PUNCH
consulting engineers

Domestic Violence Refuge and Social Housing, Turner's Cross, Cork

Engineering Planning Report

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Table of Contents

List of Figures

List of Tables

1 Introduction

This report was prepared to accompany a planning application for the proposed development on a site at Turner's Cross, Evergreen Road, Cork City.

The site of the proposed development is a brownfield site with an existing convent building located centrally within the site. The site measures approximately 0.69 hectares and is located to the north of Evergreen Road in Cork City. The Bus Eireann Capwell bus depot bounds the north of the site and Bunscoil Chríost Rí school bounds the east. The south and west are bounded by residential dwellings. The site location is shown in Figure 1-1 below.

The site is relatively flat centrally and to the east, with levels varying between 12.1mOD and 12.3mOD. The site falls in a northerly direction in the greenfield part of the site which is located in the western part of the site. Please refer to Appendix C for the full topographical survey.

Figure 1-1: Site Location of the Proposed Development

1.1 Proposed Development

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

The proposed development consists of design and construction of a development to include a Domestic Violence Refuge (20 no. units) and separate new 4-storey residential apartment block (32 no. units). The existing convent building on the site will be repurposed and extended to house the Domestic Violence Refuge and the existing chapel building will be demolished. The development will include all associated roads and ancillary services.

Access to the development will be via the existing laneway to Evergreen Road, however the entrance will be modified to accommodate intensification of use and to accommodate vehicular, cyclist and pedestrian traffic via a shared surface acces route.

An extract from the architectural site layout is shown in Figure 1-2.

Figure 1-2: Extract from Architect's Site Layout (ref: CN Architects)

2 Stormwater Drainage Design

2.1 Existing Stormwater Drainage

Record drawings from Uisce Éireann indicate the presence of an existing 300mm diameter combined public sewer on Evergreen Road, which flows in a south-easterly direction. A Ground Penetrating Radar (GPR) survey, conducted by Geodata in July 2020, confirmed the location of this 300mm combined sewer. The GPR survey also identified a 150mm diameter combined pipe serving the existing convent building. This pipe runs through the existing laneway and connects to the public sewer on Evergreen Road.

Please refer to Appendix A for the records drawings and utility survey illustrating the existing stormwater drainage arrangement, and to Figure below for an extract from Uisce Éireann records.

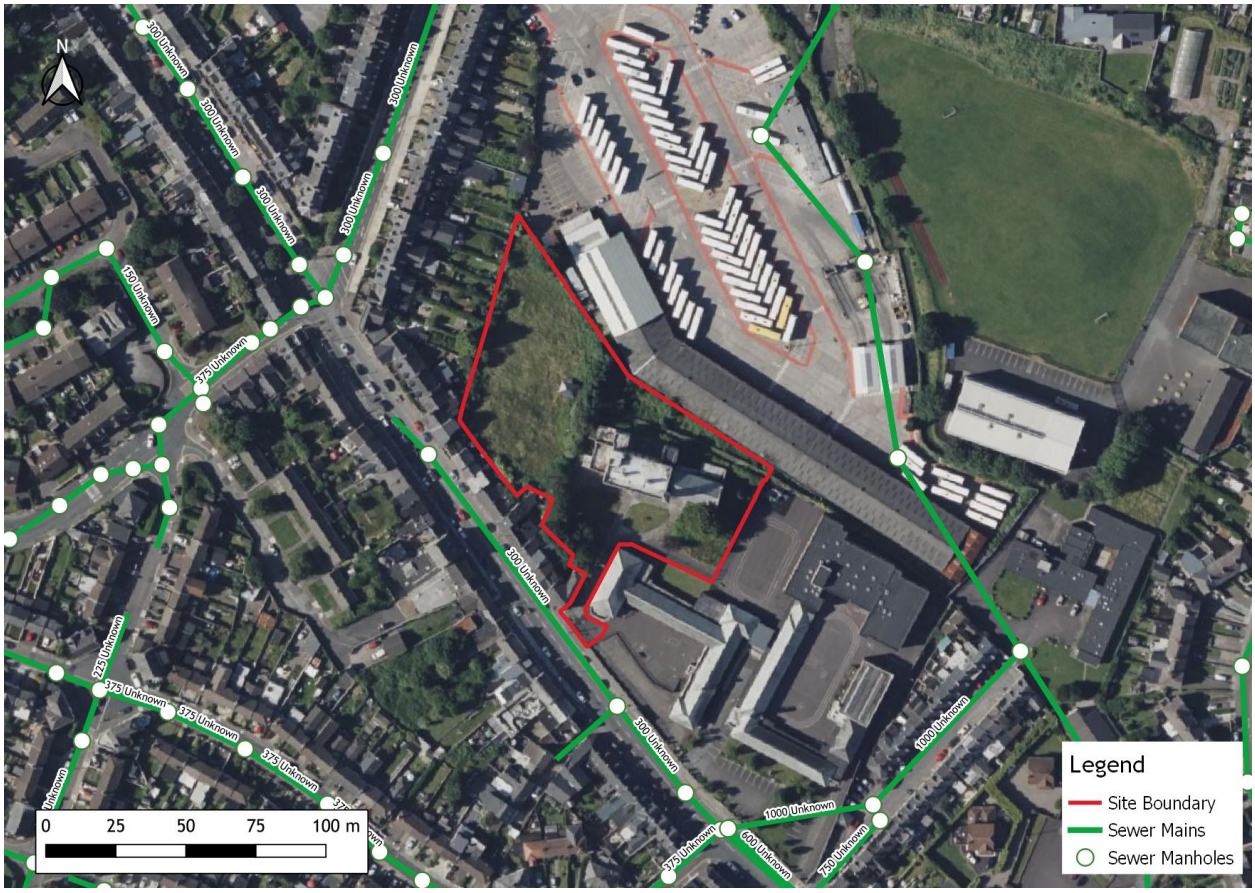


Figure 2-1: Drainage records extract (Uisce Éireann)

2.2 Existing Site Hydrogeology

Rainfall data derived from Met Eireann records (refer to Appendix B) indicate the following rainfall parameters are relevant to the site:

- M5-60 = 17.7
- M5-2D = 78.6
- Ratio "R" = 0.225

To determine an appropriate infiltration rate for the site, a review of several data sources was undertaken:

1. A ground investigation report from a location approximately 300m east of the proposed development (within a 500m radius) was obtained from the GSI website. The investigation encountered predominantly sands and gravels, with some sandy or gravelly clays. Based on this, the subsoil is assumed to correspond to Soil Type 2 or 3.
2. The WRAP maps were reviewed for the site area. Most of Cork City, excluding zones classified as 'u' (urban), falls under Class 2, which aligns with the findings from the nearby ground investigation report. The WRAP classification and corresponding soil type for the specific site location are illustrated in. At an expanded scale and overlaid with the proposed development site specific location, the WRAP map and the Soil Type are as per Figure 2-2 below.

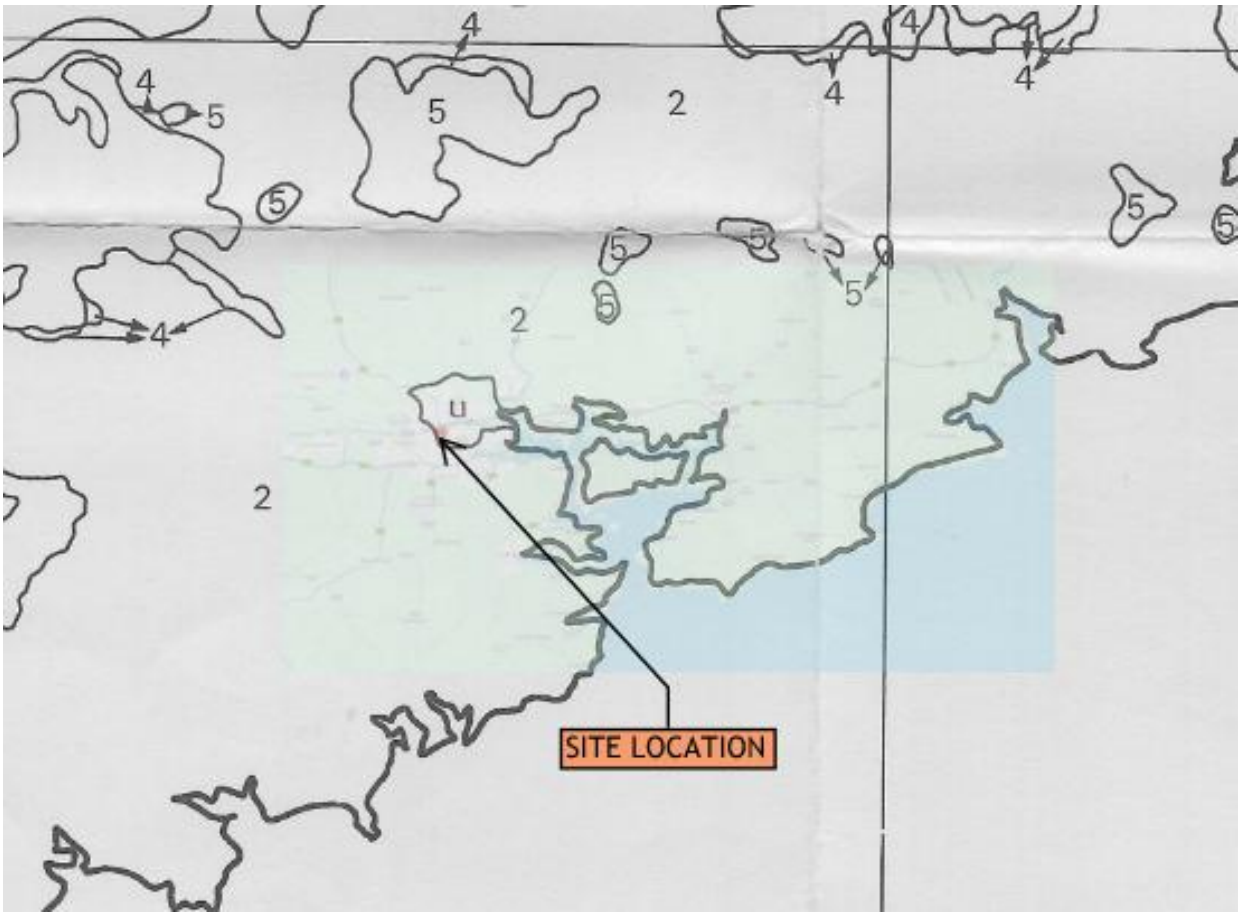


Figure 2-2: WRAP Map - Expanded Scale

3. According to Table 25.1 of the CIRIA SuDS Manual, typical infiltration rates for Soil Type 2 (loamy sand and sand) range from 1×10^{-5} m/s to 1×10^{-4} m/s. An extract from Table 25.1 of the CIRIA SuDS Manual is shown in Figure 2-3.

TABLE 25.1 Typical infiltration coefficients based on soil texture (after Bettess, 1996)

Soil type/texture	ISO 14688-1 description (after Blake, 2010)	Typical infiltration coefficients (m/s)
Good infiltration media		
• gravel	Sandy GRAVEL	$3 \times 10^{-4} - 3 \times 10^{-2}$
• sand	Slightly silty slightly clayey SAND	$1 \times 10^{-5} - 5 \times 10^{-5}$
• loamy sand	Silty slightly clayey SAND	$1 \times 10^{-4} - 3 \times 10^{-5}$
• sandy loam	Silty clayey SAND	$1 \times 10^{-7} - 1 \times 10^{-5}$
Poor infiltration media		
• loam	Very silty clayey SAND	$1 \times 10^{-7} - 5 \times 10^{-6}$
• silt loam	Very sandy clayey SILT	$1 \times 10^{-7} - 1 \times 10^{-5}$
• chalk (structureless)	N/A	$3 \times 10^{-8} - 3 \times 10^{-6}$
• sandy clay loam	Very clayey silty SAND	$3 \times 10^{-10} - 3 \times 10^{-7}$
Very poor infiltration media	–	
• silty clay loam	–	$1 \times 10^{-8} - 1 \times 10^{-6}$
• clay	Can be any texture of soil	$< 3 \times 10^{-8}$
• till	described above	$3 \times 10^{-9} - 3 \times 10^{-6}$
Other		
• rock* (note mass infiltration capacity will depend on the type of rock and the extent and nature of discontinuities and any infill)	N/A	$3 \times 10^{-9} - 3 \times 10^{-5}$

Figure 2-3: Table 25.1 of CIRIA SuDS Manual

4. Soakaway tests were carried out on-site to obtain more accurate infiltration rates. Results indicate rates ranging from 1.75×10^{-5} m/s in the northern part of the site to 6.66×10^{-5} m/s in the south-eastern area. These values fall within the expected range outlined in the CIRIA guidance.

For the purpose of storage and infiltration design, and in keeping with a conservative approach, the lower bound value of 1.75×10^{-5} m/s obtained from on-site testing will be adopted for the entire site.

2.3 Proposed Stormwater Drainage

The surface water drainage strategy for the proposed development will adhere to the principles of Sustainable Drainage Systems (SuDS), as detailed in Sections 2.4 and 2.5 of this report. The overall strategy involves collecting runoff using a combination of source control SuDS, gullies and buried pipework, which will ultimately direct the water to several infiltration-based storage systems, as such the site is split into several sub-catchments, as shown below in Figure 2-4 below.

Figure 2-4: Drainage Sub-Catchment Strategy

A by-pass petrol interceptor will be installed as a pre-treatment measure for the proposed access road and parking area before discharging to the southern bio-retention area. Additionally, all inlet manholes to the infiltration-based systems will include a 0.5m sump.

All surface water runoff from the proposed development will be managed within the site boundary, infiltrating naturally into the ground without discharging into any existing surface water drainage or combined drainage networks. This approach ensures a sustainable and self-sufficient means of surface water management, replicating pre-development conditions by returning water to the ground at its source. The proposed widened public footpath and the ramped section of the entrance to Evergreen Road will remain draining to existing gullies on the public carriageway.

The proposed surface water drainage system has been designed using Causeway Flow software, in accordance with the Department of Environment and Local Government's guidance document "Recommendations for Site Development Works for Housing Areas". Further design parameters and guidance were adopted from the following documents:

- Greater Dublin Strategic Drainage Study, 2005
- Greater Dublin Regional Code of Practice for Drainage Works, 2005
- CIRIA Report C753 – The SuDS Manual v6, 2015
- CIRIA Report C768 – Guidance on the construction of SuDS, 2017
- BRE Digest 365 – Soakaway design, 2016
- Flood Studies Report, 1975
- and the Cork City Development Plan, 2022-2028

A new surface water sewer network, entirely separate from the foul water sewer network, will be provided for the development. The minimum diameter of the mainline surface water sewers is 225mm.

The surface water drainage network has been analysed for the risk of flooding for 1 in 2-year event, 1 in 30- year event and 1 in 100-year event by means of simulating such events in the drainage model with no flooding occurring. An increase of 20% in rainfall has been included to account for climate change.

Table 2-1 outlines the stormwater drainage design parameters used, and detailed simulation results are included in Appendix D. Additionally, please refer to drawing 244110-PUNCH-XX-XX-DR-C-0101, which shows the proposed drainage plan layout for the development.

Table 2-1: Stormwater Drainage Design Parameters

Description	Value	Standard Reference / Notes
Gross Site Area	0.69 ha	Redline Boundary
Net Site Area	0.384 ha Total 0.168 ha Sub-Catchments North (1+2) 0.216 ha Sub-Catchment South	Positively Drained Net Site Area
Return period target	Pipe Design 1 in 2 year – no surcharge Network Design 1 in 30 year – surcharge allowed, no flooding Network/Attenuation Design 1 in 100 year – flooding contained on site	GDSDS
Climate Change	20%	GDSDS
M5-60	17.3mm	Met Éireann Rainfall Data (2023 Model)
Ratio R	0.225	Met Éireann Rainfall Data (2023 Model)
SOIL type	2 (sandy/gravelly)	WRAP Maps and nearby Site SI
Infiltration Rate	1.75×10^{-5} m/s (0.063 m/hr)	Site Investigation BRE365 testing

Attenuation Storage Volume	Soakaway 1 North 123 m^3 Soakaway 2 North 22 m^3 Soakaway South 183 m^3 Total = 328 m^3	
Flow reduction parameter	N/A	Discharge to ground
Interception Volume	N/A	Discharge to ground via soakaways, hence interception requirement satisfied by default.
Treatment Volume	N/A	Treatment volume not required as interception criteria satisfied.
Max. velocity at pipe full	3.0 m/s	
Min. velocity	1.0 m/s when flowing full 0.75 m/s where not practicable 0.3 m/s where run-off only from upstream SuDS	GDSDS Table 6.4 and GDSDS Section 6.5.2
Minimum cover	1.2m under roadways 0.9m elsewhere	GDSDS Table 6.4
Rougness – ks	0.6mm	GDSDS Table 6.4

The run-off factors (percentage impermeable area – PIMP) used in the drainage model are summarised in Table 2-2 below.

Table 2-2: Summary of run-off Areas

Surface Type	Gross Area (m^2)	PIMP (%)	Net Area (m^2)
Roofs directly to drainage	677	95	643
Roof to bio-retention area	152	60	91
Roads and footpaths directly to drainage	1804	95	1714
Roads and footpaths to Tree Pits	1217	60	759
Biodiverse Green roof	547	60	329
Landscaping	1008	0.3 (for soil Type 2)	302

2.4 Compliance with GDSDS and SuDS Principles

The proposed development is designed in full accordance with the principles of Sustainable Drainage Systems (SuDS) as recommended by the Greater Dublin Strategic Drainage Study (GDSDS). The GDSDS promotes sustainability by requiring designs to comply with specific drainage criteria that aim to minimize the impact of urbanization by replicating the runoff characteristics of a greenfield site. These criteria ensure a consistent approach to managing the increase in both the rate and volume of runoff, as well as protecting the environment from pollution caused by roads and buildings. The drainage design criteria are as follows:

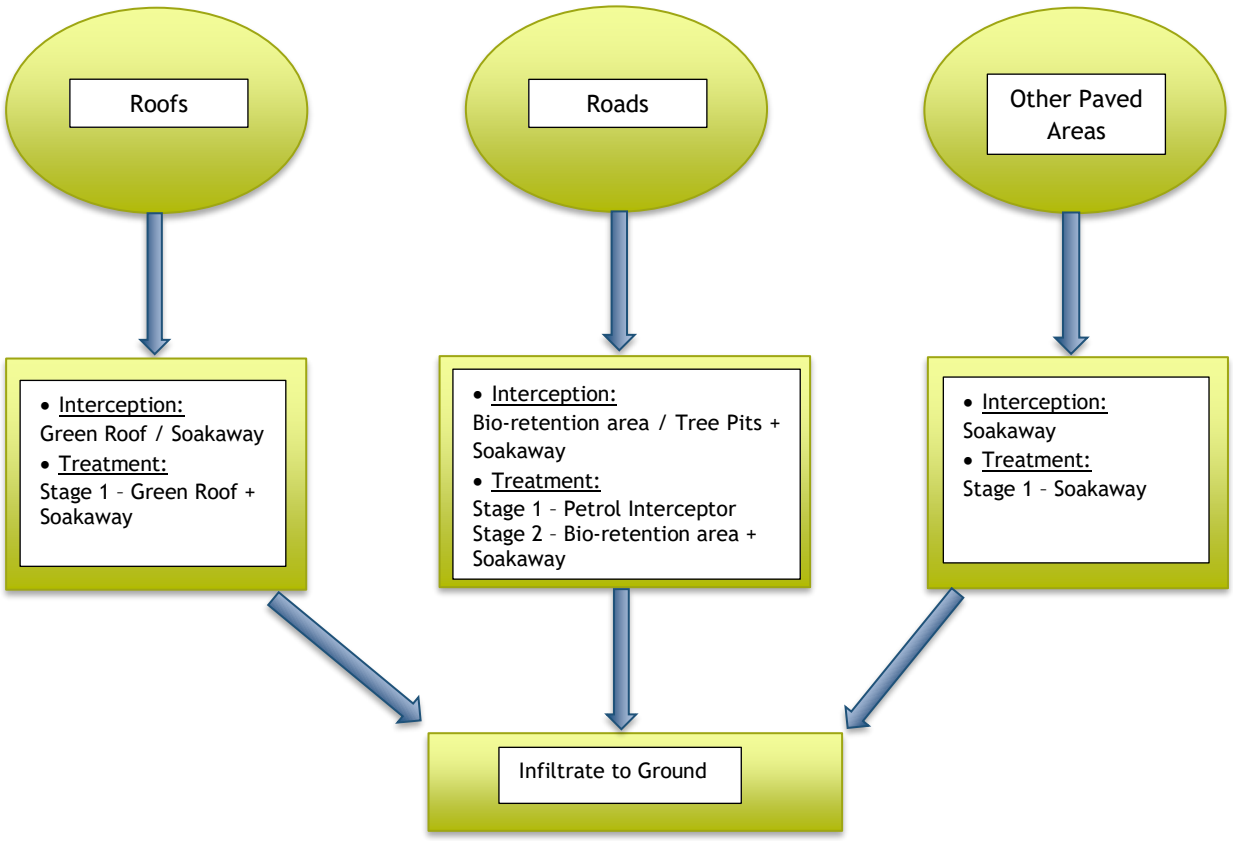
- Criterion 1: River Water Quality Protection
- Criterion 2: River Regime Protection
- Criterion 3: Level of Service
- Criterion 4: River Flood Protection

To satisfy SuDS requirements, developments typically incorporate:

- Interception storage
- Treatment storage (unnecessary if interception storage is adequate)
- Attenuation storage
- Long-term storage (unnecessary if QBAR growth factors are not applied in attenuation storage design)

In this case, surface water discharge will be managed via rainwater harvesting, green-blue roofs which are partially covering the proposed buildings to slow down the rate of discharge, and through infiltration via tree pits, a soakaway for the northern catchment and a combination of an bio-retention area and soakaway for the southern catchment, which are equipped to handle attenuation storage needs for storm events up to the 1% AEP event. This approach negates the need for off-site surface water discharge, ensuring full interception storage.

An indicative interception and treatment train for the different surfaces is shown in diagram below.



2.4.1 Criterion 1 GDSDS - River Water Quality Protection

Natural greenfield areas typically contribute minimal pollution and sediment to rivers, as most rainfall percolates into the ground, preventing direct runoff to rivers during most rainfall events. In contrast, urban areas with pipe drainage systems experience runoff from almost every rainfall event, often carrying higher levels of pollution, especially during the initial phase of runoff, with minimal percolation into the ground. To mitigate this, Criterion 1 mandates the provision of interception storage and/or treatment storage to replicate the runoff characteristics of pre-development greenfield sites.

2.4.1.1 Interception Storage

Interception storage should ensure that at least the first 5mm of rainfall is retained on-site and does not reach receiving waters. For the subject site, surface water discharge will be managed via green roofs, tree pits, soakaways and a bio-retention area, ensuring by default compliance with the 5mm interception requirement.

2.4.1.2 Treatment Storage

According to the GDSDS, interception and treatment storage are interchangeable. Since full interception storage is provided through the above systems, additional treatment storage is not necessary.

2.4.2 Criterion 2 GDSDS - River Regime Protection

Unchecked runoff from developed sites through traditional pipe networks discharges into receiving waters at rates significantly higher than pre-development levels, causing flash flows that can lead to scour and erosion in rivers and streams, as such the following requirements are to be met:

1. "Discharge rate equal to 1 – year Greenfield site peak runoff rate or 2 l/s/ha, whichever is the greater. Site critical duration storm to be used to assess attenuation storage volume".
2. "Discharge rate equal to 1 in 100 year Greenfield site peak runoff rate or 2 l/s/ha, whichever is the greater. Site critical duration storm to be used to assess attenuation storage volume".

No runoff will be leaving the site with runoff being collected by proposed stormwater drainage and ultimately infiltrating to the ground, therefore the development meets the requirement of Criterion 2.

2.4.3 Criterion 3 GDSDS - Level of Service (Flooding) for the site

The GDSDS stipulates that no flooding should occur on-site for storms up to and including the 1 in 30-year event. The pipe network and attenuation storage volumes must be sufficient to prevent site flooding, though partial surcharging is acceptable as long as it does not lead to flooding. For the 1 in 100-year + 20% climate change (CC) event, the pipe network can fully surcharge and cause site flooding, but the peak water level must be at least 500mm below any vulnerable internal floor levels, and floodwaters must be contained within the site. The top water level in any attenuation device during this event must also be at least 500mm below any vulnerable internal floor levels.

Appendix D provides the stormwater drainage calculations, including attenuation volumes, demonstrating that the attenuation systems will not flood during the 1 in 100-year + 20% CC event. The peak volume for this event is as follows for the sub-catchments:

1. Northern Sub-Catchment 1 – 122 m^3, corresponding to a depth of 1.484 m in the soakaway structure, resulting in a top water level of +10.084mOD, which is more than 500mm below any adjacent floor levels.
2. Northern Sub-Catchment 2 – 22 m^3, corresponding to a depth of 1.5 m in the soakaway structure, resulting in a top water level of +10.443m, which is more than 500mm below any adjacent floor levels.
3. Southern Sub- Catchment – 183 m^3 for the southern sub-catchment, corresponding to a depth of 1.492 m in the soakaway structure, resulting in a top water level of +11.242m which is more than 500mm below any adjacent floor levels.

Therefore, Criterion 3 is satisfied.

2.4.4 Criterion 4 GDSDS – River Flood Protection

Criterion 4 aims to prevent flooding of the receiving system or watercourse by either limiting the runoff volume to pre-development levels using "long-term storage" (Option 1) or by limiting the runoff rate for the 100-year storm to QBAR without growth factors using "extended attenuation storage" (Option 2).

As the proposed development includes systems that manage all surface water on-site, there will be no discharge to river networks. The infiltration based attenuation systems have been designed to provide sufficient storage thus meeting design Criterion 4.

2.5 Drainage Impact Assessment

The proposed development has been assessed in relation to Sustainable Urban Drainage Systems (SuDS) in accordance with Cork City Council Development Plan 2022-2028, with guidance for selection of SuDS measures taken from CIRIA C753 The SuDS Manual.

The SuDS processes decrease the impact of the development on the receiving environment by providing amenity and biodiversity in many cases. Regular maintenance of the SuDS proposals is required to ensure they are operating to their optimal level throughout their design life. There are four critical objectives that SuDS seek to meet (refer to Figure 2-5):

1. Quantity: managing flows and volumes to match the rainfall characteristics before development, in order to prevent flooding from outside the development, within the site and downstream of the development.
2. Amenity: enhancing people's quality of life through an integrated design that provides useful and attractive multifunctional spaces.
3. Quality: preventing and treating pollution to ensure that clean water is available as soon as possible to provide amenity and biodiversity benefits within the development, as well as protecting watercourses, groundwater and the sea.
4. Biodiversity: maximising the potential for wildlife through design and management of SuDS.

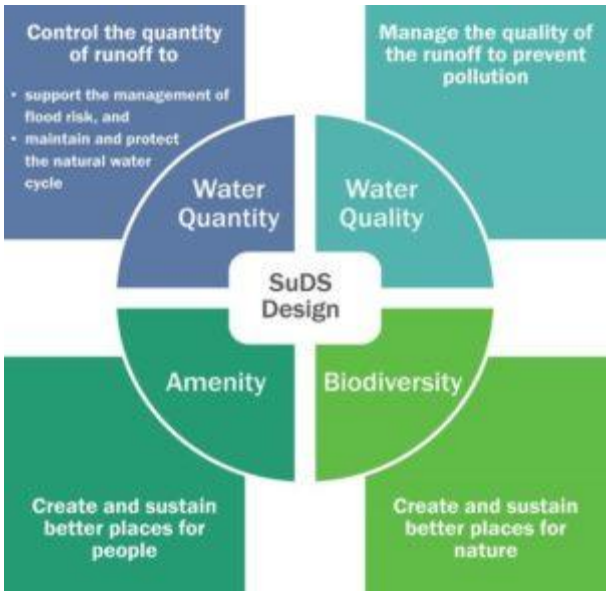


Figure 2-5:The four pillars of SuDS design (ref. CIRIA753 SuDS Manual)

The water quality, amenity and biodiversity properties of the site specific SuDS components are summarised below.

Table 2-3: Site-specific four pillars of SuDS

SuDS Components		
Water Quantity	Maintenance and protection of the natural water cycle by provision of SuDS, and management of flood risk by providing infiltration based systems adequately sized for attenuation. The bioretention area, tree pits allows rainwater to infiltrate through the granular soil, reducing surface runoff and further promoting groundwater recharge.	
Water Quality	Runoff collection	Standard downpipes to convey roof rainwater to the surface water drainage system. Road gullies to collect excess rainwater and discharge to the surface water drainage system.
	Interception	Tree pits, bio-retention area and soakaways intercept first run-off from impermeable hardstanding.
	Storage	Soakaway and bio-retention area attenuation volume – 1 in 100 year return period including 20% allowance for climate change.
	Conveyance	Pipes direct water to soakaway systems.
	Exceedance	Proposed topography allows exceedance flows to be contained at the low points within the site.
	Groundwater protection measures	Roof, footpaths and car parking area – hazard is low. The granular soil build-up within the proposed tree pits, bio-retention area and soakaways act as groundwater protection measures.
Amenity	Open green spaces provide high amenity spaces.	
Biodiversity	Green roof and open green spaces provide ecological areas and habitat for a range of species.	

The specific measures adopted for the proposed development have been selected with guidance taken from CIRIA C753 The SuDS Manual, and are described in more detail in Subsections 2.5.1 to 2.5.5.

2.5.1 Soakaways

The soakaway will provide the required level of attenuation storage within the voids in the proprietary cellular storage system. The base and sides of the soakaways will be lined. The proposed soakaways will accommodate the 1% AEP (annual exceedance probability) rainfall event with an allowance for 20% climate change, using infiltration rate of $1.75x10^{-5}$ m/s. The proposed soakaways will be a proprietary cellular storage crate soakaway system with a voids ratio of approximately 95% or similar equvialent achieving the same attenuation volume. Additionally, the soakaways will have a 0.5m sump located upstream of the inlet.

2.5.2 Bio-retention area

The bio-retention area will incorporate drainage stone and subsoil. Acting as a bioretention system, the basin will allow stormwater to percolate downwards through a carefully selected filter medium, facilitating the removal of suspended solids and other finer contaminants. The performance of the bioretention system can vary based on the particle size and composition of the filter media, with different qualities achievable depending on specific site requirements. To prevent lateral seepage and ensure controlled infiltration, the base and sides of the system will be lined.

As outlined in CIRIA C753 (The SuDS Manual), bio-retention areas are highly effective in managing runoff by promoting natural infiltration and groundwater recharge. Table 24.6 specifies that interception designs for infiltration systems can be assumed to provide complete interception, with zero runoff expected from the first 5 mm of rainfall for 80% of events during the summer and 50% in winter. This applies to systems designed to infiltrate runoff from events exceeding a 1-month return period, contributing to significant runoff reduction for smaller, more frequent storms.

Bio-retention areas, as part of a broader SuDS strategy, contribute to improving water quality, reducing runoff volumes, and mitigating flood risk by integrating natural hydrological processes into the urban environment. The proposed bio-retention area will have some attenuation storage at surface level and an overflow to the proprietary cellular storage crate system underneath. For the purpose of outline design, as a conservative measure, no attenuation storage has been assumed in the bio-retention area above ground.

2.5.3 Tree Pits

The proposed tree pits will serve both as landscape elements and as stormwater management features, providing a dual function of urban greening and surface water attenuation. Tree pits act as bioretention systems, allowing stormwater to filter down through engineered soil or bioretention media, which removes pollutants and promotes water infiltration. This system supports the health of the trees while managing surface runoff, reducing the overall burden on the drainage network.

According to CIRIA C753 (The SuDS Manual), tree pits contribute to sustainable urban drainage by capturing and retaining the first flush of stormwater, particularly for smaller, more frequent rainfall events. As per Table 24.6 of CIRIA C753, tree pits designed for interception can retain the first 5 mm of rainfall, reducing runoff for 80% of summer events and 50% of winter events, in alignment with SuDS principles. The design ensures zero runoff for many smaller events, making tree pits an effective solution for urban stormwater management.

The tree pits will consist of a permeable base layer to allow infiltration, a drainage layer (gravel or drainage stone) to support water retention, and a bioretention soil mix tailored to allow for optimal filtration and tree growth. The sides of the tree pits will be lined to prevent lateral infiltration into

surrounding structures, ensuring water is directed into the subsoil. An overflow and underdrain will be incorporated to ensure excess water is effectively drained away to the stormwater network, preventing waterlogging.

For the purpose of outline design, as a conservative measure, no attenuation storage has been assumed within tree pits.

2.5.4 Petrol Interceptor

It is proposed that all surface water run-off from car park areas will outfall via a Class 1 Bypass Separator located upstream of the proposed southern bio-retention area and soakaway. This device will remove hydrocarbons and fine sediment particles from the site runoff and lower the risk of downstream contamination following an oil spillage on site.

Bypass separators fully treat all flows generated by rainfall rates of up to 6.5mm/hr. This covers over 99% of all rainfall events. Flows above this rate are allowed to bypass the separator. These separators are used when it is considered an acceptable risk not to provide full treatment for high flows, for example where the risk of a large spillage and heavy rainfall occurring at the same time is small.

Class 1 devices are designed to achieve a concentration of less than 5mg/l of oil under standard test conditions.

The by-pass separator has been sized in accordance with IS EN 858-2:2003. Please refer to Appendix E for supporting sizing calculations.

2.5.5 Green roofs

It is proposed to provide 547m² biodiverse roof covering to the proposed building roofs.

Green roofs are widely recognised as an effective SuDS solution and an important tool in mitigating the adverse effects of development on rainfall run-off and for managing urban flood risk. Research in the UK by Kellagher and Lauchlan (2005)[1] and CIRIA C753 (The SuDS Manual) indicates that green roofs are effective in providing both attenuation and volume reduction in runoff for minor rainfall events.

There shall be a biodiverse green roof provided at roof level for all the blocks. The green roof areas proposed have been maximised, considering requirements for M&E plant at roof level, and also considering the structural capacity of the existing building. Interception storage has therefore been maximised for roof areas on the site.

Assuming 5% of the substrate depth is available for water storage, the green roofs shall provide interception storage for the first 10mm of rainfall, as required by the GDSDS criteria for River Water Quality Protection.

[1] Kellagher and Lauchlan (2005), *Use of SuDS in high density developments*

2.6 Groundwater Pollution Risk Management

Groundwater pollution risk management for the proposed development has been carried out in accordance with Section 26 of CIRIA C753 The SuDS Manual, using the Simple Index Approach. This approach attributes simple pollution hazard indices based on land use (Table 26.2 of The SuDS Manual) and simple SuDS hazard mitigation indices (Table 26.4 of The SuDS Manual).

To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type).

The pollution hazard indices for different parts of a development are given in The SuDS Manual, Table 26.1 (See Figure 2-5 below), and proposed development includes the following land uses:

- Residential Roofs,
- Low traffic roads and residential car parking.

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

Figure 2-6: Extract from CIRIA C753 The SuDS Manual – Table 26.2

The mitigation indices for various common SuDS components when discharging to surface water and groundwater are provided in The SuDS Manual, Tables 26.3 and 26.4 (see Figure 2-6 and 2-7 below).

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation indices[1]		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Figure 2-7: Figure 2 3: Extract from CIRIA C753 The SuDS Manual – Table 26.3

TABLE 26.4 Indicative SuDS mitigation indices for discharges to groundwater

Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates[1]	**TSS**	**Metals**	**Hydrocarbons**
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.6[4]	0.5	0.6
A soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.8[4]	0.8	0.8
Proprietary treatment systems[5, 6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Figure 2-8: Extract from CIRIA C753 The SuDS Manual – Table 26.4

The potential pollution hazards associated with the proposed development and the SuDS components' mitigation indices are shown in Tables 2-3 and 2-4 below.

Table 2-4: SuDS Mitigation vs Land Use Hazard comparison - Roofs

	Reference Area	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Hazard indices	Residential Roofs	0.2	0.2	0.05
Mitigation Indices	**Partially Green Roof[1]**	**0.8 > 0.2**	**0.8 > 0.2**	**0.8 > 0.05**
	Partially to Soakaway[2]	**0.4 > 0.2**	**0.4 > 0.2**	**0.4 > 0.05**
Resultant	Positive means Mitigation Indices are greater than Hazard Indices	**+0.6** **+0.2**	**+0.6** **+0.2**	**+0.75** **+0.35**

1 - Green roofs share similar structural and functional characteristics with bioretention systems. Both systems use vegetation and soil substrates to retain and treat stormwater. The vegetation helps to intercept rainfall, while the soil substrate filters pollutants. Thus, the mitigation indices for bioretention systems are applied to extensive green roofs with an 80mm substrate due to their comparable ability to reduce pollutants.

2 - Cellular soakaway systems rely on the surrounding soil for the filtration and attenuation of pollutants. This is akin to systems where the soil provides the primary contaminant removal, such as those underlain by a soil with good contaminant attenuation potential of at least 300mm in depth. Therefore, the mitigation indices for "a soil with good contaminant attenuation potential of at least 300mm in depth" are applied to cellular soakaway systems.

Table 2-5: SuDS Mitigation vs Land Use Hazard comparison - Road and car parking area

Hazard indices	Road and car parking area	0.5	0.4	0.4
Mitigation Indices	**Bio-retention area + Soakaway** **Or Tree Pit + Soakaway**	**0.4+0.5*0.4 = 0.6** **0.8+0.5*0.4 = 1.0**	**0.4+0.5*0.4 = 0.6** **0.8+0.5*0.4 = 1.0**	**0.4+0.5*0.4 = 0.6** **0.8+0.5*0.4 = 1.0**
Resultant	Positive means Mitigation Indices are greater than Hazard Indices	**+0.1** **+0.5**	**+0.2** **+0.5**	**+0.2** **+0.6**

The proposed development's SuDS components have been carefully selected to ensure that their mitigation indices surpass the potential pollution hazards identified for different land uses as shown in Tables above. By incorporating these SuDS components, the development achieves a high level of stormwater treatment, mitigating pollutants before they infiltrate into the ground. The biodiverse green roof, with its bioretention-like properties, excels in filtering a wide range of pollutants. Similarly, the cellular soakaway system, supported by the surrounding soil's filtration capacity, ensures efficient pollutant attenuation.

2.7 SuDS Maintenance

Regular maintenance of the SuDS is crucial to ensure optimal performance and longevity of the drainage infrastructure. The following maintenance procedures have been incorporated into the overall drainage design for the proposed development.

Operation and maintenance requirements for soakaways		
Maintenance schedule	**Required action**	**Typical frequency**
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

Figure 2-9: Soakaway Maintenance Requirements (Ref: CIRIA SuDS Manual)

Operation and maintenance requirements for bioretention systems		
Maintenance schedule	**Required action**	**Typical frequency**
Regular inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

Figure 2-10: Bio-retention area Maintenance Requirements (Ref: CIRIA SuDS Manual)

An example of operation and maintenance requirements for a proprietary treatment system		
Maintenance schedule	**Required action**	**Typical frequency**
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

Figure 2-11: Oil Separator Maintenance Requirements (Ref: CIRIA SuDS Manual)

In addition to the above, for a petrol interceptor the following items should be undertaken every six months as a minimum:

1. Check volume of sludge
2. Check thickness of light liquid
3. Check function of automatic closure device
4. Empty the separator, if required
5. Check the coalescing material and clean or change if necessary (class 1 only)
6. Check the function of the warning device (if fitted)

General inspection of the integrity of oil/water separators should occur at a maximum frequency of five years, and should cover watertightness of system, structural condition, internal coatings, in-built parts, electrical devices and installations, and adjustment of automatic closure devices.

Operation and maintenance requirements for trees (after CRWA, 2009)		
Maintenance schedule	**Required action**	**Typical frequency**
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets and outlets	Inspect monthly
Occasional maintenance	Check tree health and manage tree appropriately	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary	Annually, or as required
	Water	As required (in periods of drought)
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

Figure 2-12: Tree Pits Maintenance Requirements (Ref: CIRIA SuDS Manual)

Operation and maintenance requirements for green roofs		
Maintenance schedule	**Required action**	**Typical frequency**
Regular inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (ie year one), replace dead plants as required	Monthly (but usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where > 5% of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

Figure 2-13: Green Roofs Maintenance Requirements (Ref: CIRIA SuDS Manual)

3 Foul Water Drainage Design

3.1 Existing Foul Water Drainage

As stated in Section 2.1 of this report, record drawings from Uisce Éireann indicate the presence of an existing 300mm diameter combined public sewer on Evergreen Road, which flows in a south-easterly direction. A Ground Penetrating Radar (GPR) survey, conducted by Geodata in July 2020, confirmed the location of this 300mm combined sewer. The GPR survey also identified a 150mm diameter combined pipe serving the existing convent building. This pipe runs through the existing laneway and connects to the public sewer on Evergreen Road.

Please refer to Appendix A for the records drawings and utility survey illustrating the existing foul drainage arrangement. An extract from the Uisce Éireann online records is shown in Figure 3-1 below.

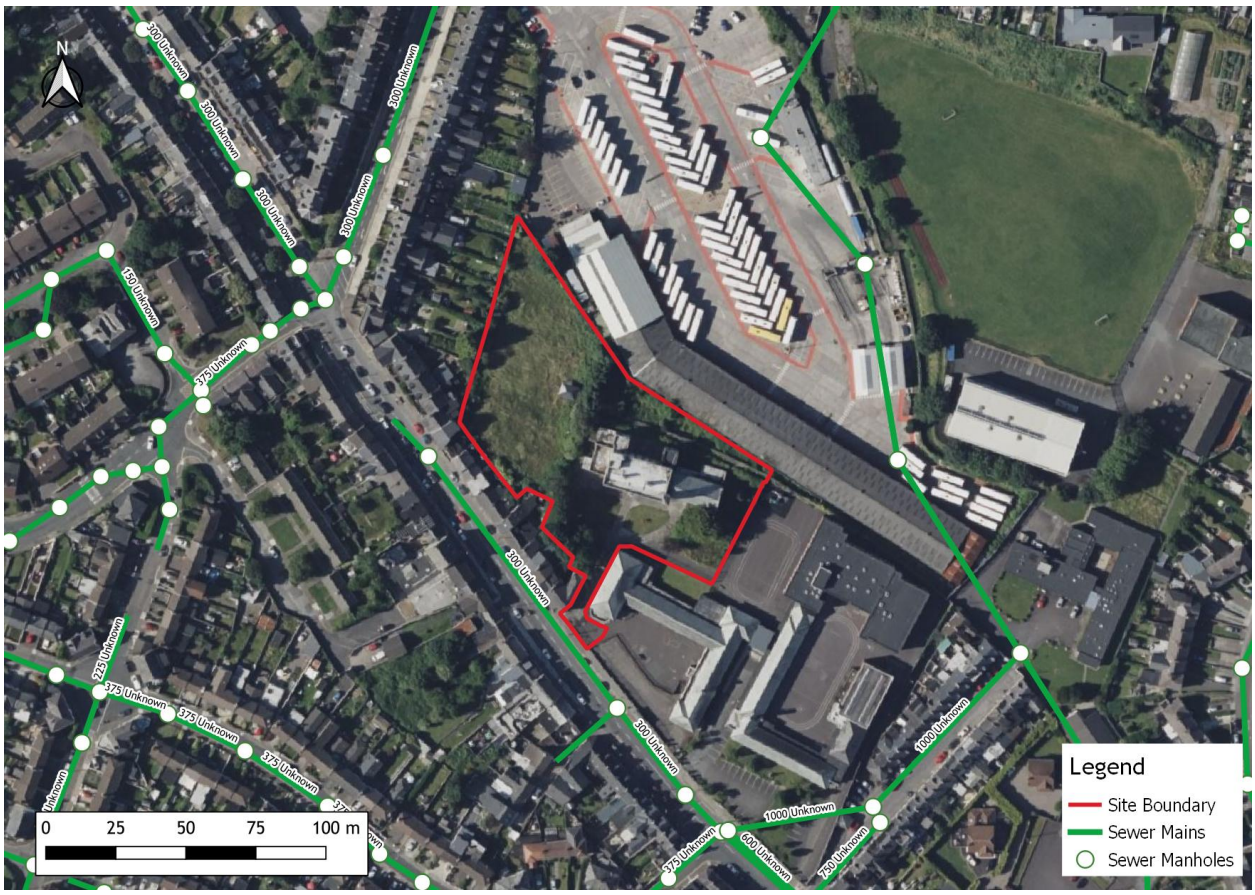


Figure 3-1: Existing foul drainage surrounding the site (Extract from Uisce Éireann online records).

3.2 Proposed Foul Water Drainage

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

It is proposed that the foul sewer will discharge by gravity to the existing 300mm diameter public combined sewer on Evergreen Road.

Table 3-1 describes the foul water drainage design parameters used.

Table 3-1: Foul Water Drainage Design Parameters

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

Indicative foul demands are shown in Table 3-2, and detailed calculations are enclosed in Appendix F.

Table 3-2: Foul Water Loading Calculations

Category	Quantity	Flow Rate	Daily Flow (l/day)	DWF (l/s)	Design Peak Flow (l/s)
Residential	52 units x 2.7 per/unit =>140 persons	150 l/per/day	21,000 + 10% = 23,100	0.267	1.602
Total			**23,100**	**0.267**	**1.602**

A Pre-Connection Enquiry Form has been issued to Uisce Éireann in relation to the proposed development. In response, Uisce Éireann confirmed the feasibility of the foul sewer connection, noting that it is subject to upgrades. Some localized sewer upsizing may be required, with the extent, if any, to be determined at the connection application stage. Please refer to Appendix G for Uisce Éireann correspondence.

4 Watermain Design

4.1 Existing Watermain

Uisce Éireann record drawings indicate that a 152.4mm cast iron watermain runs along Evergreen Road. U utility survey conducted by Murphy Geospatial in January 2024 only GPR acquired assumed a watermain in the location, however the material or diameter has not been confirmed by the survey.

Please refer to Appendix A for Utility Survey illustrating the existing watermain arrangement in the area. An extract from Uisce Éireann online records is shown in Figure 4-1 below.

Figure 4-1: Existing watermain surrounding the site (Extract from Uisce Éireann online records).

4.2 Proposed Watermain

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

Table 4-1 describes the watermain design parameters used, and water demand calculations are described in Table 4-2.

Table 4-1: Watermain Design Parameters

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

Table 4-2: Water Demand Calculations

Category	Quantity	Flow Rate	Daily Flow (l/day)	DWF (l/s)	Average Demand (1.25DWF) (l/s)	Peak Demand (5AVG) (l/s)
Residential	52units x 2.7 per/unit =>140 persons	150 l/per/day	21,000	0.243	0.304	1.519
Total			**21,000**	**0.243**	**0.304**	**1.519**

On the basis of the above tables, the development will have an increase in average water demand of 0.304l/s and a peak water demand of 1.519l/s.

It is proposed to construct a 100mm inner diameter (110mm outer diameter) HDPE watermain to serve the proposed development based on the above calculated demand. The proposed watermain will connect to the existing 152.4mm diameter cast iron watermain on Evergreen Road.

This watermain will provide a direct potable supply to the proposed development and also deliver firefighting water to a static storage tank, which will serve the fire hydrants on site. In accordance with IS 391, the fire consultant has advised that firefighting operations must be supported by a sustained flow rate of 25 L/s for a duration of 60 minutes, resulting in a required storage volume of 90 m^3. Fire coverage requirements will be reviewed and certified by the appointed fire consultant.

A bulk water meter shall be provided at the site boundary at the location of the proposed connection to the existing watermain. The watermain layout has been designed in accordance with "Uisce Éireann Code

of Practice for Water Infrastructure". All watermains are to be constructed in accordance with Uisce Éireann Code of Practice and the Local Authority's requirements.

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

A Pre-Connection Enquiry Form has been issued to Uisce Éireann in relation to the proposed development. In response, Uisce Éireann confirmed the feasibility of the water services connection without any infrastructure upgrade. Please refer to Appendix G for Uisce Éireann correspondence.

5 Flooding

Planning guidelines on flood risk and development have been published by the OPW and Department of Environment, Heritage and Local Government (DoEHLG). The following sections summarise how the development's design adheres to the main principles of the guidelines.

5.1 Sequential Approach

The sequential approach utilizes flood zones for river and coastal flooding, as described below:

- **Zone A** – High probability. This zone defines areas with the highest risk of flooding. For river flooding it is defined as more than 1% probability or more than 1 in 100 year, and for coastal flooding it is defined as 0.5% probability or more than 1 in 200 year.
- **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 1,000 years, and for coastal flooding 0.1% and 0.5% probability or between 1 in 200 and 1 in 1,000 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 1,000 years.

The flood zones are then to be looked at with the vulnerability of the building 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 used to determine 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

5.2 Development Sequential Test

5.2.1 Coastal Flood Risk

Coastal flooding results from sea levels which are higher than normal and result in sea water overflowing onto the land. Coastal flooding is influenced by the following three factors which often work in combination: high tide level, storm surges and wave action.

The Catchment Flood risk and Management Study (CFRAMS) is a national programme to assess and manage flood risk. A review of the CFRAM mapping indicates that the developed study area is not located in a flood risk area (flood risk is less than 1 in 1000) in any given year, as shown in Figure 5-1 below. Therefore, there is no risk associated with coastal flooding for the site.

Figure 5-1: Coastal and Fluvial Flooding

5.2.2 Fluvial Flood Risk

Fluvial flooding occurs when a river exceeds its capacity and overflows onto the adjacent floodplain. A review of the CFRAM mapping indicates that the developed study area is not located in a flood risk area (flood risk is less than 1 in 1000) in any given year, as shown in Figure 5-1 above. Therefore, there is no risk associated with fluvial flooding for the site.

5.2.3 Pluvial Flood Risk

Pluvial flooding results from overland flows of rainfall-generated runoff before it can enter any watercourse or sewer, typically associated with high-intensity rainfall. A review of past flood events shows a single pluvial flooding incident recorded approximately 250m south-east on Evergreen Road, as shown below. This record report does not mention any negative effect on the relevant development area itself. Additionally, the proposed drainage network is designed to accommodate a 100-year return period plus a 20% climate change allowance, mitigating pluvial flooding concerns.

5.2.4 Groundwater Flooding

According to the Geological Survey of Ireland (GSI) groundwater flooding probability maps, there is no groundwater flooding risk in this area.

5.2.5 OPW Flood Maps

The OPW Past Flood Event Local Area Summary Report has identified several flood events within 2.5 km of the study area, however none of these events directly affect the site area.

5.3 Flood Risk Assessment Conclusions

The site has been assessed in accordance with the "The Planning System and Flood Risk Management" Guidelines. As part of the sequential test, the OPW flood hazard maps have been consulted, as have the Catchment Flood Risk Assessment Maps produced by the OPW.

As the study area is located within Flood Zone C, the justification test is not applicable, and the site is appropriate for the proposed residential development.

6 Roads and Access

6.1 Proposed Roads & Access

Access to the site will be via a modified entrance on Evergreen Road. The existing gate, in its current location, presents challenges for access by refuse trucks and fire tenders. Retaining the gate in this position would restrict the necessary maneuvering space for these vehicles, particularly for emergency services and waste collection, and could result in traffic congestion with vehicles queuing on an already heavily trafficked public road.

To address these concerns, it has been decided to remove the gated access function entirely. The existing gates will be relocated and reinstated in a permanently open position further into the access laneway, retained solely for conservation purposes to preserve the historic character of the entrance. The section of access road from the junction with Evergreen Road will operate as a one-way system, incorporating priority controls and designated waiting areas on both approaches. This arrangement will alleviate congestion in the laneway, improve vehicular access, and ensure that the entrance width and alignment are suitable for refuse trucks and fire tenders when entering and exiting the site.

The proposed internal road layout complies with the Design Manual for Urban Roads and Streets (DMURS) and the Recommendations for Site Development Works. DMURS encourages the creation of safer, more vibrant streets that serve the community, while accommodating vehicles, pedestrians, cyclists, and public transport. Internally the road will function as a shared vehicle/cycle/pedestrian route.

For larger vehicles, such as delivery trucks, some turning movements may necessitate encroachment into the pedestrian zone. To facilitate this, the access route will feature no level differences between pedestrian and vehicular areas, ensuring flexibility and safety.

The internal road network has been designed to promote traffic calming, with no straight sections exceeding 35 meters in length. A raised table crossing will be installed at the entrance, further reinforcing a low-speed environment.

Additionally, refuse trucks and fire tenders will be able to maneuver within the development by utilizing the internal road. These vehicles will perform a three-point turn at the end of the internal road, allowing for safe and efficient reversing and exit through the proposed entrance. This design ensures that the development meets the access and maneuverability requirements for essential service vehicles.

6.2 Sightlines

Sightlines for the proposed entrance to the development have been designed in accordance with Sections 4.4.4 and 4.4.5 of DMURS. These sightlines were evaluated from a setback distance of 2 m from the road edge, using the Stopping Sight Distance (SSD) from Table 4.2, an extract of which is shown in Figure 6-1. The initial design was based on a vehicle design speed of 50 km/h, in line with the existing speed limit on Evergreen Road. As the proposed junction connects to a road serving existing bus routes, a sightline of 49 m was required. This was achievable at a 2 m setback, provided the existing footpath on Evergreen Road was widened to the line of the car parking spaces and eight public on-street parking spaces were removed.

To improve sightlines and enhance the public realm, the footpath on Evergreen Road was proposed to be widened to align with the car parking spaces. This necessitated the removal of eight on-street parking spaces to accommodate the new entrance and ensure compliance with the 49 m sightline requirement, as outlined in Section 6.2 of this report. These proposals were discussed with Mr. James Culhane, Executive Engineer at Cork City Council, in 2020 and were found to be generally acceptable.

However, in light of the nationwide implementation of reduced speed limits in 2025, including a reduction from 50 km/h to 30 km/h in city centres and urban areas—the design has been updated. For a design speed of 30 km/h, DMURS Table 4.2 specifies a reduced SSD of 24 m. On this basis, it is now proposed to adopt 24 m sightlines at the entrance, which are sufficient given the revised speed

environment. This change significantly reduces the extent of interventions required on Evergreen Road. Under the revised proposal, only four existing on-street parking spaces will need to be removed to achieve compliant sightlines, rather than the eight initially identified during earlier design assessments.. These sightlines are illustrated in drawing 244110-PUNCH-XX-XX-DR-C-0400.

SSD STANDARDS

Design Speed (km/h)	SSD Standard (metres)
10	7
20	14
30	23
40	33
50	45
60	59

Forward Visibility

Design Speed (km/h)	SSD Standard (metres)
10	8
20	15
30	24
40	36
50	49
60	65

Forward Visibility on Bus Routes

Figure 6-1: Table 4.2 extract from DMURS (SSD Standards within cities towns and villages)

6.3 Traffic Impact Statement

Given the low number of proposed parking spaces (13 total), traffic generated by the development will account for less than 10% of the traffic flow on the adjoining road. Additionally, with fewer than 200 units, the development is below the threshold set by Transport Infrastructure Ireland (TII) for requiring a Traffic and Transport Assessment (TTA), as per Section 2 of the Traffic and Transport Assessment Guidelines (May 2014). Therefore, no traffic survey has been conducted for this analysis.

6.4 Parking

The development will include 12 standard car parking spaces and 1 disabled parking space, totalling 13 car parking spaces.

Under the Cork City Development Plan (CCDP) 2022–2028, Table 11.13, and considering the site is located in Zone 2, the maximum parking provision is calculated as follows:

- Social Housing (32 units):
    - 24 no. 1–2 bedroom units at 1.0 space per unit = 24 spaces
    - 8 no. 3 or 3+ bedroom units at 2.0 spaces per unit = 16 spaces
    - Subtotal = 40 spaces
- Refuge Accommodation (20 units):
    - Applying a rate of 0.5 spaces per unit, consistent with standards for "Elderly Person Dwellings / Sheltered Housing" = 10 spaces

This gives a total maximum provision of 50 car parking spaces under the Development Plan.

The proposed provision of 13 spaces for 52 units equates to 0.25 spaces per unit, which is below the maximum permissible standard. This reflects a deliberate strategy to provide an appropriate level of on-site parking relative to the expected demand, while remaining well below the maximum permissible provision for Zone 2. The low car ownership levels typically associated with both social housing and refuge accommodation, particularly the latter, mean that the proposed 13 spaces are expected to adequately serve the development without generating significant overspill parking on surrounding streets. The site's urban location, with access to public transport and active travel infrastructure, further supports this reduced parking provision.

A minor reduction in on-street parking capacity is proposed as part of the development, primarily to accommodate visibility splays and ensure safe access in line with DMURS and the proposed 30 km/h speed limit. The development will provide 13 on-site car parking spaces and 68 secure cycle parking spaces, supporting a shift away from car dependency. The proposed Mobility Management Plan promotes sustainable transport options and aims to reduce pressure on the surrounding street network by encouraging walking, cycling, and use of public transport.

See Table 6-1 for a detailed breakdown.

Table 6-1: Car Parking Breakdown

Development Type	Units/ Gross Floor Area (m2)	Car Parking Standards	Maximum Car Parking Allowed	Total Provided
Residential (1-2 Bedroom)	24 No.	1 per unit	24	6
Residential (3 - 3+ Bedroom Unit)	8 No.	2 per unit	16	4
Refuge	20 No.	0.5 per unit	10	3
Total			**50**	**13**

The provision of 1 disabled parking spaces complies with the 5% requirement under the CCDP 2022-2028. Additionally, 3 of the 13 car parking spaces (1 per 5 parking spaces) will be equipped with Electric Vehicle (EV) charging points. The remaining spaces will have the infrastructure for future installation of EV charging points.

2 motorcycle parking spaces will be provided based on one motorcycle parking bay per 10 car parking spaces, as per 11.247 of the CCDP 2022-2028.

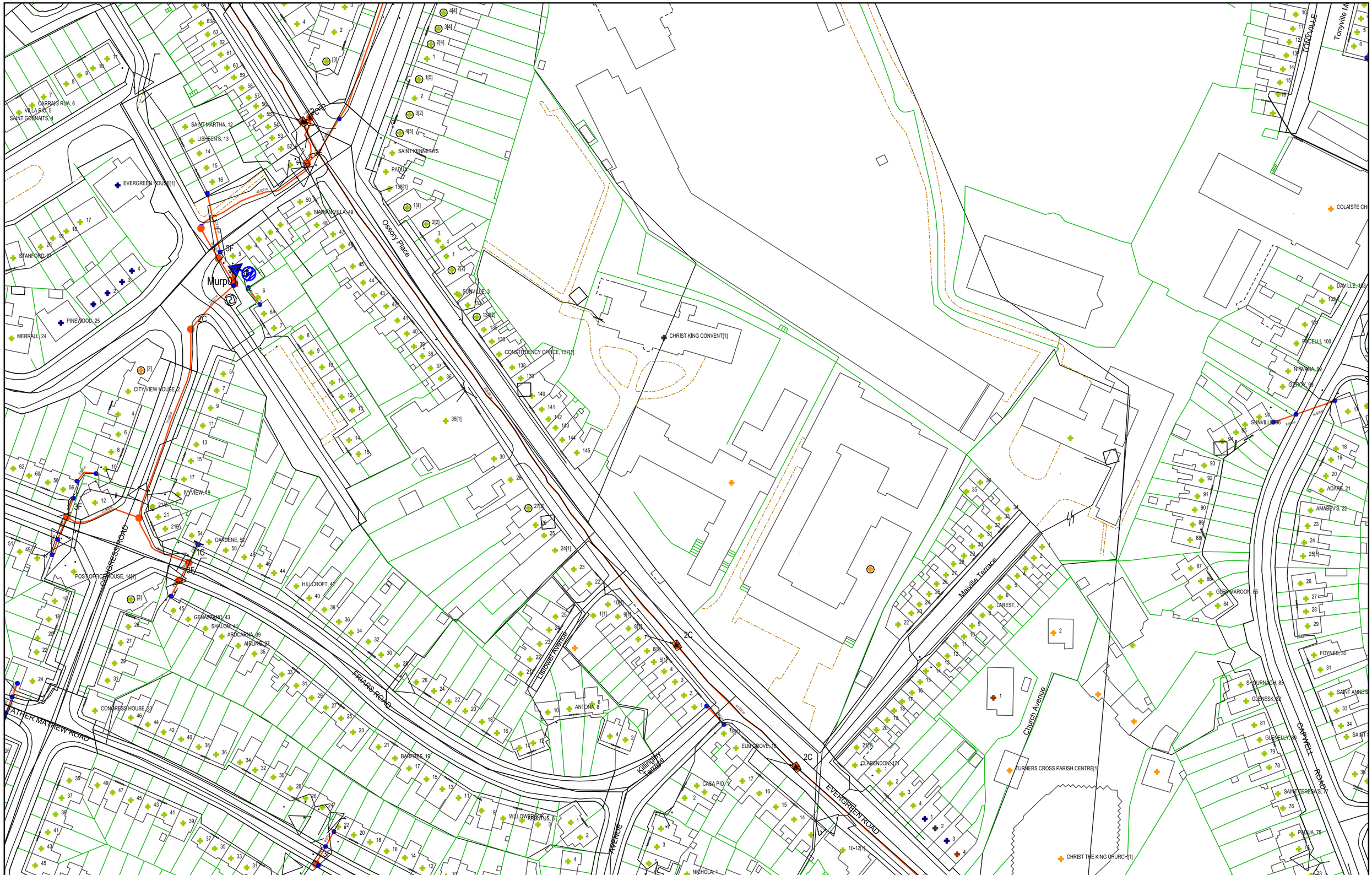
Cycle parking serving the Proposed Development is provided in accordance with Cork City Council Development Plan Cycle Parking Requirement for New Developments. It is proposed to provide 68 secure bicycle parking spaces as part of the development. This exceeds the minimum requirement of 52 spaces set by the Cork City Council Development Plan, offering enhanced support for bicycle usage within the site. While it falls short of the 114-space minimum recommended under the Sustainable Urban Housing: Design Standards for New Apartments the development will implement a monitoring system during its operational phase to assess the actual demand for bicycle parking. Should the need arise, additional spaces will be provided to meet the demand.

For more details on parking please refer to the accompanying Mobility Management Plan report reference 244110-PUNCH-XX-XX-RP-C-0003.

6.5 Road Safety Audit

A Stage 1 Road Safety Audit was carried out by Roadplan in December 2024. The audit identified several issues. Most recommendations are moving into the detailed design phase, with a few items reviewed and deemed not to require further action. Please refer to Appendix H for the Road Safety Audit report.

Appendix A Existing Record Drawings & Utility Survey



Unit 7, Westgate Business Park, Ballymount, Dublin 24.	PROJECT NAME DESIGNED BY:	Ordnance Survey Ireland Licence No. EN0023805 (c) Ordnance Survey Ireland and Government of Ireland Produced on: 15/07/2020	@ A3

TITLE: 20200703-013_A3

ESB Networks

COLOUR CODE:

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

DATE: 03-Jul-2020

** SCALE: 1:2000

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

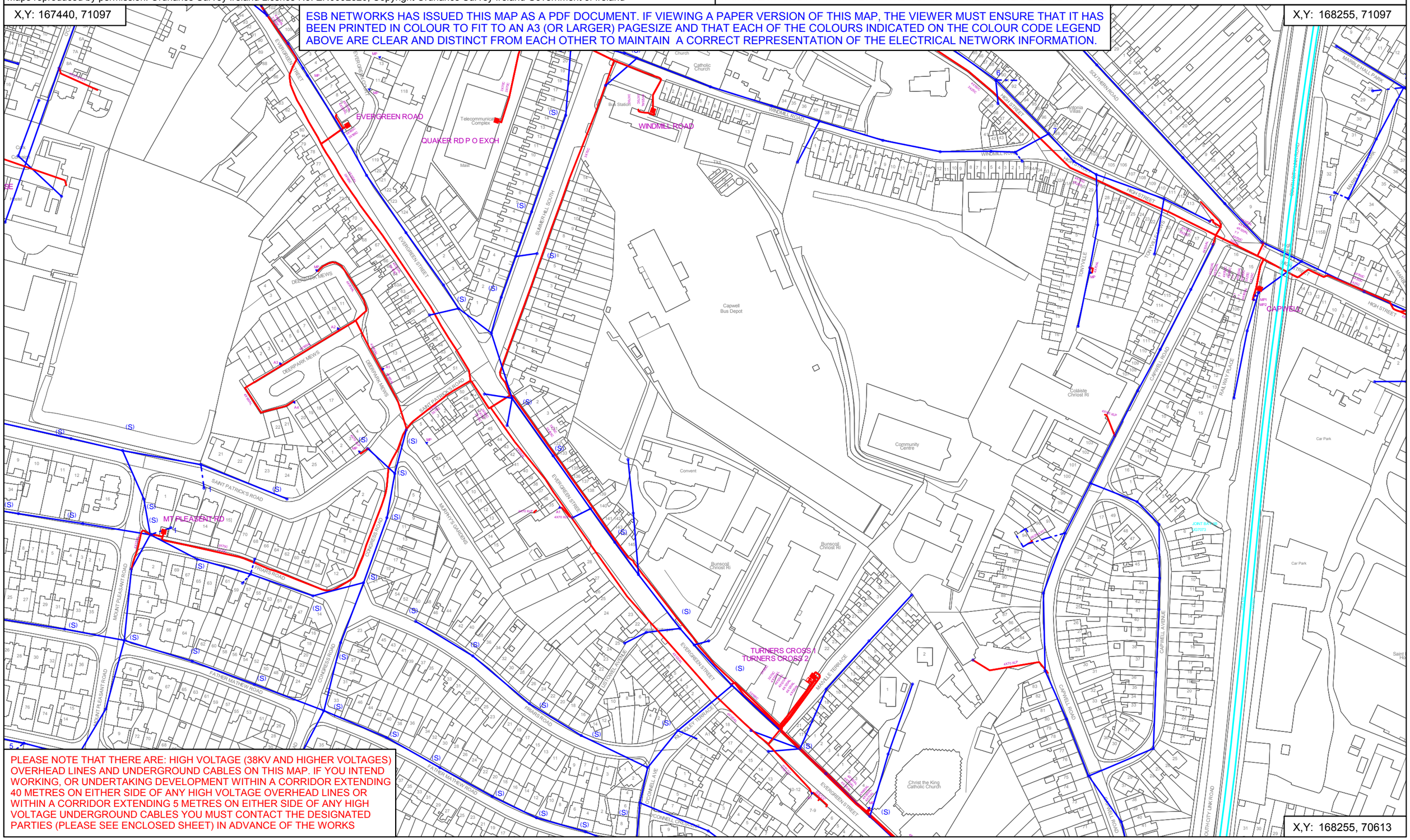
WARNING

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

X,Y: 167440, 71097

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

X,Y: 168255, 71097



PLEASE NOTE THAT THERE ARE: HIGH VOLTAGE (38KV AND HIGHER VOLTAGES) OVERHEAD LINES AND UNDERGROUND CABLES ON THIS MAP. IF YOU INTEND WORKING, OR UNDERTAKING DEVELOPMENT WITHIN A CORRIDOR EXTENDING 40 METRES ON EITHER SIDE OF ANY HIGH VOLTAGE OVERHEAD LINES OR WITHIN A CORRIDOR EXTENDING 5 METRES ON EITHER SIDE OF ANY HIGH VOLTAGE UNDERGROUND CABLES YOU MUST CONTACT THE DESIGNATED PARTIES (PLEASE SEE ENCLOSED SHEET) IN ADVANCE OF THE WORKS

X,Y: 168255, 70613

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

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

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

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

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

- Aurora Telecom Duct
- Aurora Telecom Sub Duct
- Aurora Telecom Inserted Gas Pipe

Aurora Telecom Queries - 01-8926166 (Office Hours)
Aurora_Network_Queries@gasnetworks.ie
Aurora Telecom Emergency Only 1850 427399 / 01 2030120

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

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

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

DIAL BEFORE YOU DIG 1850 42 77 47 — In Emergency call 1850 20 50 50 (Gas Networks Ireland)

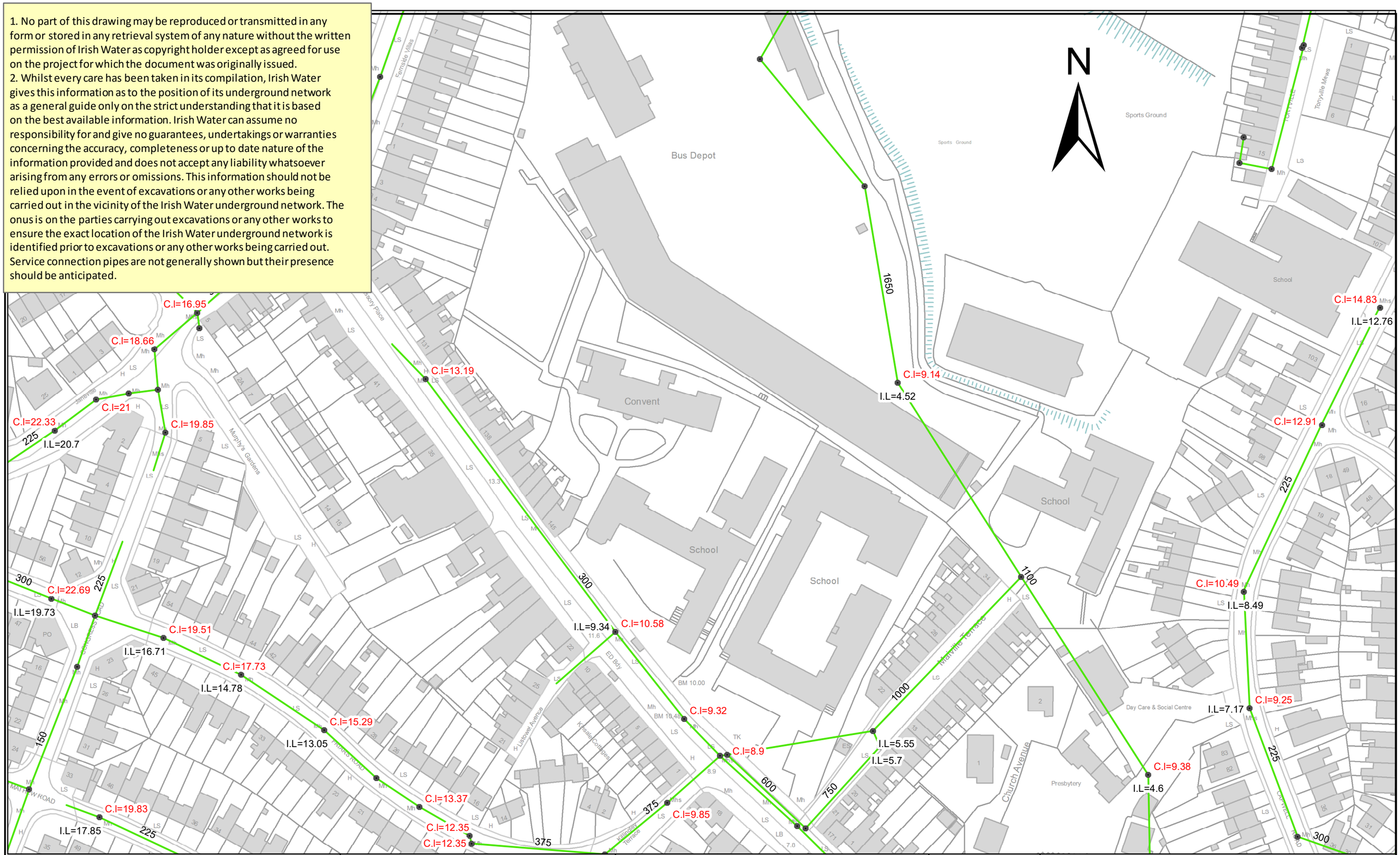
Gas Networks Ireland

GAS NETWORK INFORMATION

Description:

Location: 567801,570878

Plot Date: 02/07/2020 15:54	Scale: 1000 @ A3
Plotted By: 438	Ref ID: *438_02072020155446*



Drainage Records

Legend
- LOCAL COMBINED
- Manhole

THE SEWERS SHOWN ON THIS MAP ARE FOR REFERENCE ONLY. THE LOCATION AND PROPERTIES OF ALL SEWERS, LEVELS, PIPESIZES, etc, MUST BE CONFIRMED ON SITE.

1:1,250

N

CORK CITY COUNCIL ENVIRONMENT DIRECTORATE
(As agents of Irish Water)

Drawn By: T.Quinn

Checked by:

Date: 06/07/2020

GPR Utility Survey

Scale 1:250

ITM NORTH

SURVEY NOTES

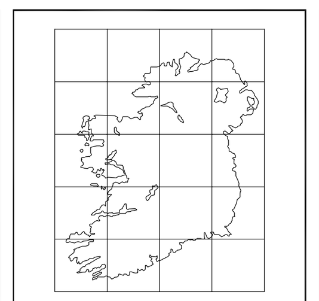
1. ALL LEVELS ARE RELATED TO MALIN HEAD DATUM (OSGM15)
2. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE STATED.
3. ANY DESCRIPENCIES IN THE SURVEY SHOULD BE REPORED TO GEODATA SURVEYING LTD IMMEDIATELY.
4. DO NOT SCALE, THIS SHALL ONLY BE PERMITTED IN DIGITAL FORM.
5. GRID IS 20m X 20m

0 5m 10m 15m

1:250

SYMBOLS

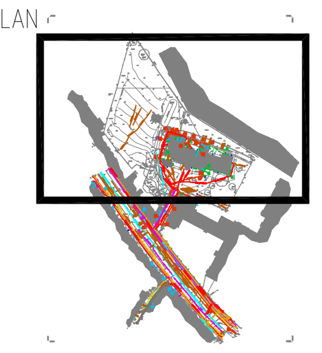
+0.00	SPOT LEVEL	G	GULLY	AV	AIR VALVE	AJ	ARMSTRONG JUNCTION		GATE	O/H ESB	OVERHEAD ESB LINE	SIGN	SIGN	UB	SOFFIT BEAM	+RIDGE	RIDGE LEVEL		FOUL SEWER		UNIDENTIFIED EM SIGNAL		TRAFFIC
	CONTROL SURVEY STATION	WM	WATER METER		FIRE HYDRANT	LP	LAMP POST	SWL:0.00	SURFACE WATER LEVEL	O/H TEL	OVERHEAD TEL LINE	DIA = 0.8m	TREE ACTUAL SPREAD	CL	SOFFIT CEILING	+EAVES	SOFFIT LEVEL		STORM SEWER		ELECTRICAL CABLE		TRENCH
MH CL	MANHOLE COVER	SV	SLUICE VALVE	TEL	TEL INSP CHAMBER	TP	TELECOM POLE	+BL:0.00	BED LEVEL WATERCOURSE	TL	TELECOM POLE	000	TREE TAG NO.	HEAD	HEAD TO FFL	FFL:100	FINISH FLOOR LEVEL		COMBINED SEWER		PUBLIC LIGHTING		COMBINED SEWER
UL	UTILITY INSP CHAMBER	SC	STOP COCK	MP	MINI PILLAR	EP	ESB POLE	+IL	INVERT LEVEL	+TOP	TOP TAG	BL	BOLLARD	WB	WINDOW BOARD TO FFL	+200	PEG REF NUMBER	ESB	ESB BOX		UNIDENTIFIED GPR	ESB	ESB BOX



COORDINATE SYSTEM

ITM-Irish Transverse Mercator

KEY PLAN



01	23-07-20	TOPO SURVEY	LK	KOB
REVISION	DATE	DESCRIPTION	DRN BY	CKD BY

RICS

SOCIETY OF CHARTERED SURVEYORS IRELAND

Geodata
Chartered Land Surveyors

47 Oliver Plunkett Street Bandon, Co Cork. P72 A443
Phone: (+353) (0)23 8852798 Fax: (+353) (0)23 8852799
Email: info@geodatasurveying.ie Website: www.geodatasurveying.ie

Client: Punch Consulting Engineers

Project: Good Shephard, Evergreen Rd, Cork

Title: Utility Survey

Scale: 1-250

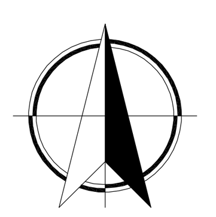
Date: 23-07-20

Sheet: A1

Dwg. No: 20485-400

GPR Utility Survey

Scale 1:250



SURVEY NOTES

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2. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE STATED.
3. ANY DESCREPIENCES IN THE SURVEY SHOULD BE REPORED TO GEODATA SURVEYING LTD IMMEDIATELY.
4. DO NOT SCALE, THIS SHALL ONLY BE PERMITTED IN DIGITAL FORM.
5. GRID IS 20m X 20m

0 5m 10m 15m

1:500

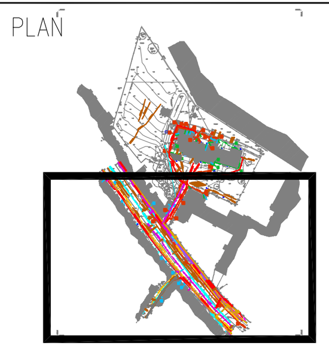
SYMBOLS

SPOT LEVEL	GULLY	AIR VALVE	ARMSTRONG JUNCTION	GATE	OVERHEAD ESB LINE	SIGN	SOFFIT BEAM	RIDGE LEVEL	FOUL SEWER	UNIDENTIFIED EM SIGNAL	TRAFFIC
CONTROL SURVEY STATION	WATER METER	FIRE HYDRANT	LAMP POST	SURFACE WATER LEVEL	OVERHEAD TEL LINE	TREE ACTUAL SPREAD	SOFFIT CEILING	SOFFIT LEVEL	STORM SEWER	ELECTRICAL CABLE	TRENCH
MANHOLE COVER	SLUICE VALVE	TEL INSP CHAMBER	TELECOM POLE	BED LEVEL WATERCOURSE	TELECOM POLE	TREE TAG NO.	HEAD TO FFL	FINISH FLOOR LEVEL	COMBINED SEWER	PUBLIC LIGHTING	COMBINED SEWER
UTILITY INSP CHAMBER	STOP COCK	MINI PILLAR	ESB POLE	INVERT LEVEL	TOP TAG	BOLLARD	WINDOW BOARD TO FFL	PEG REF NUMBER	ESB BOX	UNIDENTIFIED GPR	ESB BOX

COORDINATE SYSTEM

ITM–Irish Transverse Mercator

KEY PLAN



REVISION	DATE	DESCRIPTION	DRN BY	CKD BY
01	23-07-20	TOPO SURVEY	LK	KOB

Geodata Chartered Land Surveyors

47 Oliver Plunkett Street Bandon, Co Cork. P72 A443
Phone: (+353) (0)23 8852798 Fax: (+353) (0)23 8852799
Email: info@geodatasurvyeing.ie Website: www.geodatasurveying.ie

Client: Punch Consulting Engineers

Project: Good Shephard, Evergreen Rd, Cork

Title: Utility Survey

Scale: 1–250

Date: 23–07–20

Sheet: A1

Dwg. No: 20485–401

Appendix B Site Coordinates & Met Eireann Data

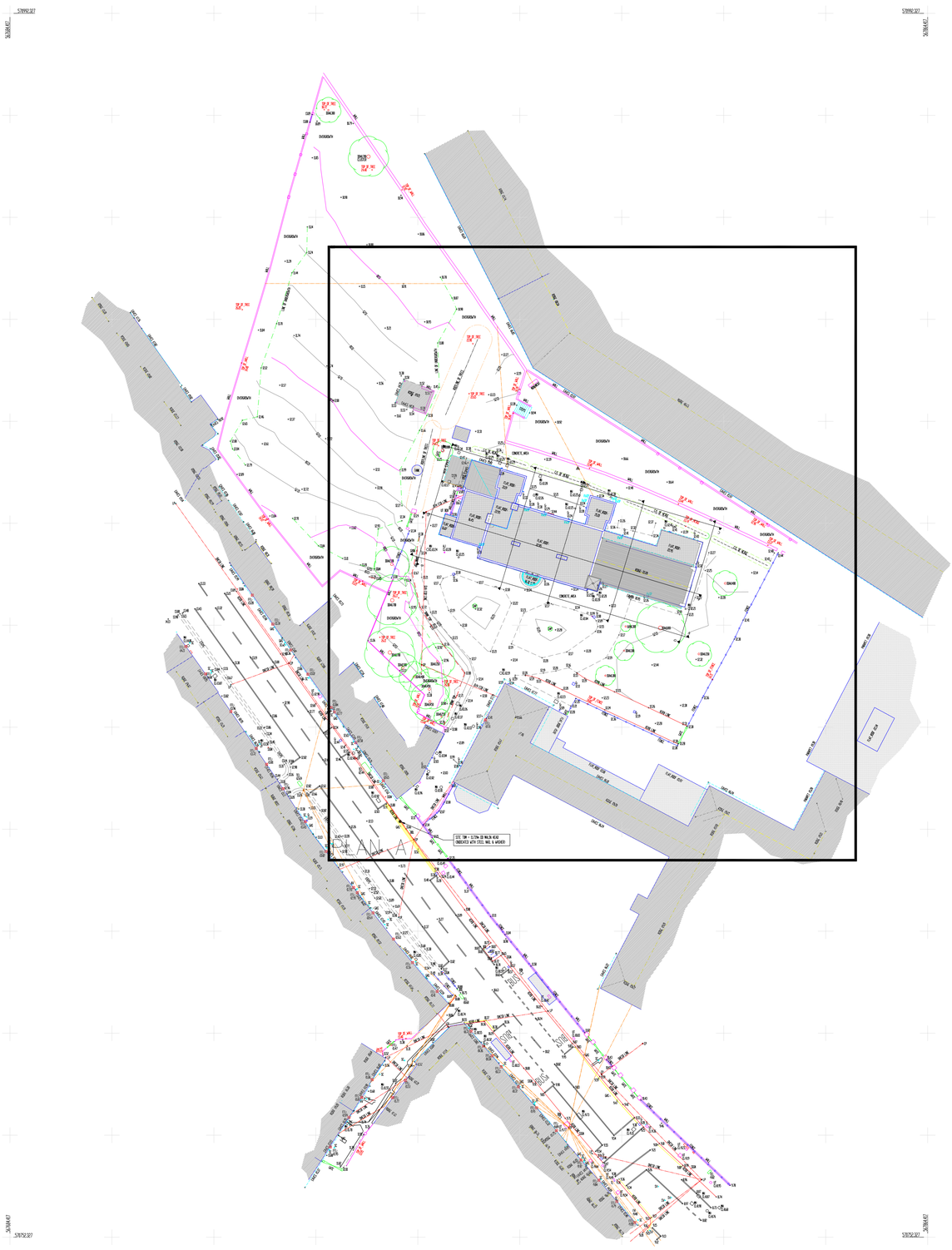
Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 167828, Northing: 70842,

	Interval		Years									
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	120,
5 mins	3.3,	4.2,	4.7,	5.4,	5.8,	6.2,	7.3,	8.5,	9.2,	10.2,	11.1,	11.8,	12.2,
10 mins	4.5,	5.9,	6.5,	7.5,	8.2,	8.6,	10.1,	11.8,	12.8,	14.2,	15.4,	16.4,	17.0,
15 mins	5.3,	6.9,	7.7,	8.8,	9.6,	10.2,	11.9,	13.9,	15.1,	16.7,	18.2,	19.3,	20.0,
30 mins	7.1,	9.2,	10.2,	11.7,	12.7,	13.4,	15.7,	18.2,	19.8,	21.9,	23.7,	25.1,	26.0,
1 hours	9.6,	12.2,	13.6,	15.5,	16.8,	17.7,	20.7,	23.9,	25.9,	28.6,	31.0,	32.8,	33.9,
2 hours	12.8,	16.3,	18.0,	20.5,	22.2,	23.4,	27.2,	31.4,	34.0,	37.5,	40.5,	42.8,	44.3,
3 hours	15.2,	19.2,	21.3,	24.2,	26.1,	27.5,	32.0,	36.8,	39.8,	43.9,	47.3,	50.0,	51.7,
4 hours	17.1,	21.7,	24.0,	27.2,	29.3,	30.9,	35.9,	41.2,	44.5,	49.0,	52.9,	55.8,	57.7,
6 hours	20.3,	25.6,	28.3,	32.1,	34.6,	36.4,	42.2,	48.3,	52.2,	57.4,	61.9,	65.3,	67.5,
9 hours	24.1,	30.3,	33.4,	37.9,	40.7,	42.9,	49.6,	56.7,	61.2,	67.2,	72.4,	76.3,	78.8,
12 hours	27.1,	34.1,	37.6,	42.6,	45.7,	48.1,	55.6,	63.5,	68.5,	75.2,	80.9,	85.2,	88.1,
18 hours	32.2,	40.4,	44.4,	50.2,	53.9,	56.7,	65.4,	74.6,	80.3,	88.1,	94.7,	99.7,	102.9,
24 hours	36.4,	45.5,	50.0,	56.4,	60.6,	63.7,	73.3,	83.5,	89.9,	98.5,	105.9,	111.4,	115.0,
2 days	47.2,	57.9,	63.1,	70.4,	75.1,	78.6,	89.4,	100.6,	107.6,	116.9,	124.8,	130.7,	134.5,
3 days	56.2,	68.2,	73.9,	82.0,	87.1,	90.9,	102.6,	114.7,	122.2,	132.1,	140.5,	146.8,	150.8,
4 days	64.3,	77.3,	83.5,	92.2,	97.7,	101.8,	114.3,	127.2,	135.1,	145.6,	154.4,	161.0,	165.2,
6 days	78.8,	93.6,	100.7,	110.4,	116.6,	121.1,	135.0,	149.2,	157.8,	169.3,	178.8,	185.9,	190.6,
8 days	92.0,	108.3,	116.1,	126.8,	133.5,	138.4,	153.4,	168.7,	178.0,	190.3,	200.5,	208.0,	213.0,
10 days	104.3,	122.0,	130.4,	141.9,	149.1,	154.4,	170.4,	186.7,	196.6,	209.5,	220.3,	228.3,	233.5,
12 days	115.9,	134.9,	143.9,	156.1,	163.8,	169.4,	186.4,	203.5,	213.9,	227.6,	238.9,	247.2,	252.6,
16 days	138.0,	159.3,	169.3,	182.8,	191.3,	197.5,	216.1,	234.9,	246.2,	261.0,	273.2,	282.2,	288.0,
20 days	158.9,	182.2,	193.1,	207.8,	217.0,	223.7,	243.8,	264.0,	276.1,	291.9,	305.0,	314.5,	320.7,
25 days	183.9,	209.5,	221.4,	237.4,	247.4,	254.7,	276.4,	298.1,	311.2,	328.1,	342.1,	352.3,	358.9,

NOTES:
These values are derived from a Depth Duration Frequency (DDF) Model update 2023
For details refer to:
'Mateus C., and Coonan, B. 2023. Estimation of point rainfall frequencies in Ireland. Technical Note No. 68. Met Eireann',
Available for download at:
http://hdl.handle.net/2262/102417

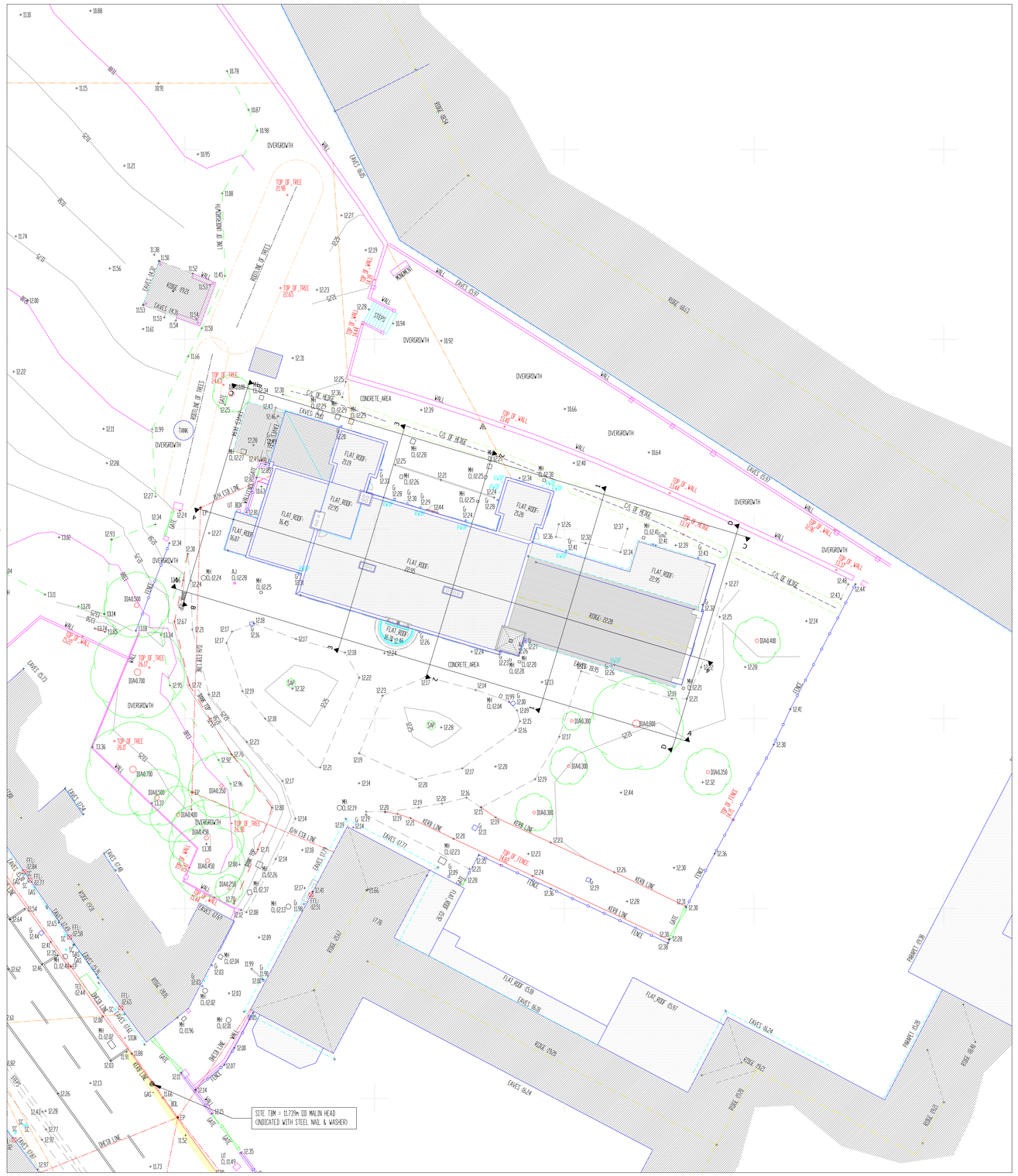
M5_60=17.7mm
M5_2D=78.6mm
R=0.225

Appendix C Topographical Survey



Topographical Survey 2D

Scale 1:500



PLAN A

Scale 1:250

SURVEY NOTES

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4. DO NOT SCALE, THIS SHALL ONLY BE PERMITTED IN DIGITAL FORM.
5. GRID IS 20m X 20m

ITM NORTH

0 10m 20m 30m

1:500

SYMBOLS

+0.00 SPOT LEVEL; G GULLY; AV AIR VALVE; AJ ARMSTRONG JUNCTION; GATE; OHE OVERHEAD ESB LINE; SIGN SIGN; UB SOFFIT BEAM; RIDGE LEVEL; FOUL SEWER; UNIDENTIFIED EM SIGNAL; TRAFFIC; CONTROL SURVEY STATION; WM WATER METER; FIRE HYDRANT; LP LAMP POST; SWL0.00 SURFACE WATER LEVEL; OHT OVERHEAD TEL LINE; TREE ACTUAL SPREAD; CL SOFFIT CEILING; EAVES SOFFIT LEVEL; STORM SEWER; ELECTRICAL CABLE; TRENCH; MH CL MANHOLE COVER; SV SLUICE VALVE; TEL TEL INSP CHAMBER; TP TELECOM POLE; +36.600 BED LEVEL WATERCOURSE; TL TELECOM POLE; 000 TREE TAG NO.; HEAD HEAD TO FFL; FFL000 FINISH FLOOR LEVEL; COMBINED SEWER; PUBLIC LIGHTING; COMBINED SEWER; UL UTILITY INSP CHAMBER; SC STOP COCK; MP MINI PILLAR; EP ESB POLE; +IL INVERT LEVEL; +TOP TOP TAG; BL BOLLARD; WB WINDOW BOARD TO FFL; +200 PEG REF NUMBER; ESB ESB BOX; UNIDENTIFIED GPR; ESB ESB BOX

COORDINATE SYSTEM
ITM-Irish Transverse Mercator

KEY PLAN

REVISION	DATE	DESCRIPTION	DRN BY	CKD BY
02	28-07-20	TOPO SURVEY	LK	KOB
01	23-07-20	TOPO SURVEY	LK	KOB

Geodata
Chartered Land Surveyors
47 Oliver Plunkett Street Bandon, Co Cork. P72 A443
Phone: (+353) (0)23 8852798 Fax: (+353) (0)23 8852799
Email: info@geodatasurveying.ie Website: www.geodatasurveying.ie

Client: Punch Consulting Engineers
Project: Good Shephard, Evergreen Rd, Cork
Title: Topographical Survey 2d
Scale: 1-250/500
Dwg. No: 20485-100
Date: 28-07-20
Sheet: A1

Appendix D Causeway Stormwater Drainage Design Calculations

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1-0	0.038	6.00	12.250	1200	567747.799	570902.395	1.425
S1-1	0.024	6.00	12.240	1200	567771.757	570895.253	1.562
S1-2	0.028	6.00	12.150	1200	567768.412	570882.215	1.551
S2-0	0.028	6.00	12.000	1200	567769.151	570843.846	1.425
S2-1	0.028	6.00	12.050	1200	567776.991	570862.121	1.592
S1-3			12.050	1200	567772.694	570872.847	1.660
S1-4 (PI)			12.150	1200	567776.624	570874.422	1.785
S1-5	0.070	6.00	12.075	1200	567779.940	570875.777	1.731
SOAKAWAY S1			12.000	1200	567797.073	570870.594	1.761
S4-0	0.131	6.00	10.980	1200	567765.919	570945.131	1.425
S4-1	0.010	6.00	10.980	1200	567766.707	570937.289	1.471
SOAKAWAY N1			11.950	1200	567771.076	570928.099	2.501
S6-0	0.035	6.00	10.950	1200	567786.846	570916.136	1.425
SOAKAWAY N2			10.950	1200	567791.448	570913.186	1.457

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
S1.000	S1-0	S1-1	25.000	0.600	10.825	10.678	0.147	170.0	225
S1.001	S1-1	S1-2	13.460	0.600	10.678	10.599	0.079	170.0	225
S1.002	S1-2	S1-3	10.300	0.600	10.599	10.538	0.061	170.0	225
S2.000	S2-0	S2-1	19.886	0.600	10.575	10.458	0.117	170.0	225
S2.001	S2-1	S1-3	11.555	0.600	10.458	10.390	0.068	170.0	225
S1.003	S1-3	S1-4 (PI)	4.234	0.600	10.390	10.365	0.025	170.0	225
S1.004	S1-4 (PI)	S1-5	3.582	0.600	10.365	10.344	0.021	170.0	225
S1.005	S1-5	SOAKAWAY S1	17.900	0.600	10.344	10.239	0.105	170.0	225
S4.000	S4-0	S4-1	7.881	0.600	9.555	9.509	0.046	170.0	225
S4.001	S4-1	SOAKAWAY N1	10.176	0.600	9.509	9.449	0.060	170.0	225
S6.000	S6-0	SOAKAWAY N2	5.466	0.600	9.525	9.493	0.032	170.0	225

Name	US Node	DS Node	Vel (m/s)	Flow (l/s)
S1.000	S1-0	S1-1	1.000	7.2
S1.001	S1-1	S1-2	1.000	11.6
S1.002	S1-2	S1-3	1.000	16.7
S2.000	S2-0	S2-1	1.000	5.4
S2.001	S2-1	S1-3	1.000	10.6
S1.003	S1-3	S1-4 (PI)	1.000	27.1
S1.004	S1-4 (PI)	S1-5	1.000	27.0
S1.005	S1-5	SOAKAWAY S1	1.000	39.3
S4.000	S4-0	S4-1	1.000	25.4
S4.001	S4-1	SOAKAWAY N1	1.000	27.0
S6.000	S6-0	SOAKAWAY N2	1.000	6.8

Simulation Settings

Rainfall Methodology	FSR	Winter CV	1.000
FSR Region	Scotland and Ireland	Analysis Speed	Normal
M5-60 (mm)	17.700	Skip Steady State	x
Ratio-R	0.225	Drain Down Time (mins)	240
Summer CV	1.000	Additional Storage (m^3/ha)	20.0

Simulation Settings

Check Discharge Rate(s) x | Check Discharge Volume x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	20	0	0
30	20	0	0
100	20	0	0

Node SOAKAWAY N2 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	8.800	Depth (m)	1.500
Side Inf Coefficient (m/hr)	0.06300	Time to half empty (mins)	590	Inf Depth (m)	
Safety Factor	1.0	Pit Width (m)	1.500	Number Required	1
Porosity	0.95	Pit Length (m)	10.000		

Node SOAKAWAY N1 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	8.600	Depth (m)	1.500
Side Inf Coefficient (m/hr)	0.06300	Time to half empty (mins)	1526	Inf Depth (m)	
Safety Factor	1.0	Pit Width (m)	4.000	Number Required	1
Porosity	0.95	Pit Length (m)	21.500		

Node SOAKAWAY S1 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	9.750	Depth (m)	1.500
Side Inf Coefficient (m/hr)	0.06300	Time to half empty (mins)	1608	Inf Depth (m)	
Safety Factor	1.0	Pit Width (m)	4.000	Number Required	1
Porosity	0.95	Pit Length (m)	32.000		

Results for 2 year +20% CC Critical Storm Duration. Lowest mass balance: 99.93%

Node Event	US Node	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	S1-0	10.889	0.064	7.3	0.1073	0.0000	OK
30 minute summer	S1-1	10.766	0.088	11.8	0.1265	0.0000	OK
30 minute summer	S1-2	10.709	0.110	17.0	0.1643	0.0000	OK
30 minute summer	S2-0	10.630	0.055	5.4	0.0843	0.0000	OK
30 minute summer	S2-1	10.589	0.131	10.7	0.1949	0.0000	OK
30 minute summer	S1-3	10.586	0.196	27.0	0.2211	0.0000	OK
1440 minute summer	S1-4 (PI)	10.571	0.206	4.2	0.2326	0.0000	OK
1440 minute summer	S1-5	10.571	0.227	6.2	0.4398	0.0000	SURCHARGED
1440 minute summer	SOAKAWAY S1	10.571	0.332	6.2	100.1620	0.0000	OK
30 minute summer	S4-0	9.707	0.152	25.3	0.4508	0.0000	OK
30 minute summer	S4-1	9.657	0.148	26.9	0.1871	0.0000	OK
1440 minute summer	SOAKAWAY N1	9.393	-0.056	4.1	64.7748	0.0000	OK
1440 minute summer	S6-0	9.640	0.115	1.0	0.1867	0.0000	OK
1440 minute summer	SOAKAWAY N2	9.640	0.147	1.0	12.1380	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap
30 minute summer	S1-0	S1.000	S1-1	7.2	0.612	0.182
30 minute summer	S1-1	S1.001	S1-2	11.7	0.698	0.296
30 minute summer	S1-2	S1.002	S1-3	17.0	0.928	0.429
30 minute summer	S2-0	S2.000	S2-1	5.3	0.496	0.134
30 minute summer	S2-1	S2.001	S1-3	10.1	0.436	0.254
30 minute summer	S1-3	S1.003	S1-4 (PI)	26.7	0.726	0.672
1440 minute summer	S1-4 (PI)	S1.004	S1-5	4.2	0.520	0.106
1440 minute summer	S1-5	S1.005	SOAKAWAY S1	6.2	0.718	0.157
1440 minute summer	SOAKAWAY S1	Infiltration		1.0		
30 minute summer	S4-0	S4.000	S4-1	25.0	0.892	0.630
30 minute summer	S4-1	S4.001	SOAKAWAY N1	26.7	1.026	0.673
1440 minute summer	SOAKAWAY N1	Infiltration		0.7		
1440 minute summer	S6-0	S6.000	SOAKAWAY N2	1.0	0.418	0.025
1440 minute summer	SOAKAWAY N2	Infiltration		0.3		

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.93%

Node Event	US Node	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	S1-0	10.983	0.158	1.7	0.2631	0.0000	OK
1440 minute summer	S1-1	10.984	0.306	2.8	0.4399	0.0000	SURCHARGED
1440 minute summer	S1-2	10.983	0.384	4.1	0.5733	0.0000	SURCHARGED
1440 minute summer	S2-0	10.984	0.409	1.3	0.6227	0.0000	SURCHARGED
1440 minute summer	S2-1	10.984	0.526	2.6	0.7795	0.0000	SURCHARGED
1440 minute summer	S1-3	10.983	0.593	6.6	0.6712	0.0000	SURCHARGED
1440 minute summer	S1-4 (PI)	10.983	0.618	6.5	0.6989	0.0000	SURCHARGED
1440 minute summer	S1-5	10.983	0.639	9.4	1.2403	0.0000	SURCHARGED
1440 minute summer	SOAKAWAY S1	10.983	0.744	9.1	150.7694	0.0000	OK
30 minute summer	S4-0	9.868	0.313	46.7	0.9290	0.0000	SURCHARGED
1440 minute winter	S4-1	9.826	0.317	4.3	0.4011	0.0000	SURCHARGED
1440 minute winter	SOAKAWAY N1	9.826	0.377	4.3	100.5545	0.0000	OK
1440 minute summer	S6-0	10.075	0.550	1.6	0.8913	0.0000	SURCHARGED
1440 minute summer	SOAKAWAY N2	10.075	0.582	1.5	18.8199	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap
1440 minute summer	S1-0	S1.000	S1-1	1.7	0.418	0.043
1440 minute summer	S1-1	S1.001	S1-2	2.8	0.507	0.070
1440 minute summer	S1-2	S1.002	S1-3	4.1	0.636	0.103
1440 minute summer	S2-0	S2.000	S2-1	1.3	0.357	0.033
1440 minute summer	S2-1	S2.001	S1-3	2.6	0.322	0.065
1440 minute summer	S1-3	S1.003	S1-4 (PI)	6.5	0.579	0.163
1440 minute summer	S1-4 (PI)	S1.004	S1-5	6.3	0.547	0.159
1440 minute summer	S1-5	S1.005	SOAKAWAY S1	9.1	0.736	0.230
1440 minute summer	SOAKAWAY S1	Infiltration		1.6		
30 minute summer	S4-0	S4.000	S4-1	45.6	1.146	1.147
1440 minute winter	S4-1	S4.001	SOAKAWAY N1	4.3	0.644	0.108
1440 minute winter	SOAKAWAY N1	Infiltration		1.1		
1440 minute summer	S6-0	S6.000	SOAKAWAY N2	1.5	0.429	0.037
1440 minute summer	SOAKAWAY N2	Infiltration		0.5		

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.93%

Node Event	US Node	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	S1-0	11.315	0.490	17.7	0.8150	0.0000	SURCHARGED
30 minute summer	S1-1	11.291	0.613	25.1	0.8820	0.0000	SURCHARGED
30 minute summer	S1-2	11.254	0.655	35.1	0.9772	0.0000	SURCHARGED
1440 minute summer	S2-0	11.242	0.667	1.5	1.0170	0.0000	SURCHARGED
1440 minute summer	S2-1	11.243	0.785	2.9	1.1637	0.0000	SURCHARGED
1440 minute summer	S1-3	11.242	0.852	7.2	0.9637	0.0000	SURCHARGED
1440 minute summer	S1-4 (PI)	11.243	0.878	7.1	0.9928	0.0000	SURCHARGED
1440 minute summer	S1-5	11.242	0.898	10.8	1.7415	0.0000	SURCHARGED
1440 minute summer	SOAKAWAY S1	11.242	1.003	10.6	182.5435	0.0000	OK
1440 minute summer	S4-0	10.085	0.530	7.2	1.5726	0.0000	SURCHARGED
1440 minute summer	S4-1	10.084	0.575	7.7	0.7291	0.0000	SURCHARGED
1440 minute summer	SOAKAWAY N1	10.084	0.635	7.7	121.9905	0.0000	OK
1440 minute summer	S6-0	10.443	0.918	1.9	1.4884	0.0000	SURCHARGED
1440 minute summer	SOAKAWAY N2	10.443	0.950	1.8	22.4567	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap
30 minute summer	S1-0	S1.000	S1-1	14.4	0.713	0.363
30 minute summer	S1-1	S1.001	S1-2	23.3	0.746	0.586
30 minute summer	S1-2	S1.002	S1-3	33.8	0.988	0.850
1440 minute summer	S2-0	S2.000	S2-1	1.4	0.340	0.034
1440 minute summer	S2-1	S2.001	S1-3	2.7	0.336	0.069
1440 minute summer	S1-3	S1.003	S1-4 (PI)	7.1	0.586	0.178
1440 minute summer	S1-4 (PI)	S1.004	S1-5	7.0	0.558	0.175
1440 minute summer	S1-5	S1.005	SOAKAWAY S1	10.6	0.734	0.267
1440 minute summer	SOAKAWAY S1	Infiltration		1.9		
1440 minute summer	S4-0	S4.000	S4-1	7.2	0.682	0.181
1440 minute summer	S4-1	S4.001	SOAKAWAY N1	7.7	0.754	0.193
1440 minute summer	SOAKAWAY N1	Infiltration		1.3		
1440 minute summer	S6-0	S6.000	SOAKAWAY N2	1.8	0.429	0.044
1440 minute summer	SOAKAWAY N2	Infiltration		0.6		

Appendix E Petrol Interceptor Sizing Calculations

Petrol Interceptor Sizing

Project title: **Turner's Cross, Cork**

Project no.: **244110**

Calculation no.: **244110-PUNCH-XX-XX-CA-C-0001**

Designed: **DT** Date: **10/09/2024**

Ref.

Calculation of Mean Annual Peak Flow

EN 858-2 4.3.5

$$Q_r = CiA$$

Where			**Units**
Q_r	=	Mean Annual Peak Flow	l/sec
A	=	Catchment area	ha
i	=	Rainfall Intensity	l/sec/ha
C	=	Runoff Coefficient	-

C = 1

Area = **0.216** ha

Rainfall intensity for 1hr event , 100 year return period 32.8 mm

+20% CC

39.36 mm

i = 119.355 l/sec/ha

Q_r = **25.78 l/s**

Calculation of Petrol Interceptor Nominal Size

EN 858-2 4.3.1

$$NS = (Q_r + f_x Q_s) f_d$$

Where:

$NS = Nominal\ Size\ of\ Separator$

$Q_r = \max flow\ rate\ of\ rainwater$

$Q_s = \max flow\ rate\ of\ wastewater$*

$f_d = density\ factor\ of\ relevant\ light\ liquid$

$f_x = impediment\ factor\ depending\ on\ nature\ of\ discharge$

***No wastewater discharging in this case, $Q_s = 0$**

EN 858-2 Annex A Table A1

f_d = 1.5

Q_r = 25.78 l/s

Nominal Size: 38.67 litres/second (peak flow rate)

Klargestor Bypass NSBP004 or equivalent product

Storage Capacity (litres)		Unit Length (mm)	Unit Diameter (mm)	Access Shaft Diameter (mm)
Silt	Oil			
450	60	1700	1350	600

Appendix F Causeway Foul Water Drainage Design Calculations

Nodes

Name	Add Inflow (l/s)	Cover Level (m)	Manhole Type	Easting (m)	Northing (m)	Depth (m)
F1-0	0.8	12.350	Adoptable	567821.430	570871.172	0.875
F1-1		12.350	Adoptable	567772.843	570885.479	1.213
F1-2		12.250	Adoptable	567774.820	570892.543	1.162
F1-3	0.8	12.250	Adoptable	567744.753	570901.511	1.319
F1-4		12.225	Adoptable	567744.170	570899.558	1.304
F1-5		12.050	Adoptable	567774.448	570865.950	1.355
F1-6		12.010	Adoptable	567775.466	570859.793	1.346
F1-7		11.700	Adoptable	567761.272	570831.928	1.192

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
F1.000	F1-0	F1-1	50.650	0.150	11.475	11.137	0.338	150.0	225
F1.001	F1-1	F1-2	7.335	0.150	11.137	11.088	0.049	150.0	225
F1.002	F1-2	F1-3	31.376	0.150	11.088	10.931	0.157	200.0	225
F1.003	F1-3	F1-4	2.038	0.150	10.931	10.921	0.010	200.0	225
F1.004	F1-4	F1-5	45.236	0.150	10.921	10.695	0.226	200.0	225
F1.005	F1-5	F1-6	6.241	0.150	10.695	10.664	0.031	200.0	225
F1.006	F1-6	F1-7	31.272	0.150	10.664	10.508	0.156	200.0	225

Name	US Node	DS Node	Vel (m/s)	Flow (l/s)
F1.000	F1-0	F1-1	1.238	0.8
F1.001	F1-1	F1-2	1.238	0.8
F1.002	F1-2	F1-3	1.067	0.8
F1.003	F1-3	F1-4	1.067	1.6
F1.004	F1-4	F1-5	1.067	1.6
F1.005	F1-5	F1-6	1.067	1.6
F1.006	F1-6	F1-7	1.067	1.6

Appendix G Uisce Éireann Pre-connection Correspondence

CONFIRMATION OF FEASIBILITY

Andrew McCarthy

Elm Court
Boreenmanna Road
Cork
T12HHW2

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

Uisce Éireann
PO Box 448
South City
Delivery Office
Cork City

www.water.ie

1 November 2024

Our Ref: CDS24005569 Pre-Connection Enquiry
Christ The King Convent, Evergreen Road, Turners Cross, Cork

Dear Applicant/Agent,

We have completed the review of the Pre-Connection Enquiry.

Uisce Éireann has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Housing Development of 52 unit(s) at Christ The King Convent, Evergreen Road, Turners Cross, Cork, (the **Development)**.

Based upon the details provided we can advise the following regarding connecting to the networks;

• **Water Connection**	- Feasible without infrastructure upgrade by Uisce Éireann - The confirmation of feasibility to connect to the Uisce Éireann infrastructure does not extend to your fire flow requirements. Uisce Éireann cannot guarantee that the flow rates and residual pressures will meet the requirements of the Fire Authority.
• **Wastewater Connection**	- Feasible Subject to upgrades - Some localised upsizing of sewers may be required to facilitate this development. The extent, if any, will be determined at connection application stage. - No stormwater shall be permitted to enter the IW wastewater network. Applicant to show at application stage how they intend to deal with stormwater on site.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Uisce Éireann infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Uisce Éireann.

As the network capacity changes constantly, this review is only valid at the time of its completion. As soon as planning permission has been granted for the Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

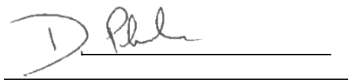
Where can you find more information?

- **Section A -** What is important to know?
- **Section B -** Details of Uisce Éireann's Network(s)

This letter is issued to provide information about the current feasibility of the proposed connection(s) to Uisce Éireann's network(s). This is not a connection offer and capacity in Uisce Éireann's network(s) may only be secured by entering into a connection agreement with Uisce Éireann.

For any further information, visit **www.water.ie/connections**, **email newconnections@water.ie** or contact 1800 278 278**.**

Yours sincerely,



Dermot Phelan
Connections Delivery Manager

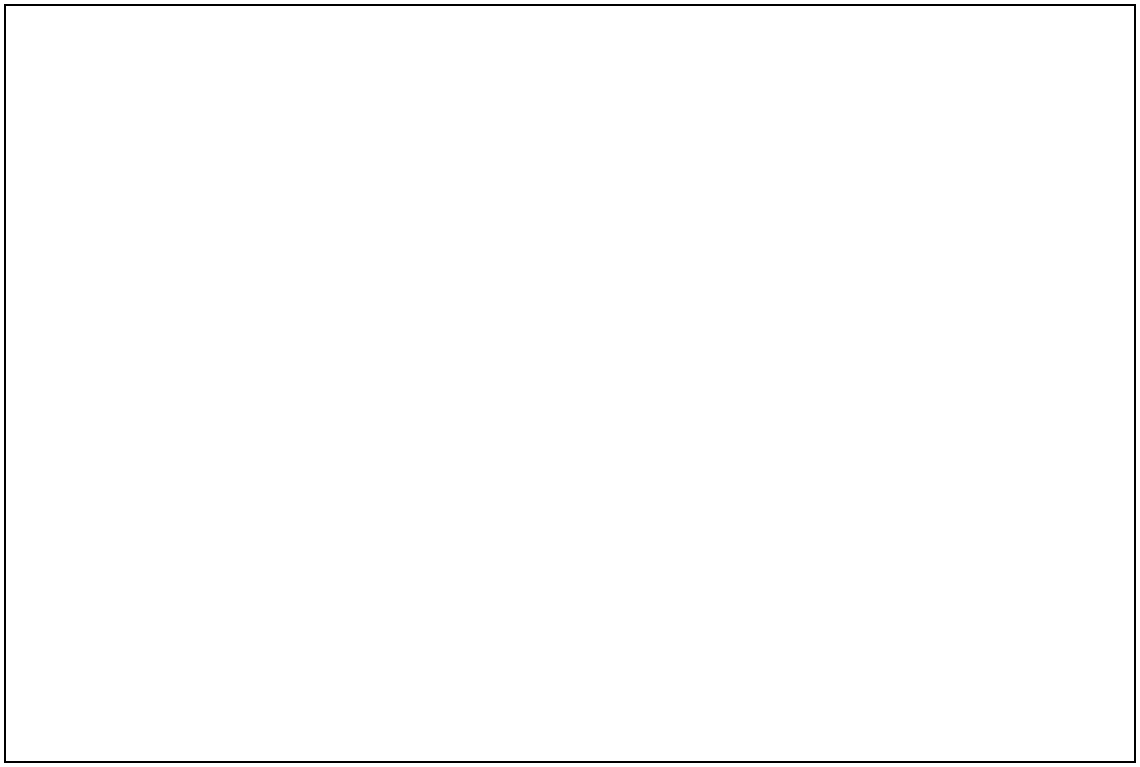
Section A - What is important to know?

What is important to know?	Why is this important?
Do you need a contract to connect?	• Yes, a contract is required to connect. This letter does not constitute a contract or an offer in whole or in part to provide a connection to Uisce Éireann's network(s). • Before the Development can connect to Uisce Éireann's network(s), you must submit a connection application and be granted and sign a connection agreement with Uisce Éireann.
When should I submit a Connection Application?	• A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	• Uisce Éireann connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Uisce Éireann's network(s), including works in the public space, must be carried out by Uisce Éireann*. *Where a Developer has been granted specific permission and has been issued a connection offer for Self-Lay in the Public Road/Area, they may complete the relevant connection works
Fire flow Requirements	• The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. • **What to do?** - Contact the relevant Local Fire Authority
Plan for disposal of storm water	• The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. • **What to do?** - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
Where do I find details of Uisce Éireann's network(s)?	• Requests for maps showing Uisce Éireann's network(s) can be submitted to: datarequests@water.ie

What are the design requirements for the connection(s)?	• The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this Development shall comply with ***the Uisce Éireann Connections and Developer Services Standard Details and Codes of Practice,*** available at www.water.ie/connections
Trade Effluent Licensing	• Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). • More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ **trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)

Section B – Details of Uisce Éireann's Network(s)

The map included below outlines the current Uisce Éireann infrastructure adjacent the Development: To access Uisce Éireann Maps email datarequests@water.ie



Note: The information provided on the included maps as to the position of Uisce Éireann's underground network(s) is provided as a general guide only. The information is based on the best available information provided by each Local Authority in Ireland to Uisce Éireann.

Whilst every care has been taken in respect of the information on Uisce Éireann's network(s), Uisce Éireann assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided, nor does it accept any liability whatsoever arising from or out of any errors or omissions. This information should not be solely relied upon in the event of excavations or any other works being carried out in the vicinity of Uisce Éireann's underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Uisce Éireann's underground network(s) 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.

Appendix H Stage 1 Road Safety Audit

24238-01-001

PROPOSED DEVELOPMENTS, TURNERS CROSS, CO. CORK

Road Safety Audit Stage 1

for

PUNCH CONSULTING ENGINEERS

MARCH 2025

ROADPLAN CONSULTING

7, Ormonde Road
Kilkenny.
R95 N4FE

Tel: 056 7795800
info@roadplan.ie
www.roadplan.ie

DOCUMENT CONTROL SHEET

Project Title	Proposed Developments at Turners Cross, Co. Cork
Project No.	24238-01
Client	Punch Consulting Engineers
Document Title	Road Safety Audit Stage 1
Document No.	24238-01-001

Status	Author(s)	Reviewed By	Approved By	Issue Date
Draft 1	JPZ	GF	GF	16/12/2024
Final	JPZ	GF	GF	5/3/2025

TABLE OF CONTENTS

1. INTRODUCTION

1.1 This report describes a Stage 1 Road Safety Audit carried out at the proposed developments at Turners Cross, Co. Cork. The audit was carried out on 12th of December 2024 in the offices of Roadplan Consulting, Kilkenny.

1.2 The audit team members were as follows:

- George Frisby, BE CEng MIEI
  Auditor Number GF51255

- Jince Philip Zachariah, PhD MIEI
  Auditor Number JP792076

1.3 Both audit team members visited the site on the 20th November 2024. The audit comprised of an examination of the drawings relating to the scheme supplied by Punch Consulting Engineers and an examination of the site.

1.4 The speed limit at the proposed works location is 50 km/h.

1.5 This Stage 1 Audit has been carried out in accordance with the relevant sections of TII GE-STY-01024. The team has examined only those issues within the design relating to the road safety implications of the scheme and has therefore not examined or verified the compliance of the design to any other criteria.

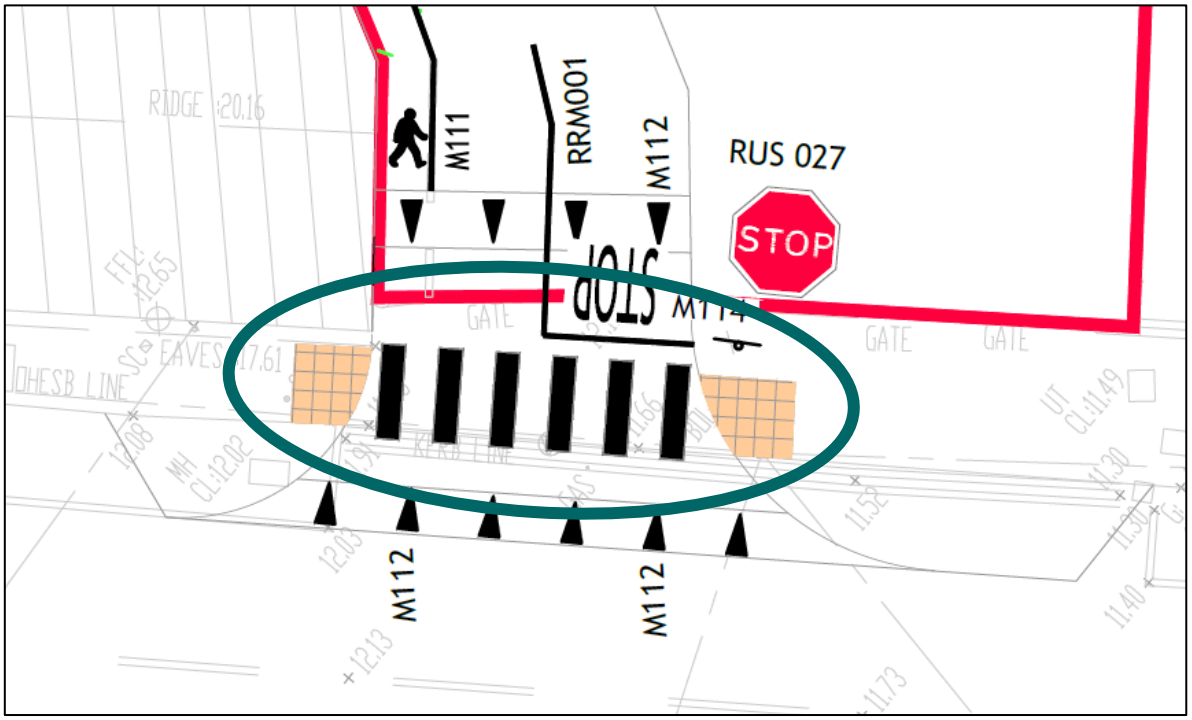
1.6 All problems described in this report are considered by the audit team to require action in order to improve the safety of the scheme and minimise accident occurrence.

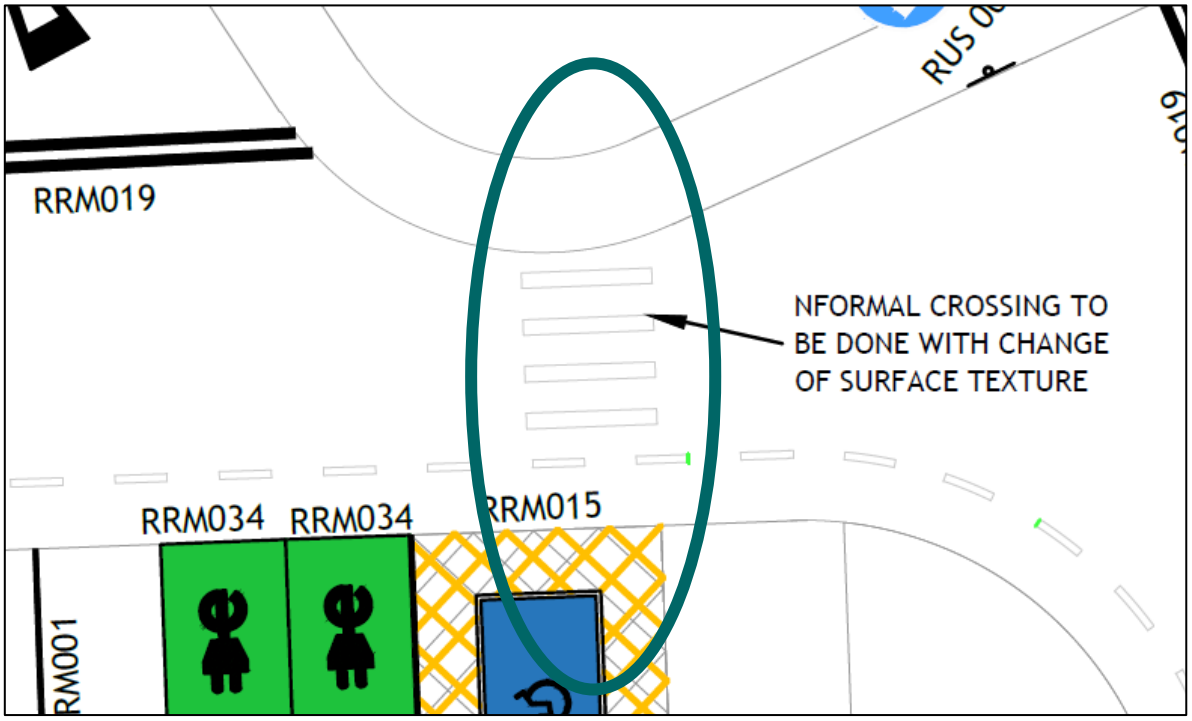
1.7 Appendix A contains copies of the audited drawings.

2. STAGE 1 AUDIT

2.1 **Problem:**

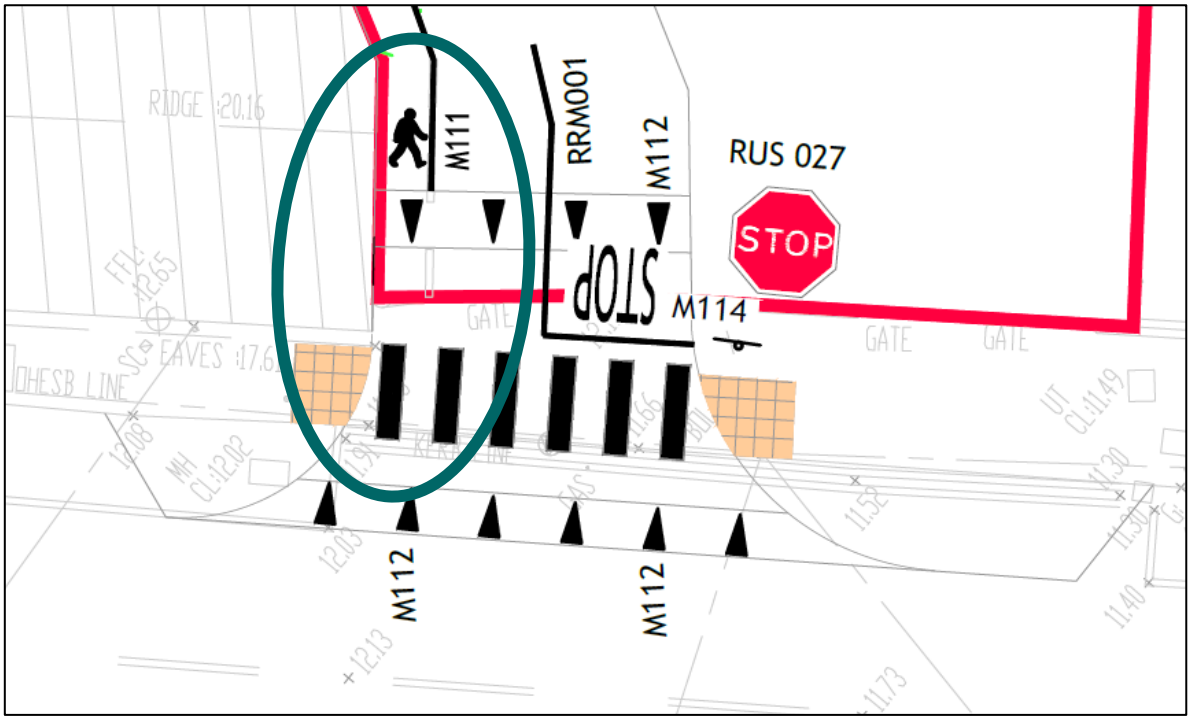
Zebra bar markings are proposed at the uncontrolled pedestrian crossing along the proposed access road within the development at a number of locations. Such a layout may confuse both motorists and pedestrians as to who has priority at the crossing which could contribute to a pedestrian collision at this location.





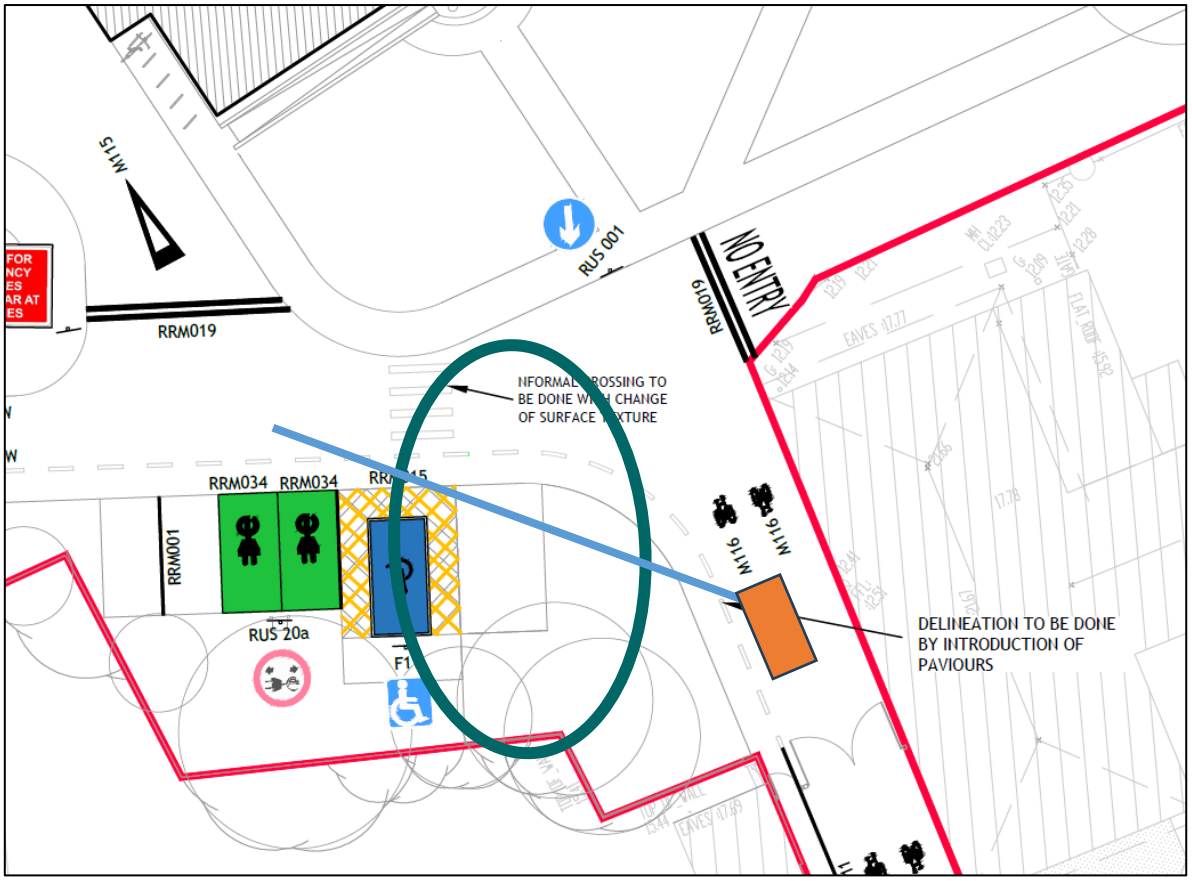
Recommendation:
Remove the zebra bar markings from the uncontrolled pedestrian crossings.

2.2 **Problem:**
The proposed marked footway does not extend the full length of the access road. As a result, drivers entering the proposed development access may not expect pedestrians to be travelling on the carriageway which may contribute to a pedestrian collision.



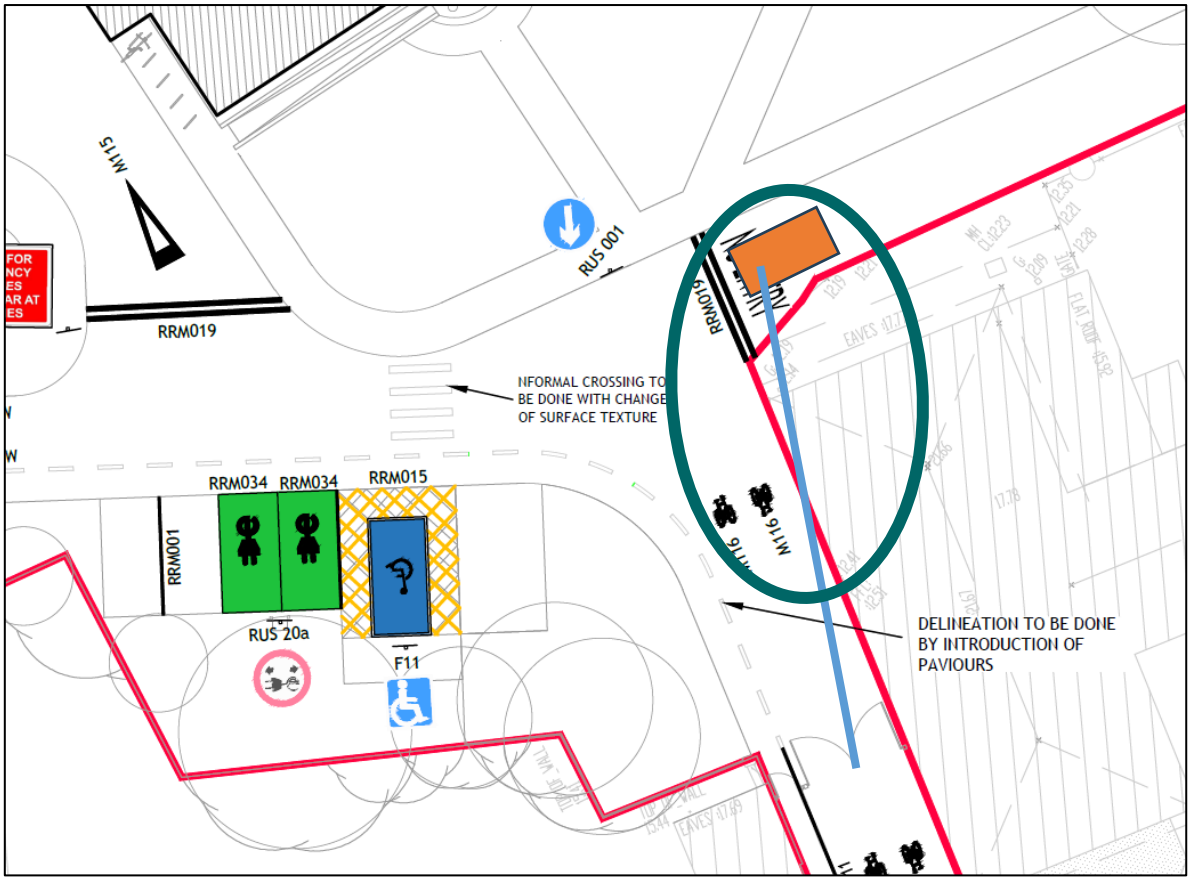
Recommendation:
Ensure that adequate street space is available for all user groups and that drivers entering the proposed development are clearly aware of pedestrians within the marked footway.

2.3 **Problem:**
A parking space appears to be provided within the development at the location shown below. Drivers may use this space to park and such vehicles may obscure the forward visibility of drivers entering the proposed development. A lack of appropriate forward visibility may contribute to a turning collision with an opposing vehicle or a pedestrian in the marked footway.



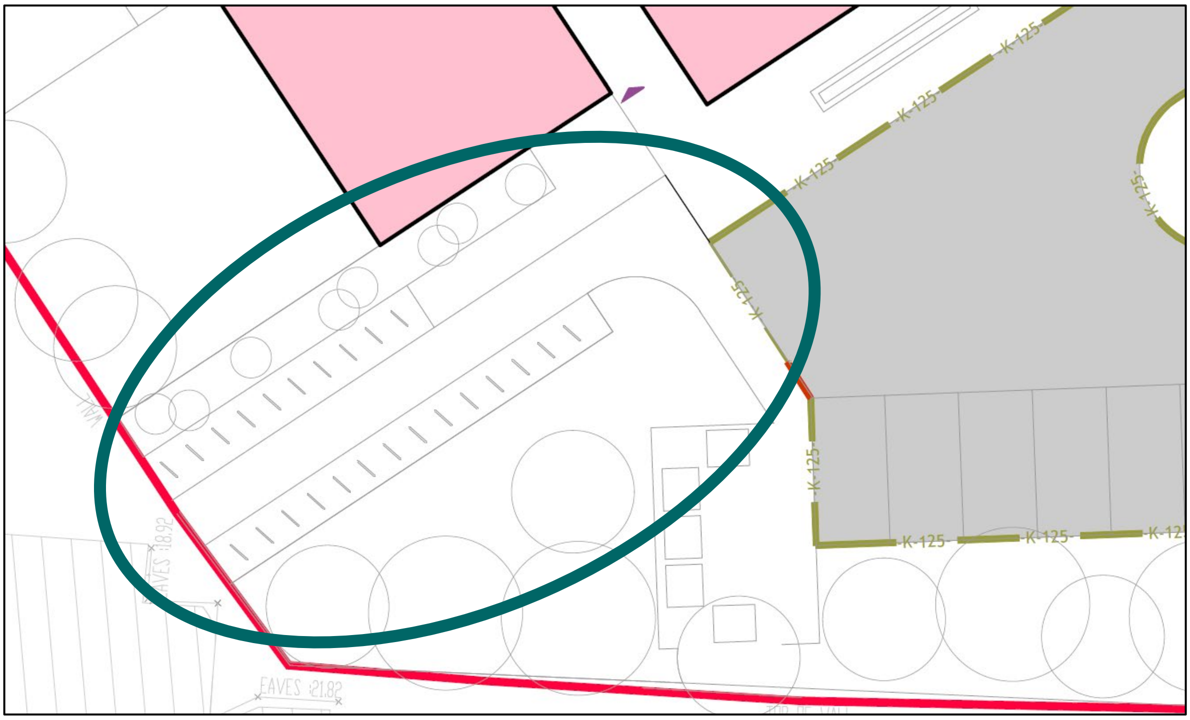
Recommendation:
Ensure that adequate forward visibility is available for all road users within the development.

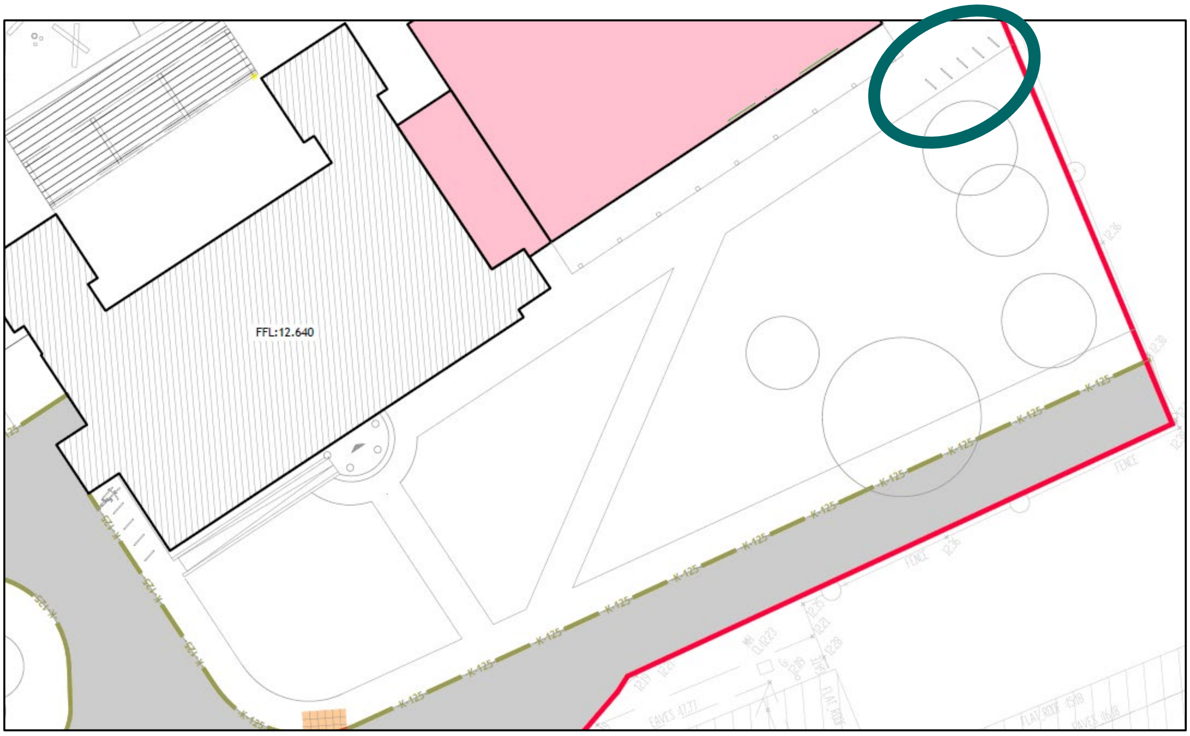
2.4 **Problem:**
The visibility splay to the left from the proposed access road shown appears to be partially obstructed by adjacent buildings and boundary wall. A lack of adequate visibility may increase the likelihood of a collision at this location



Recommendation:
Ensure that adequate visibility splays are available at all junctions within the development.

2.5 **Problem:**
Bicycle parking is provided within the proposed development. However, cyclists may have difficulty accessing the bicycle parking spaces as they are required to mount a footpath to access the bicycle parking spaces and it is unclear from the drawing if adequate facilities are provided to allow cyclist access these spaces.

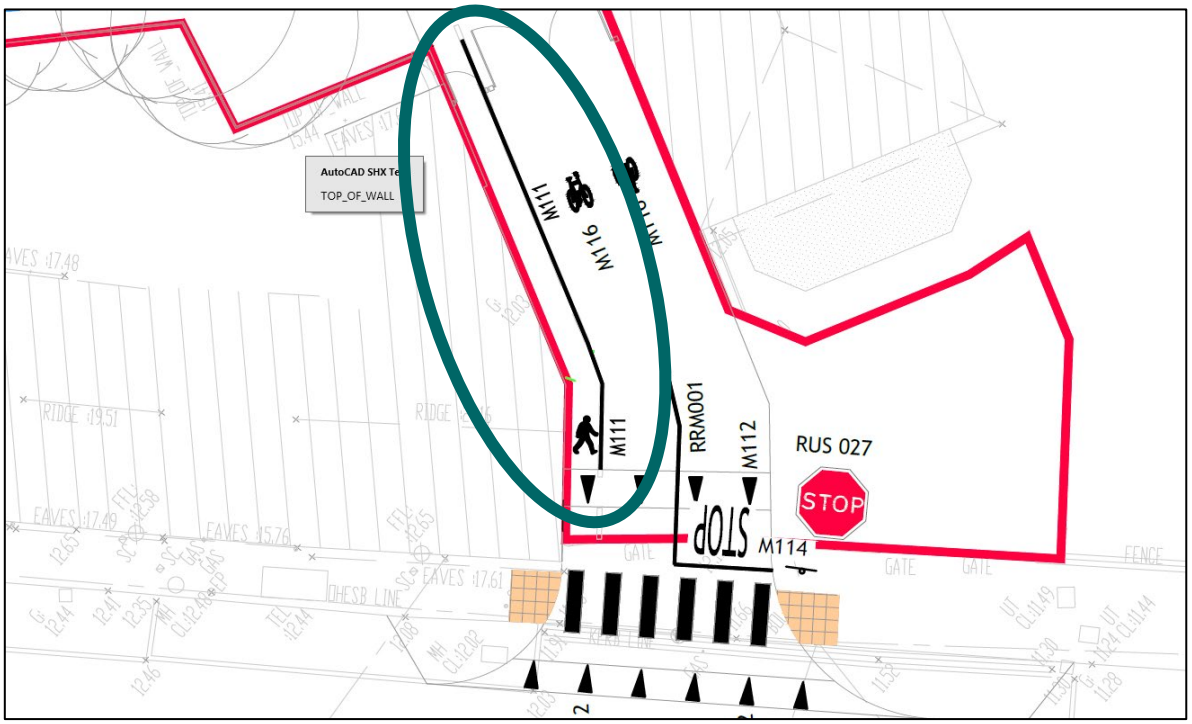




Recommendation:
Ensure facilities are provided to allow cyclist to access the bicycle parking spaces.

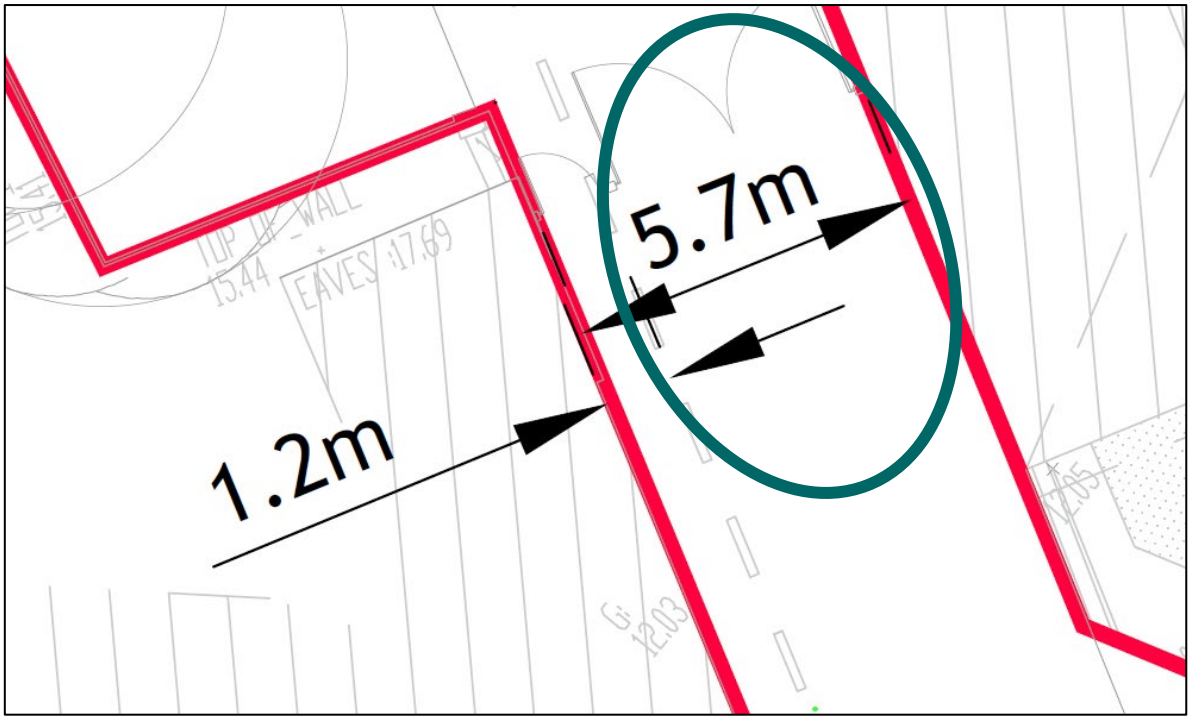
2.6 **Problem:**
The width of the marked pedestrian footway appears to be insufficient to accommodate mobility impaired pedestrians at a number of locations, including at the proposed pedestrian gate within the development. This may result in pedestrians travelling along the carriageway

where they would be at an increased risk of being struck by a passing vehicle, or into adjacent landscaping causing injury.



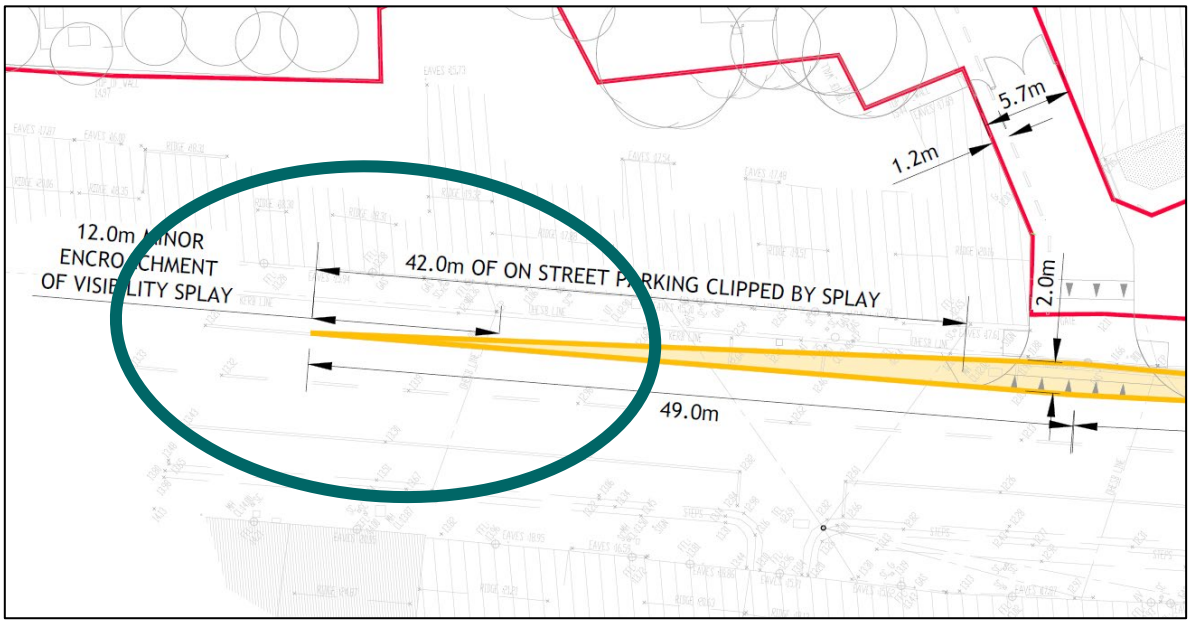
Recommendation:
Ensure that adequate footway widths are provided throughout the proposed development.

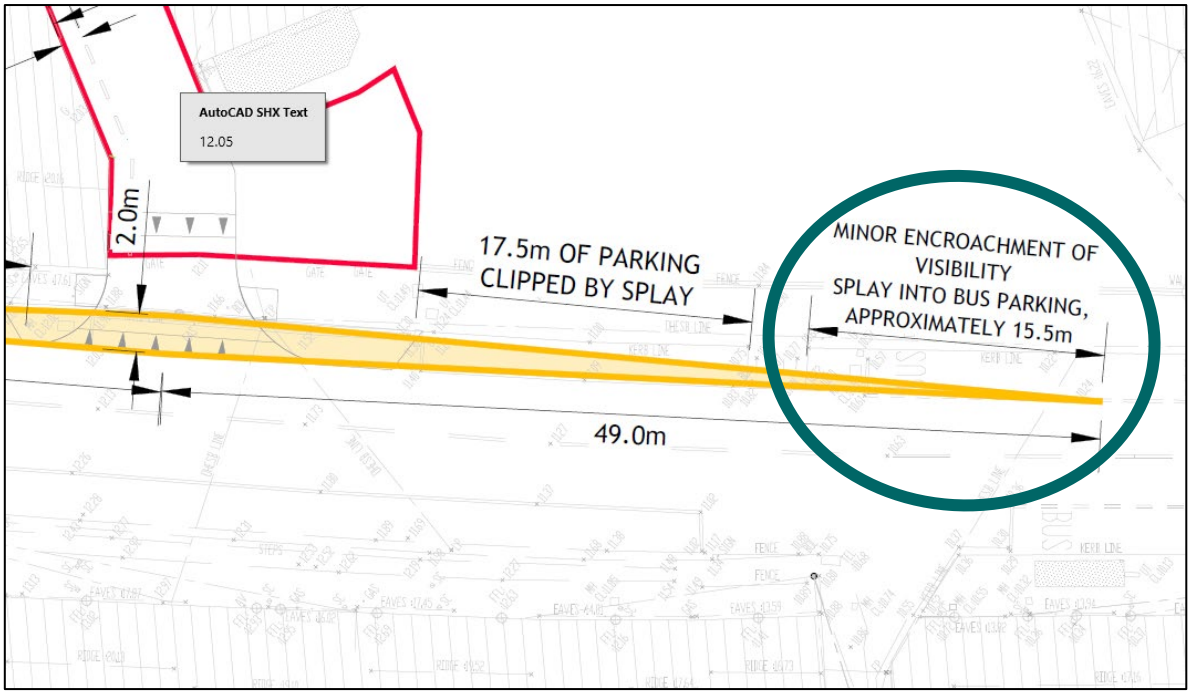
2.7 **Problem:**
The proposed access road width within the development appears insufficient to accommodate two-way traffic movements. No swept path analysis has been provided. This may lead to collisions.



Recommendation:
A swept path analysis should be carried out and the access road width to be modified where required to accommodate the necessary vehicular movements.

2.8 **Problem:**
The visibility splays to either side from the proposed access are partially obstructed by parked cars and buses. Road safety risk is increased in situations where inter-visibility between drivers turning of an access and drivers approaching on the mainline is restricted. Lack of adequate visibility may increase the likelihood of a collision at the access.





Recommendation:
Ensure that adequate unobstructed visibility splays are provided at the proposed development access.

2.9 **Observations:**
Drainage details and public lighting details are not shown on the drawings provided. It is assumed that adequate drainage and lighting provisions and would be provided in the detailed design stages.

3. AUDIT TEAM STATEMENT

3.1 We certify that we have examined the drawings listed in Appendix A and have inspected the site. This examination has been carried out with the sole purpose of identifying any features of the scheme that could be removed or modified to improve the safety of the scheme.

Signed…… …… George Frisby

Date .....12th December 2024……...

Signed….. ..... Jince Philip Zachariah

Date .....12th December 2024……...

SAFETY AUDIT FEEDBACK FORM

Scheme: Proposed Developments at Turners Cross, Co. Cork

Document Number: 24238-01-001

Audit Stage: Stage 1 RSA

Date Audit Completed: 12th December 2024

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. Only complete if recommended measure is not accepted.	Alternative measures or reasons accepted by auditors (yes/no)
2.1	Yes	Yes	----------	----------
2.2	Yes	Yes	----------	----------
2.3	No	No	The location shown is not a parking space, but free area in front of a substation and will not obstruct forward visiliblity.	Yes
2.4	Yes	Yes	----------	----------
2.5	Yes	Yes	----------	----------
2.6	Yes	Yes	----------	----------
2.7	Yes	No	The access road is too narrow for two-way traffic. To address this yield points with dwell areas will be provided at wider sections of the road on either side of the gate to allow vehicles to wait for oncoming traffic. Autotrack analysis of this approach has been carried out to confirm feasibility.	Yes
2.8	Yes	No	The first 30m of on-street parking north of the entrance and 17.5m south of the entrance are proposed to be removed to facilitate the development. This amounts to a loss of 8 on-street parking spaces. Beyond these areas, the visibility splays are only slightly encroached upon, which is acceptable under DMURS Section 4.4.5, stating: *"Splays should generally be kept free of on-street parking, but flexibility can be shown on lower-speed streets with regard to minor encroachments."* In this case, the encroachment is minimal and occurs on a lower-speed street, allowing for this flexibility. Additionally, since buses do not create a permanent obstruction—serving only as temporary stopping points—the last 12m of parking north of the entrance will be retained, and the bus stop will remain in its current position south of the entrance.	Yes

Safety Audit
Signed off ……. **Design Team Leader**

Print Name ….**Drazen Trkulja**…... **Date** …**05/03/2025**…

Safety Audi
Signed off …… **Employer**

Print Name Allison Aldred **Date** 25/04/2025

Safety Audit

Signed off ……. …… **Audit Team Leader**

Print Name ……**George Frisby** ……. **Date** …**5/3/2025**……

Please complete and return to:

Roadplan Consulting,
7, Ormonde Road
Kilkenny
E-mail: info@roadplan.ie

APPENDIX A

List of Drawings Examined

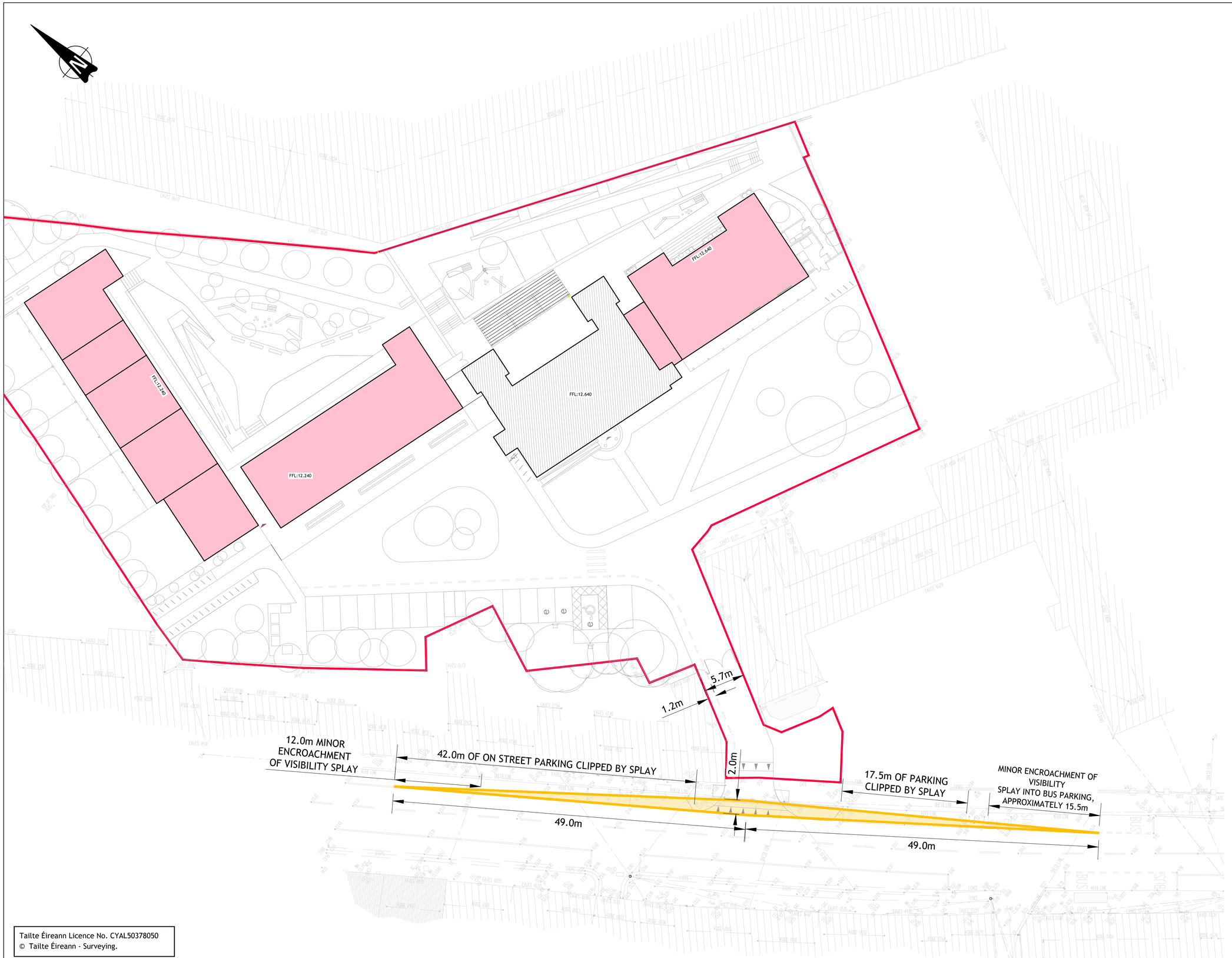
The following drawings have been provided electronically in PDF format by Punch Consulting Engineers and are appended here.

Drawing Number	Rev	Drawing Title
244110-PUNCH-XX-XX-DR-C-0400	P01	Proposed Roads Layout
244110-PUNCH-XX-XX-DR-C-0401	P01	Proposed Junction Layout
244110-PUNCH-XX-XX-DR-C-0440	P01	Proposed Road Finishes Layout
244110-PUNCH-XX-XX-DR-C-0460	P01	Proposed Road Markings And Signage

SIGHT VISIBILITY LEGEND:

SIGHT VISIBILITY SPLAY

SIGHT VISIBILITY CRITERIA USED (DMURS)	
DESIGN SPEED (km/hr)	SSD STANDARD (metres)
50	49



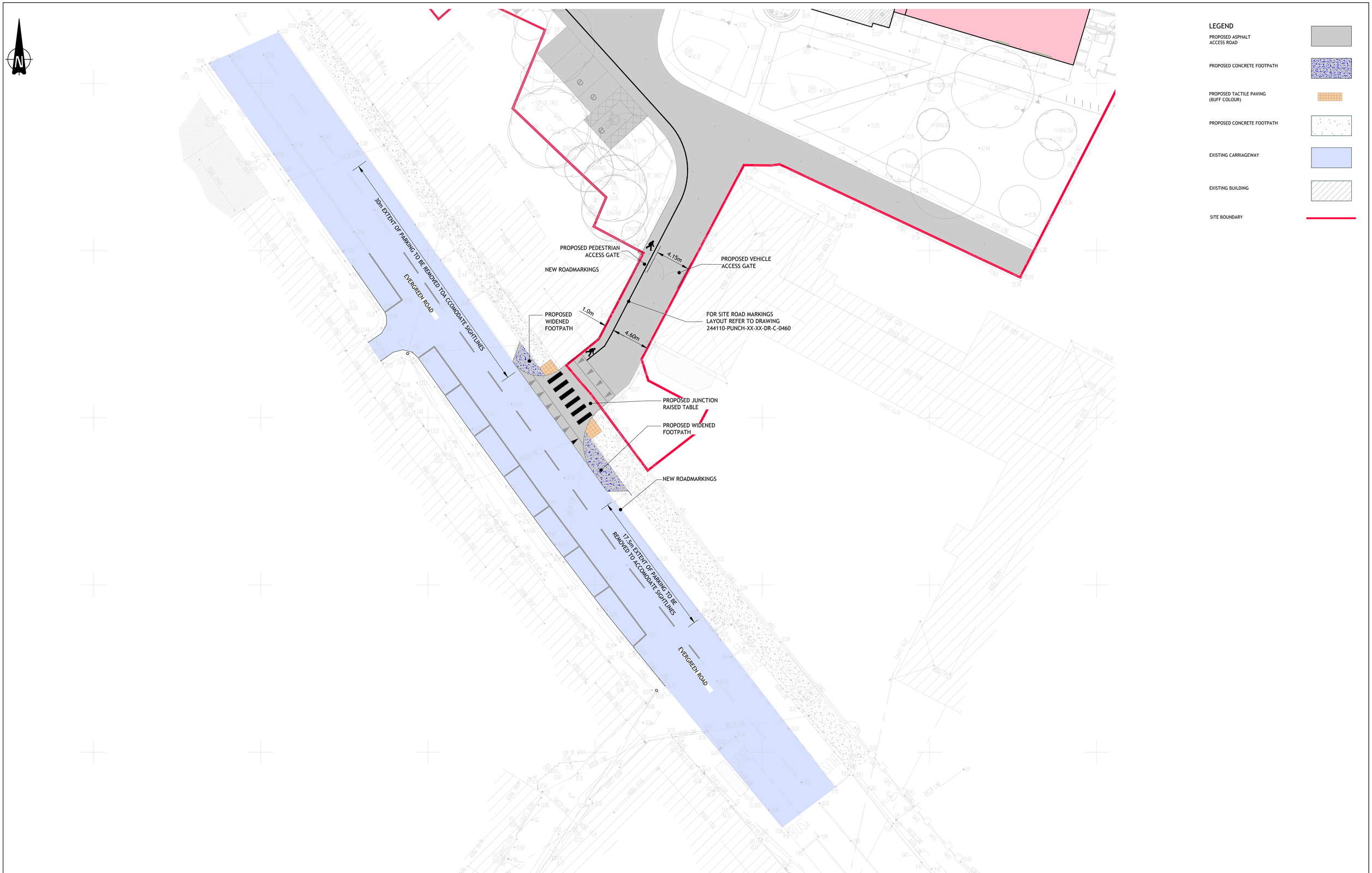
BUILDING INFORMATION MODELLING (BIM)
I.S. EN ISO 19650-2:2018
NSAI Certified

Rev	Amendment	By	Date	Rev	Amendment	By	Date
P01	ISSUED FOR PLANNING REVIEW	LL	16.10.2024				

Client: GOOD SHEPHERD

PUNCH consulting engineers
Dublin | Limerick | Cork | Galway | Glasgow
Elm Court, Boreenmanna Road, Cork, T12 HHW2
t +353 21 462 4000 | w punchconsulting.com

Project: REFUGE CENTRE TURNER'S CROSS, CORK				
Title: PROPOSED ROADS LAYOUT				
Drawn: Liam Lonergan	Date drawn: 08.10.2024	Technician Check: Drazen Trkulja	Engineer Check: Drazen Trkulja	Approved: Cian Murphy
Project No: 244110	Model Ref: 244110-PUNCH-XX-XX-M2-C-0400		Drawing Status: S3 (For Review and Comment)	
Scale @ A1: 1:250	Document No: 244110-PUNCH-XX-XX-DR-C-0400			Revision No: P01



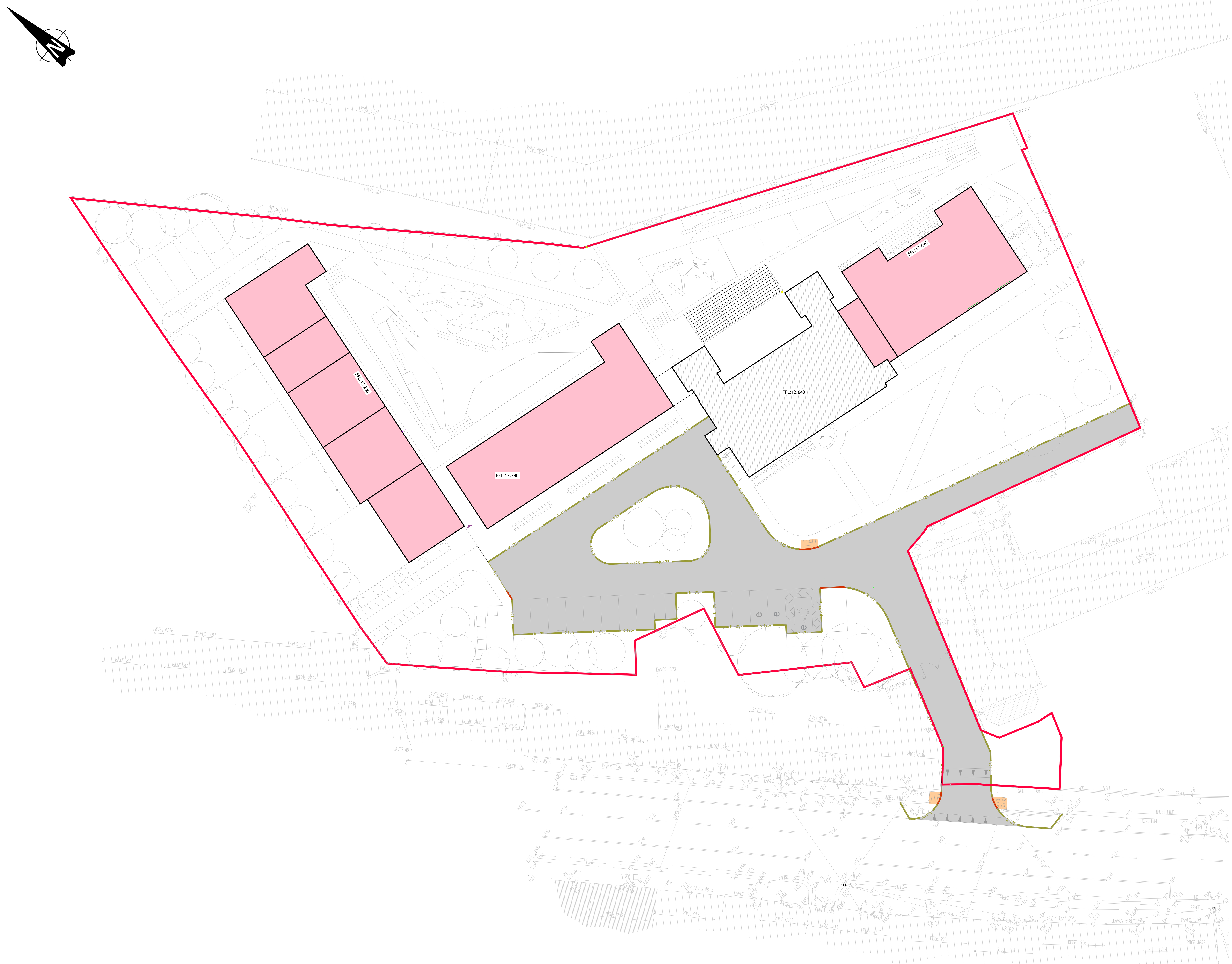
BUILDING INFORMATION MODELLING (BIM) I.S. EN ISO 19650-2:2018
NSAI Certified

Rev	Amendment	By	Date
P01	ISSUED FOR PLANNING REVIEW	LL	16.10.2024

Client: GOOD SHEPHERD

PUNCH consulting engineers
Dublin | Limerick | Cork | Galway | Glasgow
Elm Court, Boreenmanna Road, Cork, T12 HHW2
t +353 21 462 4000 | w punchconsulting.com

Project: REFUGE CENTRE TURNER'S CROSS, CORK				
Title: PROPOSED JUNCTION LAYOUT				
Drawn: Liam Lonergan	Date drawn: 08.10.2024	Technician Check: Drazen Trkulja	Engineer Check: Drazen Trkulja	Approved: Cian Murphy
Project No: 244110	Model Ref: 244110-PUNCH-XX-XX-M2-C-0401	Drawing Status: S3 (For Review and Comment)		
Scale @ A1: 1:200	Document No: 244110-PUNCH-XX-XX-DR-C-0401			Revision No: P01



LEGEND

PROPOSED MACADAM ROAD	
125mm HIGH KERB	K-125
FLUSH KERB	K-F
PROPOSED TACTILE PAVING (BUFF COLOUR)	
PROPOSED BUILDING /EXTENSION	
EXISTING BUILDING	
SITE BOUNDARY	

Rev	Amendment	By	Date
P01	FOR PLANNING REVIEW	LL	16.10.2024

Client: GOOD SHEPHERD

PUNCH consulting engineers
Dublin | Limerick | Cork | Galway | Glasgow
Elm Court, Boreenmanna Road, Cork, T12 HHW2
t +353 21 462 4000 | w punchconsulting.com

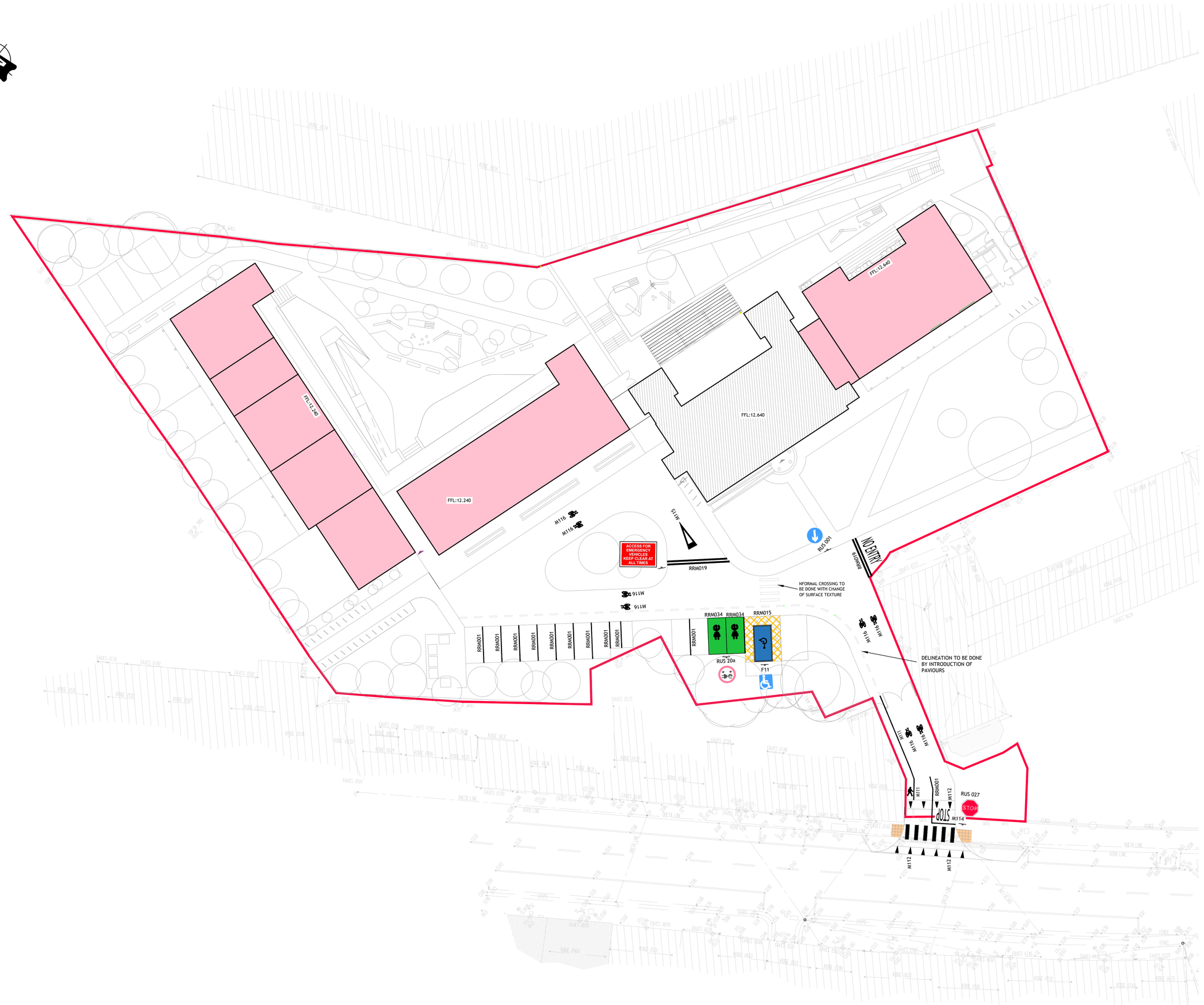
Project: REFUGE CENTRE TURNER'S CROSS, CORK

Title: PROPOSED ROAD FINISHES LAYOUT

Drawn:	Date drawn:	Technician Check:	Engineer Check:	Approved:
Liam Lonergan	08.10.2024	Drazen Trkulja	Drazen Trkulja	Cian Murphy

Project No:	Model Ref:	Drawing Status:
244110	244110-PUNCH-XX-XX-M2-C-0440	S3(For Review and Comment)

Scale @ A1:	Document No:	Revision No:
1:250	244110-PUNCH-XX-XX-DR-C-0440	P01



ROAD MARKING AND SIGNAGE LEGEND

DESCRIPTION	*DTTSM REF
PROPOSED 100mm WIDE CONTINUOUS WHITE LINE	RRM001
PROPOSED PEDESTRIAN SYMBOL	M111
PROPOSED STOP ROAD MARKING	M114
PROPOSED YIELD ROAD MARKING	M115
PROPOSED NO ENTRY LINES	RRM019
PROPOSED CYCLE SYMBOL	M116
PROPOSED RUS 027 - STOP SIGN	RUS 027
PROPOSED F11 - PARKING FACILITIES FOR PEOPLE WITH DISABILITIES	F11
PROPOSED RUS 020A - EV CHARGE SIGN	RUS 20a
PROPOSED RUS 001 - KEEP LEFT SIGN ON YELLOW FLOURESCENT REFLECTIVE SELF RIGHTING BOLLARD	RUS 001

PROPOSED BUILDING /EXTENSION

EXISTING BUILDING

SITE BOUNDARY

BUILDING INFORMATION MODELLING (BIM)
I.S. EN ISO 19650-2:2018
NSAI Certified

Rev	Amendment	By	Date
P01	ISSUED FOR PLANNING REVIEW	LL	16.10.2024

Client: GOOD SHEPHERD

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Dublin | Limerick | Cork | Galway | Glasgow
Elm Court, Boreenmanna Road, Cork, T12 HHW2
t +353 21 462 4000 | w punchconsulting.com

Project: REFUGE CENTRE TURNER'S CROSS, CORK
Title: PROPOSED ROAD MARKINGS AND SIGNAGE

Drawn:	Date drawn:	Technician Check:	Engineer Check:	Approved:
Liam Lonergan	08.10.2024	Drazen Trkulja	Drazen Trkulja	Cian Murphy

Project No:	Model Ref:	Drawing Status:
244110	244110-PUNCH-XX-XX-M2-C-0460	S3 (For Review and Comment)

Scale @ A1:	Document No:	Revision No:
1:250	244110-PUNCH-XX-XX-DR-C-0460	P01