



# SLANE BYPASS & PUBLIC REALM ENHANCEMENT SCHEME

## ENVIRONMENTAL IMPACT ASSESSMENT REPORT

### Volume 1 – Non-technical Summary



Tionscaldal Éireann  
Project Ireland  
**2040**



An Roinn Iompair  
Department of Transport



Bonneagar Iompair Éireann  
Transport Infrastructure Ireland



comhairle chontae na mí  
meath county council



WESTMEATH NATIONAL ROADS OFFICE

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**Preface**

**Glossary & Acronyms**

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## PREFACE

Meath County Council (MCC), under the auspices of Transport Infrastructure Ireland (TII), are developing a bypass of Slane village to address a sub-standard section of the existing N2 National Primary Route. The scheme also encompasses traffic management measures within Slane, together with works on the N51 between the proposed bypass and the centre of the village, and proposals for the public realm in Slane village. The collective elements together make up the N2 Slane Bypass and Public Realm Enhancement Scheme – the ‘Proposed Scheme’.

MCC have appointed RPS to prepare the Environmental Impact Assessment Report (EIAR) to support the planning application for the Proposed Scheme to An Bord Pleanála.

The EIAR is laid out in four volumes, as outlined in the preface at the start of each Volume of the EIAR for clarity. The volumes and titles that make up the full EIAR are:

- **Volume 1: Non-Technical Summary**

This provides a non-technical summary of the information contained in Volumes 2, 3 and 4.

- **Volume 2: Main EIAR**

This provides general information on the Proposed Scheme and presents the environmental assessments of the Proposed Scheme on the receiving environment.

- **Volume 3: Technical Drawings**

This volume provides the technical design drawings and illustrations, including photomontages, to support Volume 2 and is specific to the Proposed Scheme.

- **Volume 4: Technical Appendices**

This volume includes technical detail and raw data referenced in Volume 2.

## VOL. 1 PREFACE AND GLOSSARY / ACRONYMS

**GLOSSARY / ACRONYMS**

<b>Term</b>	<b>Meaning</b>
AA	Appropriate Assessment
AADT	Annual Average Daily Traffic (expressed in vehicles per day)
ABP	An Bord Pleanála
ACA	Architectural Conservation Area
CFRAMS	Catchment Flood Risk Assessment and Management Study
Ch.	Chainage (measured in metres)
CIA	Cumulative Impact Assessment
CIRIA	Construction Industry Research and Information Association
CLO	Community Liaison Officer
CPO	Compulsory Purchase Order
CSO	Central Statistics Office
dB	Decibel - unit of sound pressure level, calculated as a logarithm of the intensity of sound
DMRB	Design Manual for Roads and Bridges
ECOW	Environmental Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
EMR	Eastern-Midlands Region
EOP	Environmental Operating Plan
EPA	Environmental Protection Agency
EU	European Union
GHG	Greenhouse Gas
ha	Hectare (one ha equal to 10,000 square meters)
HGV	Heavy Goods Vehicle
IAPS	Invasive Alien Plant Species
ICOMOS	International Council on Monuments and Sites
IEF	Important Ecological Feature
km	Kilometres
km/h	Kilometres per hour
LCA	Landscape Character Assessment
L <sub>den</sub>	The day-evening-night composite noise indicator adopted by the EU for the purposes of assessing overall annoyance.
LLO	Landowner Liaison Officer
LVIA	Landscape and Visual Impact Assessment
m <sup>3</sup>	Metres cubed, a measure of volume
MCA	Multi-criteria Analysis
MCC	Meath County Council
Meath CDP	Meath County Development Plan 2021-2027
N2	N2 National Primary Road
N51	N51 National Secondary Road
NIAH	National Inventory of Architectural Heritage
NIS	Natura Impact Statement
NO <sub>x</sub>	Nitrogen Oxides

## VOL. 1 PREFACE AND GLOSSARY / ACRONYMS

<b>Term</b>	<b>Meaning</b>
NRA	National Roads Authority
OPW	Office of Public Works
OUV	Outstanding Universal Value
PM	Particulate Matter
QI	Qualifying Interest (of a Special Conservation Area)
REM	Road Emissions Model
RWMP	Resource and Waste Management Plan
SAC	Special Area of Conservation
SCI	Special Conservation Interest (of a Special Protection Area)
SMR	Sites and Monuments Record
SPA	Special Protection Area
SuDS	Sustainable Drainage System
TII	Transport Infrastructure Ireland
WFD	Water Framework Directive
WHO	World Health Organization
Zol	Zone of Influence

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# **Volume 1 – Non-technical Summary**

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## VOL. 1 NON-TECHNICAL SUMMARY

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**Appendices**

Appendix 1 Scheme Drawings

# 1 INTRODUCTION

Meath County Council (MCC), under the auspices of Transport Infrastructure Ireland (TII), are developing a bypass of Slane Village to address a sub-standard section of the existing N2 National Primary Route. The scheme also encompasses public realm enhancements and traffic management measures within Slane Village, together with works on the N51 between the proposed bypass and the centre of the village. The collective elements together make up the N2 Slane Bypass and Public Realm Enhancement Scheme hereinafter referred to as the 'Proposed Scheme'.

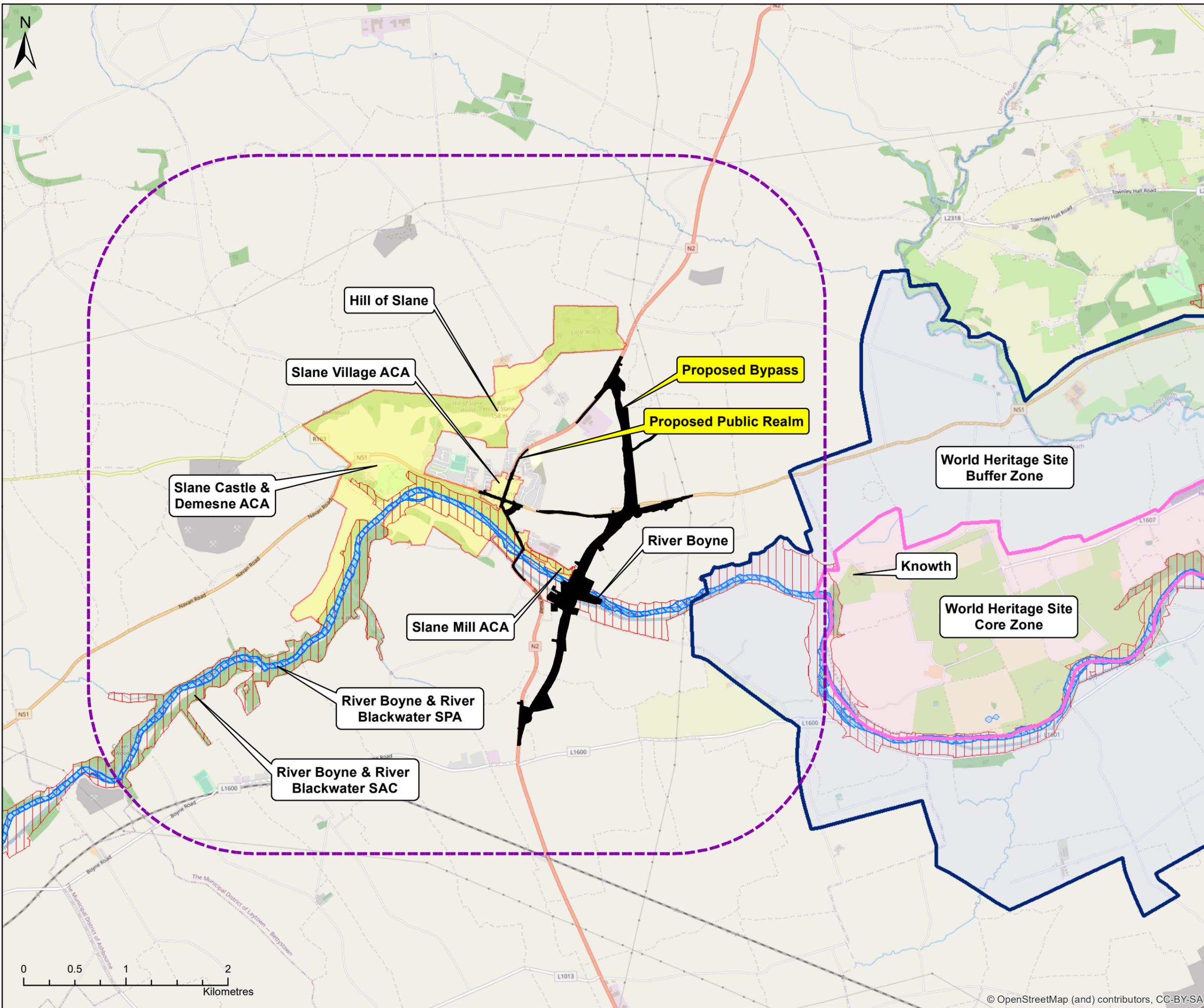
The N2 National Primary route, through its connection with the M2 at Ashbourne, connects Dublin City to the border with Northern Ireland, passing through counties Dublin, Meath, Louth and Monaghan. At the border the route becomes the A5 to Derry, passing through counties Tyrone and Derry, with links at Strabane to the N14 and N15 National Primary routes in Donegal. The N2 route forms an integral part of this important long-distance transport corridor, as well as carrying significant volumes of local traffic. The N2 runs north-south passing through Slane Village.

The N2 connects with the N51 National Secondary route in Slane Village. The N51 runs east west and connects Drogheda to Navan, and on to Mullingar and the midlands, via the N52 National secondary route at Delvin. The Proposed Scheme location in a regional context is shown in **Figure 1.1** and in the local context with key natural and built heritage features in the environs is shown in **Figure 1.2**.

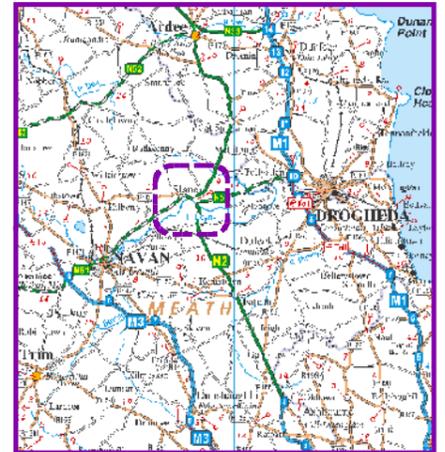
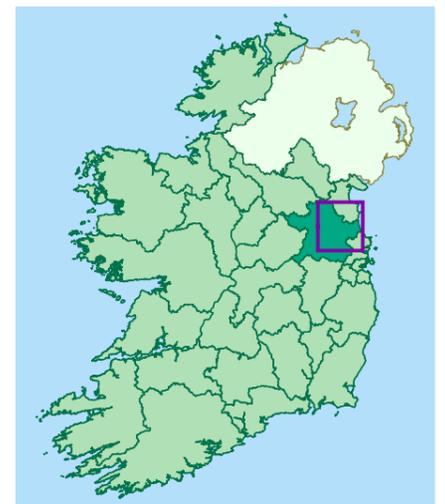
Slane Village represents a significant 'bottleneck' on the N2 corridor, and the poor quality of the road represents a potential road safety hazard. The road has a history of traffic accidents in Slane, resulting in injury, and a number of road deaths. The aim of the Proposed Scheme is to provide a high-quality alternative route for traffic which currently uses the N2 through Slane Village and thus provide greater efficiency for through traffic and provide road safety and environmental benefits to the residents of Slane. The scheme also seeks to improve the public realm within Slane Village to maximise the benefits from redistribution of traffic out of the village.



**Figure 1.1: Proposed Scheme Location in Regional Context**



**Legend**



Client **Meath County Council**

**N2 Slane Bypass and Public Realm Enhancement Scheme**

Title  
**Figure 1.2:  
Site Context of the N2 Slane Bypass and Public Realm Enhancement Scheme**

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### 1.1 EIA Requirement

The requirement for a project to be made subject to an environmental impact assessment is set by the EU Directive (85/337/EEC) as amended by Directive 97/11/EC, 2003/35/EC and 2009/31/EC on the assessment of the effects of certain public and private projects on the environment (known as the 'EIA Directive'). The amendments were codified and replaced by 2011/92/EU of the European Parliament and the Council on the assessment of the effects of certain public and private projects on the environment (and as amended in turn by Directive 2014/52/EU).

The EIA Directive requires that certain developments be assessed for likely significant effects before planning permission can be granted. An Environmental Impact Assessment Report (EIAR) must be prepared and submitted by the developer of a project under Articles 5(1) and 5(2) of the EIA Directive and must contain the information specified in Annex IV. The EIA Directive has been transposed into Irish legislation with reference to road development by the Roads Act, 1993 – 2023, as amended, and the Roads Regulations 1994 (S.I. No. 119 of 1994) as amended. Section 50 of the Roads Act, 1993 – 2023, as amended sets out the requirements for EIA as they pertain to roads development, including the content of the EIAR. The information provided in this EIAR meets these requirements.

### 1.2 EIA Guidance

The EIAR has been prepared in accordance with both the provisions of the EIA Directive and the relevant provisions of the Roads Act, 1993 – 2023, as amended, and the Roads Regulations 1994, as amended. The preparation of the EIAR has also been informed by relevant European and national EIA guidelines including the following:

- Guidelines on information to be contained in the Environmental Impact Assessment Report (EPA, 2022);
- Environmental Impact Assessment of National Road Schemes - A Practical Guide, Revision 1 (NRA/TII, November 2008);
- Advice notes on current practice in the preparation of Environmental Impact Statements (EPA, 2003);
- Advice Note seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects, published by the Planning Inspectorate, an executive agency of the Ministry of Housing, Communities and Local Government of the United Kingdom (2019);
- Guidelines for Planning Authorities and An Bord Pleanála; on carrying out Environmental Impact Assessment, (DHPLG, August 2018);
- Environmental Impact Assessment of Projects–Guidance on Scoping (Directive 2011/92/EU as amended by 2014/52/EU) (European Commission, 2017a);
- Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017b); and
- Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Commission, 1999).

Other relevant legislation and guidance has also been applied and is detailed in the relevant technical assessment chapters of this EIAR. Each environmental factor assessed in this EIAR sets out the legislative context, policy context and guidance relevant to that environmental factor. In addition to this, relevant EU directives and national legislation relating to the specialist areas have also been applied as part of the process and are addressed in each of the relevant assessment chapters contained in this EIAR.

## 1.3 Structure of the EIAR

The EIAR is divided into four volumes as follows:

- **Volume 1** – Non-Technical Summary;
- **Volume 2** – EIAR Main Report;
- **Volume 3** – Technical and Design Drawings; and
- **Volume 4** – EIAR Technical Appendices.

This EIAR has been prepared on behalf of Meath County Council by RPS with input from specialist sub-consultants, all of whom are qualified competent experts in their field.

## 2 BACKGROUND AND NEED FOR THE SCHEME

### 2.1 Background

Feasibility studies as far back as 1985 have been undertaken to address the traffic safety problems associated with Slane. The Slane Bridge Safety Measures Study was published in 2001 and this report identified three measures that could be implemented in the short, medium and long term to address the issues. The recommended short-term measures comprised segregation of Heavy Goods Vehicles (HGV) from traffic on the southbound approach to the bridge and traffic lights in the centre of Slane. The long-term solution was to provide a bypass of Slane village. Work commenced on developing a proposed bypass in 2002. An Environmental Impact Statement (EIS) and Compulsory Purchase Order (CPO) were submitted to An Bord Pleanála (ABP) for a bypass scheme in December 2009 and an oral hearing was held in 2011. An Bord Pleanála subsequently refused permission for the bypass in 2012 citing the sensitivity of the area given the rich archaeological heritage and in particular the Brú na Bóinne UNESCO World Heritage Property; the need to demonstrate alternatives including traffic management alternatives and the need to consider east – west traffic movements. Other key sensitivities in the area are also present including the European site designations of the River Boyne and River Blackwater Special Area of Conservation (SAC) and the River Boyne and River Blackwater Special Protection Area (SPA).

Following the planning outcome, MCC and TII undertook a number of studies into traffic management and alternatives. Following that, in 2017, RPS Consulting Engineers was appointed to start afresh and develop a transportation project to address the problems in Slane in accordance TII's project management guidelines and project appraisal guidelines.

A constraints study and option selection process were undertaken in accordance with TII procedures, including all relevant public consultations. The outcome of the options selection was a North-South bypass option to the east of the village, Option EG. In providing a North-South bypass solution for the N2 at Slane, the issue of residual traffic, primarily on the N51 through Slane was given further consideration. Combining the proposed bypass with traffic management measures in Slane village was considered an efficient means for safely catering for the existing traffic problems in Slane, including removal of the majority of N2 through traffic from the sub-standard N2. The final Option Selection Report was published in May 2020.

In parallel, MCC had also commenced work on a Public Realm Enhancement Strategy for Slane village (BDP for MCC, 2022). The objectives of the strategy are provided in Chapter 3 of that report, and they adhere to the relevant planning policy, vision and objectives outlined in the Meath County Development Plan. The overall vision of the Public Realm Enhancement Strategy is: *“To enhance and protect the historic character of Slane Village while providing for the needs of the local community, businesses and visitors; and, to support the village’s role as a gateway to the Boyne Valley, cultural tourism and artisan food hub in Meath.”*

Traffic management options considered as part of the route option selection process for the Slane Bypass were considered as part of a wider Slane Public Realm proposal. While the public realm considerations happened after the route options selection for the Slane Bypass, interactions were noted between the removal of HGV / through-traffic from Slane village and opportunities for public realm enhancements in the village. Consideration was therefore given to integrating elements from the public realm proposals that were dependant on traffic management improvements, into the Proposed Scheme to add value to the overall proposal for the local community involved and ensure a whole project approach was taken. The project was retitled the N2 Slane Bypass and Public Realm Enhancement Scheme and is the one for which development consent is now being sought.

### 2.2 Planning and Policy Context

#### 2.2.1 National Policy Context

The principal national policies that underpin the implementation of the N2 Slane Bypass are contained within the following plans and programmes:

- Project Ireland 2040;
- National Development Plan 2021-2030;
- National Planning Framework 2040;

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- National Investment Framework for Transport in Ireland 2021;
- National Roads 2040;
- Our Sustainable Future - A Framework for Sustainable Development for Ireland;
- Smarter Travel – A Sustainable Transport Future 2009-2020;
- Planning Land Use and Transport Outlook 2040;
- Road Safety Strategy 2021-2030;
- National Sustainable Mobility Policy and Action Plan 2022-2025;
- Spatial Planning and National Roads Guidelines for Planning Authorities 2012;
- National Cycle Manual 2013;
- Integrated Implementation Plan 2019-2024; and
- Climate Action Plan 2021.

### **2.2.2 Regional Policy Context**

- Eastern and Midland Regional Spatial & Economic Strategy 2019-2031;
- Transport Strategy for the Greater Dublin Area 2022-2042; and
- Greater Dublin Area Cycle Network Plan.

### **2.2.3 Local Policy Context**

- Meath County Development Plan 2021-2027; and
- Slane Public Realm Plan (August 2022).

## 3 CONSIDERATION OF ALTERNATIVES

A set of alternatives were considered during the evolution of the Proposed Scheme through the option selection, design and construction stages, taking into account the effects of the project on the environment. During option selection and the design stage, iterative feedback between the environmental assessment team and the engineering design team, influenced the selection of the Proposed Scheme.

The approach to consideration of alternatives has followed TII guidelines which set out a phased approach to project development, appraisal and consideration of alternatives leading to the statutory planning process. Phase 2 of the TII approach includes Constraints, Preliminary Options Appraisal and Shortlisting. Within this key phase, environmental constraints are identified and analysed, feasible options are developed and a multi-criteria analysis (MCA) is undertaken to identify initially a short list, and ultimately a preferred option, to take forward to the statutory planning process.

### 3.1.1 Option Selection Approach

Taking account of the existing constraints and the project objectives, a long list of options was developed. The options were then assessed in a two-stage assessment process before the preferred option was identified as follows:

- **Stage 1 – Preliminary Options Assessment:** A long list of options were initially assessed in relation to their effect on the three key criteria of environment, economy and engineering. This process identified the best options to bring forward to the Stage 2 appraisal. In Stage 1, an initial set of Traffic Management options were also assessed. In this way the best of the Traffic Management options were identified and brought forward for Stage 2 appraisal also.
- **Stage 2 – Project Appraisal:** The options brought forward were appraised in accordance with the Department of Transport Common Appraisal Framework and TII Project Appraisal Guidelines based on the following six Common Appraisal Framework Criteria: Economy; Safety; Environment; Accessibility & Social Inclusion; Integration; and Physical Activity.

A multi-criteria analysis was carried out on the shortlisted options. The performance of each option or alternative in meeting the scheme objectives was then categorised across five categories from Least Preferred to Preferred.

### 3.1.2 Options Considered

#### 3.1.2.1 Stage 1

As a starting point, a Do-Nothing and a Do-Minimum Option for the scheme were defined as a baseline or reference future case in which the scheme is not built and against which the alternatives could be compared. Following that and with reference to the constraints analysis, fifteen feasible preliminary bypass route option corridors, varying in length between 3.7 km and 8.2 km, were identified. In addition to bypass alternatives, and in line with TII' Guidelines, six different types of traffic management measures were also considered i.e. different ways of bringing about heavy goods vehicle (HGV) traffic reduction in Slane village and at Slane Bridge. A small number of other potential options were also identified at Stage 1 including on-line improvements on the N2; options to replace or supplement the existing Slane Bridge; and tunnel options.

In total, eight major investment bypass options, along with four Traffic Management Options were recommended for progression to Stage 2 Project Appraisal of Scheme Options. These are shown on **Figure 3.1**.

#### 3.1.2.2 Stage 2

The Stage 2 Appraisal was undertaken under the headings of Environment, Economy, Safety, Accessibility and Social Inclusion, Integration and Physical Activity. The outcome of the appraisal noted the following:

None of the traffic management options were considered an appropriate alternative to a bypass solution both in terms of achieving the required improvement of the N2 corridor or achieving the best traffic and environmental improvement within Slane village.

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The western bypass options were found to have potential for a highly negative impact on protected habitats and species which had been designated under the EU Habitats Directive and EU Birds Directive. The impact, particularly on Priority Habitats, as defined under the Habitats Directive, was a very strong indicator that less impactful options had to be considered in preference. Western options were preferred in relation to World Heritage as they were located further from the Brú na Bóinne UNESCO World Heritage Property however, Slane Castle was directly impacted by the western options. Dairy farm enterprises were generally larger land parcels on the western side of Slane and as such severance, viability, and landtake impacts were significantly more adverse for the western options compared to eastern options.

Three of the eastern bypass options (F, G and H) had the potential for direct impact on important habitats known as "Priority Habitat" within the River Boyne and River Blackwater SAC, but options E and EG did not have a direct impact. The eastern options were considered feasible from a heritage perspective, despite slight adverse impacts of moderate significance being reported on the Brú na Bóinne complex. Options E and EG were identified as slightly preferred among the eastern options owing to the distance and better screening of the proposed River Boyne bridge crossing from the monument at Knowth. Option EG was overall preferred for the eastern bypass options due to the less prominent route to the east of the Hill of Slane. The eastern options performed better under architectural heritage in general, routing away from the Slane Mills ACA while also significantly reducing traffic in Slane, which improved the setting of Slane village ACA. The eastern options impacted less on agriculture as they were generally shorter routes, impacting on fewer dairy farms than the western options.

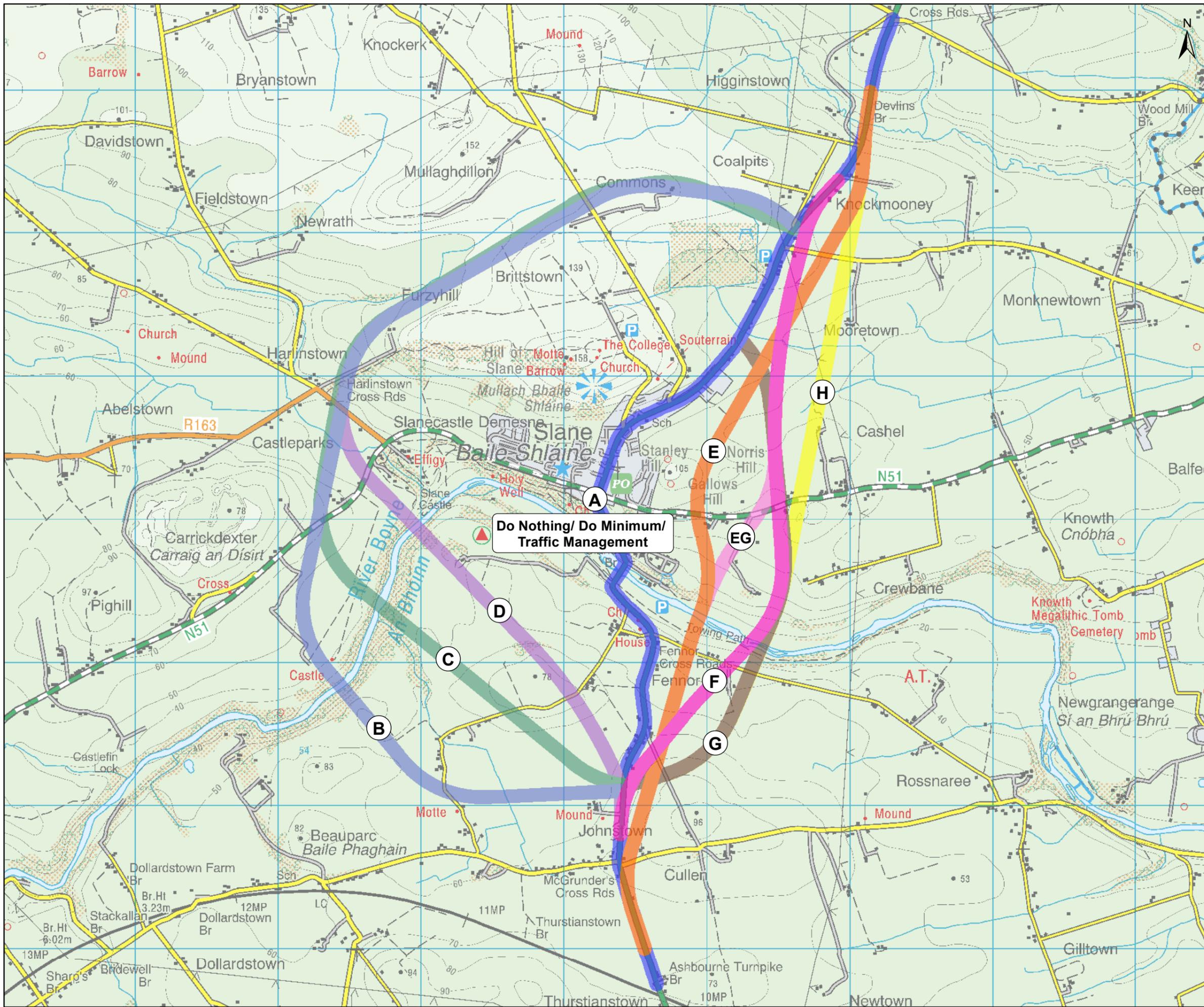
All bypass options were found to have a negative impact on landscape and visual as they all traversed designated Landscape Character Areas (LCA), would all impact on protected views and would all be visible from various dwellings. Of the bypass options, there was an overall slight preference for Option EG as it was one of the shortest routes across the landscape, was substantially in cut and was better screened from certain important views including views from Knowth and the Hill of Slane.

Generally, **economic** analysis indicated that the eastern bypass options were less costly than the western bypass options, as generally the eastern options were shorter.

The bypass options resulted in slight positive **safety** benefit, whereas the calculated benefit from the traffic management options was either negative or only very slight positive. The traffic management options were not considered long-term sustainable options from a safety perspective.

All bypass options were considered to demonstrate **integration** with national, regional and local policy however the traffic management options were assessed as poor to intermediate fit at best particularly with regard to integration with the strategic network and maximising the value of the N2.

All bypass options were also considered to perform better than traffic management options in terms of **physical activity** as they all afford more opportunities to improve cycling and pedestrian facilities within and in the environs of Slane village. The traffic management options would continue to see a significant volume of traffic passing through the village reducing opportunities to enhance active transport features. This was also relevant in terms of **accessibility**. Bypass options were considered to be slightly positive in this regard.



**Legend**

Client  
**Meath County Council**

Title  
**N2 Slane Bypass and Public Realm Enhancement Scheme**

Figure 3.1:  
**Selection of Bypass Options for Stage 2 Assessment**

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**Issue Details**

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Approved:	MN	Projection:	ITM

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### 3.1.2.3 Emerging Preferred Option

Noting the above, it was concluded that eastern bypass Option EG offered the best balance of effects and emerged as the preferred option from the consideration of alternatives process for the following reasons:

- Option EG was rated as ‘Good’ under the environment assessment criterion and was identified as preferred under the other criteria.
- Option EG offered the best balance in terms of reducing the impacts of the existing road on the human environment in Slane and minimising impacts on the wider natural and cultural environment.
- The impact on the UNESCO Brú na Bóinne World Heritage Property was somewhat mitigated with Option EG by screening views from Knowth and by being the furthest eastern bypass from the World Heritage Property.
- The proposed bridge crossing for Option EG avoids direct impact on Annex I Priority habitat and it is the preferred eastern option for landscape and visual and archaeological and cultural heritage.
- Option EG is a relatively shorter route with less landtake compared to most other options.
- Option EG was further improved through alignment adjustments that avoided direct impact on the enclosure site north of the N51, altering the N51 link road to avoid the frontage to Ledwidge Cottage and reducing severance and property impacts by completing the southern tie-in to the N2 further north.

Option EG (**Figure 3.2**) was therefore brought forward for design development and is the basis for the bypass route described in Chapter 4 Description of the Proposed Scheme.

### 3.1.3 Design Options Considered

Throughout design development, a number of discrete elements of design also warranted consideration of alternatives.

Given the sensitivities of the receiving environment for the Proposed Scheme, including the UNESCO World Heritage Property of Brú na Bóinne and the River Boyne and River Blackwater SAC and SPA, the key design options considered related to:

- The form of the Boyne Bridge crossing;
- The design of the Boyne Bridge piers;
- The design of overbridges for the scheme; and
- The design of the shared cycle and pedestrian bridge for the scheme.

An examination of the alternatives together with engineering, cost and environmental analysis under each heading was undertaken and informed the evolution of the design.

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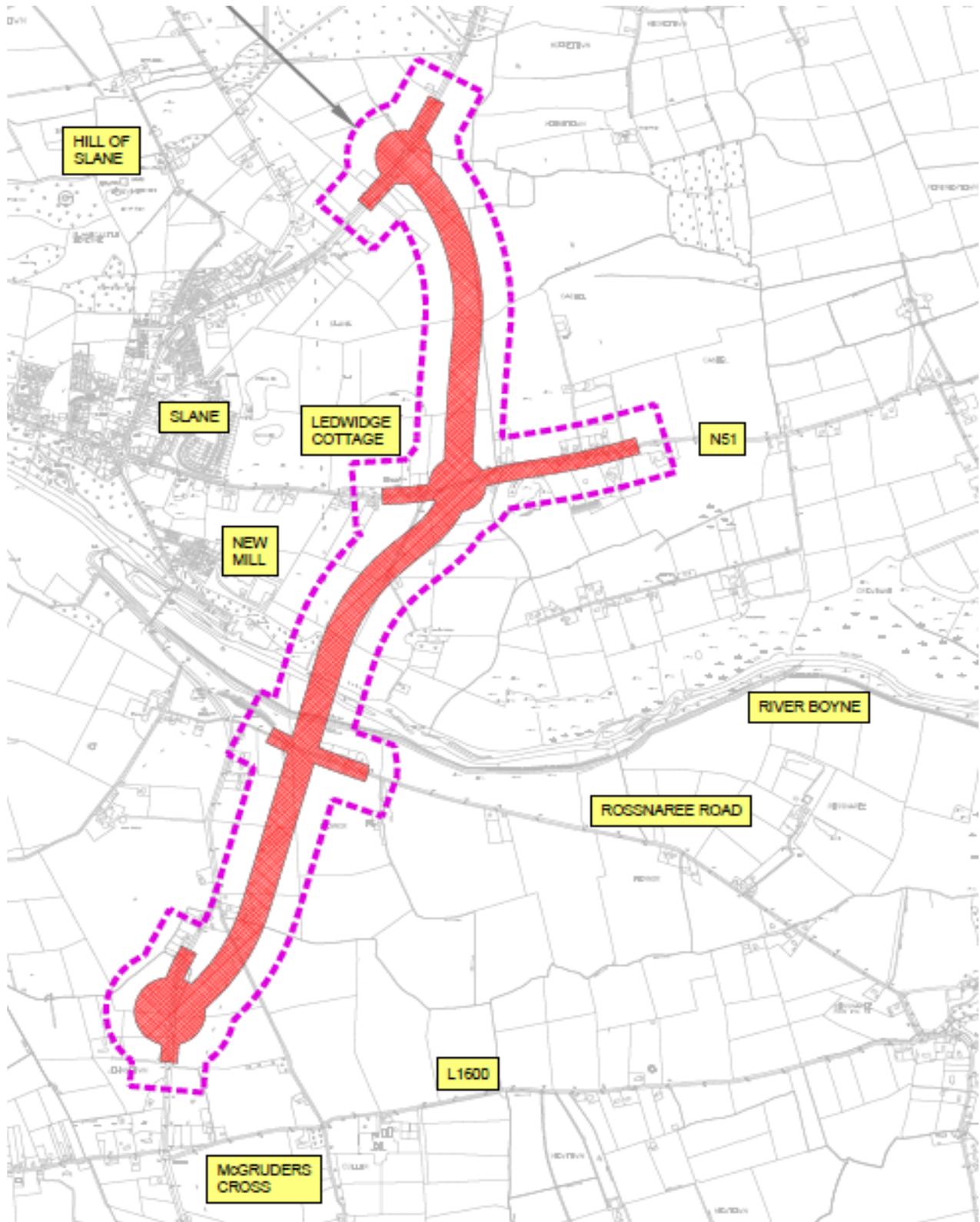


Figure 3.2 Emerging Preferred Option

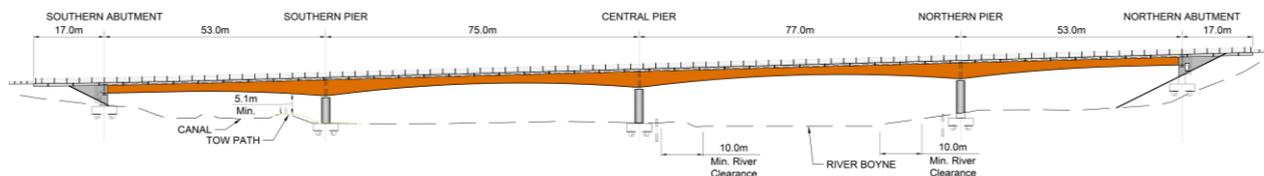
## 4 DESCRIPTION OF THE PROPOSED SCHEME

A set of scheme drawings is provided in **Appendix 1** of this Non-technical Summary to show the main features of the Proposed Scheme. The proposed N2 bypass route corridor runs to the east of Slane Village and is approximately 3.5 km in length. The proposed route diverts from the existing N2, in a north-easterly direction, from a location approximately 400 m north of McGruder's crossroads in the townland of Johnstown. It continues in a north-north easterly direction, through Fennor and Crewbane townlands in a deep cutting. The route passes under the existing Rosnaree Road, crossing the River Boyne approximately 630 m east of the existing Slane Bridge.

On the southern side of the river, the proposed bridge will span over the Boyne Canal and towpath which forms part of the Boyne Navigation. The Inland Waterways Association of Ireland (IWA) – Boyne Navigation Branch have as a primary objective the restoration of the canal. A minimum vertical clearance for canal navigation is generally required to be a minimum of 3.6 m, a minimum vertical clearance of 5.1 m to the canal towpath is also required for maintenance of the canal.

At the proposed location of the crossing the river channel is approximately 50 m wide and the flood channel is approximately 120 m wide. Setback exclusion zones of minimum 10 m width are also required from the top of both the northern and southern banks of the river to avoid hydraulic effects on river flows, as well as any disturbance to the bed of this important fisheries habitat. The minimum 10 m set-backs ensure that construction works for the piers and foundations will have no adverse impact on the river, including the risk of pollution from construction materials.

The proposed new structure comprises a four-span steel plate girder bridge made composite with a reinforced concrete deck slab as illustrated in **Figure 4.1**. The span arrangements are approximately 53 m, 75 m, 77 m and 53 m and give a total bridge length of approximately 258 m. The depth of the steel plate girders varies from 4 m at the intermediate supports to 2.15 m at mid span and the abutments. The substructure consists of cast in-situ reinforced concrete bearing shelves and columns supported by bored pile capped foundations at the piers. The abutments consist of cast in-situ reinforced concrete walls supported by bored pile foundations.



**Figure 4.1: Overview of Proposed Span Arrangement of the River Boyne Bridge**

The particular constraints of the site, the River Boyne, Boyne Navigation channel and towpath, European SAC/SPA designation of the site and the sensitivity of the area to visual intrusion, together with structural and aesthetic considerations have determined the optimal form for the bridge structure. The result is a structure with well-balanced structural form in terms of span/depth proportions, minimal footprint within the SAC/SPA and at an elevation which minimises adverse impact on the landscape and visual intrusion.

After crossing the river, the route runs in a north-easterly direction in a deep cutting until it reaches the N51. It crosses the N51 roundabout, approximately 1,300 m east of the N2/N51 junction in the centre of Slane Village. The route then proceeds northwards, passing east of Ledwidge Cottage, through the townlands of Cashel and Mooretown, before turning north-west to tie in with the existing N2, approximately 500 m north of the entrance to the Grassland Agro plant. The section from the N51 to the northern tie-in to the N2 is a combination of cut and fill.

At-grade roundabouts are proposed at each tie in with the existing N2 and at the interface with the N51.

The Proposed Scheme includes for a realignment of the N51 between the proposed bypass and the edge of the village. The purpose of the realignment is to provide consistency of cross-section, easing of existing bends, extension of the existing footway and to provide public lighting.

The improvements to the N51 between Slane village and the proposed bypass include the following:

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- Realigning the N51 route west of the N2 Bypass over approximately 820 m adopting a design speed of 60 km/h to improve the standard of the horizontal alignment. This will improve some localised sharp bends, improving visibility along the route.
- On the east side of the bypass, the N51 is realigned for approximately 600 m to remove a significantly sub-standard section of the existing route.
- The proposed traffic management measures and public realm improvements within Slane Village include:
  - Removal of traffic signals and left turn slips at the existing junction;
  - Provision of necessary signage and road markings so that the junction becomes a priority junction with the east-west N51 forming the major arms and the northern and southern approaches giving way;
  - Realignment of kerb lines to narrow the carriageway widths on approach to the junction and allow widening of the road verge and footway;
  - Provision of verge areas for suitable on-street planting;
  - Provision of raised pedestrian/ cyclist crossing ramps on each arm of the junction with signalised crossings on the N51 arms and zebra crossings on the N2 arms;
  - Enhanced pedestrian/ cyclist accessibility from the centre of Slane to the Existing River Boyne bridge and river amenity area; and
  - New off-street parking area.

With the increasing popularity of recreational cycling generally in Ireland, provision for local cycling loops incorporating the proposed bypass is proposed. The route of a local cycling loop could include the existing N2 route through the village and linking with the cycling facilities along the proposed bypass. A further route for a cycling route may be feasible using the proposed link to the existing canal tow path and linking back to the existing N2.

The concept of walking loops between the village and the bypass offers an opportunity to enhance the amenity value of the project to the local community and visitors to Slane. The Proposed Scheme includes for the provision of enhanced footway access along the existing N51 between the village and the bypass. Taking this into consideration, the provision of shared use cycle/ pedestrian facilities along the proposed bypass, linking to the existing canal tow path, presents the opportunity for an appealing pedestrian route.

An overview of the Proposed Scheme is shown on **Figure 4.2**. In summary the Proposed Scheme comprises the following main elements:

- Approximately 3.5 km of mainline N2 bypass Type 2 dual carriageway;
- Approximately 1.4 km of realigned N51 National Road;
- Reconfiguration of The Square junction in Slane, including removal of traffic light control;
- Public Realm improvement and traffic management measures in Slane village;
- Approximately 2.7 km of scheme works and maintenance access tracks;
- 3 at-grade roundabouts at N2 South, N51 and N2 North;
- 1 major bridge crossing of River Boyne
- 1 new road overbridge to allow the proposed N2 to pass under Rossnaree Road;
- 2 farm overbridges;
- 3 No. new culverts on the Mattock (Mooretown) Stream<sup>1</sup> and removal of existing culvert under existing N2;
- Provision of shared footway/cycleway facilities, including a pedestrian/cyclist link to the existing Boyne Canal towpath;

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<sup>1</sup> An upper tributary of the EPA delineated Mattock River\_030. Referred throughout EIAR as Mattock (Mooretown) Stream.

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- Utility diversions;
- Drainage system, including attenuated outfalls; and
- Landscaping and environmental mitigation measures.

Also included in the Proposed Scheme are substantial temporary works associated with the construction of the River Boyne Bridge. The Proposed Scheme includes for both the construction and decommissioning of these temporary works.

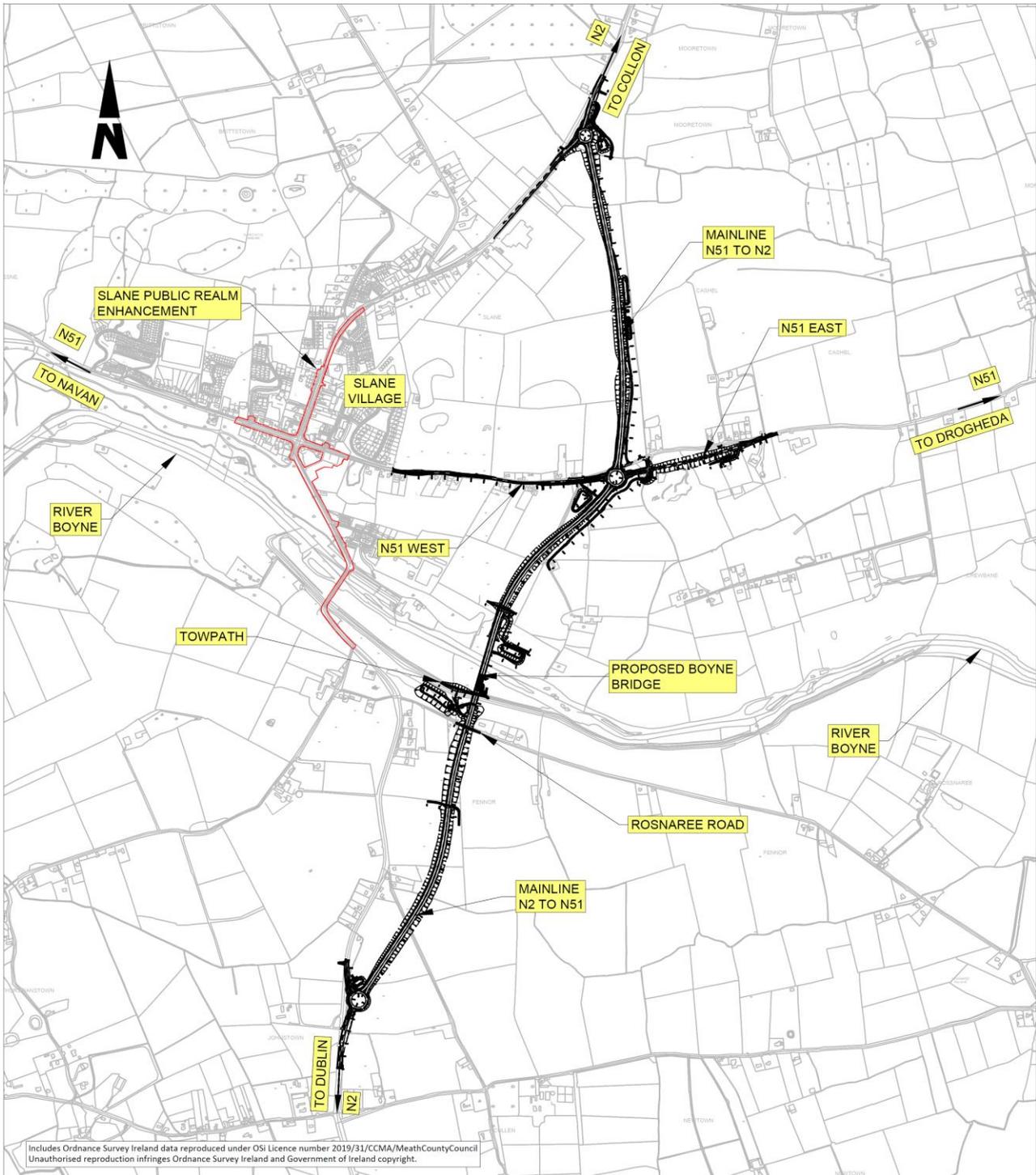
Other temporary works such as at overbridge construction locations will also be necessary as will the establishment of site compounds and other temporary areas e.g. stockpiling. The Proposed Scheme includes for both the construction and decommissioning of all these temporary works.

### 4.1 Design Measures to Offset Impact

Throughout the option selection and design processes, a number of measures were employed to help offset the impact of the Proposed Scheme; these included:

- Location of the river crossing to reduce visibility in the landscape and to avoid Annex I Habitat and Architectural Conservation Areas.
- Design of the bridge crossing to reduce visibility in the landscape – low level rather than statement bridge.
- Inclusion of a 10m setback distance from either side of the banks of the River Boyne to help preserve otter movements and eliminate any direct negative impact on the river during construction.
- Discussions with significantly impacted landowners and agricultural enterprises, and alignment adjustments where feasible and provision of suitable accommodation/ scheme works.
- Design and location to minimise visibility from World Heritage Property at Bru na Bóinne and from the monument at Knowth, in particular.
- Drainage design in accordance with the principles of SUDs to fully mitigate potential for pollution and increased flood risk.
- Design of the supporting bridge piers to have the least amount of impact in terms of footprint and in terms of visual impact.
- Design and inclusion of sympathetic Public Realm Enhancement (having regard to the overall Public Realm plan) to the Proposed Scheme to reflect and connect heritage, and to enhance the village amenity for the local and wider community.
- Design of the bridge crossing to avoid piers in the river and reduce disturbance of riverine environment.
- Acquisition of the wet field under and either side of the proposed River Boyne bridge crossing as part of biodiversity enhancement to include planting of native wet meadow species mix.

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**Figure 4.2: Outline of the Proposed N2 Slane Bypass and Public Realm Enhancement Scheme**

## 5 DECIPTON OF THE CONSTRUCTION PHASE

### 5.1 Introduction

There will be approximately 39 hectares (ha) of land permanently acquired for the construction of the Proposed Scheme, including acquisition of three occupied private dwellings, one unoccupied dwelling at the proposed northern N2 roundabout tie-in, and one derelict gate lodge on the N51. In addition, approximately 6 ha of land will be temporarily acquired to facilitate construction activities including site compounds, stockpile areas, temporary access roads and temporary works areas. The temporarily acquired land will be reinstated post construction and returned to the registered owner.

### 5.2 Pre-Construction Stage

Prior to construction, a site environmental team will be appointed including but not limited to an Environmental Clerk of Works, a Project Ecologist, and a Project Archaeologist. They will supervise works, ensure mitigation is delivered in accordance with planning permission (if received) and liaise with the corresponding Employers Representative on environmental matters.

In advance of the main contract works, a number of advanced works contracts will be required to enable the main construction; these include:

- Ground Investigation Works;
- Ecological surveys and mitigation work;
- Archaeological Surveys and testing;
- Treatment and management of non-native invasive plant species; and
- Water quality monitoring.

Other advance works will also be carried out to prepare the site for the main construction work such as fencing, site clearance, demolitions, utility diversions etc.

Four houses are included for demolition: a derelict gate lodge at N51 west approx. Ch. 700; an occupied private dwelling adjacent to the proposed bypass, approx. Ch. 825; an occupied private dwelling at N51 east approx. Ch. 75; and agricultural buildings and an uninhabited dwelling at the northern roundabout tie-in. A further occupied residential property and house is being acquired but the house will not be demolished.

Also, part of the early works on the site will be putting in place a drainage system to protect sensitive areas from damage as a result of materials like soils being washed into rivers and surrounding areas. The River Boyne is a sensitive watercourse which is designated as a European SAC site. It also contains habitats and species which depend on the quality of the water for survival. The potential sources of materials like soils are earthwork slopes, stockpiles, construction traffic and features such as ponds and ditches. To prevent/control this material being released into the watercourses, the following controls will be used: planting of exposed slopes and covering slopes in mats to reduce loss of material; dams, silt barriers and ponds as a second line of control and finally materials such as stockpiles will be located away from sensitive features and pathways that would lead to watercourses.

### 5.3 Construction Works

#### 5.3.1 Compounds and Access

One of the main features of early construction will be the set-up of the main construction compound which will provide office and welfare facilities for site construction and also an area for storage of materials. The main compound will be located north of the river at the junction of the proposed bypass and the N51. As significant construction works are required from the southern bank of the River Boyne to provide the bridge over the Boyne, a smaller second compound will also be needed and will be located just south of the Rosnaree Road and west of the proposed bypass. These compounds will be removed after the construction is completed and all materials removed from the site.

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The transport of material and people to and from the site will generate additional temporary traffic on the road network. In particular, there will be a large volume of earthworks to be removed off-site. Six access points have been identified to ensure safe and efficient movements to and from the site. These are:

- Southbound side of N2 at southern end of proposed bypass (Access 1);
- Eastbound and Westbound sides of Rossnaree Road L16002 near local road crossing of proposed bypass (Access 2 and 3);
- Eastbound and westbound sides of N51 near proposed N51 roundabout junction (Access 4 and 5); and
- Southbound side of N2 at northern end of proposed bypass (Access 6).

Works required to maintain access to lands, reinstate property boundaries, and provide ducting for services, will be completed as early as feasible in the construction programme.

### 5.3.2 Traffic Management During Construction

Traffic management on the existing road network will include the following:

- **N2:** A reduction in speed limit and appropriate warning signage will be required on the approaches to Access Points 1 and 6 as listed above. The design of N2 South and North roundabouts allows for offline construction; however, temporary traffic management will be needed for construction of the links to the existing road.
- **N51:** A reduction in speed limit and appropriate warning signage will be required on the approaches to Access Points 4 and 5. The design of N51 roundabout allows for offline construction, however, temporary traffic management will be needed for construction of the links to the existing road. The proposed works on the N51 link between the bypass and Slane village entails on-line improvement works. The majority of this work will be completed under temporary traffic management arrangements whereby the road will be maintained open, with single way shuttle systems at varying locations to enable the construction works to be completed in a safe manner. Some works, such as pavement construction may be carried out under a temporary road closure.
- **Rossnaree Road L16002:** Appropriate warning signage will likely be required on the approaches to Access Points 2 and 3. Temporary closure of the Rossnaree Road will be necessary to facilitate the construction of the mainline in the area and also the proposed Rossnaree Road overbridge. The closure is expected to last for a period of eight to nine months. Diversions via McGruder's Cross will be in place in order to maintain local access during this temporary closure.
- **Abnormal loads** are likely to deliver large plant (cranes) and bridge girders for works to be done on the north and south side of the River Boyne. The abnormal loads for the north side will be routed via the M1 and N51 for access to the site. The abnormal loads for the southside will be routed to the site access on Rosnaree Road via the N2. In both cases the loads will be subject to statutory process and management in accordance with the legislation.
- **Slane village:** The proposed public realm works within Slane village involve considerable works to reconfigure existing roads and footways. All works in the village can only take place after the proposed bypass is operational and traffic volumes will have reduced through the village. The works will be constructed with temporary traffic management arrangements in place. Works areas will be isolated using one-way shuttle systems for the most part during the construction. However, temporary road closures are also anticipated to facilitate critical works. These road closures are likely to be at night and local diversions will be in place.

Significant increases in Heavy Goods Vehicles (HGV) using the road network are expected over the 36 month construction period, particularly toward the mid-phase (around month 15) when over 500 HGV movements are anticipated per day. The majority of this additional HGV traffic will use the national road network. There is estimated to be an increase of 38 HGV accessing the centre of Slane village during construction on some days when particular activities are being carried out on site. This is primarily due to materials being brought to the site and will ultimately depend on the actual source of these materials. All earthworks removal HGV traffic will be routed to avoid any need to access through the centre of Slane.

For the purposes of this EIAR, it has been assumed that excess material resulting from earthworks will be brought to Huntstown Inert Waste Recovery Facility (Roadstone Ltd.), in Dublin and to a much lesser extent, Mullaghcrone Quarry (Roadstone Ltd), in Donore Co. Meath. The main advantage of Mullaghcrone is its

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proximity to the construction site, though it is limited by its annual authorised intake and the negative environmental impact of transporting HGV through the village of Donore. Huntstown is accessible from the N2 and has a significantly higher annual authorised intake, however the facility is approximately 40 km from the site.

### 5.3.3 Earthworks

The preferred alignment for the Proposed Scheme sets the scheme low in the landscape to reduce its impact on the sensitive heritage landscape and the World Heritage Property of Brú na Bóinne. This means much of the Proposed Scheme is in cutting (dug out). Even though some of the material to be removed can be used elsewhere on the scheme to build up slopes or new noise or landscape features there will still be a significant quantity of extra material remaining which will need to be removed from the site to a licensed facility for reuse. In total, some 520,000 m<sup>3</sup> is expected to be removed from the site. It is intended that this material will leave the site directly upon excavation. Stockpiles will be required north and south of the river to hold topsoil for later reuse in the scheme.

### 5.3.4 River Boyne Bridge

The River Boyne is a significant salmonid river. It is also part of the River Boyne and River Blackwater SAC which is a designated European site under the EU Habitats Directive. It is protected for habitats and species that include salmon, otter and alluvial forest. In addition, the River Boyne and River Blackwater is also a designated SPA under the EU Birds Directive for the common kingfisher.

The River Boyne Bridge is required to carry the proposed bypass over the River Boyne and the Boyne Canal and associated towpath. The bridge will be a four-span steel bridge with a reinforced concrete deck slab. The span arrangement is 53m, 75m, 77m and 53m gives a total bridge length of 258m.

To construct the River Boyne bridge, it will be necessary to construct considerable temporary works. These include temporary access roads and temporary working platforms to support the plant necessary to carry out the construction. Construction of these works within the boundary of the SAC will be necessary and is unavoidable. Three piers and two abutments are required for the proposed bridge.

Due to the extreme environmental sensitivity of the River Boyne, no works will be permitted within the river itself and a further zone and set-back of 10 m from the river bank will be put in place to ensure protection of otters using the river. No work will be permitted within this zone. The location of the proposed River Boyne bridge is within the floodplain of the river and the approach to construction has taken this into account as there is a likelihood that the river will flood at some point during the construction period.

Access to the south side of the river is proposed from Rossnaree Road. A temporary access road will be built. This access road will also need a temporary bridge over the Boyne Navigation Canal. Access to the north side will also require an access road. This access road will provide access for the Boyne bridge northern pier and abutment and also provide access for the construction of Attenuation Pond 3 and Farm Overbridge 3.

A series of temporary working platforms will be necessary for bridge construction. These will be located within the boundary of the ecologically sensitive River Boyne and River Blackwater SAC. A key concern is the management of contaminated or sediment-laden run-off from the working areas during their construction, operation and decommissioning. Four working platforms will be required and will be constructed using reno mattresses (**Figure 5.1**). These are stone filled platforms which reduce the risk of sediment erosion and silt deposition. They will be filled outside of the SAC to avoid any silt or sand washing out into the river. The platforms will be constructed so that machinery only operates from the platforms.

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**Figure 5.1: Example Reno Mattress<sup>2</sup>**

A structure called a cofferdam will be needed to construct the bridge piers and foundations (**Figure 5.2**). This is a watertight structure that is pumped out to allow construction to take place below the waterline. To create the cofferdam, low-noise piling machine will press sheet piles into the ground. The cofferdam will enclose the proposed excavation and further piling works stopping uncontrolled run-off from reaching the River Boyne.



**Figure 5.2: Example Cofferdam<sup>3</sup>**

The bridge will require bored pile foundations down to rock. This will require a large piling rig and crane to access each section of the valley; south of the canal, between the canal and the river and north of the river. Once these are in place the bridge deck will be lifted into place in sections by crane, operating from the temporary working platforms.

At the end of construction, the reno mattresses will be removed such that machines are always working from the platform. Decommissioning is expected to take less than one month.

<sup>2</sup> <http://gabionproducer.com/gabions/reno-mattress.html>

<sup>3</sup> [Portadam-Cofferdam-Brochure-2020.pdf](#)

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General control measures to be implemented by the appointed contractor will comprise the following:

- Machinery that can, will be returned to the site compound located outside the SAC boundary at the end of each working day.
- Machinery will be either pressure hosed or required to drive through a wheel wash to remove loose sediment and contaminants prior to entering the SAC boundary.
- Regular checks and maintenance of machinery will be carried out.
- Refuelling will not be carried out within the SAC boundary or within 50 m of a watercourse.
- Refuelling will be carried out using 110% capacity double bunded mobile bowsers. The refuelling bower will be operated by trained personnel. The bower will have spill containment equipment which the operators will be fully trained in using.
- Plant nappies or absorbent mats will be placed under refuelling point during all refuelling to absorb drips (only to occur outside of the SAC boundary).
- Mobile bowsers, tanks and drums will be stored in secure, impermeable storage area, away from drains and open water.
- Continuous weather monitoring will be carried out so as to time works within favourable weather windows, where this is feasible and also to predict when river flood events might occur. As part of this, river level gauges will be monitored with an early warning system which is triggered once the water level passes a critical threshold. In such instances, all people, plant and machinery must be removed from the platform and the cofferdams.

### 5.3.5 Other Structures

Other than the proposed River Boyne bridge, four principal structures are required on the proposed N2 Slane Bypass Scheme. These include a shared use cycle and pedestrian bridge adjacent to the mainline to link the existing Boyne Canal towpath to the shared facility (the bridge will span over the Boyne Canal and tie into the towpath) and three overbridges to carry two farm tracks and Local Road L16002 (Rosnaree Road) over the proposed N2 Slane Bypass primary route.

### 5.3.6 Public Realm Enhancement in Slane

The scheme includes for the construction of traffic management measures and public realm enhancement works within Slane village. To construct the proposed works, temporary traffic management measures including the operation of stop/go one-way shuttles will be utilised. Some night-time works are expected to be required over the construction period including road planning and paving. Road planning will be limited, where possible to a period from 19:00 – 22:00 hrs and road paving will occur primarily during night-time periods. Access to the works will be from the existing N2 and N51.

Construction activities include the removal or existing road pavement and footpaths, utility diversion, installation of new road pavements and footpaths, and construction of an off-street car park. Equipment includes excavators, dumpers, planners, rollers and pavers.

## 5.4 Environmental Management

At commencement of the project, the contractor will appoint an Environmental Clerk of Works and a Project Ecologist to ensure the proper management and delivery of all environmental mitigation for the scheme and to provide advice and support on an ongoing basis throughout the construction phase.

Construction impacts are generally of a short-term duration over the construction period and are often localised. The works will be carried out in compliance with all relevant legislation and industry best practice guidance including but not limited to the suite of TII guidance on construction of national road schemes and Construction Industry Research and Information Association (CIRIA) guidance. This relevant guidance and best practice requirements will be further detailed in the Environmental Operating Plan (EOP) which has been prepared for the scheme. This will be a live document that evolves as construction progresses, ensuring protection of the environment throughout.

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Given the sensitivity of the receiving environment, prior to starting works, the contractor will prepare an Environmental Emergency Response Plan which fully includes the mitigation requirements identified in the water and biodiversity chapters of the EIAR.

Construction noise will be kept to a minimum in accordance with industry best practice however construction noise will impact on neighbouring residences during certain activities such as piling and rock breaking. No drilling and blasting is expected. Noise levels will be monitored to make sure that levels stay within defined noise level limits.

It is unavoidable that there will be dust generated during earthworks and construction. Control measures will be implemented to reduce dust, including spraying of haul roads, use of wheel washes and regular sweeping. Monitoring of dust generation will be part of the management of construction activities.

A Resource and Waste Management Plan (RWMP) will be prepared by the contractor before construction starts to ensure that the materials and waste resulting from construction and demolition activities are managed and disposed of in compliance with the relevant legislation.

### 5.5 Construction Phase Programme

It is anticipated that there will be approximately 150 to 200 people employed on the construction site across the Proposed Scheme, rising to approximately 230 staff at peak construction. The numbers of people employed directly on the site will vary throughout the construction period as the various activities are undertaken.

Overall, the construction period is assessed to be 36 months with the proposed works on the north side of the river up to the N51 taking approximately 27 months duration and works on the south side of the river taking 33 months. One of the most important elements for the programme is considered to be the construction works around the River Boyne bridge. Key advanced site preparation works as part of an advance works contract could reduce the overall construction period from 36 months to circa 30 months.

The construction of the proposed public realm and traffic management proposals in Slane Village can only be carried out after the proposed bypass has been constructed and is open to traffic, relieving the existing traffic volumes within the village. As such, the construction of the works in Slane village, which are an integral part of the scheme are most likely to be procured under a separate construction contract undertaken after the bypass works are completed. The likely construction period for the proposed works in Slane village is estimated to be between 6 and 9 months.

The construction will include a number of stages beginning with site preparation, moving to the main excavations and construction works and finally close out. Normal working times will be 07:00 to 19:00 hours Monday to Friday and 08:00 to 16:30 hours on Saturdays. Subject to Local Authority approval, working times outside these normal hours, including Sundays, may be permitted for activities such as diversion of utilities or working on existing roads outside of peak traffic periods to avoid or minimise traffic congestion. Noisy construction activities will be avoided outside normal hours and the amount of work outside normal hours will be strictly controlled. As part of procedures to be followed to enable work outside of normal working hours, the Contractor will be required to notify affected residents in good time of upcoming planned works.

## 6 SUMMARY OF CONSULTATION

Consultation is an essential part of the EIA process. This includes not only the statutory consultation associated with the application but at pre-planning stage the early involvement of the public and other stakeholders to ensure that the views of stakeholders are taken into consideration throughout the evolution of the design and preparation of this EIAR. Stakeholder consultation has been a feature of the project development for the Proposed Scheme.

The main consultations carried out over the course of the project were undertaken at three key stages in the design process as follows:

- Consultation on the Study Area and Constraints
  - Public Consultation – 27 July 2017.
  - Other Stakeholder Consultation – 9 June to 23 June 2017.
- Consultation on the Route Selection
  - Public Consultation – 29 November 2017.
  - Other Stakeholder Consultation – 14 February 2018 to 2 March 2018.
- Consultation on the Emerging Preferred Route
  - Series of Public Consultation – 13 November 2019 to 15 November 2019.
  - Other Stakeholder Consultation – 15 November 2019 to 29 November 2019.
- EIA Scoping Consultation: Informal EIA Scoping was undertaken between 1st October and 5th November 2021. Additionally, during the EIA process, a number of meetings were held with stakeholders to inform them of aspects of the project and the assessment e.g. the National Monuments Service and International Council on Monuments and Sites (ICOMOS) Ireland. The feedback received was considered in the environmental impact assessments.
- Ongoing Landowner Liaison: Both online and on-site meetings have been held between the landowners, MCC and the Project Team to discuss the particular issues for each landowner.
- Utilities Consultation: Consultations were conducted with utilities providers from early in the process from constraints stage through to the EIA and will continue beyond this as needed.
- Public Realm Strategy: Meath County Council carried out public consultation on a draft Public Realm Strategy for Slane in January 2021. In Q1 2022, MCC published an updated draft Public Realm Plan for Slane for further public consultation that closed in February 2022.
- A public information day was held on 19 January 2023. The aim was to provide an update on scheme progress and anticipated next steps for the scheme. Members of the Project Team, both design and environmental, were present to answer questions.
- An Bord Pleanála Pre-application Consultation: Formal engagement with the Bord over four meetings between 21 September 2015 – February 2023.

## 7 TRAFFIC AND TRANSPORT

### 7.1 Introduction

The Traffic and Transport chapter identifies, describes and presents an assessment of the likely significant effects of the proposed N2 Slane Bypass and Public Realm Enhancement Scheme (the “Proposed Scheme”) on traffic and transport modes in the study area during both the construction and operational phases of the development.

The assessment considers the projected changes arising from the Proposed Scheme against a baseline in both the construction and operation phase and describes the relevance and significance of these changes in the context of current environmental guidance and policy.

The study area for the assessment relates to the areas likely to be impacted during the construction and operational phases of the proposed Scheme. A comprehensive traffic model encompassing the north-east region of the country was built using transport modelling software in accordance with standard national methodologies to provide data on the traffic impact of the Proposed Scheme under baseline and future year scenarios.

The impacts of the proposed Scheme were considered with reference to traffic effects, walking and cycling and public transport. Impacts during the construction of the proposed Scheme are also considered and described.

### 7.2 Receiving Environment

A baseline of existing traffic flows on the existing road network within the study area using traffic count data, including heavy goods vehicles was established to describe the receiving environment. The implementation of the Proposed Scheme will impact on traffic flows and journey patterns on the N2, in Slane village and across the wider road network. Additionally, the receiving environment is described in terms of walking and cycling and the provision of public transport services within Slane village.

### 7.3 Significant Impacts and Mitigation

To assess potential impacts, future year (Design Year 2041) scenarios were modelled for Do Minimum (without the Proposed Scheme) and Do Scheme (with Proposed Scheme). Future growth in accordance with TII Project Appraisal Guidelines is included in these future year scenarios. The likely significant effects of the Proposed Scheme are identified by comparisons between the Future year Do Minimum and Do Scheme scenarios.

The forecast flow on the N2 bypass of Slane is 13,610 vehicles per day annual average daily traffic (AADT) on the southern section which includes the new bridge over the river Boyne, and 11,800 vehicles per day AADT on the northern section.

The existing N2 through Slane village constitutes a significant ‘bottleneck’ on the N2 route corridor. With the proposed bypass in place, this ‘bottleneck’ is effectively removed. The wide area impact of this is to make the improved N2 corridor a more efficient and attractive route for traffic. Therefore, with the scheme in place, traffic volumes are predicted to increase on the N2 corridor. This effect is most pronounced in the vicinity of Slane, with the N2 South of the bypass predicted to gain approximately 38% additional traffic and the N2 north of the bypass predicted to increase traffic volumes by approximately 33%. This effect extends further north with the N2 south of Ardee predicted to experience approximately 12% additional traffic. The predicted changes in traffic flows on the N2 north of Ardee and south of the R150 are not significant.

Nominal change in traffic volume is predicted on the N51 west of Slane where an approximately 8% reduction in traffic volume is predicted. However, an increase of approximately 26% is predicted on the N51 between the bypass and Drogheda. This is primarily due to a predicted increase in traffic travelling towards Drogheda from the N2 Slane bypass.

Corresponding to the attraction of additional traffic to the N2 corridor is a slight reduction in traffic on the M1. This reduction is very modest in the context of the volumes of traffic utilising the M1 with the maximum reduction assessed as approximately 3% between Drogheda and Dunleer. This is significantly less than the value of 5%, below which traffic impact is not considered to be significant. The N2 Slane Bypass will not

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have an unacceptably detrimental impact on the volumes of traffic utilising the M1 and will not therefore undermine the state's investment in this key strategic national route.

There are predicted to be some increases in traffic volumes on the regional and local road network. The R163, R169 and R165 all attract slight traffic increases as the N2 route is improved. Local roads L1600, L1601 and L1610 experience slight traffic reduction. The scheme significantly reduces traffic utilising adjacent River Boyne crossing points, removing over 1,000 vehicles per day from Broadboyne Bridge near Stackallen, Obelisk Bridge near Tullyallen (which is banned to heavy vehicles) and the Mary McAleese Bridge on the M1.

The traffic impact within Slane village is significant with Chapel Street experiencing an approximately 77% decrease, including the removal of HGV traffic. Similarly, the existing N2 South of the junction in Slane experiences an approximately 88% decrease, including the removal of HGV traffic.

However, the N51 Main Street East in Slane experiences a significant increase in traffic, including an increase in HGV. An approximately 45% increase is predicted. This is primarily due to the proposed traffic management measures, which include for the substantial removal of HGV turning manoeuvres at the junction in Slane, hence north to west and south to west HGV traffic use the bypass and travel through Slane as straight through movements, minimising the adverse impact and maximising road safety and efficiency. Minimal change in traffic on the N51 Main Street West is predicted.

Notwithstanding the increase in traffic predicted on the N51 between the village and the bypass, the overall traffic volumes travelling through Slane decrease significantly with the bypass in place, which will relieve congestion and allow the existing road infrastructure to best cater for the residual traffic and allow for reallocation of road space in the village for vulnerable road users.

The proposed scheme is a multi-modal transport solution, designed to provide transport infrastructure to improve a wide range of transport needs within the study area. It addresses wider transport needs in the region, whilst locally in Slane, it improves the balance of the various travel modes and makes alternative modes more attractive to both local residents and visitors, thereby reducing vehicular trips and promoting greater modal shift to more sustainable travel modes.

The project will have a significant impact on active modes (walking and cycling) within and in the environs of Slane village. The improved walking and cycling infrastructure with the village and environs together with the removal of significant traffic volumes will promote more active travel. Providing an improved active travel link from the village to the route of the proposed River Boyne Greenway has the potential for improved active travel not just locally but regionally.

As well as improving general connectivity for bus public transport through provision of the bypass, local public transport will be facilitated by the removal of large volumes of traffic from the village, making access to bus public transport more efficient locally. The existing bus stops on the N51 to the west side of the junction are retained in the proposed design. The scheme also provides for improved bus stop facilities on the existing N2 in Slane.

The proposed Scheme will cause a slight increase in traffic locally during the construction phase. This will be to facilitate the delivery and disposal of materials as well as facilitating workers, supervisors and other visitors accessing to and from the site.

The removal of significant quantities of surplus earthworks material from the site has the potential for the most significant impact during construction. Large quantities of HGV movements are expected to be generated. The material to be removed from the site constitutes re-usable material best recycled. The most suitable recovery facilities near the construction site are accessible from the national road network and so the additional trips generated during construction will have minimal adverse impact.

## 7.4 Residual Impacts

Following opening, the proposed Scheme will provide an enhanced traffic environment with Slane village and provide a more efficient national road network.

## 8 POPULATION

### 8.1 Introduction

The Population chapter identifies, describes and presents an assessment of the likely significant effects of the proposed N2 Slane Bypass and Public Realm Enhancement Scheme (the “Proposed Scheme”) on population in the study area during both the construction and operational phases of the development.

The zone of influence (Zol) for the Population assessment extends the length of the corridor of the proposed bypass route from commencement on the existing N2 at a location approximately 1.6 km south of the existing Boyne crossing, approximately 0.4 km north of McGruder’s Cross and completes at a tie-in to the existing N2 at a location approximately 0.6 km north of the existing 50km speed limit gateway to Slane village. It also extends east-west to include the realignment of the N51 and the public realm enhancement proposals within Slane village.

The following aspects were considered in the assessment of potential effects of the Proposed Scheme on Population: residential and recreational amenity; journey characteristics; journey amenity; accessibility and community severance and economic impacts.

### 8.2 Receiving Environment

Slane is a small historic village located at a strategic bridging point on the River Boyne. The population of the village was recorded in the 2016 census as 1,369 (1,853 for the entire ED). Within the village and the immediate vicinity are a number of local shops, bars, cafes and services and a national school, health centre, churches and sports clubs. Slane Castle is located close to the banks of the River Boyne which is approximately 1 km to the west of the centre of the village. To the west of Slane Castle is the Slane Mill, a five storey cut stone building, standing on the north bank of the River Boyne beside Slane Bridge dating back to c.1765.

The former home of poet, Francis Ledwidge, now a museum is located approximately 1 km to the east of the village centre on the N51. To the north of the village rises the Hill of Slane. The hill contains a number of historic sites including the site of a Christian abbey. The River Boyne within the study area is a recreational resource with fishing and kayaking undertaken in the river.

The village is surrounded by agricultural lands with dairy, tillage and beef farming being the most prominent sectors. Located outside the village there is also one-off housing and some non-agricultural businesses.

A very significant level of traffic including HGV traffic is currently routed through Slane arising from a national primary (N2) and national secondary (N51) route passing through the village.

### 8.3 Significant Impacts and Mitigation

#### Construction Phase

Construction is expected to take in the order of 36 months on a phased basis with varied levels of activity. Construction phase effects that have potential to impact on the population within the study area comprise emissions of construction dust, noise, vibration, visual intrusion and overall impacts to amenity resulting from traffic diversions, road closures, traffic congestion and land take.

Four houses are included for demolition: a derelict gate lodge at N51 west approx. Ch. 700; an occupied private dwelling adjacent to the proposed bypass, approx. Ch. 1825; an occupied private dwelling at N51 east approx. Ch. 75; and agricultural buildings and an uninhabited dwelling at the northern roundabout tie-in. A further occupied private dwelling is being acquired but the house will not be demolished.

It is considered that the speed reductions, diversions, construction traffic generated and other impacts arising will not be of such a scale as to impact slightly on journey characteristics.

There is likely to be a negative, and slight temporary impact to journey amenity as a result of the construction of the Proposed Scheme. Accessibility and community severance impacts are considered to be temporary, negative and slight. Overall, the economic impacts are considered to be slight temporary and positive.

Mitigation measures at the construction phase include:

- Implementation of the Construction Strategy as set out in Chapter 5 of this EIAR.

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- Implementation of the mitigation measures in related chapters of the EIAR directly impacting communities which include: **Chapter 7 – Traffic and Transport, Chapter 9 – Noise and Vibration, Chapter 10 – Air Quality, Chapter 11 – Human Health, Chapter 12 – Landscape and Visual, Chapter 20 – Material Assets: Agricultural Properties, and Chapter 21 – Material Assets: Non-agricultural Properties.**
- An Environmental Operating Plan (EOP) has been prepared and is included as part of the planning application for the Proposed Scheme. The EOP contains all of the specific mitigation from the EIAR in relation to Population and shall be implemented by the appointed Contractor(s).
- A Construction Traffic Management Plan (CTMP) will be prepared by the appointed Contractor(s) to deliver the traffic and transport related mitigation measures included in this EIAR. The plan shall incorporate and elaborate on site specific delivery of the stated mitigation measures from the EIAR including temporary disruption to traffic signals, footpath access, management of pedestrian crossing points at the time of construction, provision of appropriate temporary signage to direct road users to alternative routes / car parking arrangements etc. The CTMP will detail the implementation of the mitigation measures from the EIAR to ensure disruption to economic amenities and residential properties is minimised and access is maintained along haulage routes and in vicinity of the construction site(s) for vehicles, pedestrians, cyclists, and economic operators at all times.
- The appointed Contractor(s) shall provide car and bike parking for construction staff in construction compounds.
- A Community Liaison Officer (CLO) shall be appointed by the Contractor for the construction phase of the Proposed Scheme to facilitate communication between the Contractor and stakeholders and members of the public. Contact details (email, phone) for the CLO shall be included in the EOP for the Proposed Scheme and on the project website. The CLO shall be involved throughout construction on all aspects of community engagement.
- A Community Liaison Plan shall be prepared by the CLO prior to construction and shall be updated regularly. The Community Liaison Plan will specify obligations in relation to community and stakeholder engagement that the Contractor must adhere to. Where communications are related to environmental issues, the Environmental Clerk of Works shall be involved, if appropriate.
- The plan shall include:
  - Details of how the local community, road users and affected residents shall be notified in advance of the scheduling of major works, the temporary traffic diversions, bridge and road closures and the progress of the construction works.
  - Details of the available communication channels/points of contact for members of the public to contact the project team during construction shall be established in advance of the commencement of construction.
  - The contact details for the Community Liaison Officer (CLO) shall be posted on all construction site notice boards and on any other information or correspondence, which may be distributed from time to time.
- A significant part of the plan is the ‘good neighbour’ policy. Key aspects of this policy include:
  - Implementation of the policy from the commencement of construction;
  - Providing a point of contact for queries and complaints;
  - Minimising causes of nuisance;
  - Maintaining access to neighbouring premises;
  - Clear and concise information distributed widely and updated frequently; and
  - Undertaking timely liaison with stakeholders.
- Details of general construction process/phasing will be communicated to the relevant stakeholders prior to implementation to ensure local residents and businesses are fully informed of the nature and duration of construction.

### Operational Phase

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The impact of the Proposed Scheme on residential and recreational amenity is positive, permanent and very significant arising chiefly from the reduction in traffic and enhanced public realm within the village centre and also enhanced cycle facilities and access to the River Boyne.

The Proposed Scheme will have a moderate permanent positive impact on journey characteristics through enhanced regional journey times and journey time reliability.

The Proposed Scheme will present overall a very significant permanent positive impact on journey amenity due to improved horizontal and vertical alignment on the N2 and enhanced facilities within the village centre.

Overall, the transfer of a significant volume of traffic away from the centre of Slane and the enhanced new vehicular route along with the upgraded public realm and pedestrian/cycle routes will result in a significant, permanent positive impact on accessibility for people living within the study area.

The reduced journey time and improved journey time reliability will have a significant, positive and permanent impact on economic activity.

Mitigation measures during the operational phase include:

- Dedicated signage will be provided in accordance with the Department of Transport Traffic Signs Manual, 2019; and.
- Existing direct accesses to private properties shall be maintained wherever possible. Where modification/ removal of a direct access is required, a new access shall be provided to a similar standard as the existing access.

## 8.4 Residual Impacts

The residual impacts of the Proposed Scheme on the receiving environment will be broadly positive, permanent and long term as follows:

- There will be a very significant permanent positive residual impact on residential and recreational amenity through the long-term reduction in traffic in the centre of Slane and the enhanced public realm in the village centre.
- There will be a moderate positive residual impact on journey characteristics by reducing journey time and improving journey time reliability on the N2 and N51 in the region in both opening and design years.
- There will be a very significant permanent positive residual effect on journey amenity through an enhanced horizontal and vertical alignment on the N2 and public realm enhancements within Slane which particularly benefit cyclists and pedestrians.
- There will be a significant positive permanent residual impact on severance and accessibility as journey times on the N2 in the region are reduced and traffic volumes and resultant severance in the village centre are reduced.
- The Proposed Scheme will provide a significant positive residual impact on economic activity through reducing journey time and improving journey time reliability on the N2 in the region delivering and promoting trade and commerce in the village centre by reducing through traffic, notwithstanding some reduction in passing trade and creating an enhanced public realm.

## 9 NOISE AND VIBRATION

### 9.1 Introduction

The Noise and Vibration chapter identifies, describes and presents an assessment of the likely significant effects of the proposed N2 Slane Bypass and Public Realm Enhancement Scheme (the “Proposed Scheme”) on sensitive receptors in the vicinity of the proposed project during the construction and operational phases. The assessment includes noise and vibration sensitive receptors along the proposed bypass as well as at sensitive receptors adjacent to existing roads in proximity to the proposed route where traffic flows are reduced by 20% or increased by 25%.

### 9.2 Receiving Environment

The study area for the Proposed Scheme is located in a rural setting and includes the village of Slane. The existing noise environment comprises of traffic noise and distant traffic noise from the N2, N51 and local roads. At rural locations noise from farming activity and livestock is present.

The study area for the noise and vibration impact assessment is predominantly focused on areas likely to be affected by the proposed road scheme. The NRA Guidelines (2004) recognise this to include noise and vibration sensitive receptors within 300 m of the road centrelines and noise and vibration sensitive receptors adjacent to existing roads in proximity to the Proposed Scheme. It also includes locations adjacent to roads where traffic flows are reduced by 20% or more, and where existing flows are increased by 25% or more as a result of the Proposed Scheme.

For the purposes of this scheme, the Brú na Bóinne UNESCO World Heritage Property has been considered as noise and vibration sensitive receptors and the environmental noise conditions at these sites were considered as part of the study.

A total of 1,391 receptors were considered in the noise model including residential receptors, schools, places of worship, hotels and B&Bs, commercial premises etc.

### 9.3 Significant Impacts and Mitigation

Short-term increases in noise impacts will occur during the construction phase of the road works due to the requirement to use heavy plant and machinery. The assessment has determined that the noise from construction works will generally be below the TII construction noise limit of 70 dB  $L_{Aeq,1hr}$  at the nearest noise sensitive location. However, there are occasions when the plant is in proximity to the noise sensitive receptors when predicted noise impact will be greater than the noise limits and may result in a temporary significant adverse effect at those noise sensitive locations.

A range of mitigation measures are proposed to mitigate the noise impact including the implementation of best practice noise control measures, controlling hours of operation, scheduling of works, application of construction noise limits and noise monitoring during construction activities with the greatest impact.

Construction vibration from the Proposed Scheme arise from pile driving, rock breaking, rolling and compaction and use of heavy construction equipment close to sensitive properties. Vibration impacts during the construction phase will be controlled using working methods that minimise vibration generation and adherence to vibration limit values which will be subject to monitoring at the nearest sensitive buildings during construction activities with the greatest impact.

During the operational phase, the Proposed Scheme will divert traffic from higher population areas on the N2 in Slane village and surrounds. However, noise levels are expected to increase on N51 given the increased number of vehicles travelling along the N51. An overall positive impact is predicted as the number of noise sensitive locations with predicted noise levels greater than NRA design goal of 60 dB  $L_{den}$  will reduce. However, the Proposed Scheme will result in a negative impact at some noise sensitive locations with sixteen noise sensitive locations having been identified as meeting the NRA/TII criteria for mitigation.

To reduce road traffic noise for as many properties as possible, all newly constructed roads were modelled as low noise road surfaces. Even with a low noise road surface installed on the Proposed Scheme, the requirement for further mitigation was identified and mitigation measures in the form of noise barrier/bunds, traffic calming measures including speed limit restrictions will be implemented. However, even with these

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measures in place, the predicted noise levels will remain above the design goal/Do-Minimum noise level at eleven noise sensitive locations in the opening year and design year.

Reducing traffic noise levels to at or below 60dB  $L_{den}$  and/or below the Do-Minimum noise levels at these properties would require substantial additional mitigation over and above those already proposed in order to achieve an insignificant change to the overall noise level at a property. The application of these additional measures is not considered practical at ten of the receptor locations for a combination of health and safety, proximity and visual concerns which would give rise to unsustainable conditions in order to achieve an imperceptible reduction in noise level.

### 9.4 Residual Impacts

With the implementation of the construction stage mitigation measures outlined alongside continuous noise and vibration monitoring during the construction phase 'short-term moderate adverse' residual impacts will be experienced for some noise sensitive locations in close proximity to the works. However, there is potential for 'temporary significant adverse' residual impacts for some noise sensitive locations during periods of high intensity work in close proximity to the noise sensitive locations.

No significant residual vibration impacts are predicted as a result of construction activities and construction traffic. However, construction works on the N51 and public realm works are likely to result in a brief moderate adverse effect.

Similarly for the operational phase, a limited number of properties will experience a residual noise impact as a result of the Proposed Scheme, despite the application of a structured approach through the consideration of various mitigation measures.

With mitigation measures in place, the Proposed Scheme will result in a positive aggregate residual impact under the Environmental Noise Directive Noise Mapping and the DMRB impact rating. This will result in beneficial environmental and health effects on the general population in the study area.

## 10 AIR QUALITY

### 10.1 Introduction

The Air Quality chapter identifies, describes and presents an assessment of the likely significant effects of the proposed N2 Slane Bypass and Public Realm Enhancement Scheme (the “Proposed Scheme”) on air quality in the vicinity of the proposed project during the construction and operational phases.

The impact assessment methodology used is as set out in Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document (TII, 2022a); Air Quality Assessment of Proposed National Roads - Standard (TII, 2022b); and Road Emissions Model (REM): Model Development Report (TII, 2022c).

### 10.2 Receiving Environment

Baseline air quality data was derived from the EPA monitoring network to establish the current levels of air quality within the country using data from areas similar to the Slane area. This has been supplemented with a series of baseline surveys undertaken both within the village of Slane and along the corridor of the Proposed Scheme. As expected, the results of the baseline survey indicate higher levels of pollution within Slane village as a result of traffic congestion, relative to areas outside of the village which are more typical of rural Ireland.

Baseline data trends have been used to establish compliance with European Union wide ambient air quality limits and health guidelines reported by the World Health Organisation. All baseline results are within both the limits and the health guidelines with the exception of the following:

- Site specific monitoring of nitrogen dioxide in Slane village shows levels above the WHO health guideline. The principal source of this pollutant is from road traffic; and.
- National monitoring of fine particulate matter indicates background levels in rural Ireland that are above the WHO guideline.

The study also identified the human and natural resources that will potentially be exposed to air quality impact from the Proposed Scheme. A total of 38 properties are located within 50 m from the centreline of the proposed bypass route and N51 road improvements (this is the distance within which the greatest air quality impacts will be experienced) with 28 of these properties being residential. For the natural environment, the River Boyne and River Blackwater SAC and SPA will be crossed by the Proposed Scheme and is also considered a sensitive receptor.

### 10.3 Significant Impacts and Mitigation

The construction stage of the Proposed Scheme has the potential to generate dust emissions. The potential quantity of dust emissions will depend on the type of construction activity being carried out.

The magnitude of risk of dust impacts arising from the Proposed Scheme is used to prescribe the level of site-specific mitigation required for each activity to prevent significant impacts occurring. The scale of the works on the main alignment constitutes a high dust risk requiring mitigation while the proximity of the works on the Public Realm to sensitive receptors also classifies these works as high risk and requiring mitigation. All other compounds are medium risk but will require some levels of mitigation. The impacts associated with construction phase dust emissions are considered short term slight to moderate adverse impacts without mitigation and therefore a series of best practice mitigation is presented within the chapter to mitigate these impacts.

A large quantity of earthworks material will be removed from the site and transported to a suitable location for recovery. Construction traffic can impact directly on local air quality generally and on any sensitive receptors that are located adjacent to the road networks being used during construction. The significance of air quality impacts due to vehicle emissions during the construction phase is dependent on the number of additional vehicle movements, the proportion of HGV and the proximity of sensitive receptors to site access routes. Construction traffic is predicted to result in a moderate adverse impact on air quality for the duration of material haulage for properties located along the designated haul routes.

The full list of construction mobile and fixed plant for each of the phases on the mainline, main bridge over the Boyne, other overbridges and the public realm have been compiled to assess the potential for air quality

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impact. The resultant emissions from diesel use during the construction phase are considered to result in a minor adverse impact on air quality.

During the operational phase of the Proposed Scheme, the changes to the road network, volumes of traffic and speeds will give a direct air quality impact. Projected traffic figures associated with the Proposed Scheme at key junctions and links as identified in the traffic and transport assessment were used to predict the concentrations of traffic-derived pollutants in future years. The results show that implementing the Proposed Scheme, concentrations of traffic pollutants are predicted to increase at properties adjacent to the proposed route corridor. Pollutant concentrations are predicted to decrease in Slane village as the proposed route diverts traffic away from this more densely populated area.

The proposed route traverses the River Boyne and River Blackwater and is in the vicinity of a number of other natural heritage areas. Alkaline fens were identified as the qualifying interest for the River Boyne and River Blackwater SAC and would have sensitivity to nitrogen deposition from road traffic however it is noted alkaline fen habitat was not identified within the footprint of the Proposed Scheme (see the accompanying Natura Impact Statement for further details of the qualifying interests of the River Boyne and River Blackwater SAC). This analysis indicates that the levels of nitrogen deposition are low with the proposed road project in operation. This low level of nitrogen deposition also applies to other sensitive habitats that are adjacent to the route but are qualifying interests for the European site.

### 10.4 Residual Impacts

With the implementation of the dust mitigation measures outlined in the chapter alongside monthly dust monitoring during the construction phase, the residual impact to the properties within 100 m of the proposed work areas (mainline works, construction compounds and stockpile areas) is predicted to be slight adverse. The residual impact on dwellings > 100 m from the proposed works is considered imperceptible.

Construction traffic on the proposed haul routes is predicted to have a moderate adverse impact on air quality for properties adjacent to the haul route for the short-term duration of material haulage.

The residual air quality impact from diesel use in mobile plant during the construction phase are considered a minor adverse impact in the short term.

The Proposed Scheme will lead to a net positive long term air quality impact for circa 84 properties that are currently located within 50 metres of the existing N2. For properties north/south of the offline alignment, on the N51 and on the proposed offline section the potential impact on air quality ranges from negligible to substantial adverse depending on the receptor and pollutant.

## 11 HUMAN HEALTH

### 11.1 Introduction

This chapter uses the World Health Organization (WHO) definition of health, which states that health is a “*state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity*”. The chapter also uses the WHO definition for mental health as a “*state in which every individual realises his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community*”.

The methodology for assessing human health as part of EIA follows best practice. The methods follow the general EIA guidelines set out by the EPA and the specifics of considering health in the context of EIA set out by the Institute of Public Health (IPH). The assessment provides reasoned conclusions for the identification and assessment of any likely significant effects of the proposed development on population health. Regard is given to physical health, mental health and health inequalities, across a broad range of determinants of health.

The health assessment looks at the potential effects for both the general population and for vulnerable groups. Vulnerability relates to experiencing effects differently due to age, income level, health status, degree of social disadvantage or the ability to access services or resources. The health assessment considers localised effects close to the proposed development activities, referencing particularly affected communities. The assessment also considers the wider effects at the regional and national level.

The health assessment is informed by the findings of other EIA chapters, including traffic and transport; population; noise and vibration; air quality; and landscape and visual. The health assessment has also been informed by a review of relevant public health evidence sources, including scientific literature, baseline data, health policy, local health priorities and health protection standards.

### 11.2 Receiving Environment

Overall, currently available physical health statistics for Slane ED and County Meath show they perform better than national averages. There is a higher proportion of people reporting good health, and mortality rates for all causes, cancer, circulatory diseases, and respiratory diseases are all consistently lower than national levels.

Deprivation levels in the study area are relatively low, with 5 out of the 7 Small Areas which make up the Slane ED being classified as "Marginally Above Average". However, one Small Area is classified as "Disadvantaged", and the overall deprivation of Slane ED is classified as "Marginally Below Average".

### 11.3 Significant Impacts and Mitigation

The effects on healthy lifestyles, including active travel and physical activity, are considered, as these are important determinants of physical and mental health. This includes disruption to active travel routes during construction, for which a not significant minor adverse effect is identified. At operational stage, the introduction of improved active travel infrastructure is predicted to result in a significant moderate beneficial population health effect.

Good quality employment and levels of income are strong predictors of health, including for dependants. Dependants include vulnerable groups such as children, the frail elderly and people with long-term health conditions that require high levels of care. The assessment considers how the proposed development affects employment and income generating opportunities, and what influence this may have on population health. During construction, not significant minor beneficial effects are expected.

Changes to local air quality (road traffic emissions and potential dust nuisance) and related health effects have been considered. The predicted increases in traffic along haul routes during construction will be less than 10% of existing traffic, and road traffic emissions and potential dust nuisance along the haul routes will be well below limits set to be protective of the environment and human health. A comprehensive set of mitigation measures and dust monitoring will be implemented during the construction phase to minimise construction dust impacts. The assessment identifies the potential for a minor adverse effect during construction. During operation, the redistribution of air quality away from the local population centre of Slane is considered minor beneficial overall and not significant. The latter reflects the potential for benefits of less

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traffic, including HGV, and less congestion within the bypassed community, improving air quality in the village which has a higher population density.

Changes in noise exposure are discussed, particularly night-time noise that may be detrimental to population health, as construction noise is likely to exceed limits at a small number of residential properties that are located closest to the construction compounds and mainline N2/N51 works, resulting in temporary significant effects. The assessment concludes that during construction, the effects from noise are considered to result in a minor adverse and not significant effect on population health, however noting that effects will be localised and temporary. During operation, following implementation of the noise mitigation, predicted increases in noise at the majority of sensitive locations are within statutory thresholds set for the protection of health and the environment, however four receptors are anticipated to experience a significant change in noise. Overall, at a population level, it is considered to result in a minor beneficial effect on population health.

Changes in local transport nature and flow rates are considered, particularly in relation to the Proposed Scheme's benefits to road safety. Other considerations include the influence on journey times that may affect routine or emergency healthcare access. During operation, a moderate beneficial and significant effect is predicted due to the widespread improvements to road safety and journey times from the new transport infrastructure.

The potential for changes in community cohesion and social capital within affected communities due to being either bypassed or being closer to the new road alignment are considered. Community identity is a determinant of wellbeing and is influenced by aesthetic elements of the landscape amenity, as well as by the dominance of road traffic in public spaces. Such effects relate to the operational stage only, where the conclusion is that effects would range from minor adverse, through to negligible and up to moderate beneficial. This conclusion reflects the subjective nature of people's responses to the changes and the expectation of a wide range of views amongst the public.

No additional mitigation to that proposed under the relevant factors of air, noise, traffic etc. are required. Enhancement of active travel routes within Slane by MCC to maximise active transport are supported.

### 11.4 Residual Impacts

No residual impacts are anticipated for the construction phase or the operational phase, as impacts remain the same as those discussed above. For noise, it is noted that the mitigation relates to individual level effects rather than population level effects. This is good practice, supports equity, and is consistent with the assessment conclusions for population health.

## 12 LANDSCAPE AND VISUAL

### 12.1 Introduction

A Landscape and Visual Impact Assessment (LVIA) has been completed to identify and determine the effects on landscape character, landscape features, visual receptors and visual amenity as a result of works during the construction and operational phases of the Proposed Scheme.

The methodology for the LVIA associated with the EIAR follows the process outlined in the Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) for Specified Linear Infrastructure Projects: Overarching Technical Document (TII 2020); and Technical Guidance Note 06/19 Visual Representation of Development Proposals (The Landscape Institute, 2019).

### 12.2 Receiving Environment

The existing environment, associated with the Mainline Bypass section of the Proposed Scheme includes lands lying between Littlewood Forest to the north of the Mainline Bypass roundabout and McGruder's crossroads, which lies to the south of the southern connection roundabout associated with the Proposed Scheme to the south. The landscape associated with the mainline bypass and its wider environs is comprised of the village of Slane, the Hill of Slane and associated rolling hills, and the steep river valley associated with the River Boyne. The visual amenity of this area is extremely valuable both socially and economically and is potentially the most significant and highly valued landscape in County Meath as it contains the Brú na Bóinne World Heritage Property. The western edge of the buffer zone associated with the World Heritage Property is located approximately 2 km east of Slane village and the proposed mainline bypass is located approximately 950 m to the west of the western edge of the buffer zone of the World Heritage Property.

Land cover associated with the mainline bypass is largely comprised of pastoral and arable agricultural land use, with a diverse variety of field sizes and patterns. Field patterns to the north-east of Slane are predominantly large scale, associated with larger scale farms, with field boundaries generally well defined by mixed species hedgerows of varying quality. In many places these hedgerows have become degraded, have developed gaps, become overgrown or over-mature, so that only lines of trees remain without hedgerow species to connect them. In other instances, gorse has been allowed to form hedgerows, changing the appearance of the generally well managed estate farmland.

Tree cover forms a strong element of the landscape, particularly to the north of Slane and generally consists of lines of hedgerow trees dividing large fields. Scattered copses of Beech and mixed-species woodland are often located on the tops or elevated slopes and were planted during the 18th century as hunting woodlands. They provide a strong sense of enclosure and provide a textural contrast to the otherwise open landscape. The Hill of Slane is prominent by virtue of a ruined abbey which also acts as a prominent local landmark to the north of Slane village.

The River Boyne and associated valley runs from the south-west corner of Meath through Trim, Navan, Slane and Drogheda. It is enclosed and well wooded along much of its length, particularly to the south and west of Slane. Views of the river are afforded from around Slane where the river can be seen cutting through a large flat-bottomed valley, the river corridor near the Brú na Bóinne area forms part of the World Heritage Property.

To the south of the River Boyne the landscape is comprised of a series of rolling drumlins. Thick hedgerows, with scattered coniferous plantations and shelterbelts of deciduous trees separate medium to large scale fields. Deep roadside drainage ditches and banked hedgerows are a common feature of the landscape in the enclosed rural road corridors.

The most noteworthy views towards Slane from the Boyne valley are from the southern bank of the river and from the existing N2, which forms an important approach to the town. Elements contained within available views include Slane Bridge, the Boyne Navigation Canal, the southern demesne entrance to Slane Castle (Gothic Gate), Mill Hill with stone terrace houses, the elevations of the houses fronting the Square (forming the southern entrance to the village), the plantations of Slane Castle demesne, and the church tower to the west end of the village. The view of the rear elevation of the south-eastern house on the Square forms a distinct architectural element as it is the first glimpse perceived of the historical fabric of the village from the uphill southern approach from the existing N2. The existing traffic gantries on Mill Hill are a visual distraction on available views when approaching Slane from the south.

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Other visual detractors include the overhead pylon line which crosses east to west across the central portion of the study area, and the Roadstone Quarry at Carrickdexter to the west of Slane adjacent to the N51. The quarry, however, is located on the west side of a hill and is not generally visible from the N51 to the south.

### 12.3 Significant Impacts and Mitigation

All of the identified Landscape Character Areas within the Study Area have been assessed for construction and operational phase effects as a consequence of implementing the Proposed Scheme.

The LVIA assessment concludes that Major to Substantial, short term, assessed as significant effects are predicted to occur within the Rathkenny Hills, Boyne Valley and Central Lowlands Landscape Character Areas (LCA's) during the construction phase of the Proposed Scheme, though such effects are localised in extent and predicted to occur on lands directly impacted by the Proposed Scheme. Remaining portions of the LCAs' outside of the land take are predicted to experience no significant effects during the construction phase of the Proposed Scheme.

During the operational phase, the LVIA assessment concludes that significant to profound, short term, effects are predicted to occur within the Rathkenny Hills, Boyne Valley and Central Lowlands LCA's prior to the successful establishment of mitigation planting. Remaining portions of the LCA, outside of the Proposed Scheme land take boundary are predicted to experience no significant effects as a consequence of the Proposed Scheme during the operational phase.

No significant effects were predicted on any protected landscapes associated with the World Heritage Property at Brú na Bóinne as the Proposed Scheme lies approximately 1 km west of the western edge of the buffer zone associated with the World Heritage Property.

A total of 19 viewpoints, including a number of the Protected Views and Prospects identified from the Meath County Development Plan (Meath CDP) 2021-2027 have been selected to represent the existing visual context of the Proposed Scheme and as an aid to the visual impact assessment. All the viewpoints selected as part of the EIAR process were located on publicly accessible roads, footways, and verges. Of the 19 viewpoints assessed for construction phase impacts, 8 are predicted to experience no significant visual impacts with the remaining 11 viewpoints predicted to experience significant visual impacts during the construction phase of the Proposed Scheme. Visual impacts associated with the operational phase of the Proposed Scheme have also been assessed within the EIAR, with 10 viewpoints predicted to experience no significant visual effects and the remaining 9 viewpoints predicted to experience significant effects with effects more pronounced in views experienced in closer proximity at Slane Old Bridge, Jebb's Mill Car Park and the Canal Towpath within 500 m of the Proposed Scheme.

### 12.4 Residual Impacts

After ten years of growth the proposed planting will help to integrate the Proposed Scheme into the existing landscape. The proposed mitigation planting will limit the extent of influence associated with the Proposed Scheme on the adjacent Landscape Character Areas with a resultant reduction in landscape impact.

With regards to visual impact on sensitive receptors in general, the visual impacts are slightly reduced by the establishment of replacement or new screening woodland mix that will offset views towards the Proposed Scheme and its infrastructure and traffic on the road from properties. Post-mitigation planting establishment, it is predicted that four properties will continue to experience a moderate to major effect.

## 13 ARCHAEOLOGICAL AND CULTURAL HERITAGE, INCLUDING WORLD HERITAGE

### 13.1 Introduction

This assessment considered the potential effects of the Proposed Scheme on archaeological and cultural heritage assets and on the character of the historic landscape during the construction and operational phases. The assessment involved a desk-based review of published and unpublished documents and historical mapping. The results of a variety of archaeological investigations were also used to inform the assessment, including field walkovers, geophysical surveys, targeted archaeological testing and monitoring, LiDAR survey, aerial survey, and a surface collection survey.

In accordance with the 1972 World Heritage Convention, a Heritage Impact Assessment was carried out in relation to the Brú na Bóinne World Heritage Property and the results were incorporated into the chapter. That element of the assessment considered the potential for the Proposed Scheme to impact on the Outstanding Universal Value (OUV) of Brú na Bóinne World Heritage Property. The impact assessment initially adopted the methodology recommended in Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (ICOMOS, 2011). The updated advice provided in 'Guidance and Toolkit for Impact Assessments in a World Heritage Context' (UNESCO, 2022) was subsequently adopted.

For clarity, this chapter presents material relating to archaeology and cultural heritage in **Sections 13.2 to 13.4**, and material relating to world heritage in **Sections 13.5 to 13.7**.

### 13.2 Receiving Environment – Archaeology and Cultural Heritage

The study area has a rich and well-documented archaeological and cultural heritage record, with evidence for human activity from the Neolithic period onwards. Brú na Bóinne World Heritage Property contains a prehistoric landscape that is of international importance. The proposed bypass, at its closest where it crosses the N51, would be at least 0.9km outside the buffer zone and approximately 2 km outside the World Heritage Property. The River Boyne is a key defining feature of the ritual landscape of Brú na Bóinne World Heritage Property, but beyond this ritual core it is also an important historic landscape feature in a more general sense and flows through the study area.

The Proposed Scheme traverses lands on the east side of Slane village that are exclusively 18th and 19th century in character, with large agricultural fields. Slane village has its origins in the 18th century as a planned estate village. The dominant character in this landscape with regard to archaeology is early and later medieval. This is in direct contrast to the area within the World Heritage Property, which is predominantly prehistoric in character, with a large number of significant and upstanding Neolithic tombs.

While there is some additional evidence for prehistoric activity in the form of stray finds and flint scatters, there are only three prehistoric sites known west of the World Heritage Property buffer zone, all of which date to later prehistory. In the case of the two that lie partly within the Proposed Scheme, these have been preliminarily dated to the Iron Age (one a probable ring-ditch, the other a circular enclosure). The third is an embanked barrow in Rosnaree townland, of Bronze Age/ Iron Age date, which lies outside the study area approximately 1.5km west of the Proposed Scheme.

The Hill of Slane, a national monument, is a prominent landmark in the study area and represents an important early and later medieval ecclesiastical site, with good views of Knowth in the World Heritage Property to the east. The upstanding remains of Fennor Church and Castle, recorded archaeological sites, stand on the south side of the river, another notable example of Slane's medieval past.

A large early medieval D-shaped enclosure, which survives only below ground and is a relatively common site type, is located partly within the Proposed Scheme in Slane townland. A contemporary enclosure site was discovered at the Ledwidge Hall estate, closer to Slane village to the west, and the ridge of high ground between the two is the location of two recorded enclosures and other archaeological features, possibly also of early medieval date. This location has good views of the Hill of Slane but does not have a visual relationship with either the wider Boyne Valley or the Brú na Bóinne World Heritage Property.

### 13.3 Significant Impacts and Mitigation – Archaeology and Cultural Heritage

Only three negative effects of a significant rating or higher were identified, all of which relate to subsurface archaeological sites identified by geophysical survey and confirmed by archaeological testing, which lie partly within the Proposed Scheme. Ground disturbance for construction would result in the permanent loss of those parts of the sites:

- A very significant direct negative effect was identified in relation to the recorded early medieval enclosure complex, a large part of which would be affected (AH32, SMR ME019-085); and
- Significant direct negative effects identified in relation to two undesignated sites, a probable ring-ditch (ACH26) and a probable enclosure (ACH27), both smaller sites only partly affected.

The sites will be preserved by record by means of archaeological excavation, recording and publication of results, as will an 18th century trough and drain (ACH39) identified by archaeological monitoring in Slane village.

The considerable reduction of traffic on Slane Bridge, a recorded archaeological monument, will help to greatly ameliorate the significant adverse effects of heavy traffic on the bridge. In addition to the enhancement of its setting through the public realm works, this will result in a positive significant long-term effect. The proposed works on the bridge will be within the modern road and path surfaces, but to ensure that there is no potential negative effect to the fabric of the bridge during construction phase, archaeological monitoring of any ground disturbance works will be undertaken and the works will be carried out in accordance with a method statement prepared by a suitably qualified conservation specialist, in consultation with the TII Project Archaeologist.

A moderate negative effect was identified in relation to the setting of the Hill of Slane national monument, as the operational bypass will be visible in the views to the east / south-east towards Knowth (though it would not obstruct the view, it would detract from it). To mitigate this, a continuous strip of woodland will be planted along the west side of the mainline from the N51 Roundabout northwards, including the North Roundabout. After growth of screening vegetation, this will significantly reduce the visibility or visual prominence of the proposed bypass and vehicles using it.

The majority of potential subsurface sites identified during the assessment relate to the possible buried foundations of 18th/ 19th century structures (most likely small cottages or cabins) depicted on historic maps, that may survive within the Proposed Scheme. Other areas of archaeological potential were identified, including the riverine environment in the floodplain of the Boyne and fields in which flint scatters were identified.

A programme of archaeological test excavation will be undertaken within the Proposed Scheme, to help determine the location, date, nature and extent of any previously unknown archaeological features, deposits, or finds. Given the investigations carried out to date, it is anticipated that any such features would be discrete and small in scale. The test-trenching will also target the potential archaeological sites or specific areas of archaeological potential identified in this assessment to examine their exact nature, extent, origin and significance. The entire area containing a possible enclosure (ACH24) identified by geophysical survey, where previous limited testing proved unsuccessful in confirming the site, will first be stripped of topsoil under archaeological supervision to aid in the identification of any archaeological features that may be present.

Any archaeological features revealed by the test-trenching, or by any other means (such as archaeological monitoring), which will be directly affected by the proposed works, will be preserved by record by means of archaeological excavation, recording and publication of results.

The mitigation strategy will also include paleo-environmental sampling in the River Boyne floodplain, the analysis of which will contribute to our understanding of this riverine landscape, facilitating a reconstruction of its environment in the past.

All archaeological works will take place under Ministerial Direction or Section 26 Consent Licence to the Department of Housing, Local Government and Heritage.

### 13.4 Residual Impacts – Archaeology and Cultural Heritage

No significant negative residual effects were identified in relation to the Proposed Scheme.

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Following the implementation of the proposed mitigation strategy, the residual effect on the Hill of Slane national monument is considered to be not significant.

Following the completion of the public realm works and the implementation of the proposed mitigation strategy, a positive significant long-term effect was identified in relation to Slane Bridge and positive moderate long-term effects were identified in relation to the recorded archaeological monuments at Fennor (Fennor Church and graveyard and Fennor Castle).

In addition, there will be a slight positive residual effect for sites AH32, ACH26, ACH27 and ACH39. While these sites will be permanently removed, in whole or in part from the landscape, archaeological excavation will involve full recording of all archaeological features, finds and deposits, and the results of the excavations will be published and disseminated, thus adding to the body of knowledge.

### 13.5 Receiving Environment – World Heritage

Brú na Bóinne is located on the north side of the River Boyne, to the east of Slane. The World Heritage Property, as designated by UNESCO in 1993, is a 780ha area incorporating the three large Neolithic passage tombs of Knowth, Newgrange and Dowth. It is surrounded by a 2500ha buffer zone, defined as the area required to support the property and protection of its OUV. OUV comprises those exceptional qualities of the site that justify its special protection as a World Heritage Property. It is described by UNESCO in a 'Statement of Outstanding Universal Value'.

The World Heritage Property is at least 2.7km east of the current N2 and the boundary of the buffer zone that surrounds the World Heritage Property is at least 1.4km from the current N2.

The proposed new road would bypass Slane on its east side and therefore would be closer to the World Heritage Property. However, no part of the Proposed Scheme would lie within the World Heritage Property or its buffer zone. The proposed bypass, at its closest where it crosses the N51, would be at least approximately 0.9 km outside the buffer zone and approximately 2 km outside the World Heritage Property.

As a result, the Proposed Scheme would lie within what UNESCO refers to as the 'wider setting' of the World Heritage Property. Analysis of the wider setting in the vicinity of Slane within the Heritage Impact Assessment for the World Heritage Property has identified three ways in which it supports the OUV of the World Heritage Property:

- Attributes of both the built and natural environment near Slane have functional associations with the monumental landscape of the World Heritage Property and with individual monuments within the property. Appreciation of these associations supports the OUV of the property;
- Viewpoints near Slane provide opportunities to experience the monumental landscape of the World Heritage Property and the landscape setting of individual monuments within the property. These opportunities enhance our appreciation of the landscape setting and therefore support the OUV of the property; and
- The land around Slane features in the background to some important views of the World Heritage Property from within the nominated property and the buffer zone. In these views, it is part of the modern rural agricultural landscape that forms an appropriate green setting for the Neolithic monuments within the nominated property. Experience of the monuments in this rural setting supports the OUV of the property.

### 13.6 Significant Impacts and Mitigation – World Heritage

Construction and operation of the Proposed Scheme within the wider setting of the World Heritage Property has the potential to impact on the ways in which that setting currently supports OUV. Change in the setting does not automatically affect OUV; this depends on the nature of the change and the ways in which this part of the setting supports OUV.

The key aim of the assessment has been to avoid or minimise any adverse impacts on OUV, consistent with the delivery of the public benefits of the project and recognising the need to resolve potential conflicts of interest with other environmental disciplines. This aim has been achieved in two main stages, during route option selection and then during the development of a detailed design for the Proposed Scheme.

The route option selection process led to the selection of a preferred route for the bypass to the east of Slane, between Slane and the World Heritage Property. From the perspective of the World Heritage

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Property, this choice of preferred route represents a compromise, but one that still delivers considerable mitigation embedded in the design. This is because it minimises visibility of the proposed road in the view looking west from Knowth and in the view of the World Heritage Property from the Hill of Slane.

Accepting that the selected route option could have an adverse impact on OUV, the subsequent detailed design stage of the project provided an opportunity to reduce these adverse impacts. The primary aim of mitigation measures at this stage was to reduce the visibility or visual prominence of the proposed bypass, and vehicles using it, in views from Knowth and the Hill of Slane.

The net effect of these additional mitigation measures, after growth of screening vegetation, has significantly reduced the visibility of the proposed bypass in key views. This, in turn, has reduced the magnitude of impact on OUV of the World Heritage Property below that identified during route option selection.

Operation of the Proposed Scheme would not add materially to existing cumulative impacts by other developments on the OUV of the World Heritage Property.

### 13.7 Residual Impacts – World Heritage

Implementation of all of the mitigation measures embedded in the design of the Proposed Scheme would result in no significant residual impacts on the OUV of the World Heritage Property.

Any changes in the visual or noise environment during the construction phase would be of short-duration and entirely reversed at the end of construction works. As a result of their temporary nature, it is concluded that they would not have any material residual effect on the setting of the World Heritage Property and therefore no residual impact on OUV.

The only aspect of OUV that would be adversely affected during the Operational Phase would be the functional relationship between the World Heritage Property and its wider setting; specifically, the role of the River Boyne in the development of the monumental landscape of Brú na Bóinne. Partial visibility of the proposed Boyne Bridge in the view looking west from Knowth, combined with visibility of the bridge from the Fennor Cross Roads and audible traffic noise on the Boyne Navigation towpath would have a very limited impact on the ability to experience the close physical links between the western end of Brú na Bóinne and the River Boyne and therefore very little impact on the appreciation of the role that the river may have played in the evolution of this remarkable monumental landscape. This is considered to be a permanent adverse impact of negligible magnitude and minor significance on OUV.

In terms of the UNESCO 2022 guidance, avoidance and mitigation measures implemented during the design of the Proposed Scheme have reduced any negative impacts on OUV to an acceptable level. The impact is therefore judged to be acceptable in a World Heritage context.

## 14 ARCHITECTURAL HERITAGE

### 14.1 Introduction

The Project consists of two distinct, but inter-related elements – a new road to bypass Slane village and a scheme to enhance the public realm within the village and extending across the River Boyne over the existing Slane Bridge.

Architectural heritage includes buildings of significance and also some other structures such as historic lamp posts, hydrants and also includes areas that have been designated to be architectural conservation areas. The Planning and Development Acts, 2000 – 2022, indicate that a building or other structure can be considered to be significant under one or more of eight special interests: architectural, historical, archaeological, artistic, cultural, scientific, social or technical.

### 14.2 Receiving Environment

The architectural heritage chapter considers buildings and other structures of architectural heritage significance as including protected structures, buildings that are listed in the National Inventory of Architectural Heritage (NIAH) and also any other buildings that are considered, through their age or for other reasons, to have potential architectural heritage significance. Buildings that lie within an architectural conservation area are also considered. Architectural heritage also takes account of historic landscapes, particularly those that formed the demesnes of country houses, though in this instance all demesnes within the vicinity of the Proposed Scheme have been designated as architectural conservation areas. For the purpose of evaluating the possible effect of the proposals on architectural heritage this study adopts a hierarchy or baseline rating with four categories, where category 1 is High (e.g. National monuments, Architectural Conservation Areas), category 2 (e.g. structures with a regional status in the NIAH); category 3 (structures with a level of architectural heritage) and category 4 is Very low (structures with low architectural heritage significance).

The study area for the purpose of architectural heritage is defined as extending to fifty metres beyond the defined extent of the Proposed Scheme, though this limit is extended if there is a building of very high importance at a further distance and which may be affected by the proposals.

### 14.3 Significant Impacts and Mitigation

The architectural heritage chapter identifies thirteen structures of architectural heritage significance within the study area for the mainline bypass and the proposed improvements to the N51, including one architectural conservation area. Three of these would be directly affected by the works – a farmhouse on the N2 north of Slane, a bridge or culvert beneath the N2 and a derelict gate lodge on the N51. All three of these structures are of very low architectural heritage significance and it is proposed to record them through photographs, written descriptions and some measured drawings prior to the works being commenced. In some other cases the Proposed Scheme will have some effect on the setting of the structure, including a section of the Boyne Canal, the Slane Mill Architectural Conservation Area and the Ledwidge Museum, though the effects will not be major.

A total of sixty-four buildings, structures and architectural conservation areas lie within the study area for the proposed enhancements to the public realm and there will be some negative effect on these during the works, through the presence of construction works in the vicinity. Two structures – a hydrant and a historic gas lamp – lie within the area of the proposed works and will need to be safeguarded during construction. A short section of the stone wall on the eastern side of Mill Hill will be removed to provide a pedestrian link to a proposed car park and the pedestrian link will pass close to a historic ha-ha to the rear of one of the houses in The Square, though without directly affecting it.

### 14.4 Residual Impacts

On completion of the works there will be a significant positive effect on the Slane Village Architectural Conservation Area and on the settings of the various buildings and other structures within the study area. In particular, there will be a very significant positive effect on the medieval Slane Bridge through the removal of a considerable amount of traffic from the bridge.

## 15 BIODIVERSITY: TERRESTRIAL ECOLOGY

### 15.1 Introduction

An assessment of the potential for likely significant impacts of the Proposed Scheme on Biodiversity: Terrestrial Ecology during both the construction and operational phases was carried out. This includes impacts on habitats, protected species and designated sites.

The impact assessment methodology was used as set out in Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM 2018 updated April 2022); Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA 2009a); Guidelines for assessment of ecological impacts of national road schemes (NRA 2009b) and Guidelines for assessment of ecological impacts of national road schemes, Revision 1, (NRA 2003).

The study area for the desk study consisted of a 5 km buffer and the Catchment Management Unit (CMU), while the Zone of Influence (Zol) consisted of variable distances for different ecological features depending on their sensitivity to an environmental change. Thus, the Zol for habitats and species included the redline boundary, adjoining and suitable habitats (i.e. habitats, flora, bats, birds, invertebrates and other mammals), a 2 km buffer (overwintering wildfowl), a 500m buffer (i.e. badger) and a 150 m buffer (i.e. otter) while connectivity pathways to relevant designated sites were also assessed.

### 15.2 Receiving Environment

The Proposed Scheme is located within the lower reaches of the River Boyne catchment. The principal watercourses identified within the Zol are the River Boyne (including the Boyne Navigation Canal which runs parallel to the Boyne) and the Mattock (Mooretown) Stream, which is a tributary of the River Boyne.

The River Boyne and River Blackwater Special Area of Conservation (SAC) (Code 002299) and the River Boyne and River Blackwater Special Protection Area (SPA) (Code 004232) intersect the Proposed Scheme. The River Boyne and River Blackwater SAC is designated for the two-qualifying interest (QI) habitats: alkaline fens and alluvial forests, and three QI species: river lamprey, salmon and otter. While the River Boyne and River Blackwater SPA is designated for the special conservation interest (SCI) kingfisher. The River Boyne is a designated salmonid water.

Desktop studies indicated the presence of the species listed under the Flora (Protection) Order 2022 and invasive alien plant species (IAPS) which are included under the third schedule of the Birds and Natural Habitats Regulations 2011, as amended. The field surveys also identified the presence of invasive species. With the exception of the River Boyne corridor, habitats identified were largely of low ecological and nature conservation value. No habitats identified corresponded to EU Annex I habitats and no protected flora or species listed on the Flora (Protection) Order were noted during field surveys.

Bat activity and static detector surveys were carried out to determine the species present along the Proposed Scheme. Data from the bat activity transects indicate that the site offers a foraging and commuting source for soprano pipistrelle, common pipistrelle, Leisler's and Daubenton's bat. Activity surveys were dominated by soprano pipistrelle and common pipistrelle passes, while the two static data collection locations (i.e. N51 and the River Boyne) indicated similar dominance by soprano and common pipistrelle, and additionally confirmed records for Daubenton's bat.

Protected mammals are likely to occur throughout the Zol of the Proposed Scheme such as otter, badger, Irish hare, deer, fox, rabbit, stoat, pine marten, pygmy shrew and hedgehog. Surveys to confirm the presence of otter along the River Boyne found evidence of otter, but no holts located within the footprint or within 150m of the Proposed Scheme. Surveys to confirm the presence of badger within 500 m of the Proposed Scheme identified badger trails within close proximity to setts for which there is evidence of activity. Fifty-one badger sett entrances were located within the Zol of the Proposed Scheme. The presence of smooth newt was also confirmed at two locations adjacent to the River Boyne. Although there was no direct evidence recorded of other mammals, their presence cannot be ruled out.

Breeding bird surveys confirmed that breeding activity was primarily confined to vegetation along field boundaries and buildings within the survey area. Several records for kingfisher were identified, however no breeding was confirmed owing to the lack of suitable habitat. Wintering bird surveys indicated the presence of several overwintering bird species including swan, duck, heron, and several waders.

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Characterisation of the receiving environment identified a number of important ecological features (IEF) for further assessment, these include designated sites (European and National), watercourses, habitats (i.e. grasslands, woodland and wet habitat), bats, badger, otter, kingfisher, amphibians and breeding and wintering birds.

### 15.3 Significant Impacts and Mitigation

The key parameters examined as those having the potential to result in the greatest impact on the receiving terrestrial biodiversity environment were water pollution, habitat loss/degradation and fragmentation, disturbance, and the spread of IAPS.

Construction within the River Boyne floodplain has the greatest potential to adversely affect water quality of the River Boyne, both locally and downstream. This is primarily linked to construction activities that can cause contamination of nearby surface waters with consequent effects on aquatic ecology. This can be due to the release of silt, clay and cement particles in run-off or due to accidental spillages of pollutants. Routine run-off from operational roads may also be a source of pollution in watercourses.

Habitat loss is expected within the construction footprint of the Proposed Scheme due to construction requirements. Vegetation removal and earthworks during site clearance will result in the loss of habitat and its supporting function for a number of species within the footprint of the Proposed Scheme. This activity will also result in potential for habitat degradation due to impacts and effects such as polluted run-off, dust generation, disturbance from construction and the spread of IAPS. Such degradation could also result in effects on species dependent on this habitat. The extent of habitat loss to enable the Proposed Scheme, in particular for the works proposed within the Boyne Valley will have a significant impact on the available habitat for local species such as bat and badger.

Construction within the River Boyne floodplain has the greatest potential to adversely affect otter habitats within and adjacent to the River Boyne, locally and downstream. This is primarily linked to construction vehicles, machinery, and large plant, plus excavations and materials involved in construction of the proposed new crossing of the Boyne floodplain and channel. A very detailed, phased plan for the construction phase of this aspect of the Proposed Scheme has been developed. It involves a temporary working platform and access track, that protects the floodplain and reduces potential generation of sediment laden run-off, to facilitate the proposed crossing. Three piers will be constructed in the floodplain to support the river crossing, with a minimum 10m setback zone from the Boyne main channel. Piers will be coffer-dammed to encapsulate and control pollutant run-off.

Air pollution from construction activity or traffic emissions can have negative impacts on habitats or species of conservation value in the area. The main pollutants of concern which originate from road developments are nitrogen oxides (NO<sub>x</sub>) and Particulate Matter (PM). Construction activities such as excavation could lead to the smothering of nearby vegetation, impacting designated sites and protected species using those habitats.

During construction, the piling of cofferdams as well as noise and vibration due to excavations, earthworks and movement of construction vehicles could displace foraging or commuting birds and SCI bird species. Disturbance from construction activities (i.e. noise, vibration, human presence, artificial lighting, occasional night time working) may also result in the partial loss of foraging and commuting habitat and displacement of badger and otter, particularly the east/west movement of otter along the Boyne valley. There is also potential for direct mortality of fauna during construction activities e.g. badger or otter falling into open excavations, vegetation removal resulting in the killing and/or injury of nesting birds and their young. Mitigation measures are proposed to avoid these impacts.

Habitat loss, degradation and/or fragmentation is predicted during the operational phase. This is primarily from potential surface water pollution events during operation (i.e. run-off of pollutants, silt and heavy metals), which has the potential to affect water quality and result in adverse effects on downstream habitats (including QI habitats associated with designated sites). The Proposed Scheme may also act as a permanent barrier to foraging and commuting fauna within the area, resulting in habitat fragmentation.

During the operational phase, there is potential for disturbance, surface water pollution and accidental killing/injury associated with ecological receptors. Accidental fatalities may occur as individuals (e.g. otter, badger, bats) attempt to cross the new road from adjacent watercourses and terrestrial habitats, and disturbance and surface water pollution could occur as a result of an increase in road users, pedestrians and cyclists. Designed-in and mitigation measures are proposed to avoid impacts during the operational phase.

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During construction activity, there is potential to cause the spread of invasive species due to the movement of construction personnel, transport vehicles and excavation spoil. There is also potential for the spread of IAPS during operation, as the footprint of the Proposed Scheme is located adjacent to a number of identified stands. IAPS are easily spreadable and their close proximity to the Proposed Scheme may change overtime. A precautionary approach has been applied due to their location in proximity to watercourses, primarily the River Boyne and due to the legal conformance required in line with legislation.

A wide range of mitigation measures have been included as part of the scheme to prevent contamination of surface waters during the construction phase as surface water pollution is the primary source of potential significant effects. A new drainage network will be constructed and will collect run-off in a series of attenuation ponds which discharge to watercourses following treatment. The discharges will be limited to greenfield run-off rates and will not contain appreciable sediment loads.

Furthermore, mitigation measures for the protection of important ecological features also include measures such as the following: pre-construction surveys, specific measures surrounding bat, badger and otter which may also include a derogation licence, set-back zones, timing of works, the implementation of a dust minimisation plan and landscape planting. Enhancement measures for foraging and commuting birds will involve erecting bird boxes per 1 km of new carriageway at suitable locations along the route. Suitable locations will be determined by the Environmental Clerk of Works (EcOW) based on locations available to erect, to minimise disturbance impacts. The implementation and efficacy of all mitigation measures will be overseen and monitored by a dedicated Project Ecologist during both the construction and operational phase.

### 15.4 Residual Impacts

Mitigation measures in general, will prevent any long-term significant impacts on the remaining species of conservation interest present in the Zol, while the implementation of landscape planting will compensate in part for the loss of these semi-natural habitats, over the medium to long term, as these landscaping features continue to establish and mature. A robust and functioning surface water drainage system will ensure no residual impacts will occur from the Proposed Scheme. No significant residual impacts are anticipated for species of conservation interest for the construction or operational phases.

## 16 BIODIVERSITY: AQUATIC ECOLOGY

### 16.1 Introduction

Potential likely significant impacts on Biodiversity: Aquatic Ecology were assessed for the Proposed Scheme during the construction and operational phases. This included effects on biological water quality indicators, aquatic habitats and fisheries value.

The impact assessment methodology used was as set out in Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018), Guidelines for assessment of ecological impacts of national road schemes, Revision 2 (NRA, 2009) and Guidelines for assessment of ecological impacts of national road schemes, Revision 1 (NRA, 2003).

The Zone of Influence (Zol) ranged between a minimum of 200-500 m downstream of any minor surface water interaction up to 1km downstream on larger channels i.e. River Boyne, in relation to the Proposed Scheme boundary (including the N51 and public realm works). Where necessary and based on expert judgement, the Zol and the field and/or desk study extended further downstream e.g. on the main channel of the Boyne, dependant on watercourse size, volume, flow types and potential for export of waterborne pollutants.

### 16.2 Receiving Environment

The Proposed Scheme is located within the lower reaches of the River Boyne catchment. The principal watercourses identified in the Zol are the River Boyne (including the canal running parallel to the river) and a small tributary of the Mattock River, referred to as Mattock (Mooretown) stream. The Mattock River is itself a tributary of the River Boyne. The River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA are also within the Zol. The River Boyne reach within the study area is a designated salmonid water.

The study area reach of the River Boyne is primarily a migration route with holding pools for Atlantic salmon, sea trout, brown trout, river and sea lamprey, and European eel. There are patches of salmonid nursery habitat (mainly salmon) in faster water reaches in the Zol of the Boyne main channel, but spawning habitat is not significant in the Zol. The majority of salmonid spawning occurs within (mainly upstream) tributaries of the Boyne as opposed to the main channel.

River and sea lampreys may spawn in the Boyne main channel, as they are sometimes forced to do owing to presence of difficult or impassable weirs such as those on the lower Boyne. There is certainly lamprey nursery habitat within the Boyne Zol and juvenile lampreys were observed occupying silt deposits at channel margins within the study reach.

The Mattock River main channel has good water quality and is an important seatrout and salmon spawning habitat, but it's headwater tributary, the Mattock (Mooretown) stream, which is crossed by the Proposed Scheme is polluted and is of low fisheries significance. There is a greater than 4 km separation distance between proposed works on the upper Mattock (Mooretown) stream and the better-quality habitats of the Mattock main channel.

The Thurstanstown Stream is a small tributary of the Boyne which will continue to receive a small amount of drainage via a network of field boundary drains from the Proposed Scheme at its southern extent. This stream has impaired biological water quality and is of low fisheries significance.

### 16.3 Potential Impacts and Mitigation

Construction activity can cause contamination of nearby surface waters with consequent effects on aquatic ecology. This can be due to release of silt, clay and cement in run-off or due to accidental spillages of pollutants such as hydrocarbons (fuels, oils). Routine run-off from operational roads may also be a source of pollution in watercourses. Such pollutants can alter water chemistry and physical habitat quality for fish and macroinvertebrates, locally and further downstream.

Direct effects on instream habitats could arise from stream realignment and culverting of the Mattock (Mooretown) stream, although the existing habitat is very poor for fish and macroinvertebrates in the Zol, meaning significant impact is unlikely. Removal of an existing N2 culvert at this location as part of the Proposed Scheme will remove a fish passage barrier and is predicted to improve hydromorphology (that is

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the physical form of the river and the water content of the water body) at this location and allow for future fish migration if water quality improves over current baseline.

Construction on the River Boyne floodplain has the greatest potential to adversely affect water quality and fisheries habitats of the River Boyne, locally and downstream. This is primarily linked to construction vehicles, machinery, and large plant, plus excavations and materials (cement, hydrocarbons) involved in construction of the proposed new crossing of the Boyne floodplain and channel. A very detailed, phased plan for the construction phase of this aspect of the Proposed Scheme has been developed. It involves a temporary working platform and access track, that protects the floodplain and reduces potential generation of sediment laden run-off, to facilitate the proposed crossing. Three piers will be constructed in the floodplain to support the river crossing, the nearest being 10 m from the Boyne main channel which will be coffer-dammed to capture and control any potential pollutant run-off.

A hydroacoustic noise assessment was carried out with respect to auditory capability of fish locally with respect to proposed auger and bucket pile driving near the River Boyne. The impact on freshwater fish species that are expected to occur locally (migrating salmonids and lamprey, resident juvenile lamprey, coarse fish) is predicted to be temporary and very minor for relatively small numbers of localised individuals resulting in mild avoidance behaviours and is not significant at a population level.

There is potential for a net-positive, long-term impact on water quality and aquatic ecology owing to an 88% reduction in daily traffic flow (including a 95% reduction in HGV) across the existing N2 Slane Bridge. It would be expected that the combination of (1) low traffic flow (by national and international standards) on the proposed bypass route, and (2) attenuation and treatment of road surface run-off via hybrid ponds/wetlands, will lead to an imperceptible or neutral impact on receiving water quality, with potential for long-term positive impacts compared to the do-nothing scenario.

A wide range of mitigation measures have been included as part of the scheme to prevent contamination of surface waters during the construction phase; detailed in **Chapter 5**. A new drainage network will be constructed and will collect road surface run-off in a series of attenuation ponds which discharge to watercourses following settlement and concomitant treatment. The discharges will be limited to greenfield run-off rates and will not contain appreciable sediment or heavy metal concentrations. The implementation and efficacy of all mitigation measures will be overseen and monitored by a dedicated Ecological Clerk of Works during the construction phase.

### 16.4 Residual Effects

No significant residual impacts are anticipated for the construction or operational phases.

## 17 WATER

### 17.1 Introduction

An assessment of the potential for likely significant impacts of the Proposed Scheme on the natural water environment during both the construction and operational phases was carried out. This includes impacts on the physicochemical and hydromorphological characteristics of surface waters, drainage and flood risk.

The impact assessment methodology outlined in Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2009) was followed.

The Zone of Influence (Zol) consists of a 250m-wide corridor either side of the Proposed Scheme boundary (including the N51 and public realm works) and the Study Area extends to hydrologically connected points in the wider WFD catchment.

### 17.2 Receiving Environment

The Proposed Scheme is located within the lower reaches of the River Boyne catchment. The principal watercourses identified in the Zol are the River Boyne (including the canal running parallel to the river) and the River Mattock, which is a tributary of the River Boyne.

The Water Framework Directive (WFD) status of the River Boyne in the Zol is *Moderate* at the existing crossing at Slane village, where it is classified as *At Risk*, and *Good* at the proposed crossing, where its risk status is under review. The WFD status of the Mattock is *Moderate* at the proposed crossing, where it is classified as *At Risk*. The River Boyne is nutrient sensitive within the Zol. Within the Zol, the biological status of River Boyne is *Good* and in the River Mattock it is *Poor*.

The River Boyne and River Blackwater SAC (Code 002299) and the River Boyne and River Blackwater SPA (Code 004232) are within the Zol. The River Boyne also represents a highly significant salmonid system and is designated salmonid water.

The River Boyne is subject to flooding within the Zol. The CFRAMS predicted floodplain within the Zol protects one commercial property affected by flooding, upstream of the proposed crossing. There are no dwellings affected by flooding in the Zol. The existing bridge to Slane Village has been affected by past flood events.

The River Boyne was noted to be under hydromorphological pressures due to channelisation in the Second Cycle WFD assessment and was historically part of the OPW Arterial Drainage Scheme.

There are two water supply sources within the wider study area – the Slane Public Water Supply which abstracts groundwater, and the Staleen Water Treatment Plant which abstracts surface water from the River Boyne.

### 17.3 Significant Impacts and Mitigation

The key parameters examined as those having the potential to result in the greatest impact on the receiving Water environment were surface water quality, drinking water resources, flood risk, and fluvial geomorphology. Impacts on the recreational use of water, aquatic ecology, and groundwater were assessed in Chapters 8, 16 and 18 respectively.

Construction activity can cause contamination of nearby surface waters. This can be due to entrainment of silt, clay and cement particles in run-off or due to accidental spillages of pollutants. Routine run-off from operational roads may also be a source of pollution in watercourses.

A wide range of mitigation measures have been included as part of the scheme to prevent contamination of surface waters during the construction phase; these are detailed in Chapter 5. A new drainage network will be constructed and will collect run-off in a series of attenuation ponds which discharge to watercourses following treatment. The discharges will be limited to greenfield run-off rates and will not contain appreciable sediment loads.

The Proposed Scheme does not cause deterioration of good water body status and does not jeopardise attainment of good status in any of the waterbodies in the Study Area. The drainage outfalls are predicted to

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have a negligible residual impact on water quality and quantity in the watercourses within the study area. Residual impacts on ecological receptors are discussed in Chapters 15 and 16.

Construction within floodplains has the potential to adversely affect flood risk by impeding floodwater conveyance and reducing storage. During the construction phase of the Proposed Scheme, a temporary working platform and access track will be built in the River Boyne floodplain to facilitate the proposed crossing. Three piers will be constructed in the floodplain to support the river crossing. A hydraulic model was developed to assess the potential impact on flood water depths and extents, which were found to be negligible in both the construction and operational phases.

Fluvial geomorphology can be affected by changes to a channel's flow and sediment transport regimes. No works are proposed on the main channel of the River Boyne. During a flood event, the crossing will not impede flood water in the channel and any changes in flow and sediment transport regimes due to the proposed piers are predicted to be negligible. In-stream works will occur on the River Mattock to install new culverts. The change to the flow regime is upstream and downstream of the new culverts is also predicted to be negligible.

No impacts on drinking water resources are predicted.

### 17.4 Residual Impacts

No significant residual impacts are anticipated for the construction or operational phases.

## 18 LAND, SOILS, GEOLOGY AND HYDROGEOLOGY

### 18.1 Introduction

The Land, Soils, Geology and Hydrogeology chapter of the Environmental Impact Assessment Report identifies, describes and presents an assessment of the likely significant effects of the N2 Slane Bypass and Public Realm Enhancement Scheme ('the Proposed Scheme') on Land, Soils, Geology and Hydrogeology during both the construction and operational phases of the Proposed Scheme.

The Land, Soils, Geology and Hydrogeology study area extends outside the footprint of the Proposed Scheme to include a 1 km buffer zone from the centreline to examine the potential impacts on the surrounding soils, geology and hydrogeology environment. To further examine the potential impacts on groundwater, a wider Zone of Influence for bedrock aquifers and groundwater bodies was also considered. The Zone of Influence also covers the bedrock aquifers traversed which have value in the local area for abstraction purposes.

Existing information such as mapping and aerial photographs were used during initial desktop studies. Sources of historical information, geological maps and/or features had been established during the desktop study of the area.

Site investigations were undertaken in different phases with the precise purpose of designing and assessing the proposed development. Phase 2 (Option Selection) consisted of a ground investigation and Phase 3 (design and EIAR) consisted of ground investigations and a geophysical survey to determine the soil, bedrock and ground water conditions and to establish the environmental condition of the soil.

### 18.2 Receiving Environment

The lands through which the Proposed Scheme traverses are predominantly greenfield lands; the public realm proposals occur within Slane village which is mainly comprised of urban fabric. The general topography of the lands tends to fall towards the River Boyne, on both the northern and southern sides of the river.

The study area overlies various deposits, made-ground, alluvial and a mix of well- and poorly-drained mineral soils. According to online sources (Geological Survey of Ireland), the regional subsoils are varied and include alluvium, gravels and till.

The bedrock in the north of the Proposed Scheme is the oldest bedrock in the Proposed Scheme and tends to get relatively younger towards the south within the Carboniferous bedrock. The bedrock encountered includes shale, limestones, conglomerates, sandstones and tuffs. The Proposed Scheme traverses the Boyne Valley County Geological Site.

The Proposed Scheme overlies regions of Moderate to Extreme groundwater vulnerability. Regions of High and Extreme groundwater vulnerability are common adjacent to the River Boyne. The bedrock aquifers underlying the site range from Poor to Locally Important.

The site of the Proposed Scheme is underlain by three individual Groundwater Bodies, the Wilkinstown, Trim and Donore Groundwater Bodies. The existing N2 road traverses across the outer zone of the Slane Public Water Supply. The inner zone of the Public Water Supply is located approximately 100m west of the existing N2 where it traverses the River Boyne.

### 18.3 Significant Impacts and Mitigation

#### Impact Assessment

The potential impact of the Proposed Scheme on the Land, Soil, Geology and Hydrogeology environment has been assessed by classifying the importance of the relevant attributes and quantifying the likely magnitude of impact on these attributes. This assessment methodology is consistent with impact assessment criteria outlined in the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022).

During construction phase, without mitigation there is a potential risk of localised contamination from a potential hydrocarbon (e.g. fuel) release during construction works and the use of vehicle and construction plant, which may contaminate the soils and underlying groundwaters (bedrock aquifers and Public Water

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Supply). The impact is predicted to be localised to the footprint of the Proposed Scheme and construction compounds (main and satellite). The impact will be local, short term, intermittent and with moderate reversibility.

There is also the potential source of pollution from silt-laden surface water run-off, from exposed ground and soil stockpiles entering surface and groundwaters. Surface water run-off containing large amounts of silt could make their way into the groundwater which can cause significant pollution of water through the generation of suspended solids. Where topsoil and other soils are to be stored on site, stockpiles with significant side slopes can create another source of sediment laden run-off. The impact on the bedrock aquifers and Public Water Supply is predicted to be localised to the footprint of the Proposed Scheme and construction compounds (main and satellite). The magnitude of this impact is deemed to be negligible.

The proposed construction phase will result in the removal of soil from the proposed boundary which includes greenfield soils that have a high local value. The removal of soil will result in the irreversible loss of moderate proportion of local high fertility soils and/or high proportion of local low fertility soils localised to the footprint of the Proposed Scheme and construction compounds (main and satellite). Furthermore, the impacts are principally associated with the effects of the proposed cuttings and the potential for accidental spillages entering the groundwater environment, due to increased vulnerability of the underlying aquifer. The volume that will be excavated will be small in comparison to the overall aquifer area; therefore, the impact will be negligible in magnitude.

The operational phase (which includes maintenance operations) has the potential to affect land, soils, geology and hydrogeology through the accidental spillages of fuels, chemicals or other contaminants during operational/maintenance activities. The impact on soil, bedrock aquifer and the Public Water Supply is predicted to be localised to the footprint of the Proposed Scheme. However, the proposed operations are unlikely to generate hazardous substances.

### Key Mitigation Measures

During the construction phase, the storage and handling of oils, fuel, chemicals and hydraulic fluids will be in secure areas within the site compounds and will not occur within a minimum of 50 m of watercourses and all hydrocarbons used during the construction phase shall be appropriately handled, stored and disposed of. All chemical and fuel filling locations shall be protected from potential spillages through the provision of appropriate protection measures including but not limited to bunded areas and double skinned bowser units with spill kits.

Excavated materials will be carefully managed in accordance with the TII Specification for Road Work, to prevent any potential negative impact on the receiving environment and the excess material will be taken directly from the site, limiting the potential for run-off effects. Excavated material will not be left uncovered to further avoid run-off of silty water and excavations will be backfilled at the earliest opportunity to minimise exposed areas of bare ground.

The Proposed Scheme will also include significant 'designed in' environmental mitigation measures including oil interceptors and will undergo routine maintenance and checks. No further operational phase mitigation measures are proposed.

## 18.4 Residual Impacts

The significance of all impacts identified will be reduced to imperceptible with the implementation of the mitigation measures.

## 19 CLIMATE

### 19.1 Introduction

This chapter of the Environmental Impact Assessment Report identifies, describes and presents an assessment of the likely significant effects of the N2 Slane Bypass and Public Realm Enhancement Scheme on climate and also the vulnerability of the Proposed Scheme to climatic factors.

The relevant guidance requires that the climate impact assessment must report the project's impact on greenhouse gas emissions and the project's risk and resilience to climate change through a climate assessment through the following separate assessments:

- Greenhouse Gas Emissions Assessment - this assessment identifies the impact of greenhouse gas emissions arising from the project during its lifetime and addresses how the project will affect the ability of the Government to meet its carbon reduction targets.
- Climate Change Risk Assessment - this assessment identifies the vulnerability of a project to climate change and considers adaptation measures to increase the resilience of the project.

The Greenhouse Gas Emissions assessment has been undertaken for the construction and operational maintenance phases by considering the GHG emissions associated with materials (embodied carbon), import and transport of construction materials to site, on site plant and equipment and management of materials arising. This assessment has been undertaken using the TII Carbon Tool for Road and Light Rail Projects (2022). The Carbon Tool is a spreadsheet-based product with the goal of identifying, estimating and mitigating greenhouse gas emissions that accrue on large road and rail infrastructure projects. The carbon tool is developed on a modular structure for capturing and reporting carbon emissions according to lifecycle phase.

Emissions from road transport when the road is operational have been calculated using the TII Road Emissions Model. The model calculates road transport emissions integrating the traffic volumes/speeds for light and heavy vehicles on the Proposed Scheme with Irish fleet composition information.

The combined outputs of the Carbon Tool and the Road Emissions Model represent the Greenhouse Gas Emissions assessment of this chapter. The purpose of this assessment is to quantify and then avoid or reduce, in so far as practicable, the adverse impacts of emissions from the Proposed Scheme on the climate.

The Climate Change Risk Assessment identifies the impact of a changing climate on the Proposed Scheme and receiving environment. The assessment considers the Proposed Scheme's vulnerability to climate change and identifies adaptation measures to accommodate climate change impacts. The purpose of the assessment is to reduce or manage the adverse impacts of climate change on the Proposed Scheme and develop the project resilient to climate change.

### 19.2 Receiving Environment

The proposed bridge over the River Boyne is located within the floodplain of the Boyne River. The flood risk assessment indicates that this area may flood at some stage over the course of the 36-month construction period. The design for the Proposed Scheme has taken this into account and includes for materials to reduce the risk of loss of fines which could impact on the sensitive ecology in the area and also includes platforms with the minimum thickness required to provide stability for machinery and plant operating. With the specified control measures in place, the risk of climate change impact on the construction phase of the Proposed Scheme is considered not significant.

Traffic data has been compiled for the wider road network between the M1 (east), M50 (south), N3 (west) up to the Ardee area in the north to assess the impact of Greenhouse Gas generation from the operational scheme. The level of emissions generated by traffic on a road network is largely dependent on the number of vehicles as well as the average tailpipe emissions from the vehicles. If the Climate Action Plan targets are achieved, there will be a gradual reduction in petrol/diesel fuelled vehicles on the future network and an associated reduction in vehicle tailpipe emissions at source.

### 19.3 Significant Impacts and Mitigation

The total carbon generated during the construction phase is estimated as 31,896 tonnes CO<sub>2</sub>e. Embodied carbon in the materials required for construction is the largest component of emissions at circa two thirds of the total with virgin steel, Portland cement mixes and hot rolled asphalt the main contributory materials. To mitigate these impacts in line with the Climate Action Plan, the project commits to a series of low carbon materials that will lead to a net reduction in construction emissions of the order of 23% and a minor adverse climate impact during construction.

The vulnerability analysis of the construction phase shows that with the detailed controls in place the climate risk to the works from flooding or other climate hazards has been mitigated to reduce the likelihood of such an event having a significant adverse impact. In short, the vulnerability of the works to climate change has been suitably mitigated and the potential impact is considered to be minor adverse for the short-term construction phase.

Total transport emissions associated with the operation of the Proposed Scheme are estimated to have no significant net change over the Do-Minimum scenario. This is true even under the conservative scenario whereby the current mix of petrol/diesel vehicles remain within the fleet and also taking into account the successful implementation of the Climate Action Plan measures. The impact on climate of the operational phase emissions is classed as minor adverse relative to the road traffic emissions without the Proposed Scheme.

Maintenance and operational emissions equate to circa 75 tonnes CO<sub>2</sub>e per annum and as these measures have been somewhat mitigated through design and the impact on climate of the maintenance phase emissions is classed as minor adverse.

The results of the flood risk assessment concluded that the proposed infrastructure will not increase flood risk to the proposed mainline bypass or elsewhere. The structures to be installed as part of the Proposed Scheme are designed in accordance with the best practice design requirements and will not restrict the hydraulic conveyance of the watercourses.

This vulnerability analysis for the operation phase shows that with the committed design measures in place, the risk of adverse climate change impact on the Proposed Scheme is low. In short, the vulnerability of the operational phase to climate change has been suitably mitigated and the potential impact is considered to be minor adverse in the long-term.

### 19.4 Residual Impacts

The commitment to reduce embodied emissions on the Proposed Scheme is fully aligned with the targets and trajectory of the Climate Action Plan 2023. As such, the residual impact on climate of the construction phase emissions, with this mitigation commitment, is classed as minor adverse over the construction phase.

The vulnerability analysis for the construction phase shows that with the detailed construction controls in place, the risk of adverse climate impact on the Proposed Scheme has been suitably mitigated to reduce the likelihood of such an event having a significant adverse impact. In short, the vulnerability of the works to climate change has been suitably mitigated and the potential impact is considered to be minor adverse for the short-term construction phase.

Total transport emissions associated with the operation of the Proposed Scheme are estimated to have no net change over the Do-Minimum scenario. With these factors considered, the net impact on climate of the operational phase traffic emissions is classed as minor adverse in the long term. While projected emissions are negligible relative to the Do-Minimum scenario any emissions of GHG represent an adverse impact.

Overall, the risk of climate change impact on the operational phase of the Proposed Scheme will be minor adverse for each of the main climate threats.

## 20 MATERIAL ASSETS: AGRICULTURAL PROPERTIES

### 20.1 Introduction

This chapter of the Environmental Impact Assessment Report identifies, describes and presents an assessment of the likely significant effects of the N2 Slane Bypass and Public Realm Enhancement Scheme on Material Assets – Agricultural Properties / Agronomy.

The information required to facilitate an impact assessment of the construction and operation of the Proposed Scheme in respect of agriculture / agronomy was compiled from desk research, roadside surveys, landowner surveys and farm walkover surveys.

### 20.2 Receiving Environment

Meath has a strong farming tradition and is renowned for its rich pasturelands, which are capable of supporting a wide range of farming activities; in particular there is crop production, grass growing, and cattle and horse rearing. In Meath, there are 4,508, farms, utilising approximately 197,425 hectares (ha) accounting for 84% of the total land area.

Most of the farming in Meath revolves around the grazing of drystock animals with some 68% of the farms in Meath involved in drystock in one way or another. In 2020, the year the census was published, the dairy sector in the county accounted for 10.8% of the farming practices with 487 farms specialising in dairying. Since 2015 and the lifting of milk quotas, there has been a considerable increase in dairying practices including an increase in the number of dairy farms and the number of dairy cows. In 2010, there were 44,267 cows in Meath (CSO, 2010)<sup>4</sup>, whereas in 2020 there were 67,246 (CSO, 2020)<sup>5</sup>, an increase of some 34%. It is also noted that along with Waterford and Louth, Meath had one of largest average dairy cow herd size in Ireland in 2020 (CSO, 2020)

The Proposed Scheme traverses two CSO Electoral Divisions (EDs), Painestown and Slane and passes close to the ED of Mellifont and while the Proposed Scheme does not traverse this ED it was included (land access, facilities etc.) for completeness. The farming activities for these three EDs are shown in **Table 20-1**.

**Table 20-1: CSO Census of Agriculture Data (2020)**

Agriculture data	Painestown ED	Slane ED	Mellifont ED
Number of holdings	37	32	49
Average Size of Holding (Ha)	57.7	42.3	54.6
Median Age of Holder	59	54	54
<b>Land Utilisation</b>	<b>Area (ha)</b>	<b>Area (ha)</b>	<b>Area (ha)</b>
Total Cereals	*	n/a	715
All Grassland	1,625.3	1,202.6	1,781.4
All Area Farmed	2,128.6	1,357.6	2,677.5
<b>Livestock</b>	<b>No. of Head</b>	<b>No. of Head</b>	<b>No. of Head</b>
Total Cattle	3,422	2,894	4,053
Dairy Cows	875	941	1,161
Other Cows	201	302	348
Total Sheep	1,225	n/a	2,349
Livestock Units (LSU)	2,793	2,616	4,502

Note: Some data suppressed for confidentiality reasons.

<sup>4</sup> Census of Agriculture 2010 – Final Result. Available at: <https://www.cso.ie/en/media/csoie/releasespublications/documents/agriculture/2010/full2010.pdf>

<sup>5</sup> Census of Agriculture 2020, Livestock. Available at: <https://www.cso.ie/en/releasesandpublications/ep/p-coa/censusofagriculture2020-preliminaryresults/livestock/>

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### 20.3 Significant Impacts and Mitigation

The construction phase of the Proposed Scheme will result in the generation of noise and dust – both of which may adversely impact the wellbeing of farm animals. The Proposed Scheme will also result in the disturbance of land/ services/ field drainage and/or restricted access to land, with potentially negative effects on the operation and management of farms affected.

However, the impacts that concern landowners most relate to land to be acquired, division of lands and the removal or demolition of buildings and/or facilities. **Table 20-2** provides a summary of the operational impacts from the Proposed Scheme.

**Table 20-2: Summary of Operational Impacts**

Description	Number / Area
No. of Landowners Affected	25
Total Landtake (ha)	35.8
No. of Folios Severed	4
No. of Facilities Affected	1
No. of Folios Requiring Access	14

A group of mitigation measures will be implemented as follows to manage the effects of Proposed Scheme:

- Access will be restored to lands where it is removed or restricted, unless otherwise agreed with the landowner. This will be provided by way of access tracks, the replacement of field access gates or the provision of overbridges.
- All drainage likely to be affected or disturbed during the pre-construction (ground surveys and investigations) and construction works will be confirmed during discussions with landowners. Land drains will, to the extent possible, be maintained during the course of the works. Any damage to drains due to the works will be repaired on completion of the works.
- Any services that are interfered with as a result of the Proposed Scheme will be repaired / replaced without unreasonable delay.
- All drains, cables, conduits, pipes, rights of way and wayleaves etc. where such services are severed by the CPO during construction or operation of the Proposed Scheme will be maintained or replaced, unless otherwise agreed with the landowner.
- MCC shall undertake to replace (either along the same or alternative routes) all existing rights of drainage, rights of access to the public road network and easements across the lands to be acquired both during construction and operation of the Scheme.
- Where necessary, suitable stockproof temporary fencing will be erected for the duration of the works. Where any fences, walls or hedges are damaged during the construction of these roads they will be made stock proof immediately, unless otherwise agreed with the landowner. Any necessary permanent restoration of fences, walls, or hedges will be completed within two months of the work concluding.
- A Landowner liaison officer (LLO) will be appointed by the local authority. The LLO will be the primary point of contact for landowners with concerns or issues that need addressing. Furthermore, the LLO will liaise with the local District Veterinary Office to establish the location of any restricted herds along the route of the Proposed Scheme. Where the LLO has been informed of a restricted herd along the route, it will require the Contractor to disinfect machinery and personnel before leaving the land concerned. The number of accesses across the working strip will be reduced to one in the case of lands having restricted herd status. The Contractor will arrange for disinfectant mats/baths to be replenished with disinfectants, as required.

In addition to these general measures, specific mitigation measures will be implemented for individual farms to address the specific impact(s) anticipated for each. Compensation for land acquisition and disturbance is not included in the EIAR. These matters will be dealt with through a CPO process with landowners or their representative(s).

## VOL. 1 NON-TECHNICAL SUMMARY

## 20.4 Residual Impacts

The Proposed Scheme will not have a significant impact on agriculture from a national or regional perspective. It will have an impact from a local perspective primarily from a loss of agricultural land and severance.

In summary, the Proposed Scheme will have a permanent negative residual impact on 25 landowners as shown in **Table 20-3** below.

While accommodation/ scheme works will mitigate many residual impacts, not all can be mitigated in this manner and the remainder will be dealt with by way of compensation under the statutory code.

**Table 20-3: Summary of Residual Impacts**

Residual Impact	Number
Imperceptible	9
Slight	5
Moderate	8
Major	3
Profound	0

## 21 MATERIAL ASSETS: NON-AGRICULTURAL PROPERTIES

### 21.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) identifies, describes and presents an assessment of the likely significant effects of the Proposed Scheme on the topic of Material Assets: Non-agricultural Properties during both the construction and operational phases.

The assessment has considered different property types including residential and commercial properties, land zoned for development, land not zoned, and roadbed/road verge.

### 21.2 Receiving Environment

The study area for the Proposed Scheme is located in a rural setting and includes the village of Slane. Agriculture is the predominant land use. However, non-agricultural properties are present and comprise residential properties (including farmhouses), commercial properties, and development lands and sites.

There are 48 non-agricultural properties directly affected by the Proposed Scheme. These include ten residential properties, four commercial properties, as well as the area crossed by the proposed bridge over the Boyne Navigation towpath, canal and River Boyne). The remainder of the landtake consists of portions of roadbed/ road verge and private access tracks/ laneways across various landholdings.

The majority of the route of the proposed mainline bypass traverses land zoned as 'RA – Rural Area' in the Meath CDP 2021-2027. Areas zoned as 'H1 – High Amenity' associated with the towpath are also included. The public realm enhancement proposals overlap with several objectives, mainly 'B1 – Commercial Town or Village Centre'.

There are no outstanding planning permissions that have not yet been activated in the area affected by the Proposed Scheme.

### 21.3 Significant Impacts and Mitigation

The effects of the Proposed Scheme on non-agricultural properties are generally considered and assessed under two main headings:

- **Temporary acquisition** which are those lands required for a temporary period only; and
- **Permanent acquisition** associated with the operational new road and which includes landtake and severance which is permanent, as well as acquisition for e.g. easements, way-leaves etc.

For lands temporarily required for construction, the principal construction impacts will be landtake, interruptions to property accesses (for example where a driveway might be resurfaced to align with new road levels) or temporary loss of use of a premises while works are underway. The construction of roundabout junctions and crossings in particular may impact on access to properties. The effects of temporary access are primarily a function of the activity being undertaken on the property but also the property usage and the time of occurrence. In addition, non-agricultural property may also be affected by noise, dust, construction traffic and associated impacts on visual and residential amenities during the construction stage. The temporary landtake for the scheme consists of the temporary acquisition of approximately 0.65 ha from eight non-agricultural landholdings.

The Proposed Scheme will also involve the permanent landtake of approximately 7.6 ha from 48 non-agricultural landholdings. This includes five (5 no.) dwellings which have to be acquired with/ without demolition - three (3 no.) occupied dwellings, a derelict gate lodge and one uninhabited dwelling with associated agricultural buildings.

The area of land required for the Proposed Scheme does not have a significant effect when considered at a national or regional level. However, from a local or individual scale, landtake can be significant. This is particularly the case for the existing dwellings and commercial businesses. The impact on the dwellings to be fully acquired and/or demolished will be significant and can only be mitigated through compensation under the statutory CPO process; this will run in parallel to the planning application for the Proposed Scheme.

## **VOL. 1 NON-TECHNICAL SUMMARY**

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With respect to land use, the Proposed Scheme is not considered to have a significant built footprint; the permanent loss of land use types is proportionately low when considered in the context of the overall footprint.

During the operational phase, all landtake required to deliver the Proposed Scheme will be addressed at construction stage through the CPO process and associated compensation. Ongoing inspection and maintenance of the infrastructure, including the proposed Boyne bridge and ancillary elements such as noise barriers and landscaping, will be facilitated primarily through lands permanently acquired for the Proposed Scheme. For one property, access will have to be achieved through a wayleave agreement across third party lands. In this case, access will be agreed with the landowner in advance. Therefore, no significant operational phase impacts are predicted with regard to material assets: non-agricultural properties.

### **21.4 Residual Impacts**

No residual impacts are anticipated following compensation and mitigation.

## 22 MATERIAL ASSETS: UTILITIES

### 22.1 Introduction

The Material Assets – Utilities assessment presents an overview of the existing utilities, any future alterations or expansions to these utilities and assesses the effects on each built service along with identification of mitigation measures to minimise impacts. Utilities refer to the services provided to consumers including gas transmission and distribution pipework, potable water mains, foul or combined sewers, surface water sewers, electricity transmission and distribution networks (underground cables and overhead lines) and fibre telecommunications.

The impact of the Proposed Scheme on Material Assets: Utilities has been assessed for the construction and operational phases by considering the impacts to electricity, telecommunications, gas, water supply and sewerage infrastructure.

### 22.2 Receiving Environment

A review of the existing utilities identified ESB overhead lines in four main areas including N2 Mainline, N51 West, N51 East, and Slane Village and Public Realm Enhancement. In addition, water mains and multiple Eir underground and overhead services were also identified within the area of the Proposed Scheme. Relevant bodies were contacted in relation to the existing utilities, and it was confirmed that there are no future plans to alter these services in the area. Two utility lines were discovered in the verge along the westbound side of the N51 but they are not indicated on any of the records from ESB networks or any other service provider.

### 22.3 Significant Impacts and Mitigation

The potential for impacts is in the main related to construction of the Proposed Project where interruptions and diversions of built services are required, leading to planned temporary short-term loss of services such as water services, electrical power, communication assets such as fibre optic and telephone networks, and possible damage to utility assets during works. At operational phase, impacts to the built services are limited in nature and associated with asset maintenance.

The assessment indicated that none of the utility conflicts during the construction phase are expected to have a significant impact. Additionally, no significant impacts to utilities are predicted during the operational and maintenance phase of the Proposed Scheme.

In the majority of cases, conflicts with utilities have been mitigated through the design evolution. Additional mitigation in the construction stage, in the main, relates to ongoing liaison and coordination with service providers, advance notice to local residents and businesses of any temporary interruptions to service and timely reconnection where disruption is required. No mitigation measures are required during the operational phase of the Proposed Scheme.

### 22.4 Residual Impacts

The implementation of mitigation measures will ensure minimal disruption to utilities. The residual impacts associated with utilities mitigation measures are considered to be Negligible.

## 23 MATERIAL ASSETS: RESOURCE AND WASTE MANAGEMENT

### 23.1 Introduction

The assessment identifies and assesses the likely significant effects that the construction and operation phases of the proposed Project will have on resources and waste management. The assessment has been produced in accordance with Guidelines for the Management of Waste from National Road Construction (TII, 2017) and the Guide to: Materials and Waste in Environmental Impact Assessment (Institute of Environmental Management & Assessment (IEMA) 2020).

This assessment was informed by desk study that identified waste emissions and other materials such as soil and stone that could be generated by the Proposed Scheme.

### 23.2 Receiving Environment

Increasing efforts are being made to prevent soil and stone waste arising by encouraging the lawful and beneficial use of excess uncontaminated soil and stone using the 'by-product' approach to management. In this approach, subject to certain conditions being met, excess soil and stone material can find beneficial reuse without being classified as waste.

Construction waste, including demolition and excavation waste, will be the main type of waste generated because of the Proposed Scheme. There will also be small quantities of municipal-type waste generated during construction (i.e. from site staff) and operation (i.e. associated with maintenance activities).

Construction and demolition waste (CDW) is typically composed mainly of soil and stone (representing the majority) but also concrete, brick, metals, bituminous mixtures, mixed CDW etc. Currently, the majority of CDW generated in Ireland is recycled, recovered, or reused. Where recycling, recovery or reuse is not feasible, it is disposed of at suitably licensed facilities.

The Proposed Scheme is located within the administrative area of Meath County Council, which is part of the Eastern-Midlands Region (EMR). There are over 80 licensed waste facilities within the region that are capable of the disposal of materials arising. This includes soil recovery facilities, integrated waste management facilities, waste to energy facilities and landfills. There are two small unlicensed and disused legacy dump sites close to Slane village, located to the west of the Proposed Scheme.

### 23.3 Significant Impacts and Mitigation

Most of the waste from the Proposed Scheme will arise during construction phase from site enabling works and site clearance. It is estimated that 60,000 m<sup>3</sup> of topsoil will be excavated for the Proposed Scheme with approximately 15,000 m<sup>3</sup> reused on site once the bypass and improvements works have been completed. The excess 45,000 m<sup>3</sup> of topsoil will have to be removed from site for reuse. A further approximately 520,000 m<sup>3</sup> of surplus soil and approximately 80,000 m<sup>3</sup> of surplus rock material will also arise following excavation along the entire mainline route. Four upstanding buildings will also be demolished to make way for the Proposed Scheme. Indirect effects that may arise from these activities such as noise, dust, nuisance, vehicle emissions etc. are assessed under the relevant EIA disciplines.

During the operational phase, ongoing maintenance of the roads and public realm area will generate more limited waste streams. The key waste streams include general road waste, drainage from roads, and litter waste from public realm. The waste hierarchy principles shall be fully implemented throughout the operational and maintenance phase to ensure that the circular economy approach is supported. Prevention, preparing for reuse, recycling and recovery will be enforced with appropriate waste management facilities chosen to accept disposed waste.

Any waste arising from the construction phase of the Proposed Scheme shall be deposited at an appropriate facility licensed facility in accordance with the current national waste policy. This is necessary so that all waste is disposed of to the best possible facility type to adhere to the circular economy and resource opportunity strategies.

## VOL. 1 NON-TECHNICAL SUMMARY

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The significance of effects from the amount of waste generated through vegetation removal, building demolition, excavation of topsoil and construction soils, general construction site waste, sediments from the road scheme drainage and individual waste are all deemed insignificant in EIA terms.

A Resource and Waste Management Plan (RWMP) will be prepared by the appointed Contractor to deliver the mitigation from the EIAR. The RWMP will be prepared in accordance with the Best Practice Guidelines for the Preparation of Resources & Waste Management Plans for Construction and Demolition Projects (EPA, 2021).

### 23.4 Residual Impacts

Following implementation of the mitigation measures, most excess or waste materials arising during the construction phase will be re-used either within the Proposed Scheme or reused at third party sites or will be sent for recovery/ recycling at authorised waste facilities. The residual effects following the implementation of mitigation measures are therefore considered to be minor, negative, and short term.

The waste generated during operation and maintenance of the Proposed Scheme will not be significant as it will mainly be associated with occasional maintenance works. The residual effect on resource and waste management is expected to be negligible.

## 24 RISK OF MAJOR ACCIDENTS AND/OR DISASTERS

### 24.1 Introduction

Major Accidents and/or Disasters considers the likelihood of the N2 Slane Bypass and Public Realm Enhancement Scheme ('the Proposed Scheme') to cause major accidents and disasters and also the project's vulnerability to the negative impacts resulting from potential major accidents and disasters, e.g. flooding, during both the construction and operational phases of the Proposed Scheme.

This assessment differs from the other specialist chapters in that it does not deal with likely significant effects but is instead focused on sudden events of low likelihood, which may conceivably occur, and which would result in major negative impacts on infrastructure, human health, cultural heritage and/or the environment (events of 'low likelihood but potentially high consequence'). Minor accident risks of relatively low consequence are not addressed in this section. This assessment does not deal with the impacts of gradual trends associated with climate change, e.g. sea level rise or increasing annual rainfall volumes. It does, however, address sudden events whose frequency may be increased as a result of climate change-related trends, e.g. extreme weather events.

### 24.2 Hazards/Risks and Mitigation

From examining all potential risk events associated with the Proposed Scheme, scenarios that were considered to be of the highest risk in terms of project vulnerability and its potential to cause such an event include but are not limited to the following: Accidents at Seveso Sites/ COMAH Establishments, events leading to structural collapse / damage to bridges, riverbank collapse, water pollution events, storm events and sinkholes/karst/fault line movements.

The assessment considered mitigation by design (where appropriate), and it was determined whether these are sufficient to mitigate the associated risk level(s) to be As Low As Reasonably Practicable (ALARP).

Where necessary, secondary mitigation measures have been specified which will be incorporated into the design of the proposed Project to mitigate the associated risk level(s) to be ALARP.

Following the implementation of secondary mitigation measures identified in the EIAR, all associated risk level(s) are expected to be ALARP.

### 24.3 Residual Impacts

Significant residual effects are not likely to occur during construction or operational phases of the Proposed Scheme once the identified design measures and secondary measures are applied.

## 25 SUMMARY OF CUMULATIVE EFFECTS

Cumulative effects result from the addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects. Additionally cumulative effects can be caused due to incremental changes by other past, present or reasonably foreseeable projects together with the Proposed Scheme.

The zone of influence considered for the cumulative impact assessment (CIA) takes into consideration the previously defined study areas in each of the respective specialist chapters of this EIAR (**Chapters 7 – 23**) which are informed by the appropriate guidance documents together with professional judgement associated with the potential for cumulative environmental effects to occur based on the location, nature, and characteristics of the cumulative effects of projects with the Proposed Scheme.

The main aspect of the CIA relates to the assessment of existing and/ or approved projects with the Proposed Scheme. A staged approach was applied in order to undertake the CIA as follows:

- **Stage 1:** The ZoI was defined and a desk study was then undertaken to source publicly-available information on projects within the CIA ZoI using planning databases and other available sources to identify other projects falling within the ZoI. Once the long list of projects was collated, a number of assumptions were developed and applied in order to create a list of projects (80 no.) which may have the potential to give rise to cumulative effects with the Proposed Scheme.
- **Stage 2:** The list of 80 projects was then brought forward to the next stage in order for each EIA specialist to carry out a screening exercise to identify the potential for cumulative effects with the Proposed Scheme. This screening exercise was carried out in accordance with a set of defined screening criteria (grounds for screening-in or out) in order to identify which projects should be considered in the assessment of cumulative effects.
- **Stage 3:** This stage comprised the detailed assessment which considered the potential cumulative impacts of the projects screened-in during Stage 2 alongside the Proposed Scheme. The CIA for each topic used the same language as that used for the impact assessments as set out in the methodology sections for each topic chapter.

Overall, the majority of topic areas did not identify potential for any significant cumulative effects with other projects. The exception to this was the climate chapter which identified cumulative effects with other developments arising from embodied carbon required for materials. In the light of the climate crisis, this requirement for material was seen as a cumulative adverse effect.

The cumulative assessments of existing and approved projects/ developments are presented within **Chapters 7 – 23**. The detailed methodology for compiling the other approved projects/ developments is presented in **Chapter 25 – Cumulative Effects** in **Volume 2** of this EIAR.

## 26 INTERACTIONS BETWEEN THE ENVIRONMENTAL FACTORS

In addition to the assessment of impacts on individual environmental topics, the potential interactions between these factors have also been considered as part of the topic-specific assessments. **Table 26-1** shows the principal interactions / interrelationships identified for the Proposed Scheme. The nature and magnitude of all identified interactions / interrelationships was assessed under the interrelated environmental topics and mitigation measures applied where required.

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Table 26-1: Interactive Effects Summary Matrix

	Traffic & Transport		Population		Noise & Vibration		Air Quality & Climate		Human Health		Landscape & Visual		Archaeological & Cultural Heritage		Architectural Heritage		Biodiversity (Terrestrial & Aquatic)		Water		Land, Soils, Geology & Hydrogeology		Material Assets: Agricultural Properties		Material Assets: Non-agricultural Properties & Utilities		Material Assets: Resource & Waste Management		
	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	
Traffic & Transport																													
Population	✓	✓																											
Noise & Vibration	✓	✓	✓	✓																									
Air Quality & Climate	✓	✓	✓	✓	-	-																							
Human Health	✓	✓	✓	✓	✓	✓	✓	✓																					
Landscape & Visual	✓	✓	✓	✓	✓	✓	-	-	-	-																			
Archaeological & Cultural Heritage	-	-	-	-	-	-	-	-	-	-	✓	✓																	
Architectural Heritage	✓	✓	-	-	✓	✓	-	-	-	-	✓	✓	✓	✓															
Biodiversity (Terrestrial & Aquatic)	✓	✓	-	-	✓	✓	✓	✓	-	-	✓	✓	✓	-	✓	-													
Water	✓	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓											
Land, Soils, Geology & Hydrogeology	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓									
Material Assets: Agricultural Properties	✓	-	-	-	✓	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-							
Material Assets: Non-agricultural Properties & Utilities	✓	-	-	-	✓	-	✓	-	-	-	✓	✓	-	-	-	-	✓	-	-	-	-	-	✓	-					
Material Assets: Resource & Waste Management	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-			

Note: C = Construction Phase, O = Operational Phase.

## 27 SUMMARY OF ENVIRONMENTAL COMMITMENTS

The Schedule of Environmental Commitments presents a summary of the mitigation measures identified as a result of undertaking the environmental impact assessments, as well as the mitigation measures detailed in the Natura Impact Statement which has been carried out to inform the Appropriate Assessment process.

From the inception of the design and environmental assessment processes of the Proposed Scheme, the project team has strived to avoid, prevent and reduce adverse effects, which are incorporated into the design drawings and specifications for the Proposed Scheme that have been assessed as part of the EIAR and NIS.

Avoidance of impacts is most applicable at the earliest stages of a scheme, whereas prevention has taken place during the design and environmental assessments process between the design team and EIA team. Mitigation is a last resort and can include a remedy or offsetting of adverse effects. For example, this can apply when for instance a scheme cannot avoid significant effects due to their need to locate on a particular site etc.

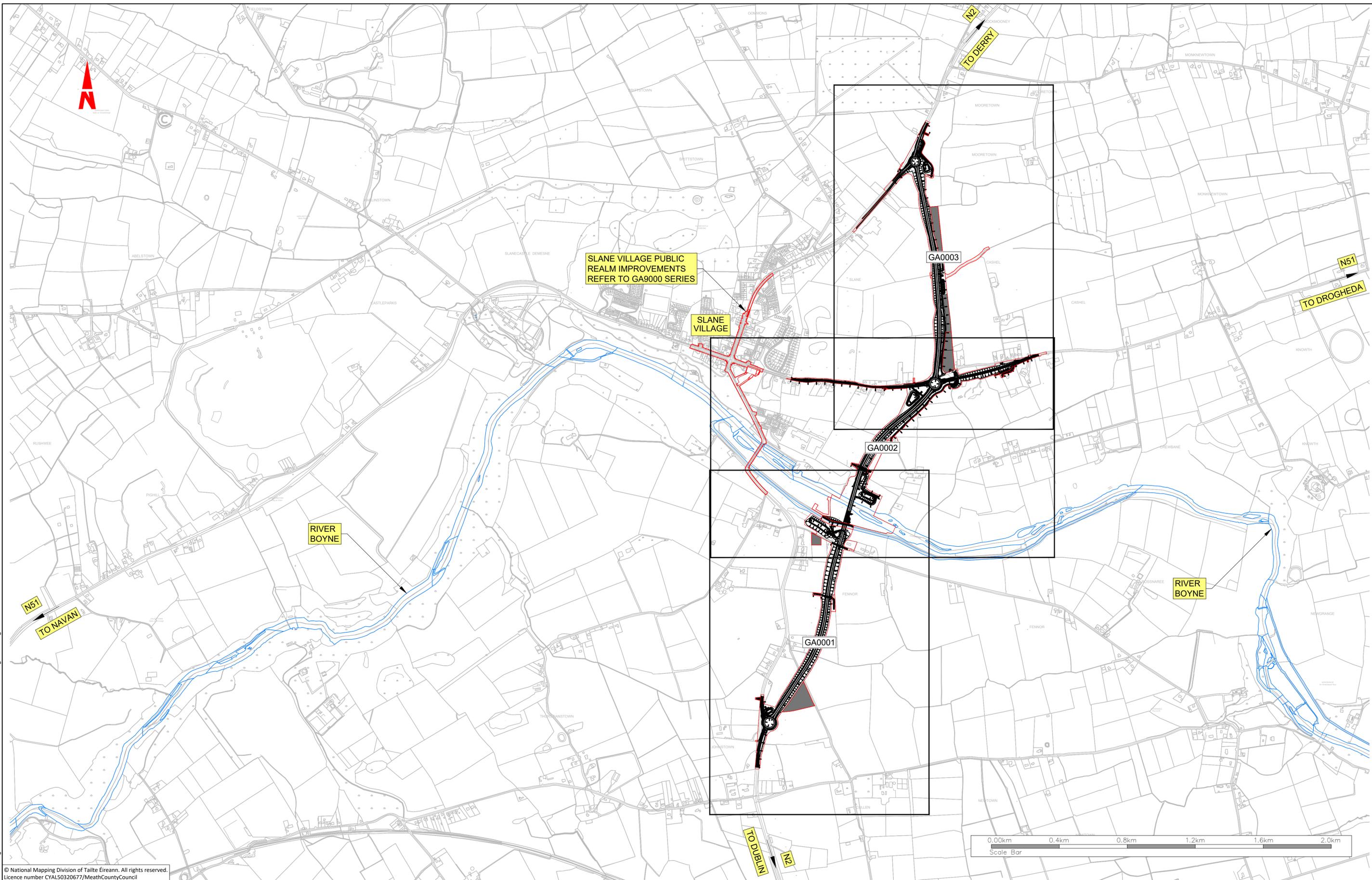
Where likely significant environmental effects have been identified during the EIA and AA processes, measures will be implemented to mitigate these effects as much as reasonably possible, with any residual effects identified in the relevant chapters of this EIAR. The objective of this chapter is to provide a central location where all measures from the preceding chapters are presented together for both ease of reference and inclusion in the contract documents at a later stage of the Proposed Scheme.

All of the mitigation commitments in EIAR are also incorporated into the Environmental Operating Plan (EOP) included as part of this EIAR.

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**Appendix 1**  
**Scheme Drawings**

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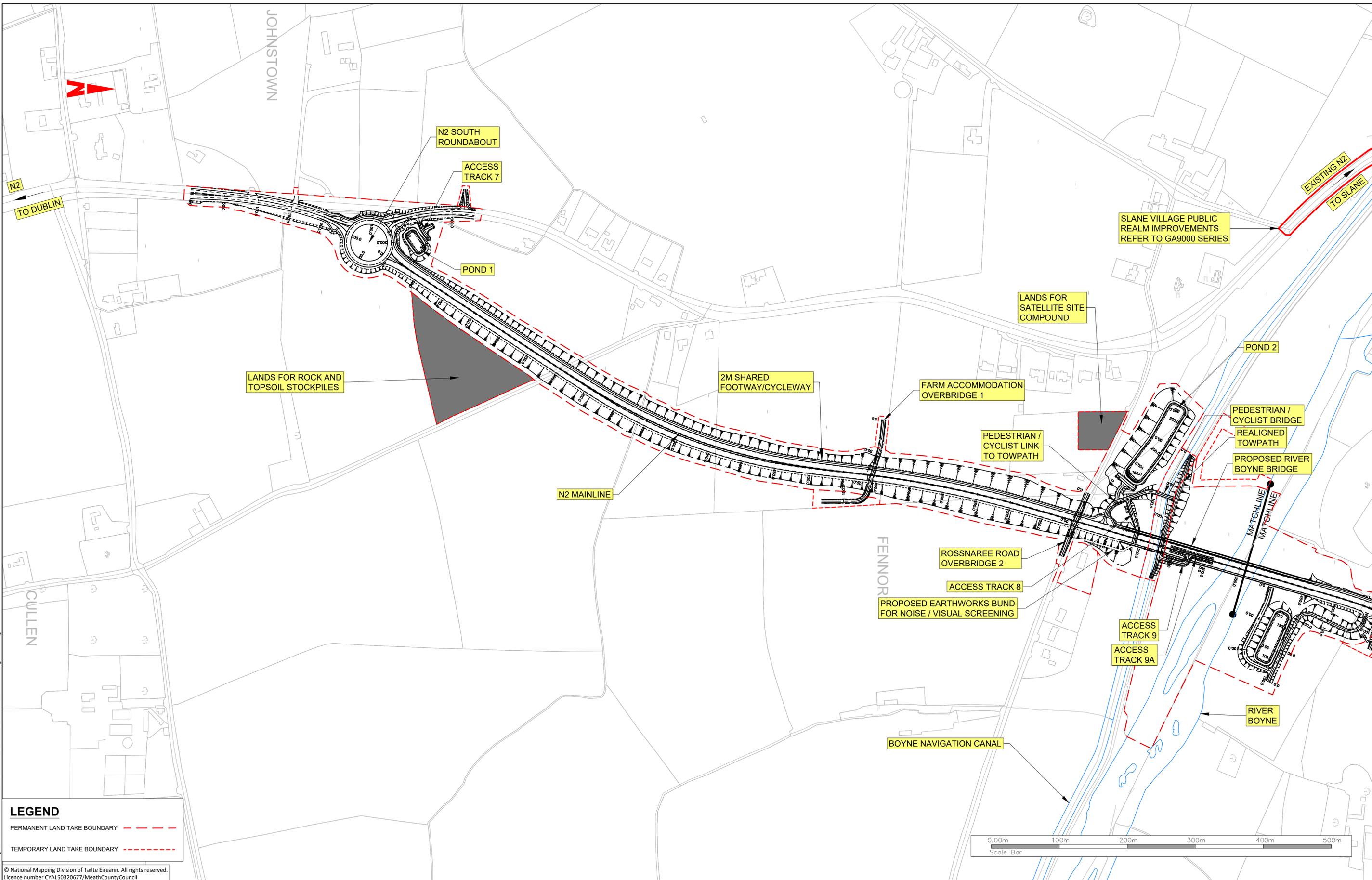
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Project **N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME**

Title **GENERAL ARRANGEMENT INDEX PLAN OF SHEETS**

Drawing Number	Status	Rev
GA0000	A1	C01

File Identifier  
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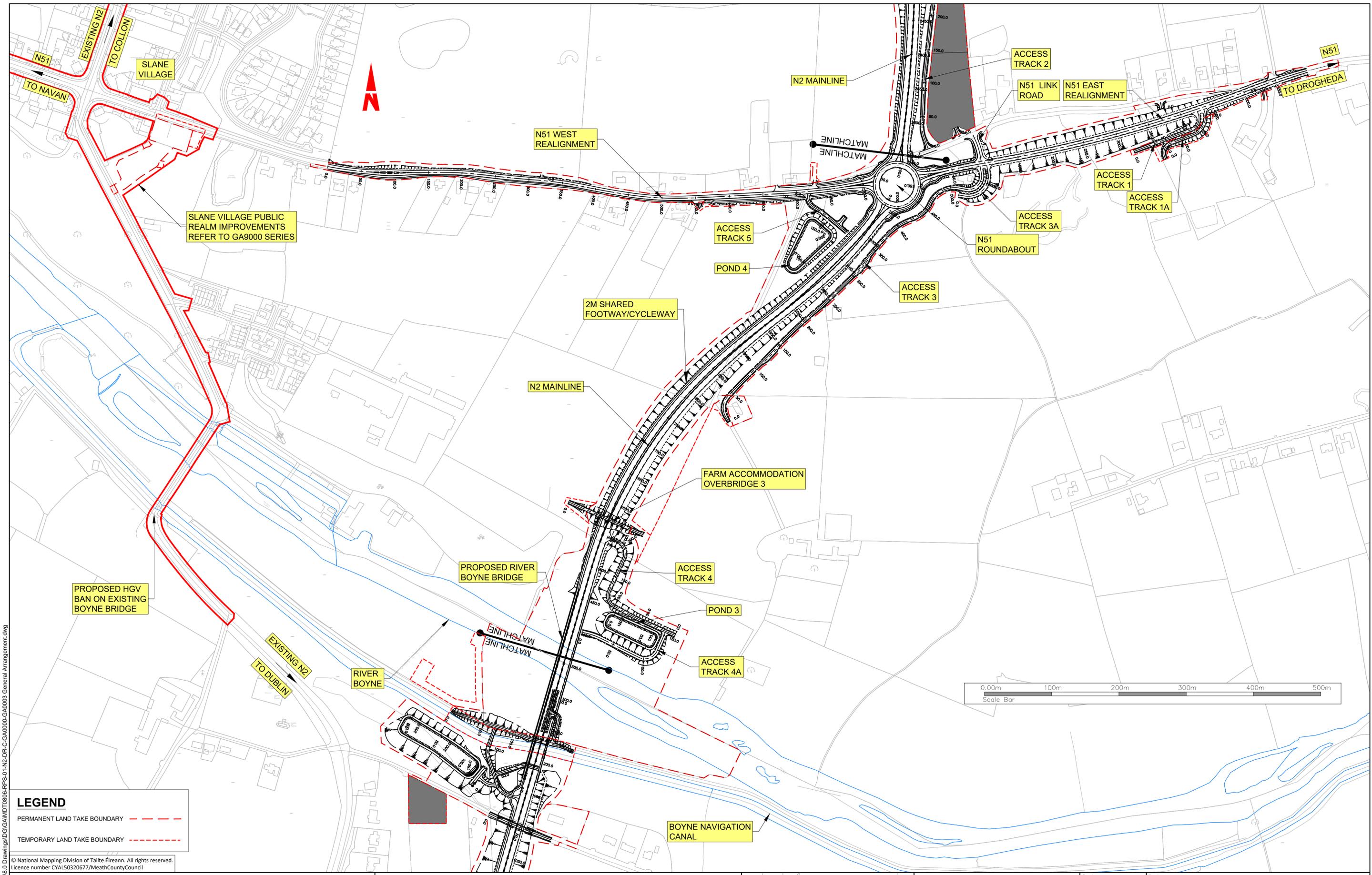
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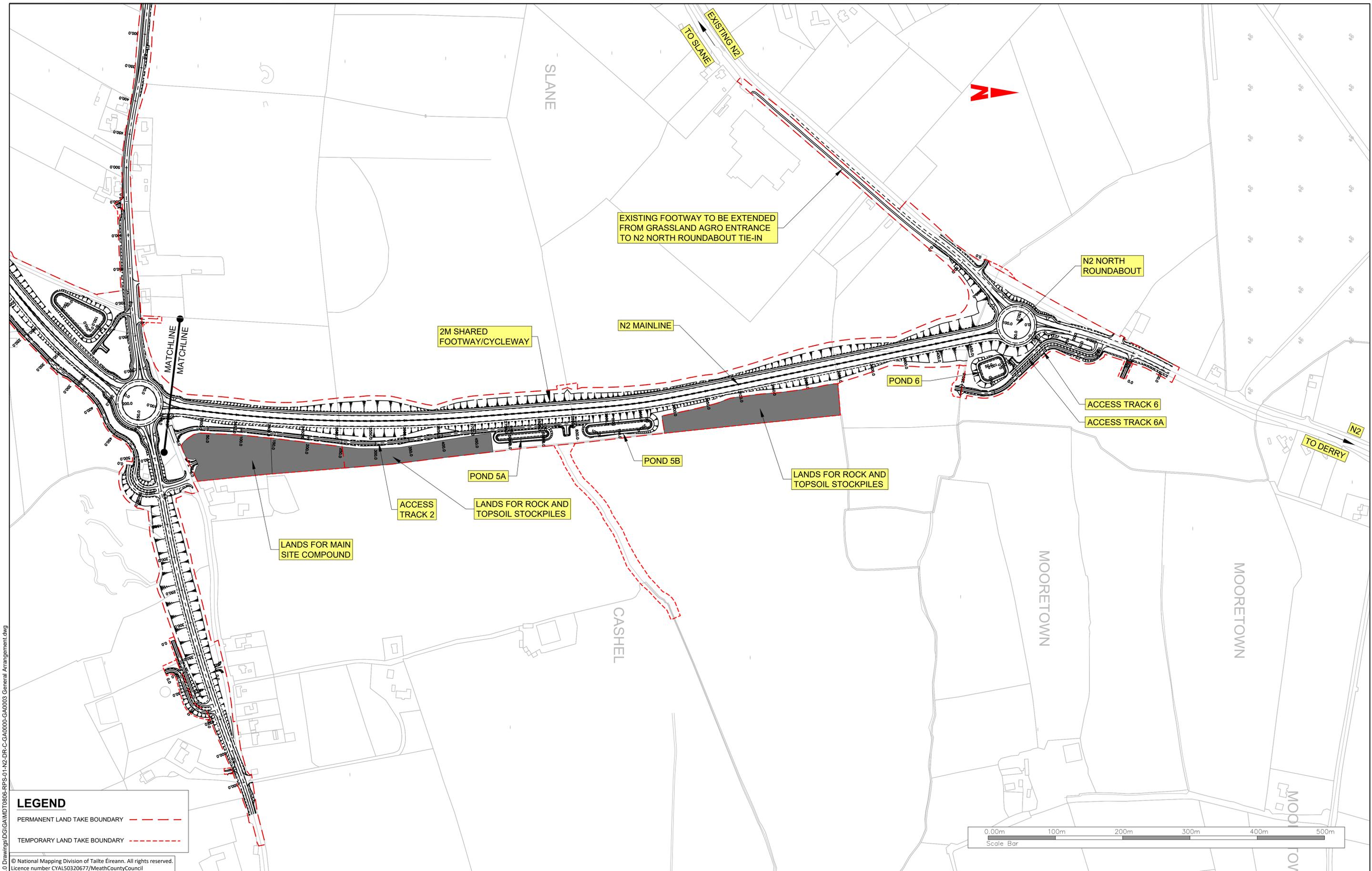
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Project	<b>N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME</b>		
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Drawing Number	GA0002	Status	A1
Rev	C01		

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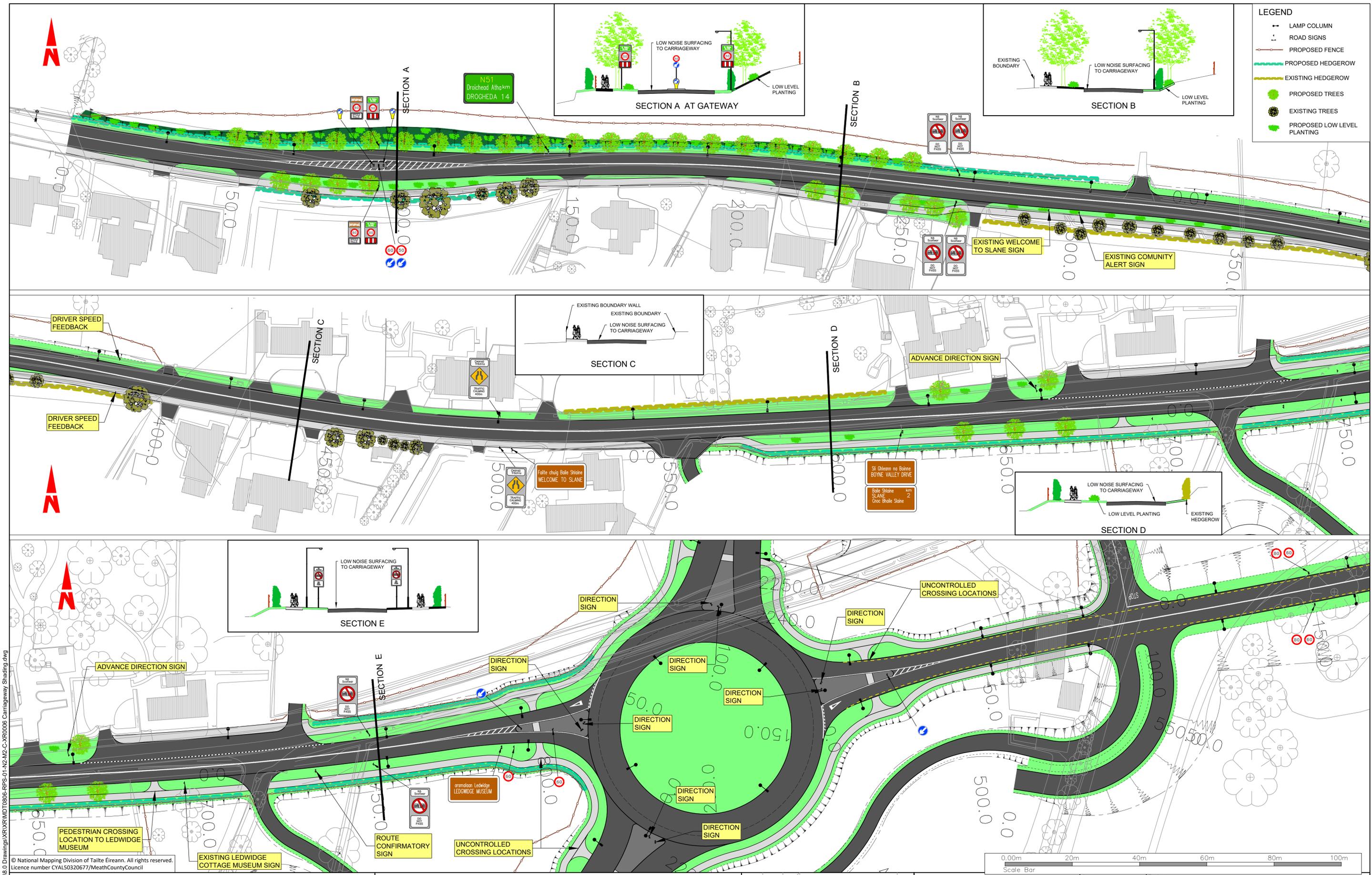
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Created on: 29/10/2020

Sheets: 03 of 03

Project: <b>N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME</b>		
Title: <b>GENERAL ARRANGEMENT SHEET 3 OF 3</b>		
Drawing Number: GA0003	Status: A1	Rev: C01

R:\MDT0806\_N2\_Slane Bypass\8\_0 Drawings\01\GA\MDT0806-RPS-01-N2-DR-C-GA0000-GA0003 General Arrangement.dwg



**LEGEND**

- LAMP COLUMN
- ROAD SIGNS
- PROPOSED FENCE
- PROPOSED HEDGEROW
- EXISTING HEDGEROW
- PROPOSED TREES
- EXISTING TREES
- PROPOSED LOW LEVEL PLANTING

Client

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Scale	1:500 @ A1 1:1000 @ A3
Created on	12/03/21
Sheets	01 of 01

**Project** N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME

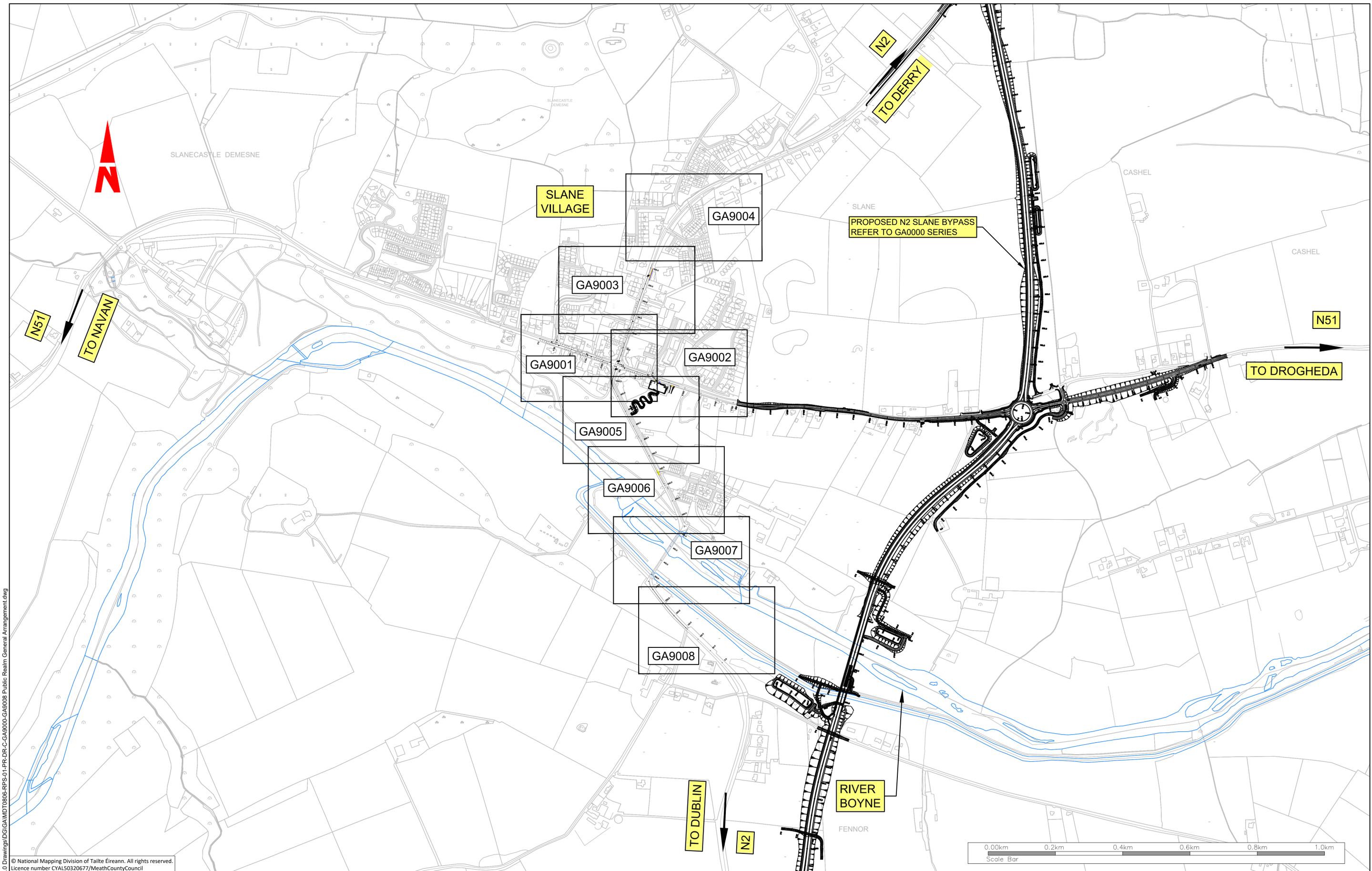
**Title** GENERAL ARRANGEMENT N51 WEST ARRANGEMENT

Drawing Number GA2201

Status A1

Rev C01

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 00 of 08

Project  
**N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME**

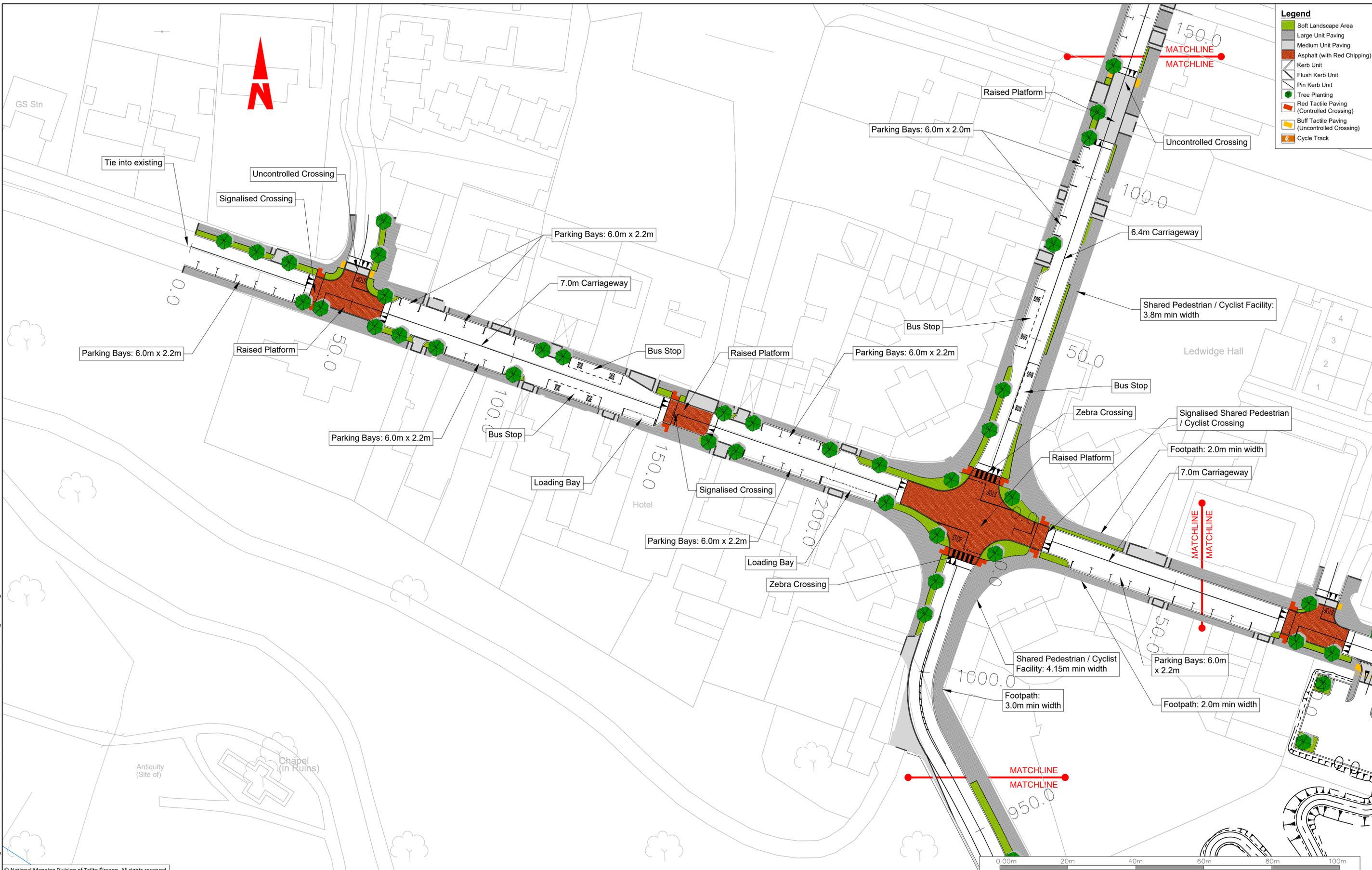
Title  
 PUBLIC REALM ENHANCEMENT AREA  
 GENERAL ARRANGEMENT  
 INDEX PLAN OF SHEETS

Drawing Number  
 GA9000

Status  
 A1

Rev  
 C01

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- Legend**
- Soft Landscape Area
  - Large Unit Paving
  - Medium Unit Paving
  - Asphalt (with Red Chipping)
  - Kerb Unit
  - Flush Kerb Unit
  - Pin Kerb Unit
  - Tree Planting
  - Red Tactile Paving (Controlled Crossing)
  - Buff Tactile Paving (Uncontrolled Crossing)
  - Cycle Track

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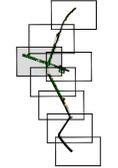
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Project  
**N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME**

Title  
**PUBLIC REALM ENHANCEMENT AREA GENERAL ARRANGEMENT SHEET 1 OF 8**

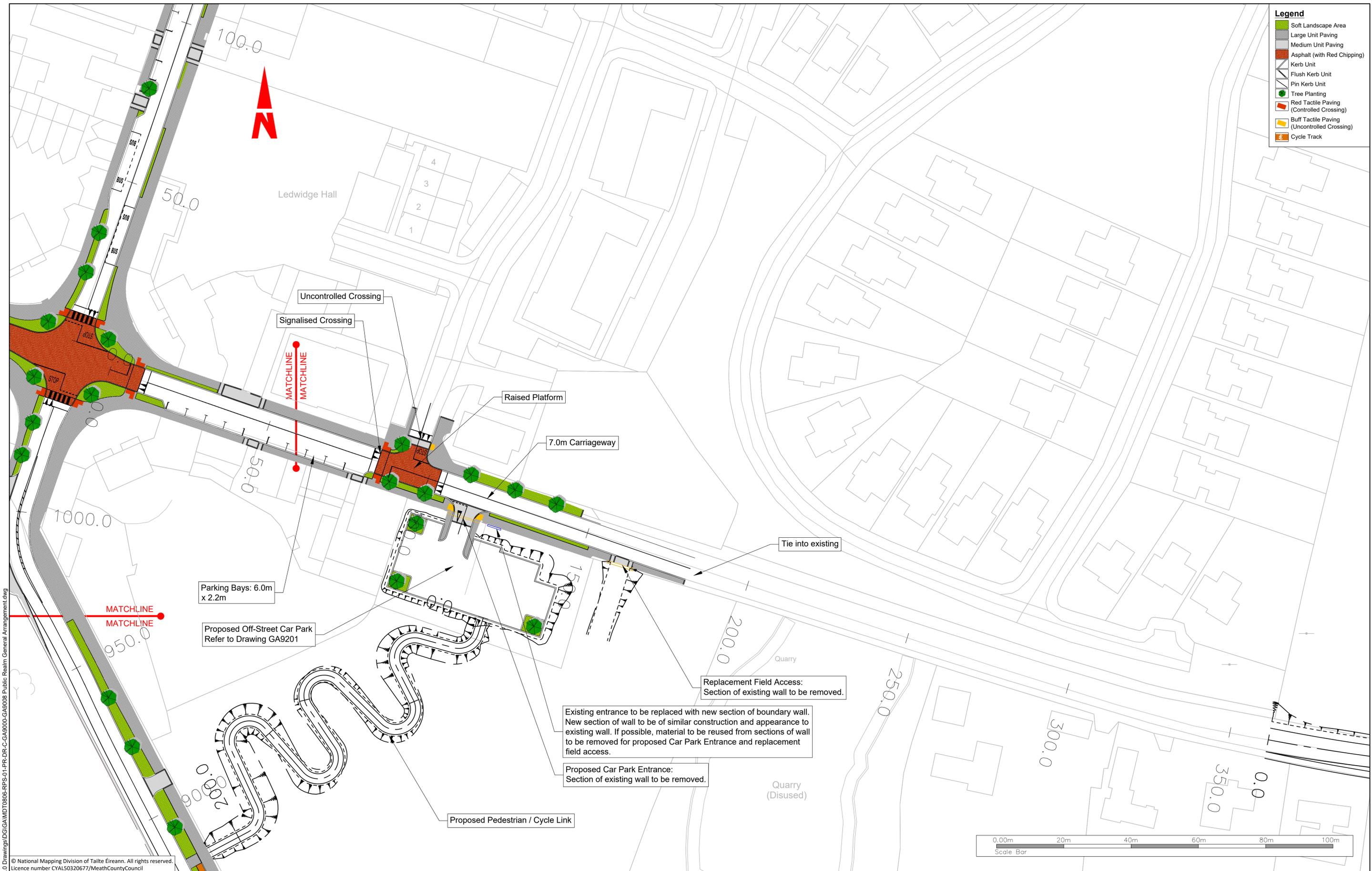
Drawing Number  
GA9001

Status  
A1

Rev  
C01

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- Legend**
- Soft Landscape Area
  - Large Unit Paving
  - Medium Unit Paving
  - Asphalt (with Red Chipping)
  - Kerb Unit
  - Flush Kerb Unit
  - Pin Kerb Unit
  - Tree Planting
  - Red Tactile Paving (Controlled Crossing)
  - Buff Tactile Paving (Uncontrolled Crossing)
  - Cycle Track



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Sheets	02 of 08

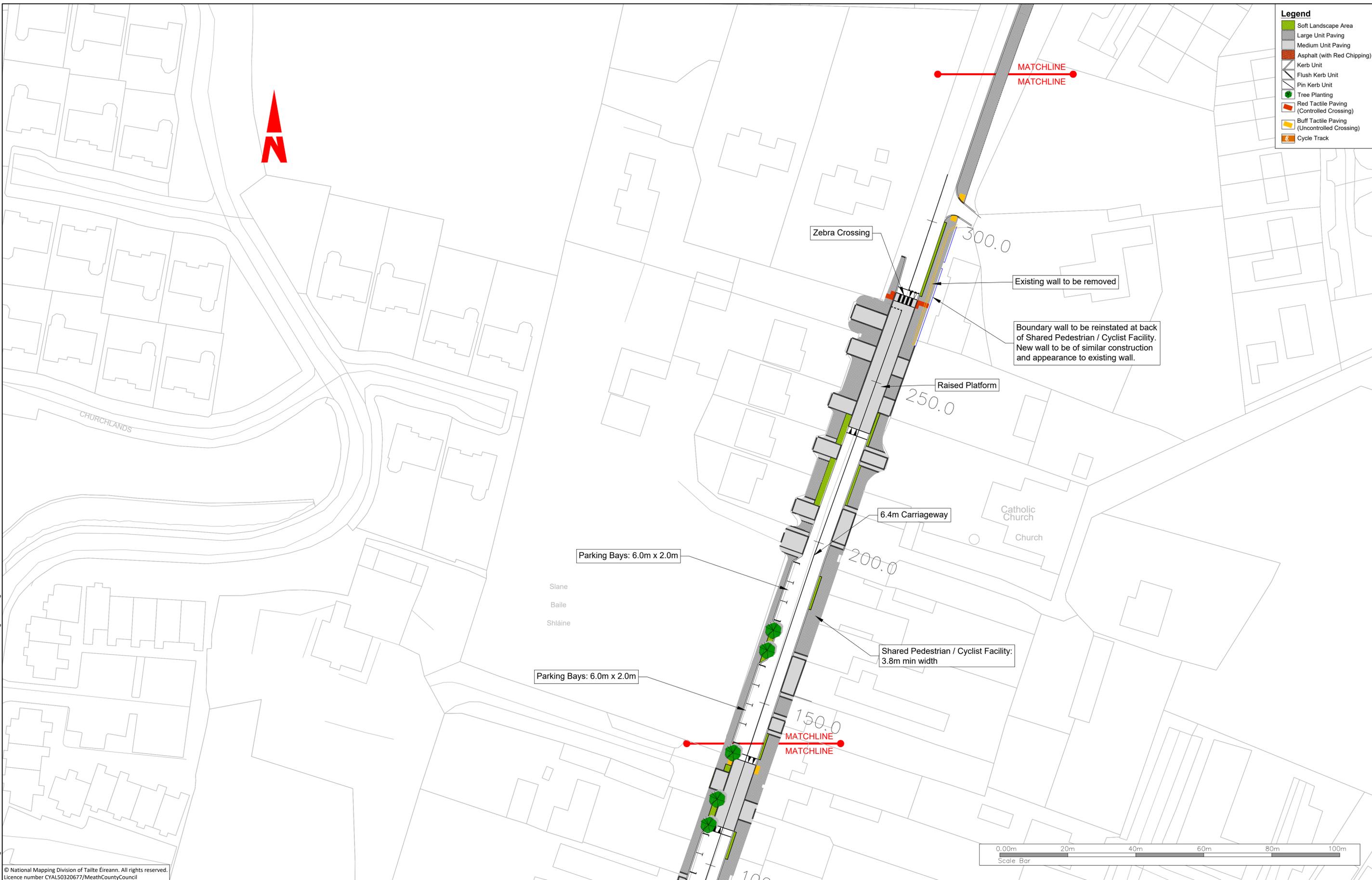
Project **N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME**

Title **PUBLIC REALM ENHANCEMENT AREA GENERAL ARRANGEMENT SHEET 2 OF 8**

Drawing Number	Status	Rev
GA9002	A1	C01

File Identifier  
MDT0806-RPS-01-PR-DR-C-GA9000-GA9008

- Legend**
- Soft Landscape Area
  - Large Unit Paving
  - Medium Unit Paving
  - Asphalt (with Red Chipping)
  - Kerb Unit
  - Flush Kerb Unit
  - Pin Kerb Unit
  - Tree Planting
  - Red Tactile Paving (Controlled Crossing)
  - Buff Tactile Paving (Uncontrolled Crossing)
  - Cycle Track



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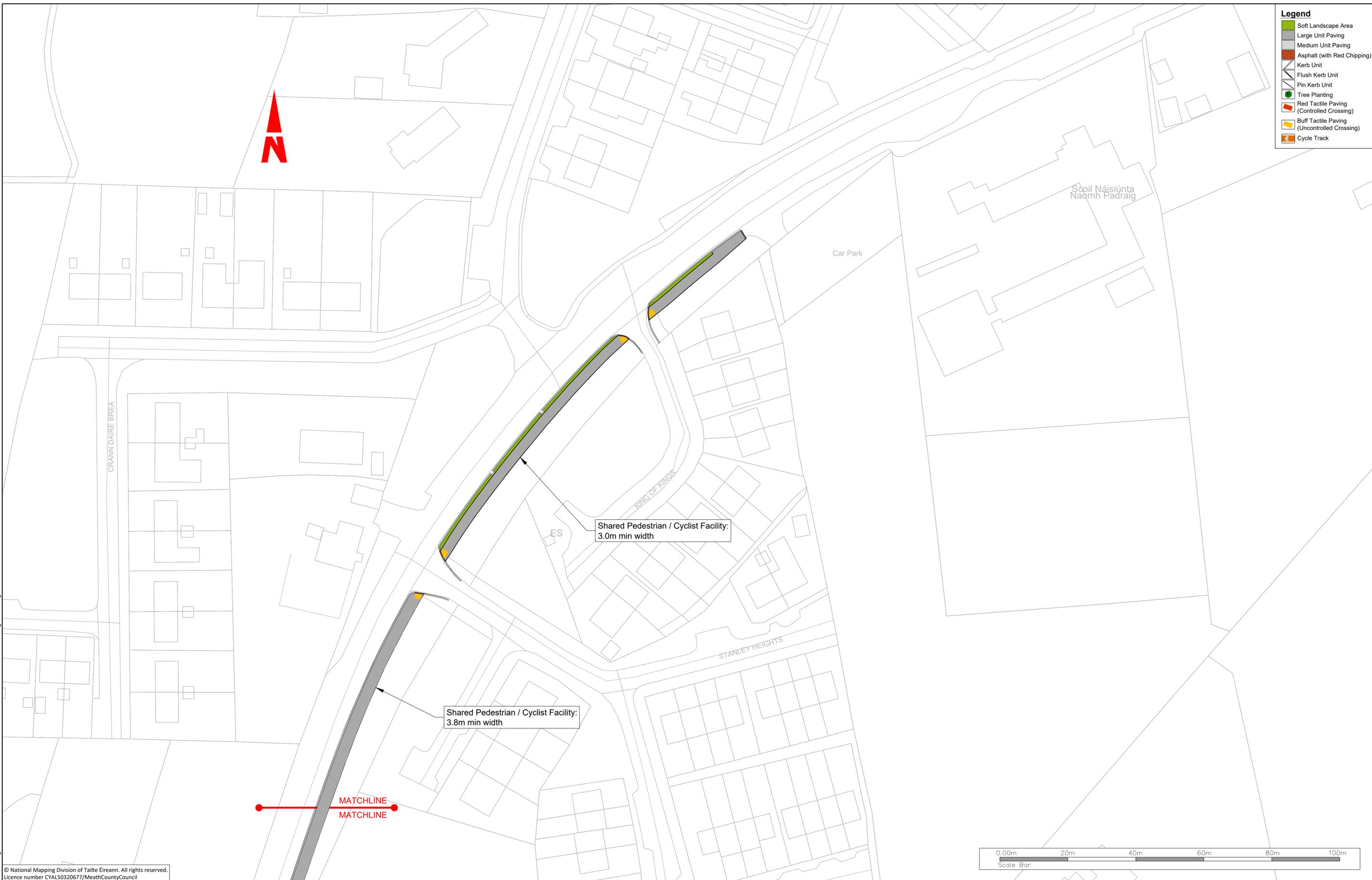
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Created on	12/07/2021
Sheets	03 of 08

Project **N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME**

Title **PUBLIC REALM ENHANCEMENT AREA GENERAL ARRANGEMENT SHEET 3 OF 8**

Drawing Number	GA9003	Status	A1	Rev	C01
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- Legend**
-  Soft Landscape Area
  -  Large Unit Paving
  -  Medium Unit Paving
  -  Asphalt (with Red Chipping)
  -  Kerb Unit
  -  Flush Kerb Unit
  -  Pin Kerb Unit
  -  Tree Planting
  -  Red Tactile Paving (Controlled Crossing)
  -  Buff Tactile Paving (Uncontrolled Crossing)
  -  Cycle Track



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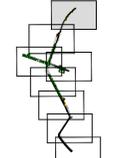
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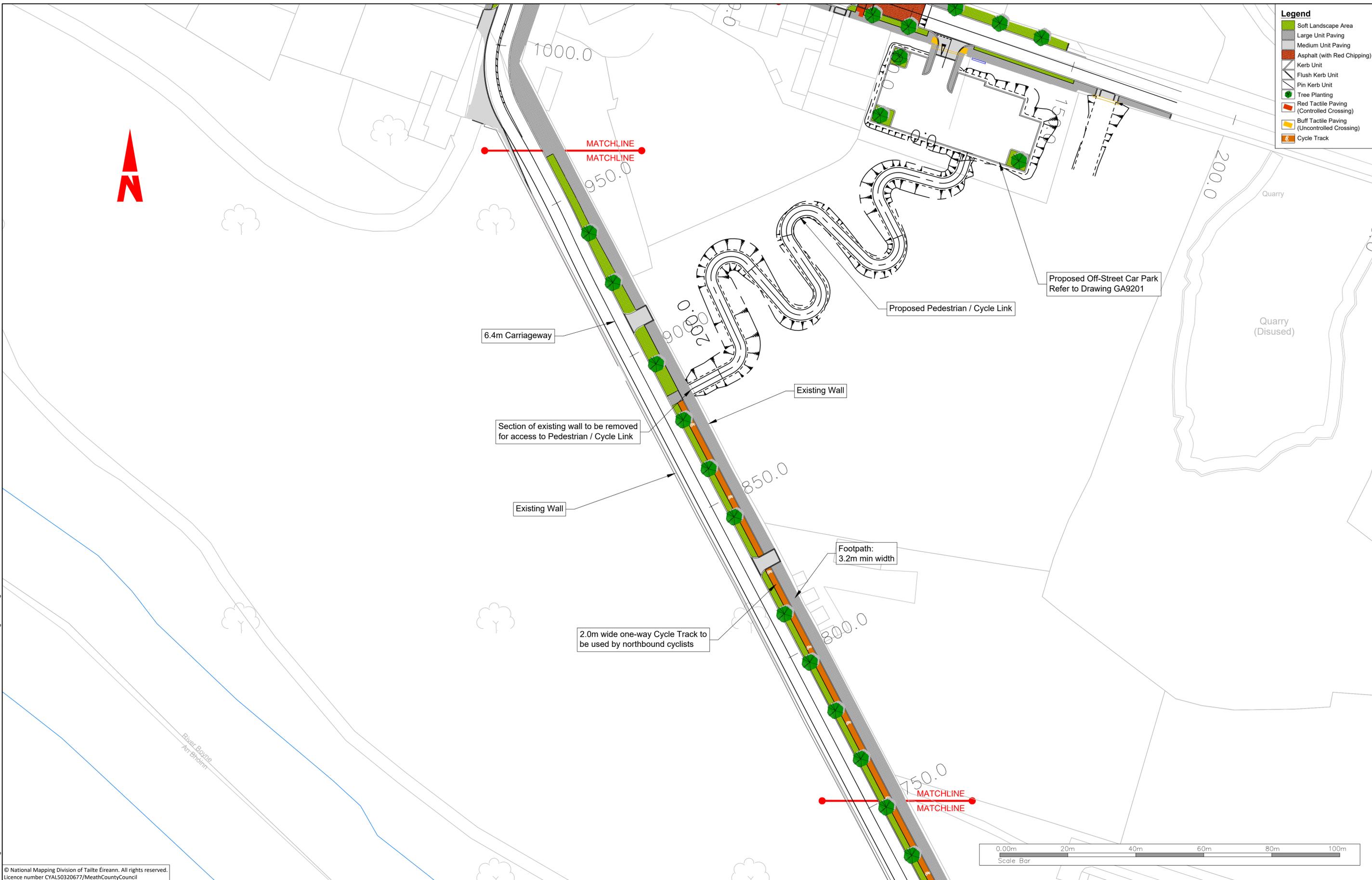
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Sheets	04 of 08

Project <b>N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME</b>		
Title PUBLIC REALM ENHANCEMENT AREA GENERAL ARRANGEMENT SHEET 4 OF 8		
Drawing Number GA9004	Status A1	Rev C01

File Identifier  
MDT0806-RPS-01-PR-DR-C-GA9000-GA9008

- Legend**
- Soft Landscape Area
  - Large Unit Paving
  - Medium Unit Paving
  - Asphalt (with Red Chipping)
  - Kerb Unit
  - Flush Kerb Unit
  - Pin Kerb Unit
  - Tree Planting
  - Red Tactile Paving (Controlled Crossing)
  - Buff Tactile Paving (Uncontrolled Crossing)
  - Cycle Track



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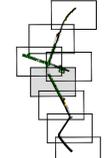
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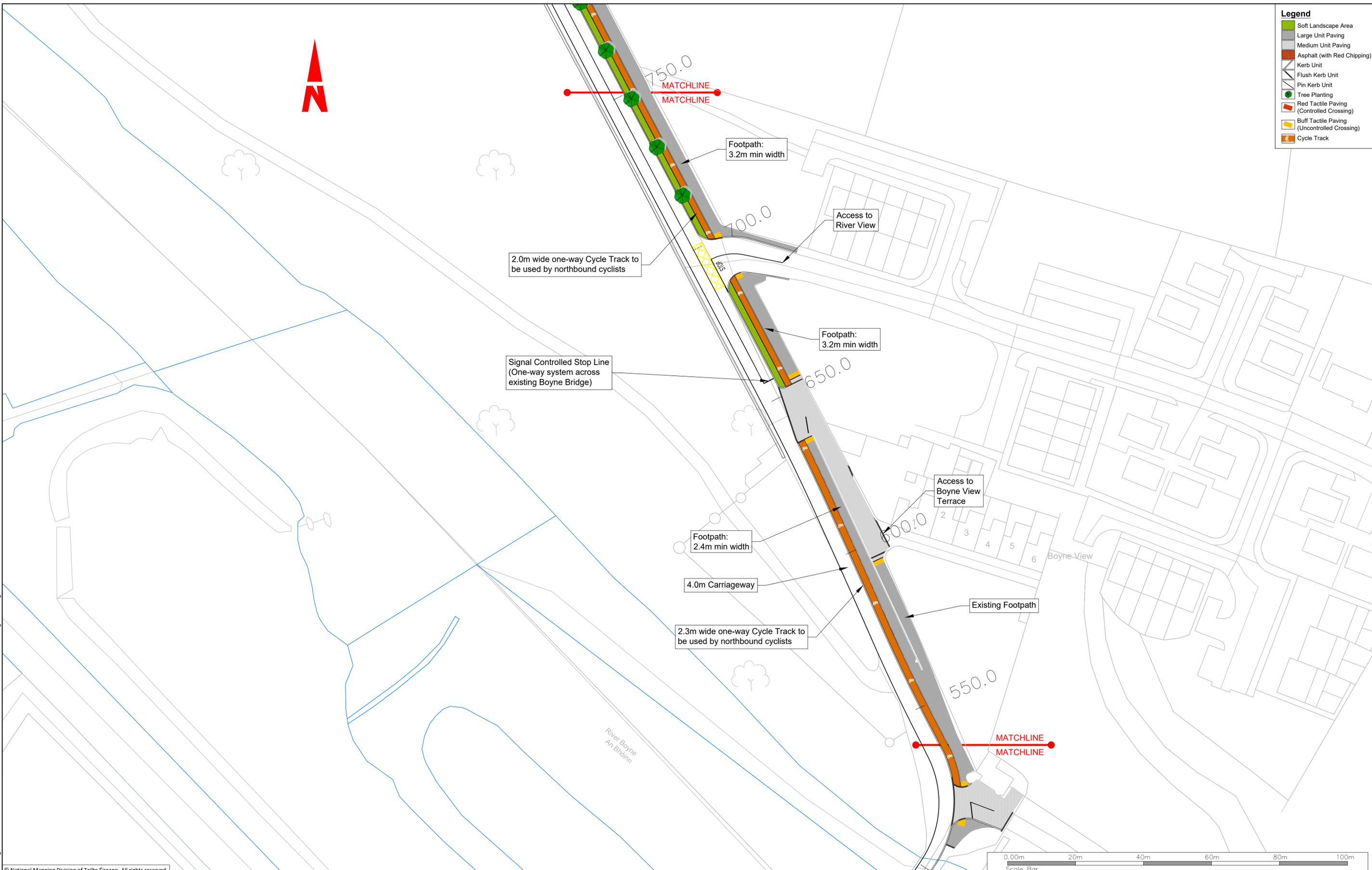
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1:1000 @ A3

Created on  
12/07/2021

Sheets  
05 of 08

Project <b>N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME</b>		
Title PUBLIC REALM ENHANCEMENT AREA GENERAL ARRANGEMENT SHEET 5 OF 8		
Drawing Number GA9005	Status A1	Rev C01

File Identifier  
MDT0806-RPS-01-PR-DR-C-GA9000-GA9008



**Legend**

- Soft Landscape Area
- Large Unit Paving
- Medium Unit Paving
- Asphalt (with Red Chipping)
- Kerb Unit
- Flush Kerb Unit
- Pin Kerb Unit
- Tree Planting
- Red Tactile Paving (Controlled Crossing)
- Buff Tactile Paving (Uncontrolled Crossing)
- Cycle Track

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1: 500 @ A1  
1:1000 @ A3

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06 of 08

Project  
**N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME**

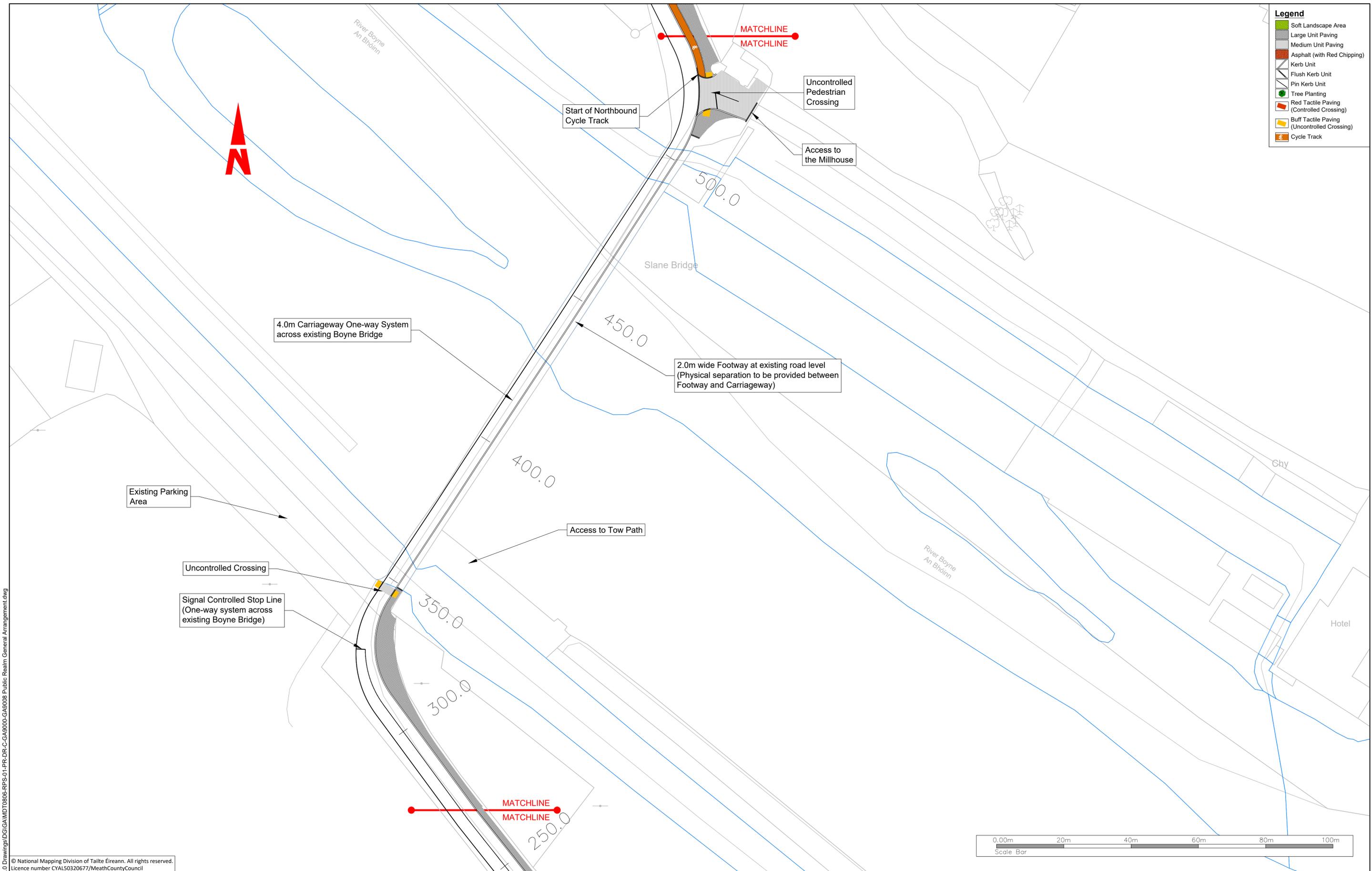
Title  
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GENERAL ARRANGEMENT  
SHEET 6 OF 8

Drawing Number  
GA9006

Status  
A1

Rev  
C01

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**Legend**

- Soft Landscape Area
- Large Unit Paving
- Medium Unit Paving
- Asphalt (with Red Chipping)
- Kerb Unit
- Flush Kerb Unit
- Pin Kerb Unit
- Tree Planting
- Red Tactile Paving (Controlled Crossing)
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- Cycle Track

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1:1000 @ A3

Created on: 12/07/2021

Sheets: 07 of 08

Project: **N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME**

Title: **PUBLIC REALM ENHANCEMENT AREA GENERAL ARRANGEMENT SHEET 7 OF 8**

Drawing Number: GA9007

Status: A1

Rev: C01

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- Legend**
-  Soft Landscape Area
  -  Large Unit Paving
  -  Medium Unit Paving
  -  Asphalt (with Red Chipping)
  -  Kerb Unit
  -  Flush Kerb Unit
  -  Pin Kerb Unit
  -  Tree Planting
  -  Red Tactile Paving (Controlled Crossing)
  -  Buff Tactile Paving (Uncontrolled Crossing)
  -  Cycle Track



MATCHLINE  
MATCHLINE

250.0

200.0

Pedestrian Facility to extend to existing Lay-by

150.0

Tie into existing

Existing Lay-by

100.0

50.0

0.0

Graveyard  
Church (in Ruins)



R:\MDT0806\_N2\_Slane Bypass\8\_0 Drawings\DWG\MDT0806-RPS-01-PR-DR-C-GA9000-GA9008 Public Realm General Arrangement.dwg

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C01	12/06/23	MM	FINAL ISSUE	MM



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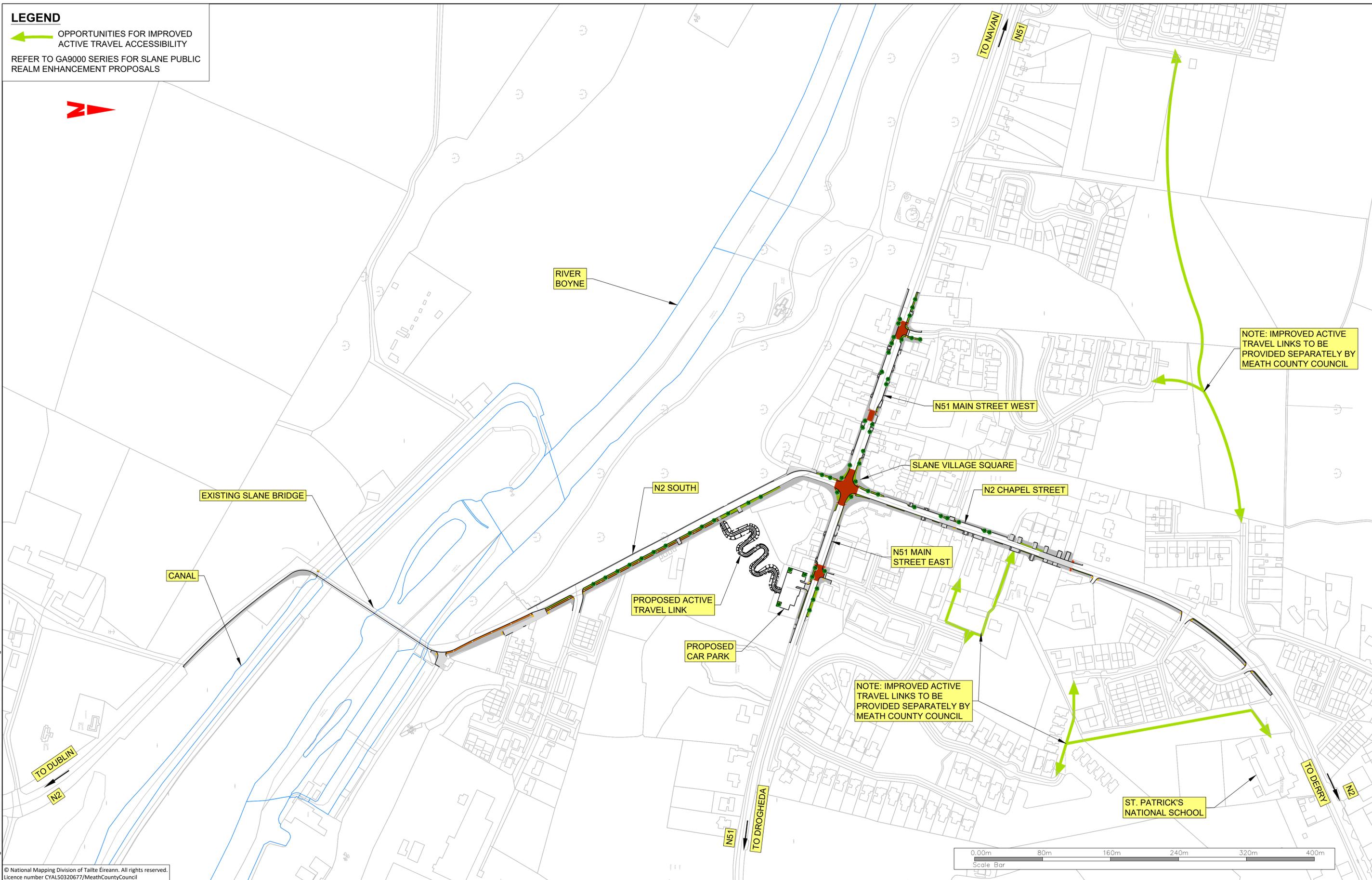
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Scale	1: 500 @ A1 1:1000 @ A3
Created on	12/07/2021
Sheets	08 of 08

Project	<b>N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME</b>		
Title	PUBLIC REALM ENHANCEMENT AREA GENERAL ARRANGEMENT SHEET 8 OF 8		
Drawing Number	GA9008	Status	A1
Rev	C01		

File Identifier  
MDT0806-RPS-01-PR-DR-C-GA9000-GA9008

**LEGEND**  
 ← OPPORTUNITIES FOR IMPROVED ACTIVE TRAVEL ACCESSIBILITY  
 REFER TO GA9000 SERIES FOR SLANE PUBLIC REALM ENHANCEMENT PROPOSALS



NOTE: IMPROVED ACTIVE TRAVEL LINKS TO BE PROVIDED SEPARATELY BY MEATH COUNTY COUNCIL

NOTE: IMPROVED ACTIVE TRAVEL LINKS TO BE PROVIDED SEPARATELY BY MEATH COUNTY COUNCIL

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Client

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Department of Transport

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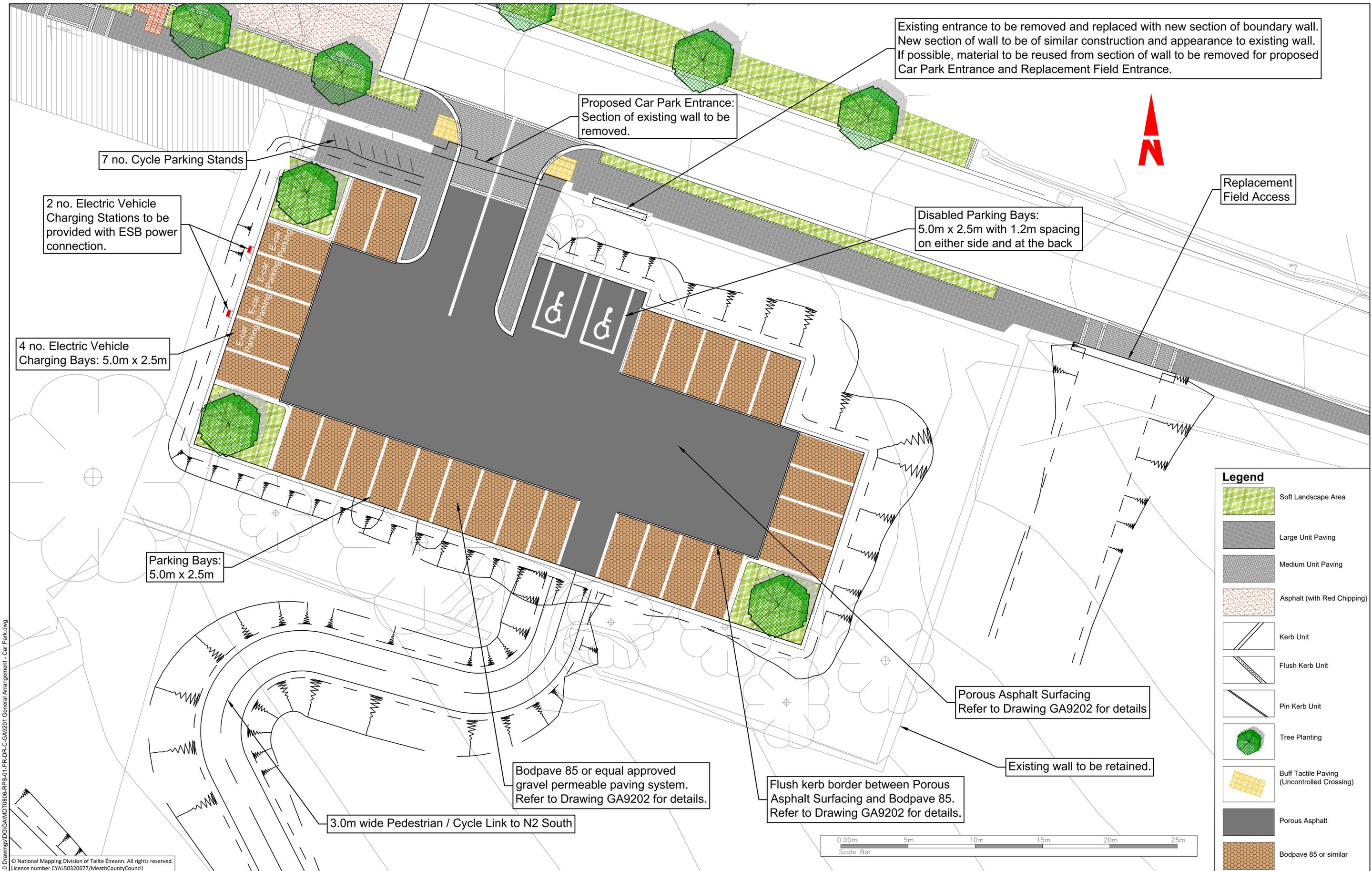
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File Identifier  
MDT0806-RPS-01-PR-DR-C-GA9101 Public

Scale	1:2,000 @ A1 1:4,000 @ A3
Created on	12/07/2021
Sheets	01 of 01

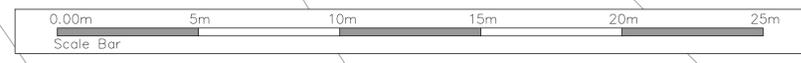
Project	<b>N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME</b>		
Title	PUBLIC REALM ENHANCEMENT AREA OVERVIEW		
Drawing Number	GA9101	Status	A1
Rev	C01		

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**Legend**

- Soft Landscape Area
- Large Unit Paving
- Medium Unit Paving
- Asphalt (with Red Chipping)
- Kerb Unit
- Flush Kerb Unit
- Pin Kerb Unit
- Tree Planting
- Buff Tactile Paving (Uncontrolled Crossing)
- Porous Asphalt
- Bodpave 85 or similar



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C01	13/06/23	MB	MB	FINAL ISSUE	MB

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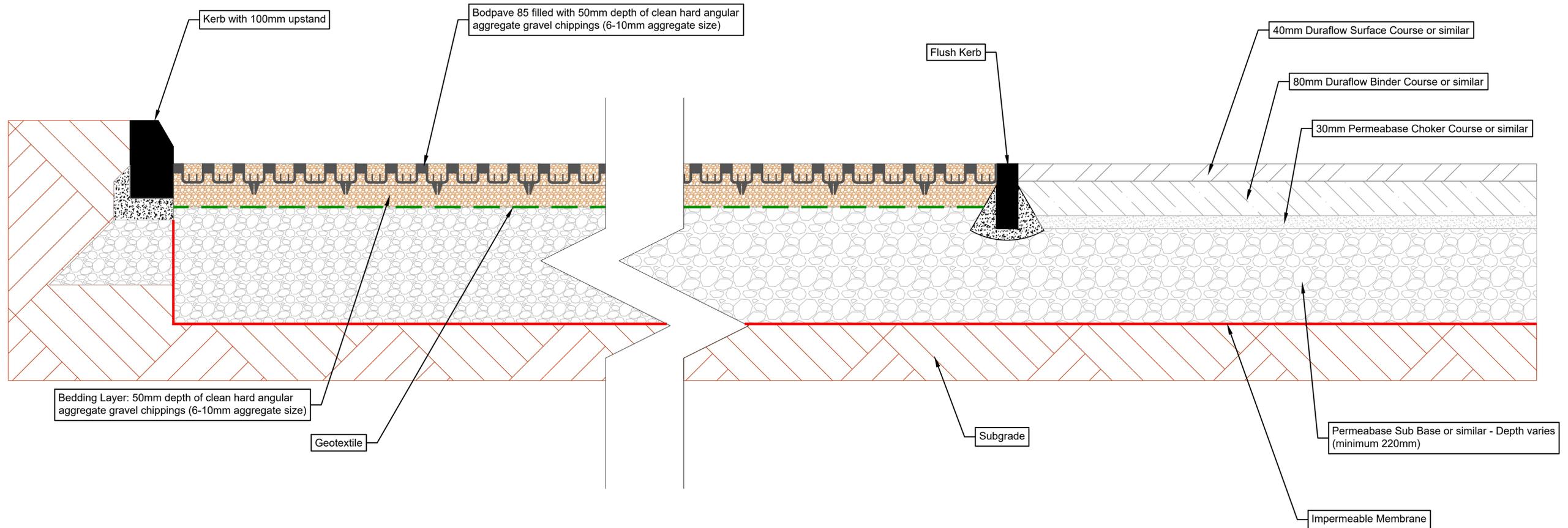
Project: **N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME**

Title: **PUBLIC REALM ENHANCEMENT AREA GENERAL ARRANGEMENT CAR PARK LAYOUT**

Drawing Number: GA9201

Status: A1

Rev: C01



**CAR-PARK TYPICAL PAVEMENT DETAIL**

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02 of 02

Project	<b>N2 SLANE BYPASS AND PUBLIC REALM ENHANCEMENT SCHEME</b>		
Title	PUBLIC REALM ENHANCEMENT AREA GENERAL ARRANGEMENT CAR PARK PAVEMENT DETAILS		
Drawing Number	GA9202	Status	A1
Rev	C01		

File Identifier  
MDT0806-RPS-01-PR-DR-C-GA9201 Genera