

# Adare Public Realm Enhancement

## Flood Risk Assessment

January 2026

Prepared for:  
MHL and Associates Ltd.

[www.jbaconsulting.ie](http://www.jbaconsulting.ie)

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# Contract

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## Abbreviation

|        |  |
|--------|--|
| AEP    | Annual Exceedance Probability                                |
| CDP    | County Development Plan                                      |
| CFRAM  | Catchment Flood Risk Assessment and Management               |
| DoHELG | Department of the Environment, Heritage and Local Government |
| DTM    | Digital Terrain Model  |
| EPA    | Environmental Protection Agency                              |
| FB     | Freeboard  |
| FFL    | Finish Floor Level   |
| FRA    | Flood Risk Assessment  |
| FSR    | Flood Studies Report   |
| GSI    | Geological Survey of Ireland                                 |
| GWB    | Groundwater Body   |
| HEFS   | High-End Future Scenario                                     |
| LiDAR  | Light Detection and Ranging                                  |
| NIFM   | National Indicative Fluvial Mapping                          |
| OPW    | Office of Public Works                                       |
| PFRA   | Preliminary Flood Risk Assessment                            |
| RMS    | Root Mean Square   |
| RR     | Rainfall-Runoff  |
| SAAR   | Standard Average Annual Rainfall (mm)                        |
| SFRA   | Strategic Flood Risk Assessment                              |
| SuDS   | Sustainable Urban Drainage System                            |
| TII    | Transport Infrastructure Ireland                             |
| WL     | Water Level  |

# 1 Introduction

Under the Planning System and Flood Risk Management Guidelines for Planning Authorities (DoEHLG & OPW, 2009), the proposed development must undergo a Flood Risk Assessment (FRA) to ensure sustainability and effective management of flood risk.

## 1.1 Terms of Reference

JBA Consulting was appointed to prepare a Site-Specific Flood Risk Assessment (FRA) to support the Part 8 planning application for the proposed Urban Realm Improvement project within the village of Adare, County Limerick.

## 1.2 Flood Risk Assessment Aims and Objectives

This study is being completed to inform the future development of the site as it relates to flood risk. It aims to identify, quantify and communicate to Planning Authority officials and other stakeholders the risk of flooding to land, property and people and the measures that would be recommended to manage the risk. The objectives of this FRA are to:

- Identify potential sources of flood risk.
- Confirm the level of flood risk and identify key hydraulic features.
- Assess the impact that the proposed development has on flood risk.
- Develop an appropriate flood risk mitigation and management measures which will allow for the long-term development of the site.

Recommendations for development have been provided in the context of the 2009 OPW / DECLG planning guidance, "The Planning System and Flood Risk Management". A review of the likely effects of climate change and the long-term impacts this may have on any development has also been undertaken.

For general information on flooding, the definition of flood risk, flood zones and other terms see 'Understanding Flood Risk' in Appendix A.

## 1.3 Proposed Development

The proposed project consists of implementing some of the interventions identified in Adare's LTP for the N21 roadway through the village. These interventions are a series of minor works and alterations to the existing N21 route that largely improving pedestrian access to the village and other measures. These works are proposed to be incorporated in line with Part XI of the Planning & Development Act 2000 (as amended) and Part 8, Article 81 of the Planning and Development Regulations 2001 (as amended) by Limerick City & County Council. These measures include the following:

- Widening and improving footpaths in the village core and village approach routes,
- Construction of 3no. controlled, 2no. uncontrolled new pedestrian crossings and upgrades to existing crossings to improve pedestrian connectivity and road safety,
- New public lighting scheme on Main Street,
- New landscaping and sustainable drainage systems, including tree pits and rain gardens,
- New street furniture including age friendly seating and new bins,
- Replacement of signage,
- New traffic calming features included Gateway Treatments (Type A in accordance with TII Standard Construction Details Series 5100), reducing the N21 road width and introduction of various landscaping features.

These minor improvements are distributed along various areas of the N21, Station Road and Blackabbey Road in Adare. There is a total of 8 different segments, known as Minor Works Areas, where these works are planned. The drawings for each of these Minor Works Areas are in Appendix B – with an overview provided in figure 1-1. A brief breakdown of each proposed measure and overview locations is provided below.

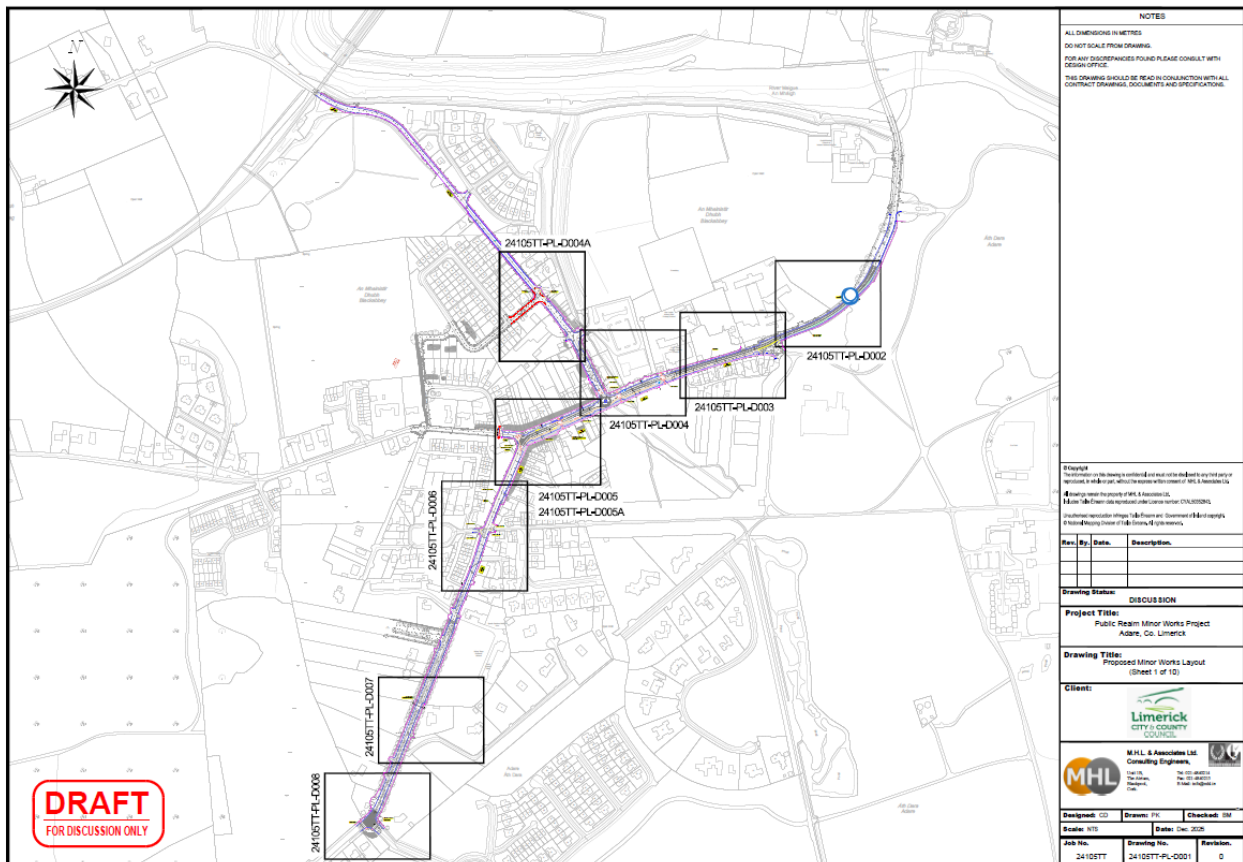


Figure 1-1 Proposed Development Layout

On Main Street, the carriageway will be reduced in width, enabling significant widening of the southern footpath. This will be achieved through a measure known as 'gate treatment'. Two gate treatments will be installed; one on the Northern Entrance/Exit to the village by Adare Manor, and the second on the Southern Entrance/Exit to the village just South of Scoil Naomh Iosaf. New pedestrian/zebra crossings are also proposed at the following locations:

- Opposite the Trinitarian Abbey
- On the Northern and Eastern arms of the roundabout junction where the N21 meets Station Road.
- Replacement of the existing crossing across from the Garvey's food store.
- At the junction of the Blackabbey road and just below it on the N21.
- At the southern and eastern legs of the traffic light junction between the N21 and Rathkeale road to the south. The existing road island at the Southern leg and Northern leg of the junction will be removed.
- New zebra crossings will be raised and the relevant landscaping design for these is described as 'raised tables' in the landscaping description below.

The next most significant work items to be completed are the incorporation of new footpaths or widening of existing footpaths. Other works on footpaths include the incorporation of tactile paving at junctions onto the N21, either on uncontrolled crossing or onto the new pedestrian crossing. Some areas of the footpaths will also be built out, with parking bollards built in. Some existing footpaths will also be extended. New footpaths will typically be of 2.0m in width. These footpath improvement works will be conducted at various points across the route and can be observed in the drawings in Appendix B.

The project also aims to introduce new accessible parking spaces, loading bays, 15-minute set-down zones, replacement of signage to meet current guidelines, removal of some existing bollards and adjustments to traffic light signals at the N21/Rathkeale Road junction.

Landscaping will include the incorporation of the following. Planting of new street trees, including those in paving.

- Incorporation of SuDS measures, either in the form of rain gardens and/or tree pits.
- Proposed granite paving to footpaths.
- Proposed small unit granite paving to raised tables.
- Proposed darker colour small unit paving to edge of raised tables.
- Limestone kerbs will be implemented.
- New concrete paths in areas.
- Tactile paving installed in various areas and on lead-up to new crossings.
- New seating and bins to be installed.

Ground levels will remain close to existing levels throughout the scheme. Any excavations for the proposed works will be minimal and kept to the small footprint around the incorporation of the above measures. The road surface in most cases will not be removed and resurfaced, except for where new features are added. Surface water will be discharged

to the existing stormwater network on Main Street, with minor adjustments to roadside gullies. Sustainable drainage systems (SuDS), including bioretention areas along the kerb line, will be introduced to attenuate runoff and improve water quality.

The village is due to be bypassed in the next two years with a projected project completion date of June 2027 for the Adare Bypass.

#### **1.4 Report Overview**

Section 2 outlines the study area, planning and policy context, relevant watercourses, local topography, and site geology. Section 3 presents flood history and provides detailed identification of flood risk. Section 4 discusses site-specific flood risk and proposed mitigation measures, with the conclusion set out in Section 5

## 2 Background

This section describes the receiving environment of the proposed development site in terms of watercourses, geology, and characteristics of the wider geographical area.

### 2.1 Location and watercourses

Adare is a large village with a population of 1,224 (Census 2022), situated approximately 18 km southwest of Limerick City on the N21 National Primary Road. The village has a linear settlement pattern along the N21, with further development extending along the L-1423 and L-1422 local roads, which connect to Askeaton and Foynes. Figure 2-1 shows the proposed development site in its wider context.

The River Maigue drains a catchment of approximately 806 km<sup>2</sup>, originating in the Ballyhoura Mountains near Milford in County Cork. It flows northward through Croom and continues northwest towards Adare, where it becomes tidally influenced. The river transitions into the Maigue Estuary downstream of Droichidín Bridge on Main Street. The estuary flows north and discharges into the Shannon Estuary approximately 10 km north of Adare. Figure 2-1 shows the watercourses in the area of the proposed development site.

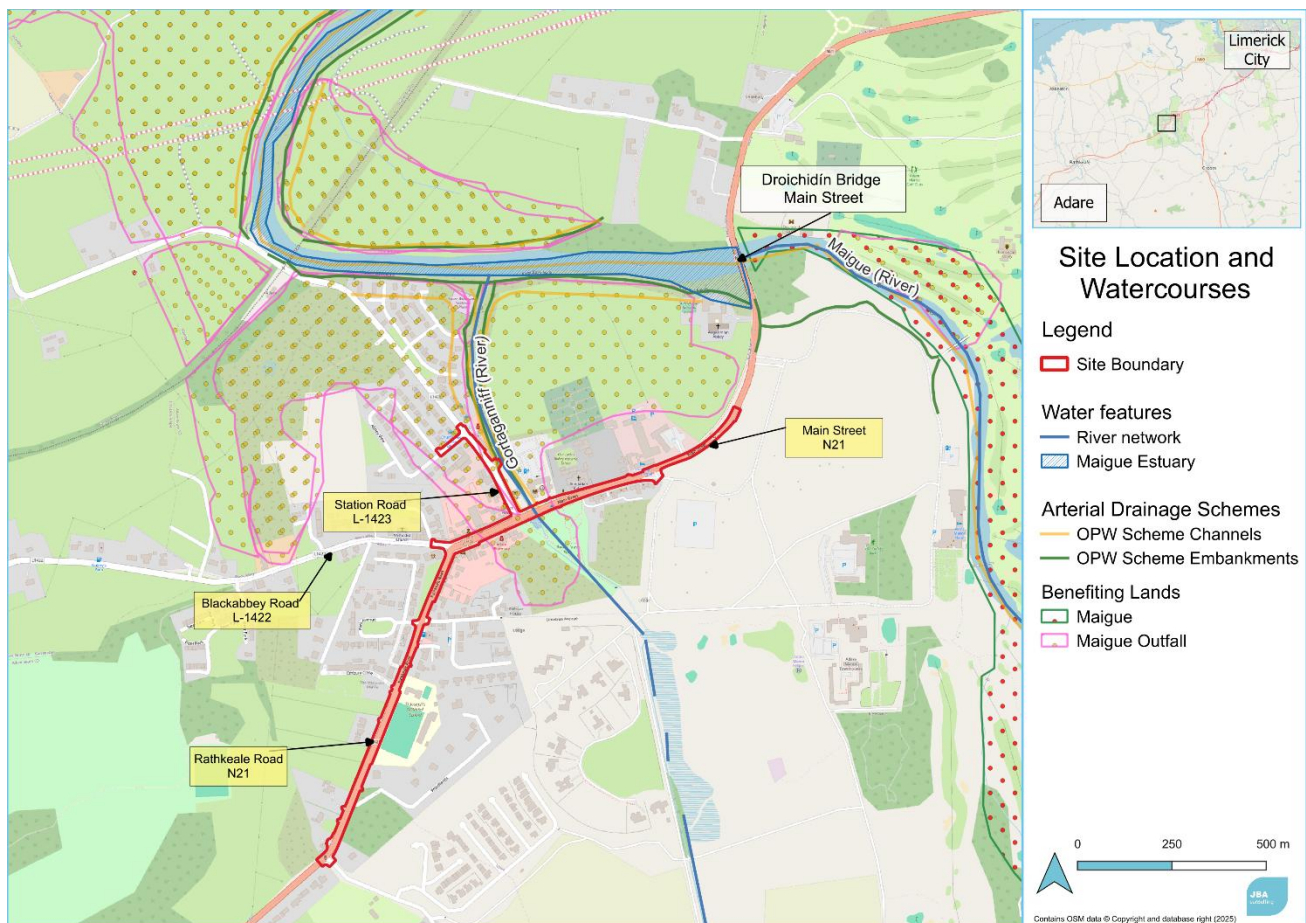


Figure 2-1 Site Location and Watercourses

The Maigue Estuary receives inflows from several tributaries, including the River Greanagh and the River Gortaganniff. The River Gortaganniff, a tributary of the River Dunaman, enters the proposed development site from the southeast and flows underground beneath Main Street before discharging to the Maigue Estuary. The river is culverted through the village core, re-emerging north of Main Street where it is managed via OPW arterial drainage channels and embankments.

The Maigue Catchment Drainage Scheme, completed between 1973 and 1986, was implemented to reduce flood risk through extensive channel works and embankment construction across the Maigue sub catchment. Figure 2-1 shows the extent of the drainage scheme defences and the benefiting lands in the vicinity of the proposed development site. These defences standard of protection is the 0.2% AEP.

### 2.1.1 Adare Flood Relief Scheme

Despite existing embankments and channel works, Adare remains at risk of flooding (see Section 3.1). A Flood Relief Scheme is being progressed by the OPW and Limerick City and County Council (see Figure 2-2).

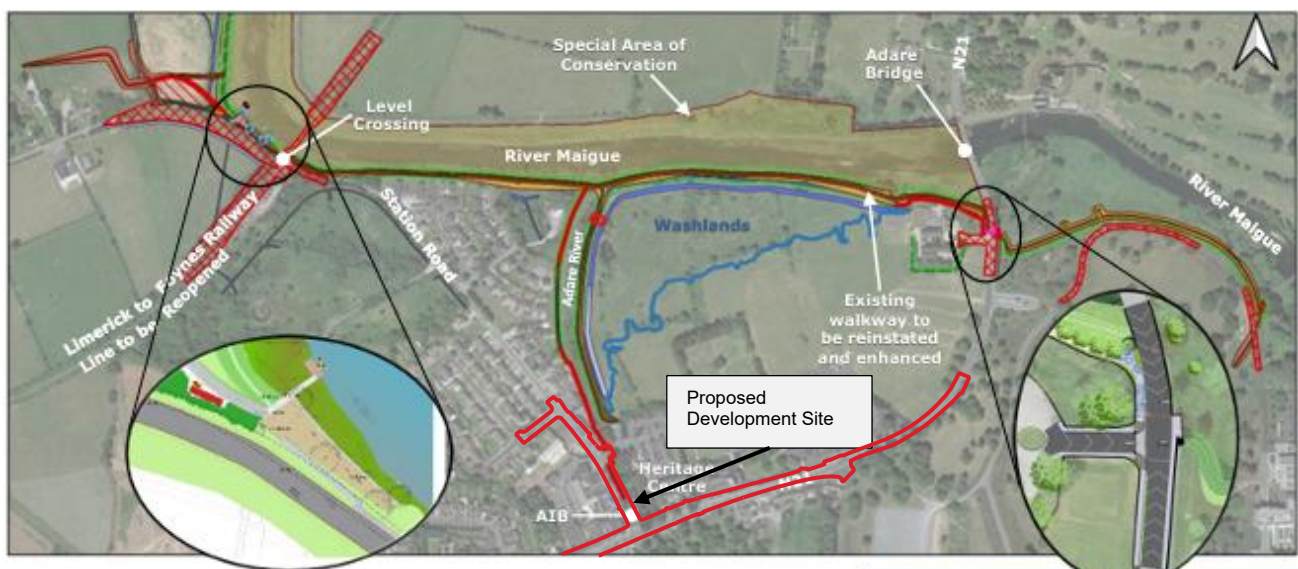


Figure 2-2 Emerging Preferred Scheme for Adare

The Emerging Preferred Scheme prioritises containment through raised embankments, flood walls, and road raising, targeting a 1% AEP fluvial and 0.5% AEP coastal standard. Dredging and storage-only options were discounted due to the estuarine flood risk.

Existing defences at Adare Manor, Riverwalk, and along the River Gortaganniff and River Maigue will be raised. New flood walls and embankments are proposed along Station Road, the N21, and the Adare River, with demountable defences at key access points.

A flood storage area will reduce peak flows, activated via an overflow structure on the Adare River into agricultural lands. This area will drain back through an existing sluice. The N21, Station Road, and adjoining railway will be raised to complete the defence line.

## 2.1.1 Adare Local Area Plan 2024 – 2030.

The *Adare Local Area Plan 2024–2030* (LAP) is the primary statutory planning document guiding development in Adare. The proposed development comprises improvements to the public realm along existing road infrastructure, including the N21, L-1422, and Station Road and are therefore not subject to land use zoning objectives within the LAP.

The proposed development is being brought forward under Part 8 of the Planning and Development Regulations as a public realm enhancement scheme led by Limerick City and County Council. The works are confined to the existing public realm and will not result in any change of land use. In accordance with the Planning and Development Regulations 2001 to 2015, where a project is progressed by a local authority, planning consent is sought under Part 8, with the relevant procedure outlined in Part 11, Section 179 of the Planning and Development Act 2000, as amended.

### 2.1.1.1 Flood Risk Objectives

As a subsidiary of the *Limerick County Development Plan 2022–2028* and its Strategic Flood Risk Assessment (SFRA), the Adare LAP incorporates several flood-related objectives that apply to the proposed development site. These include:

#### Objective IU 04 – Surface Water Management and SuDS

- a) Maintain, improve and enhance the environmental and ecological quality of surface waters and groundwater, including reducing discharges of pollutants or contaminants to waters, in accordance with the Draft River Basin Management Plan for Ireland 2022–2027 and its associated Programme of Measures.
- b) Require all planning applications to include surface water design calculations to establish the suitability of drainage between the site and the outfall point.
- c) Require all new developments to incorporate Sustainable Urban Drainage Systems (SuDS) to control surface water runoff and protect water quality. Proposals shall have regard to Nature-based Solutions to the Management of Rainwater and Surface Water Run-off in Urban Areas – Best Practice Interim Guidance.
- d) Require applicants to assess the potential for the use of porous surfaces in areas proposed for car parking and hard landscaping.
- e) Protect the surface water resources of the plan area and, where deemed necessary, request the inclusion of sediment and grease traps, and other pollution control measures in individual planning applications.

#### Objective IU 05 – Flood Risk Management

- a) Manage flood risk in accordance with the requirements of “The Planning System and Flood Risk Management Guidelines for Planning Authorities”, DECLG and OPW (2009) and any revisions thereof and consider the potential impacts of climate change in the application of these guidelines.
- b) Ensure development proposals within the townlands of Adare, Ardshanbally, Blackabbey, Boulabally, Curraghbeg and Mountwilliam or other areas outlined as being at risk of flooding both within and outside the core (where the Justification Test is not applied) are subject to Site Specific Flood Risk Assessment as outlined in “The

- Planning System and Flood Risk Management Guidelines”, DECLG and OPW (2009) and measures outlined in Section 7.2 of the SFRA Volume 3. These Flood Risk Assessments shall consider climate change impacts and adaptation measures including details of structural and non-structural flood risk management measures, such as those relating to floor levels, internal layout, flood-resistant construction, flood-resilient construction, emergency response planning and access and egress during flood events. Reference shall be made to Section 90 5.8 requirements of the Flood Risk Assessment in the SFRA of the Limerick Development Plan 2022-2028.
- c) Support and co-operate with the OPW in delivering the Adare Flood Relief Scheme.
  - d) Ensure that future developments in flood prone areas is generally limited to minor developments in line with the Circular PL 2/2014 and the Flood Risk Management Guidelines for Planning Authorities.
  - e) Developments on lands benefitting from Arterial Drainage Schemes shall preserve the maintenance and access to these drainage channels. Land identified as benefitting from these systems may be prone to flooding, as such site specific flood risk assessments will be required as appropriate, at planning application stage.
  - f) Ensure future development of lands within Flood Risk Zone A/B is in accordance with the plan-making Justification Tests in the SFRA and ensure that new highly vulnerable development is only appropriate in Flood Zone C and new less vulnerable development is only appropriate in Flood Zone B or C. Existing developments in areas at risk of flood will be considered in accordance with Section 5.28 of the Flood Guidelines.

## Objective IU 06 – Flood Risk and Blue-Green Infrastructure

It is an objective of the Council to promote the integration and delivery of blue-green infrastructure in new developments, public realm upgrades, and community projects as a means of managing flood risk and enhancing the natural environment.

### 2.2 Local Topography

LiDAR data captured by Transport Infrastructure Ireland (TII) was publicly available for the study area from the Open Topographic Data Viewer website. The LiDAR extent is shown in Figure 2-3 and covers the entire proposed development site. The resolution is 2m and has an RMS within +/- 150 mm.

The site is predominantly low-lying, with ground levels within the site boundary ranging from approximately 2.83 mAOD to 15.48 mAOD. A gentle gradient is present from both the eastern and western extents, sloping towards the central corridor and continuing down to the northwestern corner along Station Road. This topography creates a natural flow path directing surface water towards the northwestern extent of the site.

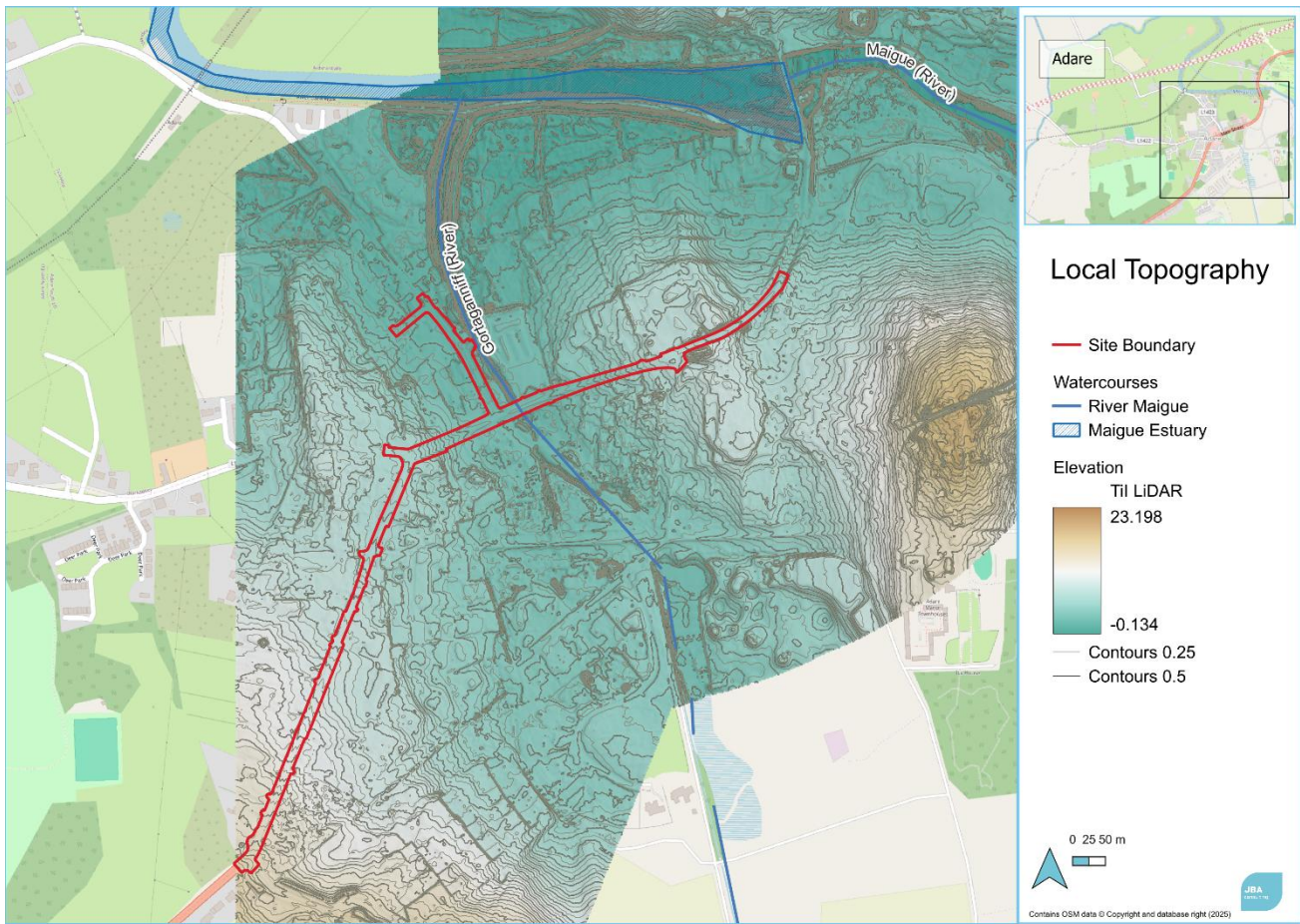


Figure 2-3 Local Topography

### 2.3 Site Geology

Groundwater and geological data obtained from the Geological Survey of Ireland (GSI) were reviewed to establish the baseline hydrogeological conditions at the site. The underlying bedrock comprises massive, unbedded lime-mudstone of the Waulsortian Limestone Formation. Subsoils within the proposed development site consist primarily of made ground (urban), with a small area of alluvium located in the northwestern corner of the site along Station Road (L-1423) (refer to Figure 2-4).

The site is underlain by a Regionally Important Karstified Bedrock Aquifer (Rk), classified as dominated by diffuse flow (Rkd). No karst features have been identified in proximity to the site, indicating limited potential for concentrated groundwater flow.

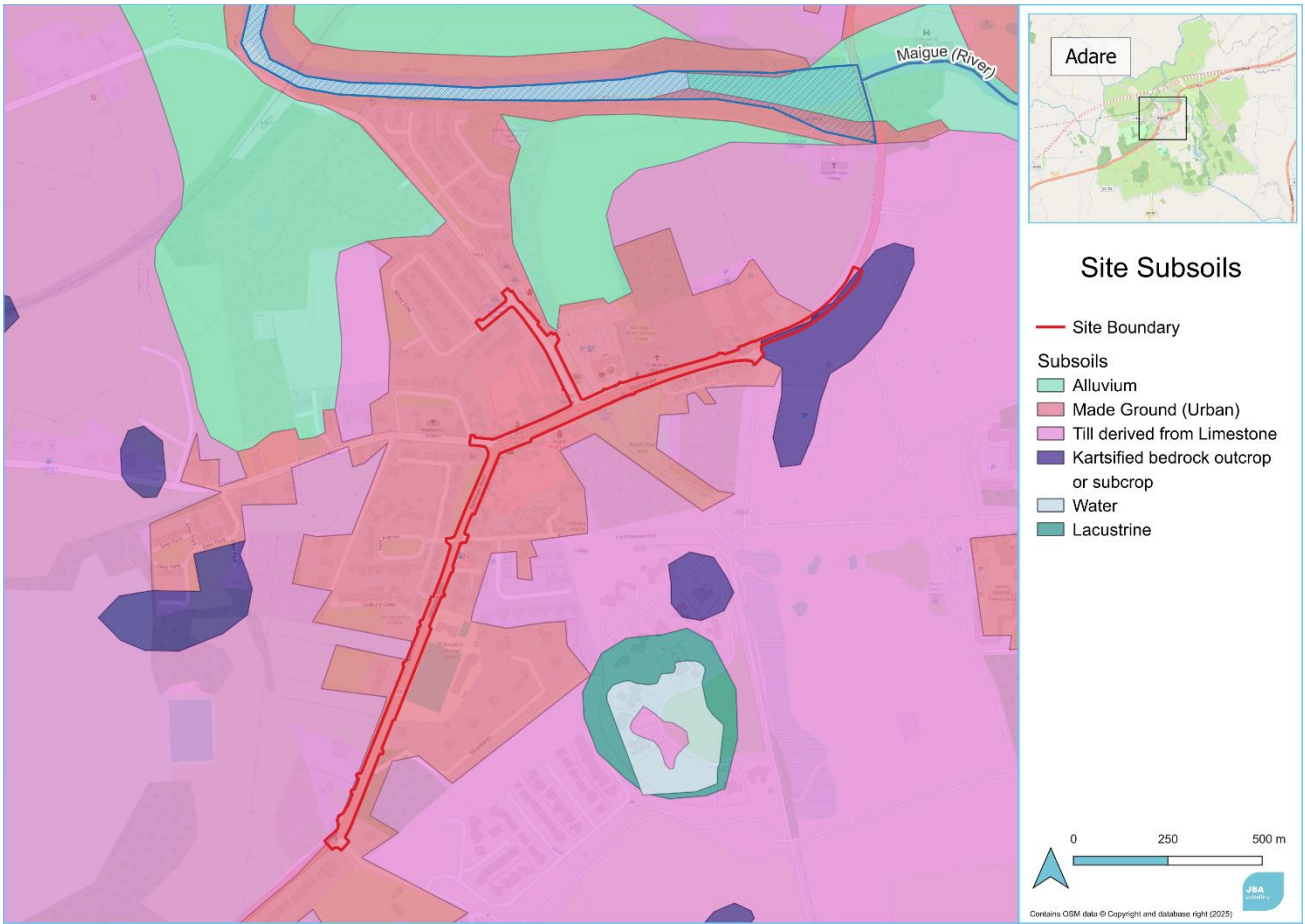


Figure 2-4: Subsoil Map

## 3 Flood Risk Identification

An assessment of the potential for and scale of flood risk at the site is conducted using historical and predictive information. This identifies any sources of potential flood risk to the site and reviews historical flood information. The findings from the flood risk identification stage of the assessment are provided in the following sections. Further detail on the Planning Guidelines and technical concepts is provided in Appendix A.

### 3.1 Flood History

A number of sources of flood information have been reviewed to establish any recorded flood history at, or near the site. This includes the OPWs national flood information portal, [www.floodinfo.ie](http://www.floodinfo.ie), and general internet searches.

#### 3.1.1 Floodinfo.ie

The OPW have established a National Flood Risk Hazard Mapping website, [www.floodinfo.ie](http://www.floodinfo.ie), which highlights areas at flood risk through the collection of recorded data and observed flood events. A summary of the relevant events is provided below (refer to Table 3-1), with approximate point locations shown in Figure 3-1.

Figure 3-1 demonstrates that a single past flood event, identified as Flood ID-842, falls within the Site Boundary.

Table 3-1 Overview Flood Events (source: Floodinfo.ie)

| Overview Flood Events  |
|--|
| <p><b>Flood Event ID-2226, 10 August 1946</b></p> <p>A breach occurred on the left bank embankment of the River Mague near the railway bridge at Adare Station. Affected lands were waterlogged. The event was noted to have occurred under low neap tide conditions; had it coincided with a spring tide, water levels would likely have been significantly higher.</p>   |
| <p><b>Flood Event ID-2216, 16 January 1995</b></p> <p>Embankments at Adare were overtopped during this event. The recorded tide level was 22.6 ft OD, compared to a design crest of 24 ft OD. Post-event inspections indicated embankment crest levels were often more than 300 mm below design. Flooding of the N21 occurred for a short period. The event was attributed to high tides combined with low atmospheric pressure.</p> |
| <p><b>Flood Event ID-307, 27 February 1996</b></p> <p>Near-record estuarine tides caused flooding of the N21. The source was identified as coastal/estuarine waters. No further detail is available.</p>   |
| <p><b>Flood Event ID-842, 09 January 1999</b></p> <p>Flooding occurred along Station Road, with level data based on flood debris marks. A river flooding map and survey book are referenced, though debris mapping was unclear.</p>  |
| <p><b>Flood Event ID-919, Recurring</b></p> <p>Recurring incidents of flooding on Station Road due to high tides, constriction of flow at the railway bridge and overtopping of embankments.</p>   |

## Overview Flood Events

### Flood Event ID-12240, 01 February 2014

Widespread flooding affected several areas including St. Nicholas' Church, the N21 at Adare Bridge, Adare Manor, and agricultural lands at Dunraven Estate. High water levels on the River Maigue were caused by elevated tides, storm surge, and adverse weather conditions. Flow constriction at Adare Bridge led to overtopping and flooding to a depth of 0.9 m. Floodwaters extended to near the entrance of Adare Manor.

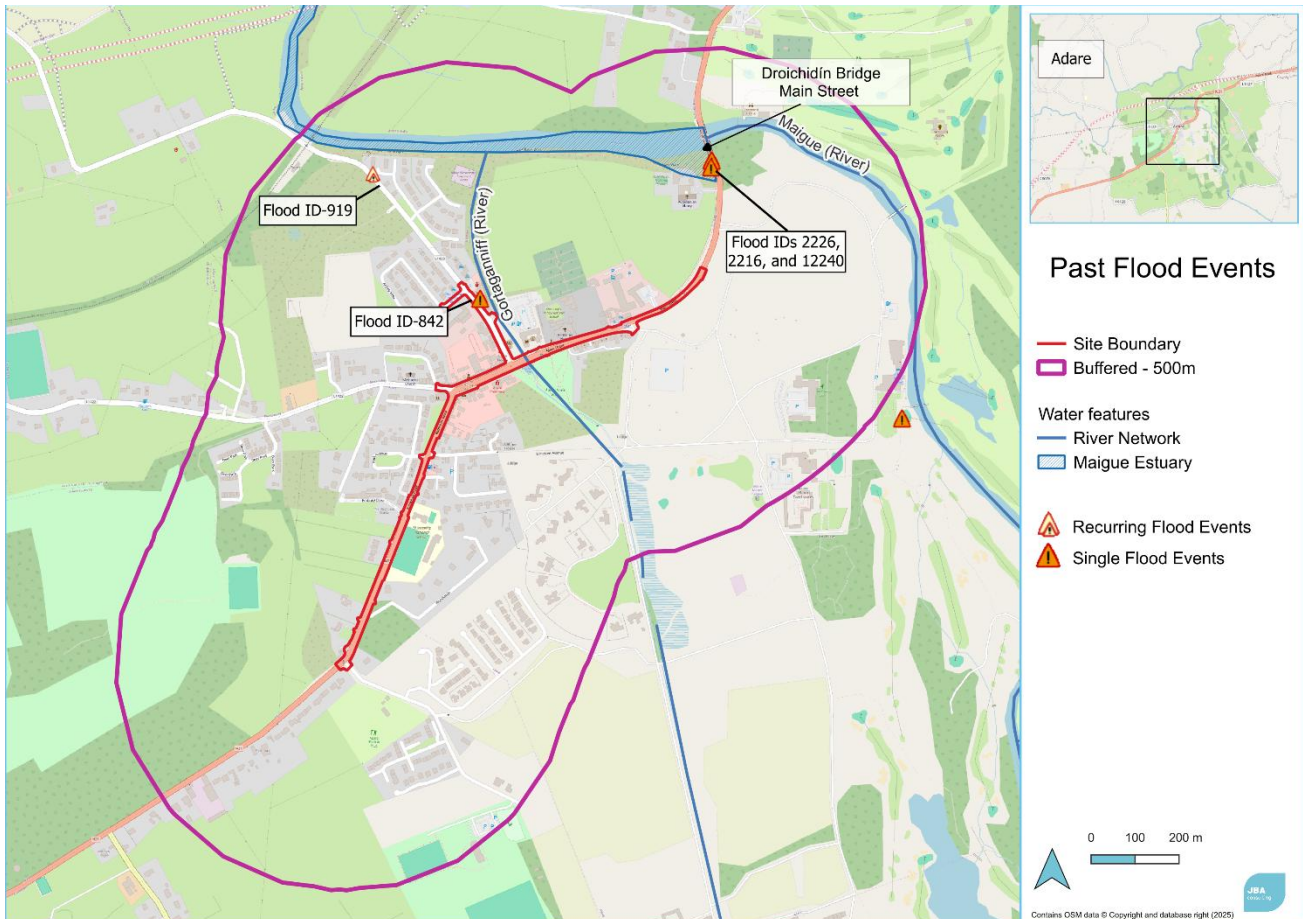


Figure 3-1 Past flood events within the vicinity of the development site

### 3.1.1 Internet Searches

An internet-based review was undertaken to identify historical flood events and supporting data not captured in official flood mapping sources. This search identified multiple relevant documents, including the *Hydrology Report* and *Flood Event Report: Adare, Co. Limerick (1 February 2014)*, both prepared as part of the Shannon CFRAM Study (2014), as well as the *Adare Flood Relief Scheme (FRS) Constraints Study* prepared by Ryan Hanley.

#### 3.1.1.1 Shannon CFRAM Study - Hydrology Report

The *CFRAM Hydrology Report* documents several historical flood events in Adare. These are listed in Table 3-1.

Table 3-2 overview Flood Events Shannon CFRAM Study – Hydrology report

| Overview Flood Events   |
|---|
| <b>February 1996:</b> Flooding is recorded, though limited supporting information is available.   |
| <b>January 1999:</b> Flooding is noted, with additional accounts confirming impacts on Station Road and the entrance to Adare Manor.    |
| <b>February 2002:</b> A combined fluvial and tidal event is reported, resulting in flood depths of approximately 150 mm on local roads. |

### 3.1.1.2 Shannon CFRAM Study - Flood Event Report: Adare on 1<sup>st</sup> Feb 2014<sup>1</sup>

As part of the CFRAM study, Jacobs undertook a detailed analysis of the February 2014 flood event. Flooding was widespread, affecting St. Nicholas’ Church, portacabins adjacent to St. Nicholas National School, the N21 at Adare Bridge, Adare Manor Hotel and golf resort, and agricultural lands within the Dunraven Estate. Approximately 2–3 km of the N21 was closed due to flooding.

The event was driven by tidal influences, with high tides, a larger-than-predicted storm surge, low atmospheric pressure, and gale-force winds raising water levels in the River Maigue. Flow at Adare Bridge was restricted by the masonry arches, which also trapped debris. This caused water levels to back up on the upstream side, resulting in overtopping of the riverbank and adjacent roads. A maximum flood level of approximately 5.9 mOD and a depth of 0.9 m were recorded. Photographic records were obtained from LCCC and Adare Manor.

### 3.1.1.3 Adare Flood Relief Scheme – FRS Constraints Study (Ryan Hanley)

The *FRS Constraints Study* prepared by Ryan Hanley for the Adare Flood Relief Scheme confirms findings from the CFRAM study. Peak water levels in the Shannon and Maigue Estuaries occurred between 3 January and 1 February 2014. On 3 January, a water level of 4.204 mOD was recorded at Adare Quay, with the peak storm surge preceding high tide by approximately four hours. Flooding occurred at Adare Bridge, reaching depths of approximately 0.9 m.

## 3.1.2 Historic Groundwater flooding

The GSI Historic Groundwater Flood Map presents the maximum observed extent of karst groundwater flooding, primarily based on the winter 2015/2016 flood event, which is considered the most extensive on record in many areas. The mapping focuses on groundwater-driven flooding in karst landscapes and was developed using SAR imagery from the 2015/2016 event, supplemented by additional available evidence.

<sup>1</sup> Jacobs (2014) *Flood Event Report: Adare, Co. Limerick on 1st February 2014*. Shannon Catchment Flood Risk Assessment and Management (CFRAM) Study, Shannon River Basin District. October 2014. Available at: [chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://static-floodinfo.s3-eu-west-1.amazonaws.com/media/reports/F310%20Data%20Collection/080%20Other/002%20Reports/ot\\_re\\_JB\\_0000012700.pdf](chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://static-floodinfo.s3-eu-west-1.amazonaws.com/media/reports/F310%20Data%20Collection/080%20Other/002%20Reports/ot_re_JB_0000012700.pdf). Accessed on 01/07/2025

A review of this mapping indicates that no historic groundwater flooding has been recorded on or in the vicinity of the proposed development site.

### 3.1.3 Historic Surface water flooding

The same methodology was adapted by the GSI to produce a surface water flood map, representing fluvial and pluvial flooding in non-urban areas since the 2015/2016 flood event. A review of the GSI Surface Water Flood Map indicates no recorded surface water flooding within or near the site boundary during the winters of 2016 to 2021. While the map shows flooding aligned with the Maigue Estuary transitional waterbody, no additional relevant extents were identified for the proposed development site. The 2015/2016 surface water flood extent is illustrated in Figure 3-2.

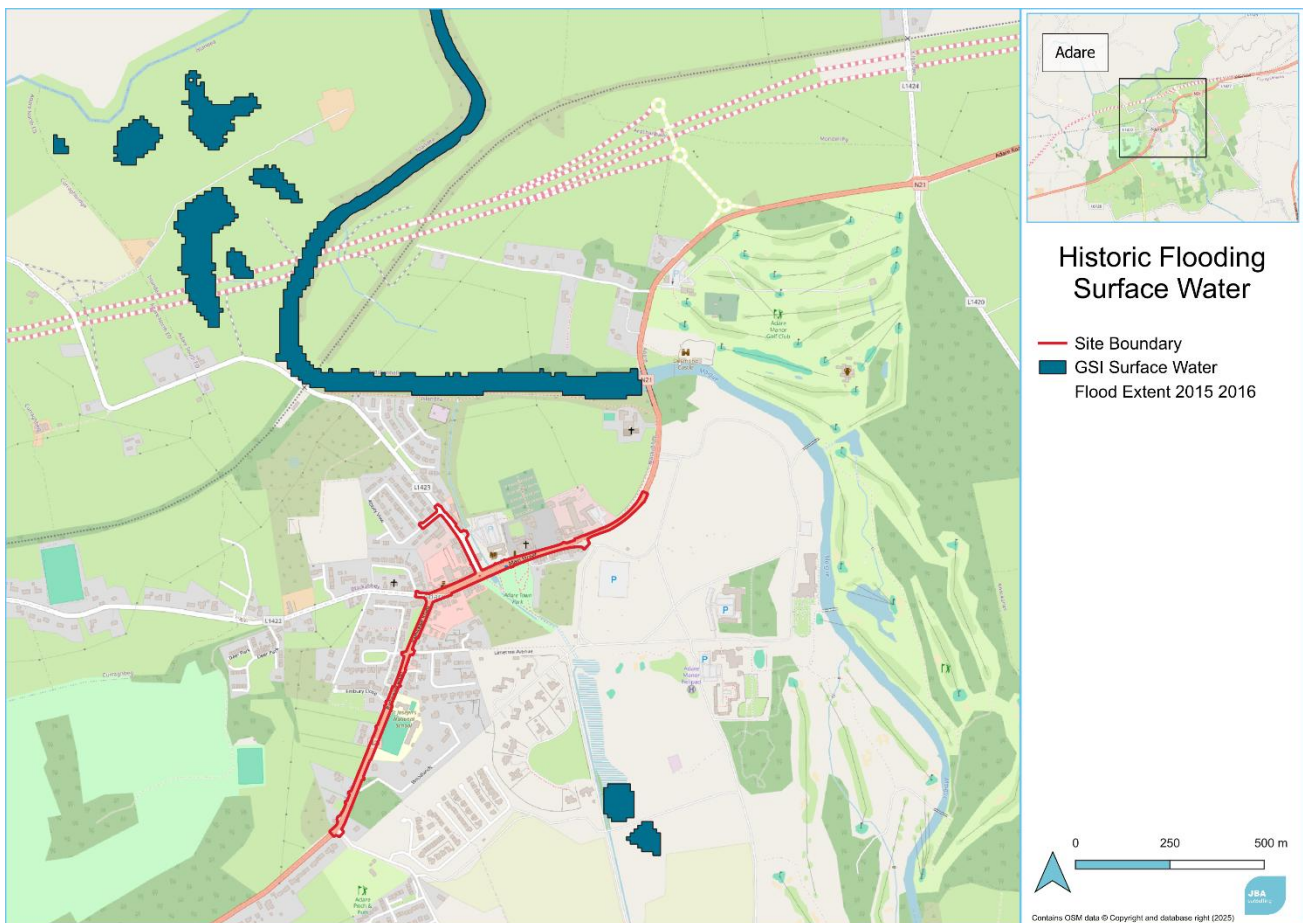


Figure 3-2 Historic Surface water flooding (source: GSI)

## 3.2 Predictive Flood Mapping

The wider area has been a subject to predictive flood mapping or modelling studies and other related studies and plans.

- Adare Local Area Plan 2024 – 2030 - Strategic Flood Risk Assessment
- Shannon Catchment Flood Risk Assessment and Management Study
- Predictive Groundwater

### 3.2.1 Adare Local Area Plan 2024 – 2030 Strategic Flood Risk Assessment

The Adare LAP Strategic Flood Risk Assessment (SFRA) proactively manages flood risk in line with the *Planning System and Flood Risk Management Guidelines for Planning Authorities* (OPW, 2009). While the SFRA is based on CFRAM mapping, the dataset was modified during its development to remove defences in order to produce Flood Zone mapping. As a result, it may differ slightly from the CFRAM data presented in Section 3.2.2 (which includes impacts of the embankments).

Figure 3-3 presents an extract from the *Adare LAP 2024 - 2030 SFRA* flood map, which indicates that low-lying areas of the proposed development site (Station Road and the central section of Main Street) are located within Flood Zone A, with a fringe of Flood Zone B around this extent. The higher elevated sections of the site (the T-junction at Blackabbey Road and Main Street, the Rathkeale N21 junction, and the eastern part of Main Street towards the bridge) are within Flood Zone C. These flood zones correspond with the local topography (refer to Section 2.3).

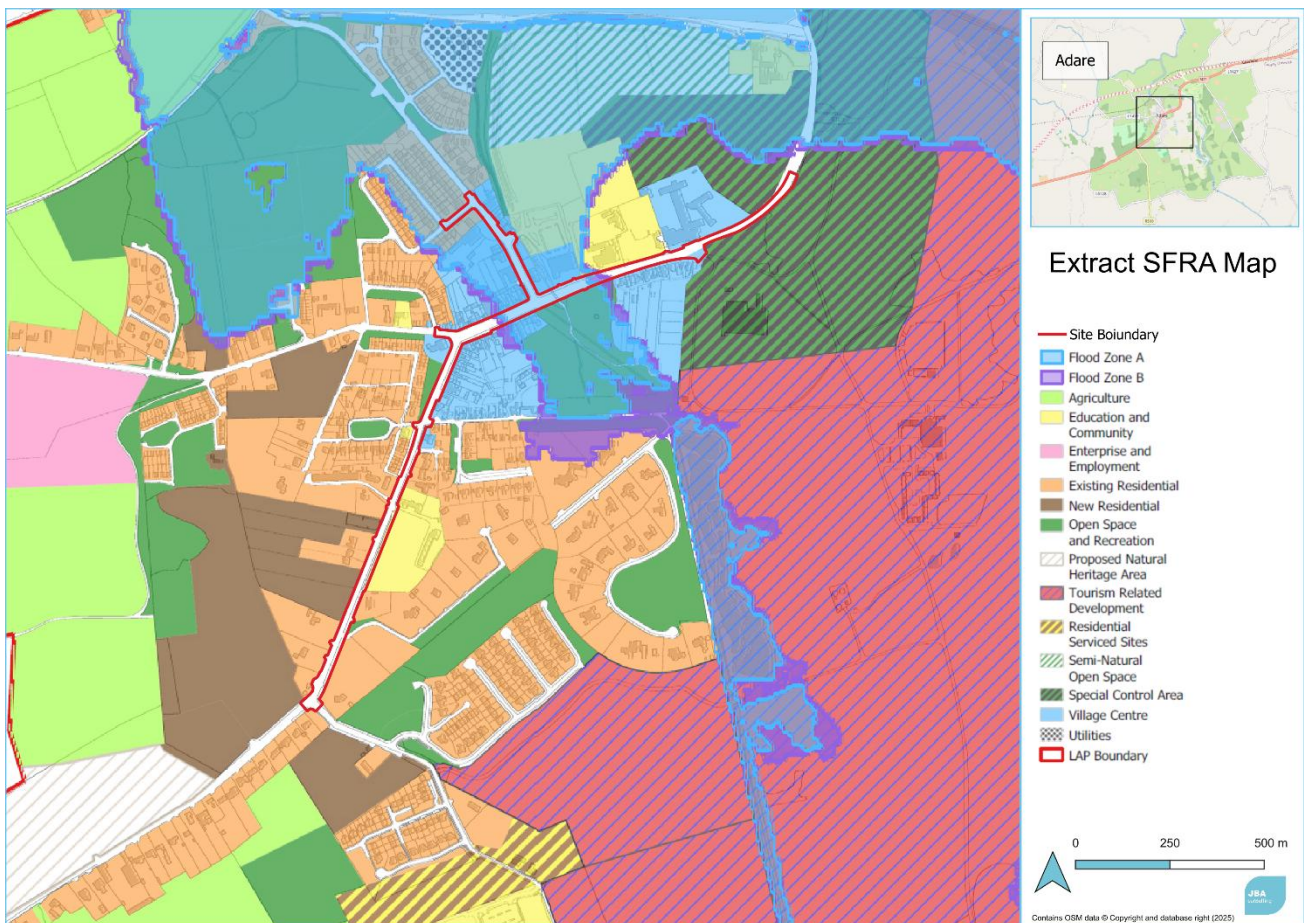


Figure 3-3 Extract Adare LAP SFRA Flood Zones

### 3.2.2 Shannon CFRAM Study

The River Maigue was originally assessed under the Shannon CFRAM Study, which modelled both fluvial and tidal flood extents. The study commenced in June 2011, with final flood maps issued in 2016. The study involved detailed hydraulic modelling of rivers and

major tributaries, focusing on areas of significant flooding. Finalised flood extents for the 10% (1-in-10-year), 1% (1-in-100-year), and 0.5% coastal (1-in-200-year), as well as the 0.1% fluvial (1-in-1000-year) AEP flood events, are publicly available via data.gov.ie and floodmaps.ie. Refer to Appendix A.2 – Flood Zones for a detailed explanation of how flood extents correspond to flood zones.

Figure 3-4 presents the fluvial flood extents for all current design flood probabilities, alongside projected water levels. Station Road and the central section of Main Street (N21 National Road) lie within the 1% AEP fluvial flood extent. The higher elevated sections of the site (the T junction at Blackabbey Road and Main Street, and the eastern approach to the bridge) lie outside all mapped flood extents. The proposed development site includes areas of varying fluvial flood probability, with low risk along the elevated western and eastern edges and high risk in the lower lying central area. Predicted flood depths for the 1% AEP event range from 0 m to approximately 1.0 m along Main Street, increasing to depths of up to 2.0 m where ground levels fall northwards along Station Road.

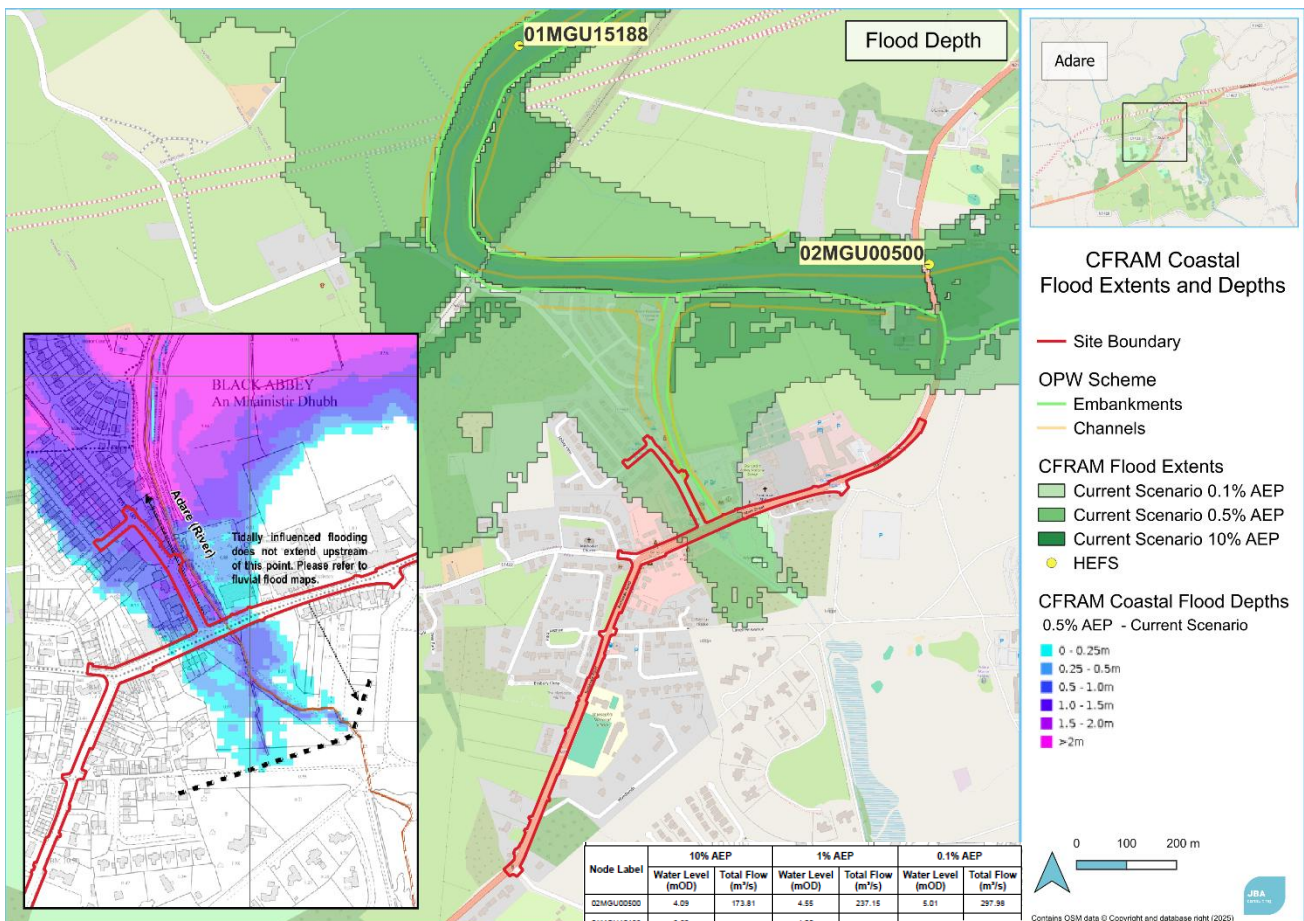


Figure 3-4 Shannon CFRAM - Adare Fluvial Current Flood Extent Map (source: floodinfo.ie)

Figure 3-5 shows the coastal flood extents for all current design flood probabilities. The mapped extent follows a similar pattern to the fluvial flood map, with Flood Zone C along the elevated western and eastern margins, and Flood Zone A (0.5% AEP) in the lower lying central area of Main Street and Station Road. Coastal flood depths for the 0.5% AEP

design event range from 0.00 m to 0.5 m along Main Street, increasing to depths of up to 2.0 m on Station Road.

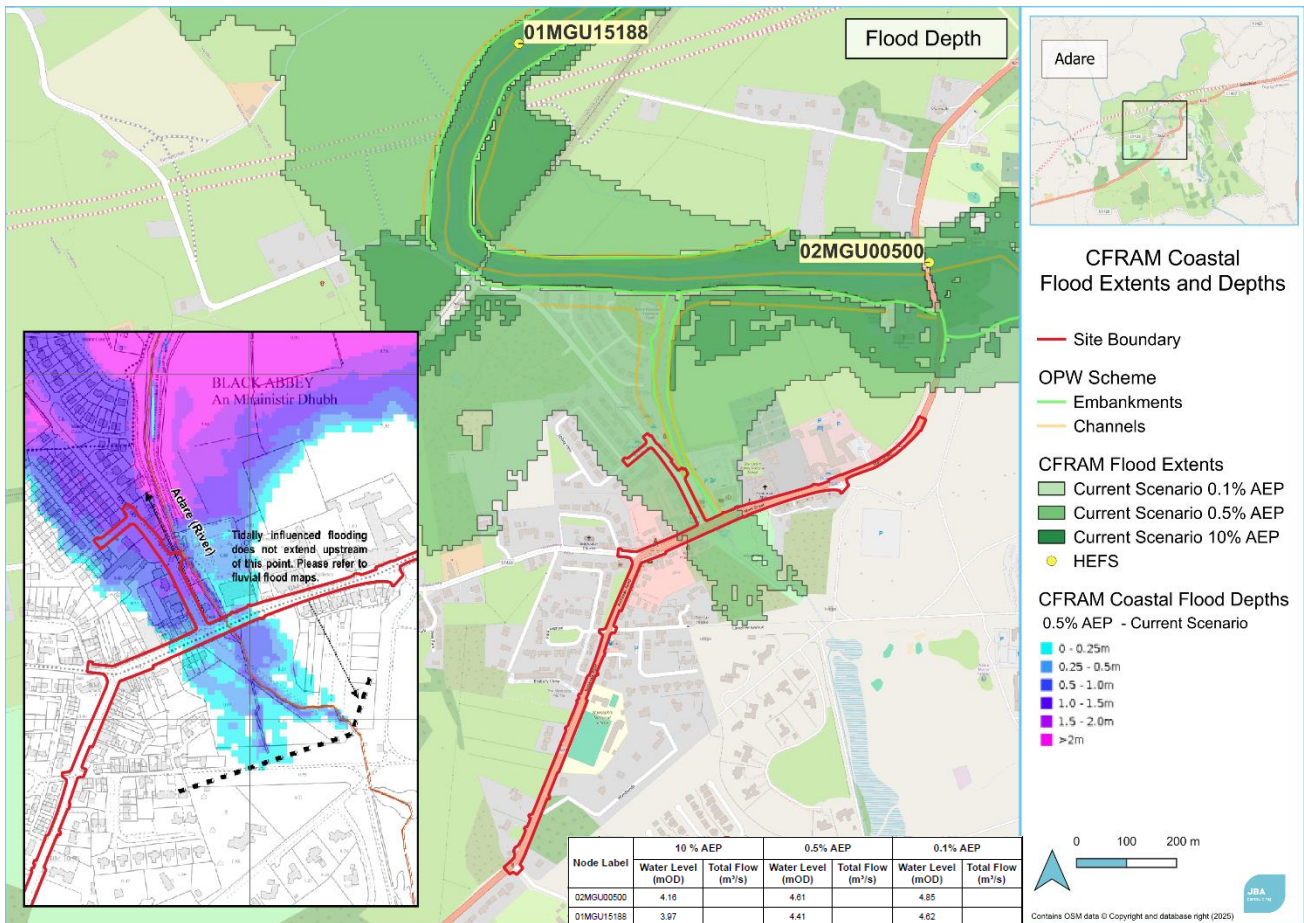


Figure 3-5 Shannon CFRAM – Adare Coastal Current Flood Extents (source: floodinfo.ie)

### 3.2.1 Predictive Groundwater

The predictive groundwater flood map presents the probabilistic flood extents for locations of recurrent karst groundwater flooding. It consists of a series of stacked 13 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).

Analysing the predictive groundwater flood extents show no predictive groundwater in the vicinity of the proposed development site.

### 3.3 Sources of Flooding

The initial stage of a Flood Risk Assessment requires the identification and consideration of probable sources of flooding. Following the initial stage of this Flood Risk Assessment, it is possible to summarise the level of potential risk posed by each source of flood sources are described below.

### 3.3.1 Tidal and Fluvial

The proposed development site lies within the floodplain of the River Maigue and its tributaries and is at risk from both fluvial and tidal flooding. These mechanisms may act independently or in combination, particularly in estuarine settings such as Adare, where high tides can restrict river discharge and increase both the extent and likelihood of flooding.

Fluvial flood risk is primarily associated with the River Maigue. The River Gortaganniff, a tributary of the River Dunaman, enters the site from the southeast and flows through a culvert beneath Main Street. It emerges north of Main Street where it is managed via OPW arterial drainage channels and embankments before discharging to the Maigue Estuary. Although the culvert prevents direct surface interaction, exceedance during high rainfall events may result in localised flooding.

The Shannon CFRAM Study identifies the central corridor of the site, including Main Street and Station Road, within the 1% AEP fluvial flood extent, corresponding to Flood Zone A. Predicted flood depths for this event range from 0 m to 1.0 m along Main Street and up to 2.0 m in the lower lying sections of Station Road. Higher ground to the west and east, including the Blackabbey Road junction and the eastern approach to Adare Bridge, lies within Flood Zone C.

Tidal flood risk arises from storm surges in the Shannon Estuary, particularly when spring tides coincide with low atmospheric pressure systems. CFRAM mapping indicates that the same central corridor is also within the 0.5% AEP tidal flood extent. Predicted tidal flood depths range from 0.0 m to 0.5 m along Main Street and increase to 2.0 m in low lying areas of Station Road.

The site benefits from elements of the Maigue Catchment Drainage Scheme, which includes arterial drainage channels and embankments designed for 0.2% AEP standard of protection. It must be noted that the Arterial Drainage embankments should be regarded as informal defences, the purpose of which is to improve land for agriculture, not defend people and property.

Historic flood records (refer to Section 3.1) confirm that the River Maigue has overtopped its banks in the past, with notable events recorded in 1995, 1999 and 2014. The same records confirm repeated tidal flooding in Adare, including significant flood depths during the 2014 event.

### 3.3.2 Pluvial

Pluvial, or surface water, flooding is the result of rainfall-generated flows that arise before run-off can enter a watercourse or sewer. It is usually associated with high intensity rainfall. Flood risk from pluvial sources exists in all areas. Adequate stormwater drainage systems will minimise the risk of pluvial flooding on land that is proposed for development.

While the GSI Surface Water Flood Map indicates no recorded surface water flooding within or near the site boundary during the winters of 2016 to 2021, the observed topographic low

points and history of flooding in the area suggest a potential risk. Therefore, while no recent mapping data confirms pluvial flooding, this source cannot be screened out.

### 3.3.3 Groundwater

Review of available groundwater and geological data indicates a low potential for groundwater flooding at the proposed development site.

Review of GSI data indicates that the site is underlain by a regionally important karstified bedrock aquifer dominated by diffuse flow (Rkd). However, no karst features have been identified within or near the site, and there are no records of historic or predicted groundwater flooding affecting the area.

The GSI Predictive Groundwater Flood Map shows no groundwater flood extents at or near the site. Accordingly, groundwater flooding is not considered a significant source of flood risk and has been screened out from further assessment.

## 4 Flood Risk Assessment and Mitigation

### 4.1 Flood Risk

The proposed development site is located within the village of Adare and lies within the floodplain of the River Mague and its tributaries. It is at risk from both fluvial and tidal flooding, as well as pluvial (surface water) flooding, as described in Section 3.

Combined fluvial and tidal flooding is the principal source of flood risk. Shannon CFRAM mapping confirms that the central section of Main Street and Station Road lie within both the 1% AEP fluvial and 0.5% AEP coastal flood extents, corresponding to Flood Zone A. Predicted flood depths for the 1% AEP event range from 0 m to approximately 1.0 m along Main Street, increasing to depths of up to 2.0 m in the lower lying areas along Station Road. The higher ground to the west and east of the site falls within Flood Zone C.

Pluvial flooding is a secondary source of risk. While no recorded surface water flooding is shown on GSI mapping for the period 2016 to 2021, the site's topography indicates a natural flow path towards the northwestern corner, particularly along Station Road. During periods of intense rainfall, this may contribute to local surface water accumulation, especially where runoff exceeds the capacity of the existing stormwater drainage system.

Elements of the proposed development located within Flood Zone A include sections of Main Street and Station Road, comprising upgrades to footpaths, pedestrian crossings, surface finishes, on-street parking, kerb realignments, and the integration of sustainable drainage systems (SuDS). Ground levels will remain close to existing throughout the scheme, with no significant elevation changes proposed. Surface water will continue to be managed via the existing drainage infrastructure, with minor adjustments to gullies. SuDS features, including bioretention areas along the kerblines, will be introduced to attenuate runoff and improve water quality. No residential, commercial, or critical infrastructure is proposed, and the development is not reliant on access or continued operation during flood events. These features are non-vulnerable and capable of tolerating temporary inundation without significant consequence.

While the proposed development is partially located within Flood Zone A and B, according to the guidelines set out by the OPW, The Planning System and Flood Risk Management - Guidelines for Planning Authorities (OPW, 2009), the development type - public realm enhancements - is not considered highly vulnerable to flooding. The road route itself would be highly vulnerable, but the proposed works are primarily cosmetic in nature and no significant changes to ground or levels are proposed in the Flood Zone and the works are not intended to manage or mitigate the wider impacts of flooding and/or improve climate change resilience.

As such, the proposals will not have any significant impact on tidal/fluvial flooding risk to surrounding lands. Furthermore, the improvements to the management of rainwater through the new sewer and incorporation of some SuDS measures will have a positive benefit on the quality and quantity of runoff.

## 4.2 Mitigation

### 4.2.1 Flood defences

The site currently benefits from the Maigue Catchment Drainage Scheme, which comprises arterial drainage channels and embankments designed to reduce flood risk from both fluvial and tidal sources. It must be noted that the Arterial Drainage embankments should be regarded as informal defences, the purpose of which is to improve land for agriculture, not defend people and property.

Additionally, A Flood Relief Scheme for Adare is being progressed by the Office of Public Works and Limerick City and County Council. The scheme is at Stage 1 (Detailed Design), with design completion anticipated in 2027 and construction targeted for 2028. The preferred option includes a combination of existing defence upgrades, new hard defences, non-structural measures, and a flood storage area (washland), designed to provide protection against the 1% AEP fluvial and 0.5% AEP coastal events.

These works are not part of the proposed development but will contribute to reducing the residual flood risk at the site. This aligns with Adare LAP Objective IU 5(d), which supports minor works that contribute to managing and reducing flood risk.

### 4.2.2 Surface Water Drainage Network

Surface water within the proposed development will be managed via the existing drainage infrastructure along Main Street and Station Road, with minor adjustments to roadside gullies where required. Ground levels will remain close to existing throughout the scheme, with no significant earthworks proposed.

Sustainable drainage systems (SuDS) will be integrated into the scheme to improve surface water attenuation and quality. Bioretention areas will be provided along the kerblines to manage runoff, reduce discharge rates, and promote infiltration where possible. These measures directly support Adare LAP Objective IU 04(c) and (d), promoting SuDS and the use of permeable surfaces in new development.

### 4.2.3 Climate Change

In accordance with the Planning System and Flood Risk Management Guidelines for Planning Authorities (2009) and OPW guidance, the proposed development has fully considered the impacts of climate change.

The OPW identifies two future climate scenarios: the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS). For less vulnerable development, allowances are typically assessed against the 1% AEP fluvial MRFS and the 0.5% AEP tidal MRFS flood levels.

Shannon CFRAM mapping incorporating the MRFS indicates that the extent of both fluvial and tidal flooding may increase marginally beyond the present-day extents. However, the proposed development is cosmetic in nature and remains within areas already identified as flood prone. It does not involve raising ground levels or introducing any vulnerable

receptors and therefore does not increase flood risk elsewhere. The road is vulnerable to future sea level rise, and this will be tackled as part of the adaptation strategy for the Adare FRS.

### 4.3 Residual Risk

Residual risks are defined as risks that remain after all risk avoidance, substitution, and mitigation measures have been implemented. The main residual risks identified for the site are:

#### 4.3.1 Breach or overtopping Flood defences

Although the site is currently benefits from the Maigne Catchment Drainage Scheme and will be formally defended by the proposed Adare Flood Relief Scheme (currently at detailed design stage), there remains a residual risk of breach or overtopping during extreme or unforeseen events. If either the arterial drainage embankments or future flood defences are overtopped, floodwaters may enter the central section of the site, particularly along Main Street and Station Road, which fall within Flood Zone A.

While the proposed development does not include residential or vulnerable infrastructure, temporary inundation of public realm features could occur. However, due to the water-compatible nature of the works and the absence of significant ground raising, the proposed scheme will not displace floodwaters or increase flood risk elsewhere. The use of durable paving materials and minimal structural installations ensures that the development is resilient to such events.

#### 4.3.2 Capacity Constraints of the River Gortaganniff

The River Gortaganniff is culverted beneath Main Street within the site. Although the culvert prevents surface interaction under normal conditions, its hydraulic capacity may be exceeded during periods of intense rainfall or if debris causes blockages. In such cases, localised surcharging and surface flooding could occur near the culvert inlet and outlet. The residual risk from culvert exceedance is not mitigated through the proposed development but should be addressed through routine maintenance and inspection by the relevant authority.

#### 4.3.3 Failure of the Surface Water Drainage System

The existing stormwater drainage network may become overwhelmed during periods of high-intensity rainfall, especially where gullies or pipes become blocked or where rainfall intensity exceeds the design standard. While the scheme includes only minor drainage works, additional surface water management will be provided through sustainable drainage systems (SuDS), including bioretention areas along the kerblines. These will attenuate runoff and reduce peak discharge rates. Given the proposed development remains close to existing ground levels and introduces no impermeable structures that displace water, the residual risk of pluvial flooding is considered manageable. However, effective maintenance of both the traditional and SuDS infrastructure is essential to minimise long-term risk.

## 5 Conclusion

JBA Consulting has undertaken a Site-Specific Flood Risk Assessment for the proposed public realm enhancement scheme in Adare, County Limerick, in support of the Part 8 planning application by Limerick City and County Council.

The development site lies within the floodplain of the River Maigue and its tributaries and is subject to fluvial, tidal, and pluvial flood risk. Shannon CFRAM mapping identifies the central section of Main Street and Station Road within Flood Zone A for both the 1% AEP fluvial and 0.5% AEP tidal events, with predicted flood depths reaching up to 2.0 m in the lowest-lying areas. The site is currently benefiting from the Maigue Catchment Drainage Scheme, which comprises arterial drainage channels and embankments designed to defend against events with a probability greater than 0.2% AEP (to an agricultural standard).

The proposed development comprises upgrades to footpaths, pedestrian crossings, kerb alignments, and the introduction of sustainable drainage systems (SuDS) within the village core of Adare. These works are considered *water-compatible development* under the *Planning System and Flood Risk Management Guidelines for Planning Authorities* (2009). As such, they are appropriate within all flood zones and do not require the application of the Justification Test.

Ground levels will remain close to existing throughout the scheme, with no significant earthworks proposed. Surface water will continue to be managed by the existing drainage network, which will be supplemented by SuDS features designed to attenuate runoff and improve water quality. These measures align with Adare Local Area Plan Objective IU 04(c) and (d), supporting SuDS and the use of porous surfacing.

Further reduction in flood risk is expected through the future implementation of the Adare Flood Relief Scheme, currently at detailed design stage. The preferred option includes a combination of hard defences and non-structural measures designed to provide protection against the 1% AEP fluvial and 0.5% AEP tidal events. Once implemented, this scheme will significantly enhance flood protection for the site and surrounding area and will be designed with climate change adaptation considered.

Residual risks relate to potential exceedance of culvert capacity beneath Main Street, failure of the stormwater drainage system, or overtopping of existing or future flood defences. These risks are considered low and manageable given the nature of the proposed works. The development is tolerant to temporary inundation, does not rely on access or operation during flood events, and will not increase flood risk elsewhere.

This Flood Risk Assessment has been prepared in accordance with the *Planning System and Flood Risk Management Guidelines for Planning Authorities* (2009). The proposed development is considered appropriate in the context of flood risk, in line with the Adare Local Area Plan Objectives IU 04, IU 05, and IU 06, and is not expected to have negative impacts on surrounding lands.

# A Understanding 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

## A.1 Probability of Flooding

The likelihood or probability of a flood event (whether tidal or fluvial) is classified by its Annual Exceedance Probability (AEP) or return period (in years). A 1% AEP flood has a 1 in 100 chance of occurring in any given year.

In this report, flood frequency will primarily be expressed in terms of AEP, which is the inverse of the return period, as shown in the table below and explained above. This can be helpful when presenting results to members of the public who may associate the concept of return period with a regular occurrence rather than an average recurrence interval and is the terminology which will be used throughout this report.

Table A-1: Conversion between return periods and annual exceedance probabilities

| Return period (years) | Annual exceedance probability (%) |
|-----------------------|-----------------------------------|
| 2                     | 50                                |
| 10                    | 10                                |
| 50                    | 2                                 |
| 100                   | 1                                 |
| 200                   | 0.5                               |
| 1000                  | 0.1                               |

## A.2 Flood Zones

Flood Zones are geographical areas illustrating the probability of flooding. For the purposes of the Planning Guidelines, there are 3 types or levels of flood zones, A, B and C.

Table A-2: Flood Zones

| Zone         | Description   |
|--------------|---|
| Flood Zone A | Where the probability of flooding is highest; greater than 1% (1 in 100) from river flooding or 0.5% (1 in 200) for coastal/tidal flooding. |
| Flood Zone B | Moderate probability of flooding; between 1% and 0.1% from rivers and between 0.5% and 0.1% from coastal/tidal.                             |
| Flood Zone C | Lowest probability of flooding; less than 0.1% from both rivers and coastal/tidal.  |

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.



### A.3 Consequence of Flooding

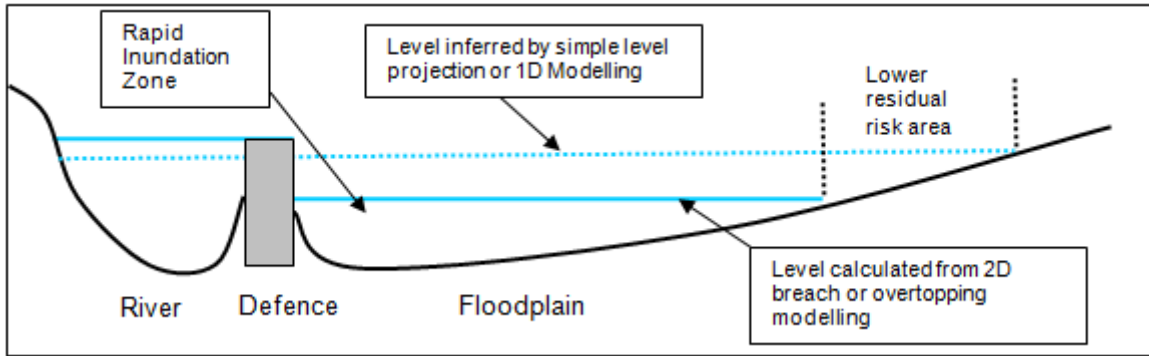
Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality) and the vulnerability of receptors (type of development, nature, e.g. age-structure, of the population, presence and reliability of mitigation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

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

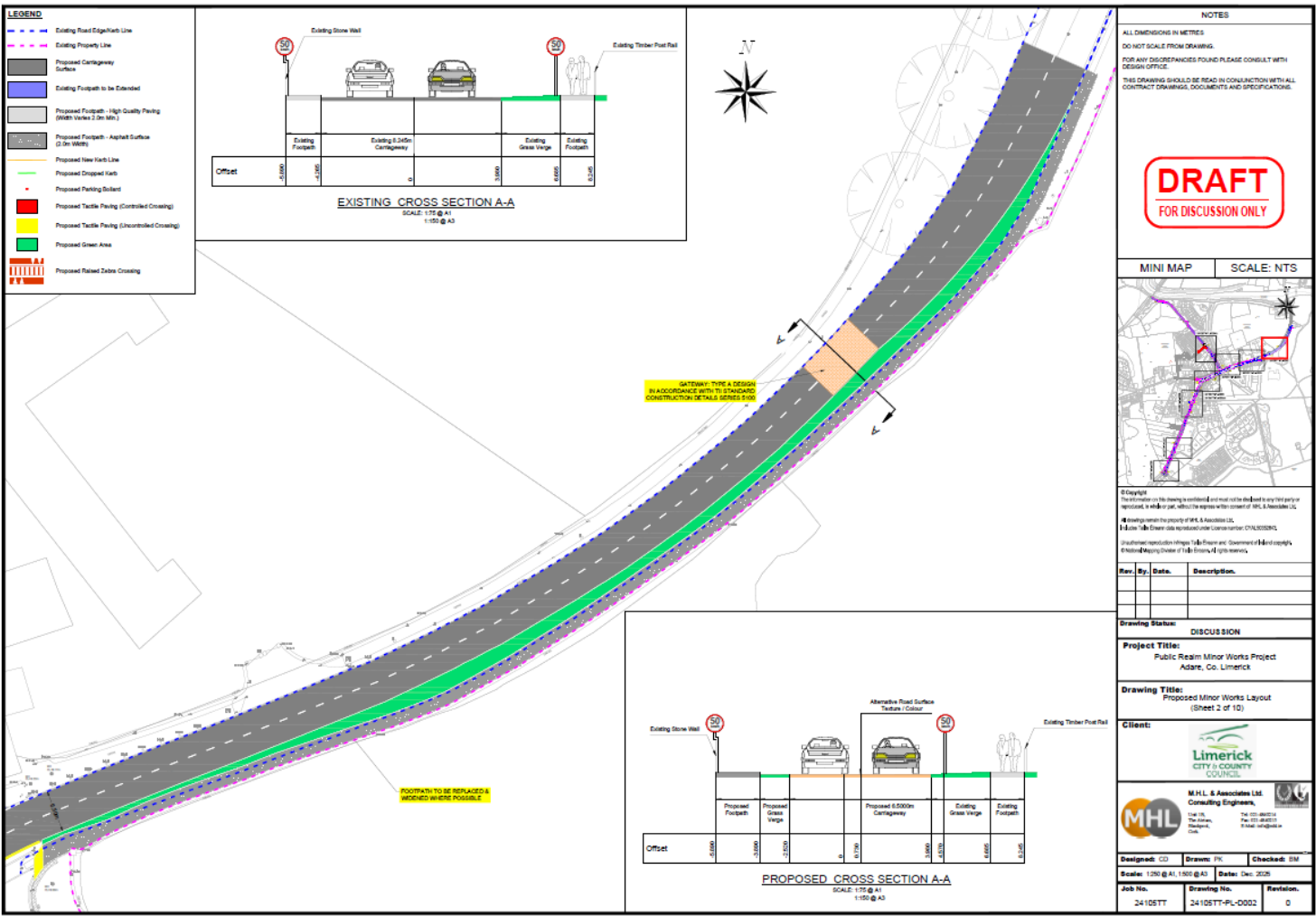
- Highly vulnerable, including residential properties, essential infrastructure and emergency service facilities;
- Less vulnerable, such as retail and commercial and local transport infrastructure;
- Water compatible, including open space, outdoor recreation and associated essential infrastructure, such as changing rooms.

### A.4 Residual Risk

The presence of flood defences, by their very nature, hinder the movement of flood water across the floodplain and prevent flooding unless river levels rise above the defence crest level, or a breach occurs. This is known as residual risk.

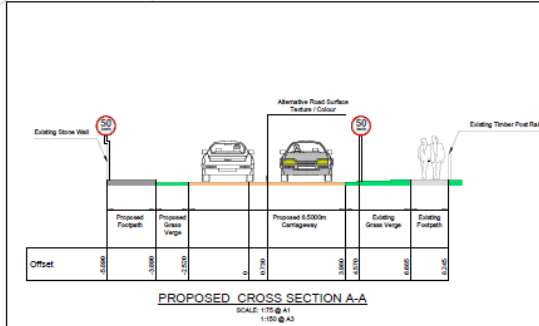
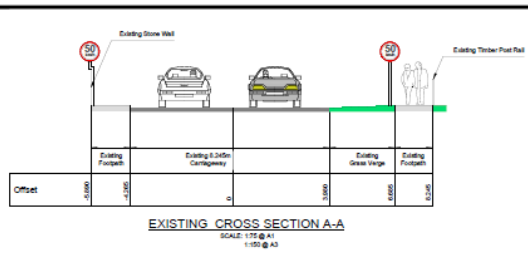


# B Proposed Minor Works Drawings



**LEGEND**

- Existing Road Edge/Path Line
- Existing Property Line
- Proposed Carriageway Surface
- Existing Footpath to be Extended
- Proposed Footpath - High Quality Paving (Width Varies 2.0m Min.)
- Proposed Footpath - Asphalt Surface (2.0m Width)
- Proposed New Wall Line
- Proposed Dripped Path
- Proposed Parking Surface
- Proposed Tactile Paving (Controlled Crossing)
- Proposed Tactile Paving (Uncontrolled Crossing)
- Proposed Green Area
- Proposed Raised Zebra Crossing



**NOTES**

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Professional Mapping Done by Tadhg O'Sullivan, 11/12/2023

| Rev. | Date | Description |
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**Drawing Status:** DISCUSSION

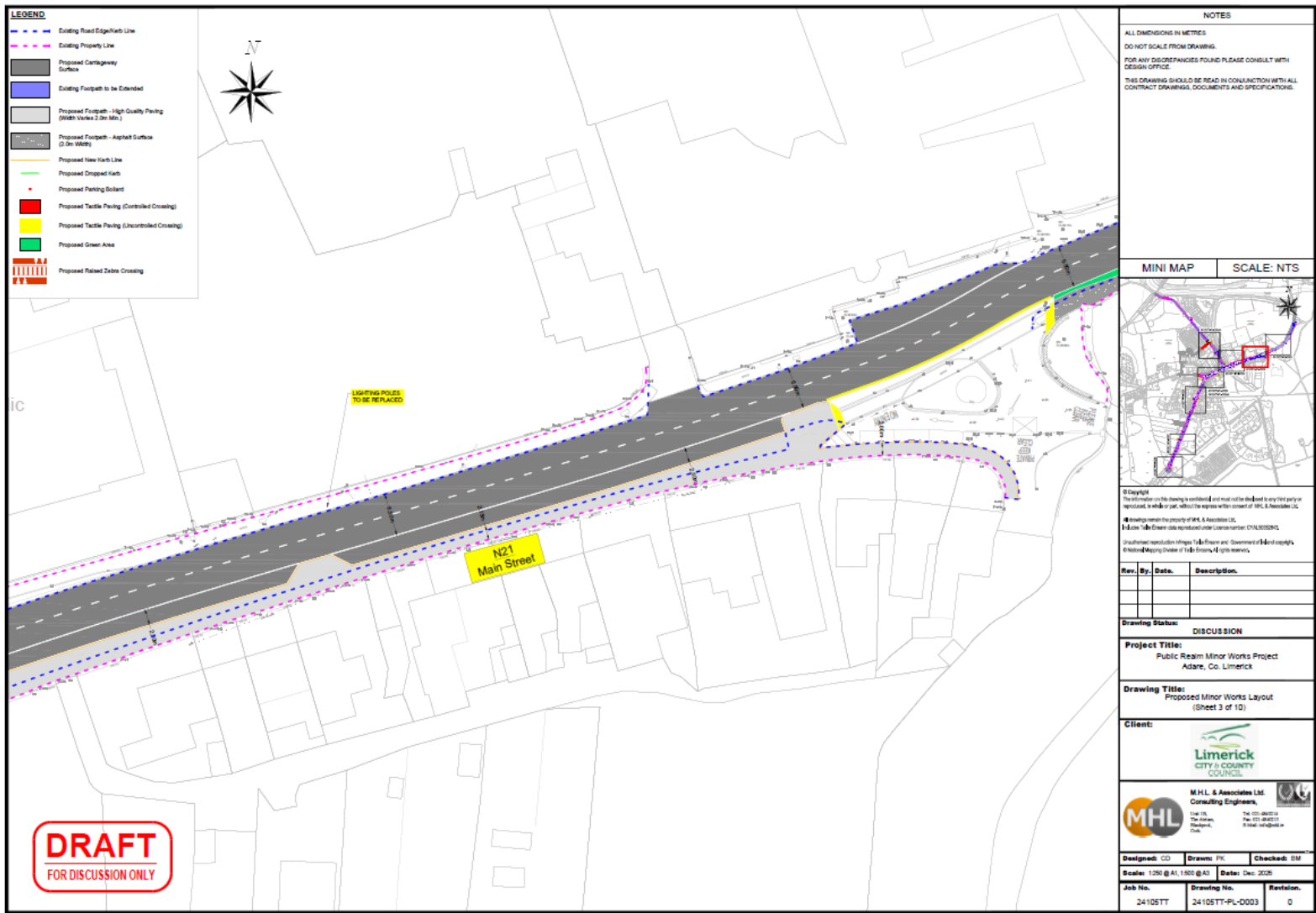
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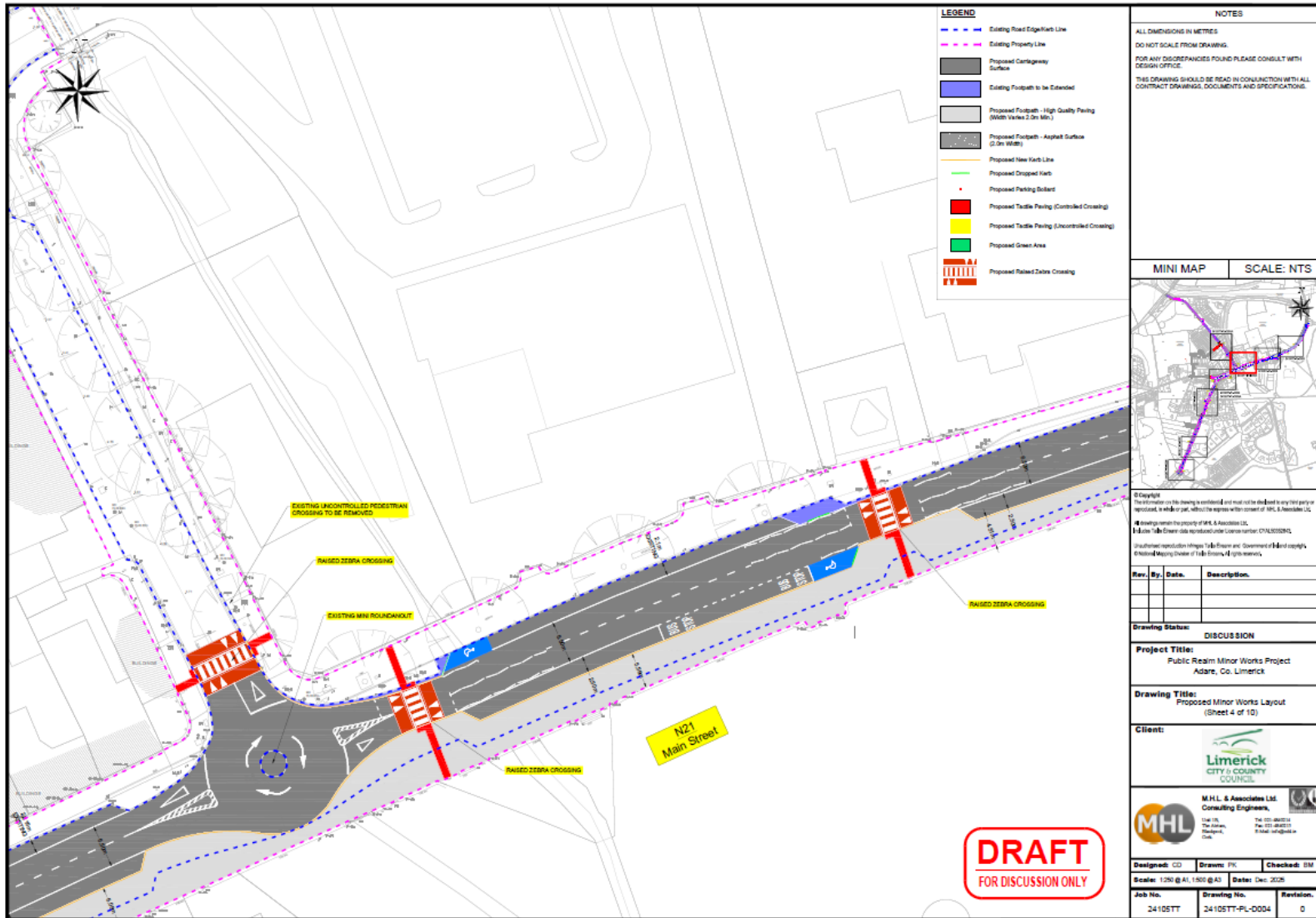
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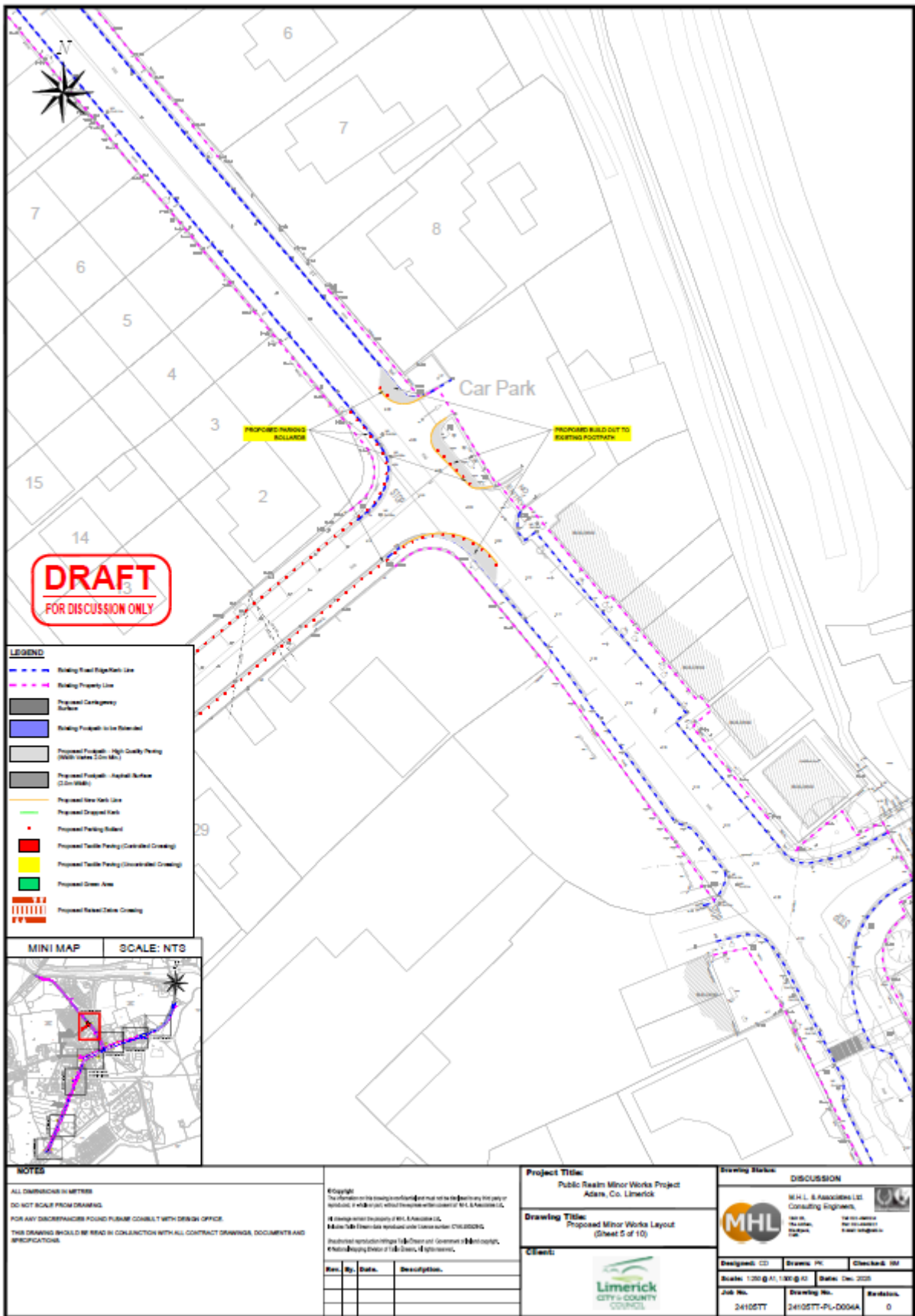
**Client:** Limerick City & County Council

**M.H.L. & Associates Ltd.**  
Consulting Engineers  
104-110, BALLYVAUGHAN ROAD, BALLYVAUGHAN, DUBLIN 11, IRELAND  
Tel: 01-809 2000 Fax: 01-809 2001 Email: info@mhl.ie

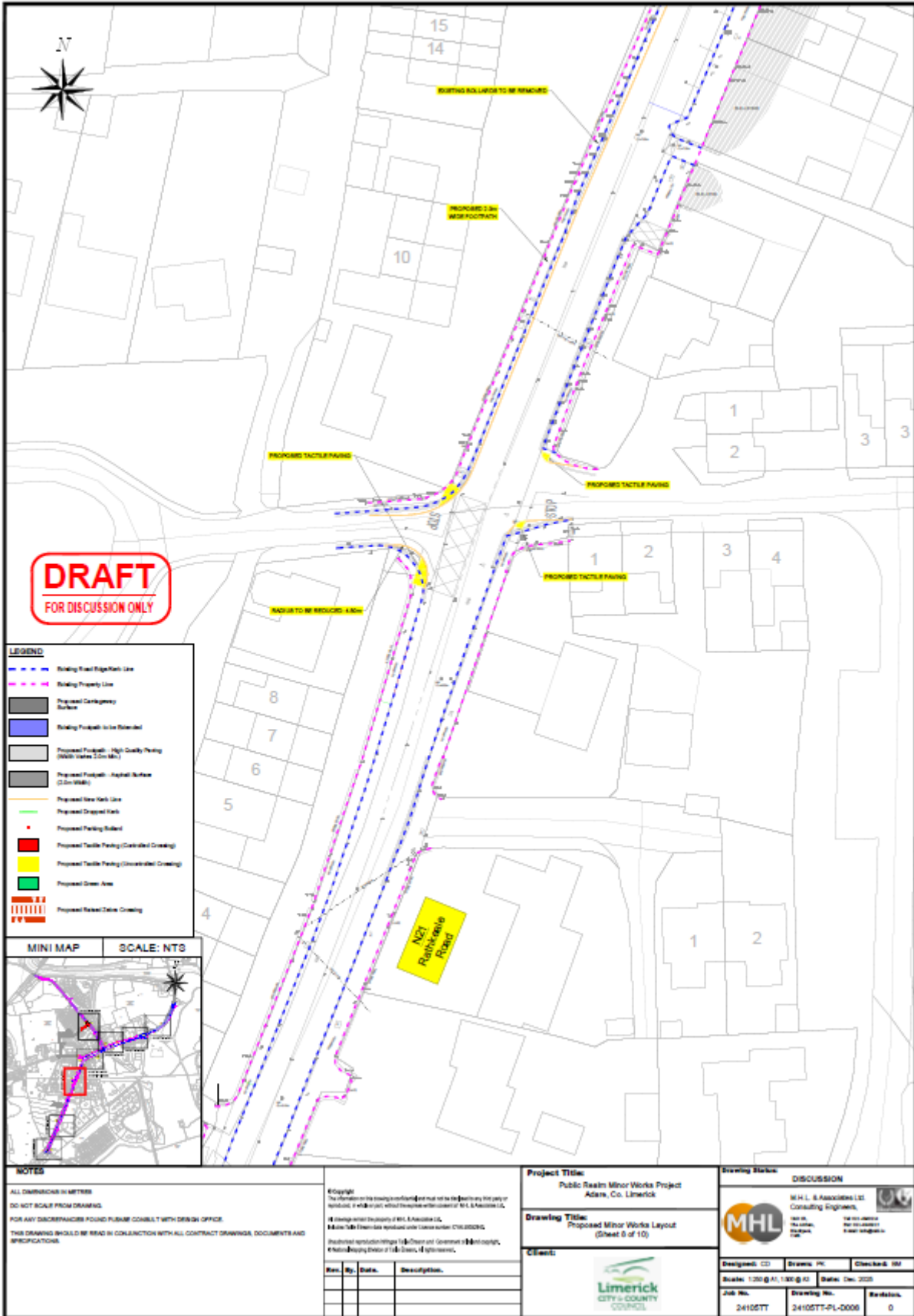
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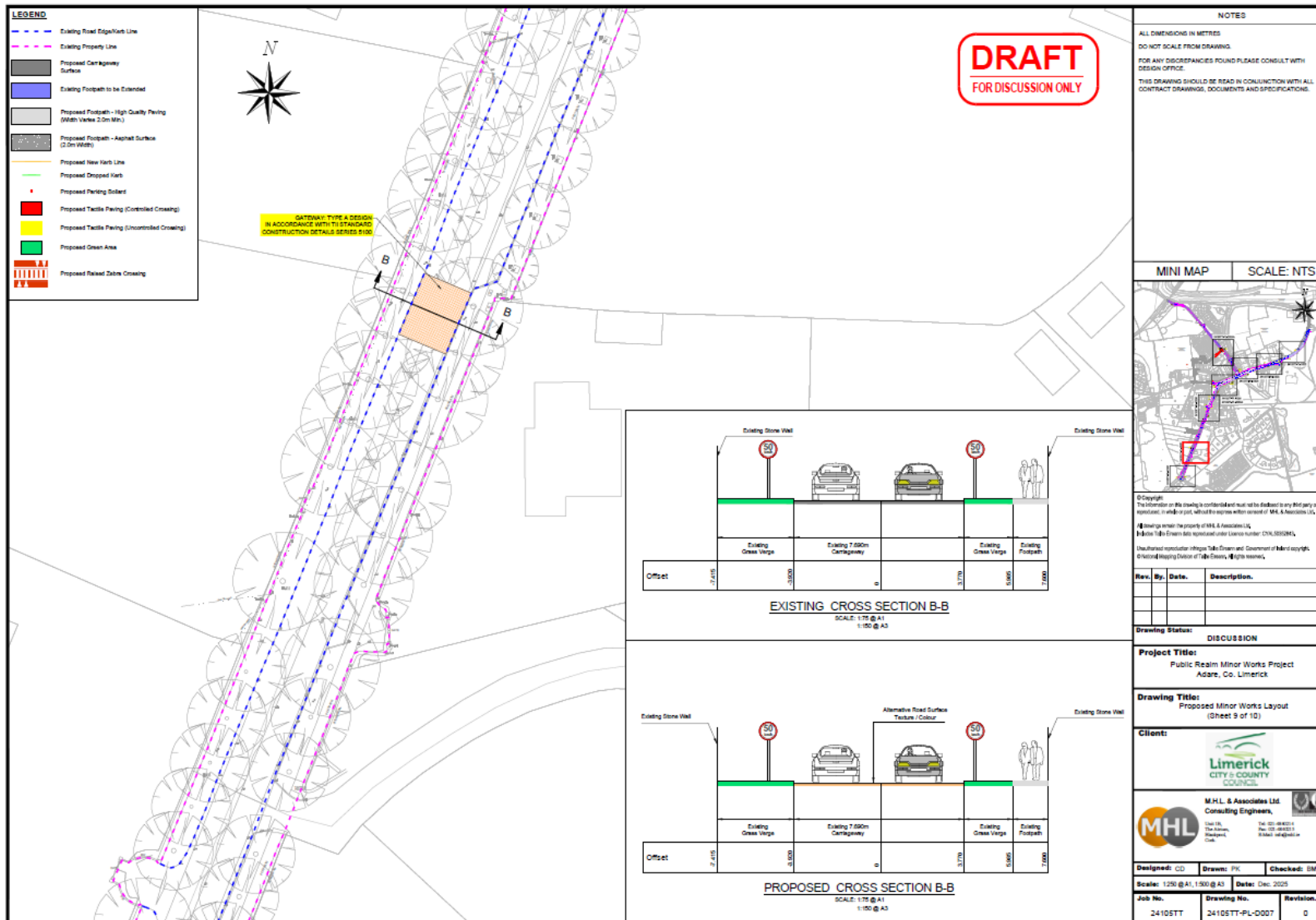












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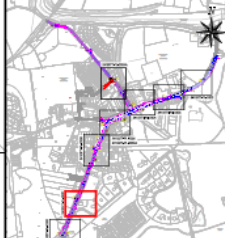
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Drawing Status: **DISCUSSION**

Project Title:  
Public Realm Minor Works Project  
Adare, Co. Limerick

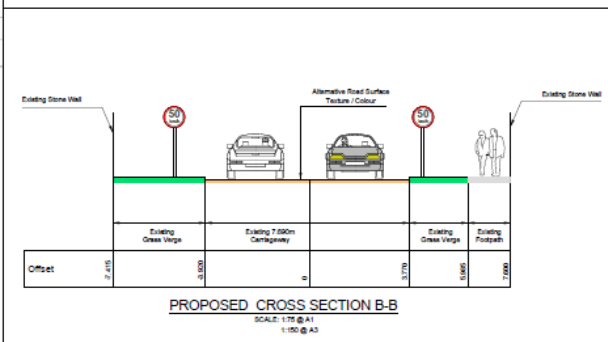
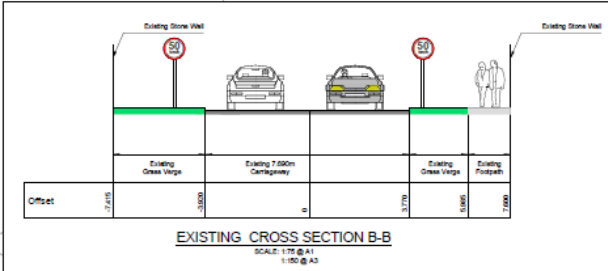
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Proposed Minor Works Layout  
(Sheet 3 of 10)

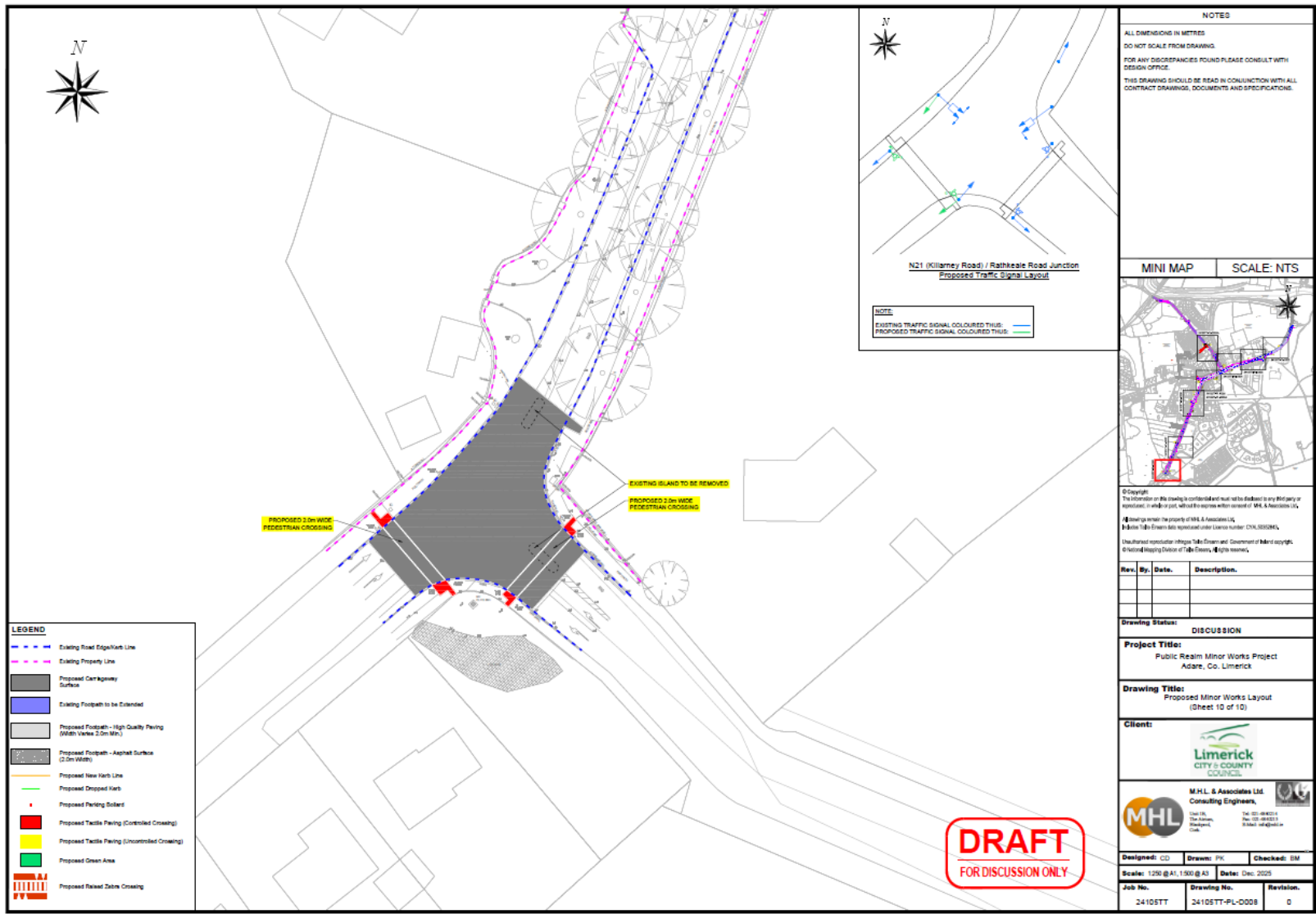


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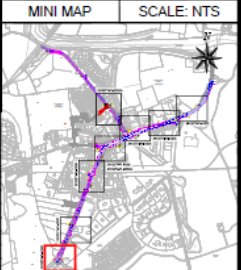
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**NOTE**

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- Proposed Carriageway Surface
- Existing Footpath to be Expanded
- Proposed Footpath - High Quality Paving (Width Varies 2.0m Min)
- Proposed Footpath - Asphalt Surface (2.0m Width)
- Proposed New Verb Line
- Proposed Dropped Kerb
- Proposed Parking Bollard
- Proposed Tactile Paving (Controlled Crossing)
- Proposed Tactile Paving (Uncontrolled Crossing)
- Proposed Green Area
- Proposed Raised Table Crossing

| Rev. | By | Date | Description |
|------|----|------|-------------|
|      |    |      |             |
|      |    |      |             |

Drawing Status: **DISCUSSION**

**Project Title:**  
Public Realm Minor Works Project  
Adare, Co. Limerick

**Drawing Title:**  
Proposed Minor Works Layout  
(Sheet 10 of 10)



|                             |                             |             |
|-----------------------------|-----------------------------|-------------|
| Designed: CD                | Drawn: PY                   | Checked: DM |
| Scale: 1:250 @A1, 1:500 @A3 | Date: Dec 2025              |             |
| Job No. 2410STT             | Drawing No. 2410STT-PL-0008 | Revision: 0 |

**DRAFT**  
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