Limerick WWTP Upgrade and Regional Bioresource Centre

Appendix 16.2 - Flood Risk Assessment

June 2026



Formerly JB Barry Partners who became part of Egis in 2023

Table of Contents

1 INTRODUCTION 1
1.1 Project Overview 1
1.2 Site Location 1
1.3 Proposed Development Description 2
1.3.1 Introduction 2
2 ASSESSMENT CRITERIA 3
2.1 Methodology 3
2.2 Data Collection 6
3 EXISTING HYDROLOGICAL REGIME 7
3.1 Historic Mapping 7
3.2 Salient Hydrological Features 8
3.3 Topographical Survey 10
3.4 Existing Geology and Hydrogeology 12
3.5 Historic Flood Events 13
3.6 Existing Flood Defences 14
3.6.1 Arterial Drainage Scheme 15
3.6.2 Land Commission 16
3.7 Flood Studies 17
3.7.1 Irish Coastal Wave and Water Level Modelling Study (ICWWS) 17
3.7.2 Shannon Catchment Flood Risk Assessment and Management Study 18
3.7.3 Limerick Development Plan Strategic Flood Risk Assessment 2022-2028 22
3.7.4 Limerick City and Environs Flood Relief Scheme 27
3.7.5 Summary of Flood Studies 28
4 FLOOD RISK ASSESSMENT 28
4.1 Introduction 28
4.2 Stage 1 – Flood Risk Identification 28
4.2.1 Coastal Flood Risk 29
4.2.2 Fluvial Flood Risk 29
4.2.3 Groundwater Flood Risk 29
4.2.4 Pluvial Flood Risk 29
4.2.5 Artificial Drainage Systems Flood Risk 29
4.2.6 Residual Flood Risk 29
4.3 Stage 2 – Initial Flood Risk Assessment 29
4.4 Justification Test 31
4.4.1 Criterion 1: The subject land has been designated for this particular use 32
4.4.2 Criterion 2: The proposal has been subject to an appropriate flood risk assessment 33
5 SUMMARY OF ASSESSMENT 37
5.1 Flood Risk Summary 37
5.2 Mitigation Measures 37

List of Figures

Figure 1-1: Location of proposed development at Limerick WWTP and Corcanree PS (source: google maps, annotations by egis) 1

Figure 3-1: Hydrological features of the study area (Source: www.epa.ie, annotations by egis) 9
Figure 3-2: Limerick WWTP Survey Extents (Source: Murphy Geospatial) 10
Figure 3-3: Corcanree PS Survey Extents (Source: Murphy Geospatial) 11
Figure 3-4: GSI Aquifer Vulnerability Mapping (Source: www.gsi.ie, annotations by Egis) 12
Figure 3-5: GSI Subsoil Mapping (Source: www.gsi.ie, annotations by Egis) 13
Figure 3-6: Location of historic flooding in the vicinity of the proposed development (Source: www.floodinfo.ie, annotations by Egis) 14
Figure 3-7: OPW and Non-OPW Embankments (Source: www.floodinfo.ie) 15
Figure 3-8: Existing Arterial Drainage Scheme Flood Defences (Source: www.floodmaps.ie) 16
Figure 3-9: Land Commission Embankments and Benefitted Lands (Source: www.floodinfo.com, annotations by Egis) 17
Figure 3-10: Proposed Site Locations in Relation to ICWWS Node S26 18
Figure 3-11: Extract of Coastal Flood Extent Map at WWTP Site (Source: Shannon CFRAM, annotations by Egis) 19
Figure 3-12: Extract of Fluvial Flood Extent Map at WWTP Site (Source: Shannon CFRAM, annotations by Egis) 20
Figure 3-13: Extract of Coastal Flood Extent Map at PS Site (Source: Shannon CFRAM, annotations by Egis) 21
Figure 3-14: Extract of Fluvial Flood Extent Map at PS Site (Source: Shannon CFRAM, annotations by Egis) 22
Figure 3-15: Extract from Limerick City & County Council SFRA Flood Zone Map 23
Figure 3-16: Present Day 0.5% AEP Event Overtopping Extents (Source: RPS, annotations by Egis) 25
Figure 3-17: 0.5% AEP Breach 2 Extents (Source: RPS, annotations by Egis) 26
Figure 3-18: Flood Defence Failure Breach Analysis Flood Extents for 0.5% AEP Event (Source: PUNCH Consulting Engineers (via Limerick SFRA), annotations by Egis) 27
Figure 4-1: Matrix of Vulnerability versus Flood Zone to illustrate appropriate development. 31
Figure 4-2: Extract of LDP Limerick City and Suburbs maP 3 - Zoning Map 32
Figure 4-3: Proposed Storm tank and Existing Ground Levels 34
Figure 5-1: Adopted Coastal Flood Levels 37

List of Tables

Table 3-1: Historic 6 inch and 25 inch Maps of the Proposed Development and surrounding areas (Source: www.geohive.ie, annotations by Egis) 7
Table 3-2: Coastal Flood water Levels at WWTP 19
Table 3-3: Coastal Flood Water Levels at PS 21
Table 3-4: Extract from Table 5-2 of Limerick SFRA 24
Table 3-5: Extract from Table 5-3 of Limerick SFRA 24
Table 3-6: Summary of Coastal Flood Levels 28

List of Appendices

Appendix 16.1: Proposed Development Layouts 39
Appendix 16.2: Topographical Survey 42
Appendix 16.3: Past Flood Event Summary Report 45
Appendix 16.4: Shannon CFRAM Maps 48
Appendix 16.5: Limerick SFRA Flood Maps 53

1 INTRODUCTION

1.1 Project Overview

Egis Engineering Ireland Ltd. has been commissioned by Uisce Éireann to undertake a site-specific Flood Risk Assessment (FRA) for proposed works at Limerick Wastewater Treatment Plant (WWTP) and Corcanree Pumping Station (PS) in Co. Limerick. The assessment has been prepared to accompany a planning application relating to the proposed upgrade of the existing WWTP and the development of a Regional Bioresource Centre, together with associated works at Corcanree Pumping Station.

The aim of the FRA is to identify, assess and communicate to decision-makers and other stakeholders the potential risk of flooding associated with the proposed development. The assessment has been carried out in accordance with the Planning System and Flood Risk Management Guidelines (hereafter referred to as the FRM Guidelines) published in November 2009 by the then Department of the Environment, Heritage and Local Government (DEHLG) and the Office of Public Works (OPW).

1.2 Site Location

The proposed development comprises works at Limerick WWTP and Corcanree Pumping Station (PS). Both sites are located within an established industrial area along Dock Road, approximately 3 km south-west of Limerick City Centre. The facilities are situated on the southern bank of Limerick Dock, within the transitional zone where the River Shannon flows into the Shannon Estuary. The relative locations of the two sites in the context of Limerick City and Limerick Dock are shown in Figure 1-1. The figure also identifies the red line planning application boundary and the blue line denoting lands within the ownership of the applicant.

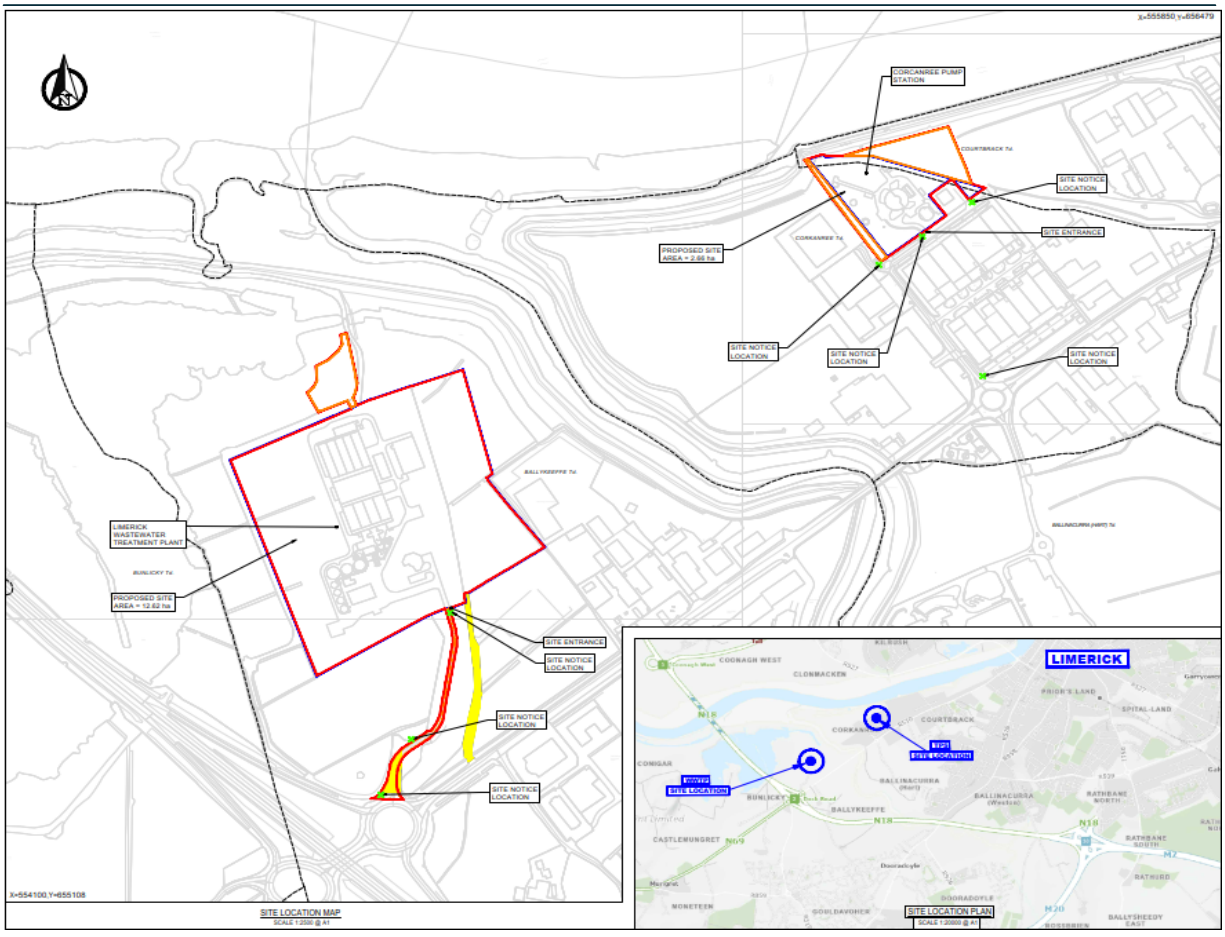


FIGURE 1-1: LOCATION OF PROPOSED DEVELOPMENT AT LIMERICK WWTP AND CORCANREE PS (SOURCE: GOOGLE MAPS, ANNOTATIONS BY EGIS)

The immediate surrounding land use is predominantly industrial and port-related, consistent with the long-established character of the Dock Road corridor. Adjacent and nearby land uses include port infrastructure, warehousing and storage facilities, light and heavy industrial units, and other utility installations. A concrete batching plant is located in close proximity, alongside other industrial and commercial operations.

Beyond the Dock Road industrial area, the surrounding landscape comprises predominantly agricultural lands. These lands are physically separated from the sites by established industrial plots and transport infrastructure, thereby limiting direct connectivity and interaction with the proposed development.

Both sites are accessible via Dock Road (R510), which connects to Limerick City Centre and provides onward access to the N18 and N69 national and regional routes. This road network accommodates the operational traffic associated with industrial and port-related activities in the area.

Approximately 90% of the Limerick Main Drainage network flows to Corcanree Pumping Station, where it is conveyed onward to the Limerick WWTP via two 900 mm diameter rising mains. The remaining influent enters the WWTP via Mungret Pumping Station (located on the WWTP site). Following treatment, the final effluent is discharged to the Shannon Estuary through a 1.2 km long outfall pipeline.

1.3 Proposed Development Description

1.3.1 Introduction

The Proposed Development will cater for future population growth and industrial development in the area, in line with population projections for Limerick as set out in the National Planning Framework (NPF) Implementation Roadmap and the Southern Region Regional Spatial and Economic Strategy (RSES). It will provide 20% Headroom allowance, in line with Uisce Éireann guidelines for large urban settlements. It will also ensure the WWTP continues to comply with requirements of the EPA Wastewater Discharge License (WWDL), Urban Wastewater Treatment Regulations (UWWTR) and other relevant Uisce Éireann Guidelines.

The initial upgrade works will cater for the +10-year growth projections, increasing to 285,000 PE including a future industrial committed load of 27,500 PE. There will be provision made in the civil infrastructural development of the plant (tank sizing and pipework) for the +25-year growth projections of 325,000 PE. However, a planning review will be required before any uplift above 285,000 PE can be instated.

The main elements of the Proposed Development are listed below, and detailed site layout drawings are available in Appendix 14.1:

- Wastewater Treatment Capacity Upgrade
  - New inlet works and Aerobic Granular Sludge (AGS) treatment stream with capacity of 157,000 PE, operating in parallel with the existing process.
  - Diversion of one rising main from Corcanree Pumping Station to the new process stream, enabling an approximate 50:50 flow split between the new and existing works.
  - Reconfiguration of the Mungret pumping arrangement to distribute flows between the existing and new treatment streams.
- Stormwater Storage (Corcanree PS)
  - Complete acquisition of Shannon Foynes Port Company (SFPC) lands (greenfield) to the east of Corcanree PS site.
  - Construct new 12,500m^3 stormwater storage tank with gravity overflow to existing Corcanree outfall chamber.
  - Retain existing rising mains to the WWTP site.
  - Upgrade existing foul pumps to increase pumping capacity to the WWTP.
- Regional Bioresource Centre (RBC)

- Sludge reception facilities – existing imported cake reception retained and new dewatered cake reception facility.
- Cake storage and blending silo for management of imported sludge.
- Installation of a Thermal Hydrolysis Plant (THP).
- Additional anaerobic digestion capacity.
- Biogas management and energy recovery, including additional gas storage and additional 800kW CHP capacity.
- Digested sludge dewatering and biosolids export silos.
- Supporting infrastructure, including odour control and upgraded wash water system with UV treatment.

- Surface water management with the inclusion of Sustainable Drainage Systems (SuDS) features:

  - SuDS features providing both interception and attenuation.
  - Hydrocarbon interceptor to mitigate pollution risk.
  - Discharge at the site's Q_{BAR} flow rate.

2 ASSESSMENT CRITERIA

2.1 Methodology

The methodology used for the flood risk assessment for the proposed developments at Limerick WWTP and Corcanree PS is based on the 2009 publication 'The Planning System and Flood Risk Management, Guidelines for Planning Authorities' (FRM Guidelines). The FRM Guidelines require the planning system at national, regional and national levels to:

- Avoid development in areas at risk of flooding, particularly flood plains, unless there are proven wider sustainability grounds that justify appropriate development;
- Adopt a sequential approach to flood risk management when assessing the location for new development based on avoidance, reduction and then mitigation of flood risk; and
- Incorporate flood risk assessment into the process of making decisions on planning applications, land use and planning appeals.

The sequential approach (see Figure 3.1 of the FRM Guidelines below) in flood risk management requires the following three steps to identify the necessity for the justification test for a development:

- Step 1: Identification of the Flood Zone at the proposed development site (Section 2.23 of the FRM Guidelines);
- Step 2: Identification of the vulnerability of the type of the proposed development (Table 3.1 of the FRM Guidelines); and
- Step 3: Using the matric of vulnerability versus Flood Zone (Table 3.2 of the FRM Guidelines), identify the necessity for the Justification test for the proposed development.

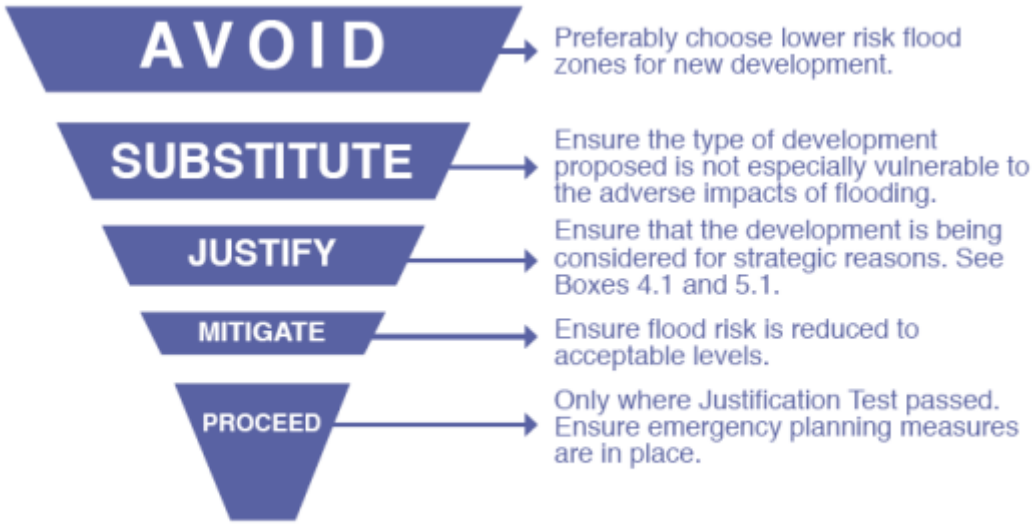


Fig. 3.1: Sequential approach principles in flood risk management

While Figure 3.1 of the FRM Guidelines sets out the broad philosophy underpinning the sequential approach in the flood risk management, Figure 3.2 of the Guidelines (shown overleaf) describes the mechanism of the sequential approach for use in the planning process.

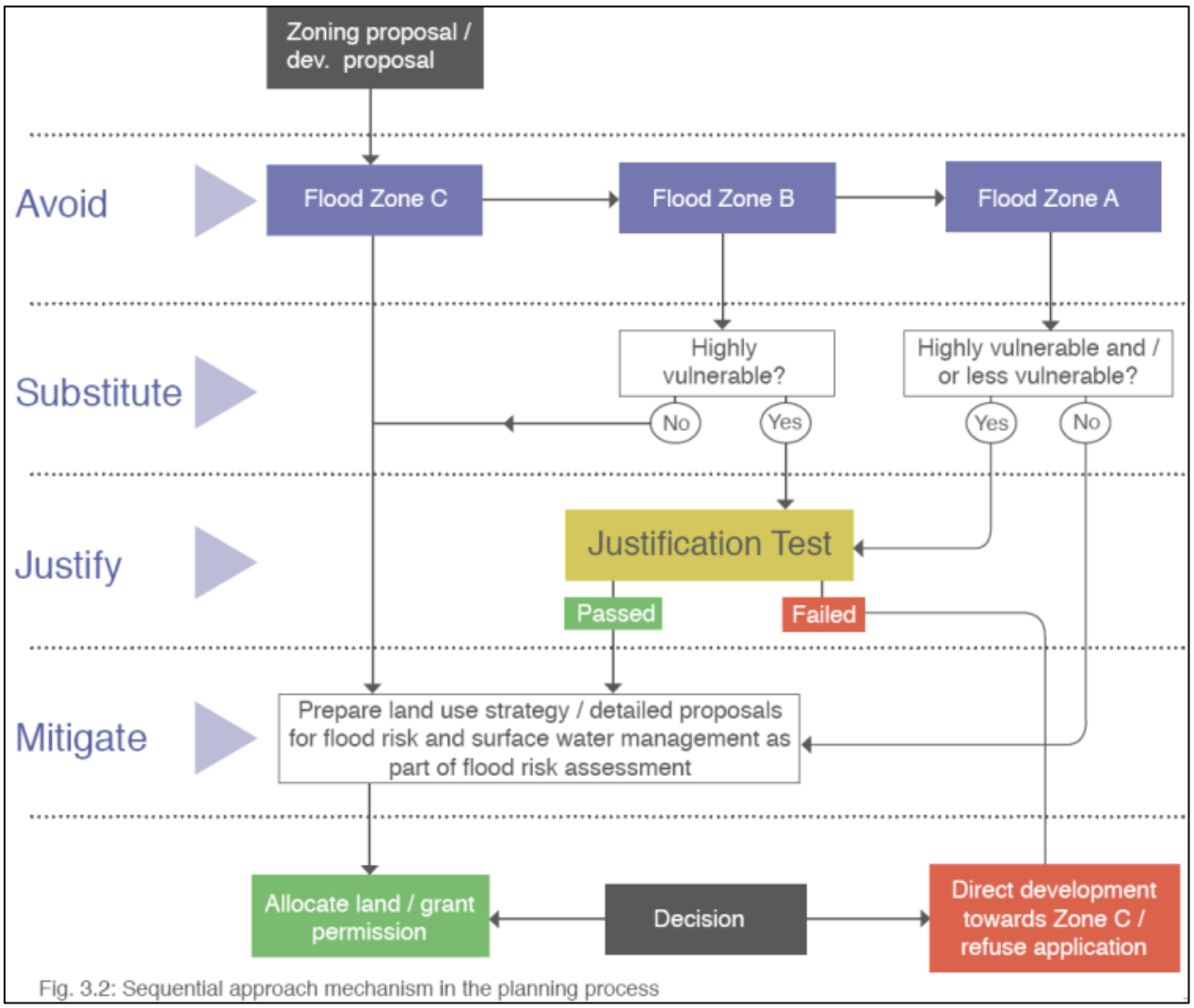


Fig. 3.2: Sequential approach mechanism in the planning process

According to the FRM Guidelines, Flood Zones are graphical areas within which the likelihood of flooding is in a particular range. They are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. There are three Flood Zones, namely,

- **Flood Zone A** – where the probability of flooding from rivers and the sea is highest (greater than 1% AEP or 1 in 100-year for river flooding or 0.5% or 1 in 200-year for coastal flooding);
- **Flood Zone B** – where the probability of flooding from rivers and the sea is moderate (between 0.1% AEP or 1 in 1000 year and 1% AEP or 1 in 100-year for river flooding and between 0.1% AEP or 1 in 1000 year and 0.5% AEP or 1 in 200-year for coastal flooding);
- **Flood Zone C** – where the probability of flooding from rivers and the sea is low (less than 0.1% AEP or 1 in 1000 year for both river and coastal flooding).

Flood Zones A, B and C are based on the current assessment of the 1% AEP and the 0.1% AEP fluvial events and the 0.5% AEP and 0.1% AEP tidal events, without the inclusion of climate change factors. Table 3.1 of the FRM Guidelines (See extract of Table 3.1 overleaf) shows the classification of the vulnerability to flooding of different types of development.

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).
*Uses not listed here should be considered on their own merits	

Table 3.1 Classification of vulnerability of different types of development

Table 3.2 of the FRM Guidelines (shown below) identifies the type of development that would be appropriate for each Flood Zone and those that would be required to meet the Justification test. Since, essential infrastructure such as water and sewerage treatment are classified as '*Highly vulnerable development*' the section highlighted in Table 3.2 presents the required actions for each flood zone for this assessment.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

The FRM Guidelines (Chapter 2) outlines the following three stages of flood risk assessment:

Stage 1: Flood Risk Identification – to identify whether there may be any flooding or surface water management issues relating to the proposed development site that may warrant further investigations.

Stage 2: Initial Flood Risk Assessment - to confirm the sources of flooding that may affect the proposed development site, to appraise the adequacy of existing information and to determine what surveys and modelling approach is appropriate to match the spatial resolution required and complexity of the flood risk issues. This stage involves the review of existing studies and hydraulic modelling to assess flood risk and to assist with the development of FRM measures.

Stage 3: Detailed Flood Risk Assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development, of its potential impacts on flood risk elsewhere and of the effectiveness of any proposed mitigation measures. This will typically involve use of an existing or construction of a hydraulic model across a wide enough area to appreciate the catchment wide impact and hydrological process involved.

2.2 Data Collection

Data required for the flood risk assessment was obtained from various sources, as described below.

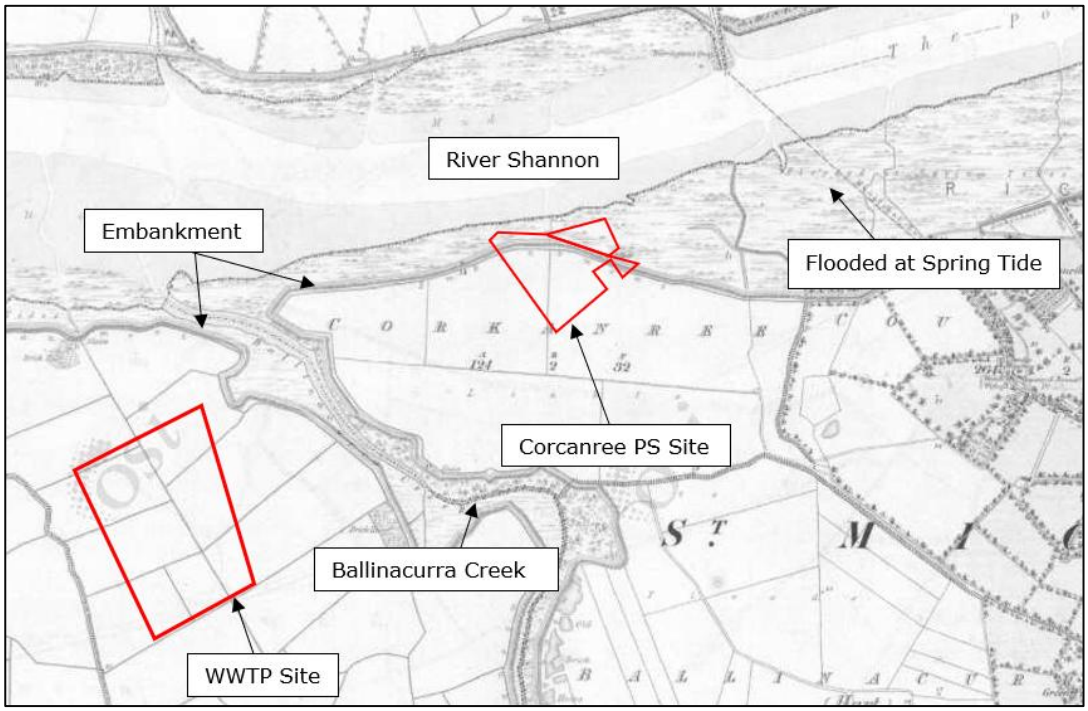
- The Limerick Development Plan Strategic Flood Risk Assessment 2022 – 2028 was obtained from the Limerick City and County Council website *www.limerick.ie*;
- The historic flood data was obtained from the National Flood Hazard Mapping website *www.floodmaps.ie;*
- Historic mapping of the proposed development and surrounding watercourses was obtained from *www.geohive.ie*;
- The Subsoil and Aquifer vulnerability data was obtained from the Geological Survey of Ireland website *www.gsi.ie;*
- CFRAM Flood Maps were obtained from the OPW website *www.floodinfo.ie*;
- Flood Extent Maps (Fluvial and Coastal) were obtained from *www.floodinfo.ie;*
- Information on the Limerick City & Environs Flood Relief Scheme undertaken by the OPW was obtained from *www.floodinfo.ie;* and
- Extreme Water Levels were obtained from the Irish Coastal Wave and Water Level Modelling Study (ICWWS), 2018 undertaken by the OPW was obtained from *www.floodinfo.ie.*

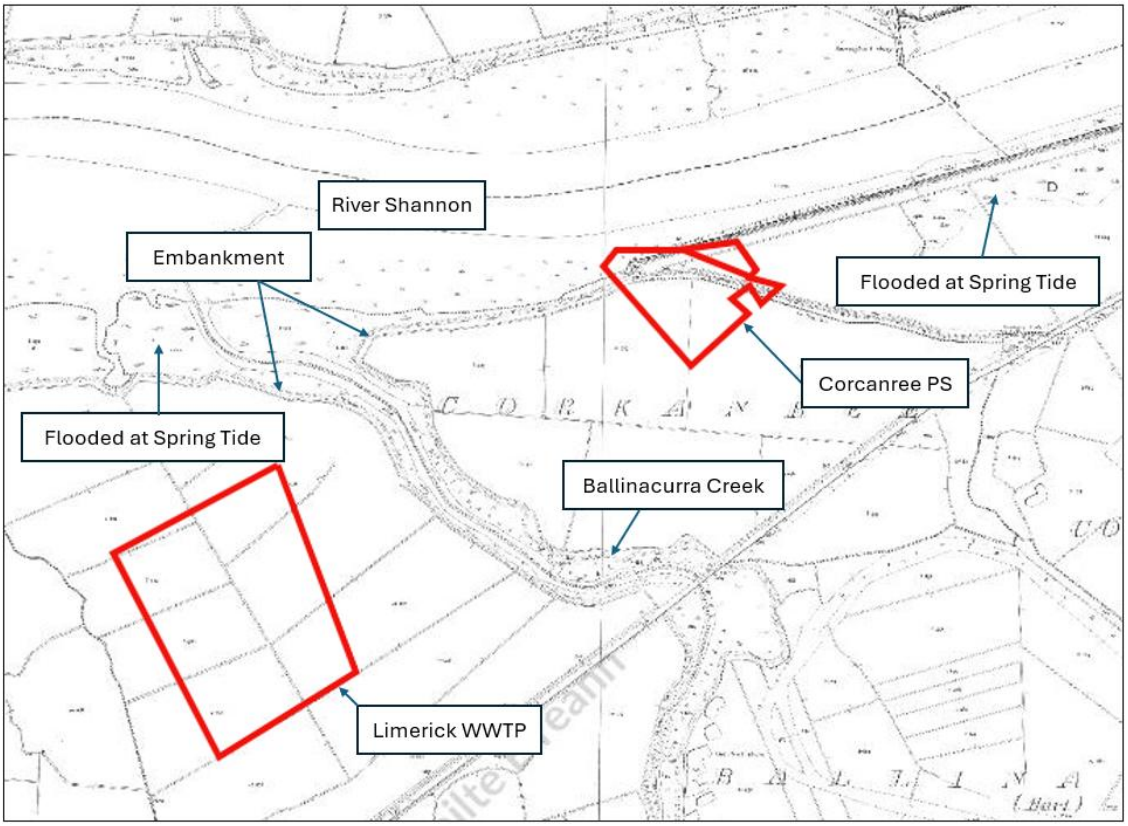
3 EXISTING HYDROLOGICAL REGIME

3.1 Historic Mapping

Desktop investigation of historic mapping of the proposed development and surrounding watercourses was carried out through *www.geohive.*ie web portal. Table 3-1 below presents the findings of the proposed development and surrounding watercourses.

TABLE 3-1: HISTORIC 6 INCH AND 25 INCH MAPS OF THE PROPOSED DEVELOPMENT AND SURROUNDING AREAS (SOURCE: WWW.GEOHIVE.IE, ANNOTATIONS BY EGIS)

Mapping	Findings
6-Inch	 Historic 6-inch mapping notably does not include the manmade Bunlicky Lake, which was not yet present. It indicates the longstanding presence of flood defence measures in the vicinity of both sites, each separated from the Shannon and the Ballinacurra Creek by an embankment. It is noted that the proposed location for the stormwater tank is not within the protected area, which is labelled on the map as 'flooded at spring tide'. There are areas to the north of the WWTP site also marked as 'flooded at spring tide'. The majority of these lands have since been developed and are presently occupied by industrial/commercial premises.

25-Inch	 25-inch historical mapping was also reviewed and shows no notable variations from 6-inch mapping. A notable development is the Dock Road which has been constructed to the south of both development sites.

3.2 Salient Hydrological Features

The main hydrological features of the area are three transitional waterbodies, Limerick Dock, Upper Shannon Estuary and Ballinacurra Creek and a manmade lake formed from the flooding of an alluvium quarry known as Bunlicky Lake. Figure 3-1 illustrates these hydrological features associated with the site.

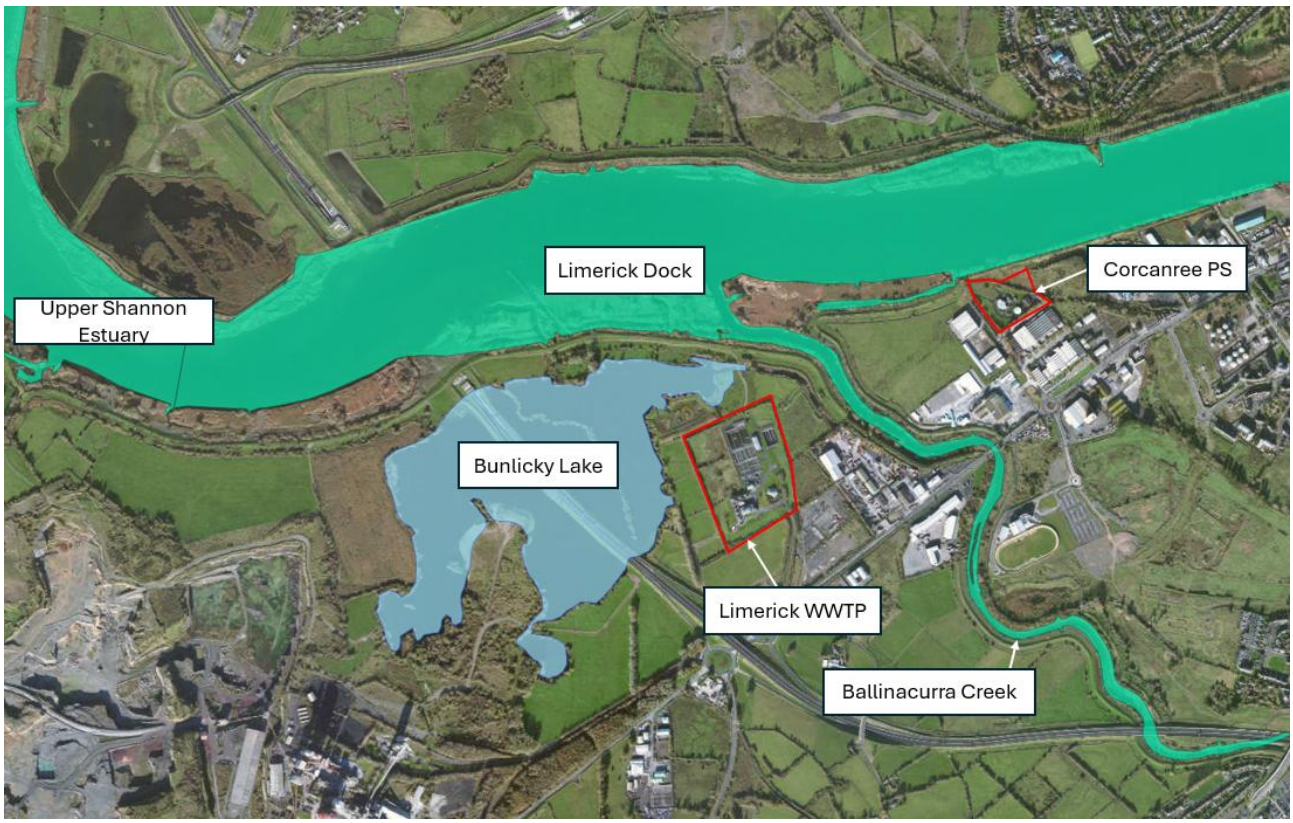


FIGURE 3-1: HYDROLOGICAL FEATURES OF THE STUDY AREA (SOURCE: *WWW.EPA.IE*, ANNOTATIONS BY EGIS)

3.3 Topographical Survey

A site-specific topographic survey was undertaken for Limerick WWTP and Corcanree PS by Murphy Geospatial and is included as Appendix 14.2.

Limerick WWTP

Existing levels at the site generally fall in a north-westerly direction. Observations of the topographical survey indicate that ground elevations in the vicinity of the existing infrastructure at Limerick WWTP are generally in the region of 4.3mOD, with the exception of the access road that connects the Sludge Hub to the northern boundary of the site. Ground levels here are continually decreasing before plateauing in the yard area at 2.1 - 2.3mOD.

Vacant areas of land within the site are also considerably lower than the existing plant. Existing ground levels in the western portion of the site where development is proposed are in the range of 1.0 - 1.6mOD. There are trees present on the survey in this area also, beneath which ground levels are unknown.

An extract of Limerick WWTP site survey is presented as Figure 3-2.



FIGURE 3-2: LIMERICK WWTP SURVEY EXTENTS (SOURCE: MURPHY GEOSPATIAL)

Corcanree PS

The topographic survey for Corcanree PS (Figure 3-3) indicates some variability in ground levels, particularly along the curtilage of the site. Existing access road levels range from 2.97 - 4.4mOD, raising in a north-westerly direction, with the lowest points present at the entrance gate to the site. The northern boundary of the existing site is 4.6 - 4.76mOD.

Trees are present along the northeastern boundary that borders the lands on which development is proposed. This area displays higher spot levels than lands within the existing site, generally ranging between 4.45mOD – 5.21mOD. Contours illustrate a strip of land along the northern boundary (roughly parallel to the estuary) at 5.0mOD or higher. A large decrease in gradient is present in the northeastern corner of these lands. No development is proposed in this area at this stage.



FIGURE 3-3: CORCANREE PS SURVEY EXTENTS (SOURCE: MURPHY GEOSPATIAL)

3.4 Existing Geology and Hydrogeology

The Geological Survey of Ireland (GSI) website provides information on their public online mapping services at www.gsi.ie on subsoil type and aquifer vulnerability. The maps presented in Figure 3-4 and Figure 3-5 depict the aquifer vulnerability and subsoil type for the proposed development.

The aquifer vulnerability (Figure 3-4) in the area of the developments is mapped under a rating of *"low"* .GSI states that "Vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determines the ease with which groundwater may be contaminated by human activities". GSI further describes that the vulnerability of groundwater depends on:

- The time of travel of infiltrating water (and contaminants);
- The relative quantity of contaminants that can reach the groundwater; and
- The contaminant attenuation capacity of the geological materials through which the water and contaminants infiltrate.

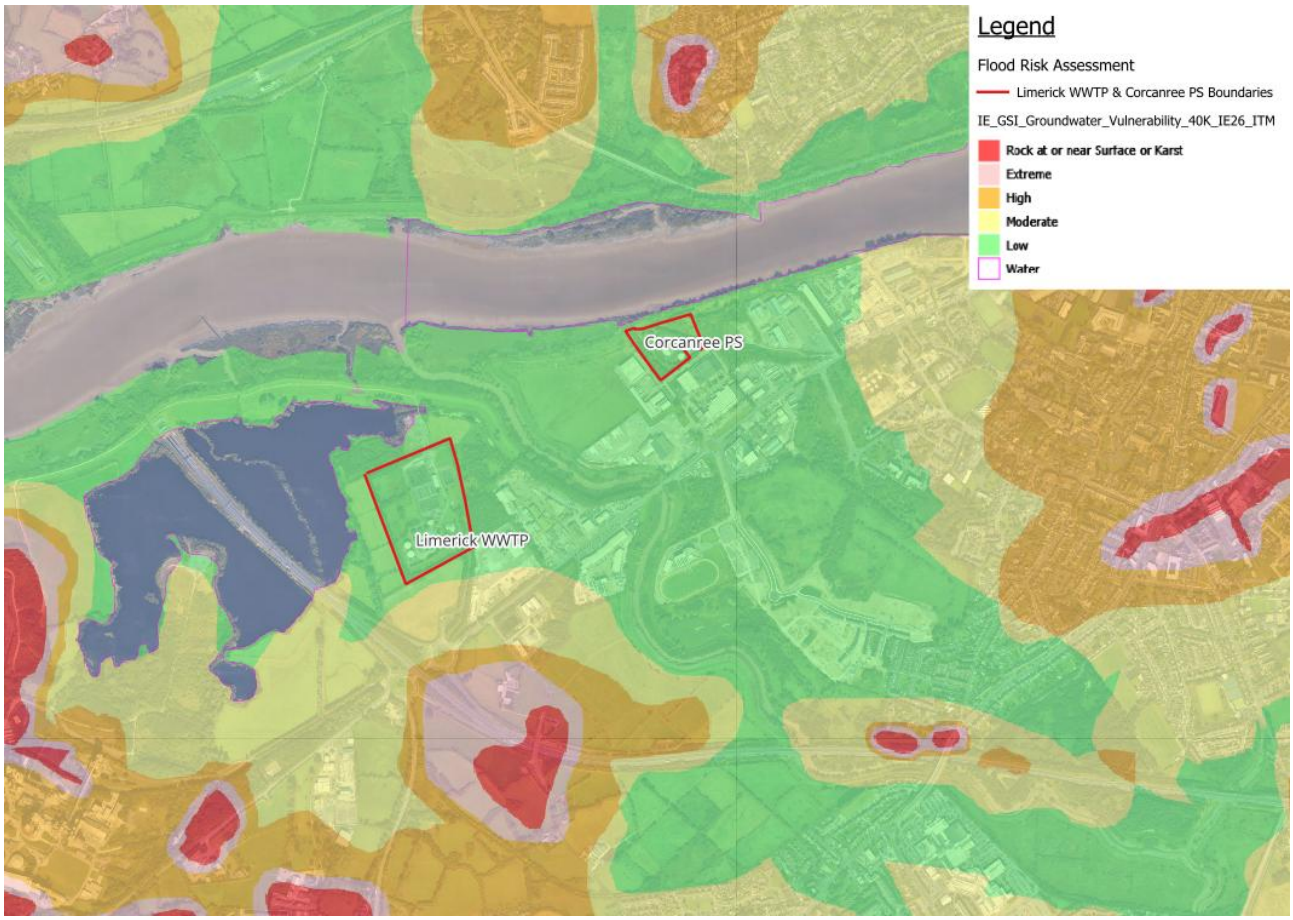


FIGURE 3-4: GSI AQUIFER VULNERABILITY MAPPING (SOURCE: *WWW.GSI.IE*, ANNOTATIONS BY EGIS)

The GSI subsoil mapping (Figure 3-5) indicates that Limerick WWTP is situated on, and surrounded by, marine/estuarine sediment (orange). Corcanree PS is also sits on marine/estuarine sediment (orange), however, the site boundary is also surrounded by made ground (turquoise) which continues eastwards towards Limerick City.

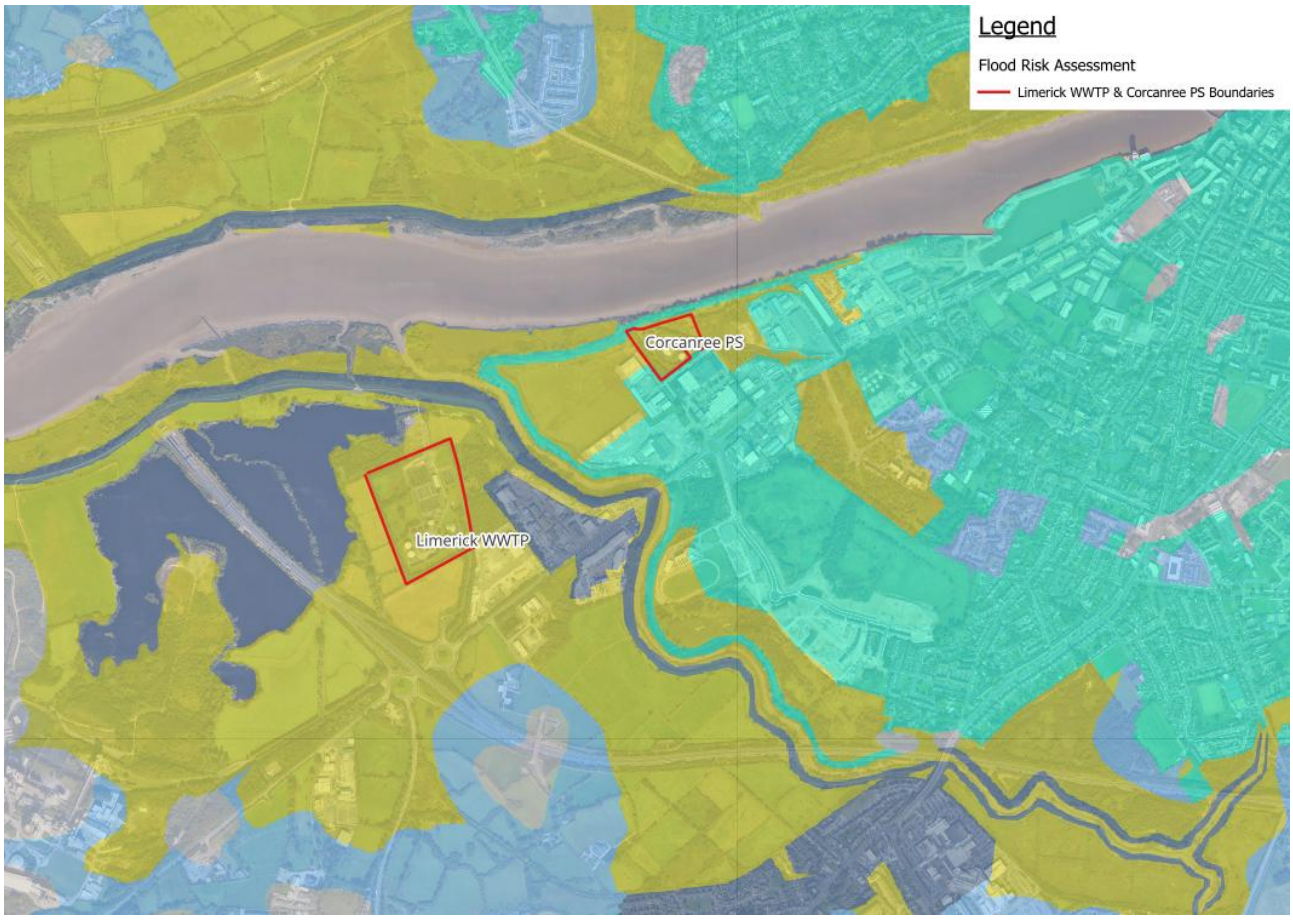


FIGURE 3-5: GSI SUBSOIL MAPPING (SOURCE: WWW.GSI.IE, ANNOTATIONS BY EGIS)

3.5 Historic Flood Events

The National Flood Hazard Mapping Website www.floodinfo.ie shows records of historic flooding throughout the country. A review of this database determined that there was no record of flooding in the vicinity of Limerick WWTP, however, there was 1 No. flood event in the vicinity of Corcanree PS.

Records indicate that this single flood event (ID-301) occurred on 25th December 1999 due to a combination of weather factors including low atmospheric pressure, westerly winds, persistent rainfall and spring tide. The persistent rainfall also meant that the ESB Hydroelectric Station were required to release large quantities of water, which also contributed to the flooding in the vicinity of the site. Flooding at other locations throughout the city are recorded as part of this event.

The extent of this flood event is presented in Figure 3-6.

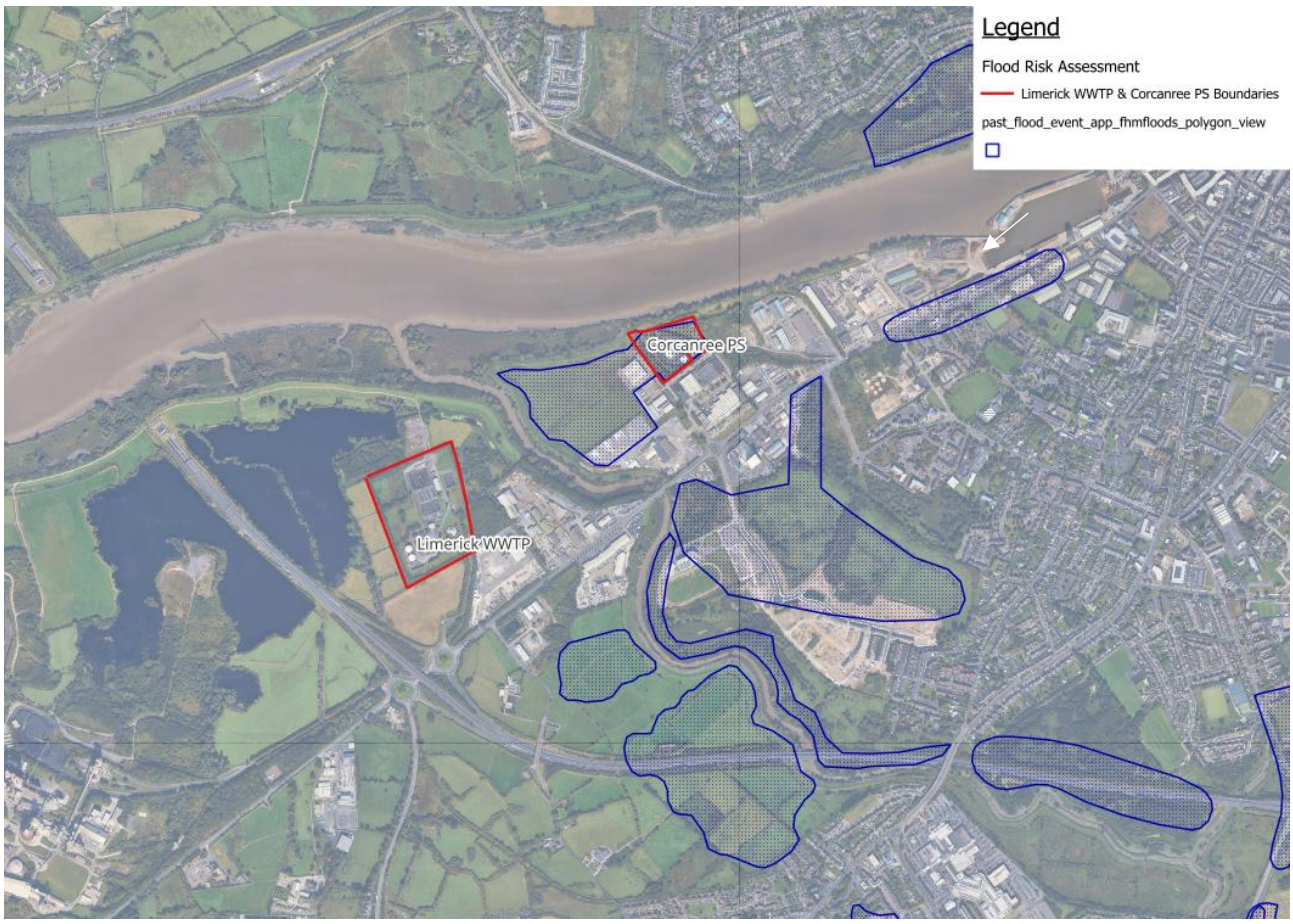


FIGURE 3-6: LOCATION OF HISTORIC FLOODING IN THE VICINITY OF THE PROPOSED DEVELOPMENT (SOURCE: WWW.FLOODINFO.IE, ANNOTATIONS BY EGIS)

Following the major floods in December 1999, Limerick Flood Study, Draft Report No.3, was prepared by Limerick City Council. It addressed a number of districts in the city, with Corcanree PS located within Area 4. The report indicated that the existing foul and surface water drainage system in this area was at capacity and recommended a new system be put in place before any future development, which would reduce the risk of flooding.

This was subsequently addressed by the Limerick Main Drainage scheme, which included the installation of 48km of Interceptor Sewers throughout the city up to 2700mm diameter, including 10km of trenchless pipelines. A summary of past flood events is included in Appendix 14.3.

3.6 Existing Flood Defences

There are 2 no. drainage schemes in place in the region of the assessment sites, namely the Arterial Drainage Scheme (ADS) and the Land Commission (LC). The ADS features are owned and maintained by the OPW, whereas the LC features Mapping obtained from Limerick City & Environs Flood Relief Scheme indicates that the embankment to the north of Limerick WWTP is not an OPW embankment. Figure 3-8Figure 3-7 below indicates which embankments are under the remit of OPW (shown in blue) and those that are non-OPW (shown in purple).

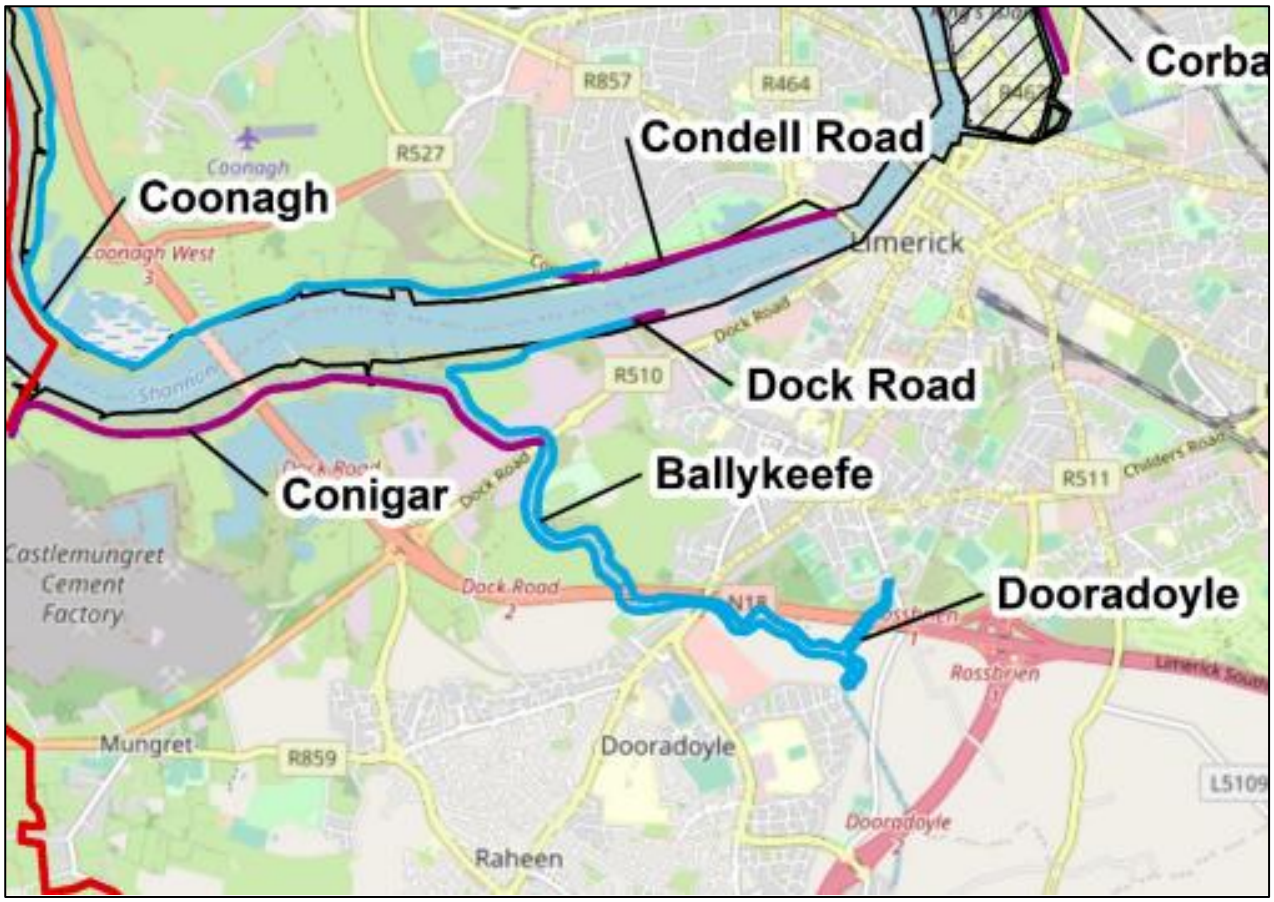


FIGURE 3-7: OPW AND NON-OPW EMBANKMENTS (SOURCE: *WWW.FLOODINFO.IE*)

According to the Shannon Catchment Flood Risk Assessment and Management (CFRAM) Study the embankment present to the north of Limerick WWTP provides a 0.5% AEP standard of protection (SOP) while the embankment to the north of Corcanree PS provides a 2% AEP SOP, with an upstream SOP of 5% AEP. The crest levels have been increased since the original construction of the embankment. It can be derived from the nodes within the model of the Shannon CFRAM Study, that the height of the embankment in the vicinity of Limerick WWTP is approximately 4.74mOD, and the height at Corcanree is approximately 4.39mOD (4.12mOD upstream).

3.6.1 Arterial Drainage Scheme

The OPW are responsible for Arterial Drainage Schemes (ADS) under the Arterial Drainage Act 1945. The purpose of these schemes is to improve land for agriculture and to mitigate flooding. Both of the assessment sites are located within areas predicted to benefit from the Ballynaclogh Arterial Drainage Scheme. Under Section 37 of the 1945 Act, the OPW is required to maintain drainage works in proper repair and effective condition. This is organised on a regional basis, with offices in Mungret, Co. Limerick, Headford, Co. Galway and Trim, Co. Meath.

The location of ADS features, namely channels and embankments, are presented in Figure 3-8 alongside the Benefited Lands. There are ADS channels present to the northeast of Corcanree PS parallel to Limerick Dock and to the east of Limerick WWTP, running adjacent to Ballinacurra Creek. Both Corcanree PS and Limerick WWTP are within the Benefitted Lands of the Arterial Drainage Scheme.

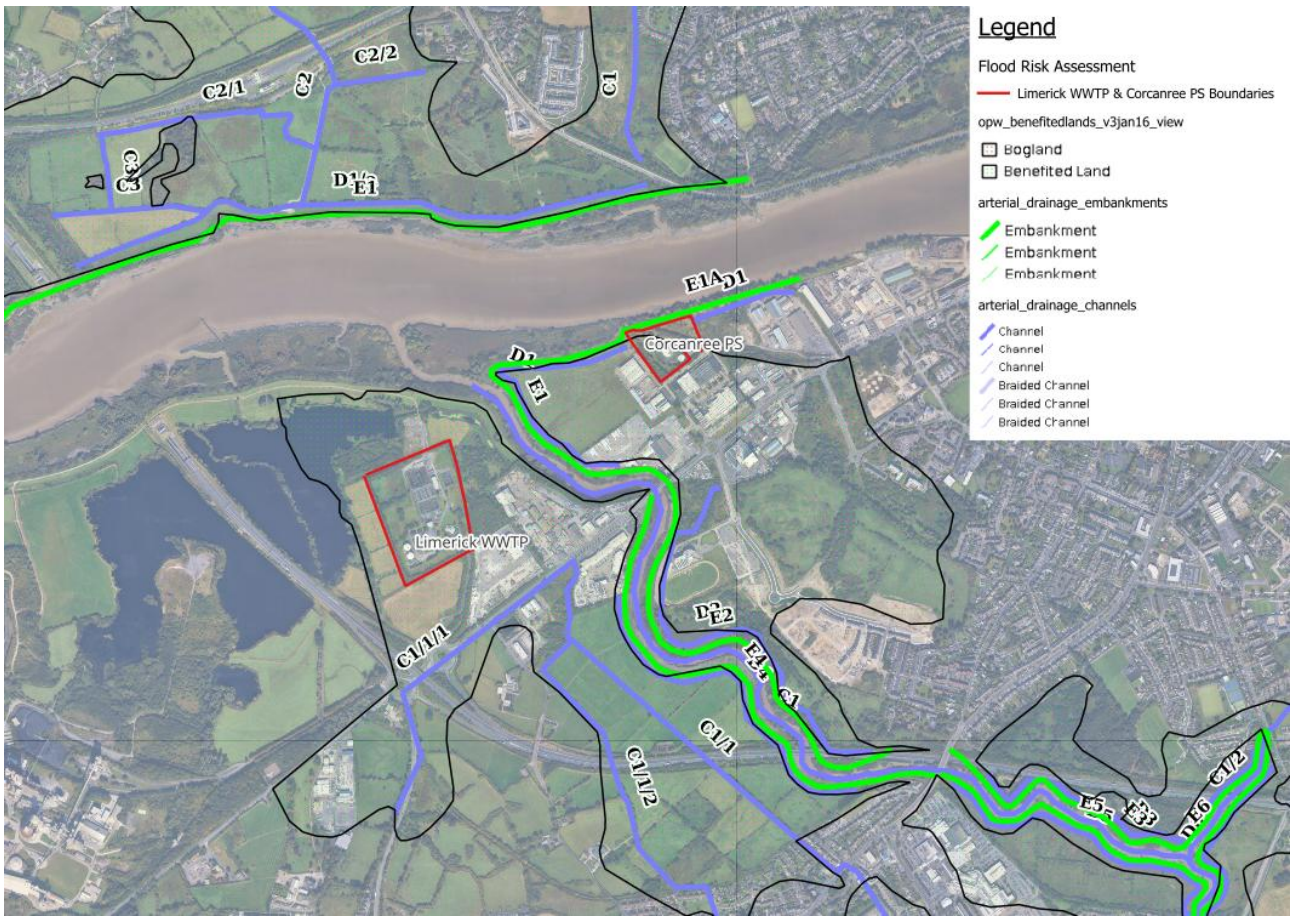


FIGURE 3-8: EXISTING ARTERIAL DRAINAGE SCHEME FLOOD DEFENCES (SOURCE: *WWW.FLOODMAPS.IE*)

3.6.2 Land Commission

Land Commission embankments are man-made, raised structures constructed by landowners, mainly in the 19th century, using natural materials to protect low-lying land from flooding. These embankments were created to reclaim land from rivers or the sea, often for agricultural purposes. Responsibility for maintaining these structures now falls to current landowners, as both the Minister and the Land Commission were exempted from this duty under Section 10 of the Land Act, 1965. In some cases, embankments allowed the enclosed land to flood and flush several times, helping to reduce salt content in the soil and improve its suitability for farming.

Figure 3-9 illustrates Land Commission Benefitted Lands covering the area of Limerick WWTP, Bunlicky Lake and the area to the southeast known as Greenpark. Although the embankment is not marked as a Land Commission embankment, evidence suggests that this is its origin. As such, the maintenance regime which has been in place since its construction is unknown.

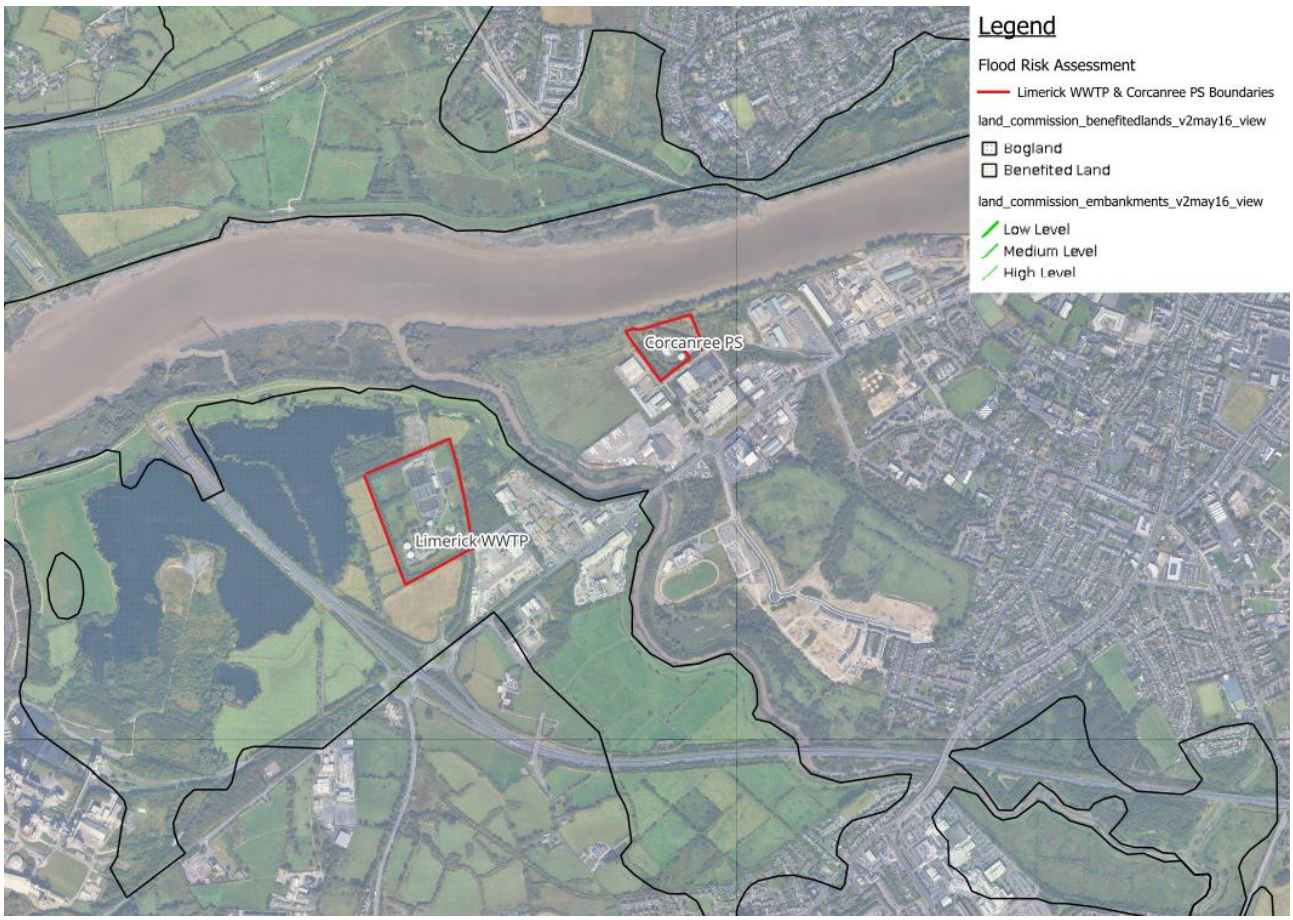


FIGURE 3-9: LAND COMMISSION EMBANKMENTS AND BENEFITTED LANDS (SOURCE: WWW.FLOODINFO.COM, ANNOTATIONS BY EGIS)

3.7 Flood Studies

3.7.1 Irish Coastal Wave and Water Level Modelling Study (ICWWS)

Phase 1 of the Irish Coastal Wave and Water Level Modelling Study (ICWWS) was carried out in 2018 with official publications issued by the Office of Public Works in October 2020. The study aimed to provide an update to Extreme Coastal Water levels for the coast of Ireland, which was originally presented as the Irish Coastal Protection Strategy Study (ICPSS) undertaken between 2004 and 2013 and provides estimate water levels for a range of Annual Exceedance Probability (AEP) events at a series of points.

When a comparison was made between the ICWWS 2018 and ICPSS water levels to OD Malin (OSGM02), the upper Shannon Estuary showed a notable decrease in water levels between the ICPSS and the ICWWS 2018. At the time of the ICPSS assessments, there was limited bathymetric and gauge data available for this area, and the results to the east of the Fergus Estuary were deemed unreliable.

Following the acquisition of LiDAR data for the Fergus Estuary (2012) and the installation of several tide gauges over the intervening period to provide data for validation, the accuracy and confidence in the ICWWS 2018 modelling in the Shannon Estuary has improved significantly.

The Phase 1 Technical Report indicates that node S26 is the closest estimation point within the Shannon Estuary, located at ITM 549620 (Eastings), 658687 (Northings). The water level at this point is predicted to be 4.27mOD during a present day 0.5% AEP flood event.

The location of node S26 is illustrated in Figure 3-10 below.

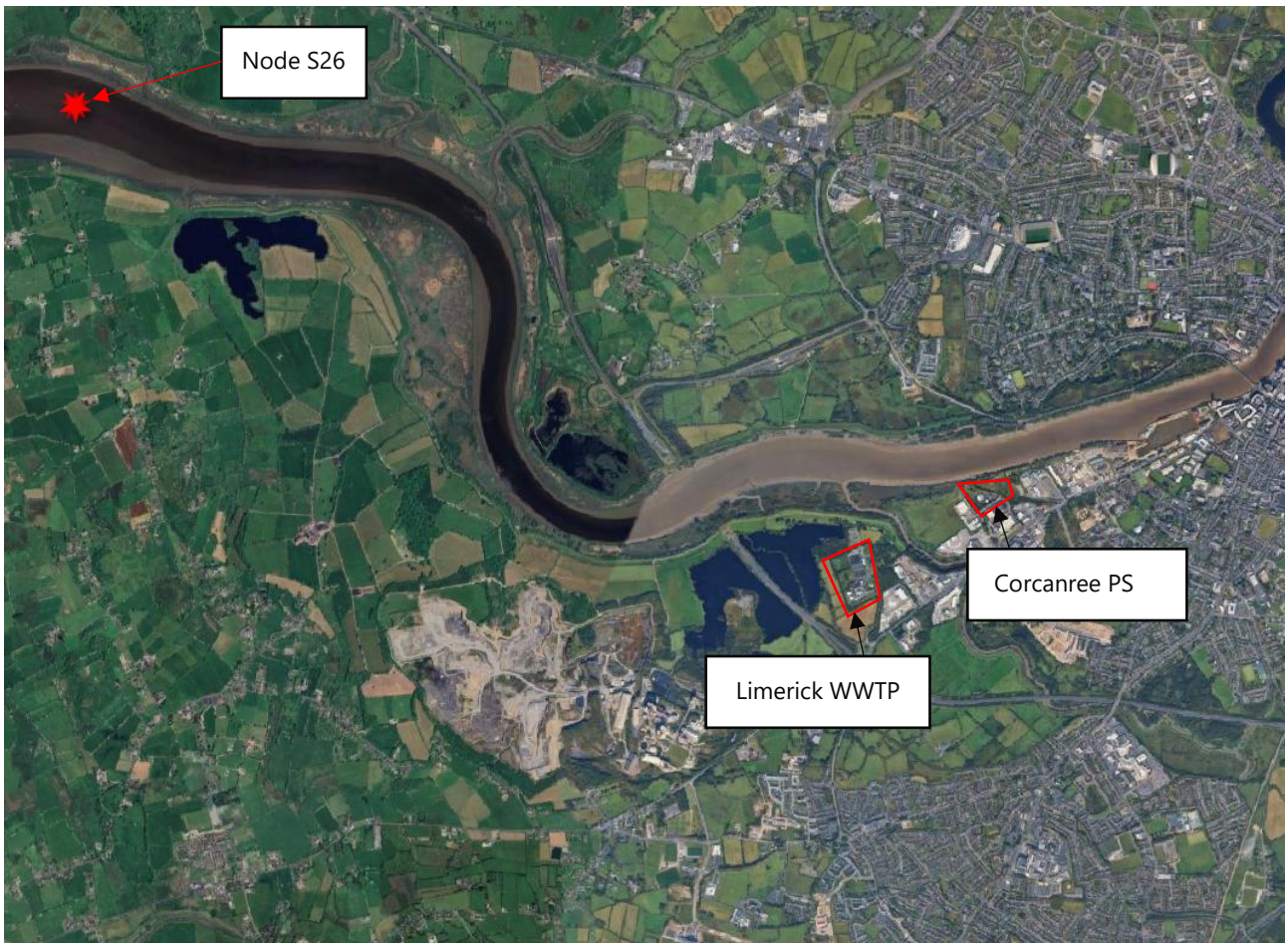


FIGURE 3-10: PROPOSED SITE LOCATIONS IN RELATION TO ICWWS NODE S26

3.7.2 Shannon Catchment Flood Risk Assessment and Management Study

The OPW, as lead agency for flood risk management in Ireland, has produced a Flood Risk Management Plan for the Shannon Upper & Lower River Basin alongside Limerick City and County Council. The CFRAM Study includes the entire catchment of the Shannon Estuary. Limerick City and Environs was selected as an area for further assessment (AFA) under the CFRAM Study. The study modelled (in compliance with OPW and suitable of planning purposes) coastal and fluvial flooding in the area for present day, mid-range future scenario (MRFS) and high-end future scenario (HEFS). Detailed flood maps of the area were produced showing the 10%, 0.5% and 0.1% annual exceedance probability (AEP) which are publicly available at *www.floodmaps.ie*.

The FRM Guidelines state that *"the presence of flood protection structures should be ignored when determining flood zones."* This is because *"areas that benefit from an existing flood relief scheme or flood defences have a reduced probability of flooding but can be particularly vulnerable due to the speed of flooding when overtopping or a breach or other failure takes place. Because this residual risk of flooding remains, the sequential approach and the Justification Test apply to such defended locations."*

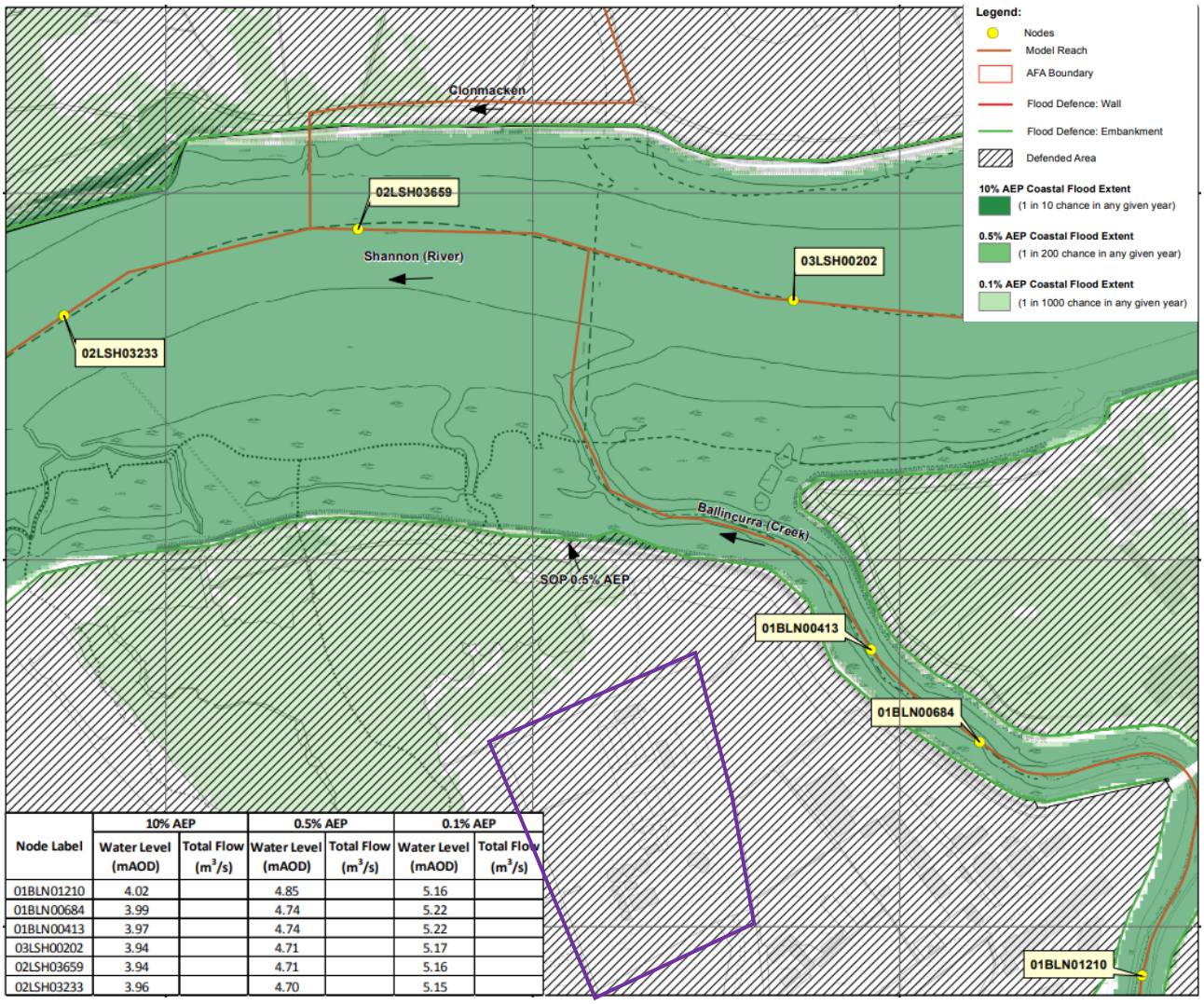
Below are extracts from the Present Day Flood Extent Maps concerning the proposed development sites. The full maps are included in Appendix 14.4.

Limerick WWTP

Figure 3-11 appears to illustrate flooding to the north-west of Limerick WWTP (indicative boundary marked in purple) during a 0.1% AEP coastal flood event, however, much of this area is occupied by Bunlicky Lake. Overland flow is more widespread within lands to the east of Ballinacurra Creek. Flood waters do not infiltrate the site boundary of Limerick WWTP. This indicates that the site is in Flood Zone C for coastal flooding.

The mapping does however illustrate that the site is within the "Defended Area" (black hatching), meaning the site is dependent on the embankment that bounds the Ballinacurra Creek and the Shannon Estuary, which

provides a 0.5% AEP standard of protection (SOP). The Defended Area hatching is an indication of the flood extents during a breach of flood defences when fully functional during a 0.1% AEP event. This indicates the area is in coastal Flood Zone A.



Node Label	10% AEP		0.5% AEP		0.1% AEP	
	Water Level (mAOD)	Total Flow (m^3/s)	Water Level (mAOD)	Total Flow (m^3/s)	Water Level (mAOD)	Total Flow (m^3/s)
01BLN01210	4.02		4.85		5.16	
01BLN00684	3.99		4.74		5.22	
01BLN00413	3.97		4.74		5.22	
03LSH00202	3.94		4.71		5.17	
02LSH03659	3.94		4.71		5.16	
02LSH03233	3.96		4.70		5.15	

FIGURE 3-11: EXTRACT OF COASTAL FLOOD EXTENT MAP AT WWTP SITE (SOURCE: SHANNON CFRAM, ANNOTATIONS BY EGIS)

Through analysis of modelled nodes, node 01BLN00684 was determined to be the most accurate representation of flood water levels for the WWTP site as it is the closest upstream node. Node 01BLN00413 would also be an appropriate choice. The results for each are tabulated below.

TABLE 3-2: COASTAL FLOOD WATER LEVELS AT WWTP

Node	Scenario	10% AEP (mOD)	0.5% AEP (mOD)	0.1% AEP (mOD)
01BLN00684	Present Day	3.99	4.74	5.22
	MRFS	4.61	5.34	5.55
	HEFS	5.12	5.62	6.26
01BLN00413	Present Day	3.97	4.74	5.22
	MRFS	4.6	5.33	5.56
	HEFS	5.12	5.62	6.22

Fluvial flood mapping (Figure 3-12) of the same area shows no extents. The WWTP site (indicative boundary marked in purple) is deduced therefore to not be in a fluvially influenced region and can be deemed fluvial Flood Zone C by the CFRAM analysis.

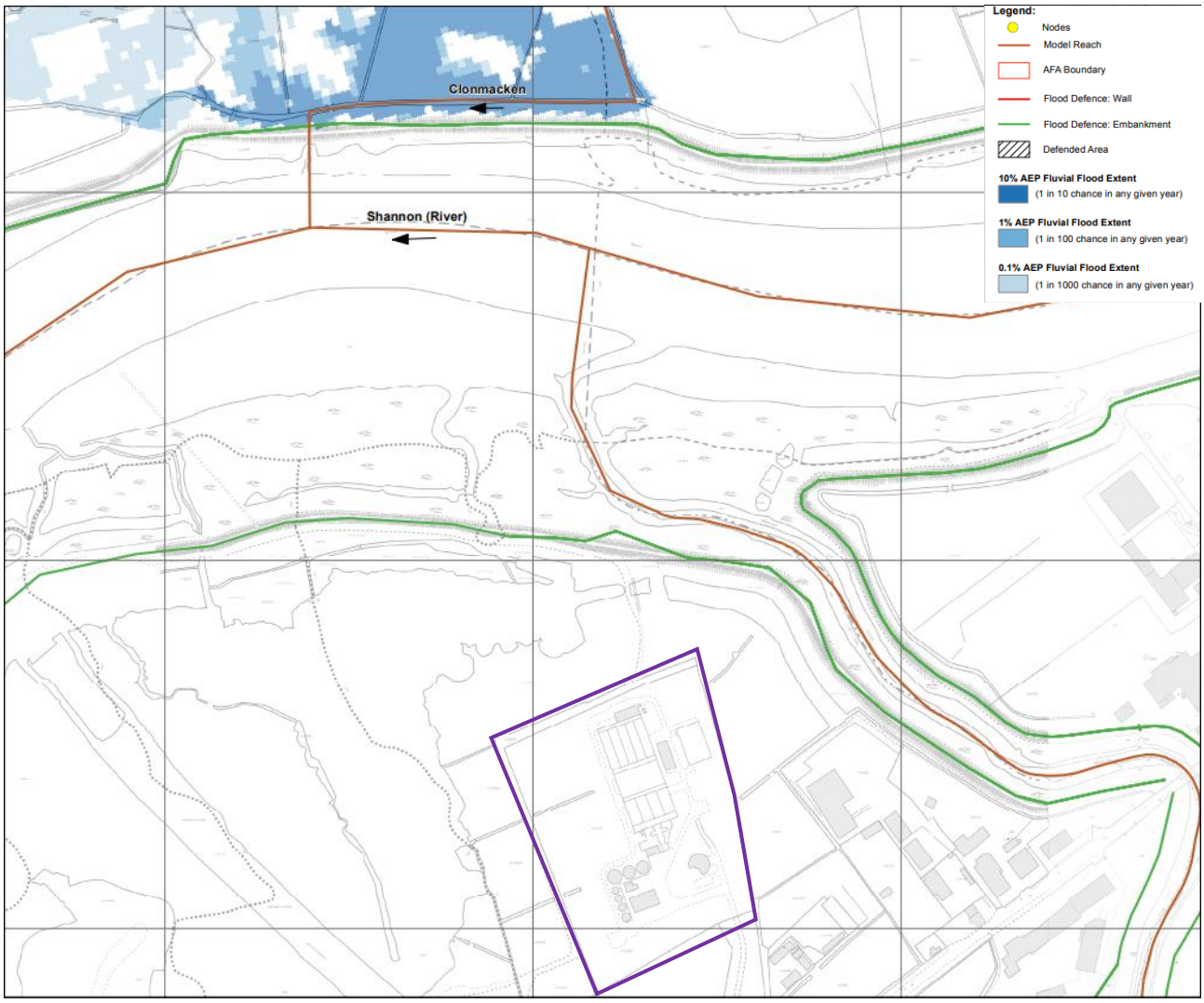
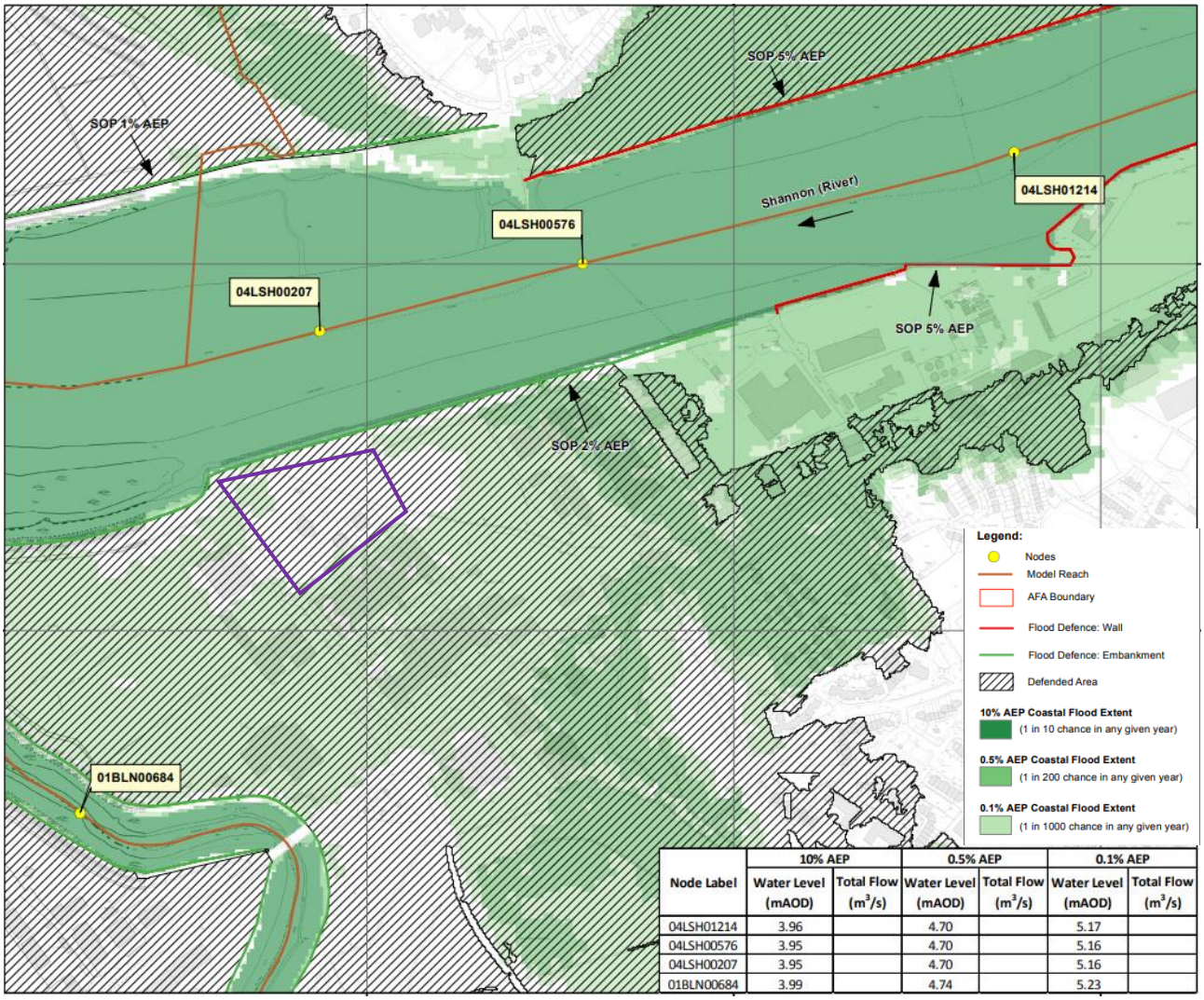


FIGURE 3-12: EXTRACT OF FLUVIAL FLOOD EXTENT MAP AT WWTP SITE (SOURCE: SHANNON CFRAM, ANNOTATIONS BY EGIS)

Corcanree PS

Figure 3-13 illustrates that the lands within Corcanree PS (indicative boundary marked in purple) are partially impacted during a 0.1% coastal flood extent. Flood waters encroach into the northern portion of the current PS site. It is noted that there is no development proposed in this area. Flood extents do not reach the lands currently subject to acquisition, where the proposed installation is intended.

The mapping demonstrates that the site falls within the "Defended Area" (shown with black hatching), indicating that it depends on the OPW embankment bordering the Shannon Estuary for flood protection. This embankment offers a SOP against a 2% AEP event at the site, and 5% SOP upstream near to Ted Russel Dock. The Defended Area hatching reflects the extent of flooding that could occur if these flood defences were breached during a 0.1% AEP event while fully functional. This classification places the site within coastal Flood Zone A.



Node Label	10% AEP		0.5% AEP		0.1% AEP	
	Water Level (mAOD)	Total Flow (m^3/s)	Water Level (mAOD)	Total Flow (m^3/s)	Water Level (mAOD)	Total Flow (m^3/s)
04LSH01214	3.96		4.70		5.17	
04LSH00576	3.95		4.70		5.16	
04LSH00207	3.95		4.70		5.16	
01BLN00684	3.99		4.74		5.23	

FIGURE 3-13: EXTRACT OF COASTAL FLOOD EXTENT MAP AT PS SITE (SOURCE: SHANNON CFRAM, ANNOTATIONS BY EGIS)

Through analysis of modelled nodes, node 04LSH0207 was determined to be the most accurate representation of flood water levels for the PS site as it is the closet upstream node. The results of the model at the node at tabulated below.

TABLE 3-3: COASTAL FLOOD WATER LEVELS AT PS

Node	Scenario	10% AEP (mOD)	0.5% AEP (mOD)	0.1% AEP (mOD)
04LSH0207	Present Day	3.95	4.70	5.16
	MRFS	4.60	5.31	5.61
	HEFS	5.13	5.67	6.24

Fluvial flood mapping (Figure 3-14) of the same area shows no extents. The PS site (indicative boundary marked in purple) is deduced therefore to not be in a fluvially influenced region and can be deemed fluvial Flood Zone C by the CFRAM analysis.

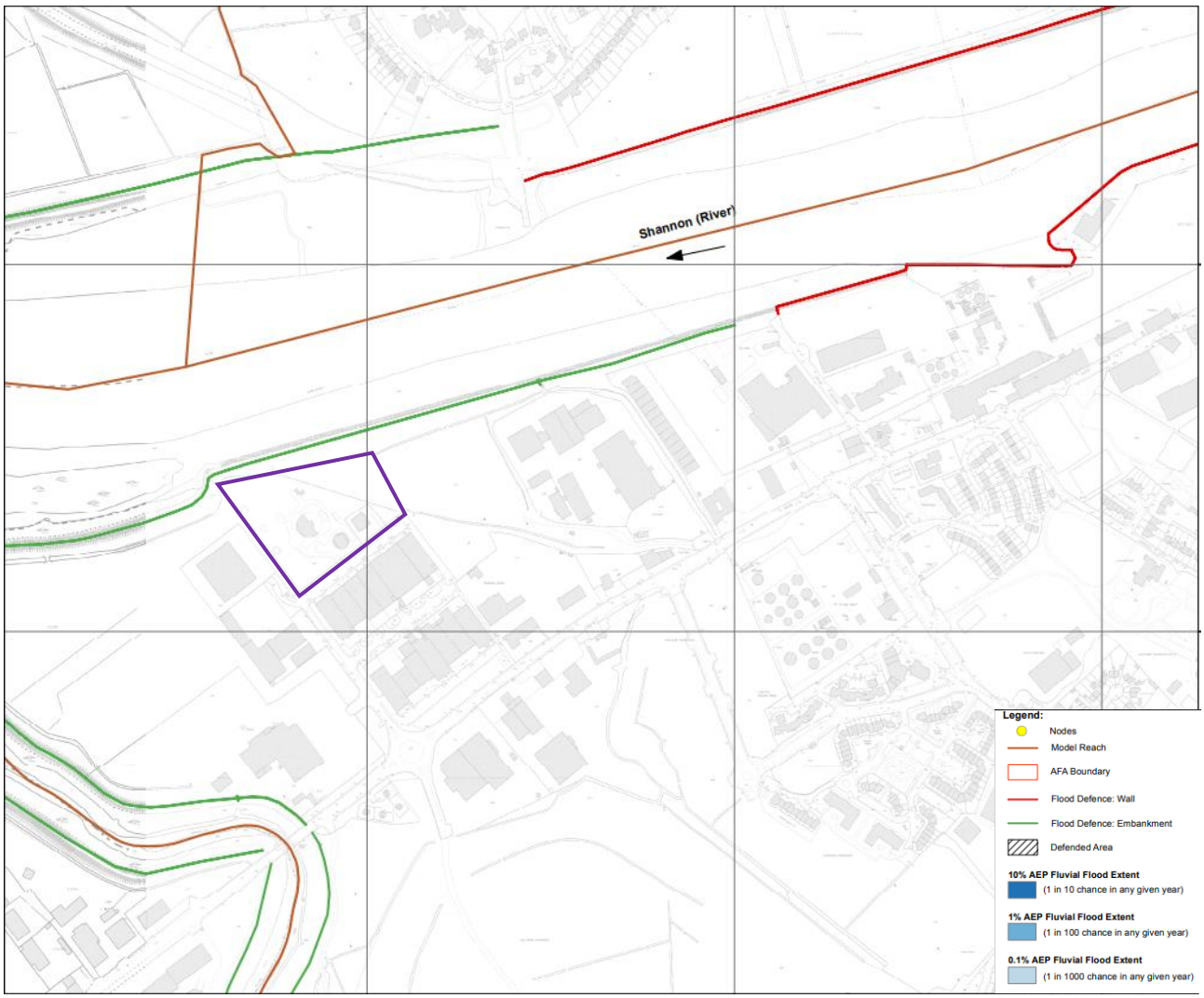


FIGURE 3-14: EXTRACT OF FLUVIAL FLOOD EXTENT MAP AT PS SITE (SOURCE: SHANNON CFRAM, ANNOTATIONS BY EGIS)

3.7.3 Limerick Development Plan Strategic Flood Risk Assessment 2022-2028

Limerick City and County Council (LCCC) Strategic Flood Risk Assessment (SFRA) was developed as part of the Draft Limerick Development Plan 2022-2028. The SFRA provides an area-wide assessment of all types of significant flood risk to inform strategic land use planning decisions. The SFRA enables LCCC to allocate appropriate sites for development and identify how flood risk can be reduced as part of the development plan process.

As part of the SFRA, flood zone maps were generated for Limerick City and Environs. Regarding the docklands it states *"The Dock Road area of the City lies within Flood Zones A and B. The area closest to the River Shannon is largely zoned for Industrial and Enterprise and Employment. This is a docklands area of the City and much of this industrial and enterprise use is marine based and therefore exempt from the Justification Test and risks here can be managed by following the sequential approach, guided by an appropriately detailed FRA. Where the uses are not marine related, a Justification Test has been completed and is included in Appendix A. Other areas along the Dock Road comprise of Agriculture, Open Space and Recreation and Semi Natural Open Space zonings. These areas should be maintained, with the flood risk for Agricultural built development managed by following the sequential approach and an appropriately detailed FRA."* Figure 3-15 shows an extract from the Flood Zone Map in the vicinity of the proposed development sites. The full map is included in Appendix 14.5.

The Limerick SFRA indicates that the Proposed Development sites predominately lie within Flood Zone A, with the exception of a narrow band along the north-eastern boundary of Corcanree PS and the southern boundary of Limerick WWTP, which lie within Flood Zone B.

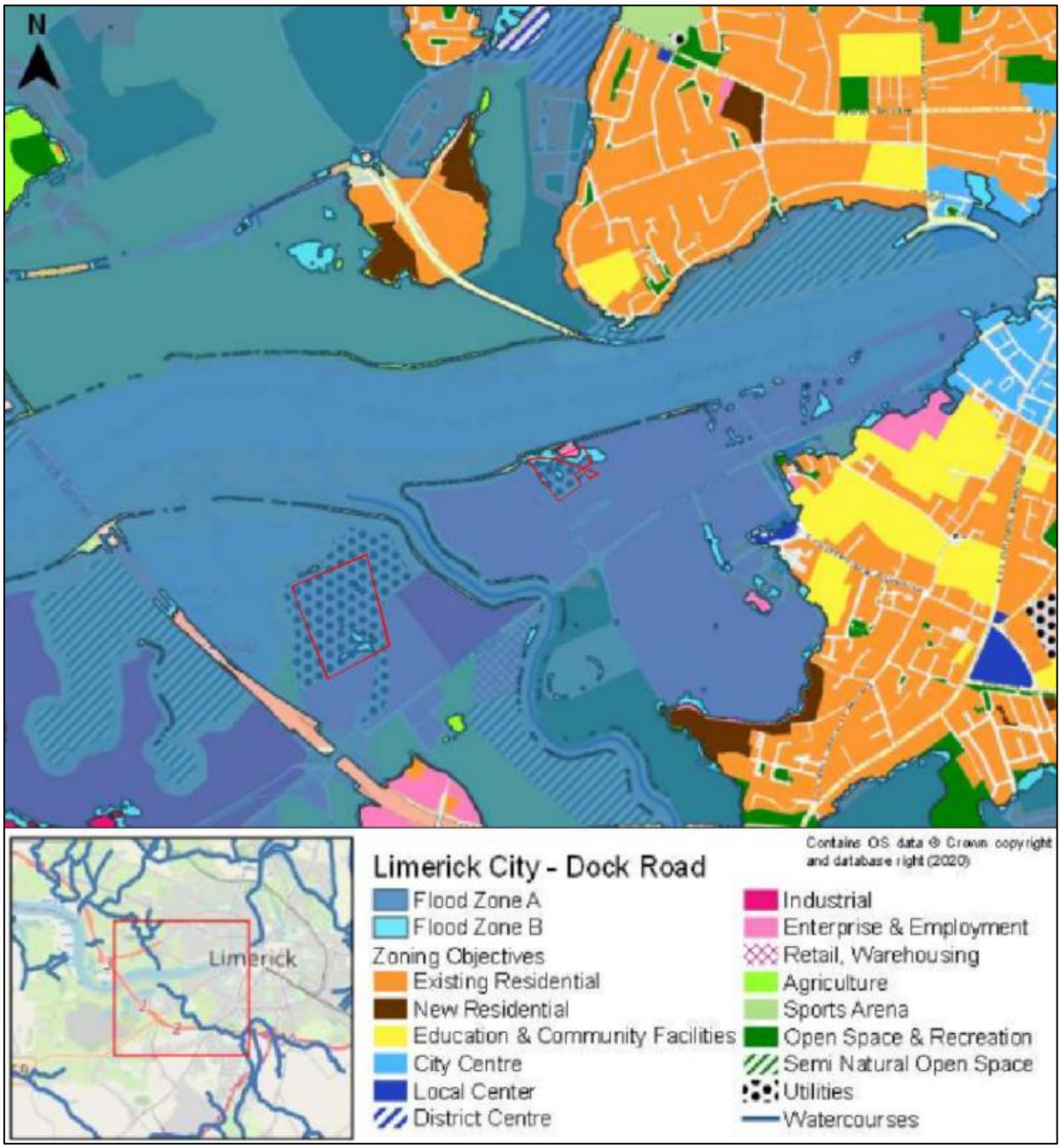


FIGURE 3-15: EXTRACT FROM LIMERICK CITY & COUNTY COUNCIL SFRA FLOOD ZONE MAP

Section 5.8.1 of the SFRA notes that where a site is referred to as being within a defended area, it is assumed that that site avails of a minimum of 1% AEP (fluvial) or 0.5% AEP (tidal) SOP. Such defences have been through a formal design process approved by the OPW or Limerick City and County Council.

As per the SFRA, defended areas that are prone to flooding require breach analysis to assess the residual risk that exists in the event of failure/overtopping. Following a review of the SFRA, it was uncovered that the assessment sites are located within areas where the breach and overtopping of the flood defences in question have been investigated, this is detailed further below.

The SFRA Section 5.10.2 presented recommendations on ground levels, finished floor levels and building use for developments in the flood zone. Section 5.9 outlines the climate change mitigatory measures recommended. Though each development is defended, the PS is not defended to an adequate SOP (2% AEP as opposed to 0.5% AEP) and the WWTP defences are non-OPW, meaning their condition and historic

maintenance regime is unknown. As such the "Tidal, undefended" scenario (Table 3-5) is the most suitable at the sites.

However, it has been deemed a more conservative approach to use the available 0.5% AEP coastal MRFS flood levels plus the recommended 300mm freeboard. The reasoning for this determination is because the modelled nodes are in close proximity to each site & therefore represent the local levels to a high confidence. The MRFS modelling also already incorporates climate-change adjustments at the boundary conditions, so it provides a more realistic water level than applying the generic uplift recommended to present-day values. These levels are presented in Table 3-6.

TABLE 3-4: EXTRACT FROM TABLE 5-2 OF LIMERICK SFRA

Development Vulnerability	Fluvial climate change allowance (increase in flows)	Tidal climate change allowance (increase in sea level)
Less Vulnerable	20%	0.5m (MRFS) + 50mm for land movement
Highly Vulnerable	20%	0.5m (MRFS) + 50mm for land movement
Critical or extremely	30%	1.0m (HEFS) + 50mm for land movement

TABLE 3-5: EXTRACT FROM TABLE 5-3 OF LIMERICK SFRA

Scenario	Finished floor level to be based on
Fluvial, undefended	1% AEP flood + climate change (as Table 5-2) + 300mm freeboard.
Tidal, undefended	0.5% AEP flood + climate change (as Table 5-2) + 300mm freeboard (or 500mm where there is risk of storm surge and wave action).
Fluvial, defended	1% AEP flood + 300mm freeboard. Climate change does not need to be included, provided it is included in the defence height or adaption plan for the scheme. Where a breach model has been developed to further understand risks, FFL may be set based on model outputs.
Tidal, defended	0.5% AEP flood + 300mm freeboard (or 500mm where there is risk of storm surge and wave action). Climate change does not need to be included, provided it is included in the defence height or adaption plan for the scheme. Where a breach model has been developed to further understand risks, FFL may be set based on model outputs.

3.7.3.1 Limerick Strategic Flood Risk Assessment (SFRA) – Appendix D

The previous sections have presented studies on the defended and undefended flood risks to the development sites. This section carries out a residual risk assessment of OPW and non-OPW flood embankments which offer flood defence to the area. These embankments offer varying standards of protection (SOP) throughout Limerick City and Suburbs. Residual risk in this case presents as flood defence overtopping and breach, which is analysed at both sites below. The breach analyses was undertaken using the UK Environment Agencies guidance on breach modelling which was also adopted by the Shannon CFRAM Study and thus are compliant with OPW standards and are suitable for planning purposes.

Strategic Housing Development Flood Risk Assessment at Greenpark, Limerick

Limerick SFRA presents a Flood Risk Assessment (Ref: IBE1706, September 2021) within Appendix D that has modelled the existing situation in the vicinity of Corcanree PS. The existing baseline model was run using peak tidal levels from the Shannon CFRAM study in the estuary and Ballynaclogh River to run a 0.5% AEP flood inundation simulation.

The SOP in this area according to the Shannon CFRAM is equivalent to a 5% to 2% AEP coastal event. The results found that there is likely to be overtopping of defences close to Corcanree PS (labelled A in Figure 3-16)

in a present day 0.5% AEP event but not breaching. The flood depths modelled are approximately 0 - 0.5m in depth. This is considered high-confidence indication of the actual flood depths expected at the site for assessment purposes.

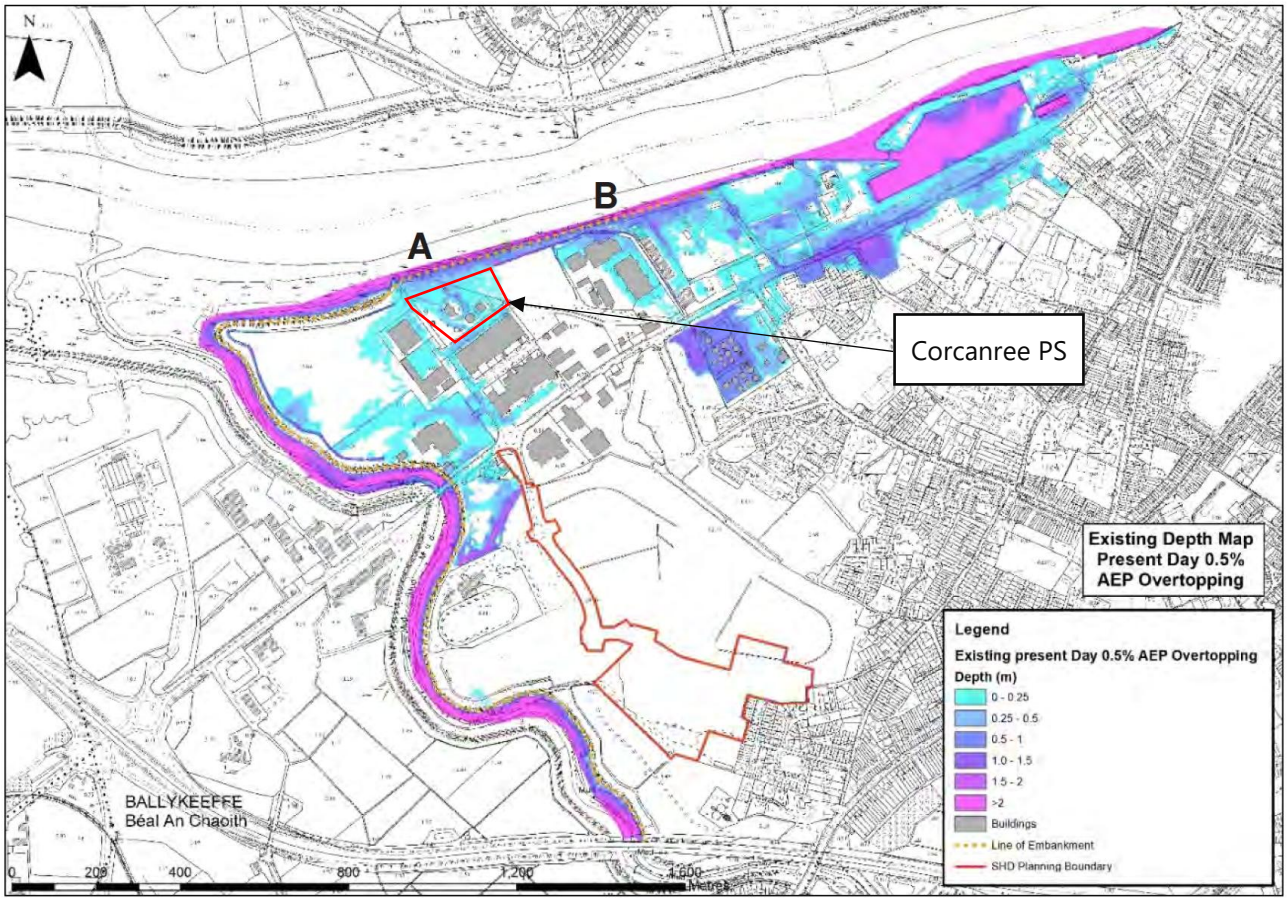


FIGURE 3-16: PRESENT DAY 0.5% AEP EVENT OVERTOPPING EXTENTS (SOURCE: RPS, ANNOTATIONS BY EGIS)

This study also assessed 3 no. individual breach scenarios using a detailed topographic survey of the existing flood defences.

An extract from Appendix D states the scenarios as follows: *Breach 1 – along the Estuary at the rear of McMahon Building Providers; Breach 2 – along the lower reaches of the Ballynaclough River; Breach 3 – on the Ballynaclough River upstream of the Greyhound Stadium. All breaches were run over 72-hour tidal cycle with the breach set to occur 1 hr before the peak of flood. At this time in the simulation a 50m section of the embankment is removed with the spill level being reduced to existing ground levels on either side of the defence. A separate map was produced for each location i.e. it is assumed only one breach occurred at a time.*

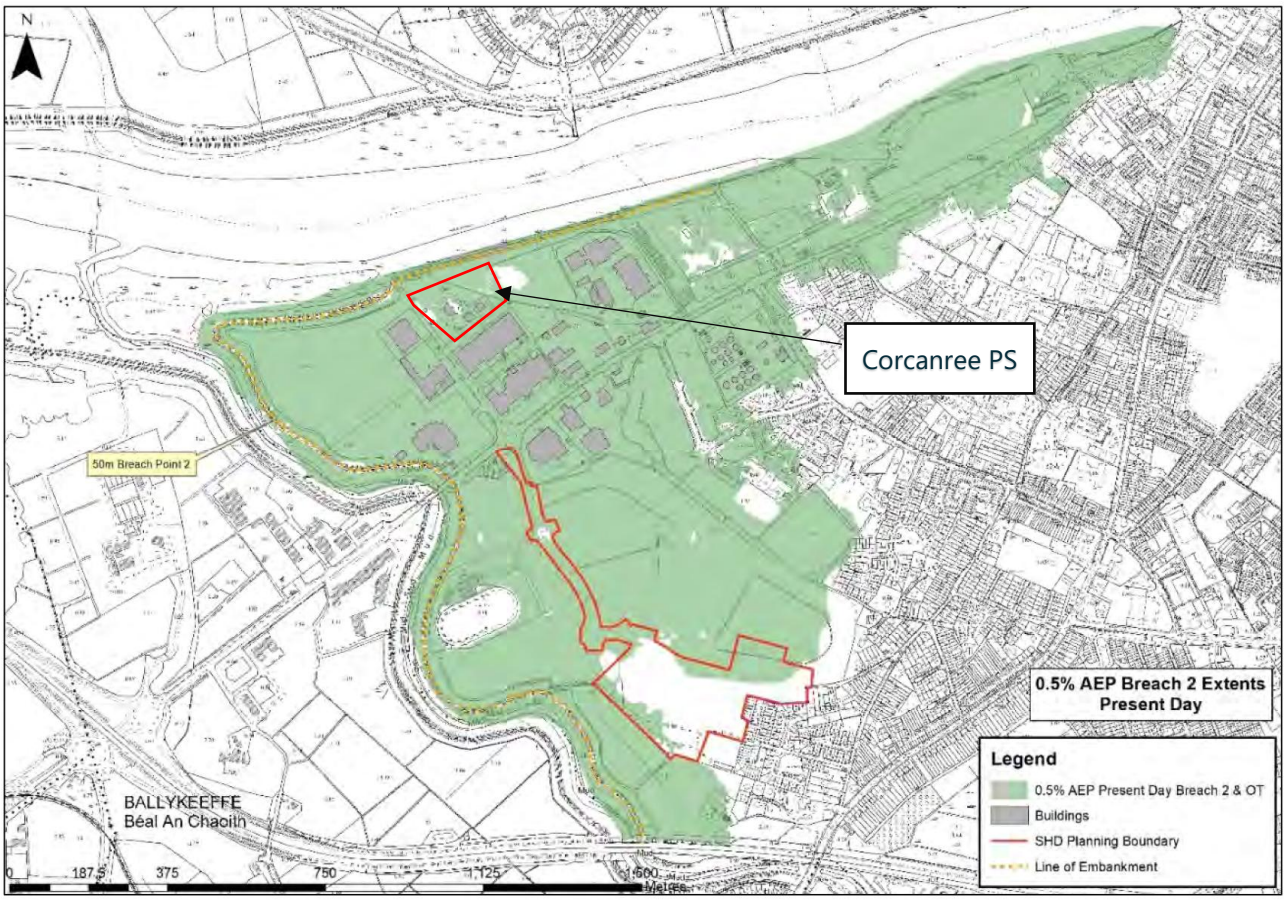


FIGURE 3-17: 0.5% AEP BREACH 2 EXTENTS (SOURCE: RPS, ANNOTATIONS BY EGIS)

Each scenario resulted in similar flood extents across the surrounding lands. The flood mapping output from the model simulation determined that during a 0.5% AEP flood event, the maximum water level was 4.3mOD due to water dissipating across the Dock Road area during the breach scenario. A figure of the results for Breach 2 is included in Figure 3-17 above. When addressing mitigation measures for the breach scenario it is noted in the report that preference was given to abide by the Shannon CFRAM design flood level of 4.87mOD, this was prior to the publication of the SFRA.

Michael Gabbet Sites Site Specific Flood Risk Assessment – PUNCH Consulting Engineers

Limerick SFRA also presents a Flood Risk Assessment (September 2021) within Appendix D that has examined the existing situation in the area of Limerick WWTP site (indicative boundary marked in orange). The sites detailed are located to the south of the WWTP.

A defence failure breach analysis was presented as part of this FRA with 3 breach locations in the area. Namely, 2 on the estuary to the northwest of the site north of Bunlicky Lake and 1 to the southeast of the site on the Ballinacurra Creek. The worst-case scenario at Limerick WWTP is via a breach on the estuary embankment to the north. The extents are shown in Figure 3-18. Local flooding during a breach appears to range from 0 metres to in excess of 2 metres in depth. As the exact depth range of the flood waters is unknown this is not considered high-confidence for the purposes of assessment.

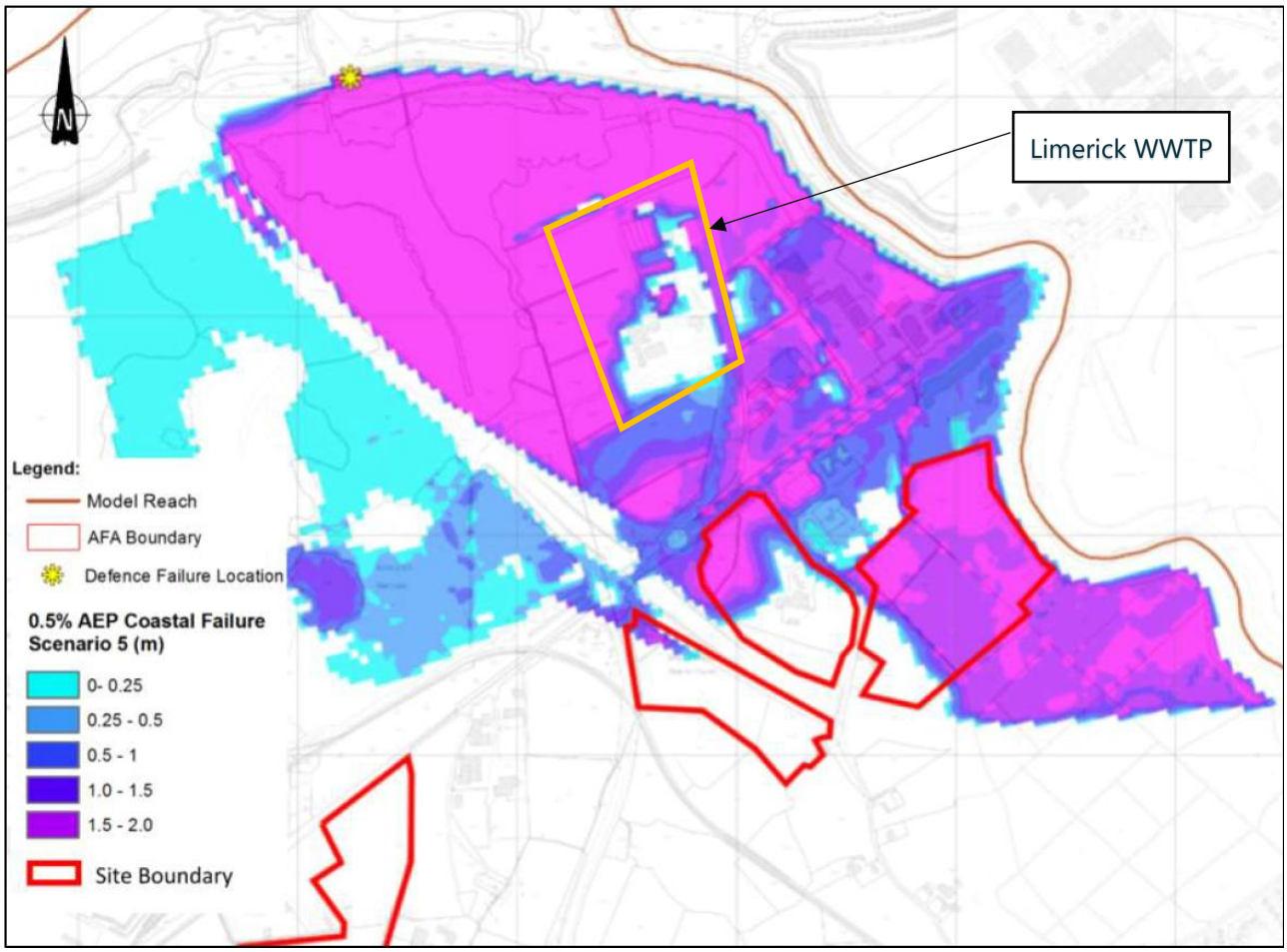


FIGURE 3-18: FLOOD DEFENCE FAILURE BREACH ANALYSIS FLOOD EXTENTS FOR 0.5% AEP EVENT (SOURCE: PUNCH CONSULTING ENGINEERS (VIA LIMERICK SFRA), ANNOTATIONS BY EGIS)

3.7.4 Limerick City and Environs Flood Relief Scheme

Under the CFRAM process, Limerick was identified as an Area for Further Assessment (AFA). Limerick City & County Council, in partnership with the OPW, are now advancing with the Limerick City & Environs Flood Relief Scheme (FRS) to mitigate flood risks in and around the Limerick area.

The scheme seeks to enhance the resilience of Limerick against flooding and minimise the impact of floods on the community and infrastructure. Measures to be implemented under the scheme include, but are not limited to, river channel improvements, flood defences and infrastructure improvements. The design will include a standard of protection that satisfies the 1% AEP fluvial flood event and the 0.5% AEP tidal flood event.

Updates from the scheme, issued in September 2023, confirm that ground/geotechnical site investigations of the existing embankments have been completed. Further ground investigations are currently underway in areas where new flood defence measures are being considered. Ornithology surveys and invasive species treatment have also commenced.

Further updates issued in February and July 2024 state the scope of geophysical surveys and ecological investigations scheduled to be undertaken as part of the scheme.

Hydraulic modelling for the scheme is noted to be well advanced at this point, which will be used to convey the flood extents for a range of return periods with the scope of the FRS. However, this information has not been made publicly available at the time of writing. With the knowledge that this scheme is underway, it is expected that OPW embankments will be maintained in satisfactory condition and that the likelihood of a breach scenario is significantly reduced considering this ongoing management.

3.7.5 Summary of Flood Studies

In the absence of Limerick City & Environs FRS mapping for the site, the hydraulic modelling presented in Appendix D of the Limerick SFRA and the mapping produced by Shannon CFRAM Study are both considered to represent the most reliable flood studies available for the assessment areas.

The closest ICWWS model node to the site is Node S26, which is located significantly downstream of the proposed development sites. Limerick SFRA breach modelling supplies high-confidence results for Corcanree PS, but the same information is not available for Limerick WWTP. Shannon CFRAM Study, although predating the SFRA, has high-confidence mapping and node data in close proximity to both sites, both upstream and downstream.

To ensure a conservative design approach, the higher flood levels, identified in the CFRAM, are to be adopted in the design of the proposed development. The recommended climate change and freeboard allowances produced by the Limerick SFRA (Table 3-4 & Table 3-5) were assessed. A marginally different approach of using the 0.5% AEP MRFS flood level plus the recommended freeboard are used to determine the design flood level for the developments. This approach ensures the development remains safe under a climate-adjusted 0.5% AEP MRFS event including overtopping.

Table 3-6 summarises the adopted coastal flood levels for the proposed development sites.

TABLE 3-6: SUMMARY OF COASTAL FLOOD LEVELS

Flood Study	Location	Water Level for Present Day 0.5% AEP Event		Water Level for MRFS 0.5% AEP Event	Design Flood Level
ICWWS Node S26	D/S of Limerick WWTP & Corcanree PS	4.27 mOD		-	-
Limerick SFRA (Appendix D)	Limerick WWTP	Depth >2.0 m		-	-
	Corcanree PS	4.30 mOD	-	-	
Shannon CFRAM	Limerick WWTP	4.74 mOD	5.34 mOD	**5.64 mOD**	
	Corcanree PS	4.70 mOD	5.31 mOD	**5.61 mOD**	

4 FLOOD RISK ASSESSMENT

4.1 Introduction

As outlined in Section 2 of this report, the FRM Guidelines identifies three stages of Flood Risk Assessment namely;

- Stage 1: Flood Risk Identification
- Stage 2: Initial Flood Risk Assessment
- Stage 3: Detailed Flood Risk Assessment

4.2 Stage 1 – Flood Risk Identification

According to the FRM Guidelines, flood risk identification is the process for deciding whether a plan or project requires further investigation. This is a desk-based exercise based on existing information. All the existing information is described in Section 3 of this report and the identification of flood risk from each of the five

sources of flooding (coastal, fluvial (river), groundwater, pluvial (rainfall) and from artificial drainage systems is considered.

4.2.1 Coastal Flood Risk

The Limerick SFRA maps indicate that the proposed development sites are located within Flood Zone A. In this instance, the Shannon CFRAM Study maps that were produced following the identification of Limerick as an AFA are considered to reflect a more accurate delineation of flood extents in the vicinity of the site. This study also indicates that the proposed development sites are both situated within coastal **Flood Zone A,** within a defended area. Regardless of the fact that the sites are defended, and in reality at a low risk of flooding, it is recommended by the FRM Guidelines to assess the sites as undefended.

4.2.2 Fluvial Flood Risk

The development sites are located next to a transitional section of the Shannon Estuary where water depth is governed by tidal movements. Therefore, both Limerick WWTP and Corcanree PS are outside of the 0.1% AEP fluvial flood extent and within fluvial **Flood Zone C**, where the risk of flooding is low.

4.2.3 Groundwater Flood Risk

The aquifer vulnerability map (refer to Figure 3-4) classifies the site as having *'low vulnerability'* which indicates a low water table and hence a low risk of groundwater related flooding. There is no historical evidence of groundwater flooding at the site. There is no indication on the maps of any springs or wells on this site. Groundwater flooding risk is therefore not considered to be significant.

4.2.4 Pluvial Flood Risk

There have been no recorded instances of pluvial flooding events at the site. Pluvial flood risk is therefore not considered to be significant. Notwithstanding this, it is important to consider appropriate mitigation measures. During extreme rainfall events the application of SuDS principles at the site will ensure surface water is managed sufficiently and sustainably discharged to the drainage network.

4.2.5 Artificial Drainage Systems Flood Risk

As discussed previously in Section 3.5, the Corcanree area was affected by major floods in December 1999 due to the drainage system operating at capacity. The entire network across Limerick City and surrounds has since been upgraded with the Limerick Main Drainage scheme, hence mitigating against further flooding at this site. This artificial drainage systems flood risk is assessed to be low.

4.2.6 Residual Flood Risk

Residual flood risk associated with the presence of flood defences was assessed in Section 0. This assessment presented flood depths in the event of a 50m breach during a 0.5% AEP coastal event at either site. Although the probability of a breach of this extent cannot be accurately quantified, it is assumed to be low. An overtopping analysis was also presented at Corcanree PS. The overtopping depths at the PS were in the range of 0-0.5m in depth.

During the breach scenario the flood level at the PS was approximately 4.3mOD, which when assessed against topographical data would only partially flood the site as the majority of the site is above this level. Residual risk at Corcanree PS is therefore low. Depths at Limerick WWTP site in the event of a breach are in excess of 2m. The residual risk at Limerick WWTP is determined to be moderate.

4.3 Stage 2 – Initial Flood Risk Assessment

The Flood Risk Identification has identified that there is flood risk to the proposed development site. Under the sequential approach identified in the FRM Guidelines a three-step approach is required to confirm the appropriateness of the development in terms of flood risk.

Step 1: Identification of the Flood Zone at the Proposed Development Site

Using the Flood Zone criteria from the FRM Guidelines and as defined in Section 2 above, the flood zones for each of the sites were determined.

- **Flood Zone A** – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100-year for river flooding or 0.5% or 1 in 200-year for coastal flooding);
- **Flood Zone B** – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1000-year and 1% or 1 in 100-year for river flooding and between 0.1% or 1 in 1000-year and 0.5% or 1 in 200-year for coastal flooding); and
- **Flood Zone C** – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000-year for both river and coastal flooding).

Limerick WWTP Development Site

As discussed in Section 4.2, the site of the existing Limerick WWTP is located within **Flood Zone A** for coastal flood risk. In accordance with the sequential approach outlined in the FRM Guidelines, the vulnerability classification of the proposed development must therefore be identified.

Corcanree PS Development Site

Corcanree PS lies within coastal **Flood Zone A**, where the probability of flooding is considered high. The proposed development at this site pertains an upgrade to existing foul pumps, the installation of a stormwater storage tank and associated infrastructure within an extension area adjacent to the existing pumping station. Permanent acquisition of land (approximately 0.4 ha) extending the site in a north-easterly direction is proposed for this development. In accordance with the sequential approach outlined in the FRM Guidelines, the vulnerability classification of the proposed development must therefore be identified.

Step 2: Identification of the Vulnerability of the type of the proposed development (Table 3.1 of the FRM Guidelines). The different types of proposed development sites are then assigned a vulnerability classification according to the definitions in 'Table 3.1 – Classification of vulnerability of different types of development' of the FRM Guidelines.

As described in Section 1.2 above, the proposed development is for wastewater treatment purposes. Essential infrastructure is classified within the FRM Guidelines as *'highly vulnerable development'*. However, the Limerick Development Plan 2022 – 2028 Strategic Flood Risk Assessment considers the land use zoning alongside its water compatibility and with regards to *'Utilities'* it states that *'depending on the nature of the utility to be provided, vulnerability may be high, less or water compatible'*.

Limerick WWTP

The development at Limerick WWTP includes new inlet works, tanks, buildings and surface water systems. The Regional Bioresource Centre proposed at the site includes sludge storage and treatment vessels. As some of the proposed developments are non-water compatible, along with the nature of the development being *'essential infrastructure'*, it is classified as *'highly vulnerable development'* under the FRM Guidelines.

Corcanree PS

The development at Corcanree PS includes construction of an underground stormwater tank and upgraded to mechanical equipment. No buildings are proposed at this site as part of the Proposed Development, resulting in a lower potential risk to human health from flooding than would typically be associated with occupied buildings. It is however deemed *'essential infrastructure'* and therefore, it is classified as *'highly vulnerable development'* under the FRM Guidelines.

Step 3: Using the matrix of vulnerability versus Flood Zone (Table 3.2 of the FRM Guidelines), identify the necessity for the justification test for the proposed development.

Both sites are located within Flood Zone A and the proposed development is categorised as Highly Vulnerable Development. In accordance with Table 3.2 of the FRM Guidelines, such development requires a Justification Test, which is carried out in Section **Error! Reference source not found.**.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

FIGURE 4-1: MATRIX OF VULNERABILITY VERSUS FLOOD ZONE TO ILLUSTRATE APPROPRIATE DEVELOPMENT.

4.4 Justification Test

According to the FRM Guidelines, the Justification Test has been designed to rigorously assess the appropriateness, or otherwise, of particular developments that are being considered in areas of moderate or high flood risk (Flood Zones A and B; respectively).

The FRM Guidelines outlines in Box 5.1 (shown in the five criteria, namely Criterion 1, 2(i), 2(ii), 2(iii), and 2(iv)), all of which must be satisfied under the Justification Test as it applies to development management. These justification criteria have been addressed in the following paragraphs.

Box 5.1 Justification Test for development management (to be submitted by the applicant)

When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
   - (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;
   - (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;
   - (iii) The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and
   - (iv) The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: See section 5.27 in relation to major development on zoned lands where sequential approach has not been applied in the operative development plan.

Both developments assessed in this report are deemed highly vulnerable and within coastal Flood Zone A. Some elements of the Justification Test are presented separately for each site in the interest of clarity.

4.4.1 Criterion 1: The subject land has been designated for this particular use

Both sites are located within Limerick City and Suburbs. The most up to date zoning information is provided by the Limerick Development Plan 2022-2028 (LDP). Volume 2a provides information on settlements and zoning maps. An extract from Map 3 of LDP Volume 2a is presented in Figure 4-2. This illustrates the zoning of both assessment sites.



FIGURE 4-2: EXTRACT OF LDP LIMERICK CITY AND SUBURBS MAP 3 - ZONING MAP

Limerick WWTP

The existing WWTP boundary is zoned for 'Utilities' (black spotted area), as is the area immediately to the northeast. This zoning is appropriate for the form of development proposed and thus fulfils Criterion 1.

Corcanree PS

The existing Corcanree PS boundary is zoned for 'Utilities' (black spotted area). The proposed site extension to the northeast is zoned for 'Enterprise & Employment' (light pink).

The land use zoning matrix in the Limerick Development Plan 2022-2028 does not specifically address utilities use within Enterprise & Employment lands; it neither identifies such use as generally permitted, open for consideration, nor generally not permitted. This absence of explicit categorisation suggests a flexible approach to accommodating essential infrastructure across various zoned lands. As a result, utilities development is not expressly excluded and can be considered acceptable in principle.

It can be concluded that the proposed development is appropriate with regards to land use zoning and thus fulfils Criterion 1.

4.4.2 Criterion 2: The proposal has been subject to an appropriate flood risk assessment

In accordance with the FRM Guidelines, a detailed flood risk assessment should be undertaken to satisfy the four sub-criteria included under criterion 2 in Box 5.1. The four sub-criteria are as follows:

- Sub-criterion 2 (i) – Detailed flood risk assessment
- Sub-criterion 2 (ii) – Flood risk mitigation measures
- Sub-criterion 2 (iii) – Residual risks
- Sub-criterion 2 (iv) – Wider planning objectives

4.4.2.1 Sub-criterion 2(i): The development will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk

Sub-criterion 2 (i) has been assessed to determine the impact caused by the development in the floodplain. The FRM Guidelines state that *'Planning authorities will ensure that development is not permitted in areas of flood risk, particularly floodplains, except where there are no suitable alternative sites available in areas at lower risk that are consistent with the objectives of proper planning and sustainable development. Where such development has to take place, in the case of urban regeneration for example, the type of development has to be carefully considered and the risks should be mitigated and managed through location, layout and design of the development to reduce flood risk to an acceptable level.'*

As mentioned previously, the proposed development is spread over two sites, Limerick WWTP and Corcanree PS. Corcanree PS lies within the 0.5% AEP tidal flood plain when the presence of the existing flood defence is excluded. The FRM Guidelines requires that the planning systems *'Avoid development in areas at risk of flooding, particularly floodplains, unless there are proven wider sustainability grounds that justify appropriate development and where the flood risk can be reduced or managed to an acceptable level without increasing flood risk elsewhere'*.

Development in a floodplain has the potential to increase flood risk elsewhere by increasing runoff in areas of low permeability and/or decreasing the volume of available flood storage.

The historic embankments adjacent to both sites have altered the natural flood plains which once existed. Said defences offer a 0.5% AEP SOP to the WWTP site and a 2% AEP SOP to the PS site, which suggests that in reality the site is protected against flooding up to and including events of this severity. It should be noted that there is no historical evidence of flooding at the WWTP site throughout its operation or previous to its construction. The only recorded flooding event at the PS site was attributed to a combination of many factors and further risk of flooding was subsequently mitigated by the Limerick Main Drainage Scheme.

Limerick WWTP

The proposed works include the construction of AGS infrastructure and inlet works in an area which is believed to encroach on an existing drainage channel. The extents and performance of these drains with regard to flood storage and conveyance is unknown. They have not been analysed under any existing flood studies reviewed for this report, nor are they mapped as Arterial Drainage or Land Commission channels. When considered in the context of the tidally influenced floodplain of the Shannon Estuary, which represents a large receiving system with substantial storage and conveyance capacity, this volume is likely negligible. As also mentioned above, this area is not functioning as an active floodplain under current defended conditions, nor has the area flooded in recorded history. There is no evidence the loss of this localised storage will materially affect flood conveyance, tidal storage or flood levels within the wider system.

The proposed development includes large above ground tanks, accessways and raising of ground levels. While the embankment is not an OPW flood relief or drainage scheme defence, it provides an estimated standard of protection of approximately 0.5% AEP based on historic performance, and consequently the site has not functioned as part of the active tidal floodplain for many years. There is no alteration proposed to the embankment and therefore no change to the existing scenario and flood pathways. It can be concluded that no developments proposed increase coastal flood risk elsewhere.

Incorporation of SuDS proposed at the site is noted as a positive measure for flood risk. The features proposed at this stage include porous paving and a dry swale to manage surface water run-off produced by the new hardstanding within the development, providing interception and attenuation storage. This reduces the pluvial flood risk at the site.

The proposed development is considered to satisfy Sub-Criterion 2(i) of the Justification Test.

Corcanree PS

Based on the topographical survey undertaken of the lands adjacent to Corcanree PS, the existing ground levels within the footprint of the proposed stormwater tank range between 4.45mOD – 5.21mOD (see Figure 4-3 below). As mentioned above the historic embankment present between the site and the estuary is estimated to be 4.39mOD (2% AEP SOP), this altered the natural flood plain, which is no longer functioning as an active floodplain under the defended scenario.

There is also a strip of land which reaches 5.36mOD along the northern bounds of the survey outside the site boundary adjacent to the estuary. This is recent and high confidence data which increases the estimated protection provided the site. The 0.5% AEP flood level in this area is 4.70mOD, therefore the risk of overtopping and flooding is low.

Nonetheless, the proposed works at Corcanree PS are limited. The construction of a new underground storm tank (the proposed is illustrated in Figure 4-3) is the most extensive development and it would not increase flood risk under any circumstances. Other developments are upgrade and retentions only and will not increase risk of flooding.

The proposed development is considered to satisfy Sub-Criterion 2(i) of the Justification Test.

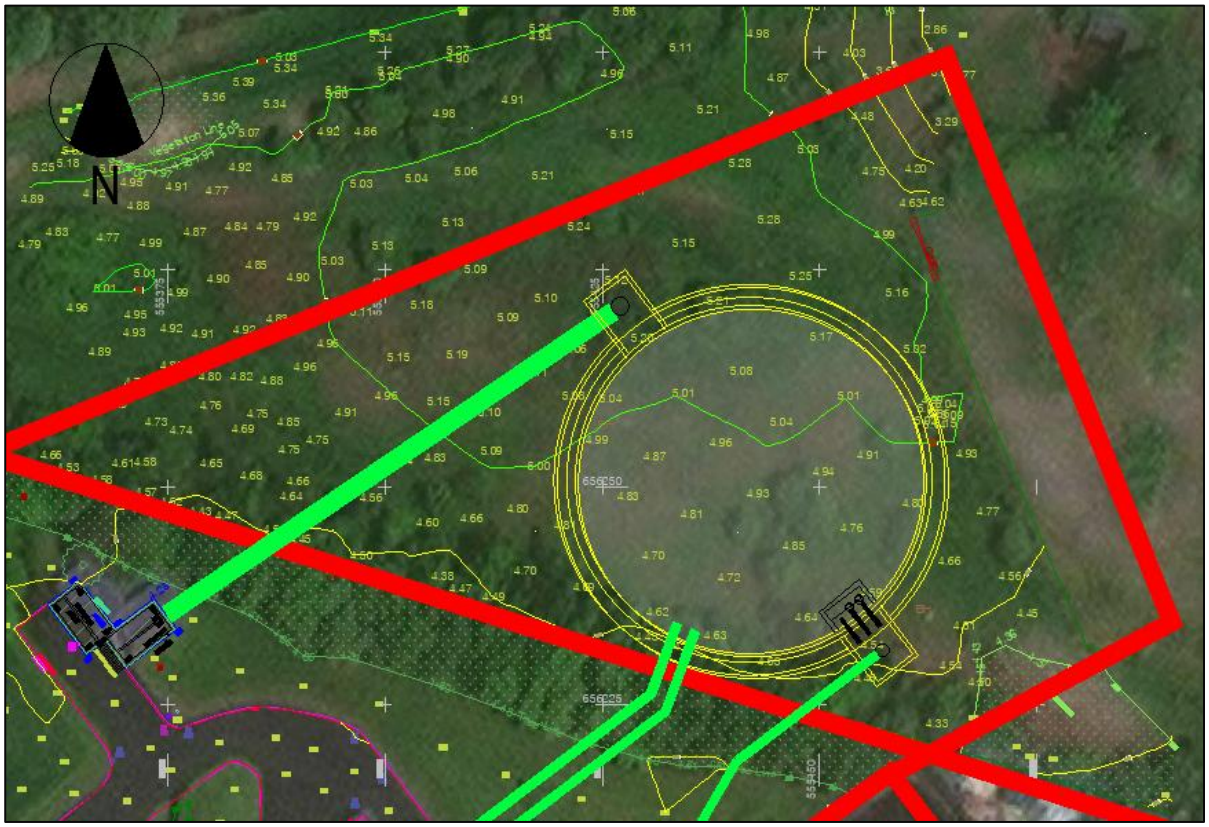


FIGURE 4-3: PROPOSED STORM TANK AND EXISTING GROUND LEVELS

4.4.2.2 Sub-criterion 2(ii): The development includes measures to minimise flood risk

According to the Limerick SFRA *"In some cases, land use objectives which include for highly vulnerable uses have been justified in the Development Plan. This includes zonings focused around an urban core which allow for a mix of residential, commercial and other uses. In such cases, a sequential approach to land use within the site*

must be taken and will consider the presence or absence of defences, land raising and provision of compensatory storage, safe access and egress in a flood and the impact on the wider development area." Mapping from the Shannon CFRAM Study and the SFRA both show that the proposed development sites are located within a defended area.

Limerick WWTP

Referring to Table 3-6: Summary of Coastal Flood Levels, the adopted design flood level for the WWTP site is 5.64mOD. This level is based on the Shannon CFRAM Study modelled coastal 0.5% AEP MRFS flood level of 5.34mOD plus 300mm freeboard. All sensitive infrastructure (electrical equipment, top of open tanks and channels) and finish floor levels of occupied buildings must be at or above 5.64mOD to ensure resilience under defended and residual flood conditions. Finish floor levels of storage and process buildings may be below this level when all sensitive infrastructure within is raised and the building is wet-proofed to 5.64mOD.

As previously outlined SuDS are included in the proposed drainage design at the site. Full details of such are outlined in document no. 20702-JBB-00-XX-RP-Z-02000 and drawing no. 20702-JBB-XX-XX-DR-C-2008, submitted along with this report. The proposed infrastructure includes interception and attenuation storage which will reduce pluvial flood risk to the site. Depending on discharge method and location, provision should be included for a non-return valve to ensure the proposed drainage network does not become a conduit for flood waters to enter the site.

Following these recommendations the proposed development is considered capable of being safely managed during extreme flood events through the raising of design flood level, including those exceeding the standard of protection of the existing defence, the proposed development satisfies Sub-Criterion 2(ii).

Corcanree PS

The only significant development is a sealed stormwater tank of approximately 40m diameter that will be submerged into the ground by approximately 12m. The risk of flood water ingress is therefore low, barring failure of the asset. Mitigation measures should include design to prevent uplift following pluvial or combined pluvial and coastal events which would increase the soil saturation surrounding the tank.

Again referring to Table 3-6, the design flood level for the PS site is 5.61mOD. This is based on a Shannon CFRAM Study modelled coastal 0.5% AEP MRFS flood level of 5.31mOD plus the same allowances outline above for the WWTP site. If any sensitive infrastructure (electrical equipment, top of open tanks and channels) or occupied buildings were to be built at the site they should be raised above this level.

Similarly to the WWTP site, the proposed development satisfies Sub-Criterion 2(ii).

4.4.2.3 Sub-criterion 2(iii): The development includes measures to ensure that residual risks to the area can be managed

To address the residual risks to the area posed by the defences surrounding Limerick Dock, breach analysis of the sites presented in the Limerick SFRA Appendix D was summarised in Section 0. It is noted that existing internal access roads at both sites will remain, therefore, access/egress to the site in the event of a flood will remain as existing. On-site operators are not considered to be vulnerable as there are no proposed control or other buildings which they would occupy on a prolonged and regular basis.

Limerick WWTP

With the implementation of flood risk mitigation measures recommended above, it is considered that the risk of flood damage to the proposed infrastructure and to operators will be minimised.

The local flooding depth during the worst-case scenario breach appears to range from 0m surrounding existing infrastructure and accessways, to in excess of 2m in the area of proposed AGS and inlet works development, the exact depth range could not be determined. This depth is below the adopted design flood level of 5.64mOD for the site. This measure manages the residual risk presented by breaches.

The site therefore fulfils Sub-Criterion 2(iii).

Corcanree PS

With the implementation of flood risk mitigation measures recommended above, it is considered that the risk of flood damage to the proposed infrastructure and to operators will be minimised.

The SOP of the embankment nearest Corcanree PS is to 2% AEP flood level. This embankment is below the 0.5% AEP coastal flood level which would be deemed a sufficient level of defence. To remove reliance on this defence, design flood levels have been specified at the 0.5% AEP MRFS coastal flood level plus 300mm freeboard.

The worst-case breach scenario at this site determined a flood level of 4.3mOD, which when following Limerick SFRA recommendations, results in a design flood level of 5.15mOD. Similar to the WWTP this level is below the adopted level of 5.61mOD at the PS site. This measure manages the residual risk presented.

The site therefore fulfils Sub-Criterion 2(iii).

4.4.2.4 Sub-criterion 2 (iv) – the development is compatible with wider planning objectives

The following points are taken from the Limerick Development Plan (LDP) 2022-2028 and regard both Limerick WWTP and Corcanree PS.

Strategic Objective 7 – "*Protect, enhance and ensure the sustainable use of key infrastructure, through the provision of support to utility providers including water supplies and wastewater treatment facilities, energy supply including renewables, broadband and transportation. This plan will also foster the linkages to transition from linear model to a circular model which keeps resources in use for as long as possible.*"

Chapter 8 of the LDP is titled Infrastructure. Chapter 8.5 Water Services and Surface Water is summarised as follows - water services infrastructure in the LDP includes potable water supply and wastewater disposal, both essential for quality of life and economic growth. These services are prioritized for investment at regional, national, and EU levels. Water services are a key factor in land zoning and planning for future population and employment growth. The LDP aligns with national and EU policies and regulations, with oversight from the EPA and HSE. Uisce Éireann is responsible for delivering safe water and wastewater services, which are critical for public health.

Notable extracts from this chapter which relate directly to and support the need for this development include:

- 8.5.3 Public Waste Water Treatment - *"As part of the Mungret Local Infrastructure Housing Activation Fund project (LIHAF), Irish Water is working with the Council to provide wastewater network infrastructure in the Mungret area."*
- 8.7.3 Sludge Management – *"In the National Waste Water Sludge Management Plan, Irish Water proposes to expand on the provision of 'sludge centres' and satellite facilities in Limerick. These proposals include upgrading the existing sludge centre at Bunlicky and the construction of dewatering satellite facilities in Newcastle West, Rathkeale, Foynes Shanagolden and Cappamore. In the case of sludge management facilities, these facilities are best suited to sites of existing public wastewater treatment facilities, due to the nature and characteristics of existing operations on these sites and the need to strictly control the treatment of sludge."*

Chapter 12 refers to Land Use Zoning. Both sites are zoned for "Utilities". The Utilities Objective aims to support the infrastructure requirements of transport and other utility providers. It ensures land is reserved for essential services such as electricity and gas networks, telecommunications, and the treatment of water and wastewater.

This development is in line with the objectives of the LDP. It therefore fulfils Sub-Criterion 2(iv).

5 SUMMARY OF ASSESSMENT

5.1 Flood Risk Summary

This Flood Risk Assessment (FRA) has assessed the potential flood risk associated with the proposed development at Limerick Wastewater Treatment Plant (WWTP) and Corcanree Pumping Station (PS) in accordance with the Planning System and Flood Risk Management Guidelines for Planning Authorities (2009).

A review of available flood information, including the Shannon Catchment Flood Risk Assessment and Management Study (CFRAM), Limerick Strategic Flood Risk Assessment (SFRA), the Irish Coastal Wave and Water Level Study (ICWWS) and the national flood mapping database (*www.floodmaps.ie*), indicates that both sites are at high risk of flooding in Flood Zone A. The sites are located within an area benefiting from existing arterial drainage and embankment defences; however, in accordance with the FRM Guidelines the flood zones adopted for this assessment are based on undefended flood extents, and the potential vulnerability of the defences to overtopping or breach has been considered. As the development is wastewater infrastructure it is classified as highly vulnerable. Due to the vulnerability and flood zoning assigned to each site, they were both subject to a Justification Test.

Limerick WWTP – The Justification Test deemed the development proposed at Limerick WWTP to be acceptable.

Corcanree PS - The Justification Test deemed the development proposed at Corcanree PS to be acceptable.

Overall, the assessment concludes that when the need for development, the lack of other suitable sites and the mitigation measures recommended are combined the proposed development is appropriate in flood risk terms and will not increase flood risk either on-site or elsewhere.

5.2 Mitigation Measures

For development proposals in areas at moderate or high flood risk, it must be shown that effective mitigation measures can be implemented and that any remaining risks are manageable. Proposals should use flood-resistant or resilient construction techniques to prevent or minimize flood damage and support quick recovery. These measures should only be considered if development is deemed appropriate for the location, as engineering solutions should not be used to justify unsuitable developments.

Design coastal flood levels have been adopted for the assessment, using the 0.5% AEP MRFS flood level and allowance for freeboard (300mm), resulting in the table below. All sensitive infrastructure such as electrical equipment and open channel and tank walls are to be at or above the design flood level to mitigate flood risk.

FIGURE 5-1: ADOPTED COASTAL FLOOD LEVELS

Location	Design Flood Level (mOD)
Limerick WWTP	5.64
Corcanree PS	5.61

The design flood levels could be refined if a condition survey of the embankments protecting each site was carried out to increase the confidence in the flood defence. Other mitigation measures include:

.

- Access to both sites will remain as existing. There is therefore no change to the emergency evacuation route in the case of a flood.
- New surface water drainage infrastructure including SuDS to manage run-off and reduce pluvial risk.

- Flood resilience measures such as wet-proofing buildings should be considered to protect assets where applicable.

The following measures will be implemented during construction to manage potential flood risk.

- Stockpiles, plant and hazardous materials will be managed and stored in designated areas to minimise the risk of flood-related damage or pollution.
- Deployable measures such as portable bunds, sandbags, or silt fencing shall be installed if weather forecasts or river level monitoring indicate potential flooding.
- Drains, sumps, and pumping systems shall be maintained to ensure that any incidental water does not cause uncontrolled release or damage.
- Flood risk mitigation measures shall be inspected daily by the Project Supervisor, with review and verification by the ECoW where the area is in use. Any observed risk, breach, or failure shall be addressed immediately, and all actions recorded.

SUB-APPENDIX 16.1: PROPOSED DEVELOPMENT LAYOUTS



LEGEND:

1. PROPOSED AGS TANKS
2. PROPOSED INLET WORKS
3. PROPOSED EXPORT CAKE SILO STORAGE
4. PROPOSED SLUDGE SCREENING
5. PROPOSED LTP BUFFER TANK
6. PROPOSED SLUDGE THICKENING & DEWATERING BUILDING
7. PROPOSED LTP TANK
8. PROPOSED THICKENED SLUDGE STORAGE TANK
9. EXISTING PRIMARY SLUDGE TANK
10. EXISTING PRIMARY / IMPORTED SLUDGE TANK
11. EXISTING WAS BUFFER TANK (PRE GBT)
12. PROPOSED DIGESTER NO. 3
13. EXISTING TANKS TO BE USED AS DIGESTED SLUDGE TANKS
14. EXISTING TANKS TO BE USED AS BLENDING TANKS
15. EXISTING THERMAL OXIDISERS TO BE DECOMMISSIONED / NEW ODOUR UNIT
16. EXISTING MCC
17. EXISTING CHP
18. PROPOSED GAS BELL
19. PROPOSED IMPORTED CAKE RECEPTION AREA
20. NEW MCC KIOSK
21. PROPOSED THP SILOS
22. EXISTING WEIGH BRIDGE
23. PROPOSED VEHICLE PARKING AREA
24. PROPOSED NEW HARDSTANDING AREA
25. EXISTING ADMINISTRATION BUILDING AND SCADA ROOM
26. EXISTING INLET WORKS
27. EXISTING MUNGRET PUMPING STATION TO BE MODIFIED
28. EXISTING BUILDING
29. EXISTING STORM TANK
30. EXISTING FINAL EFFLUENT PUMPING STATION
31. EXISTING OUTFALL TIE IN LOCATION
32. PROPOSED ESB TRANSFORMER
33. ODOUR EXTRACTION
34. SLUDGE PUMPING STATION
35. SLUDGE RECEIVING STATION
36. ELECTRICAL CABLE CONTAINMENT
37. PROPOSED HEAT EXCHANGER

X=554244,Y=655469

PROPOSED SITE LAYOUT PLAN
SCALE 1:1000 @ A1

© Copyright
This drawing and any design hereon is the copyright of the Consultants and must not be reproduced without their written consent.

All drawings remain the property of the Consultants.

NOTES:
1. ALL LEVELS ARE IN METRES AND RELATE TO O.S. DATUM MALIN
2. THIS DRAWING IS REPRODUCED FROM DIGITAL MAPS:
   O.S. MAPS - SCALE 1:2,500
   O.S. MAPS - SCALE 1:1,000
   DISCOVERY SERIES - SCALE 1:50,000
3. ALL MAPS ARE REFERENCED TO IRISH TRANSVERSE MERCATOR (I.T.M.)
4. LICENCE NO. CYAL50419116 © NATIONAL MAPPING DIVISION OF TAILTE ÉIREANN
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND DOCUMENTATION
6. ALL DIMENSIONS IN MM UNLESS NOTED OTHERWISE
7. FOR LANDSCAPING DETAILS, PEASE REFER TO LANDSCAPE MITIGATION PLAN
8. PROPOSED STRUCTURAL HEIGHTS, LEVELS & DIMENSIONS ARE INDICATIVE
9. LOCATION OF PIPEWORK IS INDICATIVE AND SUBJECT TO ALTERATIONS PENDING FINAL DESIGN.
10. SOLAR PANELS SPECIFICATION & LAYOUT TO BE FINALISED

MAPPING
OS SHEET: 4742

LEGEND

- PLANNING BOUNDARY
- LANDS IN UISCE ÉIREANN OWNERSHIP OUTLINED IN BLUE
- LANDS IN THIRD PARTY OWNERSHIP OUTLINED IN ORANGE
- LOCATION OF SITE NOTICE
- 0.00 — CONTOURS AT 0.5m OD
- 0.00 — EXISTING GROUND LEVEL
- FGL=0.00m — EXISTING FINISHED GROUND LEVEL
- FFL=0.00m — EXISTING FINISHED FLOOR LEVEL
- FGL=0.00m — PROPOSED FINISHED GROUND LEVEL
- FFL=0.00m — PROPOSED FINISHED FLOOR LEVEL
- PROPOSED - SUBJECT OF THIS PLANNING APPLICATION
- EXISTING LANDSCAPING
- TOWNLAND BOUNDARY

Rev:	Suit:	Revision Description	Checked:	Date:
C01	A1	ISSUED FOR PLANNING	PJ	26-03-26

Client

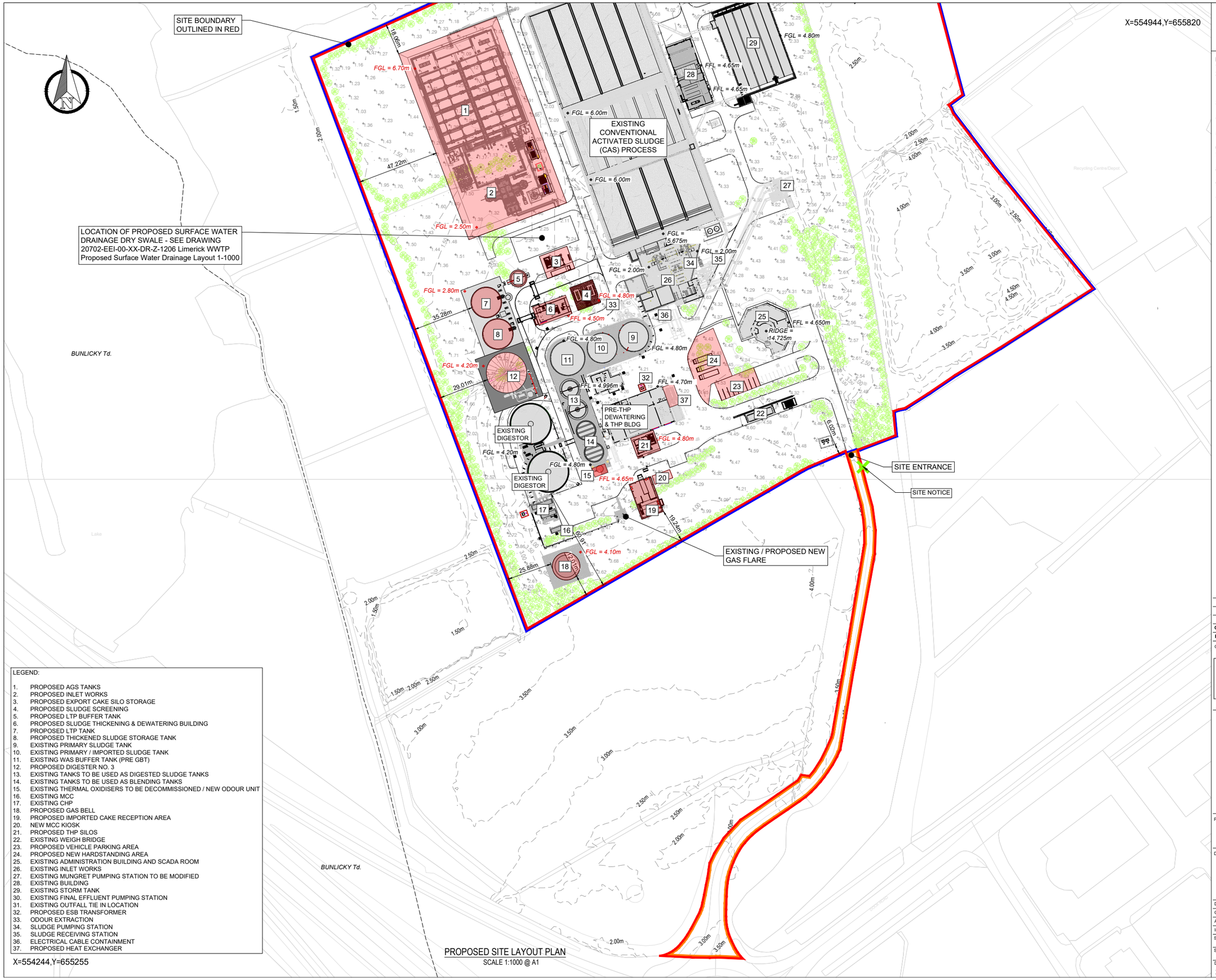
Uisce Éireann
Irish Water
Colvill House
24-26 Talbot Street
Dublin 1
Tel: 1890 278 278
Int:353-1-707 2828
email: info@water.ie
Web: www.water.ie

egis
info.ireland@egis-group.com
Formerly JB Barry & Partners who became part of Egis in 2023

Project
LIMERICK WWTP UPGRADE AND REGIONAL BIORESOURCE CENTRE

Drawing Title
LIMERICK WWTP & CORCANREE PS
LIMERICK WWTP -
PROPOSED SITE LAYOUT PLAN
SHEET 1 OF 2 - SCALE 1:1000

Drawn by :	KM	Date :	16.01.26
Checked by :	OOB	Date :	16.01.26
Approved by :	PJ	Date :	16.01.26
Internal Project REF :	EEI: 20702		
Scales :	AS INDICATED		
Stage :	PLANNING		
Drawing No. :	20702-EEI-00-XX-DR-Z-1202	Revision	C01
		Suitability	A1



LEGEND:

1. PROPOSED AGS TANKS
2. PROPOSED INLET WORKS
3. PROPOSED EXPORT CAKE SILO STORAGE
4. PROPOSED SLUDGE SCREENING
5. PROPOSED LTP BUFFER TANK
6. PROPOSED SLUDGE THICKENING & DEWATERING BUILDING
7. PROPOSED LTP TANK
8. PROPOSED THICKENED SLUDGE STORAGE TANK
9. EXISTING PRIMARY SLUDGE TANK
10. EXISTING PRIMARY / IMPORTED SLUDGE TANK
11. EXISTING WAS BUFFER TANK (PRE GBT)
12. PROPOSED DIGESTER NO. 3
13. EXISTING TANKS TO BE USED AS DIGESTED SLUDGE TANKS
14. EXISTING TANKS TO BE USED AS BLENDING TANKS
15. EXISTING THERMAL OXIDISERS TO BE DECOMMISSIONED / NEW ODOUR UNIT
16. EXISTING MCC
17. EXISTING CHP
18. PROPOSED GAS BELL
19. PROPOSED IMPORTED CAKE RECEPTION AREA
20. NEW MCC KIOSK
21. PROPOSED THP SILOS
22. EXISTING WEIGH BRIDGE
23. PROPOSED VEHICLE PARKING AREA
24. PROPOSED NEW HARDSTANDING AREA
25. EXISTING ADMINISTRATION BUILDING AND SCADA ROOM
26. EXISTING INLET WORKS
27. EXISTING MUNGRET PUMPING STATION TO BE MODIFIED
28. EXISTING BUILDING
29. EXISTING STORM TANK
30. EXISTING FINAL EFFLUENT PUMPING STATION
31. EXISTING OUTFALL TIE IN LOCATION
32. PROPOSED ESB TRANSFORMER
33. ODOUR EXTRACTION
34. SLUDGE PUMPING STATION
35. SLUDGE RECEIVING STATION
36. ELECTRICAL CABLE CONTAINMENT
37. PROPOSED HEAT EXCHANGER

X=554244,Y=655255

PROPOSED SITE LAYOUT PLAN

SCALE 1:1000 @ A1

© Copyright
This drawing and any design hereon is the copyright of the Consultants and must not be reproduced without their written consent.

All drawings remain the property of the Consultants.

NOTES:
1. ALL LEVELS ARE IN METRES AND RELATE TO O.S. DATUM MALIN
2. THIS DRAWING IS REPRODUCED FROM DIGITAL MAPS:
   O.S. MAPS - SCALE 1:2,500
   O.S. MAPS - SCALE 1:1,000
   DISCOVERY SERIES - SCALE 1:50,000
3. ALL MAPS ARE REFERENCED TO IRISH TRANSVERSE MERCATOR (I.T.M.)
4. LICENCE NO. CYAL50419116 © NATIONAL MAPPING DIVISION OF TAILTE ÉIREANN
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND DOCUMENTATION
6. ALL DIMENSIONS IN MM UNLESS NOTED OTHERWISE
7. FOR LANDSCAPING DETAILS, PEASE REFER TO LANDSCAPE MITIGATION PLAN
8. PROPOSED STRUCTURAL HEIGHTS, LEVELS & DIMENSIONS ARE INDICATIVE
9. LOCATION OF PIPEWORK IS INDICATIVE AND SUBJECT TO ALTERATIONS PENDING FINAL DESIGN.
10. SOLAR PANELS SPECIFICATION & LAYOUT TO BE FINALISED

MAPPING
OS SHEET: 4742

LEGEND

- PLANNING BOUNDARY
- LANDS IN UISCE ÉIREANN OWNERSHIP OUTLINED IN BLUE
- LANDS IN THIRD PARTY OWNERSHIP OUTLINED IN ORANGE
- LOCATION OF SITE NOTICE
- CONTOURS AT 0.5m OD
- 0.00 EXISTING GROUND LEVEL
- FGL=0.00m EXISTING FINISHED GROUND LEVEL
- FFL=0.00m EXISTING FINISHED FLOOR LEVEL
- FGL=0.00m PROPOSED FINISHED GROUND LEVEL
- FFL=0.00m PROPOSED FINISHED FLOOR LEVEL
- PROPOSED - SUBJECT OF THIS PLANNING APPLICATION
- EXISTING LANDSCAPING
- TOWNLAND BOUNDARY

Rev:	Suit:	Revision Description	Checked:	Date:
C01	A1	ISSUED FOR PLANNING	PJ	26-03-26

Client

Uisce Éireann
Irish Water
Colvill House
24-26 Talbot Street
Dublin 1
Tel: 1890 278 278
Int:353-1-707 2828
email: info@water.ie
Web: www.water.ie

egis
info.ireland@egis-group.com
Formerly JB Barry & Partners who became part of Egis in 2023

Project
LIMERICK WWTP UPGRADE AND REGIONAL BIORESOURCE CENTRE

Drawing Title
LIMERICK WWTP & CORCANREE PS
LIMERICK WWTP -
PROPOSED SITE LAYOUT PLAN
SHEET 2 OF 2 - SCALE 1:1000

Drawn by :	KM	Date :	16.01.26
Checked by :	OOB	Date :	16.01.26
Approved by :	PJ	Date :	16.01.26
Internal Project REF :	EEI: 20702		
Scales :	AS INDICATED		
Stage :	PLANNING		

Drawing No. :	Revision	Suitability
20702-EEI-00-XX-DR-Z-1203	C01	A1

X=555552,Y=656338

LANDS TO BE ACQUIRED

EXISTING OVERFLOW CHAMBER

HWM

STORM TANK WITH GREEN ROOF

16.26m

22.56m

COURTBRACK Td.

12.14m

SITE BOUNDARY OUTLINED IN RED

French Drain
EL: 4.50m
Depth: 1.00m
BL: 3.50m
Length: 30.00m
Slope: 1:200
Width: 2.50m
Under Drain Ø: 150mm

P01
Length: 7.09m
Dia.: 150mm

MH01
CL: 5.00m
IL: 4.10m

PROPOSED STORM TANK
40m Ø X 12m DEEP

FGL = -4.850m

FGL = 7.15m

FGL = 4.15m

LANDS IN UISCE ÉIREANN OWNERSHIP OUTLIINED IN BLUE

16.98m

9.02m

72.06m

63.74m

P02
Length: 7.23m
Dia.: 150mm

EX-MH
CL: 4.23m
IL: 3.33m

RIDGE = 10.24m

32.25m

FFL = 4.60m

39.81m

BOUNDARY FENCE

10.32m

RIDGE = 11.32m

FFL = 4.50m

57.07m

46.52m

9.42m

ISL.1

STORM PUMPS

FOUL PUMPS

EXISTING PUMP STATION

EXISTING ELECTRICAL SUBSTATION

SITE NOTICE

SITE NOTICE

CONTROL BUILDING

EXISTING GATE ACCESS

EXISTING SURFACE WATER DRAINAGE OUTFALL CONNECTION

SITE NOTICE

CORKANREE Td.

CORCANREE BUSINESS PARK

Corkanree Business Park

CORCANREE BUSINESS PARK

ES

CORCANREE BUSINESS PARK

PROPOSED SITE LAYOUT PLAN
SCALE 1:500 @ A1

X=555202,Y=656055

© Copyright
This drawing and any design hereon is the copyright of the Consultants and must not be reproduced without their written consent.

All drawings remain the property of the Consultants.

NOTES:
1. ALL LEVELS ARE IN METRES AND RELATE TO O.S. DATUM MALIN
2. THIS DRAWING IS REPRODUCED FROM DIGITAL MAPS:
   O.S. MAPS - SCALE 1:2,500
   O.S. MAPS - SCALE 1:1,000
   DISCOVERY SERIES - SCALE 1:50,000
3. ALL MAPS ARE REFERENCED TO IRISH TRANSVERSE MERCATOR (I.T.M.)
4. LICENCE NO. CYAL50419116 © NATIONAL MAPPING DIVISION OF TAILTE ÉIREANN
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND DOCUMENTATION
6. ALL DIMENSIONS IN MM UNLESS NOTED OTHERWISE
7. FOR LANDSCAPING DETAILS, PEASE REFER TO LANDSCAPE MITIGATION PLAN
8. PROPOSED STRUCTURAL HEIGHTS, LEVELS & DIMENSIONS ARE INDICATIVE
9. LOCATION OF PIPEWORK IS INDICATIVE AND SUBJECT TO ALTERATIONS PENDING FINAL DESIGN.
10. SOLAR PANELS SPECIFICATION & LAYOUT TO BE FINALISED

MAPPING
OS SHEET: 4742

LEGEND

- PLANNING BOUNDARY
- LANDS IN UISCE ÉIREANN OWNERSHIP OUTLINED IN BLUE
- LANDS IN THIRD PARTY OWNERSHIP OUTLINED IN ORANGE
- LOCATION OF SITE NOTICE
- 0.00 — CONTOURS AT 0.5m OD
- 0.00 — EXISTING GROUND LEVEL
- FGL=0.00m — EXISTING FINISHED GROUND LEVEL
- FFL=0.00m — EXISTING FINISHED FLOOR LEVEL
- FGL=0.00m — PROPOSED FINISHED GROUND LEVEL
- FFL=0.00m — PROPOSED FINISHED FLOOR LEVEL
- PROPOSED - SUBJECT OF THIS PLANNING APPLICATION
- TOWNLAND BOUNDARY
- STORM TANK OVERFLOW
- STORM TANK FEED RISING MAINS
- STORM TANK RETURN RISING MAIN
- SWS — SWS — EXISTING SURFACE WATER DRAINAGE
- EXISTING ROAD GULLY
- FD — FD — PROPOSED SURFACE WATER DRAINAGE FILTER DRAIN 150mm DIA.
- SWS — SWS — PROPOSED SURFACE WATER DRAINAGE PIPE 150mm DIA.

NOTE:

SURFACE WATER DRAINAGE IS INDICATIVE & SUBJECT TO ALTERATIONS PENDING TESTING & FINAL DESIGN

Rev.	Suit.	Description	Checked	Date
C01	A1	ISSUED FOR PLANNING	PJ	01.07.26

Client

Uisce Éireann
Irish Water

Uisce Éireann
Colvill House
24-26 Talbot Street
Dublin 1
Tel: 1890 278 278
Int:353-1-707 2828
email: info@water.ie
Web: www.water.ie

egis

info.ireland@egis-group.com

Formerly JB Barry & Partners who became part of Egis in 2023

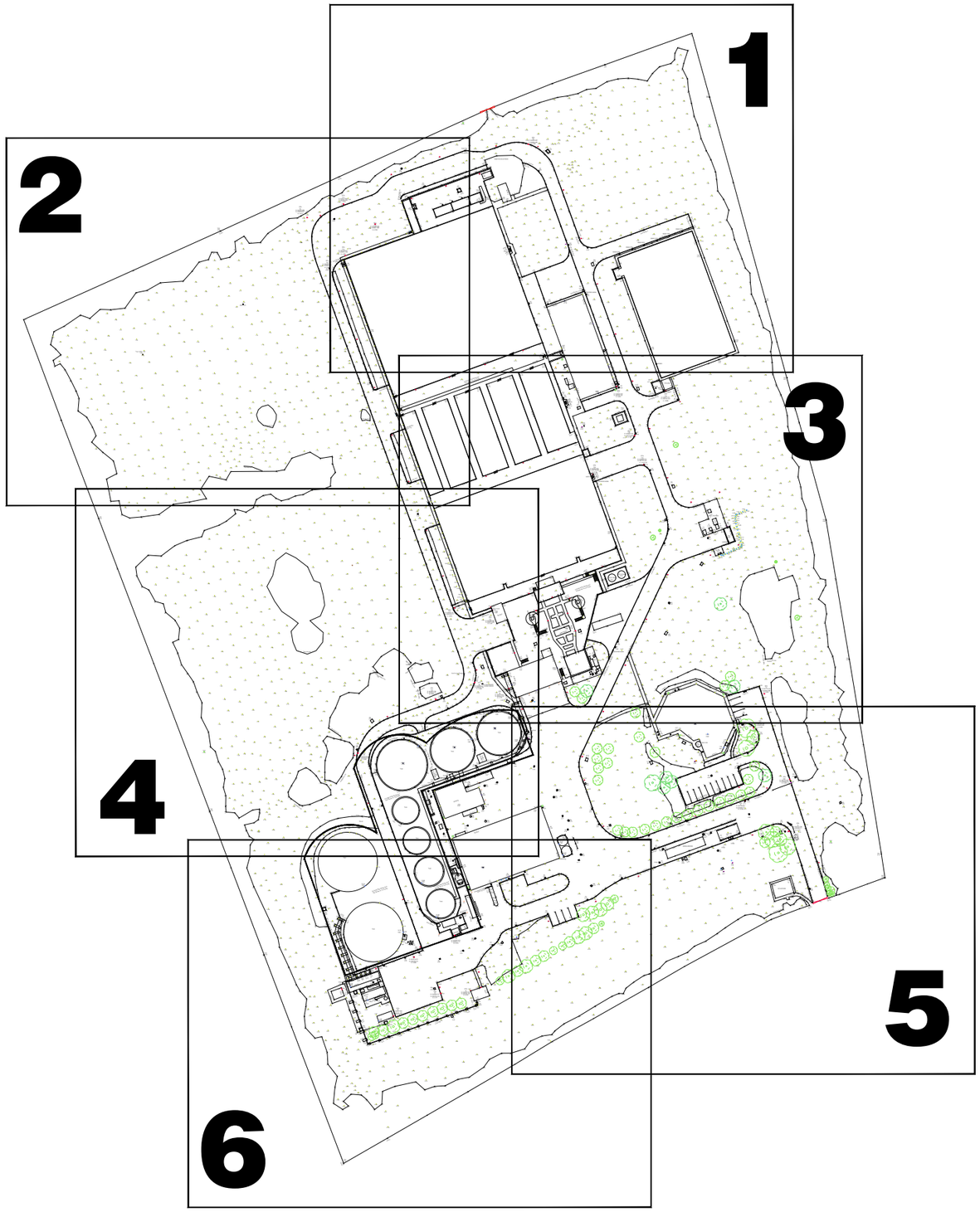
Project
LIMERICK WWTP UPGRADE AND
REGIONAL BIORESOURCE CENTRE

Drawing Title
LIMERICK WWTP & CORCANREE PS

CORCANREE PS
- PROPOSED SITE LAYOUT PLAN

Drawn by :	KM	Date :	16.01.26
Checked by :	OOB	Date :	16.01.26
Approved by :	PJ	Date :	16.01.26
Internal Project REF :	EEI: 20702		
Scales :	AS INDICATED		
Stage :	PLANNING		
Drawing No. :	20702-EEI-00-XX-DR-Z-1211	Revision	C01
		Suitability	A1

SUB-APPENDIX 16.2: TOPOGRAPHICAL SURVEY



LEGEND

Street furniture & Services

- Over Head Wires (LUAS) - Pylon ESB
- Flowerbed
- Pipe
- Lift
- Barrier
- Pump
- Trial Pit
- Bus/Tram Shelter
- Postbox
- Valve - General
- Water Valve
- Gas Valve
- Sluice Valve
- Air Valve
- Stop Cock
- C P Post
- Marker Post
- Traffic light
- Parking Meter
- Plane Aerial Mark
- Smart Card Validator
- Unknown Valve
- Road Sign
- Bus Stop
- Bollard
- Beacon
- Coalhole Cover
- Bore Hole
- Electricity Pole
- Telegraph pole
- OCS Pole
- CCTV Camera Pole
- Lamp Post
- Foul Manhole
- Surface Water MH
- Manholes
- Air Conditioning Vents
- Services Inspection Cover
- Traffic Inspection Cover
- Cable TV Inspection Cover
- ESAT Inspection Cover
- NTL Inspection Cover
- Eircom Inspection Cover
- Rodding Eye
- Phone Box
- Bench Seat
- Kiosk
- Gully
- Waste Bin
- Hydrant
- Fire Hydrant
- ESB Box
- ESB Inspection Cover
- Traffic Control Box
- LUAS Technical Cubicle
- Ticket Vending Machine
- Water Meter Cover
- Telecom Inspection Cover
- Monument / Toilets
- Tank Storage
- Basement: MH, Cover & Pipe
- Dished Aerial Mark
- Stay for pole
- Pipe Protection
- Washout

Natural Features

- Surface Change
- Land Drain
- Bottom of Slope
- Top of Slope
- Ditch
- Water Edge / Lake / Pond
- Hedge / Trees Drip Line / Vegetation
- Tree Coniferous
- Water Level
- Crown Level
- Invert level
- Bed Level
- Spotheight
- Tree Deciduous

Golf

- Fair Way
- Green
- Tee Box

Other

- Survey Station
- Photo point
- Top of Tree

Built Features

Roads & Road Markings

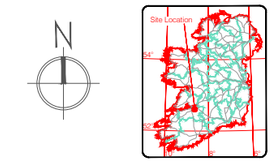
- Building
- Edge of Road
- Kerb Bottom
- Kerb Top
- Bridge Abutment
- Bridge Deck
- Bridge Parapet
- Building Façade
- Footpath / Platform Train & Tram
- Damp Proof Course / Verge
- Bridge Pier / Wall & Gate Pillar / LUAS Trackbed
- Cycleway / Private Landing Area
- Fence
- Gate
- Road Centreline
- Top of Wall
- Hoarding
- Property Line
- Road Scar
- Top of Fence
- Floor Level
- Apex Height
- Eaves Height
- Parapet Height
- Soffit Elevation
- Step Level
- Concrete Pad
- Track
- Wall / Retaining Wall
- Railway / Tram Rail / Grating / Ramp
- Building Canopy / Roof / Overhang

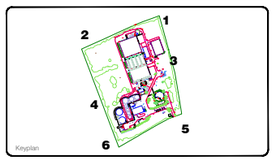
Murphy Geospatial Ltd. Disclaimer

The user or recipient of this survey data understands and acknowledges this data may be inaccurate or contain errors or omissions and the user or recipient assumes full responsibility for any risks or damages resulting from, arising from, or in connection with any use of or reliance upon data displayed herein. Although significant care has been exercised to produce surveys that satisfy survey accuracy standards, these surveys are only as accurate as the source data from which they were compiled. Although all reasonable steps have been taken to locate all features visible at the time of the survey, there is no guarantee that all will be shown on the drawing, as some above ground features may have obstructed the survey. Wherever possible, areas unable to be surveyed will be labelled as "UTS".

The Company shall not be liable for any inaccuracy of the data provided beyond the specified scale or accuracy, or for any matters resulting from their use for purposes other than that stated in the Contract. No liability shall attach to the Surveyor in respect of any consequential loss or damages suffered by the Client.

The Client must promptly notify the Company of any errors in mapping of which it becomes aware. If misleading, inaccurate or otherwise inappropriate information is brought to the Company's attention or the Company itself identifies any such imprecision or error in a survey, it shall use its reasonable endeavours to fix or remove it and if necessary in certain instances, the Company being on notice of any such misleading, inaccurate or otherwise inappropriate information, it will re-conduct the survey and reproduce the data to within the specified scale or accuracy.





Surveyed by : TC	Date: November 2021	Datum: Malin Head
Drawn by : CC	Date: 22/12/2021	Grid System:
Checked by : SS	Date: 17/01/2022	Irish National Grid ☐ ITM ☒

Revisions

No.	Date	Description
0	22/12/2021	PRELIMINARY DRAWING
1	17/01/2022	ISSUED FOR FINAL DRAWING

Murphy GEOSPATIAL

Topographic surveys, Measured Building Surveys, Setting-Out, As-Built Surveys, Hydrographic Surveys, Legal Mapping, Pipeline Surveys, Services Location, Ground Penetrating Radar, Laser Scanning, Rectified Photography

Kildare Cork Belfast Glasgow London

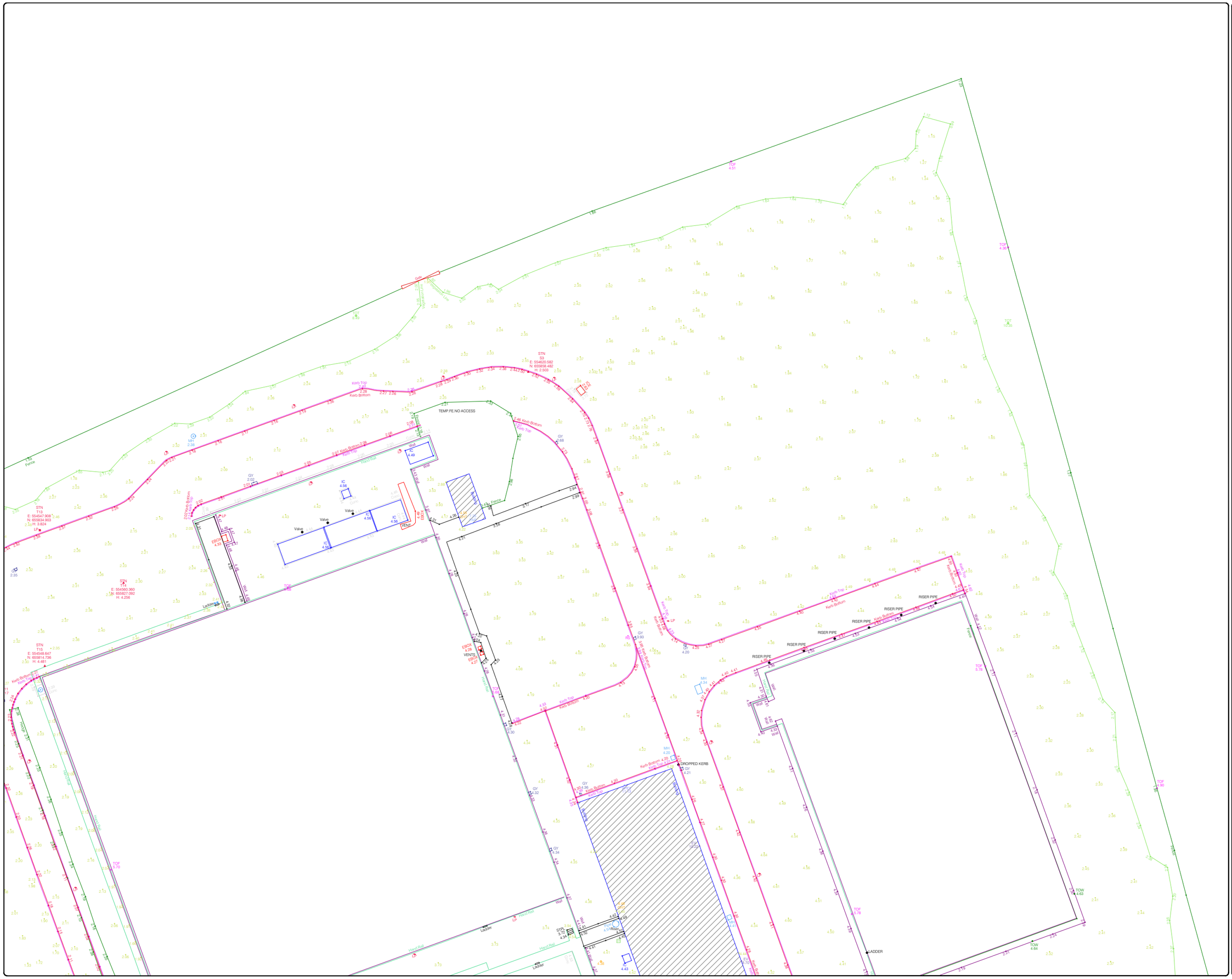
Head Office

Global House
Kilcullen Business Campus
Kilcullen Co. Kildare
Ireland

Phone: (+353) 045 484040
Fax: (+353) 045 484004
Email: info@murphygs.ie

Client :	JB Barry & Partners Ltd
Project :	Topographical & laser scan surveys at 3 WWTPs
Date : 17/01/2022	**Scale :** 1:NTS@A1
Description :	Topographical Survey
Drawing Number :	**MGS43961_T3_2D_ITM_Rev0_0**

© Copyright 2022 MURPHY GEOSPATIAL LTD



LEGEND

Street furniture & Services

- Over Head Wires (OHW) - Pylon
- ESB
- Road Sign
- Phone Box
- Flowerbed
- Bus Stop
- Bench Seat
- Duct
- Pipe
- Bollard
- Kiosk
- Gas Cover
- Lift
- Beacon
- Gully
- C P Box
- Barrier
- Coalhole Cover
- U/G Vent
- U/G Car Park Vent
- Pump
- Bore Hole
- Waste Bin
- Trial Pit
- Electricity Pole
- Hydrant
- Bus/Tram Shelter
- Telegraph pole
- Fire Hydrant
- Postbox
- OCS Pole
- ESB Box
- Valve - General
- CCTV Camera Pole
- ESB Inspection Cover
- Water Valve
- Lamp Post
- Traffic Control Box
- Gas Valve
- Foul Manhole
- LUAS Technical Cubicle
- Sluice Valve
- Surface Water MH
- Ticket Vending Machine
- Air Valve
- Manholes
- Water Meter Cover
- Stop Cock
- Air Conditioning Vents
- Telecom Inspection Cover
- C P Post
- Services Inspection Cover
- Monument / Toilets
- Marker Post
- Traffic Inspection Cover
- Tank Storage
- Traffic light
- Cable TV Inspection Cover
- Basement: MH, Cover & Pipe
- Parking Meter
- ESAT Inspection Cover
- Dished Aerial Mark
- Plane Aerial Mark
- NTL Inspection Cover
- Stay for pole
- Smart Card Validator
- Eircom Inspection Cover
- Pipe Protection
- Unknown Valve
- Rodding Eye
- Washout

Natural Features

- Surface Change
- Land Drain
- Bottom of Slope
- Top of Slope
- Ditch
- Water Edge / Lake / Pond
- Hedge / Trees Drip Line / Vegetation
- Tree Coniferous
- Tree Deciduous
- Water Level
- Crown Level
- Invert level
- Bed Level
- Spotheight

Golf

- Fair Way
- Green
- Tee Box

Other

- Survey Station
- Photo point
- Top of Tree

Built Features

- Building
- Edge of Road
- Kerb Bottom
- Kerb Top
- Bridge Abutment
- Bridge Deck
- Bridge Parapet
- Building Façade
- Fence
- Gate
- Road Centreline
- Top of Wall
- Hoarding
- Property Line
- Road Scar
- Top of Fence
- Floor Level
- Apex Height
- Eaves Height
- Parapet Height
- Soffit Elevation
- Step Level
- Concrete Pad
- Track

Roads & Road Markings

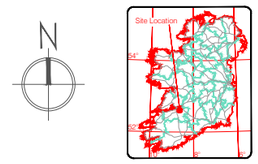
- Footpath / Platform Train & Tram
- Damp Proof Course / Verge
- Bridge Pier / Wall & Gate Pillar / LUAS Trackbed
- Cycleway / Private Landing Area
- Wall / Retaining Wall
- Railway / Tram Rail / Grating / Ramp
- Building Canopy / Roof / Overhang

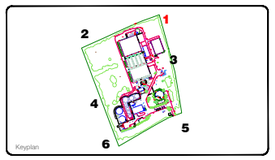
Murphy Geospatial Ltd. Disclaimer

The user or recipient of this survey data understands and acknowledges this data may be inaccurate or contain errors or omissions and the user or recipient assumes full responsibility for any risks or damages resulting from, arising from, or in connection with any use of or reliance upon data displayed herein. Although significant care has been exercised to produce surveys that satisfy survey accuracy standards, these surveys are only as accurate as the source data from which they were compiled. Although all reasonable steps have been taken to locate all features visible at the time of the survey, there is no guarantee that all will be shown on the drawing, as some above ground features may have obstructed the survey. Wherever possible, areas unable to be surveyed will be labelled as "UTS".

The Company shall not be liable for any inaccuracy of the data provided beyond the specified scale or accuracy, or for any matters resulting from their use for purposes other than that stated in the Contract. No liability shall attach to the Surveyor in respect of any consequential loss or damages suffered by the Client.

The Client must promptly notify the Company of any errors in mapping of which it becomes aware. If misleading, inaccurate or otherwise inappropriate information is brought to the Company's attention or the Company itself identifies any such imprecision or error in a survey, it shall use its reasonable endeavours to fix or remove it and if necessary in certain instances, the Company being on notice of any such misleading, inaccurate or otherwise inappropriate information, it will re-conduct the survey and reproduce the data to within the specified scale or accuracy.





Surveyed by : TC	Date: November 2021	Datum:	Main Head
Drawn by : CC	Date: 22/12/2021	Grid System:	
Checked by : SS	Date: 17/01/2022	Irish National Grid ☐ ITM ☐	

Revisions

No.	Date	Description
0	22/12/2021	PRELIMINARY DRAWING
1	17/01/2022	ISSUED FOR FINAL DRAWING

Murphy GEOSPATIAL

Topographic surveys, Measured Building Surveys, Setting-Out, As-Built Surveys, Hydrographic Surveys, Legal Mapping, Pipeline Surveys, Services Location, Ground Penetrating Radar, Laser Scanning, Rectified Photography

Kildare Cork Belfast Glasgow London

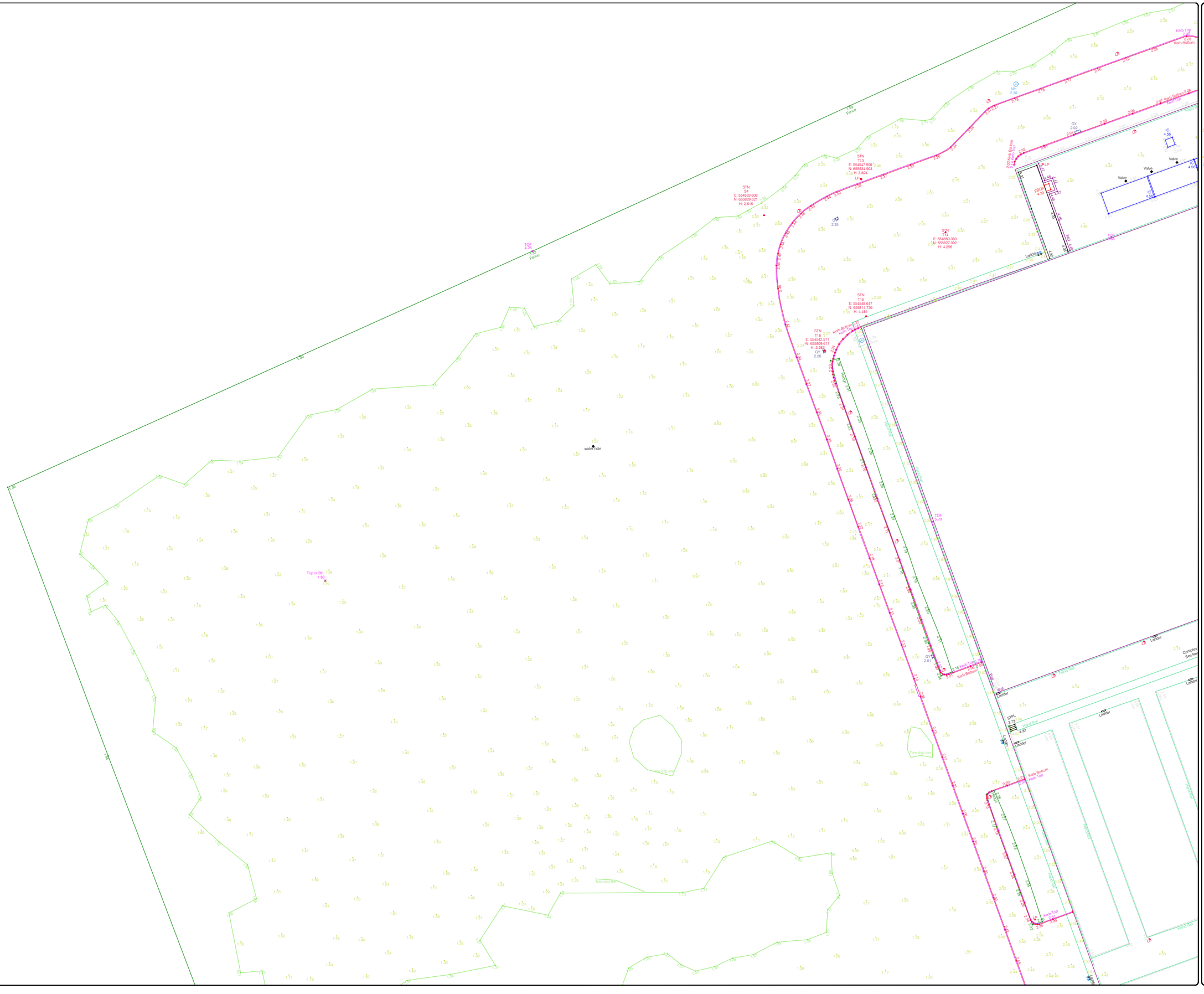
Head Office

Global House
Kilcullen Business Campus
Kilcullen Co. Kildare
Ireland

Phone: (+353) 045 484040
Fax: (+353) 045 484004
Email: info@murphygs.ie

Client :	JB Barry & Partners Ltd
Project :	Topographical & laser scan surveys at 3 WWTPs
Date : 17/01/2022	**Scale :** 1:250@A1
Description :	Topographical Survey
Drawing Number :	MGS43961_T3_2D_ITM_Rev0_1

© Copyright 2022 MURPHY GEOSPATIAL LTD



LEGEND

Street furniture & Services

Over Head Wires (LUAS) - Pylon ESB
Flowerbed
Pipe
Lift
Barrier
Pump
Trial Pit
Bus/Tram Shelter
Postbox
Valve - General
Water Valve
Gas Valve
Sluice Valve
Air Valve
Stop Cock
C P Post
Marker Post
Traffic light
Parking Meter
Plane Aerial Mark
Smart Card Validator
Unknown Valve
Road Sign
Bus Stop
Bollard
Beacon
Coalhole Cover
Bore Hole
Electricity Pole
Telegraph pole
OCS Pole
CCTV Camera Pole
Lamp Post
Foul Manhole
Surface Water MH
Manholes
Air Conditioning Vents
Services Inspection Cover
Traffic Inspection Cover
Cable TV Inspection Cover
ESAT Inspection Cover
NTL Inspection Cover
Eircom Inspection Cover
Rodding Eye
Phone Box
Bench Seat
Kiosk
Gully
Waste Bin
Hydrant
Fire Hydrant
ESB Box
ESB Inspection Cover
Traffic Control Box
LUAS Technical Cubicle
Ticket Vending Machine
Water Meter Cover
Telecom Inspection Cover
Monument / Toilets
Tank Storage
Basement: MH, Cover & Pipe
Dished Aerial Mark
Stay for pole
Pipe Protection
Washout

Natural Features

Surface Change
Land Drain
Bottom of Slope
Top of Slope
Ditch
Water Edge / Lake / Pond
Hedge / Trees Drip Line / Vegetation
Tree Coniferous
Water Level
Crown Level
Invert level
Bed Level
Spotheight
Tree Deciduous

Golf

Fair Way
Green
Tee Box
Top of Tree

Other

Survey Station
Photo point

Built Features

Roads & Road Markings

Building
Edge of Road
Kerb Bottom
Kerb Top
Bridge Abutment
Bridge Deck
Bridge Parapet
Building Façade
Footpath / Platform Train & Tram
Damp Proof Course / Verge
Bridge Pier / Wall & Gate Pillar / LUAS Trackbed
Cycleway / Private Landing Area
Fence
Gate
Road Centreline
Top of Wall
Hoarding
Property Line
Road Scar
Top of Fence
Wall / Retaining Wall
Railway / Tram Rail / Grating / Ramp
Building Canopy / Roof / Overhang
Floor Level
Apex Height
Eaves Height
Parapet Height
Soffit Elevation
Step Level
Concrete Pad
Track

Murphy Geospatial Ltd. Disclaimer

The user or recipient of this survey data understands and acknowledges this data may be inaccurate or contain errors or omissions and the user or recipient assumes full responsibility for any risks or damages resulting from, arising from, or in connection with any use of or reliance upon data displayed herein. Although significant care has been exercised to produce surveys that satisfy survey accuracy standards, these surveys are only as accurate as the source data from which they were compiled. Although all reasonable steps have been taken to locate all features visible at the time of the survey, there is no guarantee that all will be shown on the drawing, as some above ground features may have obstructed the survey. Wherever possible, areas unable to be surveyed will be labelled as "UTS".

The Company shall not be liable for any inaccuracy of the data provided beyond the specified scale or accuracy, or for any matters resulting from their use for purposes other than that stated in the Contract. No liability shall attach to the Surveyor in respect of any consequential loss or damages suffered by the Client.

The Client must promptly notify the Company of any errors in mapping of which it becomes aware. If misleading, inaccurate or otherwise inappropriate information is brought to the Company's attention or the Company itself identifies any such imprecision or error in a survey, it shall use its reasonable endeavours to fix or remove it and if necessary in certain instances, the Company being on notice of any such misleading, inaccurate or otherwise inappropriate information, it will re-conduct the survey and reproduce the data to within the specified scale or accuracy.

Keyplan

Surveyed by : TC	Date: November 2021	Datum: Main Head
Drawn by : CC	Date: 22/12/2021	Grid System:
Checked by : SS	Date: 17/01/2022	Irish National Grid ☐ ITM ☒

Revisions

No.	Date	Description
0	22/12/2021	PRELIMINARY DRAWING
1	17/01/2022	ISSUED FOR FINAL DRAWING

Murphy GEOSPATIAL

Topographic surveys, Measured Building Surveys, Setting-Out, As-Built Surveys, Hydrographic Surveys, Legal Mapping, Pipeline Surveys, Services Location, Ground Penetrating Radar, Laser Scanning, Rectified Photography

Kildare Cork Belfast Glasgow London

Head Office
Global House
Kilcullen Business Campus
Kilcullen Co. Kildare
Ireland

Phone: (+353) 045 484040
Fax: (+353) 045 484004
Email: info@murphygs.ie

Client :	JB Barry & Partners Ltd
Project :	Topographical & laser scan surveys at 3 WWTPs
Date : 17/01/2022	**Scale :** 1:250@A1
Description :	Topographical Survey
Drawing Number :	MGS43961_T3_2D_ITM_Rev0_2

© Copyright 2022 MURPHY GEOSPATIAL LTD



LEGEND

Street furniture & Services

- Over Head Wires (LUAS) - Pylon
- Flowerbed
- Pipe
- Lift
- Barrier
- Pump
- Trial Pit
- Bus/Tram Shelter
- Postbox
- Valve - General
- Water Valve
- Gas Valve
- Sluice Valve
- Air Valve
- Stop Cock
- C P Post
- Marker Post
- Traffic light
- Parking Meter
- Plane Aerial Mark
- Smart Card Validator
- Unknown Valve
- ESB Pole
- Bus Stop
- Bollard
- Beacon
- Coalhole Cover
- Bore Hole
- Electricity Pole
- Telegraph pole
- OCS Pole
- CCTV Camera Pole
- Lamp Post
- Foul Manhole
- Surface Water MH
- Manholes
- Air Conditioning Vents
- Services Inspection Cover
- Traffic Inspection Cover
- Cable TV Inspection Cover
- ESAT Inspection Cover
- NTL Inspection Cover
- Eircom Inspection Cover
- Rodding Eye
- Road Sign
- Bench Seat
- Kiosk
- Gully
- Waste Bin
- Hydrant
- Fire Hydrant
- ESB Box
- ESB Inspection Cover
- Traffic Control Box
- LUAS Technical Cubicle
- Ticket Vending Machine
- Water Meter Cover
- Telecom Inspection Cover
- Monument / Toilets
- Tank Storage
- Basement: MH, Cover & Pipe
- Dished Aerial Mark
- Stay for pole
- Pipe Protection
- Washout
- Phone Box
- Duct
- Gas Cover
- C P Box
- U/G Car Park Vent

Natural Features

- Surface Change
- Land Drain
- Bottom of Slope
- Top of Slope
- Ditch
- Water Edge / Lake / Pond
- Hedge / Trees Drip Line / Vegetation
- Tree Coniferous
- Tree Deciduous
- Water Level
- Crown Level
- Invert level
- Bed Level
- Spotheight

Golf

- Fair Way
- Green
- Tee Box

Other

- Survey Station
- Photo point
- Top of Tree

Built Features

- Building
- Edge of Road
- Kerb Bottom
- Kerb Top
- Bridge Abutment
- Bridge Deck
- Bridge Parapet
- Building Façade
- Footpath / Platform Train & Tram
- Damp Proof Course / Verge
- Bridge Pier / Wall & Gate Pillar / LUAS Trackbed
- Cycleway / Private Landing Area
- Fence
- Gate
- Road Centreline
- Top of Wall
- Hoarding
- Property Line
- Road Scar
- Top of Fence
- Floor Level
- Apex Height
- Eaves Height
- Parapet Height
- Soffit Elevation
- Step Level
- Concrete Pad
- Track
- Wall / Retaining Wall
- Railway / Tram Rail / Grating / Ramp
- Building Canopy / Roof / Overhang

Roads & Road Markings

Murphy Geospatial Ltd. Disclaimer

The user or recipient of this survey data understands and acknowledges this data may be inaccurate or contain errors or omissions and the user or recipient assumes full responsibility for any risks or damages resulting from, arising from, or in connection with any use of or reliance upon data displayed herein. Although significant care has been exercised to produce surveys that satisfy survey accuracy standards, these surveys are only as accurate as the source data from which they were compiled. Although all reasonable steps have been taken to locate all features visible at the time of the survey, there is no guarantee that all will be shown on the drawing, as some above ground features may have obstructed the survey. Wherever possible, areas unable to be surveyed will be labelled as "UTS".

The Company shall not be liable for any inaccuracy of the data provided beyond the specified scale or accuracy, or for any matters resulting from their use for purposes other than that stated in the Contract. No liability shall attach to the Surveyor in respect of any consequential loss or damages suffered by the Client.

The Client must promptly notify the Company of any errors in mapping of which it becomes aware. If misleading, inaccurate or otherwise inappropriate information is brought to the Company's attention or the Company itself identifies any such imprecision or error in a survey, it shall use its reasonable endeavours to fix or remove it and if necessary in certain instances, the Company being on notice of any such misleading, inaccurate or otherwise inappropriate information, it will re-conduct the survey and reproduce the data to within the specified scale or accuracy.

Surveyed by :	TC	Date:	November 2021
Drawn by :	CC	Date:	22/12/2021
Checked by :	SS	Date:	17/01/2022

Datum: Malin Head
Grid System: Irish National Grid ITM:1855

Revisions

No.	Date	Description
0	22/12/2021	PRELIMINARY DRAWING
1	17/01/2022	ISSUED FOR FINAL DRAWING

Murphy GEOSPATIAL

Topographic surveys, Measured Building Surveys, Setting-Out, As-Built Surveys, Hydrographic Surveys, Legal Mapping, Pipeline Surveys, Services Location, Ground Penetrating Radar, Laser Scanning, Rectified Photography

Kildare Cork Belfast Glasgow London

Head Office

Global House
Kilcullen Business Campus
Kilcullen Co. Kildare
Ireland

Phone: (+353) 045 484040
Fax: (+353) 045 484004
Email: info@murphygs.ie

Client :	JB Barry & Partners Ltd
Project :	Topographical & laser scan surveys at 3 WWTPs
Date :	17/01/2022
Scale :	1:250@A1
Description :	Topographical Survey
Drawing Number :	**MGS43961_T3_2D_ITM_Rev0_3**

© Copyright 2022 MURPHY GEOSPATIAL LTD


Tree drip line
Kerb Level Change
Kerb Bottom
Kerb Top
Low Wall
Hedge
Fence
Pipetrack
Gravel
Building
Tank
Tank Opening
Vertical Pipe
Plant Equipment
Limited Access Area
Concrete Plant Equipment. See Receipt for more data
Sunc is timber
Hard Rd
Hard Rd 2
Hard Rd 3
Hard Rd 4
Hard Rd 5
Hard Rd 6
Hard Rd 7
Hard Rd 8
Hard Rd 9
Hard Rd 10
Hard Rd 11
Hard Rd 12
Hard Rd 13
Hard Rd 14
Hard Rd



LEGEND

Street furniture & Services

- Over Head Wires (LUAS) - Pylon ESB
- Flowerbed
- Pipe
- Lift
- Barrier
- Pump
- Trial Pit
- Bus/Tram Shelter
- Postbox
- Valve - General
- Water Valve
- Gas Valve
- Sluice Valve
- Air Valve
- Stop Cock
- C P Post
- Marker Post
- Traffic light
- Parking Meter
- Plane Aerial Mark
- Smart Card Validator
- Unknown Valve
- Road Sign
- Bus Stop
- Bollard
- Beacon
- Coalhole Cover
- Bore Hole
- Electricity Pole
- Telegraph pole
- OCS Pole
- CCTV Camera Pole
- Lamp Post
- Foul Manhole
- Surface Water MH
- Manholes
- Air Conditioning Vents
- Services Inspection Cover
- Traffic Inspection Cover
- Cable TV Inspection Cover
- ESAT Inspection Cover
- NTL Inspection Cover
- Eircom Inspection Cover
- Rodding Eye
- Phone Box
- Bench Seat
- Kiosk
- Gully
- Waste Bin
- Hydrant
- Fire Hydrant
- ESB Box
- ESB Inspection Cover
- Traffic Control Box
- LUAS Technical Cubicle
- Ticket Vending Machine
- Water Meter Cover
- Telecom Inspection Cover
- Monument / Toilets
- Tank Storage
- Basement: MH, Cover & Pipe
- Dished Aerial Mark
- Stay for pole
- Pipe Protection
- Washout
- Duct
- Gas Cover
- C P Box
- LUG Car Park Vent

Natural Features

- Surface Change
- Land Drain
- Bottom of Slope
- Top of Slope
- Ditch
- Water Edge / Lake / Pond
- Hedge / Trees Drip Line / Vegetation
- Tree Coniferous
- Tree Deciduous
- Water Level
- Crown Level
- Invert level
- Bed Level
- Spotheight

Golf

- Fair Way
- Green
- Tee Box

Other

- Survey Station
- Photo point
- Top of Tree

Built Features

Roads & Road Markings

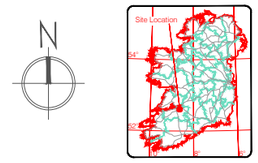
- Building
- Edge of Road
- Kerb Bottom
- Kerb Top
- Bridge Abutment
- Bridge Deck
- Bridge Parapet
- Building Façade
- Footpath / Platform Train & Tram
- Damp Proof Course / Verge
- Bridge Pier / Wall & Gate Pillar / LUAS Trackbed
- Cycleway / Private Landing Area
- Fence
- Gate
- Road Centreline
- Top of Wall
- Hoarding
- Property Line
- Road Scar
- Top of Fence
- Floor Level
- Apex Height
- Eaves Height
- Parapet Height
- Soffit Elevation
- Step Level
- Concrete Pad
- Track
- Wall / Retaining Wall
- Railway / Tram Rail / Grating / Ramp
- Building Canopy / Roof / Overhang

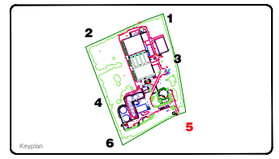
Murphy Geospatial Ltd. Disclaimer

The user or recipient of this survey data understands and acknowledges this data may be inaccurate or contain errors or omissions and the user or recipient assumes full responsibility for any risks or damages resulting from, arising from, or in connection with any use of or reliance upon data displayed herein. Although significant care has been exercised to produce surveys that satisfy survey accuracy standards, these surveys are only as accurate as the source data from which they were compiled. Although all reasonable steps have been taken to locate all features visible at the time of the survey, there is no guarantee that all will be shown on the drawing, as some above ground features may have obstructed the survey. Wherever possible, areas unable to be surveyed will be labelled as "UTS".

The Company shall not be liable for any inaccuracy of the data provided beyond the specified scale or accuracy, or for any matters resulting from their use for purposes other than that stated in the Contract. No liability shall attach to the Surveyor in respect of any consequential loss or damages suffered by the Client.

The Client must promptly notify the Company of any errors in mapping of which it becomes aware. If misleading, inaccurate or otherwise inappropriate information is brought to the Company's attention or the Company itself identifies any such imprecision or error in a survey, it shall use its reasonable endeavours to fix or remove it and if necessary in certain instances, the Company being on notice of any such misleading, inaccurate or otherwise inappropriate information, it will re-conduct the survey and reproduce the data to within the specified scale or accuracy.





Surveyed by : TC	Date: November 2021	Datum:	Malin Head
Drawn by : CC	Date: 22/12/2021	Grid System:	
Checked by : SS	Date: 17/01/2022	Irish National Grid ☐	ITM ☑

Revisions

No.	Date	Description
0	22/12/2021	PRELIMINARY DRAWING
1	17/01/2022	ISSUED FOR FINAL DRAWING

Society of Chartered Surveyors Ireland · The Survey Association Full Member · Irish Geotechnical Society GPR Association · RICS Geomatics Property Professional Group

Murphy GEOSPATIAL

Topographic surveys, Measured Building Surveys, Setting-Out, As-Built Surveys, Hydrographic Surveys, Legal Mapping, Pipeline Surveys, Services Location, Ground Penetrating Radar, Laser Scanning, Rectified Photography

Kildare Cork Belfast Glasgow London

Head Office

Global House
Kilcullen Business Campus
Kilcullen Co. Kildare
Ireland

Phone: (+353) 045 484040
Fax: (+353) 045 484004
Email: info@murphygs.ie

Client : JB Barry & Partners Ltd

Project : Topographical & laser scan surveys at 3 WWTPs

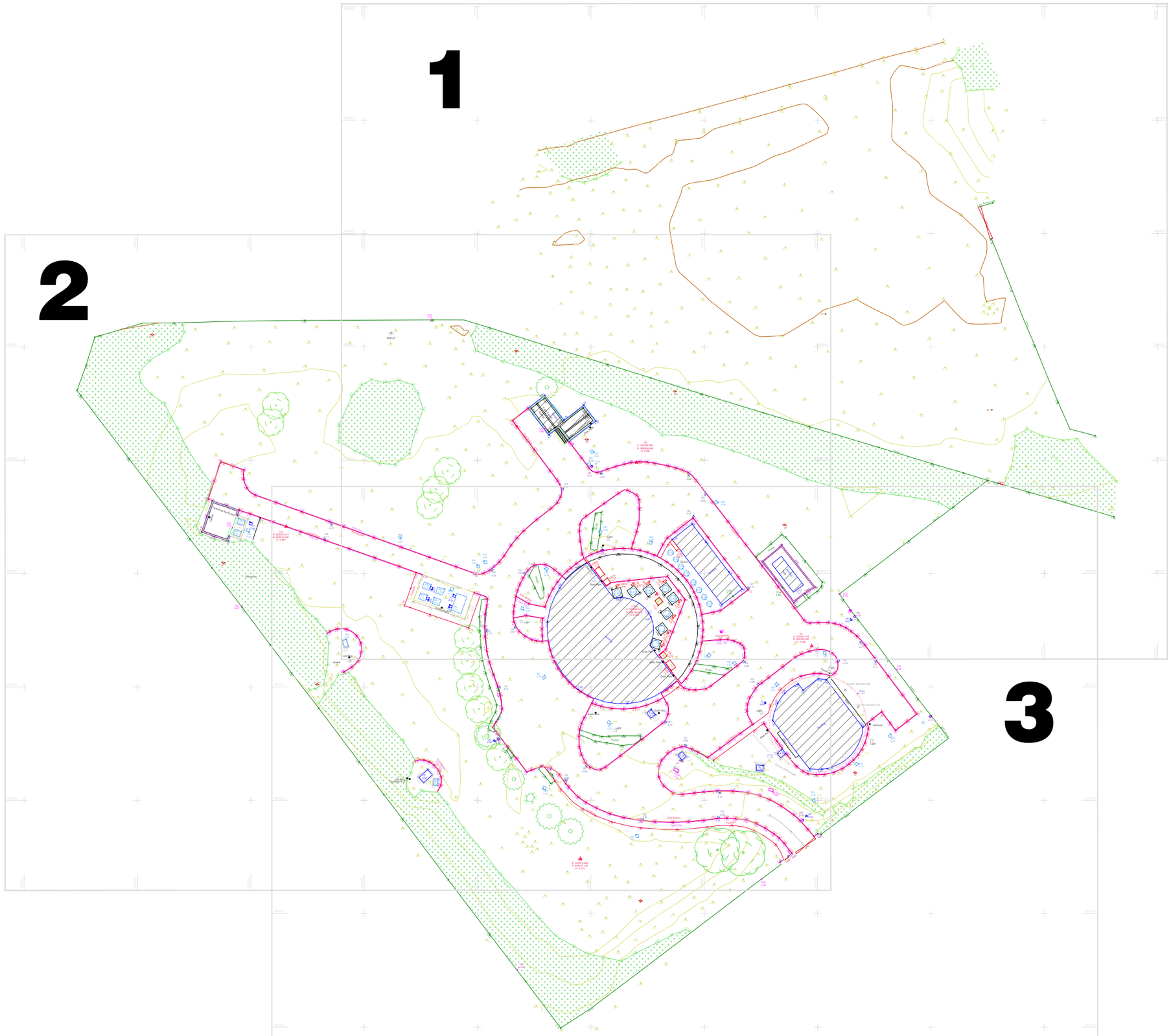
Date : 17/01/2022 **Scale :** 1:250@A1

Description : Topographical Survey

Drawing Number : MGS43961_T3_2D_ITM_Rev0_5

© Copyright 2022 MURPHY GEOSPATIAL LTD


Tank
Tank
Tank
Tank
Building
Building
Building



LEGEND

Street furniture & Services

- Over Head Wires (LUAS) - Pylon ESB
- Flowerbed
- Pipe
- Lift
- Barrier
- Pump
- Trial Pit
- Bus/Tram Shelter
- Postbox
- Valve - General
- Water Valve
- Gas Valve
- Sluice Valve
- Air Valve
- Stop Cock
- C P Post
- Marker Post
- Traffic light
- Parking Meter
- Plane Aerial Mark
- Smart Card Validator
- Unknown Valve
- Bus Stop
- Bollard
- Beacon
- Coalhole Cover
- Bore Hole
- Electricity Pole
- Telegraph pole
- OCS Pole
- CCTV Camera Pole
- Lamp Post
- Foul Manhole
- Surface Water MH
- Manholes
- Air Conditioning Vents
- Services Inspection Cover
- Traffic Inspection Cover
- Cable TV Inspection Cover
- ESAT Inspection Cover
- NTL Inspection Cover
- Eircom Inspection Cover
- Rodding Eye
- Road Sign
- Kiosk
- Gully
- Waste Bin
- Hydrant
- Fire Hydrant
- ESB Box
- ESB Inspection Cover
- Traffic Control Box
- LUAS Technical Cubicle
- Ticket Vending Machine
- Water Meter Cover
- Telecom Inspection Cover
- Monument / Toilets
- Tank Storage
- Basement: MH, Cover & Pipe
- Dished Aerial Mark
- Stay for pole
- Pipe Protection
- Washout
- Phone Box
- Bench Seat
- Duct
- Gas Cover
- C P Box
- U/G Car Park Vent

Natural Features

- Surface Change
- Land Drain
- Bottom of Slope
- Top of Slope
- Ditch
- Water Edge / Lake / Pond
- Hedge / Trees Drip Line / Vegetation
- Tree Coniferous
- Water Level
- Crown Level
- Invert level
- Bed Level
- Spotheight
- Tree Deciduous

Golf

- Fair Way
- Green
- Tee Box

Other

- Survey Station
- Photo point
- Top of Tree

Built Features

Roads & Road Markings

- Building
- Edge of Road
- Kerb Bottom
- Kerb Top
- Bridge Abutment
- Bridge Deck
- Bridge Parapet
- Building Façade
- Footpath / Platform Train & Tram
- Damp Proof Course / Verge
- Bridge Pier / Wall & Gate Pillar / LUAS Trackbed
- Cycleway / Private Landing Area
- Fence
- Gate
- Road Centreline
- Top of Wall
- Hoarding
- Property Line
- Road Scar
- Top of Fence
- Wall / Retaining Wall
- Railway / Tram Rail / Grating / Ramp
- Building Canopy / Roof / Overhang
- Floor Level
- Apex Height
- Eaves Height
- Parapet Height
- Soffit Elevation
- Step Level
- Concrete Pad
- Track

Murphy Geospatial Ltd. Disclaimer

The user or recipient of this survey data understands and acknowledges this data may be inaccurate or contain errors or omissions and the user or recipient assumes full responsibility for any risks or damages resulting from, arising from, or in connection with any use of or reliance upon data displayed herein. Although significant care has been exercised to produce surveys that satisfy survey accuracy standards, these surveys are only as accurate as the source data from which they were compiled. Although all reasonable steps have been taken to locate all features visible at the time of the survey, there is no guarantee that all will be shown on the drawing, as some above ground features may have obstructed the survey. Wherever possible, areas unable to be surveyed will be labelled as "UTS".

The Company shall not be liable for any inaccuracy of the data provided beyond the specified scale or accuracy, or for any matters resulting from their use for purposes other than that stated in the Contract. No liability shall attach to the Surveyor in respect of any consequential loss or damages suffered by the Client.

The Client must promptly notify the Company of any errors in mapping of which it becomes aware. If misleading, inaccurate or otherwise inappropriate information is brought to the Company's attention or the Company itself identifies any such imprecision or error in a survey, it shall use its reasonable endeavours to fix or remove it and if necessary in certain instances, the Company being on notice of any such misleading, inaccurate or otherwise inappropriate information, it will re-conduct the survey and reproduce the data to within the specified scale or accuracy.

N

Site Location

Keyplan

Surveyed by : TC	Date: 17.11.2021	Datum:	Malin Head
Drawn by : CC	Date: 20.12.2021	Grid System:	
Checked by : VH, SS	Date: 21.12.2021	Irish National Grid ☐	ITM ☑

Revisions

No.	Date	Description
0	21.12.2021	ISSUED FOR FINAL DRAWING

Murphy GEOSPATIAL

Topographic surveys, Measured Building Surveys, Setting-Out, As-Built Surveys, Hydrographic Surveys, Legal Mapping, Pipeline Surveys, Services Location, Ground Penetrating Radar, Laser Scanning, Rectified Photography

Kildare Cork Belfast Glasgow London

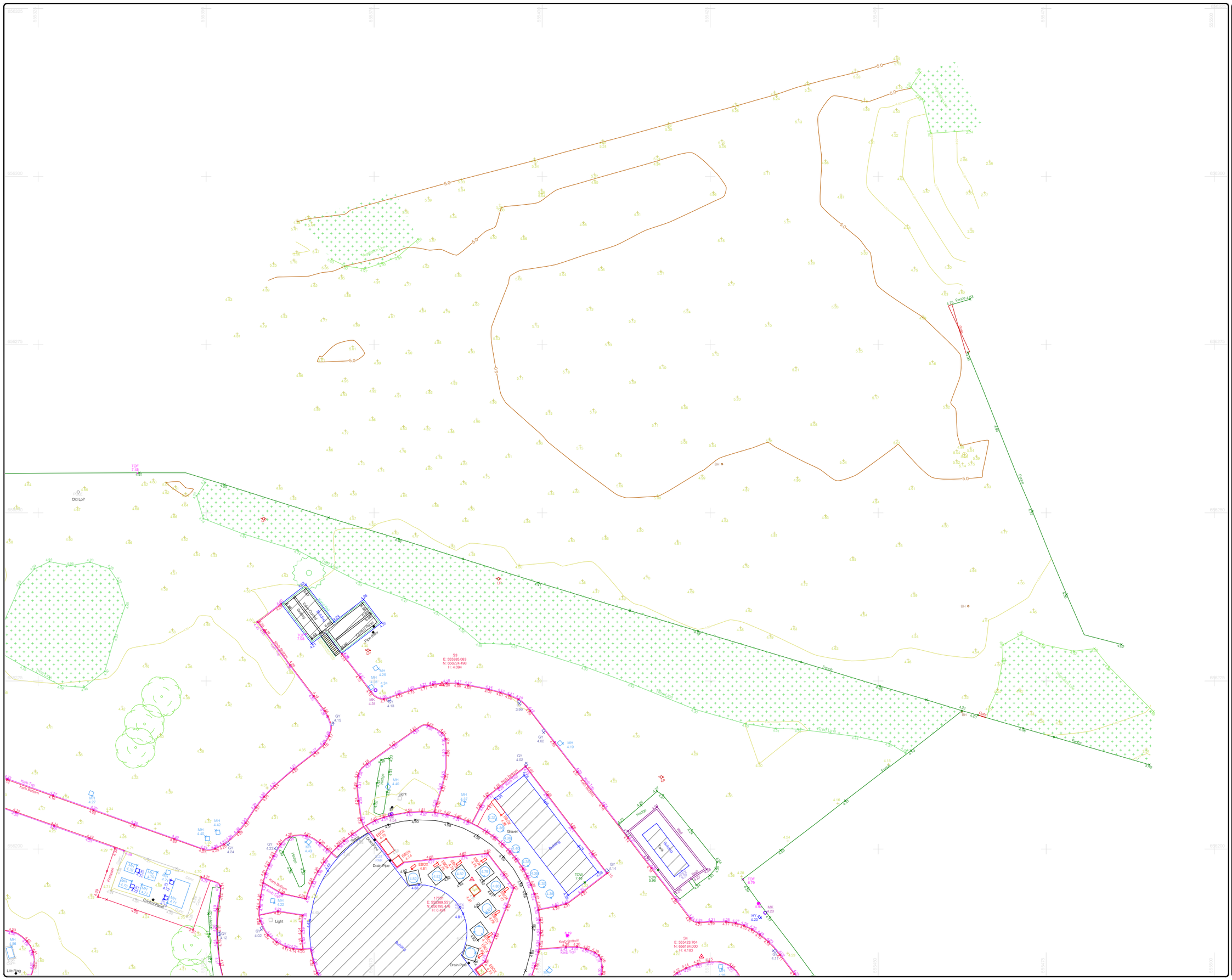
Head Office

Global House
Kilcullen Business Campus
Kilcullen Co. Kildare
Ireland

Phone: (+353) 045 484040
Fax: (+353) 045 484004
Email: info@murphygs.ie

Client :	JB Barry & Partners Ltd
Project :	Topographical & laser scan surveys at 3 WWTPs
Date : 21.12.2021	**Scale :** NTS@A1
Description :	Topographical Survey
Drawing Number :	MGS43961_T1_2D_ITM_Rev0_0

© Copyright 2021 MURPHY GEOSPATIAL LTD



LEGEND

Street furniture & Services

- Over Head Wires (LUAS) - Pylon ESB
- Flowerbed
- Pipe
- Lift
- Barrier
- Pump
- Trial Pit
- Bus/Tram Shelter
- Postbox
- Valve - General
- Water Valve
- Gas Valve
- Sluice Valve
- Air Valve
- Stop Cock
- C P Post
- Marker Post
- Traffic light
- Parking Meter
- Plane Aerial Mark
- Smart Card Validator
- Unknown Valve
- Road Sign
- Bench Seat
- Kiosk
- Gully
- Waste Bin
- Hydrant
- Fire Hydrant
- ESB Box
- ESB Inspection Cover
- Traffic Control Box
- LUAS Technical Cubicle
- Ticket Vending Machine
- Water Meter Cover
- Telecom Inspection Cover
- Monument / Toilets
- Tank Storage
- Basement: MH, Cover & Pipe
- Dished Aerial Mark
- Stay for pole
- Pipe Protection
- Washout
- Bus Stop
- Bollard
- Beacon
- Coalhole Cover
- Bore Hole
- Electricity Pole
- Telegraph pole
- OCS Pole
- CCTV Camera Pole
- Lamp Post
- Foul Manhole
- Surface Water MH
- Manholes
- Air Conditioning Vents
- Services Inspection Cover
- Traffic Inspection Cover
- Cable TV Inspection Cover
- ESAT Inspection Cover
- NTL Inspection Cover
- Eircom Inspection Cover
- Rodding Eye
- Phone Box
- Duct
- Gas Cover
- C P Box
- U/G Car Park Vent
- Hydrant
- ESB Box
- Basement: MH, Cover & Pipe
- Tank Storage
- Monument / Toilets
- Telecom Inspection Cover
- Water Meter Cover
- Ticket Vending Machine
- LUAS Technical Cubicle
- Traffic Control Box
- Dished Aerial Mark
- Stay for pole
- Pipe Protection
- Washout

Natural Features

- Surface Change
- Land Drain
- Bottom of Slope
- Top of Slope
- Ditch
- Water Edge / Lake / Pond
- Hedge / Trees Drip Line / Vegetation
- Tree Coniferous
- Tree Deciduous
- Water Level
- Crown Level
- Invert level
- Bed Level
- Spotheight

Golf

- Fair Way
- Green
- Tee Box

Other

- Survey Station
- Photo point
- Top of Tree

Built Features

Roads & Road Markings

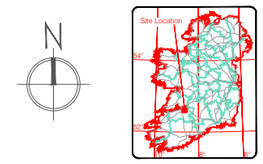
- Building
- Edge of Road
- Kerb Bottom
- Kerb Top
- Bridge Abutment
- Bridge Deck
- Bridge Parapet
- Building Façade
- Footpath / Platform Train & Tram
- Damp Proof Course / Verge
- Bridge Pier / Wall & Gate Pillar / LUAS Trackbed
- Cycleway / Private Landing Area
- Fence
- Gate
- Road Centreline
- Top of Wall
- Hoarding
- Property Line
- Road Scar
- Top of Fence
- Floor Level
- Apex Height
- Eaves Height
- Parapet Height
- Soffit Elevation
- Step Level
- Concrete Pad
- Track
- Wall / Retaining Wall
- Railway / Tram Rail / Grating / Ramp
- Building Canopy / Roof / Overhang

Murphy Geospatial Ltd. Disclaimer

The user or recipient of this survey data understands and acknowledges this data may be inaccurate or contain errors or omissions and the user or recipient assumes full responsibility for any risks or damages resulting from, arising from, or in connection with any use of or reliance upon data displayed herein. Although significant care has been exercised to produce surveys that satisfy survey accuracy standards, these surveys are only as accurate as the source data from which they were compiled. Although all reasonable steps have been taken to locate all features visible at the time of the survey, there is no guarantee that all will be shown on the drawing, as some above ground features may have obstructed the survey. Wherever possible, areas unable to be surveyed will be labelled as "UTS".

The Company shall not be liable for any inaccuracy of the data provided beyond the specified scale or accuracy, or for any matters resulting from their use for purposes other than that stated in the Contract. No liability shall attach to the Surveyor in respect of any consequential loss or damages suffered by the Client.

The Client must promptly notify the Company of any errors in mapping of which it becomes aware. If misleading, inaccurate or otherwise inappropriate information is brought to the Company's attention or the Company itself identifies any such imprecision or error in a survey, it shall use its reasonable endeavours to fix or remove it and if necessary in certain instances, the Company being on notice of any such misleading, inaccurate or otherwise inappropriate information, it will re-conduct the survey and reproduce the data to within the specified scale or accuracy.





Surveyed by :	TC	Date: 17.11.2021	Datum: Malin Head
Drawn by :	CC	Date: 20.12.2021	Grid System:
Checked by :	VH, SS	Date: 21.12.2021	Irish National Grid ☐ ITM ☐

Revisions

No.	Date	Description
0	21.12.2021	ISSUED FOR FINAL DRAWING

Topographic surveys, Measured Building Surveys, Setting-Out, As-Built Surveys, Hydrographic Surveys, Legal Mapping, Pipeline Surveys, Services Location, Ground Penetrating Radar, Laser Scanning, Rectified Photography

Kildare Cork Belfast Glasgow London

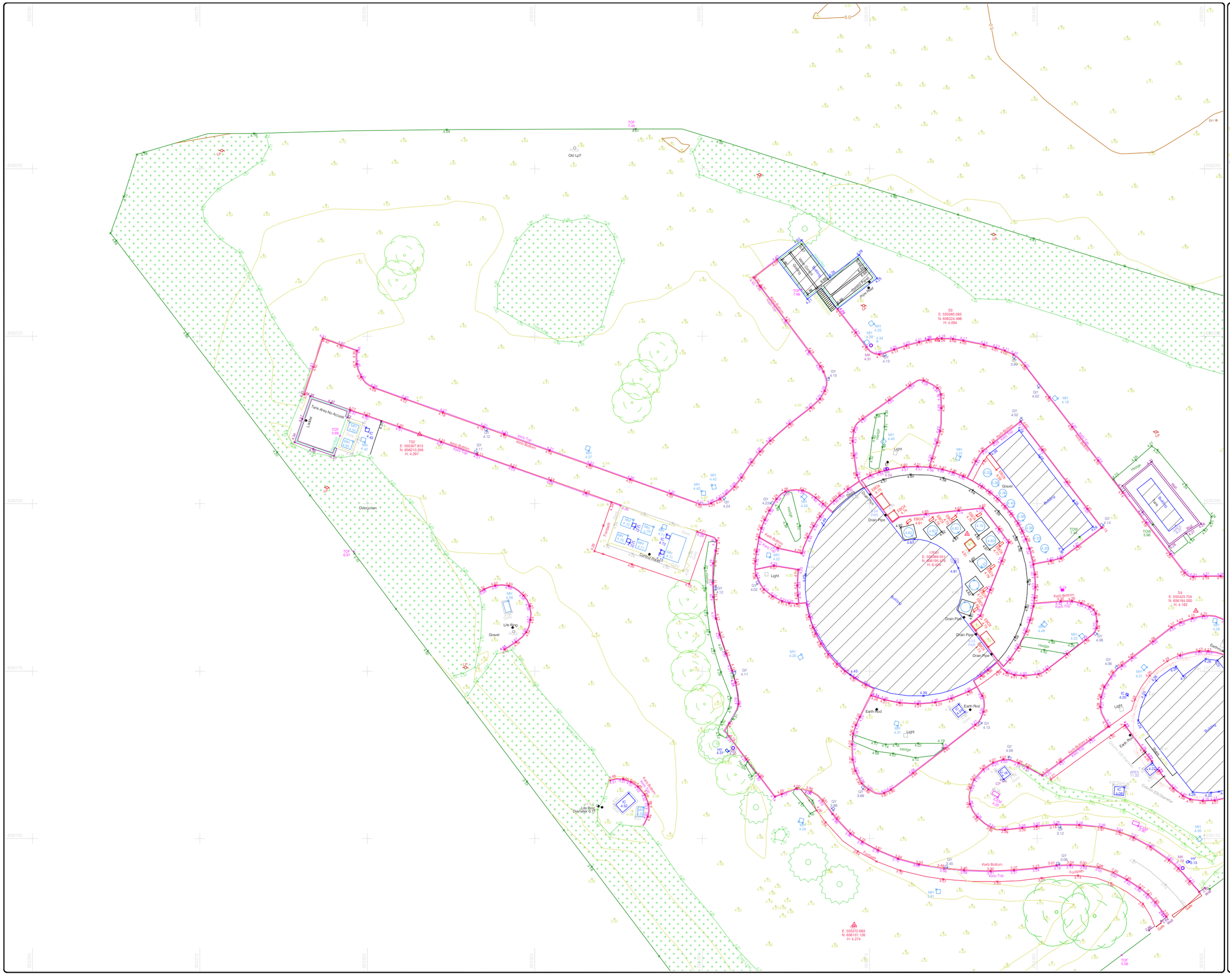
Head Office

Global House
Kilcullen Business Campus
Kilcullen Co. Kildare
Ireland

Phone: (+353) 045 484040
Fax: (+353) 045 484004
Email: info@murphygs.ie

Client :	JB Barry & Partners Ltd
Project :	Topographical & laser scan surveys at 3 WWTPs
Date : 21.12.2021	**Scale :** 1:250@A1
Description :	Topographical Survey
Drawing Number :	**MGS43961_T1_2D_ITM_Rev0_1**

© Copyright 2021 MURPHY GEOSPATIAL LTD



LEGEND

Street furniture & Services

- Over Head Wires (LUAS) - Pylon ESB
- Flowerbed
- Pipe
- Lift
- Barrier
- Pump
- Trial Pit
- Bus/Tram Shelter
- Postbox
- Valve - General
- Water Valve
- Gas Valve
- Sluice Valve
- Air Valve
- Stop Cock
- C P Post
- Marker Post
- Traffic light
- Parking Meter
- Plane Aerial Mark
- Smart Card Validator
- Unknown Valve
- Road Sign
- Bus Stop
- Bollard
- Beacon
- Coalhole Cover
- Bore Hole
- Electricity Pole
- Telegraph pole
- OCS Pole
- CCTV Camera Pole
- Lamp Post
- Foul Manhole
- Surface Water MH
- Manholes
- Air Conditioning Vents
- Services Inspection Cover
- Traffic Inspection Cover
- Cable TV Inspection Cover
- ESAT Inspection Cover
- NTL Inspection Cover
- Eircom Inspection Cover
- Rodding Eye
- Phone Box
- Bench Seat
- Kiosk
- Gully
- Waste Bin
- Hydrant
- Fire Hydrant
- ESB Box
- ESB Inspection Cover
- Traffic Control Box
- LUAS Technical Cubicle
- Ticket Vending Machine
- Water Meter Cover
- Telecom Inspection Cover
- Monument / Toilets
- Tank Storage
- Basement: MH, Cover & Pipe
- Dished Aerial Mark
- Stay for pole
- Pipe Protection
- Washout
- Duct
- Gas Cover
- C P Box
- U/G Car Park Vent

Natural Features

- Surface Change
- Land Drain
- Bottom of Slope
- Top of Slope
- Ditch
- Water Edge / Lake / Pond
- Hedge / Trees Drip Line / Vegetation
- Tree Coniferous
- Tree Deciduous
- Water Level
- Crown Level
- Invert level
- Bed Level
- Spotheight

Golf

- Fair Way
- Green
- Tee Box

Other

- Survey Station
- Photo point
- Top of Tree

Built Features

Roads & Road Markings

- Building
- Edge of Road
- Kerb Bottom
- Kerb Top
- Bridge Abutment
- Bridge Deck
- Bridge Parapet
- Building Façade
- Footpath / Platform Train & Tram
- Damp Proof Course / Verge
- Bridge Pier / Wall & Gate Pillar / LUAS Trackbed
- Cycleway / Private Landing Area
- Fence
- Gate
- Road Centreline
- Top of Wall
- Hoarding
- Property Line
- Road Scar
- Top of Fence
- Floor Level
- Apex Height
- Eaves Height
- Parapet Height
- Soffit Elevation
- Step Level
- Concrete Pad
- Track
- Wall / Retaining Wall
- Railway / Tram Rail / Grating / Ramp
- Building Canopy / Roof / Overhang

Murphy Geospatial Ltd. Disclaimer

The user or recipient of this survey data understands and acknowledges this data may be inaccurate or contain errors or omissions and the user or recipient assumes full responsibility for any risks or damages resulting from, arising from, or in connection with any use of or reliance upon data displayed herein. Although significant care has been exercised to produce surveys that satisfy survey accuracy standards, these surveys are only as accurate as the source data from which they were compiled. Although all reasonable steps have been taken to locate all features visible at the time of the survey, there is no guarantee that all will be shown on the drawing, as some above ground features may have obstructed the survey. Wherever possible, areas unable to be surveyed will be labelled as "UTS".

The Company shall not be liable for any inaccuracy of the data provided beyond the specified scale or accuracy, or for any matters resulting from their use for purposes other than that stated in the Contract. No liability shall attach to the Surveyor in respect of any consequential loss or damages suffered by the Client.

The Client must promptly notify the Company of any errors in mapping of which it becomes aware. If misleading, inaccurate or otherwise inappropriate information is brought to the Company's attention or the Company itself identifies any such imprecision or error in a survey, it shall use its reasonable endeavours to fix or remove it and if necessary in certain instances, the Company being on notice of any such misleading, inaccurate or otherwise inappropriate information, it will re-conduct the survey and reproduce the data to within the specified scale or accuracy.

Surveyed by : TC — Date: 17.11.2021 — Datum: Malin Head
Drawn by : CC — Date: 20.12.2021 — Grid System: Irish National Grid — ITM16
Checked by : VH, SS — Date: 21.12.2021

Revisions

No.	Date	Description
1	21.12.2021	ISSUED FOR FINAL DRAWING

Murphy GEOSPATIAL

Topographic surveys, Measured Building Surveys, Setting-Out, As-Built Surveys, Hydrographic Surveys, Legal Mapping, Pipeline Surveys, Services Location, Ground Penetrating Radar, Laser Scanning, Rectified Photography

Kildare Cork Belfast Glasgow London

Head Office
Global House
Kilcullen Business Campus
Kilcullen Co. Kildare
Ireland

Phone: (+353) 045 484040
Fax: (+353) 045 484004
Email: info@murphygs.ie

Client :	JB Barry & Partners Ltd
Project :	Topographical & laser scan surveys at 3 WWTPs
Date : 21.12.2021	**Scale :** 1:250@A1
Description :	Topographical Survey
Drawing Number :	**MGS43961_T1_2D_ITM_Rev0_2**

© Copyright 2021 MURPHY GEOSPATIAL LTD



LEGEND

Street furniture & Services

- Over Head Wires (LUAS) - Pylon ESB
- Flowerbed
- Pipe
- Lift
- Barrier
- Pump
- Trial Pit
- Bus/Truss Shelter
- Postbox
- Valve - General
- Water Valve
- Gas Valve
- Sluice Valve
- Air Valve
- Stop Cock
- C P Post
- Marker Post
- Traffic light
- Parking Meter
- Plane Aerial Mark
- Smart Card Validator
- Unknown Valve
- Bus Stop
- Bollard
- Beacon
- Coalhole Cover
- Bore Hole
- Electricity Pole
- Telegraph pole
- OCS Pole
- CCTV Camera Pole
- Lamp Post
- Foul Manhole
- Surface Water MH
- Manholes
- Air Conditioning Vents
- Services Inspection Cover
- Traffic Inspection Cover
- Cable TV Inspection Cover
- ESAT Inspection Cover
- NTL Inspection Cover
- Eircom Inspection Cover
- Rodding Eye
- Road Sign
- Bench Seat
- Kiosk
- Gully
- Waste Bin
- Hydrant
- Fire Hydrant
- ESB Box
- ESB Inspection Cover
- Traffic Control Box
- LUAS Technical Cubicle
- Ticket Vending Machine
- Water Meter Cover
- Telecom Inspection Cover
- Monument / Toilets
- Tank Storage
- Basement: MH, Cover & Pipe
- Dished Aerial Mark
- Stay for pole
- Pipe Protection
- Washout
- Phone Box
- Duct
- Gas Cover
- C P Box
- UG Car Park Vent

Natural Features

- Surface Change
- Land Drain
- Bottom of Slope
- Top of Slope
- Ditch
- Water Edge / Lake / Pond
- Hedge / Trees Drip Line / Vegetation
- Tree Coniferous
- Water Level
- Crown Level
- Invert level
- Bed Level
- Spotheight
- Tree Deciduous

Golf

- Fair Way
- Green
- Tee Box

Other

- Survey Station
- Photo point
- Top of Tree

Built Features

Roads & Road Markings

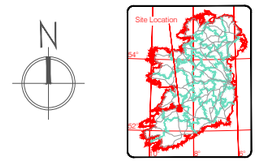
- Building
- Edge of Road
- Kerb Bottom
- Kerb Top
- Bridge Abutment
- Bridge Deck
- Bridge Parapet
- Building Façade
- Footpath / Platform Train & Tram
- Damp Proof Course / Verge
- Bridge Pier / Wall & Gate Pillar / LUAS Trackbed
- Cycleway / Private Landing Area
- Fence
- Gate
- Road Centreline
- Top of Wall
- Hoarding
- Property Line
- Road Scar
- Top of Fence
- Wall / Retaining Wall
- Railway / Tram Rail / Grating / Ramp
- Building Canopy / Roof / Overhang
- Floor Level
- Apex Height
- Eaves Height
- Parapet Height
- Soffit Elevation
- Step Level
- Concrete Pad
- Track

Murphy Geospatial Ltd. Disclaimer

The user or recipient of this survey data understands and acknowledges this data may be inaccurate or contain errors or omissions and the user or recipient assumes full responsibility for any risks or damages resulting from, arising from, or in connection with any use of or reliance upon data displayed herein. Although significant care has been exercised to produce surveys that satisfy survey accuracy standards, these surveys are only as accurate as the source data from which they were compiled. Although all reasonable steps have been taken to locate all features visible at the time of the survey, there is no guarantee that all will be shown on the drawing, as some above ground features may have obstructed the survey. Wherever possible, areas unable to be surveyed will be labelled as "UTS".

The Company shall not be liable for any inaccuracy of the data provided beyond the specified scale or accuracy, or for any matters resulting from their use for purposes other than that stated in the Contract. No liability shall attach to the Surveyor in respect of any consequential loss or damages suffered by the Client.

The Client must promptly notify the Company of any errors in mapping of which it becomes aware. If misleading, inaccurate or otherwise inappropriate information is brought to the Company's attention or the Company itself identifies any such imprecision or error in a survey, it shall use its reasonable endeavours to fix or remove it and if necessary in certain instances, the Company being on notice of any such misleading, inaccurate or otherwise inappropriate information, it will re-conduct the survey and reproduce the data to within the specified scale or accuracy.





Surveyed by : TC	Date: 17.11.2021	Datum:	Malin Head
Drawn by : CC	Date: 20.12.2021	Grid System:	
Checked by : VH, SS	Date: 21.12.2021	Irish National Grid ☐	ITM:1 ☒

Revisions

No	Date	Description
1	21.12.2021	ISSUED FOR FINAL DRAWING

Murphy GEOSPATIAL

Topographic surveys, Measured Building Surveys, Setting-Out, As-Built Surveys, Hydrographic Surveys, Legal Mapping, Pipeline Surveys, Services Location, Ground Penetrating Radar, Laser Scanning, Rectified Photography

Kildare Cork Belfast Glasgow London

Head Office
Global House
Kilcullen Business Campus
Kilcullen Co. Kildare
Ireland
Phone: (+353) 045 484040
Fax: (+353) 045 484004
Email: info@murphygs.ie

Client :	JB Barry & Partners Ltd
Project :	Topographical & laser scan surveys at 3 WWTPs
Date : 21.12.2021	**Scale :** 1:250@A1
Description :	Topographical Survey
Drawing Number :	**MGS43961_T1_2D_ITM_Rev0_3**

© Copyright 2021 MURPHY GEOSPATIAL LTD

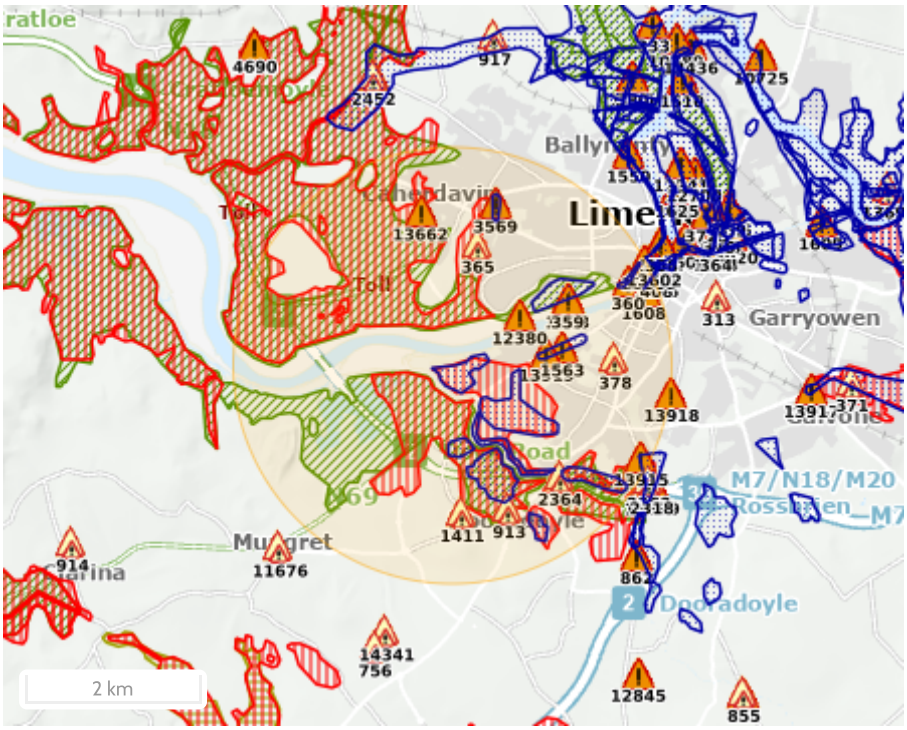
SUB-APPENDIX 16.3: PAST FLOOD EVENT SUMMARY REPORT

Past Flood Event Local Area Summary Report

Report Produced: **25/3/2026 10:49**

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.

This report has been downloaded from www.floodinfo.ie (the "**Website**"). The users should take account of the restrictions and limitations relating to the content and use of the Website that are explained in the Terms and Conditions. It is a condition of use of the Website that you agree to be bound by the disclaimer and other terms and conditions set out on the Website and to the privacy policy on the Website.



Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

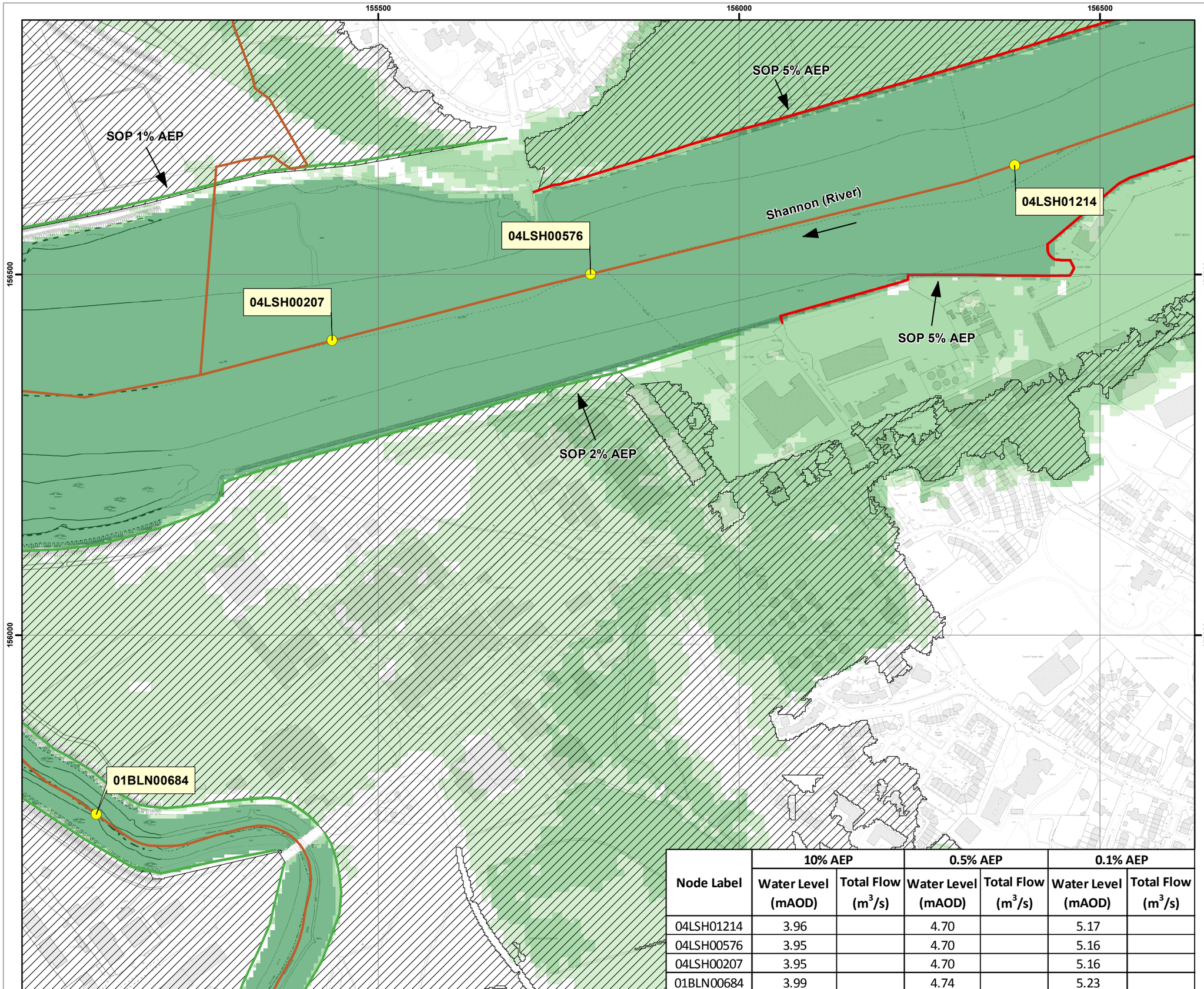
* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

24 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Shannon Dock Road Limerick Dec 1999 (ID-301)	25/12/1999	Area
	Additional Information: Reports (5) Press Archive (1)		
2.	Corrib Drive Limerick Dec 1999 (ID-297)	25/12/1999	Area
	Additional Information: Reports (3) Press Archive (1)		
3.	Shannon Westfields Limerick Dec 1999 (ID-299)	25/12/1999	Area
	Additional Information: Reports (3) Press Archive (2)		
4.	Shannon Condell Road Limerick Feb 2002 (ID-359)	11/02/2002	Approximate Point
	Additional Information: Reports (3) Press Archive (0)		
5.	OCallaghans Strand Limerick Feb 2002 (ID-360)	11/02/2002	Exact Point
	Additional Information: Reports (3) Press Archive (0)		
6.	Ballynaclough River Limerick Dec 1999 (ID-1986)	25/12/1999	Area
	Additional Information: Reports (3) Press Archive (0)		

	Name (Flood_ID)	Start Date	Event Location
7.	Shannon Adjacent Dock Road Limerick Dec 1999 (ID-302) **Additional Information:** Reports (3) Press Archive (1)	25/12/1999	Area
8.	Corrib Drive Limerick Oct 1995 (ID-3569) **Additional Information:** Reports (1) Press Archive (0)	24/10/1995	Approximate Point
9.	Greenfield Road Rossbrien Dec 1999 (ID-304) **Additional Information:** Reports (3) Press Archive (1)	25/12/1999	Area
10.	Clancy's Strand Harry's Mall Limerick Dec 1999 (ID-315) **Additional Information:** Reports (20) Press Archive (3)	23/12/1999	Area
11.	Flooding at Limerick City, Rosbrien Road (ID-13915) **Additional Information:** Reports (0) Press Archive (0)	n/a	Approximate Point
12.	Limerick City 3rd January 2014 (ID-12380) **Additional Information:** Reports (1) Press Archive (0)	03/01/2014	Approximate Point
13.	Raheen Dooradoyle, Limerick Feb 1990 (ID-541) **Additional Information:** Reports (1) Press Archive (0)	01/02/1990	Area
14.	Ashbrook Gardens Limerick Recurring (ID-365) **Additional Information:** Reports (1) Press Archive (0)	n/a	Approximate Point
15.	South Circular Road St Mary's Limerick Recurring (ID-378) **Additional Information:** Reports (1) Press Archive (0)	n/a	Exact Point
16.	Dooradoyle-St Nessans/Fr Russell recurring (ID-913) **Additional Information:** Reports (2) Press Archive (0)	n/a	Approximate Point
17.	Dooradoyle Limerick recurring (ID-1411) **Additional Information:** Reports (1) Press Archive (0)	n/a	Approximate Point
18.	Ballynaclogh Ballinacurra Recurring (ID-2364) **Additional Information:** Reports (2) Press Archive (0)	n/a	Approximate Point
19.	Limerick Dock Rd Jan 1995 (ID-1563) **Additional Information:** Reports (1) Press Archive (0)	25/01/1995	Approximate Point
20.	Limerick Condell Road Feb 1990 (ID-1603) **Additional Information:** Reports (2) Press Archive (0)	01/02/1990	Approximate Point
21.	Condell Road Limerick Feb 1997 (ID-1607) **Additional Information:** Reports (2) Press Archive (0)	10/02/1997	Approximate Point
22.	Dock Road Bishops Quay Limerick Feb 1997 (ID-1608) **Additional Information:** Reports (3) Press Archive (0)	10/02/1997	Approximate Point
23.	Flooding at Limerick City & Environs on 30/08/2019 (ID-13662) **Additional Information:** Reports (0) Press Archive (0)	30/08/2019	Approximate Point
24.	Flooding at Limerick City, Dock Road/Atlas Avenue (ID-13919) **Additional Information:** Reports (0) Press Archive (0)	n/a	Approximate Point

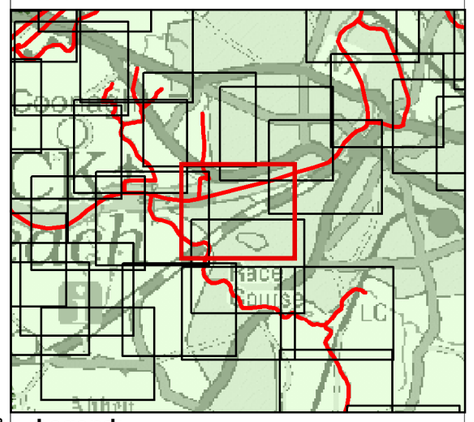
SUB-APPENDIX 16.4: SHANNON CFRAM MAPS



Node Label	10% AEP		0.5% AEP		0.1% AEP	
	Water Level (mAOD)	Total Flow (m^3/s)	Water Level (mAOD)	Total Flow (m^3/s)	Water Level (mAOD)	Total Flow (m^3/s)
04LSH01214	3.96		4.70		5.17	
04LSH00576	3.95		4.70		5.16	
04LSH00207	3.95		4.70		5.16	
01BLN00684	3.99		4.74		5.23	

© Ordnance Survey Ireland. All rights reserved. Licence Number EN0021014

Location Plan:



Legend:

- Nodes
- Model Reach
- AFA Boundary
- Flood Defence: Wall
- Flood Defence: Embankment
- Defended Area

10% AEP Coastal Flood Extent
(1 in 10 chance in any given year)

0.5% AEP Coastal Flood Extent
(1 in 200 chance in any given year)

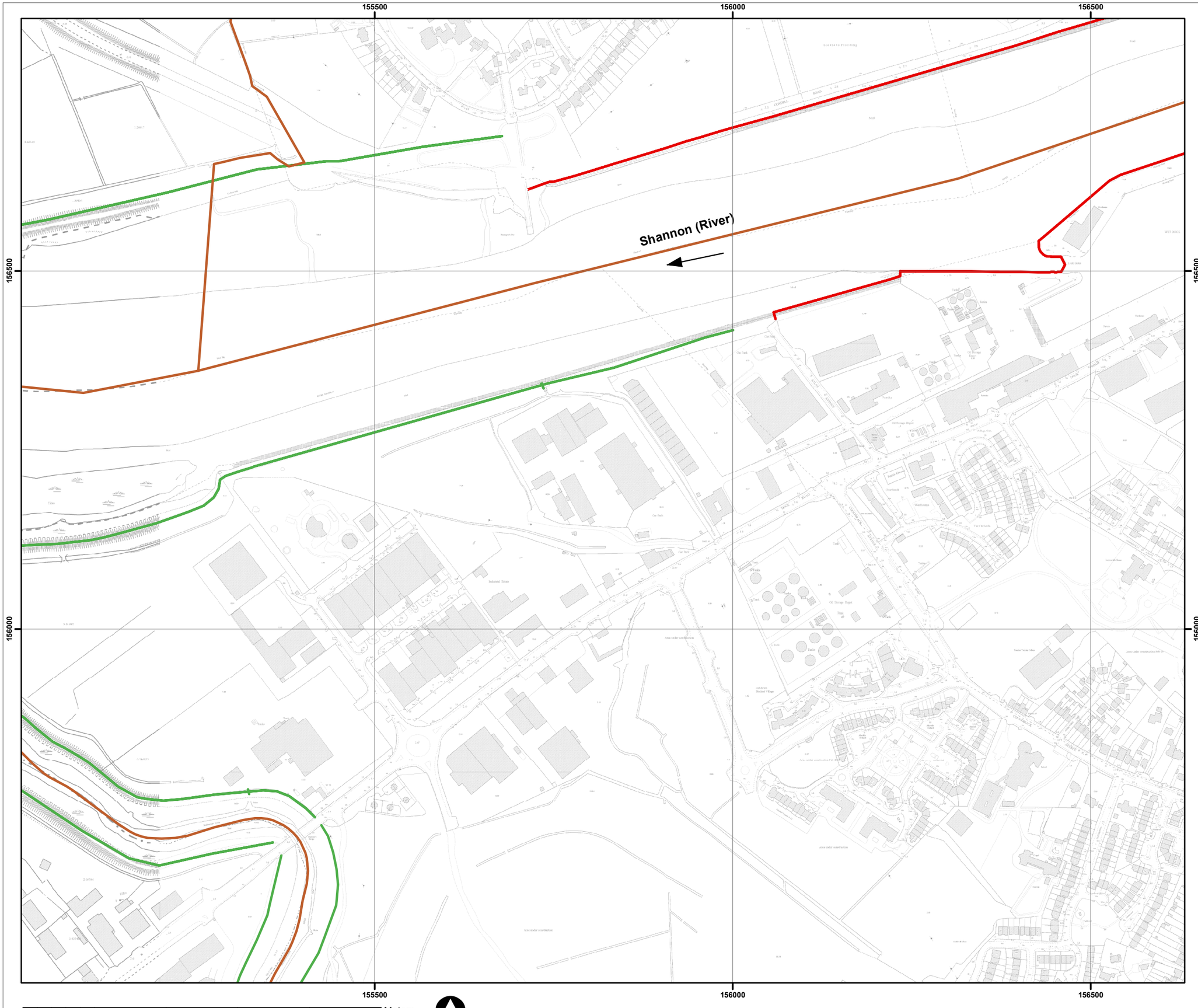
0.1% AEP Coastal Flood Extent
(1 in 1000 chance in any given year)

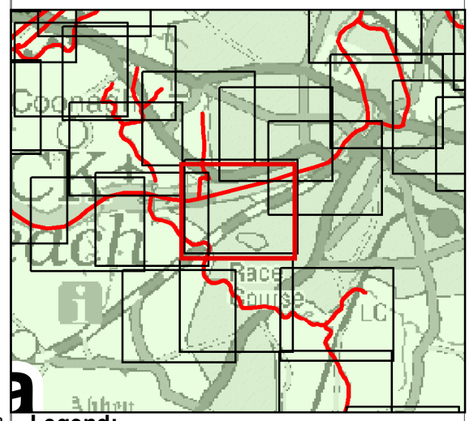
IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath
C15 NX36

Merrion House
Merrion Road
Dublin 4
D04 R2C5

Project:	SHANNON CFRAM STUDY
Map Type:	EXTENT
Source:	COASTAL - TIDAL
Area:	LIMERICK
Scenario:	EXISTING
Drawn by: EH	Date: June 2016
Checked by: KM	Date: June 2016
Reviewed by: MC	Date: June 2016
Approved by: PS	Date: June 2016
Map No.:	S2526LIK_EXCCD_F1_26
Sheet: 26 of 65	Revision: 0
Map Scale: 1: 5000	Plot Scale: 1:1 @ A3





Legend:

- Nodes
- Model Reach
- AFA Boundary
- Flood Defence: Wall
- Flood Defence: Embankment
- Defended Area

10% AEP Fluvial Flood Extent
(1 in 10 chance in any given year)

1% AEP Fluvial Flood Extent
(1 in 100 chance in any given year)

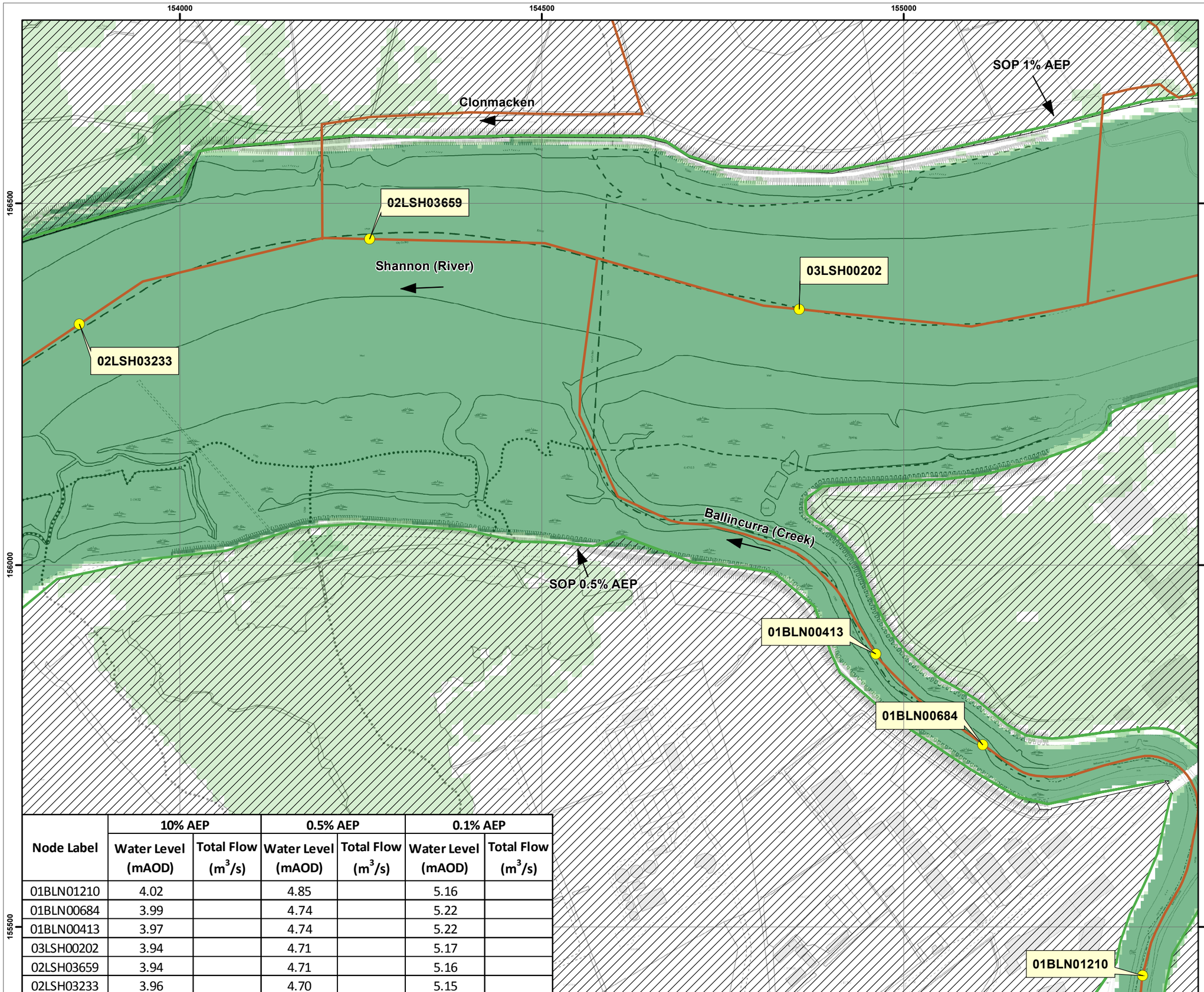
0.1% AEP Fluvial Flood Extent
(1 in 1000 chance in any given year)

IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath
C15 NX36

Merrion House
Merrion Road
Dublin 4
D04 R2C5

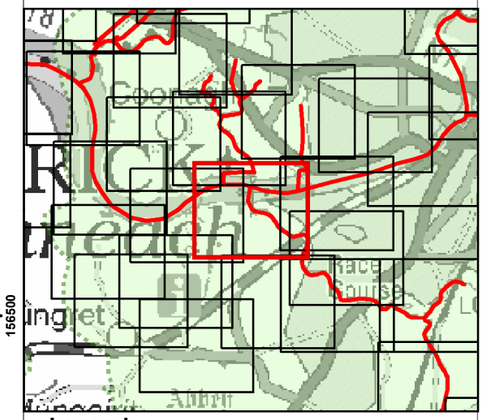
Project:	SHANNON CFRAM STUDY
Map Type:	EXTENT
Source:	FLUVIAL
Area:	LIMERICK
Scenario:	EXISTING
Drawn by:	Date: June 2016
Checked by:	Date: June 2016
Reviewed by:	Date: June 2016
Approved by:	Date: June 2016
Map No.:	S2526LIK_EXFCD_F1_26
Sheet: 26 of 59	Revision: 0
Map Scale: 1: 5000	Plot Scale: 1:1 @ A3



Node Label	10% AEP		0.5% AEP		0.1% AEP	
	Water Level (mAOD)	Total Flow (m^3/s)	Water Level (mAOD)	Total Flow (m^3/s)	Water Level (mAOD)	Total Flow (m^3/s)
01BLN01210	4.02		4.85		5.16	
01BLN00684	3.99		4.74		5.22	
01BLN00413	3.97		4.74		5.22	
03LSH00202	3.94		4.71		5.17	
02LSH03659	3.94		4.71		5.16	
02LSH03233	3.96		4.70		5.15	

0 50 100 200 300 400 500 Meters

Location Plan:



Legend:

- Nodes
- Model Reach
- AFA Boundary
- Flood Defence: Wall
- Flood Defence: Embankment
- Defended Area

10% AEP Coastal Flood Extent
(1 in 10 chance in any given year)

0.5% AEP Coastal Flood Extent
(1 in 200 chance in any given year)

0.1% AEP Coastal Flood Extent
(1 in 1000 chance in any given year)

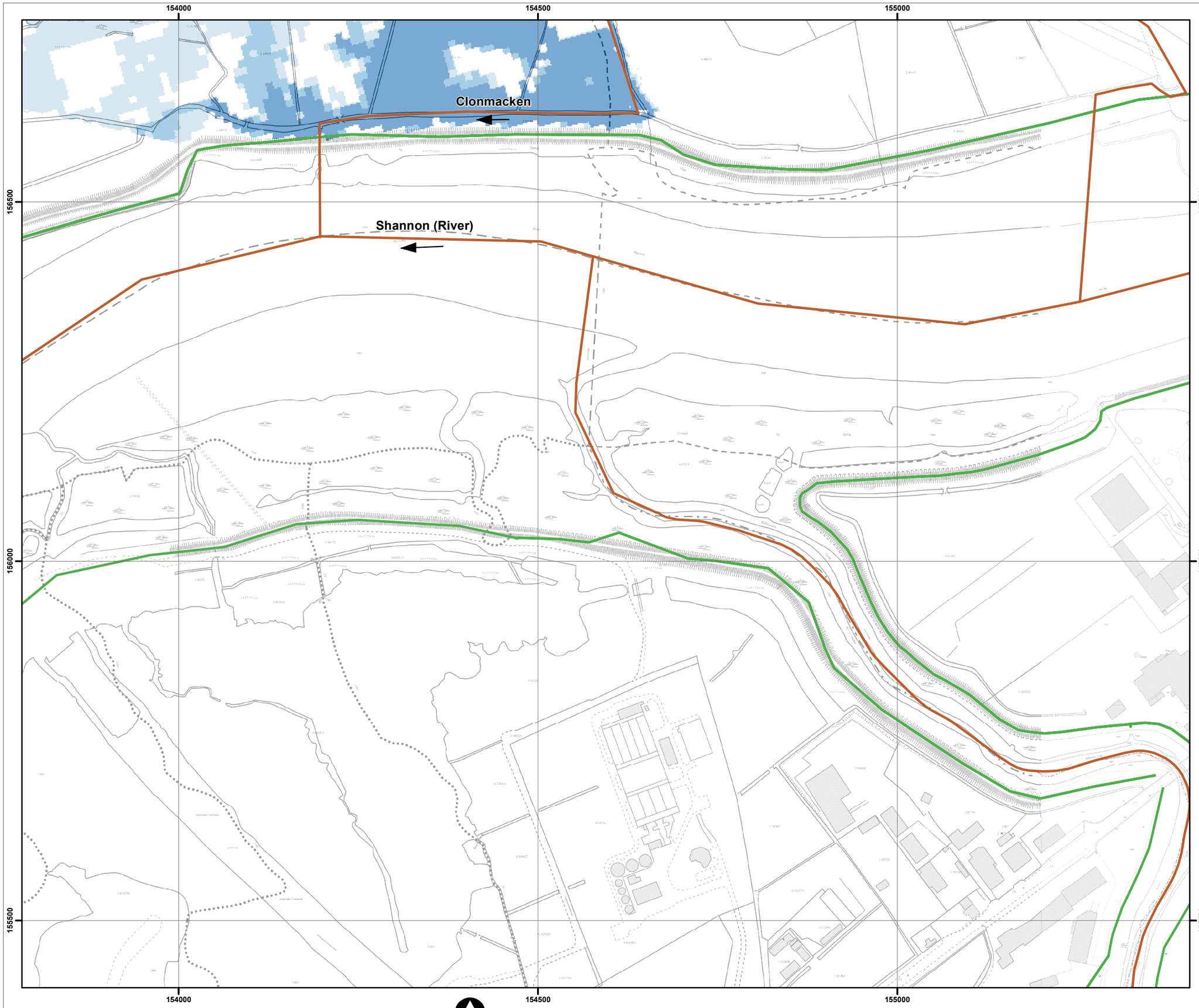
IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath
C15 NX36

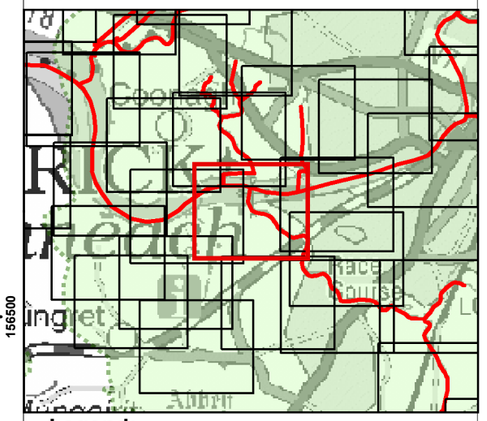
Merrion House
Merrion Road
Dublin 4
D04 R2C5

Project:		SHANNON CFRAM STUDY
Map Type:		EXTENT
Source:		COASTAL - TIDAL
Area:		LIMERICK
Scenario:		EXISTING
Drawn by:	EH	Date: June 2016
Checked by:	KM	Date: June 2016
Reviewed by:	MC	Date: June 2016
Approved by:	PS	Date: June 2016
Map No.:		S2526LIK_EXCCD_F1_33
Sheet: 33 of 65		Revision: 0
Map Scale: 1: 5000		Plot Scale: 1:1 @ A3

© Ordnance Survey Ireland. All rights reserved. Licence Number EN0021014



Location Plan:



Legend:

- Nodes
- Model Reach
- AFA Boundary
- Flood Defence: Wall
- Flood Defence: Embankment
- Defended Area

10% AEP Fluvial Flood Extent
(1 in 10 chance in any given year)

1% AEP Fluvial Flood Extent
(1 in 100 chance in any given year)

0.1% AEP Fluvial Flood Extent
(1 in 1000 chance in any given year)

IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath
C15 NX36

Merrion House
Merrion Road
Dublin 4
D04 R2C5

Project:	SHANNON CFRAM STUDY
Map Type:	EXTENT
Source:	FLUVIAL
Area:	LIMERICK
Scenario:	EXISTING
Drawn by: EH	Date: June 2016
Checked by: KM	Date: June 2016
Reviewed by: MC	Date: June 2016
Approved by: PS	Date: June 2016
Map No.:	S2526LIK_EXFCD_F1_33
Sheet: 33 of 59	Revision: 0
Map Scale: 1: 5000	Plot Scale: 1:1 @ A3

© Ordnance Survey Ireland. All rights reserved. Licence Number EN0021014

SUB-APPENDIX 16.5: LIMERICK SFRA FLOOD MAPS

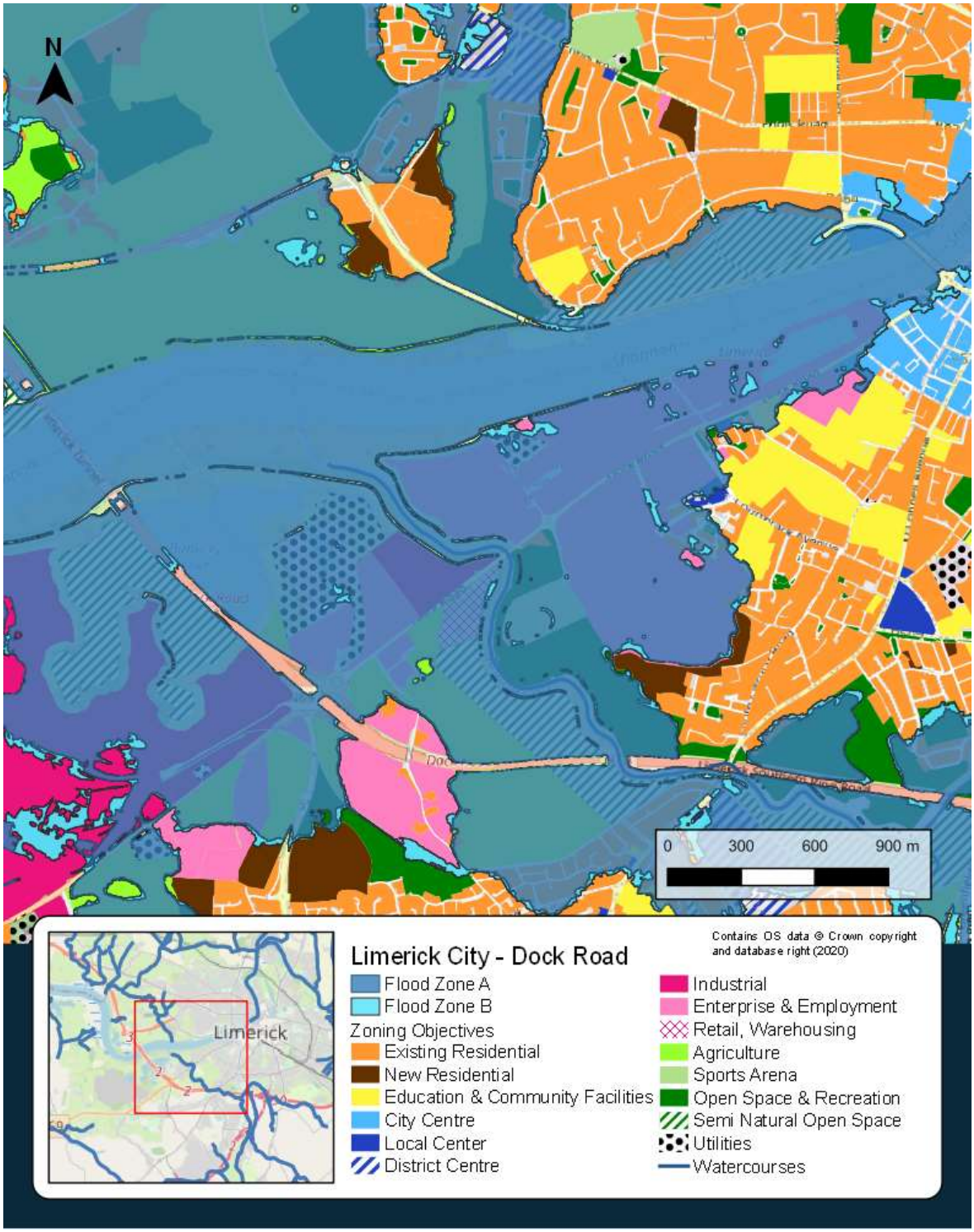


Figure 7-1 Limerick City - Dock Road

Ireland

www.egis-group.com