

**Part 8 Application for Nenagh Historical  
and Cultural Quarter**

**Engineering Planning Report  
204199-PUNCH-XX-XX-RP-C-0001**

**November 2023**

## Document Control

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## 1 Introduction

This report was prepared to accompany a Part 8 planning application for the proposed development on a site located in Nenagh Town, Co. Tipperary. The site location is shown in Figure 1-1 below. Nenagh’s Historic and Cultural Quarter contains several historic buildings including Nenagh Castle, Nenagh Gaol, the Governor’s House & Gate lodge, the former Rialto Cinema, and buildings owned by the Office of Public Works (OPW) at 35 and 36 Pearse Street. It also comprises the public realm area linking these buildings, inclusive of Banba Square, as well as footpath upgrade works to the south of Banba Square. Figure 1-1 below highlights the site location of Nenagh’s Historic and Cultural Quarter.

The proposed project will maximise the potential of the Nenagh Historic and Cultural Quarter (NHCQ) and its contribution to Nenagh as a successful and sustainable visitor destination. The Quarter is located in the centre of Nenagh and comprises a number of historic buildings set around Banba Square and O’Rahilly Street. The principal landmark buildings are the Castle and Gaol. It is proposed that the visitor experiences offered at these two sites be significantly upgraded. The project also includes extensive improvements to the public realm at Banba Square and the adjoining streets which will greatly enhance Nenagh town. There are a number of Protected Structures within the development area and the site lies within an Architectural Conservation Area. Nenagh Castle is a national monument in State Guardianship.

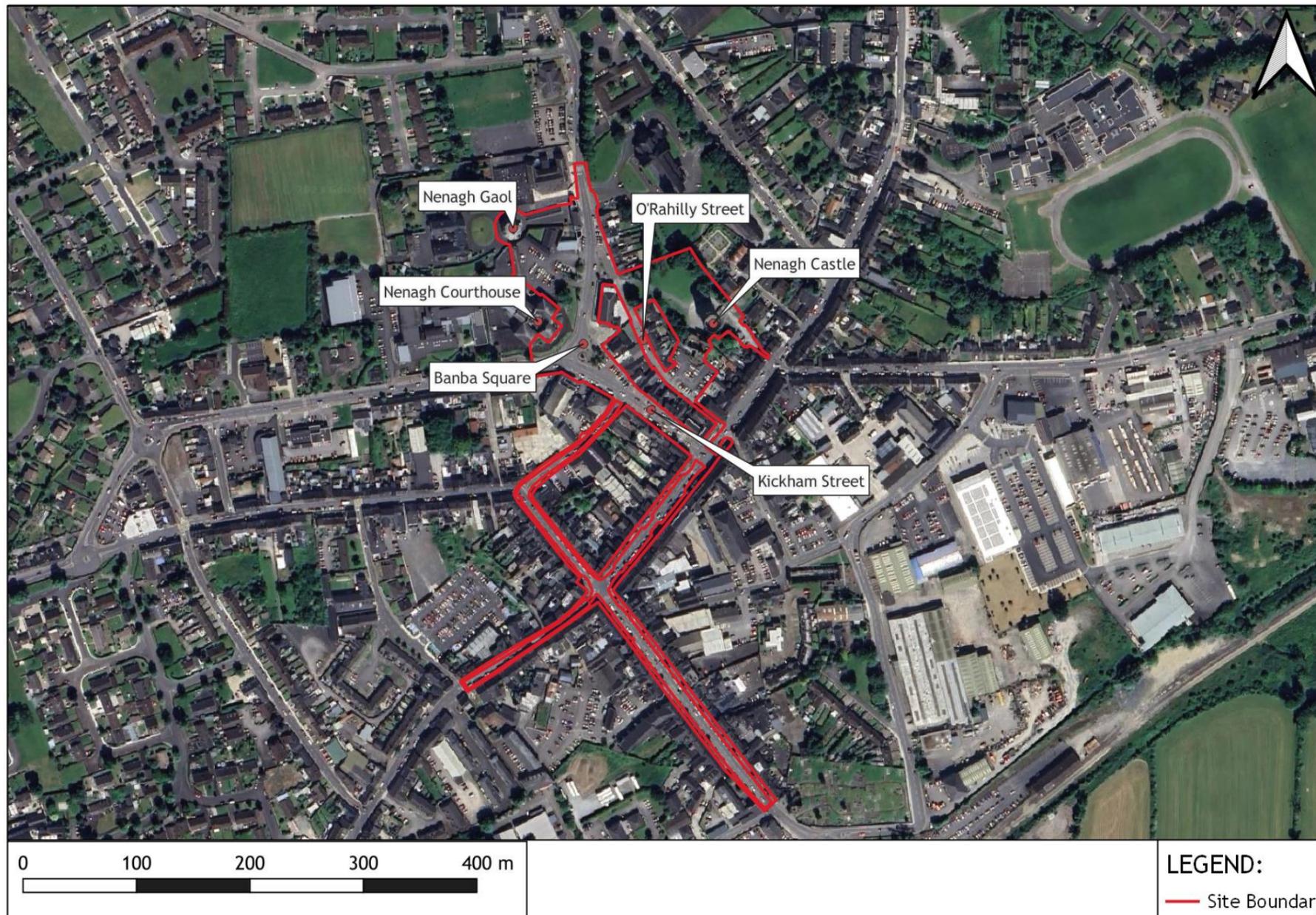


Figure 1-1: Nenagh’s Historic and Cultural Quarter Location

## 1.1 Proposed Development

The proposed works are outlined in a series of Architectural drawings prepared by Scott Talon Walker and Landscape Architectural report prepared by Bernard Seymour Landscape Architects as part of the planning documentation and should be referenced in conjunction with this report.

The development area covers approximately 2.64ha and is located within the urban environment of Nenagh town at 186,596 Easting and 179,311 Northing to Irish National Grid, falling under the jurisdiction of Tipperary County Council. Banba Square and the subject buildings can be accessed via Ashe Road, Kickham Street and O’Rahilly Street. The development has been divided into a number of Zones for ease of reference. These are illustrated by Figure 1-2 to the right and listed below:

- Banba Square (NHCQ Zone 1)
- Nenagh Castle - Forecourt (NHCQ Zone 3)
- Nenagh Castle - Barbican & Bailey (NHCQ Zone 5)
- Nenagh Castle - Castle Park (NHCQ Zone 6)
- Nenagh Gaol & Courthouse/Gaol carpark (NHCQ Zone 7)
- O’Rahilly Street & Tourist Office/former Town Hall (NHCQ Zone 8)
- Streets upgrade - business district footpaths (NHCQ Zone 9)

Works involve:

- I. Public Realm upgrade works to Banba Square, O’Rahilly Street & Carpark, Gaol Carpark & Courthouse frontage, Castle Park, Barbican entrance & bridge.
- II. Reinstatement of historic access gates and posts (incorporating light) to the courthouse including extension of the Banba Square paving to the courthouse steps & portico.
- III. Removal of unnecessary street clutter, road signage, pedestrian barriers throughout the development area of the NHCQ and including those described in the March '23 Nenagh Traffic Management Plan - One Way System under Section 38 of the road traffic act 1994
- IV. Installation of natural stone paving to the footpaths of the main business district streets, Kenyon Street, Mitchel Street, Pearse Street, Silver Street and Emmet Place.
- V. Refurbishment with internal and external alterations to the Protected Structure, the existing Nenagh Heritage Centre (former Governors’ house, Gatehouse and the single storey and three storey Gaol Cell Blocks) conservation and adaptive reuse works, installation of new accessible toilets on the ground floor of the truncated Cell Block.
- VI. Reinstatement of an elevated footbridge structure and associated works connecting the cell block to the Governor’s House.
- VII. Demolition of the former Civil defence building & adjacent lean-to stores in the courthouse public carpark and reorganisation of the parking including the partial removal of a dividing stone wall.
- VIII. Installation of a new universal access pedestrian route (comprising elevated bridge, paved walkway, and ramped footpaths) from the O’Rahilly Street Carpark to Nenagh Castle forecourt (utilising the Castle barbican entrance).
- IX. Demolition of the modern single storey lean-to structure adjacent to the Barbican entrance of Nenagh Castle and associated works at O’Rahilly Street Carpark.
- X. Accessible public realm to the O’Rahilly Street carpark comprised of predominantly hard landscaping with soft landscaping areas including installation of new edgings at junctions between hard and soft landscaping, asphalt surfacing to car park, natural stone paving to the public areas, with installation of Nature Based Drainage Solutions.
- XI. Installation of high & low lighting to public realm (Banba Square, Courthouse carpark, O’Rahilly Street carpark) generally as well as facade lighting to Nenagh Castle and Nenagh Gaol buildings and the former Gaol exercise yards.
- XII. Removal of existing traffic barrier and installation of a revised vehicle access security system (automated rising bollards) at the vehicle entrance through the Gaol gatehouse archway serving the Governor’s house & existing Convent access beyond.

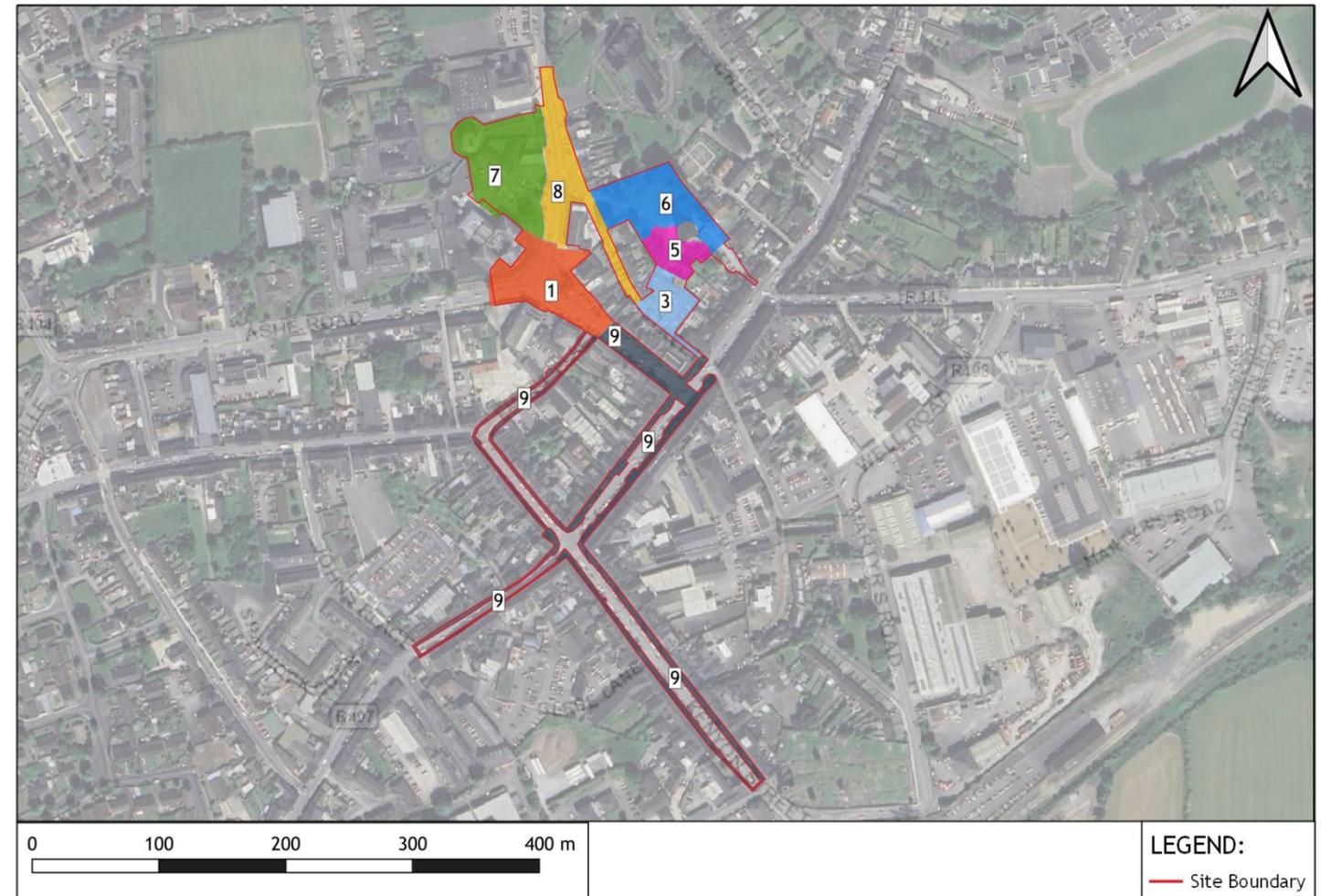


Figure 1-2: Development Zone Locations and Extents

## 2 Flooding

Planning guidelines on flood risk and development have been published by the OPW and Department of Environment, Heritage and Local Government (DoEHLG). The below sections summarise how the development’s design will be assessed in accordance with the main principles of the guidelines.

### 2.1 Sequential Approach

The sequential approach makes use of flood zones for river and coastal flooding, as described below:

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

**Zone B**- Moderate probability. This zone defines areas with a moderate risk of flooding. For river flooding it is defined as 0.1% to 1% probability or between 1 in 100 and 1 in 1,000 years, and for coastal flooding 0.1% and 0.5% probability or between 1 in 200 and 1 in 1,000 years.

**Zone C**- Low probability. This zone defines areas with a low risk of flooding less than 0.1% probability or less than 1 in 1,000 years.

The flood zones are then to be looked at with the vulnerability of the building proposed;

- Highly Vulnerable - Hospitals, Garda stations, homes, motorways etc.
- Less Vulnerable - Commercial, retail, offices etc.
- Water Compatible - Marina’s, green areas

A sequential approach is then taken to assess the most favourable location for the development based on its vulnerability.

**Zone A** - Water Compatible or Justification Test

**Zone B** - Less Vulnerable if no other lands are available or highly vulnerable with Justification Test

**Zone C** - Any development

Table 3.1 of the OPW publication ‘The Planning System and Flood Risk Management, Guidelines for Planning Authorities’, outlines the vulnerability classification for various developments. The subject buildings are not included within this table. However, it notes that uses not listed within the table should be considered on their own merits. As the completed works will not be used for education and residential purposes, emergency services or essential infrastructure (primary transport and utilities distribution), the building developments may be classified as less vulnerable. The proposed public realm and streets/footpath upgrades can be classified as “Amenity Open Space”, and as such considered as Water Compatible Developments.

Extracts of tables 3.1 and 3.2 of the OPW guidelines are included to the right in Figure 2-1, and Figure 2-2 respectively, to illustrate the types of developments that are appropriate to each flood zone and those that would be required to meet the criteria of a Justification Test.

Vulnerability class	Land uses and types of development which include*:
<b>Highly vulnerable development (including essential infrastructure)</b>	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children’s homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
<b>Less vulnerable development</b>	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
<b>Water-compatible development</b>	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).

\*Uses not listed here should be considered on their own merits

**Figure 2-1: Vulnerability classification of developments (image taken from OPW report)**

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

**Figure 2-2: Appropriate developments for each flood zone and justification test requirement (image taken from OPW report)**

## 2.2 Development Sequential Test

### 2.2.1 Coastal Flood Risk

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

There is no risk associated with coastal flooding for this site as general ground levels for the site are much higher than expected extreme coastal flood levels.

### 2.2.2 Fluvial Flood Risk

Fluvial flooding is the result of a river exceeding its capacity and excess water spilling out onto the adjacent floodplain.

Preliminary CFRAM mapping, as shown in Figure 2-3 below, indicates that most of the proposed development is located in Flood Zone C, with only a small portion of Zone 9 of the development, on R498, being within Flood Zone A.

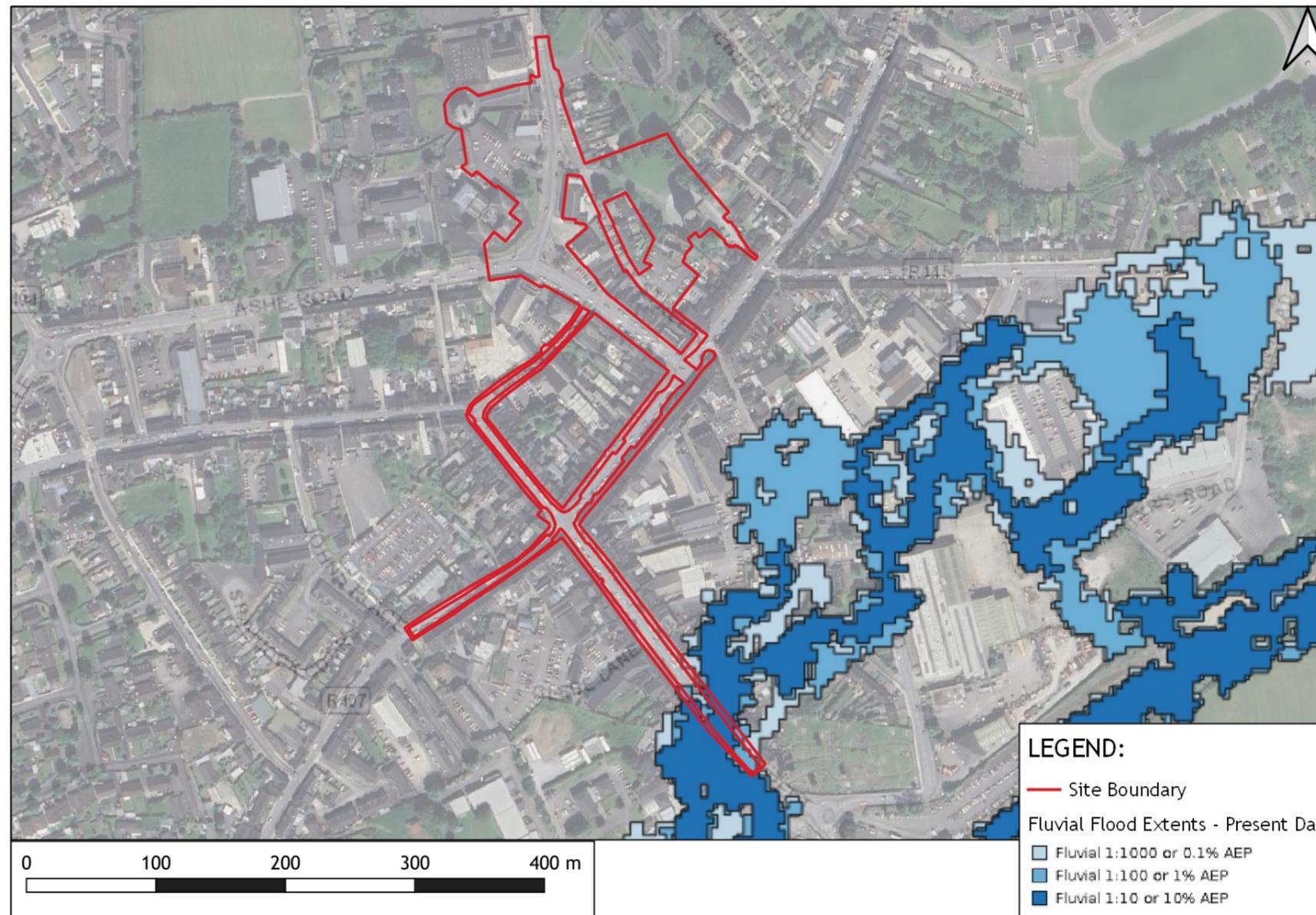


Figure 2-3: Fluvial Flood Extents

### 2.2.3 Pluvial Flood Risk

Pluvial flooding is the result of rainfall-generated overland flows which arise before run-off can enter any watercourse or sewer. It is usually associated with high intensity rainfall and typically occurs in the summer months. Pluvial flood risk has not been identified by the Preliminary Flood Risk Assessment (PFRA) mapping as being a risk to this site.

### 2.2.4 OPW Flood Maps

The OPW Flood Hazard Mapping Website is a record of historic flood events. This database indicates that there is no record of flooding incidents in the area of the proposed development.

## 2.3 Flood Risk Assessment Conclusions

The site has undergone assessment in accordance with the “The Planning System and Flood Risk Management” Guidelines. The OPW flood hazard maps and Catchment Flood Risk Assessment Maps have been referenced during the sequential test.

For each respective zone, the flood risk assessment results are as follows:

- Banba Square (NHCQ Zone 1): Not at flood risk in all cases.
- Castle Forecourt (NHCQ Zone 3): Not at flood risk in all cases.
- 35&36 Pearse Street (NHCQ Zone 4): Not at flood risk in all cases.
- Nenagh Castle Barbican & Bailey (NHCQ Zone 5): Not at flood risk in all cases.
- Nenagh Castle - Castle Park (NHCQ Zone 6): Not at flood risk in all cases.
- Nenagh Gaol & Courthouse/Gaol carpark (NHCQ Zone 7): Not at flood risk in all cases.
- O’Rahilly Street & Tourist Office/Former Town Hall (NHCQ Zone 8): Not at flood risk in all cases.
- Streets Upgrade - Business District footpaths (NHCQ Zone 9): Partially within Fluvial Flood Zone A.

Given that Streets Upgrade - Business District footpaths (NHCQ Zone 9) is partially within Fluvial Flood Zone A, the footpath upgrades are identified as at risk of flooding. However, as street upgrades are classified as water-compatible, the overall development is considered appropriate.

### 3 Stormwater Drainage Design

#### 3.1 Existing Stormwater Drainage

Tipperary County Council (TCC) were contacted to establish the existing drainage infrastructure within the site area. TCC advised the 525mm concrete sewer that traverses Banba Square and follows Kickham Street in a south-easterly direction is a combined system, not a foul only as shown in an extract from online records, in Figure 3-1. Topographical survey confirms the existence of the combined system from the record drawings.



Figure 3-1: Existing Drainage Arrangement

### 3.2 Proposed Stormwater Drainage

The surface water drainage system will be designed in accordance with the Department of Environment and Local Government’s guidance document “Recommendations for Site Development Works for Housing Areas”, with guidance taken from the “Greater Dublin Strategic Drainage Study” (GSDSDS) and the Tipperary County Council Development Plan and reference to the Design Manual for Urban Roads and Streets “Road and Street Drainage using Nature Based Solutions”.

Although the proposed design intends to alter the hardstanding and landscape geometrically, the effects of changes to the greenfield runoff rate are negligible as the permeable areas will greatly remain the same, with allowance for the introduction of Nature Based Drainage Solutions to improve the effects on the existing combined drainage system, by overall reducing the run-off from the existing network and improving the quality of the surface water run-off that enters the system. The measures that will be sought to be detailed within the detailed design are:

#### 3.2.1 Permeable Pavements

The car parking bays to be reconfigured will be reconstructed using permeable paving. The treatment processes that occur within permeable pavements include:

- I. Filtration of silt and the attached pollutants - the majority of silt is trapped within the top 30mm of the jointing material between the blocks.
- II. Biodegradation of organic pollutants, such as petrol and diesel within the pavement construction.
- III. Adsorption of pollutants (pollutants attach or bind to surfaces within the construction) which depends on factors such as texture, aggregate structure and moisture content.
- IV. Settlement and retention of solids.

The use of permeable pavers for car parks is proposed as an alternative to an oil separator. The use of permeable pavers for this purpose is supported by the treatment processes outlined above. CIRIA C753 (The SuDS Manual) notes that regarding interception design of pervious pavements, studies have shown that runoff typically does not occur from pervious pavements for rainfall events up to 5 mm. A typical cross-section schematic is shown in Figure 3-2 (Reference: Farley Pavers, farleypavers.com).

The extent of permeable paving is to be as shown on drawings in Sections 3.2.4 to 3.2.7 of this report.

A typical cross-section schematic is shown in Figure 3-3 to the right (Reference: Farley Pavers, farleypavers.com).

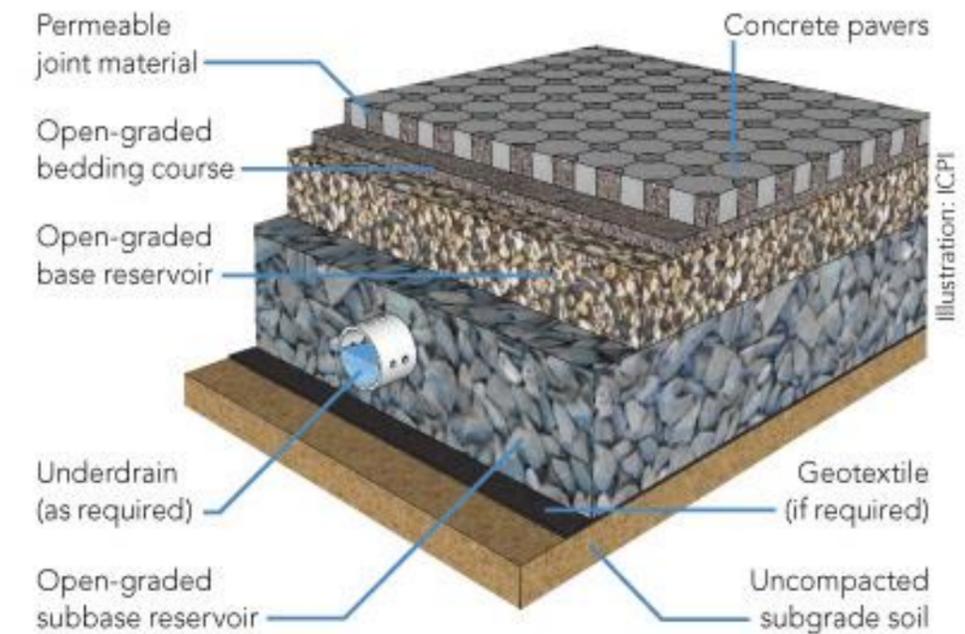


Figure 3-2: Permeable Paving Schematic

### 3.2.2 Tree Root Systems

Proposed surface water along the development's landscaped paved areas where possible will discharge to nature based solutions such as tree root systems for interception and treatment prior to entering the drainage network. The tree root systems will incorporate drainage stone/subsoil and will provide a level of additional attenuation within the tree root system. The base and sides of the tree root system will be lined and a high level overflow to the drainage network within the build-up will accommodate removal of water.

CIRIA C753 (The SuDS Manual) Table 24.6 notes that regarding interception design of tree root system (bio retention areas), pavements drained by tree root systems can be considered to provide Interception, i.e. it can be assumed that there will be zero runoff from the first 5 mm rainfall for 80% of events during the summer and 50% in winter.

A typical cross-section schematic is shown in Figure 3-3 to the right (Reference: DMURS 'Advice Note 5: Road and Street Drainage using Nature Based Solutions', Figure 4.5).

The extent of tree root systems is to be as shown on drawings in Sections 3.2.4 to 3.2.7 of this report.

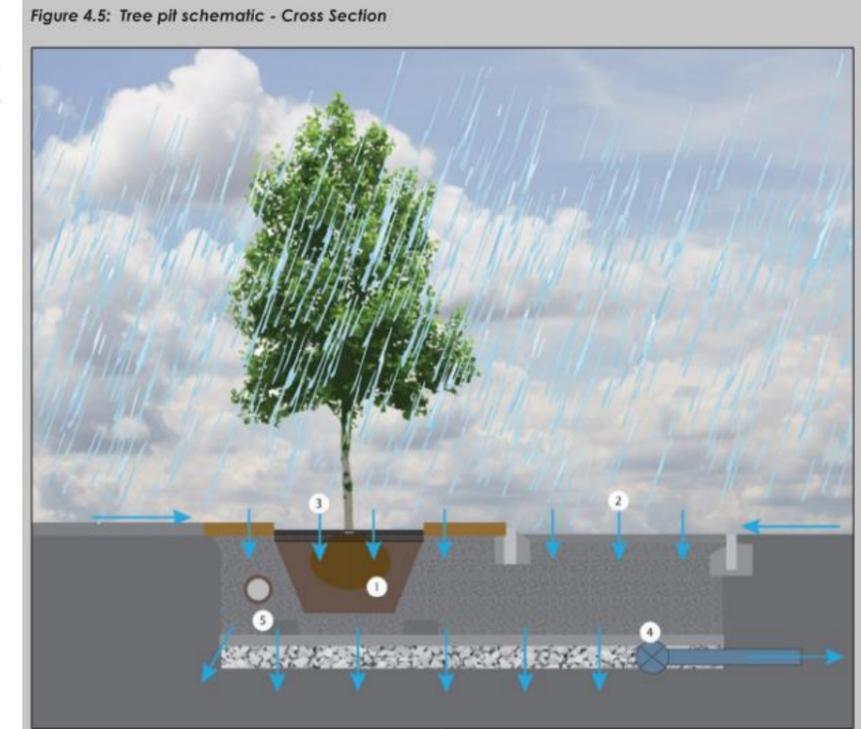


Figure 3-3: Tree Pit System Schematic

### 3.2.3 Rain Gardens

Newly paved surfaces will, where possible, runoff overland to rain gardens, a schematic of which is shown in Figure 3-4 to the right (Reference: DMURS 'Advice Note 5: Road and Street Drainage using Nature Based Solutions').

The proposed rain gardens will serve to provide treatment to pavement runoff for low intensity storms. Rainwater will be treated through evapotranspiration within the filter media of the rain garden structure. These rain gardens are to comprise a landscape area with high permeability soil in the top 900mm depth. A perforated surface water drain is to be provided at a low level to drain any excess surface water. The extent of rain gardens is to be as shown on drawings in Sections 3.2.5 and 3.2.6 of this report.

Any water that drains through the above-mentioned perforated drainage pipe will subsequently discharge to the main stormwater drainage system.

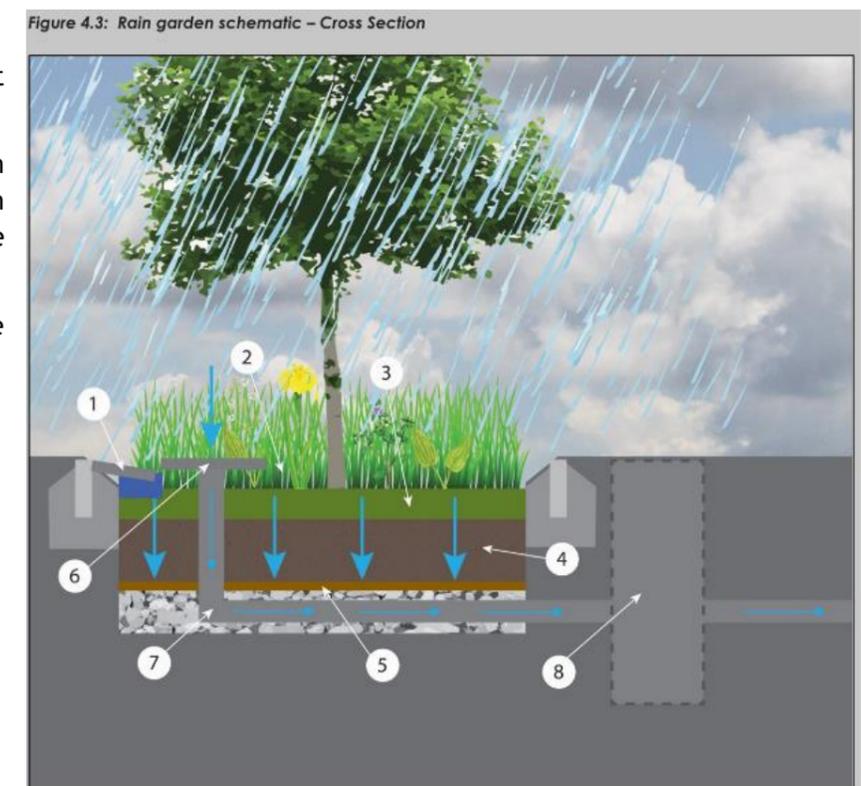


Figure 3-4: Rain Garden Schematic

### 3.2.4 Proposed Stormwater Drainage Banba Square (NHCQ Zone 1)

It is proposed to resurface Banba Square and geometrically realign the road and parking layouts. This includes a slight re-profiling of the surface to convey surface water located on sides of the proposed parking and the proposed plaza, however in general longitudinal and cross falls will replicate the existing situation where possible. This philosophy will ensure that the distribution of the storm water run-off is consistent with the existing situation.

Additional sub-surface drainage outlets are being introduced where required. The proposed drainage layout is shown in Figure 3-5 below. In summary:

- The existing gully arrangement may be adjusted for the proposed geometric changes to the road layout.
- Additional roadside gullies will be included at the base of the raised table. This will minimize the risk of ponding at this location. These gullies will be connected to sub-surface drainage.
- The proposed tree pits and rain gardens to be connected with perforated pipe with an overflow pipe that connects into the nearby combined line.



Figure 3-5: Proposed Stormwater Drainage Banba Square (NHCQ Zone 1)

### 3.2.5 Proposed Stormwater Drainage Nenagh Castle Forecourt (NHCQ Zone 3)

It is proposed to resurface and regrade The Castle Forecourt, construct a pedestrian bridge that connects The Forecourt with The Castle Grounds, and adjust the parking layout. The re-profiling of the surface will require gully rearrangement with the installation of replacement gullies. Minimum longitudinal and cross falls will be adhered to facilitate the free draining of surface water to nearby gullies.

Additional sub-surface drainage outlets are being introduced where required. The proposed drainage layout is shown in Figure 3-6 below. In summary:

- The existing gully arrangement is to be adjusted for the proposed regrading changes and changes to the parking layout, where required, the permeable paving installation will minimise this requirement.
- Additional gullies will be included at new low points, if required. This will minimize the risk of ponding at these locations. These gullies will be connected to sub-surface drainage.
- Aco drain to be installed at the bottom of the proposed pedestrian bridge. The Aco drain will be connected to sub-surface drainage.
- The proposed rain gardens and tree pits to be connected with perforated pipe with an overflow pipe that connects into the nearby combined line.

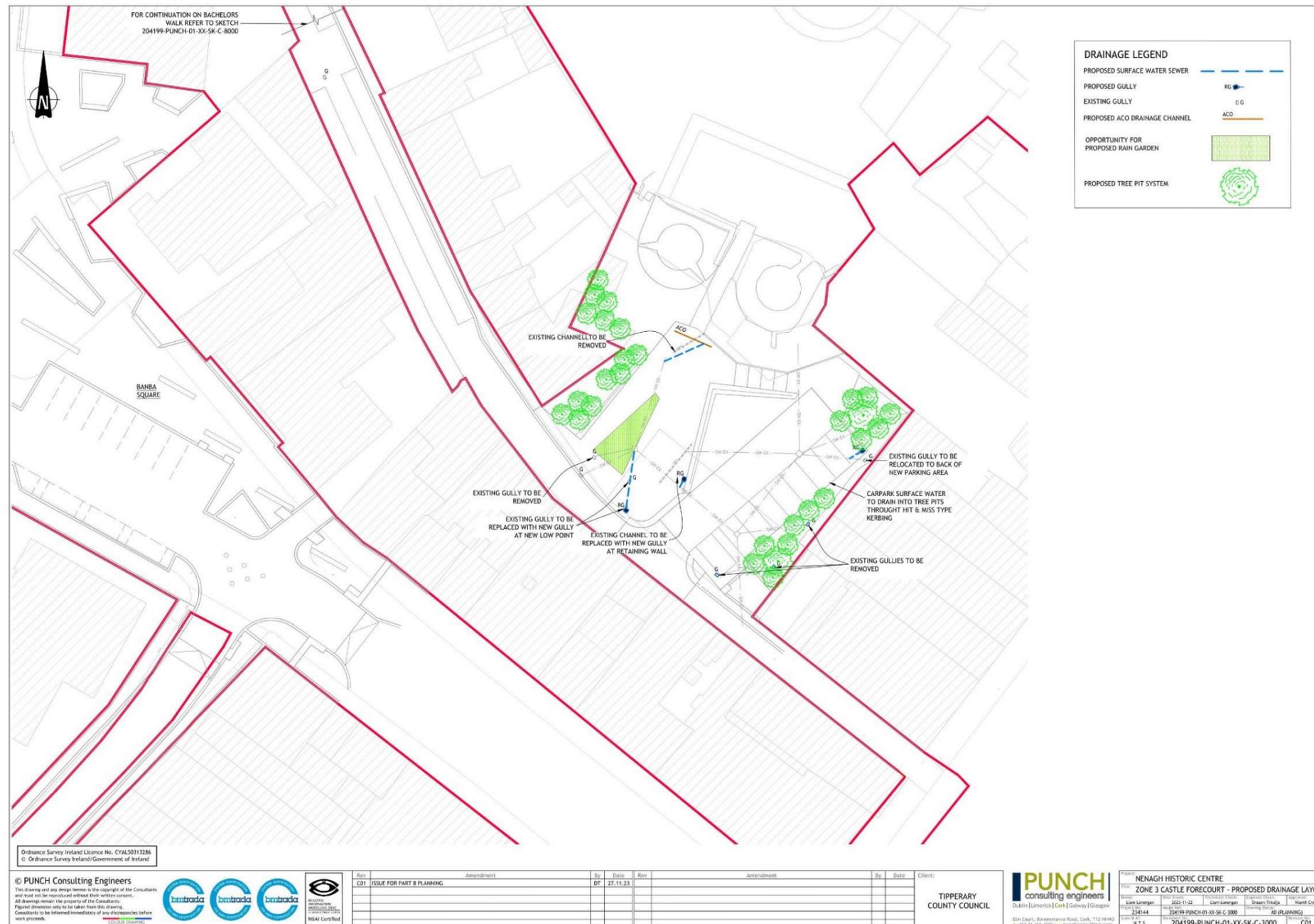


Figure 3-6: Proposed Stormwater Drainage Nenagh Castle Forecourt (NHCQ Zone 3)

### 3.2.6 Proposed Stormwater Nenagh Gaol & Courthouse/Gaol carpark (NHCQ Zone 7)

It is proposed to geometrically realign the parking layout within the existing Nenagh Gaol car park. This includes a slight re-profiling of the surface to convey surface water towards road gullies, however in general longitudinal and cross falls will replicate the existing situation where possible. This philosophy will ensure that the distribution of the storm water run-off is consistent with the existing situation.

Additional sub-surface drainage outlets are being introduced where required. The proposed drainage layout is shown in Figure 3-7 below. In summary:

- The proposed permeable paving forming the car parking with perforated underdrain pipe to connect into the nearby combined line.
- The existing gully arrangement is being adjusted for the proposed geometric changes to the parking layout, where required, the permeable paving installation will minimise this requirement.
- The proposed tree pits and rain gardens to be connected with perforated pipe with an overflow pipe that connects into the nearby combined line.

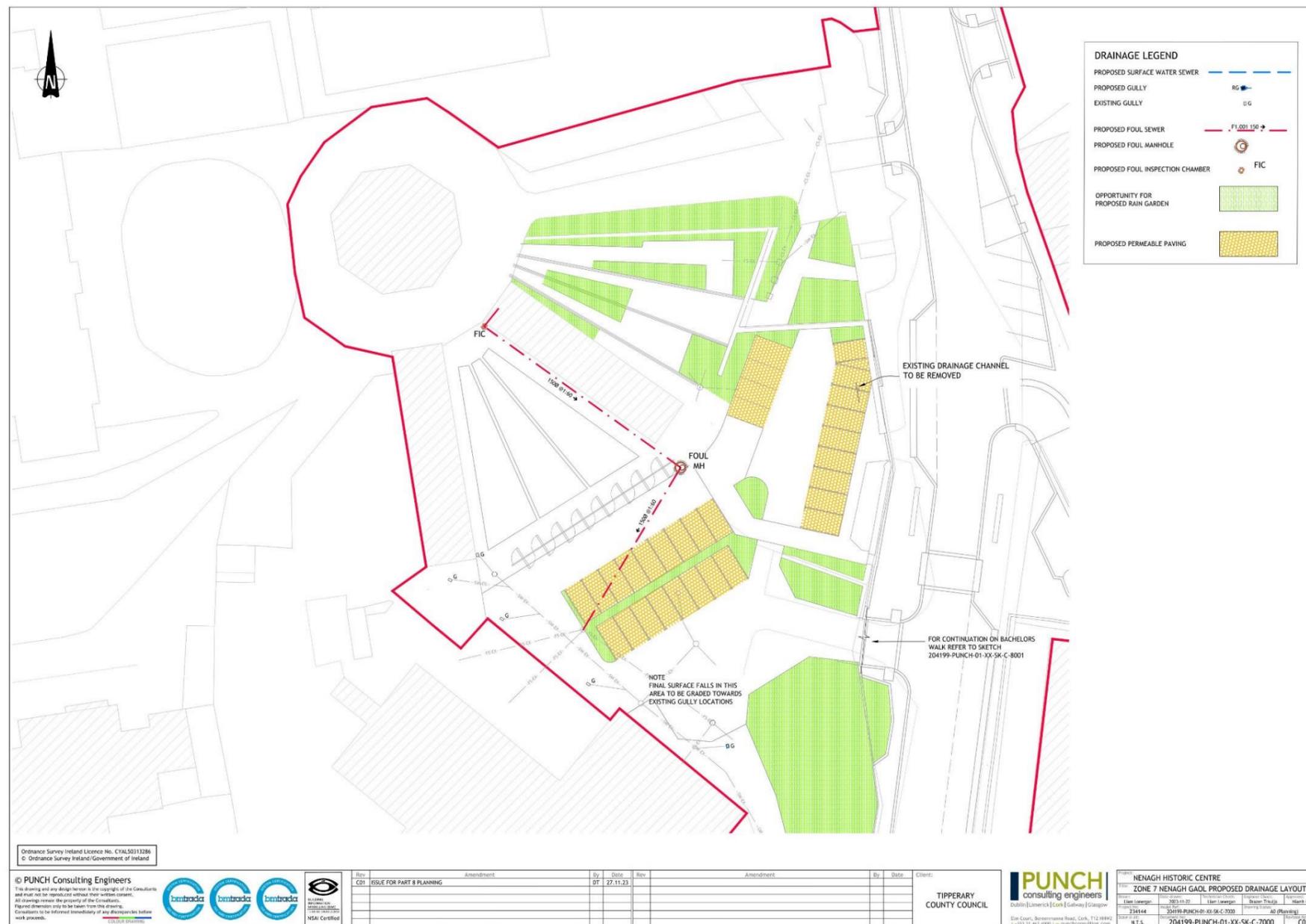


Figure 3-7: Proposed Stormwater Nenagh Gaol & Courthouse/Gaol carpark (NHCQ Zone 7)

**3.2.7 Proposed Stormwater O’Rahilly Street & Tourist Office/Former Town Hall (NHCQ Zone 8)**

It is proposed to resurface Bachelor’s Walk and geometrically realign the road alignment, as well as provide bus parking to both sides of the road. This includes a slight re-profiling of the surface to convey surface water located on sides of the proposed road and the proposed footpaths, however in general longitudinal and cross falls will replicate the existing situation where possible. This philosophy will ensure that the distribution of the storm water run-off is consistent with the existing situation.

Additional sub-surface drainage outlets are being introduced where required. The proposed drainage layout is shown in Figure 3-8 below. In summary:

- The existing gully arrangement will be adjusted as required for the proposed geometric changes to the road, parking, and footpath layouts.
- Additional roadside gullies will be included at the base of the raised table pedestrian crossings. This will minimize the risk of ponding at this location. These gullies will be connected to sub-surface drainage.
- The proposed tree pits to be connected with perforated pipe with an overflow pipe that connects into the nearby combined line.



Figure 3-8: Proposed Stormwater O’Rahilly Street & Tourist Office/Former Town Hall (NHCQ Zone 8)

**3.2.8 Proposed Stormwater Drainage Nenagh Castle Barbican & Bailey (NHCQ Zone 5)**

No alterations or additional piped drainage is required due to these works. Nature based drainage systems will be incorporated within the landscaping design, where practicable.

**3.2.9 Proposed Stormwater Drainage Nenagh Castle - Castle Park (NHCQ Zone 6)**

No alterations or additional piped drainage is required due to these works. Nature based drainage systems will be incorporated within the landscaping design, where practicable.

**3.2.10 Proposed Stormwater Drainage Streets Upgrade - Business District footpaths (NHCQ Zone 9)**

No alterations or additional drainage is required due to these works.

## 4 Foul Water Drainage Design

### 4.1 Existing Foul Water Drainage

Record drawings and TCC advice indicate that the 525mm concrete sewer that traverses Banba Square and follows Kickham Street in a south-easterly direction is a combined system as shown in Section 3.1 of this report. There is a series of internal foul lines within the existing Nenagh Gaol complex, mostly comprising pipes 100mm to 150mm in diameter.

### 4.2 Proposed Foul Water Drainage

The only zone where foul water drainage works are required is NHCQ Zone 7, as described in the following section.

#### 4.2.1 Proposed Foul Water Drainage Nenagh Gaol & Courthouse/Gaol carpark (NHCQ Zone 7)

The only facilities requiring an additional foul connection are proposed toilet facilities within a Nenagh Gaol wing. It is proposed that the foul sewer will discharge by gravity to an existing 225mm foul sewer within the confines of the Gaol Museum car park, before ultimately discharging to the 525mm combined public sewer on Banba Square.

The foul loading for these new welfare facilities has been calculated in accordance with “Code of Practice for Wastewater Infrastructure” (particularly clause 36, Appendix C and Appendix D) published by Uisce Éireann. Tables 3-1 and 3-2 describe the foul water drainage design parameters used and foul water flow calculations.

Table 3-1: Foul Water Drainage Design Parameters

Description	Value
Gaol Museum Flow Rate	20 l/visitor/day 150 l/staff/day
Gaol Museum Visitors	192 per day
Gaol Museum Staff	10
Peaking Factor	4.5 DWF (Commercial)
Minimum Self Cleansing Velocity	0.75m/s
Minimum Pipe Diameter	150mm

Table 3-2: Foul Water Drainage Design Calculations

Category	Quantity	Flow Rate	Daily Flow (l/day)	DWF (l/s)	Design Peak Flow (4.5DWF) (l/s)
Gaol Museum	192 visitors	20 l/per/day	4224*	0.049*	0.22*
	10 staff	150 l/per/day	1650*	0.019*	0.09
Total			5874	0.068	0.31

\* Value includes additional 10% for infiltration

A Pre-Connection Enquiry Form has been issued to Uisce Éireann in relation to the proposed development. On receipt of returned Confirmation of Feasibility any requirements will be adopted within the detailed design.



## 5.2 Proposed Watermain

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

The only zone where watermain connection works are required is NHCQ Zone 7, as described in the following section.

### 5.2.1 Proposed Watermain Nenagh Gaol & Courthouse/Gaol carpark (NHCQ Zone 7)

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

Table 4-1: Watermain Design Parameters

Description	Value
Gaol Musem Flow Demand	5874*
Average Demand	1.25 DWF
Peak Demand	5 DWF

\* Taken from Table 3-2 of this report.

Table 4-2: Watermain Design Calculation

Category	Quantity	Flow Rate	Daily Flow (l/day)	DWF (l/s)	Average Demand (1.25DWF) (l/s)	Peak Demand (5 Avg Demand) (l/s)
Gaol Museum			5874	0.07	0.08	0.42

On the basis of the above tables, there will be an increase in average water demand of 0.08l/s and a peak water demand of 0.42l/s from Nenagh Gaol.

It is proposed to utilize the existing watermain connection to serve the proposed development based on the above calculated demand. This feed will provide potable and firefighting water to the proposed development. A bulk water meter shall be provided at the site boundary at the location of the proposed connection to the existing watermain. The watermain layout has been designed in accordance with “Irish Water Code of Practice for Water Infrastructure”. All watermains are to be constructed in accordance with Irish Water Code of Practice and the Local Authority’s requirements. Fire coverage is to be reviewed and certified by the fire consultant. To reduce the water demand on Local Authority water supplies and to reduce the foul discharge from the development, water conservation measures will be incorporated in the sanitary facilities throughout the development, e.g. dual flush toilets, monobloc low volume push taps and waterless urinals.

A Pre-Connection Enquiry Form has been issued to Uisce Eireann in relation to the proposed development. On receipt of returned Confirmation of Feasibility any requirements will be adopted within the detailed design. Uisce Eireann will be engaged with in the event of any proposed modifications to the existing road alignments may impact access to their services to ensure their requirements are followed.

## 6 Road Design

### 6.1 Introduction

The design presented in the series of architectural and landscape architectural plans is to be detailed designed in accordance with Design Manual for Urban Roads and Streets. It will take note of and tie in at locations to the March '23 Nenagh Traffic Management Plan - One Way System granted under Section 38 of the road traffic act 1994. All designs presented have been subject to Autotrack Analysis as illustrated in Figures 6-1 to 6-4. All road designs will be subject to a Road Safety Audit process under TII requirements. Recommendations arising from the audits will be incorporated within the detailed design.

### 6.2 Banba Square (NHCQ Zone 1)

It is proposed to resurface Banba Square and geometrically realign the road and parking layouts. The design alterations will co-ordinate and tie into the proposals under the '23 Nenagh Traffic Management Plan - One Way System. It has been agreed with TCC and the designers of the scheme to introduce modifications to their design to align with the works proposed under this development. The proposed works are documented in detail on the architectural and landscape architectural plans with outline road signs and lines design shown in Figure 6-1 below.

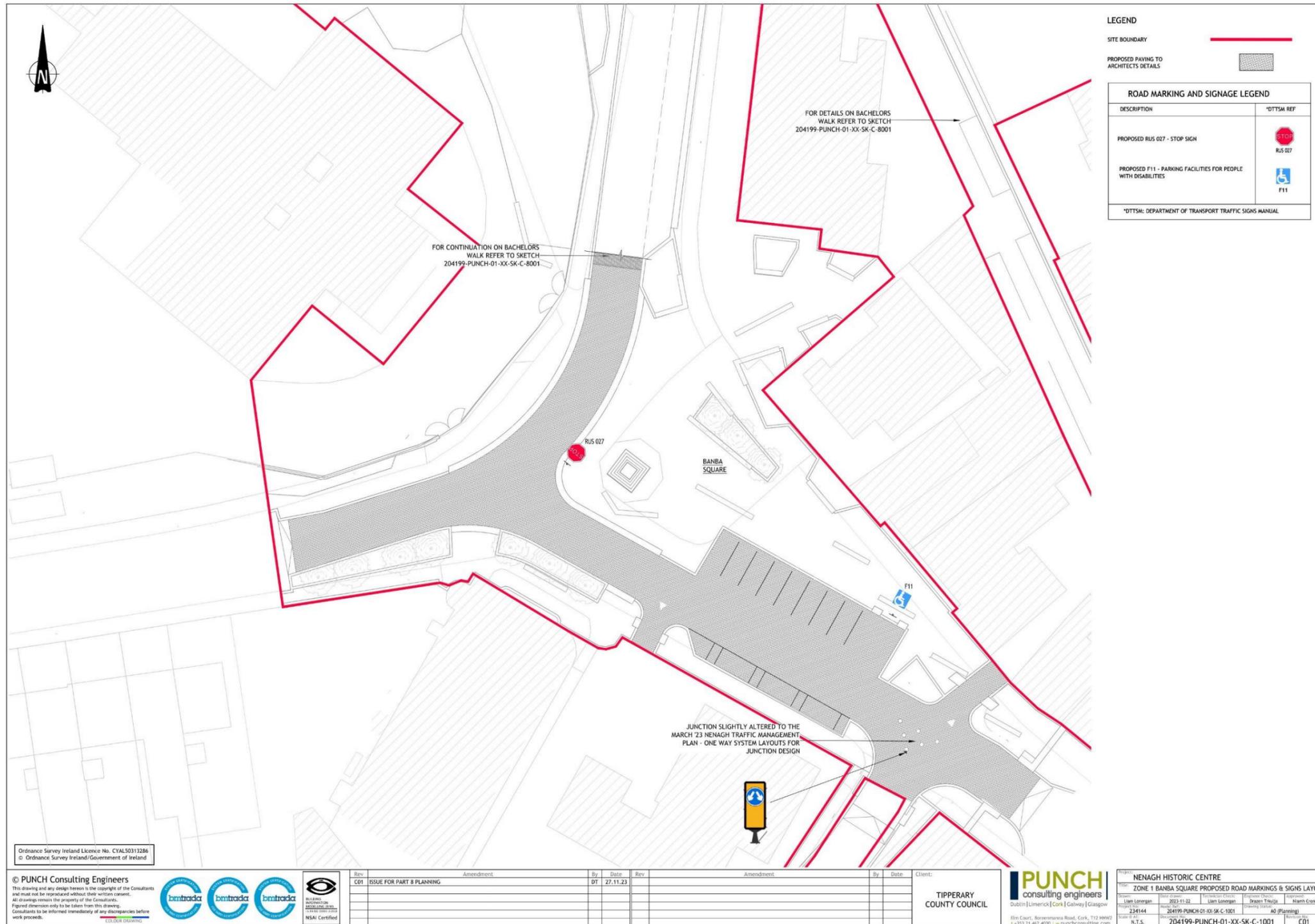


Figure 6-1: Proposed Road Design Banba Square (NHCQ Zone 1)

### 6.3 Castle Forecourt (NHCQ Zone 3)

It is proposed to resurface and regrade The Castle Forecourt, construct a pedestrian bridge that connects The Forecourt with The Castle Grounds, and adjust the parking layout, resulting in a reduction of parking numbers. The existing entrance is to be maintained with improved pedestrian entrance facilities. The proposed works are documented in detail on the architectural and landscape architectural plans with outline road signs and lines design shown in Figure 6-2 below.

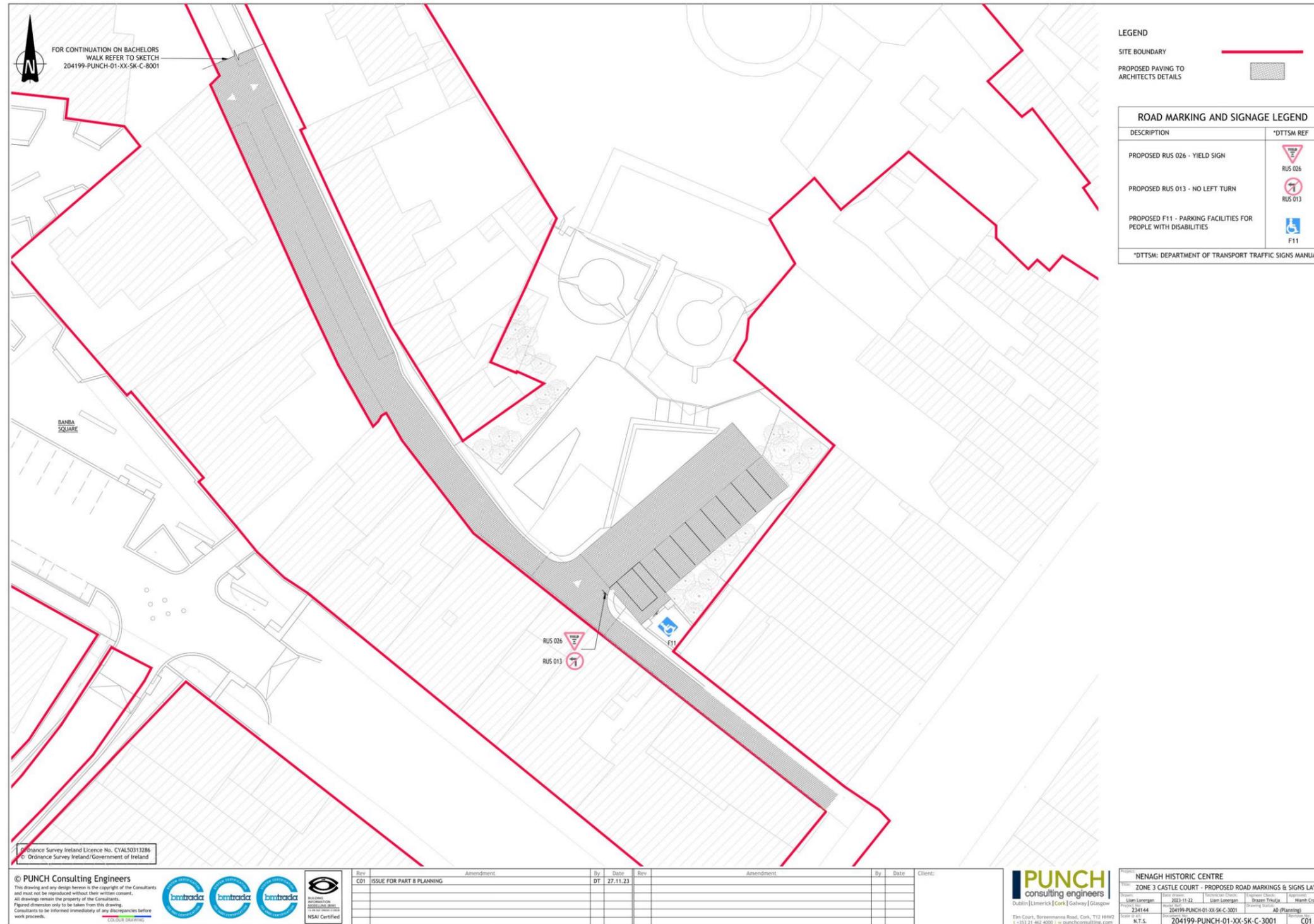


Figure 6-2: Proposed Road Design Castle Forecourt (NHCQ Zone 3)

**6.4 Nenagh Gaol & Courthouse/Gaol carpark (NHCQ Zone 7)**

It is proposed to geometrically realign the parking layout within the existing Nenagh Gaol car park. The entrance will also be modified in accordance with DMURS, and improved pedestrian connectivity is central to the development. The proposed works are documented in detail on the architectural and landscape architectural plans with outline road signs and lines design shown in Figure 6-3 below.

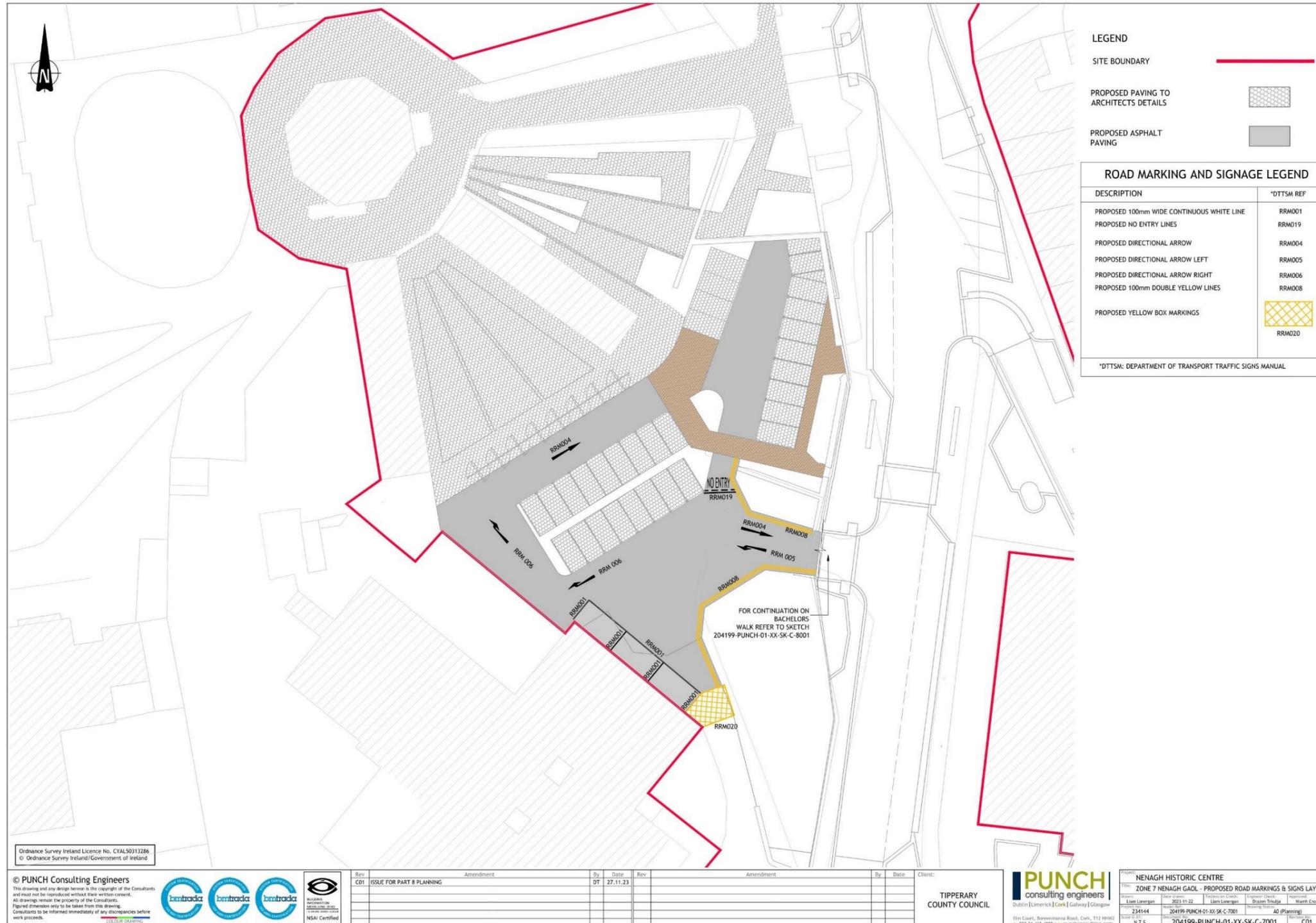


Figure 6-3: Proposed Road Design Gaol & Courthouse/Gaol carpark (NHCQ Zone 7)

### 6.5 O’Rahilly Street & Tourist Office/Former Town Hall (NHCQ Zone 8)

It is proposed to resurface Bachelor’s Walk and geometrically realign the road alignment, providing bus parking to both sides of the road and a series of improved pedestrian connectivity measures, including upgraded footpaths, crossings, and the provision of an additional crossing. The proposed works are documented in detail on the architectural and landscape architectural plans with outline road signs and lines design shown in Figure 6-4 below.

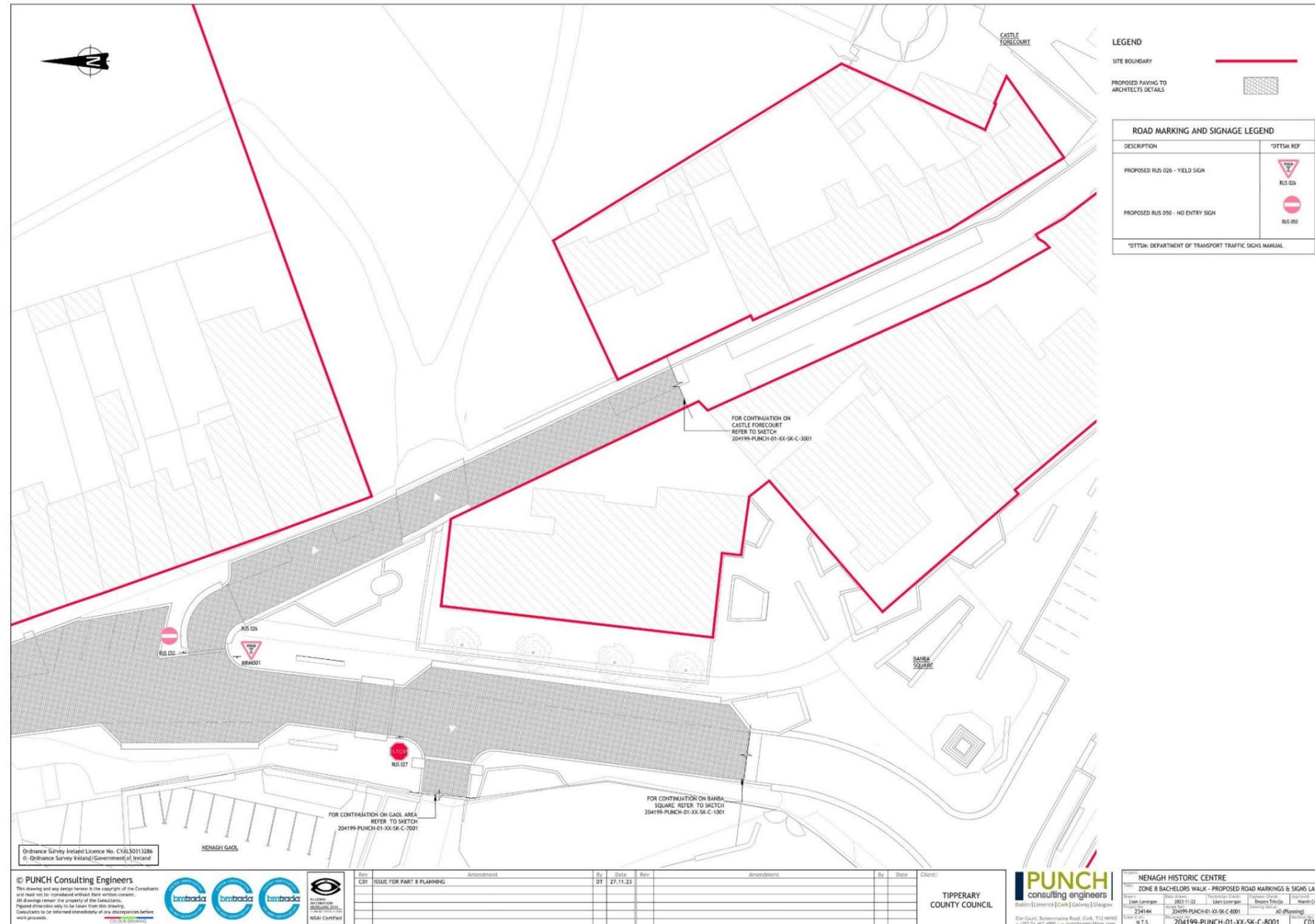


Figure 6-4: Proposed Road Design O’Rahilly Street & Tourist Office/Former Town Hall (NHCQ Zone 8)

### 6.6 Streets Upgrade - Business District footpaths (NHCQ Zone 9)

March '23 Nenagh Traffic Management Plan - One Way System granted under Section 38 of the road traffic act 1994 proposes several measures to alter the traffic flows in Nenagh. In addition, several pedestrian crossings were proposed. The proposal for Zone 9 is to upgrade the footpaths to compliment the road scheme design, ensuring co-ordinated improvements to the pedestrian connectivity for the development and the Town as a whole.