New Residential Development, Harbour Road, Mullingar

Infrastructure Report

Document Reference: 26019-MHT-XX-ZZ-RP-C-0001

Issue P01 – 28 May 2026

Prepared For:

Westmeath County Council

NEW RESIDENTIAL DEVELOPMENT, HARBOUR ROAD, MULLINGAR

INFRASTRUCTURE REPORT

Quality Assurance Page

Issue	Date	Prepared By	Checked By	Approved By	Remarks
P01	28/05/2026	V. Magalhaes	A. Lacey	B. Mitchell	Planning Issue

Table of Contents

1 Introduction 1
1.1 Proposed Development 2
2 Surface Water Drainage 3
2.1 Existing Watercourses 3
2.2 Proposed Surface Water Drainage 4
2.3 Proposed Attenuation Tank 6
2.4 SuDS 8
3 Foul Water Drainage 10
3.1 Existing Foul Water Drainage 10
3.2 Proposed Foul Water Drainage 10
4 Water Supply 12
4.1 Existing Water Supply 12
4.2 Proposed Water Supply 12
5 Flood Risk Assessment - Stage 1 14
5.1 Planning Guidelines 14
5.2 Existing Hydrology 14
5.3 Existing Topography 15
5.4 Strategic Flood Risk Assessments 16
5.5 OPW Flood Map Interactive Website 17
5.6 GSI Map Interactive Website 19
5.7 Summary of Potential Sources of Flooding 19
5.8 Conclusion 20

Appendix A – Met Eireann Rainfall Data
Appendix B – Greenfield Runoff Calculations
Appendix C – Soil Infiltration Tests Results
Appendix D – Confirmation of Feasibility
Appendix E – Surface Water Network Calculations
Appendix F – Attenuation Tank Calculations
Appendix G – Foul Water Network Calculations
Appendix H – Existing Topography
Appendix I – OPW Past Flood Event Summary
Appendix J – Mullingar Settlement Area Plan Draft (Relevant Pages)

1 Introduction

Meinhardt has been commissioned by Westmeath County Council (the applicant) to prepare a Infrastructure Report in support of a Part 8 planning permission for a proposed residential development comprising a total of 50 residential units, consisting of 22 no. one- and two-bedroom duplex units, 16 no. two-bedroom houses, 9 no. three-bedroom houses, 1 no. three-bedroom medical needs adapted dwelling, and 2 no. one-bedroom dwelling, together with all associated site development and ancillary works. The proposed development site is located in the town of Mullingar, Co. Westmeath. Mullingar is located in central Westmeath, approximately 42km northeast of Athlone town. The N4 and N52 national primary roads bypass Mullingar to the east, connecting the town to Longford, Sligo, Ardee and the M6 at Tyrrellspass.

The site location is shown in Figure 1-1.



Figure 1-1: Site Location (Prepared by Meinhardt)

This report presents the existing drainage, foul and watermain infrastructure in the vicinity of the site and outlines the civil infrastructure design criteria for the proposed development.

1.1 Proposed Development

The site layout is shown in Figure 1-2.



Figure 1-2: Proposed Site Layout (Source: Westmeath Housing Design Team)

2 Surface Water Drainage

2.1 Existing Watercourses

There is no existing surface watercourse within the proposed site. There is a tributary to the River Brosna at the northeast corner of the proposed site (Figure 2.1), which connects downstream to the River Brosna [IE_SH_25B090006].

There is a surface water outfall from the proposed site which flows into this small tributary in the proposed development's operational phase. In addition, it is likely that the urban surface water infrastructure from the proposed site and surrounds areas connects to this tributary or the River Brosna.

The River Brosna flows through Mullingar town, eventually connecting with Lough Ennell, approximately 6 km downstream. The River Brosna has a Water Framework Directive (WFD) status of "poor".

The Royal Canal is located to the south of the proposed site and represents an additional significant water feature within the wider hydrological context of the development area.

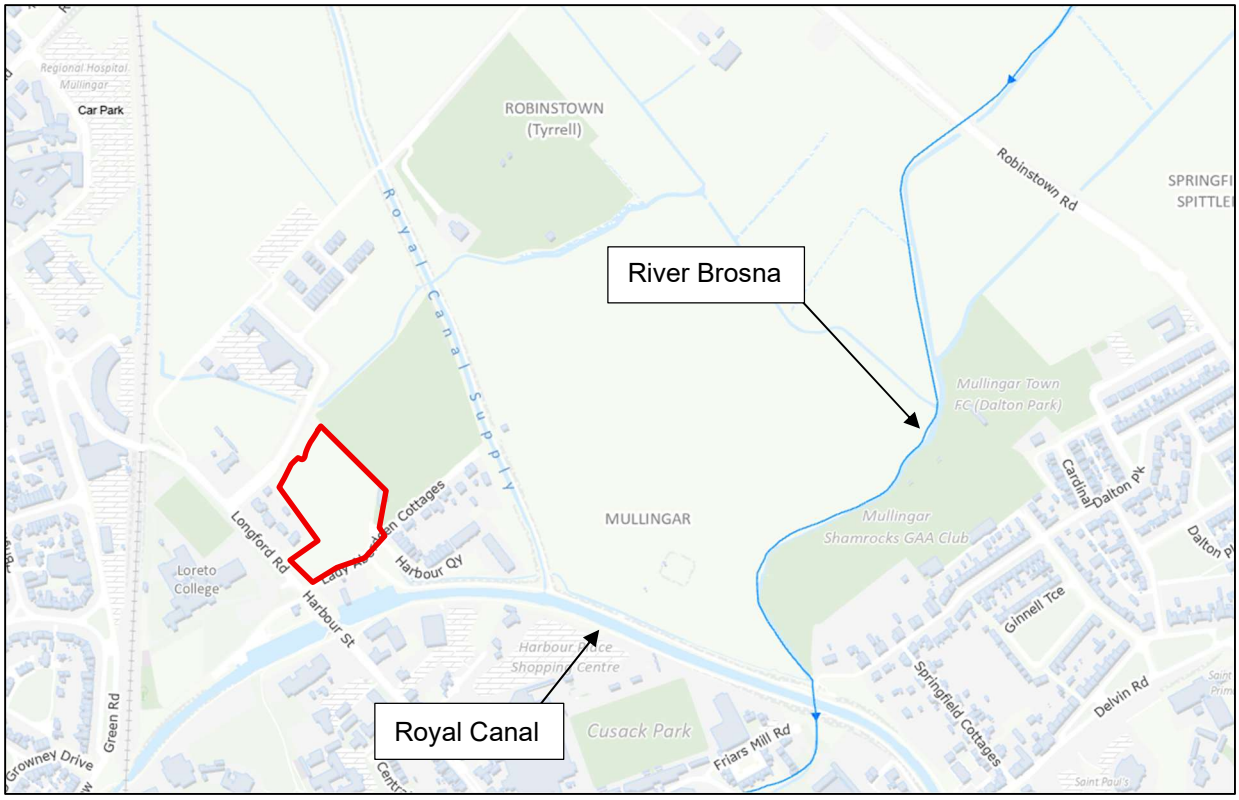


Figure 2-1: Existing Hydrological Features in the Vicinity of the Proposed Development, Including the River Brosna and Royal Canal (Extracted from GSI Maps)

A Ground Penetrating Radar (GPR) and electro-magnetic survey was undertaken to identify existing underground services within and adjacent to the site. The survey, carried out by Metroscan, identified a number of existing utilities along the adjoining road corridor, including surface water drainage.

The majority of identified services are located along Harbour Road and the surrounding local road network, generally following the road alignment. Depths to services were recorded where possible based on GPR data.

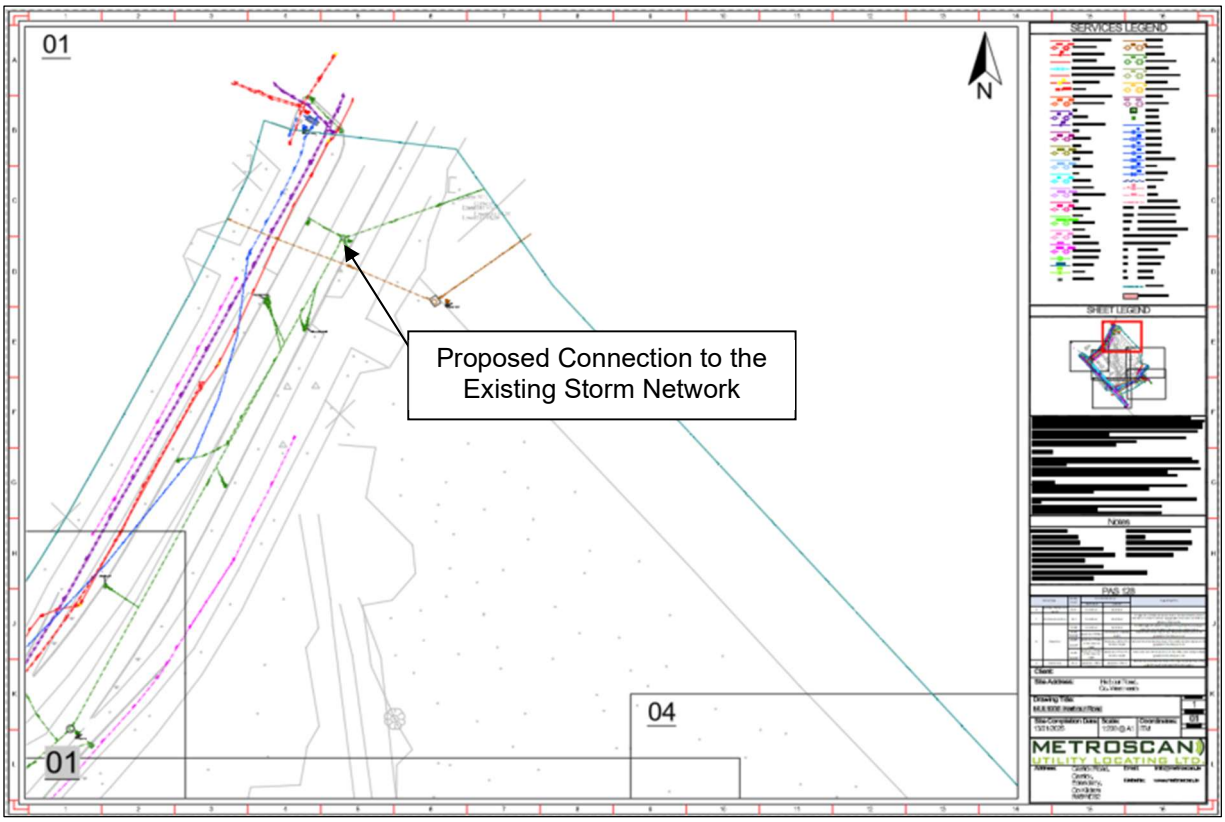


Figure 2-1: Existing Surface Water Network in the vicinity of development (Prepared by Metroscan)

2.2 Proposed Surface Water Drainage

It is proposed to drain the surface water generated from the roads, roofs and hardstanding areas of the proposed development via road gullies, permeable paving and underground pipe network. The surface water drainage incorporates SuDS and attenuation, such as a Stormtech tank, where possible to meet policy guidelines. The new gravity surface water network will discharge into the existing storm network located in Harbour Road, which will therefore discharge to the stream shown on Figure 2-1 above.

The following design standards and guidelines have been followed in the design of the proposed surface water drainage network for the site:

- BS EN 752 – Drains and sewer system outside buildings.
- Greater Dublin Strategic Drainage Study (GDSDS) Volume 2 – New Developments.
- Westmeath County Council Taking in Charge Standards
- CIRIA C753 – The SuDS Manual.
- Flood Studies Report (FSR).

The proposed storm sewers have been designed using industry standard Causeway Flow software in accordance with the requirements of the GDSDS and the following design criteria applied:

- Pipe network has been designed to ensure no surcharging during a 1 in 5-year return period rainfall event.
- No manhole flooding during a 1 in 100-year return period rainfall event.
- An additional 20% has been allowed for climate change in relation to rainfall intensities.
- GDSDS river regime protection criteria applied.

The proposed surface water network has been designed using Causeway Flow software with a M5-60 value of 15.6mm and a ratio R of 0.275, which is based on the Met Eireann rainfall data for the site location. A rainfall intensity of 50 mm/hr and a return period of 5 years were used throughout the calculations for pipeline design. The software simulation settings were set for rainfall durations up to 36 hours. Additionally, the following industry-standard volumetric runoff coefficients (C_V values) were applied to reflect seasonal differences in runoff potential in Ireland, as per the Wallingford Procedure from the FSR:

- Summer C_V = 0.75
- Winter C_V = 0.84

Prior to discharging to the existing storm network, the runoff generated from the site has been restricted, by means of a Hydro-Brake (or equal approved) flow control device, to the associated greenfield runoff rate (QBar). The greenfield runoff rate was calculated based on the equation developed by the Institute of Hydrology (Report 124 “Flood estimation for small catchments”, 1994) as shown below.

$QBar_{rural} = 0.00108 \times AREA^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}$

Where:

- $QBar_{rural}$ is the mean annual flood flow from a rural catchment in m³/s.
- AREA is the area of the catchment in km².
- SAAR is the Standard Average Annual Rainfall for the period from 1941 to 1970 (mm).
- SOIL is the soil index from FSR.

The QBar rate for the site was calculated based on soil type 4 (default soil type value for this location on this calculation tool), representing a low permeability soil, and a Standard Annual Average Rainfall (SAAR) of 1005mm using HR Wallingford runoff estimation tool available on www.uksuds.com website.

A Ground Investigation was undertaken on 23rd January 2026 by Ground Investigations Ireland (GII) to characterise the subsurface conditions. The investigation identified predominantly cohesive clay soils with localised granular deposits, and soakaway testing indicated generally low permeability with variable infiltration performance across the site. These findings support the adoption of WRAP Soil Type 4 for runoff estimation. Hence, the QBar for the subject site was determined as 11.6l/s.

It is considered good practice that runoff rates shall be restricted to no less than 2.0 l/s/ha due to the potential risk of blockage within the flow control devices, which corresponds to a minimum rate of 3.14 l/s for the proposed development. Therefore, it is proposed to restrict the surface water runoff of the subject site to the respective QBar of 11.6 l/s.

The Ground Investigation also provided infiltration rates at various locations across the site. These values have been incorporated into the design of the surface water drainage network and SuDS elements. The locations of the tests are illustrated in Figure 2.3, with the corresponding infiltration rates presented in Table 2.1.



Figure 2-2: Trial Hole Location Map (Source: Ground investigations Ireland)

Table 2-1: Soil Infiltration Rates Measured

Location	Soil Infiltration Rate (m/s)
TP 01	Soakaway failed
TP 03	3.107E - 04
TP 04	3.739E - 05
TP 05	Soakaway failed

Refer to Appendix A for the Met Eireann rainfall data for the subject site area, Appendix B for details of the Greenfield runoff (QBar) calculations and Appendix C for the soil infiltration tests results from the site investigation. Surface Water calculations are included in Appendix E. The full proposed surface water network layout is detailed in Meinhardt's drawing No. 26019-MHT-XX-ZZ-DR-C-0500.

2.3 Proposed Attenuation Tank

A proprietary underground attenuation tank system, or equivalent approved, is proposed as part of the surface water drainage strategy for the development. The attenuation system is intended to provide temporary storage of surface water runoff generated from impermeable areas within the site prior to controlled discharge to the receiving surface water network.

The attenuation storage has been designed in accordance with SuDS principles to restrict post-development runoff rates to the permitted discharge rate. The system has been sized to accommodate the critical storm event, including an allowance for climate change, whilst ensuring that no on-site flooding occurs during the design storm event.

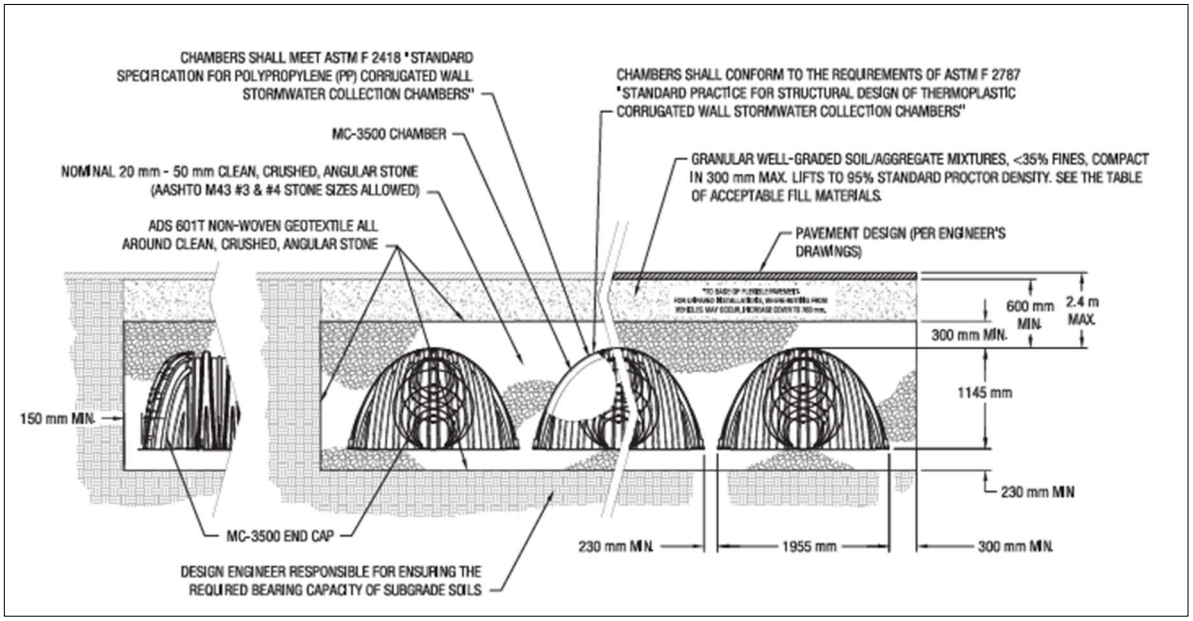


Figure 2-4: Indicative Section Through Proprietary Underground Attenuation Tank System (Adapted from Stormtech Technical Literature)

The proposed attenuation tank will comprise a modular underground storage structure wrapped in an impermeable geomembrane and surrounded by granular stone backfill. Surface water runoff from roofs, roads, parking areas and other impermeable surfaces within the development will be conveyed to the attenuation system via the proposed surface water drainage network.

Stored runoff will discharge at a controlled rate via a flow control device prior to discharge to the receiving surface water network. The attenuation system has been designed to provide the required storage volume whilst minimising the overall development footprint and maintaining available surface areas for the proposed development layout (Refer Appendix F for calculations).



Figure 2-5: Figure 2-6: Example Installation of a Proprietary Underground Attenuation Storage System

The attenuation system will incorporate appropriate inspection and maintenance access arrangements to facilitate future operation and maintenance activities. Routine inspection and maintenance will ensure the long-term operational performance of the proposed surface water drainage infrastructure.

Refer to the accompanying drainage drawings for indicative attenuation tank layout, dimensions and associated drainage infrastructure.

2.4 SuDS

The proposed development has been assessed in relation to Sustainable Urban Drainage Systems (SuDS) in accordance with the guidelines of the GDSDS and the SuDS CIRIA Manual C753. The SuDS Manual document promotes the use of a variety of alternative measures in the design of sustainable drainage systems, which consider quantity, quality and amenity aspects of the urban drainage system. SUDS encourage the use of soft systems that replicate as far as possible the natural treatment of surface water and attenuation storage to manage surface water runoff.

Based on the architectural layout, topography of the site and the site investigation carried out on the 23rd of January 2026, it is proposed to include permeable paving in the private car parking spaces and an Attenuation Tank.

The SuDS measures that have been included within the proposal for the site are shown in Meinhardt's Drawing No. 26019-MHT-XX-ZZ-DR-C-0500 and further detailed below.

2.4.1 Permeable Paving

Permeable paving is proposed at all private car parking spaces in accordance with Westmeath County Council's Taken in Charge Policy. The permeable paving allows for interception and evaporation of rainwater which reduces the runoff from these areas in small rainfall events. These systems will also allow some storage for small rainfall events within the voids of the subbase. Permeable paving will also provide a level of water quality treatment as pollutants and solids are removed when the surface water infiltrates through the surface and the underlying porous subbase.

The interception, storage and treatment volumes provided by the permeable paving help mimic the natural conditions of the site. Any excess flows from the permeable paving subbase can be discharged into the drainage collection system via an overflow pipe.

The soil infiltration tests indicated that the subsoil has low permeability and therefore it is proposed that permeable paving will be lined with an impermeable membrane and a perforated pipe will be installed allowing for conveyance of the surface water whilst still providing 5mm interception.

Refer to Figure 2-6 for an indicative scheme of the permeable paving proposed.

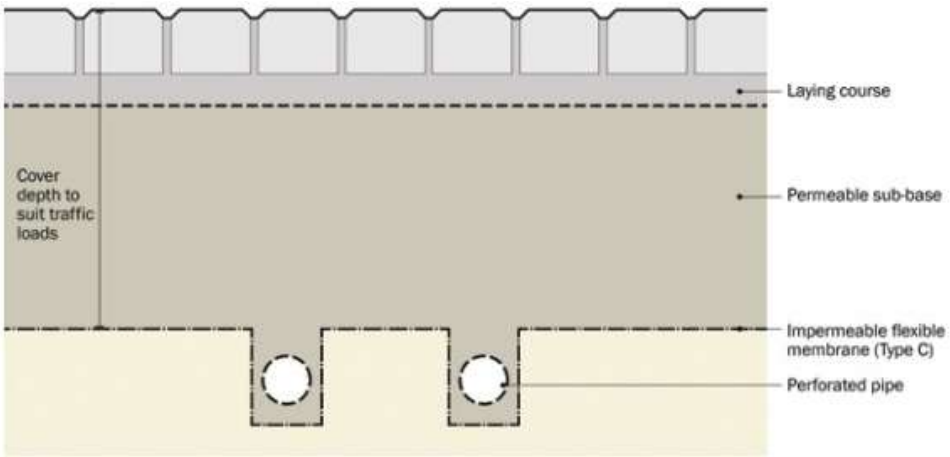


Figure 2-6: Permeable Paving with Perforated Land Drain (Extract from Ciria C753 SuDS Manual)

2.4.2 SuDS Pollutant analysis

To ensure that the SuDS measures proposed are sufficient in removing pollutants from the generated runoff, a SuDS pollutant analysis has been carried out in accordance with Section 26 of the Ciria SuDS Manual.

The main sources of pollutants on site are from the building roofs, car parking and roads. The pollution indices relevant to the subject site are presented in Table 2-3. The pollution hazard on site is generally low as private driveways and car parks with infrequent change are classified as low. As such, the simple index approach has been applied, and is summarized below:

Total SuDS Mitigation Index ≥ Pollution Hazard Index

Table 2-2: Pollution Hazard Index (Source: Ciria C753 SuDS Manual)

Land Use	Pollution Hazard Level	TSS	Metals	Hydrocarbons
Residential Roofs	Very Low	0.2	0.2	0.05
Individual driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change eg schools, offices ie <300 traffic movements day	Low	0.5	0.4	0.4

The SuDS elements on site have been reviewed to ensure this criterion is met, and this assessment is presented in Table 2-3. The assessment has been carried out using the information and figures presented in Table 26.2, 26.3 and 26.15 in the Ciria C753 SuDS Manual for the primary treatment features on site (i.e. permeable car parking have been assessed).

Table 2-3: Pollution Hazard Assessment

Pollutant	Total SuDS Mitigation Index	Pollution Hazard Index	Status
Road drainage through permeable car parking			
Total Suspended Solids	0.7	0.5	OK
Metals	0.6	0.4	OK
Hydrocarbons	0.7	0.4	OK

* Refer to the paragraph below for justification

3 Foul Water Drainage

3.1 Existing Foul Water Drainage

No Uisce Éireann record drawings were available at the time of assessment; therefore, the information is based on surveyed data and is considered adequate for planning purposes. The utility survey indicates the presence of an existing foul sewer network in the vicinity of the site, including a foul sewer located along Harbour Road to the northeast of the development.

Based on survey data, this sewer is identified as a large diameter pipe, approximately 750mm, and is considered to form part of the local foul drainage network, as illustrated in Figure 3.1.

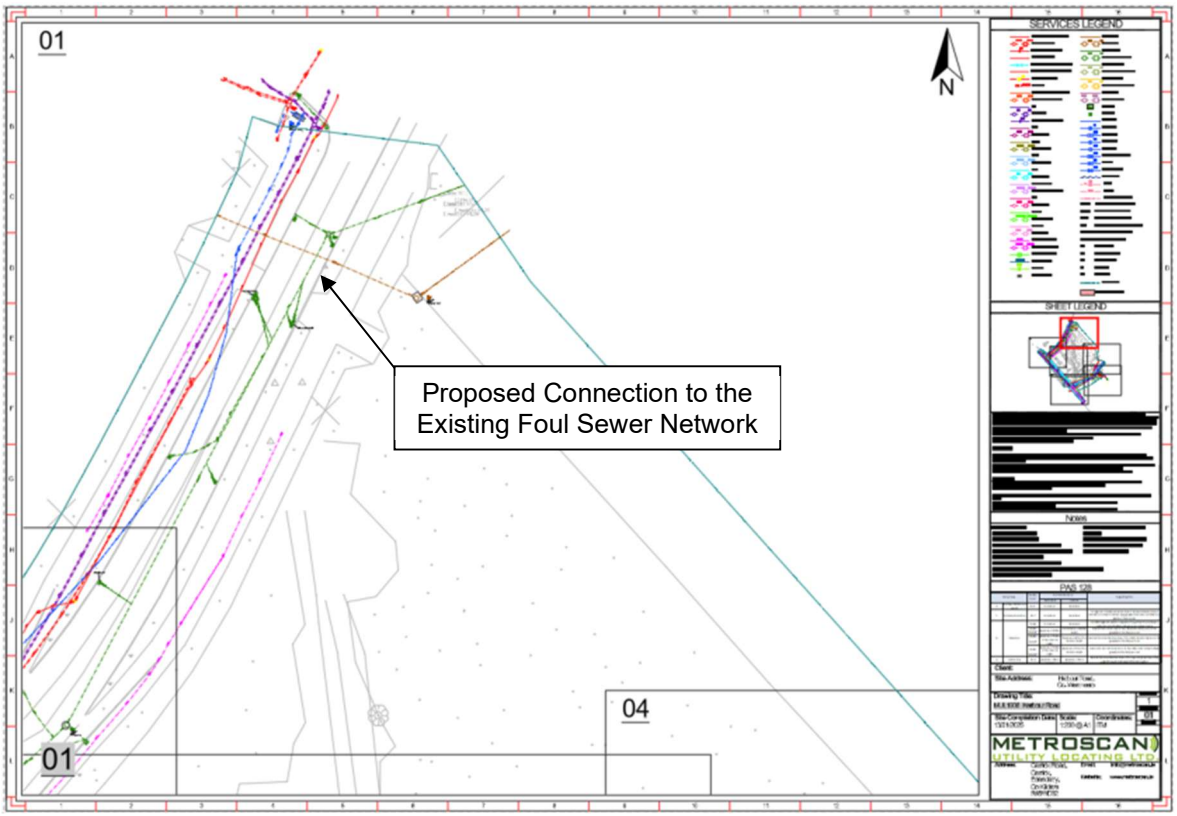


Figure 3-1: Existing Foul Water Sewers and Proposed Connections to the New Foul Water Network for the development (Prepared by Metroscan).

3.2 Proposed Foul Water Drainage

A Pre-Connection Enquiry has been submitted to Uisce Éireann (Ref. CDS25005369) in respect of the proposed development. Uisce Éireann has confirmed that a connection to the existing wastewater network is feasible without the requirement for any infrastructure upgrades. This confirms that the existing foul sewer network has sufficient capacity to accommodate the proposed development.

A new gravity foul water drainage network is proposed within the site, generally following the internal road layout. The proposed network will collect flows from the development and convey them to the existing foul sewer network.

The overall foul water network will connect to the existing 750mm diameter concrete foul sewer located along Harbour Road to the northeast of the development, via a new manhole at the location indicated in Figure 3-1 above. The proposed network has been designed to accommodate flows generated by the proposed 50 no. residential units.

The following design standards and guidelines have been used in the design of the wastewater drainage network for the site:

- Uisce Éireann Code of Practice for Wastewater Infrastructure.
- BS EN 752 – Drains and sewer systems outside buildings.
- Building Regulations - Part H.

Table 3-1 below describes the foul water drainage parameters used. Infiltration has been taken as 10% in accordance with the Uisce Éireann Code of Practice for Wastewater Infrastructure Table 2.4 for new properties.

Table 3-1: Foul Water Drainage Design Parameters

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

The estimated foul water flow generated by the proposed development is detailed in Table 3-2 below. The design flow for the development is estimated as 1.55 l/s with a Dry Weather Flow (DWF) rate of 0.26 l/s.

Table 3-2: Foul Water Demand Calculations

Source	Unit	Quantity	Flow (litres/day/unit or litres/sec/ha)	Population Equivalent (persons)	DWF (litres/ day)	DWF (litres/ sec)	Design Peak Flow (litres/sec)
Residential units (2.7 persons per dwelling @ 150 l/p/person + 10% unit allowance)	Person	50	165	135	22,275	0.258	1.547
Total					**22,275**	**0.26**	**1.55**

Notes:
1. Domestic calculations based on a national average of 2.7 persons/house (Irish Water Code of Practice).
2. Domestic calculations based on foul loading 165 l/p/d as per Irish Water Requirements.
3. Domestic peak factor equals to 6 as per Irish Water requirements (population between 0 - 750).

This foul water network has been modelled using industry standard Causeway Flow software and the calculations of the proposed gravity foul network are detailed in Appendix G.

The full proposed foul water network layout for the development is detailed in Meinhardt's drawings No. 26019-MHT-XX-ZZ-DR-C-0500.

All sewers have been sized to comply with the minimum sizing and gradients as required in the Uisce Éireann Code of Practice for Wastewater Infrastructure.

4 Water Supply

4.1 Existing Water Supply

A utility survey, including Ground Penetrating Radar (GPR) and electro-magnetic detection, has been undertaken to identify existing underground services within and adjacent to the site. The survey confirms the presence of an existing watermain along the site boundary, generally aligned with the adjacent roadway.

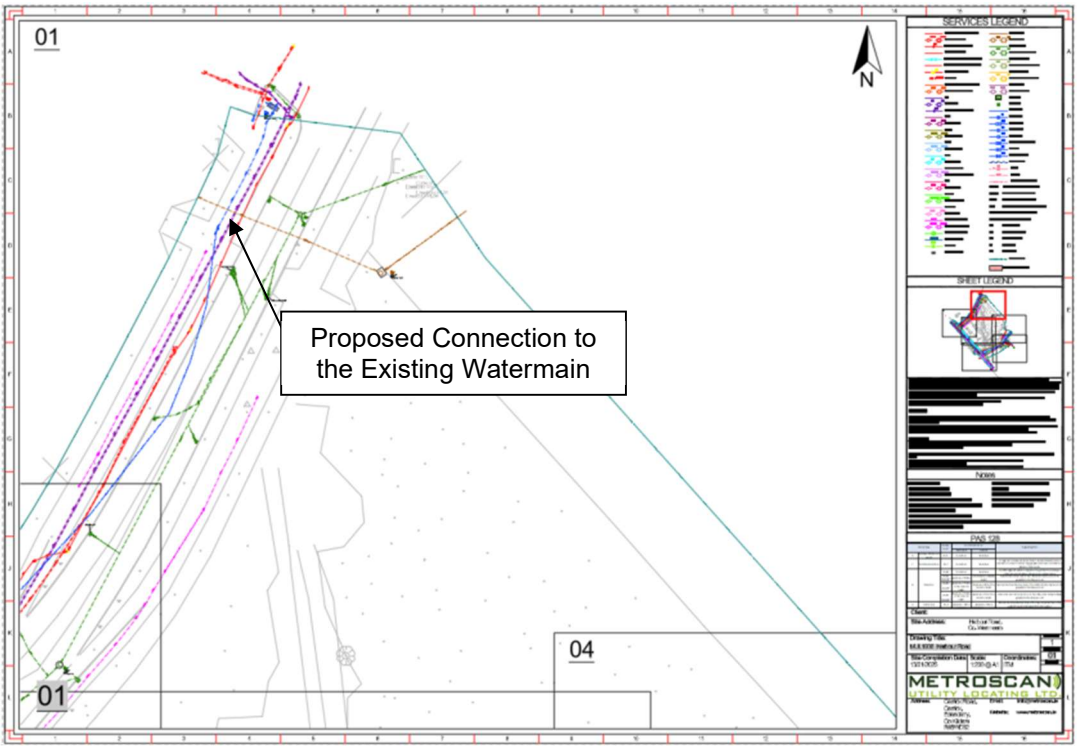


Figure 4-1: Existing Water Supply Records Provided by Uisce Éireann (Prepared by Metroscan)

4.2 Proposed Water Supply

A Pre-Connection Enquiry has been submitted to Uisce Éireann (Ref. CDS25005369) in respect of the proposed development. Uisce Éireann has confirmed that a connection to the existing water supply network is feasible without the requirement for any infrastructure upgrades indicating that sufficient capacity is available to serve the development.

With reference to Uisce Éireann's Code of Practice for Water Infrastructure, the average daily flow is calculated as the number of persons multiplied by the flow rate per person. The average day/peak week flow is taken to be 1.25 times the average flow, and the peak demand is taken to be the average day/peak week flow multiplied by a peaking factor.

Table 4-1 describes the watermain design parameters used.

Table 4-1: Watermain Design Parameters

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

The estimated water demand associated with the development is detailed in Table 4-2 below. The estimated peak water demand for the proposed development is 1.465 l/s with an average day demand of 0.234 l/s.

Table 4-2: Water Demand Calculations

Source	Unit	Quantity	Flow (litres/day/unit or litres/sec/ha)	Population Equivalent (persons)	Average Daily Demand (litres/ day)	Average Daily Demand litres/sec	Peak Day/Week Demand litres/sec	Peak Demand litres/sec
Residential Units (150 l/day/person)	Persons	50	150	135	20,250	0.23	0.293	1.465
Total					**20,250**	**0.234**	**0.293**	**1.465**

Notes:
1. Domestic calculations based on a national average of 2.7 persons/house (Irish Water Code of Practice).
2. Domestic calculations based on per-capita consumption of 150 l/p/d, as per Irish Water requirements.
3. Day/week peak demand as 1.25 times the average daily domestic demand, as per Irish Water requirements.
4. Peak demand as 5 times the peak day/peak week demand, for sizing of the pipe network, as per Irish Water requirements.

It is proposed to supply the proposed development via a new 100mm HDPE watermain network connected to the existing watermain that runs along Harbour Road.

Furthermore, each unit will have a separate 20mm (OD) PE service connection and a boundary box in accordance with Uisce Éireann requirements and standard detail STD-W-03.

The internal water supply network design is based on the requirements of Uisce Éireann such that:

- Hydrants are positioned within 46m of the proposed buildings.
- The development shall have a bulk water meter (location to be agreed with Uisce Éireann) in accordance with Uisce Éireann Code of Practice for Water Infrastructure Section 3.15.4.
- Domestic connections shall be made “meter ready” by the provision of a boundary box on the service connection by the developer. All domestic meters shall be installed as per section 3.15.2 of the Uisce Éireann Code of Practice.
- Meters to measure water use shall be installed in boundary boxes (for concentric meters) or chambers (for inline meters) on each service connection supplying a commercial premise. All commercial meters shall be installed as per section 3.15.3 of the Uisce Éireann Code of Practice.
- Sluice valves are positioned in accordance with Uisce Éireann requirements in case of emergency repairs, to isolate the watermain if necessary.
- Air valves are positioned at the high points of the watermain and shall be installed in accordance with section 3.16.6 of the Uisce Éireann Code of Practice.
- Scour valves are positioned at low-points and connected to the proposed surface water network and shall be installed in accordance with section 3.16.4 of the Uisce Éireann Code of Practice.

To further reduce the water demand on the public water supply infrastructure and to reduce the load on the public wastewater infrastructure, water conservation measures will be incorporated in the sanitary facilities through the development, e.g., dual flush toilets.

Refer to drawing No. 26019-MHT-XX-ZZ-DR-C-2700 for the water supply network proposals.

5 Flood Risk Assessment - Stage 1

5.1 Planning Guidelines

The Planning System and Flood Risk Management, Guidelines for Planning Authorities (thereafter the Planning Guidelines) published in 2009 by the Office of Public Works (OPW) provides key concepts and guidelines in relation to flood management. Flood risk is defined as the combination of the likelihood of flooding (percentage probability of a flood of a given magnitude or severity occurring or being exceeded in any given year) and the potential consequences arising which depend on the vulnerability of development.

The Planning Guidelines recommend a staged approach for flood risk assessment as follows.

Stage 1 Flood risk identification – to identify whether there may be any flooding or surface water management issues related to either the area of regional planning guidelines, development plans and LAP's or a proposed development site that may warrant further investigation at the appropriate lower-level plan or planning application levels.

Stage 2 Initial flood risk assessment – to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped; and

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 or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

Flood zones are defined as geographical areas within which the likelihood of flooding is in a particular range. There are three types of flood zones as per the Planning Guidelines:

Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).

Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding).

Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

5.2 Existing Hydrology

Refer to Section 2.1.

There is no existing surface watercourse within the proposed site. There is a tributary to the River Brosna at the NE corner of the proposed site (ref Figure 2-1), which connects downstream to the River Brosna [IE_SH25B090006]. There is a surface water outfall from the proposed site which will flow into this small tributary in the proposed development's operational phase. In addition, it is likely that the urban surface drainage infrastructure from the proposed site and surrounding areas connects to this tributary or the River Brosna. The River Brosna flows through Mullingar town, eventually connecting with Lough Ennell, approximately 6 km downstream. The Royal Canal is also located immediately south of the proposed site and represents a significant hydrological and amenity feature within the wider receiving environment of the development area. The River Brosna has a Water Framework Directive (WFD) status of "poor".

5.3 Existing Topography

The subject site is characterised by a generally sloping topography, falling from the northern and north-western extents towards the southern and south-western boundaries. The figure below shows an extract of the existing topography within the site boundary.



Figure 5-1: Existing Topography of the Site

5.4 Strategic Flood Risk Assessments

A Catchment Flood Risk Assessment and Management (CFRAM) Study has been undertaken by the Office of Public Works (OPW) to assess flood risk across Ireland, including the River Brosna catchment within which Mullingar is located. The findings of the CFRAM Study have informed the Strategic Flood Risk Assessment (SFRA) prepared as part of the Draft Mullingar Settlement Area Plan 2025–2031.

The CFRAM mapping provides detailed assessment of fluvial flood risk and forms the primary basis for identifying Flood Zones within Mullingar. These assessments consider both current and potential future flood scenarios, including the effects of climate change, and are used to inform land use zoning and development management in accordance with the Planning System and Flood Risk Management Guidelines (2009).

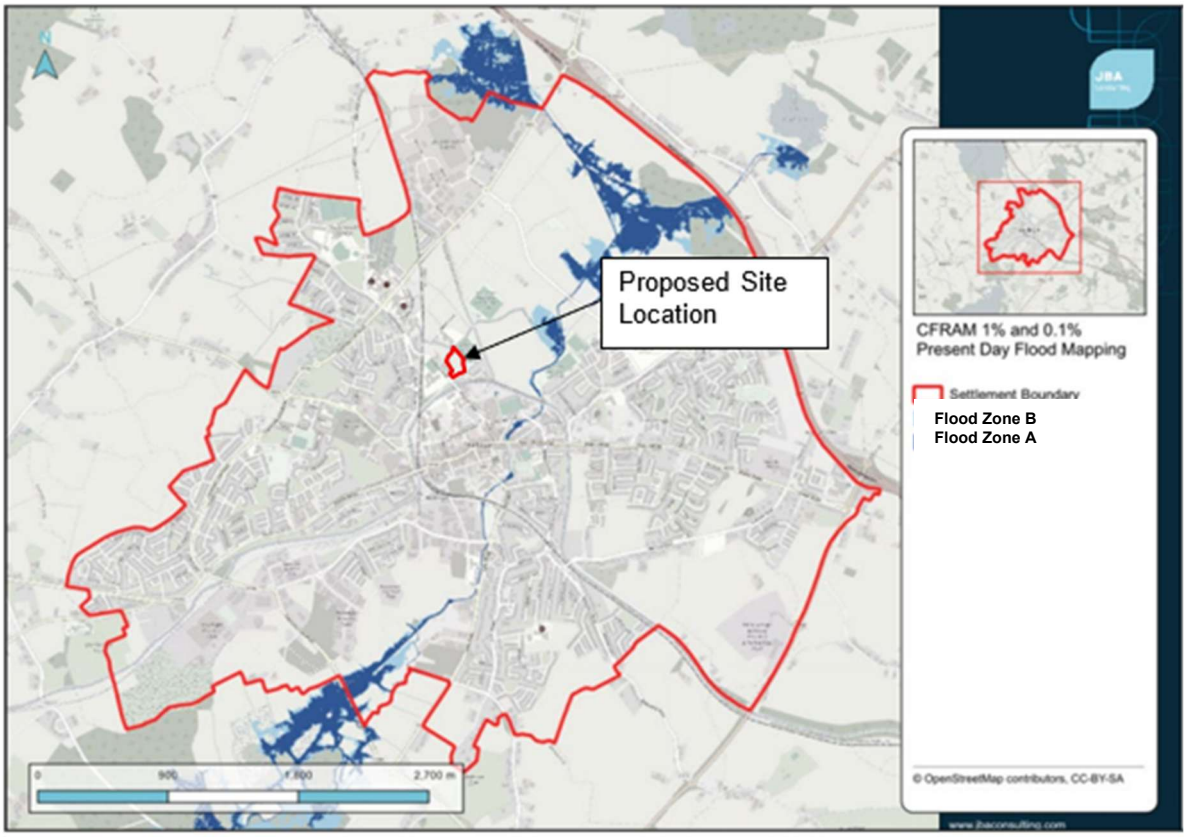


Figure 5-2: Indicative Flood Zones (Source: SFRA – Draft Mullingar Settlement Area Plan 2025-2031)

5.5 OPW Flood Map Interactive Website

5.5.1 Past Flood Events

The OPW flood map interactive website (www.floodinfo.ie) was also consulted in relation to available historical data on any past flooding occurrences in the vicinity of the subject site. This consultation showed that the nearest flooding event recorded occurred at Main Street, Ballytown in 2010 and it occurred within the River Brosna catchment following prolonged heavy rainfall. The event was attributed to a blockage and an undersized culvert beneath the adjacent railway line, which created a throttling effect and resulted in flooding to the rear gardens of six houses. This event occurred at 550m from the site, and it was a single event. Therefore, it does not pose a risk to the subject site (refer to extract from OPW interactive website below and summary report in Appendix I).

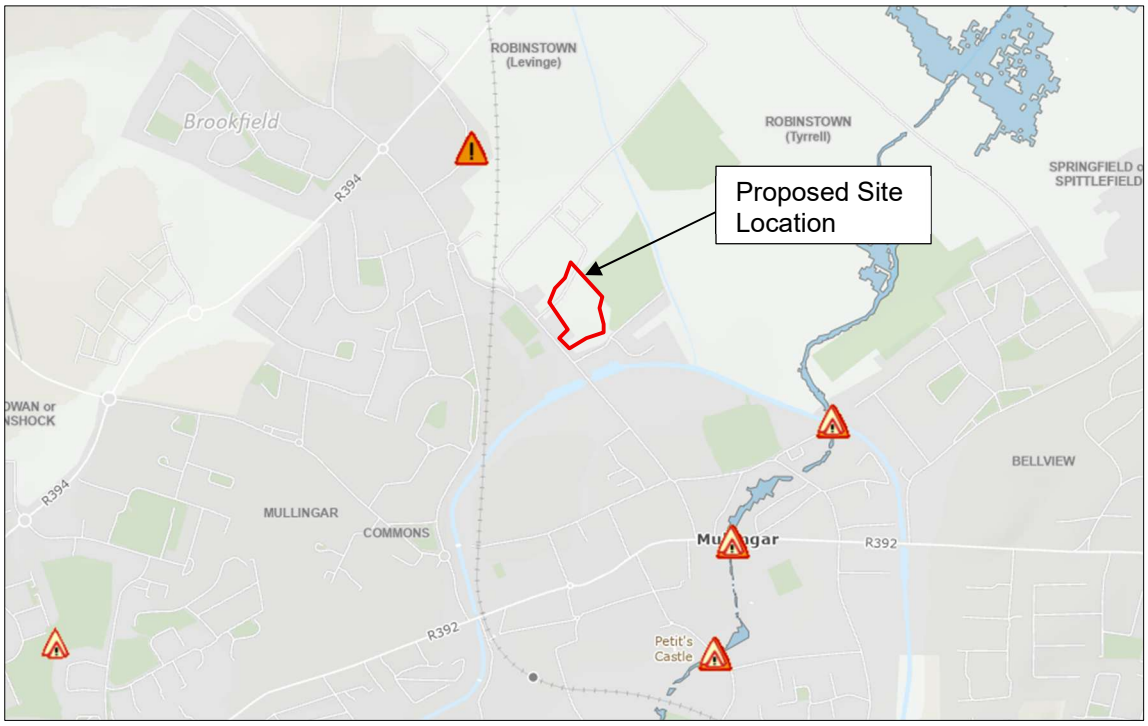


Figure 5-3: Past flooding events in the vicinity of the subject site (Source: https://www.floodinfo.ie/map/floodmaps/)

5.5.2 Potential Fluvial Flood Extends

The OPW interactive website also showed that the subject site is not located within flood zone A or B (refer to Appendix I). As Figure 5-4 below illustrates, the site is located in flood zone C and at approximately 460m distance from the nearest stream.

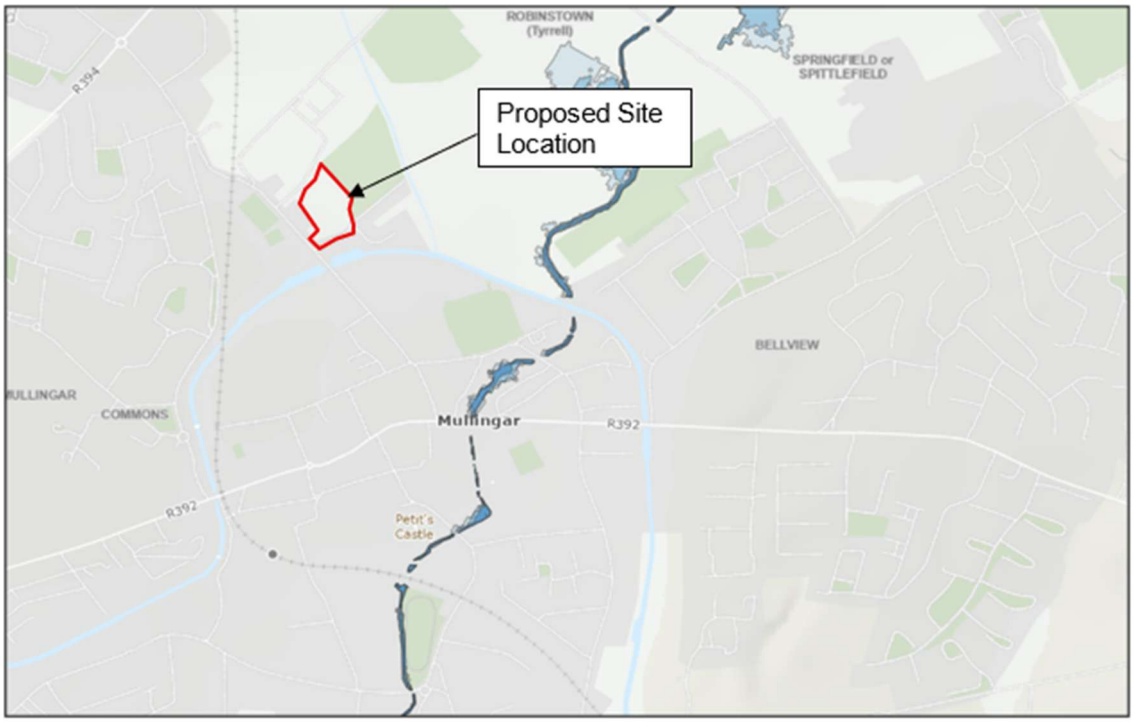


Figure 5-4: Potential flood extents (Source: https://www.floodinfo.ie/map/floodmaps/)

5.5.3 Potential Coastal Flood Extends

Regarding possible coastal floods, the OPW interactive website showed that the site is approximately 85km distance from the coast and that the estimated coastal flood extents are not a concern, as Figure 5-5 below shows.



Figure 5-5: Potential coastal flood extents (Source: https://www.floodinfo.ie/map/floodmaps/)

5.6 GSI Map Interactive Website

The GSI map interactive website (https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx) was also consulted in relation to significant springs or groundwater discharges mapped or records that might impact the subject site. It has been determined that there are no springs nor groundwater features located in the area, as the screenshot below from the GSI map interactive website shows.

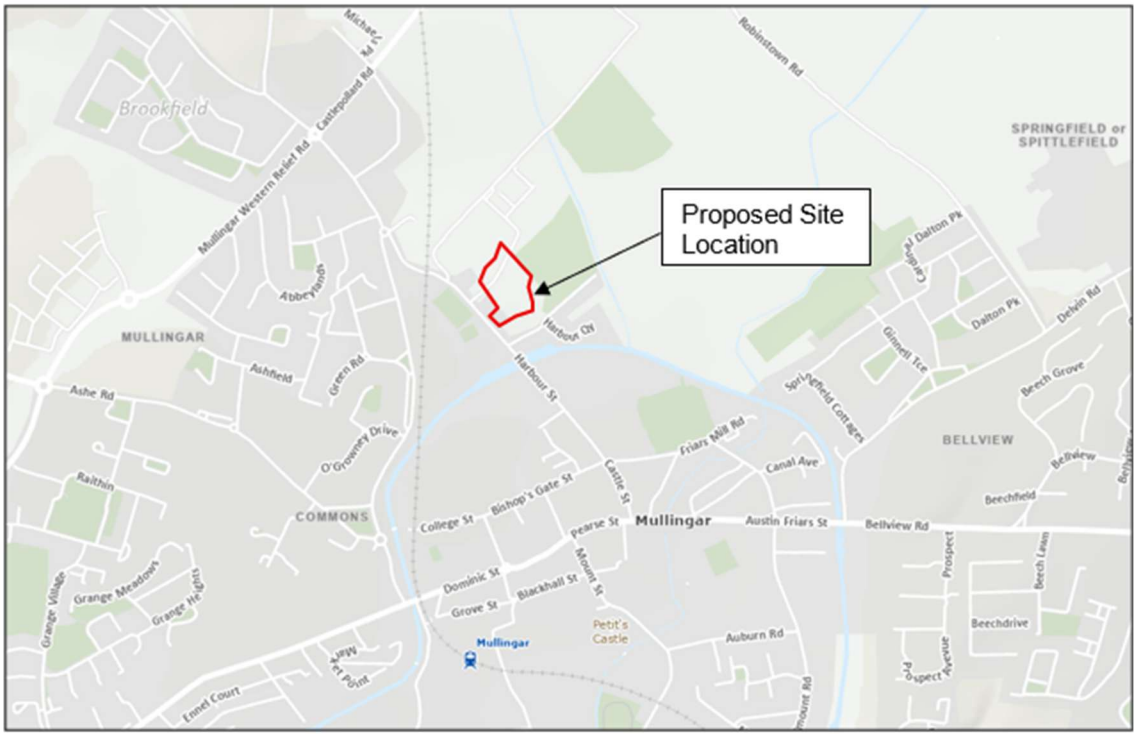


Figure 5-6: Springs and groundwater features located in the area, Mullingar, Co. Westmeath (Source: https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx)

5.7 Summary of Potential Sources of Flooding

From a high-level review, the only potential source for flooding that seems to be relevant for this site is rainfall (pluvial source). Table 5-1 outlines all possible sources and indicates whether they are relevant to the subject site, providing also a brief description of the potential flood risk.

Table 5-1 - Sources of Flood Risk

Source of Flooding	Relevance to Site	Comments
Pluvial (Rural)	None	The site is located within an urbanised area of Mullingar and is not subject to rural catchment runoff.
Pluvial (Urban)	Primary/Relevant	The proposed development will be served by a new surface water drainage network designed in accordance with SuDS principles. Surface water runoff will be attenuated and discharged at greenfield rates to the receiving network.
Fluvial	None	Based on CFRAM mapping, the site is located outside Flood Zone A and Flood Zone B. The nearest watercourse is located to the east and south of the site and ultimately connects to the Royal Canal. Given the separation distance and topography, fluvial flooding is not considered to pose a risk to the site.
Tidal or Coastal	None	The existing site is not located within a coastal or tidally influenced region.
Groundwater	None	There are no significant springs or groundwater discharges mapped or recorded in the immediate vicinity of the site.

Pluvial (overland flow)	Secondary/Residual	The site slopes generally from north to south. Lands to the north are at a higher elevation and may generate overland flow towards the site. However, existing and proposed drainage infrastructure within the surrounding developments is designed to intercept and attenuate runoff, thereby minimizing the risk of overland flow entering the site.
Infrastructure	None	There are no special structures such as dams, or wastewater treatment plants, in close proximity to the site that could potentially fail and cause issues.

Based on Table 5-1, the only relevant flood risk to the site location can be attributed to a potential pluvial flooding, if the development surface water runoff is not managed properly.

5.8 Conclusion

Based on the information available, the residential development under consideration is situated outside of coastal and pluvial flood zones A and B, indicating a low risk of flooding. Furthermore, there is no historical record of flood events occurring within or in close proximity to the subject site.

This assessment concluded that there is only one potential source of flooding for the development, which can be attributed to pluvial flooding within the site resulting from proposed impermeable areas (such as roofs and roads) if the surface water runoff is not managed properly.

Therefore, surface water runoff from new impermeable roofs, roads and other hardstanding areas needs to be collected and managed properly as part of a site-specific surface water drainage strategy. It is recommended that the surface water management strategy considers the gradient falling towards the lower parts of the site and how the flows can be attenuated and discharged safely to the existing public infrastructure. Furthermore, the surface water drainage design shall incorporate Sustainable Urban Drainage Systems (SuDS) and attenuation to avoid flooding in the 1 in 100-year event as per GDSDS guidelines. The proposed surface water drainage design has been developed to accommodate the 1-in-100 year storm event, including a 20% allowance for climate change. As such, the residual risk of flooding associated with the proposed development is considered to be low.

Appendix A – Met Eireann Rainfall Data

Met Éireann

Return Period Rainfall Depths

Coordinates: 53.530713, -7.343698

M5-60: 15.6
Ratio: 0.275

Duration	0.5 yrs	1 yrs	2 yrs	3 yrs	4 yrs	5 yrs	10 yrs	20 yrs	30 yrs	50 yrs	75 yrs	100 yrs	120 yrs
15 mins	4	5.7	6.6	7.9	8.8	9.5	11.8	14.4	16.2	18.6	20.8	22.4	23.6
30 mins	5.3	7.4	8.5	10.2	11.3	12.2	15	18.2	20.2	23.2	25.7	27.7	29.1
1 hour	7	9.7	11.1	13.1	14.5	15.6	19	22.8	25.3	28.8	31.9	34.3	35.9
2 hours	9.3	12.6	14.3	16.9	18.6	19.9	24.1	28.7	31.7	35.9	39.6	42.4	44.3
3 hours	10.9	14.7	16.7	19.6	21.5	23	27.7	32.8	36.2	40.8	44.9	48	50.1
4 hours	12.2	16.5	18.6	21.7	23.8	25.4	30.5	36.1	39.7	44.7	49.1	52.4	54.6
6 hours	14.4	19.2	21.6	25.2	27.6	29.3	35.1	41.3	45.3	50.8	55.7	59.3	61.8
9 hours	17	22.5	25.2	29.2	31.9	33.9	40.3	47.2	51.7	57.8	63.1	67.2	69.9
12 hours	19.1	25.1	28.1	32.5	35.3	37.5	44.4	52	56.8	63.3	69	73.4	76.2
18 hours	22.4	29.3	32.7	37.6	40.8	43.3	51.1	59.4	64.7	72	78.3	83	86.2
24 hours	25.2	32.7	36.4	41.8	45.3	47.9	56.3	65.3	71.1	78.9	85.6	90.7	94.1
2 days	31.6	40	44.1	50	53.8	56.6	65.5	74.9	80.9	88.9	95.7	100.9	104.3

Appendix B – Greenfield Runoff Calculations

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

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

Project details

Date	30/01/2026
Calculated by	Francisco Sá Lourenço
Reference	Harbour Road
Model version	2.2.2

Location

Site name	Mullingar
Site location	



Site easting (Irish Grid)	243572
Site northing (Irish Grid)	253565
Site easting (Irish Transverse Mercator)	643514
Site northing (Irish Transverse Mercator)	753588

Site details

Total site area (ha)	1.57 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	1004 mm		1004
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		2
SPR	0.47		
QBar (IH124) (l/s)	11.6 l/s		

Growth curve factors

	My value		Map value
Hydrological region	13		13
1 year growth factor	0.85		
2 year growth factor	0.95		
10 year growth factor	1.4		
30 year growth factor	1.65		
100 year growth factor	1.95		
200 year growth factor	2.15		

Results

Method	IH124
Flow rate 1 year (l/s)	9.8 l/s
Flow rate 2 year (l/s)	11.0 l/s
Flow rate 10 years (l/s)	16.2 l/s
Flow rate 30 years (l/s)	19.1 l/s
Flow rate 100 years (l/s)	22.5 l/s
Flow rate 200 years (l/s)	24.9 l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.2) developed by HR Wallingford and available at uksuds.com (https://www.uksuds.com/). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Appendix C – Soil Infiltration Tests Results

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

Ground Investigations Ireland

Harbour Road

Westmeath County Council

Ground Investigation Report

January 2026

Directors:
Fergal McNamarra, Conor Finnerty, Barry Sexton, Stephen Kealy and Micheal Sutton
Ground Investigations Ireland Limited | Registered in Ireland Company Regsitration No.: 405726

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

DOCUMENT CONTROL SHEET

Project Title	Harbour Road
Client	Westmeath County Council
Project No	14940-08-25 C
Document Title	Ground Investigation Report

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
A	Final	A Browne	C Finnerty	B Sexton	Dublin	23 January 2026

Ground Investigations Ireland Ltd. present the results of the fieldworks and laboratory testing in accordance with the specification and related documents provided by or on behalf of the client The possibility of variation in the ground and/or groundwater conditions between or below exploratory locations or due to the investigation techniques employed must be taken into account when this report and the appendices inform designs or decisions where such variation may be considered relevant. Ground and/or groundwater conditions may vary due to seasonal, man-made or other activities not apparent during the fieldworks and no responsibility can be taken for such variation. The data presented and the recommendations included in this report and associated appendices are intended for the use of the client and the client's geotechnical representative only and any duty of care to others is excluded unless approved in writing.

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

CONTENTS

1.0 Preamble 1
2.0 Overview 1
2.1. Background 1
2.2. Purpose and Scope 1
3.0 Subsurface Exploration 1
3.1. General 1
3.2. Trial Pits 2
3.3. Soakaway Testing 2
3.4. Cable Percussion Boreholes 2
3.5. Rotary Boreholes 3
3.6. In-situ Plate Bearing Test 3
3.7. Surveying 3
3.8. Groundwater Monitoring Installations 3
3.9. Laboratory Testing 4
4.0 Ground Conditions 4
4.1. General 4
4.2. Groundwater 5
4.3. Laboratory Testing 5
4.3.1. Geotechnical Laboratory Testing 5
4.3.2. Chemical Laboratory Testing 6
4.3.3. Environmental Laboratory Testing 6
5.0 Recommendations & Conclusions 7
5.1. General 7
5.2. Foundations 7
5.3. External Pavements 8
5.4. Excavations 8
5.5. Soakaway Design 8

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

LIST OF TABLES

Table 1 - Allowable Bearing Capacities 7

APPENDICES

Appendix 1	**Figures**
Appendix 2	**Trial Pit Records**
Appendix 3	**Soakaway Testing Records**
Appendix 4	**Cable Percussion Borehole Records**
Appendix 5	**Rotary Core Records**
Appendix 6	**In-situ Plate Bearing Test Records**
Appendix 7	**Laboratory Testing**
Appendix 8	**Groundwater Monitoring**

1.0 Preamble

On the instructions of Westmeath County Council, a site investigation was carried out by Ground Investigations Ireland Ltd. (GII) between October and December 2026 at the site of the proposed residential development in Mullingar.

2.0 Overview

2.1. Background

It is proposed to construct a new residential development with associated services, access roads and car parking at the proposed site. At the time of the site investigation the site was greenfield. The site is situated on Harbour Road, Mullingar, County Westmeath. The proposed construction is envisaged to consist of conventional foundations and pavement make up with some local excavations for services and plant.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 9 No. Trial Pits to a maximum depth of 2.50m BGL
- Carry out 4 No. Soakaway tests to determine a soil infiltration value to BRE Digest 365
- Carry out 12 No. Cable Percussion boreholes to a maximum depth of 4.00m BGL
- Carry out 5 No. Rotary Core Boreholes to a maximum depth of 20.20m BGL
- Carry out 10 No. Plate bearing tests to determine the modulus of subgrade reaction and equivalent CBR values
- Installation of 1 No. Groundwater monitoring wells
- Geotechnical & Environmental Laboratory testing
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing were undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.

The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015+A1:2020.

3.2. Trial Pits

The trial pits were excavated using a JCB 3CX excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged and photographed by a Geotechnical Engineer/Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered, and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report.

3.3. Soakaway Testing

The soakaway testing was carried out in selected trial pits at the locations shown in the exploratory hole location plan in Appendix 1. These pits were carefully excavated and filled with water to assess the infiltration characteristics of the proposed site. The pits were allowed to drain and the drop in water level was recorded over time as required by BRE Digest 365. The pits were logged prior to completing the soakaway test and were backfilled with arising's upon completion. The soakaway test results are provided in Appendix 3 of this Report.

3.4. Cable Percussion Boreholes

The Cable Percussion Boreholes were drilled using a Dando 2000 drilling rig with regular in-situ testing and sampling undertaken to facilitate the production of geotechnical logs and laboratory testing.
The standard method of boring in soil for site investigation is known as the Cable Percussion method. It consists of using a Shell in non-cohesive soils and a clay cutter in cohesive soils, both operated on a wire cable. Very hard soils, boulders and other hard obstructions are broken up by chiselling and the fragments removed with the Shell. Where ground conditions made it necessary, the borehole was lined with 200mm diameter steel casing. While the use of the Cable Percussion method of boring gives the maximum data on soil conditions, some mixing of laminated soil is inevitable. For this reason, thin lenses of granular material may not be noticed. Disturbed samples were taken from the boring tools at suitable depths, so that there is a representative sample at the top of each change in stratum and thereafter at regular intervals down the borehole until the next stratum was encountered. The disturbed samples were then sealed and sent to the laboratory where they were visually examined to confirm the description of the relevant strata.
Standard Penetration Tests were carried out in the boreholes. The results of these tests, together with the depths at which the tests were taken are shown on the accompanying borehole records. The test consists of a thick wall sampler tube, 50mm external diameter, being driven into the soil by a monkey weighing 63.5kg and with a free drop of 760mm. For gravels and glacial till the driving shoe was replaced by a solid 60º cone. The Standard Penetration Test number referred to as the 'N' value is the number of blows required to drive the tube 300mm, after an initial penetration of 150mm. The number gives a guide to the consistency of the soil and can also be used to estimate the relative strength/density at the depth of the

test and also to estimate the bearing capacity and compressibility of the soil. The cable percussion borehole logs are provided in Appendix 4 of this Report.

3.5. Rotary Boreholes

The rotary coring was carried out by a track mounted T44 Beretta rig at the locations shown on the location plan in Appendix 1. The rotary boreholes were completed from the ground surface.
The T44 Beretta is equipped with rubber tracks which allow for short travel on pavement surfaces avoiding any damage to the surface. The T44 Beretta utilises a triple tube core barrel system operated using a wireline drilling process. The outer barrel is rotated by the drill rods and at its lower end, carries the coring bit. The inner barrel is mounted on a swivel so that it does not rotate during the process. The third barrel or liner is placed within the second one to retain the core intact and to preserve as much as possible the fabric of the drilling stratum. The core is cut by the coring bit and passes to the inner liner. The core is brought up to the surface within the inner barrel on a small diameter wire rope or line attached to the “overshoot” recovery tool which is then placed into a core box in order of recovery. A drilling fluid, typically air mist or water flush is passed from the surface through hollow drill rods to the drill bit and is used to cool the drill bit. Temporary casing is used in some situations to support unstable ground or to seal off fissures or voids. It should be noted that the rotary coring can only achieve limited recovery in overburden, particularly granular or weakly cemented strata due to the flushing medium washing away the cohesive fraction during coring. The recovery achieved, where required is noted on the borehole logs and core photographs are provided to allow assessment of the core recovered. The rotary borehole logs are provided in Appendix 5 of this Report.

3.6. In-situ Plate Bearing Test

The plate bearing tests were carried out using a 457mm diameter plate at the locations shown on the site plan in Appendix 1. The plate was loaded in increments using a hydraulic jack and an excavator to provide a reaction and the displacement was monitored in accordance with BS1377 Part 9 using independently mounted digital strain gauges. The constrained modulus and equivalent CBR are calculated in accordance with HD29/75 and are provided on the test reports in Appendix 6 of this Report.

3.7. Surveying

The exploratory hole locations have been recorded using a KQGeo M8 GNSS System which records the coordinates and elevation of the locations to Irish Transverse Mercator (ITM) as required by the project specification. The coordinates and elevations are provided on the exploratory hole logs in the appendices of this Report.

3.8. Groundwater Monitoring Installations

Groundwater Monitoring Installations were installed upon the completion of the boreholes to enable sampling and the determination of the equilibrium groundwater level. The typical groundwater monitoring

installation consists of a 50mm uPVC/HDPE slotted pipe with a pea gravel response zone and bentonite seal installed to the Engineers specification. Where required the standpipe is sealed with a gas tap and finished with a durable steel cover fixed in place with a concrete surround. The installation details are provided on the exploratory hole logs in the appendices of this Report.

3.9. Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design.
Environmental & Chemical testing as required by the specification, including the Rilta Suite, pH and sulphate testing was carried out by Element Materials Technology Laboratory in the United Kingdom (UK). The Rilta suite testing includes both Solid Waste and Leachate Waste Acceptance Criteria.
Geotechnical testing consisting of moisture content, Atterberg limits and Particle Size Distribution (PSD) tests were carried out in NMTL's Geotechnical Laboratory in Tullow, County Carlow.
The results of the laboratory testing are included in Appendix 7 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to in-situ and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered was consistent across the site and generally comprised;

- Topsoil
- Cohesive Deposits
- Granular Deposits
- Very Coarse Deposits
- Bedrock

TOPSOIL: Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.60m BGL.

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Topsoil and were described typically as *brown/grey slightly sandy gravelly CLAY with low cobble and boulder content*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. The strength of the cohesive deposits typically increased with depth and was firm to stiff or stiff below 1.00m BGL in the majority of the exploratory holes. These deposits had low

(<5%), medium (5%-20%) or high (20%-50%) cobble and boulder content, where noted on the exploratory hole logs.

GRANULAR DEPOSITS: Granular deposits were encountered below the cohesive deposits and were typically described as g*rey and brown clayey sandy subangular to subrounded fine to coarse GRAVEL with low cobble content.* The secondary sand and fines constituents varied across the site and with depth, while low (<5%), medium (5%-20%) or high (20%-50%) cobble and boulder content was also present, where noted on the exploratory hole logs.
Based on the SPT N values the deposits are typically dense.

VERY COARSE DEPOSITS: Very coarse soils consisting of COBBLES and BOULDERS of limestone with variable amounts of finer material were observed at most exploratory hole locations. The secondary constituents present within the deposit consisted of *clayey sandy Gravel* with the mass of the constituents varying between a little (<5%), some (5%-20%) or much (20%-50%), where noted on the exploratory hole logs.

BEDROCK: The rotary core boreholes recovered *strong thinly to thickly laminated dark grey fine grained argillaceous LIMESTONE with occasional calcite veins.* This is typical of the Lucan Formation, which is noted on Geological Survey Ireland's (GSI) geological mapping of the site.

The depth to rock varies from 5.50m BGL in RC04 to a maximum of 10.50m BGL in RC02. The total core recovery is good, typically 100% with some of the uppermost runs dropping to 80 or 90%. The SCR and RQD both are relatively poor in the upper weathered zone, often recovered as non-intact, however both indices show an increase with depth in each of the boreholes.

4.2. Groundwater

No groundwater was noted during the investigation however it should be noted out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the time of year, rainfall, nearby construction and other factors. For this reason, standpipes were installed in RC01 and RC05 to allow the equilibrium groundwater level to be determined. The groundwater monitoring is included in Appendix 8 of this Report.

4.3. Laboratory Testing

4.3.1. Geotechnical Laboratory Testing

These results were not available at the time of writing this report.

4.3.2. Chemical Laboratory Testing

The pH and sulphate testing carried out indicate that pH results are near neutral and that the water-soluble sulphate results is low when compared to the guideline values from BRE Special Digest 1:2005. The samples tested classify the soil as a Design Sulphate Level DS-1.

4.3.3. Environmental Laboratory Testing

A number of samples were analysed for a suite of parameters which allows for the assessment of the sampled material in terms of total pollutant content for classification of materials as *hazardous* or *non-hazardous*. The suite also allows for the assessment of the sampled material in terms of suitability for placement at licenced landfills (inert, stable non-reactive, hazardous etc.). The parameter list for the suite includes analysis of the solid samples for arsenic, barium, cadmium, chromium, copper, cyanide, lead, nickel, mercury, zinc, speciated aliphatic and aromatic petroleum hydrocarbons, pH, sulphate, sulphide, moisture content, soil organic matter and an asbestos screen.
The suite also includes those parameters specified in the EU Council Decision establishing criteria for the acceptance of waste at Landfills (Council Decision 2003/33/EC), which for the solid samples are total organic carbon (TOC), speciated aliphatic and aromatic petroleum hydrocarbons, BTEX, phenol, polychlorinated biphenyls (PCB) and PAH.
As part of the suite a leachate is generated from the solid sample, which is analysed for antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, chloride, fluoride, soluble sulphate, sulphide, phenols, dissolved organic carbon (DOC) and total dissolved solids (TDS).
While the laboratory report provides a comparison with the waste acceptance criteria limits it does not provide a waste classification of the material sampled nor does it comment on any potentially hazardous properties of the materials tested. The possibility for contamination, not revealed by the testing undertaken should be borne in mind particularly where Made Ground deposits are present, or the previous site use or location indicate a risk of environmental variation. The waste classification report is included under the cover of a separate report by Ground Investigations Ireland

The results from the completed laboratory testing are included in Appendix 7 of this report.

5.0 Recommendations & Conclusions

5.1. General

The recommendations given and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between exploratory hole locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the exploratory holes. Limited information has been provided at the ground investigation stage and any designs based on the recommendations or conclusions should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory hole logs.

5.2. Foundations

At the location of the proposed structures, an allowable bearing capacity of 125 kN/m^2 is recommended for conventional strip or pad foundations on the stiff cohesive deposits or medium dense granular deposits at the depths outlined in Table 1 below. Any soft spots encountered at the proposed foundation depths should be excavated and replaced with lean mix concrete.

Table 1 - Allowable Bearing Capacities

Depth to 125 kN/m^2			
Borehole	ABC	Depth	
No.	kN/m^2	m BGL	Comment
BH01	125	1.00	Granular
BH02	125	1.00	Cohesive
BH03	125	1.00	Cohesive
BH04	125	1.00	Cohesive
BH05	125	1.00	Granular
BH06	125	1.00	Granular
BH07	125	1.00	Cohesive
BH08	125	1.00	Granular
BH09	125	1.00	Cohesive
BH10	125	1.00	Granular
BH11	125	1.00	Granular

In any part of the site, should part of the foundation be on both granular and cohesive deposits it is recommended that all the foundations of the unit in question be lowered to the competent deeper stratum or suitably reinforced to avoid problems with differential settlement.

A ground bearing floor slab is recommended to be based on the firm to stiff cohesive deposits or medium dense granular deposits, with an appropriate depth of compacted hardcore specified by the consulting engineer and in accordance with the limits and guidelines in SR21:2014 +A1:2016 and/or NRA SRW CL808 Type E granular stone fill.

5.3. External Pavements

The proposed pavements are recommended to be designed in accordance with the CBR test results included in the Appendices of this Report. The low CBR test results indicate that a capping layer or a sufficient depth of crushed stone fill may be required. Plate bearing tests are recommended at the time of construction to verify the design assumptions for the proposed pavement make up and to verify adequate compaction has been achieved.

The use of a geogrid and separation membrane may improve the performance of the proposed pavement and enable a more economical pavement design to be achieved, a specialist supplier is recommended to advise of the required strength, depth and type of geotextile for the proposed design.

5.4. Excavations

Short term temporary excavations in the cohesive deposits will remain stable for a limited time only and will require to be appropriately battered or the sides supported if the excavation is below 1.25m BGL or is required to permit man entry.

Any excavations which penetrate the granular deposits will require to be appropriately battered or the sides supported and are likely to require dewatering due to the groundwater seepages noted in the exploratory hole logs in the Appendices of this Report.

Any waste material to be removed off site should be disposed of to a suitably licenced landfill.

The environmental testing completed during the ground investigation is reported under the cover of a separate GII Waste Classification Report.

5.5. Soakaway Design

Infiltration rates of f = 3.107 x 10^{-4} m/s and 3.739 x 10^{-5} m/s respectively were calculated for the soakaway locations TP03 and TO04. At the locations of TP01 and TP05 the water level dropped too slowly to allow calculation of ‘f’ the soil infiltration rate. These locations are therefore not recommended as suitable for soakaway design and construction.

The recommendations provided in this report should be verified in the design of the proposed buildings, using the full details of the loading conditions and taking into consideration the allowable tolerable settlements/movements that the building can accommodate. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations.

APPENDIX 1 - Figures



Site Location

Indicative Site Boundary

Client:

WESTMEATH COUNTY COUNCIL
Comhairle Chontae na hIarmhí

Project Code:
14940-08-25_C

Project Title:
Harbour Road

Drawing Title:
Figure 1 Site Location

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

0 14 28 42 56 70 m

Drawn By:	Date:
AB	19-01-2025



Indicative Site Boundary

Rotary Core Borehole

Cable Percussion Borehole

Trial Pit

In-situ Plate Bearing Test

Client:

WESTMEATH COUNTY COUNCIL
Comhairle Chontae na hIarmhí

Project Code:
14940-08-25

Project Title:
Harbour Road

Drawing Title:
Figure 2 - Site Investigation Points

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

0 9 18 27 36 45

Drawn By:	Date:
JK	23/01/2026

APPENDIX 2 – Trial Pit Records

www.gii.ie

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Trial Pit Number** TP01
Machine : JCB3CX **Method :** Trial Pit	**Dimensions** L x W x D 2.10 x 0.50 x 1.50	**Ground Level (mOD)** 94.60	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643491.4 E 753704.6 N	**Dates** 23/10/2025-23/11/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
				94.40	0.20	Firm to stiff dark grey slightly sandy gravelly CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse		
					(0.30)			
0.50 0.50	B ES			94.10	0.50	Stiff dark grey slightly sandy gravelly CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse		
					(1.00)			
1.50 1.50	B ES			93.10	1.50	Complete at 1.50m		

Plan

Remarks

No groundwater encountered
Trail pit stable
Soakaway test carried out in trial pit
Trial pit complete at 1.50m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AF	14940B-08-25.TP01

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Trial Pit Number** TP02
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** L x W x D 2.20 x 0.80 x 2.40	**Ground Level (mOD)** 95.87	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643510.9 E 753672.4 N	**Dates** 23/10/2025-23/11/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
				95.67	0.20			
					(0.20)	Firm to stiff brown slightly sandy slightly gravelly CLAY		
				95.47	0.40			
0.50	ES					Stiff grey slightly sandy gravelly CLAY with medium cobble and boulder content		
					(0.80)			
1.00	B							
				94.67	1.20			
						Very stiff orange mottled brown sandy gravelly CLAY with medium cobble and boulder content. Gravel is subagnular to subrounded fine to coarse		
					(1.20)			
2.00	B							
2.00	ES							
				93.47	2.40			
						Complete at 2.40m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Trial pit complete at 2.40m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AF	14940B-08-25.TP02

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Trial Pit Number** TP03
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** L x W x D 1.40 x 0.45 x 1.50	**Ground Level (mOD)** 95.79	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643531.8 E 753650.3 N	**Dates** 23/10/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
				95.59	0.20			
					(0.20)	Firm to stiff brown slightly sandy slightly gravelly CLAY.		
				95.39	0.40			
0.50 0.50	B ES					Stiff grey slightly sandy gravelly CLAY with low cobble and boulder content.		
					(1.10)			
1.00 1.00	B ES							
				94.29	1.50			
						Complete at 1.50m		

Plan

Remarks

No groundwater encountered.
Trial pit stable.
Soakaway test completed in trial pit
Trial pit complete at 1.50m BGL.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	AF	14940B-08-25.TP03

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Trial Pit Number** TP04
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** L x W x D 1.40 x 0.50 x 1.50	**Ground Level (mOD)** 96.46	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643530.9 E 753590 N	**Dates** 24/10/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
				96.26	0.20			
					(0.30)	Firm to stiff brown slightly sandy slightly gravelly CLAY.		
0.50 0.50	B ES			95.96	0.50			
					(1.00)	Stiff brownish grey slightly sandy gravelly CLAY with low cobble and boulder content. Gravel is subangular to subrounded fine to coarse.		
1.00 1.00	B ES							
				94.96	1.50	Complete at 1.50m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Soakaway test carried out in trial pit
Trial pit complete at 1.50m BGL.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	AF	14940B-08-25.TP04

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Trial Pit Number** TP05
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** L x W x D 1.40 x 0.50 x 1.50	**Ground Level (mOD)** 97.13	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643495.9 E 753565.7 N	**Dates** 24/10/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
				96.93	0.20	Firm to stiff dark brown mottled brown slightly sandy slightly gravelly CLAY.		
					(0.20)			
				96.73	0.40	Stiff light brown sandy gravelly CLAY with low cobble and boulder content. Gravel is fine to coarse subangular to subrounded		
0.50 0.50	B ES							
					(1.10)			
1.50	B			95.63	1.50	Complete at 1.50m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Soakaway test completed in trial pit
Trial pit complete at 1.50m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AF	14940B-08-25.TP05

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Trial Pit Number** TP06
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** L x W x D 2.60 x 0.90 x 2.30	**Ground Level (mOD)** 97.08	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643481.2 E 753573.6 N	**Dates** 23/10/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
				96.88	0.20			
					(0.20)	Firm to stiff slightly sandy slightly gravelly CLAY		
				96.68	0.40			
0.50	ES				(0.20)	Firm to stiff orange mottled light brown sandy gravelly CLAY with low cobble content		
				96.48	0.60			
1.50	B				(1.90)	Clayey sandy subangular to subrounded fine to coarse GRAVEL with low cobble content		
2.50	B			94.58	2.50			
2.50	ES					Complete at 2.50m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Trial pit complete at 2.50m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AF	14940B-08-25.TP06

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Trial Pit Number** TP07
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** L x W x D 2.60m x 0.80m x 2.30m	**Ground Level (mOD)** 97.37	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643486.9 E 753593 N	**Dates** 23/10/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
				97.17	0.20			
					(0.30)	Firm to stiff dark brown slightly sandy slightly gravelly CLAY		
0.50 0.50	B ES			96.87	0.50			
					(0.30)	Firm to stiff orange mottled light brown sandy gravelly CLAY with low cobble content		
				96.57	0.80			
1.50	B				(1.50)	Grey clayey sandy subangular to subrounded fine to coarse GRAVEL with medium cobble and boulder content		
				95.07	2.30			
						Complete at 2.30m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Trial pit complete at 2.30m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AF	14940B-08-25.TP07

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Trial Pit Number** TP08
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** L x W x D 2.40 x 0.90 x 1.60	**Ground Level (mOD)** 97.02	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643473.5 E 753610.5 N	**Dates** 23/10/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
				96.82	0.20			
					(0.20)	Firm to stiff brown slightly sandy slightly gravelly CLAY		
				96.62	0.40			
0.50 0.50	B ES				(0.30)	Firm to stiff orange mottled light brown sandy gravelly CLAY with low cobble and boulder content		
				96.32	0.70			
					(0.90)	Clayey sandy subangular to subrounded fine to coarse GRAVEL with low cobble and boulder content		
1.50 1.50	B ES			95.42	1.60			
						Complete at 1.60m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Refused at 1.60m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AF	14940B-08-25.TP08

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Trial Pit Number** TP09
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** L x W x D 2.20m x 0.80m x 2.20m	**Ground Level (mOD)** 95.94	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643456.6 E 753633.6 N	**Dates** 23/10/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
				95.74	0.20			
0.50	ES					Firm to stiff slightly sandy gravelly CLAY with medium cobble and boulder content. Gravel is subangular to subrounded fine to coarse		
					(1.20)			
1.00	B							
				94.54	1.40			
						Stiff orange mottled brown slightly sandy gravelly CLAY with medium cobble and boulder content		
					(0.80)			
2.00 2.00	B ES							
				93.74	2.20			
						Complete at 2.20m		

Plan

Remarks

Groundwater encountered; seepage at 2.00m BGL
Trial pit stable
Trial pit complete at 2.20m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AF	14940B-08-25.TP09

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Harbour Road – Trial Pit Photographs

TP01



TP01



Harbour Road – Trial Pit Photographs

TP01



TP01



Harbour Road – Trial Pit Photographs

TP02



TP02



Harbour Road – Trial Pit Photographs

TP02



TP02



Harbour Road – Trial Pit Photographs

TP03



TP03



Harbour Road – Trial Pit Photographs

TP03



TP03



Harbour Road – Trial Pit Photographs

TP04



TP04



Harbour Road – Trial Pit Photographs

TP04



TP04



Harbour Road – Trial Pit Photographs

TP05



TP05



Harbour Road – Trial Pit Photographs

TP05



TP05



Harbour Road – Trial Pit Photographs

TP06



TP06



Harbour Road – Trial Pit Photographs

TP06



TP06



Harbour Road – Trial Pit Photographs

TP07



TP07



Harbour Road – Trial Pit Photographs

TP07



TP07



Harbour Road – Trial Pit Photographs

TP08



TP08



Harbour Road – Trial Pit Photographs

TP08



TP08



Harbour Road – Trial Pit Photographs

TP09



TP09



Harbour Road – Trial Pit Photographs

TP09



TP09



APPENDIX 3 – Soakaway Testing Records

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

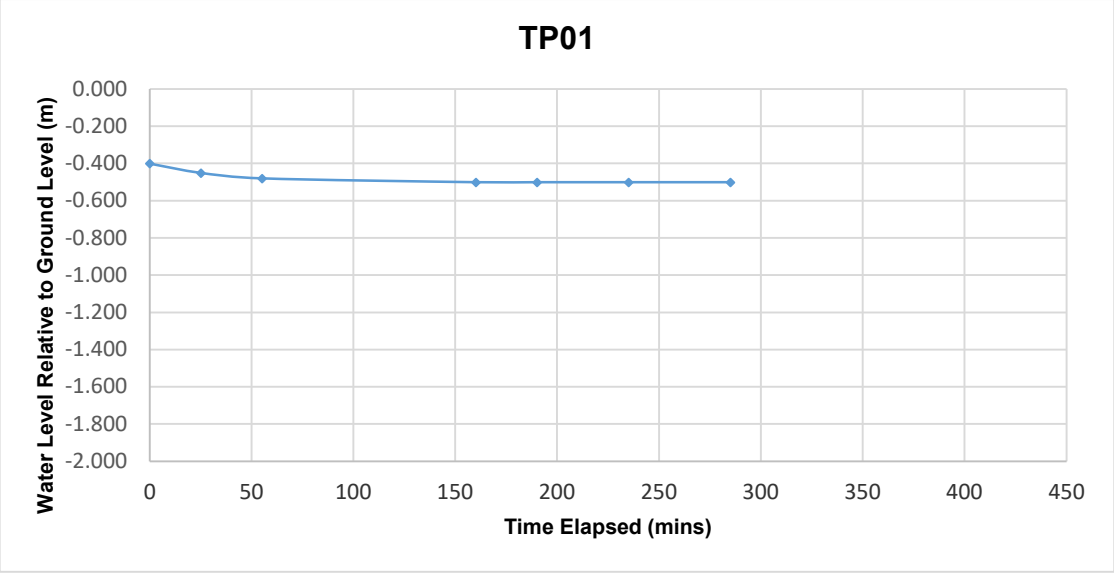
TP01

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.10m x 0.50m x 1.50m (L x W x D)

Date	Time	Water level (m bgl)
23/10/2025	0	-0.400
23/10/2025	25	-0.450
23/10/2025	55	-0.480
23/10/2025	160	-0.500
23/10/2025	190	-0.500
23/10/2025	235	-0.500
23/10/2025	285	-0.500

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.40	1.500	1.100	0.675	1.225



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

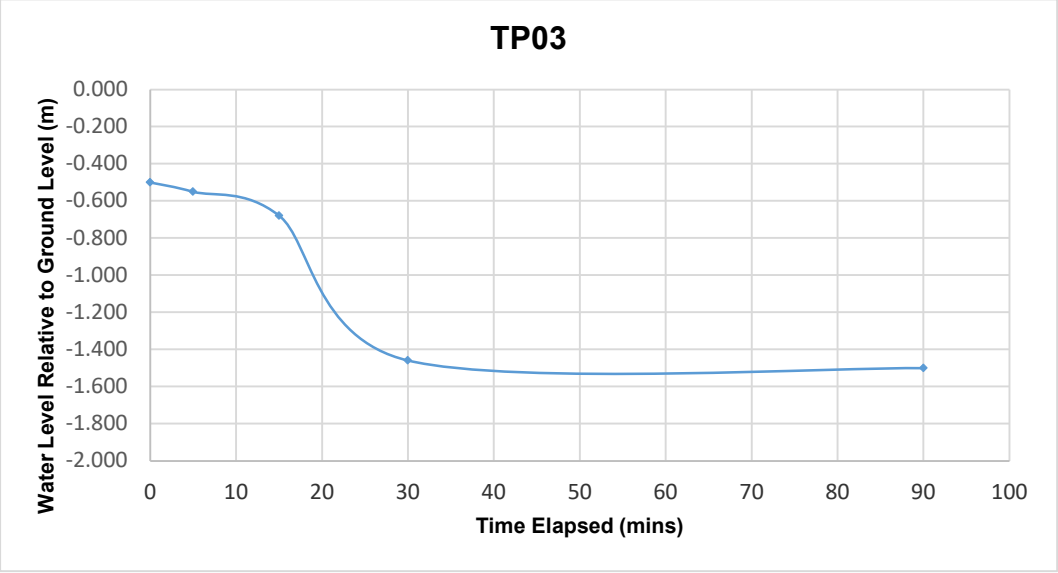
Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

TP03

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.40m x 0.45m x 1.50m (L x W x D)

Date	Time	Water level (m bgl)
23/10/2025	0	-0.500
23/10/2025	5	-0.550
23/10/2025	15	-0.680
23/10/2025	30	-1.460
23/10/2025	90	-1.500

Start depth	Depth of Pit		Diff	75% full	25%full
0.50	**1.500**		**1.000**	**0.75**	**1.25**
Length of pit (m)	Width of pit (m)			75-25Ht (m)	Vp75-25 (m3)
1.500	0.700			0.500	0.53
Tp75-25 (from graph) (s)		**520**		50% Eff Depth	ap50 (m2)
				0.500	3.25
f =	**3.107E-04**	**m/s**			



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

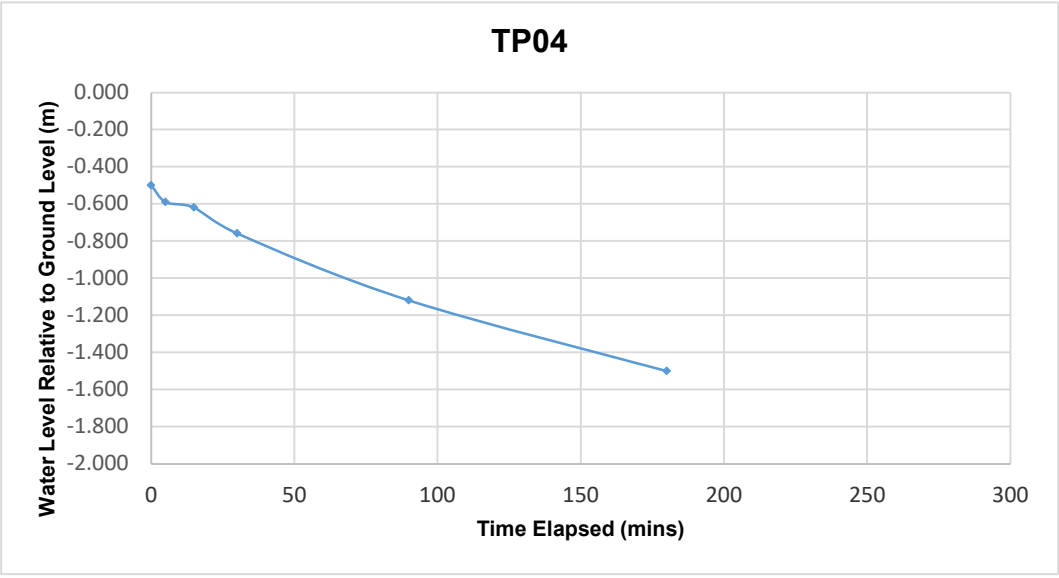
Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

TP04

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.40m x 0.50m x 1.50m (L x W x D)

Date	Time	Water level (m bgl)
23/10/2025	0	-0.500
23/10/2025	5	-0.590
23/10/2025	15	-0.620
23/10/2025	30	-0.760
23/10/2025	90	-1.120
23/10/2025	180	-1.500

Start depth	Depth of Pit		Diff	75% full	25%full
0.50	**1.500**		**1.000**	**0.75**	**1.25**
Length of pit (m)	Width of pit (m)			75-25Ht (m)	Vp75-25 (m3)
1.500	0.700			0.500	0.53
Tp75-25 (from graph) (s)		**4320**		50% Eff Depth	ap50 (m2)
				0.500	3.25
f =	**3.739E-05**	**m/s**			



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

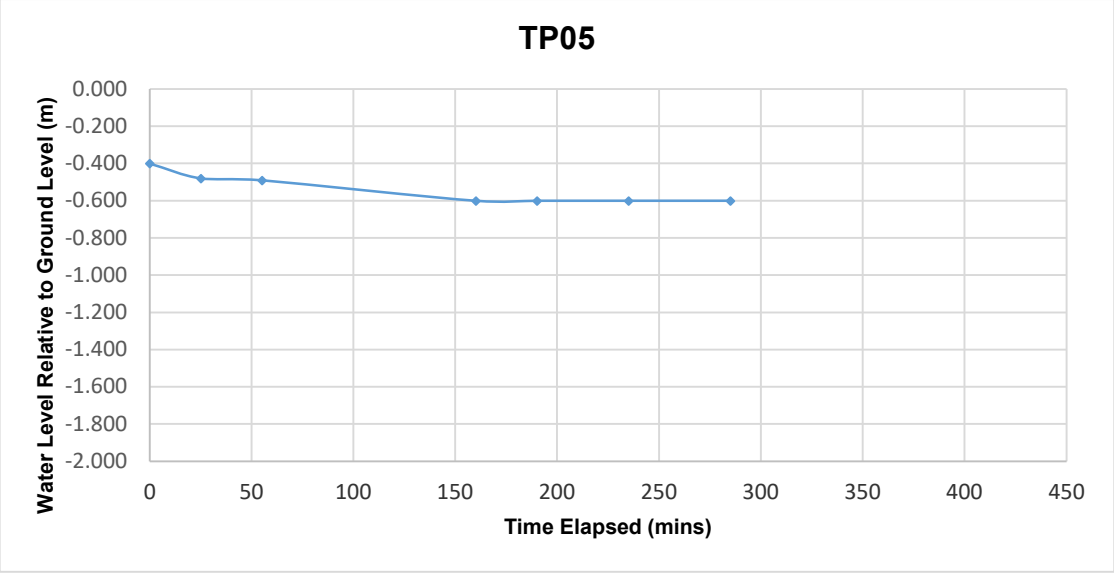
TP05

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.40m x 0.50m x 1.50m (L x W x D)

Date	Time	Water level (m bgl)
23/10/2025	0	-0.400
23/10/2025	25	-0.480
23/10/2025	55	-0.490
23/10/2025	160	-0.600
23/10/2025	190	-0.600
23/10/2025	235	-0.600
23/10/2025	285	-0.600

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.40	1.500	1.100	0.675	1.225



APPENDIX 4 – Cable Percussion Borehole Records

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** BH01
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 2.00m	**Ground Level (mOD)** 95.07	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643501.1 E 753689.7 N	**Dates** 26/11/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.40)	TOPSOIL		
					94.67	0.40	Grey sandy gravelly CLAY with medium cobble content		
						(0.60)			
1.00-1.45 1.00	SPT(C) N=45 B			13,14/14,10,10,11	94.07	1.00	Dense blueish grey slightly clayey sandy fine to coarse angular GRAVEL with medium cobble and boulder content		
						(1.00)			
2.00-2.15 2.00	SPT(C) 50/0 B			50/50	93.07	2.00	Complete at 3.80m		

Remarks
No groundwater encountered during Cable Precussion Drilling.
Borehole complete at 2.00m BGL.
Borehole backfilled upon completion.
Chiselling from 1.20m for 1 hour. Chiselling from 2.00m for 1 hour.

Scale (approx)	Logged By
1:50	AD

Figure No. 14940B-08-25.BH10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** BH02
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 2.00m	**Ground Level (mOD)** 94.91	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643476.1 E 753671.4 N	**Dates** 26/11/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.50)	TOPSOIL		
					94.41	0.50			
						(0.50)	Grey slightly sandy slightly gravelly CLAY with low cobble content		
1.00-1.45 1.00	SPT(C) N=37 B			5,6/10,7,9,11	93.91	1.00			
						(1.00)	Very stiff grey slightly sandy slightly gravelly CLAY with medium cobble and boulder content		
2.00-2.45 2.00	SPT(C) N=50 B			10,13/14,15,16,5	92.91	2.00			
						(0.70)	Dense blueish grey slightly clayey sandy gravelly COBBLES AND BOULDERS of Limestone		
2.70-2.75	SPT(C) 50*/50 50/0			50/50	92.21	2.70	Complete at 3.80m		

Remarks
No groundwater encountered during Cable Precussion Drilling.
Refusal at 2.70m BGL
Borehole backfilled upon completion.
Chiselling from 1.20m for 1 hour. Chiselling from 2.00m for 1 hour.

Scale (approx)	Logged By
1:50	AD

Figure No. 14940B-08-25.BH10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** BH03
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 3.00m	**Ground Level (mOD)** 95.30	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643454.3 E 753646.8 N	**Dates** 02/12/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.30)	TOPSOIL		
					95.00	0.30	Grey sandy gravelly CLAY with medium cobble content		
0.50	B					(0.70)			
1.00-1.45	SPT(C) N=29			2,2/3,8,7,11	94.30	1.00	Stiff grey sandy gravelly CLAY with medium cobble content		
1.50	B					(1.00)			
2.00-2.45	SPT(C) N=33			5,6/8,6,9,10	93.30	2.00	Very stiff Grey sandy gravelly CLAY with medium cobble content		
2.50	B					(1.00)			
3.00-3.15	SPT(C) 50/0			25/50	92.30	3.00	Complete at 3.00m		

Remarks
No groundwater encountered during Cable Precussion Drilling.
Borehole complete at 3.00m BGL.
Borehole backfilled upon completion.
Chiselling from 3.00m for 4 hours.

Scale (approx)	Logged By
1:50	AD

Figure No. 14940B-08-25.BH10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** BH04
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 3.30m	**Ground Level (mOD)** 95.29	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643468.8 E 753637.5 N	**Dates** 26/11/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.40)	TOPSOIL		
					94.89	0.40	Grey sandy gravelly CLAY		
						(0.60)			
1.00-1.45 1.00	SPT(C) N=36 B			6,6/8,8,9,11	94.29	1.00	Very stiff grey sandy gravelly CLAY with low cobble content		
						(0.80)			
2.00-2.45 2.00	SPT(C) N=50 B			10,7/11,12,14,13	93.49	1.80	Dense dark grey sandy fine to coarse subangular to angular GRAVEL with low cobble content		
						(1.50)			
3.00-3.45	SPT(C) N=50			17,20/26,24					
					91.99	3.30	Complete at 3.80m		

Remarks
No groundwater encountered during Cable Precussion Drilling.
Borehole complete at 3.30m BGL.
Borehole backfilled upon completion.
Chiselling from 2.00m to 3.30m for 3 hours. Chiselling from 3.30m for 1 hour.

Scale (approx)	Logged By
1:50	AD

Figure No. 14940B-08-25.BH10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** BH05
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 1.80m	**Ground Level (mOD)** 95.51	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643502.9 E 753668.4 N	**Dates** 26/11/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.40)	TOPSOIL		
					95.11	0.40			
					95.01	0.50	Grey sandy gravelly CLAY with low cobble content		
0.50	B					(0.50)	Blueish grey sandy fine to coarse subangular to angular GRAVEL with high cobble and boulder content		
1.00-1.45 1.00	SPT(C) N=50 B			11,13/15,16,19	94.51	1.00			
						(0.80)	Dense blueish grey sandy fine to coarse subangular to angular GRAVEL with high cobble and boulder content		
1.80-1.95	SPT(C) 50/0			50/12,38	93.71	1.80			
							Terminated at 1.80m		

Remarks
No groundwater encountered during Cable Precussion Drilling.
Borehole complete at 1.80m BGL.
Borehole backfilled upon completion.
Chiselling from 1.60m for 4 hours. Chiselling from 1.80m for 1 hour.

Scale (approx)	Logged By
1:50	AD

Figure No. 14940B-08-25.BH10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** BH06
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 1.30m	**Ground Level (mOD)** 95.85	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643529.1 E 753664.5 N	**Dates** 26/11/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.50)	TOPSOIL		
					95.35	0.50			
						(0.30)	Grey sandy gravelly CLAY with low cobble content		
					95.05	0.80			
						(0.20)	Blueish grey fine to coarse subangular to subrounded COBBLES and BOULDERS		
1.00-1.30 1.00	SPT(C) 50/150 B			20/50	94.85	1.00			
						(0.30)	Dense blueish grey fine to coarse subangular to subrounded COBBLES and BOULDERS		
					94.55	1.30			
							Terminated at 1.30m		

Remarks
No groundwater encountered during Cable Precussion Drilling.
Borehole complete at 1.30m BGL.
Borehole backfilled upon completion.
Chiselling from 1.00m for 3 hours. Chiselling from 1.30m for 1 hour.

Scale (approx)	Logged By
1:50	

Figure No. 14940B-08-25.BH10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** BH07
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 2.70m	**Ground Level (mOD)** 95.61	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643527.2 E 753635.6 N	**Dates** 05/12/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.40)	TOPSOIL		
					95.21	0.40	Grey sandy gravelly CLAY		
						(0.60)			
1.00-1.45 1.00	SPT(C) N=37 B			5,6/10,7,9,11	94.61	1.00	Very stiff slightly andy slightly gravelly CLAY with medium cobble content		
						(1.00)			
2.00-2.45 2.00	SPT(C) N=50 B			10,13/14,15,16,5	93.61	2.00	Dense blueish grey sandy fine to coarse subangular to angular GRAVEL with medium cobble content		
						(0.70)			
2.70-2.85	SPT(C) 50/0			50/50	92.91	2.70	Complete at 2.70m		

Remarks
No groundwater encountered during Cable Precussion Drilling.
Borehole complete at 2.70m BGL.
Borehole backfilled upon completion.
Chiselling from 2.70m for 4 hours.

Scale (approx)	Logged By
1:50	AD

Figure No. 14940B-08-25.BH10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** BH08
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 2.50m	**Ground Level (mOD)** 96.38	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643515.2 E 753610.4 N	**Dates** 27/11/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.50)	TOPSOIL		
					95.88	0.50			
						(0.40)	Greyish brown sandy gravelly CLAY with medium cobble content		
					95.48	0.90			
1.00-1.45	SPT(C) N=48			8,11/13,13,11,11			Dense blueish grey slightly clayey sandy fine to coarse subangular to angular GRAVEL with medium cobble content		
1.20	B								
						(1.60)			
2.00-2.45	SPT(C) N=50			10,13/15,25,10					
2.00	B								
					93.88	2.50			
2.50-2.65	SPT(C) 50/0			50/50			Complete at 2.50m		

Remarks
No groundwater encountered during Cable Precussion Drilling.
Borehole complete at 2.50m BGL.
Borehole backfilled upon completion.
Chiselling from 1.50m for 1 hour. Chiselling from 2.50m for 1 hour.

Scale (approx)	Logged By
1:50	AD

Figure No. 14940B-08-25.BH10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** BH09
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 2.00m	**Ground Level (mOD)** 97.08	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643475.8 E 753563.8 N	**Dates** 27/11/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.30)	TOPSOIL		
					96.78	0.30			
						(0.20)	Grey slightly sandy slightly gravelly CLAY		
0.50	B				96.58	0.50			
						(0.50)	Grey slightly sandy slightly gravelly CLAY with medium cobble content		
1.00-1.45 1.00	SPT(C) N=26 B			4,5/10,6,5,5	96.08	1.00			
						(1.00)	Stiff grey slightly sandy slightly gravelly CLAY with medium cobble content		
					95.08	2.00			
							Complete at 2.00m		

Remarks
No groundwater encountered during Cable Precussion Drilling.
Borehole complete at 3.80m BGL.
Borehole backfilled upon completion.
Chiselling from 2.00m for 4 hours.

Scale (approx)	Logged By
1:50	AD

Figure No. 14940B-08-25.BH10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** BH09A
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 4.00m	**Ground Level (mOD)** 97.08	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643475.8 E 753563.8 N	**Dates** 28/11/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.60)	TOPSOIL		
					96.48	0.60			
						(0.40)	Greyish brown slightly sandy slightly gravelly CLAY		
1.00-1.45 1.00	SPT(C) N=23 B			4,6/6,6,5,5,6	96.08	1.00	Stiff grey sandy gravelly CLAY with low cobble content		
						(1.00)			
2.00-2.45 2.00	SPT(C) N=21 B			3,5/4,6,5,5,6	95.08	2.00	Medium dense greyish brown sandy fine to coarse subangular to subrounded GRAVEL with low cobble content		
						(1.00)			
3.00-3.45 3.00	SPT(C) N=50 B			5,7/10,12,18,10	94.08	3.00	Dense greyish brown sandy fine to coarse subangular to subrounded GRAVEL with low cobble content		
						(1.00)			
					93.08	4.00	Complete at 4.00m		

Remarks
No groundwater encountered during Cable Precussion Drilling.
Borehole complete at 4.00m BGL.
Borehole backfilled upon completion.

Scale (approx)	Logged By
1:50	AD

Figure No. 14940B-08-25.BH10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** BH10
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 3.80m	**Ground Level (mOD)** 96.64	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643540.5 E 753597.6 N	**Dates** 26/11/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.40)	TOPSOIL		
					96.24	0.40			
						(0.30)	Brown slightly sandy slightly gravelly CLAY		
					95.94	0.70			
						(0.30)	Greyish brown sandy gravelly CLAY with medium cobble content		
1.00-1.45 1.00	SPT(C) N=50 B			20,19/12,12,26	95.64	1.00	Dense blueish grey slightly clayey sandy fine to coarse subangular to subrounded GRAVEL with medium coobble and boulder content		
2.00-2.45 2.00	SPT(C) N=34 B			10,8/7,8,9,10					
						(2.80)			
3.00-3.45 3.00	SPT(C) N=34 B			7,7/6,10,7,11					
3.80-3.95	SPT(C) 50/0			50/50	92.84	3.80	Complete at 3.80m		

Remarks
No groundwater encountered during Cable Precussion Drilling.
Borehole complete at 3.80m BGL.
Borehole backfilled upon completion.
Chiselling from 1.40m for 4 hours. Chiselling from 3.80m for 1 hour.

Scale (approx)	Logged By
1:50	AD

Figure No. 14940B-08-25.BH10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** BH11
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 1.40m	**Ground Level (mOD)** 95.55	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643554.4 E 753653.4 N	**Dates** 04/12/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.30)	TOSPOIL		
					95.25	0.30	Grey sandy gravelly CLAY		
						(0.70)			
1.00-1.45 1.00	SPT(C) N=50 B			10,18/39,11	94.55	1.00	Dense grey slighlty clayey COBBLES and BOULDERS		
						(0.40)			
					94.15	1.40	Complete at 1.40m		

Remarks
No groundwater encountered during Cable Precussion Drilling.
Borehole complete at 1.40m BGL.
Borehole backfilled upon completion.
Chiselling from 2.70m for 4 hours.

Scale (approx)	Logged By
1:50	AD

Figure No. 14940B-08-25.BH11

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

APPENDIX 5 - Rotary Borehole Records

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** RC-01
Machine : Beretta T44 **Flush :** Polymer Water Mix **Core Dia :** 102 mm **Method :** Rotary Cored	**Casing Diameter** 146mm cased to 8.50m	**Ground Level (mOD)** 94.71	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643508.6 E 753700.1 N	**Dates** 18/12/2025-19/12/2025	**Engineer**	**Sheet** 1/1

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						94.61	0.10	TOPSOIL			
	30						(2.40)	Recovery consists of dark brown slightly sandy organic Clay onto brown slightly sandy gravelly Clay. Driller notes CLAY with cobbles			
2.50 2.50-2.73	67				7,13/50 SPT(C) 50/75	92.21	2.50 (1.50)	Recovery consists of dark grey angular to subrounded coarse Gravel with low cobble content. Driller notes CLAY with cobbles (Stiff)			
4.00 4.00-4.15	60				25/50 SPT(C) 25*/75 50/75	90.71	4.00	Recovery consists of dark grey angular to subrounded coarse Gravel with medium cobble content. Driller notes slightly clayey GRAVEL with cobbles (Dense) or possible weathered bedrock			
5.50 5.50-5.65	67				27/50 SPT(C) 27*/75 50/75		(4.50)				
7.00	53										
8.50						86.21	8.50	Complete at 8.50m			

Remarks
Borehole complete at 8.50m BGL
50mm slotted standpipe with pea gravel surround installed from 8.50m to 1.00m BGL. 50mm plain standpipe with a bentonite seal installed from 1.00m to GL with a raised cover.

Scale (approx)	Logged By
1:50	JK

Figure No. 14940B-08-25.RC-01

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** RC-02
Machine : Beretta T44 **Flush :** Polymer Water Mix **Core Dia :** 102 mm **Method :** Rotary Cored	**Casing Diameter** 146mm cased to 11.50m	**Ground Level (mOD)** 95.73	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643514.8 E 753625.3 N	**Dates** 18/12/2025	**Engineer**	**Sheet** 1/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						95.53	(0.20) 0.20	TOPSOIL		
	28							Recovery consists of dark grey subangular to subrounded coarse Gravel and Cobbles. Driller notes gravelly CLAY with cobbles and boulders		
							(3.80)			
2.50 2.50-2.88	40				7,8/11,14,25 SPT(C) 50/225					
4.00 4.00-4.45	47				9,11/14,10,8,16 SPT(C) N=48	91.73	4.00	Recovery consists of dark grey subangular to subrounded fine to coarse Gravel with low cobble and boulder content. Driller notes gravelly CLAY with some cobbles and boulders (Dense)		
							(1.50)			
5.50 5.50-5.80	73				7,14/17,33 SPT(C) 50/150	90.23	5.50	Dense dark grey subangular coarse GRAVEL with medium cobble and low boulder content		
							(1.50)			
7.00	93					88.73	7.00	Dark grey angular to subangular COBBLES and BOULDERS with some dark grey angular to subrounded coarse Gravel		
8.50	87						(3.50)			
10.00										

Remarks
Borehole complete at 11.50m BGL

Scale (approx)	Logged By
1:50	JK

Figure No.
14940B-08-25.RC-02

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** RC-02
Machine : Beretta T44 **Flush :** Polymer Water Mix **Core Dia :** 102 mm **Method :** Rotary Cored	**Casing Diameter** 146mm cased to 11.50m	**Ground Level (mOD)** 95.73	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643514.8 E 753625.3 N	**Dates** 18/12/2025	**Engineer**	**Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.50	100	66	0	NI		85.23	10.50 (1.00)	Strong thin to thickly bedded dark grey fine grained argillaceous LIMESTONE 10.50m to 11.50m BGL - Non Intact		
11.50						84.23	11.50	Complete at 11.50m		

Remarks

Scale (approx)	Logged By
1:50	JK

Figure No. 14940B-08-25.RC-02

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** RC-03
Machine : Beretta T44 **Flush :** Polymer Water Mix **Core Dia :** 102 mm **Method :** Rotary Cored	**Casing Diameter** 146mm cased to 17.50m	**Ground Level (mOD)** 96.01	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643557.1 E 753625.3 N	**Dates** 11/12/2025	**Engineer**	**Sheet** 1/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(0.50)	TOPSOIL		
	52					95.51	0.50 (2.00)	Recovery consists of brown slightly sandy gravelly Clay with low cobble content. Driller notes gravelly CLAY with cobbles		
2.50 2.50-2.95	67				7,8/8,10,11,9 SPT(C) N=38	93.51	2.50 (1.50)	Recovery consists of brown slightly sandy gravelly Clay with low cobble content. Driller notes gravelly CLAY with cobbles (Very Stiff)		
4.00 4.00-4.30	67				9,12/17,33 SPT(C) 50/150	92.01	4.00 (1.50)	Dense dark grey angular coarse GRAVEL with low cobble and boulder content.		
5.50 5.50-5.95	40				7,8/8,14,10,9 SPT(C) N=41	90.51	5.50 (4.50)	Recovery consists of dark grey angular coarse Gravel with low cobble and boulder content. Driller notes gravelly CLAY with boulders (Very Stiff)		
7.00 7.00-7.38	53				7,10/10,18,22 SPT(C) 50/225					
8.50 8.50-8.95	33				9,7/8,8,10,24 SPT(C) N=50					
10.00										

Remarks
Borehole complete at 11.50m BGL

Scale (approx)	Logged By
1:50	JK

Figure No.
14940B-08-25.RC-03

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** RC-03
Machine : Beretta T44 **Flush :** Polymer Water Mix **Core Dia :** 102 mm **Method :** Rotary Cored	**Casing Diameter** 146mm cased to 17.50m	**Ground Level (mOD)** 96.01	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643557.1 E 753625.3 N	**Dates** 11/12/2025	**Engineer**	**Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.00-10.45	47				8,9/12,13,10,11 SPT(C) N=46	86.01	10.00 (1.50)	Recovery consists of dark grey gravelly fine to coarse Sand with low cobble content. Driller notes sandy CLAY with cobbles (Very Stiff)		
11.50 11.50-11.88	80				7,14/16,16,21 SPT(C) 53/225	84.51	11.50 (1.50)	Dark brown slightly sandy clayey angular to subangular fine to coarse GRAVEL with medium cobble and low boulder content (Dense)		
13.00 13.00-13.38	60				9,11/12,16,22 SPT(C) 50/225	83.01	13.00	Recovery consists of dark greyish brown slightly clayey slightly sandy angular fine to coarse Gravel with low cobble content. Driller notes gravelly CLAY with cobbles and boulders (Very Stiff)		
14.50 14.50-14.95	33				7,6/8,10,12,12 SPT(C) N=42		(3.00)			
16.00 16.00-16.45	53				8,11/13,14,7,21 SPT(C) N=55	80.01	16.00 (1.50)	Recovery consists of dark grey gravelly coarse Sand. Driller notes sandy gravelly CLAY with boulders (Very Stiff)		
17.50						78.51	17.50	Complete at 17.50m		

Remarks

Scale (approx)	Logged By
1:50	JK

Figure No. 14940B-08-25.RC-03

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** RC-04
Machine : Beretta T44 **Flush :** Polymer Water Mix **Core Dia :** 102 mm **Method :** Rotary Cored	**Casing Diameter** 146mm cased to 10.00m	**Ground Level (mOD)** 96.42	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643471.6 E 753617.8 N	**Dates** 11/12/2025	**Engineer**	**Sheet** 1/1

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						96.22	(0.20) 0.20	TOPSOIL		
							(0.35)	Soft dark brown slightly sandy organic CLAY		
	44					95.87	0.55	Recovery consists of dark grey angular to subrounded fine to coarse Gravel with low cobble and boulder content. Driller notes gravelly CLAY with boulders		
							(1.95)			
2.50 2.50-2.65	60				25/50 SPT(C) 25*/75 50/75	93.92	2.50	Recovery consists of dark grey angular to subrounded fine to coarse Gravel with low cobble and boulder content. Driller notes gravelly CLAY with boulders (Very Stiff)		
							(1.50)			
4.00 4.00-4.30	87				7,9/10,40 SPT(C) 50/150	92.42	4.00	Dark grey angular to subrounded COBBLES and BOULDERS with some angular to subrounded fine to coarse Gravel		
							(1.50)			
5.50 5.50-5.65	100	100	66		25/50 SPT(C) 25*/75 50/75	90.92	5.50	Strong thin to thickly bedded dark grey fine grey argillaceous LIMESTONE with occasional calcite veins		
7.00	100	100	80	4			(4.50)	5.50m to 8.50m BGL - Two Fracture Sets - F1: 0 to 20 degrees, close to medium spaced, undulating, rough. F2: 50 to 70 degrees, widely spaced, undulating, smooth to rough		
8.50	87	87	23	11				8.50m to 10.00m BGL - Three Fracture Sets - F1: 0 to 20 degrees, closely spaced, undulating, smooth to rough. F2: 50 to 70 degrees, closely spaced, stepped, rough. F3: 70 to 90 degrees, close to medium spaced, undulating, rough		
10.00						86.42	10.00			

Remarks
Borehole complete at 10.00m BGL

Scale (approx)	Logged By
1:50	JK

Figure No.
14940B-08-25.RC-04

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** RC-05
Machine : Beretta T44 **Flush :** Polymer Water Mix **Core Dia :** 102 mm **Method :** Rotary Cored	**Casing Diameter** 146mm cased to 20.20m	**Ground Level (mOD)** 97.18	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643498 E 753564.8 N	**Dates** 08/12/2025-09/12/2025	**Engineer**	**Sheet** 1/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						97.08	0.10	TOPSOIL			
							(0.50)	Soft dark brown slightly sandy organic CLAY			
	80					96.58	0.60	Recovery consists of brown slightly sandy gravelly Clay with medium cobble content. Driller notes CLAY			
							(0.65)				
1.25 1.25-1.40	24				25/50 SPT(C) 25*/75 50/75	95.93	1.25	Recovery consists of grey slightly sandy fine to coarse subangular to subrounded Gravel. Driller notes gravelly CLAY (Stiff)			
2.50 2.50-2.95	33				7,10/14,15,14,7 SPT(C) N=50		(2.75)				
4.00 4.00-4.45	50				7,8/8,12,14,13 SPT(C) N=47	93.18	4.00	Recovery consists of grey fine to coarse gravelly Sand. Driller notes sandy GRAVEL (Dense)			
							(1.50)				
5.50 5.50-5.95	43				8,9/9,12,15,14 SPT(C) N=50	91.68	5.50	Recovery consists of grey fine to coarse gravelly Sand with medium cobble content. Driller notes SAND and COBBLES (Dense)			
7.00 7.00-7.38	50				7,9/12,17,21 SPT(C) 50/225		(5.70)				
8.50 8.50-8.95	53				8,10/7,12,12,15 SPT(C) N=46						
10.00											

Remarks
Borehole complete at 20.20m BGL
50mm slotted standpipe with pea gravel surround installed from 20.20m to 1.00m BGL. 50mm plain standpipe with a bentonite seal installed from 1.00m to GL with a raised cover

Scale (approx)	Logged By
1:50	JK

Figure No. 14940B-08-25.RC-05

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** RC-05
Machine : Beretta T44 **Flush :** Polymer Water Mix **Core Dia :** 102 mm **Method :** Rotary Cored	**Casing Diameter** 146mm cased to 20.20m	**Ground Level (mOD)** 97.18	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643498 E 753564.8 N	**Dates** 08/12/2025-09/12/2025	**Engineer**	**Sheet** 2/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10.00-10.45	53				9,10/14,11,12,12 SPT(C) N=49	85.98	11.20				
11.50 11.50-11.88	73				14,12/11,13,26 SPT(C) 50/225		(1.80)	Dense dark grey slightly sandy subrounded to rounded fine to coarse GRAVEL with low cobble content			
13.00 13.00-13.30	100				10,12/15,35 SPT(C) 50/150	84.18	13.00				
14.50 14.50-14.65	80				25/50 SPT(C) 25*/75 50/75		(1.50)	Dark brown slightly sandy clayey angular to subrounded fine to coarse Gravel with low cobble content. Driller notes gravelly CLAY (Very stiff)			
16.00	33					82.68	14.50				
17.50	67						(1.50)	Stiff dark grey and brown slightly sandy gravelly CLAY with medium cobble content			
19.00	83					81.18	16.00				
							(1.50)	Recovery constists of dark grey subangular to rounded coarse Gravel. Driller notes gravelly CLAY (Very stiff)			
						79.68	17.50				
							(2.70)	Very stiff brown and dark grey slightly sandy gravelly CLAY with low cobble content			

Remarks

Scale (approx)	Logged By
1:50	JK

Figure No. 14940B-08-25.RC-05

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Harbour Road			**Borehole Number** RC-05
Machine : Beretta T44 **Flush :** Polymer Water Mix **Core Dia :** 102 mm **Method :** Rotary Cored	**Casing Diameter** 146mm cased to 20.20m	**Ground Level (mOD)** 97.18	**Client** Westmeath County Council	**Job Number** 14940B-08-25
	Location 643498 E 753564.8 N	**Dates** 08/12/2025-09/12/2025	**Engineer**	**Sheet** 3/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
20.20						76.98	20.20	Complete at 20.20m			

Remarks

Scale (approx)	Logged By
1:50	JK

Figure No. 14940B-08-25.RC-05

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Harbour Road – Rotary Core Photographs

RC-01



RC-01



Harbour Road – Rotary Core Photographs

RC-02



RC-02



Harbour Road – Rotary Core Photographs

RC-02



Harbour Road – Rotary Core Photographs

RC-03



RC-03



Harbour Road – Rotary Core Photographs

RC-03



RC-03



Harbour Road – Rotary Core Photographs

RC-04



RC-04



Harbour Road – Rotary Core Photographs

RC-05

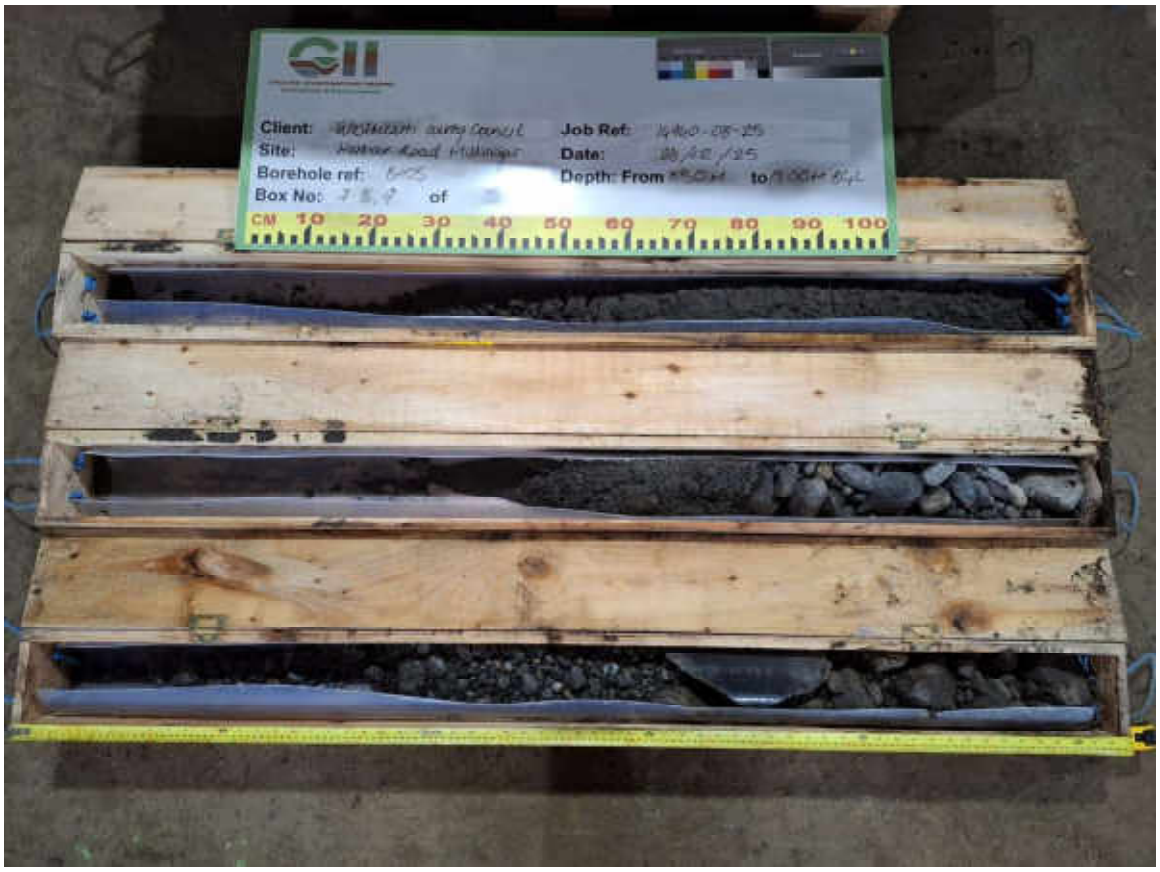


RC-05



Harbour Road – Rotary Core Photographs

RC-05



RC-05



Harbour Road – Rotary Core Photographs

RC-05

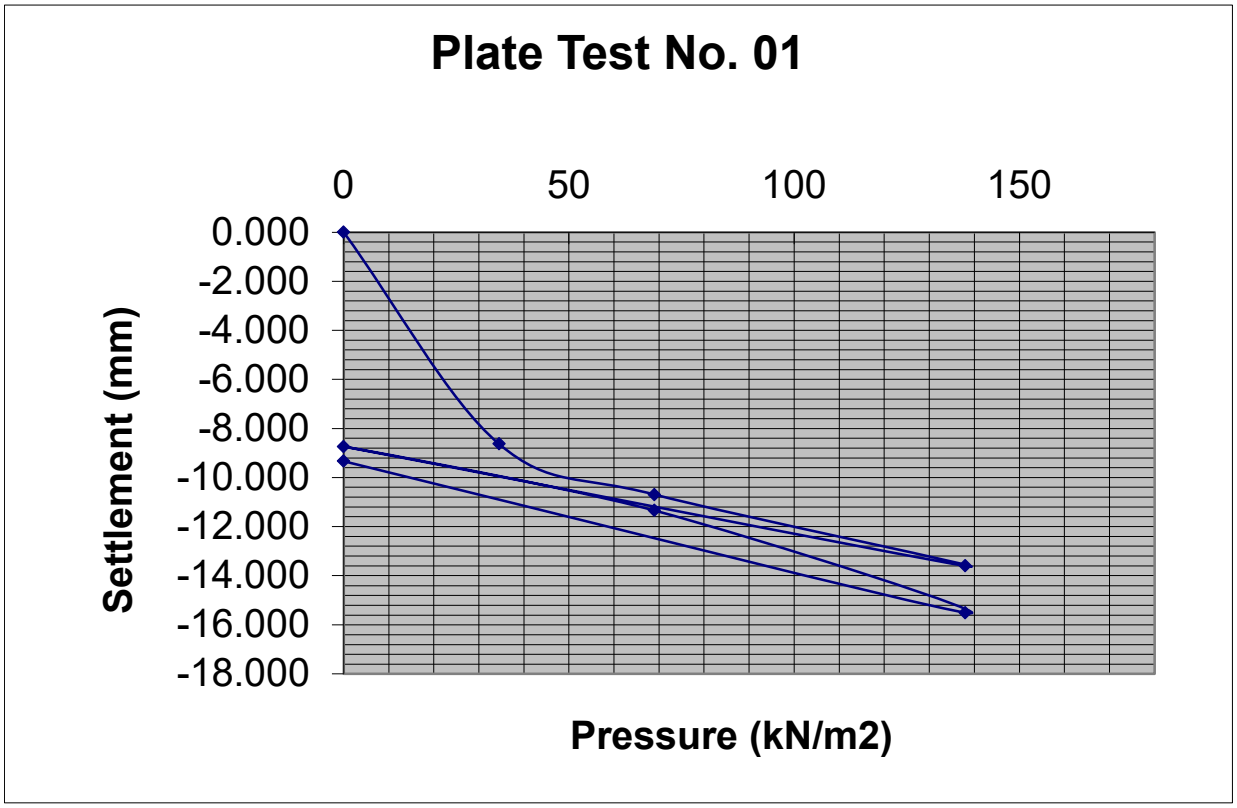


APPENDIX 6 – In-situ Plate Bearing Test Records

Applied Load	Gauge settlement
0	**0.000**
34.5	-8.6233
69	-10.6934
138	-13.59535
0	-8.73125
69	-11.3411
138	-15.5067
0	-9.329

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Harbour Road Mullingar	**MATERIAL**	Dark brown slightly sandy gravelly CLAY.
CONTRACT NO.			
DATE	24/10/2025		
CLIENT	Westmeath County Coun	**DEPTH**	0.40m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-01	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **4.36 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **17.86 MN/m2/m**

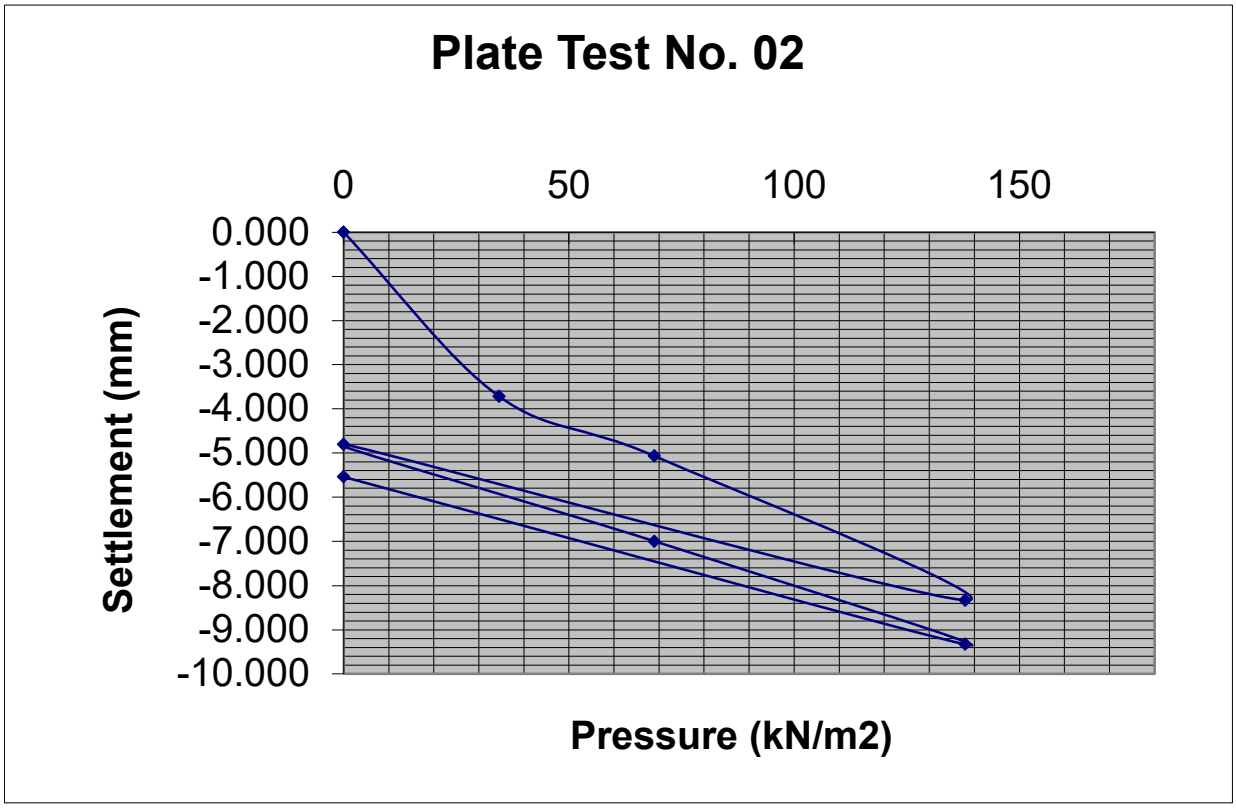
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.12 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **1.43 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-3.71475
69	-5.0673
138	-8.3312
0	-4.8006
69	-6.9977
138	-9.32815
0	-5.5372

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Harbour Road Mullingar	**MATERIAL**	Brown slightly sandy slightly gravelly CLAY.
CONTRACT NO.			
DATE	24/10/2025		
CLIENT	Westmeath County Coun	**DEPTH**	0.40m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-02	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **9.20 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **21.22 MN/m2/m**

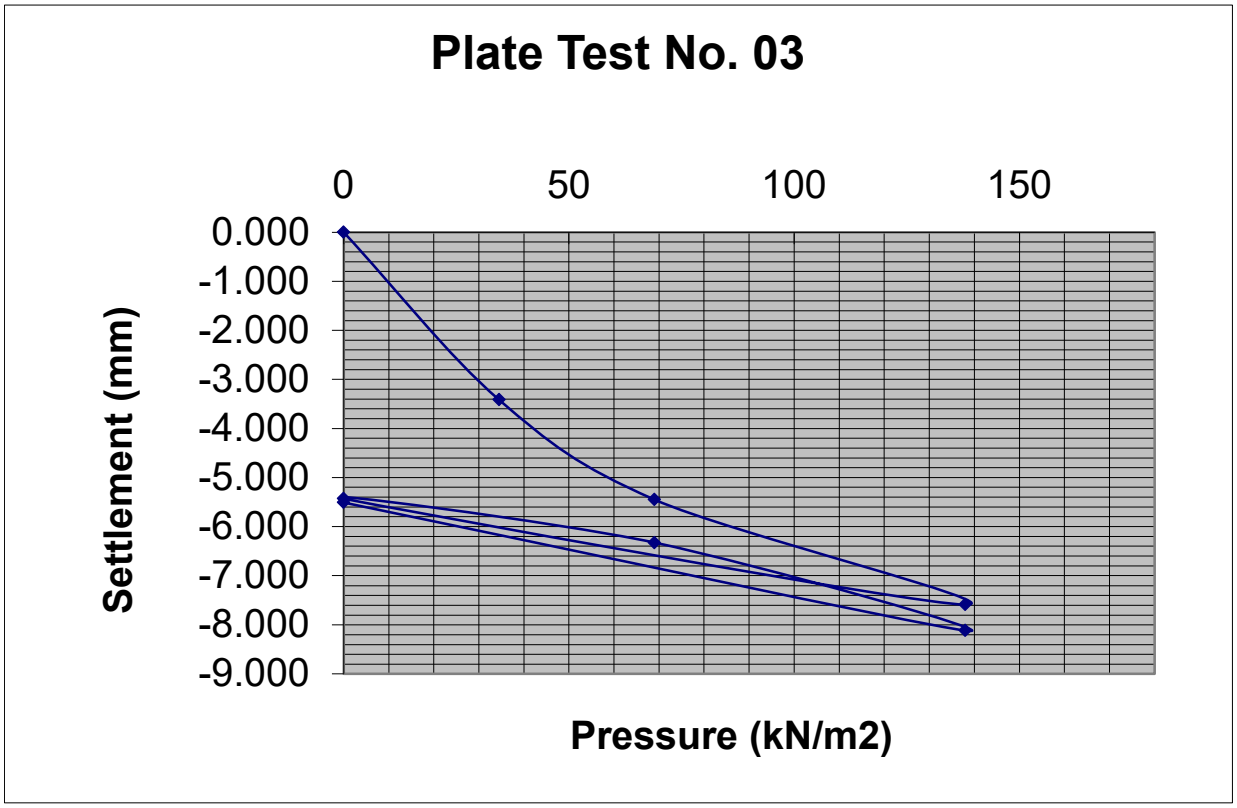
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.45 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **1.92 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-3.40995
69	-5.4483
138	-7.58825
0	-5.42642
69	-6.3246
138	-8.1153
0	-5.50545

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Harbour Road Mullingar	**MATERIAL**	Brown slightly sandy slightly gravelly CLAY.
CONTRACT NO.			
DATE	24/10/2025		
CLIENT	Westmeath County Coun	**DEPTH**	0.40m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-03	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **8.56 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **51.91 MN/m2/m**

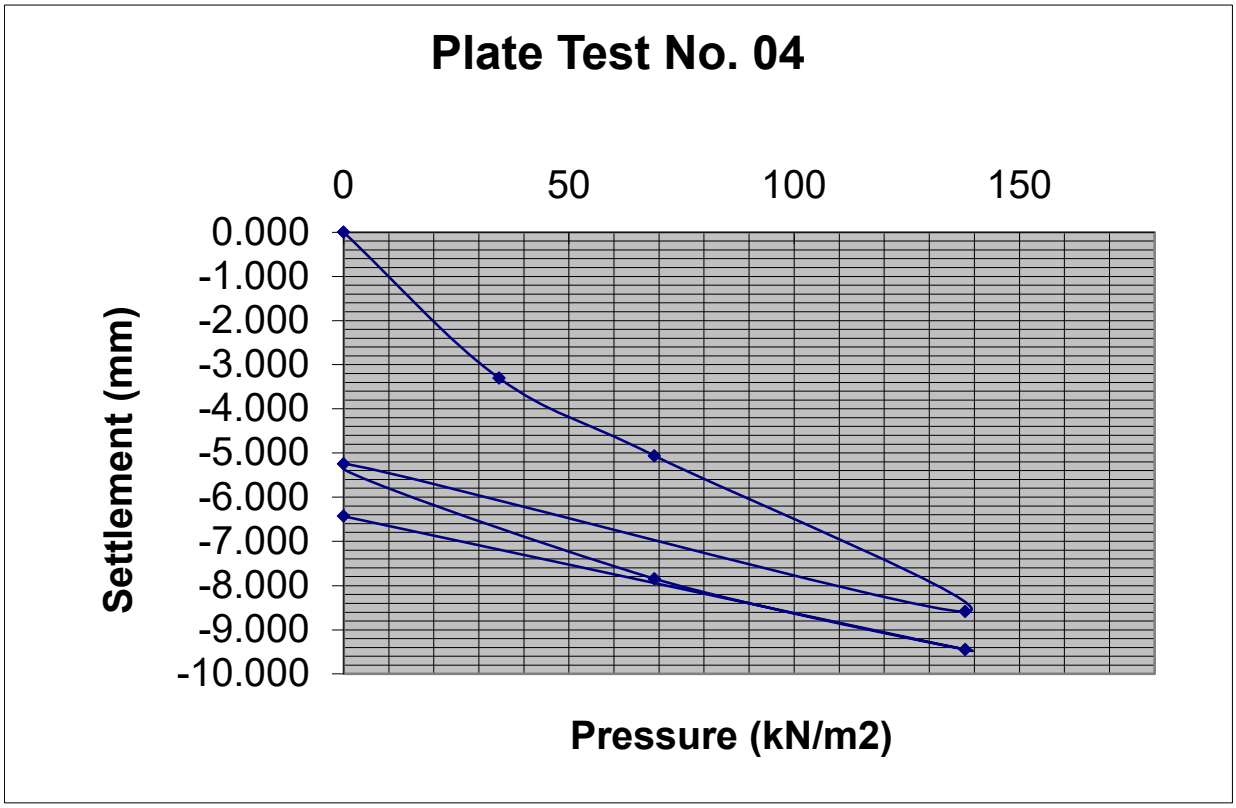
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.40 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **9.05 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-3.3021
69	-5.06095
138	-8.59155
0	-5.2451
69	-7.8486
138	-9.4488
0	-6.429

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Harbour Road Mullingar	**MATERIAL**	Brown slightly sandy slightly gravelly CLAY.
CONTRACT NO.			
DATE	24/10/2025		
CLIENT	Westmeath County Coun	**DEPTH**	0.40m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-04	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **9.21 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **17.91 MN/m2/m**

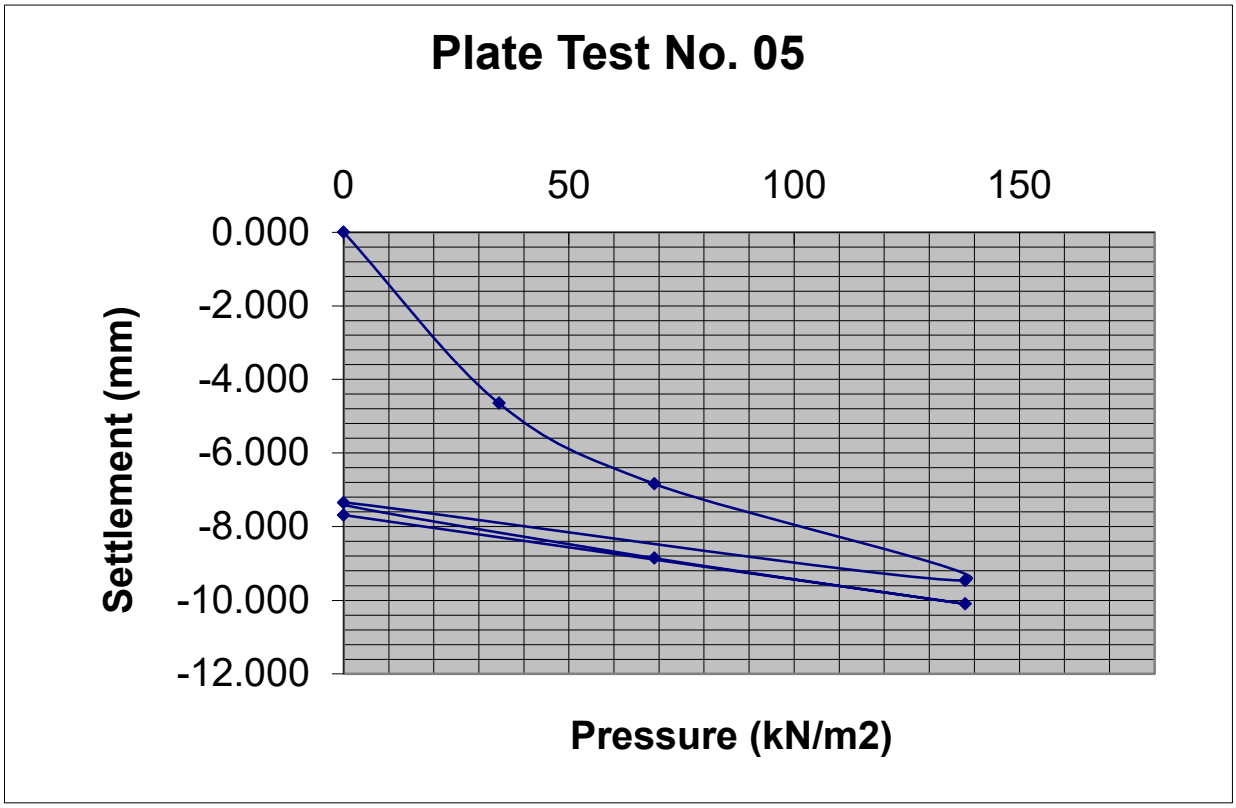
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.45 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **1.43 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-4.645
69	-6.835
138	-9.46
0	-7.3465
69	-8.855
138	-10.1
0	-7.685

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Harbour Road Mullingar	**MATERIAL**	Grey clayey sandy subangular to subrounded fine to coarse GRAVEL.
CONTRACT NO.			
DATE	24/10/2025		
CLIENT	Westmeath County Coun	**DEPTH**	0.6m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-05	**SAMPLES**	



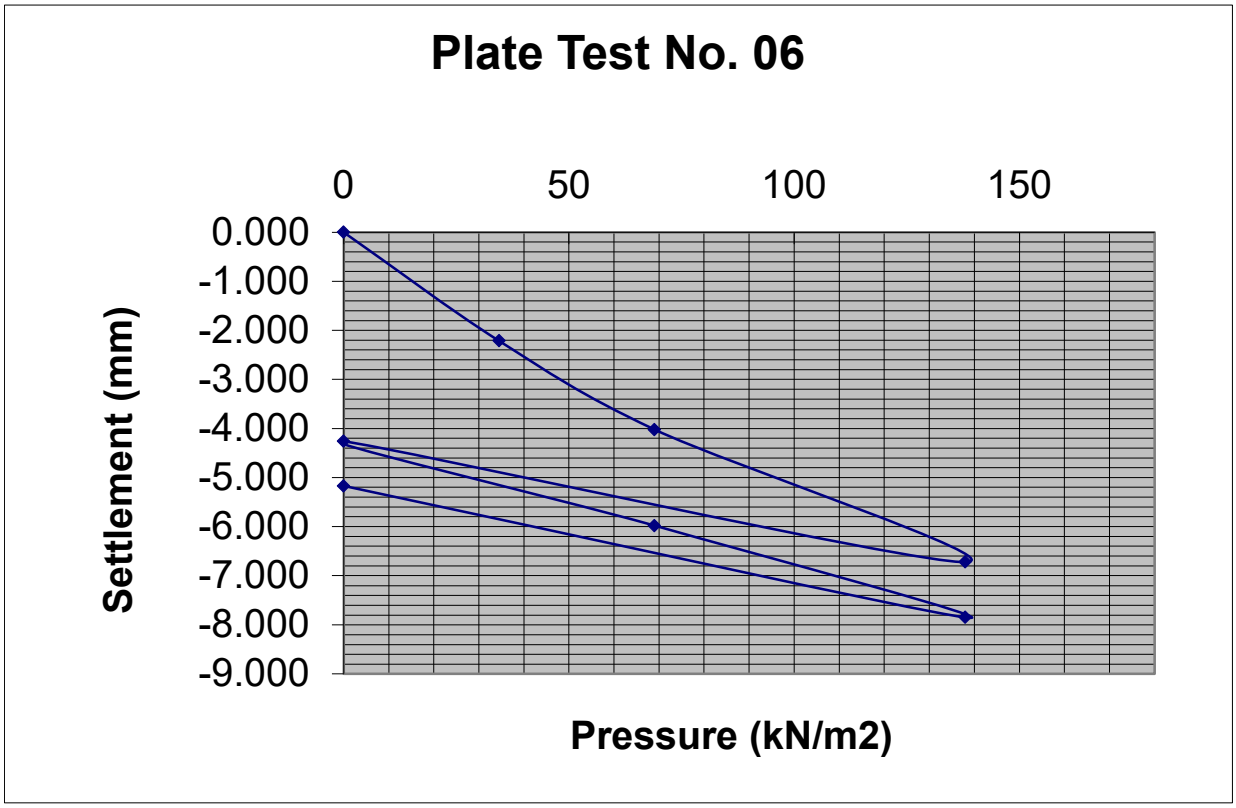
Modulus of subgrade reaction, K (Initial) = **6.82 MN/m2/m**
Modulus of subgrade reaction, K (Reload) = **30.91 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.27 %**
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **3.69 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-2.21
69	-4.02
138	-6.72
0	-4.26
69	-5.98
138	-7.85
0	-5.17

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Harbour Road Mullingar	**MATERIAL**	Brown slightly sandy slightly gravelly CLAY.
CONTRACT NO.			
DATE	19/03/2021		
CLIENT	Westmeath County Coun	**DEPTH**	0.60m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-06	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **11.60 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **27.11 MN/m2/m**

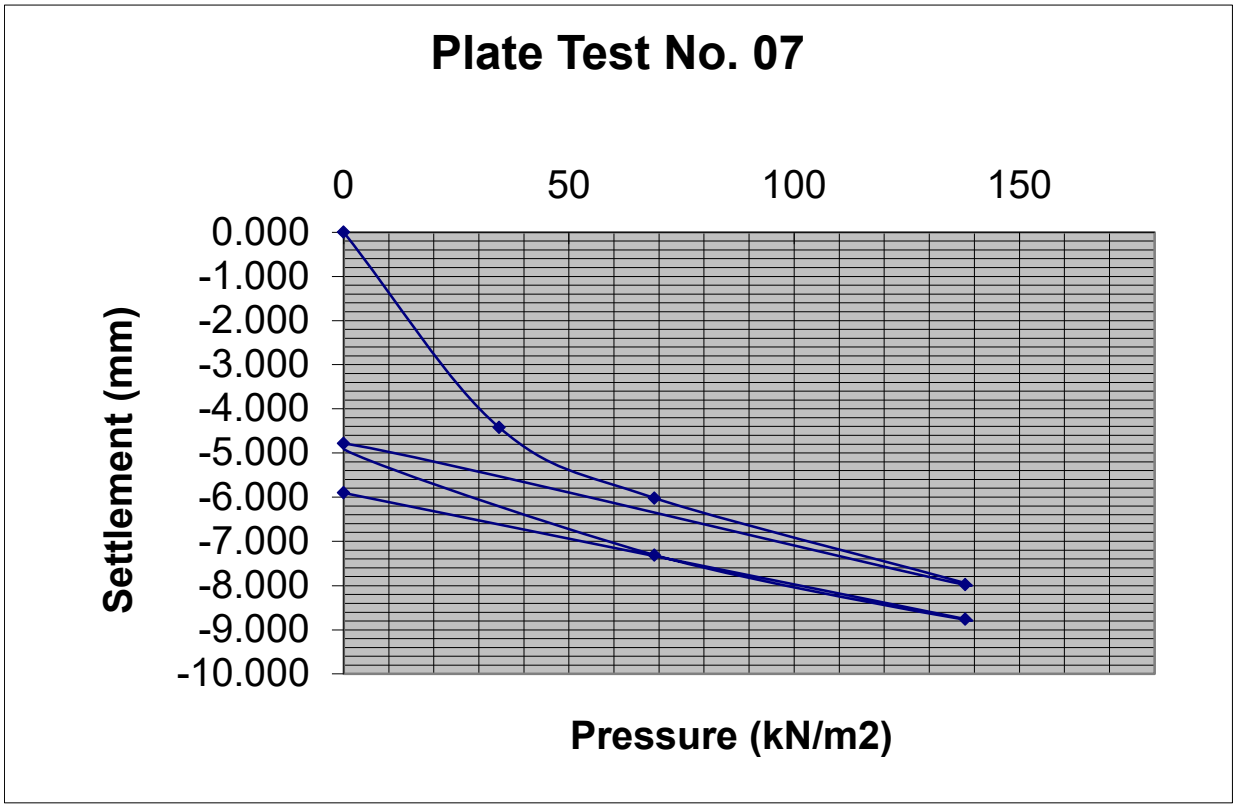
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.67 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **2.94 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-4.41635
69	-6.02
138	-7.98
0	-4.785
69	-7.31
138	-8.76
0	-5.9

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Harbour Road Mullingar	**MATERIAL**	Dark brown slightly sandy slightly gravelly CLAY.
CONTRACT NO.			
DATE	19/03/2021		
CLIENT	Westmeath County Coun	**DEPTH**	0.40m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-07	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **7.74 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **18.46 MN/m2/m**

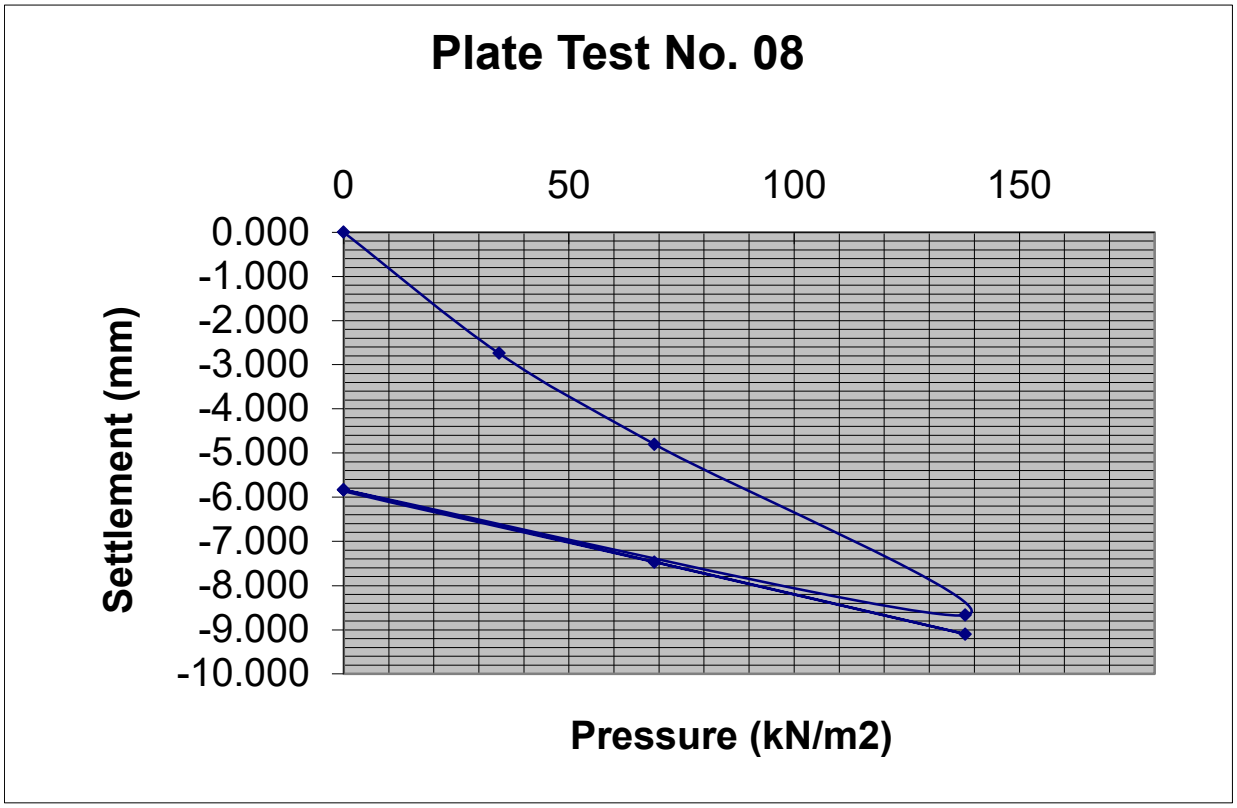
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.33 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **1.51 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-2.74
69	-4.802
138	-8.67
0	-5.835
69	-7.47
138	-9.1
0	-5.83

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Harbour Road Mullingar	**MATERIAL**	Dark Brown slightly sandy slightly gravelly CLAY.
CONTRACT NO.			
DATE	24/10/2025		
CLIENT	Westmeath County Coun	**DEPTH**	0.40m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-08	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **9.71 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **28.52 MN/m2/m**

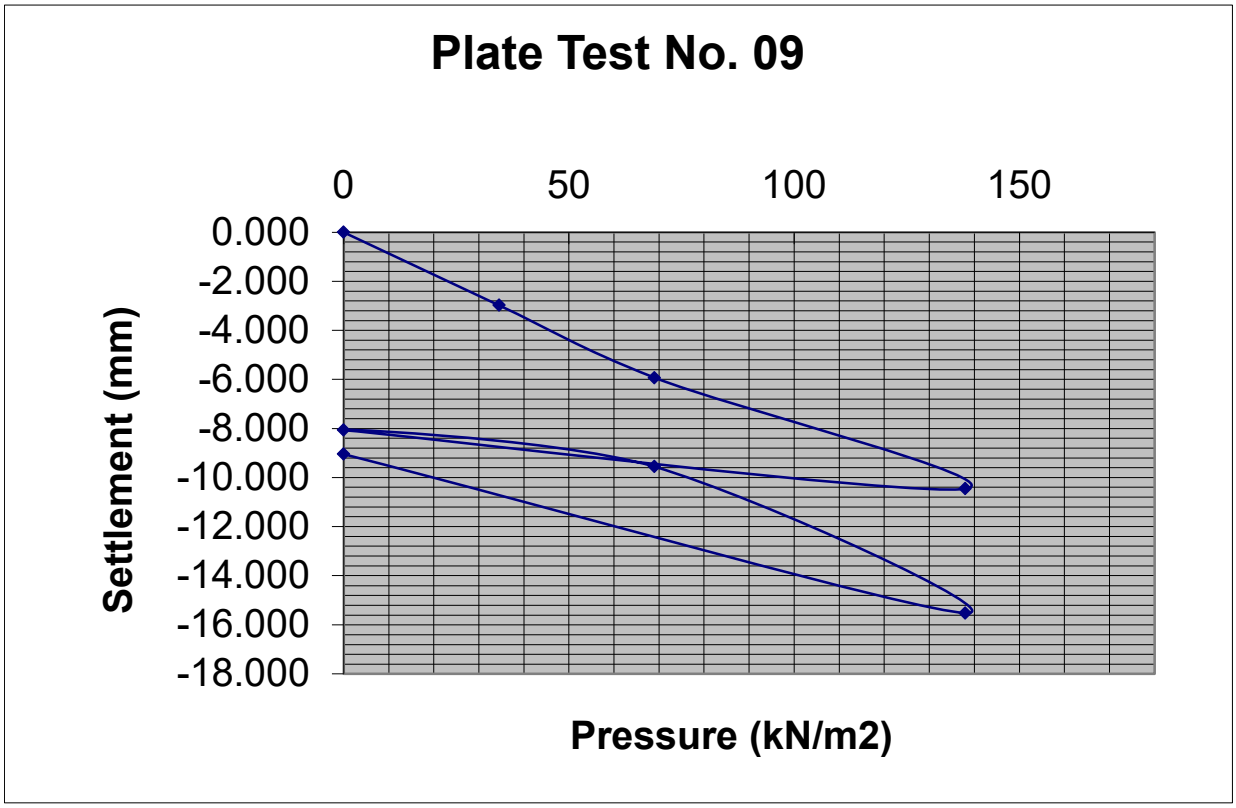
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.50 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **3.21 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-2.97
69	-5.9274
138	-10.45
0	-8.06075
69	-9.55
138	-15.52
0	-9.04

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Harbour Road Mullingar	**MATERIAL**	Brown slightly sandy slightly gravelly CLAY.
CONTRACT NO.			
DATE	24/10/2025		
CLIENT	Westmeath County Coun	**DEPTH**	0.4m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-09	**SAMPLES**	



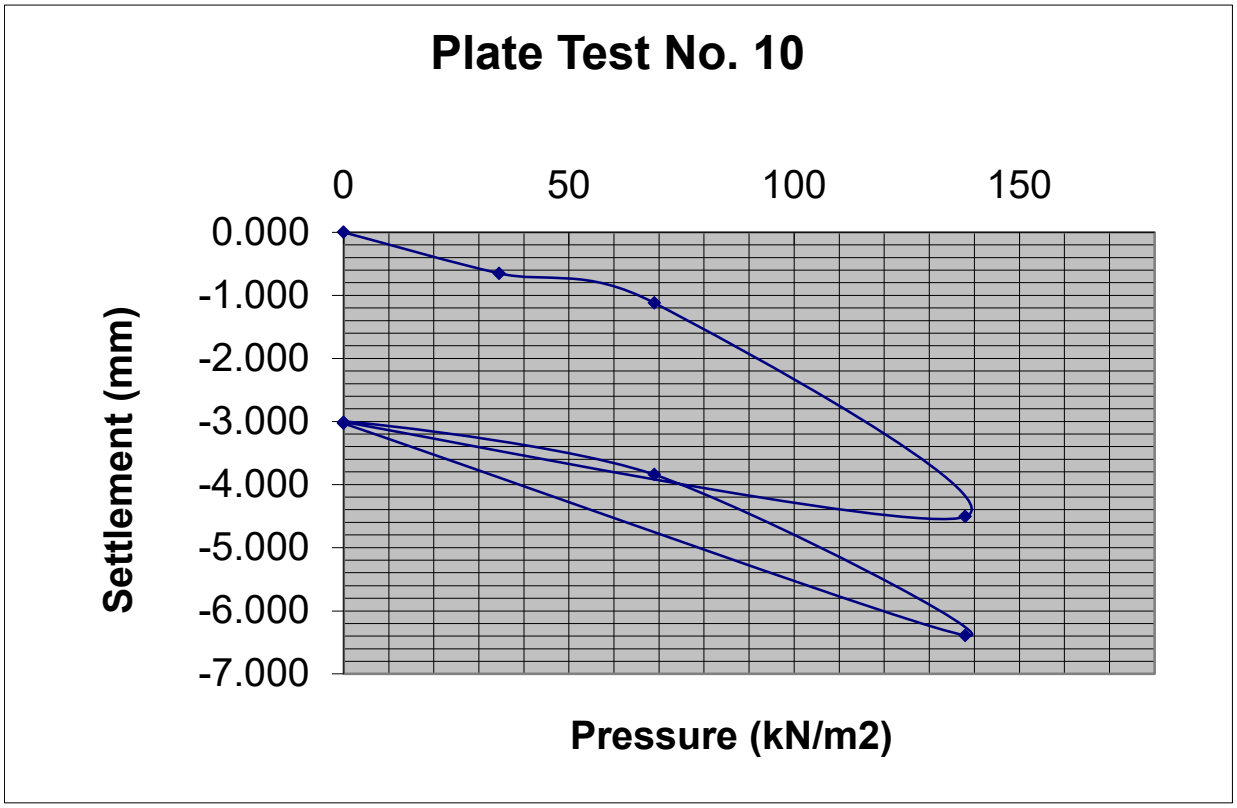
Modulus of subgrade reaction, K (Initial) = **7.87 MN/m2/m**
Modulus of subgrade reaction, K (Reload) = **31.31 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.34 %**
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **3.77 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-0.65
69	-1.12
138	-4.505
0	-3.01
69	-3.84
138	-6.39
0	-3.03

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Harbour Road Mullingar	**MATERIAL**	Brown sandy gravelly CLAY.
CONTRACT NO.			
DATE	24/10/2025		
CLIENT	Westmeath County Coun	**DEPTH**	0.40m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-10	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **41.63 MN/m2/m**
Modulus of subgrade reaction, K (Reload) = **56.17 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **6.18 %**
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **10.38 %**

APPENDIX 7 – Laboratory Testing

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

P: +44 (0) 1244 833780
F: +44 (0) 1244 833781
W: www.element.com

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland
D22 K5P8

Attention :	Adam Browne
Date :	2nd December, 2025
Your reference :	14940-08-25
Our reference :	Test Report 25/19294 Batch 1
Location :	Harbour Road Westmeath County Council
Date samples received :	19th November, 2025
Status :	Final Report
Issue :	202512021013

Eighteen samples were received for analysis on 19th November, 2025 of which eighteen were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 83.622 kg of CO2

Scope 1&2&3 emissions - 197.621 kg of CO2

Authorised By:

Phil Sommerton BSc
Senior Technical Account Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne
EMT Job No: 25/19294

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	LOD/LOR	Units	Method No.
Sample ID	TP01	TP01	TP02	TP02	TP03	TP03	TP04	TP04	TP05	TP05			
Depth	0.50	1.50	0.50	2.00	0.50	1.00	0.50	1.50	0.50	1.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025			
Antimony	2	-	2	1	2	1	1	1	3	1	<1	mg/kg	TM30/PM15
Arsenic #	6.5	-	5.1	2.7	7.6	2.3	5.9	5.9	9.0	5.2	<0.5	mg/kg	TM30/PM15
Barium #	49	-	18	10	49	10	21	24	62	18	<1	mg/kg	TM30/PM15
Cadmium #	2.4	-	0.6	0.7	<0.3	0.6	1.0	0.8	0.5	0.7	<0.3	mg/kg	TM30/PM15
Chromium #	60.0	-	92.3	58.0	73.4	61.2	52.2	39.2	86.7	45.1	<0.5	mg/kg	TM30/PM15
Copper #	29	-	10	9	19	8	15	20	25	15	<1	mg/kg	TM30/PM15
Lead #	33	-	14	<5	100	<5	10	21	44	10	<5	mg/kg	TM30/PM15
Mercury #	0.2	-	<0.1	<0.1	0.6	0.1	<0.1	0.2	0.2	<0.1	<0.1	mg/kg	TM30/PM15
Molybdenum #	3.8	-	6.2	3.9	5.5	4.1	3.6	2.4	6.4	3.2	<0.1	mg/kg	TM30/PM15
Nickel #	33.1	-	29.0	16.0	21.5	16.9	28.6	30.7	35.0	29.0	<0.7	mg/kg	TM30/PM15
Selenium #	6	-	<1	<1	2	<1	<1	<1	1	<1	<1	mg/kg	TM30/PM15
Zinc #	47	-	68	33	81	34	63	70	107	63	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.05	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	-	<0.03	<0.03	0.13	<0.03	<0.03	<0.03	0.37	<0.03	<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	-	<0.04	<0.04	0.06	<0.04	<0.04	<0.04	0.23	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.06	-	<0.03	<0.03	0.34	<0.03	<0.03	0.05	0.78	<0.03	<0.03	mg/kg	TM4/PM8
Pyrene #	0.04	-	<0.03	<0.03	0.28	<0.03	<0.03	0.04	0.64	<0.03	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	-	<0.06	<0.06	0.21	<0.06	<0.06	<0.06	0.39	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene #	0.04	-	<0.02	<0.02	0.21	<0.02	<0.02	0.04	0.40	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	-	<0.07	<0.07	0.31	<0.07	<0.07	<0.07	0.57	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	-	<0.04	<0.04	0.18	<0.04	<0.04	<0.04	0.32	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	-	<0.04	<0.04	0.10	<0.04	<0.04	<0.04	0.15	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	-	<0.04	<0.04	0.10	<0.04	<0.04	<0.04	0.14	<0.04	<0.04	mg/kg	TM4/PM8
Coronene	<0.04	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 6 Total #	<0.22	-	<0.22	<0.22	1.03	<0.22	<0.22	<0.22	1.96	<0.22	<0.22	mg/kg	TM4/PM8
PAH 17 Total	<0.64	-	<0.64	<0.64	1.92	<0.64	<0.64	<0.64	4.04	<0.64	<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	-	<0.05	<0.05	0.22	<0.05	<0.05	<0.05	0.41	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	-	<0.02	<0.02	0.09	<0.02	<0.02	<0.02	0.16	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	93	-	96	89	95	102	98	94	102	100	<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	<30	-	<30	<30	<30	<30	<30	<30	<30	<30	<30	mg/kg	TM5/PM8/PM16

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne
EMT Job No: 25/19294

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	LOD/LOR	Units	Method No.
Sample ID	TP01	TP01	TP02	TP02	TP03	TP03	TP04	TP04	TP05	TP05			
Depth	0.50	1.50	0.50	2.00	0.50	1.00	0.50	1.50	0.50	1.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025			
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL)#	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL)#	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL)#	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL)#	<4	-	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL)#	<7	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL)#	<7	-	<7	<7	<7	<7	<7	<7	14	<7	<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_CU_1D_AL)	<7	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH_CU+HS_1D_AL)	<26	-	<26	<26	<26	<26	<26	<26	<26	<26	<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_CU_1D_AL)	<10	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_CU_1D_AL)	<10	-	<10	<10	<10	<10	<10	<10	14	<10	<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR)#	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR)#	<4	-	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR)#	<7	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR)#	33	-	<7	<7	<7	<7	<7	<7	47	<7	<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_CU_1D_AR)	<7	-	<7	<7	<7	<7	<7	<7	11	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH_CU+HS_1D_AR)	33	-	<26	<26	<26	<26	<26	<26	58	<26	<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH_CU+HS_1D_Total)	<52	-	<52	<52	<52	<52	<52	<52	58	<52	<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR)#	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_CU_1D_AR)	<10	-	<10	<10	<10	<10	<10	<10	19	<10	<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_CU_1D_AR)	31	-	<10	<10	<10	<10	<10	<10	35	<10	<10	mg/kg	TM5/PM8/PM16
MTBE#	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
Benzene#	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
Toluene#	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
Ethylbenzene#	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
m/p-Xylene#	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
o-Xylene#	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
PCB 28#	<5	-	<5	<5	<10$_{AA}$	<5	<5	<10$_{AA}$	<5	<5	<5	ug/kg	TM17/PM8
PCB 52#	<5	-	<5	<5	<10$_{AA}$	<5	<5	<10$_{AA}$	<5	<5	<5	ug/kg	TM17/PM8
PCB 101#	<5	-	<5	<5	<10$_{AA}$	<5	<5	<10$_{AA}$	<5	<5	<5	ug/kg	TM17/PM8
PCB 118#	<5	-	<5	<5	<10$_{AA}$	<5	<5	<10$_{AA}$	<5	<5	<5	ug/kg	TM17/PM8
PCB 138#	<5	-	<5	<5	<10$_{AA}$	<5	<5	<10$_{AA}$	<5	<5	<5	ug/kg	TM17/PM8
PCB 153#	<5	-	<5	<5	<10$_{AA}$	<5	<5	<10$_{AA}$	<5	<5	<5	ug/kg	TM17/PM8
PCB 180#	<5	-	<5	<5	<10$_{AA}$	<5	<5	<10$_{AA}$	<5	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs#	<35	-	<35	<35	<70$_{AA}$	<35	<35	<70$_{AA}$	<35	<35	<35	ug/kg	TM17/PM8

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne
EMT Job No: 25/19294

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	LOD/LOR	Units	Method No.
Sample ID	TP01	TP01	TP02	TP02	TP03	TP03	TP04	TP04	TP05	TP05			
Depth	0.50	1.50	0.50	2.00	0.50	1.00	0.50	1.50	0.50	1.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025			
Natural Moisture Content	48.3	-	16.1	8.8	47.6	9.9	13.9	22.1	26.0	7.9	<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	32.6	-	13.9	8.1	32.3	9.0	12.2	18.1	20.6	7.3	<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	-	0.0044	-	-	-	-	-	0.0123	-	-	<0.0015	g/l	TM38/PM20
Chromium III	60.0	-	92.3	58.0	73.4	61.2	52.2	39.2	86.7	45.1	<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.13	-	0.49	0.15	0.63	0.13	3.37	0.65	3.14	0.38	<0.02	%	TM21/PM24
Organic Matter	0.2	-	-	0.3	-	-	5.8	-	-	-	<0.2	%	TM21/PM24
pH #	7.64	8.62	8.27	8.67	5.69	8.56	8.45	8.20	8.05	8.59	<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne
EMT Job No: 25/19294

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	41-44	45-48	49-52	53-56	57-60	61-64	65-68	69-72			LOD/LOR	Units	Method No.
Sample ID	TP06	TP06	TP07	TP07	TP08	TP08	TP09	TP09					
Depth	0.50	2.50	0.50	1.50	0.50	1.50	0.50	1.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025					
Antimony	2	1	1	<1	<1	2	3	<1			<1	mg/kg	TM30/PM15
Arsenic #	8.5	3.9	5.4	4.1	4.1	3.8	11.2	5.1			<0.5	mg/kg	TM30/PM15
Barium #	23	13	19	15	14	16	35	17			<1	mg/kg	TM30/PM15
Cadmium #	1.3	0.5	1.3	0.8	0.7	0.5	<0.3	0.5			<0.3	mg/kg	TM30/PM15
Chromium #	70.2	65.5	57.6	20.3	36.3	52.5	95.5	26.7			<0.5	mg/kg	TM30/PM15
Copper #	18	9	15	13	11	12	20	14			<1	mg/kg	TM30/PM15
Lead #	14	7	8	6	<5	6	17	11			<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	0.2	0.2	<0.1	0.2	<0.1			<0.1	mg/kg	TM30/PM15
Molybdenum #	4.6	4.4	3.8	1.4	2.5	3.8	6.5	1.7			<0.1	mg/kg	TM30/PM15
Nickel #	40.9	19.1	30.6	23.1	19.6	21.2	64.5	24.3			<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	<1	<1	<1	1	<1			<1	mg/kg	TM30/PM15
Zinc #	99	48	64	48	40	46	148	56			<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.29	0.09	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Pyrene #	0.26	0.09	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.16	0.07	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06			<0.06	mg/kg	TM4/PM8
Chrysene #	0.20	0.07	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.45	0.15	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07			<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.26	0.08	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.20	0.07	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.21	0.07	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
PAH 6 Total #	1.41	0.46	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22			<0.22	mg/kg	TM4/PM8
PAH 17 Total	2.06	0.69	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64			<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.32	0.11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.13	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1			<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	94	105	102	102	95	95	101	101			<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	<30	<30	<30	<30	<30	<30	<30	<30			<30	mg/kg	TM5/PM8/PM16

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne
EMT Job No: 25/19294

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	41-44	45-48	49-52	53-56	57-60	61-64	65-68	69-72			LOD/LOR	Units	Method No.
Sample ID	TP06	TP06	TP07	TP07	TP08	TP08	TP09	TP09					
Depth	0.50	2.50	0.50	1.50	0.50	1.50	0.50	1.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025					
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL)#	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL)#	<4	<4	<4	<4	<4	<4	<4	<4			<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL)#	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL)#	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_CU_1D_AL)	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH_CU+HS_1D_AL)	<26	<26	<26	<26	<26	<26	<26	<26			<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_CU_1D_AL)	<10	<10	<10	<10	<10	<10	<10	<10			<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_CU_1D_AL)	<10	<10	<10	<10	<10	<10	<10	<10			<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR)#	<4	<4	<4	<4	<4	<4	<4	<4			<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR)#	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR)#	10	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_CU_1D_AR)	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH_CU+HS_1D_AR)	<26	<26	<26	<26	<26	<26	<26	<26			<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH_CU+HS_1D_Total)	<52	<52	<52	<52	<52	<52	<52	<52			<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_CU_1D_AR)	<10	<10	<10	<10	<10	<10	<10	<10			<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_CU_1D_AR)	<10	<10	<10	<10	<10	<10	<10	<10			<10	mg/kg	TM5/PM8/PM16
MTBE#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
Benzene#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
Toluene#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
Ethylbenzene#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
m/p-Xylene#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
o-Xylene#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
PCB 28#	<10 AA	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 52#	<10 AA	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 101#	<10 AA	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 118#	<10 AA	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 138#	<10 AA	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 153#	<10 AA	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 180#	<10 AA	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
Total 7 PCBs#	<70 AA	<35	<35	<35	<35	<35	<35	<35			<35	ug/kg	TM17/PM8

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne
EMT Job No: 25/19294

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	41-44	45-48	49-52	53-56	57-60	61-64	65-68	69-72			LOD/LOR	Units	Method No.
Sample ID	TP06	TP06	TP07	TP07	TP08	TP08	TP09	TP09					
Depth	0.50	2.50	0.50	1.50	0.50	1.50	0.50	1.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025					
Natural Moisture Content	16.1	8.5	12.4	8.0	8.5	7.6	20.0	12.4			<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	13.9	7.9	11.1	7.4	7.8	7.0	16.7	11.0			<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3			<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	-	-	-	0.0037	-	-	-	0.0042			<0.0015	g/l	TM38/PM20
Chromium III	70.2	65.5	57.6	20.3	36.3	52.5	95.5	26.7			<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.33	0.31	5.29	0.23	0.16	0.14	0.29	0.51			<0.02	%	TM21/PM24
Organic Matter	0.6	-	-	-	-	-	0.5	-			<0.2	%	TM21/PM24
pH #	8.49	8.80	8.53	8.67	8.70	8.86	6.87	8.36			<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne
EMT Job No: 25/19294

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	41-44	LOD/LOR	Units	Method No.
Sample ID	TP01	TP02	TP02	TP03	TP03	TP04	TP04	TP05	TP05	TP06			
Depth	0.50	0.50	2.00	0.50	1.00	0.50	1.50	0.50	1.50	0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025			
Dissolved Antimony #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	0.0025	<0.0025	<0.0025	<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.025	<0.025	<0.025	<0.025	mg/kg	TM30/PM17
Dissolved Barium #	0.008	0.004	<0.003	0.007	<0.003	<0.003	<0.003	0.007	<0.003	<0.003	<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	0.08	0.04	<0.03	0.07	<0.03	<0.03	<0.03	0.07	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	0.003	0.010	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	0.10	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	0.003	0.002	<0.002	0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	0.03	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	0.003	<0.003	0.005	0.004	<0.003	<0.003	<0.003	0.003	0.003	<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03	0.05	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.3	<0.3	<0.3	<0.3	<0.3	mg/l	TM173/PM0
Fluoride	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	mg/kg	TM38/PM0
Mass of raw test portion	0.1468	0.1098	0.0991	0.1258	0.1007	0.0987	0.1076	0.1161	0.0977	0.1071		kg	NONE/PM17
Chloride #	0.3	<0.3	<0.3	0.4	<0.3	<0.3	<0.3	1.8	<0.3	<0.3	<0.3	mg/l	TM38/PM0
Chloride #	3	<3	<3	4	<3	<3	<3	18	<3	<3	<3	mg/kg	TM38/PM0
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09		kg	NONE/PM17
Dissolved Organic Carbon	5	6	<2	4	3	<2	<2	4	<2	3	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	50	60	<20	40	30	<20	<20	40	<20	30	<20	mg/kg	TM60/PM0
pH	8.19	8.13	8.03	7.62	8.20	8.10	8.01	7.92	8.06	8.13	<0.01	pH units	TM73/PM0

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne
EMT Job No: 25/19294

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	41-44	LOD/LOR	Units	Method No.
Sample ID	TP01	TP02	TP02	TP03	TP03	TP04	TP04	TP05	TP05	TP06			
Depth	0.50	0.50	2.00	0.50	1.00	0.50	1.50	0.50	1.50	0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025			
Total Dissolved Solids #	119	104	44	52	44	44	59	71	51	56	<35	mg/l	TM20/PM0
Total Dissolved Solids #	1190	1040	440	520	440	440	590	710	510	560	<350	mg/kg	TM20/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne
EMT Job No: 25/19294

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	45-48	49-52	53-56	57-60	61-64	65-68	69-72				LOD/LOR	Units	Method No.
Sample ID	TP06	TP07	TP07	TP08	TP08	TP09	TP09						
Depth	2.50	0.50	1.50	0.50	1.50	0.50	1.50						
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T						
Sample Date	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025						
Dissolved Antimony #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002				<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025				<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025				<0.025	mg/kg	TM30/PM17
Dissolved Barium #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003				<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03				<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005				<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015				<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015				<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007				<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07				<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002				<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002				<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003				<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03				<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	0.004	0.003	<0.003	0.004	0.004	<0.003				<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	0.04	0.03	<0.03	0.04	0.04	<0.03				<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001				<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	0.4	0.3	<0.3	<0.3	<0.3	<0.3				<0.3	mg/l	TM173/PM0
Fluoride	<3	4	3	<3	<3	<3	<3				<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	<5	<5	<5	<5	<5	<5	<5				<5	mg/kg	TM38/PM0
Mass of raw test portion	0.0965	0.0976	0.1108	0.0982	0.0971	0.1071	0.0992					kg	NONE/PM17
Chloride #	<0.3	<0.3	0.6	<0.3	<0.3	0.3	<0.3				<0.3	mg/l	TM38/PM0
Chloride #	<3	<3	6	<3	<3	3	<3				<3	mg/kg	TM38/PM0
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09					kg	NONE/PM17
Dissolved Organic Carbon	<2	<2	3	<2	<2	4	4				<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	<20	30	<20	<20	40	40				<20	mg/kg	TM60/PM0
pH	7.94	8.06	8.05	8.21	8.63	7.00	8.12				<0.01	pH units	TM73/PM0

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne
EMT Job No: 25/19294

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	45-48	49-52	53-56	57-60	61-64	65-68	69-72				LOD/LOR	Units	Method No.
Sample ID	TP06	TP07	TP07	TP08	TP08	TP09	TP09						
Depth	2.50	0.50	1.50	0.50	1.50	0.50	1.50						
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T						
Sample Date	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025						
Total Dissolved Solids #	<35	<35	61	36	36	<35	66				<35	mg/l	TM20/PM0
Total Dissolved Solids #	<350	<350	610	360	360	<350	660				<350	mg/kg	TM20/PM0

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne
EMT Job No: 25/19294

Report : EN12457_2

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

Unable to perform guideline check. Limits of detection have been raised. This could be due to insufficient sample, dilution or matrix effect.

EMT Sample No.	1-4	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	41-44						
Sample ID	TP01	TP02	TP02	TP03	TP03	TP04	TP04	TP05	TP05	TP06						
Depth	0.50	0.50	2.00	0.50	1.00	0.50	1.50	0.50	1.50	0.50						
COC No / misc																
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T						
Sample Date	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1	1	1	1						
Date of Receipt	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Solid Waste Analysis																
Total Organic Carbon #	0.13	0.49	0.15	0.63	0.13	3.37	0.65	3.14	0.38	0.33	3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.070$_{BA}$	<0.035	<0.035	<0.070$_{BA}$	<0.035	<0.035	<0.070$_{BA}$	1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	<0.22	<0.22	<0.22	1.03	<0.22	<0.22	<0.22	1.96	<0.22	1.41	-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	<0.64	<0.64	<0.64	1.92	<0.64	<0.64	<0.64	4.04	<0.64	2.06	100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.025	<0.025	<0.025	0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	0.08	0.04	<0.03	0.07	<0.03	<0.03	<0.03	0.07	<0.03	<0.03	20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	0.10	<0.02	0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	0.03	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	<0.03	<0.03	<0.03	0.05	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	1190	1040	440	520	440	440	590	710	510	560	4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	50	60	<20	40	30	<20	<20	40	<20	30	500	800	1000	<20	mg/kg	TM60/PM0
Mass of raw test portion	0.1468	0.1098	0.0991	0.1258	0.1007	0.0987	0.1076	0.1161	0.0977	0.1071	-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	61.2	81.9	91.2	71.3	89.2	90.7	83.4	77.5	92.1	84.2	-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.843	0.88	0.891	0.864	0.889	0.891	0.882	0.874	0.892	0.883	-	-	-		l	NONE/PM17
Moisture Content 105C (% Dry Weight)	63.5	22.1	9.7	40.2	12.1	10.3	19.9	29.1	8.6	18.7	-	-	-	<0.1	%	PM4/PM0
pH #	7.64	8.27	8.67	5.69	8.56	8.45	8.20	8.05	8.59	8.49	-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	10	150	500	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	3	<3	<3	4	<3	<3	<3	18	<3	<3	800	15000	25000	<3	mg/kg	TM38/PM0

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne
EMT Job No: 25/19294

Report : EN12457_2

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

Unable to perform guideline check. Limits of detection have been raised. This could be due to insufficient sample, dilution or matrix effect.

EMT Sample No.	45-48	49-52	53-56	57-60	61-64	65-68	69-72									
Sample ID	TP06	TP07	TP07	TP08	TP08	TP09	TP09									
Depth	2.50	0.50	1.50	0.50	1.50	0.50	1.50									
COC No / misc																
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T									
Sample Date	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025	14/11/2025									
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1	1	1	1									
Date of Receipt	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025	19/11/2025									
Solid Waste Analysis																
Total Organic Carbon #	0.31	5.29	0.23	0.16	0.14	0.29	0.51				3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025				6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035				1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30	<30	<30	<30				500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	0.46	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22				-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	0.69	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64				100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025				0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03				20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015				0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07				2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03				0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	<0.03	0.04	0.03	<0.03	0.04	0.04	<0.03				4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	<350	<350	610	360	360	<350	660				4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	<20	<20	30	<20	<20	40	40				500	800	1000	<20	mg/kg	TM60/PM0
Mass of raw test portion	0.0965	0.0976	0.1108	0.0982	0.0971	0.1071	0.0992				-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	93.3	92.2	81.0	91.4	92.2	83.9	90.7				-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.894	0.892	0.879	0.891	0.892	0.883	0.891				-	-	-		l	NONE/PM17
Moisture Content 105C (% Dry Weight)	7.2	8.5	23.5	9.5	8.5	19.1	10.2				-	-	-	<0.1	%	PM4/PM0
pH #	8.80	8.53	8.67	8.70	8.86	6.87	8.36				-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	4	3	<3	<3	<3	<3				10	150	500	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<5	<5	<5	<5	<5	<5	<5				1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	<3	<3	6	<3	<3	3	<3				800	15000	25000	<3	mg/kg	TM38/PM0

Client Name: Ground Investigations Ireland

Matrix : Solid

Reference: 14940-08-25

Location: Harbour Road Westmeath County Council

Contact: Adam Browne

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
25/19294	1	TP01	0.50	1-4	Naturally occurring compounds
25/19294	1	TP02	0.50	9-12	No interpretation possible
25/19294	1	TP02	2.00	13-16	No interpretation possible
25/19294	1	TP03	0.50	17-20	No interpretation possible
25/19294	1	TP03	1.00	21-24	No interpretation possible
25/19294	1	TP04	0.50	25-28	No interpretation possible
25/19294	1	TP04	1.50	29-32	No interpretation possible
25/19294	1	TP05	0.50	33-36	Possible PAHs & Naturally occurring compounds
25/19294	1	TP05	1.50	37-40	No interpretation possible
25/19294	1	TP06	0.50	41-44	Naturally occurring compounds
25/19294	1	TP06	2.50	45-48	No interpretation possible
25/19294	1	TP07	0.50	49-52	No interpretation possible
25/19294	1	TP07	1.50	53-56	No interpretation possible
25/19294	1	TP08	0.50	57-60	No interpretation possible
25/19294	1	TP08	1.50	61-64	No interpretation possible
25/19294	1	TP09	0.50	65-68	No interpretation possible
25/19294	1	TP09	1.50	69-72	No interpretation possible

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Asbestos sub-samples are retained for not less than 6 months from the date of analysis unless specifically requested.

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
25/19294	1	TP01	0.50	4	Mathew Day	24/11/2025	**General Description (Bulk Analysis)**	Grey soil, stones
					Mathew Day	24/11/2025	**Asbestos Fibres**	NAD
					Mathew Day	24/11/2025	**Asbestos ACM**	NAD
					Mathew Day	24/11/2025	**Asbestos Type**	NAD
25/19294	1	TP02	0.50	12	Matthew Turner	24/11/2025	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	24/11/2025	**Asbestos Fibres**	NAD
					Matthew Turner	24/11/2025	**Asbestos ACM**	NAD
					Matthew Turner	24/11/2025	**Asbestos Type**	NAD
25/19294	1	TP02	2.00	16	Catherine Coles	25/11/2025	**General Description (Bulk Analysis)**	brown soil,stone
					Catherine Coles	25/11/2025	**Asbestos Fibres**	NAD
					Catherine Coles	25/11/2025	**Asbestos ACM**	NAD
					Catherine Coles	25/11/2025	**Asbestos Type**	NAD
25/19294	1	TP03	0.50	20	Caoimhe Anders	24/11/2025	**General Description (Bulk Analysis)**	Brown soil, stones
					Caoimhe Anders	24/11/2025	**Asbestos Fibres**	NAD
					Caoimhe Anders	24/11/2025	**Asbestos ACM**	NAD
					Caoimhe Anders	24/11/2025	**Asbestos Type**	NAD
25/19294	1	TP03	1.00	24	Kieran Hubbard	24/11/2025	**General Description (Bulk Analysis)**	brown soil
					Kieran Hubbard	24/11/2025	**Asbestos Fibres**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos Fibres (2)**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos ACM**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos ACM (2)**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos Type**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos Type (2)**	NAD
25/19294	1	TP04	0.50	28	Catherine Coles	25/11/2025	**General Description (Bulk Analysis)**	brown soil,stone
					Catherine Coles	25/11/2025	**Asbestos Fibres**	NAD
					Catherine Coles	25/11/2025	**Asbestos ACM**	NAD
					Catherine Coles	25/11/2025	**Asbestos Type**	NAD
25/19294	1	TP04	1.50	32	Simon Postlewhite	25/11/2025	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	25/11/2025	**Asbestos Fibres**	NAD
					Simon Postlewhite	25/11/2025	**Asbestos ACM**	NAD
					Simon Postlewhite	25/11/2025	**Asbestos Type**	NAD

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
25/19294	1	TP05	0.50	36	Michael Reilly	24/11/2025	**General Description (Bulk Analysis)**	Brown soil, stones
					Michael Reilly	24/11/2025	**Asbestos Fibres**	NAD
					Michael Reilly	24/11/2025	**Asbestos ACM**	NAD
					Michael Reilly	24/11/2025	**Asbestos Type**	NAD
25/19294	1	TP05	1.50	40	Caoimhe Anders	24/11/2025	**General Description (Bulk Analysis)**	Brown soil, stones
					Caoimhe Anders	24/11/2025	**Asbestos Fibres**	NAD
					Caoimhe Anders	24/11/2025	**Asbestos ACM**	NAD
					Caoimhe Anders	24/11/2025	**Asbestos Type**	NAD
25/19294	1	TP06	0.50	44	Catherine Coles	25/11/2025	**General Description (Bulk Analysis)**	brown soilo,stone
					Catherine Coles	25/11/2025	**Asbestos Fibres**	NAD
					Catherine Coles	25/11/2025	**Asbestos ACM**	NAD
					Catherine Coles	25/11/2025	**Asbestos Type**	NAD
25/19294	1	TP06	2.50	48	Caoimhe Anders	24/11/2025	**General Description (Bulk Analysis)**	Stoneds, grit
					Caoimhe Anders	24/11/2025	**Asbestos Fibres**	NAD
					Caoimhe Anders	24/11/2025	**Asbestos ACM**	NAD
					Caoimhe Anders	24/11/2025	**Asbestos Type**	NAD
25/19294	1	TP07	0.50	52	Kieran Hubbard	24/11/2025	**General Description (Bulk Analysis)**	stoney soil
					Kieran Hubbard	24/11/2025	**Asbestos Fibres**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos Fibres (2)**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos ACM**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos ACM (2)**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos Type**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos Type (2)**	NAD
25/19294	1	TP07	1.50	56	Matthew Turner	24/11/2025	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	24/11/2025	**Asbestos Fibres**	NAD
					Matthew Turner	24/11/2025	**Asbestos ACM**	NAD
					Matthew Turner	24/11/2025	**Asbestos Type**	NAD
25/19294	1	TP08	0.50	60	Caoimhe Anders	24/11/2025	**General Description (Bulk Analysis)**	Brown soil, stones
					Caoimhe Anders	24/11/2025	**Asbestos Fibres**	NAD
					Caoimhe Anders	24/11/2025	**Asbestos ACM**	NAD
					Caoimhe Anders	24/11/2025	**Asbestos Type**	NAD
25/19294	1	TP08	1.50	64	Kieran Hubbard	24/11/2025	**General Description (Bulk Analysis)**	brown soil mn
					Kieran Hubbard	24/11/2025	**Asbestos Fibres**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos Fibres (2)**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos ACM**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos ACM (2)**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos Type**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos Type (2)**	NAD
25/19294	1	TP09	0.50	68	Matthew Turner	24/11/2025	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	24/11/2025	**Asbestos Fibres**	NAD
					Matthew Turner	24/11/2025	**Asbestos ACM**	NAD
					Matthew Turner	24/11/2025	**Asbestos Type**	NAD
25/19294	1	TP09	1.50	72	Kieran Hubbard	24/11/2025	**General Description (Bulk Analysis)**	brown soil
					Kieran Hubbard	24/11/2025	**Asbestos Fibres**	NAD

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
25/19294	1	TP09	1.50	72	Kieran Hubbard	24/11/2025	**Asbestos Fibres (2)**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos ACM**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos ACM (2)**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos Type**	NAD
					Kieran Hubbard	24/11/2025	**Asbestos Type (2)**	NAD

Element Materials Technology

Notification of Deviating Samples

Client Name: Ground Investigations Ireland
Reference: 14940-08-25
Location: Harbour Road Westmeath County Council
Contact: Adam Browne

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 25/19294						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 35°C ±5°C.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x2 Dilution
BA	x2 Dilution

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 25/19294

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35 degrees Celsius or 105 degrees Celsius. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.			AD	Yes

EMT Job No: 25/19294

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma-Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 degrees Celsius. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma-Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 degrees Celsius. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma-Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) - All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) - All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) - All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes

EMT Job No: 25/19294

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM61	Determination of Mercury by Cold Vapour Atomic Fluorescence - WATERS: Modified USEPA Method 245.7, Rev 2, Feb 2005. SOILS: Modified USEPA Method 7471B, Rev.2, Feb 2007	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 9214 - 340.2 (EPA 1998)	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35 degrees Celsius or 105 degrees Celsius. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	

APPENDIX 8 – Groundwater Monitoring

www.gii.ie

Appendix D – Confirmation of Feasibility

CONFIRMATION OF FEASIBILITY

Paul Browne

Aras an Chontae
Mount Street
Mullingar
Co. Westmeath
N91FH4N

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

Uisce Éireann
PO Box 448
South City
Delivery Office
Cork City

www.water.ie

24 July 2025

Our Ref: CDS25005369 Pre-Connection Enquiry
Harbour Road, Mullingar, Co. Westmeath

Dear Applicant/Agent,

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

Uisce Éireann has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Housing Development of 50 unit(s) at Harbour Road, Mullingar, Co. Westmeath, (the **Development)**.

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

- **Water Connection** - Feasible without infrastructure upgrade by Uisce Éireann
- **Wastewater Connection** - Feasible without infrastructure upgrade by Uisce Éireann

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

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

Stiúrthóirí / Directors: Niall Gleeson (POF / CEO), Jerry Grant (Cathaoirleach / Chairperson), Gerard Britchfield, Liz Joyce, Michael Nolan, Patricia King, Eileen Maher, Cathy Mannion, Paul Reid, Michael Walsh.
Oifig Chláraithe / Registered Office: Teach Colvill, 24-26 Sráid Thalbóid, Baile Átha Cliath 1, D01 NP86 / Colvill House, 24-26 Talbot Street, Dublin, Ireland D01NP86
Is cuideachta ghníomhaíochta ainmnithe atá faoi theorainn scaireanna é Uisce Éireann / Uisce Éireann is a designated activity company, limited by shares.
Cláraithe in Éirinn Uimh.: 530363 / Registered in Ireland No.: 530363.

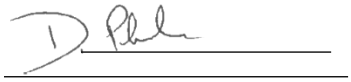
Where can you find more information?

- **Section A -** What is important to know?

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

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

Yours sincerely,



Dermot Phelan
Connections Delivery Manager

Section A - What is important to know?

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

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

Appendix E – Surface Water Network Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	Scotland and Ireland	Connection Type	Level Soffits
M5-60 (mm)	15.600	Minimum Backdrop Height (m)	0.200
Ratio-R	0.276	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SW01		4.00	97.130	1200	643496.664	753536.406	2.360
SW03			96.570	1200	643532.329	753566.009	2.073
SW04	0.006	4.00	96.230	1200	643515.304	753589.780	1.852
Soakaway 1			95.850	1350	643544.941	753615.240	1.631
SW06			95.700	1350	643555.396	753641.839	1.569
SW08			95.200	1350	643511.261	753699.412	1.285
SW12		4.00	96.030	1200	643501.222	753601.834	1.512
SW13			95.520	1200	643468.412	753644.739	1.340
SW14			95.400	1200	643470.680	753655.496	1.265
Hydrobrake			95.100	1500	643498.642	753705.670	1.228
SW09	0.013	4.00	96.590	1200	643551.206	753577.658	1.960
Outfall			95.000	1200	643495.639	753725.875	1.230
SW10		4.00	96.044	1200	643517.678	753602.648	1.425
SW11			95.843	1200	643539.923	753619.761	1.425
IC01	0.016	4.00	97.350	900	643478.975	753535.718	2.050
IC02			97.050	900	643500.955	753553.219	2.151
SW02			96.924	1200	643509.253	753546.836	2.250
SW07			95.422	1350	643533.305	753670.591	1.403
SW05	0.048	4.00	95.800	1350	643547.194	753620.820	1.600

Flow+ v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
SW1.000	SW01	SW02	16.348	0.600	94.770	94.674	0.096	169.8	225	4.27	50.0
SW1.002	SW03	SW04	29.239	0.600	94.497	94.378	0.119	245.7	300	5.52	50.0
SW1.003	SW04	Soakaway 1	39.071	0.600	94.378	94.219	0.159	245.7	300	6.17	50.0
SW1.004	Soakaway 1	SW05	6.018	0.600	94.219	94.200	0.019	324.8	375	6.27	50.0
SW1.006	SW06	SW07	36.259	0.600	94.131	94.019	0.112	325.0	375	7.26	50.0
SW1.008	SW08	Hydrobrake	14.086	0.600	93.915	93.872	0.043	327.6	375	8.12	48.1
SW5.001	SW13	SW14	10.993	0.600	94.180	94.135	0.045	244.3	300	4.91	50.0
SW3.000	SW09	SW03	22.182	0.600	94.630	94.497	0.133	166.8	225	4.37	50.0
SW5.000	SW12	SW13	54.012	0.600	94.518	94.180	0.338	159.8	300	4.73	50.0
SW1.009	Hydrobrake	Outfall	20.427	0.600	93.872	93.770	0.102	200.3	225	8.49	47.2
SW5.002	SW14	Hydrobrake	57.440	0.600	94.135	93.872	0.263	218.4	300	5.81	50.0
SW4.000	SW10	SW11	28.066	0.600	94.619	94.418	0.201	139.6	225	4.42	50.0
SW4.001	SW11	SW05	7.348	0.600	94.418	94.350	0.068	108.1	225	4.52	50.0
SW2.000	IC01	IC02	28.096	0.600	95.300	94.899	0.401	70.0	150	4.39	50.0
SW2.001	IC02	SW02	10.469	0.600	94.899	94.749	0.150	69.8	150	4.53	50.0
SW1.001	SW02	SW03	30.002	0.600	94.674	94.497	0.177	169.5	225	5.03	50.0
SW1.007	SW07	SW08	36.285	0.600	94.019	93.915	0.104	348.9	375	7.88	48.7
SW1.005	SW05	SW06	22.563	0.600	94.200	94.131	0.069	327.0	375	6.65	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
SW1.000	1.000	39.8	4.9	2.135	2.025	0.027	0.0	53	0.684
SW1.002	0.998	70.6	48.3	1.773	1.552	0.267	0.0	183	1.072
SW1.003	0.998	70.6	49.5	1.552	1.331	0.274	0.0	185	1.078
SW1.004	1.000	110.4	49.5	1.256	1.225	0.274	0.0	175	0.972
SW1.006	0.999	110.4	84.5	1.194	1.028	0.467	0.0	246	1.097
SW1.008	0.995	109.9	94.9	0.910	0.853	0.546	0.0	270	1.114
SW5.001	1.001	70.8	41.4	1.040	0.965	0.229	0.0	165	1.039
SW3.000	1.009	40.1	16.2	1.735	1.848	0.089	0.0	99	0.954
SW5.000	1.241	87.7	40.6	1.212	1.040	0.225	0.0	143	1.217
SW1.009	0.920	36.6	143.4	1.003	1.005	0.841	0.0	225	0.937
SW5.002	1.060	74.9	53.4	0.965	0.928	0.296	0.0	188	1.148
SW4.000	1.104	43.9	13.7	1.200	1.200	0.076	0.0	86	0.976
SW4.001	1.257	50.0	13.7	1.200	1.225	0.076	0.0	80	1.076
SW2.000	1.203	21.3	9.1	1.900	2.001	0.050	0.0	68	1.155
SW2.001	1.205	21.3	9.1	2.001	2.025	0.050	0.0	68	1.157
SW1.001	1.001	39.8	18.7	2.025	1.848	0.103	0.0	109	0.986
SW1.007	0.964	106.5	92.1	1.028	0.910	0.523	0.0	271	1.080
SW1.005	0.996	110.0	71.9	1.225	1.194	0.398	0.0	222	1.060

Flow+ v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
SW1.000	16.348	169.8	225	Circular	97.130	94.770	2.135	96.924	94.674	2.025
SW1.002	29.239	245.7	300	Circular	96.570	94.497	1.773	96.230	94.378	1.552
SW1.003	39.071	245.7	300	Circular	96.230	94.378	1.552	95.850	94.219	1.331
SW1.004	6.018	324.8	375	Circular	95.850	94.219	1.256	95.800	94.200	1.225
SW1.006	36.259	325.0	375	Circular	95.700	94.131	1.194	95.422	94.019	1.028
SW1.008	14.086	327.6	375	Circular	95.200	93.915	0.910	95.100	93.872	0.853
SW5.001	10.993	244.3	300	Circular	95.520	94.180	1.040	95.400	94.135	0.965
SW3.000	22.182	166.8	225	Circular	96.590	94.630	1.735	96.570	94.497	1.848
SW5.000	54.012	159.8	300	Circular	96.030	94.518	1.212	95.520	94.180	1.040
SW1.009	20.427	200.3	225	Circular	95.100	93.872	1.003	95.000	93.770	1.005
SW5.002	57.440	218.4	300	Circular	95.400	94.135	0.965	95.100	93.872	0.928
SW4.000	28.066	139.6	225	Circular	96.044	94.619	1.200	95.843	94.418	1.200
SW4.001	7.348	108.1	225	Circular	95.843	94.418	1.200	95.800	94.350	1.225
SW2.000	28.096	70.0	150	Circular	97.350	95.300	1.900	97.050	94.899	2.001
SW2.001	10.469	69.8	150	Circular	97.050	94.899	2.001	96.924	94.749	2.025
SW1.001	30.002	169.5	225	Circular	96.924	94.674	2.025	96.570	94.497	1.848
SW1.007	36.285	348.9	375	Circular	95.422	94.019	1.028	95.200	93.915	0.910
SW1.005	22.563	327.0	375	Circular	95.800	94.200	1.225	95.700	94.131	1.194

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
SW1.000	SW01	1200	Manhole	Adoptable	SW02	1200	Manhole	Adoptable
SW1.002	SW03	1200	Manhole	Adoptable	SW04	1200	Manhole	Adoptable
SW1.003	SW04	1200	Manhole	Adoptable	Soakaway 1	1350	Manhole	Adoptable
SW1.004	Soakaway 1	1350	Manhole	Adoptable	SW05	1350	Manhole	Adoptable
SW1.006	SW06	1350	Manhole	Adoptable	SW07	1350	Manhole	Adoptable
SW1.008	SW08	1350	Manhole	Adoptable	Hydrobrake	1500	Manhole	Adoptable
SW5.001	SW13	1200	Manhole	Adoptable	SW14	1200	Manhole	Adoptable
SW3.000	SW09	1200	Manhole	Adoptable	SW03	1200	Manhole	Adoptable
SW5.000	SW12	1200	Manhole	Adoptable	SW13	1200	Manhole	Adoptable
SW1.009	Hydrobrake	1500	Manhole	Adoptable	Outfall	1200	Manhole	Adoptable
SW5.002	SW14	1200	Manhole	Adoptable	Hydrobrake	1500	Manhole	Adoptable
SW4.000	SW10	1200	Manhole	Adoptable	SW11	1200	Manhole	Adoptable
SW4.001	SW11	1200	Manhole	Adoptable	SW05	1350	Manhole	Adoptable
SW2.000	IC01	900	Manhole	Adoptable	IC02	900	Manhole	Adoptable
SW2.001	IC02	900	Manhole	Adoptable	SW02	1200	Manhole	Adoptable
SW1.001	SW02	1200	Manhole	Adoptable	SW03	1200	Manhole	Adoptable
SW1.007	SW07	1350	Manhole	Adoptable	SW08	1350	Manhole	Adoptable
SW1.005	SW05	1350	Manhole	Adoptable	SW06	1350	Manhole	Adoptable

Flow+ v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SW01	643496.664	753536.406	97.130	2.360	1200	0	SW1.000	94.770	225
SW03	643532.329	753566.009	96.570	2.073	1200	1	SW3.000	94.497	225
						2	SW1.001	94.497	225
						0	SW1.002	94.497	300
SW04	643515.304	753589.780	96.230	1.852	1200	1	SW1.002	94.378	300
						0	SW1.003	94.378	300
Soakaway 1	643544.941	753615.240	95.850	1.631	1350	1	SW1.003	94.219	300
						0	SW1.004	94.219	375
SW06	643555.396	753641.839	95.700	1.569	1350	1	SW1.005	94.131	375
						0	SW1.006	94.131	375
SW08	643511.261	753699.412	95.200	1.285	1350	1	SW1.007	93.915	375
						0	SW1.008	93.915	375
SW12	643501.222	753601.834	96.030	1.512	1200	0	SW5.000	94.518	300
SW13	643468.412	753644.739	95.520	1.340	1200	1	SW5.000	94.180	300
						0	SW5.001	94.180	300
SW14	643470.680	753655.496	95.400	1.265	1200	1	SW5.001	94.135	300
						0	SW5.002	94.135	300
Hydrobrake	643498.642	753705.670	95.100	1.228	1500	1	SW5.002	93.872	300
						2	SW1.008	93.872	375
						0	SW1.009	93.872	225
SW09	643551.206	753577.658	96.590	1.960	1200	0	SW3.000	94.630	225
Outfall	643495.639	753725.875	95.000	1.230	1200	1	SW1.009	93.770	225
SW10	643517.678	753602.648	96.044	1.425	1200	0	SW4.000	94.619	225

Flow+ v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SW11	643539.923	753619.761	95.843	1.425	1200	1	SW4.000	94.418	225
						0	SW4.001	94.418	225
IC01	643478.975	753535.718	97.350	2.050	900	0	SW2.000	95.300	150
IC02	643500.955	753553.219	97.050	2.151	900	1	SW2.000	94.899	150
						0	SW2.001	94.899	150
SW02	643509.253	753546.836	96.924	2.250	1200	1	SW1.000	94.674	225
						2	SW2.001	94.749	150
						0	SW1.001	94.674	225
SW07	643533.305	753670.591	95.422	1.403	1350	1	SW1.006	94.019	375
						0	SW1.007	94.019	375
SW05	643547.194	753620.820	95.800	1.600	1350	1	SW4.001	94.350	225
						2	SW1.004	94.200	375
						0	SW1.005	94.200	375

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	Scotland and Ireland	Drain Down Time (mins)	240
M5-60 (mm)	15.600	Additional Storage (m³/ha)	20.0
Ratio-R	0.276	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160
30	120	240	480	720	1440	2880

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

Flow+ v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.90%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	SW01	112	94.811	0.041	0.2	0.0458	0.0000	OK
120 minute winter	SW1.000:50%	112	94.810	0.088	2.9	0.0000	0.0000	OK
120 minute winter	SW03	112	94.810	0.313	20.3	0.3542	0.0000	SURCHARGED
120 minute winter	SW1.002:50%	112	94.810	0.372	28.1	1.7637	0.0000	SURCHARGED
120 minute winter	SW04	112	94.810	0.432	28.6	0.5181	0.0000	SURCHARGED
120 minute winter	Soakaway 1	112	94.809	0.590	60.2	101.1701	0.0000	SURCHARGED
120 minute winter	SW06	114	94.809	0.678	22.9	0.9701	0.0000	SURCHARGED
120 minute winter	SW1.006:50%	112	94.809	0.734	23.3	0.0000	0.0000	SURCHARGED
120 minute winter	SW08	110	94.809	0.894	11.9	1.2797	0.0000	SURCHARGED
120 minute winter	SW1.008:50%	110	94.808	0.915	17.4	16.6483	0.0000	SURCHARGED
15 minute winter	SW12	11	94.952	0.434	16.2	0.4910	0.0000	SURCHARGED
15 minute winter	SW5.000:50%	11	94.939	0.590	68.1	0.0000	0.0000	SURCHARGED
15 minute winter	SW13	11	94.869	0.689	56.3	0.7792	0.0000	SURCHARGED
15 minute winter	SW5.001:50%	11	94.847	0.690	56.4	0.0000	0.0000	SURCHARGED
15 minute winter	SW14	11	94.825	0.690	55.4	0.7803	0.0000	SURCHARGED
120 minute winter	SW5.002:50%	110	94.809	0.805	27.1	0.0000	0.0000	SURCHARGED
120 minute winter	Hydrobrake	110	94.809	0.937	26.8	1.6549	0.0000	FLOOD RISK
120 minute winter	SW09	112	94.810	0.180	1.4	0.2276	0.0000	OK
120 minute winter	SW3.000:50%	112	94.810	0.246	9.5	0.7521	0.0000	SURCHARGED
15 minute summer	Outfall	9	93.856	0.086	11.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	SW01	SW1.000	SW1.000:50%	-0.2	-0.059	-0.005	0.0789	
120 minute winter	SW01	SW1.000	SW02	2.9	0.382	0.073	0.1621	
120 minute winter	SW03	SW1.002	SW1.002:50%	20.2	0.721	0.287	1.0295	
120 minute winter	SW03	SW1.002	SW04	27.9	0.924	0.395	1.0295	
120 minute winter	SW04	SW1.003	Soakaway 1	27.9	1.072	0.395	2.7514	
120 minute winter	Soakaway 1	SW1.004	SW05	-32.3	-0.629	-0.292	0.6638	
120 minute winter	Soakaway 1	Infiltration		5.1				
120 minute winter	SW06	SW1.006	SW1.006:50%	-22.9	0.411	-0.208	1.9996	
120 minute winter	SW06	SW1.006	SW07	-16.6	0.448	-0.150	1.9996	
120 minute winter	SW08	SW1.008	SW1.008:50%	-11.9	0.262	-0.109	0.7768	
120 minute winter	SW08	SW1.008	Hydrobrake	-15.0	0.203	-0.136	0.7768	
15 minute winter	SW12	SW5.000	SW5.000:50%	-16.2	-0.234	-0.184	1.9017	
15 minute winter	SW12	SW5.000	SW13	56.3	1.127	0.642	1.9017	
15 minute winter	SW13	SW5.001	SW5.001:50%	55.4	0.974	0.783	0.3871	
15 minute winter	SW13	SW5.001	SW14	55.4	0.993	0.783	0.3871	
15 minute winter	SW14	SW5.002	SW5.002:50%	54.1	0.854	0.722	2.0224	
15 minute winter	SW14	SW5.002	Hydrobrake	71.3	1.013	0.952	2.0224	
120 minute winter	Hydrobrake	SW1.009	Outfall	11.6	0.805	0.317	0.2937	176.0
120 minute winter	SW09	SW3.000	SW3.000:50%	1.4	0.205	0.034	0.4097	
120 minute winter	SW09	SW3.000	SW03	9.5	0.594	0.235	0.4411	

Flow+ v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.90%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	SW10	108	94.810	0.190	0.9	0.2155	0.0000	OK
120 minute winter	SW4.000:50%	112	94.810	0.291	8.0	0.0000	0.0000	SURCHARGED
120 minute winter	SW11	112	94.809	0.391	8.1	0.4426	0.0000	SURCHARGED
15 minute winter	IC01	10	95.349	0.049	5.0	0.0394	0.0000	OK
15 minute winter	SW2.000:50%	10	95.197	0.097	15.3	0.1124	0.0000	OK
15 minute winter	IC02	10	95.002	0.103	15.3	0.0654	0.0000	OK
120 minute winter	SW02	112	94.810	0.136	8.2	0.1543	0.0000	OK
120 minute winter	SW1.001:50%	110	94.810	0.224	10.9	0.5774	0.0000	OK
120 minute winter	SW07	112	94.809	0.790	16.8	1.1305	0.0000	SURCHARGED
120 minute winter	SW1.007:50%	110	94.809	0.842	17.0	0.0000	0.0000	SURCHARGED
120 minute winter	SW05	106	94.810	0.610	34.4	1.2412	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	SW10	SW4.000	SW4.000:50%	-0.9	-0.093	-0.021	0.5308	
120 minute winter	SW10	SW4.000	SW11	8.1	0.869	0.185	0.5581	
120 minute winter	SW11	SW4.001	SW05	7.9	0.843	0.157	0.2922	
15 minute winter	IC01	SW2.000	SW2.000:50%	5.0	0.586	0.235	0.1203	
15 minute winter	IC01	SW2.000	IC02	15.3	1.226	0.719	0.1752	
15 minute winter	IC02	SW2.001	SW02	15.2	1.247	0.716	0.1279	
120 minute winter	SW02	SW1.001	SW1.001:50%	8.2	0.706	0.205	0.4869	
120 minute winter	SW02	SW1.001	SW03	10.9	0.655	0.273	0.5963	
120 minute winter	SW07	SW1.007	SW1.007:50%	-16.8	0.387	-0.158	2.0010	
120 minute winter	SW07	SW1.007	SW08	-11.7	0.363	-0.110	2.0010	
120 minute winter	SW05	SW1.005	SW06	-21.4	0.516	-0.195	2.4886	

Flow+ v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.86%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	SW01	114	95.061	0.291	1.1	0.3286	0.0000	SURCHARGED
120 minute winter	SW1.000:50%	114	95.061	0.339	3.7	0.0000	0.0000	SURCHARGED
120 minute winter	SW03	114	95.060	0.563	25.8	0.6367	0.0000	SURCHARGED
120 minute winter	SW1.002:50%	114	95.059	0.622	35.2	4.9256	0.0000	SURCHARGED
120 minute winter	SW04	116	95.059	0.681	33.9	0.8176	0.0000	SURCHARGED
120 minute winter	Soakaway 1	116	95.058	0.839	73.3	143.9576	0.0000	SURCHARGED
120 minute winter	SW06	114	95.059	0.928	32.1	1.3274	0.0000	SURCHARGED
120 minute winter	SW1.006:50%	114	95.058	0.983	32.4	0.0000	0.0000	SURCHARGED
120 minute winter	SW08	114	95.057	1.142	17.5	1.6343	0.0000	FLOOD RISK
120 minute winter	SW1.008:50%	116	95.057	1.164	29.5	26.9467	0.0000	SURCHARGED
15 minute winter	SW12	11	95.376	0.858	17.4	0.9699	0.0000	SURCHARGED
15 minute winter	SW5.000:50%	11	95.371	1.022	88.2	0.0000	0.0000	SURCHARGED
15 minute winter	SW13	11	95.232	1.052	78.6	1.1897	0.0000	FLOOD RISK
15 minute winter	SW5.001:50%	11	95.191	1.034	76.5	0.0000	0.0000	SURCHARGED
15 minute winter	SW14	11	95.151	1.016	75.9	1.1487	0.0000	FLOOD RISK
120 minute winter	SW5.002:50%	116	95.057	1.054	37.4	0.0000	0.0000	SURCHARGED
120 minute winter	Hydrobrake	116	95.057	1.185	37.0	2.0946	0.0000	FLOOD RISK
120 minute winter	SW09	114	95.060	0.430	1.8	0.5429	0.0000	SURCHARGED
120 minute winter	SW3.000:50%	114	95.060	0.496	12.3	3.0514	0.0000	SURCHARGED
180 minute winter	Outfall	376	93.856	0.086	11.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	SW01	SW1.000	SW1.000:50%	-1.1	-0.171	-0.028	0.3251	
120 minute winter	SW01	SW1.000	SW02	3.7	0.414	0.093	0.3251	
120 minute winter	SW03	SW1.002	SW1.002:50%	25.1	0.743	0.356	1.0295	
120 minute winter	SW03	SW1.002	SW04	33.1	0.956	0.470	1.0295	
120 minute winter	SW04	SW1.003	Soakaway 1	31.6	1.083	0.447	2.7514	
120 minute winter	Soakaway 1	SW1.004	SW05	-45.2	-0.633	-0.409	0.6638	
120 minute winter	Soakaway 1	Infiltration		5.1				
120 minute winter	SW06	SW1.006	SW1.006:50%	-32.1	0.396	-0.291	1.9996	
120 minute winter	SW06	SW1.006	SW07	-23.3	0.479	-0.211	1.9996	
120 minute winter	SW08	SW1.008	SW1.008:50%	-17.5	0.213	-0.159	0.7768	
120 minute winter	SW08	SW1.008	Hydrobrake	-26.4	-0.240	-0.240	0.7768	
15 minute winter	SW12	SW5.000	SW5.000:50%	-17.4	-0.247	-0.198	1.9017	
15 minute winter	SW12	SW5.000	SW13	78.6	1.116	0.896	1.9017	
15 minute winter	SW13	SW5.001	SW5.001:50%	75.2	1.068	1.063	0.3871	
15 minute winter	SW13	SW5.001	SW14	75.9	1.097	1.072	0.3871	
15 minute winter	SW14	SW5.002	SW5.002:50%	75.0	1.065	1.001	2.0224	
15 minute winter	SW14	SW5.002	Hydrobrake	96.6	1.372	1.289	2.0224	
120 minute winter	Hydrobrake	SW1.009	Outfall	11.6	0.805	0.317	0.2937	223.7
120 minute winter	SW09	SW3.000	SW3.000:50%	1.8	0.211	0.044	0.4411	
120 minute winter	SW09	SW3.000	SW03	12.0	0.617	0.299	0.4411	

Flow+ v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.86%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	SW10	116	95.060	0.441	1.1	0.4983	0.0000	SURCHARGED
120 minute winter	SW4.000:50%	116	95.058	0.540	10.4	0.0000	0.0000	SURCHARGED
120 minute winter	SW11	116	95.059	0.641	10.2	0.7245	0.0000	SURCHARGED
15 minute winter	IC01	10	95.356	0.056	6.4	0.0449	0.0000	OK
15 minute winter	SW2.000:50%	10	95.219	0.120	19.7	0.1706	0.0000	OK
15 minute winter	IC02	11	95.076	0.177	19.6	0.1129	0.0000	SURCHARGED
120 minute winter	SW02	114	95.061	0.387	10.5	0.4371	0.0000	SURCHARGED
120 minute winter	SW1.001:50%	114	95.060	0.474	14.0	2.5917	0.0000	SURCHARGED
120 minute winter	SW07	114	95.058	1.039	23.8	1.4861	0.0000	SURCHARGED
120 minute winter	SW1.007:50%	114	95.058	1.091	24.2	0.0000	0.0000	SURCHARGED
120 minute winter	SW05	114	95.059	0.859	45.9	1.7483	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	SW10	SW4.000	SW4.000:50%	-1.1	-0.111	-0.025	0.5581	
120 minute winter	SW10	SW4.000	SW11	10.2	0.871	0.232	0.5581	
120 minute winter	SW11	SW4.001	SW05	8.9	0.863	0.178	0.2922	
15 minute winter	IC01	SW2.000	SW2.000:50%	6.4	0.610	0.301	0.1484	
15 minute winter	IC01	SW2.000	IC02	19.6	1.268	0.921	0.2202	
15 minute winter	IC02	SW2.001	SW02	19.2	1.271	0.902	0.1843	
120 minute winter	SW02	SW1.001	SW1.001:50%	10.5	0.753	0.265	0.5966	
120 minute winter	SW02	SW1.001	SW03	14.0	0.685	0.352	0.5966	
120 minute winter	SW07	SW1.007	SW1.007:50%	-23.8	0.395	-0.224	2.0010	
120 minute winter	SW07	SW1.007	SW08	-17.0	0.407	-0.159	2.0010	
120 minute winter	SW05	SW1.005	SW06	-31.6	0.510	-0.287	2.4886	

Flow+ v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Appendix F – Attenuation Tank Calculations

User Inputs

Chamber Model:	SC-800
Outlet Control Structure:	Yes
Project Name:	Harbour Rd
Engineer:	N/A
Project Location:	
Measurement Type:	Metric
Required Storage Volume:	186.01 cubic meters.
Stone Porosity:	40%
Stone Foundation Depth:	153 mm.
Stone Above Chambers:	153 mm.
Design Constraint Dimensions:	(9.01 m. x 33.01 m.)

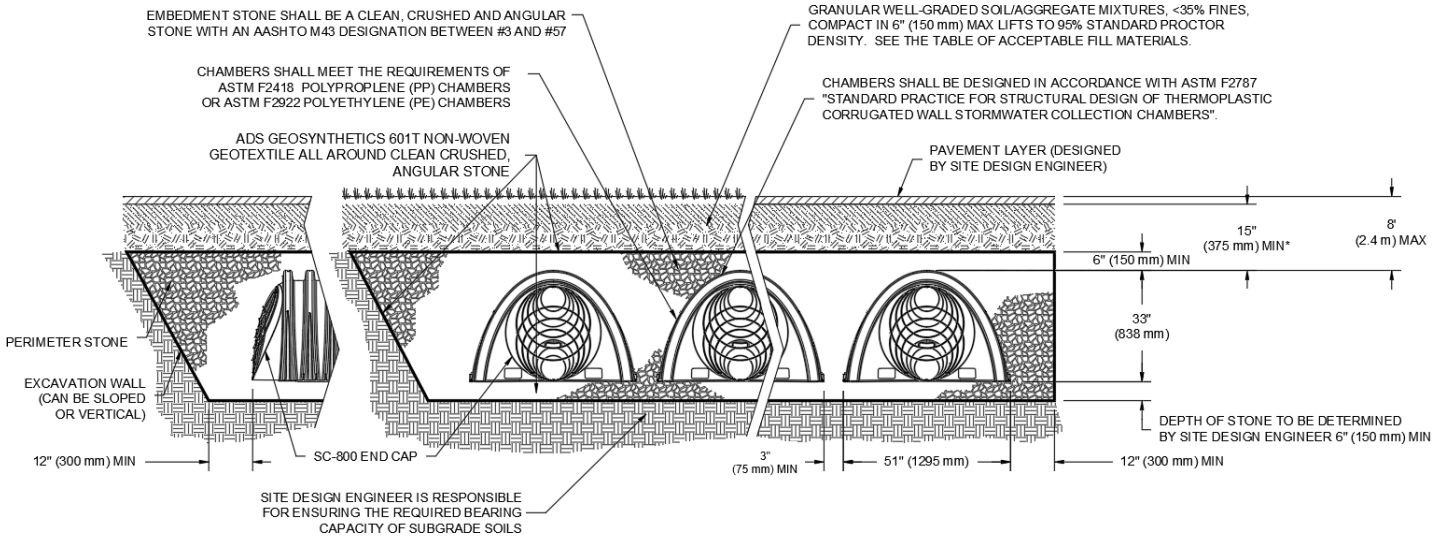
Results

System Volume and Bed Size

Installed Storage Volume:	193.15 cubic meters.
Storage Volume Per Chamber:	1.44 cubic meters.
Number of Chambers Required:	78
Number of End Caps Required:	12
Chamber Rows:	6
Maximum Length:	30.66 m.
Maximum Width:	8.95 m.
Approx. Bed Size Required:	274.20 square meters.
Average Cover Over Chambers:	N/A .

System Components

Amount Of Stone Required:	
(0% Overage):	201 cubic meters
(Cubic yard to ton factor:1.4):	367.14 tons
Volume of Excavation (Not Including Fill):	314 cubic meters
Total Non-woven Geotextile Required:	767 square meters
Woven Geotextile Required (excluding Isolator Row):	44 square meters
Woven Geotextile Required (Isolator Row):	53 square meters
Total Woven Geotextile Required:	97 square meters
Impervious Liner Required:	0 square meters



*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

Appendix G – Foul Water Network Calculations

Design Settings

Frequency of use (kDU)	0.00	Minimum Velocity (m/s)	0.75
Flow per dwelling per day (l/day)	2673	Connection Type	Level Soffits
Domestic Flow (l/s/ha)	0.0	Minimum Backdrop Height (m)	0.200
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	1.200
Additional Flow (%)	0	Include Intermediate Ground	✓

Nodes

Name	Dwellings	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
FW01	6	97.130	1200	643496.866	753538.772	1.350
FW02	6	96.570	1200	643529.617	753565.846	1.626
FW03	4	96.115	1200	643507.371	753597.732	1.894
FW04	4	95.780	1200	643550.231	753631.120	1.994
FW05	3	95.700	1200	643553.321	753642.392	2.008
FW06	3	95.422	1200	643530.768	753671.198	2.023
FW07		95.200	1200	643510.621	753696.096	2.057
FW08		95.110	1200	643498.879	753701.603	2.071
FW09		94.993	1200	643488.477	753708.140	2.052
FW10		95.075	1200	643494.093	753719.675	2.237
FW11	6	96.572	1200	643543.893	753574.415	1.350
FW12	15	96.000	1200	643501.343	753605.667	1.350
FW13		95.520	1200	643470.631	753645.607	1.710
FW14	3	95.400	1200	643472.821	753656.074	1.768

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
FW1.000	FW01	FW02	42.493	1.500	95.780	94.944	0.836	50.8	150
FW1.001	FW02	FW03	38.879	1.500	94.944	94.296	0.648	60.0	150
FW1.002	FW03	FW04	54.330	1.500	94.221	93.786	0.435	125.0	225
FW1.003	FW04	FW05	11.688	1.500	93.786	93.692	0.094	125.0	225
FW1.004	FW05	FW06	36.584	1.500	93.692	93.399	0.293	125.0	225
FW1.005	FW06	FW07	32.028	1.500	93.399	93.143	0.256	125.0	225
FW1.006	FW07	FW08	12.969	1.500	93.143	93.039	0.104	125.0	225
FW1.007	FW08	FW09	12.286	1.500	93.039	92.941	0.098	125.0	225
FW1.008	FW09	FW10	12.829	1.500	92.941	92.838	0.103	125.0	225
FW2.000	FW11	FW02	16.650	1.500	95.222	94.944	0.278	59.9	150

Name	Pro Vel @ 1/3 Q (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Depth (mm)	Pro Velocity (m/s)
FW1.000	0.247	1.230	21.7	0.2	1.200	1.476	0.000	6	0.0	0.0	10	0.362
FW1.001	0.332	1.132	20.0	0.6	1.476	1.669	0.000	18	0.0	0.0	17	0.480
FW1.002	0.270	1.026	40.8	0.7	1.669	1.769	0.000	22	0.0	0.0	21	0.379
FW1.003	0.284	1.026	40.8	0.8	1.769	1.783	0.000	26	0.0	0.0	22	0.401
FW1.004	0.284	1.026	40.8	0.9	1.783	1.798	0.000	29	0.0	0.0	23	0.411
FW1.005	0.296	1.026	40.8	1.0	1.798	1.832	0.000	32	0.0	0.0	24	0.422
FW1.006	0.296	1.026	40.8	1.0	1.832	1.846	0.000	32	0.0	0.0	24	0.422
FW1.007	0.345	1.026	40.8	1.5	1.846	1.827	0.000	50	0.0	0.0	30	0.490
FW1.008	0.345	1.026	40.8	1.5	1.827	2.012	0.000	50	0.0	0.0	30	0.490
FW2.000	0.227	1.133	20.0	0.2	1.200	1.476	0.000	6	0.0	0.0	10	0.333

Flow+ v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
FW3.000	FW12	FW13	50.383	1.500	94.650	93.810	0.840	60.0	150
FW3.001	FW13	FW14	10.693	1.500	93.810	93.632	0.178	60.0	150
FW3.002	FW14	FW08	52.459	1.500	93.632	93.114	0.518	101.3	150

Name	Pro Vel @ 1/3 Q (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Depth (mm)	Pro Velocity (m/s)
FW3.000	0.318	1.132	20.0	0.5	1.200	1.560	0.000	15	0.0	0.0	16	0.457
FW3.001	0.318	1.132	20.0	0.5	1.560	1.618	0.000	15	0.0	0.0	16	0.457
FW3.002	0.285	0.870	15.4	0.6	1.618	1.846	0.000	18	0.0	0.0	20	0.401

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
FW1.000	42.493	50.8	150	Circular	97.130	95.780	1.200	96.570	94.944	1.476
FW1.001	38.879	60.0	150	Circular	96.570	94.944	1.476	96.115	94.296	1.669
FW1.002	54.330	125.0	225	Circular	96.115	94.221	1.669	95.780	93.786	1.769
FW1.003	11.688	125.0	225	Circular	95.780	93.786	1.769	95.700	93.692	1.783
FW1.004	36.584	125.0	225	Circular	95.700	93.692	1.783	95.422	93.399	1.798
FW1.005	32.028	125.0	225	Circular	95.422	93.399	1.798	95.200	93.143	1.832
FW1.006	12.969	125.0	225	Circular	95.200	93.143	1.832	95.110	93.039	1.846
FW1.007	12.286	125.0	225	Circular	95.110	93.039	1.846	94.993	92.941	1.827
FW1.008	12.829	125.0	225	Circular	94.993	92.941	1.827	95.075	92.838	2.012
FW2.000	16.650	59.9	150	Circular	96.572	95.222	1.200	96.570	94.944	1.476
FW3.000	50.383	60.0	150	Circular	96.000	94.650	1.200	95.520	93.810	1.560
FW3.001	10.693	60.0	150	Circular	95.520	93.810	1.560	95.400	93.632	1.618
FW3.002	52.459	101.3	150	Circular	95.400	93.632	1.618	95.110	93.114	1.846

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
FW1.000	FW01	1200	Manhole	Adoptable	FW02	1200	Manhole	Adoptable
FW1.001	FW02	1200	Manhole	Adoptable	FW03	1200	Manhole	Adoptable
FW1.002	FW03	1200	Manhole	Adoptable	FW04	1200	Manhole	Adoptable
FW1.003	FW04	1200	Manhole	Adoptable	FW05	1200	Manhole	Adoptable
FW1.004	FW05	1200	Manhole	Adoptable	FW06	1200	Manhole	Adoptable
FW1.005	FW06	1200	Manhole	Adoptable	FW07	1200	Manhole	Adoptable
FW1.006	FW07	1200	Manhole	Adoptable	FW08	1200	Manhole	Adoptable
FW1.007	FW08	1200	Manhole	Adoptable	FW09	1200	Manhole	Adoptable
FW1.008	FW09	1200	Manhole	Adoptable	FW10	1200	Manhole	Adoptable
FW2.000	FW11	1200	Manhole	Adoptable	FW02	1200	Manhole	Adoptable
FW3.000	FW12	1200	Manhole	Adoptable	FW13	1200	Manhole	Adoptable
FW3.001	FW13	1200	Manhole	Adoptable	FW14	1200	Manhole	Adoptable
FW3.002	FW14	1200	Manhole	Adoptable	FW08	1200	Manhole	Adoptable

Flow+ v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
FW01	643496.866	753538.772	97.130	1.350	1200	0	FW1.000	95.780	150
FW02	643529.617	753565.846	96.570	1.626	1200	1	FW2.000	94.944	150
						2	FW1.000	94.944	150
						0	FW1.001	94.944	150
FW03	643507.371	753597.732	96.115	1.894	1200	1	FW1.001	94.296	150
						0	FW1.002	94.221	225
FW04	643550.231	753631.120	95.780	1.994	1200	1	FW1.002	93.786	225
						0	FW1.003	93.786	225
FW05	643553.321	753642.392	95.700	2.008	1200	1	FW1.003	93.692	225
						0	FW1.004	93.692	225
FW06	643530.768	753671.198	95.422	2.023	1200	1	FW1.004	93.399	225
						0	FW1.005	93.399	225
FW07	643510.621	753696.096	95.200	2.057	1200	1	FW1.005	93.143	225
						0	FW1.006	93.143	225
FW08	643498.879	753701.603	95.110	2.071	1200	1	FW3.002	93.114	150
						2	FW1.006	93.039	225
						0	FW1.007	93.039	225
FW09	643488.477	753708.140	94.993	2.052	1200	1	FW1.007	92.941	225
						0	FW1.008	92.941	225
FW10	643494.093	753719.675	95.075	2.237	1200	1	FW1.008	92.838	225
FW11	643543.893	753574.415	96.572	1.350	1200	0	FW2.000	95.222	150
FW12	643501.343	753605.667	96.000	1.350	1200	0	FW3.000	94.650	150
FW13	643470.631	753645.607	95.520	1.710	1200	1	FW3.000	93.810	150
						0	FW3.001	93.810	150

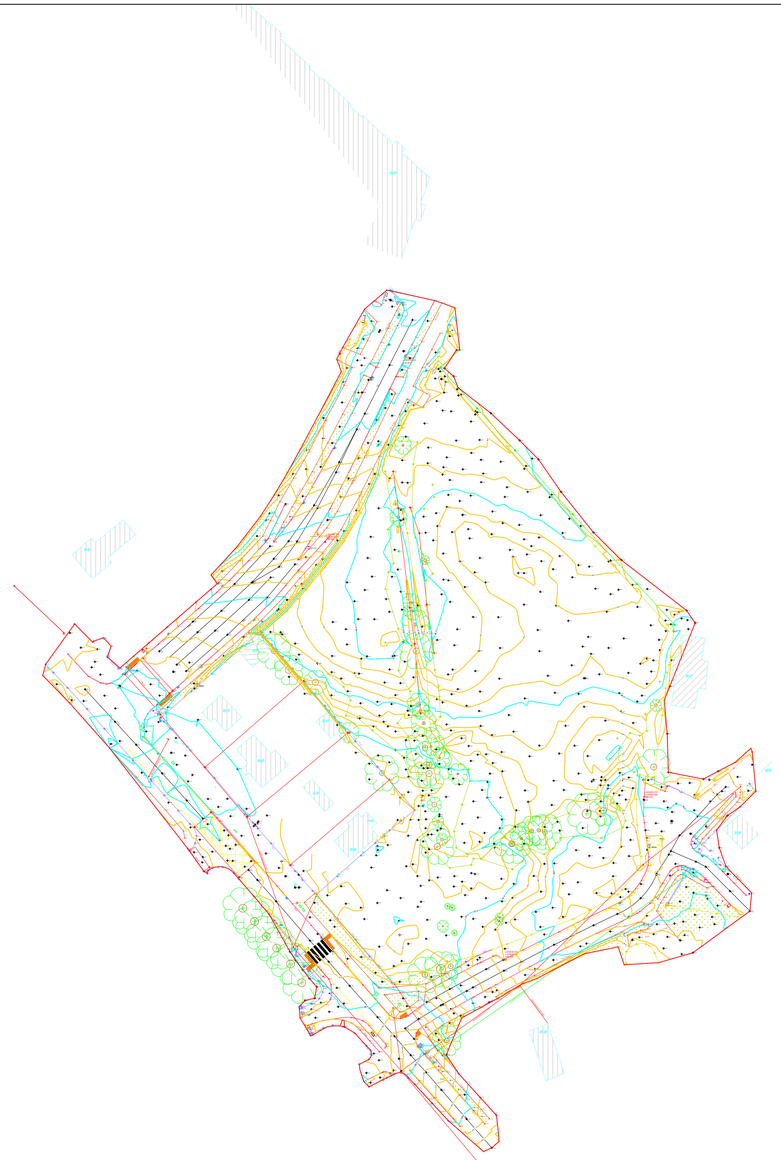
Flow+ v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
FW14	643472.821	753656.074	95.400	1.768	1200		1	FW3.001	93.632	150
							0	FW3.002	93.632	150

Flow+ v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Appendix H – Existing Topography



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.

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.

Legend

Fire Hydrant	Bottom of Bank	Top of Bank
Manhole	Building Line	
Gully	Path Edge	
Road Sign	Edge of Vegetation	
Lamp post	ESB Lines	
Water Meter	Fenceline	
Telegraph Pole	Wall Line	
Control Point	Hedgeline	
Top of Wall	Kerb Top	
Building	Kerb Bottom	
Vegetation	Road Centre Line	
Top of Fence	Top of Stockpile	
Tactile	Drain	

Date	Rev. No.	Description	Drawn by	Checked by	Approved by
12/01/25	1	For Information Purposes	PS	PS	OS
12/04/25	2	Updated	PS	PS	OS

Client

DRAFT

NOTES:

1. ITM Co-ordinates.
2. All levels relative to Malin Head Datum.
3. Contour interval 0.25 metres.
4. Although every effort has been made to survey all features, some may be missing due to obstructions.
5. Every effort has been made to survey features at regular intervals and retain their integrity.

Project Title:

Survey Site at Harbour Rd, Mullingar, Co. Westmeath.

Approved by O.Scally	Y
Checked by P.Scally	Y
Drawn by: P.Scally	Y

Drawing Title:

Topographical Survey

Scale: 1:1000

Date: 12th March 2025

Appendix I – OPW Past Flood Event Summary

Flooding at Mullingar Reginal Hospital car park and rear gardens of 6 houses on 16th August 2008

The information contained in this report has been extracted from a Flood Data Collection Form submitted to The Office Of Public Works (OPW) by Westmeath County Council.

- **Location and date of flood event:**

Location: Mullingar Regional Hospital car park.
National Grid Reference:
NGR – N 432 541
I

This flooding event started on 16th August 2008 it is not clear when it ended or when the peak flood occured.

- **Source and cause:**

The source of the flood waters was a river after heavy prolonged rainfall (and the cause was a channel blockage). The flooding occurred in the Brosna catchment, on the River Brosna.

Following period of heavy rainfall. The flooding was caussed by throttling effect that an inadequately sized culvert under adjacent railway line. The rear gardens of 6 no. houses were flooded.

- **Flood data:**

The following flood information was provided:

Flood Parameter	Max Value	Typical Value	Comments
Flood Level (metres OD Malin)			
Flood Depth (metres)	0.25		Hospital car park
Flood Flow (m^3/s)			
Flood Velocity (m/s)			

Flooding has occurred at this location before – occasionally.

- **Impacts of flooding event:**

It was recorded that this flooding event had the following impacts.

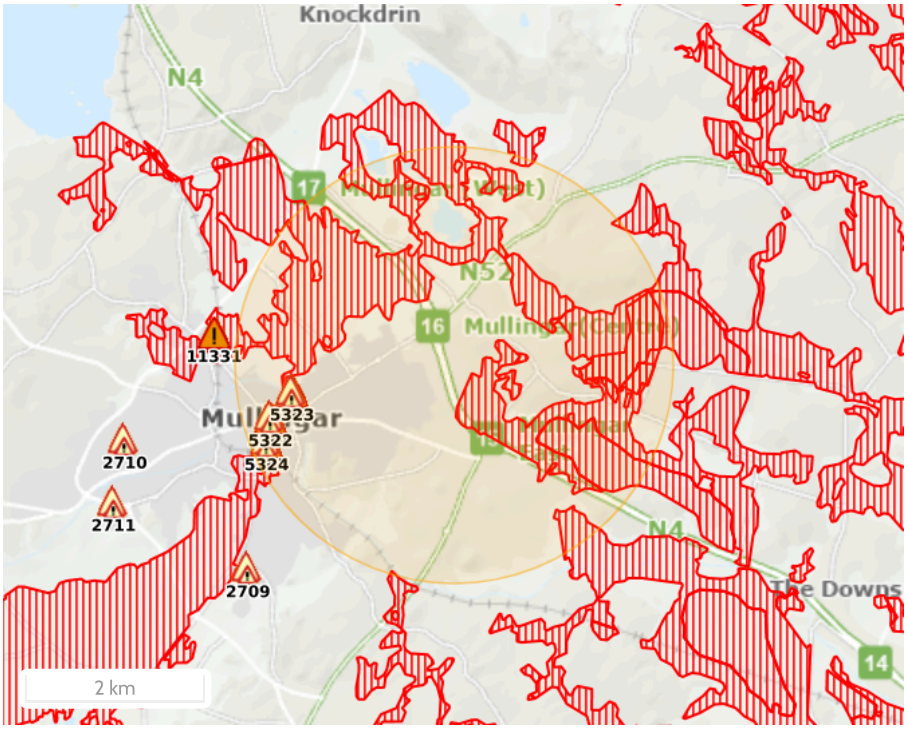
Impacts to property:
Residential – 6 houses had back gardens flooded.
Community – *car park of hospital was flooded to 0.25m.*

Past Flood Event Local Area Summary Report

Report Produced: **14/4/2026 10:12**

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

6 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Brosna Pearse St Mullingar Nov 1965 (ID-5322)	16/11/1965	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
2.	Springfield Aqueduct Mullingar Nov 1965 (ID-5323)	16/11/1965	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
3.	Bleach Yard Lynnsbury Tce Mullingar Nov 1965 (ID-5324)	16/11/1965	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
4.	Brosna Canal Aqueduct Mullingar Recurring (ID-2706)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
5.	Brosna Gaol Hill, Mullingar Recurring (ID-2707)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
6.	Brosna Austin Friar Pearse St Mullingar Recurring (ID-2708)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		

Appendix J – Mullingar Settlement Area Plan Draft (Relevant Pages)

DRAFT

MULLINGAR
Settlement Area Plan
2025-2031



WESTMEATH COUNTY COUNCIL
Comhairle Chontae na hIarmhí

Volume **5**
Strategic Flood Risk Assessment (SFRA)

Mullingar Settlement Area Plan

Strategic Flood Risk Assessment

1 July 2025

Prepared for:

WESTMEATH COUNTY COUNCIL
Comhairle Chontae na hIarmhí

www.jbaconsulting.ie

Document Status

Issue date	1 July 2025
Issued to	Westmeath County Council
BIM reference	MRE
Revision	S3-P06
Prepared by	Fiona Byrne BSc MSc Analyst
Reviewed by	Ross Bryant BSc MSc CEnv MCIWEM C.WEM Director
Authorised by	Bernadette O'Connell BA MSc CMLI Director

Carbon Footprint

JBA is committed to championing sustainability and has made The Ten Principles of the UN Global Compact part of its culture and operations. We have a Group-wide objective to be a Net Zero carbon emissions business.

The format of this report is optimised for reading digitally in pdf format; duplex printing in B&W on 100% post-consumer recycled A4 will result in a carbon footprint of 371g CO2e. This will increase to 472g CO2e if primary-source paper is used. Please consider the environment before printing.

Contract

JBA Project Manager	Ross Bryant
Address	24, Grove Island, Limerick, V94 312N
JBA Project Code	2024s0417

This report describes work commissioned by Westmeath County Council by an instruction dated (insert date in full). The Client's representative for the contract was (name of Client's Project Manager) of (insert Client). Ross Bryant and Fiona Byrne of JBA Consulting carried out this work.

Purpose and Disclaimer

Jeremy Benn Associates Limited ("JBA") has prepared this Report for the sole use of Westmeath County Council and its appointed agents in accordance with the Agreement under which our services were performed.

JBA has no liability for any use that is made of this Report except to Westmeath County Council for the purposes for which it was originally commissioned and prepared.

No other warranty, expressed or implied, is made as to the professional advice included in this Report or any other services provided by JBA. This Report cannot be relied upon by any other party without the prior and express written agreement of JBA.

The conclusions and recommendations contained in this Report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by JBA has not been independently verified by JBA, unless otherwise stated in the Report.

The methodology adopted and the sources of information used by JBA in providing its services are outlined in this Report. The work described in this Report was undertaken between ("date" and "date and Year") and is based on the conditions encountered and the information available during the said period. The scope of this Report and the services are accordingly factually limited by these circumstances.

Where assessments of works or costs identified in this Report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

JBA disclaims any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to JBA's attention after the date of the Report.

Certain statements made in the Report that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are based on reasonable assumptions as of the date of the Report, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. JBA specifically does not guarantee or warrant any estimates or projections contained in this Report.

Unless otherwise stated in this Report, the assessments made assume that the sites and facilities will continue to be used for their current purpose without significant changes.

Where field investigations are carried out, these have been restricted to a level of detail required to meet the stated objectives of the services. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant delay in issuing this Report.

Copyright

© Jeremy Benn Associates Limited 2025

Contents

1 Introduction 1
1.1 Terms of Reference 1
1.2 Report Structure 2

2 Mullingar Study Area 4
2.1 Introduction 4
2.2 Current Planning Policy 5

3 The Planning System and Flood Risk Management 7
3.1 Introduction 7
3.2 Definition of Flood Risk 7
3.3 Likelihood of Flooding 8
3.4 Consequences of Flooding 8
3.5 Definition of Flood Zones 9
3.6 Objectives and Principles of the Planning Guidelines 10
3.7 The Sequential Approach & Justification Test 10
3.8 Scales and Stages of Flood Risk Assessment 12

4 Data Collection and Review 13
4.1 Historic Flooding 17
4.2 Site Walkover 19
4.3 NIFM 19
4.4 GSI Groundwater Flood 20
4.5 CFRAM 22
4.6 Mullingar Flood Relief Scheme 26
4.7 Mullingar Sewerage Improvement Scheme 26

5 Sources of Flooding 28
5.1 Fluvial Flooding 28
5.2 Arterial Drainage Schemes 28
5.3 Pluvial Flooding 29
5.4 Flooding from Drainage Systems 30
5.6 Royal Canal 31
5.7 Groundwater Flooding 31

6 Flood Risk Management Policy 32
6.1 Flood Risk Policy Objectives 32
6.2 Stormwater Policy 33

7 Development Management and Flood Risk 35
7.1 Requirements for a Flood Risk Assessment 35
7.2 Drainage Design 36
7.3 Application for Development in Flood Zones A or B 36
7.4 Development Proposals in Flood Zone C 39
7.5 Key points for FRA for all types of developments 39
7.6 Incorporating Climate Change into Development Design 40
7.7 Flood Mitigation Measures at Site Design 42

8 Settlement Zoning Review 47
8.1 A Strategic Approach to Flood Risk Management 47
8.2 Town Centre 50
8.3 Robinstown 53
8.4 Mullingar Business Park 57
8.5 Rathgowan 59
8.6 Lynn/Clonmore 61
8.7 Mount Lynn 64

A Appendix A - Justification Tests 66
A.1 Mixed Use 66
A.2 Established Residential 70
A.3 Community, Educational & Institutional 74

List of Figures

Figure 2-1: Mullingar settlement and rivers 4

Figure 3-1: Source Pathway Receptor Model 7

Figure 3-2: Sequential Approach Principles in Flood Risk Management 11

Figure 4-1 Past Flood Events 19

Figure 4-2 SAR Seasonal Flood map 21

Figure 4-3 Historic Groundwater & Surface Water Flooding with predicted groundwater flooding 22

Figure 4-4 CFRAM Current Scenario Extents 23

Figure 4-5 CFRAM 1% AEP Present Day vs MFRS 24

Figure 4-6 CFRAM 0.1% AEP Present Day vs MFRS 24

Figure 4-7 CFRAM 1% AEP Present day vs HEFS 25

Figure 4-8 CFRAM 0.1% Present Day vs HEFS 25

Figure 4-9 Mullingar Flood Relief Scheme defended area 26

Figure 5-1 OPW Brosna Arterial Drainage Schemes 29

Figure 8-1 Overview map - Mullingar LUZ with Flood Zones 49

List of Tables

Table 3-1: Probability of Flooding 8

Table 3-2: Definition of Flood Zones 9

Table 3-3: Matrix of Vulnerability versus Flood Zone 12

Table 4-1: Available Flood Data for Flood Zone Development 13

Table 4-3 Flood History 17

Table 8-1: Zoning Objective Vulnerability 48

Abbreviations

1D	One Dimensional (modelling)
2D	Two Dimensional (modelling)
AEP	Annual Exceedance Probability
AFA	Area for Further Assessment
AONB	Area of Outstanding Natural Beauty
CFRAM	Catchment Flood Risk Assessment and Management
DoEHLG	Department of the Environment, Heritage and Local Government
FFL	Finished Floor Level
FRA	Flood Risk Assessment
FRR	Flood Risk Review
GDSDS	Greater Dublin Strategic Drainage Strategy
GSI	Geological Survey of Ireland
HEFS	High End Future Scenario
HPW	High Priority Watercourse
LA	Local Authority
LiDAR	Light Detection And Ranging
MRFS	Medium Range Future Scenario
OPW	Office of Public Works
PFRA	Preliminary Flood Risk Assessment
SAR	Synthetic Aperture Radar
SFRA	Strategic Flood Risk Assessment
SPR	Standard percentage runoff
SUDS	Sustainable Urban Drainage Systems
Tp	Time to Peak
WFD	Water Framework Directive
WMCC	Westmeath County Council

1 Introduction

JBA Consulting was appointed by Westmeath County Council to carry out the Strategic Flood Risk Assessment for Variation No. 1 to the Westmeath County Development Plan 2021.2027. The Variation comprises of two individual components, namely

(1) To incorporate a Settlement Area Plan for Mullingar under Volume 9 of the Westmeath County Development Plan 2021–2027.

(2) To integrate the Specific Planning Policy Requirements (SPPRs) from the Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities (2024) into the Westmeath County Development Plan 2021–2027.

The Settlement Plan is being introduced under Volume 9 of the Westmeath County Development Plan 2021–2027, providing a detailed framework to guide the sustainable growth and development of Mullingar. The integration of the Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities (2024) into the Westmeath County Development Plan 2021–2027, will ensure that the Westmeath County Development Plan 2021–2027 is fully aligned with the Specific Planning Policy Requirements (SPPRs) set out in the Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities 2024.

This report details the SFRA for this area and has been prepared in accordance with the requirements of the DoEHLG and OPW Planning Guidelines, The Planning System and Flood Risk Management[1]; these guidelines were issued under the Planning and Development Act 2000 and recognise the significance of proper planning to manage flood risk.

1.1 Terms of Reference

Under the "Planning System and Flood Risk Management" guidelines, the purpose for the SFRA is detailed as being *"to provide a broad (wide area) assessment of all types of flood risk to inform strategic land-use planning decisions. SFRAs enable the LA to undertake the sequential approach, including the Justification Test, allocate appropriate sites for development and identify how flood risk can be reduced as part of the development plan process".*

The Mullingar Settlement Area Plan will be the key document for setting out a vision for the development of Mullingar during the plan period.

It is important that the Plan fulfils the requirements of the document “The Planning System and Flood Risk Management Guidelines for Planning Authorities”

1 DoEHLG and OPW (2009) The Planning System and Flood Risk Management: Guidelines for Planning Authorities

(OPW/DoEHLG, 2009) which states that flood risk management should be integrated into spatial planning policies at all levels to enhance certainty and clarity in the overall planning process.

In order to ensure that flood risk is integrated into the Plan, the main requirements of the SFRA are to:

- Update the Flood Zone Mapping produced under the Mullingar Local Area Plan 2014-2020.
- Prepare a Stage 2 - Flood Risk Assessment of Mullingar in particular in relation to location and type of zoning and land-use proposals, with a focus on new or changed zoning compared with the current plan.
- Review and update the policy guidance within the SFRA in compliance with OPW/DoEHLG – "The Planning System and Flood Risk Management –Guidelines for Planning Authorities (OPW/DoEHLG, 2009)".
- Take cognisance of the Westmeath County Council Climate Adaptation Strategy 2019-2024, the National Climate Adaptation Framework and the various environmental and visual designations applicable to Mullingar.
- Advise on zonings/land use-proposals and appropriate mitigation measures, assess and report on any submissions received as part of both the preparation and the public consultation stage of the plan, as they relate to flood risk.

1.2 Report Structure

This study considers the development strategy that will form part of the Mullingar Settlement Area Plan. The context of flood risk in Mullingar is considered with specific reference to a range of flood sources, including fluvial, pluvial, groundwater, sewer and canals.

A two-stage assessment of flood risk was undertaken, as recommended in 'The Planning System and Flood Risk Management' guidelines, for the area that lies within the development boundary of the Mullingar Settlement Area Plan.

Historical records and recent events demonstrate that Mullingar has a history of flooding and confirms that a proportion of zoned lands are at flood risk. There is one existing flood relief scheme for Mullingar, so the SFRA must also ensure that development within Flood Zones A/B is sustainably managed.

The second stage and the main purpose of this SFRA report is to appraise the adequacy of existing information, to prepare a Flood Zone map, based on available data, and to highlight potential development areas that require application of the Justification Test and/or more detailed assessment on a site specific level. The SFRA also provides guidelines for development within areas at potential risk of flooding, and specifically looks at flood risk and the potential for development within a number of key sites in Mullingar.

Section 2 of this report provides an introduction to the study area and Section 3 discusses the concepts of flooding, Flood Zones and flood risk.

In Section 4 the available data related to flooding is summarised and appraised and outlines the sources of flooding to be considered, based on the review of available data. This section also considers any flood management assets that are in place or planned. Section 4.6 summarises the key sources of flooding.

Following this, Section 6 outlines the flood risk management policy and Section 7 provides guidance and suggested approaches to managing flood risk to development; the contents of this section will be of particular use in informing the policies and objectives within the Settlement Area Plan.

Section 8 contains the review of land use zoning objectives across the settlement it also summarises the application of the Justification Test to which specific responses are included in the Appendix.

2 Mullingar Study Area

2.1 Introduction

The primary watercourse in the Mullingar area is the River Brosna, which flows from Lough Owel in a south-westerly direction through the town into Lough Ennell. From Lough Ennell the Brosna flows through Kilbeggan, Clare, Ballycumber and Pullough before joining the Silver River east of Ferbane. The River Brosna is located within the Lower Shannon (Brosna) catchment, which has a catchment area of 1,248km². The catchment is relatively low lying and is subject to extensive arterial drainage works. The area adjoining the River Brosna to the south of the town, comprises of benefitting lands. Tributaries of the Brosna include Saranstown Stream, Lough Sheever Stream and the Boardstown Stream.

The Royal Canal also flows through Mullingar and is fed by a channel that flows from Lough Owel.

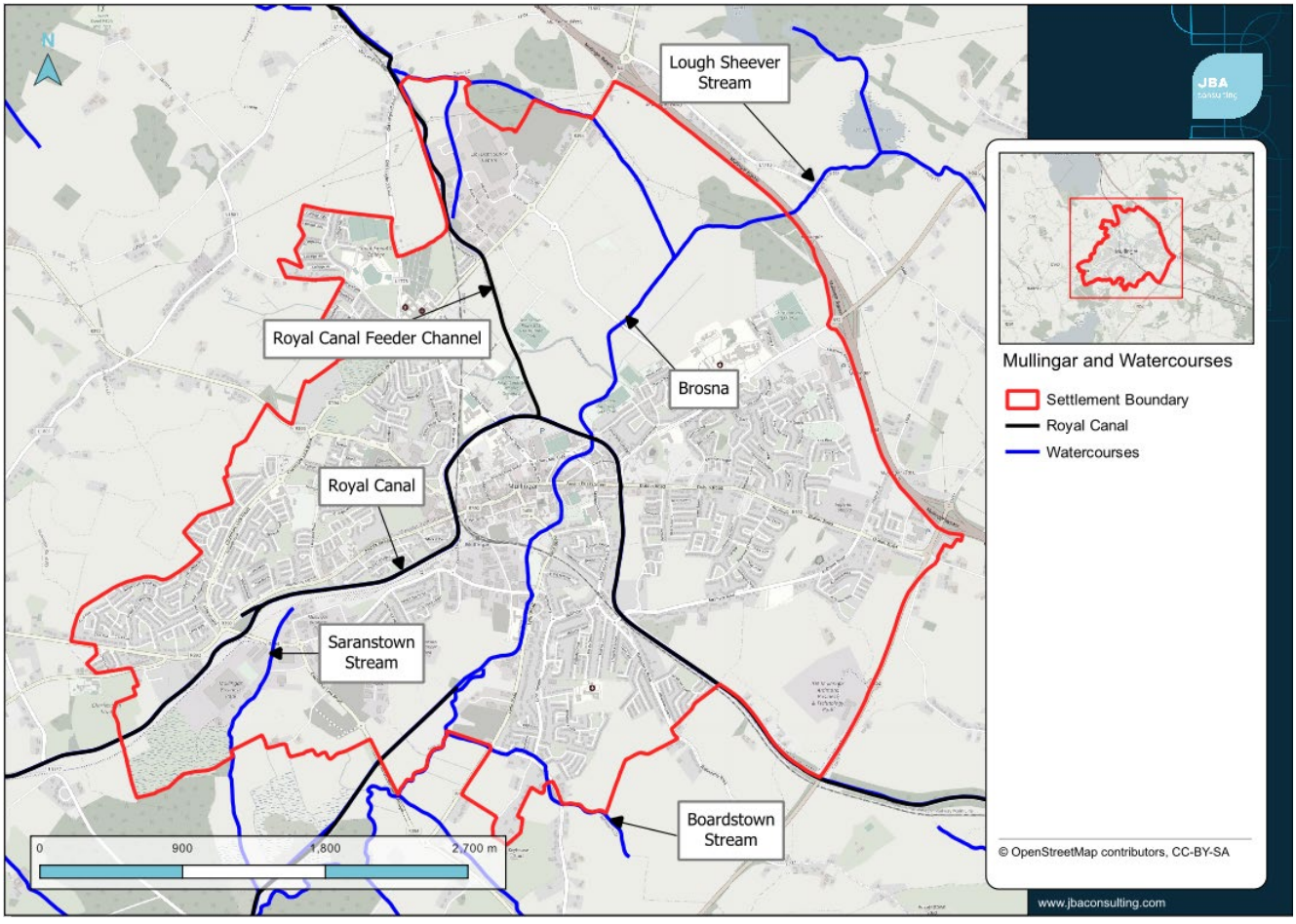


Figure 2-1: Mullingar settlement and rivers

2.2 Current Planning Policy

2.2.1 Ireland 2040 – National Planning Framework

A Strategic Flood Risk Assessment of the National Policy Objectives (NPO) within the Ireland 2040 – National Planning Framework was undertaken with the aim of ensuring that flood risk is a key consideration in delivering the proposed strategic sustainable land-use planning decisions. It sets out how all levels of the planning process, from national level strategic assessments to individual planning applications, should follow the sequential approach set out in the 2009 Guidelines on Planning and Flood Risk Management.

The NPF recognises that it is not always possible to avoid developing in flood risk areas due to spatial, economic, environmental and physical constraints. Development should be encouraged to continue, and in flood risk areas should follow the sequential approach and application of Justification Test set out in the Department's Guidelines on the Planning System and Flood Risk Management. These guidelines will facilitate the integration of flood risk and land use planning in the Eastern and Midland region, at all tiers of the planning hierarchy from national level through regional, city/county and local plans, masterplans and individual planning applications.

2.2.2 Regional Spatial & Economic Strategy (RSES)

The main purpose of the Regional Spatial and Economic Strategy (RSES) is to support the implementation of the NPF and wider Project Ireland 2040 aspirations. The RSES also supports the economic policies and objectives of the Government by providing a detailed strategic planning and economic framework for the development of the Midland Region. As Westmeath forms part of the Midlands Region, the plan must comply with the provisions of the Eastern & Midland Regional Assembly RSES. The RSES provides a framework for the development of the region up to 2031. It focuses on the delivery of housing, job creation, infrastructure, community facilities and ensuring that the region remains attractive for investment. Mullingar is identified as a key town which provides an anchor for employment in Westmeath.

The settlement hierarchy selected by the RSES takes account of the fact that while Mullingar is vulnerable to fluvial flooding, wider, effective management of flood risk coupled with wider environmental, sustainability and economic considerations mean that it is possible to facilitate the continued consolidation of the development of the existing urban structure of the region. In line with the sequential and justification criteria set out in the Department's Guidelines on the Planning System and Flood Risk Management it is considered that these locations should be encouraged to continue to consolidate and to grow in order to bring about a more compact and sustainable urban development form while at the same time managing flood risk appropriately. These guidelines outline measures through which both the flood risk and the continued

development of Westmeath's Regional Centre of Athlone and the key town of Mullingar can be reconciled.

The RSES included a number of development plan implications:

- An integrated approach to river catchment management is essential to manage and avoid increasing flood risk. Local authorities should fully support the completion of CFRAM studies and jointly implement any actions identified.
- Future statutory land use plans shall include Strategic Flood Risk Assessments and all future zoning of land for development in areas at risk of flooding should follow the sequential approach set out in the 2009 Department Guidelines on Planning and Flood Risk Management.
- Future statutory land use plans should include policies on the requirement for Sustainable Drainage Systems (SuDS) in future developments as a major component of flood management and prevention.

2.2.3 The Westmeath County Development Plan 2021-2027

The current Westmeath County Development Plan covers the period 2021-2027. The plan sets out compliance with the National Planning Framework and the Regional Spatial and Economic Strategies. As part of the Westmeath County Development Plan 2021-2027 a Strategic Flood Risk Assessment was undertaken in accordance with the Planning System and Flood Risk Management Guidelines for Planning Authorities (2009). The purpose of the SFRA is to identify flooding or surface water management issues related to the County to inform strategic land use planning decisions, as such the key flooding and stormwater policy from the CDP is also applied at Plan level.

The Westmeath County Development Plan (WCDP) 2021-2027 considered flood risk in reference to people, business, infrastructure, and the environment at risk of flooding. The WCDP proposed to minimize the risk of flooding through the identification and management of existing and particularly potential future flood risks. The SFRA proposed this be completed by following the sequential approach and application of the Justification Test set out in the 2009 Guidelines on Planning and Flood Risk Management (DoEHLG) throughout the planning process.

3 The Planning System and Flood Risk Management

3.1 Introduction

Prior to discussing the management of flood risk, it is helpful to understand what is meant by the term. It is also important to define the components of flood risk in order to apply the principles of the Planning System and Flood Risk Management in a consistent manner.

The Planning System and Flood Risk Management: Guidelines for Planning Authorities, published in November 2009, describe flooding as a natural process that can occur at any time and in a wide variety of locations. Flooding can often be beneficial, and many habitats rely on periodic inundation. However, when flooding interacts with human development, it can threaten people, their property and the environment.

This Section will firstly outline the definitions of flood risk and the Flood Zones used as a planning tool; a discussion of the principles of the planning guidelines and the management of flood risk in the planning system will follow.

3.2 Definition of Flood Risk

Flood risk is generally accepted to be a combination of the likelihood (or probability) of flooding and the potential consequences arising. Flood risk can be expressed in terms of the following relationship:

Flood Risk = Probability of Flooding x Consequences of Flooding

The assessment of flood risk requires an understanding of the sources, the flow path of floodwater and the people and property that can be affected. The source - pathway - receptor model, shown below in Figure 3-1, illustrates this and is a widely used environmental model to assess and inform the management of risk.

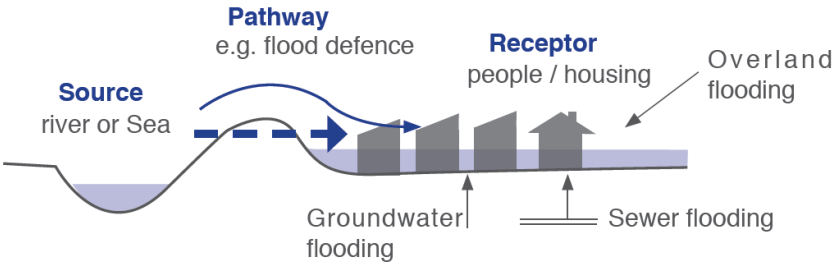


Figure 3-1: Source Pathway Receptor Model

Source: Figure A1 The Planning System and Flood Risk Management Guidelines Technical Appendices

Principal sources of flooding are rainfall or higher than normal sea levels while the most common pathways are rivers, drains, sewers, overland flow and river and coastal floodplains and their defence assets. Receptors can include people, their property and the environment. All three elements must be present for flood risk to arise. Mitigation measures, such as defences or flood resilient construction, have little or no effect on sources of flooding but they can block or impede pathways or remove receptors.

The planning process is primarily concerned with the location of receptors, taking appropriate account of potential sources and pathways that might put those receptors at risk.

3.3 Likelihood of Flooding

Likelihood or probability of flooding of a particular flood event is classified by its annual exceedance probability (AEP) or return period (in years). A 1% AEP flood indicates the flood event that will occur or be exceeded on average once every 100 years and has a 1 in 100 chance of occurring in any given year.

Return period is often misunderstood to be the period between large flood events rather than an average recurrence interval. Annual exceedance probability is the inverse of return period as shown in Table 3-1.

Table 3-1: Probability of Flooding

Return Period (Years)	Annual Exceedance Probability (%)
2	50
100	1
200	0.5
1000	0.1

Considered over the lifetime of development, an apparently low-frequency or rare flood has a significant probability of occurring. For example:

A 1% flood has a 22% (1 in 5) chance of occurring at least once in a 25-year period - the period of a typical residential mortgage;

And a 53% (1 in 2) chance of occurring in a 75-year period - a typical human lifetime.

3.4 Consequences of Flooding

Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality) and the vulnerability of receptors (type of development, nature, e.g. age-structure, of the population, presence and reliability of mitigation measures etc).

The Planning System and Flood Risk Management guidelines provide three vulnerability categories, based on the type of development, which are detailed in Table 3.1 of the Guidelines, and are summarised as:

Highly vulnerable, including residential properties, essential infrastructure and emergency service facilities;

Less vulnerable, such as retail and commercial and local transport infrastructure;

Water compatible, including open space, outdoor recreation and associated essential infrastructure, such as changing rooms.

3.5 Definition of Flood Zones

In the Planning System and Flood Risk Management guidelines, Flood Zones are used to indicate the likelihood of a flood occurring. These Zones indicate a high, moderate or low probability of flooding from fluvial or tidal sources and are defined below in Table 3-2.

It is important to note that the definition of the Flood Zones is based on an undefended scenario and does not take into account the presence of flood protection structures such as flood walls or embankments. This is to allow for the fact that there is a residual risk of flooding behind the defences due to overtopping or breach and that there may be no guarantee that the defences will be maintained in perpetuity.

It is also important to note that the Flood Zones indicate flooding from fluvial and tidal sources and do not take other sources, such as groundwater or pluvial, into account, so an assessment of risk arising from such sources should also be made.

Table 3-2: Definition of Flood Zones

Zone	Description
Zone A High probability of flooding.	This zone defines areas with the highest risk of flooding from rivers (i.e. more than 1% probability or more than 1 in 100) and the coast (i.e. more than 0.5% probability or more than 1 in 200).
Zone B Moderate probability of flooding.	This zone defines areas with a moderate risk of flooding from rivers (i.e. 0.1% to 1% probability or between 1 in 100 and 1 in 1000) and the coast (i.e. 0.1% to 0.5% probability or between 1 in 200 and 1 in 1000).
Zone C Low probability of flooding.	This zone defines areas with a low risk of flooding from rivers and the coast (i.e. less than 0.1% probability or less than 1 in 1000).

3.6 Objectives and Principles of the Planning Guidelines

The Planning System and Flood Risk Management Guidelines describe good flood risk practice in planning and development management. Planning authorities are directed to have regard to the guidelines in the preparation of Development Plans and Settlement Area Plans, and for development management purposes.

The objective of the Planning System and Flood Risk Management Guidelines is to integrate flood risk management into the planning process, thereby assisting in the delivery of sustainable development. For this to be achieved, flood risk must be assessed as early as possible in the planning process. Paragraph 1.6 of the Guidelines states that the core objectives are to:

- "Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface run-off;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management".
- The guidelines aim to facilitate 'the transparent consideration of flood risk at all levels of the planning process, ensuring a consistency of approach throughout the country.' SFRAs therefore become a key evidence base in meeting these objectives.

The 'Planning System and Flood Risk Management' works on a number of key principles, including:

- Adopting a staged and hierarchical approach to the assessment of flood risk;
- Adopting a sequential approach to the management of flood risk, based on the frequency of flooding (identified through Flood Zones) and the vulnerability of the proposed land use.

3.7 The Sequential Approach & Justification Test

Each stage of the Flood Risk Assessment (FRA) process aims to adopt a sequential approach to management of flood risk in the planning process.

Where possible, development in areas identified as being at flood risk should be avoided; this may necessitate de-zoning lands within the development plan. If de-zoning is not possible, then rezoning from a higher vulnerability land use, such as residential, to a less vulnerable use, such as open space may be required.

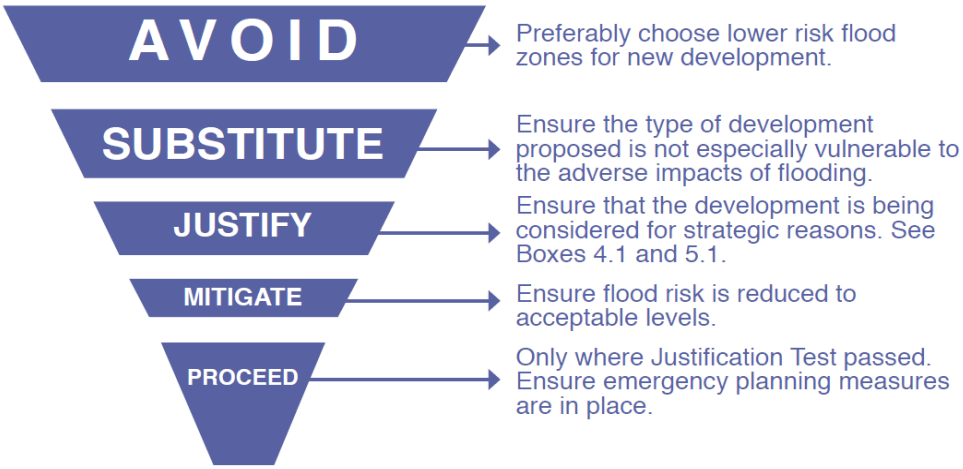


Figure 3-2: Sequential Approach Principles in Flood Risk Management
Source: The Planning System and Flood Risk Management (Figure 3.1)

Where rezoning is not possible, exceptions to the development restrictions are provided for through the application of the Justification Test. Many towns have central areas that are affected by flood risk and have been targeted for growth. To allow the sustainable and compact development of these urban centres, development in areas of flood risk may be considered necessary. For development in such areas to be allowed, the Justification Test must be passed.

The Justification Test has been designed to rigorously assess the appropriateness, or otherwise, of such developments. The test is comprised of two processes; the Plan-making Justification Test, and the Development Management Justification Test. The latter is used at the planning application stage where it is intended to develop land that is at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be considered inappropriate for that land.

Table 3-3 shows which types of development, based on vulnerability to flood risk, are appropriate land uses for each of the Flood Zones. The aim of the SFRA is to guide development zonings to those which are 'appropriate' and thereby avoid the need to apply the Justification Test.

Table 3-3: Matrix of Vulnerability versus Flood Zone

	Flood Zone A High Probability	Flood Zone B Moderate Probability	Flood Zone C Low Probability
Highly Vulnerable Development (Including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less Vulnerable Development	Justification Test	Appropriate	Appropriate
Water-Compatible Development	Appropriate	Appropriate	Appropriate

3.8 Scales and Stages of Flood Risk Assessment

Within the hierarchy of regional, strategic and site-specific flood-risk assessments, a tiered approach ensures that the level of information is appropriate to the scale and nature of the flood-risk issues and the location and type of development proposed, avoiding expensive flood modelling and development of mitigation measures where it is not necessary. The stages and scales of flood risk assessment comprise of:

Regional Flood Risk Assessment (RFRA) – a broad overview of flood risk issues across a region to influence spatial allocations for growth in housing and employment and to identify where flood risk management measures may be required at a regional level to support the proposed growth. This should be based on readily derivable information and undertaken to inform the Regional Planning Guidelines.

Strategic Flood Risk Assessment (SFRA) – an assessment of all types of flood risk informing land use planning decisions. This will enable the Planning Authority to allocate appropriate sites for development, whilst identifying opportunities for reducing flood risk. This SFRA will revisit and develop the flood risk identification undertaken in the RFRA and give consideration to a range of potential sources of flooding. An initial flood risk assessment, based on the identification of Flood Zones, will also be carried out for those areas zoned for development. Where the initial flood risk assessment highlights the potential for a significant level of flood risk, or there is conflict with the proposed vulnerability of development, then a site-specific FRA will be recommended, which will necessitate a detailed flood risk assessment.

Site Specific Flood Risk Assessment (FRA) – site or project specific flood risk assessment to consider all types of flood risk associated with the site and propose appropriate site management and mitigation measures to reduce flood risk to and from the site to an acceptable level. If the previous tiers of study have not been undertaken to appropriate levels of detail, it is highly likely that the site-specific FRA will require detailed channel and site survey, and hydraulic modelling.

4 Data Collection and Review

This section reviews the data collection and the flood history for the settlements so that any additional information on flooding can be included within this SFRA. It will confirm the extent of extreme flooding (through the Flood Zone mapping) and key sources of flood risk.

Table 4-1: Available Flood Data for Flood Zone Development

Description	Coverage	Robustness	Comment on usefulness
Shannon CFRAM Flood Mapping	Covers the River Brosna and tributaries	High AFA status	Detailed 1D/2D CFRAM HPW model and is useful. Site verified by walkover and consultation with local authority. In general, CFRAM provides all information needed to apply the Justification Test (JT) for Plan Making under the SFRA.

Description	Coverage	Robustness	Comment on usefulness
National Indicative Fluvial Mapping (OPW)	Limited coverage to small watercourses on the periphery of the settlement. The study did not model catchments <5km2. See OPW user guide for more details.	Moderate -	The National Indicative Fluvial Maps is broadscale in nature and based on remotely sensed ground models. It has been used to form the basis of Flood Zones where CFRAM or other detailed modelling study is not available. Has been used as an initial screening tool for flood extents and should be reviewed as part of site specific FRAs. There is no modelled water level or depth associated with this dataset. NIFM cannot be used to make zoning decisions without validation through site visits. Further site investigation has been undertaken to provide greater confidence in the outlines and inform the land use zoning decisions, where applicable.
Historical Flood Event Outlines	Coverage of most of Settlement Plan area from 2009 flood event	Moderate	Used indirectly to validate flood zones. Useful background information for flooding in specific areas of the settlement.
JBA Vision Flood Mapping	Covers Saranstown Stream	Moderate	30m flood map. 2D model for stream not covered in CFRAM modelling and represents the best available dataset for the area.
Desktop study flood mapping	Covers arterial drainage channels in some areas	Low	Flood mapping estimated using historical data, topological data and soils data.

Description	Coverage	Robustness	Comment on usefulness
Bespoke models from Site Specific Flood Risk Assessments	Covers arterial drainage channels in some areas.	Moderate/High	Local detailed studies carried out be competent flood risk professionals have been reviewed and approved for use in come areas.

Table 4-2 Other Available Data

Description	Coverage	Robustness	Comment on usefulness
GSi Groundwater and Surface Water flood information	Full Study Area	Moderate	Provides both historic and predictive flood extents for groundwater and historic surface water flooding.
Alluvial Soils Maps	Full Study Area	Low	Used to provide indication of risk in areas with no other mapping available.
Groundwater vulnerability maps	Broadscale, County wide	Moderate	Initial assessment of groundwater vulnerability. Provides a screening tool for use in FRA.
Site Walkover	Specific areas of interest	Moderate	Helpful for assessing flood risk in areas where mapping is unavailable. Used to verify existing mapping.
Historic Flood Records including photos, aerial photos and reports.	Coverage of most of Settlement Plan area from 2009 flood event and spot coverage for other events	Various	Highly useful oversight of historic flooding issues provided by Local Authority.
LiDAR height model	Mullingar area	High	Aerial survey is used to appraise the topography and identify low spots, floodplain and areas potentially susceptible to flooding.

As set out in the RSES Regional Flood Risk Appraisal Report, and under the Planning Guidelines, the Flood Zone mapping for Mullingar is principally derived from the CFRAM where possible. Watercourses not covered by the CFRAM and in this case a range of other datasets, as shown in Table 4-1 and Table 4-2, were used as supplementary information to inform this SFRA, where necessary.

All sources of available flood mapping were reviewed and the best available dataset is used.

Specific guidance is provided for each area of Mullingar based on the data review and the site visit is used to confirm the most appropriate dataset and flood extents to define the Flood Zones. During the site visit (attended by Local Authority Engineers and

Planners) the flood mapping was appraised on site by an experienced flood risk manager and professional opinion and judgement has been used to develop the recommendations within the Settlement Review of Section 8.

The review of the suite of flood risk data has been developed as a spatial planning tool to guide WMCC in making land-use zoning and development management decisions in Mullingar. The data sets have been deemed appropriate for the planning decisions being made at this stage of the plan making process and where flood risk is identified the following approach has been undertaken;

- Application of the Justification Test and/or;
- Further detailed analysis, or;
- Rezoning to a less vulnerable use, or;
- Further assessment at Development Management stage in limited circumstances where it has been determined that development should be possible in principle, taking into account a site specific opinion.

Where CFRAM modelling has been carried out (on the Brosna River), flood levels are available at selected node points along the watercourse. Once an appropriate level of validation has been undertaken as part of the site-specific FRA, these flood levels may be used to form the basis of the development design.

4.1 Historic Flooding

A number of areas in Mullingar have been affected by flooding historically. Several sources were consulted to identify previous flood events including the OPW floodinfo.ie website, newspaper articles and previous flood studies. Floodinfo.ie provides information on historical flood events across the country and formed the basis of the Regional Flood Risk Assessment. Information is provided in the form of reports and newspaper articles which generally relate to rare and extreme events.

Table 4-3 Flood History

Location	Start Date	Description
Clonmore, Mullingar	Recurring	A Tributary of the River Brosna overflows its banks upstream of the road culvert every year after heavy rain.
Ballinderry, Mullingar	Recurring	A Tributary of the River Brosna overflows its banks upstream of the road culvert every year after heavy rain. Road is liable to flood.
Austin Friar Pearse St Mullingar	Recurring	The River Brosna overflows its banks upstream of the road culvert every year after heavy rain. Properties are affected.
Brosna Gaol Hill, Mullingar Recurring	Recurring	The River Brosna overflows its banks upstream of the road culvert every year after heavy rain

Location	Start Date	Description
Brosna Canal Aqueduct Mullingar Recurring	Recurring	The River Brosna overflows its banks upstream of the canal aqueduct every year after heavy rain
Grange, Mullingar	Recurring	A Tributary of the River Brosna overflows its banks upstream of the road culvert every year after heavy rain.
Brosna, Pearse St. Mullingar	Nov 1965	Significant flooding across Mullingar after extreme rainfall with return period of less than 5.1%
Springfield Aqueduct Mullingar	Nov 1965	Significant flooding across Mullingar after extreme rainfall with return period of less than 5.1%
Bleach Yard Lynnbury Tce Mullingar	Nov 1965	Significant flooding across Mullingar after extreme rainfall with return period of less than 5.1%
Royal Canal, Mullingar	1967	Flooding due to overtopping of Royal Canal
Bleach Yard & Lynn Road, Mullingar	1987	Flooding due to bridge blockage at Pearse Street.
Pearse St., Mullingar	1995	Flood due to bridge blockage after rainfall with return period of an estimated 16.5% AEP
Regional Hospital Car Park, Mullingar	Aug 2008	Following period of heavy rainfall. The flooding was caused by a throttling effect that an inadequately sized culvert under adjacent railway line. The rear gardens of 6 no. houses were flooded.

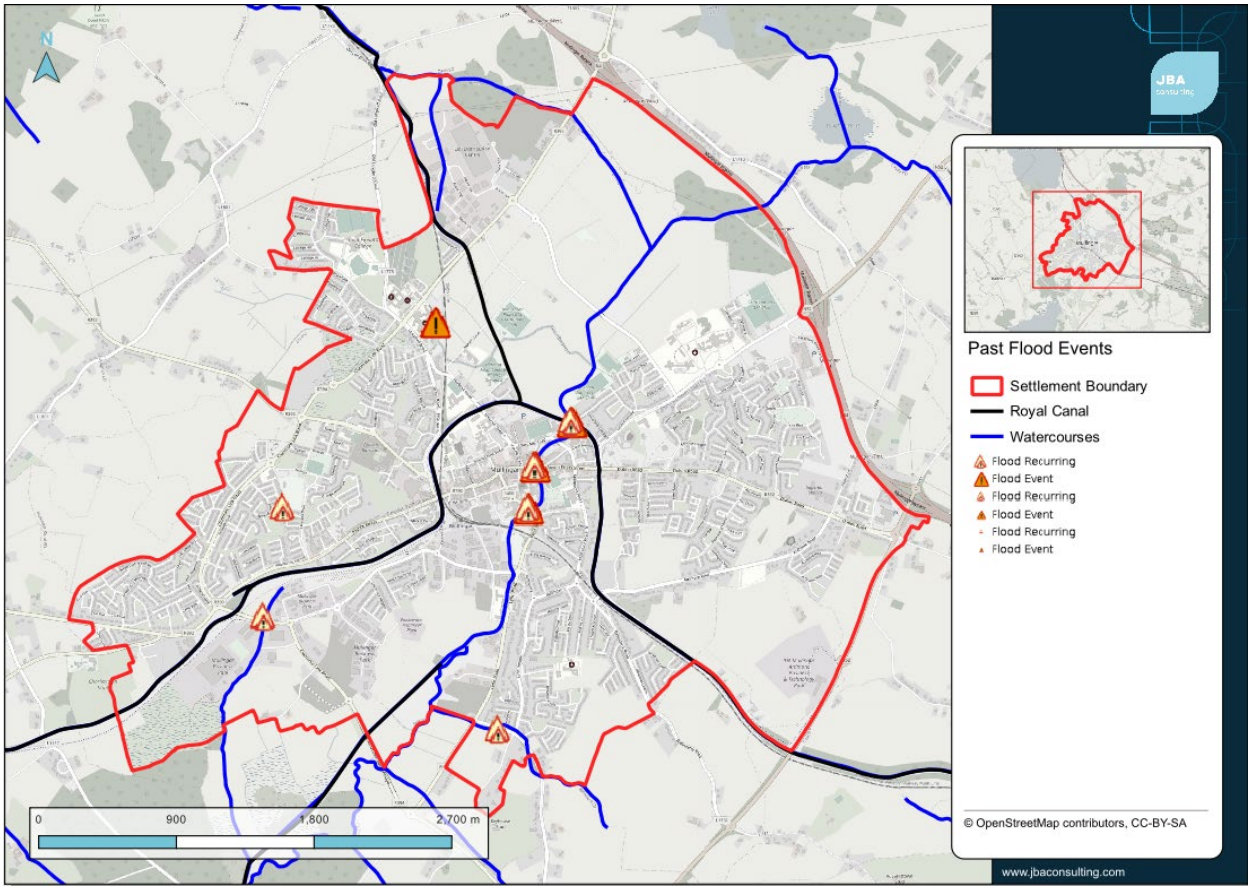


Figure 4-1 Past Flood Events

4.2 Site Walkover

As part of the SFRA process a site walkover and consultation was undertaken in Mullingar by an experienced Flood Risk Manager alongside the Local Authority Engineer. The site walkover took place on 12/12/2024 and aimed to assess risks presented by potentially unmapped watercourses and to verify CFRAM and other flood mapping.

The walkover took place at specific locations throughout Mullingar based on CFRAM mapping, NIFM mapping and the previous walkover. Culverts and unmapped watercourses were also assessed. The CFRAM mapping and previous SFRA were also found to be in agreement with observations made during the walkover.

4.3 NIFM

The OPW NIFM fluvial flood extents cover watercourses where CFRAM flood outlines are not provided and where the catchment is greater than 5km^2. The quality of the flood extents are lower than the CFRAM and do not include flood level information. There is one NIFM watercourse within the settlement boundary of Mullingar – the upper reach of the Boardstown Stream.

4.4 GSI Groundwater Flood

The winter of 2015/2016 saw the most extensive groundwater flooding ever witnessed in Ireland. The lack of data on groundwater flooding and fit-for-purpose flood hazard maps were identified as serious impediments to managing groundwater flood risk in vulnerable communities. Geological Survey Ireland - in collaboration with Trinity College Dublin and Institute of Technology Carlow - initiated the groundwater flood project GWFlood to address these deficits. Data available as a result of the project include national-scale flood maps for both historic and predictive groundwater flooding.

The Seasonal SAR flood map in Figure 4-2 is primarily based on the winter 2015/2016 flood event, which in most areas represented the largest surface or groundwater flood event on record. The map was produced based on the SAR imagery of the 2015/2016 event as well as any available supplementary evidence.

The predictive and max historic groundwater flood map is displayed in Figure 4-3 and shows that there are no areas of predicted groundwater flood flooding within the Plan boundary. The map presents the probabilistic flood extents for locations of recurrent karst groundwater flooding. It consists of a series of stacked polygons at each site representing the flood extent for specific AEP's mapping floods that are expected to occur every 10, 100 and 1000 years (AEP of 0.1, 0.01, and 0.001 respectively). The map is focussed primarily (but not entirely) on flooding at seasonally inundated wetlands known as turloughs. Sites were chosen for inclusion in the predictive map based on existing turlough databases as well as manual interpretation of SAR imagery.

The mapping process tied together the observed and SAR-derived hydrograph data, hydrological modelling, stochastic weather generation and extreme value analysis to generate predictive groundwater flood maps for over 400 qualifying sites. It should be noted that not all turloughs are included in the predictive map as some sites could not be successfully monitored with SAR and/or modelled.

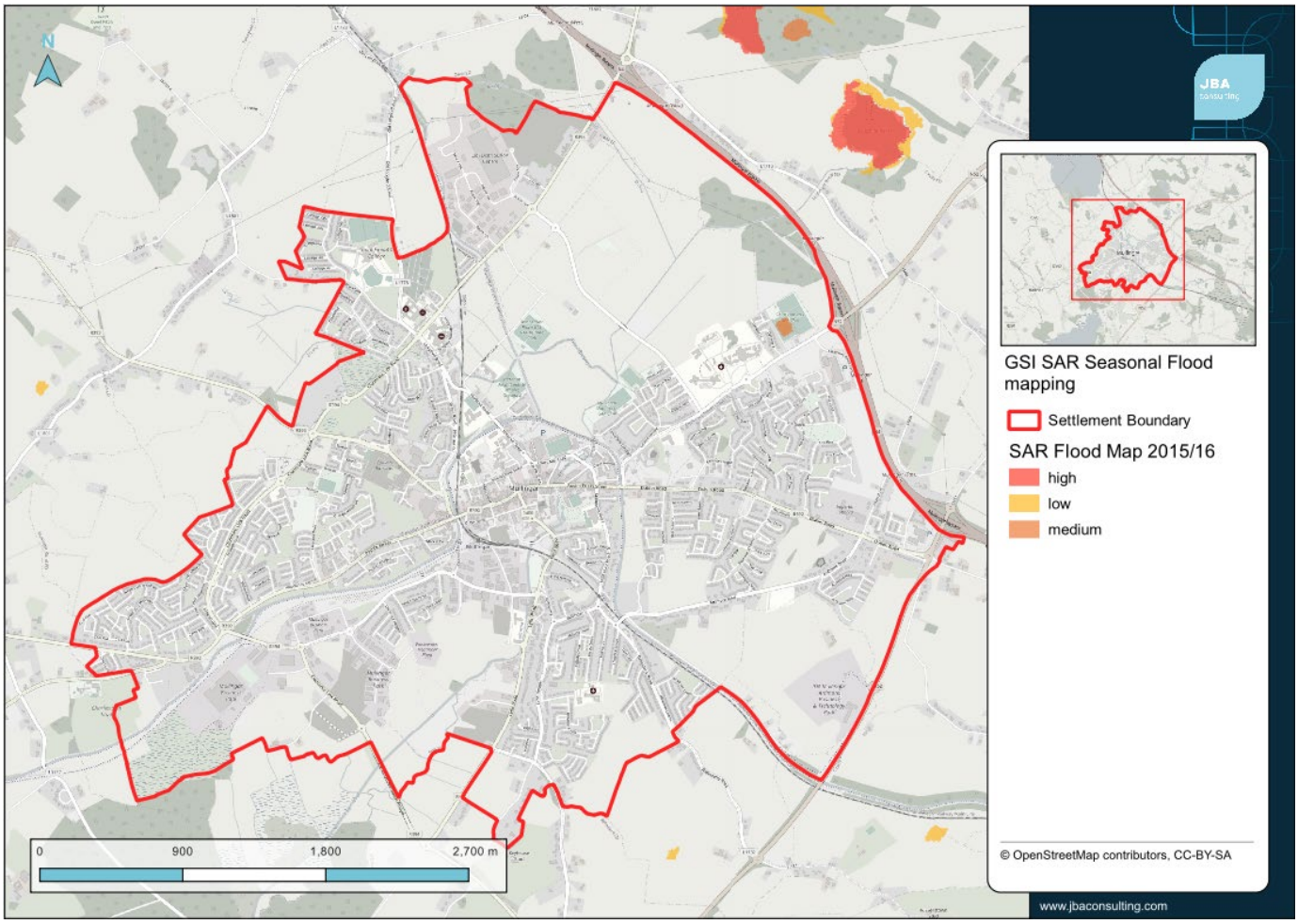


Figure 4-2 SAR Seasonal Flood map

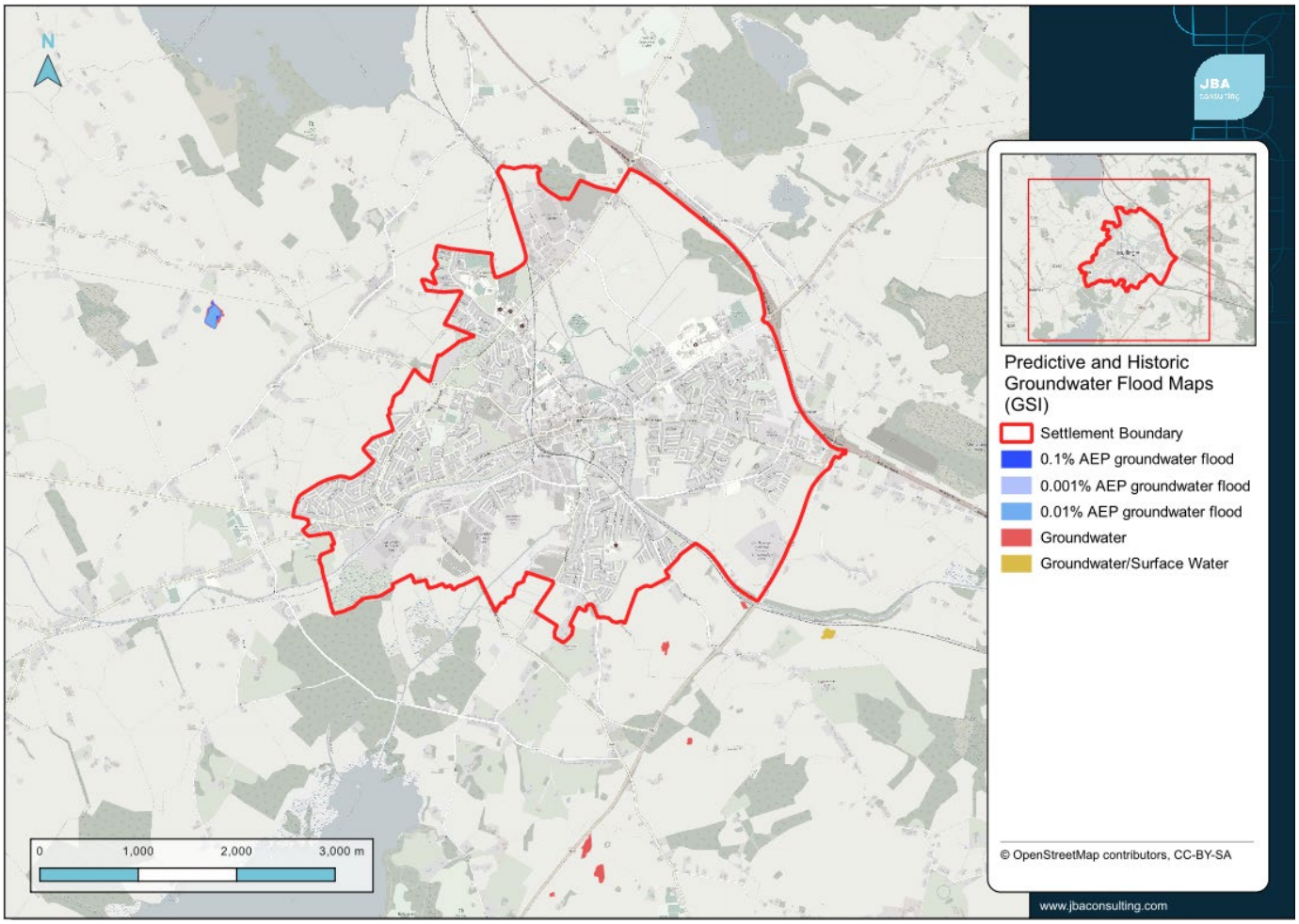


Figure 4-3 Historic Groundwater & Surface Water Flooding with predicted groundwater flooding

4.5 CFRAM

In 2011 the OPW commenced appointment of consultants to carry out a more detailed flood risk assessment on key flood risk areas. This work was undertaken under the CFRAM programme across seven river basin districts in Ireland. The Shannon Upper & Lower River Basin includes the entire catchment of the River Brosna, covering some 17,800km^2 and 20% of the island of Ireland. The RBD covers parts of 17 counties: Limerick, Clare, Tipperary, Offaly, Westmeath, Longford, Roscommon, Kerry, Leitrim, Cavan, Sligo, Cork, Laois, Meath and Fermanagh.

The initial Flood Risk Review (FRR) stage of the of the Shannon CFRAM included a site-based review of the PFRA flood outlines at a number of settlements. Several communities were identified through this process as being at potentially significant flood risk in the Western Upper & Lower River Basin, which included Mullingar. Following this review, any sites recommended as an Area for Further Assessment (AFA) were included in the subsequent detailed assessment stage of each CFRAM study.

A set of flood maps, indicating the areas prone to flooding, has been developed and published for each of the communities. The Plan builds on and supplements the national programme of flood protection works completed previously, that are under design and construction at this time or that have been set out through other projects or plans, and the ongoing maintenance of existing drainage and flood relief schemes.

Climate change is likely to have a considerable impact on flood risk in Ireland, such as through rising mean sea levels, increased wave action and the potential increases in winter rainfall and intense rainfall events. Land use change, for example, through new housing and other developments, can also increase potential future flood risk. In order to assess this risk, the Shannon CFRAM study also included detailed assessments of flooding and impacts for potential future climate change scenarios are displayed in Figure 4-5, Figure 4-6, Figure 4-7 and Figure 4-8.

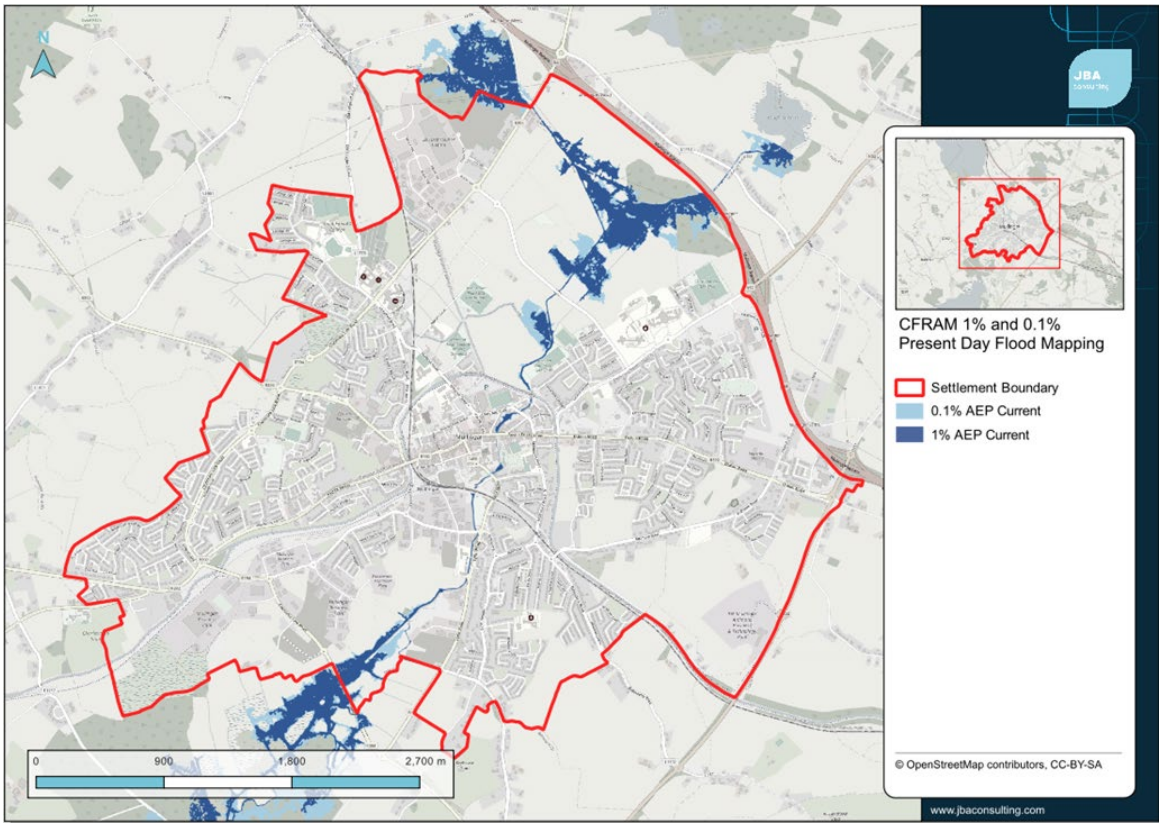


Figure 4-4 CFRAM Current Scenario Extents

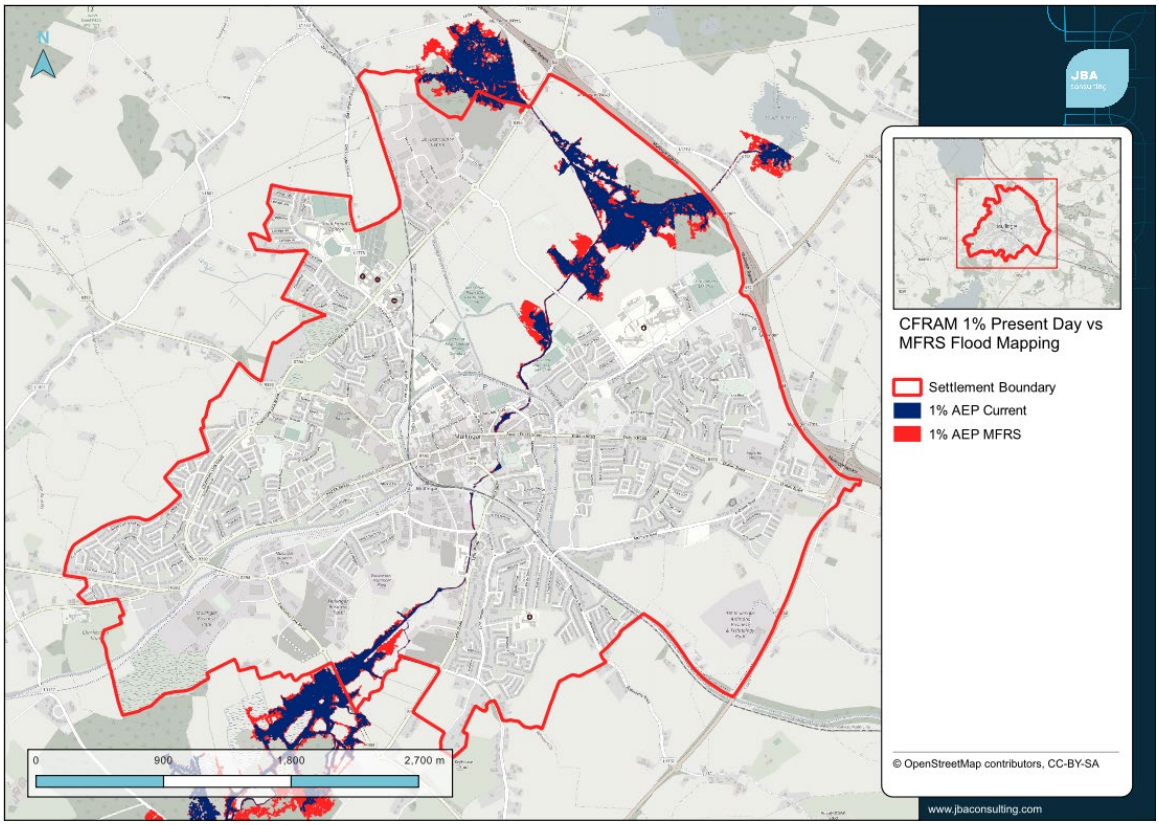


Figure 4-5 CFRAM 1% AEP Present Day vs MFRS

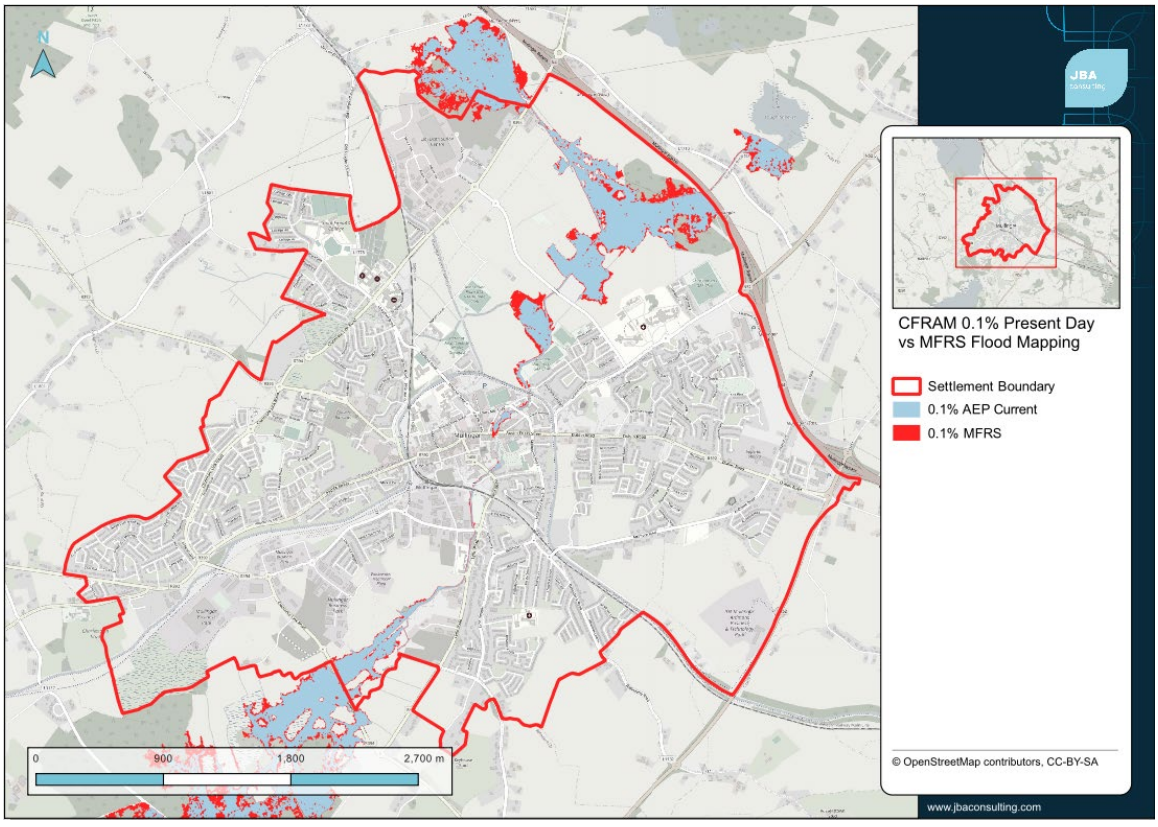


Figure 4-6 CFRAM 0.1% AEP Present Day vs MFRS

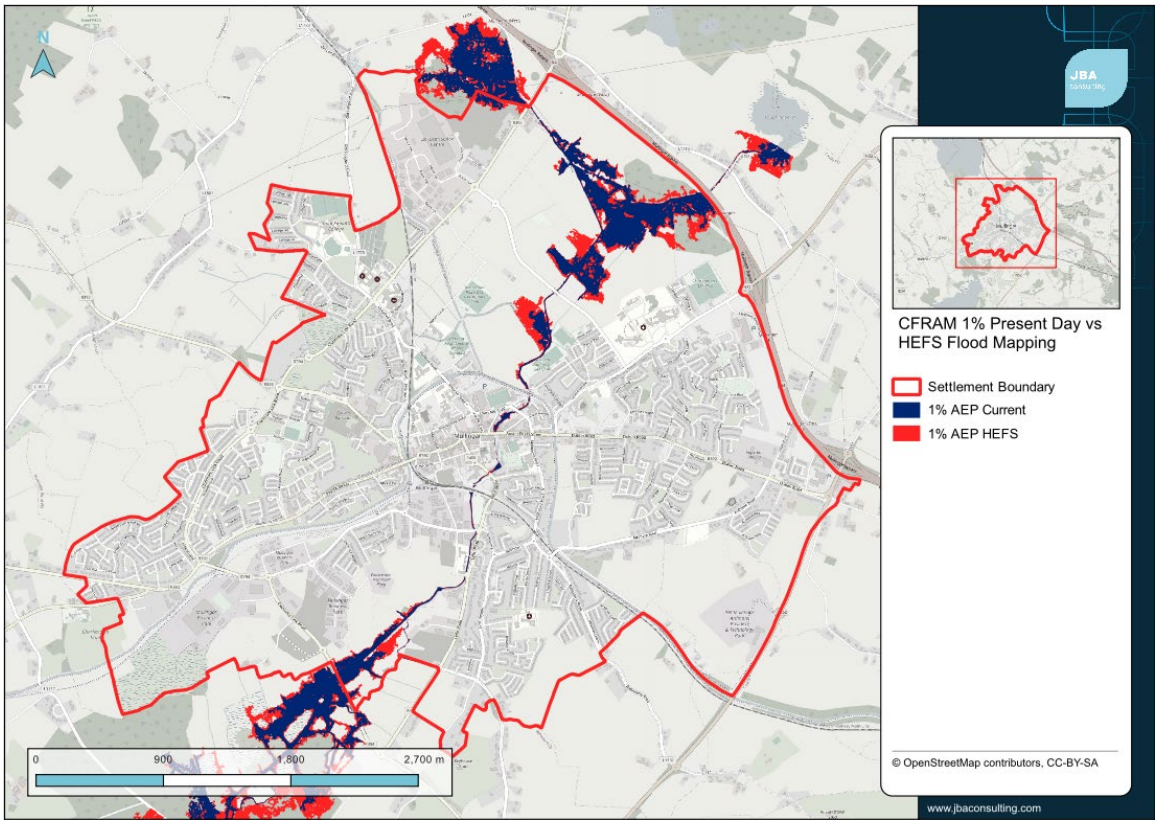


Figure 4-7 CFRAM 1% AEP Present day vs HEFS

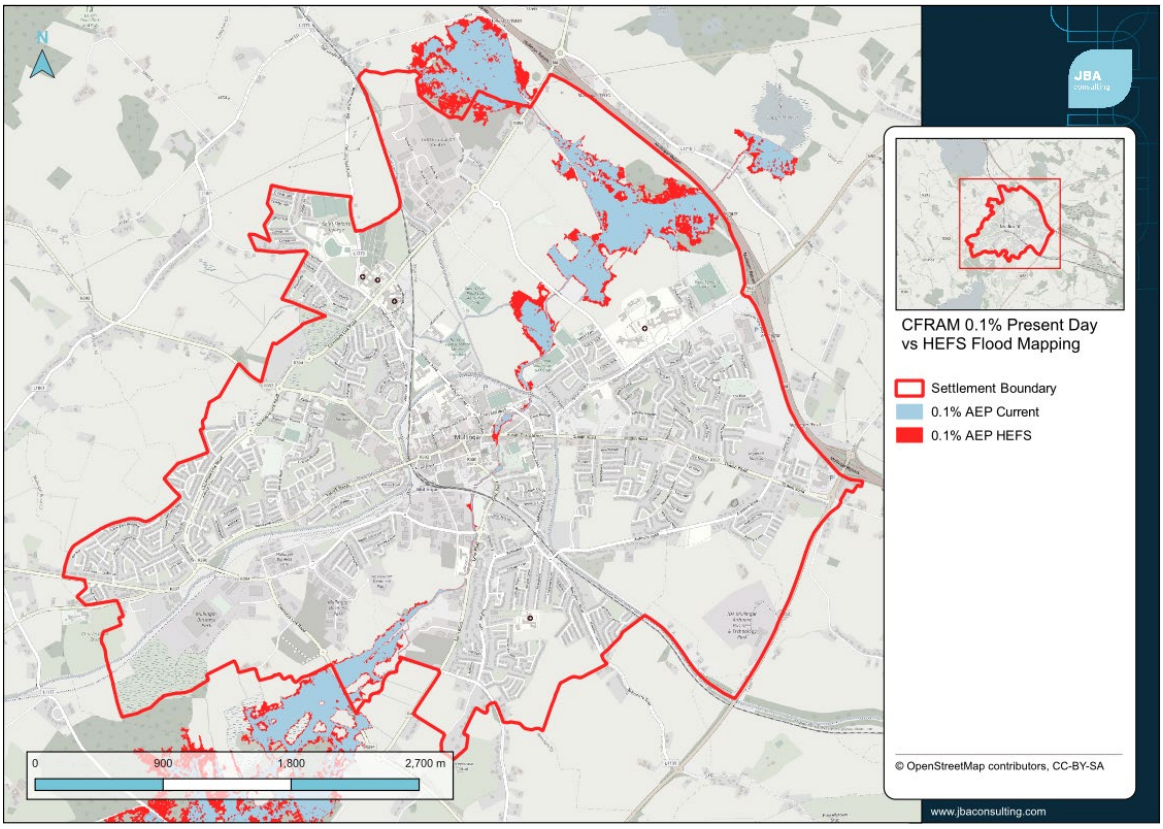


Figure 4-8 CFRAM 0.1% Present Day vs HEFS

4.6 Mullingar Flood Relief Scheme

The Mullingar flood alleviation scheme, which commenced in 2009, continued into 2010. The scheme was being carried out by the Office of Public Works on behalf of Westmeath County Council and comprised flood relief works on the Brosna River in Mullingar. As the river was partly situated within Mullingar town, and in close proximity to the former location of the Mullingar town walls, a ministerial consent was obtained before the works proceeded. This was granted in 2008. Monitoring was recommended for all the groundworks and underwater works associated with the flood relief works. The defended area of the works is displayed below in Fig 4.9. The defences (flood wall) principally protect existing residential development to a 0.1% Standard of Protection (SOP).

Judith Carroll & Company Ltd was contracted for this work and had already carried out archaeological assessments and underwater surveys for this scheme, including a wade survey and metal-detection survey for the Brosna River in 2008.

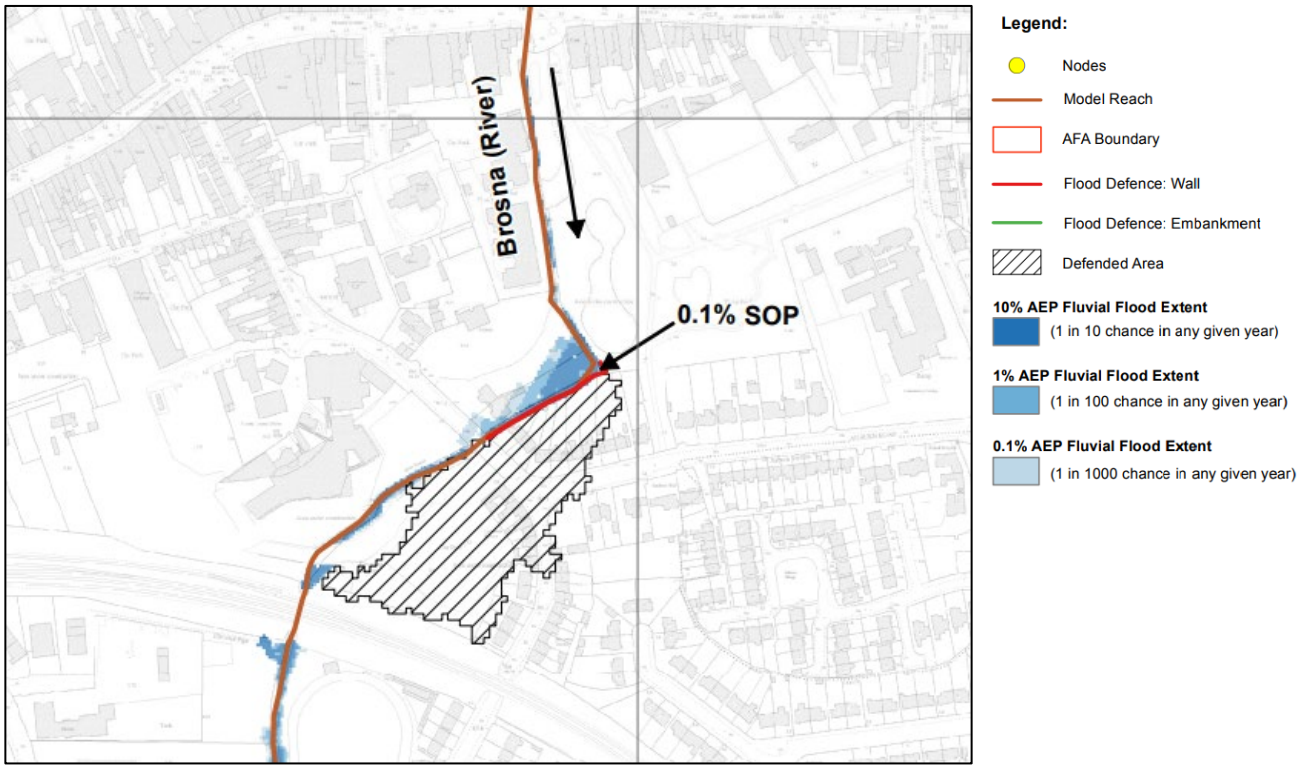


Figure 4-9 Mullingar Flood Relief Scheme defended area

4.7 Mullingar Sewerage Improvement Scheme

In 2001, J. B. Barry & Partners and White Young Green Ireland were appointed by Westmeath County Council to carry out the “Mullingar Sewerage Improvement Scheme”. The Scheme incorporated two main elements:

- Analysis of the Mullingar Main Drainage Scheme and recommendations on a wastewater collecting system to cater for the needs of Mullingar and its environs for a fifty year design horizon.
- Identification and analysis of the causes of flooding of the River Brosna and its tributaries. Identification of flood prevention and alleviation measures.

Previously the wastewater system in Mullingar was overburdened with storm drains connected to the sewer. This resulted in wastewater overflowing into the Brosna during times of heavy rainfall. These combined sewer overflows have been eliminated through the Mullingar Interceptor Sewer Contract that was completed in 2010 as part of the Scheme and relieves some of the surface water risk to the town.

5 Sources of Flooding

This SFRA has reviewed flood risk from fluvial, pluvial and groundwater sources. Flooding events have become more pronounced in Ireland, and County Westmeath, in recent years. Climate change risks also need to be considered at a strategic and site-specific scale. Climate change is discussed in Section 4.5 in relation to incorporation of climate change into the SFRA. A comment on the likely impacts of climate change, on a settlement basis, has been provided in Section 8.

5.1 Fluvial Flooding

This is the principal source of flood risk to Mullingar. Flooding from rivers and streams is associated with the exceedance of channel capacity during times of heavy rainfall resulting in higher flows. The process of flooding from watercourses depends on numerous characteristics associated with the catchment including; geographical location and variation in rainfall, steepness of the channel and surrounding floodplain and infiltration and rate of runoff associated with urban and rural catchments. Generally, there are two main types of catchments; large and relatively flat or small and steep, both giving two very different responses during large rainfall events.

Areas along the River Brosna, in particular to the east of the town are prone to flooding. Flood risk relating to specific areas of Mullingar is discussed in Section 8 and has been used to inform the zoning objectives for the Settlement Area Plan.

5.2 Arterial Drainage Schemes

It must be noted that the majority of the rivers in Mullingar have been subject to an OPW Arterial Drainage Scheme (ADS). The main purpose of the ADSs was to improve land drainage and reduce the frequency and extent of overland flooding. ADSs can involve embankment construction, river straightening, lake storage development, and, most commonly, the deepening and widening of river channels. Through the implementation of ADSs the hydraulic conveyance efficiency of a catchment is increased, thereby leading to a reduction in overland flood storage. The reduction in overland storage results in downstream flood peaks of increased intensity with rapid recessions. Although it has been found that ADS generally achieve their main objectives, this increase in discharge-carrying capacity leads to an acceleration of the response to rainfall with flood peaks of increased intensity and more rapid recessions.

However, the catchment response has not been consistent over the decades since inception. Catchment responses went back to something akin to pre scheme conditions for a number of years, and returned to early post drainage conditions in the 1990s. It is unclear what may have caused these inconsistencies.

The Brosna arterial drainage scheme was undertaken in Mullingar under the Arterial Drainage Acts of 1948 and 1995. The scheme took place between 1948 – 1955 and covers a benefitting area of 86,200 acres.

Arterial drainage maintenance and monitoring of these schemes is still carried out by OPW on rivers, lakes, weirs, bridges and embankments to maintain adequate conveyance and ensure that flood waters (of varying magnitude but typically the 3-year flood) are retained in bank by lowering water levels during the growing season thus reducing waterlogging on the adjacent land during wetter periods. Schemes are actively managed by OPW.

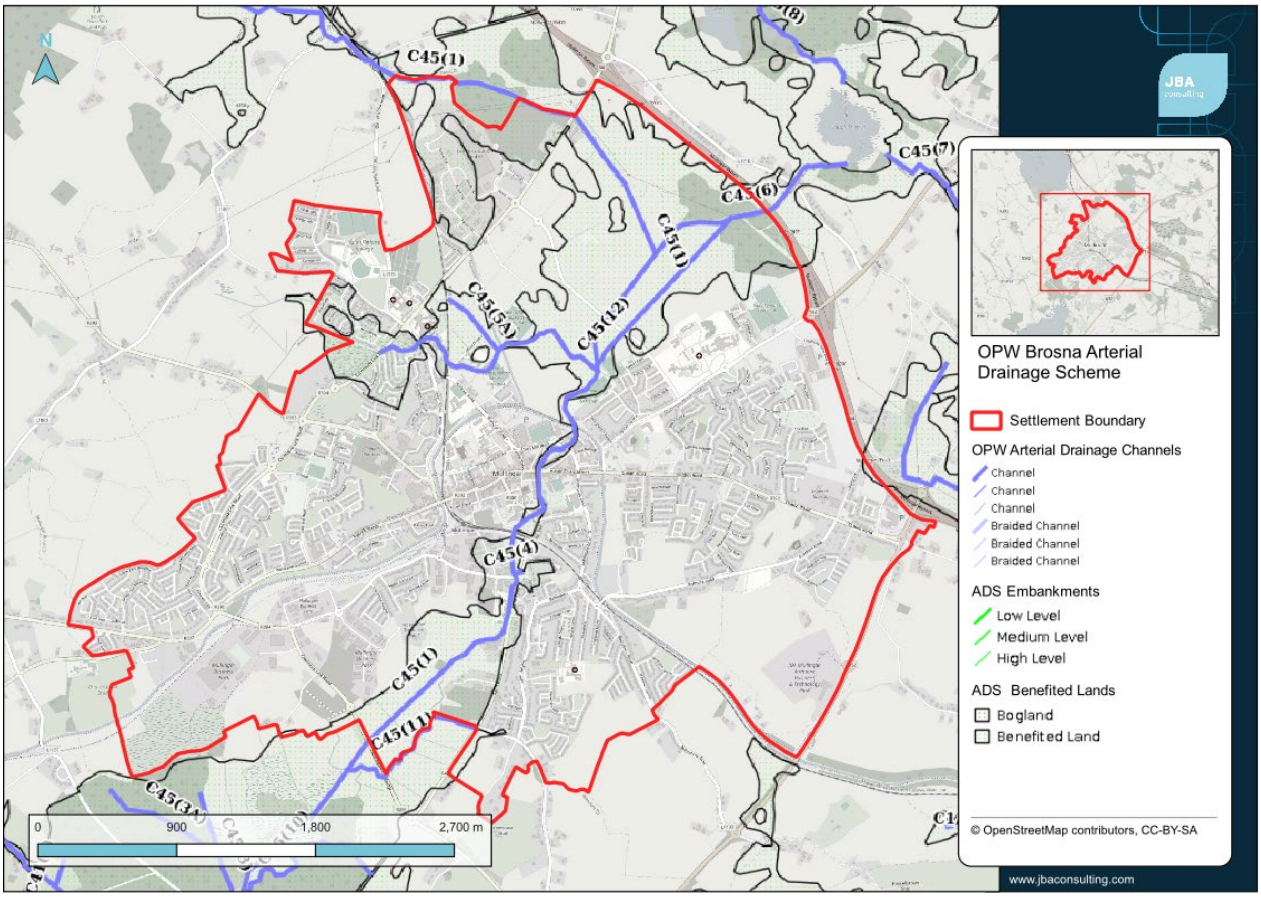


Figure 5-1 OPW Brosna Arterial Drainage Schemes

5.3 Pluvial Flooding

Flooding of land from surface water runoff is usually caused by intense rainfall that may only last a few hours. The resulting water follows natural valley lines, creating flow paths along roads and through and around developments and ponding in low spots, which often coincide with fluvial floodplains. Any areas at risk from fluvial flooding will almost certainly be at risk from surface water flooding.

5.4 Flooding from Drainage Systems

Flooding from artificial drainage systems occurs when flow entering a system, such as an urban storm water drainage system, exceeds its discharge capacity, it becomes blocked or it cannot discharge due to a high-water level in the receiving watercourse.

Flooding in urban areas can also be attributed to sewers. Sewers have a finite capacity which, during certain load conditions, will be exceeded. In addition, design standards vary and changes within the catchment areas draining to the system, in particular planned growth and urban creep, will reduce the level of service provided by the asset. Sewer flooding problems will often be associated with regularly occurring storm events during which sewers and associated infrastructure can become blocked or fail. This problem is exacerbated in areas with under-capacity systems. In the larger events that are less frequent but have a higher consequence, surface water will exceed the sewer system and flow across the surface of the land, often following the same flow paths and ponding in the same areas as overland flow.

Foul sewers and surface water drainage systems are spread extensively across the urban areas with various interconnected systems discharging to treatment works and into local watercourses. The potential for pluvial flooding will be managed by the application of the specific policies on surface water, as displayed in Section 6.

5.6 Royal Canal

The Royal Canal was the second canal to be built across the country from Dublin to the River Shannon. Work started in 1790 and the canal reached the Shannon in 1817. Approximately 55% of the Royal canal is embanked with 3 peat embankments at Cloonbreany, Begnagh and Ballymaclavy and a 3km embankment running around the town of Mullingar. The Royal Canal has been identified as a risk in Mullingar due to risk of failures of embankments. Up to 200 houses could be affected by embankment breaches within the settlement. Waterways Ireland have identified this risk and while all embankments are inspected regularly, the embankments within Mullingar are inspected on a more regular basis than other sections of the Royal Canal due to this risk. Embankments within Mullingar are inspected on a weekly basis and all necessary repairs are carried out immediately. Although the consequences associated with failure of the embankments is considered significant, the likelihood of failure is extremely low due to the following points:

- The embankments here have no history of failure or overtopping.
- The embankments have been strengthened and partially lined in recent years.
- The embankments are inspected on a weekly basis.
- Any remedial actions are put in place immediately.

Therefore, the Royal Canal is not considered to be an area of significant risk within Mullingar.

5.7 Groundwater Flooding

Groundwater flooding is caused by the emergence of water originating from underground and is particularly common in karst landscapes. This can emerge from either point or diffuse locations. The occurrence of groundwater flooding is usually very local and unlike flooding from rivers and the sea, does not generally pose a significant risk to life due to the slow rate at which the water level rises. However, groundwater flooding can cause significant damage to property, especially in urban areas and pose further risks to the environment and ground stability. Flood risk relating to groundwater has been screened under Section 4.4 and confirmed that Mullingar at risk from predicted or historic groundwater flooding. This risk is limited to areas that are within fluvial flood outlines and have therefore been considered in terms of risk associated with Flood Zone A\B.

6 Flood Risk Management Policy

The use and application of the policies and guidelines constitutes the formal plan for flood risk management under the Mullingar Settlement Area Plan. This approach has been achieved in the development plan making process contained within the plan and covered in this SFRA.

The specific management of risk in Mullingar is discussed in Section 8 of this report.

6.1 Flood Risk Policy Objectives

The policies for the management of flood risk are as follows:

Flood Risk Policy Objectives
Implement and comply fully with the recommendations of the Strategic Flood Risk Assessment prepared as part of the Mullingar Settlement Area Plan.
Have regard to the *Guidelines for Planning Authorities on the Planning System and Flood Risk Management (DoEHLG/OPW 2009) and Circular PL2/2014,* through the use of the sequential approach and application of the Justification Tests in Development Management.
Ensure that a flood risk assessment is carried out for any development proposal, within 200m of a watercourse or at potential risk of flooding, in accordance with the Planning System and Flood Risk Management (DoEHLG/OPW 2009). This assessment shall be appropriate to the scale and nature of risk to the potential development.
Support the implementation of any future recommendations under the CFRAM or EU Flood Risk Directive (2007/60/EC) on the assessment and management of flood risks and the Flood Risk Regulations (SI No 122 of 2010) ensure that flood risk management policies and infrastructure are progressively implemented.
Consult with the OPW in relation to proposed developments in the vicinity of drainage channels and rivers for which the OPW are responsible, and to retain a strip on either side of such channels where required, to facilitate maintenance access thereto.
Require that development along urban watercourses comply with the Inland Fisheries Ireland Guidance: Planning for Watercourses in the Urban Environment (2020), including the maintenance of a riparian zone of 10 m either side of the bank (for river channels less than 10 metres in width). Development within this zone will only be considered for water compatible development as far as possible and as defined in the *Planning System and Flood Risk Management Guidelines for Planning Authorities (2009).*
Protect the integrity and ensure maintenance of the OPW Mullingar Flood Relief Scheme infrastructure, thereby ensuring that any new development does not negatively impact upon any existing defense infrastructure or compromise any proposed new infrastructure.

Ensure each flood risk management activity is examined to determine actions required to embed and provide for effective climate change adaptation, as set out in the OPW Climate Change Sectoral Adaptation Plan Flood Risk Management applicable at the time.
Consult, where necessary, with Inland Fisheries Ireland, the National Parks and Wildlife Service and other relevant agencies in the provision of flood alleviation measures in Mullingar.

6.2 Stormwater Policy

The management of surface and storm water is important so as to avoid increased flood or pollution risk in the storm water network, rivers and streams in the county's towns, villages and rural areas. The Council will require compliance with best practice guidance for the collection, reuse, treatment and disposal of surface waters for all future development proposals.

Traditionally, rain falling on impervious surfaces was directed into a receiving watercourse through surface water drainage systems. While such drainage systems are effective at transferring surface water quickly, they provide only limited attenuation causing the volume of water in the receiving watercourse to increase more rapidly, thereby increasing flood risk.

Sustainable Drainage Systems, commonly known as SuDS is a nature-based solution to water management that aims to manage surface water as close as possible to its origin by replicating the natural characteristics of rainfall run-off from any site ensuring water is infiltrated or conveyed more slowly to the drainage system and ultimately to water courses via permeable paving, swales, green roofs, rainwater harvesting, detention basins, ponds, and wetlands.

SuDS can achieve multiple objectives such as removing pollutants for urban run-off at source, improving water quality, controlling surface water run-off from developments, and ensuring flood risk does not increase further downstream. The Council will require the application of SuDS and nature based solutions in development proposals. The following stormwater management policies have been included.

Stormwater Management Policy Objectives
Support the improvement of storm water infrastructure to improve sustainable drainage, reduce the risk of flooding in urban environments. In this context, due regard shall be given to the *Nature Based Management of Urban Rainwater and Urban Water Discharges, A National Strategy (May 2024).*
Ensure new development is adequately serviced with surface water drainage infrastructure and Sustainable Urban Drainage Systems, which meets the requirements of the Water Framework Directive and associated River Basin Management Plans.

Facilitate the development of nature based Sustainable Urban Drainage Systems, including the retrofitting of SuDS in established urban areas. Culverting entire drains and streams will generally be prohibited; interference with natural drainage systems is to be minimized. Opportunities to remove culverted drainage systems in favour of open, natural drainage systems should be explored.
Require that planning applications are accompanied by an assessment of the incorporation of Sustainable Urban Drainage Systems (SuDS) and other nature-based surface water drainage in new development proposals.
Ensure that in public and private developments in urban areas, both within developments and within the public realm, seek to minimise and limit the extent of hard surfacing and paving and require the use of sustainable drainage techniques for new development or for extensions to existing developments, in order to reduce the potential impact of existing and predicted flooding risks.
Ensure appropriate maintenance of surface water drainage infrastructure to avoid flood risk.

The policy objectives listed above will be supplemented by local policy objectives to reinforce measures implemented under Section 8 – Settlement Review, which incorporates the Justification Test.

7 Development Management and Flood Risk

In order to guide both applicants and relevant council staff through the process of planning for and mitigating flood risk, the key features of a range of development scenarios have been identified (relating to the flood zone, development vulnerability and presence or absence of defences). For each scenario, a number of considerations relating to the suitability of the development are summarised below.

It should be noted that this section of the SFRA begins from the point that all land zoned for development has passed the Justification Test for Development Plans, and therefore passes Part 1 of the Justification Test for Development Management – which states that the land has in the first instance been zoned accordingly in a statutory land use Plan (that underwent an SFRA). In addition to the general recommendations in the following sections, Section 8 should be reviewed for specific recommendations for individual areas within Mullingar, including details of the application of the Justification Test. In areas where there are no formal land use zoning objectives, the Justification Test cannot pass for any sites within Flood Zone A/B. It would be down to a site-specific FRA to confirm (in appropriate detail) the extent of Flood Zone A/B.

In order to determine the appropriate design standards for a development it may be necessary to undertake a site-specific flood risk assessment. This may be a qualitative appraisal of risks, including drainage design. Alternatively, the findings of the CFRAM, or other detailed study, may be drawn upon to inform finished floor levels. In other circumstances a detailed modelling study and flood risk assessment may need to be undertaken. Further details of each of these scenarios, including considerations for the flood risk assessment are provided in the following sections.

7.1 Requirements for a Flood Risk Assessment

As specified under CPO 10.98 assessment of flood risk is required in support of any planning application where flood risk may be an issue, and this may include sites in Flood Zone C (low probability of flooding) where a watercourse or field drain exists nearby. The level of detail will vary depending on the risks identified and the proposed land use. As a minimum, all proposed development, including that in Flood Zone C, must consider the impact of surface water flood risks on drainage design. In addition, flood risk from sources other than fluvial should be reviewed.

For sites within Flood Zone A or B (high/moderate probability of flooding), a site specific "Stage 2 - Initial FRA" will be required and may need to be developed into a "Stage 3 - Detailed FRA". The extents of Flood Zone A and B are delineated through this SFRA. However, future studies may refine the extents (either to reduce or enlarge them) so a comprehensive review of available data should be undertaken once an FRA has been triggered.

Within the FRA the impacts of climate change and residual risk (including culvert/structure blockage) should be considered and remodelled where necessary, using an appropriate level of detail, in the design of finished floor levels. Further information on the required content of the FRA is provided in the Planning System and Flood Risk Management Guidelines.

Any proposal that is considered acceptable in principle shall demonstrate the use of the sequential approach in terms of the site layout and design and, in satisfying the Justification Test (where required), the proposal will demonstrate that appropriate mitigation and management measures are put in place.

7.2 Drainage Design

Under CPO 10.109 of the Westmeath County Development Plan, all proposed development, whether in Flood Zone A, B or C, must consider the impact of surface water flood risks on drainage design as specified by the surface water management policies in the Greater Dublin Strategic Drainage Study (GDSDS) and this will be considered in the planning process. This may be in the form of a section within the flood risk assessment (for sites in Flood Zone A or B) or part of a surface water management plan.

Areas vulnerable to ponding are indicated on the OPW's PFRA mapping. Particular attention should be given to development in low-lying areas which may act as natural ponds for collection of run-off.

The drainage design should ensure no increase in flood risk to the site, or the downstream catchment. Where possible, and particularly in areas of new development, floor levels should at a minimum be 300mm above adjacent roads and hard standing areas to reduce the consequences of any localised flooding. Where this is not possible, an alternative design appropriate to the location may be prepared.

In addition, for larger sites (i.e. multiple dwellings or commercial units) master planning should ensure that existing flow routes are maintained, through the use of green infrastructure.

7.3 Application for Development in Flood Zones A or B

7.3.1 Minor Developments

Section 5.28 of the Planning Guidelines on Flood Risk Management identifies certain types of development as being 'minor works'. In such cases, the sequential approach cannot be used to locate such development in lower-risk areas and the Justification Test will not apply.

Generally, the approach to deal with flood protection would involve raising the ground floor levels above extreme flood levels. However, in some parts of the plan area, which are already developed, ground floor levels for flood protection could lead to floor levels

being much higher than adjacent streets, thus creating a hostile streetscape for pedestrians. This would cause problems for infill development sites if floor levels were required to be significantly higher than those of neighbouring properties. In this regard, for the key sites in the plan area it has been recognised that ground floor levels below predicted flood levels could be allowed, in limited circumstances, on a site by site basis, for commercial and business developments. However, if this is the case, then these would be required to be of flood resistant construction using water resistant materials and electrical fittings placed at higher levels. For high risk areas it would also be necessary to impose planning restrictions in these areas. Residential Uses would not be permitted at ground flood levels in high risk zones.

It should be noted that for residential buildings within Flood Zone A or B, bedroom accommodation shall not be permitted at basement or ground floor.

For commercial operations, business continuity must be considered, and steps taken to ensure operability during and recovery after a flood event for both residential and commercial developments. Emergency access must be considered as in many cases flood resilience will not be easily achieved in the existing built environment.

The requirement for providing compensatory storage for minor developments has been reviewed and can generally be relaxed, even where finished floor levels have been raised, or the development is behind defences. This is because the development concerns land which has previously been developed and would already have limited capacity to mitigate flooding. However, a commentary to this effect must be substantiated in the FRA and should be discussed with Westmeath County Council prior to submission of a planning application.

7.3.2 Highly vulnerable development in Flood Zone A or B

Development which is highly vulnerable to flooding, as defined in The Planning System and Flood Risk Management, includes (but is not limited to) dwelling houses, hospitals, emergency services and caravan parks.

New development

It is not appropriate for new, highly vulnerable, development to be located in Flood Zones A or B outside the core of a settlement. Such proposals do not pass the Justification Test for Development Plans / Settlement Area Plans. Instead, a less vulnerable or water compatible use should be considered.

In some cases, land use objectives which include for highly vulnerable uses have been justified in the Settlement Area Plan. This includes zonings focused on 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.

Existing developed areas

The Planning Circular (PL02/2014) states that "*notwithstanding the need for future development to avoid areas at risk of flooding, it is recognised that the existing urban structure of the country contains many well established cities and urban centres which will continue to be at risk of flooding. In addition, development plans have identified various strategically important urban centres … whose continued consolidation, growth, development or generation, including for residential use, is being encouraged to bring about compact and sustainable growth.*"

In cases where specific development proposals have passed the Justification Test for Development Plans, the outline requirements for a flood risk assessment and flood management measures are detailed in this SFRA in the following sections and the site specific assessments in Section 8, which also detail where such development has been justified. Of prime importance is the requirement to manage risk to the development site and not to increase flood risk elsewhere. It should also be noted that for residential buildings within Flood Zone A or B, bedroom accommodation shall not be permitted at basement or ground floor.

7.3.3 Less vulnerable development in Flood Zone A or B

This section applies to less vulnerable development in Flood Zone A which has passed the Justification Test for development plans, and less vulnerable development in Flood Zone B, where this form of development is appropriate, and the Justification Test is not required. Development, which is less vulnerable to flooding, as defined in The Planning Guidelines, includes (but is not limited to) retail, leisure and warehousing and buildings used for agriculture and forestry (see Table 3-3 for further information). This category includes less vulnerable development in all forms, including refurbishment or infill development, and new development both in defended and undefended situations.

The design and assessment of less vulnerable development should begin with 1% AEP fluvial as standard, with climate change and a suitable freeboard included in the setting of finished floor levels. The presence or absence of flood defences informs the level of flood mitigation recommended for less vulnerable developments in areas at risk of flooding. In contrast with highly vulnerable development, there is greater scope for the developer of less vulnerable uses to accept flood risks and build to a lower standard of protection, which is still high enough to manage risks for the development in question. However, any deviation from the design standard of 1% AEP, plus climate change, plus freeboard, needs to be fully justified within the FRA and show an appropriate response to the flood risk present and to be agreed with Westmeath County Council engineers and planners. However, in Mullingar there is only one location where formal (non-agricultural) flood defences are present.

7.4 Development Proposals in Flood Zone C

Where a site is within Flood Zone C but adjoining or in close proximity to Flood Zone A or B there could be a risk of flooding associated with factors such as future scenarios (climate change) or in the event of failure of a defence, blocking of a bridge or culvert. Risk from sources other than fluvial must also be addressed for all development in Flood Zone C. As a minimum in such a scenario, a flood risk assessment should be undertaken which will screen out possible indirect sources of flood risk and where they cannot be screened out, it should present mitigation measures. The most likely mitigation measure will involve setting finished floor levels to a height that is above the 1 in 100-year fluvial flood level, with an allowance for climate change and freeboard, or to ensure a step up from road level to prevent surface water ingress. Design elements such as channel maintenance or trash screens may also be required. Evacuation routes in the event of inundation of surrounding land should also be detailed.

The impacts of climate change should be considered for all proposed developments. A development which is currently in Flood Zone C may be shown to be at risk when 20% uplift is added to the flow. Details of the approach to incorporating climate change impacts into the assessment and design are provided in Section 7.6.

7.5 Key points for FRA for all types of developments

- Finished floor levels to be set above the 1% AEP fluvial level, with an allowance for climate change plus a freeboard of at least 300mm. The freeboard allowance should be assessed, and the choice justified.
- Flow paths through the site and areas of surface water storage should be managed to maintain their function and without causing increased flood risk elsewhere.
- Compensatory storage is to be provided to balance floodplain loss as a result of raising ground levels within Flood Zone A. The storage should be provided within the flood cell and on a level for level basis up to the 1% level.
- In a defended site, compensatory storage is not required, but the impact of removing the net reduction in floodplain storage should be assessed, and any impacts to existing development mitigated for the 0.1% event or a breach of these defences.
- A site is considered to be defended if the standard of protection is 1% AEP, within which a freeboard of at least 300mm is included. The FFL of the proposed development needs to take into account the impacts of climate change and other residual risks, including the 0.1% event, unless this has also been incorporated into the defence design. This may be assessed through breach analysis, overtopping analysis or projection of levels from the channel inland.
- For less vulnerable development, it may be that a finished floor level as low as the 1% AEP level could be adopted, provided the risks of climate change are included in the development through adaptable designs or resilience measures. This approach should reflect emergency planning and business continuity to be

provided within the development. It may reflect the design life of the development, the proposed use, the vulnerability of items to be kept in the premises, the occupants and users, emergency plan and inclusion of flood resilience and recovery measures.

7.6 Incorporating Climate Change into Development Design

In all developments, climate change should be considered when assessing flood risk and in particular residual flood risk. Climate change may result in increased flood extents and therefore caution should be taken when zoning lands in transitional areas (i.e. on the edge of the floodplain). Consideration of climate change is particularly important where flood alleviation measures are proposed, as the design standard of the proposal may reduce significantly in future years due to increased rainfall, river flows and sea levels

The 'Planning System and Flood Risk Management' recommends that a precautionary approach to climate change is adopted due to the level of uncertainty involved in the potential effects. A significant amount of research into climate change has been undertaken on both a national and international front, and updates are ongoing.

Advice on the expected impacts of climate change and the allowances to be provided for future flood risk management in Ireland is given in the OPW Climate Change Sectoral Adaptation Plan. Two climate change scenarios are considered; these are the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS). The MRFS is intended to represent a "likely" future scenario based on the wide range of future predictions available. The HEFS represents a more "extreme" future scenario at the upper boundaries of future projections. Based on these two scenarios the OPW recommended allowances for climate change are given in the table below. These climate change allowances are particularly important at the development management stage of planning and will ensure that proposed development is designed and constructed to take into account best current knowledge.

Table 7-1: Allowances for Future Scenarios (100-year Time Horizon)

Criteria	MRFS	HEFS
Extreme Rainfall Depths	+20%	+30%
Flood Flows	+20%	+30%
Mean Sea Level Rise	+500mm	+1000mm
Land Movement	-0.5mm / year*	-0.5mm / year*
Urbanisation	No General Allowance - Review on Case by Case Basis	No General Allowance - Review on Case by Case Basis
Forestation	-1/6 Tp**	-1/3 Tp**+10% SPR***
Notes: * Applicable to the southern part of the country only (Dublin - Galway and south of this) ** Reduce the time to peak (Tp) by a third; this allows for potential accelerated runoff that may arise as a result of drainage of afforested land *** Add 10% to the Standard Percentage Runoff (SPR) rate; this allows for increased runoff rates that may arise following felling of forestry		

Through the CFRAM Studies, both MRFS and HEFS model runs have been completed on all study watercourses, providing flood extent and depth maps. This information can be used to support flood risk assessments where the current CFRAM scenario has been deemed appropriate to the location.

For watercourses that are not part of the CFRAM programme, fluvial flood extents can be qualitatively assessed by using the Flood Zone B outline as a surrogate for 'Flood Zone A with allowance for the possible impacts of climate change', as suggested in the 'Planning System and Flood Risk Management'. Quantitative assessment of risks may require an additional model run to fully understand risks.

For most development, including residential, nursing homes, shops and offices, the medium-range future scenario (20% increase in flows) is an appropriate consideration. This should be applied in all areas that are at risk of flooding (i.e. within Flood Zone A and B) and should be considered for sites which are in Flood Zone C but are adjacent to Flood Zone A or B. This is because land which is currently not at risk may become vulnerable to flooding when climate change is taken into account.

Where the risk associated with inundation of a development is low and the design life of the development is short (typically less than 30 years) the allowance provided for climate change may be less than the 20% / 0.5m level. However, the reasoning and impacts of such an approach should be provided in the site-specific FRA.

Conversely, there may be development which requires a higher-level response to climate change. This could include major facilities which are extremely difficult to

relocate, such as hospitals, airports, Seveso sites or power stations, and those which represent a high-economic and long-term investment within the scale of development across the county. In such situations it would be reasonable to expect the high-end future scenario (30% increase in flow) to be investigated in the site-specific FRA and used as the design standard.

In general, climate change will be accounted for the setting of finished floor levels to a height which includes an allowance for climate change. However, climate change may also reveal additional flow paths which need to be protected or give rise to flows which exceed culvert capacity or overtop defences. These outcomes will need to be specifically investigated for each site, and an appropriate response provided.

Further consideration to the potential future impacts of climate change is given in Section 8.

7.7 Flood Mitigation Measures at Site Design

For any development proposal in an area at moderate or high risk of flooding that is considered acceptable in principle (i.e. has passed the Plan Making Justification Test), the site specific FRA must demonstrate that appropriate mitigation measures can be put in place and that residual risks can be managed to acceptable levels. This may include the use of flood-resistant construction measures that are aimed at preventing water from entering a building and that mitigate the damage floodwater causes to buildings. Alternatively, designs for flood resilient construction may be adopted where it can be demonstrated that entry of floodwater into buildings is preferable to limit damage caused by floodwater and allow relatively quick recovery.

Various mitigation measures are outlined below and further detail on flood resilience and flood resistance are included in the Technical Appendices of the Planning Guidelines, The Planning System and Flood Risk Management.

7.7.1 Site Layout and Design

To address flood risk in the design of new development, a risk-based approach should be adopted to locate more vulnerable land use to higher ground while water compatible development i.e. car parking (with appropriate flood management plan) and recreational space can be located in higher flood risk areas.

The site layout should identify and protect land required for current and future flood risk management. Waterside areas or areas along known flow routes can be used for recreation, amenity and environmental purposes to allow preservation of flow routes and flood storage, while at the same time providing valuable social and environmental benefits.

7.7.2 Ground Levels, Floor Levels and Building Use

Modifying ground levels to raise land above the design flood level is a very effective way of reducing flood risk to the site. However, in most areas of fluvial flood risk, conveyance or flood storage would be reduced locally and could increase flood risk off site. There are a number of criteria which must all be met before this is considered a valid approach:

- Development at the site must have been justified through this SFRA based on the existing (unmodified) ground levels.
- The FRA should establish the function provided by the floodplain. Where conveyance is a prime function then a hydraulic model will be required to show the impact of its alteration.
- The land being given over to storage must be land which does not flood in the 1% AEP fluvial event (i.e. Flood Zone B or C).
- Compensatory storage should be provided on a level for level basis to balance the total area that will be lost through infilling where the floodplain provides static storage.
- The provision of the compensatory storage should be in close proximity to the area that storage is being lost from (i.e. within the same flood cell).
- The land proposed to provide the compensatory storage area must be within the ownership / control of the developer.
- The compensatory storage area should be constructed before land is raised to facilitate development.
- Compensatory storage is generally not required for loss of floodplain in locations behind defences.

In some sites it is possible that ground levels can be re-landscaped to provide a sufficiently large development footprint. However, it is likely that in other potential development locations there is insufficient land available to fully compensate for the loss of floodplain. In such cases it will be necessary to reconsider the layout or reduce the scale of development or propose an alternative and less vulnerable type of development. In other cases, it is possible that the lack of availability of suitable areas of compensatory storage mean the target site cannot be developed and should remain open space.

Raising finished floor levels within a development is an effective way of avoiding damage to the interior of buildings (i.e. furniture and fittings) in times of flood. Alternatively, assigning a water compatible use (i.e. garage / car parking) or less vulnerable use to the ground floor level, along with suitable flood resilient construction, is an effective way of raising vulnerable living space above design flood levels. It can however have an impact on the streetscape. Safe access and egress is a critical consideration in allocating ground floor uses.

Depending on the scale of residual risk, resilient and resistance measures may be an appropriate response, but this will mostly apply to less vulnerable development.

7.7.3 Raised Defences

Construction of raised defences (i.e. flood walls and embankments) has traditionally been the response to flood risk. However, this is not a preferred option on an ad-hoc basis where the defences to protect the development are not part of a strategically led flood relief scheme. Where a defence scheme is proposed as the means of providing flood defence, the impact of the scheme on flood risk up and downstream must be assessed and appropriate compensatory storage must be provided.

7.7.4 Emergency Flood Response Plans

In some instances, and only when all parts both the Plan Making and Development Management Justification Tests have been passed, it may be necessary for an emergency flood response plan to be prepared to support other flood management measures within the context of a less vulnerable or water compatible development. An emergency response plan may be required to trigger the operation of demountable flood defences to a less vulnerable development, evacuation of a car park or closure of a business or retail premises.

The emergency plan will need to detail triggers for activation, including receipt of a timely flood warning, a staged response and to set out the management and operational roles and responsibilities. The plan will also need to set out arrangements for access and egress, both for pedestrians, vehicles and emergency services. The details of the plan should be based on an appropriately detailed assessment of flood risk, including speed of onset of flooding, depths and duration of inundation.

However, just because it is possible to prepare an emergency plan does not mean this is advisable or appropriate for the nature and vulnerability of development.

7.7.5 Nature based solutions / Green Infrastructure / SUDS

Measures can be taken that aim to retain water on the landscape during periods of high rainfall and flood by mimicking the functioning of a natural landscape, thereby reducing the magnitude of flood events and providing complementary ecosystem services. In general, nature-based measures aim to:

- Reduce the rate of runoff during periods of high rainfall;
- Provide flood storage in upper catchment areas; and
- Use natural materials and “soft” engineering techniques to manage flooding in place of “hard” engineering in river corridors.

Nature-based measures to control flooding typically focus on the use of porous surfaces in developments (Sustainable Urban Drainage Systems or SUDS), planting of native vegetation communities/assemblages that are tolerant of both wet and dry

conditions and reversing the impacts of over-engineered river corridors (river restoration) to reduce the peak of flood events by mimicking the function of a natural catchment landscape. In addition to providing flood relief benefits, nature-based solutions can provide an array of ecosystem services including silt and pollution control for runoff entering the river system, improved riparian and in-river habitats, localised temperature reduction during periods of extreme heat, reduced maintenance requirements in engineered systems, groundwater recharge, and carbon sequestration.

These measures can be implemented across an array of scales, for instance across a catchment as part of a wider flood relief scheme, or on a site-specific basis as part of a landscaping or green infrastructure plan. Nature-based solutions can provide flood mitigation benefits and ecosystem services across all scales if given adequate planning, and should be considered during the site layout and design stages of a development in accordance with the Nature Based Management of Urban Rainwater and Urban Water Discharges, A National Strategy (May 2024).

The drainage design shall ensure no increase in flood risk to the site, or the downstream catchment. Reference should be made to the Westmeath County Development Plan and Mullingar Settlement Area Plan for further policy and objectives. Considerable detail on the process and design of SuDS is also provided in C753[2], the Dublin SuDS Manual and the Greater Dublin Strategic Drainage Study.

7.7.6 'Green Corridor'

It is recommended that, where possible, and particularly where there is greenfield land adjacent to the river, a 'green corridor', is retained on all rivers and streams. This will have a number of benefits, including:

- Retention of all, or some, of the natural floodplain;
- Opportunities to undertake works to restore natural in-river processes and habitats;
- Potential opportunities for amenity, including better views, riverside walks and public open spaces;
- Maintenance of the connectivity between the river and its floodplain, encouraging the development of a full range of riparian and floodplain habitats;
- Natural attenuation of flows in the immediate floodplain will help ensure no increase in flood risk downstream;
- Allows access to the river for maintenance works;
- Helping to achieve “Good” Ecological Status for river waterbodies under the EU Water Framework Directive (WFD); and
- Retention of clearly demarcated areas where development is not appropriate on flood risk grounds, and in accordance with the Planning System and Flood Risk Management.

2 C753, The SUDS Manual, CIRIA (2015)

The width of this corridor should be determined through undertaking of a river restoration strategy, but can also be indicated by the available land, and topographical constraints, such as raised land and flood defences. It would ideally span the full width of the floodplain (i.e. all of Flood Zone A).

In Mullingar this has been facilitated as far as possible in land use zoning by providing;

- A 15m buffer along the River Brosna within Robinstown;
- An enhanced green buffer along the River Brosna behind the Supervalu Car Park;
- North of Canal Avenue together with extensive open space area along River Brosna to south of the town (Lynn/Clonmore).

7.7.7 Bridges, culverts and weirs

Where a planning application includes proposals to amend an existing bridge, culvert or weir, or introduce a new in-channel structure, it will be necessary for the applicant to seek OPW's approval under Section 48 (weirs) and Section 50 (bridges and culverts) of the Arterial Drainage Act 1945. It should be noted that OPW approval under Section 48 and / or 50 does not influence or determine the outcome of the Planning Application process.

8 Settlement Zoning Review

The purpose of land use zoning objectives is to indicate to property owners and members of the public the types of development the Planning Authority considers most appropriate in each land use category. Zoning is designed to reduce conflicting uses within areas, to protect resources and, in association with phasing, to ensure that land suitable for development is used to the best advantage of the community as a whole.

This section of the SFRA will:

- Outline the strategic approach to flood risk management.
- Consider the land use zoning objectives utilised within Mullingar and assess their potential vulnerability to flooding.
- Based on the associated vulnerability of the particular use, a clarification on the requirement of the application of the Justification Test is provided.
- The consideration of the specific land use zoning objectives and flood risk will be presented for the settlement. Comment will be provided on the use of the Sequential Approach and Justification Test. Conclusions will be drawn on how flood risk is proposed to be managed in the settlement.

8.1 A Strategic Approach to Flood Risk Management

A strategic approach to the management of flood risk is important in Mullingar as the risks are varied, with scales of risk and vulnerability varying across the settlement.

Following the Planning Guidelines, development should always be located in areas of lowest flood risk first, and only when it has been established that there are no suitable alternative options should development (of the lowest vulnerability) proceed. Consideration may then be given to factors which moderate risks, such as defences, and finally consideration of suitable flood risk mitigation and site management measures as necessary.

It is important to note that whilst it may be technically feasible to mitigate or manage flood risk at site level, strategically it may not be a sustainable approach.

A summary of flood risks associated with each of the zoning objectives has been provided in the following settlement review. The Flood Risk commentary indicates whether a certain land zoning, in Flood Zone A or B, will need to have the Plan Making Justification Test (JT) applied and passed.

When carrying out a site-specific FRA, or when planning applications are being considered, it is important to remember that not all uses will be appropriate on flood risk grounds, hence the need to work through the Justification Test for Development Management on a site by site basis and with reference to Table 8-1. For example, a Town Centre zoning objective can include for an integrated mix of residential,

commercial, community and social uses which have varying vulnerabilities and would not be equally permissible within Flood Zone A and B.

Table 8-1: Zoning Objective Vulnerability

Zoning Objective	Indicative Primary Vulnerability	Flood Risk Commentary
Enterprise & Employment	Less / highly vulnerable	For highly vulnerable development in Flood Zone A or B. For less vulnerable development in Flood Zone A.
Commercial	Less / highly vulnerable	For highly vulnerable development in Flood Zone A or B. For less vulnerable development in Flood Zone A.
Innovation Technology	Less / highly vulnerable	For highly vulnerable development in Flood Zone A or B. For less vulnerable development in Flood Zone A.
Community, Educational & Institutional	Less / highly vulnerable	Consideration to be given to flood risks and sequential use of land to ensure highly vulnerable uses such as school buildings are located within areas at lowest risk of flooding.
Neighbourhood Centre	Less / highly vulnerable	For highly vulnerable development in Flood Zone A or B. For less vulnerable development in Flood Zone A.
Established Residential	Highly Vulnerable	JT required for within Flood Zone A and B within the core.
Proposed Residential	Highly Vulnerable	JT required for within Flood Zone A and B within the core.
Open Space	Water compatible	For Water Compatible, land use appropriate and should be retained. For highly vulnerable development in Flood Zone A or B. For less vulnerable development in Flood Zone A.
Sporting Recreational	Water compatible / less vulnerable.	For Water Compatible, land use appropriate and should be retained. For less vulnerable development in Flood Zone A.

Zoning Objective	Indicative Primary Vulnerability	Flood Risk Commentary
Mixed Use	Less / Highly Vulnerable	For highly vulnerable development in Flood Zone A or B. For less vulnerable development in Flood Zone A.
Retail Warehousing	Less / highly vulnerable	For highly vulnerable development in Flood Zone A or B. For less vulnerable development in Flood Zone A.
Major Regeneration Opportunity Site	Less/Highly Vulnerable	For highly vulnerable development in Flood Zone A or B. For less vulnerable development in Flood Zone A.

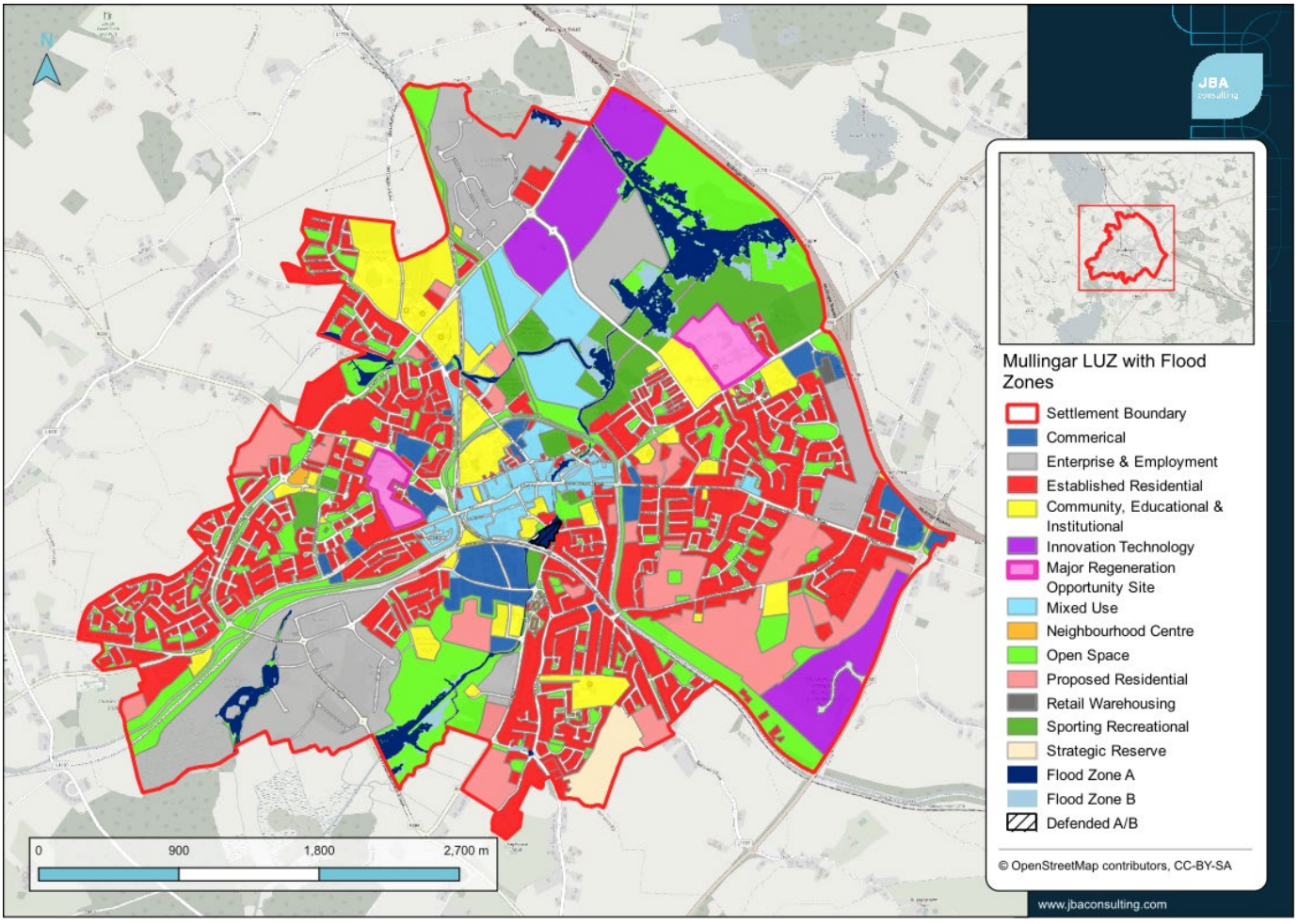
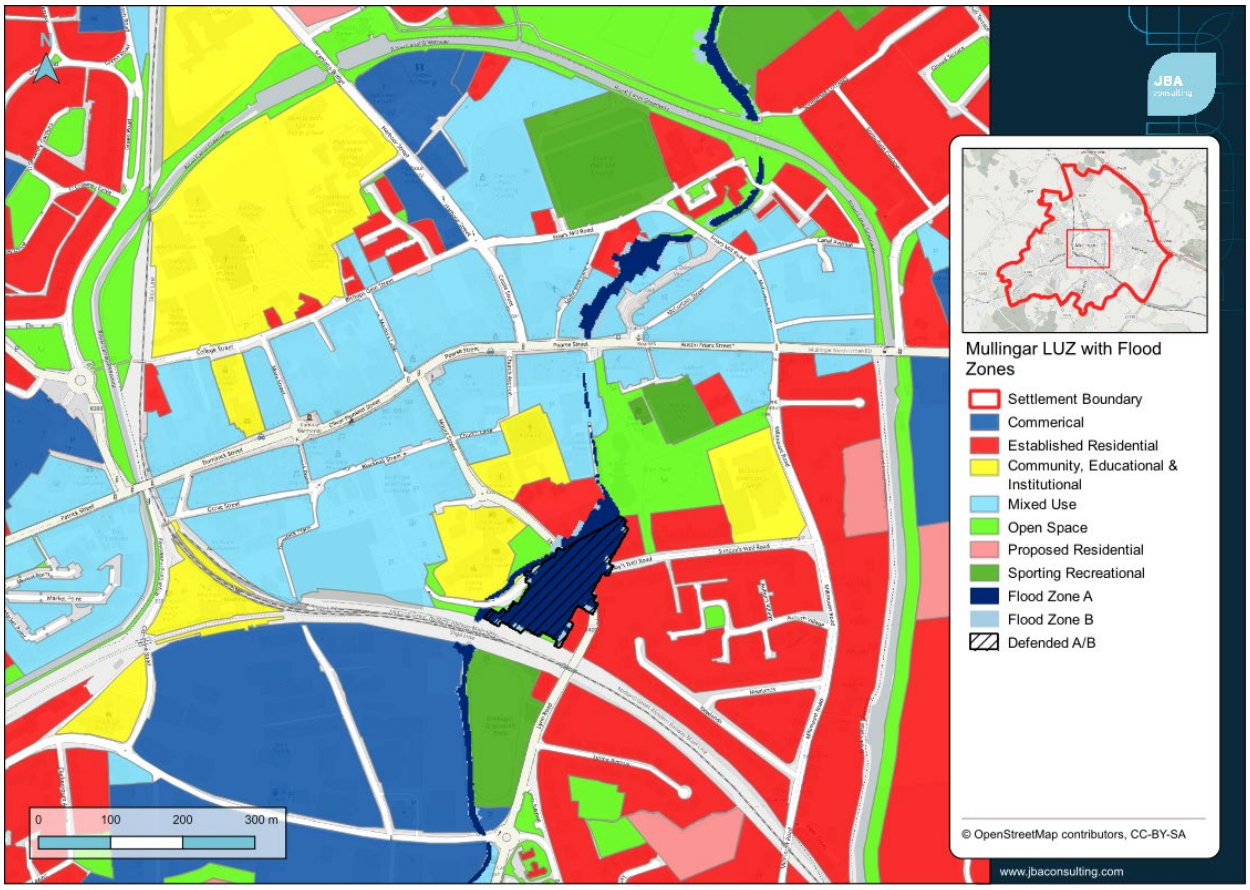


Figure 8-1 Overview map - Mullingar LUZ with Flood Zones

The following sections review the land use zoning objectives within Mullingar and provide a comprehensive summary of flood risk and justification where necessary.

8.2 Town Centre



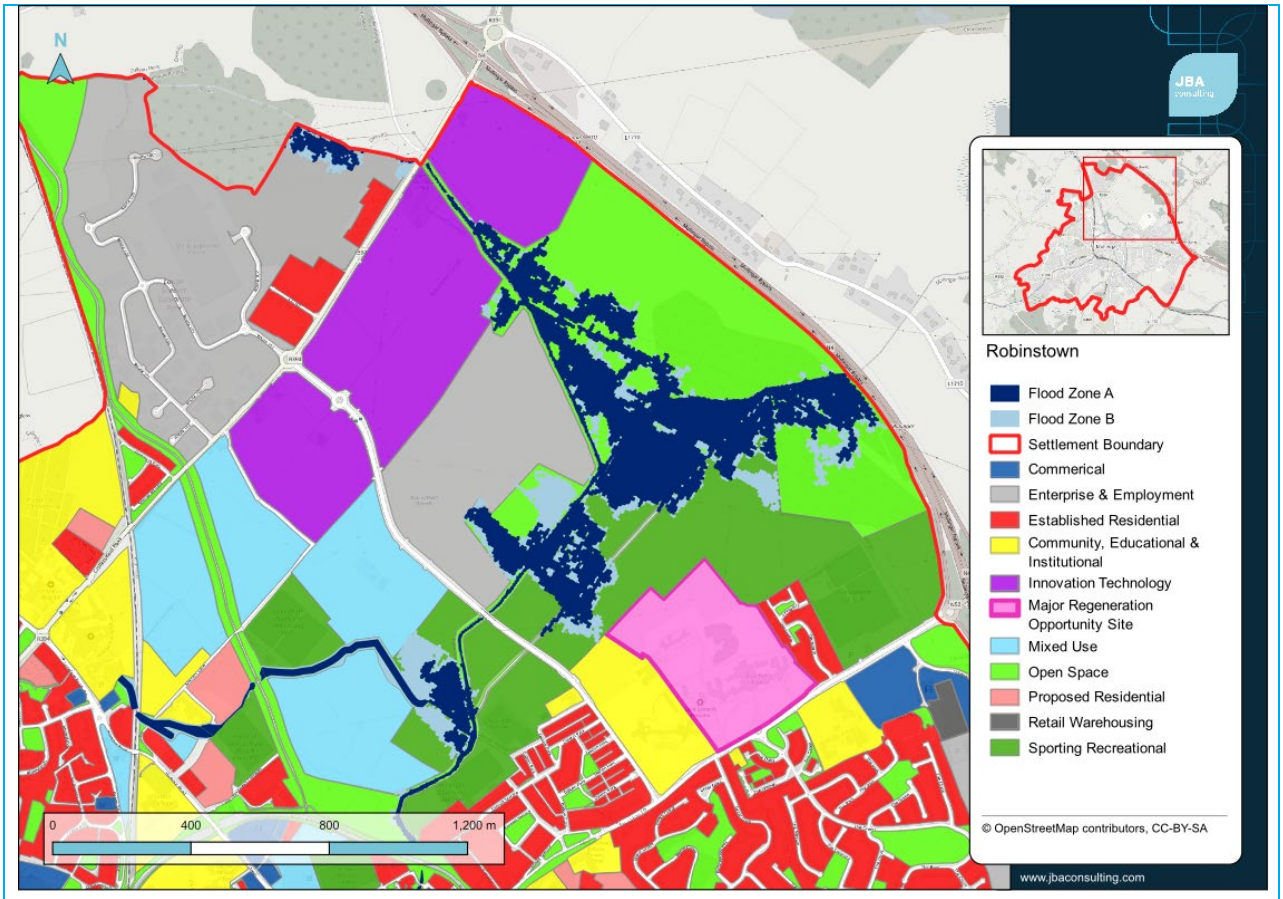
The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

Flood Zone Data	CFRAM (verified by a site visit)
Historic Flooding	Flooding was reported on Jail Hill, Austin Friar Street and Springfield canal aqueduct where the River Brosna overflows its banks upstream of the respective culverts every year after heavy rain. Flood relief scheme is now in place, this is displayed as a Flood Zone with an overlapping defended area hatching.
Comment	The Brosna flows in a southerly direction through Mullingar town centre. CFRAM flood zones show established residential, open space, mixed use, and community, educational & institutional lands partially within flood zone A and B.

Climate Change	Low sensitivity to climate change in Flood Zones A/B.
Conclusion	The Justification Test has been applied and passed for the Mixed Use (see Appendix A.1) on the basis that for highly vulnerable development; • Within Flood Zone A/B is limited to extensions, renovations and change of use. • Demolition/reconstruction consisting of infill residential development on the ground floor can only take place in Flood Zone C. • For less vulnerable use under the Mixed Use zoning within Flood Zone A/B reflects that the risk is lower and that development can proceed on the basis that: • Any future development should be subject to an FRA which should follow the general guidance provided in Section 7 of the SFRA. • Development must specifically address points under the Justification Test as listed in Appendix A.1. The Justification Test for Established Residential (see Appendix A.2) is passed on the basis that development is: • Limited to extensions, renovations and change of use. • Demolition/reconstruction consisting of infill residential development on the ground floor can only take place in Flood Zone C. • There are to be no bedrooms on the ground floor when extending existing residential property in Flood Zone A/B. • Any future development should be subject to an FRA which should follow the general guidance provided in Section 7of the SFRA and must specifically address the points detailed in Part 3 of the JT under Appendix A.2. The Justification Test for Community, Educational & Institutional zoning is passed on the basis that that the points detailed in Part 3 of the JT under Appendix A.3 are adhered to, key points include: • Within Flood Zone A/B development should be water compatible. • Highly vulnerable development and demolition and reconstruction can only take place in Flood Zone C. • Development is constructed in accordance with the

	site specific FRAs consistent with Section 7. Elsewhere in the area, risk can be managed in line with approved policy and the guidance provided within Section 7 of this SFRA. All new development should, where possible, consider the opportunity to include nature based solutions and SuDS for the management of stormwater as outlined in Section 7.7.5 and under WMCC SuDS policy.

8.3 Robinstown



The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

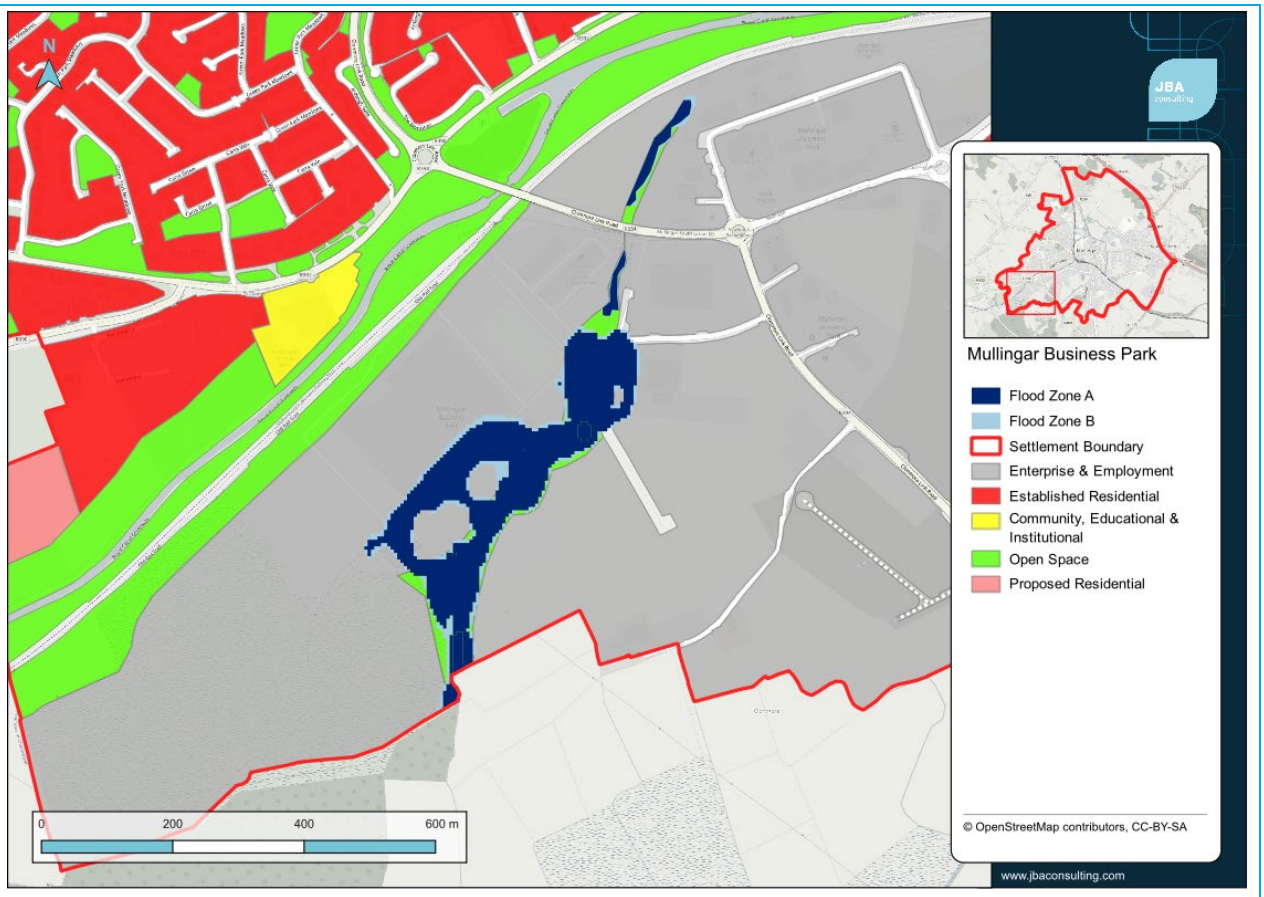
Flood Zone Data	CFRAM (verified by a site visit), bespoke modelling, desktop study
Historic Flooding	Flooding at Mullingar Regional Hospital carpark and rear gardens of 6 houses on 16/08/2008 due to inadequately sized culvert under railway line. Culvert has since been upsized.
Comment	The Brosna flows in a southerly direction through Robinstown and confluences with the Sheever Lough Stream in the northeast of the area. CFRAM flood zones show proposed residential, open space, mixed use, sporting recreational, innovation technology and enterprise and employment lands partially within Flood Zone A and/or B. A hydraulic modelling study was carried out for the proposed residential site to the northeast of the Mullingar Primary Care Centre. Culvert upgrades were implemented as part of this development and site layouts of the build show that no

	residential properties are within Flood Zone A/B. There has also been a modelling study for the proposed film studio (enterprise & employment) to the northeast of Lough Sheever Corporate park. This planning permission has yet to be implemented. The site layout plan shows all buildings to be within Flood Zone C. The best available datasets have been used to create the Flood Zones.
Climate Change	Moderate sensitivity to climate change.
Conclusion	The risk to Proposed Residential Lands is managed by following the sequential approach and avoiding less or highly vulnerable development in Flood Zone A or B. This has been enacted through the site specific FRA that was granted for the lands, which are now under construction. Any future development of the land should ensure: • New residential development and all associated infrastructure can only take place in Flood Zone C. • Development is constructed in accordance with the site specific FRA guided by Section 7 of the SFRA. For the Mixed Use zoning this has been amended to sequentially avoid almost all overlap with Flood Zone A/B. For highly vulnerable development (Mixed Use) the following shall apply; • The existing flood data does not provide flood levels. An appropriately detailed hydraulic model will be required to verify flood levels and extents as part of an appropriately detailed FRA which should follow the general guidance provided in Section 7 of the SFRA. • Within Flood Zone A/B (particularly if adjusted by site specific FRA) development is limited to extensions, renovations and change of use. For less vulnerable development under the Mixed Use zoning within Flood Zone B, development can proceed on the basis that: • Any future development should be subject to an FRA which should follow the general guidance provided in Section 7 of the SFRA and incorporates verification of flood levels and

	extents. The risk to Community, Educational & Institutional zoning (adjacent to the hospital) is again marginal and managed by the following approach: • Within Flood Zone A/B development should be water compatible development. • Some of the existing flood data does not provide flood levels. An appropriately detailed hydraulic model will be required to verify flood levels and extents as part of an appropriately detailed FRA. Any future development should be subject to an FRA which should follow the general guidance provided in Section 7 of the SFRA. • Highly vulnerable development and demolition and reconstruction can only take place in Flood Zone C. The risk to Enterprise and Employment lands is managed by the following approach: • Within Flood Zone A development should be water compatible development. • Proposals should not impede existing flow paths or cause flood risk impacts to the surrounding areas, and; • Any development shall also be required to be built in accordance with WMCC SuDS Policy. • Any future development of the land should be subject to an FRA which should follow the general guidance provided in Section 7 of the SFRA The risk to Sporting & Recreational lands is managed by the following approach • The sequential approach should be applied and highly or less vulnerable elements of development should be located in Flood Zone C; • Flood Zone A would principally be suitable for playing pitches/water compatible use only. Elsewhere in the area, risk can be managed in line with approved Policy and the guidance provided within Section 7 of this SFRA. All new development should, where possible, consider the

	opportunity to include nature based solutions and SuDS for the management of stormwater as outlined in Section 7.7.5 and under WMCC SuDS policy.

8.4 Mullingar Business Park

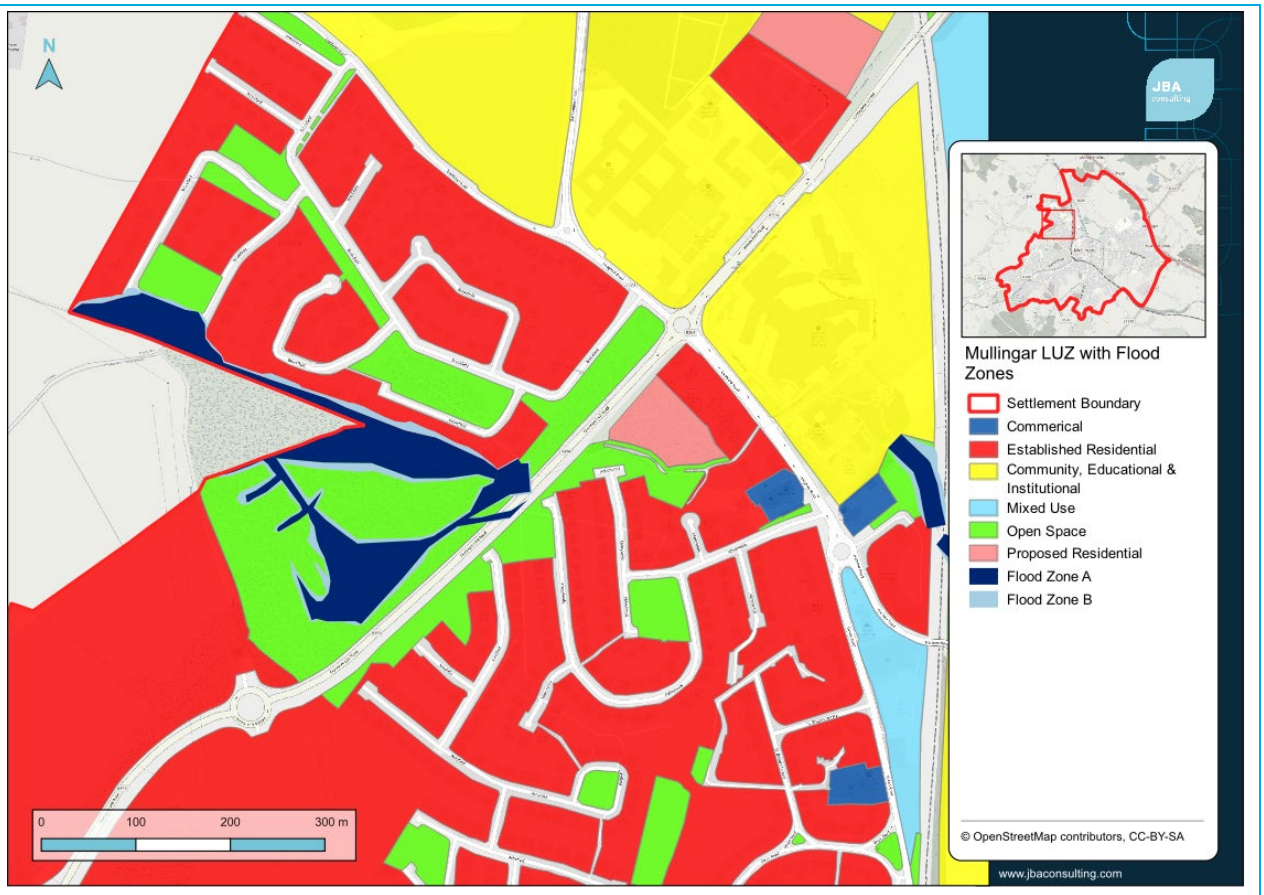


The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

Flood Zone Data	JBA mapping, desktop study.
Historic Flooding	A recurring flood event is reported on the Clonmore Link Road which is said to occur every year after heavy rain relating to the Saranstown Stream overflowing upstream of a road culvert.
Comment	The Saranstown Stream flows in a southerly direction and confluences with the Brosna to the south. Flood Zones here are a combination of JBA flood modelling and desktop study.
Climate Change	Low sensitivity
Conclusion	The risk to Enterprise and Employment lands is managed by ensuring the following: • The existing flood data does not provide flood levels. An appropriately detailed hydraulic model will be required to verify

	flood levels and extents as part of an appropriately detailed FRA which should follow the general guidance provided in Section 7 of the SFRA. • Development proposals should not impede existing flow paths or cause flood risk impacts to the surrounding areas. • New development is not suitable in Flood Zone A. • Extensions and renovations can be undertaken in Flood Zone A but will require an appropriately detailed hydraulic model as noted above. • Any development shall also be required to be built in accordance with WMCC SuDS Policy. Elsewhere in the area, risk can be managed in line with approved Policy and the guidance provided within Section 7 of this SFRA. All new development should, where possible, consider the opportunity to include nature based solutions and SuDS for the management of stormwater as outlined in Section 7.7.5 and under WMCC SuDS policy.

8.5 Rathgowan

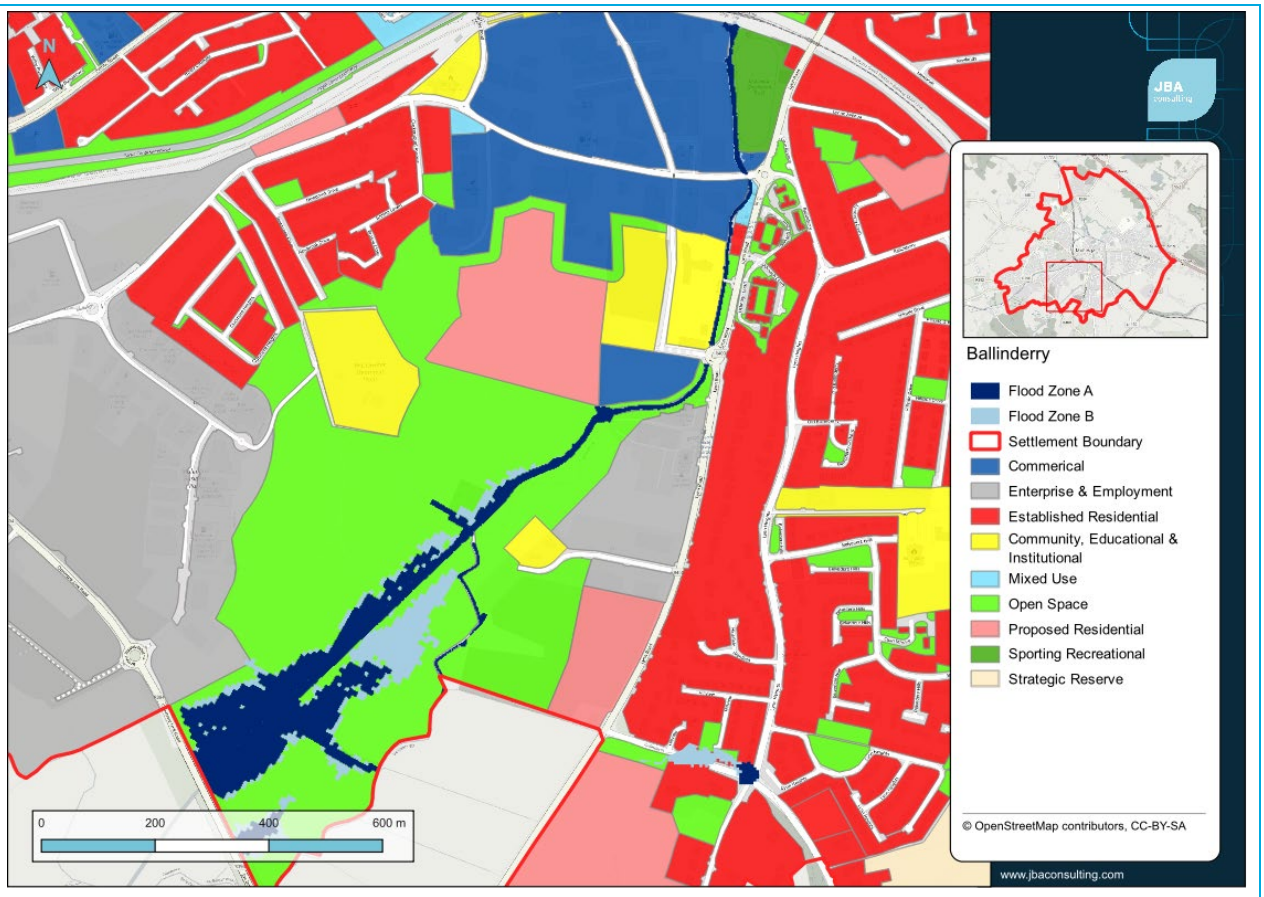


The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

Flood Zone Data	Bespoke flood mapping from model and desktop study.
Historic Flooding	Reports of previous flooding in the Brookfield estate which affected 3 properties and local roads.
Comment	A number of arterial drainage scheme channels are located here, these formally begin downstream (to the east) of the R394 with channel C45(5), but the channels themselves extend to the west of the R394 and the benefitting lands maps cover the entire open space area and parts of the Brookfield estate, which has historic flood risk from the local watercourses. Flood Zones show established residential (Brookfield) and open space lands partially within Flood Zone A and B. A hydraulic modelling study was carried out for the watercourse west of the R394 (that turns into OPW channel C45(5)) as part of the Stage 3 detailed FRA for a recent local housing development. Flooding, as confirmed by the Stage 3 FRA, largely affects an area of low lying ground that is zoned open space and is also

	included within the OPW benefitting lands maps. Flood Zones have been created using the Stage 3 FRA, historic data and verified by a site visit. The area is wet and marshy in the low lying spots as observed on the site visit.
Climate Change	Low sensitivity.
Conclusion	The risk to Established Residential at the Brookfield estate is managed by the following guidance: • Within Flood Zone A/B development should be limited to extensions, renovations and change of use. • Demolition/reconstruction consisting of infill residential development on the ground floor can only take place in Flood Zone C. • There are to be no bedrooms on the ground floor when extending existing residential property in Flood Zone A/B. • Any future development should be subject to a FRA which should follow the general guidance provided in Section 7 of the SFRA. Elsewhere in the area, risk can be managed in line with approved Policy and the guidance provided within Section 7 of this SFRA. The area of Open Space to the west of the R394 is impacted significantly by Flood Zone A/B as evidenced by the recent detailed Stage 3 FRA, local historic flooding, benefitting lands maps coverage and as identified by the site walkover. The Justification Test cannot pass/be applied to lands that are not within or adjoining the core/town centre and where other lands at lower risk of flooding are available closer to the core and as such Open Space zoning has been maintained. All new development should, where possible, consider the opportunity to include nature based solutions and SuDS for the management of stormwater as outlined in Section 7.7.5 and under WMCC SuDS policy.

8.6 Lynn/Clonmore



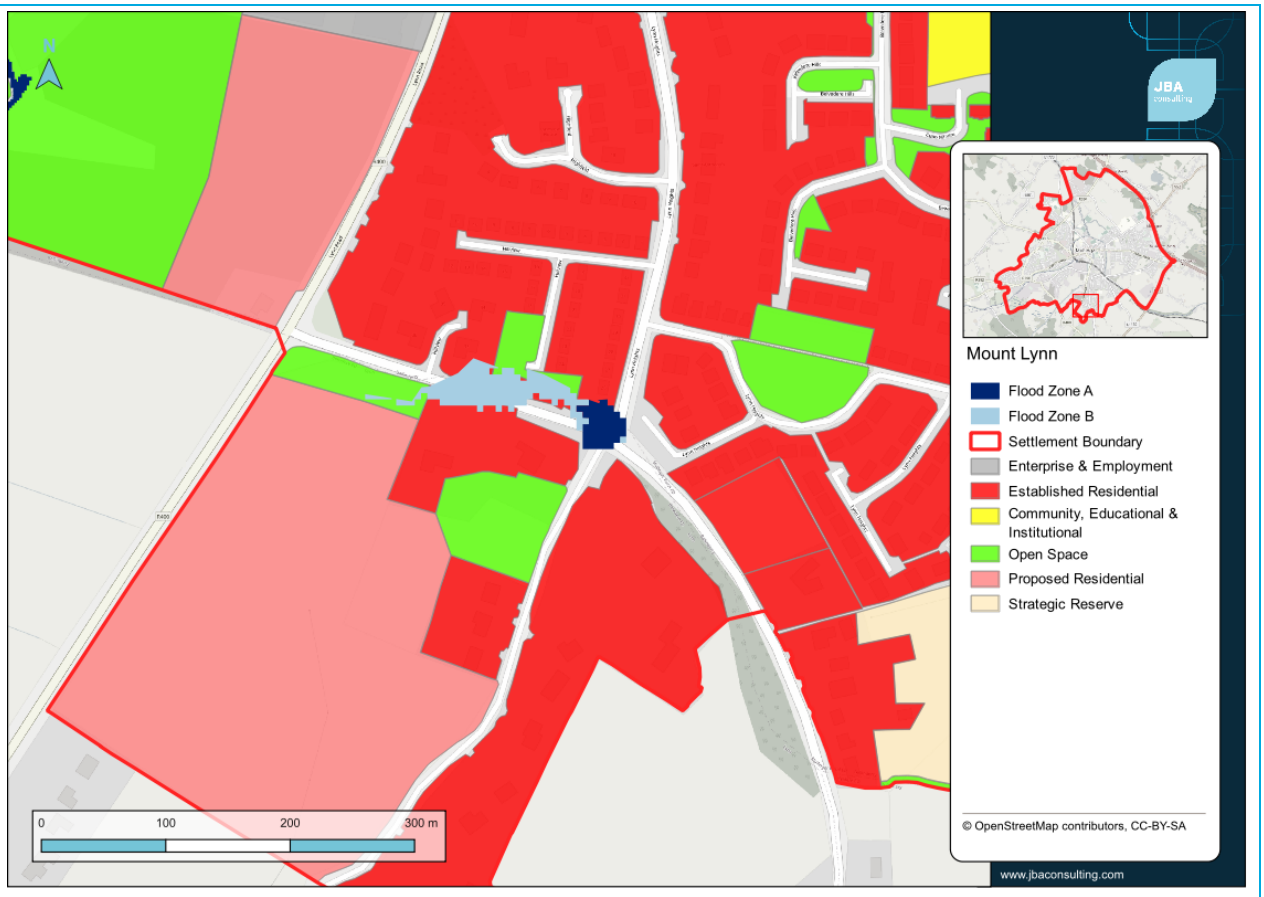
The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

Flood Zone Data	CFRAM (verified by a site visit).
Historic Flooding	No record of historic flooding.
Comment	The Brosna flows in a southerly direction through the area. CFRAM flood zones show open space, mixed use, sporting recreational and commercial lands partially within Flood Zone A and B. The pattern of flooding is quite constrained south of the railway line adjacent to the Greyhound Stadium and through the subsequent Commercial and then Educational lands. Further south the channel is flanked by extensive areas of open space.
Climate Change	Low to Moderate sensitivity to climate change in Flood Zones A/B. Areas with moderate sensitivity are zoned open space.
Conclusion	For the Mixed Use zoning there is very marginal encroachment of Flood Zones. For highly vulnerable development (Mixed Use) the following shall apply;

	• Within Flood Zone A/B development is limited to extensions, renovations and change of use. • Demolition/reconstruction consisting of infill residential development on the ground floor can only take place in Flood Zone C. • Any future development should be subject to a FRA which should follow the general guidance provided in Section 7 of the SFRA. • For less vulnerable development under the Mixed Use zoning within Flood Zone B development can proceed on the basis that: any future development should be subject to an FRA which should follow the general guidance provided in Section 7 of the SFRA. The risk to Community, Educational & Institutional zoning is managed by the following guidance: • Within Flood Zone A/B development should be water compatible development. • The existing flood data does not provide flood levels. An appropriately detailed hydraulic model will be required to verify flood levels and extents as part of an appropriately detailed FRA which should follow the general guidance provided in Section 7 of the SFRA. • Highly vulnerable development and demolition and reconstruction can only take place in Flood Zone C. The risk to Commercial lands is managed by the following guidance: Within Flood Zone A/B development should be water compatible development. • Proposals should not impede existing flow paths or cause flood risk impacts to the surrounding areas, and; • Any development shall also be required to be built in accordance with WMCC SuDS Policy. • Any future development of the land should be subject to a FRA which should follow the general guidance provided in Section 7 of the SFRA Elsewhere in the area, risk can be managed in line with approved Policy and the guidance provided within Section 7 of this SFRA. All new development should, where possible, consider the

	opportunity to include nature based solutions and SuDS for the management of stormwater as outlined in Section 7.7.5 and under WMCC SuDS policy.

8.7 Mount Lynn



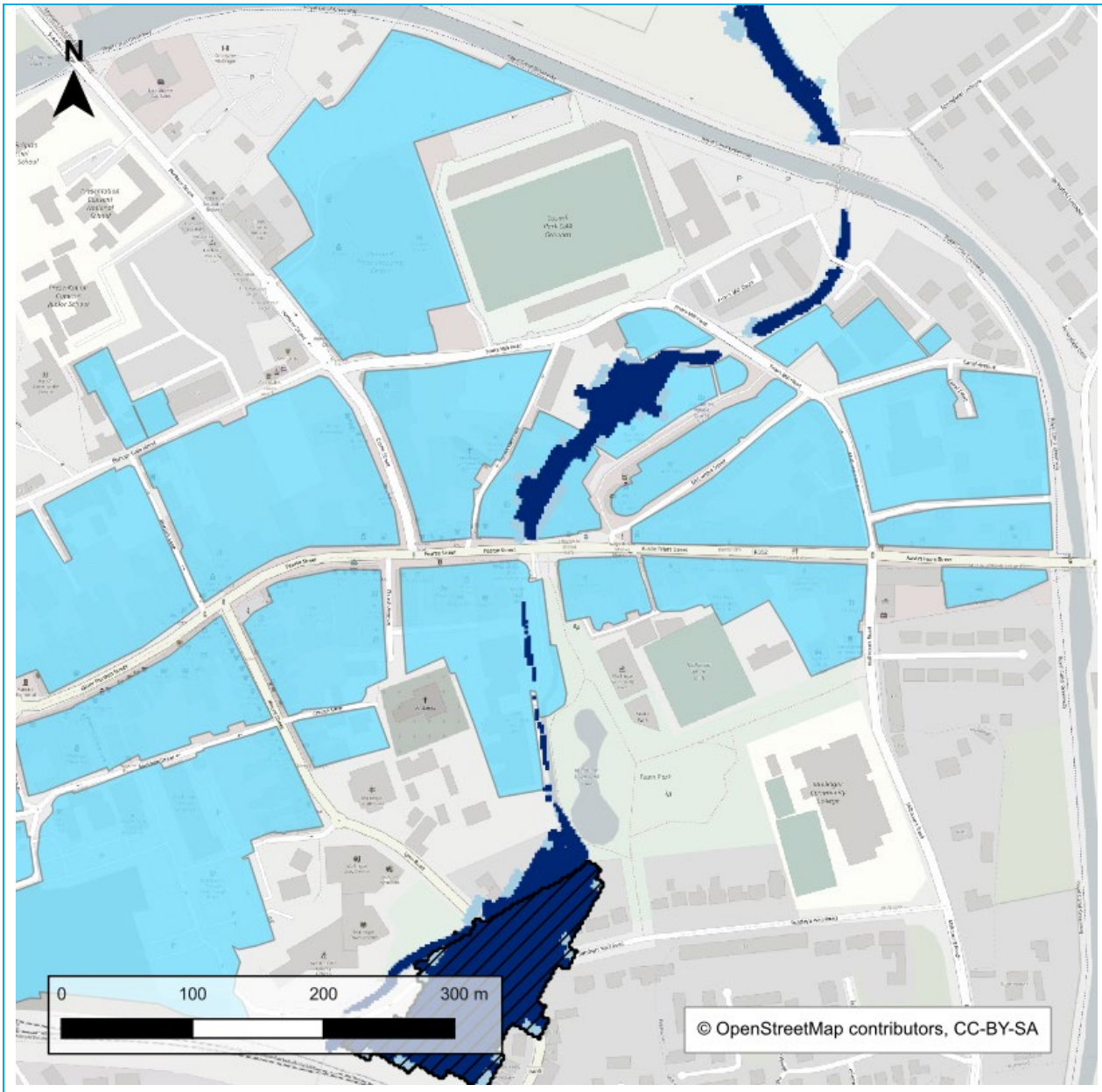
The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

Flood Zone Data	NIFM (verified by a site visit)
Historic Flooding	A tributary of the River Brosna overflows its banks upstream of the road culvert every year after heavy rain. Road is liable to flood. Some works undertaken to upgrade the culvert.
Comment	The Boardstown Stream flows in a westerly direction through the area. NIFM flood zones show open space and established residential lands partially within Flood Zone A and B. The flooding pattern was verified by the site visit.
Climate Change	High sensitivity to climate change, due to culvert capacity.
Conclusion	The risk to Established Residential is managed by following the sequential approach and avoiding less or highly vulnerable development in Flood Zone A or B. Any future development of the land should be subject to a FRA which must specifically comply

	with the following: • Limited to extensions, renovations and change of use. • Demolition/reconstruction consisting of infill residential development can only take place in Flood Zone C. • There are to be no bedrooms on the ground floor when extending existing residential property in Flood Zone A/B. • Follow the general guidance provided in Section 7 of the SFRA. Elsewhere in the area, risk can be managed in line with approved Policy and the guidance provided within Section 7 of this SFRA. All new development should, where possible, consider the opportunity to include nature based solutions and SuDS for the management of stormwater as outlined in Section 7.7.5 and under WMCC SuDS policy.

A Appendix A - Justification Tests

A.1 Mixed Use



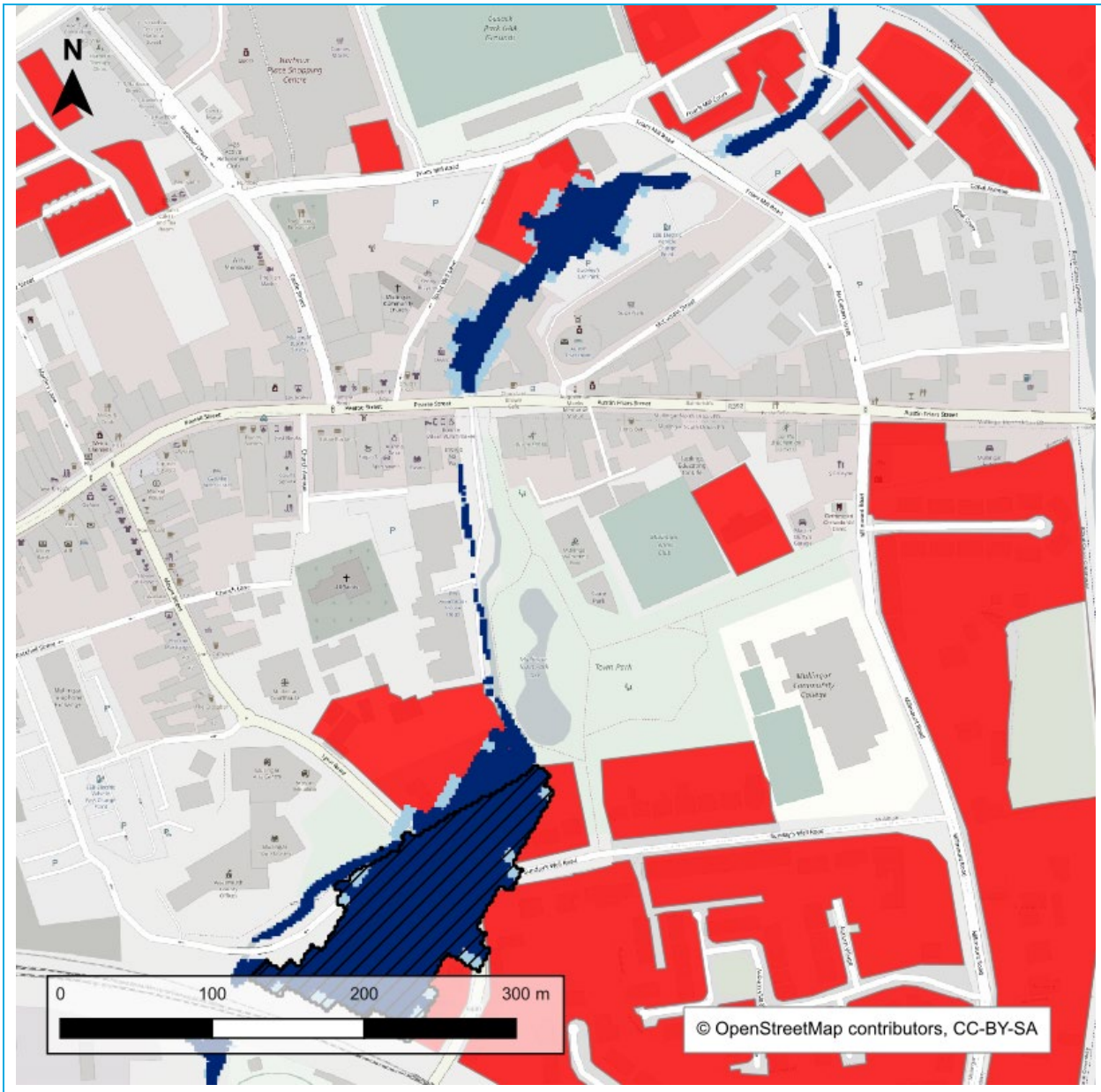
1. The urban settlement is targeted for growth under the National Spatial Strategy, regional planning guidelines, statutory plans or under the Planning Guidelines or Planning Directives	The National Planning Framework identifies a number of centres of scale, such as Mullingar, which have the potential to achieve the critical mass required to drive regional growth. This status is reinforced in the Eastern and Midlands Regional Spatial and Economic Strategy (RSES) which designates Mullingar as a “Key Town”. It is stipulated in the RSES that the role of Mullingar is to facilitate commensurate population and job growth

provisions of the Planning and Development Act 2000, as amended.	and serve as a growth enabler for the region. The Westmeath County Development Plan (CDP) 2021-2027 supports the continued growth and sustainable development of Mullingar to act as a growth driver in the region and to fulfil its role as a 'Key Town' (CPO 2.5). It is also a policy objective of the CDP to prepare a land use plan for Mullingar to align with the RSES and the Core Strategy (CPO 2.6). The Mullingar Settlement Area Plan employs compact growth principles to facilitate a joined-up approach to urban development including re-use and renewal of vacant sites and activation of regeneration opportunities.
2. The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular:	The subject lands comprise Mullingar's Town Core, which are zoned for mixed use development, reflecting the long-standing mixture of uses that have always co-existed in the town core. This zoning type supports a balance of residential, commercial, retail and community uses, reinforcing the critical mass needed for service provision. The continued integration of mixed-use development within the town core will support the sequential and compact growth of Mullingar, and therefore, is required to secure the proper planning and sustainable development of the town.
i. Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement:	The centrally located subject lands have an essential role in supporting the compact growth of Mullingar's urban core, together with the implementation of the Canal Avenue Regeneration Masterplan 2023. The Masterplan seeks to enable the comprehensive regeneration and re-development of Canal Avenue and its environs.
ii. Comprises significant previously developed and/or under-utilised lands:	The subject lands, which extend along the River Brosna, are predominantly developed, featuring car parking, road and footpath infrastructure and commercial/retail premises. Lands within Flood Zones A and B represent a small proportion of the wider development lands, and would contribute more to sustainability efforts by retaining an enhanced green corridor along the River Brosna. This corridor could

	incorporate public access to the watercourse and support biodiversity enhancement.
iii. Is within or adjoining the core of an established or designated urban settlement:	Adjoining lands along the River Brosna are centrally positioned within Mullingar's town core. Mullingar is designated as a Key Town in both the Westmeath CDP and the RSES.
iv. Will be essential in achieving compact and sustainable urban growth;	The development of these lands will consolidate Mullingar's town core, promoting compact growth and contributing to the overall functionality of the town centre. Furthermore, their development is integral to the successful implementation of the Canal Avenue Regeneration Masterplan.
v. There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement.	The subject lands are predominantly developed, with the existing built environment contributing to the overall functionality of the town centre. There are no alternative suitable lands that could adequately replace the services and infrastructure in-situ.
3. A flood risk assessment to an appropriate level of detail has been carried out as part of the Strategic Environmental Assessment as part of the development plan preparation process, which demonstrates that flood risk to the development can be adequately managed and the use or development of the lands will not cause unacceptable adverse impacts elsewhere. N.B. The acceptability or otherwise of levels of any residual risk should be	Parts of the town core are within Flood Zone A/B. Most of the land is under existing development. Parts 1 & 2 of the test found that it is considered appropriate to retain the zoning. This is on the basis that; • Highly vulnerable use is restricted to extensions/renovations in Flood Zone A/B. • Less vulnerable development within Flood Zone A/B is appropriate but must be subject to a FRA which should follow the general guidance provided in Section 7 of the SFRA. • Infill highly vulnerable development and demolition and reconstruction can only take place in Flood Zone C. • Any future development should be subject to a FRA which should follow the general guidance provided in Section 7 of the SFRA and must also be required to be built in accordance with WMCC SuDS Policy.

made with consideration for the proposed development and the local context and should be described in the relevant flood risk assessment	• Bedrooms should be located in the upstairs of two-story buildings when extending existing property; • Flood resilient construction materials and fittings should be considered if in Flood Zone A/B for both highly and less vulnerable use. Proposals should not impede existing flow paths or cause flood risk impacts to the surrounding areas

A.2 Established Residential



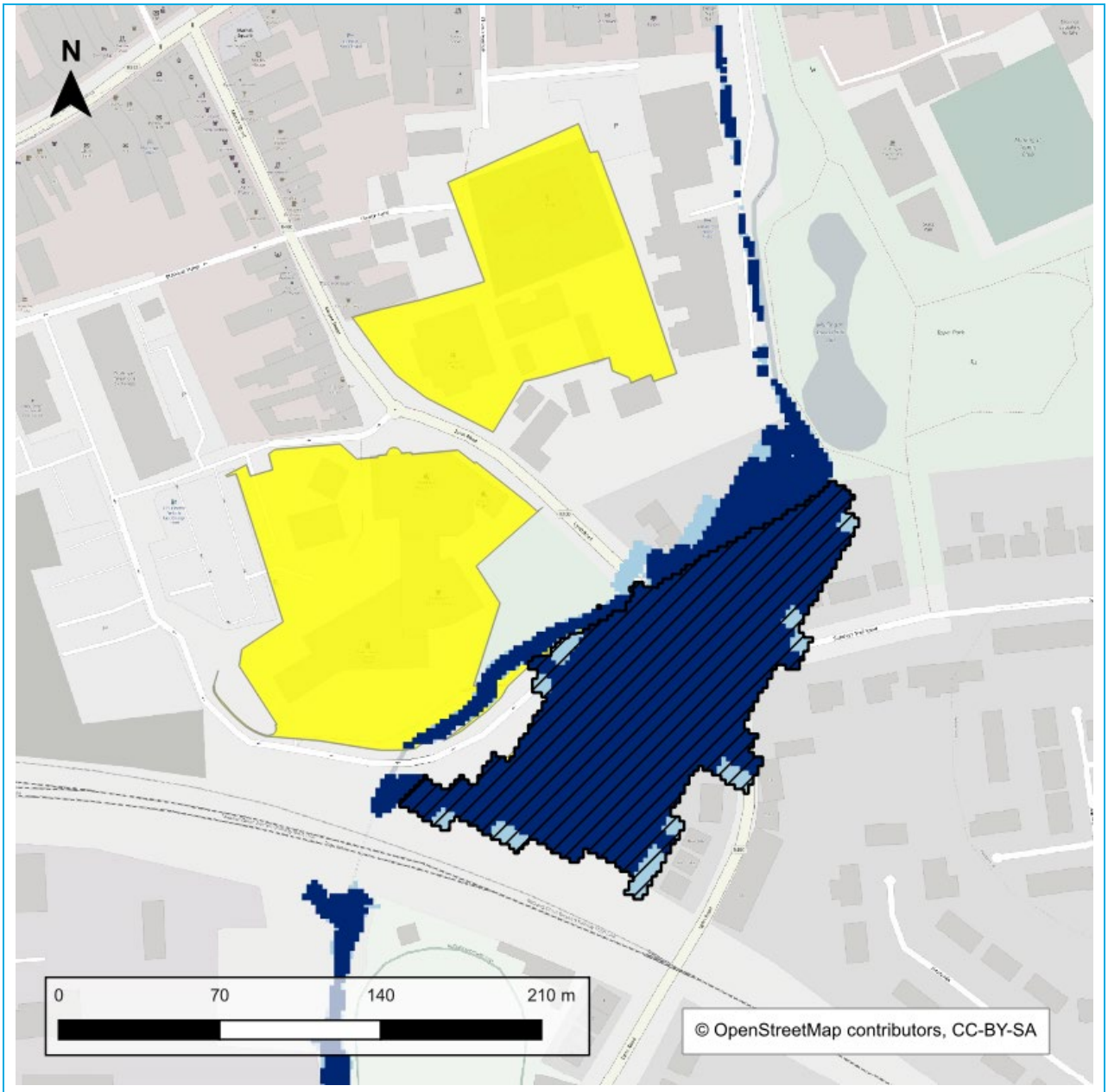
1. The urban settlement is targeted for growth under the National Spatial Strategy, regional planning guidelines, statutory plans or under the Planning Guidelines or Planning Directives provisions of the Planning and Development Act 2000, as amended.	The National Planning Framework identifies a number of centres of scale, such as Mullingar, which have the potential to achieve the critical mass required to drive regional growth. This status is reinforced in the Eastern and Midlands Regional Spatial and Economic Strategy (RSES) which designates Mullingar as a "Key Town". It is stipulated in the RSES that the role of Mullingar is to facilitate commensurate population and job growth and serve as a growth enabler for the region. The Westmeath County Development Plan (CDP) 2021-2027 supports the continued growth and

	sustainable development of Mullingar to act as a growth driver in the region and to fulfil its role as a 'Key Town' (CPO 2.5). It is also a policy objective of the CDP to prepare a land use plan for Mullingar to align with the RSES and the Core Strategy (CPO 2.6). The Mullingar Settlement Area Plan employs compact growth principles to facilitate a joined-up approach to urban development including re-use and renewal of vacant sites and activation of regeneration opportunities.
2. The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular:	The subject lands comprise Mullingar's town core, which are zoned as 'Established Residential', reflecting the long-standing residential areas that have always existed in the town centre. This zoning type promotes high quality residential consolidation and sustainable intensification, reinforcing the critical mass needed for service provision. The continued integration of residential development within the town core will support the sequential and compact growth of Mullingar, in line with the *Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities (2024)*, and therefore, is required to secure the proper planning and sustainable development of the town.
i. Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement:	The centrally located subject lands have an essential role in supporting compact residential growth and community/social services in Mullingar's urban core, together with the implementation of the Canal Avenue Regeneration Masterplan. The Masterplan seeks to enable the comprehensive regeneration and re-development of Canal Avenue and its environs.
ii. Comprises significant previously developed and/or under-utilised lands:	The subject lands, which extend along the River Brosna, are predominantly developed, featuring car parking, road and footpath infrastructure and residential premises. Lands within Flood Zones A and B represent a small proportion of the wider development lands, and would contribute more to sustainability efforts by retaining an enhanced green corridor along the River Brosna. This corridor could support existing communities by incorporating public

	access to the watercourse and supporting biodiversity enhancement.
iii. Is within or adjoining the core of an established or designated urban settlement:	Adjoining lands along the River Brosna are centrally positioned within Mullingar's town core. Mullingar is designated as a Key Town in both the Westmeath CDP and the RSES.
iv. Will be essential in achieving compact and sustainable urban growth;	The development of these lands will consolidate Mullingar's town core, promoting compact growth and contributing to the overall functionality of the town centre. Furthermore, their development is integral to the successful implementation of the Canal Avenue Regeneration Masterplan.
v. There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement.	The subject lands are predominantly developed, with the existing built environment contributing to the overall functionality of the town centre. There are no alternative suitable lands that could adequately replace the services and infrastructure in-situ.
3. A flood risk assessment to an appropriate level of detail has been carried out as part of the Strategic Environmental Assessment as part of the development plan preparation process, which demonstrates that flood risk to the development can be adequately managed and the use or development of the lands will not cause unacceptable adverse impacts elsewhere. N.B. The acceptability or otherwise of levels of any residual risk should be made with consideration for the proposed	Parts of the land here are within Flood Zone A/B Parts 1 and 2 of the test found that it is considered appropriate to retain the existing zoning. This is on the basis that; • Additional development in Flood Zones A/B should be limited to extensions, renovations and change of use. • Demolition/reconstruction consisting of infill residential development on the ground floor can only take place in Flood Zone C. Any future development should be subject to a FRA which should follow the general guidance provided in Section 7 of the SFRA and must specifically address the following: • Bedrooms should be located in the upstairs of two-story buildings when extending existing property; • Flood resilient construction materials and fittings should be considered if in Flood Zone A/B; • Proposals should not impede existing flow paths or cause flood risk impacts to the surrounding areas, and;

development and the local context and should be described in the relevant flood risk assessment	• Any development shall also be required to be built in accordance with WMCC SuDS Policy.

A.3 Community, Educational & Institutional



1. The urban settlement is targeted for growth under the National Spatial Strategy, regional planning guidelines, statutory plans or under the Planning Guidelines or Planning Directives provisions of the Planning and Development Act 2000,	The National Planning Framework identifies a number of centres of scale, such as Mullingar, which have the potential to achieve the critical mass required to drive regional growth. This status is reinforced in the Eastern and Midlands Regional Spatial and Economic Strategy (RSES) which designates Mullingar as a "Key Town". It is stipulated in the RSES that the role of Mullingar is to facilitate commensurate population and job

as amended.	growth and serve as a growth enabler for the region. The Westmeath County Development Plan (CDP) 2021-2027 supports the continued growth and sustainable development of Mullingar to act as a growth driver in the region and to fulfil its role as a 'Key Town' (CPO 2.5). It is also a policy objective of the CDP to prepare a land use plan for Mullingar to align with the RSES and the Core Strategy (CPO 2.6). The Mullingar Settlement Area Plan employs compact growth principles to facilitate a joined-up approach to urban development including re-use and renewal of vacant sites and activation of regeneration opportunities.
2. The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular:	The subject lands comprise Mullingar's town core, which are zoned as 'Community, Educational & Institutional', reflecting the long-standing civic / institutional uses (Westmeath County Council) that have always existed in the town core. This zoning type provides for facilities that serve and contribute to the creation of viable and stable communities, reinforcing the critical mass needed for service provision. The continued integration of such uses within the town core will support the sequential and compact growth of Mullingar, and therefore, is required to secure the proper planning and sustainable development of the town.
i. Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement:	The centrally located subject lands have an essential role in supporting community/social services in Mullingar's core.
ii. Comprises significant previously developed and/or under-utilised lands:	The subject lands, which extend along the River Brosna, are predominantly developed, featuring car parking, road and footpath infrastructure. Lands within Flood Zones A and B represent a small proportion of the wider development lands, and would contribute more to sustainability efforts by retaining an enhanced green corridor along the River Brosna. This corridor could incorporate public

	access to the watercourse and support biodiversity enhancement.
iii. Is within or adjoining the core of an established or designated urban settlement:	Adjoining lands along the River Brosna are centrally positioned within Mullingar's town core. Mullingar is designated as a Key Town in both the Westmeath CDP and the RSES.
iv. Will be essential in achieving compact and sustainable urban growth;	The development of these lands will consolidate Mullingar's town core, promoting compact growth and contributing to the overall functionality of the town centre.
v. There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement.	The subject lands are predominantly developed, with the existing built environment contributing to the overall functionality of the town centre. There are no alternative suitable lands that could adequately replace the services and infrastructure in-situ.
3. A flood risk assessment to an appropriate level of detail has been carried out as part of the Strategic Environmental Assessment as part of the development plan preparation process, which demonstrates that flood risk to the development can be adequately managed and the use or development of the lands will not cause unacceptable adverse impacts elsewhere. N.B. The acceptability or otherwise of levels of any residual risk should be made with consideration for the proposed development and the local context and should be described in the relevant flood risk assessment	The existing Community, Educational & Institutional lands are within Flood Zone A\B. Parts 1 and 2 of the test found that it is considered appropriate to retain the existing zoning. Any future construction should be subject to a FRA which should follow the general guidance provided in Section 7 of the SFRA and must specifically address the following: • Only water compatible development should be placed in Flood Zone A/B; • Development is constructed in accordance with the site specific FRAs. • Proposals should not impede existing flow paths or cause flood risk impacts to the surrounding areas, and; • Any development shall also be required to be built in accordance with WMCC SuDS Policy.



Offices at

Bristol
Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Leeds
Limerick
Newcastle upon Tyne
Newport
Peterborough
Portsmouth
Saltaire
Skipton
Tadcaster
Thirsk
Wallingford
Warrington

Registered Office
1 Broughton Park
Old Lane North
Broughton
SKIPTON
North Yorkshire
BD23 3FD
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
Follow us:

Jeremy Benn Associates Limited

Registered in England 3246693
JBA Group Ltd is certified to:
ISO 9001:2015
ISO 14001:2015
ISO 27001:2013
ISO 45001

DRAFT

MULLINGAR

Settlement Area Plan

2025-2031

WESTMEATH COUNTY COUNCIL
Comhairle Chontae na hIarmhí

The Greenway,
Block C Ardilaun Court,
St. Stephens Green,
Dublin 2
D02 TD28
Republic of Ireland

www.meinhardt.ie