflict with cyclists. Kassel kerbing should also be installed at the bus stop kerb edge.

Recommendation 3

Ensure appropriate tactile paving is provided at all locations along the scheme.

2.4 Problem: Advanced Warning Signage at proposed Controlled Pedestrian Crossing.

It is not clear from the drawing submitted for audit if signage on the approaches to the proposed crossing will be provided. Failure to provide adequate warning signage may lead to drivers failing to see the crossing point in time resulting in collisions between passing vehicles and crossing pedestrians.

Recommendation 4

Provide advanced warning signage in accordance with the Traffic Signs Manual.

2.5 Problem: Visibility at proposed new junctions and pedestrian crossing.

The designers should ensure that all visibility splays to and from the proposed junctions and the controlled pedestrian crossing are provided in accordance with relevant design standards. Ensure that the splays are free of landscaping elements and poles that may restrict visibility. Failure to provide adequate visibility splays at junctions and pedestrian crossings may lead to collisions between exiting vehicles at junctions and crossing pedestrians at the controlled crossing.

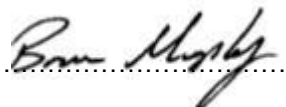
Recommendation 5

Ensure that adequate visibility splays and forward visibility is provided at the new junctions and also at the proposed new pedestrian crossing.

3. AUDIT TEAM STATEMENT

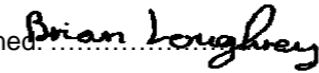
We certify that we have examined the drawings and documents listed in the Appendices of this report. The examination has been carried out with the sole purpose of identifying any features that could be removed or modified in order to improve the safety of the proposed development. The problems identified have been noted in this report, together with associated safety improvement suggestions, which we recommend should be studied for implementation. The auditors have not been involved in the design of this scheme.

Mr Brian Murphy BE CEng MIEI

Signed: 

Date: 23/06/2021

Mr Brian Loughrey BE CEng MIEI

Signed: 

Date: 23/06/2021

APPENDIX A

Drawings and documents submitted for information:

By: Deady Gahan Architects

Cloghroe, Cork

File Name	File Type	Drawing Title	Scale	Revision
RL1-PFP-P01	AutoCAD .dwg	n/a	n/a	04
Site Layout Drawing	PDF	n/a	n/a	04
Public Lighting Design	PDF	n/a	n/a	01

APPENDIX B

Road Safety Audit Feedback Form

Scheme: Cloghroe, Cork

Route No. N/A

Audit Stage: 1

Date Audit Completed: 23rd June 2021

Paragraph No. in Safety Audit Report	To Be Completed By Designer			To Be Completed by Audit Team Leader
	Problem accepted (yes/no)	Recommended measure accepted (yes/no)	Describe alternative measure(s). Give reasons for not accepting recommended measure	Alternative measures or reasons accepted by auditors (yes/no)
2.1	YES	YES		
2.2	YES	YES		
2.3	YES	YES		
2.4	YES	YES		
2.5	YES	YES		

Signed: Liam Murphy (Designer)

Date: 24/06/2021

Signed: Brian Loughrey (Audit Team Leader)

Date: 23/06/2021

Signed: _____ (Employer)

Date: _____

date	rev	name	chk	note
26.10.21	P1	LM	EJG	ISSUE FOR PLANNING



EASTGATE VILLAGE, LITTLE ISLAND, CORK
 T: 021 4355016 W: WWW.DGARCHITECTS.IE
 EMAIL: INFO@DGARCHITECTS.IE

Project
 PROPOSED MIXED-USE DEVELOPMENT
 IN CLOGHROE, TOWER, CO. CORK

Drawing title
 PROPOSED SITE PLAN - PART A

Scale	Drawn	Checked	Date
1:500 @ A1	LM	EJG	14.12.20
Project No.	Drwg. No.	Revision	
20068	20068/P/003A	P1	

DO NOT SCALE. WORK TO FIGURED DIMENSIONS ONLY.
 ALL EXISTING DIMENSIONS TO BE CHECKED ON SITE.
 DRAWN ON AUTOCAD R2004 AT DEADY GAHAN ARCHITECTS LTD
 LAYERS ON THIS DRAWING COMPLY WITH BS 1192: PART 5



LOCATION OF SITE NOTICE

LOCATION OF SITE NOTICE

LOCATION OF SITE NOTICE

- Note**
- Please refer to landscape proposal for public realm, open space & external boundaries information
 - Please refer to boundary treatment drawing (Dwg - 20068/P/004) for all internal boundary treatments
 - Refer to accompanying plans prepared by MHL & Associates for details of proposed upgrades to R617
 - "M" indicated on site plan refers to motor bike spaces

- Character Area 1
(beige brick + off-white/beige render)
- Character Area 2
(natural stone + off-white render)
- Character Area 3
(red brick + off-white render)

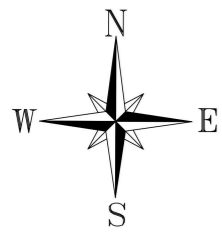
Developable area shown in orange (5.6Ha)
 Refer to accompanying plans prepared by Forestbird Design for details of proposed central parkland and all amenity areas/public open spaces

Dashed magenta line denotes the existing overhead power lines that are to be diverted underground

PEDESTRIAN ENTRANCE

Signalised pedestrian crossing-Refer to drawings prepared by MHL for details

PROPOSED SITE PLAN (PART A)
 SCALE 1:500 @ A1



DO NOT SCALE. WORK TO FIGURED DIMENSIONS ONLY.
 ALL EXISTING DIMENSIONS TO BE CHECKED ON SITE.
 DRAWN ON AUTOCAD R2004 AT DEADY GAHAN ARCHITECTS LTD
 LAYERS ON THIS DRAWING COMPLY WITH BS 1192: PART 5

Developable area shown in orange (5.6Ha)
 Refer to accompanying plans prepared by Forestbird Design for details of proposed central parkland and all amenity areas/public open spaces

Dashed magenta line denotes the existing overhead power lines that are to be diverted underground

Developable area shown in orange (5.6Ha)

Please refer to accompanying information prepared by MHL & Associates for details of proposed flood storage tank below car park & storm chamber

Dashed magenta line denotes the existing overhead power lines that are to be diverted underground

LOCATION OF SITE NOTICE

Please refer to accompanying plans prepared by MHL & Associates for details of proposed upgrades to R617

RESIDENTIAL SITE ENTRANCE

LOCATION OF SITE NOTICE

Dashed magenta line denotes the existing overhead power lines that are to be diverted underground

RETAIL SITE ENTRANCE



- Note**
- Please refer to landscape proposal for public realm, open space & external boundaries information
 - Please refer to boundary treatment drawing (Dwg - 20068/P/004) for all internal boundary treatments
 - Refer to accompanying plans prepared by MHL & Associates for details of proposed upgrades to R617
 - "M" indicated on site plan refers to motor bike spaces

- Character Area 1**
(beige brick + off-white/beige render)
- Character Area 2**
(natural stone + off-white render)
- Character Area 3**
(red brick + off-white render)

PROPOSED SITE PLAN (PART B)
 SCALE 1:500 @ A1

date	rev	name	chk	note
28.10.21	P1	LM	EJG	ISSUE FOR PLANNING

DEADY GAHAN ARCHITECTS

EASTGATE VILLAGE, LITTLE ISLAND, CORK
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 EMAIL: INFO@DGARCHITECTS.IE

Project
 PROPOSED MIXED-USE DEVELOPMENT
 IN CLOUGHROE, TOWER, CO. CORK

Drawing title
 PROPOSED SITE PLAN - PART B

Scale	Drawn	Checked	Date
1:500 @ A1	LM	EJG	14.12.20
Project No.	Dwg. No.	Revision	
20068	20068/P/003B	P1	

Information	Comments	Tender
<input checked="" type="checkbox"/> Planning		<input type="checkbox"/> Construction

