

CHAPTER TWENTY MATERIAL ASSETS: UTILITIES

20.1 INTRODUCTION

According to relevant EPA ‘Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)’ (EPA, 2022) the following topics warrant consideration under material assets:

- Built Services/Utilities;
- Roads and Traffic; and,
- Waste Management.

Roads and traffic have been assessed separately as part of this EIAR. Refer to Chapter 18.0– Traffic and Transport. Waste Management has been assessed separately as part of this EIAR in Chapter 19.0 – Material Assets - Waste Management.

Therefore, this assessment examines material assets serving the proposed development specifically in relation to existing and proposed built services (i.e. foul sewerage, surface water drainage, lighting, water supply, gas, electricity, and telecommunications utilities). A detailed description of the proposed development is presented in Chapter 2.0 of this EIAR.

20.2 ASSESSMENT METHODOLOGY

The methodology and terminology used to prepare this section of the EIAR is in accordance with the EPA ‘Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)’ (2022). The following sources have been used to collate information on built services within the general area of the site:

- Available utility information and maps received from Uisce Éireann (UÉ), the Limerick City and County Council (LCCC);
- ARUP. 2025a. Structural Report;
- ARUP. 2025b. Lighting Design Report;
- ARUP. 2025c. Engineering Services Report – Civil;
- Precision Utility Mapping. 2021;
- Phoenix Environmental Safety Ltd. 2024. Asbestos Survey Report;
- Independent Site Management (ISM), 2025 Report; and,
- Uisce Éireann (UÉ). 2025. Confirmation of Feasibility.

This information has been supplemented by observations recorded during site walkover surveys, and pre-application consultation with UÉ and LCCC. Surface water runoff, foul drainage discharge and water supply requirements have also been designed in accordance with the following guidelines:

- Limerick City and County Council Surface Water/SuDS Specification 2022;
- CIRIA report C753 ‘The SuDS Manual – v6;
- Limerick Main Drainage Scheme;
- Limerick City and County Development Plan, 2022- 2028; and,
- Uisce Éireann Code of Practices and Technical Standards (IW-CDS-5030-01 to 04 & IW-TEC-800).

The proposed application site (Phase II) is part of a phased development proposal for a significant city centre, regeneration area or Masterplan Site (MS). This MS is divided into four different phases of delivery as detailed in Chapter 1.0 Introduction. The overall MS layout which illustrates the indicative layout of the subject site and adjoining lands in the ownership of the applicant is displayed on Figure 1.4 in Chapter 1.0 and full details of the MS phases are given in Chapter 2.0. The assessment takes a holistic approach and examines the wider MS area, taking into account the proposed future phases of development based on the available information.

No limitations or technical difficulties were encountered during the assessment.

20.3 EXISTING RECEIVING ENVIRONMENT

The site, known locally as 'Cleeves Riverside Quarter' comprises the former industrial mill complex ('Cleeves') situated on the northern side of the River Shannon, Limerick City and occupies the area between; Stonetown Terrace Road to the northeast; O'Callaghan Strand to the southeast; Condell Road (R527) to the southwest; and, Salesian Primary School and the 'Fernhill' residential estate to the northwest and west respectively - all situated in the townland of Farranshone More in Limerick City. The site is dissected by North Circular Road where it extends between Shelborne Road Lower and O'Callaghan Strand.

The site is located just outside the western boundary of the River Shannon and is zoned as part of the City Centre Commercial Area (CCCA) within the Limerick City and Council Development Plan 2022-2028. Condell Road (R527) is located directly south of the site and south of the R527 is a semi-natural open space area. Directly north of the site there is an existing residential area and the land east of the site is classed as education and community facilities, where Ard Scoil Rís middle school is located. Consultation with relevant bodies has been undertaken to determine existing utilities present in the vicinity of the site. Existing onsite utilities are presented in Appendix 20.1., and summarized below.

20.3.1 Storm Water Drainage

There is an existing 150mm surface water pipe from the Salesians site that is discharging directly to the combined sewer on NCR via a 300mm internal combined drainage network. There is an existing 225mm Surface Water Sewer serving the apartments at the top of Stonetown Terrace (ARUP, 2025c).

There appears to be a 400mm surface water outfall (discharge) via an existing pipe at the Shannon River's north bank from the Flaxmill site. The CCTV survey shows that there are a series of pipes that link the Shannon River to the Reservoir from this feature. There was confirmed in early March 2021, as well as the existence of a flap-gate access point to the Reservoir in the area below the infiltration gallery which has an invert level of 0.33m. The last manhole before the Shannon River has a higher invert level (0.99m), which suggests that the link was designed to drain water from the Shannon River to the Reservoir to be used for onsite industrial processes at the time. The flap-gate at the reservoir no longer works and thus allows water to enter in either side of the pipe depending on the resultant water level in the Shannon River (i.e. allows discharge of water from the onsite Reservoir directly to the River Shannon and, depending on hydraulic levels, allows ingress of water from the River Shannon directly to the Reservoir). The tide in the reservoir fluctuates from a minimum low tide of +0.99m ODM to a maximum high tide at +2.00m ODM (ARUP, 2025c).

There is a 200mm diameter watermain crossing the Shannon bridge which connects to a 150mm diameter watermain surrounding the site on the lower North Circular Road (NCR), O'Callaghan Strand and on Stonetown Terrace¹ (ARUP, 2025c).

There is a large diameter combined sewer located on the lower NCR which is connected to a 1.8m diameter combined sewer crossing the river just northeast of St Michael's Rowing Club. It is understood that these sewers were installed as part of the Limerick Main Drainage Scheme (LMDS) in the early 2000's. The existing combined sewer in the lower NCR between the two sites (Flaxmill and Shipyard) is 1050mm in diameter and has a shallow hydraulic gradient of circa 1/400. It is understood from previous discussions with representatives of Uisce Éireann and LCCC regarding the Cleaves development in 2021 that there is sufficient capacity in the existing sewer for the new development (ARUP, 2025c).

20.3.2 Foul Water Drainage

There are adjacent Uisce Éireann foul sewers (with existing capacity) located on North Circular Road, O'Callaghan Strand and Stonetown Terrace (ARUP, 2025c).

20.3.3 Water Supply and Distribution

The existing 6-inch public water mains network runs along the NCR, O'Callaghan Strand and the R464. The existing public water supply adjacent to the development site is confirmed to have capacity to supply the requested demand (Uisce Eireann, 2025).

20.3.4 ESB Networks

The existing ESB network runs along the NCR, O'Callaghan Strand and the R464. There are three active substations in the vicinity of the site, i.e. there is an existing ESB substation located centrally in the site near the Salesians school, as well as the existing Fernhill substation (with limited capacity available) and the Stonetown Terrace substation. The existing Lansdowne substation in the Flaxmill is not showing as active (ARUP 2024), as per information received from ESB and as noted from the ESB Capacity Map.

The Salesians substation will be decommissioned, as part of the proposed development, and an allowance made to divert the supply.

20.3.5 Telecoms/Fibre

The Metropolitan Area Network (MAN) is currently routed across the Shannon Bridge and on Shelbourne Road. There is a spur serving the old Salesians secondary school. eNet have confirmed that the MAN will be extended to serve development on the Cleaves site as required. There is also an extensive telecoms duct network available on NCR & O'Callaghan Strand.

20.3.6 Gas

There is a 125mm diameter (Low Pressure) Gas main located on O'Callaghan Strand and NCR with a spur located on Stonetown Terrace. The nearest Medium Pressure line is at the Sarsfield Bridge at the other end of O'Callaghan Strand.

¹ A Confirmation of Feasibility has been received from Uisce Éireann which has confirmed that the proposed connections are feasible without upgrades to the network

20.3.7 Lighting

There is an existing public street lighting network along NCR, O'Callaghan Strand and the R464. There is also currently public lighting within the existing Euro Car Park and Salesian Primary School. Given the derelict nature of the former Cleeves site, onsite lighting comprises lighting attached to onsite buildings and structures.

20.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed application site (Phase II) is part of a phased development proposal for a significant city centre, regeneration area or Masterplan Site (MS). This MS is divided into four different phases of delivery as detailed in Chapter 1.0 Introduction. The overall MS layout which illustrates the indicative layout of the subject site and adjoining lands in the ownership of the applicant is displayed on Figure 1.4 in Chapter 1.0 and full details of the proposed development phases are given in Chapter 2.0. The assessment takes a holistic approach and examines the wider MS area, taking into account the proposed future phases of development based on the available information. The proposed application site has been designed holistically to ensure that future delivery of the masterplan development (as detailed in Chapter 1.0 Introduction) is considered where relevant e.g. the Phase II drainage design has been future proofed to allow for the impermeable areas associated with the masterplan layouts.

The proposed development consists of:

- A. Demolition of a number of structures to facilitate development including (i) Salesians Secondary School and Fernbank House; (ii) 2 no. houses on North Circular Road; (iii) Residual piers from the basin of the reservoir; (iv) Upper Reservoir on Stonetown Terrace comprising 2 no. concrete water tanks, pump house and liquid storage tank; (v) 1960's lean-to building structures adjoining the Cold Store (former Weaving Mill); (vi) remaining fabric of c20th rear lean-to of the Flaxmill Building; (vii) c.1960s office building adjoining the Packing Store and Cheese Plant on North Circular Road; (viii) Cluster of buildings including altered part of the Linen Store, the former Linen Store, Storage Building, and Office/Lab building at O'Callaghan Strand / Stonetown Terrace with partial retention of existing stone wall; (ix) warehouse on the Shipyard site; and (x) partial removal of stone boundary wall defining the Cleeves site adjoining O'Callaghan Strand / Stonetown Terrace and around the Shipyard site.
- B Construction and phased delivery of:
 - i. Residential Development in 4 development 'zones' within the site ranging in height from 3 – 7 storeys (with screened service plant at roof level) comprising; (a) 234 no. residential units; (b) 270 no. student bedspaces with ancillary resident services at ground floor level; (c) 299sqm of commercial floorspace; and (d) a creche. The specific development details of each proposed development zone comprise the following:
 - Salesians Zone – 1 no. building with 2 no. blocks extending to 6 and 7 storeys comprising 146 no. apartments (76 no. 1 bed; and 70 no. 2 bed); a creche; semi basement car and bicycle parking; reception area, plant rooms, and refuse storage, with screened external plant and photovoltaic panels at roof level; 20 no. 3 storey 3 bed triplex units with photovoltaic panels at roof level; and 30 no. car parking spaces for the dedicated use of the adjoining Salesians Primary School.
 - Quarry Zone – 1 no. Purpose Built Student Accommodation (PBSA) building with 3 no. blocks extending to 6 and 7 storeys comprising 270 no. bedspaces with study rooms, shared areas, exercise room, reception area, plant rooms, refuse storage and bicycle parking all at ground floor level and screened external plant and photovoltaic panels at roof level. Provision is made for

telecommunication antennae on the roof top of one block. Consent is also sought for use of the PBSA accommodation, outside of student term time, for short-term letting purposes.

- Stonetown Terrace Zone – 1 no. building extending to 4 - 5 storeys comprising 38 no. apartments (6 no. studios; 12 no. 1 beds; and 20 no. 2 beds) with plant rooms and refuse storage at ground level, ancillary infrastructure at basement level at northern end of the block, with screened external plant and photovoltaic panels at roof level; 9 no. 3 storey 3 bed townhouses with photovoltaic panels at roof level; and a dedicated secure bicycle storage facility.
- O'Callaghan Strand Zone – 1 no. building extending to 4 / 5 storeys comprising 21 no. apartments (9 no. 1 bed and 12 no. 2 bed) with an open roof structure accommodating communal open space, plant and photovoltaic panels; and 299qm of commercial ground floorspace intended to accommodate Class 1, Class 2 and / or Class 3 uses, with provision for car parking in the undercroft.
- ii. Dedicated mobility hub with canopy and photovoltaic panels including double stacker bicycle parking; and EV Charging spaces, within the Shipyard Zone. A dedicated pedestrian/cycle link connects North Circular Road with Condell Road. The remaining area of the zone shall accommodate temporary car parking and a temporary external event space to be used on a periodic basis as the need arises, pending future redevelopment proposals as detailed in the Masterplan (Stage IV).
- iii. Extensive provision of Public Realm including creation of the Reservoir/Quarry Park, the Flaxmill Square and the Riverside Corridor. Significant areas of civic and green spaces are provided, incorporating formal and informal play space; nature based SuDs, permeability and access; and a riverside canopy with photovoltaic panels functioning as an outdoor event space and incorporating heritage interpretative panels
- iv. 3 no. dedicated bat houses;
- v. Telecommunication antennae on roof of Block 2A of the PBSA, including (a) 9 no. Support poles to support 2 no. antennae each; (b) 6 no. microwave dishes affixed to the plant screen; and (c) associated telecommunications equipment and cabinets (effectively screened). To facilitate technologically acceptable locations at the time of delivery, a micro-siting allowance of 3m is proposed on the roof top of Block 2A of the PBSA for the infrastructure.
- vi. Provision of vehicular access/egress points including (a) utilisation of existing access points to the Salesians Zone, to the Flaxmill and Quarry Zones and to the Mobility Hub on the Shipyard Site Zone; (ii) reopening an existing (currently blocked) access point off O'Callaghan Strand; (iii) new access points to the proposed undercroft carparking at Salesians from the North Circular Road and at the end of Stonetown Terrace road which provides access to the Stonetown Terrace Zone; and (iv) emergency access only from Stonetown Terrace to the Flaxmill Zone;
- vii. Provision of 30 no. dedicated car parking spaces to serve the Salesians Primary School; and
- viii. All ancillary site development works including (a) water services, foul and surface water drainage and associated connections across the site and serving each development zone; (b) attenuation proposals; (c) raising the level of North Circular Road between Fernhill and O'Callaghan Strand; (d) refuse collection store (e) car and bicycle parking to serve the development; (f) public lighting; (g) all landscaping works.; and (h) temporary construction measures including (i) construction access to the Quarry site including provision of a temporary access across the reservoir; and (ii) temporary use of onsite mobile crusher.

20.4.1 Proposed Built Services/Utilities

The overall services and utilities strategy to be delivered as part of the proposed development has taken account of the Masterplan lands including the proposed TUS Educational Campus, where required (e.g. the drainage design has allowed for the impermeable areas associated with the masterplan layouts). All development zones will be treated separately, such that each site will have an independent set of surface water, foul and watermain networks (where possible) to enable phasing of the works. Specific design details and characteristics of the proposed development (Phase II) are presented as follows.

Surface Water/Storm Water Drainage

The basis of the SuDS and drainage design are founded on the principles detailed in the below list of documents (ARUP, 2025c):

- Part H of the Building Regulations
- BS EN 752 Drain and Sewer Systems outside Buildings
- Limerick Development Plan 2022 to 2028
- CIRIA report C753 The SuDS Manual
- The Greater Dublin Regional Code of Practice for Drainage Works and Irish Water requirements.

The overall design strategy is to promote the use of Sustainable Urban Drainage Systems (SuDS) to minimise final discharge rate and mitigate flood risk on each site by providing an alternative to the direct channelling of surface water through networks of pipes and sewers to nearby watercourses. Each site will be drained as an independent network to enable phasing of the works. It is proposed to discharge the surface water from the development to the Shannon River via the existing 400 mm diameter discharge pipe. The existing final manhole will be replaced with a new structure, while the existing discharge pipe will be extended to connect to the new manhole.

The site comprises the following zones:

- **Zone 1:** Site catchments (Salesians, PBSA, Stonetown Terrace, Reservoir, Flaxmill Plaza, Shipyard, O'Callaghan Strand)
- **Zone 2:** Peripheral areas (North Circular Road, O'Callaghan Strand Road, Stonetown Terrace Road) (ARUP, 2025c).

Surface water infrastructure and attenuation facilities will be designed to service a volume equivalent to a 1 in 100-year event plus 30% for climate change and 10% urban creep in agreement with Limerick County Council. Exceedance events beyond the 1 in 100-year will be channelled towards sacrificial areas away from buildings. Building finished floor levels will be raised above adjacent ground levels to an extent commensurate with the flood risk considerations for the individual areas, as a further protection measure.

The aim is to restrict surface water peak discharges from the Cleaves development site to 2 litres/second/hectare, in line with the GDSDS and Limerick City & County Council Water Services requirements, prior to discharge to the Shannon River. Moreover, the critical requirement will be that the final rate of flow discharge that leaves the site does not exceed the current levels. The reservoir will be used as an attenuation facility, managing surface water runoff from the adjacent Salesians, PBSA, and Stonetown Terrace sites. Controlled discharge from the reservoir will be facilitated via a 225 mm diameter outlet pipe, which will traverse through the Flaxmill Plaza site and connect to the final manhole before discharging to the River Shannon (ARUP, 2025c).

The remaining development areas—including Flaxmill Plaza, O’Callaghan Strand, Shipyard, and the adjacent roads (NCR, OCS, and Stonetown Road)—will drain independently to the existing discharge pipe network. Surface water runoff from all internal drainage networks will be treated prior to discharge using a combination of Sustainable Drainage Systems (SuDS) and petrol interceptors, ensuring compliance with water quality and environmental standards (ARUP, 2025c).

The overarching strategy for surface water management is to prioritise the implementation of Sustainable Urban Drainage Systems (SuDS) across all development sites. This implementation of SUDS will help to achieve the key objectives of:

- Managing runoff close to source
- Limiting peak discharges to pre-development levels
- Maintaining or improving runoff quality
- Integrating stormwater management and control into the landscape design for the benefits of amenity and recreation
- Mimicking the way existing groundwater, drainage channels and wetlands are supplied with water
- Installing petrol interceptors in all areas with potential exposure to hydrocarbons e.g. car parks
- Minimising the use of buried attenuation tanks (by exception only)
- Use of natural materials for check dams in swales, consider use of recovered rock from site
- Designing detention basins to have various states of water retention to enhance biodiversity and add interest to the landscape
- Planting to comprise of species with low water demand
- Infrastructure plot boundaries to be defined to provide sufficient footprint for implementation of proposed SuDS strategy.

The range of SuDS measures on individual plots varies from site to site, within the proposed development. Systems will treat and control the run-off as close as possible to the source. A Management Train that incorporates a series of features will be incorporated to ensure that the series of features treats and attenuates the stormwater run-off where possible (ARUP, 2025c).

Reservoir as attenuation facility

Excess runoff from adjacent sites and SuDS features will be routed to the reservoir for attenuation. Surface water calculations verify that there is sufficient capacity in the reservoir to attenuate excess runoff for a 1:100 year storm (plus 30% climate change and 10% urban creep) from the proposed development. The total required attenuation volume is 1597.6m³. A 225 mm diameter outlet pipe is proposed to be laid horizontally from the reservoir to the final discharge manhole, with an invert level of +1.00 m ODM. During attenuation, the water level within the reservoir is expected to rise to +1.90 m ODM, maintaining a freeboard of 2.90 m relative to the proposed ground level at the PBSA (+4.80 m ODM), ensuring adequate flood protection. A reservoir clean-up strategy will be implemented during the construction phase. This will consist of:

- Controlled draining of the reservoir;
- Removal of accumulated sediment;
- Survey and inspection of the reservoir bed (ARUP, 2025c).

Final manhole within planning boundary

The existing final manhole (Ref: ExMHC112) located at the southern boundary of the proposed development,

which includes a penstock, is in poor structural condition. It is proposed to construct a new offline manhole (SMH100) adjacent to the existing structure (to keep the existing system operational during construction). The new manhole will be fitted with a TideFlex non-return valve to prevent backflow and protect the site from flooding from the outfall pipe. Once the new manhole is operational, the existing manhole will be decommissioned and demolished and the discharge pipe from the reservoir will be extended to connect to the new manhole (ARUP, 2025c).

Green Infrastructure & SUDS

The overall strategy for surface water management is to maximise the SuDS features on all the sites within the Cleaves Riverside Quarter development (Salesians, PBSA, Stonetown Terrace, Flaxmill, O'Callaghan Strand and Shipyard).

SuDS will be implemented to the maximum extent possible across the full extent of the site, with the intention of filtering and storing rainfall at source. This will be achieved through a range of techniques and associated flow controls. Sustainable drainage systems are designed to maximise the opportunities and benefits that can be secured from surface water management. SuDS can take many forms, both above and below ground, and they facilitate four main categories of benefits (water quantity, water quality, amenity and biodiversity). SuDS deliver high quality drainage while supporting urban areas to cope better with severe rainfall both now and in the future. SuDS also help counteract some of the impacts in the water cycle caused by increased urbanisation, such as reduced infiltration, which in turn can result in diminished groundwater supplies. The various available solutions for SuDS require a coordinated design between engineering, sustainability consultancy and landscape design. A Management Train comprising of a series of features will be implemented where feasible to ensure that the series of features treat and attenuate the stormwater run-off to an acceptable quality at greenfield rates of flow. Systems will treat and control the run-off as close as possible to the source.

Several SuDS components in a Management Train facilitates the capture, conveyance and storage of surface water runoff while delivering interception and pollutant risk management. An impermeable lining will be installed beneath the porous paving and rain gardens to prevent infiltration into the made ground, thereby eliminating the risk of pollutant transfer (ARUP, 2025c).

For the purpose of describing the surface water design strategy, the development has been defined as two distinct zones:

- **Zone 1:** This zone encompasses the primary development sites, where dedicated attenuation facilities and SuDS features have been proposed. These include: Salesians, PBSA, Stonetown Terrace, Reservoir, Flaxmill Plaza, O'Callaghan Strand, and Shipyard. Catchments have been delineated around each site to optimise runoff management and integrate SuDS measures such as rain gardens, permeable paving, and green roofs.
- **Zone 2:** This zone includes surrounding road infrastructure with limited space for SuDS implementation and no conventional attenuation facilities. These areas include: North Circular Road, O'Callaghan Strand Road, and Stonetown Terrace Road. Due to spatial constraints, conventional drainage systems will be used, supplemented by targeted SuDS interventions where feasible.

The proposed SuDS scheme includes the following features for the two zones.

- Green Roofs
- Raised planted areas/Rain gardens/Tree pits (bioretention systems)
- Porous/Permeable Paving
- Swales (ARUP, 2025c).

Discharge pipe from the reservoir to Shannon River

A 225 mm diameter discharge pipe is proposed to be laid horizontally from the attenuation reservoir to the newly constructed final manhole, with an invert level of +1.00 m ODM. The pipe has been sized to significantly restrict outflow from the reservoir, ensuring controlled discharge to the River Shannon during 1:100 year storm event. Hydraulic modelling indicates that the maximum head of water at the outlet pipe will be 0.93 m, resulting in a restricted flow rate of 42.97 l/s at a velocity of 1.08 m/s. Whilst this is higher than the QBAR rate, it is below the existing brownfield runoff rate (ARUP, 2025c).

Piped Networks per Zone

All existing utility services within the development site are to be decommissioned and removed with the exception of the combined sewer located at the north-western corner of the Salesians site. This sewer currently transverses the site boundary and connects to the neighbouring Salesian Primary School property. It is proposed to divert this combined sewer via a 160 mm diameter pipe, rerouting it off-site in accordance with the drainage strategy. The surface water drainage network for the development is proposed to be constructed as a gravity fed piped system as follows:

- Zone 1 – Gravity drainage from the green roof, discharging directly into rain gardens and subsequently into the final discharge pipework
- Zone 1 – Gravity drainage from hard landscaped areas, planter box overflows, and raised planted area overflows, discharging into the final pipe network
- Zone 2 – Gravity drainage from bioretention areas (rain gardens), with flow throttled prior to discharge into the public drainage system.

An independent surface water drainage system is proposed for each site within the development. These systems will operate separately until they converge at the newly constructed final manhole, from which the combined flow will discharge to the existing outfall leading to the Shannon River (ARUP, 2025c).

Zone 1 - The volumetric runoff for each site was calculated using a rainfall depth of 77.53 mm and runoff factors. The various proposed SuDS techniques were then sized to store the calculated volume locally for rainfall events up to and including the 1:100-year event plus 30% for climate change and 10% for urban creek, for slow release once the storm abates (ARUP, 2025c).

Zone 2 - The volumetric runoff for each catchment was calculated using a rainfall depth of 77.53 mm and runoff factors. The various proposed SuDS techniques (see section 8.1.6) were then sized to store the calculated volume locally for rainfall events up to and including the 1:100-year event plus 20% for climate change, for slow release once the storm abates (ARUP, 2025c).

The anticipated total runoff volumes, current discharge rates and proposed controlled discharge rates each of these drainage structures can accommodate are listed in Tables 20-1 and 20-2 (ARUP, 2025c). Refer to the Engineering Services Report (ARUP, 2025c), which accompanies this planning submission for further

details.

Table 20.1. Zone 1: Catchments Anticipated water runoff volume and discharge rate (ARUP, 2025c)

Site	Area (m ²)	Runoff volume (m ³)	Discharge Rate (l/s)	Controlled Discharge Rate Post Development (l/s)
Shipyards	8978	562.4	156.4	1.7
O'Callaghan Strand	1869	144.9	40.3	35.1
The Flaxmill Plaza	7593	696.1	193.5	84.9
Reservoir	5354	297.8	82.8	92
Stonetown Terrace	3677	121.3	33.7	43.5
Quarry/PBSA	6896	470.7	128.1	101.6
Salesians	10013	665.7	185.1	129.4

Table 20-2. Zone 2: Catchments Anticipated water runoff volume and discharge rate (ARUP, 2025c)

Site	Area (m ²)	Runoff volume (m ³)	Discharge Rate (l/s)	Controlled Discharge Rate Post Development (l/s)
North Circular Road	3316	257.1	71.5	28.4
O'Callaghan Strand Road	2928	197.3	54.8	48.2
Stonetown Terrace Road	1077	76.8	21.4	15.3

A full set of all proposed Stormwater Drainage design drawings are presented in the planning application.

Foul Drainage/Foul Water Network

The design approach for foul water services from each site is based on individual connections to the adjacent Uisce Éireann foul sewers on NCR, O'Callaghan Strand and on Stonetown Terrace. The buildings will be catered for by individual foul drainage networks within each site discharging to the final connection points. This approach will be discussed and agreed with Uisce Éireann when the site layouts and the accommodation / units have been finalised. The key strategies for the wastewater system are the use of gravity networks to avoid the need for pumping where possible, the use of the existing combined sewer to the southwest, and the implementation of demand reduction strategies such as the use of low flow fixtures and fittings (ARUP, 2025c). The key objectives to achieve the strategy are:

- Gravity Networks – The uniform sloping nature of the terrain generally supports the use of gravity sewer collection systems. These will be used where possible to avoid the need for pump stations and associated operating and maintenance costs;
- Using Existing Outfall Sewer – The strategy is to connect the wastewater discharges to the existing public sewers along the NCR;
- Reducing water demand through water saving technologies i.e. flow restrictors; Low flow fixtures and fittings/Dual Flush Toilets - Low flow fixtures conserve water by using a high-pressure technique to produce a strong or equal flow of water with less water than more water-wasting fixtures. Dual flush toilets prevent the full contents of the cistern being discharged with every flush; and,
- Education and Smart Metering - live recording of water consumption patterns to indicate in real time potential problems with the network; can include a user interface to encourage changes in water usage patterns; can support remote meter reading and billing (ARUP, 2025c).

The use of techniques such as low flow fixtures and fittings and dual flush toilets combined with smart metering and education of the end users, could achieve up to a 30% reduction in potable water consumption and wastewater discharge (ARUP, 2025c).

The proposed Phase II development of the overall Masterplan will include apartments/townhouses across three development sites (Salesians, Stonetown Terrace and O'Callaghan Strand) with an assumed full capacity of 788 No. residents, student accommodation with an assumed full capacity of 271 No. residents and commercial/educational building units with an assumed full capacity of 1161 No. visitors (Flaxmill). Irish Water Hydraulic Design Guidance of 150 l/h/d for a residential unit, and 100 l/h/d for a commercial/educational building serving visitors has informed the design (ARUP, 2025c). The estimated daily wastewater hydraulic loading will be 263.3 m³ /d, for the proposed development. This figure equates to an average (DWF) of approximately 3.05 l/s based on a 24-hour day (or 1.84 l/s when only considering Phase 2, i.e. the subject of this planning application). Assuming a peaking factor from Irish Water Wastewater Code of Practice of 6 times DWF for residential unit peak discharge, and 4.5 times DWF for commercial/building visitor unit peak discharge, the peak discharge would be 16.47 l/s (ARUP, 2025c) (or 11.08 l/s when only considering Phase 2, i.e. the subject of this planning application). A Confirmation of Feasibility has been received from Uisce Éireann which has confirmed that the proposed wastewater connections for the proposed development are feasible without upgrades to the network.

A full set of all proposed Foul Drainage design drawings are presented in the planning application.

Water Supply

There will be specific potable water storage and design requirements for high-rise and large-scale developments on the various sites as well as for firefighting purposes. The design approach for the provision of potable water to each site will be stand alone, i.e., individual ring mains for each site, with separate metered connections to the existing Uisce Éireann (UE) mains adjacent to each site. A Confirmation of Feasibility has been received from Uisce Éireann which has confirmed that the proposed connections for the proposed development are feasible without upgrades to the network.

The intention is for all new developments to be supplied via a ring main system connected to the existing campus network with new sluice valves and hydrants located to meet the requirements of the current Part B Building Regulations and the Local Fire Officer. Any storage or pressure boosting required for use within the new buildings will be designed as part of the MEP scope for each building. No specific capacity issues with the campus distribution system have been identified.

The anticipated average demand is 3.447 litres/second with a peak demand of 18.506 litres/second (ARUP, 2025c). A full set of all proposed Water Supply design drawings are presented in the planning application.

ESB Networks & Emergency Generators

As stated in Chapter 2.0 – Project Description, the existing Salesians substation will be decommissioned and an allowance made to divert the supply. New substations are proposed as part of the development proposal to service the site. ESB will confirm the loads being fed from here and allowance will be made to divert supply from another source to allow the decommission of same. The Salesians site is currently provided with an ESB substation for each of the apartment blocks and a Kiosk substation for the triplex units.

The PBSA in the Quarry Zone is currently provided with a standalone ESB substation at ground floor. In Stonetown Terrace the apartment block will be provided with a dedicated ESB substation and the townhouses will be provided with a supply from a nearby existing substation to cater for these houses via externally located ESB mini pillars. For O'Callaghan Strand, provision has been made for a dedicated ESB substation at ground floor level.

The Fernhill substation has limited capacity available. For the proposed development which includes carpark lighting and EV charging only on the Shipyard Site, supply will be from Fernhill substation to a new metered supply on the Shipyard site. Should the use of the site expand in the future a new Kiosk may be required and a space allowance has been provided for this in order to future proof a supply to the site.

The estimated maximum demand for the proposed development is in the region of 2.7MVA.

Generators will be located onsite during the operational phase, for emergency use only, as follows:

- Quarry – Approximate generator size: 220kVA generator.
- Salesians – Approximate generator size: 330kVA generator
- Stonetown Terrace - Approximate generator size: 100kVA generator
- O'Callaghan Strand - Approximate generator size: 90kVA generator

Each generator would typically only run for ca. 30mins monthly, as part of regular testing and these generators will provide an emergency power supply. They will not be used to supplement general power or to export to the grid.

Telecoms/Fibre

As stated in Chapter 2.0 – Project Description eNet have confirmed that the Metropolitan Area Network (MAN) will be extended to serve development on the Cleeves site as required. All apartments shall be cabled from a local electrical riser to outlet boxes at the TV location in the living room for a minimum two fibre broadband utility suppliers such as SIRO, Virgin Meida or OpenEir. All townhouses and triplex units shall be cabled from the local underground network via external telecoms boxes to outlet boxes at the TV location in the living room for a minimum two fibre broadband utility suppliers such as SIRO, Virgin Meida or OpenEir.

Proposed Telecommunications Infrastructure

Based on the findings of a telecommunications report, Block 2A (west wing) of the PBSA proposes support poles to accommodate telecommunication equipment and associated infrastructure. A comprehensive report has been prepared by ISM (Independent Site Management, 2025) which accompanies the application for consent under separate cover. The report details why the infrastructure is necessary to mitigate the impact the development will have on the existing poor mobile phone signal in the area and provide both the occupants of the development and the local area with adequate voice and data services to meet modern demands.

Block 2A of the PBSA proposes telecommunication antennae on roof of Block 2A of the PBSA, consisting of:

- (a) 9 no. Support poles to support 2 no. antennae each;
- (b) 6 no. microwave dishes affixed to the plant screen; and
- (c) associated telecommunications equipment and cabinets (effectively screened).

To facilitate technologically acceptable locations at the time of delivery, a micro-siting allowance of 3m is

proposed on the roof top of Block 2A of the PBSA. The adjustment is intended to optimize signal coverage and network performance without altering the overall design or height of the installation. The antenna will continue to operate within established radiofrequency emissions issued by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and national safety guidelines. The 3m shift does not materially affect exposure levels for residents or the public.

Energy Strategy

As stated in Chapter 2.0 – Project Description, the proposed development incorporates a range of energy reduction strategies aligned with Part L 2022 for Dwellings, including passive solar design through optimised glazing to balance daylighting, solar gain, and thermal performance.

Building fabric insulation will meet or exceed regulatory U-values, with thermal bridging minimised using Acceptable Construction Details and certified junctions. Energy-efficient LED lighting will be installed throughout, and all hot water vessels and pipes will be fully insulated to enhance performance and safety.

The new residential apartments will be de-centralised building-by-building. There will be a central, roof mounted air-to-water source heat pump on each apartment building and individual water-to-water pumps within each dwelling. A local air source heat pump system in combination with a Mechanical Ventilation Heat Recovery (MVHR) system per dwelling is proposed for the townhouses. The new student accommodation will be a centralised system. There will be an air-to-water source heat pump for each student block, providing the primary space heating through radiators which serve the living spaces, bathrooms and bedrooms.

Gas

The residential element of the proposed development is utilising air source heat pumps (ASHP's)².

Lighting

The landscaping proposals include a Lighting Strategy, and this is supported by an External Lighting Design Report prepared by ARUP (2025b). The overarching principle of the strategy is to create a safe night-time environment, ensuring no undue harm to neighbouring residents, and including bat friendly lighting (ARUP, 2025b). Site lighting will be divided across the site, as follows - Zone 1 : Salesians Site; Zone 2 : Quarry; Zone 3: Stonetown terrace; Zone 4 : O'Callaghan Strand; Zone 5 : Shipyard Site; and Zone 6: Public Lighting.

Zones 1 – 4 as listed above will be fed from a dedicated External Lighting panel located in the relevant building switchroom in that zone. The Lighting DB shall be fitted with a meter. The lighting for these areas will incorporate photocell control. The light fittings shall be dimmable and a pre agreed dimming and trimming profile will be programmed to maximise the efficiency. Some of the fixtures for example along the quarry road, will have movement sensor control to allow fittings to remain turned off when not in use.

The Shipyard site will be fed from local pillars located on the shipyard site. The control will be via Dusk to Dawn PIR's mounted on each fitting and the lights will be programmed with an agreed dimming and trimming

² Note: Early planning for future gas demand for the project (future phases of the masterplan) indicates a peak gas load greater than 1035kWh to space heating for the Flaxmill building (both educational and commercial uses which are part of the future masterplan development), and water heating and cooking for all restaurants/ catering functions.

regime to suit site activities. The LCCC public lighting will be fed from new unmetered supply on NCR (ARUP, 2025b).

Walkways and amenity areas will be programmed with dusk to midnight switching, and roadways with dusk to dawn switching, as per LCCC specification. The Quarry Roadway being the primary route for the foraging wildlife will incorporate presence detection, the lighting will be off unless there is movement detected that will activate the lights in this area via movement sensors. The purpose of this is to always ensure minimum light in the area to allow maintenance of the foraging route. LCCC lighting will be taken in charge by LCCC Control for the lighting shall be in line with LCCC requirements. Light fittings shall have dimming capabilities and be fitted with LCCC approved photocell for control (ARUP, 2025b).

Luminaire Types

The scheme will incorporate the following luminaires:

- Columns are used throughout the site. Within most areas of the site, lighting columns have been kept at or below 4m and have a specified directional beam to reduce back spill to reduce unnecessary light on bat foraging areas. 3.5m columns being used along the quarry wall, as this is the main bat foraging area within the site. Columns used in these areas are Darksky approved, to reduce unnecessary upward light spill.
- The use low-level bollards have also been incorporated into many areas to suit the design team vision for the site, primarily in bat foraging areas, to reduce high-level light. There is a mixture of symmetrical and asymmetrical bollards being used in the proposed scheme.
- Handrail lights are used in areas with steps. This lighting type will maximise the lighting on the steps for safety and minimise up light spill and impact on the ecology. Lighting in handrails will be fit with dimming control to achieve appropriate lux levels.
- Surface mounted downlight luminaires are proposed in some areas, primarily the canopy areas on the main site, and in the shipyard. These luminaires were selected to reduce upwards light spill on the site while providing sufficient light fittings for pedestrians within the scheme constraint.
- Recessed wall lights have been used along steps and walkways around the site. These fixtures are mounted between 0.3-0.5m and selected to achieve high uniformity while maintaining low level distribution of light. This luminaire is also Darksky approved.
- In the central Amenity space, a mix of 4.2m and 6.2m decorative columns will be used to blend with the landscape. Wide beam fixtures will be mounted on these poles, to evenly distribute light across this open amenity space.
- Standard 8m columns have been used along main public roads, using a luminaire specified for use along roads and pedestrian areas. The light fittings currently in place in the area will be removed and replaced, unless otherwise decided by LCC.
- Standard 6m columns are used in the shipyard car park, with 4m decorative columns used in the adjoining amenity space. All luminaires will have an LED light source with dimming capabilities.

Further details on the luminaire types used can be found in the appended luminaire schedule, within the Lighting Design Report (ARUP, 2025 b).

Construction Stage Lighting

Construction work will be (unless agreed with the local authority) confined to the core Working Hours, which for most of the year occurs primarily during daylight hours. Therefore, additional lighting will not be required for the majority of the construction work. There will however be occasion where the provision of portable

lighting will be required. Following studies carried out on ecological impact on the site, and the identification of foraging bats in the area, the following measures will be applied in relation to site lighting during construction (ARUP, 2025 b):

- Light fitting colour temperature used will be set to a maximum of 2700K to accommodate the local wildlife requirements. This colour temperature allows for better visual comfort for the wildlife.
- As per the permanent strategy, lighting columns must be kept at or below 4m and have a specified directional beam to reduce back spill and unnecessary illumination on bat foraging areas. 3.5m columns will be used along the quarry wall as this is the main bat foraging area within the site.
- Low-level bollard light fittings will be preferred to temporary lighting columns, especially in the Quarry and along the northern boundary, to reduce high-level light within bat foraging areas.
- The column lighting would be cowled and angled downwards to minimise spillage to surrounding properties and other sensitive receptors.
- Lighting will be provided with a minimum luminosity sufficient for safety and security purposes, where practicable, precautions will be taken to avoid shadows cast by the site hoarding on surrounding roads, footpaths and amenity areas.
- Motion sensor lighting and low energy consumption fittings will be installed to reduce usage and energy consumption.
- Lighting will be positioned to not cause distraction or confusion to pass motorists, river users, or navigation lights for air or water traffic.
- The contractor will maintain control and ensure all lights are turned off when not required.
- The security strategy will be developed to reduce potential requirements for evening lighting.

Further details can be found in the Lighting Design Report (ARUP, 2025 b), submitted separately as part of this planning application.

20.5 LIKELIHOOD OF SIGNIFICANT EFFECTS

20.5.1 Potential Impacts during demolition phase

The following impacts could occur during the demolition phase:

- The presence of asbestos containing materials (ACM's) or suspected ACM's and associated health and safety effects;
- Damage to existing underground power supply;
- Damage to existing air telecommunications assets;
- Damage to existing overhead power lines;
- Potential power outages to existing services in the surrounding area during the demolition of existing structures;
- Safety risk if live utilities such as gas and electricity are not properly turned off, especially during the demolition of ESB substation at Salesians;
- Contamination to existing public water supply network during the demolition of existing structures; and,
- Damage to gas network within the site.

20.5.2 Potential Impacts during construction phase

The following impacts could occur during the construction phase:

- Damage to existing major foul water network;
- Damage to existing underground power supply;
- Damage to existing air telecommunications assets;
- Damage to existing overhead power lines;
- Pollution and debris in stormwater runoff may contaminate local waterbodies;
- Potential power outages to existing services in the surrounding area during the connection of the proposed new supply networks within the site of existing networks;
- Contamination to existing public water supply network during connection to the proposed new water supply network within the residential development; and
- Damage to gas network within the site.

The potential impacts during the construction phase are considered to be unlikely and should they occur, would be temporary and moderate adverse.

20.5.3 Potential Impacts during operational phase

Uisce Éireann has confirmed that the foul network has sufficient capacity for the proposed development, and that the water supply network has sufficient capacity to meet the foul and water supply requirements of the proposed development, once operational. All foul water, storm water and water main services will be installed and commissioned within the proposed development in accordance with all Uisce Éireann requirements and standard best practice guidelines.

All power, telecommunications networks and street lighting will be installed and commissioned within the proposed development in accordance with the relevant service providers guidelines and requirements and standard best practice guidelines.

Accordingly, no potential impacts are likely to occur during the operational phase. No significant impacts are likely to occur during the operational phase.

20.5.4 Do Nothing Scenario

The Material Assets Assessment assumes that under the 'Do Nothing' scenario the proposed development would not be developed. As Phases I and II of the Masterplan consists of the stabilization, repair and repurposing of the Flaxmill Building, as well as the attenuation and treatment of surface water drainage runoff as required, the 'Do Nothing' scenario may have a negative impact on this protected structure, leading to further deterioration, and untreated surface water drainage entering the River Shannon. However, there would be a neutral impact on the remainder of built assets/utilities within the vicinity of the proposed development.

20.6 CUMULATIVE DEVELOPMENT & IMPACTS

As part of this assessment, a comprehensive review of other permitted developments within a 1 km radius of the proposed site was undertaken, focusing on those submitted and approved within the last five years.

This review was conducted using the Limerick City and County Council's online planning application portal. The relevant projects are listed in Appendix 1.1 of the EIAR and have been considered in evaluating the cumulative environmental effects of the proposed development. Based on this review, key proposed developments in close proximity to the site have been identified, consisting of the following:

- **2560780:** Demolition of existing offices and construction of 285 no. residential units and a creche on O'Curry Street and Dock Road Limerick;
- **221172:** the change of use to Student Residences, adaptive re-use and refurbishment of the former Railway Hotel (Protected Structure - RPS Ref. 6035, NIAH Ref: 21518017), demolition of McEnerys Shop, erection of a 3 storey building to Parnell Street and a 7 storey building to Davis Street/Davis Lane, to provide 111 no bed spaces (6no studios and 19no apartments), a ground floor Café to Parnell Street/Davis Street, a Laundry accessed via courtyard, Bicycle and Bin Stores.
- **221189:** (a) Demolition of existing derelict building and associated works, (b) the construction of a residential development comprising of 28 No. Apartments which will be located within 4 separate blocks, construction of new access and internal roads, the installation of all required services to include pumping stations, connection to all public utility services, hard and soft landscaping with all associated site works.
- **221367:** demolition of a non-historic single storey over basement extension and the construction of 24 no. residential units over commercial unit (458.2 sq. metres) and café (135.2 sq. metres) in two separate blocks.
- **19710:** development of a six storey building comprising of 31 student apartment units (143 student bed spaces) & all associated auxiliary rooms. Medical Centre of 366.72 sq.m. Provision of 20 car parking spaces & secure bicycle storage. Demolition of existing bungalow & public house. Modifications to front site boundary wall and entrance and all associated site works.
- **2460570:** the construction of 2 no. apartment buildings, containing 40 No. apartment units comprising of 24 one bed, 16 two bed and ancillary works.

Based on the location, nature and scale of each of these developments, and taking account of the results of the impact assessment for the proposed development (i.e. subject of this application), no significant cumulative effects will arise.

The masterplan development for Phase I has been assessed with respect to potential cumulative effects, based on available information. The masterplan development for Phase III and IV has been assessed with respect to potential cumulative effects, based on available information. It is noted that the proposed application site has been designed holistically to ensure that future delivery of the masterplan development (as detailed in Chapter 1.0 Introduction) is considered where relevant e.g. the Phase II drainage design has been developed, allowing for the impermeable areas associated with the masterplan layouts.

Cumulative effects with respect to Material Assets – Utilities are considered likely to have an imperceptible impact and are therefore not significant.

20.7 REMEDIAL & MITIGATION MEASURES

20.7.1 Demolition Phase

In November 2024 an Asbestos Survey Report was prepared by Phoenix Environmental Safety Ltd (Report No. PE24-1226) to locate and identify the presence of asbestos containing materials (ACM's) or suspected ACM's. Asbestos was identified in 15no. of the 19no. buildings where asbestos surveys took place, at a total of 31no. locations. A list of these materials, the buildings they are located in and the approximate floor area of each can be found in Chapter 19.0 – Material Assets - Waste Management.

The following mitigation measures (as detailed in the by Asbestos Survey Report (Phoenix Environmental Safety Ltd., 2024) will be implemented:

- Asbestos containing materials will be removed by an asbestos removal contractor from all 31no. locations identified, and disposed of as asbestos waste before any demolition works commence;
- Carrying out removal works with asbestos recovered on insulation board and millboard panels will require 14 days notification to the HSA. This applies to 7no. locations; and,
- All asbestos removal work will be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010, and all asbestos waste will be disposed of in accordance with all relevant statutory requirements.

The following mitigation measures will also be implemented during the demolition phase:

- A project-specific Detailed Construction Environmental Management Plan (CEMP) will be prepared by the appointed Contractor prior to the commencement of demolition / construction works. This document will incorporate all of the environmental considerations (including water, dust and noise nuisance control; soil/stockpile management; temporary groundwater management; appropriate site management of compound area; fuel, oil and chemical storage and use; and waste management) set out in the Outline CEMP submitted as part of this planning application;
- All works will be carried out in strict accordance with the guidelines of the relevant stakeholders (specifically ESB, eir and Uisce Éireann), Health and Safety and any additional site specific requirements;
- A copy of all available existing, and as built utility plans will be maintained onsite during the demolition phase, and;
- The underground power lines and foul water mains within the existing Uisce Éireann services, located onsite will be clearly marked and all Site personnel will be made aware of the known location of any onsite underground or over ground services during the construction phase.

20.7.2 Construction Phase

The following mitigation measures will be implemented during the construction phase:

- A project-specific Detailed Construction Environmental Management Plan (CEMP) will be prepared by the appointed Contractor prior to the commencement of construction works. This document will incorporate all of the environmental considerations (including water (specifically stormwater run-off), dust and noise nuisance control; soil/stockpile management; temporary groundwater management; appropriate site management of compound area; fuel, oil and chemical storage and use; and waste management) set out in the Outline CEMP submitted as part of this planning application;
- All newly installed utilities/services will be assessed, tested and certified as required prior to being fully commissioned;

- The construction compounds will include adequate temporary welfare facilities including foul drainage and potable water supply. Foul drainage discharge from the compound will be removed off site to an appropriately licensed facility for disposal until a connection to the public foul drainage network has been established;
- Connections to the existing and proposed foul networks will be coordinated with the relevant utility provider. All works associated with the existing and proposed utilities for the proposed development will be carried out in strict accordance with the guidelines of the relevant stakeholders (specifically ESB, eir and Uisce Éireann), Health and Safety and any additional site specific requirements;
- A copy of all available existing, and as built utility plans will be maintained onsite during the construction of the proposed development. The underground power lines and foul water mains within the existing Uisce Éireann services, located onsite will be clearly marked and all Site personnel will be made aware of the known location of any onsite underground or over ground services during the construction phase and,
- Street Lighting will be implemented in accordance with the lighting report prepared by Arup (2025b).
- Telecommunications infrastructure will be installed in accordance with the ISM (2025) report, submitted as part of this planning application.

20.7.3 Operational Phase

As no significant adverse impacts are predicted to occur during the operational phase, no mitigation measures apply to the operational phase of the proposed development.

20.8 RESIDUAL IMPACTS

Taking account of the proposed mitigation measures for Material Assets – Utilities, the residual impacts of the proposed development will be short-term and slight adverse during the demolition and construction phases. An increased demand for power supply, water and foul services and telecommunications will occur during the operational phase; however this has been designed for and assessed accordingly, and required capacity has been confirmed to be present.

No potential impacts are likely to occur during the operational phase. No significant impacts are likely to occur during the operational phase.

20.9 MONITORING

The Contractor will be responsible for maintaining records and documentation for the full duration of the demolition and construction phase, including all relevant paperwork during commissioning of new services, consisting of required approvals and consents, and documentation for each system being commissioned (i.e. completion reports, checklists, test results, utility provider confirmation, and operations and maintenance manuals). No monitoring is required during the operational phase of the proposed development.

20.10 REFERENCES

- ARUP, 2025(a). Structural Report
- ARUP, 2025(b). Lighting Design Report.
- ARUP, 2025(c). Engineering Services Report
- ARUP, 2025. Engineering planning drawings.
- British Standard, 2017. BS EN 752 Drain and Sewer Systems outside Buildings
- CIRIA report C753 'The SuDS Manual – v6;
- Department of Housing, Local Government and Heritage, 2020. Technical Guidance Document H - Drainage and Waste Water Disposal.
- EPA, 2022. 'Guidelines on the information to be contained in Environmental Impact Assessment Reports'.
- Greater Dublin Regional Code of Practice for Drainage Works and Irish Water requirements.
- Independent Site Management (ISM), 2025. Telecommunications Report
- Limerick City and County Council, 2022. Surface Water/SuDs Specification
- Limerick City and County Council (LCCC), 2022. Limerick City and County Development Plan, 2022 - 2028
- Limerick City and County Council (LCCC), 2025. Available utility information and maps.
- Phoenix Environmental Safety Ltd., 2024. Asbestos Survey Report
- Uisce Éireann, 2017. Code of Practices and Technical Standards (IW-CDS-5030-01 to 04 & IW-TEC-800).
- Uisce Éireann (UÉ), 2025. Available utility information and maps.
- Uisce Éireann (UÉ), 2025. Confirmation of Feasibility (CoF)