



# N81 WHITESTOWN LOWER PROJECT AND N81 HANGMAN'S BEND AND TUCKMILL PROJECT

## Constraints Study Report

February 2024



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# N81 Whitestown Lower Project and N81 Hangman's Bend and Tuckmill Project

## Constraints Study Report

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## 1. INTRODUCTION

Wicklow County Council, in conjunction with Transport Infrastructure Ireland (TII) have appointed Roughan and O'Donovan Consulting Engineers as technical advisors to progress the project, N81 Whitestown Lower Project (Section 1) and N81 Hangman's Bend and Tuckmill Project (Section 2), from consideration of Options (which may include looking at both on-line and off-line options), selection of Preferred Improvement Options, and to take the project through the Statutory Processes before developing a Detailed Design.

The purpose of this Constraints Study is to undertake a series of desk studies, preliminary site inspections/field studies and preliminary consultations with statutory and non-government bodies as required, to identify the nature and extent of significant constraints relating to the development of the N81 Whitestown Lower Project and N81 Hangman's Bend and Tuckmill Project. The aim is to gather background information prior to the commencement of the route options study and design stage of these projects. This data collection is focused on determining the existing receiving environment and the existing constraints, which could influence the design and progress of the projects.

## 2. DEFINITION OF THE STUDY AREA

The N81 is approximately 76km long from the M50 in Dublin to the N80 in Carlow travelling through the counties of Dublin, Wicklow, Kildare and Carlow. The N81 is the only National Secondary route emerging from Dublin City, serving as an invaluable link between strategic national road corridors (M50 and N80) and serving a rural demographic.

Study areas for both the N81 Whitestown Lower Project (Section 1) and the N81 Hangman's Bend and Tuckmill Project (Section 2) were determined at the onset of the options selection process. The boundary of the study area was mapped by applying offsets of the existing N81 corridor, and then reshaped to ensure the boundary encompassed all areas which may be considered for potential road improvement solutions. The study area was circulated, for input, and accepted by all members of the project team before the development and examination of potential design options.

The study areas for Section 1 and Section 2 total 404 and 535 hectares respectively. They are presented in Figures 2.0.1 and 2.0.2 below, and on Drawing No. 23127-ROD-EAC-SW\_AE-DR-EN-100001 included in Appendix A.

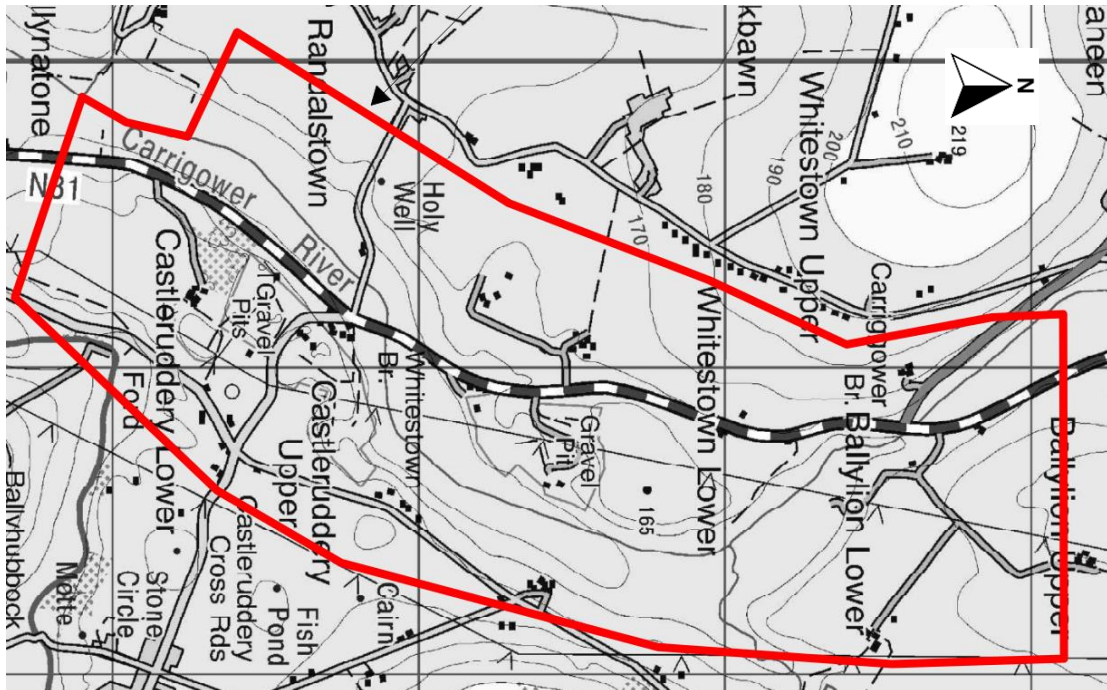


Figure 2.0.1 N81 Whitestown Lower Project Study Area (Section 1)



**Figure 2.0.2 N81 Hangman's Bend and Tuckmill Project Study Area (Section 2)**

## 2.1 History of the Proposed Development

The 12km section of the N81 between Merginstown crossroads (The Old Tollhouse) and the urban speed limit zone entering Baltinglass has a poor road safety record. Wicklow County Council received approval from TII to progress the N81 Tuckmill Lower, N81 Hangman's Bend, N81 Whitestown Lower and N81 Irishtown West projects in accordance with Phases 1 to 4 of the TII Project Management Guidelines (PMG).

Wicklow County Council (WCC) are the Sponsoring Agency for the project and Kildare National Roads Office (KNRO) have been appointed by TII (the Approving Authority) to manage the delivery of the projects.

KNRO prepared a Feasibility Report for the four N81 projects which was issued in October 2022. It was decided to progress the scheme to PMG Phase 2 as two projects based on the findings of this report. These are the N81 Whitestown Lower Project and the N81 Hangman's Bend and Tuckmill Project as a single minor project. It was decided not to progress the N81 Irishtown West component of the feasibility study as part of this project.

Roughan & O'Donovan (ROD) Consulting Engineers were appointed from the TII Project Services Framework in May 2023, for technical consultancy services for PMG Phases 2 to 4 for the N81 Whitestown Lower Project and N81 Hangman's Bend and Tuckmill Project.

### 3. THE CONSTRAINTS STUDY

#### 3.1 Introduction

The project is being developed in accordance with Transport Infrastructure Ireland (TII) 'Project Manager's Manual for Minor National Road Projects' guidelines. These guidelines include an eight-phase process (Phase 0 to Phase 7 inclusive) for the development, management and delivery of Minor National Road Schemes in Ireland as shown in Table 3.1.1. This constraints study relates to Phase 2 of the project management guidelines. The constraints study is the first stage in Phase 2 Options Selection process and is carried out to identify the nature and extent of environmental constraints within the study area of the proposed development. Consequently, this Constraints Report will inform the Options Selection Report of the existing environmental constraints in the study area, which will be taken into consideration when identifying the preferred options.

Note that any documents or guidelines published prior to 2015 i.e., prior to the merger of the National Roads Authority (NRA) and the Rail Procurement Agency (RPA) into TII effective from August 2015, are referenced by the published author title.

**Table 3.1.1 TII Project Management Guidelines – Eight Phase Approach to the Development, Management and Delivery of Major National Road Schemes in Ireland**

Phase		2019 Project Management Guidelines
Planning and Design	Phase 0	Scope and Pre-Appraisal
	Phase 1	Concept and Feasibility
	Phase 2	Options Selection
	Phase 3	Design and Environmental Evaluation
	Phase 4	Statutory Processes
Construct /Implement	Phase 5	Enabling and Procurement
	Phase 6	Construction and Implementation
	Phase 7	Close out and Review

#### Constraints Study Report Team

ROD has led the preparation of the Constraints Study Report with the assistance of specialists who have prepared the appropriate sections of this report. Table 3.1.2 identifies the contributors of this report.

**Table 3.1.2 Specialist Contributors to the Constraints Report**

Topic	Specialist Contributors	Company	Qualifications	Experience (years)
EIA Co-ordinator	Claire Cable	ROD	Postgrad Dip, B.Sc. Env Sci MCIWEM	17
Engineering	John Bell	ROD	B.Eng., M.I.E.I., C.Eng.	23
	John Ahern	ROD	B.A., B.A.I Civil, Structural &	13

Topic	Specialist Contributors	Company	Qualifications	Experience (years)
			Environmental Engineering	
Traffic Services	John Bell	ROD	B.Eng., M.I.E.I., C.Eng.	23
Project Appraisal	John Ahern	ROD	B.A., B.A.I Civil, Structural & Environmental Engineering	13
Biodiversity	Patrick O'Shea	ROD	B.A., M.Sc., M.C.I.E.E.M.	13
Land and Geology	Paul Kissane	ROD	B.A., B.A.I., Ph.D., C.Eng. M.I.E.I., R.o.G.E.P.	16
Hydrology and Hydrogeology	Warren Vokes	ROD	B.A. Geography Planning & Environmental Policy M.Sc. River Environments & their Management, MCIWEM & IAH	11
Landscape and Visual	Declan O'Leary	CSR	B.Agr.Sc. Landscape Horticulture Postgrad Dip Landscape Architecture Chartered Landscape Architect, MILI	27
Land Use and Planning	John Bell	ROD	B.Eng., M.I.E.I., C.Eng.	23
Archaeological, Architectural and Cultural Heritage	Faith Bailey	IAC Archaeology	B.A. (Hons) Archaeology, M.A. Cultural Landscape Management, MIAI, MCIFA	23
Material Assets and Land (Non-Agricultural)	Claire Cable	ROD	Postgrad Dip, B.Sc.. Env Sci MCIWEM	17
Material Assets and Land (Agricultural)	Con Curtin	Curtin Agricultural Consultants Ltd	Degree in Agricultural Science, Level 6 Cert. in Land Drainage	33
Air Quality and Climate	Olivia Maguire	AONA Environmental Consulting	B.Sc. (Hons) Geography, B.Sc. Occupational Safety and Health, M.Sc. Environmental	15



Topic	Specialist Contributors	Company	Qualifications	Experience (years)
			Science, IEMA, and OSHI	
Noise and Vibration	Mervyn Keegan	AONA Environmental Consulting	B.Sc. (Hons) Applied Biology, M.Sc. Environmental Science, Diploma in Pollution Assessment & Control, Diploma in Acoustics & Noise Control, IAQM, and IES	23
Population and Human Health	Frances O'Kelly	ROD	BSc, MSc, MIPI	18

### 3.2 Structure of the Report

The TII Project Manager's Manual splits the constraints into three principal categories, namely: natural constraints, artificial constraints and external parameters, as described briefly below:

- Natural Constraints: naturally occurring landscapes and features, including underground features.
- Artificial Constraints: forming part of the built environment including underground features.
- External Parameters: design standards, policy, procedural, financial and legal issues.

In order to identify the constraints, the initial step of the constraints study is the definition of a suitable study area, within which the constraints are identified. This process facilitates the development of feasible options, as well as the systematic assessment of the potential impacts associated with these options during Phase 2 of the TII Project Management Guidelines.

## 4. NATURAL CONSTRAINTS

### 4.1 Biodiversity

#### 4.1.1 Introduction

This section of the report provides an overview of the biodiversity constraints within the study area of the N81 Whitestown Lower (Section 1) and N81 Hangman's Bend and Tuckmill Project (Section 2). This is accomplished by reviewing and identifying the areas of ecological significance within the study area which may form a constraint to the proposed development.

This section describes:

- The methodology used in identifying the biodiversity constraints;
- The receiving environment in the study area; and
- The biodiversity constraints within the study area.

#### 4.1.2 Methodology

This biodiversity constraints assessment is a desktop study, which includes the review and analysis of various documentation, including mapping. A desktop study and appraisal of the ecological receptors within the study area was undertaken using the following sources of information:

- The National Biodiversity Data Centre (NBDC) database provided species records within hectads that intersect with the study area (i.e. S89 and S99);
- The National Parks and Wildlife Service (NPWS) map viewer to determine the boundaries of designated sites;
- A review of the Conservation Objectives and Site Synopses for European sites within the Zone of Influence to identify the Qualifying Interests; and
- Environmental Protection Agency (EPA) Unified GIS Application provided data in relation to the Water Framework Directive (WFD) Risk/Status of waterbodies in the study area.

#### 4.1.3 Designated Sites

For the purpose of this review, the Zone of Influence (ZOI) for the construction and operation of the proposed development was defined as:

- A 1km buffer surrounding the study area and;
- 20km downstream of the study area

Designated sites fall into a number of categories based on the associated level of protection afforded:

- Special Areas of Conservation (SAC) are strictly protected sites designated under the European Commission (EC) Habitats Directive.
- Special Protection Areas (SPA) are strictly protected sites classified in accordance with Article 4 of the EC Birds Directive.
- Natural Heritage Areas (NHA) are considered important for the habitats that are present or which hold species of plants and animals whose habitat needs protection. These areas are afforded statutory protection under the Wildlife Amendment Act (2000).
- Proposed National Heritage Areas (pNHA) are sites of significance for wildlife and habitats but which have not yet been statutorily proposed or designated as

NHA. These areas were proposed for protection on a non-statutory list which was published in 1995.

- Other designated sites including National Parks, Nature Reserves, Wildfowl Reserves, OSPAR sites, Ancient and long established woodlands etc.

See drawings 23127-ROD-EAC-SW\_AE-DR-EN-100003 (pNHA+NHA) and 23127-ROD-EAC-SW\_AE-DR-EN-100002 (SAC+SPA) in Appendix A for drawings of the Zone of Influence and relevant designated sites.

#### 4.1.4 European Sites

The Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora ("the Habitats Directive") and the European Parliament and Council Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds ("the Birds Directive") specify habitats and species that are important for conservation and require protection in a European context. This protection is provided in part through the designation of sites that provide notable examples of habitats or populations of species in a European context. There is one SAC, namely the Slaney River Valley SAC, and no SPAs within the Zone of Influence. The Slaney River Valley SAC is described below.

##### **Slaney River Valley SAC [000781]**

The description of the Slaney River Valley SAC provided here is based on the Site Synopsis (NPWS, 2015), and the Conservation Objectives (2011c) for the site.

##### **Site Overview**

This site comprises the freshwater stretches of the River Slaney as far as the Wicklow Mountains, a number of tributaries, the larger of which include the Bann, Boro, Glasha, Clody, Derry, Derreen, Douglas and Carrigower Rivers; the estuary at Ferrycarrig; and Wexford Harbour. The River Slaney flows through the Counties of Wicklow, Wexford and Carlow. Towns along the site but not within it include Baltinglass, Hacketstown, Tinahely, Tullow, Bunclody, Camolin, Enniscorthy and Wexford. The river is up to 100 m wide in places and is tidal at the southern end from Edermine Bridge below Enniscorthy. In the upper and central regions almost as far as the confluence with the Derry River the geology consists of granite. Above Kilcarry Bridge, the Slaney has cut a gorge into the granite plain. The Derry and Bann Rivers are bounded by a narrow line of uplands which corresponds to schist outcrops. Where these tributaries cut through this belt of hard rocks, they have carved deep gorges, more than two miles long at Tinahely and Shillelagh. South of Kildavin the Slaney flows through an area of Ordovician slates and grits.

Good examples of wet woodland are found associated with Macmine marshes, along the banks of the Slaney and its tributaries, and within reedswamps. Rusty Willow (*Salix cinerea* subsp. *oleifolia*) scrub and pockets of wet woodland dominated by Alder (*Alnus glutinosa*) have become established in places. Ash (*Fraxinus excelsior*) and Downy Birch (*Betula pubescens*) are common in the latter and the ground flora is typical of wet woodland, with Meadowsweet (*Filipendula ulmaria*), Wild Angelica (*Angelica sylvestris*), Yellow Iris (*Iris pseudacorus*), horsetails (*Equisetum* spp.) and occasional tussocks of Greater Tussock-sedge (*Carex paniculata*). These woodlands have been described as two types: one is quite eutrophic, dominated by willow and subject to tidal influence; while the other is flushed or spring-fed, subject to waterlogging but not to flooding, and dominated by Alder and Ash.

The salt marsh at Castlebridge is dominated by Mediterranean salt meadows. The main community is characterized by the presence of Sea Rush (*Juncus maritimus*).

Red Fescue (*Festuca rubra*) and Creeping Bent-grass (*Agrostis stolonifera*) are both abundant within this vegetation type. A significant area of Atlantic salt meadows also occurs at Castlebridge. This habitat is characterised by the presence of grassy upper saltmarsh vegetation communities dominated by Red Fescue and/or Creeping Bent-grass. Other species present include Saltmarsh Rush, Sea Milkwort (*Glaux maritima*), Sea Aster, Sea Arrowgrass (*Triglochin maritimum*), Sea Plantain, Common Scurvygrass (*Cochlearia officinalis*), and Curled Dock (*Rumex crispus*).

The site supports populations of several species listed on Annex II to the Habitats Directive, including Sea Lamprey, River Lamprey and Brook Lamprey, Otter, Salmon, small numbers of Freshwater Pearl Mussel, and in the tidal stretches, Twaite Shad. A survey of the Derreen River in 1995 estimated the population of Freshwater Pearl Mussel at about 3,000 individuals. This is a significant population, especially in the context of eastern Ireland. The Slaney is primarily a spring salmon fishery and is regarded as one of the top rivers in Ireland for early spring fishing. The upper Slaney and tributary headwaters are very important for spawning. The site supports regionally significant numbers of Harbour Seal. This Annex II species occurs year-round in Wexford Harbour where several sandbanks are used for breeding, moulting and resting activity. At least 27 Harbour Seal regularly occur within the site.

The site is of high ornithological importance also, with internationally important populations of Mute Swan (300), Light-bellied Brent Goose (200), Bar-tailed Godwit (1,843) and Black-tailed Godwit (350) occurring – all figures are average peaks for the five winters, 1995/96-99/2000. There are at least a further 18 species of wintering waterfowl which occur in numbers of national importance, i.e. Great-crested Grebe (123), Cormorant (443), Shelduck (903), Teal (800), Scaup (416), Goldeneye (151), Red-breasted Merganser (226), Oystercatcher (1,800), Golden Plover (3,000), Grey Plover (1,412), Lapwing (5,000), Knot (566), Sanderling (262), Dunlin (3,037), Curlew (1,300), Redshank (535), Black-headed Gull (6,136) and Lesser Black-backed Gull (1,036). Several of the above populations represent substantial proportions of the national totals, especially Shelduck (6.1%), Scaup (5.9%), Red-breasted Merganser (5.6%), Grey Plover (18.8%, the top site in the country) and Black-headed Gull (6.1%).

The site supports many of the mammal species occurring in Ireland. Those which are listed in the Irish Red Data Book include Pine Marten, Badger, Irish Hare and Daubenton's Bat. Common Frog, another Red Data Book species, also occurs within the site.

The site supports populations of several species listed on Annex II to the Habitats Directive, and habitats listed on Annex I to this Directive, as well as important numbers of wintering wildfowl including some species listed on Annex I to the Birds Directive. The presence of wet and broad-leaved woodlands increases the overall habitat diversity, and the occurrence of a number of Red Data Book plant and animal species adds further importance to the site.

### Qualifying Interests of the Site

- [1130] Estuaries
- [1140] Mudflats and sandflats not covered by seawater at low tide
- [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- [1410] Mediterranean salt meadows (*Juncetalia maritimi*)
- [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation
- [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

- [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)
- [1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
- [1095] Sea Lamprey (*Petromyzon marinus*)
- [1096] Brook Lamprey (*Lampetra planeri*)
- [1099] River Lamprey (*Lampetra fluviatilis*)
- [1103] Twaite Shad (*Alosa fallax fallax*)
- [1106] Salmon (*Salmo salar*)
- [1355] Otter (*Lutra lutra*)
- [1365] Harbour Seal (*Phoca vitulina*)

#### 4.1.5 Nationally Designated Sites

There are no nationally designated sites within the Zone of Influence.

#### 4.1.6 Other Designated Sites

##### Ancient and Long-Established Woodland

There is one area within the study area that is listed on the Ancient and Long-established Woodland Inventory (NPWS, 2012). This is in Saundersgrove at the northern end of Section 1, within the study area.

There are no other designated sites within the Zone of Influence.

#### 4.1.7 Fossitt Habitats

From the available aerial photography mapping, the following habitat and land use types (classified using Fossitt 2000) are contained within the study area.

**Table 4.1.1 The habitat classifications and codes that correspond to Fossitt 2000 within the study area.**

Habitat Name	Fossitt Code	Study Area Section No.
BC1	Arable crops	1 & 2
BL3	Buildings and artificial surfaces	1 & 2
ED1	Exposed sand, gravel or till	2
ED3	Recolonising bare ground	2
FW1	Eroding/upland rivers	1 & 2
FW2	Depositing/lowland rivers	1 & 2
FW4	Drainage ditches	1 & 2
GA1	Improved agricultural grassland	1 & 2
GA2	Amenity grassland (improved)	1 & 2
GS4	Wet grassland	2
WD1	(Mixed) broadleaved woodland	1 & 2
WD2	Mixed broadleaved/conifer woodland	1 & 2
WD4	Conifer plantation	1 & 2
WL1	Hedgerows	1 & 2
WL2	Treelines	1 & 2

Habitat Name	Fossitt Code	Study Area Section No.
WN1	Oak-birch-holly woodland	1
WN4	Wet pedunculate oak-ash woodland	1
WS1	Scrub	1 & 2
WS2	Immature woodland	1 & 2
WS5	Recently-felled woodland	1 & 2

#### 4.1.8 Annex I Habitats

The Fossitt (2000) habitats 'Depositing/lowland rivers' (FW2), 'Wet pedunculate oak-ash woodland' (WN4) and 'Oak-Birch-Holly woodland' (WN1) correspond to 'Watercourses of plain to montane levels with the *Ranaunculuion fluitantis* and *Callitricho-Batrachion* vegetation (3260)', 'Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-padion, Alnion incanae, Salicion albae) (91E0)' and 'Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles (91A0)' respectively. These habitats are listed as Qualifying Interests of the Slaney River Valley SAC and are likely to occur within the study area. There is also potential for the priority Annex I habitat 'Petrifying springs with tufa formation (*Cratoneurion*) (7220)' to be present within the study area, however this habitat is not listed as a Qualifying Interest of the SAC. The presence or absence of this habitat will need to be confirmed by dedicated habitat survey at a later stage.

#### 4.1.9 Watercourses and Waterbodies

The study area is located within the Slaney & Wexford Harbour catchment. The River Slaney and the Carrigower River run north to south alongside the N81 within the study area. In Section 2, the Carrigower River runs north to south, and is joined by Brown's Brook at the northern end of Section 2. The Carrigower River joins the River Slaney between Sections 1 and 2. There are three more tributaries that join the River Slaney in Section 1, namely Baltinglass East Stream, Gibraltar Stream and East Spinans Stream.

Watercourses are of ecological significance as they provide important habitat for a range of sensitive protected species, for example, species listed on Annex II to the Habitats Directive, e.g. Otter and Atlantic Salmon, and species listed on Annex I to the Birds Directive, e.g. Kingfisher. In addition, watercourses often support a wide range of aquatic and riparian species of high conservation value. Watercourses can act as conduits for invasive alien species and both a pathway and receptor for pollutants to sensitive habitats/species located downstream of the proposed route options.

#### Water Quality

In accordance with WFD guidelines, water quality 'Status' is assigned using a variety of available data on aquatic flora and fauna (including fish), the availability of nutrients, and aspects like salinity, temperature and pollution by chemical pollutants. Morphological features, such as quantity, water flow, water depths and structure of the riverbeds, are also taken into account. The Environmental Protection Agency (EPA) water quality classification system (Quality Rating System (Q-values)) is also used to assess water quality in Irish rivers, taking into account aquatic macrophytes, phytobenthos and hydromorphology. The Q-value system has been shown to be a robust and sensitive measure of riverine water quality and has been linked with both chemical status and land-use pressures in catchments. A review of both the Q-value status and WFD status for the watercourses was undertaken. The online EPA Unified GIS Application provides access to information at individual waterbody level and at Water Management Unit level for all the River Basin Districts in Ireland. Table 4.1.2

shows the information recorded regarding water quality status at the location of the study area.

**Table 4.1.2 EPA Water Quality Results**

EPA Name/WFD Watercourse Name	River Waterbody WFD Status (2016-2021)	Latest River Q-Values
Slaney_040 (SLANEY – Tuckmill Br)	High	4-5
Slaney_040 (SLANEY – Manger Br)	High	5
Carrigower_020 (Br d/s Whitestown Br)	High	4
Carrigower_020 (CARRIGOWER – Whitestown Br)	Good	5
Carrigower_020 (CARRIGOWER – Carrigower Br)	Good	4

#### 4.1.10 Protected and Invasive Species

The study area lies within the Ordnance Survey 10km x 10km grid squares (hectads) S89 and S99. Records of rare, protected and invasive species of flora and fauna from these grid squares were obtained from the National Biodiversity Data Centre (NBDC) online database. See Appendix B for these records.

##### Birds

The study area supports a range of farmland and wetland bird species, including a number of BoCCI red-listed species. These species could be present and nesting in the study area. However, some areas provide more favourable conditions than others. There were 4 red-listed species and 18 amber-listed in the search area. There are also records for three species listed under Annex I of the Birds Directive within the search area, namely Little Egret (*Egretta garzetta*), Peregrine Falcon (*Falco peregrinus*) and Merlin (*Falco columbarius*). The proposed development has the potential to impact birds through disturbance and habitat loss and degradation.

##### Otter

Otter (*Lutra lutra*) are listed under Annex II and IV of the EU Habitats Directive, and the Fifth Schedule of the Wildlife Act. The numerous watercourses within the study area provide potential Otter habitat, particularly along the River Slaney which is designated as a SAC where Otter is listed as a Qualifying Interest.

The proposed development has the potential to impact Otter directly through collision risk, habitat loss and indirectly through habitat degradation and pollution of watercourses which could lead to impacts downstream. Otter habitat in the form of watercourses should be considered a constraint of the study area.

##### Bats

Brown Long-eared Bat (*Plecotus auratus*), Daubenton's Bat (*Myotis Daubentoniid*), Leisler's Bat (*Nyctalus leisleri*), Natterer's Bat (*Myotis nattereri*), Nathusius's Bat (*Pipistrellus nathusii*), Common Pipistrelle (*Pipistrellus pipistrellus*), and Soprano Pipistrelle (*P. pygmaeus*) were recorded in the relevant hectads.

All bat species are listed on Annex IV of the Habitats Directive and the Fifth Schedule of the Wildlife Act. The watercourses, pockets of woodland / scrub and hedgerows provide habitat for bats. Road construction can lead to the loss of roosting habitat, habitat fragmentation and habitat degradation through the introduction of artificial light.

## **Badger**

Badgers are protected under the Wildlife Acts and are common and widespread in Ireland and it is likely that Badger setts are present in the hedgerows and pockets of woodland in the study area. There is potential to temporarily impact indirectly on badger activity during the construction stage of proposed development through disturbance, habitat loss and degradation, and fragmentation as well as collision risk during operation. National guidelines apply for mitigating impacts for this species and reference to these guidelines should be made in this regard. A survey is required at a later stage to assess the impact on these species.

## **Other Mammals**

Red Squirrel (*Sciurus vulgaris*), Hedgehog (*Erinaceus europaeus*), Pine Marten (*Martes martes*), and Red Deer (*Cervus elaphus*) have been recorded within the relevant hectads, and all of these species are protected under the Wildlife Acts. There is potential to impact these species through collision risk, and habitat loss, degradation and fragmentation as a result of the road development. Red Squirrel and Pine Marten surveys should be undertaken at a later stage within any woodlands likely to be affected by the proposed development to assess the impact on these species. Incidental records will be made for all other mammal species during any future ecological surveys.

## **Amphibians and Reptiles**

Common Frog (*Rana temporaria*), Smooth Newt (*Lissotriton vulgaris*) and Common Lizard (*Zootoca vivipara*) are protected under the Wildlife Acts and were all recorded within the relevant hectads. Amphibians rely on standing water including ponds and drainage ditches to breed and are vulnerable to the loss of these habitats particularly during spawning season. Dedicated surveys for these species should be undertaken at a later stage if suitable habitat for these species is likely to be affected by the proposed development.

## **Invertebrates**

White-clawed Crayfish (*Austropotamobius pallipes*) and Freshwater Pearl Mussel (*Margaritifera margaritifera*) are both protected under the Wildlife Acts and Annex II and V to the Habitats Directive. White-clawed Crayfish were recorded within the relevant hectads. According to a GIS shapefile of Freshwater Pearl Mussel spatial records provided by the NPWS (2020), the closest known location of Freshwater Pearl Mussel is 4.4km upstream of the study area. It should also be noted that there are also records for Freshwater Pearl Mussel >10km downstream of the study area.

Marsh Fritillary was also recorded within the relevant hectads and is listed under Annex II to the Habitats Directive.

White-clawed Crayfish is assumed to be present throughout the watercourses within the study area, however, dedicated surveys for Freshwater Pearl Mussel and Marsh Fritillary will need to be undertaken at a later stage.

## **Invasive Species**

An invasive species survey of the preferred route should be undertaken to identify and map invasive species and provide recommendations to prevent the spread of these species during construction of the road. Of particular concern are plant species listed on the Third Schedule to the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended) ("the Habitats Regulations"). Only one Third



Schedule invasive plant species as recorded in the search area, namely Three-cornered Garlic (*Allium triquetrum*). Other invasive plant species that could be present within the study area include the following:

- Himalayan Knotweed (*Persecaria wallichii*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Japanese Knotweed (*Fallopia japonica*)
- Giant Hogweed (*Heracleum mantegazzianum*)
- Rhododendron (*Rhododendron ponticum*)

As the management of some of these species can be particularly onerous, consideration should be given to avoiding any stands where possible. Where stands cannot be avoided, reference should be made to the following documents, which provides detailed recommendations for the control of invasive species and noxious weeds:

- *The Management of Invasive Alien Plant Species on National Roads – Standard*. Transport Infrastructure Ireland (2022).
- *The Management of Invasive Alien Plant Species on National Roads – Technical Guidance*. Transport Infrastructure Ireland (2022).

All other Third Schedule species recorded within the relevant hectads are animals and are listed below:

- American Mink (*Mustela vison*)
- Brown Rat (*Rattus norvegicus*)
- Grey Squirrel (*Sciurus carolinensis*)
- Fallow Deer (*Dama dama*)
- Harlequin Ladybird (*Harmonia axyridis*)
- Sika Deer (*Cervus nippon*)

#### 4.1.11 Identified Constraints

##### Section 1: N81 Whitestown Lower Project

1. The presence of Slaney River Valley SAC within the study area.
2. The presence of ancient and long-established woodland.
3. The presence of Annex I habitat within the study area.
4. The presence of watercourses within the study area.
5. The presence of semi-natural habitats that support a range of protected species within the study area.
6. The presence of bats within the study area.
7. The presence of protected mammals such as Badger and Otter within the study area.
8. The presence of breeding farmland and wetland birds within the study area.
9. The potential presence of protected invertebrates such as Freshwater Pearl Mussel, White-clawed Crayfish and Marsh Fritillary within the study area.
10. The potential for invasive species within the study area.

##### Section 2: N81 Hangman's Bend and Tuckmill Project

1. The presence Slaney River Valley SAC within the study area.

2. The presence for Annex I habitat within the study area.
3. The presence of watercourses within the study area.
4. The presence of semi-natural habitats that support a range of protected species within the study area.
5. The presence of bats and suitable bat habitat within the study area.
6. The presence of protected mammals such as Badger and Otter within the study area.
7. The presence of breeding farmland and wetland birds within the study area.
8. The potential presence of protected invertebrates such as Freshwater Pearl Mussel, White-clawed Crayfish and Marsh Fritillary within the study area.
9. The potential for invasive species within the study area.

#### 4.1.12 References

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive). Official Journal of the European Communities, L206/7.

Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (the Birds Directive). Official Journal of the European Union, L20/7.

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EPA Ireland (2010). EPA Maps. [online] Gis.epa.ie. Available at: <https://gis.epa.ie/EPAMaps/>.

European Communities (Birds and Natural Habitats) (Amendment) Regulations, 2013. *SI No. 499/2013*.

European Communities (Birds and Natural Habitats) (Amendment) Regulations, 2015. *SI No. 355/2015*.

European Communities (Birds and Natural Habitats) Regulations, 2011. *SI No. 477/2011*.

Fossitt, J. (2000) *A Guide to Habitats in Ireland*. The Heritage Council, Kilkenny. [natura2000.eea.europa.eu](https://natura2000.eea.europa.eu). ArcGIS Web Application. [online] Available at: <https://natura2000.eea.europa.eu/>.

NBDC (2024) *Biodiversity Maps* <<https://maps.biodiversityireland.ie>>. National Biodiversity Data Centre, Waterford.

NPWS (2011) *Conservation Objectives for the Slaney River Valley SAC [000781]*. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

NPWS (2020) *Margaritifera point records*. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

NPWS (2024) *Online Map Viewer* <<http://webgis.npws.ie/npwsviewer/>>. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

The Management of Invasive Alien Plant Species on National Roads – Standard. Transport Infrastructure Ireland (2022).

The Management of Invasive Alien Plant Species on National Roads – Technical Guidance. Transport Infrastructure Ireland (2022).

TII (2022) *The Management of Invasive Alien Plant Species on National Roads – Standard*. Transport Infrastructure Ireland, Dublin.

TII (2022) *The Management of Invasive Alien Plant Species on National Roads – Technical Guidance*. Transport Infrastructure Ireland, Dublin.

Wicklow County Development Plan 2022-2028 and associated documents.

Wildlife (Amendment) Act, 2000. No. 38 of 2000.

Wildlife (Amendment) Act, 2012. No 29 of 2012.

Wildlife Act, 1976 (Protection of Wild Animals) Regulations, 1990. SI No. 112/1990.

Wildlife Act, 1976. No. 39 of 1976.

## 4.2 Land & Soils

### 4.2.1 Introduction

This section of the report identifies the constraints in terms of land and geology within the study area of the N81 Whitestown Lower (Section 1) and N81 Hangman's Bend and Tuckmill Project (Section 2). This is accomplished by reviewing and identifying the areas of land and geological significance within the study area which may form a constraint to the proposed development.

### 4.2.2 Methodology

The present section is prepared in accordance with the Environmental Impact Assessment (EIA) Directive 2011/92/EU (as amended by Directive 2014/52/EU) and the following guidance documents:

- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII, 2008);
- Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Assessment Reports (IGI, 2013);
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022);
- Draft Advice Notes for Preparing Environmental Impact Statements (EPA, 2015);
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003);
- Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2002);
- S.I. No. 286 of 2018 (cited as European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018);
- S.I. No. 279 of 2019 (cited as European Union (Roads Act 1993) (Environmental Impact Assessment) (Amendment) Regulations 2019); and
- S.I. No. 486 of 2019 (cited as The Roads (Amendment) Regulations 2019).

### Available Information and Data Collection

#### Desk Study

A desk based study was undertaken in preparation of this section of the Constraints Study Report which comprised consultation with relevant publicly available online sources in order to identify and retrieve published information concerning the study area. All publicly available sources consulted at this stage are outlined below:

- Geological Survey of Ireland (GSI) for mapping and preliminary classification of superficial deposits, solid geology, economic geology karst features, geological heritage and groundwater vulnerability;
- Google Earth, Bing Maps and Ordnance Survey Ireland (OSI) for aerial imagery and large-scale identification of surficial ground features and general topographical characteristics as well as features of the built environment within the study area;
- Geohive's historical maps dated from 1830 until recently for mapping of the historical development in the study area in terms of land use, infrastructure and other likely changes in the existing environment;
- EPA maps to identify and assess any likely landfill sites or waste facilities within the study area.

**Ground Investigations**

**Section 1: N81 Whitestown Lower Project:**

Four boreholes were drilled to the South of the southern end of the existing N81 road as described below.

**Section 2: N81 Hangman's Bend and Tuckmill Project:**

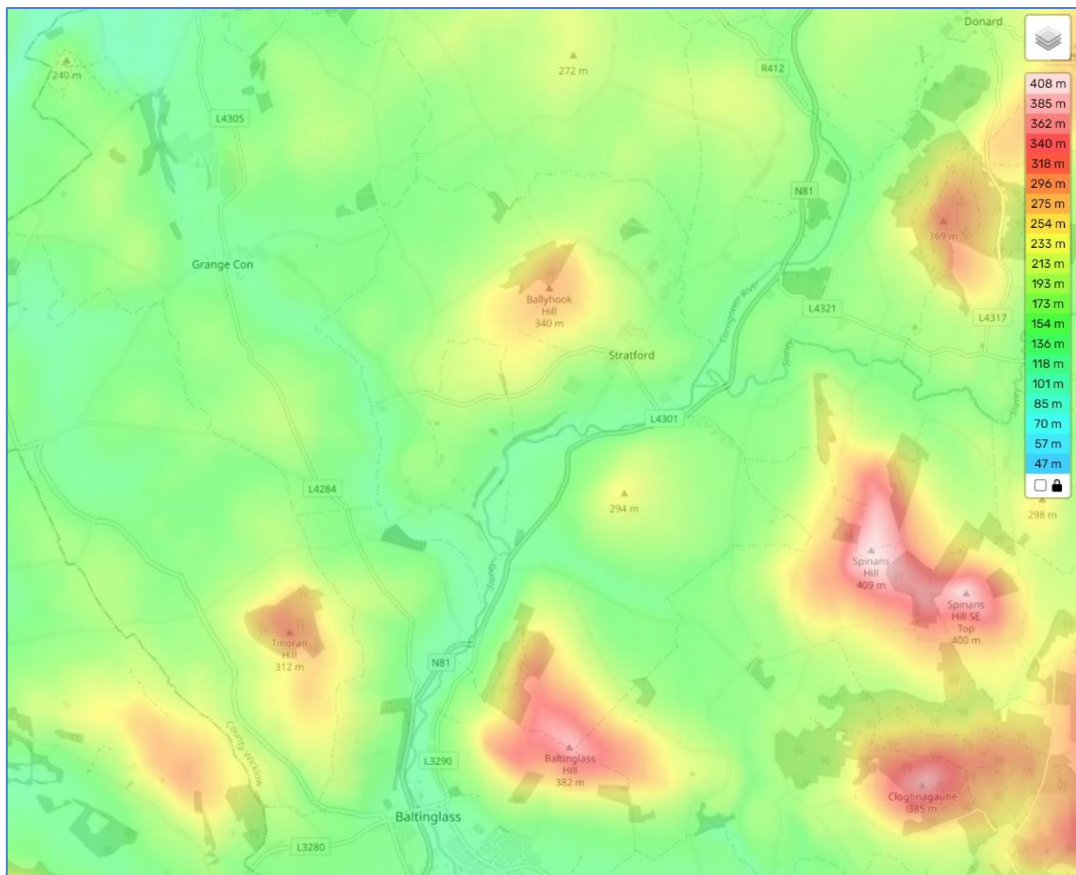
There are records of four boreholes carried out in the past at Stratford, at L4301 Woodenbridge road crossing the River Slaney, which is located North of this section. The ground investigation was undertaken by IGSL and the name of the report is "Report on a Site Investigation for a proposed bridge at Stratford on Slaney for Wicklow County Council" (Report No. 772 A, July 1985).

**4.2.3 Receiving Environment**

The ground conditions were assessed with due consideration of both the desk study and historical site investigations available as discussed in section 4.2.2.

**Geomorphology**

The geomorphology of the study area is undulated with steeper contours and higher levels towards the East, where Wicklow Mountains are found. The lower levels correspond to those from the rivers of the site. The existing N81 road is also found at these lower levels as it runs parallel to the existing Carrigower River (Section 1) and Slaney River (Section 2). To the North of Section 2 (N81 Hangman's Bend and Tuckmill Project) there are two fields that comprise a 'delta' feature composed of deep glaciofluvial and glaciolacustrine sediments and both sites are recognised as audited geological heritage sites.



**Figure 4.2.1 Topography of the study area (Topographic Maps, 2023)**

## **Overview of Solid Geology**

According to the GSI Bedrock Geology 100k series maps (1:100,000) the study area for both Section 1 and Section 2 is primarily underlain by the Butter Mountain Formation of the Ordovician Period which is mainly described as dark slate schist, quartzite and coticule, and indicated to outcrop as far east as Carrig Mountain. Solid geology towards the north (N81 Whitestown Lower Project) is partly dominated by the Donard Andesite Member of the Ordovician Period mainly comprising andesite and andesitic tuff.

## **Overview of Superficial Deposits**

### Section 1: N81 Whitestown Lower Project

Alluvium is present largely associated with Carrigower River and Browns Beck Brook stream, however, for the most part, shallow geology throughout the study area mainly comprises gravels derived from granite. Thirdly Till derived from Lower Palaeozoic sandstones and shales appears at the northern area of this section. Bedrock outcrops or subcrops are also found at the North at localised areas, and lastly it is noted the presence of two small lacustrine sediment areas at both sides of the existing N81. Till derived from granites appears in the vicinity but to a significant distance of the existing route.

### Section 2: N81 Hangman's Bend and Tuckmill Project

Superficial deposits below the ground of the area of interest comprises mainly alluvium associated with Slaney River and gravels derived from granite. The next most predominant units are Till derived from granites and bedrock outcrops or subcrops, the latter ones located mostly at the eastern boundary of the section.

## **Overview of Soft Ground**

### Section 1: N81 Whitestown Lower Project

Soft/loose ground is likely to be found at alluvial deposits as these types of soils have a low degree of consolidation. These deposits match the position of the existing Carrigower River, which is crossed by existing N81 road in two different locations. The extent of soft ground is not expected to be significant.

### Section 2: N81 Hangman's Bend and Tuckmill Project

Soft ground is likely to be present under most of the existing N81 road in this section as its alignment is underlain, for the most part, by alluvial deposits that match the extent of Slaney River. Some flood events were recorded in "floodinfo.ie" website maps along the existing river, which suggest high probability of presence of soft grounds in the proximity of the watercourse/flood plains.

## **Contaminated Land**

No evidence of contamination has been found from the desk study however its presence cannot be ruled out due to the agricultural and industrial activities present along the existing N81 route along with the activities derived from the mineral localities and landfills found adjacent to the existing road.

## **Economic geology**

### Section 1: N81 Whitestown Lower Project

There is an active quarry 10km to the West of this section approximately. It is named "Ballitore Pit" and its product is mortar sand, washed sand, washed drainage pebble and natural building stone. There are two other quarries in the vicinity of the area, adjacent to each other, located approximately 10km to the Northeast of this section.

There are two mineral localities at the middle of the section at each side of the existing N81 road and they relate to sand and gravel. One of them is called "Castleruddery Quarry", at the eastern side of the road, and the second one, at the western side, might be out of use.

#### Section 2: N81 Hangman's Bend and Tuckmill Project

As stated, there is an active quarry 10km to the West of this section approximately. It is named "Ballitore Pit" and its product is mortar sand, washed sand, washed drainage pebble and natural building stone. Also, there is a mineral locality of granite 2km to the East of the southern end of the existing N81.

### **Geological Heritage**

#### Section 1: N81 Whitestown Lower Project

There is an audited geological heritage site called "Hollywood Glen" approximately 4km to the north of this section. It is a deep channel formed by meltwater erosion on the northwestern flank of the Wicklow Mountains. There are two other sites to the South of this option that are described below.

#### Section 2: N81 Hangman's Bend and Tuckmill Project

There are two audited geological heritage sites at the northern part of this section which are called "Manger-Saundersgrove" and are described as fields that comprise a 'delta' feature composed of deep glaciofluvial and glaciolacustrine sediments.

### **Landslides events**

Both Section 1 and Section 2 are relatively near to an area that has registered large amounts of landslide events in the past which coincides with the general extent of the Wicklow Mountains. Some of the nearest landslides to the area of interest reached movements of 300 and 400m in length.

#### Section 1: N81 Whitestown Lower Project

The nearest landslide event recorded approximately 3km to the North-east of its northern end, described as a small earth flow with a general shape of a teardrop. The length was 40m and the width 13m.

#### Section 2: N81 Hangman's Bend and Tuckmill Project

The nearest event recorded approximately 5km to the East of its southern end. It is recorded as an earthflow next to a larger slide with debris as material.

### **Landfills**

There is a licensed waste facility at approximately 3km to the East of both Section 1 and Section 2, at the southern side of the Slaney River, which is called "Swalcliffe Limited". Further checks on the status of these or other unregulated sites may be needed. In addition to this, the following records are noted:

#### Section 1: N81 Whitestown Lower Project

A licensed waste boundary is located at the eastern side of the existing N81, and its facility is called "Brownfield Restoration Ireland Ltd".

#### Section 2: N81 Hangman's Bend and Tuckmill Project

A licensed waste boundary is located 1km to the West of the existing N81, and its facility is called "Rampere Landfill".

#### 4.2.4 Identified Constraints

##### Section 1: N81 Whitestown Lower Project

- Presence of two mineral localities at the middle of the section at each side of the existing N81 road which relate to sand and gravel. Only one of them appears to be still active, which is called Castleruddery Quarry, at the eastern side of the road.
- Presence of a licensed waste boundary located at the eastern side of the existing N81. Its facility is called "Brownfield Restoration Ireland Ltd".

##### Section 2: N81 Hangman's Bend and Tuckmill Project

- Presence of alluvial soils under most of the existing N81 road in this section following the extent of Slaney River. It is likely that most of these soils are soft;
- Presence of two audited geological heritage sites at the northern part of this section which are called "Manger-Saundersgrove" and are described as fields that comprise a 'delta' feature composed of deep glaciofluvial and glaciolacustrine sediments;
- Presence of a licensed waste facility located 1km to the West of the existing N81 and called "Rampere Landfill".

#### 4.2.5 References

Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003);

Draft Advice Notes for Preparing Environmental Impact Statements (EPA, 2015);

EPA (2024) *Unified GIS Application* <https://gis.epa.ie/EPAMaps>. Environmental Protection Agency, Wexford.

EPA Ireland (2010). EPA Maps. [online] Gis.epa.ie. Available at: <https://gis.epa.ie/EPAMaps/>.

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Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Assessment Reports (IGI, 2013);

Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII, 2008);

Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022);

Guidelines on the information to be contained in Environmental Impact Statements (EPA,2002);

S.I. No. 279 of 2019 (cited as European Union (Roads Act 1993) (Environmental Impact Assessment) (Amendment) Regulations 2019); and

S.I. No. 286 of 2018 (cited as European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018);

S.I. No. 486 of 2019 (cited as The Roads (Amendment) Regulations 2019)



Wicklow County Development Plan 2022-2028 and associated documents.

## 4.3 Water - Hydrology and Hydrogeology

### 4.3.1 Introduction

This section of the report identifies the constraints in terms of hydrology and hydrogeology of the study area of the N81 Whitestown Lower (Section 1) and N81 Hangman's Bend and Tuckmill Project (Section 2). This is accomplished by the collation and evaluation of existing baseline information on the hydrology and hydrogeology of the study area for the proposed scheme with the aim to identify constraints relating to the water features.

The hydrology constraints applicable to the study area can be summarised under the following headings:

- Surface Waters
  - River, stream and drainage channel (large and small)
  - Lakes, ponds (permanent and seasonal)
- Water Framework Directive (WFD) Catchments
- Surface water quality in terms of the WFD Risk Project, Status and quality classification
- Hydromorphological pressures
- Surface Water resources
  - Rivers, lakes and reservoirs used for water supply or Group Water Schemes
  - Surface water abstraction sites
- Floodplains and Flood Risk
  - Fluvial
  - Pluvial
  - Groundwater (seasonal lakes)
- Arterial Drainage Schemes and flood defences
- Hydroecology (water dependent) Sites
- Natura 2000 sites
  - Surface water related habitats
  - Salmonid Rivers
  - Wetland
  - Peatlands

The hydrogeology factors applicable to the study area can be summarised under the following headings:

- Aquifers
- Quaternary Geology
- Groundwater Vulnerability and soil permeability
- Groundwater recharge
- Groundwater quality
- Groundwater pressures
- Licensed discharges and emissions
- Karst features

- Groundwater resources
  - Source Protection Area
  - Wells and springs
  - Public Supplies
  - Private Supplies

#### 4.3.2 Methodology

For this assessment of water environment constraints and opportunity, a desktop study was conducted to gather available information on surface water features, flood risk, WFD groundwater bodies, abstractions, water dependent terrestrial ecosystems and flood risk. The principal sources of guidance which were followed included:

- National Roads Authority (NRA), 2008. Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. National Roads Authority, Dublin;
- Project Appraisal Guidelines for National Roads Unit 13.0 - Appraisal of Active Modes PE-PAG-02036 May 2023;
- TII, 2015. Road Drainage and the Water Environment. Transport Infrastructure Ireland, Dublin; and
- Working Group on Groundwater, 2005. Guidance on the application of groundwater risk assessment sheets SWRA 1-6 and GWDTERA 1-9 to areas designated for the protection of habitats and species.

The guidelines provide useful criteria for ranking the 'Importance' of the identified hydrological and hydrogeological constraints and these criteria are presented in Table 4.3.1.

**Table 4.3.1 Attribute Rating and Significance**

No.	Attribute Rating	Significance
1	Extremely High	European
2	Very High	National
3	High	Regional/ County
4	Medium	Locally High
5	Low	Locally Low

The desk study for hydrology and hydrogeology considers the study area as described in section 2 of this report. Consideration is also given to the surface waterbodies that are potentially hydrologically linked to the Study Area and these comprise:

- The receiving hydrological environment within the vicinity of the Study Area including Water Framework Directive (WFD), Surface Waterbody Risk and Quality Status;
- Water Dependant Protected Areas e.g., Natura 2000 sites, drinking water supplies;
- Flood Risk – Potential flood risk in the Study Areas as derived from fluvial and coastal sources; and
- Lands subject to drainage schemes.

The key aspects of hydrogeology that are relevant to the Study Area and stage of the project are as follows:

- Aquifer Classification and Groundwater Vulnerability;
- Ground Waterbodies crossed;
- Groundwater Recharge;
- Subsoil Permeability;
- Areas susceptible to groundwater flooding
- The type and presence of groundwater abstractions, for example boreholes, wells or springs used for public water supply, group water supply or private abstractions, and their catchment areas i.e., Source Protection Areas (SPAs) or Zone of Contributions (ZOCs);
- The type and presence of karst landforms and traced underground connections, for example karst springs, turloughs, dolines and swallow holes, and their catchment areas;
- The delineation and classification of WFD groundwater bodies and associated qualitative and quantitative status, which will indicate the broader 'state' of groundwater resources; and
- The type and presence of Groundwater Dependent Terrestrial Ecosystems (GWTDEs), defined as ecosystems which use groundwater for survival either partially or completely, and which are designated for protection under Article 1 of the Water Framework Directive, and their catchment areas.

The constraints and opportunities assessment were prepared taking into consideration the requirements of the National Roads Authority's (NTA) Environmental Impact Assessment of National Road Schemes – Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, NRA 2009. The guidelines provide criteria for ranking the 'Importance' of the identified hydrological and hydrogeological constraints and these criteria are presented in Table 4.3.2 and Table 4.3.3 respectively presents the attribute rating and significance provides a description of the level of importance criteria for both hydrological and hydrogeological features.

**Table 4.3.2 Criteria for rating the Importance of identified features (based on NRA Guidelines (2009); Box 4.3.2: Criteria for Rating Site Attributes -Hydrology.**

Importance	Criteria	Typical Example
<b>Extremely High</b>	Attribute has a high quality or value on an international scale.	River, wetland or surface water body ecosystem protected by EU legislation e.g., 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
<b>Very High</b>	Attribute has a high quality or value on a regional or national scale.	<ul style="list-style-type: none"> <li>• River, wetland or surface water body ecosystem protected by national legislation – NHA status.</li> <li>• Regionally important potable water source supplying &gt;2500 homes.</li> <li>• Quality Class A (Biotic Index Q4, Q5) Flood plain protecting more than 50 residential or commercial properties from flooding. Nationally important amenity site for wide range of leisure activities.</li> </ul>

Importance	Criteria	Typical Example
<b>High</b>	Attribute has a high quality or value on a local scale.	<ul style="list-style-type: none"> <li>• Salmon fishery.</li> <li>• Locally important potable water source supplying &gt;1000 homes.</li> <li>• Quality Class B (Biotic Index Q3- 4).</li> <li>• Flood plain protecting between 5 and 50 residential or commercial properties from flooding.</li> <li>• Locally important amenity site for wide range of leisure activities.</li> </ul>
<b>Medium</b>	Attribute has a medium quality or value on a local scale.	<ul style="list-style-type: none"> <li>• Coarse fishery.</li> <li>• Local potable water source supplying &gt;50 homes.</li> <li>• Quality Class C (Biotic Index Q3, Q2- 3).</li> <li>• Flood plain protecting between 1 and 5 residential or commercial properties from flooding.</li> </ul>
<b>Low</b>	Attribute has a low quality or value on a local scale.	<ul style="list-style-type: none"> <li>• Locally important amenity site for small range of leisure activities.</li> <li>• Local potable water source supplying &lt; 50 homes.</li> </ul>

Source: Adapted from National Road Schemes – Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. (p 58) by NRA 2009

The water bodies intercepted is defined by their associated catchment areas and presented with reference to their WFD Status, Risk Classification and Quality Class.

**Table 4.3.3 Criteria for rating the importance of identified features (based on NRA Guidelines (2009); Box 4.3.3: Criteria for Rating Site Attributes- Hydrogeology**

Importance	Criteria	Typical Example
<b>Extremely High</b>	Attribute has a high quality or value on an international scale.	<ul style="list-style-type: none"> <li>• Groundwater that supports river, wetland or surface water body ecosystem protected by EU legislation e.g., 'European sites' either SAC or SPA status.</li> </ul>
<b>Very High</b>	Attribute has a high quality or value on a regional or national scale.	<ul style="list-style-type: none"> <li>• Regionally Important Aquifer with multiple Wellfields.</li> <li>• Groundwater that supports river, wetland or surface water body ecosystem protected by National Legislation – NHA status.</li> <li>• Regionally important water supply supplying &gt; 2500 homes.</li> <li>• Inner source protection area for regionally important water source.</li> </ul>
<b>High</b>	Attribute has a high quality or value on a local scale	<ul style="list-style-type: none"> <li>• Regionally Important Aquifer.</li> <li>• Groundwater provides large proportion of baseflow to local rivers.</li> <li>• Regionally important water supply supplying &gt; 1000 homes.</li> <li>• Outer Source protection area for Regionally important water source.</li> <li>• Inner source protection area for locally</li> </ul>

Importance	Criteria	Typical Example
		<ul style="list-style-type: none"> <li>• Important water source.</li> </ul>
<b>Medium</b>	Attribute has a medium quality or value on a local scale	<ul style="list-style-type: none"> <li>• Locally Important Aquifer.</li> <li>• Potable water supply &gt; 50 homes.</li> <li>• Outer Source protection area for locally important water source</li> </ul>
<b>Low</b>	Attribute has a low quality or value on a local scale	<ul style="list-style-type: none"> <li>• Poor Bedrock Aquifer. Potable water source supplying &lt; 50 homes.</li> </ul>

Source: Adapted from National Road Schemes – Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. (p 59) by NRA 2009

The desk study and evaluation of the hydrological constraints within the study area was carried out using the following sources of information:

**Ordnance Survey Ireland (OSI):**

- Discovery Series Mapping (1:50,000); and
- Historic 6" Maps.

**Environmental Protection Agency (EPA):**

- Water Quality Monitoring Database and Reports;
- WFD Classification;
- EPA Hydrometric Data System;
- WFD River Basin Management Plans;
- Office of Public Works (OPW);
- OPW Benefitting Land maps<sup>3</sup>
- OPW National Indicative Flood Mapping (NIFM);
- OPW Catchment Flood Risk Assessment and Management (CFRAM) Mapping;
- National Coastal Flood Hazard Mapping (NCFHM) mapping;
- Wicklow County Development Plan - Strategic Flood Risk Assessment.
- Drainage Scheme Benefitting Land Maps;
- 3rd Cycle Draft Slaney & Wexford Harbour Catchment Report (HA 12)
- Review of OPW online mapping at floodinfo.ie;

The desk study and evaluation of the hydrogeological constraints within the Study Area was carried out using the following sources of information:

- Geological Survey of Ireland (GSI) Spatial Resources viewer;
- Teagasc Soils (Geological Survey Ireland Spatial Resources (arcgis.com));
- Environmental Protection Agency (EPA) Water map viewer;
- National Parks and Wildlife Service (NPWS) Designations Viewer;
- Ordnance Survey of Ireland (OSI) GeoHive online mapping; and
- Wetland Surveys Ireland online mapping.

## Limitations

The assessment presented here has been completed solely using publicly available hydrological data with associated inherent limitations. Nonetheless, the information available for key hydrological receptors is seen as appropriate for the scale and nature of the assessment undertaken.

### 4.3.3 Receiving Environment

#### **Water Framework Directive, Waterbodies and Protected Areas**

The Study Area is located within one WFD Catchment and these are named by the EPA as Slaney & Wexford harbour. Slaney & Wexford Harbour catchment includes the area drained by the River Slaney and all streams entering tidal water between the Raven Point and Greenore Point, Co. Wexford, draining a total area of 1,981km<sup>2</sup> (Drawing No. 23127-ROD-EAC-SW\_AE-DR-EN-100011). The largest urban centre in the catchment is Wexford Town. The other main urban centres in this catchment are Enniscorthy, Baltinglass, Tullow, Rosslare and Kilrane. The Slaney & Wexford Harbour catchment is divided into 16 sub catchments and the Study Area lies wholly within the Slaney\_SC\_010.

The water bodies intercepted by the Study Area are listed in Table 4.3.4 and Table 4.3.5 for the two sections respectively and shown on Drawing No. 23127-ROD-EAC SW\_AE-DR-EN-100006.

#### Section 1: N81 Whitestown Lower Project

This section of the Study Area intercepts two EPA named Waterbodies namely: Slaney\_040 and Carrigower\_020. Carrigower\_020 flows from northwest to southeast crosses N81 road and confluences with a tributary of Carrigower\_020 (Donard Brook) at approximately 100m from the nearest boundary of the section and continues to flow in a south westerly direction crossing N81 road. It is named Slaney\_040 by EPA after passing under the culvert of L4321 road and continues south west as it flows out of the section.

A Drinking Water- Rivers (Protected Areas), Little Slaney\_010 is at approximately 4.5km southeast of the section where it joins Slaney\_30 at the boundary of Gibbstown, west of the Study Area. Little Slaney\_010 is not directly hydraulically linked to this section as it confluences with the section outside the boundary and downstream.

#### Section 2: N81 Hangman's Bend and Tuckmill Project

This section of the Study Area intercepts two EPA named Waterbodies namely: Slaney\_040 and Slaney\_050. Outside the Study Area, Slaney\_030 joins Slaney\_040 at approximately 760m northwest from the nearest boundary. Slaney\_040 tributary (Mill Race) flows from the northeast passes through the culvert of the N81 and continues to flow parallel to N81 road as it enters the section. Slaney\_040 continues approximately to 3km and is joined by a tributary of Slaney\_040 at approximately, 3 km downstream. From this point of intersection, the River Waterbody is named Slaney\_050 and one other tributary join the main water body (Slaney\_050) downstream and flows southward passing under the N81 after which it is joined by another tributary of the Slaney\_050. It continues to flow southwest and parallel to the N81 road, as it flows out of this section and is named Slaney\_060 by the EPA after passing through the culvert under Main Street.

Little Slaney\_010 (Drinking Water- Rivers) joins the Slaney\_30 at approximately 5km northeast and upstream of the Study Area boundary.

Another Drinking Water- Rivers (Protected Areas), Slaney\_070 is present at approximately 3.9km from the nearest section boundary and downstream. Slaney\_050 which flows through this section feeds Slaney\_060 and continues to flow to Slaney\_070.

### Surface Water Quality

#### Section 1: N81 Whitestown Lower Project

A total of two (2) Surface Waterbodies have been identified within the Section 1: N81 Whitestown Lower Project. The Biological Q rating, the WFD Risk 3rd Cycle, River Waterbody WFD Status 2016-2021 and the importance are listed in Table 4.3.4.

**Table 4.3.4 Surface Waterbodies within the Section 1: N81 Whitestown Lower Project and WFD Status and Risk**

WFD Code	Category	Name	Latest River Q Values	WFD Risk 3 <sup>rd</sup> Cycle	River Waterbody WFD Status 2016-2021	Importance
IE_SE_12C060600	River Waterbody	Carrigower_020	4 (Good))	Not at Risk	Good	High
IE_SE_12S020600	River Waterbody	Slaney_040	4 (Good)	Not at Risk	High	High

#### Section 2: N81 Hangman's Bend and Tuckmill Project

A total of two (2) Surface Waterbodies have been identified within Section 2: Hangman's Bend and Tuckmill Project. The Biological Q rating, the WFD Risk 3rd Cycle, River Waterbody WFD Status 2016-2021 and the importance are listed in Table 4.3.5.

**Table 4.3.5 Surface Waterbodies within Section 2: N81 Hangman's Bend and Tuckmill Project and WFD Status and Risk**

WFD Code	Category	Name	Latest River Q Values	WFD Risk 3 <sup>rd</sup> Cycle	River Waterbody WFD Status 2016-2021	Importance
IE_SE_12S020600	River Waterbody	Slaney_040	4 (Good)	Not at Risk	High	High
IE_SE_12S020700	River Waterbody	Slaney_050	4 (Good)	Not at Risk	High	High

### 4.3.4 Surface Water Supply Abstractions

There is no known public water surface water supply in proximity to Section 1: N81 Whitestown Lower Project and Section 2: N81 Hangman's Bend and Tuckmill Project.

#### Pressure

River Anthropogenic Pressures are shown to impact Slaney\_030. Slaney\_030 is outside the boundaries of Section 1: N81 Whitestown Lower Project and Section 2: N81 Hangman's Bend and Tuckmill Project.

#### Licensed Emissions

##### Section 1: N81 Whitestown Lower Project



A Primary Effluent Emission Point is present at approximately 1.2km northeast from the nearest boundary (TPEFF3400A0197GW001) with coordinates at Eastings: 292401, Northings: 197402. A sewage treatment <500 pe (Reg no. A0197-01) is present at approximately 0.86km from the nearest boundary of this section. There are no EPA licensed activity-UWW within this section.

**Section 2: N81 Hangman's Bend and Tuckmill Project**

At the northern boundary of this section, the two (2) EPA Emission Types and their status are listed in Table 4.3.6.

**Table 4.3.6 Emission Type, Location and Status**

<b>Emission Type</b>	<b>ID/Reg No.</b>	<b>Eastings</b>	<b>Northings</b>	<b>Status</b>
Primary Effluent Emission Point	TPEFF3400A0533SW001	289382	193059	Active
UWW Plant Locations (>500pe)	D0477	-	-	Withdrawn

Note: - not provided

There are three (3) Emission Types present outside of the section boundary and these include:

- Sewage Treatment >500pe, Baltinglass Wastewater Treatment Works (D0089-01) at approximately 1.87km from the nearest section boundary.
- Storm Water Overflow (TPEFF3400D0089SW002) at approximately 1.8km from the nearest section boundary; and
- Primary Effluent Emission Point (TPEFF3400D0089SW001) at approximately 1.9km from the nearest section boundary.

These EPA Licenced Activity-UWW locations are downstream of this section.

**Flood Risk Areas**

**Section 1: N81 Whitestown Lower Project**

National Indicative Fluvial Mapping- Present Day shows that the plains along Slaney\_040 and Carrigower\_020. Carrigower\_020 crossing the N81 Road are at River - Low Probability and River - Medium Probability of flooding as shown on Drawing No. 23127-ROD-EAC-SW\_AE-DR-EN-100006.

There are no areas within this section that is within the CFRAM River Flood Extents - Present Day.

There is one (1) Past Flood Events (Recurring Flood Event) associated with N81 of this section.

**Section 2: N81 Hangman's Bend and Tuckmill Project**

National Indicative Fluvial Mapping (NIFM)- Present Day shows that the plains along Slaney\_040 and Slaney\_050 are at River - Low Probability and River - Medium Probability of flooding. A small area crossing the N81 road in the middle and southern parts are at Probability and River - Medium Probability of flooding. The area adjacent to the N81 road in the north and south of this section are at River - Low Probability and River - Medium Probability of flooding lie adjacent.

The southern extent of Slaney\_050, adjacent to the N81 road is within the CFRAM River Flood Extents - Present Day.

There are four (4) Past Flood Events (Recurring Flood Event) associated with this section. Three of these Recurring Flood Events occur along the N81 road.

### **Drainage District Schemes**

#### **Section 1: N81 Whitestown Lower Project**

In this section, the plains of Carrigower\_020 and Slaney\_040 is drained by Drainage District (DD) Channels under a Scheme known as Carrigower DD. The area adjacent to the DD – Channels is known as the DD-Benefited Land.

#### **Section 2: N81 Hangman's Bend and Tuckmill Project**

In this section, there are no areas shown to be drained by DD channels.

### **Water Dependant Habitats**

#### **Section 1: N81 Whitestown Lower Project**

Slaney River Valley Special Area of Conservation (SAC) is designed along the Slaney\_040 in this section.

#### **Section 2: N81 Hangman's Bend and Tuckmill Project**

Slaney River Valley SAC is designated along the stretch of Slaney\_40 and Slaney\_50. In this section.

## **4.3.5 Summary of Constraints and Opportunities**

### **Constraints**

#### **Section 1: N81 Whitestown Lower Project**

The constraints relating to this section in terms of surface water and flood risks are outlined below:

- There are two surface water bodies crossings - Slaney\_040 and Carrigower\_020 with High River Waterbody WFD Status 2016 – 2021 and Not at Risk projection;
- The plains of the Slaney\_040 and Carrigower\_020 are at River - Low Probability and River - Medium Probability of flooding (NIFM) and crosses the N81 at two points;
- Past Flood Events (Recurring Flood Event) is associated with N81; and
- Slaney River Valley Special Area of Conservation (SAC) is present.

#### **Section 2: N81 Hangman's Bend and Tuckmill Project**

The constraints relating to this section in terms of surface water and flood risks are outlined below:

- There are two surface water bodies crossings- Slaney\_040 and Slaney\_050 both with High River Waterbody WFD Status 2016 – 2021 and Not at Risk projection. Slaney\_050 crosses the N81 in the south ;
- A Drinking Water- Rivers (Protected Areas), Slaney\_070 is present down stream of the section;
- The plains of Slaney\_040 and Slaney\_050 are at River - Low Probability and River - Medium Probability of flooding (NIFM);
- Four Past Flood Events (Recurring Flood Event) are associated with N81;

- The southern extent adjacent to the N81 road in the east is the CFRAM River Flood Extents - Present Day; and
- Slaney River Valley Special Area of Conservation (SAC) is present.

### **Opportunities**

The nature of the project means that it is not likely to entail significant impacts to surface waterbodies. There is potential for benefits to degraded water dependant protected areas through restoration (e.g., bogs, wetlands) and community action as part of scheme.

### **Aquifer Classification**

#### **Section 1: N81 Whitestown Lower Project**

This section is underlain by several different types of subsoils (Quaternary Sediments). These include:

- Gravels derived from granite;
- Alluvium; and
- Till derived from Lower Palaeozoic sandstones and shales.

The southern part of this section is underlain by Gravels derived from granite and Alluvium along the Carrigower\_020 plain extending northwest and along Donard Brook plain in the east. The north and northwestern part is predominantly underlain by Till derived from Lower Palaeozoic sandstones and shales. The bedrock underlying this section comprises both the Donard Andesite Member (Ordovician volcanic rocks) described as "Andesite & andesitic tuff" and Butter Mountain Formation (Lower-Middle Ordovician slate, sandstone, greywacke, conglomerate) described as "Dark slate-schist, quartzite & coticule".

According to the GSI's aquifer classification mapping<sup>7</sup>, both bedrocks are classified as Locally Important Aquifer - Bedrock which is Moderately Productive only in Local zones (Li) (as shown on Drawing No. 23127 ROD EAC SW\_AE DR GI 100005). Locally important aquifers are of medium importance as shown in Table 4.3.8.

#### **Section 2: N81 Hangman's Bend and Tuckmill Project**

This section is underlain by three (3) different types of subsoils (Quaternary Sediments). These include:

- Gravels derived from granite;
- Alluvium; and
- Till derived from granites.

The western half of the section is predominantly underlain by Gravels derived from granite and Alluvium along the Carrigower\_020 plain. The remaining eastern half of the section is underlain by Till derived from granites, whilst a small part is underlain by Gravels derived from granite. The eastern part is underlain by Bedrock outcrop or subcrop.

The entire section is underlain by Butter Mountain Formation and according to the GSI's aquifer classification mapping, the bedrock is classified as a Locally Important Aquifer - Bedrock which is Moderately Productive only in Local zones (Li) (Drawing No. 23127-ROD-EAC-SW\_AE-DR-GI-100005). Locally important aquifers are of medium importance as described in Table 4.3.9.

## **Groundwater Vulnerability**

Groundwater vulnerability classification which is based primarily on the overburden depth and also on the subsoil permeability and the nature of the underlying aquifer provides a vulnerability measure for pollution of the underlying aquifer and groundwater resources. There are five levels of groundwater vulnerability classified by GSI, namely:

- Extreme with outcropping or sub-cropping or Rock at or near surface or Karst: X;
- Extreme (overburden cover < 3m): E;
- High (overburden cover 3 to 5): H;
- Moderate (overburden cover 5 to 10): M; and
- Low (overburden cover > 10m): L.

### Section 1: N81 Whitestown Lower Project

The GSI Aquifer Vulnerability mapping<sup>6</sup> shows that most of this section is underlain by groundwater of High (H) Vulnerability as shown on Drawing No. 23127-ROD-EAC-SW\_AE-DR-EN-100007. However, a small part along the middle and northern extent is classified as groundwater of Extreme (E) Vulnerability enclosing small areas designated as Rock at or near surface or Karst (X) Vulnerability.

### Section 2: N81 Hangman's Bend and Tuckmill Project

Majority of the western half of this section is underlain by groundwater of High (H) Vulnerability. However, an isolated small strip along the N81 Road and veering west off the N81 Road is designated as groundwater of Extreme (E) Vulnerability enclosing a strip of Rock at or near surface or Karst (X) Vulnerability. The eastern half of the section (west of N81 Road) is mainly underlain by groundwater designated as Rock at or near surface or Karst (X) Vulnerability with small areas of Extreme Vulnerability enclosing them. These areas coincide with the areas with Bedrock outcrop or subcrop described in 4.2.3 of this report and these are mainly in the southeastern and northeastern parts as shown on Drawing No. 23127-ROD-EAC-SW\_AE-DR-EN-100007. A small strip along the tributary of Slaney\_040 is designated as Rock at or near surface or Karst (X) enclosed by a small area with groundwater of Extreme Vulnerability. The remaining part of this section is underlain by groundwater of High (H) Vulnerability.

## **Sub-soil permeability and Groundwater Recharge**

The GSI Teagasc (2022) mapping database indicates that the study area is covered by two main subsoil permeability categories, with the area with Bedrock outcrop shown as not mapped, refer to in Drawing No. 23127 ROD EAC SW AE DR GI 100009 and Drawing No. 23127 ROD EAC SW AE DR EN 100012. A description of the subsoil types, average recharge and subsoil permeability in the Study Area are provided as follows.

### Section 1: N81 Whitestown Lower Project

Drawing No. 23127 ROD EAC SW\_AE DR EN 100009 presents the soil and subsoil geology which generally shows that the area with Alluvium along the Carrigower\_20 (River) and the areas underlain by Till derived from Lower Palaeozoic sandstones and shales have moderate subsoil permeability. A small area of outcrop of bedrock with the centre at the Junction of N811 Road and R412, extending southeast and northwest is designated as subsoils with high permeability.

The estimated groundwater recharge rates according to GSI Groundwater Data Viewer ranges between 151-200 mm/yr across majority of the section. Areas with slightly lower recharge rates (101-150 mm/yr) are shown to be along the Slaney\_040.

### Section 2: N81 Hangman's Bend and Tuckmill Project

A significant part the N81 road in the south extending eastward and a small area in the northeastern part of this section is unmapped (Drawing No. 23127 ROD EAC SW\_AE DR EN 100012). The areas underlain by subsoils of high permeability are:

- Two small portions west of the N81 Road and a long strip of subsoils between Junctions 2 and extending for 0.2 km;
- Approximately 0.15km north of the Junction 4 extending more to the west and along the N81 northwest for approximately 2 km; and
- A small patch in the north of the section.

The rest of the section is underlain by subsoils of moderate permeability. Generally, recharge in this section is in the region of 151 - 200 mm/yr across majority of the section. Areas with slightly lower recharge rates (101 - 150 mm/yr) are shown to be along the Slaney\_040 (Carrigower River) plain.

## **Groundwater Flooding**

### Section 1: N81 Whitestown Lower Project and Section 2: N81 Hangman's Bend and Tuckmill Project

In terms of groundwater flooding, there no areas with historic groundwater flooding or potential groundwater flooding identified.

## **Groundwater Resources**

### Section 1: N81 Whitestown Lower Project and Section 2: N81 Hangman's Bend and Tuckmill Project

#### *Groundwater Body*

The groundwater body underlying the two sections of the Study Area is the largest groundwater body in the South-East River Basin District (SERBD). The Groundwater body underlying the section is known as Ballyglass (IE\_SE\_G\_011). The highest elevations are at the source of the River Slaney on Lugnaquilla Mountain at 925m OD, which is in the northeast of the body. Elevations reduce to the west and the River Slaney's course changes from west to south near Grangecon. The Slaney flows close to the western catchment boundary, with major tributaries e.g., Derreen, Derry & Bann, joining it from the east. There are three distinct areas of structural deformation over this groundwater body. The highest concentration of faulting is found in the southeast in the Ordovician and Silurian slates and schists. Here, faults run NW to SE. There is no information available on the hydrogeological properties of this groundwater body. Estimated transmissivities can be considered to range 1 – 10m<sup>2</sup>/d. Rock close to surface has been mapped at the higher elevations of the Wicklow Mountain and the Blackstairs Mountain. Most recharge to this body is likely to take place in the elevated areas where there is a thin subsoil cover or rock outcrop. Baseflow analysis of this area shows that there is a higher baseflow from the granites than from the Ordovician slates. The bedrock strata of this aquifer are Siliceous. EPA sampling shows the groundwater to be soft and have a low electrical conductivity: 94 – 266 (µs/cm).

## **Private and public boreholes and wells**

GSI Groundwater Data Viewer<sup>11</sup> does not show any private, public supply boreholes or wells in both sections and proximal to the Study Area.

### GSI Public Supply Source Protection Areas

The EPA map viewer shows that there are three GSI Public Supply Source Protection Area (named Baltinglass PWS) in three different townlands comprising Inner Protection Area (SI) and Outer Protection Area (SO) present to the southwest and at the periphery, south and southwest of the Section 2: N81 Hangman's Bend and Tuckmill area's boundary respectively.

Source protection areas are zones surrounding individual groundwater sources defined by a 100-day time of travel (TOT) from any point below the water table to the source. Outer Protection Area encompasses the remainder of the source catchment area or Zone of Contribution (ZOC). Inner Protection Area (SI) is designed to protect against the effects of human activities that might have an immediate effect on the source and against microbial pollution.

The source protection area and their distances from the Study Area is presented in Table 4.3.7 and shown on Drawing Number No. 23127-ROD-EAC-SW\_AE-DR-EN-100013.

**Table 4.3.7 GSI Public Supply Source Protection Areas**

Study Area (section)	GSI Public Supply Source Protection Areas	Townland	Comment
Section 1: N81 Whitestown Lower Project	Baltinglass PWS (SI - Inner Protection Area) and SO - Outer Protection Area	Hartstown ED	Located approximately 6km southwest from the nearest boundary and down hydraulic gradient
	Baltinglass PWS (SI - Inner Protection Area) and SO - Outer Protection Area	Bawnoge and Clogh Lower	Located approximately 6.6 km southwest from the nearest boundary and down hydraulic gradient
	Baltinglass PWS (SI - Inner Protection Area) and SO - Outer Protection Area	Baltinglass Hill	Located approximately 4.5 km southwest from the nearest boundary down hydraulic gradient
	Usk / Gormanstown GW (SI - Inner Protection Area) and SO - Outer Protection Area	Tober ED	Located approximately 5.5 km northwest from the nearest boundary and up hydraulic gradient
Section 2: N81 Hangman's Bend and Tuckmill Project	Baltinglass PWS (SI - Inner Protection Area) and SO - Outer Protection Area	Hartstown ED	Located approximately 0.25 km west from the nearest boundary and down hydraulic gradient
	Baltinglass PWS (SI - Inner Protection Area) and SO - Outer Protection Area	Bawnoge and Clogh Lower	Located approximately 1.4 km south from the nearest boundary and down hydraulic gradient
	Baltinglass PWS (SI - Inner Protection Area)	Baltinglass Hill	Located approximately 0.7 km southeast from the nearest

Study Area (section)	GSI Public Supply Source Protection Areas	Townland	Comment
	and SO - Outer Protection Area		boundary and down hydraulic gradient
	Usk / Gormanstown GWS (SI - Inner Protection Area) and SO - Outer Protection Area	Tober ED	Located approximately 8.5 km northwest from the nearest boundary and up hydraulic gradient

The GSI Public Supply Source Protection Area (Usk / Gormanstown GWS) is outside of the boundary of the Study Area and up hydraulic gradient, therefore it is not considered to be a receptor. Whereas the Baltinglass PWS SI - Inner Protection Area and SO - Outer Protection Area are both down hydraulic gradient and it is of medium importance because of the aquifer class of the bedrock.

### Groundwater Quality

#### Section 1: N81 Whitestown Lower Project and Section 2: N81 Hangman's Bend and Tuckmill Project

##### Drinking Water Groundwater

All groundwater bodies nationally are identified as Drinking Water Protected Areas (DWPA) according to the EPA. The designated Drinking Water Groundwater (GWB) is the Ballyglass underlies both sections.

### WFD Status and Risk

WFD Ground Waterbody Status 2016-2021 is classed as 'Good' by the EPA for the 2016-2021 monitoring period. However, the WFD Risk 3<sup>rd</sup> Cycle indicate that Ground Waterbodies Risk is At Risk.

### Groundwater Significant Pressures

#### Section 1: N81 Whitestown Lower Project and Section 2: N81 Hangman's Bend and Tuckmill Project

EPA identified groundwater agriculture and anthropogenic pressures as the associated impact on groundwater quality. Both sections are impacted by the pressure sources mentioned.

### Karst Hydrogeological Features

#### Section 1: N81 Whitestown Lower Project and Section 2: N81 Hangman's Bend and Tuckmill Project

The GSI Groundwater Data Viewer indicates that there are no known karst features located within 5km of the boundary of Study Area.

### Groundwater Dependent Eco-Terrestrial Systems (GWDTE)

#### Section 1: N81 Whitestown Lower Project and Section 2: N81 Hangman's Bend and Tuckmill Project

There are no GWDTEs based on the description provided in "Table 1.1. List of Habitats Directive Annex I habitats and Annex II species that are groundwater-dependent terrestrial ecosystems"

#### 4.3.6 Identified Constraints

Having established the baseline condition of this section of the Study Area a list of the hydrological and hydrogeological features which are potential constraints in the Study Area, their attributes and ratings are presented in Table 4.3.8 and Table 4.3.9.

**Table 4.3.8 Hydrogeological Assessment of Section 1: N81 Whitestown Lower Project**

Features	Type	Attribute and rating	Reason
Aquifer classification (Donard Andesite Member and Butter Mountain Formation)	Groundwater	Medium (4)	Moderately Productive only in Local zones (Li). Locally important aquifers
Groundwater vulnerability	Groundwater	Medium (4)	High Vulnerability with isolated areas of groundwater of Extreme (E) Rock at or near surface or Karst (X) Vulnerability.
Subsoil permeability and Groundwater Recharge	Groundwater	Medium (4)	Moderate subsoil permeability and recharge is mainly 151-200 mm/yr with other small areas of lower recharge rates
Groundwater flooding	Groundwater	Medium (4)	No known groundwater flood risk is associated with the section.
Groundwater resources: Drinking water supply wells/ Boreholes GSI Public Supply Source Protection Areas (Baltinglass PWS Inner and outer Source Protection Area (at Hartstown ED, Bawnoge abd Cogh Lower and Tober ED)	Groundwater	Medium (4)	There are three (3) source protection areas down hydraulic gradient of the section, however, these are far away (with the nearest at approximately 4.5 km southwest from the nearest boundary and down hydraulic gradient).
Groundwater Quality Status and Risk	Groundwater	Medium (4)	WFD Ground Waterbody Status 2016-2021 -Good WFD Risk 3rd Cycle Ground Waterbodies Risk - At Risk.
Karst	Groundwater	Medium (4)	There are no known karst features within 5km of the section
Groundwater Pressure	Groundwater	Medium (4)	Groundwater Agriculture and Anthropogenic pressures impact the section



Features	Type	Attribute and rating	Reason
Groundwater dependent (downgradient)	Groundwater ecosystem	Medium (4)	There are no known GWDTEs proximal to this section

**Table 4.3.9 Section 2: N81 Hangman's Bend and Tuckmill Project**

Features	Type/Name	Name	Reason
Aquifer classification (Donard Andesite Member and Butter Mountain Formation)	Groundwater	Medium (4)	Moderately Productive only in Local zones (Li). Locally important aquifers are of medium importance
Groundwater vulnerability	Groundwater	Medium (4)	High Vulnerability with isolated areas of groundwater of Extreme (E) Rock at or near surface or Karst (X) Vulnerability
Subsoil permeability and Groundwater Recharge	Groundwater	Medium (4)	Moderate subsoil permeability and recharge is mainly 151-200 mm/yr with generally low groundwater recharge rates, and small areas with slightly lower recharge rates
Groundwater flooding	Groundwater	Medium (4)	No known groundwater flooding is associated with the section
Groundwater resources: Drinking water supply wells/ Boreholes GSI Public Supply Source Protection Areas (Baltinglass PWS Inner and outer Source Protection Area (at Hartstown ED, Bawnoge abd Cogh Lower and Tober ED)	Groundwater	Medium (4)	There are three (3) source protection areas that are down hydraulic gradient of the section, however, is far enough away (approximately 4.5 km southwest from the nearest boundary and down hydraulic gradient)
Groundwater Quality Status and Risk	Groundwater	Medium (4)	WFD Ground Waterbody Status 2016-2021 -Good WFD Risk 3rd Cycle Ground Waterbodies Risk - At Risk.
Karst	Groundwater	Medium (4)	There are no known karst features within 5km of the section.
Groundwater Pressure	Groundwater	Medium (4)	Groundwater Agriculture and Anthropogenic pressures impact the section

Features	Type/Name	Name	Reason
Groundwater dependent (downgradient)	Groundwater ecosystem	Medium (4)	There are no known GWDTEs proximal to this section.

### Section 1: N81 Whitestown Lower Project

The N81 road crosses a small area of Extreme Groundwater Vulnerability and Rocks at or near Surface in the northern part of this section, whereas the rest and majority of the N81 road is underlain by groundwater of High Vulnerability Classification. The bedrock aquifer underlying this section is a Locally Important Aquifer (Li) of medium importance and there are no Public Supply Source Protection Area and GWDTE SACs/SPAs in the section.

The section is underlain by Ballyglass GWB and WFD Ground Waterbody Status 2016-2021 is Good whilst the WFD Risk 3rd Cycle Ground Waterbodies Risk - At Risk. These At-Risk waterbodies require not only implementation of the existing measures described in the various regulations, e.g., the Good Agricultural Practices Regulations, but also in many instances more targeted supplementary measures.

Therefore there are a few constraints associated with groundwater in terms of vulnerability and quality; however, these constraints are not expected to have a significant influence on the development of the project at this stage. The impact on groundwater will be generally low due to absorption, immobilisation by the presence of low to moderate sub soil permeability, bacterial degradation, low recharge and storage effects.

### Section 2: N81 Hangman's Bend and Tuckmill Project

The N81 road crosses a small area Extreme Groundwater Vulnerability and Rocks at or near Surface in two areas in the southern part of this section, whereas the rest of the N81 road is underlain by groundwater of High Vulnerability Classification. The bedrock aquifer is Locally Important Aquifer (Li) of medium importance and there is a Public Supply Source Protection Areas proximal and down hydraulic gradient of the section. The section is underlain by Ballyglass GWB and WFD Ground Waterbody Status 2016-2021 is Good whilst the WFD Risk 3rd Cycle Ground Waterbodies Risk - At Risk. As recharge to groundwater is generally low, and there are no wells within the section, there is therefore no direct groundwater pathway linking the section with the Public Supply Source Protection Areas. Although there are few constraints associated with groundwater in terms of vulnerability, quality and Public Supply Source Protection Areas downgradient, it is not anticipated that these constraints will significantly influence the development of the project at this stage. The impact on groundwater will be generally low due to absorption, immobilisation by the presence of low to moderate sub soil permeability, bacterial degradation, low recharge and storage effects.

## **Opportunities**

### Section 1: N81 Whitestown Lower Project and Section 2: N81 Hangman's Bend and Tuckmill Project

Road projects usually provide vegetated buffers which protect natural habitats, improve water quality and reduce the impacts of surface water runoff and subsequently groundwater through infiltration. The buffer zones and corridors will serve to preserve aquifer recharge areas and groundwater; however, this will depend on the position of route options at the latter stage of the assessment.

#### 4.3.7 References

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3. Environment Protection Agency (EPA) 2005. A Framework for the Assessment of Groundwater - Dependent Terrestrial Ecosystems under the Water Framework Directive. Environmental Research Centre (Final Report of project 2005-W-FS-5). Available at: [Water](http://www.epa.ie) [Accessed on 24<sup>th</sup> January 2024]
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## 4.4 Landscape and Visual

### 4.4.1 Introduction

This section of the report identifies the constraints in terms of landscape and visual constraints and opportunities within the study area of the N81 Whitestown Lower (Section 1) and N81 Hangman's Bend and Tuckmill Project (Section 2). This is accomplished by reviewing the areas of sensitivity within the receiving environment and highlighting significant characteristics, elements, and features which may form a constraint within the study area.

### 4.4.2 Methodology

This study has been informed by the following documents:

- Guidelines for Landscape and Visual Impact Assessment, 3rd Edition 2013, published by the UK Landscape Institute and the Institute of Environmental Management and Assessment (hereafter referred to as the GLVIA).
- The Wicklow County Development Plan 2022-2028 and Associated Documents, including the Wicklow County Landscape Assessment.
- Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Proposed National Roads- Standard, 2020, published by Transport Infrastructure Ireland (TII).
- The National Roads Authority Environmental Impact Assessment of National Road Schemes – A Practical Guide.
- The National Roads Authority Guide to Landscape Treatments for National Road Schemes

#### Desk Study – Policy and Mapping

Section 4.4.3.1 includes the planning policies contained in the current Wicklow County Development Plan 2022-2028 (CDP), which identifies landscape protection in relation to the study area and in the immediate environs. Relevant landscape and visual policies including Landscape Character Areas (LCAs), Protected Views, Scenic Routes and other important landscape features were mapped.

With guidance from the County Development Plans in terms of sensitivity, various aspects of the receiving environment are assessed to identify significant characteristics, elements and features.

#### Site Visit – Identification of Landscape Features and Visual Qualities

Following the desktop study, a roadside survey of the study area was carried by qualified landscape architect in August 2023. Section 4.4.3 includes a description of the landscape character and features, visual qualities and views and cultural heritage features which were identified on the site visit.

#### Identification of Landscape Features and Values

This section then identifies particular values attached to the landscape which are recommended to be conserved, and values which should be enhanced, by the proposed project. A table identifying relevant landscape elements and the recommended approach in relation to the study area is included in Section 4.4.4. Particular attention is given to the following aspects of the landscape character and is relevant to the proposed project, which is as follows:

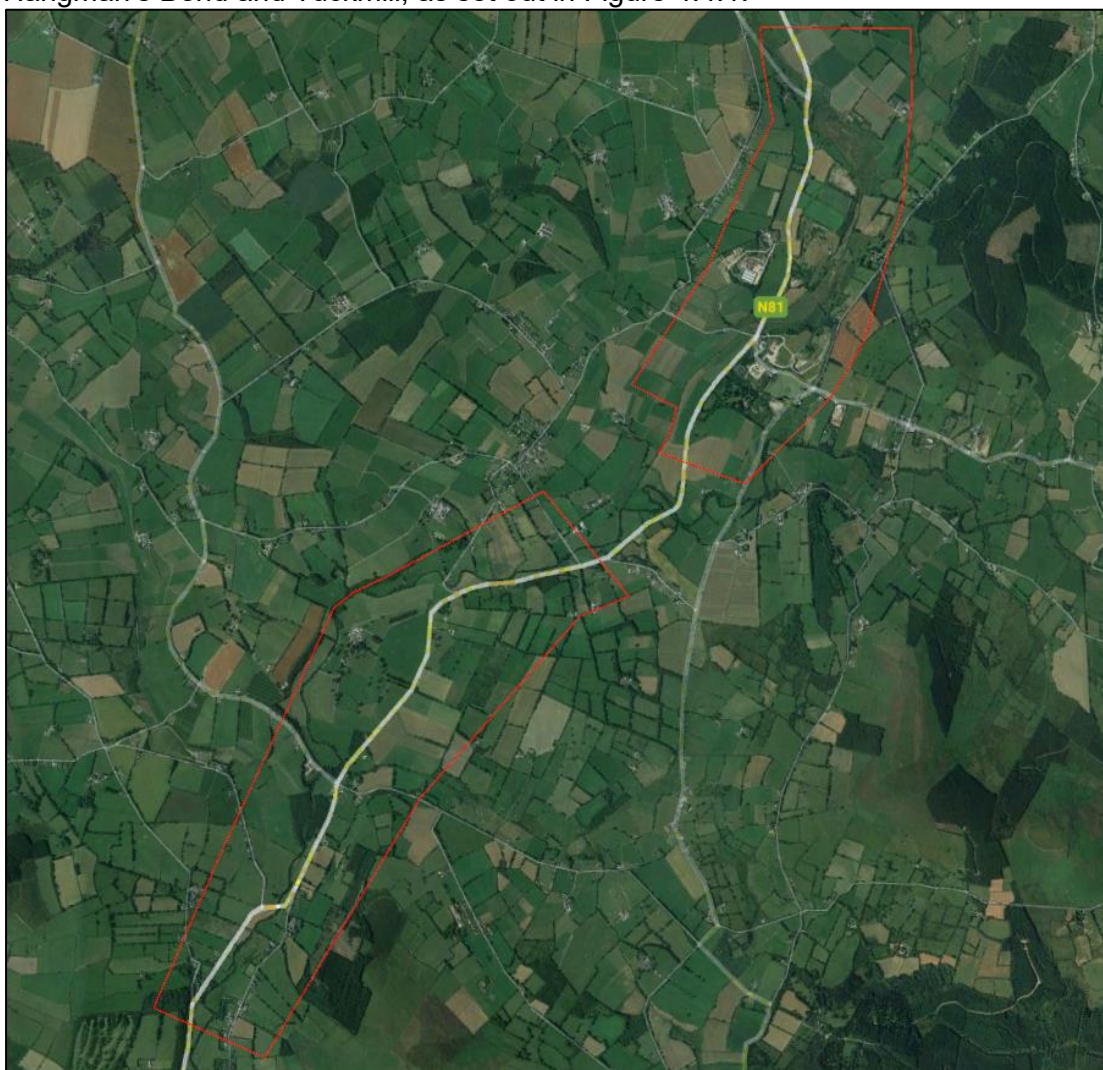
- Topography and drainage – Upper slopes and crests of hills are more visible and therefore more sensitive to physical disturbance (in relation to disruption of the

skyline). Valleys, being drainage channels, are sensitive to hydrological disturbance and associated effects on ecology (and possibly recreation and visual amenity).

- Field patterns, boundaries, and vegetation – Landscapes characterised by smaller fields have more field boundaries and hedgerow (by length) than areas with larger fields. Field boundaries have cultural historic value, ecological value (providing habitat and habitat connectivity) and visual amenity value (containing much of the tree cover found in the landscape). There is thus more hedgerow vegetation and legibility likely to be lost in an area characterised by smaller fields than in areas with larger fields.
- Settlement and transport patterns – In a rural environment, more densely settled landscapes are more sensitive to the introduction of a road than less densely populated areas as they have more receptors that are sensitive to sensory disturbance. In addition, landscapes with fewer physical obstacles (buildings, infrastructure, etc.) are more suitable for road construction because they require less bends and bridges in the route and/or less demolition of structures, infrastructure, etc.
- Special features – Certain elements and features of the landscape, notably natural and cultural heritage features, are sensitive to the disturbance caused by a road and should be avoided/protected.
- Land use – Various land uses have differing sensitivity to the disturbance caused by construction and operation of a road. For example, landscapes valued for their ecological or recreational functions are more sensitive to the severing effect of a road than an agricultural or industrial landscape (in which mitigation options might be more effective).

### 4.4.3 Receiving Environment

The study area for this Constraints & Opportunities Report is divided between that which pertains to N81 Whitestown Lower, and that which pertains to the N81 Hangman's Bend and Tuckmill, as set out in Figure 4.4.1.



**Figure 4.4.1 Study Area's (red line boundary)**

#### 4.4.3.1 Planning Policy

The Wicklow County Development Plan 2022-2028 is the relevant Plan for the area. Relevant policies to the study area are as follows.

##### **Landscape and Landscape Character**

The Wicklow County Development Plan 2022-2028 (hereafter referred to as the CDP) was adopted on the 12<sup>th</sup> of September 2022 by the Elected Members of Wicklow County Council.

The CDP contains a number of policies and objectives relating to landscape and protected views and prospects as well as zoning objectives, county policy objective (hereafter referred to as CPOs). Chapter 17 of the CDP pertains to 'Landscape Character,' with Section 17.3 pertaining to 'Landscape.'

It states that:

*'The landscape of the County is a national asset. County Wicklow is richly endowed with a variety of landscape 'types' formed naturally over time and through the interactions of humans with the natural environment producing a variety of characteristic landscapes and landscape features. The increasing development pressure of recent years has caused changes in the natural landscape, which are unprecedented in scale and nature, and has led to the Government setting out guidelines for landscape appraisal. This assessment of the landscape is to ensure that "the environment and heritage generally are maintained in a sustainable manner, while at the same time enabling a proactive approach to development.*

*'The landscape assessment that was undertaken for the previous County Development Plan in 2016 has not been updated for the purposes on this plan and is considered to remain a robust and up to date reflection of the landscape character zones of the County.'*

The Wicklow Landscape Character Assessment identified 15 distinctive landscape categories, which were placed within a landscape hierarchy, ranging from 1 (i.e., of highest value/sensitivity) to 6 (i.e. the lowest value/ sensitivity). In terms of the two proposed projects:

- The aforementioned N81 Whitestown Lower Study area is divided between the 'Baltinglass Hills Area of High Amenity' LCA, and the 'Western Corridor' LCA
- The aforementioned N81 Hangman's Bend and Tuckmill Study Area lies within the 'Baltinglass Hills Area of High Amenity' LCA.

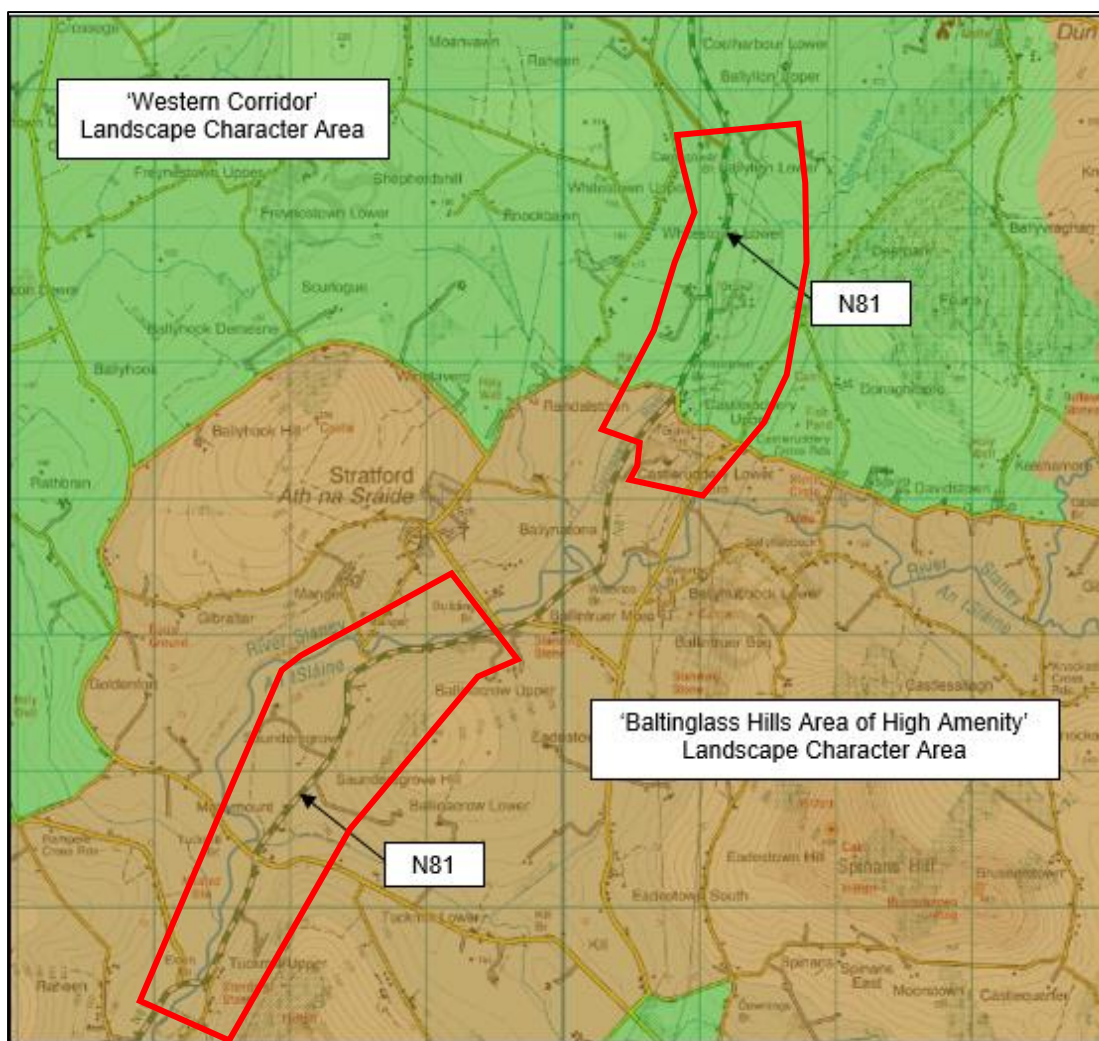
Baltinglass Hills' Area of High Amenity has a level 3 landscape sensitivity/ value, in the hierarchy of 1-6. This is described as:

*"The rolling undulating terrain of the hills around Baltinglass, characterised by the existence of important archaeological remains and monuments. This area is of significant heritage value while also forming a key tourist attraction within this area."*

The Western Corridor landscape category has a level 4 landscape sensitivity/value, in the hierarchy of 1-6. This is described as:

*"This landscape area covers the main access corridor along the west of the County. The boundary of the western corridor generally follows what is considered to be the area upon which the greatest influence is exerted by this secondary access route. This route, for the most part, runs through the more low lying and accessible tracts of land, providing expansive views of the Wicklow Mountain Range, intermittent views of the Blessington lakes south of Blessington with its primary function being the connection between the towns of Blessington and Baltinglass in the west of the County."*

Both Landscape Character Areas are illustrated in Figure 4.4.2.



**Figure 4.4.2 Wicklow Landscape Character Areas**

Section 17.4 of the CDP pertains to 'Natural Heritage & Biodiversity Objectives'.

**CPO 17.1** To protect, sustainably manage and enhance the natural heritage, biodiversity, geological heritage, landscape and environment of County Wicklow in recognition of its importance for nature conservation and biodiversity and as a non-renewable resource.

**CPO 17.2** Ensure the protection of ecosystems and ecosystem services by integrating full consideration of these into all decision making.

**CPO 17.3** To support and promote the implementation of the County Wicklow Heritage Plan and the County Wicklow Biodiversity Action Plan.'

**'Protected Sites' & 'Sites & Corridors of Ecological & Biodiversity Value'**

According to the National Parks and Wildlife Service (NPWS), there are no Special Protection Areas, Natural Heritage Areas or proposed Natural Heritage Areas within the study area.

However, there is a Special Area of Conservation: Slaney River Valley SAC, Site code 000781. This designation runs throughout the Study area and adheres to the water-surface area of the river (i.e., not the land surrounding the river). Please refer to Chapter 4.1 Biodiversity for more information.



### **Woodlands, Trees and Hedgerows**

**CPO 17.18** *To promote the preservation of trees, groups of trees or woodlands in particular native tree species, and those trees associated with demesne planting, in the interest of the long-term sustainability of a stable ecosystem amenity or the environment generally.*

**CPO 17.20** *Development that requires the felling of mature trees of environmental and/or amenity value, even though they may not have a TPO [Tree Preservation Order] in place, will be discouraged.*

**CPO 17.21** *To strongly discourage the felling of mature trees to facilitate development and encourage tree surgery rather than felling if such is essential to enable development to proceed.*

**CPO 17.22** *To require and ensure the preservation and enhancement of native and semi-natural woodlands, groups of trees and individual trees, as part of the development management process, and require the planting of native broad-leaved species, and species of local provenance in all new developments.*

**CPO 17.23** *To require the retention, wherever possible, of hedgerows and other distinctive boundary treatment in the County. Where removal of a hedgerow, stone wall or other distinctive boundary treatment is unavoidable, provision of the same type of boundary will be required of similar length and set back within the site in advance of the commencement of construction works on the site (unless otherwise agreed by the Planning Authority)."*

### **Landscape, Views & Prospects**

**CPO 17.35** *All development proposals shall have regard to the County landscape classification hierarchy in particular the key landscape features and characteristics identified in the Wicklow Landscape Assessment (set in Volume 3 of the 2016 County Development Plan) and the 'Key Development Considerations' set out for each landscape area set out in Section 5 of the Wicklow Landscape Assessment.*

**CPO 17.37** *To resist development that would significantly or unnecessarily alter the natural landscape and topography, including land infilling / reclamation projects or projects involving significant landscape remodelling, unless it can be demonstrated that the development would enhance the landscape and / or not give rise to adverse impacts.*

**CPO 17.38** *To protect listed views and prospects from development that would either obstruct the view / prospect from the identified vantage point or form an obtrusive or incongruous feature in that view / prospect. Due regard will be paid in assessing development applications to the span and scope of the view / prospect and the location of the development within that view / prospect."*

It is worth noting that there are no Tree Preservation Orders, or Trees Considered for Preservation, within the study area.

### **Scenic Designations**

According to Section 17.3 of the CDP:

*"The views and prospects listed in this plan for protection are those views / prospects that are considered to be of the highest amenity value in the County. Some views / prospects will form a cohesive set, such as coastal or lake drives, while some appear suddenly and provide the viewer with a new and interesting angle on a natural feature or place. Some views / prospects are intermittent in nature and appear through gaps in vegetation or buildings."*

While there are no designated scenic views within the study area, there are two designated scenic routes within the respective study areas, which are set out in Schedule 17.12 and Figure 17.11 of the CDP. There is one of these scenic routes in each of the study areas.

In the Whitestown Lower study area:

**Scenic Route 48**

View Of *N81 at Merginstown Glen*

Description *Prospect of Carrigower river valley*

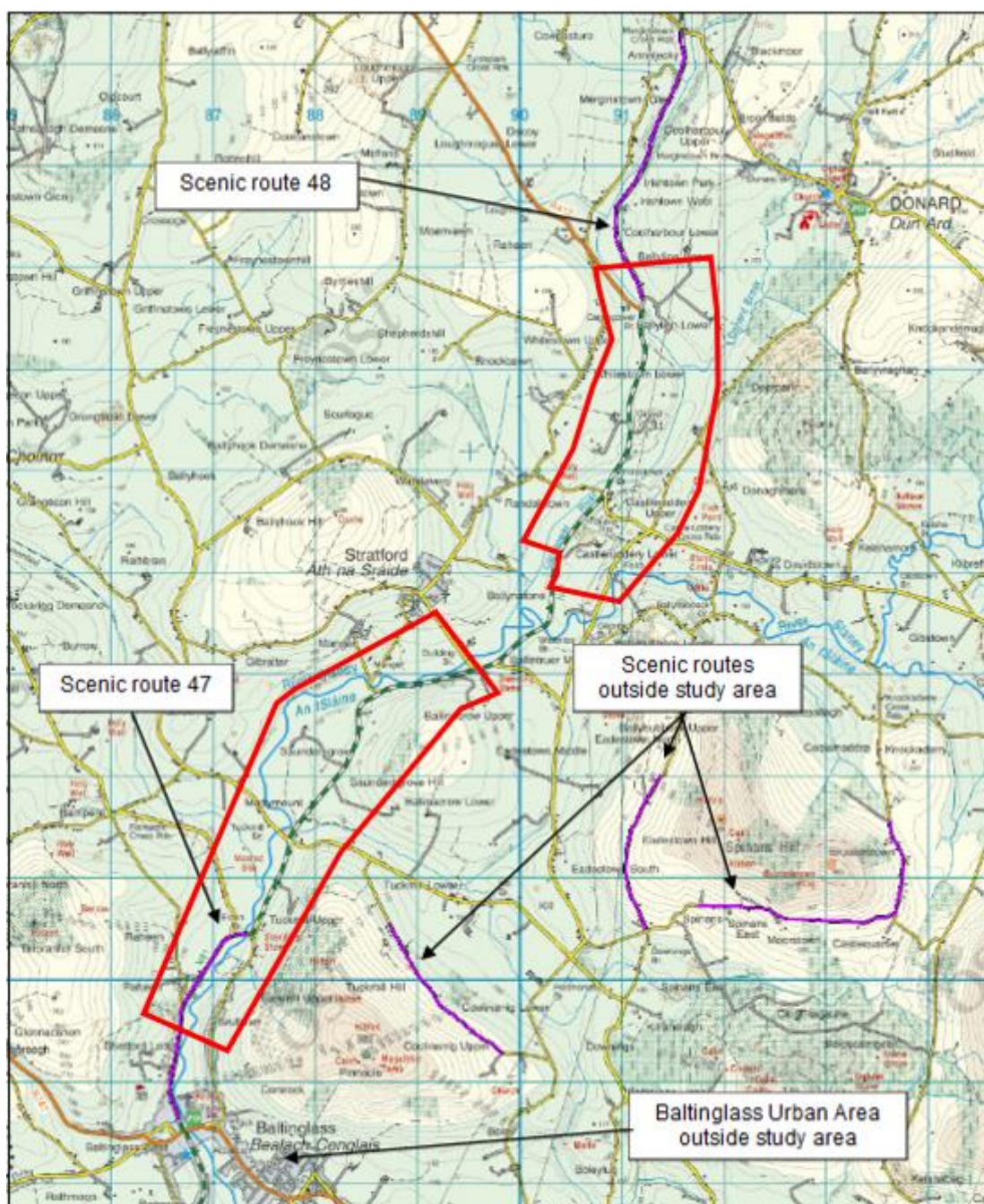
In the N81 Hangman's Bend & Tuckmill study area:

**Scenic Route 47**

View Of *N81 north of Baltinglass, Slaney Drive*

Description *Prospect of Slaney river valley, Baltinglass Abbey Rathnagree and Rathcoran hillforts*

These scenic routes are illustrated in Figure 4.4.3.



**Figure 4.4.3 Designated Scenic Routes**

### Summary of Development Plan Policies

- The Wicklow Landscape Character Assessment categorises the study area landscape in two separate LCAs. The 'Baltinglass Hills Area of High Amenity' LCA has a level 3 landscape sensitivity/value (in the hierarchy of 1-6, with the most sensitive being '1'). The 'Western Corridor' LCA has a level 4 landscape sensitivity/value.
- There is one NPWS designation within the two respective study areas. This is a Special Area of Conservation: Slaney River Valley SAC.
- While there are no designated scenic views within the study area, there are two designated scenic routes within the respective study areas, both of which are along/from the N81.

- Policies also relate to the importance of retaining trees, woodlands and hedgerows.

### Landscape Characteristics

#### Topography: Drainage and Landform

##### *The N81 Whitestown Lower Study Area:*

Terrain is undulating, ranging from approx. 140m AOD along the valley floor, to approx. 185m AOD on the valley sides. While landform to the east and west of the study area is more dramatic in elevation, the defining feature of the study area is the drainage basin cut out by the Carrigower River and Donard Brook, in the north; both of which feed into the Slaney River south of this study area. There are considerably boggy or marshy, water-retaining areas to either side of the Carrigower River that flood following heavier or more persistent rainfall. The N81 for the most part is aligned close to the valley floor and/or the Carrigower River.



**Plate 4.4.1 The Carrigower River**



**Plate 4.4.2 Distant Terrain (i.e., outside the study area) rises dramatically.**

*The N81 Hangman's Bend and Tuckmill study area:*

This study area is centred around the Slaney River valley, as the river flows from north to south, towards Baltinglass (i.e. outside the study area). In certain sections, the valley floor is notably U-shaped, with wide parcels of relatively flat or slightly sloping land, allowing for excellent agricultural zones. The N81 for the most part is aligned close to the valley floor and/or the Slaney River.



**Plate 4.4.3 Sections of the Valley Floor are Wide and Slightly-Sloping**

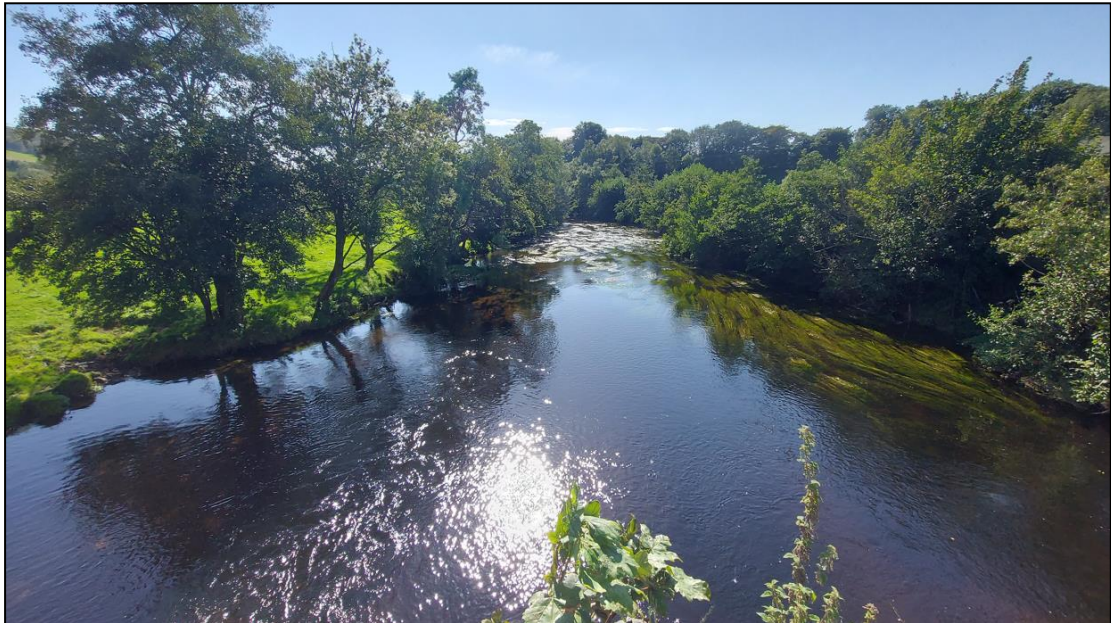
Terrain ranges from approx. 130m AOD on the valley floor, to over 200m AOD along the eastern flank of the study area, where landform rises steadily. On the western flank of the study area, landform rises to approx. 150m AOD. On both the eastern and western flanks, the lift in landform serves as *de facto* foothills of higher hills, outside the study area, which reach to over 300m AOD. In this regard, the broader valley of this study area is more dramatic than the Whitestown Lower Study Area.



**Plate 4.4.4 Terrain lifts to over 200m AOD along the eastern flank of the study area**

The most notable waterbody in the study area and wider area, the Slaney River rises in the western Wicklow Mountains, before descending to flow through three counties (Wicklow, Carlow and Wexford) over the course of 117km, before reaching its estuary

at Wexford town. As it passes through the study area, the Slaney is frequently bridged, resulting in a wider connectivity between both sides of the valley.



**Plate 4.4.5** The River Slaney

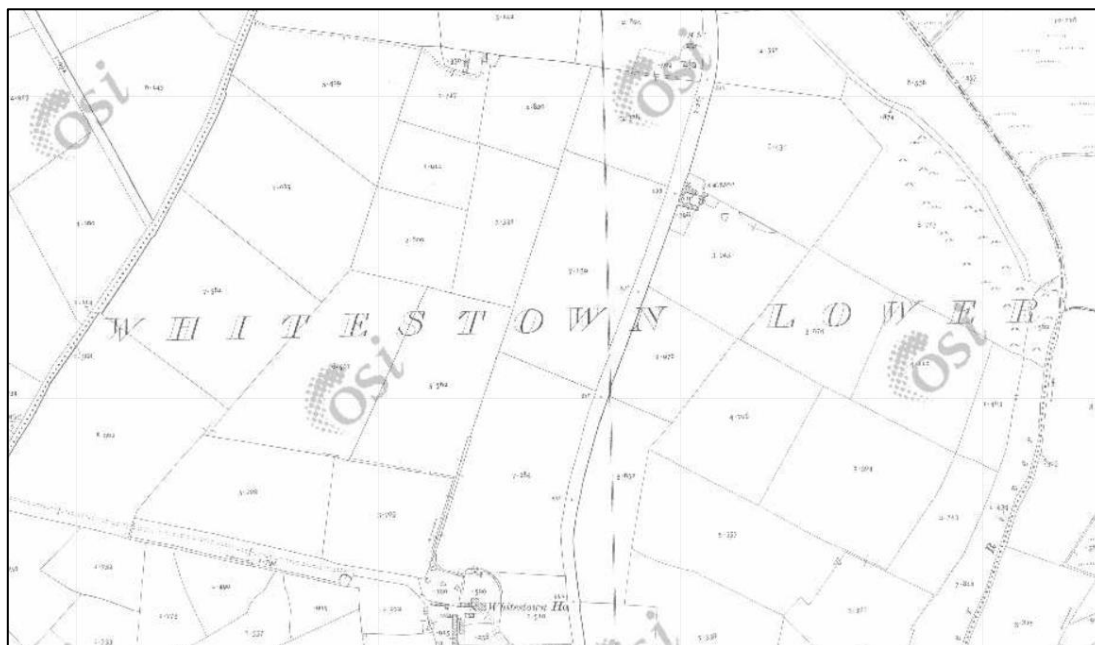
#### **Landcover, Land Use & Vegetation**

##### N81 Whitestown Lower Study Area:

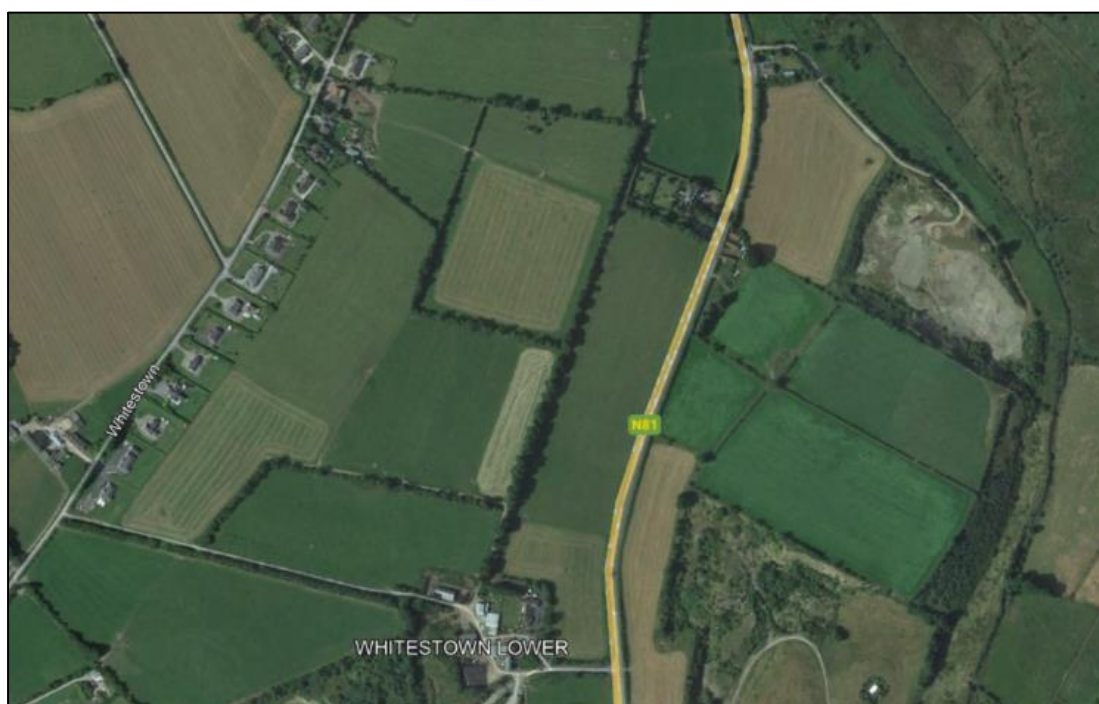


**Figure 4.4.4** Imagery of Landcover in the Whitestown Lower Study Area (Ref: Google Earth)

Land use is primarily agricultural, made up of field sizes that are mid or large-sized, as illustrated in Figure 4.4.4. Agricultural appears to have been heavily intensified in its practices, over the previous century (i.e., in comparison to 19<sup>th</sup> Century maps), with the removal of field boundaries, as well as numerous more dwellings since constructed in the area. This is particularly evident in and near the townland of Whitestown Lower, as illustrated below in Figure 4.4.5 & Figure 4.4.6.

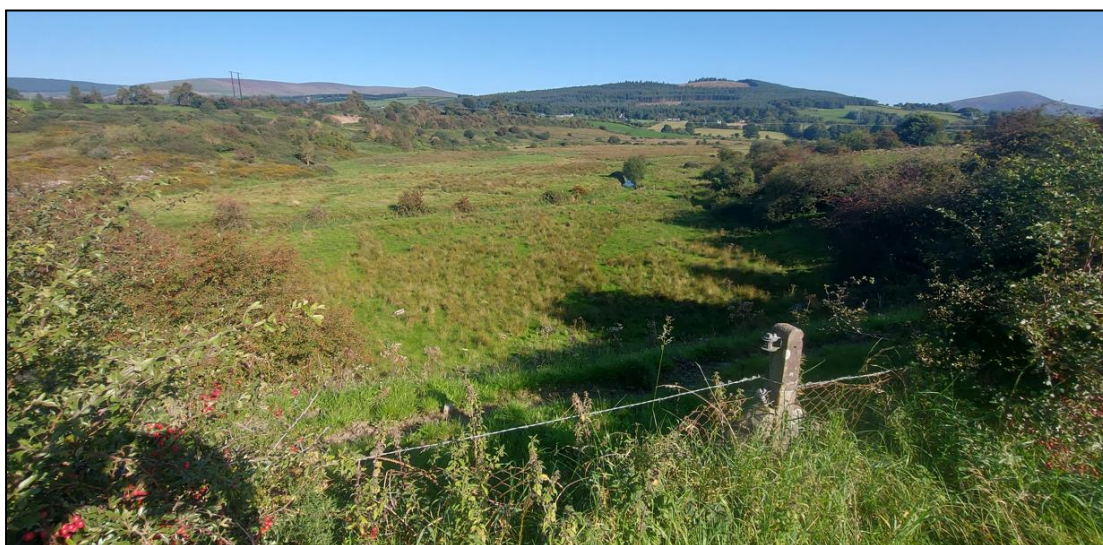


**Figure 4.4.5** Extract of historical 25-inch Ordnance Survey map (1897-1913 at Whitestown Lower (source: [www.heritagemaps.ie](http://www.heritagemaps.ie)).

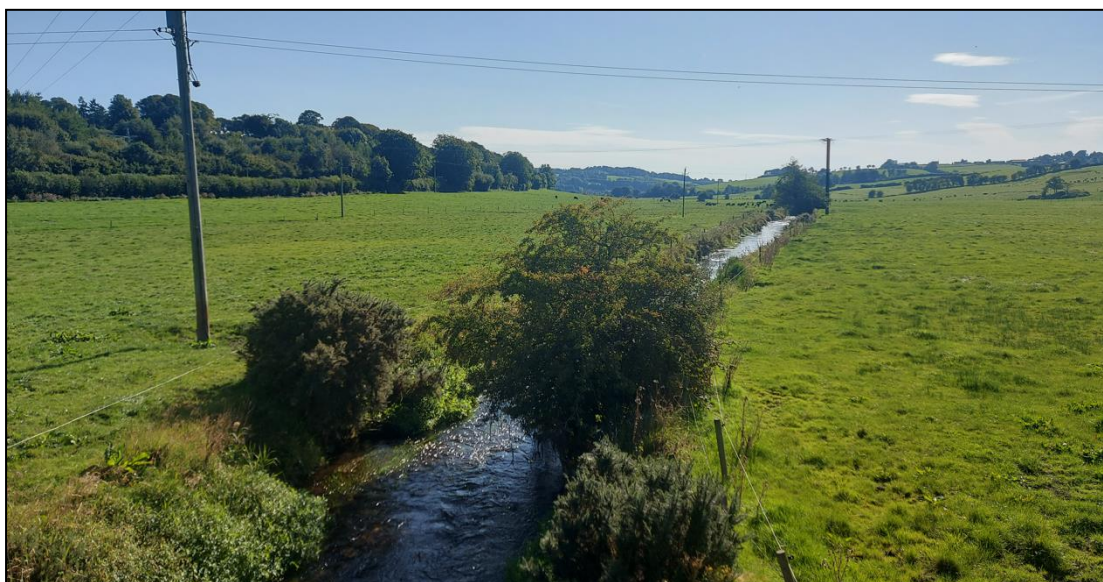


**Figure 4.4.6** Whitestown Lower (Google Earth 2021 capture), showing notably fewer fields/field boundaries than in Figure 4.4.5.

Consequently, tall or mature trees in field boundaries across the study area are not predominant, while long stretches of the Carrigower River have been canalised, with its' former riparian vegetation removed. In the upper reaches of the study area, land to either side of the river is marshy in places, along a reed- and rush-infested floodplain that is marginal for agriculture or settlement. Overall, these elements help generate a sense of a mixed and much modified working agricultural landscape. There is also some industry within the study area, in the form of a large warehouse and yard on the western side of the valley, housing Leinster Pellets, and a large, operational sand and gravel pit/quarry in the southeast.



**Plate 4.4.6** A marshy floodplain in the northern reaches of the study area, to either side of Carrigower River



**Plate 4.4.7** Long stretches of the Carrigower River have been canalised, with its' former riparian vegetation removed

*N81 Hangman's Bend and Tuckmill study area*

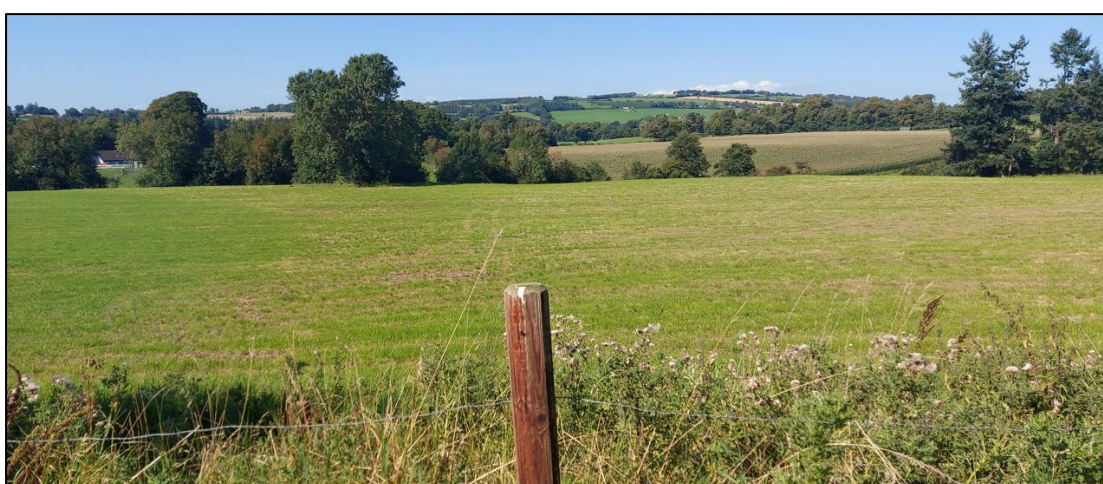
Land use is overwhelmingly agricultural in nature, with medium-sized pastoral fields being predominant. Field boundaries on the eastern side of the valley tend to have taller, more mature vegetation within them than is the case on the western side of the



valley. In the southern half of the study area, there are also isolated pockets of commercial conifer forestry, as may be discerned from Figure 4.4.7, below.



**Figure 4.4.7** Landcover in the study area



**Plate 4.4.8** Agricultural fields within the study area

**Built Form & Cultural Heritage**  
N81 Whitestown Lower Study Area

The N81 itself is the largest built element in the study area. It is a busy national secondary road that links Tullow in Co. Carlow to the M50 in Dublin, over the course of approx. 75km (see Plate 4.4.9, below). It is one of the most heavily used arterial routes in Wicklow, with an Annual Average Daily Traffic (AADT) flow of 12,000 vehicles per day (source: 'Greater Dublin Area Transport Strategy 2022-2042, West Wicklow/East Kildare,' - National Transport Authority November 2021). While there are no settlements in the study area, there is a small handful of detached rural residences. In terms of archaeological remnants, there is one Holy Well in the study area, which is located in the Randalstown townland.



**Plate 4.4.9 N81**

**N81 Hangman's Bend and Tuckmill study area**

The highest concentration of residences is at Sruhan, in the southeast of the study area. These are located within 1km north of Baltinglass. The crossroads at Tuckmill is the site of a former large mill, the building for which is currently being renovated.



**Plate 4.4.10 View of the alignment of the former Great Southern & Western Railway, from one of two overpass rail bridges**

The southern section of the study area was once home to the Tullow branch of the Great Southern & Western Railway, which opened in the 1880s. While the line itself was removed in 1959, two overpass rail bridges remain, over which local roads cross (see Plate 4.4.10, above).

In the northern section of this study area is Saundersgrove House, a large detached seven-bay two-storey house. The house was built in c.1925 on the site of the original Saundersgrove House that was built in 1716 and burnt down in 1922. However, the extensive parkland demesne that was in place in the 19<sup>th</sup> Century, remains discernible from the N81, including the Beech-lined main entrance off the N81, as seen in Plate 4.4.11, below. The house is in private ownership and is now a working farm.



**Plate 4.4.11 Beech-lined main entrance to Saundersgrove House off the N81**

There are two stone bridges spanning the Slaney (i.e. Eldon Bridge and Tuckmill Bridge). In terms of archaeological remnants, there is one standing stone (in Tuckmill Upper townland) and one moated site (in Tuckmill Bridge townland) in the study area.



**Plate 4.4.12 Stone Bridge Spanning the River Slaney**

## **Recreation & Amenity**

The only known recreation or amenity within either study area is fishing along the banks the Slaney River. There are no known sporting or recreational amenities and/or clubs within either study.

## **Visual Amenity and Visual Receptors**

### N81 Whitestown Lower Study Area

The source of visual amenity in the study area entails the features already referred to in the above Landscape Characteristics of this report. These largely consist of rolling hills framing a winding, attractive river, set within a verdant, modified, agricultural valley. Verdant pastures and hedgerows/field boundaries are present, as well as views of the more distant Wicklow mountains beyond. These contribute to the visual amenity of this high-quality working agricultural landscape.

The main visual receptors in this study area are residents, followed by those travelling along the aforementioned designated scenic route 48, in the far north of this study area.

### N81 Hangman's Bend and Tuckmill study area

The visual amenity of this study area is broadly similar to that set out and described within the N81 Whitestown Lower study area. In addition, there is the presence of rustic, stone bridges over the Slaney; the stately trees and scenic former demesne landscape of Saundersgrove House, as well as views of the distant Wicklow mountains. The major visual receptors in this study area are residents, followed by those travelling along the aforementioned designated Scenic Route 47.

## **Landscape Values**

Section 4.3.3.1 has outlined the relevant planning policies in the area, as well as a more detailed description of the landscape characteristics of the study area. As noted, the Landscape Character Assessment assigns, on balance, a moderate or mid-table degree of sensitivity attributed to the landscape of the receiving environment.

The *Guidelines for Landscape and Visual Impact Assessment* (3rd Edition 2013) set out the methodology for assigning landscape sensitivity. This is based on combining judgements on landscape value, and landscape susceptibility, which relates to the type of development proposed.

Landscape values are derived from both indications of value, as seen in national and local policy, as well as other indications on which a landscape or landscape element, is valued. Landscape values can include international designations (such as UNESCO World Heritage sites), national designations, and local designations, such as designated scenic routes, scenic views or amenity designations which are included in County Development Plans. Important tourism, cultural heritage or recreational areas are also indicative of value.

In addition, where landscapes do not have designations, a number of criteria are used to assess the value of a landscape within the study area. These criteria include:

- Landscape Quality/Condition
- Cultural Heritage/Conservation value
- Aesthetic/Scenic Quality
- Rarity or Representativeness

- **Public Accessibility and Recreation Value**

The concept of conservation values and enhancement values is referred to in the Draft Guidelines for Landscape and Landscape Assessment (DoEHLG 2000). These features, characteristics or values are summarised below in terms of:

- **Conservation Values** (i.e. those values or aspects of the receiving environment that should be protected and/or conserved).
- **Enhancement Values** (i.e. those aspects or characteristics of the landscape that are supportive of change and development).

For both conservation and enhancement values, the constraints or opportunities they present for the proposed project are identified in Table 4.4.1 and Table 4.4.2.

#### **4.4.4 Identified Constraints**

Please note that the two aforementioned study areas have a considerable amount of landscape features, characteristics, values and sensitivities that are similar to one another. This is reflective of the fact that both study areas are set within the one extended river valley, only separated by less than 1km distance from one another. Thus, both study areas are likely to have similar conservation and/or enhancement values to one another.

**Section 1: N81 Whitestown Lower Project**

**Table 4.4.1 Landscape and Visual Characteristics – Conservation Values**

No.	Landscape and Visual Characteristic, Element or feature	Conservation Values	Constraints/Opportunities
1	Rolling topography centred upon a river valley.	Undulating countryside contributes to the sense of place of the study area.	<u>Constraint:</u> Any proposed development should respect the undulating landform and rolling topography through gentle gradients and curves where feasible.
2	River/stream corridors in the study area.	The Carrigower River and Donard Brook contribute to the visual amenity and amenable sense of place of the setting. They are also important in terms of ecological interest and value, as borne out by the Carrigower River being part of the Slaney River Valley SAC.	<u>Constraint:</u> Any proposed development should ensure the protection of species and avoid disturbance to ecological connectivity where possible. Ecological mitigation plans should address and enhance any likely impacts.
3	Mature trees and tree lines.	Mature trees are high quality visual elements in the landscape, providing enclosure and structure and are a primary contributor to ecological value in the landscape.	<u>Constraint:</u> any proposed development should seek to avoid traversing woodland areas and areas with tree lines (especially mature trees). This will help avoid reducing the landscape's ecological, cultural heritage and visual amenity value.
4	Field patterns, field boundaries and hedgerows.	As linear and intrinsically connected habitat corridors, hedgerows have significant ecological value, as well as being a primary contributor to visual amenity value in the landscape. As indications of historic field and/or land boundaries, they have significant cultural historic value. Along with areas of woodlands, they provide enclosure and structure in the landscape, particularly along the slopes of the hills lining the eastern and western fringes of the study area.	<u>Constraint:</u> Any proposed development should retain the landscape pattern of fields or as many lengths of hedgerow as possible. Those parts of the study area with larger fields and less valuable hedgerow vegetation boundary edges should be favoured over areas with more complex field patterns.
5	Landscape and visual qualities of local roads and residential receptors, in particular residents along or close to the N81	The rural character of the landscape generates a palpable degree of amenity value enjoyed by the residents of the study area particularly those along the N81. The residents (and other viewers) along the local roads tend to experience more enclosed, intimate views due to screening by trees and hedgerows.	<u>Constraint:</u> any proposed development should seek to avoid causing disturbance to residential dwellings and the existing local road network. Mitigation proposals should enhance screening of localised topography, hedgerows and trees through earthworks and new planting.

No.	Landscape and Visual Characteristic, Element or feature	Conservation Values	Constraints/Opportunities
6	Archaeological feature (the aforementioned Holy Well)	Archaeological features provide a sense of historical settlement in the landscape and are distinctive features at a local level.	<u>Constraint:</u> any proposed development should seek to protect the historic archaeological remains.
7	Moderate/mid-table degree of landscape value/sensitivity (as per aforementioned Landscape Character Assessment)	These landscape sensitivities combine several of the above landscape characteristics and constraints. While the resulting sensitivity is stated in the County Development Plan, other factors that contribute to this include Landscape Quality/Condition; Cultural Heritage/ Conservation value; Aesthetic/Scenic Quality; Rarity or Representativeness; Public Accessibility and Recreation Value.	<u>Constraint:</u> any proposed development should seek to not erode or reduce the existing landscape value and/or sensitivity of the study area.
8	Wicklow designated Scenic Route 48	As Schedule 17.12 of the CDP states, this scenic route enjoys a "Prospect of Carrigower river valley"	<u>Constraint:</u> as objective (CP0 17.38) of the Wicklow CDP states, "To protect listed views and prospects from development that would either obstruct the view / prospect from the identified vantage point or form an obtrusive or incongruous feature in that view / prospect."

Please note that there are no known enhancement values associated with the Landscape and Visual Characteristics of the N81 Whitestown Lower study area.

**Section 2: N81 Hangman's Bend and Tuckmill Project**

**Table 4.4.2 Landscape and Visual Characteristics – Conservation Values**

No.	Landscape and Visual Characteristic, Element or feature	Conservation Values	Constraints/Opportunities
1	Rolling topography centred upon a river valley.	Undulating countryside contributes to the sense of place of the study area.	<u>Constraint:</u> Any proposed development should respect the undulating landform and rolling topography through gentle gradients and curves where feasible.
2	River/stream corridors in the study area.	The Slaney River contributes to the visual amenity and amenable sense of place of the setting. This is also important in terms of ecological interest and value, as borne out by the Carrigower River being part of the Slaney River Valley SAC.	<u>Constraint:</u> Any proposed development should ensure the protection of species and avoid disturbance to ecological connectivity where possible. Ecological mitigation plans should address and enhance any likely impacts.
3	Mature trees and tree lines.	Mature trees are high quality visual elements in the landscape, providing enclosure and structure and are a primary contributor to ecological value in the landscape.	<u>Constraint:</u> any proposed development should seek to avoid traversing woodland areas and areas with tree lines (especially mature trees). This will help avoid reducing the landscape's ecological, cultural heritage and visual amenity value.
4	Field patterns, field boundaries and hedgerows.	As linear and intrinsically connected habitat corridors, hedgerows have significant ecological value, as well as being a primary contributor to visual amenity value in the landscape. As indications of historic field and/or land boundaries, they have cultural historic value. Along with areas of woodlands, they provide enclosure and structure in the landscape, particularly along the slopes of the hills lining the eastern and western fringes of the study area.	<u>Constraint:</u> Any proposed development should retain the landscape pattern of fields or as many lengths of hedgerow as possible. Those parts of the study area with larger fields and less valuable hedgerow vegetation boundary edges should be favoured over areas with more complex field patterns.
5	Landscape and visual qualities of local roads and residential receptors, in particular residents along or close to the N81	The rural character of the landscape generates a palpable degree of amenity value enjoyed by the residents of the study area particularly those along the N81. The residents (and other viewers) along the local roads tend to experience more enclosed, intimate views due to screening by trees and hedgerows.	<u>Constraint:</u> any proposed development should seek to avoid causing disturbance to residential dwellings and the existing local road network. Mitigation proposals should enhance screening of localised topography, hedgerows and trees through earthworks and new planting.



No.	Landscape and Visual Characteristic, Element or feature	Conservation Values	Constraints/Opportunities
6	Architectural and Archaeological features	These entail the aforementioned parkland demesne of Saundersgrove House; the two stone bridges spanning the Slaney and the one standing stone and one moated site in the study area. Such features provide a sense of historical settlement in the landscape and are distinctive features at a local level.	<u>Constraint:</u> any proposed development should seek to protect the historic archaeological remains.
7	Moderate/mid-table degree of landscape value/sensitivity (in accordance with the County Wicklow Landscape Character Assessment)	These landscape values/sensitivities combine several of the above landscape characteristics and constraints. While the resulting value/sensitivity is stated in the Country Development Plan, other factors that contribute to this include Landscape Quality/Condition; Cultural Heritage/ Conservation value; Aesthetic/Scenic Quality; Rarity or Representativeness; Public Accessibility and Recreation Value.	<u>Constraint:</u> any proposed development should seek to not erode or reduce the existing landscape value and/or sensitivity of the study area.
8	Wicklow designated Scenic Route 47	As Schedule 17.12 of the CDP states, this scenic route enjoys a <i>“Prospect of Slaney river valley, Baltinglass Abbey Rathnagree and Rathcoran hillforts.”</i>	<u>Constraint:</u> as objective (CP0 17.38) of the Wicklow CDP states, <i>“To protect listed views and prospects from development that would either obstruct the view / prospect from the identified vantage point or form an obtrusive or incongruous feature in that view / prospect.”</i>

Please note that there are no known enhancement values associated with the Landscape and Visual Characteristics of the Hangman's Bend and Tuckmill study area.

#### **4.4.5 References**

Landscape Institute and the Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment (GLVIA), 3rd Edition

Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Proposed National Roads - Standard, 2020, published by Transport Infrastructure Ireland (TII).

National Transport Authority Greater Dublin Area Transport Strategy 2022-2042, West Wicklow/East Kildare (November 2021).

The National Roads Authority Environmental Impact Assessment of National Road Schemes - A Practical Guide.

The National Roads Authority Guide to Landscape Treatments for National Road Schemes

Wicklow County Development Plan 2022-2028 and associated documents.

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

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

## 5. ARTIFICIAL CONSTRAINTS

### 5.1 Introduction

The key artificial constraints of the receiving environment are described under the following headings according to the TII Project Manager's Manual:

- Land Use and Planning;
- Engineering (e.g., earthworks, horizontal/vertical alignments, and road/rail crossings);
- Archaeology, Architectural and Cultural Heritage;
- Material Assets (agriculture and non-agriculture);
- Air Quality and Climate;
- Noise and Vibration; and
- Human Health / Population

### 5.2 Land Use & Planning

The need for improvement of the N81 Whitestown Lower Project and Hangman's Bend to Tuckmill project in County Wicklow has been identified in and/or is consistent with the following National, Regional and Local planning policy documents:

#### 5.2.1 Policy Background

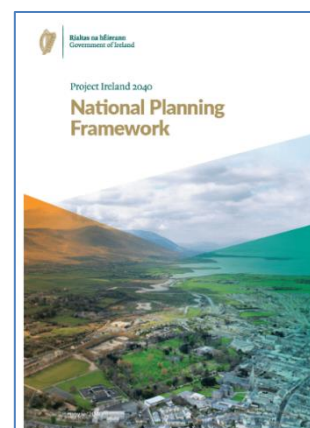
#### 5.2.2 National Policy Context

##### Project Ireland 2040 – National Planning Framework

The Project Ireland 2040 National Planning Framework was published on the 16th of February 2018. It sets out a new strategic planning and development context for Ireland and its regions up to 2040, setting a high-level framework for the coordination of a range of national, regional and local policies, activities, planning and investment for both public and private authorities.

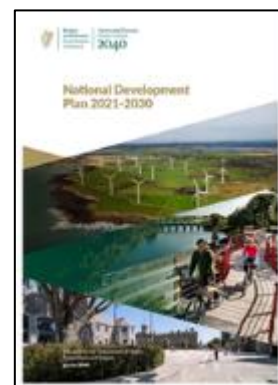
Key objectives of these projects would seek to align with the following National Strategic Outcomes of National Planning Framework:

- National Strategic Outcome 2 – Enhanced Regional Accessibility e.g., access to the southeast.
- National Strategic Outcome 3 – Strengthened Rural Economies and Communities e.g., by providing improved connectivity and accessibility.
- National Strategic Outcome 6 – High Quality International Connectivity e.g., providing an improved link to Rosslare Europort to improve international connectivity.
- National Strategic Outcome 7 – Enhanced Amenities and Heritage e.g., access to Wicklow mountains.
- National Strategic Outcome 10 – Access to Quality Childcare, Education and Healthcare Services e.g., improve corridor for a more harmonised access to provisions.



## National Development Plan 2021 - 2030

As a part of Project Ireland 2040, a renewed National Development Plan 2021 - 2030 was published on the 4<sup>th</sup> of October 2021. The National Development Plan is clearly aligned with the delivery of the outcomes and objectives of the National Planning Framework. The National Development Plan highlights the importance of regional accessibility, which is a key function of the N81 and provides access between Dublin, Wicklow and the southeast, in addition to providing an alternative route to Rosslare Europort. The National Development Plan promotes the following:

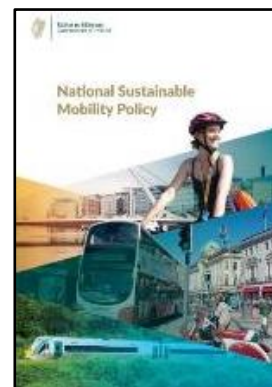


- “... seeks to enhance intra-regional accessibility through improving transport links between key urban centres of population and their respective regions, as well as improving transport link between the regions themselves” - National Strategic Outcome 2 – Enhanced Regional Accessibility
- “... emerging from such developments as improved transport connectivity, national broadband delivery, climate action and rural economic development.” - National Strategic Outcome 3 - Strengthened Rural Economies and Communities
- “Strengthening access routes to Ireland’s ports through investment to upgrade and enhance the road and rail transport network to improve journey times is and remains a government priority” - National Strategic Outcome 6 – High Quality International Connectivity

## National Sustainable Mobility Policy

The National Sustainable Mobility Policy (NSMP) was published in April 2022 as a replacement to the Smarter Travel – A Sustainable Transport Future, considering the significant changes in legislation during the intervening period.

The NSMP aligns with current policies such as the NPF, NDP, Climate Action Plan, Road Safety Strategy 2021 – 2030, and the National Investment Framework for Transport in Ireland (NIFTI) and its vision is “to connect people and places with sustainable mobility that is safe, green, accessible and efficient.”



The NSMP is guided by three key principles which are underpinned by 10 high level goals, namely:

### Safe and Green Mobility

1. Improve mobility safety.
2. Decarbonise public transport.
3. Expand the availability of sustainable mobility in metropolitan areas.
4. Expand the availability of sustainable mobility in regional and rural areas.
5. Encourage people to choose sustainable mobility options over private car.

### People Focused Mobility

6. Take a whole of journey approach to mobility, promoting inclusive access for all.
7. Design infrastructure according to Universal Design Principles and the Hierarchy of Road Users model.

8. Promote sustainable mobility through research and citizen engagement,

### **Better Integrated Mobility**

9. Better integrate land use and transport planning at all levels.
10. Promote smart and integrated mobility through innovative technologies and development of appropriate regulation.

The proposed N81 road improvement project specifically supports goals 1, 4, 5, 6, 8 and 9 of the NSMP with the opportunity to better facilitate public transport alternatives along the study area in the future. Additionally, for bus transport providers such as Bus Eireann, Expressway and others, quality roads are an essential requirement. Investment in improving the road network is a key ingredient in improved public transport in Ireland. Improving public transport is a key priority under the NPF with goal 4 of the NSMP seeking to expand the regional and local bus networks in rural areas, such as this specific study area in Co. Wicklow.

### **TII National Secondary Road Needs Study – South East Region**

Key objectives of these projects would seek to align with the following objectives of the TII National Secondary Road Needs Study:

- Reduce the direct cost of transport.
- Reduce collision numbers and the proportion of fatal and serious injuries.
- Minimise the impact on the environment.

The N81 connects directly to the N80 close to Ballon which is listed as a Strategic Linking Corridor between Carlow town and Enniscorthy in the Needs Study. It also describes the N81 as “strategically nationally important for the volume of commuter traffic it carries into Dublin city every day”. The Needs Study provides a quality score of just below average for the N81 route and indicates lane widths of less than 3 meters on over 26% of the route.

Although the N81 between Hollywood Cross and Baltinglass has been highlighted in the Need Study as a “red flag” location, it indicates that realignment of the entire section of road does not represent value for money under the multi criteria analysis. Recommendations from the Need Study suggest that more localised improvements could have a significant impact, specifically focusing on:

- More localised remedial measures to address existing major deficiencies such as sections with a history of road collisions; and
- Localised improvements to address deficiencies in width or alignment, as a possible condition of TII approval for appropriate development.

### **National Investment Framework for Transport in Ireland (NIFTI)**

NIFTI, published in December 2021, is the Department of Transport’s framework which sets out clear principles for the consideration of future transport investment, and is closely aligned with key Government policy priorities and commitments, such as the Climate Action Plan and the Nation Development Plan.

This new framework replaces the previous Strategic Investment Framework for Land Transport (SIFLT), which was published by the Department of Transport in 2015. NIFTI establishes four strategic investment priorities to address the transport challenges ahead. These priorities, which have equal weighting in the framework, include:

- Decarbonisation

- Protect and Renewal
- Enhance Regional and Rural Connectivity
- Mobility of People and Goods in Urban Areas

The NIFTI Investment Priorities represent the key objectives of transport investment that new projects must align with in the years ahead. They are supplemented by two principle-based hierarchies that will ensure that the most sustainable intervention or transport solution is given due consideration ahead of less sustainable options.

The modal hierarchy will ensure future transport investments will prioritise sustainable modes of transport options where possible. Active travel will be top of the hierarchy followed by public transport and private car travel.

There are four categories of intervention in the intervention hierarchy, 1. Maintain, 2. Optimise, 3. Improve, and 4. New. The goal of the intervention hierarchy is to prioritise transport investment decisions that make the best use of the nation's existing transport assets ahead of the construction of new infrastructure. Maintaining the existing transport network will be given priority, followed by maximising the value of the network through optimising its use. Infrastructural investments will only be considered after these two categories have been assessed as inappropriate for the identified problem, with upgrades to existing infrastructure to be considered before new infrastructure.

### **Connecting Ireland Rural Mobility Plan**

The Connecting Ireland Rural Mobility Plan was developed by the National Transport Authority (NTA) and was published in November 2021. This plan aims to increase connectivity with an emphasis on improving mobility for those living outside the major cities and towns as well as rural areas to create a more integrated system.

The N81 is the only National Secondary route emerging from Dublin City, serving as an invaluable link between strategic national roads corridors (M50 and N80) and serving a rural demographic.

This plan intends to improve: (1) The uneven connectivity between places as some areas are well connected, while others are not well served and (2) Ensuring that public transportation caters for a range of functions and not just focused on providing options for commuting to work or education.

- The N81 route serves as a year-round bus route that is operated by Bus Eireann. It serves as part of a link between Rosslare Port and Dublin City with a public transport route, Bus Eireann Route 132, that links Busáras to Rosslare Port via Blessington and Baltinglass. Private cars are used the most in this particular section of the N81 because previously, significant provisions were not dedicated to address public transport along the corridor. To mitigate the dependence on private cars, an ongoing investment in the road network is required. This will provide a safe and reliable road network which will cater to modes of public transport for not only commuting to work and education, but also serving as a route for tourism and local activities.

### **Ireland's Government Road Safety Strategy 2021 – 2030**

Ireland's Government Road Safety Strategy 2021 – 2030, published by the Road Safety Authority (RSA), sets our targets to be achieved in terms of road safety in Ireland as well as policies to achieve these targets. The primary target of this strategy is to reduce the number of deaths and serious injuries on Irish roads by 50% by 2030.

This means reducing deaths on Ireland's roads annually by 144 to 72 or lower and reducing serious injuries from 1,259 to 620 or lower by 2030.

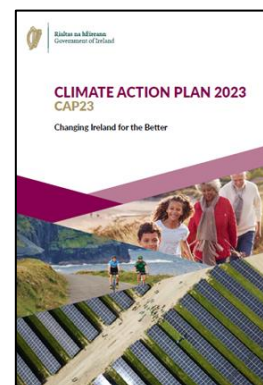
Guiding this strategy is Vision Zero, Ireland's long-term goal of achieving zero road deaths or serious injuries by 2050 using a Safe Systems approach.

This plan sets out priority intervention areas for action to achieve ambitious targets for 2030 and 2050. One investment area for priority is on safe roads and roadsides. Some high-impact actions identified include:

- Deliver an average of 60 road safety improvement schemes and fund an average of four minor realignment schemes on national roads per year to create forgiving roadsides, self-explaining roads and a safe environment for vulnerable road users.
- Over the period 2010 to 2025, 1000km of segregated walking and cycling facilities will be constructed or under construction on the national, local and regional road network to provide safe cycling and walking arrangements for users of all ages.

### Climate Action Plan 2023

The Climate Action Plan 2023 (CAP23) sets out a roadmap of specific actions in various sectors including road transport. This plan is the first to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021, which commits Ireland to a legally binding target of net-zero greenhouse gas emissions no later than 2050 and a reduction of 51 percent by 2030, compared to 2018 levels, which are required to be reviewed and updated annually to ensure it is responsive. Under the Climate Act 2021, Ireland's national climate objective requires the State to pursue and achieve, by no later than the end of the year 2050, the transition to a climate-resilient, biodiversity rich, environmentally sustainable, and climate-neutral economy.



The transport sector has been the fastest growing source of Greenhouse Gas (GHG) emissions and is the source of 15.7% emissions in Ireland in 2021 (Source: CAP23). The Plan states transport is required to reduce emissions by 50 percent by 2030. There are several actions identified across the transport section of the CAP23. The transport emissions reductions pathway is focused on the electrification of road transport, the use of biofuels, and a modal shift from private car use to public transport and active travel modes. These actions range from updating standards, support for active travel projects, and working collaboratively with other stakeholders to influence positive climate action.

The CAP23 recognises that the transport networks are becoming increasingly exposed to the effects of climate change, where flooding, high temperatures and increased storms in particular are posing challenges for the operation and resilience of roads. In line with the Sectoral Adaptation Plan for the Transport sector, this plan identifies transport adaptation actions that will be taken in 2023 to accelerate the transport sector's adaptation to climate change.

The proposed development aligns with several objectives of the Climate Action Plan 2023 which are listed below along with the proposed timeframe in which they are to be achieved or implemented:

#### By 2025:

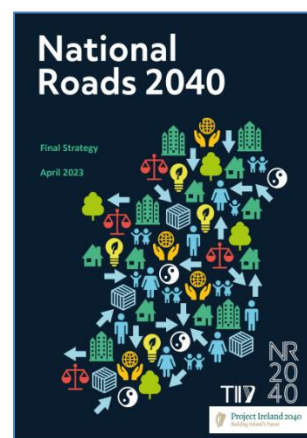
- Expand the number of safe, accessible, walking and cycling routes, including through the provision of 500 Safe Routes to School schemes and the rollout of over 1,000 kilometres in active travel infrastructure;
- Work with key stakeholders to implement the National Planning Framework (NPF), focusing on improving placemaking and accessibility;
- Enhance the integration of sustainable transport considerations into the spatial planning system; and
- Improve air quality, particularly through the transition of our vehicle fleets along with reduced car dependency.

#### By 2030:

- Address transport poverty through the Connecting Ireland programme and by prioritising public transport projects and demand responsive services that enhance regional and rural connectivity;
- Communicate the benefits of a shift away from private car usage and facilitate the provision of the required infrastructure and services to bring about a very significant modal shift to public transport and active travel, and away from car journeys (internal combustion engine and electric vehicle (EV)).

### National Roads 2040

Transport Infrastructure Ireland published the National Roads Investment Strategy 2040 (NR 2040) in April 2023. The NR 2040 is TII's long-term investment framework for maintaining, developing, and managing Ireland's National Road Network. This investment strategy aims to aid in the delivery of the National Planning Framework, supports several National Strategic Outcomes (NSOs), aligns with the Department of Transport's National Investment Framework for Transport in Ireland (NIFTI) and the Climate Action Plan 2023.



The NR 2040 identifies the function and investment priorities for different parts of the National Roads network by addressing issues and reinforcing commitments such as:

- Reducing emissions and environmental impacts from maintenance and operations of existing National Road infrastructure.
- In line with its legislative remit, TII will minimise the impact of road infrastructure on the environment and support the development and maintenance of ecological corridors along National Roads.
- Deliver on its actions in the Government's Road Safety Strategy 2021- 2030 'Our Journey towards Vision Zero' and collaborate with partners to deliver on supporting actions.
- Prioritise the delivery of high quality, suitable infrastructure to create forgiving roadsides, self-explaining roads and a safe environment for vulnerable road users.

### Public Transport Policy

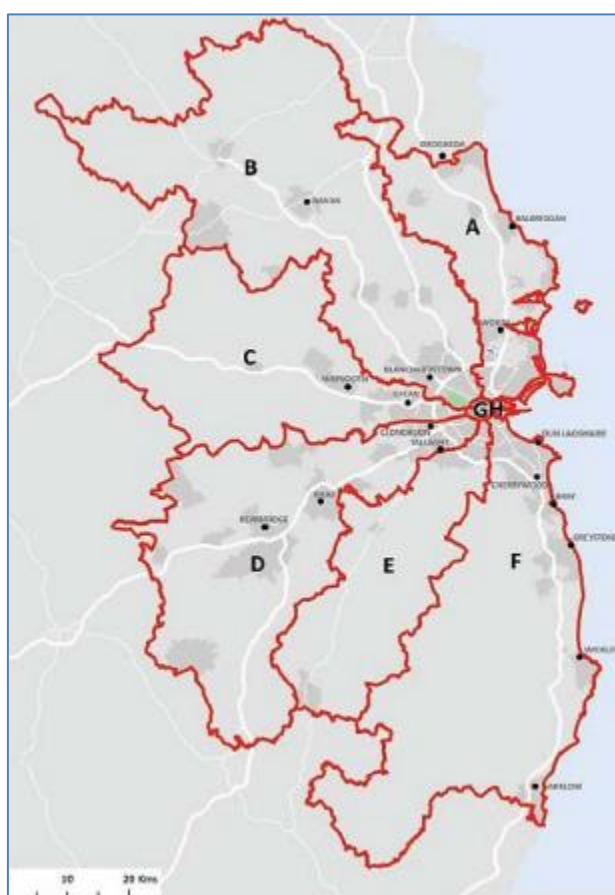
The N81 route supports a year-round bus services operated by Bus Eireann (Route 132) that links Busáras to Rosslare Port via Blessington and Baltinglass. Improved



public transport to Blessington and Baltinglass and making them more accessible as employment opportunities develop is also a feature of the Wicklow County Council Development Plan 2022-2028. The proposed projects would seek to support public transport as well as for cars and goods vehicles.

### NTA Transport Strategy for Greater Dublin

This strategy provides “a framework for the planning and delivery of transport infrastructure and services in the Greater Dublin Area (GDA) over the next two decades”. The strategy contains a series of transportation objectives for the GDA including the provision of additional public transport (heavy rail, light rail, bus and bus rapid transit facilities), cycling and walking infrastructure and road network measures up to 2035.



**Figure 5.2.1: National Transport Authority Transport Strategy for the Greater Dublin Area 2016-2035 Corridors (Source: NTA)**

The Study Area for this project forms part of Corridor E which comprises of the N81 Settlements, South Tallaght to Dublin City Centre. Within this corridor, the strategy indicates:

- The car mode share for all trip purposes is 73%.
- The public transport mode share for all trip purposes is 9%.
- The principal areas of transport demand in Corridor E, outside of the M50, are concentrated in the southern part of Tallaght, beyond which there are few settlements of significant size and relatively low rural population densities. Up to 2035, the population growth in this corridor, is expected to be low, by comparison with most other corridors.

The strategy also notes that *“for large parts of the GDA it is simply not viable to provide public transport services at a frequency and capacity that caters adequately for the needs of the relevant area. In such locations car travel will continue to be the dominant mode of travel and investment in the road network will be an ongoing requirement.”*

*“As limited growth in radial trips along Corridor E outside of the Metropolitan Area is anticipated, it is not proposed to implement significant public transport infrastructure improvements. Bus capacity will be increased to meet demand along the N81.”*

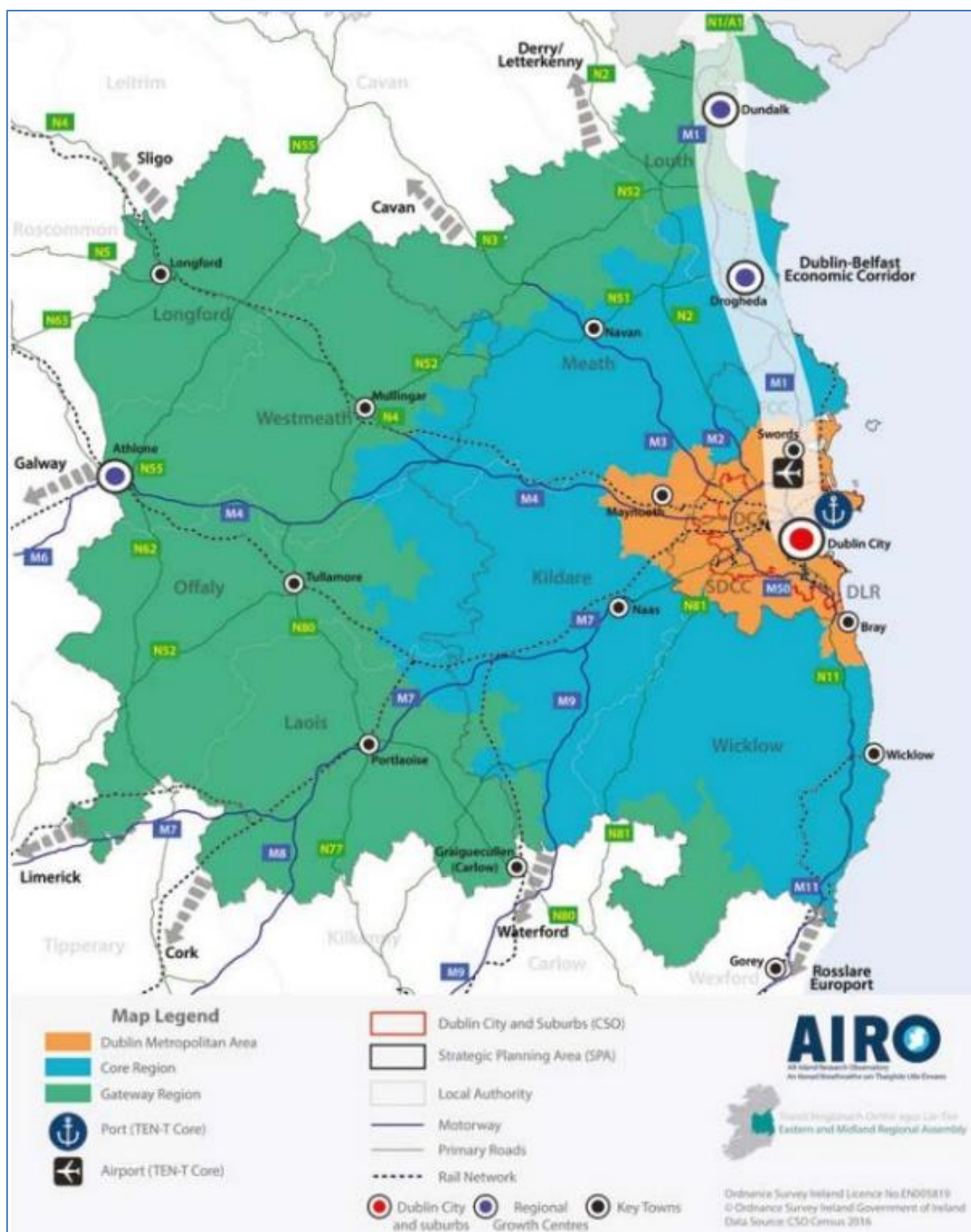
### 5.2.3 Regional Policy Context

#### **Regional Spatial and Economic Strategy (RSES) for the Eastern and Midland Region 2019 –2031**

This strategy supports the implementation of Project Ireland 2040. The N81 forms one of the primary roads located within the core region as defined in Settlement Strategy in the RSES and plays an important role as a commuter and tourist route in Figure 5.2.2. The strategy is underpinned by 3 key principles:

- **Healthy Placemaking** which aims to promote people’s quality of life through the creation of healthy and attractive places to live, work, visit, invest and study in.
- **Climate Action** based upon the need to enhance climate resilience and to accelerate a transition to a low carbon society recognising the role of natural capital and ecosystem services in achieving this.
- **Economic Opportunity** which aims to create the right conditions and opportunities for the Region to realise sustainable economic growth and quality jobs that ensure a good living standard for all.

One of the aims of the RSES is to promote effective regional development with more balanced growth outside of Dublin. The N81 is an important link between Dublin and the southeast, in particular providing a part link to Rosslare Europort. The RSES also focuses on improving international connectivity and regional accessibility and supporting tourism which are all functions that the N81 currently provides.



**Figure 5.2.2 RSES Settlement Strategy (Source: RSES for Eastern and Midland Region 2019-2031)**

### Regional Planning Guidelines for the GDA 2010 – 2022

The Regional Planning Guidelines for South-East Region 2010-2022 identifies the N81 as a main access route to the South East (Figure 5.2.3). The objective of this plan is to promote balanced regional development by improving links between the South East and the rest of the country and to ensure that the gateway, hubs, and principal towns are easily accessible, and that efficient links are available for access to employment. The N81 provides strategic links between ports and airports in Dublin and the southeast of the country.

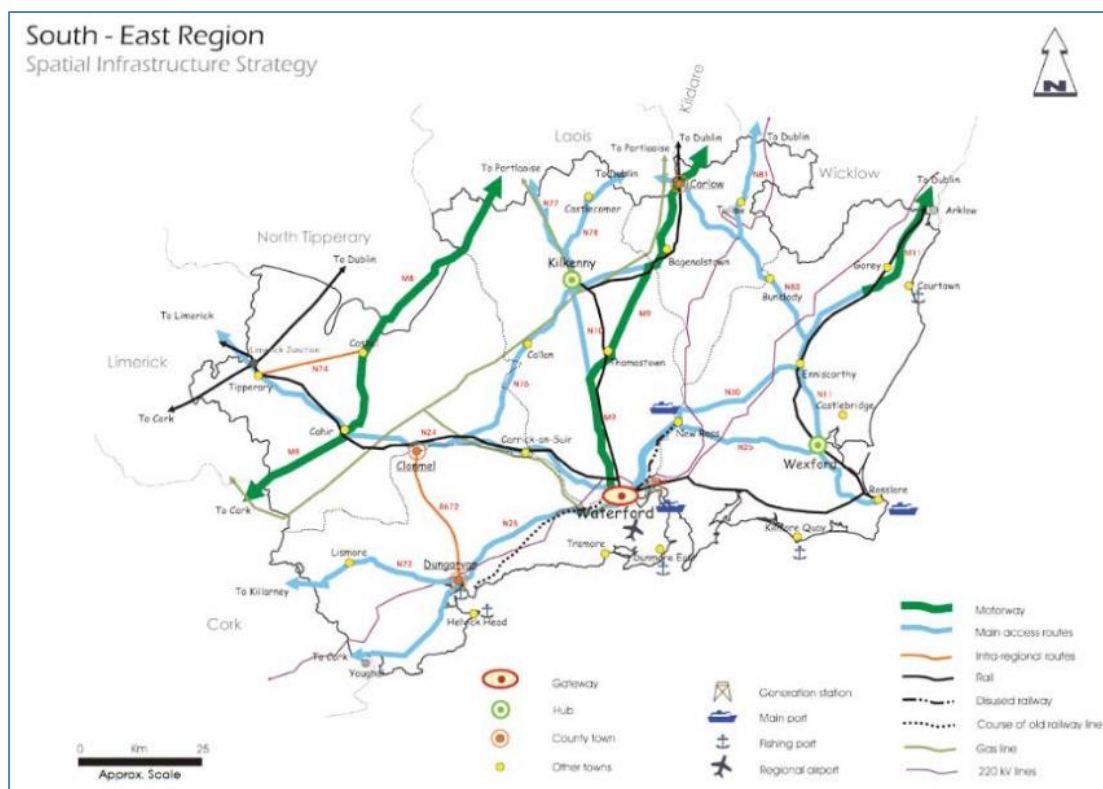


Figure 5.2.3 Source: Regional Planning Guidelines for South-East 2010-2022

#### 5.2.4 Local Policy Context

##### Wicklow County Development Plan 2022 – 2028

The N81 has been included in the updated Wicklow County Council Development Plan 2022-2028 with plans to bring National Primary and National Secondary Routes to an acceptable standard. Hangman's Bend, Tuckmill, Whitestown Lower and local alignment and width improvements south of Hollywood Cross have been included as objectives for the N81 with the Development Plan stating, "The Council will work to ensure the N81 receives much greater funding than received to date for improvements."

### 5.2.5 References

Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003);

Draft Advice Notes for Preparing Environmental Impact Statements (EPA, 2015);

The Department of Housing Planning and Local Government, (2018). The National Planning Framework. [online] Available at: <https://www.npf.ie/project-ireland-2040-national-planning-framework/>.

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Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022);

Guidelines on the information to be contained in Environmental Impact Statements (EPA,2002);

National Transport Authority. (2021). Connecting Ireland. [online] Available at: <https://www.nationaltransport.ie/connecting-ireland/>.

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Transport Infrastructure Ireland, (2023). National Roads Investment Strategy 2040. [online] Available at: [Bóithre Náisiúnta 2040 – Tuarascáil Deiridh - \(tii.ie\)](https://www.tii.ie/Bóithre%20Náisiúnta%202040%20-%20Tuarascáil%20Deiridh)

National Transport Authority Greater Dublin Area Transport Strategy 2022-2042, West Wicklow/East Kildare (November 2021).

Eastern & Midland Regional Assembly. (n.d.). Regional Spatial and Economic Strategy (RSES). [online] Available at: <https://emra.ie/rses/>.

Wicklow County Development Plan 2022-2028 and associated documents.

## **5.3 Engineering and Infrastructure**

### **5.3.1 Introduction**

This section of the report identifies the constraints in terms of engineering within the study area of the N81 Whitestown Lower (Section 1) and N81 Hangman's Bend and Tuckmill Project (Section 2). This study, which is informed by a desktop analysis and a site walk over, assesses the receiving environment, and highlights potential engineering constraints.

The N81 is a National Secondary Road with a special posted speed limit of 80km/h south of the Merginstown Crossroads. The N81 forms part of the legacy network, which were typically constructed without the benefit of formal geometric or pavement design standards.

### **5.3.2 Topography, Water Courses and Drainage**

#### **Section 1: N81 Whitestown Lower Project**

The contours in Section 1 generally run parallel to the Carrigowen River which forms a low point through the study area. The landscape rises east and west of the Carrigowen River

The N81 crosses the Carrigowen River, a tributary of the River Slaney, at two locations. These crossings are at Whitestown Bridge in Castleruddery and just north of the R412 junction in Ballylion Lower. The L8321 side road crosses the Carrigowen River approximately 100m west of its junction with the N81.

The road generally has over-the-edge drainage with surface water being conveyed to nearby streams and rivers via roadside ditches. There is a minor underground surface water network at the R412 junction which drains water into the nearby Carrigowen River.

#### **Section 2: N81 Hangman's Bend and Tuckmill Project**

The contours in Section 2 generally run parallel to the River Slaney which forms a low point through the study area. The landscape rises east and west of the River Slaney at an average gradient of approximately 1.2% and 12%.

Section 2 of the N81 crosses the River Slaney at Eldon Bridge (ref. WW-N81-003.00) and crosses a minor tributary of the River Slaney just north of the cross roads in Tuckmill via bridge ref. WW-N81-004.00. The River Slaney is also bridged by the L4310 via Tuckmill Bridge and L8301 via Manger Bridge within 150m of the N81.

Section 2 has an over the edge drainage regime with surface water being conveyed to nearby streams and rivers via roadside ditches. There are minor underground surface water networks on the north side of Eldon Bridge in the eastern road verge, and at the crossroads in Tuckmill.

### **5.3.3 Traffic**

Irish Traffic Surveys were engaged by Wicklow County Council to undertake a traffic survey of the N81 in May 2017. The survey consisted of 12-hour junction turning counts at six different locations within the study area. The 12-hour short term junction turning counts were expanded using expansion factors as outlined in TII publication PE-PAG-02039 to estimate the Annual Average Daily Traffic (AADT) flow.

Link-based traffic growth factors in line with TII publication PE-PAG-02017 were then applied to project current AADT flows to the opening year (2028), design year (2043) and forecast year (2058) of the proposed development.

**Section 1: N81 Whitestown Lower Project**

A summary of the traffic data and projected AADTs for section 1 is provided in the table below.

**Table 5.3.1 Summary of Traffic Survey Data and Traffic Projections in Section 1**

Location	12 Hour JTC, 2017		2017 AADT (Base Year)	2028 Projected AADT (Opening Year)	2043 Projected AADT (Design Year)	2058 Projected AADT (Forecast Year)
	(vehicles)	HGV				
N81 at the L4301 junction	3,807	5.8%	4,587	5,742	6,283	6,751
N81, south of Whitestown Bridge	3,135	5.4%	3,777	4,401	4,816	5,175
N81 at the R412 junction	4,038	6.0%	4,865	5,669	6,203	6,665
N81, Section 1 (avg.)	3,660	5.7%	4,409	5,270	5,767	6,197
L4301	362	5.8%	436	508	556	597
L8321	281	1.8%	339	395	432	464
L4321	1,114	10.5%	1,342	1564	1711	1839
R412	752	3.6%	906	1,056	1,155	1,241

The traffic survey information indicates that Section 1 has an average AADT of 4,409 with an HGV percentage of approximately 5.7%. This AADT is projected to grow to 5,270 in the opening year, 5,767 in the design year and 6,197 in the forecast year.

The data also indicates that the L4321 side road is relatively busy with an AADT of 1,342 consisting of 10.5% HGVs.

**Section 2: N81 Hangman's Bend and Tuckmill Project**

A summary of the traffic data and projected AADTs for Section 2 is provided in the table below.

**Table 5.3.2 Summary of Traffic Survey Data and Traffic Projections in Section 2**

Location	12 Hour JTC, 2017		2017 AADT (Base Year)	2028 Projected AADT (Opening Year)	2043 Projected AADT (Design Year)	2058 Projected AADT (Forecast Year)
	(vehicles)	HGV				
N81 at the L4284 junction	4,090	6.9%	4,928	5,742	6,283	6,751
N81 at the L3290 junction	4,148	6.5%	4,998	5,824	6,373	6,847
N81 at the Tuckmill Crossroads	4,200	4.8%	5,060	5,896	6,452	6,932
N81 at the L8301 junction	3,870	5.9%	4,663	5,434	5,946	6,388
N81, Section 2 (avg.)	4,077	6.0%	4,912	5,724	6,264	6,730
L4284	558	5.6%	672	783	857	921
L3290	511	1.4%	616	718	785	844
L4310	351	5.4%	423	493	539	580
L8291	190	6.3%	229	267	292	314
L8301	359	16.2%	433	505	552	593

The traffic survey information indicates that section 2 has an average AADT of 4,912 consisting of approximately 6.0% HGVs. This AADT is projected to grow to 5,724 in the opening year, 6,264 in the design year and 6,730 in the forecast year.

Traffic on the N81 side roads in Section 2 ranges from 229 to 672 vehicles per day.

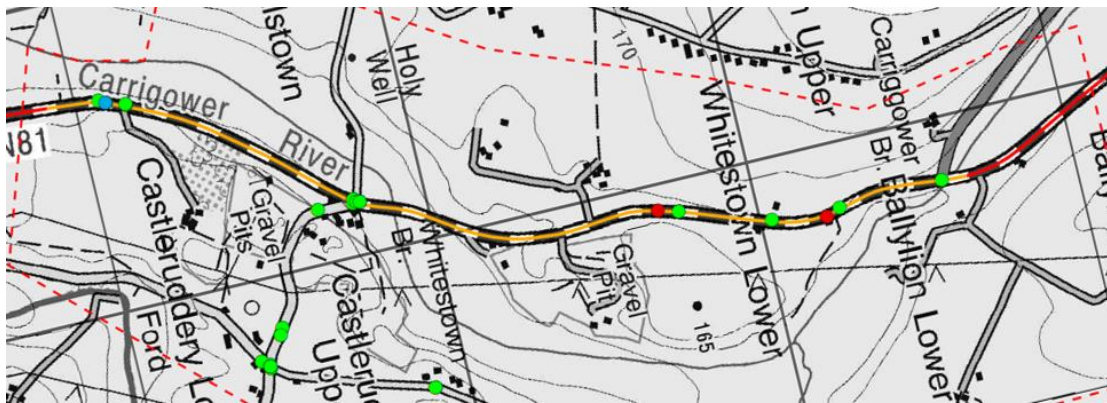
#### 5.3.4 Collisions

Traffic collision data was sourced from the Wicklow County Council and TII. The data is presented on drawings 23127-ROD-VAS-S1\_AE-DR-TR-100001 and 23127-ROD-VAS-S2\_AE-DR-TR-100002 in Appendix A. A summary of the data is provided in the paragraphs below.

##### Section 1: N81 Whitestown Lower Project

Traffic collision data on Section 1 is presented in Figure 5.3.1 below. Minor injury collisions are represented by the green dots, serious injury collisions by the blue dots and fatal collisions by the red dots.





**Figure 5.3.1 Section 1 Traffic Collision Map (2009-2019) & Alignment Sinuosity**

As presented in the figure above, Section 1 has had 11 minor injury collisions, 1 serious injury collision and 2 fatal collisions in the 10 year period between 2009 to 2019.

The collision rate per 100 million kilometres travelled for on Section 1 is 24, or 0.24 PIC/mvkm (Personal Injury Collisions/ Million Vehicle Kilometres). This is in comparison with the average of 0.080 PIC/mvkm for 2 lane single carriageway roads on the national network with a speed limit greater than 60km/h. Therefore, the collision rate on Section 1 over a 10-year period is 3 times the national average for national roads with similar features and speed conditions.

Fatal collisions account for 14% of the total collisions on Section 1 in the 10-year study period. In comparison, the national average proportion of fatal to total collisions is 6%.

### Section 2: N81 Hangman's Bend and Tuckmill Project

Traffic collision data on Section 2 is presented in Figure 5.3.2 below. Minor injury collisions are represented by the green dots, serious injury collisions by the blue dots and fatal collisions by the red dots.



**Figure 5.3.2 Section 2 Traffic Collision Map (2009-2019) & Alignment Sinuosity**

As presented in the figure above, Section 2 has had 12 minor injury collisions and 3 serious injury collisions in the 10 year period between 2009 to 2019.

The traffic collision map shows a cluster of minor injury collisions on Hangman's Bend and another cluster of collisions on the straight south of Eldon Bridge.

The collision rate per 100 million kilometres travelled for on Section 2 is 16, or 0.16 PIC/mvkm (Personal Injury Collisions/ Million Vehicle Kilometres). This is in comparison with the average of 0.080 PIC/mvkm for 2 lane single carriageway roads on the national network with a speed limit greater than 60km/h. Therefore the collision rate on Section 1 over a 10-year period is twice the national average for national roads

with similar features and speed conditions.

### 5.3.5 Alignment

The N81 forms part of the legacy network, which were typically constructed without the benefit of formal geometric or pavement design standards.

Sinuosity mapping provided by TII was used to assess the horizontal alignment of the road. Sinuosity is a good indicator of horizontal road bendiness and, by extension, an approximate indicator of the standard of horizontal alignments. The data is presented on drawings 23127-ROD-VAS-S1\_AE-DR-TR-100001 and 23127-ROD-VAS-S2\_AE-DR-TR-100002 in Appendix A.

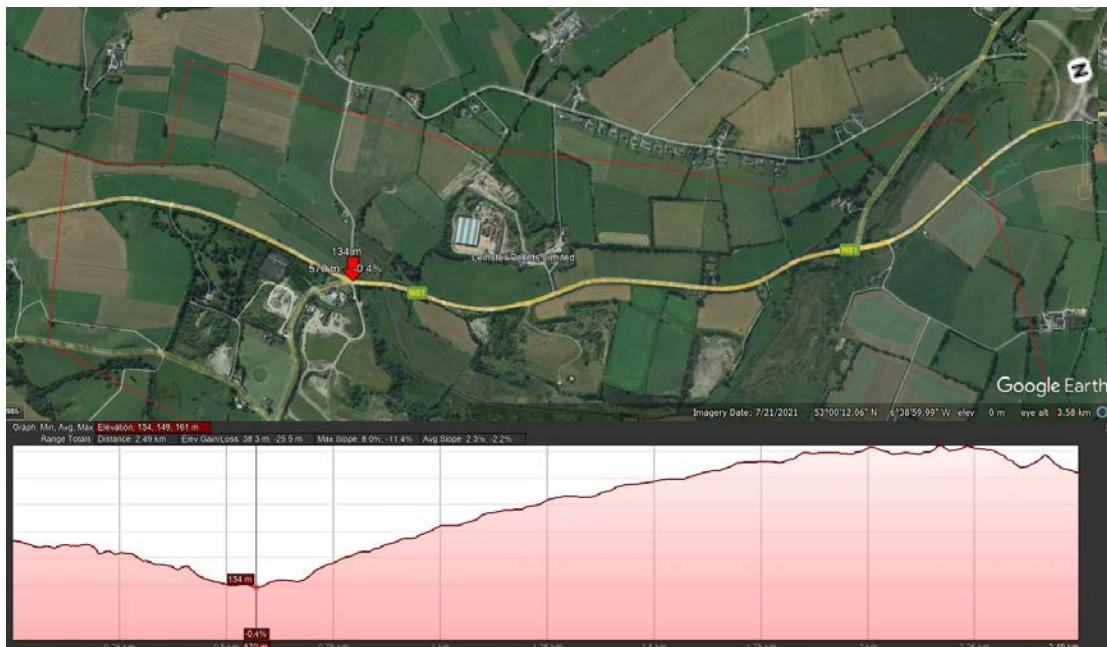
Longitudinal profiles of the road using Google Earth were used to assess the vertical alignment of the road. An assessment of both the horizontal and vertical alignments is provided in the paragraphs below.

#### Section 1: N81 Whitestown Lower Project

The network sinuosity for Section 1 is presented in Figure 5.3.1 above. Straight sections of road are represented by a blue line. Sections of road with a low sinuosity index (almost straight) is represent by a green line, medium sinuosity index by a yellow line and high sinuosity index by a red line.

An analysis of Figure 5.3.1 found that the entire length of Section 1 south of the R412 junction has a sinuosity index of Medium (1.010 to 1.032). The sinuosity index increases to High north of the R412.

A screenshot from Google Earth showing the vertical profile of Section 1 is presented in Figure 5.3.3 below.



**Figure 5.3.3 Section 1 Longitudinal Profile (Google Earth)**

The vertical profile indicates that there is a low point at Whitestown Bridge. The road profile rises in the northbound direction at an average gradient of 8% to a high point

near the R412 junction. The road rises in the southbound direction from Whitestown Bridge at an average slope of 2%.

### Section 2: N81 Hangman's Bend and Tuckmill Project

The network sinuosity for Section 2 is presented in Figure 5.3.2 above. Straight sections of road are represented by a blue line. Sections of road with a low sinuosity index (almost straight) is represented by a green line, medium sinuosity index by a yellow line and high sinuosity index by a red line.

An analysis shows that the section of the N81 under consideration has a sinuosity index of High (i.e. >1.032) over 1.88km or 37% of the study area. These high sinuosity locations are centred on Hangman's Bend and Eldon Bridge.

A screenshot from Google Earth showing the vertical profile of Section 2 is presented in Figure 5.3.4 below.



**Figure 5.3.4 Section 2 Longitudinal Profile (Google Earth)**

The vertical profile indicates that there is a high point approximately 500m south of Hangman's Bend. The road profile rises to this high point with a maximum slope of 8% from both directions.

The profile for the remaining length of Section 2 has an average grade of between 1% and 2%.

### 5.3.6 Sightlines

#### Section 1: N81 Whitestown Lower Project

The narrow cross section and substandard horizontal alignment restricts forward visibility. The desirable minimum Stopping Sight Distance (SSD) of 160m set out in DN-GEO-03031 is not achieved along approximately 32% of the Section 1 study area. The minimum Full Overtaking Sight Distance (FOSD) is not achieved on any part of the 3,500m road in Section 1.

#### Section 2: N81 Hangman's Bend and Tuckmill Project

The narrow cross section and substandard horizontal alignment restricts forward visibility. The desirable minimum SSD of 160m set out in DN-GEO-03031 is not

achieved along approximately 32% of the Section 2 study area. The minimum FOSD is only achieved on 7% of the Section 2 study area.

### 5.3.7 Junctions and Direct Accesses/ Driveways

A desktop study of the site was undertaken to investigate the level of access permitted on the N81 mainline.

#### Section 1: N81 Whitestown Lower Project

The desktop study found that there are two 3-way priority-controlled junctions and one 5-way priority-controlled junction in Section 1. The two 3-way junctions are formed by R412 and a local access road at the northern end of the scheme, while the 5-way junction is formed by the L4321, L8321 and a quarry access in Castleruddery. The traffic survey data presented in section 5.3.2 indicates that the R412 and L4321 are busy with AADTs of 906 and 1,342 respectively. The L8321 is a low trafficked side road with approximately 330 vehicles/day.

There are 20 direct accesses in Section 1 of the scheme. This includes 9 residential, 7 agricultural and 4 commercial accesses including the quarry access in Castleruddery. This equates to a direct access or junction every 150m on average.

#### Section 2: N81 Hangman's Bend and Tuckmill Project

The desktop study found that there are three 3-way priority-controlled junctions and one 4-way priority-controlled junction in Section 2. The 3-way junctions are formed by the L4284, L3290 and L8301 side roads. The 4-way junction is located in Tuckmill and is formed by the L8291 and the L4310 side roads. The traffic survey data presented in section 5.3.2 indicates that these side roads have traffic volumes ranging from 229 to 672 vehicles/day.

There are 42 direct accesses in Section 2 of the scheme. This includes 25 residential, 16 agricultural and 1 quarry access. This equates to a direct access or junction every 105m on average.

### 5.3.8 Cross Section

The existing carriageway is approximately 6 to 7m wide with grass verge widths typically varying between 0 and 3 meters on either side of the carriageway. Based on TII DN-GEO-03031 this indicates the road is currently mixed between Type 2 (7m) and Type 3 (6m) Single Carriageways. Overall, the carriageway has centre and edge line road markings with no hard strips. Hard shoulders are provided in a few locations, mostly on approach to junctions. The verges have a series of obstructions along the entire route resulting in an unforgiving roadside in the event of collisions.

### 5.3.9 Provision for NMUs

The provisions for Non-Motorised Users (NMU) are non-existent. There are no off-road pedestrian or cyclist facilities, and the width of the verge is not consistently wide enough to properly accommodate even occasional pedestrian movements.

### 5.3.10 Public Transport

The N81 route supports a year-round bus service operated by Bus Eireann (Route 132) that links Busáras to Rosslare Port via Blessington and Baltinglass. There are no bus stops for this service within Sections 1 or 2 of the scheme.

### 5.3.11 Identified Constraints and Opportunities

#### Section 1: N81 Whitestown Lower Project

Constraints

- Topography - The topography in Castleruddery is a constraint on design solutions at the L4321, L8321 junction. The natural topography east of the road rises at an average rate of 9-10%. Solutions to realign the L4321 and provide a more suitable approach to the N81 will require a large cutting to comply with TII road design standards.
- Existing traffic – The N81 is a national secondary road with strategic significance on the transport network in the region. This traffic must be maintained through the construction stage. The project team must ensure the feasibility of design solutions in respect to work stage traffic management.
- Local Access – access to local houses and businesses within the study area must be maintained throughout the construction and operational stages of the development.
- Direct Accesses – direct accesses are prolific on Section 1 which are a constraint on achieving safe overtaking opportunities with online solutions.

#### Opportunities

- Road Safety – In line with the project objectives, there is an opportunity to improve road safety on the N81 with design solutions which resolve current issues on the road network. This will reduce both the quantity and severity of collisions.
- Direct Accesses – there may be an opportunity to reduce or rationalise the number of direct accesses onto the mainline. This will reduce the number of conflict points and improve junction safety.

### **Section 2: N81 Hangman's Bend and Tuckmill Project**

#### Constraints

- Topography - The topography at Hangman's Bend is a significant constraint. The topography on the inside of the bend rises at an average rate of 10% to the top of Saundersgrove Hill approximately 950m east of Hangman's Bend. Solutions which involve cutting the inside of the bend will require substantial earthworks.
- Existing traffic – The N81 is a national secondary road with strategic significance on the transport network in the region. This traffic must be maintained through the construction stage. The project team must ensure the feasibility of design solutions in respect to work stage traffic management.
- Local Access – access to local houses and businesses within the study area must be maintained throughout the construction and operational stages of the development.
- Direct Accesses – direct accesses are prolific on Section 2 which are a constraint on achieving safe overtaking opportunities with online solutions.

#### Opportunities

- Road Safety – In line with the project objectives, there is an opportunity to improve road safety on the N81 with design solutions which resolve current issues on the road network. This will reduce both the quantity and severity of collisions.
- Direct Accesses – there may be an opportunity to reduce or rationalise the number of direct accesses onto the mainline. This will reduce the number of conflict points and improve junction safety.

## 5.4 Archaeological, Architectural and Cultural Heritage

### 5.4.1 Introduction

This section of the report describes the archaeological, architectural and cultural heritage constraints identified within the study area of the N81 Whitestown Lower (Section 1) and N81 Hangman's Bend and Tuckmill Project (Section 2) and should be read in conjunction with the archaeological, architectural, and cultural heritage constraints figures below, Figures 5.4.1 and 5.4.2.

Section 5.4.2 describes the methodologies and sources of information that were used to carry out the study. Section 5.4.3 describes the archaeological, architectural, and cultural heritage constraints within the study area. A summary and references are presented in Section 5.4.4.

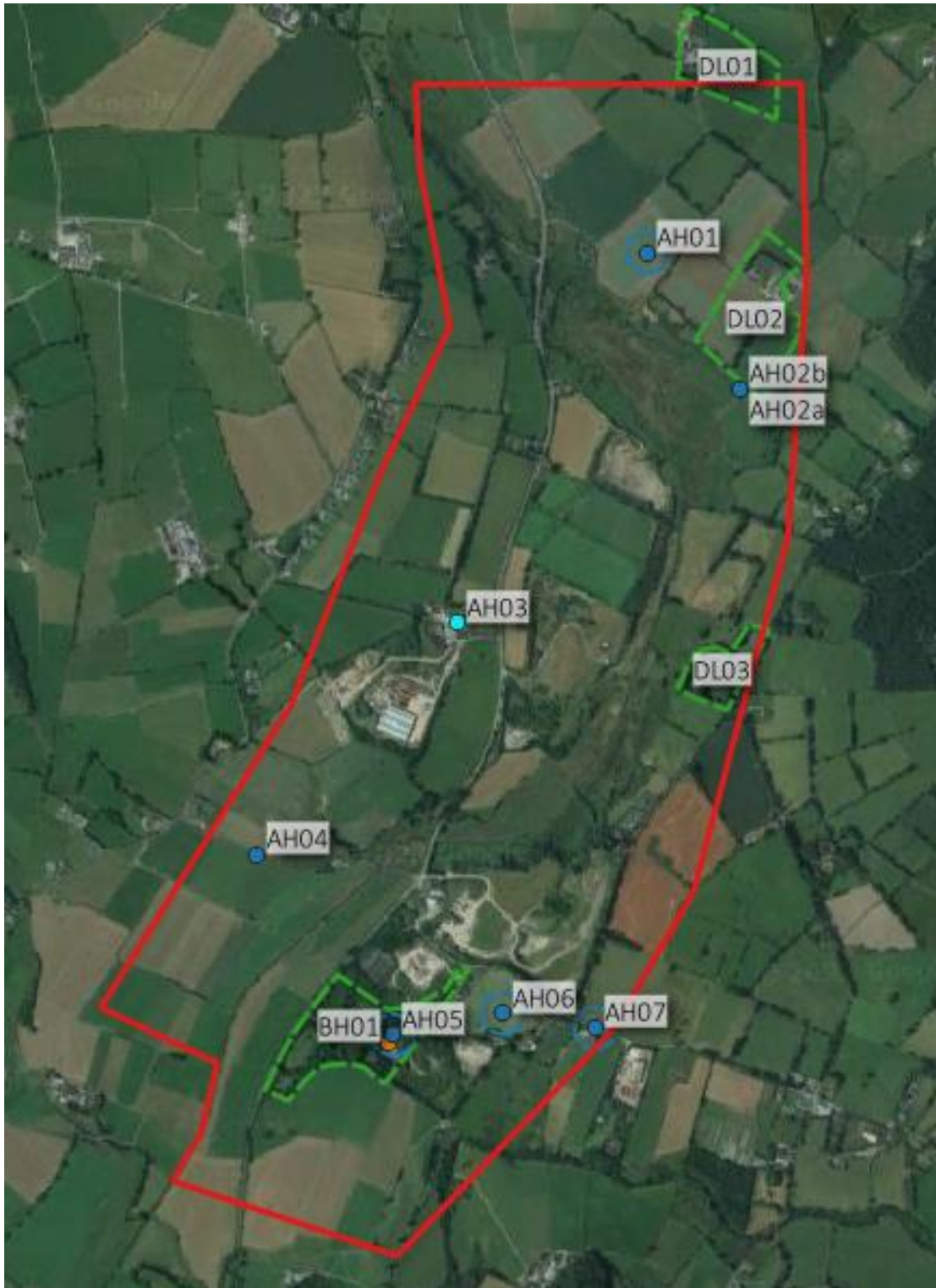
### 5.4.2 Methodology

This study has been carried out in accordance with the TII Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes (2005a) and the TII Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes (2005b).

Research for this constraints study was undertaken as a desktop exercise. The following sources were consulted in order to identify archaeological, built heritage and cultural heritage constraints:

- Record of Monuments and Places (RMP) for County Wicklow;
- Sites and Monuments Record (SMR) for County Wicklow;
- Monuments in State Care Database;
- List of Preservation Orders (2019);
- Cartographic and written sources relating to the project study area;
- Wicklow County Development Plan, 2022-2028 plan, incl. County Wicklow Record of Protected Structures;
- Excavations Bulletin (1970-2023);
- Historic Ordnance Survey mapping (1840 and 1909-1910);
- National Inventory of Architectural Heritage (NIAH): Architectural & Garden Survey, County Wicklow; and
- Ireland's National Inventory of Intangible Cultural Heritage.

Once all archaeological heritage (RMP/SMR) and built heritage (protected structures and NIAH structures) sites had been identified during the initial research, the sites were plotted onto a map presented on Figures 5.4.1 and 5.4.2 and are referred to as Archaeological Heritage (AH) and Built Heritage (BH) sites. In addition, all areas of designed landscapes or demesnes (DL), which often include the site or ruins of a former country house, were identified and mapped.



**Figure 5.4.1** Archaeological and architectural constraints within Section 1 of the study area



Figure 5.4.2 Archaeological and architectural constraints within Section 2 of the study area

### 5.4.3 Receiving Environment

#### Archaeological Heritage

A total of 18 RMP/SMR individual or groups of sites have been identified within the study area and have been grouped into 16 Archaeological Heritage (AH) sites. Some of the AH sites contain multiple constraints, such as AH02 and AH16, which present groups of two monuments in close proximity.

#### National Monuments and Sites with Preservation Orders

Of the 16 AH sites falling within the study area, none are listed as National Monuments. Furthermore, none of the sites within the study area are protected with Preservation Orders.

A national monument receives statutory protection and is described as '*a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto*' (National Monuments Act, 1930, Section 2).



Preservation Orders and/or Temporary Preservation Orders, can be assigned to a site or sites that are deemed to be in danger of injury or destruction. These are allocated under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Amendment. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister (DoHLGH).

### **Record of Monuments and Places and the Sites and Monuments Record**

Section 12 (1) of the National Monuments Act (1994 amendment) provides that the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Minister for Department of Housing, Local Government and Heritage) shall establish and maintain a Record of Monuments and Places (RMP) where it is known that such monuments exist. The record comprises of a list of monuments and relevant places with supporting mapping showing each monument and relevant place in respect of each county in the State. The mapping comprises annotated versions of the third edition Ordnance Survey maps (OS), the last revision of which dates to 1996. Sites recorded on the Record of Monuments and Places all receive statutory protection under the National Monuments Act.

Sites and Monuments Record (SMR) holds documentary evidence and records of field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments whose precise location is not known e.g. only a site type and townland are recorded. These are known to the National Monuments Section as 'un-located sites' and cannot be afforded legal protection. As a result, these are omitted from the Record of Monuments and Places.

It should be noted that revisions are proposed to the RMP and SMR, with some sites listed as redundant records and proposed for removal and other, newly discovered sites, proposed for inclusion. Some of the recorded sites within the study area fall into these categories. As the revisions have yet to take place, all current RMP / SMR sites are listed as AH sites within this assessment.

Of the 18 archaeological monuments recorded within the study area, 17 are RMP sites, and one is a an SMR, a redundant record (AH03). The recorded sites within the constraints area can be roughly divided into six categories: prehistoric sites, early medieval sites, medieval sites, post-medieval sites, miscellaneous sites and redundant records. The majority of the sites can be allotted a time period; however, some have the potential to belong to any period and as such have been added to the miscellaneous category.

A total of three site classifications, as defined within the SMR/RMP, are included within the prehistoric category. This time period includes the Mesolithic (6000–4000 BC), Neolithic (4000–2500 BC), Bronze Age (2500–800 BC) and Iron Age (800 BC–AD 500). The sites included within the constraints study area comprise a standing stone (AH02b), and barrow (Ah16a) a cist (AH16b). All three of these sites are likely to relate to the Bronze Age period.

A total of 11 site classifications, as defined within the SMR/RMP, are included within the early medieval category, which dates from AD 500-1169. By far the most numerous site types are enclosures, totalling seven sites. This is unsurprising as there are at least 60,000 ringforts, raths, cashels, cahers, and 'enclosures' sites located across Ireland. Enclosures have the potential to represent ploughed-out or denuded ringforts

and can vary in size. They represent secular habitation sites of the period and can contain the remains of houses and storage structures, along with souterrains. Sites of higher status often possess multiple enclosing elements and can cover a large area. In addition, two ringforts are also recorded within the study area.

A total of two site classifications, as defined in the SMR/RMP, are included within the medieval category, which covers the time period of AD 1169-1700. These comprise a castle (AH05) and a moated site (AH13).

There are no site classifications, as defined in the SMR/RMP, included within the post-medieval category which covers the time period of AD 1700-1900. Post-medieval categories are often not as well represented within the record. This is generally due to an inconsistency as to whether post-medieval sites are recorded as 'archaeological' by the Archaeological Survey of Ireland.

In addition, there is one redundant record (AH03) within the study area, but it is included in this constraints study, given that some sites classified as a redundant record have been proven later to be of archaeological significance.

**Table 5.4.1 AH Sites within the Constraints Study Area**

AH No.	SMR No.	Category	Classification	Townland	RMP Status
AH01	WI021-002----	Early medieval	Enclosure	Ballylion Lower	RMP
AH02a	WI021-081----	Early medieval	Ogham stone	Ballylion Lower	RMP
AH02b	WI021-082----	Prehistoric	Standing stone	Ballylion Lower	RMP
AH03	WI021-016----	Redundant Record	Redundant record	Whitestown Lower	SMR
AH04	WI021-015----	Early medieval	Ritual site - holy well	Randalstown	RMP
AH05	WI021-025----	Medieval	Castle - unclassified	Castleruddery Lower	RMP
AH06	WI021-026----	Early medieval	Enclosure	Castleruddery Lower	RMP
AH07	WI021-029----	Early medieval	Enclosure	Castleruddery Lower	RMP
AH08	WI021-053----	Early medieval	Ringfort - rath	Ballinacrow Lower	RMP
AH09	WI021-049----	Early medieval	Enclosure	Saundersgrove Hill	RMP
AH10	WI021-048----	Early medieval	Enclosure	Saundersgrove Hill	RMP
AH11	WI021-050----	Early medieval	Enclosure	Saundersgrove Hill	RMP
AH12	WI027-003----	Early medieval	Enclosure	Mattymount	RMP
AH13	WI027-004----	Medieval	Moated site	Rampere	RMP
AH14	WI027-006----	Miscellaneous	Mound	Raheen (Talbotstown Upper By., Baltinglass Ed)	RMP
AH15	WI027-005----	Early medieval	Ringfort - rath	Raheen (Talbotstown Upper By., Baltinglass Ed)	RMP
AH16a	WI027-008001-	Prehistoric	Barrow - mound barrow	Tuckmill Upper	RMP

AH No.	SMR No.	Category	Classification	Townland	RMP Status
AH16b	WI027-008002-	Prehistoric	Cist	Tuckmill Upper	RMP

### Summary of Previous Archaeological Excavations

A review of the Excavations Bulletin (<https://excavations.ie>) has revealed that one archaeological investigation (EX01) has been carried out within the study area in the period 1970-2023.

Archaeological testing was carried out for a private dwelling, at a site adjacent to mound (AH14) in the townland of Tuckmill Upper. Nothing of archaeological significance revealed (Licence No. 00E0040, Bennett 2000:1094).

### Areas of Archaeological Potential

Whilst specific Areas of Archaeological Potential (AAPs) have not been designated as part of the constraints assessment, they are worth overall consideration at an early design stage as they can be defined as part of the landscape that possess the potential to contain archaeological remains due to the presence of topographic features such as rivers, lakes, turloughs, high defendable ground and bogland. Rivers and lakes are a focus for human habitation due to the obvious transport and food resources. They (along with bogs) also have the potential to preserve organic archaeological deposits or artefacts such as wood or leather, which do not usually survive within the alkaline conditions associated with terrestrial archaeology. Rivers and lakes may have also played a role in prehistoric ritual, as significant artefacts from the prehistoric periods and into the early medieval period, are often found within riverbed deposits. All of these areas and their margins, within the study area should be considered as possessing an overall archaeological potential. The aim, at early design stage, should be to cross any significant watercourses with single span structures.

### Architectural Heritage

A total of seven individual structures or groups of structures of architectural heritage significance have been identified within the project study area each of which has been designated as a Built Heritage site for the purposes of this constraints report. These are either listed within the Record of Protected Structures (RPS) (Wicklow County Development Plan 2022-2028) or have been identified as part of the architecture survey carried out by the National Inventory of Architectural Heritage (NIAH). The structures are listed in the constraints table and have been identified with the prefix of Built Heritage (BH).

Structures of architectural, cultural, scientific, historical, or archaeological interest are protected under the Planning and Development Act, 2000, where the conditions relating to the protection of the architectural heritage are set out in Part IV of this Act. The Act defines a protected structure as '(a) a structure, or (b) a specified part of a structure which is included in a Record of Protected Structures (RPS), and, where that record so indicates, includes any specified feature which is in the attendant grounds of the structure, and which would not otherwise be included in this definition.' Protection of the structure or part thereof, includes conservation, preservation, and improvement compatible with maintaining its character and interest'.

Buildings recorded in the RPS can include Recorded Monuments, structures listed in the NIAH or buildings deemed to be of architectural, archaeological, or artistic importance by the Minister of Department of Housing, Local Government and Heritage.

It is noted that inclusion within the NIAH survey does not afford statutory protection. However, the structure may be added to the RPS by the relevant Local Authority in the future. As such, the buildings should be considered to be a constraint.

Structures and sites that are included within the RMP and RPS are subject to statutory protection under both the National Monuments Act and the Planning and Development Act.

The NIAH rating values are: International, National, Regional, Local and Record Only (I, N, R, L, O). Structures which are considered of International, National, and Regional significance are recommended by the Minister to the relevant Local Authority for inclusion in their RPS (NIAH Handbook 2017, DoCHG).

**International:** Structures or sites of sufficient architectural heritage importance to be considered in an international context. These are exceptional structures that can be compared to and contrasted with the finest architectural heritage in other countries.

**National:** Structures or sites that make a significant contribution to the architectural heritage of Ireland. These are structures and sites that are considered to be of great architectural heritage significance in an Irish context.

**Regional:** Structures or sites that make a significant contribution to the architectural heritage within their region or area. They also stand in comparison with similar structures or sites in other regions or areas within Ireland. Increasingly, structures that need to be protected include structures or sites that make a significant contribution to the architectural heritage within their own locality. Examples of these would include modest terraces and timber shop fronts.

**Local:** These are structures or sites of some vintage that make a contribution to the architectural heritage but may not merit being placed in the RPS separately. Such structures may have lost much of their original fabric.

**Record Only:** These are structures or sites that are not deemed to have sufficient presence or inherent architectural or other importance at the time of recording to warrant a higher rating. It is acknowledged, however, that they might be considered further at a future time.

Of the seven structures across the constraints study area, six are both Protected Structures and listed in the NIAH Building Survey. One additional structure is both an RMP and listed in the NIAH Building Survey, BH01.

**Table 5.4.2 BH Sites within the Constraints Study Area**

BH	RPS No.	NIAH Ref.	Description	Location	Name	Status
BH01	N/A	16402115	Detached four-bay two-storey house, c.1810, possibly over basement with four-bay single-storey lateral wing. Renovated, c.1985.	Castleruddery Lower	Castleruddery House	NIAH (and RMP)
BH02	21-09	16402114	Low, five-arch bridge with cutwaters possibly early 18th century in date.	Manger, Saundersgrove, Saundersgrove Hill	Manger Bridge	RPS and NIAH

BH	RPS No.	NIAH Ref.	Description	Location	Name	Status
BH03	21-10	16402116	Original house burnt in the troubles and rebuilt incorporating the magnificent, Gibbsian doorcase	Saundersgrove	Saundersgrove	RPS and NIAH
BH04	21-11	16402117	Early-18th century, five-arch bridge of granite with cutwaters on the upper side.	Mattymount, Tuckmill Lower, Tuckmill Upper	Tuckmill Bridge	RPS and NIAH
BH05	21-13	16402716	Five-bay, three-storey, gable-ended mill building of coursed-rubble stone with brick dressings to opes- arched on the ground floor, tall opes on first floor and half-moon windows on top floor, natural slates on roof.	Tuckmill Lower	Mill	RPS and NIAH
BH06	21-12	16402717	Wall-mounted post box with the monogram 'ERVII'.	Tuckmill Lower	Post box	RPS and NIAH
BH07	27-33	16402715	Three-arch, early-19th century bridge with channelled voussoirs.	Raheen (Up. Ta. By.) Baltinglass Ed, Tuckmill Upper	Eldon Bridge	RPS and NIAH

### Architectural Conservation Areas (ACAs)

An Architectural Conservation Area is defined as;

*'A place, area, group of structures or townscape, taking account of building lines and heights, that is of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest or that contributes to the appreciation of a protected structure, and whose character it is an objective of a development plan to preserve.'* (DoAHG, 2011, 40).

Chapter II of Part IV of the Planning and Development Act 2000 states that that all development plans must now include objectives for preserving the character of ACAs. As such ACAs are subject to statutory protection and are a key constraint.

There are 18 ACAs listed within the Wicklow County Development Plan 2022-2028, none of which are located within the study area.

### Designed Landscapes

The first edition Ordnance Survey map of County Wicklow (1840) shows the extent of demesne landscapes as shaded areas of land. These were established as a naturalised landscaped setting for the large houses of the landed gentry. Later OS mapping (1909-1910) can also indicate demesne extent, although they are not shaded. Not all demesne landscapes are subject to statutory protection. However, where a demesne exists in association with a protected structure (dependant on the preservation of the landscape), protection can be interpreted as extending to the limits of the curtilage and as such falls within the remit of the Planning and Development Act 2000.

A total of seven Designed Landscapes (DL) have been identified in the study area from the desktop survey. These are described in the Table 5.4.3. The NIAH have carried

out a desk-based survey of identifiable demesnes within County Wicklow. Only four of the seven identified are detailed within the NIAH survey. The historic mapping and aerial photographic coverage, along with the NIAH garden descriptions have been utilised in order to provide a summary statement on the condition of the landscapes, as described in Table 5.4.3.

**Table 5.4.3 DL Sites within the Constraints Study Area**

DL No.	Name	NIAH Ref.	Description
DL01	Ballylion House	-	Two structures associated with principal farm complex survive, but are not on the RPS or NIAH. Designed elements of the original landscape have become very denuded and large agricultural structures are present in the western part of the landscape.
DL02	Unnamed	-	Small principal structure survives although the majority of the designed landscape elements marked on the first edition OS map have been removed, including field boundaries. Large agricultural structures and a modern residence has also been constructed.
DL03	Glebe House	-	Principal structure survives as depicted on 25-inch OS map but is not included in RPS or NIAH. The mature planting within the landscape survives, along with the main access drive. Some modern outbuildings have been erected.
DL04	Castleruddery House	5539	Principal structure recorded on NIAH (BH01) along with outbuildings. Much of the landscape remains well preserved with mature tree belts and specimen planting. The entrance drive has been affected by modern development.
DL05	Saundersgrove House	4329	The principal structure is recorded on RPS and NIAH (BH03) although the main house is a replacement to the original house marked within the historic mapping. The demesne retains some mature planting and specimen planting along with the walled garden, but a large number of designed features have been subsumed into an agricultural landscape, including ornamental ponds. Bridge BH02 is located within demesne to the north. Large farm buildings are present to north of the main house.
DL06	Goldenfort House	4327	The principal structure has been removed, along with outbuildings and many of the designed landscape features. Some mature boundaries survive but the landscape has become more agricultural in nature with scattered residential development.
DL07	Stratford Lodge	4336	Principal structure located outside the study area but not included in the RPS or NIAH. The northeast corner of the demesne is located in the study area, which is planted with a mixture of mature and commercial trees. The landscape has been developed with the insertion of a golf course.

### Cultural Heritage

The term 'cultural heritage' can be used as an over-arching term that can be applied to both archaeology and architecture. However, it also refers to more ephemeral

aspects of the environment, which are often recorded in folklore or tradition or possibly date to a more recent period.

The archaeological and architectural sites and demesne landscapes within the study area discussed previously in this section are also considered to represent cultural heritage sites.

### Cultural Heritage Sites

The term 'cultural heritage' can be used as an over-arching term that can be applied to both archaeology and architecture. It also refers to more ephemeral aspects of the environment, which are often recorded in folk law or tradition or possibly date to a more recent period. The archaeological and architectural features discussed also constitute cultural heritage features.

A former mill and an associated mill race are located at Whitestown Lower, as visible on the first edition OS map of 1840. There is a second former mill (BH05) and an associated mill race within the study area in the townland of Tuckmill Lower. Both of these water-powered former corn-mills represent cultural heritage features associated with industrial heritage of County Wicklow.

### National Inventory of Intangible Cultural Heritage (NIICH)

In July 2019 the Minister for Culture, Heritage and the Gaeltacht approved the inscription of 30 cultural heritage elements on Ireland's permanent National Inventory. This followed the ratification by Ireland of the 2003 UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, in December 2015. Ireland's obligations under the 2003 Convention include the establishment of a National Inventory for Intangible Cultural Heritage to protect, promote and celebrate Irish living cultural heritage practices, customs, crafts and traditions.

A review of the NIICH has been carried out as part of this study in order to identify intangible cultural heritage that may be located within the project study area. Those practices and traditions that may be located within the study area are listed in Table 5.4.4.

No indications, at this stage, have been identified that definitively illustrate that the activities shown in Table 5.4.4 are carried out within the study area. This will be reassessed throughout each stage of the proposed project.

**Table 5.4.4 NIICH Potentially Located within the Study Area**

Designation	Location	NIICH Categories
Irish Traditional Travelling Circus and Funfair	Throughout the island of Ireland	Performing arts Social practices, rituals and festive events Traditional craftsmanship Oral traditions and expressions, including language Knowledge and practices concerning nature and the universe
Lá an Dreoilín/ Wren's Day	Throughout the island of Ireland	Performing arts Social practices, rituals and festive events Traditional craftsmanship

Designation	Location	NIICH Categories
		Oral traditions and expressions, including language Knowledge and practices concerning nature and the universe
Uilleann Piping	Ireland and worldwide	Performing arts Social practices, rituals and festive events Oral traditions and expressions, including language Traditional craftsmanship
Hurling	Ireland and worldwide	Knowledge and practices concerning nature and the universe Social practices, rituals and festive events Oral traditions and expressions, including language Performing arts Traditional craftsmanship
Irish Harping	Throughout the island of Ireland	Performing arts Social practices, rituals and festive events Traditional craftsmanship Oral traditions and expressions, including language
Art and Practice of Falconry	Throughout the island of Ireland	Knowledge and practices concerning nature and the universe Social practices, rituals and festive events Traditional craftsmanship Performing arts
Cant / Gammon	Throughout Ireland.	Oral traditions and expressions, including language
Floating Heritage	Throughout the inland waterways of Ireland	Knowledge and practices concerning nature and the universe Oral traditions and expressions, including language Traditional craftsmanship
Irish Traditional Music	Throughout the island of Ireland, the diaspora and overseas	Social practices, rituals and festive events
Native Irish Pedigree Dog Breeds	Throughout Ireland	Knowledge and practices concerning nature and the universe Social practices, rituals and festive events
Basket making	Throughout Ireland	Knowledge and practices concerning nature and the universe Social practices, rituals and festive events Traditional craftsmanship Performing arts



Designation	Location	NIICH Categories
Dry stone construction	Throughout the island of Ireland; particularly Connemara, the Aran Islands and the Dingle Peninsula	Traditional craftsmanship
Irish Draught Horse Breeding	Throughout the island of Ireland	Traditional craftsmanship Knowledge and practices concerning nature and the universe Social practices, rituals and festive events
Loy Digging	At local and national ploughing championships in Ireland	Knowledge and practices concerning nature and the universe
Letterpress Printing in Ireland	Ireland and abroad	Traditional craftsmanship
Beekeeping	Throughout the island of Ireland	Knowledge and practices concerning nature and the universe
Native Irish Cattle Breeding	Throughout the island of Ireland	Knowledge and practices concerning nature and the universe
Traditional Sheep Farming and Sheepdog Training	Throughout Ireland	Knowledge and practices concerning nature and the universe

#### 5.4.4 Identified Constraints

The purpose of this assessment is to provide an analysis of the archaeological, architectural and cultural heritage resources within the project study area in order to inform the design of the N81 Whitestown Lower Project and the N81 Hangman's Bend and Tuckmill Project. The project study area is located within County Wicklow contains all or part of 27 townlands. The sites and areas listed within this section should be considered as constraints during the design process.

A total of 16 Archaeological Heritage (AH) sites, of varying dates, are listed within the current study area indicating a continuance of activity and settlement in the region. The most represented period in the study area is the early medieval period, which accounts for 58% of the sites, with enclosures and ringforts being the most frequent type. There are no National Monuments or sites subject to Preservation Orders located within the study area.

A survey of the Excavations Bulletin (1970-2023) has revealed that over only one previous archaeological investigation has taken place to date within the Constraints study area. Nothing of archaeological significance uncovered.

There are a number of Areas of Archaeological Potential (AAPs) within the project study area. These consist of various rivers and streams. All AAPs should be considered as archaeological constraints and avoided where possible. Where avoidance is not possible, potential impacts should be minimised through design. This includes the use of clear span structures across waterways.

An analysis of the built heritage within the project study area provides a holistic overview of the built heritage resource. Structures that are architecturally and socially important are listed within the development plan of County Wicklow and the NIAH

survey. Protected structures receive statutory protection that helps to ensure their preservation for the future. A total of seven individual or groups of protected structures and/or NIAH structures are located within the project study area. All protected structures and NIAH structures should be considered as cultural heritage constraints during the design of the proposed project with direct impacts and indirect impacts on settings avoided where possible. Where avoidance is not possible, potential impacts should be minimised through design.

There are no Architectural Conservation Areas within the constraints study area.

A total of seven Designed Landscapes (DL) have been identified within the study area, four of which are included on the NIAH Garden Survey. Some of these still retain their principal building and/or outbuildings and may be associated with a protected structure and can therefore be viewed as attendant grounds to the same, whilst others have been lost over the course of time. Only DL5 is associated with a principal structure that is listed in the record of protected structures for County Wicklow.

The Constraints study area contains two mills and associated mill races, which represent industrial heritage in the area. These should be considered cultural heritage constraints.

A review of the NIICH has also been undertaken in relation to Ireland intangible cultural heritage. A total of 18 practises or traditions have been identified from the survey that may be located within the project study area.

### **Glossary of Terms**

AAP – Area of Archaeological Potential

ACA – Architectural Conservation Area

AH – Archaeological Heritage site

BH – Built Heritage site

DL – Designed Landscape

DoHLGH – Department of Housing, Local Government and Heritage

EX – Excavation

NIAH – National Inventory of Architectural Heritage. Contains a building survey and garden survey

NIICH – National Inventory of Intangible Cultural Heritage

OS – Ordnance Survey

RMP – Record of Monuments and Places

RPS – Record of Protected Structures

SMR – Sites and Monuments Record

### **5.4.5 References**

Bennett, I. (ed.) 1987-2010 Excavations: Summary Accounts of Archaeological Excavations in Ireland. Bray. Wordwell.

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[www.excavations.ie](http://www.excavations.ie) – Summary of archaeological excavation from 1970-2023. (Accessed September 2023).

[www.archaeology.ie](http://www.archaeology.ie) – DoHLGH website listing all RMP/SMR sites. (Accessed September 2023).

[www.osiemaps.ie](http://www.osiemaps.ie) – Ordnance Survey aerial photographs dating to 1995-2013 and 6-inch/25-inch OS maps. (Accessed September 2023).

[www.heritagemaps.ie](http://www.heritagemaps.ie) – The Heritage Council web-based spatial data viewer which focuses on the built, cultural, and natural heritage. (Accessed September 2023).

[www.bingmaps.com](http://www.bingmaps.com) – Website containing aerial photographic datasets. (Accessed September 2023).

[www.logainm.ie](http://www.logainm.ie) – Placenames Database of Ireland launched by Fiontar agus Scoil na Gaelige and the DoHLGH. (Accessed September 2023).

[www.googleearth.com](http://www.googleearth.com) – Satellite imagery of the study area. (Accessed September 2023).

[www.buildingsofireland.ie](http://www.buildingsofireland.ie) – Website listing the results of the NIAH building and garden survey for Wicklow (Accessed September 2023).

[www.nationalinventoryich.chg.gov.ie](http://www.nationalinventoryich.chg.gov.ie) – National Inventory of Intangible Cultural Heritage (Accessed September 2023).

## 5.5 Material Assets – Land and Agriculture

### 5.5.1 Introduction

This section describes the material assets that are agricultural constraints identified within the study area for the N81 Whitestown Lower Project (Section 1) and N81 Hangman's Bend and Tuckmill Project (Section 2).

Section 5.5.2 describes the methodologies and sources of information that were used to carry out the study. Section 5.5.3 describes the existing agricultural environment (land use, soil types, and types and sizes of farms within the study area). Section 5.5.4 describes the agricultural constraints within the study area and references are listed in Section 5.5.5.

The study area for the N81 Whitestown Lower and Hangman's Bend to Tuckmill Project is illustrated in Drawing No. 23127-ROD-EAC-SW\_AE-DR-EN-1000014 and 23127-ROD-EAC-SW\_AE-DR-EN-1000015 showing Land Use and Soil Types.

### 5.5.2 Methodology

The following guidelines and legislation were referred to when writing this chapter:

- European Union (2018) (Planning and Development) (Environmental Impact Assessment) Regulations. (SI 296 of 2018);
- Environmental Protection Agency (EPA) (May 2022) Guidelines on the Information to be contained in Environmental Impact Assessment Reports<sup>14</sup>; and
- Transport Infrastructure Ireland (TII) (2019) Project Management Guidelines PE-PMG-02041<sup>15</sup>. In line with these TII and EPA guidelines, the constraints study seeks to identify the issues that are likely to be important at this stage of the environmental assessment process and to inform the design team so that preventative action can be pursued. This constraints study has comprised of a desktop collation and interpretation of published data, on-line resources, aerial photography and on-site survey of the study area that were undertaken on 22<sup>nd</sup> August 2023. The purpose of this constraints study was to identify features which reflect the agricultural potential and agricultural sensitivity of the study area. The desktop study has considered the following sources of information:
  - Data from the Central Statistics Office (CSO);
    - The preliminary results from the 2020 Census of Agriculture<sup>16</sup>.
  - Soil mapping data from the Teagasc Irish Soil Information System<sup>17</sup> was used to identify the soil types within the study area. For example, poorly drained alluvial soils are generally poor quality. The soil quality and type varies within a small area and the mapping data used is consistent over large areas - thus the information is indicative only;
  - Google<sup>18</sup> aerial maps were used to identify land use, yards, farm facilities, forestry, scrub and rough boggy land;

<sup>14</sup> Environmental Protection Agency (August 2017) Guidelines on the Information to be contained in Environmental Impact Assessment Reports. Available from: <http://www.epa.ie/pubs/advice/ea/EPA%20EIA%20Guidelines.pdf>

<sup>15</sup> Transport Infrastructure Ireland (2019) Project Management Guidelines PE-PMG-02041. Available from: <https://www.tiipublications.ie/library/PE-PMG-02041-02.pdf>

<sup>16</sup> Central Statistics Office (2022), Census of Agriculture 2020 – Preliminary Results. Available from <https://www.cso.ie/en/releasesandpublications/ep/p-coa/censusofagriculture2020-preliminaryresults/>

<sup>17</sup> Teagasc (2021), Irish Soil Information System. Available from <http://gis.teagasc.ie/soils/> [Accessed in March 2021]

<sup>18</sup> Google Aerial Mapping (2021). Available from: <https://www.google.com/maps> [Accessed March 2021 - October 2021]

- The Property Registration Authority of Ireland (PRAI)<sup>19</sup> open database was used to identify folio land parcels where grazing dairy cows and horses were noted during the on-site survey; and
- The on-line planning portal of Wicklow County Council was referred to in order to gain information on farm yard types and enterprises (e.g. planning applications involving milking parlours, farmyard plans, etc)

The following features have been identified from desktop information sources:

- Yards and farm facilities - farm paddocks and roadways typical of dairy farms have been identified from aerial photography;
- Dairy and equine farms are generally high sensitivity and equine enterprises are within the high to very high range of enterprise sensitivity (see Table of this document). As explained, Goggle Earth aerial imagery<sup>19</sup> and the PRAI open database<sup>19</sup> has been used to identify folios and land parcels; and
- Areas with good quality soils generally have a higher agricultural potential than poor quality land. Good quality land was initially identified by using the Teagasc Irish Soils Information System<sup>17</sup> and aerial photography<sup>18</sup> and later verified with on-site surveying.

An on-site survey was conducted on August 22<sup>nd</sup> 2023. This survey involved driving through the study area and recording farm enterprises, land use and land quality. The purpose of the survey was to verify where possible the desktop data and identify the following:

- Farm yards and other facilities – Farm yards milking parlours. Farm yards and facilities such as stables, sand arenas, racehorse training tracks and lounging areas were identified;
- Fields with dairy cows or horses; and
- Land quality - Desktop information was verified and areas with forestry, scrub and marshes were noted.

Where farm enterprises are identified, the information in Table 5.5.1 is used to categorise the sensitivity. This table provides an indication of the range of sensitivity for common enterprise types in Ireland and has been adopted based on the professional judgement of the author.

**Table 5.5.1 Farm sensitivity**

Farm enterprise type	Intensity / scale	Sensitivity
Stud farms, are generally high or very high sensitivity. Intensive horticulture is generally high or very high sensitivity. Intensive agriculture (pigs) is very high sensitive.	High	Very High
	Medium	High
	Low	Medium
Dairy farms and equine enterprises (equine enterprises other than intensive stud farms).	High	High
	Medium	High
	Low	Medium
	High	Medium

<sup>19</sup>Property Registration Authority (2021). Available from <https://www.landdirect.ie/index>. [Accessed in March 2021]

Farm enterprise type	Intensity / scale	Sensitivity
Non-dairy grazing livestock enterprises (including beef, sheep and small non intensive equine) and grass cropping enterprise.	Medium	Low
	Low	Very low
Tillage	High	Medium
	Medium	Low
	Low	Very low
Rough Grazing, Bog, Forestry, Woodland	Low	Low or Very low

### 5.5.3 Existing Material Assets – Land and Agriculture

#### Existing land use and soil types

##### Section 1: Whitestown Lower Project

The Section 1 Study Area is comprised of 404 hectares. The land use within the study area is shown in Table 5.5.2.

**Table 5.5.2 Land Use in Section 1**

Land use	% of study area
Agricultural land	84
Built on land (roads & residential)	4
Quarry and industrial	12
Forestry / woodland	0

Agriculture farmland is the dominant land use in Section 1. There are two industrial sites and one quarry site – these are non-agricultural and low sensitivity from an agricultural perspective. The agricultural land is generally good quality. The study area is located along a river valley (Carrigower River). The dominant soil type as illustrated in Drawing 23127 ROD EAC SW AE DR EN 100015, is a Brown Earth (80% of Section 1 study area). This is a free draining soil suited to both tillage and grassland. There is a band of low lying wet Alluvial soil (20% of Section 1 study area) adjoining the Carrigower River. This Alluvial land is medium or poor quality.

##### Section 2: Hangman's Bend and Tuckmill Project

The Section 2 Study Area is comprised of 535 hectares. The land use within the study area is shown in Table 5.5.3.

**Table 5.5.3 Land Use in Section 2**

Land use	% of study area
Agricultural land	85
Built on land (roads & residential)	6
Quarry and industrial	0
Forestry / woodland	9

Agricultural farmland is the dominant land use in Section 2. Forestry and woodland account for 9% of the land use. The study area is located along a river valley (Slaney River). The valley is flanked by relatively steep slopes with Saundersgrove Hill and Tuckmill Hill on the eastern side of the valley and Tinoran Hill North on the western side of the valley. The north of Section 2 is dominated by a free draining productive Brown Earth soil type as illustrated in Drawing No. 23127 ROD-EAC-SW\_AE-DR -EN-100015 (44% of Section 2 study area). To the west of the N81 Alluvial soils along the River Slaney account for 25% of Section 2. The Alluvial soils in Section 2 are intensively managed, drained and fertilised and are productive from an agricultural perspective. To the south of the study area the dominant soil type is Brown Podzolic (31% of Section 2). This soil type is associated with higher elevations and is generally less productive than the soils in the northern part of this Section.

### Existing Farm Enterprises

The enterprise types in County Wicklow are summarised in Table 5.5.4

**Table 5.5.4 Enterprise types in County Wicklow<sup>20</sup>**

Enterprise Type	Sensitivity	Co Wicklow	Ireland
Dairy	High	9%	11.5%
Beef, sheep mixed grazing, mixed crops and livestock and mixed filed crops	Medium	83%	84.5%
Tillage	Medium	6%	3%
Other	High	2%	1%

According to the 2020 Agricultural Census the average farm size in County Wicklow is 42 hectares. The enterprise types broadly reflect the national averages. The percentage of specialist sheep farmers in County Wicklow (30%) is higher than the national average (13%).

The on-site survey conducted in August 2023 identified that both Section 1 and Section 2 were intensively farmed and had significant areas of high sensitivity dairy enterprises.

#### Section 1: Whitestown Lower Project

From a combination of examining aerial photography and from the drive-by surveying on August 22<sup>nd</sup> 2023, the following material assets – agricultural constraints were identified in Section 1;

- Five farmyards were identified.
- Six folios were identified where dairy cows are located.

#### Section 2: Hangman's Bend and Tuckmill Project

From a combination of examining aerial photography and, from the drive-by surveying on August 22<sup>nd</sup> 2023, the following material assets – agricultural constraints were identified in Section 2;

- Sixteen farm yards were identified.
- Five high sensitive folios were identified; two with dairy cows, one with dairy cows and horses, one equine holding (track and stables) and one small high sensitive intensive agriculture enterprise.

<sup>20</sup> Based on Table 2.3 <https://www.cso.ie/en/releasesandpublications/ep/p-coa/censusofagriculture2020-preliminaryresults/farmstructure/>

#### 5.5.4 Identified Constraints

In general, the agriculture in both Sections is highly sensitive due to a high proportion of dairy farming. The land quality is good except for soils identified as Alluvial in Section 1. The following agricultural constraints are identified:

- Section 1: N81 Whitestown Lower Project
  - Five farmyards.
  - Six high sensitive folios. These are shown in Drawing 23127 ROD EAC SW AE DR EN 100014.
- Section 2: N81 Hangman's Bend and Tuckmill Project
  - Sixteen farmyards.
  - Five high sensitive folios. These are shown in Drawing 23127 ROD EAC SW AE DR EN 100014.

#### 5.5.5 References

Central Statistics Office (2022), Census of Agriculture 2020 – Preliminary Results. Available from <https://www.cso.ie/en/releasesandpublications/ep/p-coa/censusofagriculture2020-preliminaryresults/>

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Transport Infrastructure Ireland (2019) Project Management Guidelines PE-PMG-02041. Available from: <https://www.tiipublications.ie/library/PE-PMG-02041-02.pdf>

Teagasc (2021), Irish Soil Information System. Available from <http://gis.teagasc.ie/soils/>



## 5.6 Material Assets – Non- Agriculture

### 5.6.1 Introduction

This section of the report provides an overview of the non-agricultural material assets within the study area of the N81 Whitestown Lower (Section 1) and N81 Hangman's Bend and Tuckmill Project (Section 2).

Material assets can be defined as economic assets of natural and human origin, or cultural aspects of a physical and social type. This is accomplished by reviewing and identifying the existing material assets and aims to ascertain any key proposals for future development of material assets within the study area i.e., new roads, water mains etc. that may pose a constraint to works associated with the study area.

### 5.6.2 Methodology

The following guidelines and legislation were referred to when drafting this section:

- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 – Si 296 of 2018;
- EPA (Environmental Protection Agency): Guidelines on the information to be contained in environmental impact assessment reports, 2022;
- EPA: Advice Notes for Preparing Environmental Impact Statements, (2003 and Draft, September 2015); and
- Transport Infrastructure Ireland (2023) Project Manager's Manual for Major National Road Projects: PE-PMG-02043.

In line with the TII and EPA guidelines, the constraints report seeks to identify the issues that are likely to be important at this stage of the environmental assessment process and to inform the design team so that preventative action can be pursued. The constraints assessment comprised of desktop collation and interpretation of available published data relating to the study area.

The desktop study of non-agricultural material assets referred to the following sources of information:

- Aerial photography was used to identify dwellings, commercial & leisure facilities;
- The Property Registration Authority of Ireland (PRAI) open database was used to identify folio land parcels;
- The Wicklow County Council Planning Applications database was utilised to locate and summarise the planning applications within the study area.

The following non-agricultural features have been identified from desktop information sources:

- Built environment – dwellings, commercial & leisure facilities have been identified from aerial photography;
- Wicklow County Council Development Plan (2022-2028)
- Rural areas were mapped using aerial photography from Google Earth.

#### **Planning applications/records**

A desktop assessment of the open planning applications for residential and commercial developments within the study area was carried out. The current planning applications for developments within the study area were collected from the Wicklow

County Council Planning Applications database, Tables 5.6.1 and 5.6.2 summarises the planning permission history in the study area within the past 5 years.

**Table 5.6.1 Section 1: Whitestown Lower; Summary of Planning Records Post-2018**

Ref. No.	Description	Application Type or Status
19522	Single story garage and fuel store with covered link to side of existing dwelling and for all associated site works.	Application Finalised 8 July 2019
201117	Importation of inert soil and stones for use in site restoration of an extracted area of 2.73 hectares within the pit area authorized under PL27/5/58916, at a rate of 23,000 tonnes per annum and cumulative tonnage of 115,000 tonnes.	Application Finalised 7 July 2021
2341	Construct (i) cubicle shed with slatted tanks (ii) calf shed and all associated site works. Permission for retention of (i) milking parlour with collecting yard and slatted tank (ii) loose shed (iii) cubicle shed and all associated site works.	Application Finalised 16 March 2023
19621	Change of use (removal of condition 2 of Planning Reg Ref 01/5522) from restricted use as a dwelling to use by all classes of persons.	Permission Withdrawn 13 February 2020
201291	Importation of inert soil and stones for use, including through screening and soil recovery, in site restoration of an area of 1.26 hectares with a former gravel pit, at a rate of 10,000 tonnes per annum (100,000 tonnes total).	Application Finalised 17 February 2022
2360182	Continued use of an existing facility (permitted under Plan File Ref. No. 18/1363) used for the importation of concrete, the storing of concrete, the processing of concrete including crushing and the storage of the crushed concrete product pending reuse.	<i>New Application Decision on or before 20 September 2023</i>
22273	Finger post sign.	Application Finalised 16 May 2022
181363	Importation of concrete, the storing of concrete, the processing of concrete including crushing and the storage of the crushed concrete product pending reuse off site.	Application Finalised 18 April 2019

**Table 5.6.2 Section 2: Hangman's Bend and Tuckmill Road; Summary of Planning Records Post 2018**

Ref. No.	Description	Application Type or Status
236087	The development will consist of the demolition of an existing front porch and unfinished extension to the rear of the existing cottage. Retain and renovate the original cottage and the construction of new single-story extension to the front.	Permission 31 July 2023
181323	Dwelling house, septic tank, percolation area, bored well, domestic garage, alterations to existing entrance and all ancillary site works.	Application Finalised 26 January 2019
2360056	A detached single-story house, single story domestic garage, effluent treatment system, percolation area, new recessed entrance, and all associated site development works.	<i>Further Information Needed</i> <i>Application Received: 19 May 2023</i>
19908	Vehicle entrance and ancillary works.	Application Finalised 14 October 2019

### 5.6.3 Receiving Environment

#### Built Environment

The built environment in the study area can be classified into three distinct categories as follows:

- One-off dwellings and housing clusters;
- Village nodes; and
- Commercial and leisure.

The section of the N81 under consideration in the N81 Whitestown Lower Project is from Junction R412 / N81, south along the N81 to the Junction L4321 / L8321 / N81, this is considered Section 1 of the study area. The section of the N81 under consideration in the N81 Hangman's Bend and Tuckmill Project is from Hangman's Bend (and L8301 / N81 Junction), south along the N81 to the straight section south of Eldon Bridge, this is considered Section 2 of the study area.

At the start of Section 1, Junction R412 / N81, there are one-off residential dwellings and farmland sparsely located on the outskirts of the study area. These sparse residential dwellings are located directly off the N81 to both the East and West while traveling South on local roads towards Junction L4321 / L8321 / N81. A large majority of the Section 1 study area is mainly farmland and grassland pasture. While traveling South to Junction L4321 / L8321 / N81, there are built commercial developments for construction companies such as *Leinster Pellets Limited* and *Sand and Gravel*. Both commercial developments are sizeable properties within a large curtilage that is located directly off the N81. The remainder of Section 1 is largely a rural area with dwellings located seldomly off the N81.

At the Northern point of the study area in Section 2 from Hangman's Bend, Ballinacrow Seventh Day Adventist is located to the East of the N81 that can be accessed by a local road. While continuing to travel South, there are minimal residential dwellings and sheds located directly off the N81 while the majority of this study area is farmland and

grassland pasture. When approaching the halfway point of Section 2, there is an intersection on the N81 towards Mattymount and Tuckmill Lower. At this intersection, there is a cluster of residential dwellings in addition to a commercial building and a large shed which are located directly off the N81. While continuing South towards Eldon Bridge, the rest of this section is largely rural with grassland pasture surrounding the study area and a commercial property: *Bradwood Bespoke Carpentry*, which is located just before Eldon Bridge. Continuing towards the end of Section 2 on the N81, South of Eldon Bridge, the study area is surrounded by woodlands and grassland pasture with very few residential dwellings positioned within this final part of Section 2.

The existing road network for Section 1 and 2 is show on Drawing No. 23127-ROD-EAC-SW\_AE-DR-EN-100001.

#### **5.6.4 Identified Non-Agricultural Constraints**

There are very few overtaking opportunities in Section 1 and Section 2 of the study area and only one bus route, Bus Eireann Route 132, serves this area of the N81. The study area serves a rural demographic where most journeys utilise a private car. The existing road network and conditions has created a reliance on private transportation and with an increase in population, traffic congestion will prove to be a constraint along the study area for both Section 1 and 2 during the construction phases.

The land use in the study area for both Section 1 and Section 2 is dominated largely by wooded areas, farmland, and grassland pasture along the study area corridor for both Sections 1 and 2. The impact of land take on the associated lands, subject to use, can have a significant to profound effect and should be avoided, where possible. Section 1 and Section 2 are both in a largely rural area where there are very few residential and commercial dwellings located sparsely throughout the bounds of the study areas along edges the existing N81 and local roads which are identified as constraints and should be avoided, where possible.

#### **5.6.5 Utilities (Engineering)**

The various utility service providers have provided records of their infrastructure in the region. The records have been mapped and reviewed to identify particular constraints within the study area.

#### **5.6.6 Identified Constraints**

##### **Section 1: N81 Whitestown Lower Project**

###### Power

The Stratford 110kV Sub-station is located in Castleruddery. The site is bounded to the northwest by the N81 and accessed on the northeast via the L4321. There are two separate HV lines from the substation which travel in the west and northwest directions. These lines cross the N81 within 30m of each other.

There is also a HV line through section 1 running parallel to the N81 at an offset ranging from 150m to 450m. This line has a spur to connect to the Stratford Substation. The line crosses the L4321 approximately 350m east of the N81.

###### Eir

There is an overhead communications cable which travels in the road verge for the entire length of Section 1, with junction connections at the L4312, L8321 junction and the R412 junction.

### Water

The records indicate there's a three-way mains supply junction at the road junction in Castleruddery. The watermain travels along the N81 from this junction to a property approximately 250m north of Whitestown Bridge.

## **Section 2: N81 Hangman's Bend and Tuckmill Project**

### Power

There is a HV powerline which crosses the study area in the north-south direction, and crosses the N81 between Eldon Bridge and the L4284 junction.

### Eir

There are underground communication cables which travel in the road verge for the entire length of Section 2 with junction connections on the side roads both sides of Eldon Bridge and at the Tuckmill junction.

### Water

There's a 900mm, 3.5 bar watermain which travels west of the L4301 junction and terminates at the three houses approximately 320m east of Hangman's Bend.

## **5.6.7 References**

Google Aerial Mapping (2021). Available from: <https://www.google.com/maps>

European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 – Si 296 of 2018;

EPA (Environmental Protection Agency): Guidelines on the information to be contained in environmental impact assessment reports, 2022;

EPA: Advice Notes for Preparing Environmental Impact Statements, (2003 and Draft, September 2015); and

EPA (2024) Unified GIS Application <https://gis.epa.ie/EPAMaps>. Environmental Protection Agency, Wexford.

Property Registration Authority (2021). Available from <https://www.landdirect.ie/index>.

Transport Infrastructure Ireland (2023) Project Manager's Manual for Major National Road Projects: PE-PMG-02043.

Wicklow County Council Planning (<https://www.wicklow.ie/Living/Services/Planning>)

Wicklow County Development Plan 2022-2028 and associated documents.

## 5.7 Air Quality

### 5.7.1 Introduction

This section of the report provides an overview of the air quality within the study area of the N81 Whitestown Lower (Section 1) and N81 Hangman's Bend and Tuckmill Project (Section 2). This is accomplished by reviewing and identifying the areas of existing ambient air quality significance within the study area and identify all sensitive receptor locations within the study area that are likely to be impacted before feasible options are identified.

### 5.7.2 Methodology

The air quality section of the constraints report has been prepared in accordance with the methodology outlined in the TII Publications; PE-ENV-01107 Air Quality Assessment of proposed National Roads – Standard (December 2022) and PE-ENV-01106 Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document (December 2022). These documents outline the following be included in a Stage 1 Preliminary Options Assessment:

- Determine existing air quality in the study area in relation to NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> from available information.
- Identify significant non-road sources.
- Identify and record all sensitive receptor locations (human health and sensitive designated habitats) within 200m of the carriageway of each option that are or have the potential to be significantly affected by a proposed scheme.
- Discuss any opportunities for mitigation.
- Review relevant previous air quality studies for schemes within the study area.
- Review of planning permissions granted within the study area of relevance from an air quality perspective.

### Air Quality Limit Values

In order to reduce the risk to human health and to the environment from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. The Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) establish the limit values in Ireland for particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), lead (Pb), carbon monoxide (CO) and benzene. These Regulations implement Directive 2008/50/EC on ambient air quality and cleaner air for Europe. The Environmental Protection Agency (EPA) is the competent authority for the purpose of Directive 2008/50/EC and these Regulations. These Regulations also provide for the dissemination of public information, including information on any exceedances of the target values, the reasons for the exceedances, the area(s) in which they occurred and appropriate information regarding effects on health and impact on the environment.

### 5.7.3 Receiving Environment

#### Baseline Air Quality

Particulates (PM<sub>10</sub> & PM<sub>2.5</sub>) and nitrogen dioxide (NO<sub>2</sub>) are the regulated pollutants of most concern in terms of road traffic emissions. Under the Clean Air for Europe Directive, EU member states must designate "Zones" for the purpose of managing air quality. For Ireland, four zones were defined in the Air Quality Standards Regulations (2011). The zones were amended on 1<sup>st</sup> January 2013 to take account of population counts from the 2011 CSO Census and to align with the coal restricted areas in the 2012 Regulations (S.I. No. 326 of 2012). Zone A is Dublin, Zone B is Cork City and

Zone C includes 24 large towns and Zone D is the remainder of the State. The N81 Whitestown Lower Project and N81 Hangman's Bend and Tuckmill Project constraints study area is within Zone D. The air quality in Zone D is well within the limits outlined in the Air Quality Standards Regulations 2011.

WHO updates the Air Quality Guidelines on a regular basis so as to assure their continued relevance and to support a broad range of policy options for air quality management in various parts of the world, especially taking into account the breadth of new health studies that have been published in the meanwhile. The 2021 update of the WHO air quality guidelines is in response to the real and continued threat of air pollution to public health.

The EPA manages the National Ambient Air Quality Network. The closest ambient air quality monitoring stations are located in Newbridge Co. Kildare, Naas Co. Kildare and in Carlow Town.

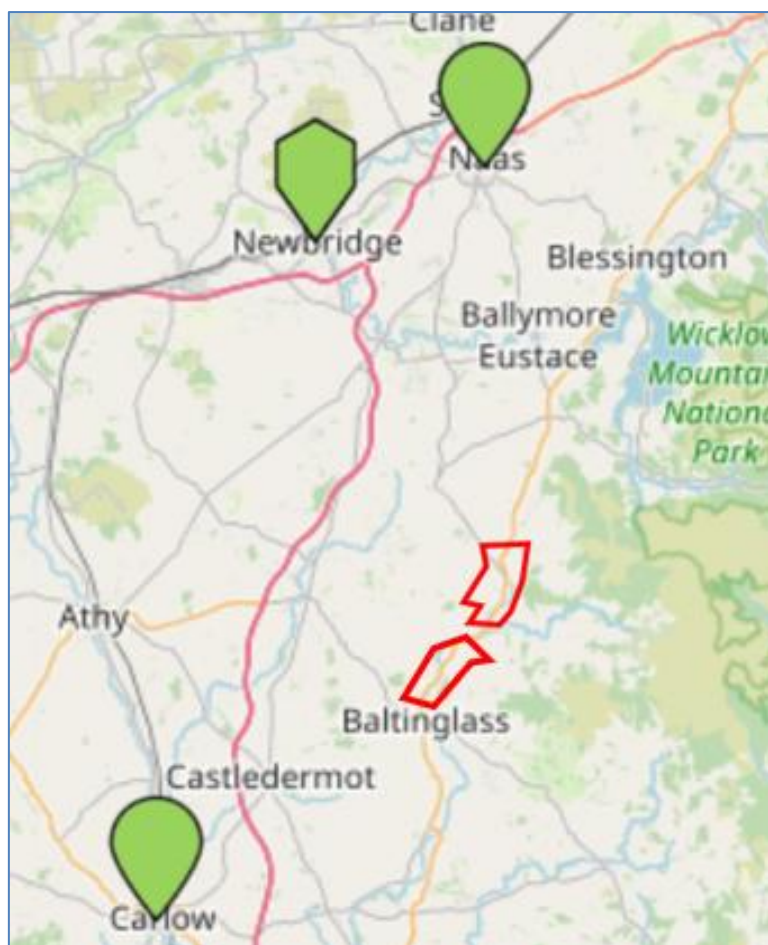
The quality monitoring station in Newbridge Co. Kildare is located c.21km and c.23km north-north-west of the N81 Whitestown Lower Project study area and the N81 Hangman's Bend and Tuckmill Project study area respectively.

The quality monitoring station in Naas Co. Kildare is located c.22km and c.26km north of the N81 Whitestown Lower Project study area and the N81 Hangman's Bend and Tuckmill Project study area respectively.

The quality monitoring station in Carlow Town is located c.25km and c.19km south-west of the of the N81 Whitestown Lower Project study area and the N81 Hangman's Bend and Tuckmill Project study area respectively.

Air quality monitoring is undertaken at each of these monitoring stations for particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>).

The location of the continuous monitoring stations relative to the study area are shown in Figure 5.7.1 and the average particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) concentrations for 2023 to date (1<sup>st</sup> January – 1<sup>st</sup> August 2023) at Naas and Carlow monitoring stations are presented. The Newbridge monitoring station is a local network monitoring station where recorded data is only available intermittently since 21<sup>st</sup> July 2023. All results are expressed in µg/m<sup>3</sup> and compared to relevant annual mean limit values as outlined in the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) and the WHO Global air quality guidelines (2021).



**Figure 5.7.1** The location of EPA continuous monitoring stations relative to the N81 Whitestown Lower Project and the N81 Hangman's Bend and Tuckmill Project study areas.

**Table 5.7.1** Average particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) concentrations recorded at Naas, Co. Kildare and Carlow Town, Co. Carlow monitoring location between 1<sup>st</sup> January - 1<sup>st</sup> August 2023.

Averaging Period	Monitoring Station	PM <sub>10</sub> (µg /m <sup>3</sup> )	PM <sub>2.5</sub> (µg /m <sup>3</sup> )
Annual Average	Naas, Co. Kildare	10.89 µg/m <sup>3</sup>	6.64 µg/m <sup>3</sup>
	Carlow Town	10.23 µg/m <sup>3</sup>	6.64 µg/m <sup>3</sup>
AQS Annual mean limit for protection of human health		40 µg/m <sup>3</sup>	25µg/m <sup>3</sup>
AQS 24 hour limit for protection of human health (not to be exceeded more than 35 times / year)		50 µg/m <sup>3</sup>	

Table 5.7.1 outlines that the relevant Air Quality Standard regulations limit values for Particulate Matter (PM<sub>10</sub> and PM<sub>2.5</sub>) have not been exceeded from 1<sup>st</sup> January - 1<sup>st</sup> August 2023.

#### 5.7.4 Identified Constraints

##### Non-Road Users

PE-ENV-01106 outlines that non-road sources of air pollution may significantly affect air quality within a study area. For example, industrial sources (both point sources and



fugitive emissions), ports and areas with a high density of domestic solid-fuel combustion. Sources within 1 km of the study corridor should be identified; this should be extended to 3 km in the case of large industrial sources such as power stations. No significant non-road sources of air pollution exist within the constraints study area.

A search of licensed activities in the vicinity of the study area was undertaken to identify any significant non-road emission sources in the area. The EPA licensed activities within 3 Km of each study area are shown in Table 5.7.2: Whitestown Lower Project study area and Table 5.7.3: Hangman's Bend and Tuckmill Project study area.

A search of quarries was also undertaken. Quarries may be deemed to be potentially significant dust sources in the area. Excavated areas on EPA mapping are shown in Figure 5.7.2: for the Whitestown Lower Project study area.

**Section 1: N81 Whitestown Lower Project**

The EPA licensed activities within 3 Km of the Whitestown Lower Project study area are shown in Table 5.7.2.

**Table 5.7.2** IPPC, IPC and IEL licence activities in Section 1 Study Area.

Name	Location	Licence Reference No.	Licence Type/Class of Activity	Location in relation to Study Area
Brownfield Restoration Ireland Limited	Whitestown Lower	W0204-01	Industry (IEL) – Waste	Within study area



**Figure 5.7.2:** Excavated areas within the study area and surrounding locality.

***Section 2: N81 Hangman's Bend and Tuckmill Project***

The EPA licensed activities within 3 Km of the Hangman's Bend and Tuckmill study area are shown in Table 5.7.3.

**Table 5.7.3** IPPC, IPC and IEL licence activities in Section 2 Study Area.

Name	Location	Licence Reference No.	Licence Type/Class of Activity	Location in relation to Study Area
Rampere Landfill	Rampere, Baltinglass	W0066	Industrial Emissions – Waste	~ 645 m from study area boundary
Brownfield Restoration Ireland Limited	Whitestown Lower	W0204-01	Industry (IEL) – Waste	2.7 km from study area boundary

Figure 5.7.2 shows several excavated areas located within the Whitestown Lower project constraints study area. The closest of these to the Hangman's Bend and Tuckmill project constraints study area is ~2km away.

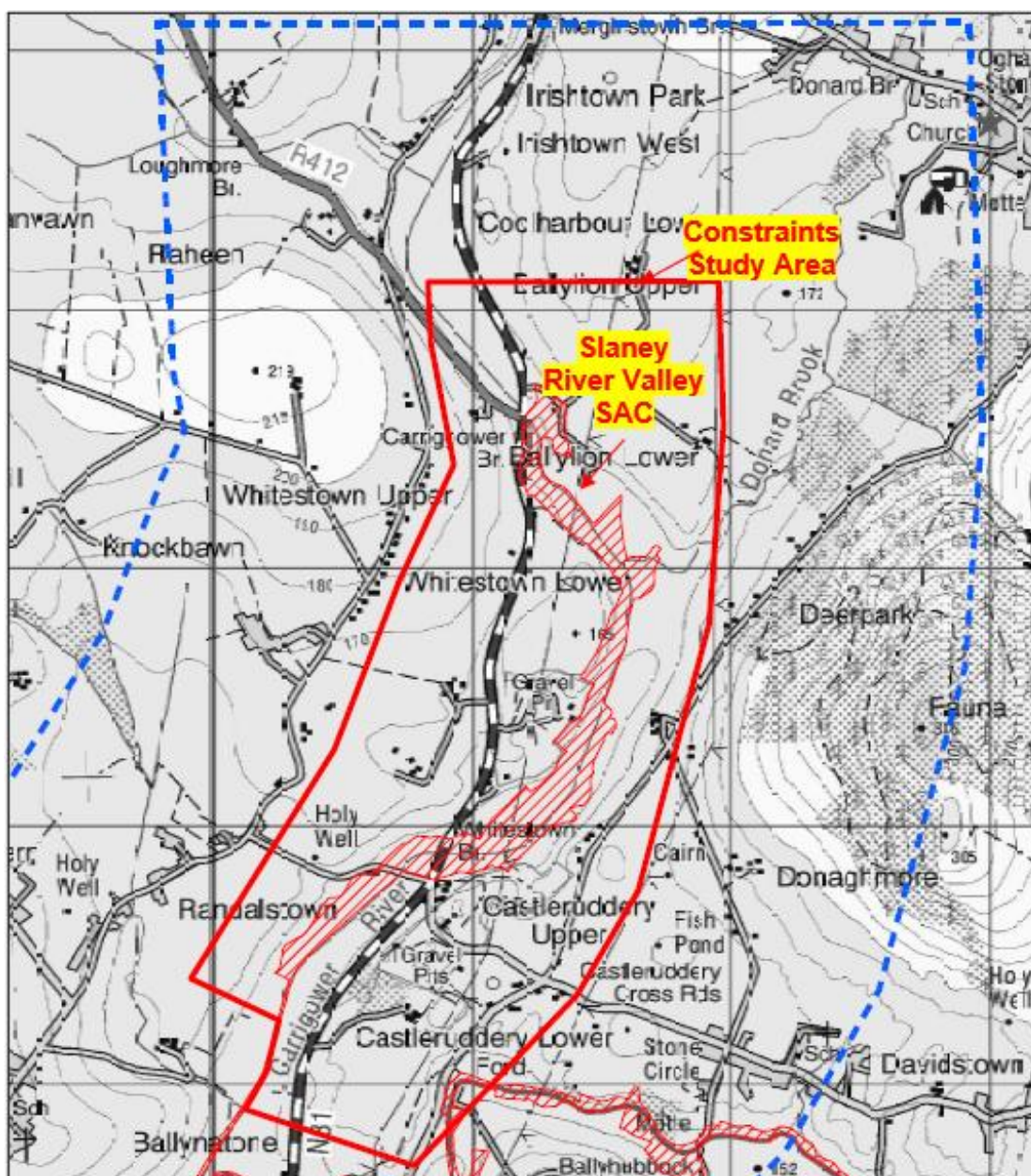
### **Sensitive Receptors**

Sensitive receptors are defined in PE-ENV-01106 and PE-ENV-01107 to include residential properties, schools, hospitals, care homes, hotels & B&Bs, places of worship, sports centres, shopping areas, playing fields, cycle routes, car parks, bus stations and railway stations, with the provision that the likely public exposure should be relevant to the regulatory averaging period. The shortest averaging period is 1-hour (which applies to NO<sub>2</sub> for the protection of human health). This indicates that areas where members of the public are likely to be present for one hour or greater should be considered.

Designated habitats must also be considered since these may be sensitive receptors. The legal basis on which habitats are selected and designated is the [EU Habitats Directive](#), transposed into Irish law by the [European Communities \(Birds and Natural Habitats\) Regulations 2011 \(S.I. No. 477 of 2011\)](#) (as amended). European sensitive designated sites within 2 km of the route options and all sensitive designated habitats within 200 m of the route options should be identified.

### **Section 1: N81 Whitestown Lower Project**

There are a significant number of residential receptors identified in the constraints study area, mostly within 50m of the existing N81 and other regional and local roads. There are a number of schools and childcare facilities served by the N81 but none within the study area boundary. There is one B&B; namely The Old Rectory located within the study area. There are no other sensitive receptors noted within the study area. Slaney River Valley SAC, a Natura 2000 designated site (Site Code: 000781) is located within the study area, as shown in Figure 5.7.3.

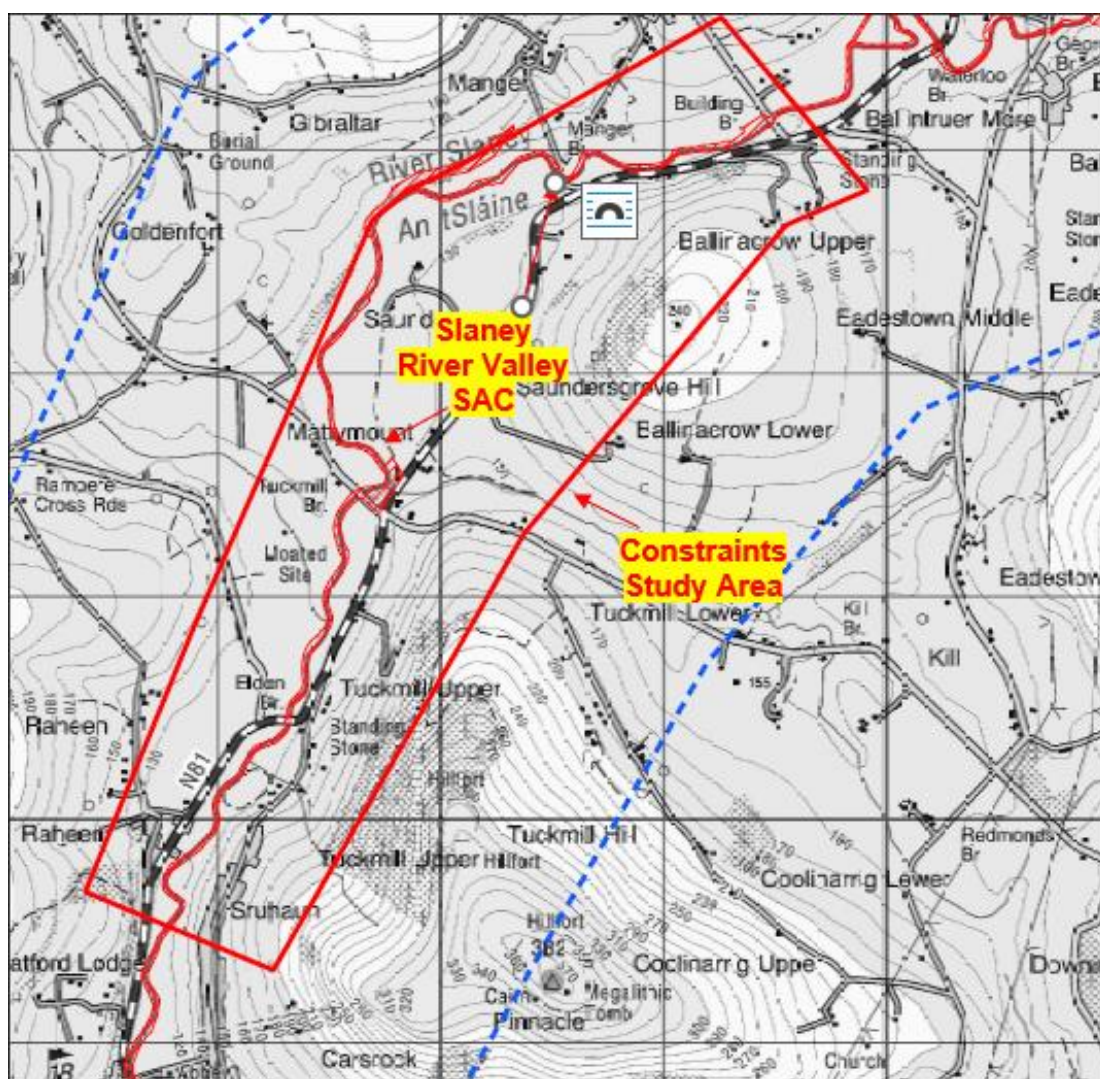


**Figure 5.7.3** Location of Slaney River Valley SAC relative to the constraints study area - N81 Whitestown Lower Project.

### Section 2: N81 Hangman's Bend and Tuckmill Project

There are a significant number of residential receptors identified in the constraints study area, mostly within 50m of the existing N81 and other regional and local roads. There are several schools and childcare facilities served by the N81 but none within the study area boundary. There are no other sensitive receptors noted within the study area.

Slaney River Valley SAC, a Natura 2000 designated site (Site Code: 000781) is located within the study area, as shown in Figure 5.7.4.



**Figure 5.7.4** Location of Slaney River Valley SAC relative to the constraints study area - N81 Hangman's Bend and Tuckmill Project.

The closest national designated site is Lowtown Fen (Site Code: 001764) which is >2km from the study area boundary.

### Planning Permissions

At present, Wicklow County Council has not received or reported any commercial or industrial planning applications within the study area. Several permissions have been granted within the study area for agricultural sheds, dwelling houses or residential extensions. There are no applications for planning permission for quarries within the constraints study areas.

### 5.7.5 Summary & Conclusions

The prevailing air quality in the constraints study area is already impacted by the traffic flows on the existing N81 and pollutant concentrations are in compliance with the national air quality standards.

The most sensitive receptors in terms of air quality within the constraints study area include residential properties and an ecologically protected area considered to be important on a European as well as Irish level. Other than existing road traffic emissions, no significant existing air pollution sources need to be considered in the

route selection process. Potential air quality impacts will be examined in more detail during the route corridor selection phase in order to assess the potential impacts on the sensitive receptors.

### 5.7.6 References

Google Aerial Mapping (2021). Available from: <https://www.google.com/maps>

European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 – Si 296 of 2018;

EPA (Environmental Protection Agency): Guidelines on the information to be contained in environmental impact assessment reports, 2022;

EPA: Advice Notes for Preparing Environmental Impact Statements, (2003 and Draft, September 2015);

EPA 2024 [online] Available at: <https://epawebapp.epa.ie/terminalfour/ippc/index.jsp> [Accessed 26 Jan. 2024].

EPA (2024) Unified GIS Application <https://gis.epa.ie/EPAMaps>. Environmental Protection Agency, Wexford.

NPWS (2024) *Online Map Viewer* <<http://webgis.npws.ie/npwsvviewer/>>. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

NPWS. (2011) Maps and Data | National Parks & Wildlife Service. [online] Available at: <https://www.npws.ie/maps-and-data>.

Transport Infrastructure Ireland, (December 2022). Air Quality Assessment of proposed National Roads – Standard, PE-ENV-01107.

Transport Infrastructure Ireland, (December 2022). Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document, PE-ENV-01106.

Transport Infrastructure Ireland (2023) Project Manager's Manual for Major National Road Projects: PE-PMG-02043.

Wicklow County Development Plan 2022-2028 and associated documents.

## 5.8 Climate

### 5.8.1 Introduction

This section of the report provides an overview of the climate within the study area of the N81 Whitestown Lower (Section 1) and N81 Hangman's Bend and Tuckmill Project (Section 2). This is accomplished by reviewing and identifying the areas significance within the study area and identify all sensitive receptor locations within the study area that are likely to be impacted before feasible options are identified.

### 5.8.2 Methodology

The Climate section of the constraints report has been prepared in accordance with the methodology outlined in the TII Publications; PE-ENV-01104 Climate Guidance for National Roads, Light Rail, and Rural Cycleways (Offline & Greenways) - Overarching Technical Document and PE-ENV-01105 Climate Assessment of Proposed National Roads - Standard PE-ENV-01105 (December 2022). These documents outline the following be included in a Stage 1 Constraints Report:

- A description of likely GHG differences between proposed reasonable alternatives as identified through their likely distinguishable design features.
- A record of the GHG mitigation principles agreed between the Climate Practitioner and Design team.
- A record of the project location's climate vulnerabilities.

The following sources were consulted for the purpose of this report:

- Environmental Protection Agency (EPA) Air Quality Data (<https://www.epa.ie/environment-and-you/air/>)
- EPA IPPC Applications and Licences (<https://epawebapp.epa.ie/terminalfour/ippc/index.jsp/>)
- National Parks and Wildlife Services (NPWS) ([www.npws.ie](http://www.npws.ie))
- Wicklow County Council Planning (<https://www.wicklow.ie/Living/Services/Planning>)
- Climate Ireland's (2022) 'Climate Data Explorer' tool (<https://www.climateireland.ie/#!/tools/climateDataExplorer>)
- The Global Facility for Disaster Reduction and Recovery's (GFDRR) (2020) 'Think Hazard' tool (<https://thinkhazard.org/en/>)
- Met Éireann's (Met Éireann, Major Weather Events, n.d) 'Major Weather Events' database (<https://www.met.ie/climate/major-weather-events>)

#### 5.8.2.1 Climate

Ireland's climate is changing. Over the last century, temperatures have increased, precipitation patterns have changed, and sea levels have risen. These changes are expected to continue and intensify in the future. Proposed national road developments can have effects on the climate, and conversely the climate can have significant effects on proposed national road developments. The climate assessment will assess the impact of Greenhouse Gases (GHGs) arising from a proposed national road development during its lifetime, and address how the project will affect the ability of the Government to meet its carbon reduction targets.

In 2022, Ireland's GHG emissions are estimated to be 60.76 million tonnes carbon dioxide equivalent (Mt CO<sub>2eq</sub>), which is 1.9% lower (or 1.19 Mt CO<sub>2eq</sub>) than emissions

in 2021 (61.95 Mt CO<sub>2eq</sub>) and follows a 5.1% increase in emissions reported for 2021. Decreased emissions in 2022 compared to 2021 were observed in the largest sectors except for transport, waste and commercial services. These 3 sectors showed increases in emissions (+6.0%, +4.9% and +0.2% respectively).

Ireland has an objective of climate neutrality by 2050 with an interim target of a 51% reduction in GHG emissions, including LULUCF (*Land Use, Land-use Change and Forestry*), by 2030 relative to a baseline of 2018. The latest projections indicate that the sectoral and overall targets set out in the Climate Action Plan 2023 will not be met with the measures currently modelled. An emissions reduction of 29% in 2030 vs 2018 (WAM) is being projected compared to the 51% target.

The following was used to establish climate baseline data:

- Climate Ireland's (2022) 'Climate Data Explorer' tool. This tool allows for the collection of observed climate data over a set baseline period (1981 to 2010) and provides information on average temperature, average precipitation, maximum temperature and minimum temperature. A spatial resolution of 4km has been used for the study area and average results provided on an annual basis.
- The Global Facility for Disaster Reduction and Recovery's (GFDRR) (2020) 'Think Hazard' tool which provides a high-level understanding of the hazards present within a select location. Think Hazard provides information on flooding (including coastal, pluvial and fluvial), extreme heat, drought, wildfires and landslides. The tool will indicate if the user requires a high, medium or low awareness of the hazard.
- Met Éireann's (Met Éireann, Major Weather Events, n.d) 'Major Weather Events' database, provides a list of major weather events in Ireland including storms, heatwaves, droughts, windstorms, flood events.
- Online search of different hazards in the project location

The Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment Report developed Representative Concentration Pathways (RCPs) to describe different 21<sup>st</sup> century pathways of GHG emissions depending on the level of climate mitigation action undertaken. Climate Ireland provides data for Representative Concentration Pathways (RCP) scenarios 4.5 (moderate) and 8.5 (high), which are appropriate to adopt for this assessment. The Climate Ireland Data Explorer provides access to mapped climate observation and projection information for Ireland. There are two future scenarios to choose from: RCP4.5 (Low-medium) and RCP8.5 (High) and a number of climate variables.

### 5.8.3 Receiving Environment

#### Baseline

Table 5.8.1 outlines that the Observed Climate data for the period 1981-2010 for the study area.



**Table 5.8.1 Observed Climate data for the period 1981-2010 for the study area**

<b>Observed Climate data (based on Climate Irelands 'Climate Data Explorer' tool (1981-2010))</b>	
<b>Climate Variable</b>	<b>Observed Climate at project location</b>
Average Temperature	11.5 - 12.1°C
Average Precipitation	1064 – 1240 mm
Maximum Temperature	17.2°C
Minimum Temperature	6.9°C

Table 5.8.2 outlines that the Climate Assessment Baseline Data for Co. Wicklow.

**Table 5.8.2: Climate Assessment Baseline Data for Co. Wicklow.**

<b>Hazard Level based on the GFDRRs 'ThinkHazard!' tool</b>	
<b>Hazard Type</b>	<b>Hazard Level</b>
Coastal Flood	Medium
Pluvial flood	Low
Fluvial Flood	Very Low
Extreme Heat	Low
Wildfire	Low
Earthquake	Low
Water Scarcity	Low
Landslide	No Data
Volcano	No Data
Cyclone	No Data
<b>Past Extreme Events</b>	
<b>Past Flood Events based on OPW Flood Maps</b>	<b>Flood Event - Record Type</b>
N81 Whitestown Lower Project	Little Slaney Whitestown Recurring (ID:3645)
N81 Hangman's Bend and Tuckmill Project	Little Slaney Manger Recurring (ID:3646)
	Little Slaney Whitestown to Baltinglass Recurring (ID:3647)
	Little Slaney Tuckmill Recurring (ID-3649)
	Eldon Br. Baltinglass Co Wicklow Recurring (ID-3634)
	Little Slaney Raheen Recurring (ID-3648)

OPW Flood maps show there is medium probability of fluvial flooding occurring in the N81 Whitestown Lower Project study area and within the Hangman's Bend and Tuckmill Project study area as far as Eldon Bridge. This means there is a 1-in-a-100 chance of a fluvial flood occurring or being exceeded in any given year. This is also referred to as an Annual Exceedance Probability (AEP) of 1%. From Eldon Bridge south as far as Baltinglass there is a high Probability of fluvial flooding occurring. This

means there is a 1-in-a-10 chance of a fluvial flood occurring or being exceeded in any given year, (AEP of 10%).

Table 5.8.3 outlines that the Climate Assessment Future Scenario Projected Climate Change at project location.

**Table 5.8.3 Climate Assessment Future Scenario Projected Climate Change at project location.**

Projections Climate data (based on Climate Irelands 'Climate Data Explorer' tool (2041-2060))		
Representative Concentration Pathway (RCP) scenario	RCP 4.5 (low-medium)	RCP 8.5 (high)
Climate Variable	Projected Climate change at project location on an annual basis (%)	
Average Temperature	1.2	1.6
Heating Degree Days (no. of days where average temperature is < 15.5 °C (i.e. a temperature below which heating is required))	-13.6	-17.4
Frost Days (no. of days when minimum temperatures are <0°C)	-37	-50.9
Precipitation (% change in average levels of precipitation)	-3.6 to -4.4	-1.9 to -3.1
Wet Days (% in number of days with rainfall >20m)	2 to 9.5	5 to 14.6
Very Wet Days (% in number of days with rainfall >30mm)	14.1 to 15.4	20 to 28.8
Snowfall (% snowfall)	-49 to -49.7	-56 to -57.8
Dry Periods (no. of dry periods defined as at least 5 consecutive days on which daily precipitation is < 1mm)	16 to 21	11.2 to 17
Wind Speed (% in wind speed at 10m)	-2.1	-2.6

#### 5.8.4 Summary & Conclusions

The potential impacts of the project on both macro-climate and micro-climate will be assessed in detail at route selection and full EIAR stage. The climate impact assessment will include a study of carbon dioxide (CO<sub>2</sub>) emissions as a result of traffic on the proposed project versus the existing N81.

#### 5.8.5 References

Google Aerial Mapping (2021). Available from: <https://www.google.com/maps>

European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 – Si 296 of 2018;

EPA (Environmental Protection Agency): Guidelines on the information to be contained in environmental impact assessment reports, 2022;

EPA: Advice Notes for Preparing Environmental Impact Statements, (2003 and Draft, September 2015);

EPA 2024 [online] Available at: <https://epawebapp.epa.ie/terminalfour/ippc/index.jsp> [Accessed 26 Jan. 2024].

EPA (2024) Unified GIS Application <https://gis.epa.ie/EPAMaps>. Environmental Protection Agency, Wexford.

Met Éireann's (Met Éireann, Major Weather Events, n.d) 'Major Weather Events' database (<https://www.met.ie/climate/major-weather-events>)

NPWS (2024) *Online Map Viewer* <<http://webgis.npws.ie/npwsviewer/>>. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

NPWS. (2011) Maps and Data | National Parks & Wildlife Service. [online] Available at: <https://www.npws.ie/maps-and-data>.

The Global Facility for Disaster Reduction and Recovery's (GFDRR) (2020) 'Think Hazard' tool (<https://thinkhazard.org/en/>)

Transport Infrastructure Ireland, (December 2022). Climate Guidance for National Roads, Light Rail, and Rural Cycleways (Offline & Greenways) - Overarching Technical Document, PE-ENV-01104

Transport Infrastructure Ireland, (December 2022). Climate Assessment of Proposed National Roads - Standard PE-ENV-01105

Transport Infrastructure Ireland (2023) Project Manager's Manual for Major National Road Projects: PE-PMG-02043.

Wicklow County Development Plan 2022-2028 and associated documents.

## 5.9 Noise and Vibration

### 5.9.1 Introduction

This section of the report provides an overview of the noise and vibration within the study area of the N81 Whitestown Lower (Section 1) and N81 Hangman's Bend and Tuckmill Project (Section 2). This is accomplished by reviewing the significant areas of noise and vibration within the study area and identify all sensitive receptor locations within the study area that are likely to be impacted before feasible options are identified.

### 5.9.2 Methodology

This constraints study has been completed in accordance with the *TII Guidelines for the Treatment of Noise & Vibration in National Road Schemes (2004)* and *TII Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (2014)*.

The TII Guidelines list examples of noise and vibration sensitive receivers as including 'schools, hospitals, places of worship, heritage buildings, special habitats, amenity areas in common use and designated quiet areas. However, residential properties must not be overlooked, and it may be noted that some commercial or industrial uses can also be noise sensitive, for example, recording studios and research or manufacturing facilities using noise or vibration-sensitive equipment'.

In the Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (2016) issued by the EPA the definition of noise is given (guidance only) as follows:

*"Any sound, that has the potential to cause disturbance, discomfort or psychological stress to a subject exposed to it, or any sound, that could cause actual physiological harm to a subject exposed to it, or physical damage to any structure exposed to it, is known as noise."*

### 5.9.3 Receiving Environment

The prevailing noise climate in the constraints study area varies from relatively rural areas with low background noise levels to areas with more elevated noise levels due to proximity to the existing traffic flows along the existing N81. Given the rural nature of the section of the N81 under consideration, there is a high reliance on private cars. The route is utilised as a strategic corridor, a local business route, a commuter route, a tourist route and for everyday local and social activities such as school, shopping and sports activity trips. This section of existing N81 is a single carriageway. Hard shoulders are provided in a few locations, mostly on approach to junctions.

#### Review of Published Data

Wicklow County Council Planning Website was reviewed to assess planning permissions granted within the study area of relevance from a noise perspective. At present, Wicklow County Council has not received or reported any commercial or industrial planning applications within the study area. Several permissions have been granted within the study area for agricultural sheds, dwelling houses or residential extensions. There are no applications for planning permission for quarries within the constraints area.

The Wicklow County Council Noise Action Plan 2018 – 2023 states that the N81 is classified as a National Secondary Route and is a single carriageway road along its entire length. The road runs on a north to south axis linking the population centres of Blessington and Baltinglass in west Wicklow (west of the Wicklow Mountains) with

Dublin to the north and Tullow and Enniscorthy to the south. Sections of the N81 have been improved by widening over the years, however some sections without hard shoulders remain on the route.

The Noise Action Plan applies to the areas adjacent to roads in County Wicklow which experience traffic volumes in excess 3 million vehicles a year as defined in the Regulations.

The National Major Roads identified in County Wicklow within excess of 3 million vehicles a year include the N81 from SDCC County Boundary at Moanspick to Junction with R758 (Valleymount). The N81 south of the junction with the R758 (Valleymount Road) does not fall within the threshold. Therefore, the N81 Whitestown Lower Project and N81 Hangman's Bend and Tuckmill Project do not fall within the sections of road in County Wicklow which experience traffic volumes in excess 3 million vehicles a year.

#### **5.9.4 Identified Constraints**

##### **Noise Sensitive Locations**

###### *Section 1: N81 Whitestown Lower Project*

There are a significant number of residential receptors identified in the constraints study area, mostly within 50m of the existing N81 and other regional and local roads. There are several schools and childcare facilities served by the N81 but none within the study area boundary. There is one B&B; namely The Old Rectory located within the study area. There are no other sensitive receptors noted within the study area.

Slaney River Valley SAC, a Natura 2000 designated site (Site Code: 000781) is located within the study area, as shown in Figure 5.9.1.

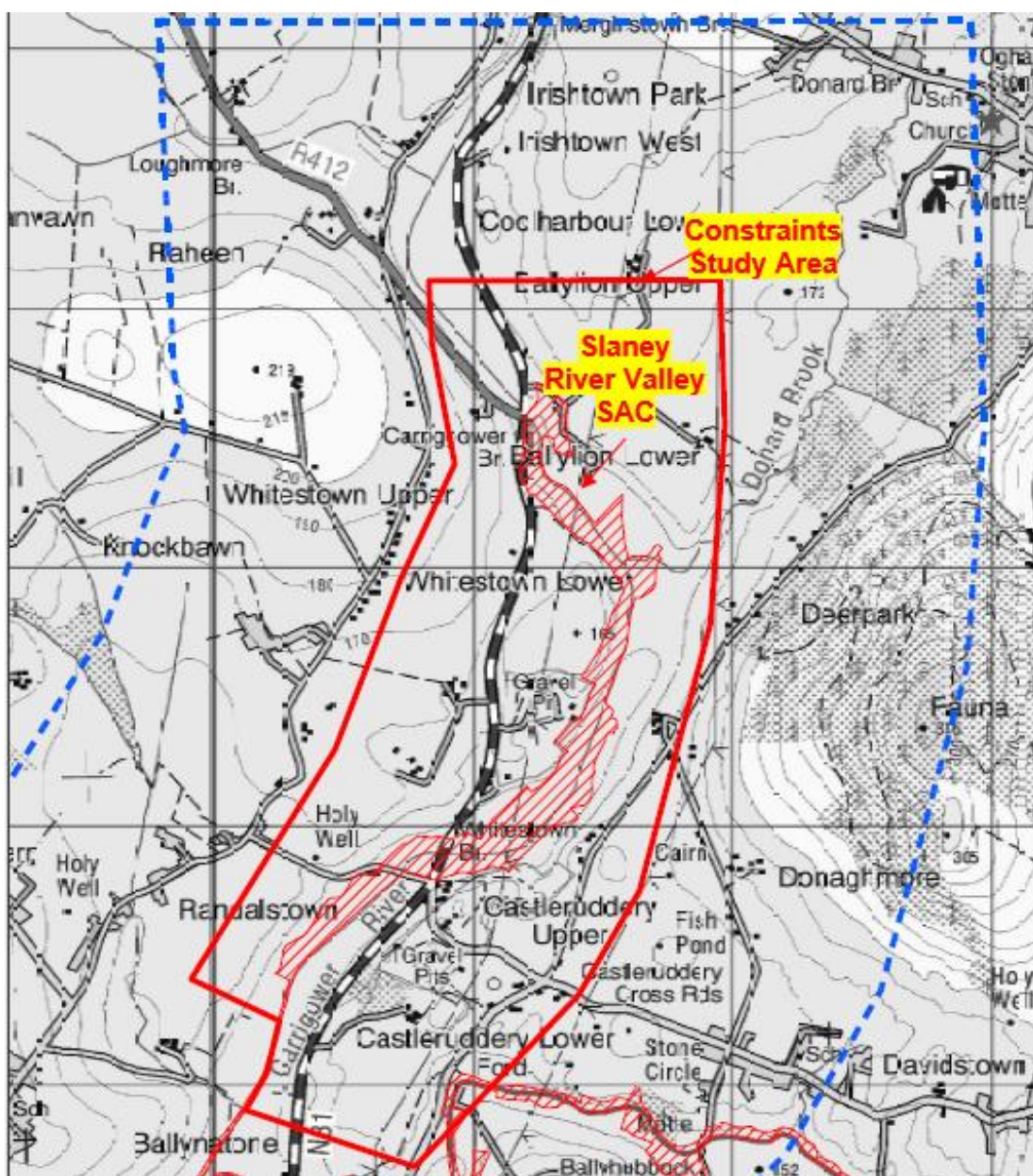
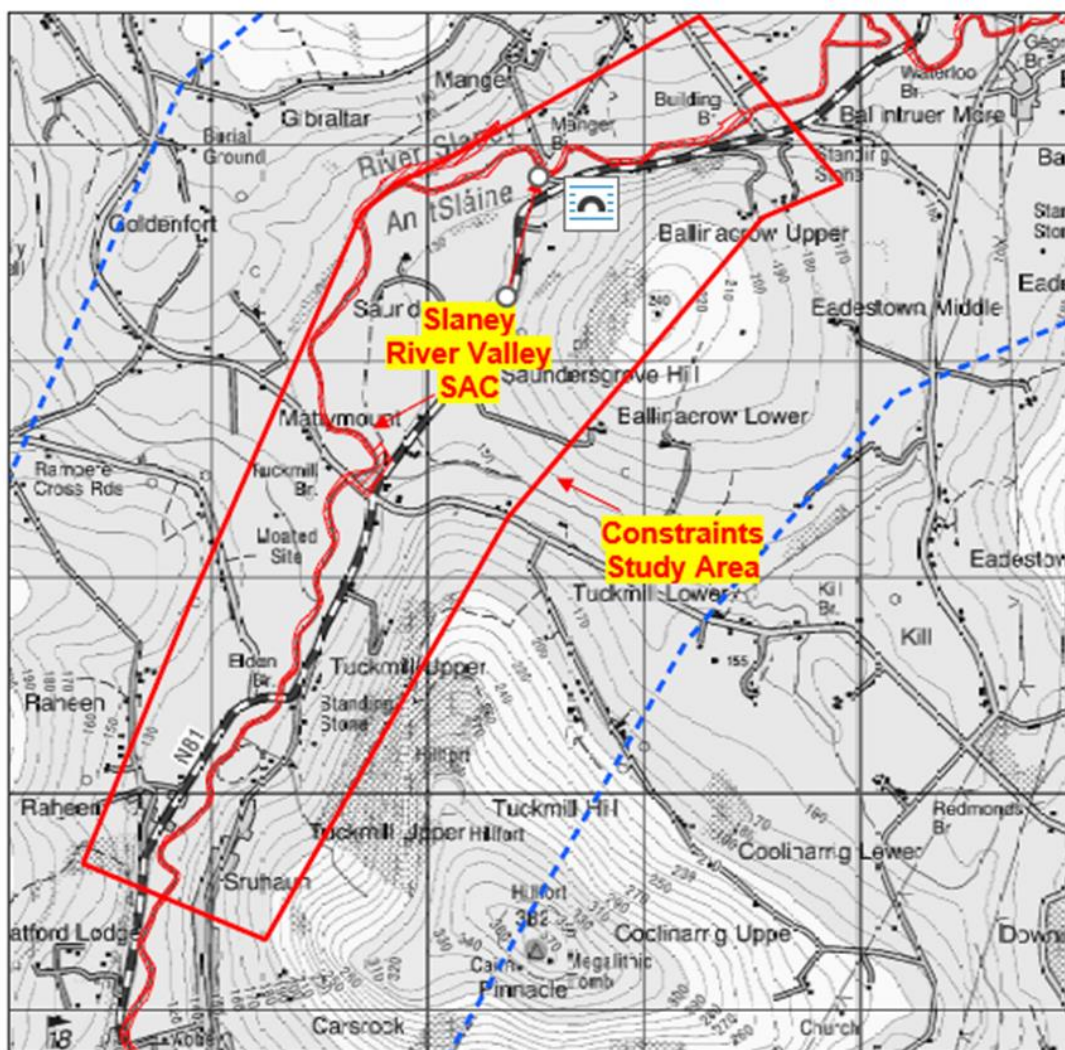


Figure 5.9.1 Location of Slaney River Valley SAC relative to the constraints study area

Section 2: N81 Hangman's Bend and Tuckmill Project

There are a significant number of residential receptors identified in the constraints study area, mostly within 50m of the existing N81 and other regional and local roads. There are several schools and childcare facilities served by the N81 but none within the study area boundary. There are no other sensitive receptors noted within the study area.

Slaney River Valley SAC, a Natura 2000 designated site (Site Code: 000781) is located within the study area, as shown in Figure 5.9.2.



**Figure 5.9.2** Location of Slaney River Valley SAC relative to the constraints study area

The closest national designation is Lowtown Fen (Site Code: 001764) which is >2km from the study area boundary. Therefore, this is not a noise sensitive location at this distance from the project.

### **Existing Noise Sources**

#### Industrial Emission Licence (IEL) activities

A search of EPA licensed activities in the vicinity of the study area was undertaken to identify any significant non-road emission sources in the area.

#### Quarry Activities

A search of quarries was also undertaken. Quarries may be deemed to be potentially significant noise and vibration sources in the area. Excavated areas on EPA mapping are shown in Figure 5.9.3: for the Whitestown Lower Project study area.

#### Section 1: N81 Whitestown Lower Project

The EPA licensed activities within 3 Km of the Whitestown Lower Project study area are shown in Table 5.9.1

**Table 5.9.1 IPPC, IPC and IEL licence activities in study area.**

Name	Location	Licence Reference No.	Licence Type/Class of Activity	Location in relation to Study Area
Brownfield Restoration Ireland Limited	Whitestown Lower	W0204-01	Industry (IEL) – Waste	Within study area

Section 2: N81 Hangman's Bend and Tuckmill Project

The EPA licensed activities within 3 Km of the Hangman's Bend and Tuckmill study area are shown in Table 5.9.2.

**Table 5.9.2 IPPC, IPC and IEL licence activities in study area.**

Name	Location	Licence Reference No.	Licence Type/Class of Activity	Location in relation to Study Area
Rampere Landfill	Rampere, Baltinglass	W0066	Industrial Emissions – Waste	~ 645 m from study area boundary
Brownfield Restoration Ireland Limited	Whitestown Lower	W0204-01	Industry (IEL) – Waste	2.7 km from study area boundary

Figure 5.9.3 shows several quarry excavation areas located within the Whitestown Lower project constraints study area. The closest quarry excavation area to the Hangman's Bend and Tuckmill project constraints study area is ~2km away.





**Figure 5.9.3** Excavated areas at Castleruddery within the study area and surrounding locality.

### **Summary & Conclusion**

The prevailing noise climate in the Constraints study area varies from relatively rural areas with low background noise levels to areas with more elevated noise levels due to proximity to the existing traffic flows along the existing N81.

The most sensitive receptors in terms of noise and vibration within the constraints study area includes residential properties, and one Bed & Breakfast.

Other than existing road traffic noise, no significant existing noise sources need to be considered in the route selection process.

Potential noise and vibration impacts will be examined in more detail during the route corridor selection phase in order to assess the potential impacts on the sensitive receptors.

### 5.9.5 References

- Google Aerial Mapping (2021). Available from: <https://www.google.com/maps>
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 – Si 296 of 2018;
- EPA (Environmental Protection Agency): Guidelines on the information to be contained in environmental impact assessment reports, 2022;
- EPA: Advice Notes for Preparing Environmental Impact Statements, (2003 and Draft, September 2015);
- EPA 2024 [online] Available at: <https://epawebapp.epa.ie/terminalfour/ippc/index.jsp> [Accessed 26 Jan. 2024].
- EPA (2024) Unified GIS Application <https://gis.epa.ie/EPAMaps>. Environmental Protection Agency, Wexford.
- Transport Infrastructure Ireland, (2004). Guidelines for the Treatment of Noise & Vibration in National Road Schemes
- Transport Infrastructure Ireland, (2014). Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes
- Transport Infrastructure Ireland (2023) Project Manager's Manual for Major National Road Projects: PE-PMG-02043.
- Wicklow County Development Plan 2022-2028 and associated documents.

## 5.10 Population and Human Health

### 5.10.1 Introduction

This section identifies the socio-economic forces in operation within the study area of the N81 Whitestown Lower Project and N81 Hangman's Bend and Tuckmill Project. This is accomplished by reviewing the population and human health profile and key economic operators in the study area.

### 5.10.2 Methodology

This section has been prepared with regard to the following guidelines:

- Environmental Protection Agency (EPA) Guidelines on information to be contained in the Preparation of Environmental Impact Statements/ Environmental Impact Assessments (2022).
- Environmental Protection Agency (EPA) Advice Notes for Preparing Environmental Impact Statements (2015).
- Environmental Protection Agency (EPA) Advice note on Current Practice in the Preparation of the Environmental Impact Statements/ Environmental Impact Assessments (2003).
- Transport Infrastructure Ireland (TII) Environmental Impact Assessment of National Road Schemes – A Practical Guide (2008).

The following data sources and policy documents were also consulted:

- Wicklow County Council Development Plan (2022-2028)
- Wicklow Tourism Strategy and Marketing Plan (2018-2023)
- CSO Census 2022 and 2016 Population Distribution and Movements.
- Lenus, The Irish Health Repository, Wicklow Health Profile (2015)

### 5.10.3 Receiving Environment

#### Population

The study areas for the N81 Whitestown Lower Project (Section 1) and N81 Hangman's Bend and Tuckmill Project (Section 2) are located within a rural area of County Wicklow with one-off residential properties and commercial dwellings located sparsely throughout the study area along the existing N81 and local roads.

According to the results from the 2022 Census, the population of County Wicklow is 155,851 which is a 9.43% increase from the 2016 Census results which displayed a population of 142,425. The specified study area is located within the Electoral Division (ED) area of Baltinglass. According to the 2022 Census, the population within the Baltinglass ED is 3,029 which is a 12.35% increase from the 2016 Census results which displayed a population within the Baltinglass ED area of 2,696. A summary of these results can be found in Table 5.10.1:

**Table 5.10.1 Population of County Wicklow and Baltinglass**

Census 2022	County Wicklow	Electoral Division: Baltinglass, 2022	Census 2016	County Wicklow	Electoral Division: Baltinglass, 2016
Male	76,564	1,505	Male	70,156	1,331
Female	79,287	1,524	Female	72,269	1,365
Population	155,851	3,029	Population	142,425	2,696

### **Economy, Business, and Tourism**

The study area is predominantly rural in nature, where the main economic activity is the agriculture sector. CORINE 2018 land use data for the study area classifies “Pastures” as the main land use for this area. There is an area labelled as quarry and landfill in Section 1, located before the N81/L4321 junction, which is classified as “artificial surfaces”.

The Study Area is situated to the west of the Wicklow mountains which makes it challenging to access by public transport if you are on the western side of County Wicklow. According to the Wicklow Tourism Strategy and Marketing Plan, the eastern side of the county does not face as many challenges because it is serviced by both “the DART and mainline rail service which offers daily commuter and intercity services in and out of the capital, serving the county towns of Bray, Wicklow, Rathdrum, and Arklow.” The Wicklow Mountains are a main tourist attraction in the area however, with the coastal nature of the rail services, the more inland tourism attractions are virtually inaccessible unless you have access to a private car or pre-booked tour.

Additionally, the Wicklow County Council Development plan has put an emphasis on various works for the N81 as addressed in 5.2.4 of this report, stating that “the Council will work to ensure the N81 receives much greater funding than received to date for improvements” because of this landscape area covering the main access corridor along the west of the County. Tourism makes a positive contribution to the economic and social wellbeing of County Wicklow and Ireland, so making this scenic attraction more accessible to both visitors and tourists by improving road conditions and public transportation routes will prove to be beneficial both locally and nationally.

### **Human Health**

Lenus, the Irish Health Repository, prepared health profiles in 2015 for all Local Authorities. Some of the key data from the Lenus Health Profile for County Wicklow is identified below:

- The seventh most affluent local authority area nationally.
- Has a high percentage of lone parent households of 11.9% (national of 10.9%).
- Cancer incidence is higher than the national rate for female malignant melanoma and female lung cancer.
- Death rates for all ages and the main cause of death are average or below the national average.
- Suicide rate of 9.4% is less than the national average of 11.3%.

The 2022 Census results are being released periodically over 2023 as a series of results that are released thematically. With that, the 2022 Electoral Division Census populations have not been released to the public yet, so the data for table 5.10.2 was

pulled from the 2022 and 2016 Census results which includes the entirety of County Wicklow as opposed to just the electoral division, Baltinglass. According to the data from the 2022 Census, out of the 155,851 people that currently reside in this area, 133,102 people have stated that they are in very good / good health, representing 85.4% of the population in County Wicklow which is marginally higher than the national average which is 82.9%. The percentage of people reporting bad / very bad health represents 1.6% of the population in County Wicklow, which is comparable to the national average of 1.7%. Table 5.10.2 summarizes the findings from the 2016 and 2022 Census results by general health status for County Wicklow.

**Table 5.10.2 Population of County Wicklow by General Health Status**

Census Year	Very Good	Good	Fair	Bad	Very Bad	Not Stated	Total Population
2022	87,478	45,624	12,828	2,086	527	7,308	155,851
2016	88,984	37,311	10,594	1,632	385	3,519	142,425

#### 5.10.4 Identified Constraints

There are no significant constraints in terms of population and human health within the study area. The study area is predominantly a rural environment with agriculture land use and one-off residential properties and few commercial developments along the N81 and local roads. The potential impacts on agricultural and non-agricultural assets have been considered in sections 5.5 and 5.6 of this report.

#### 5.10.5 References

Central Statistics Office (CSO) Census 2022 and 2016 Population Distribution and Movements.

Google Aerial Mapping (2021). Available from: <https://www.google.com/maps>

European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 – Si 296 of 2018;

EPA (Environmental Protection Agency): Guidelines on the information to be contained in environmental impact assessment reports, 2022;

EPA: Advice Notes for Preparing Environmental Impact Statements, (2003 and Draft, September 2015);

Lenus, The Irish Health Repository, Wicklow Health Profile (2015)

Transport Infrastructure Ireland, (2014). Environmental Impact Assessment of National Road Schemes – A Practical Guide.

Wicklow Tourism Strategy and Marketing Plan (2018-2023)

Wicklow County Development Plan 2022-2028 and associated documents.

## **6. EXTERNAL PARAMETERS**

### **6.1 Funding and Scope**

Wicklow County Council will be seeking funding for the project through the various phases and ultimately the construction of the project.

The current project scope includes the four relevant planning and design phases which are to be delivered in accordance with the TII Project Management Guidelines Project Manager's Manual for Minor National Road Projects December 2023 as outlined below:

- Phase 1 – Concept and Feasibility
- Phase 2 – Options Selection
- Phase 3 - Design and Environmental Evaluation
- Phase 4 – Statutory Processes
- Phase 5 – Enabling and Procurement
- Phase 6 – Construction and Implementation
- Phase 7- Close out and Review

### **6.2 Construction Phasing**

The length of any project is likely to be short, resulting in a single construction contract. Due to the need to maintain access and traffic flows, it may be necessary to complete this over multiple construction phases to facilitate temporary traffic management. The construction phasing strategy will be developed as the project progresses.

### **6.3 Technical Standards**

The design will be developed in compliance with the latest TII Standards and Guidance Documents.

### **6.4 Access Control**

As the project is developed, access control and junction strategies will be prepared in accordance with TII Standards and Guidance.

### **6.5 Policy Documents**

Refer to Section 5.2 for details of Land Use and Planning (Policy Context).

### **6.6 Procedural and legal Requirements**

As part of the constraints study, consideration of procedural and legal issues, which may arise during the design and construction process, must be taken into account at as early a stage as possible so as not to delay the timely completion of the project. On this basis the following should be noted at the appropriate stages.

- European and Irish environmental legislation,
- Amendments to Local Authority Development Plans;
- Guidelines on Process and Codes of Practice relating to environmental and legal aspects of Road design and construction;
- EIA and CPO format and procedures;
- Rights of statutory undertakers;

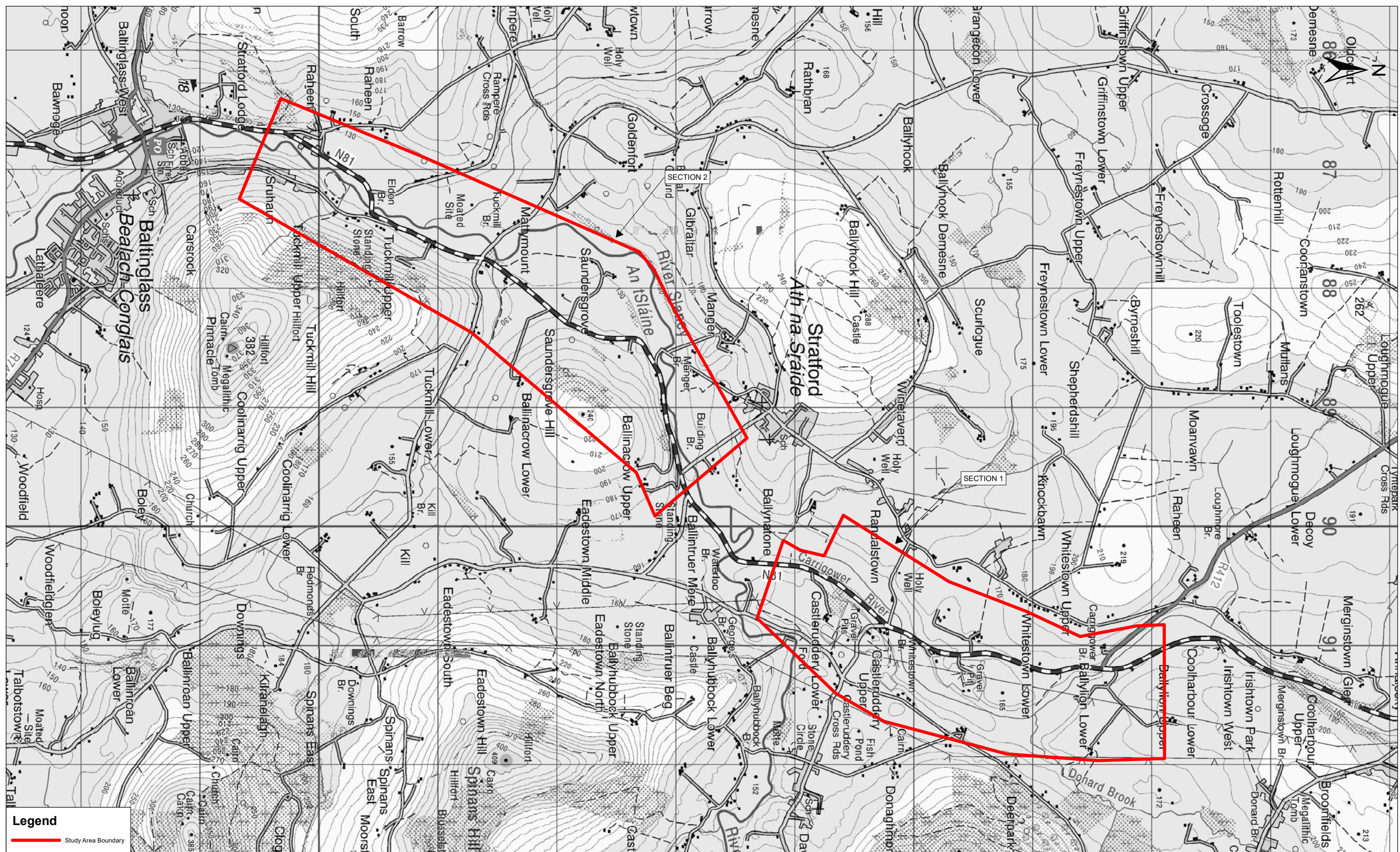
- Wayleaves, Public and private Rights of Way; and
- Site Investigation Notices.

## **6.7 Inter-Relationships**

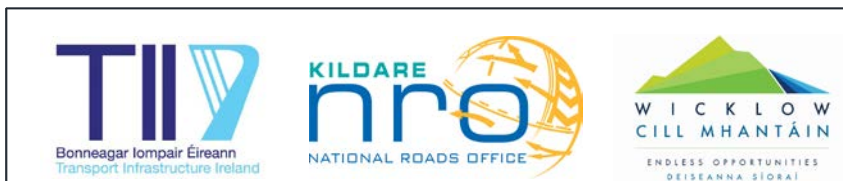
Whilst undertaking the constraints study it is necessary to consider the divisions above in parallel. This is necessary as constraints in the divisions above are interrelated and indeed dependent on one another.

## **APPENDIX A DRAWINGS**





**Legend**  
 Study Area Boundary



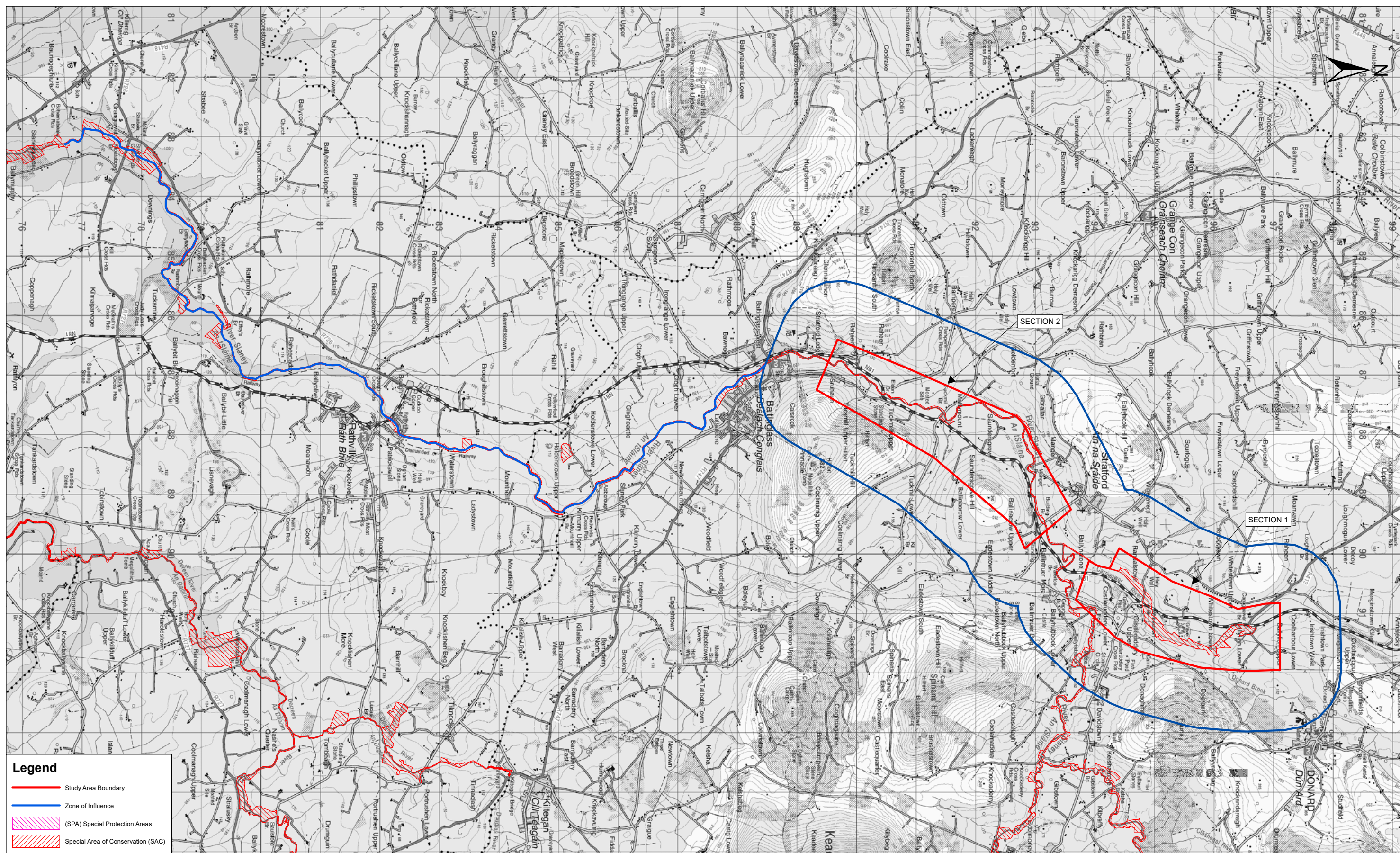
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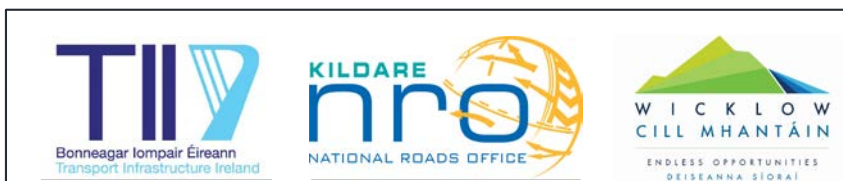
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Drawing Title	PROPOSED STUDY AREA
Drawing Number	23127 - ROD - EAC - SW_AE - DR - EN - 100001
Scale (A1)	1:15,000
Date	June 2023
Job No.	23.127
Rev.	P0



**Legend**

- Study Area Boundary
- Zone of Influence
- (SPA) Special Protection Areas
- Special Area of Conservation (SAC)



No.	Revision	Date	By	Chkd	App'd

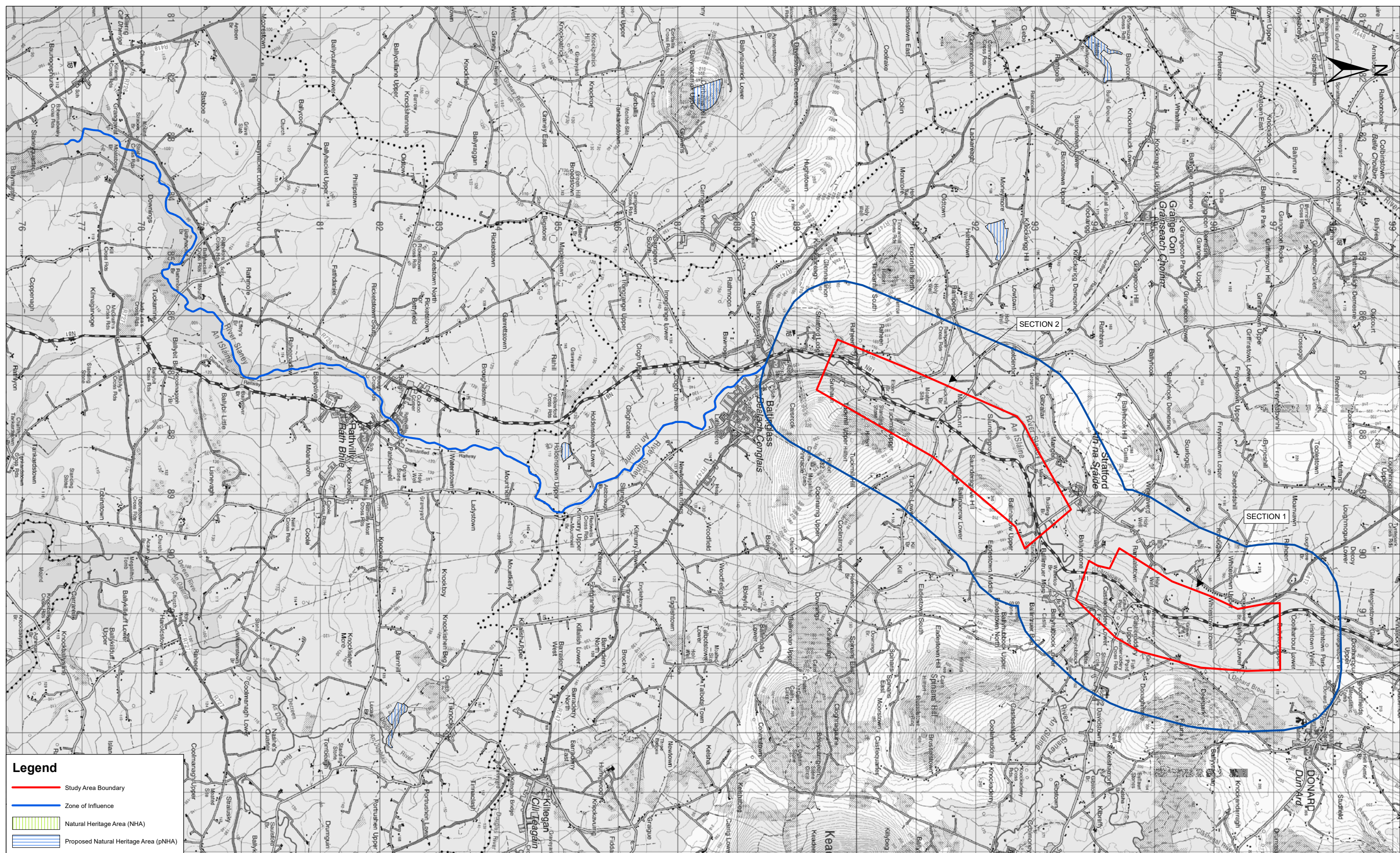
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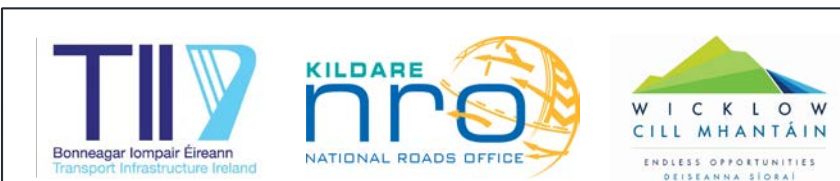
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Scale (A1)	1:30,000	Date	June 2023	Job No: 23.127 Rev: P0

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**Legend**

- Study Area Boundary
- Zone of Influence
- Natural Heritage Area (NHA)
- Proposed Natural Heritage Area (pNHA)



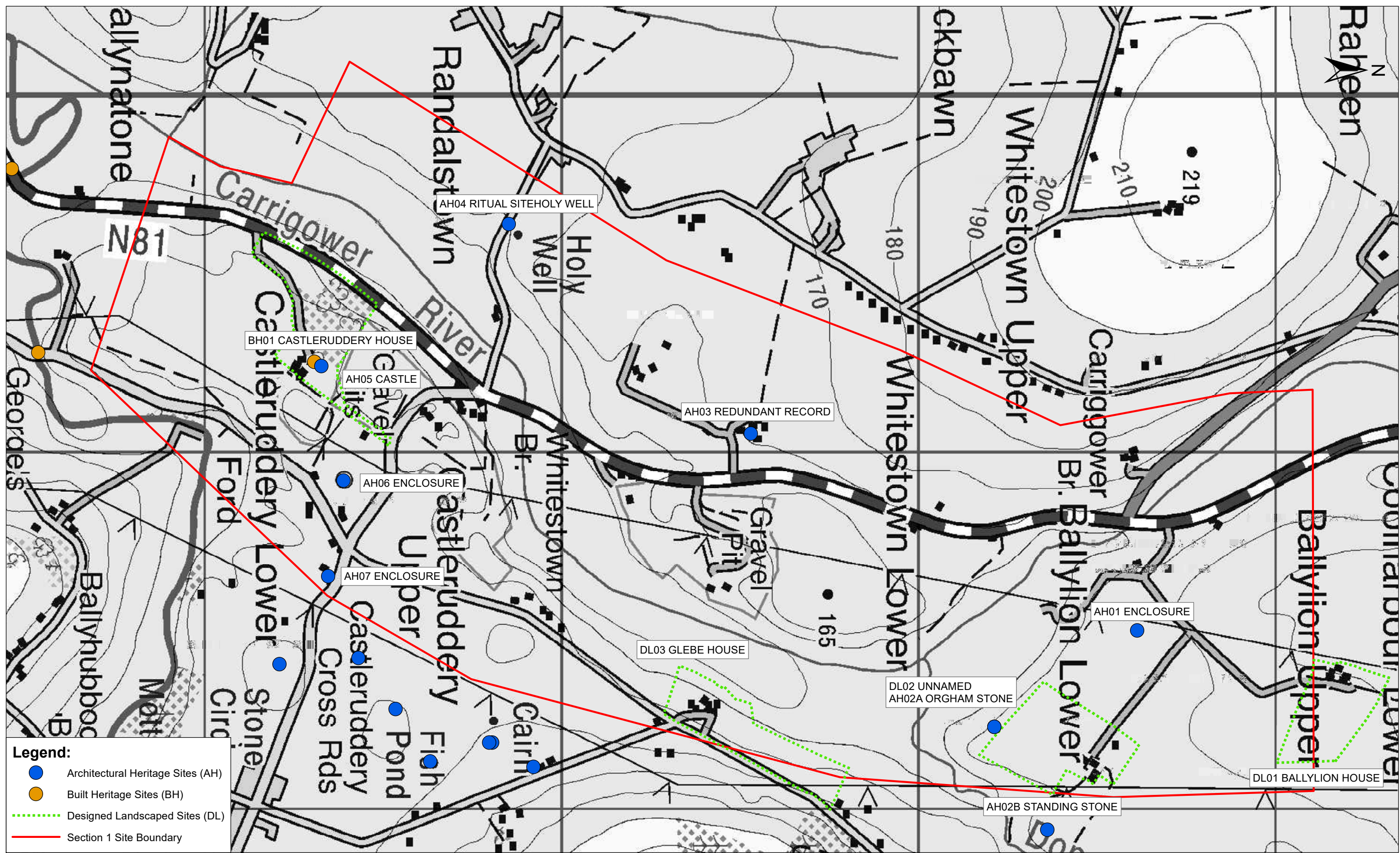
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Rev.	P0				



- Legend:**
- Architectural Heritage Sites (AH)
  - Built Heritage Sites (BH)
  - - - Designed Landscaped Sites (DL)
  - Section 1 Site Boundary



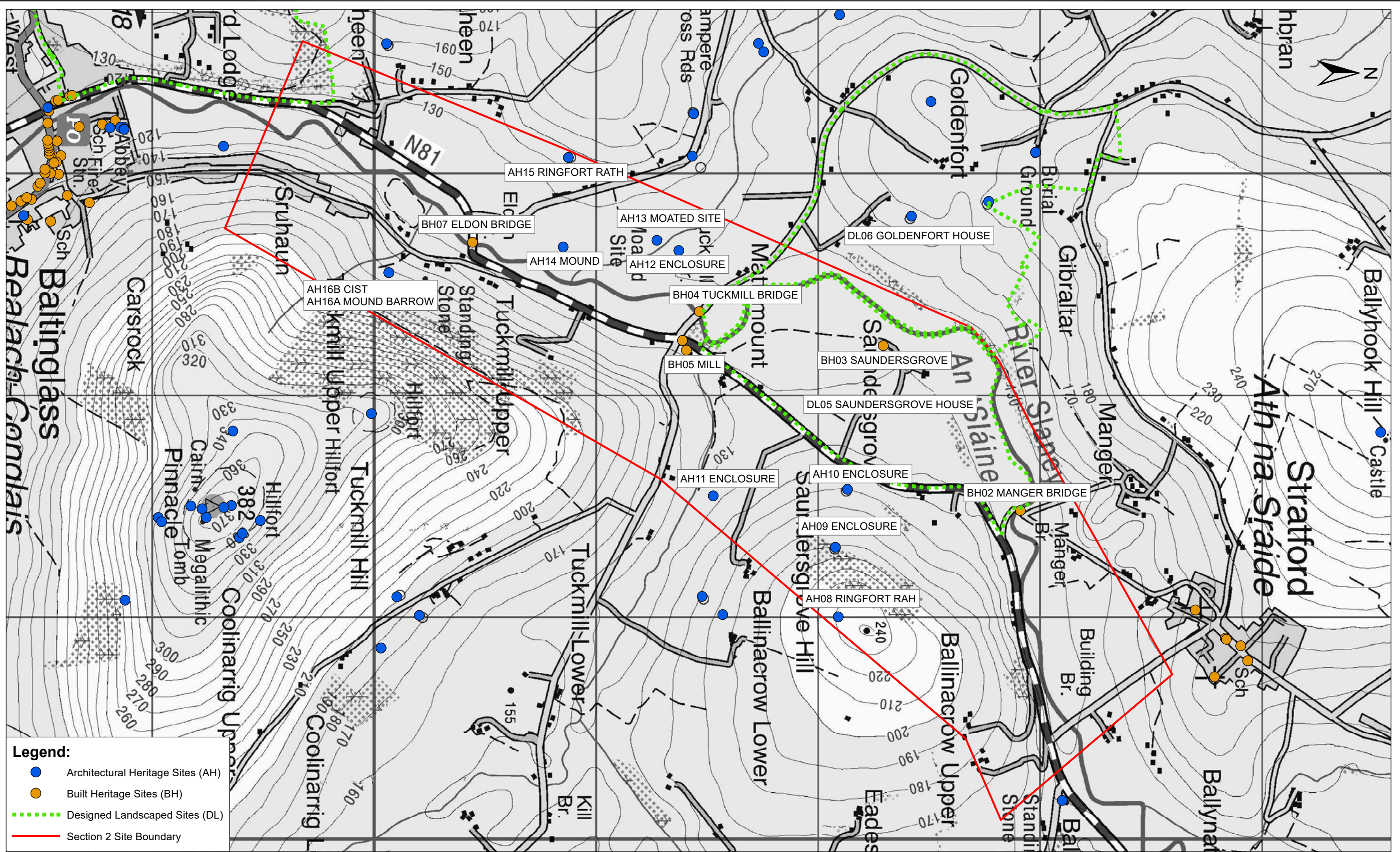
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Drawing Number	Project	Originator	Volume	Location	Type	Role	Number
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Scale (A1)	1:5,000	Date	January 2024	Job No.	23.127	Rev.	P0



- Legend:**
- Architectural Heritage Sites (AH)
  - Built Heritage Sites (BH)
  - - - Designed Landscaped Sites (DL)
  - Section 2 Site Boundary



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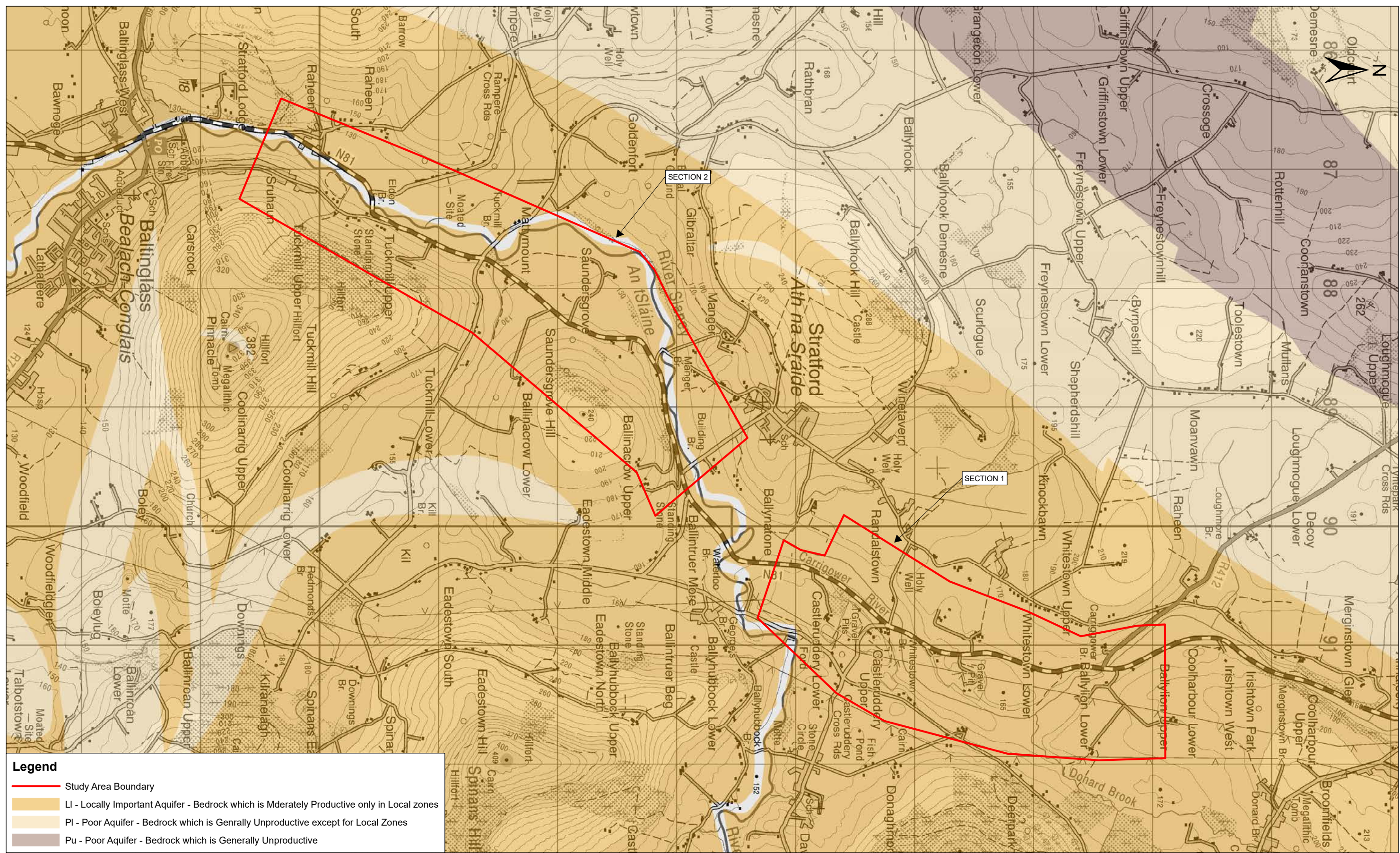
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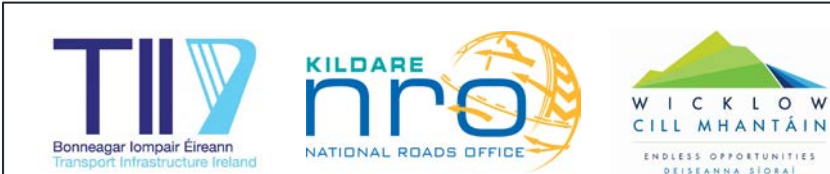
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**Legend**

- Study Area Boundary
- LI - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local zones
- PI - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
- Pu - Poor Aquifer - Bedrock which is Generally Unproductive



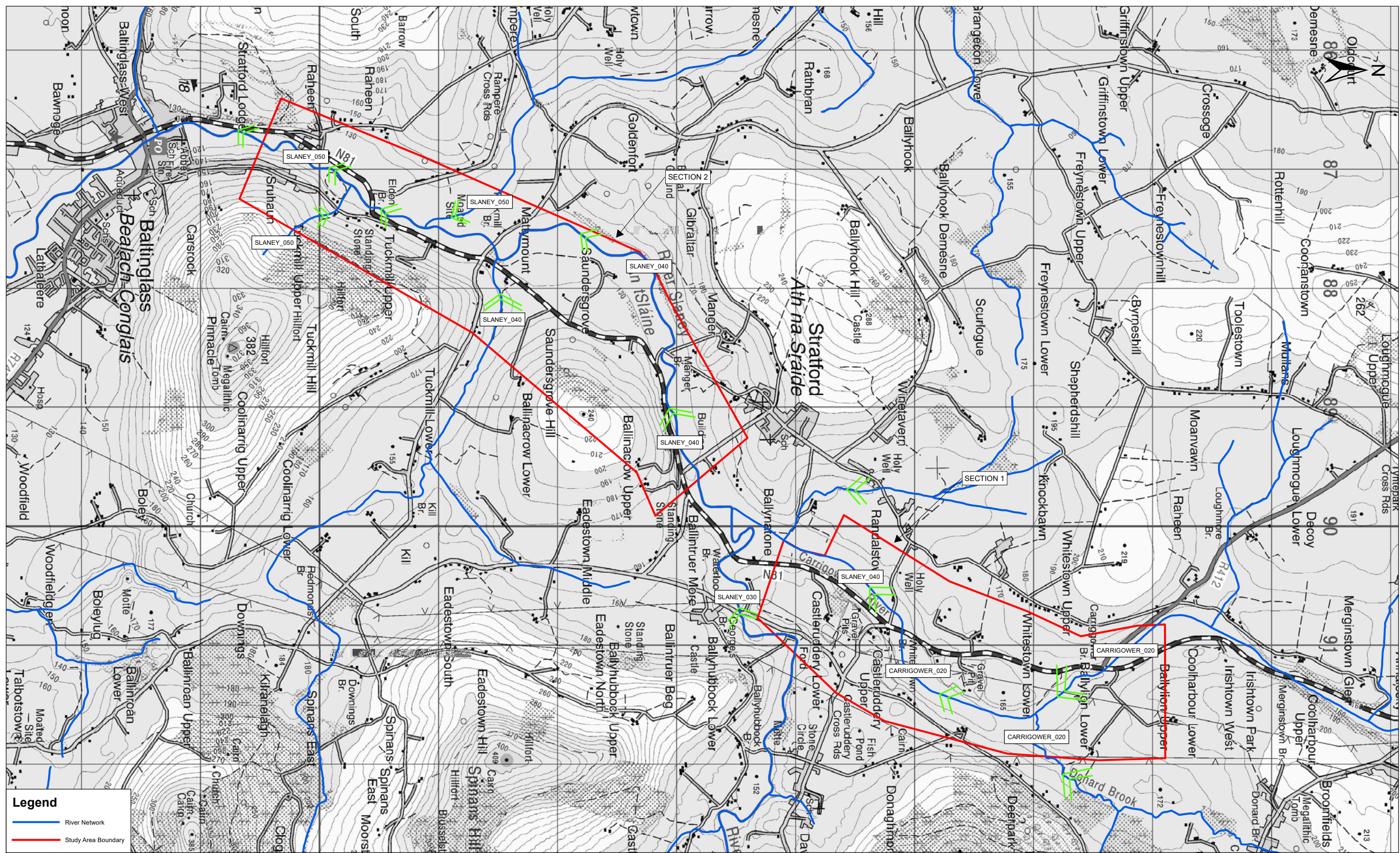
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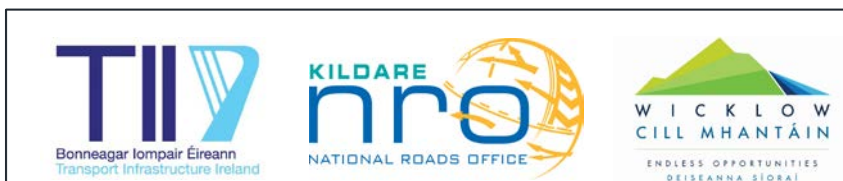
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Scale (A1)	1:15,000	Date	June 2023	Job No.	23.127	Rev.	P0						



**Legend**

- River Network
- Study Area Boundary



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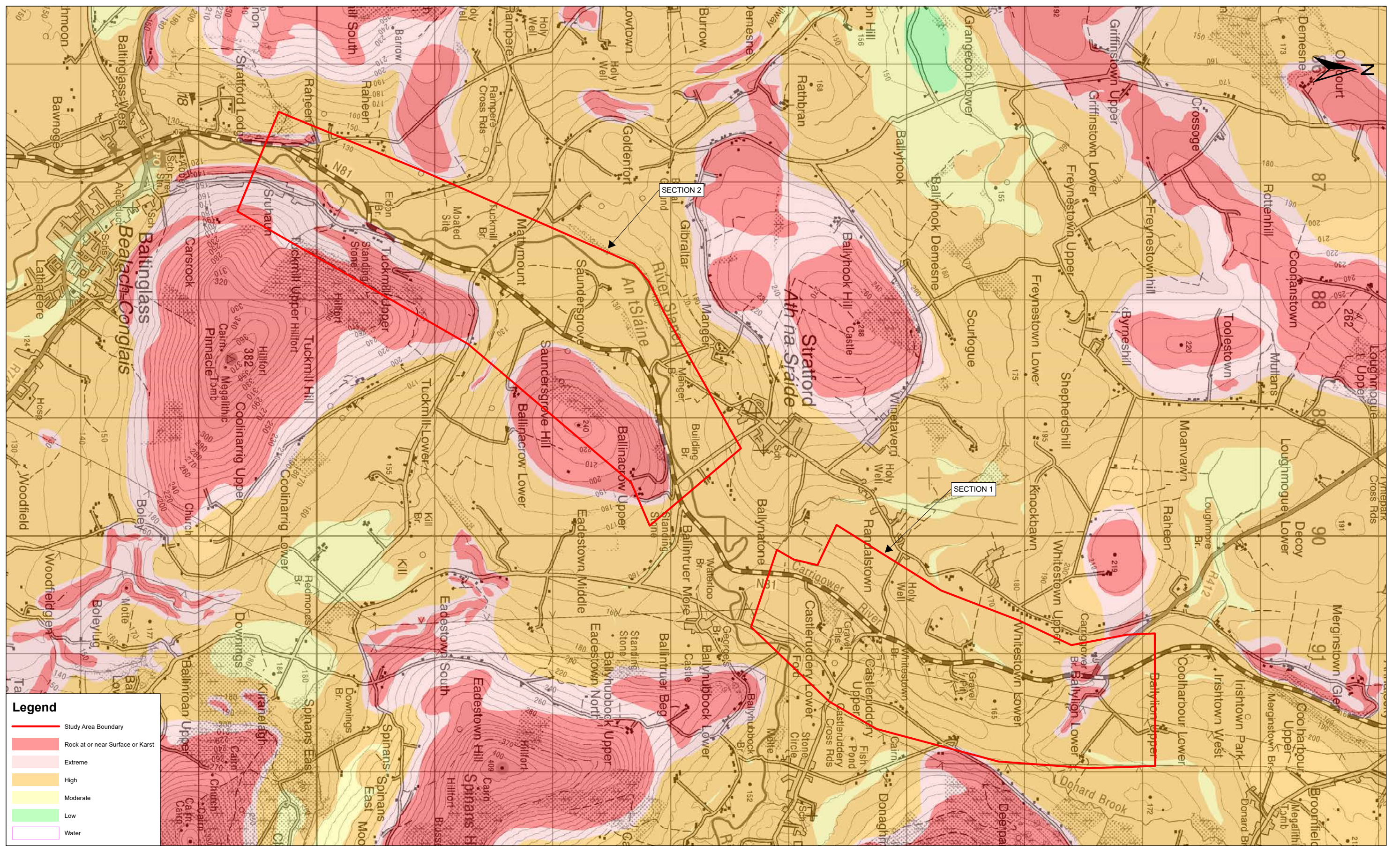
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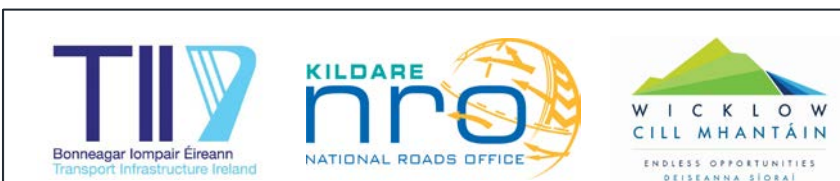
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Scale (A1)	1:15,000	Date:	June 2023	Job No:	23.127
		Rev:			P0

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**Legend**

- Study Area Boundary
- Rock at or near Surface or Karst
- Extreme
- High
- Moderate
- Low
- Water



No.	Revision	Date	By	Chkd	App'd

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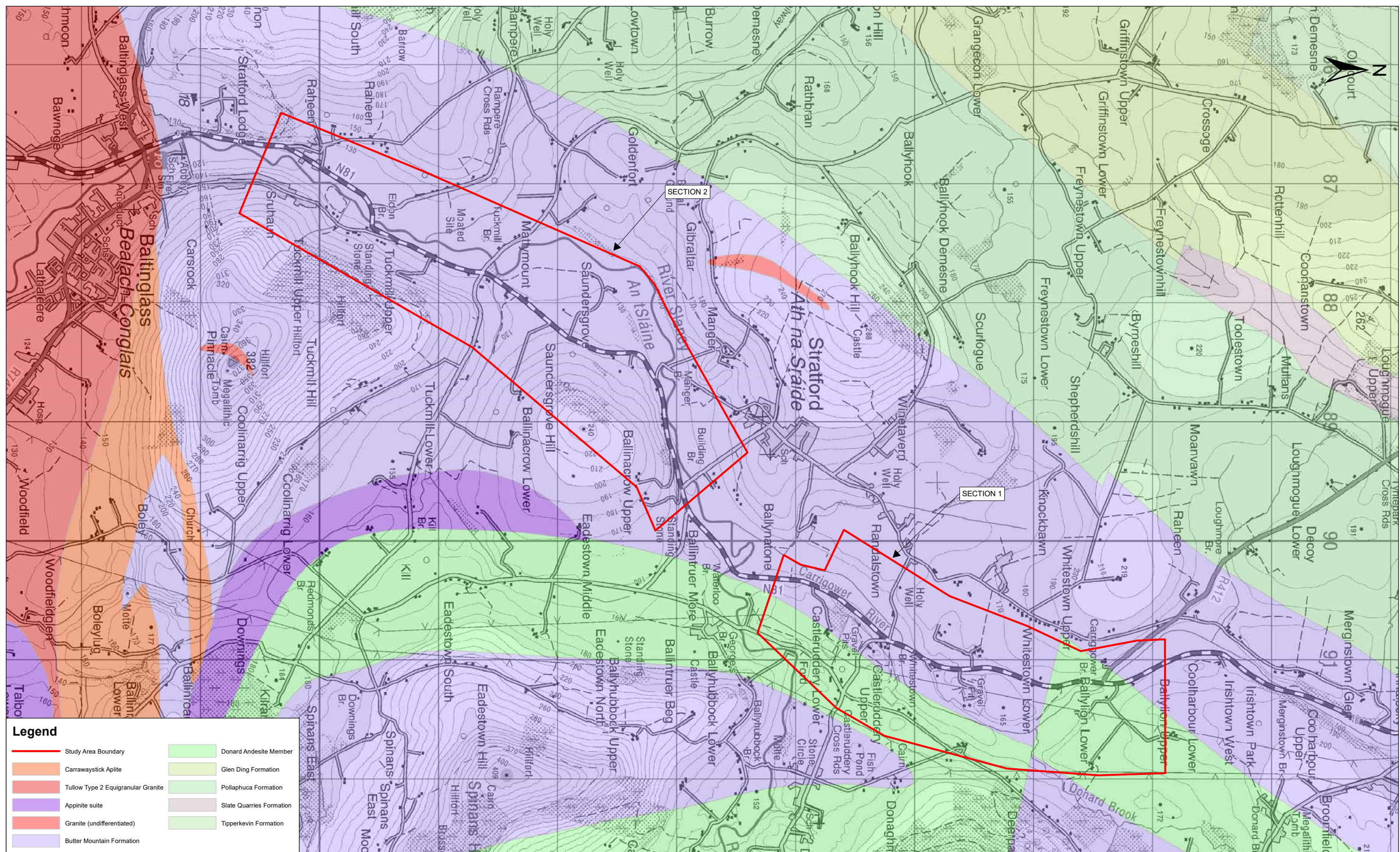
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Number	100007	Role	EN		





**Legend**

	Study Area Boundary		Donard Andesite Member
	Carrarystick Aplites		Glen Ding Formation
	Tullow Type 2 Equigranular Granite		Pollaphuca Formation
	Appinite suite		Slate Quarries Formation
	Granite (undifferentiated)		Tipperkevin Formation
	Butter Mountain Formation		



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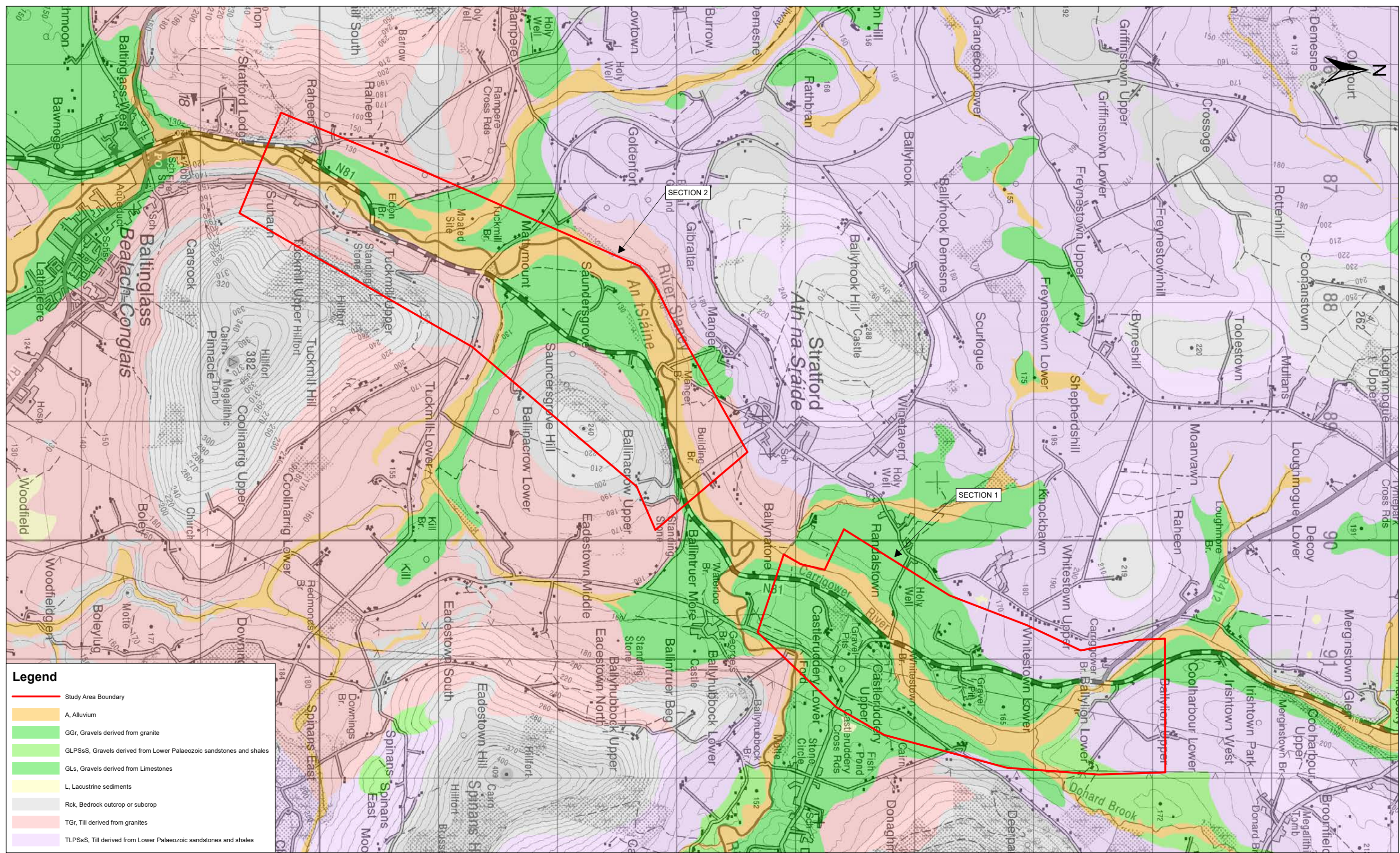


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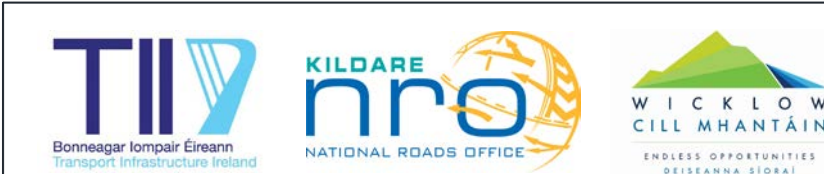
Project Stage PLANNING
Project Title N81 WHITESTOWN LOWER TO TUCKMILL
Drawing Title BEDROCK GEOLOGY
Drawing Number 23127 - ROD - EAC - SW_AE - DR - EN - 100008
Scale (A1) 1:15,000
Date June 2023
Job No. 23.127
Rev. P0

DO NOT SCALE USE FIGURED DIMENSIONS ONLY



**Legend**

- Study Area Boundary
- A, Alluvium
- GG, Gravels derived from granite
- GLPSs, Gravels derived from Lower Palaeozoic sandstones and shales
- GLs, Gravels derived from Limestones
- L, Lacustrine sediments
- Rck, Bedrock outcrop or subcrop
- TGr, Till derived from granites
- TLPSs, Till derived from Lower Palaeozoic sandstones and shales



No.	Revision	Date	By	Chkd	App'd

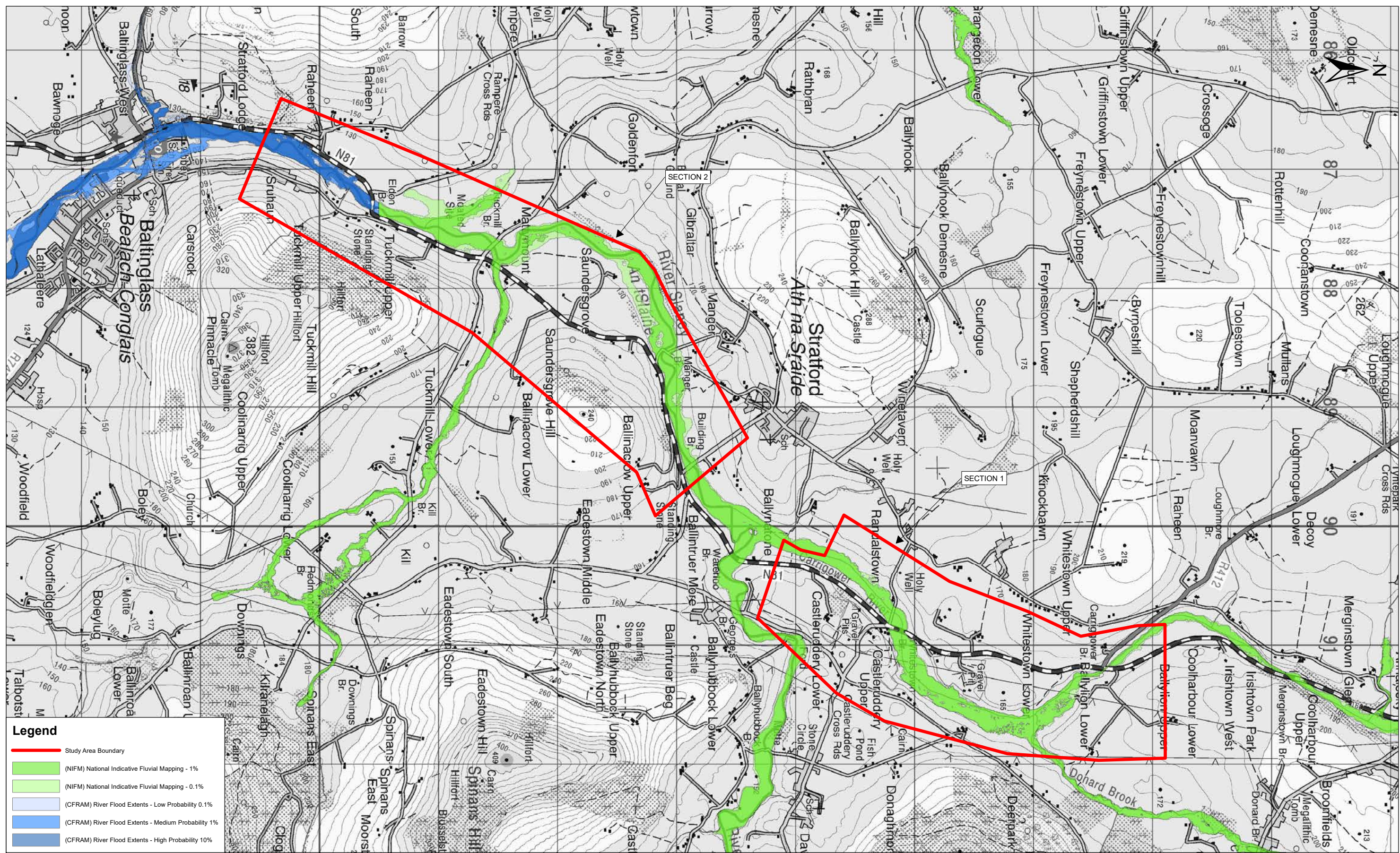
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Drawn AC	Designed AC	Checked CC	Approved RMJ	Suitability Code - Description S0 - Work in Progress
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Project Stage	PLANNING												
Project Title	N81 WHITESTOWN LOWER TO TUCKMILL												
Drawing Title	QUATERNARY SEDIMENTS												
Drawing Number	23127	Originator	ROD	Volume	EAC	Location	SW_AE	Type	DR	Role	EN	Number	100009
Scale (A1)	1:15,000	Date	June 2023	Job No.	23.127	Rev.	PO						



**Legend**

- Study Area Boundary
- (NIFM) National Indicative Fluvial Mapping - 1%
- (NIFM) National Indicative Fluvial Mapping - 0.1%
- (CFRAM) River Flood Extents - Low Probability 0.1%
- (CFRAM) River Flood Extents - Medium Probability 1%
- (CFRAM) River Flood Extents - High Probability 10%



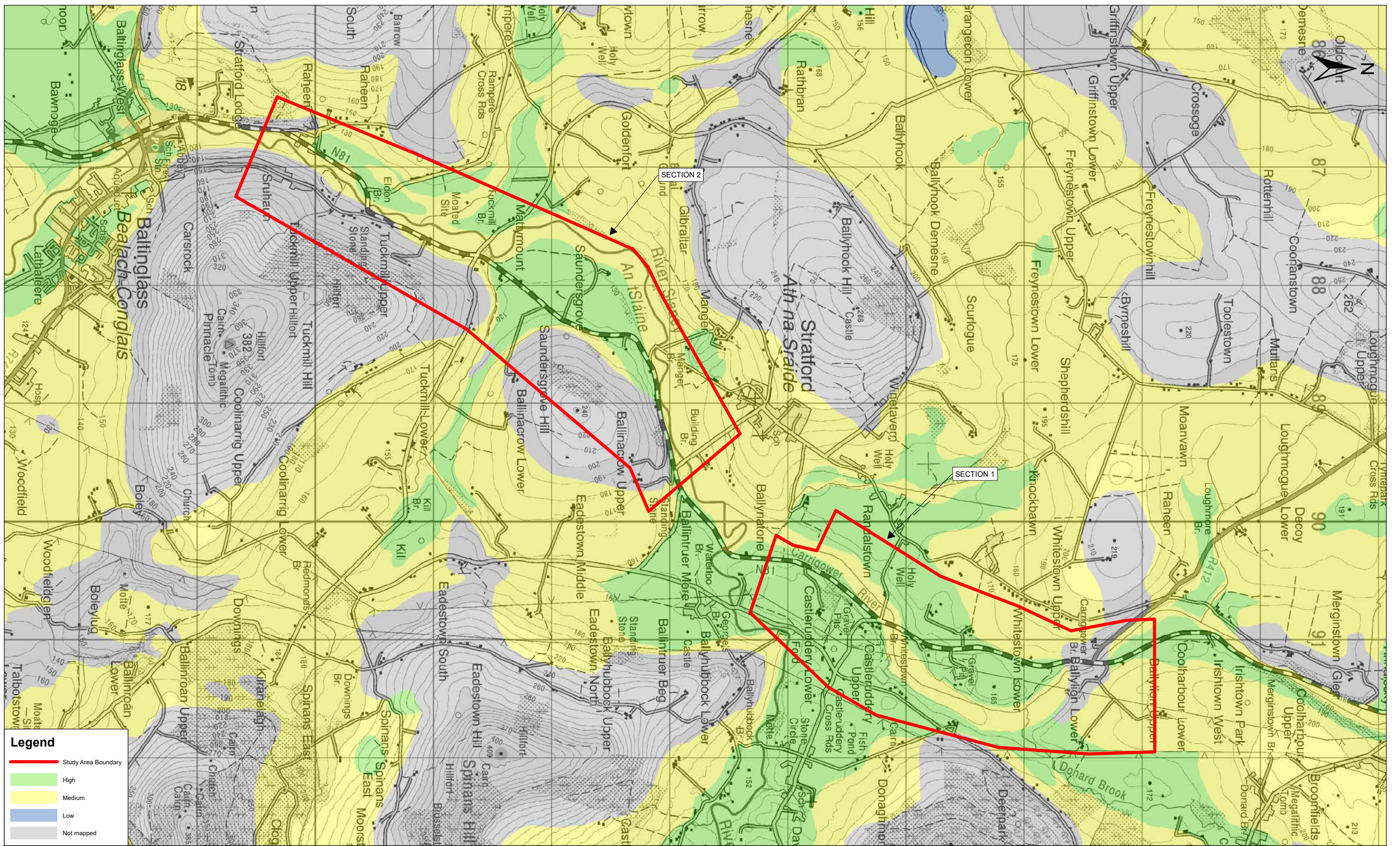
No.	Revision	Date	By	Chk'd	App'd

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AC	AC	CC	RMJ	S0 - Work in Progress

Project Stage	PLANNING												
Project Title	N81 WHITESTOWN LOWER TO TUCKMILL												
Drawing Title	RIVER FLOOD EXTENTS												
Drawing Number	23127	Originator	ROD	Volume	EAC	Location	SW_AE	Type	DR	Role	EN	Number	100011
Scale (A1)	1:15,000	Date	August 2023	Job No.	23.127	Rev.	P0						



**Legend**

- Study Area Boundary
- High
- Medium
- Low
- Not mapped



No.	Revision	Date	By	Chkd	App'd

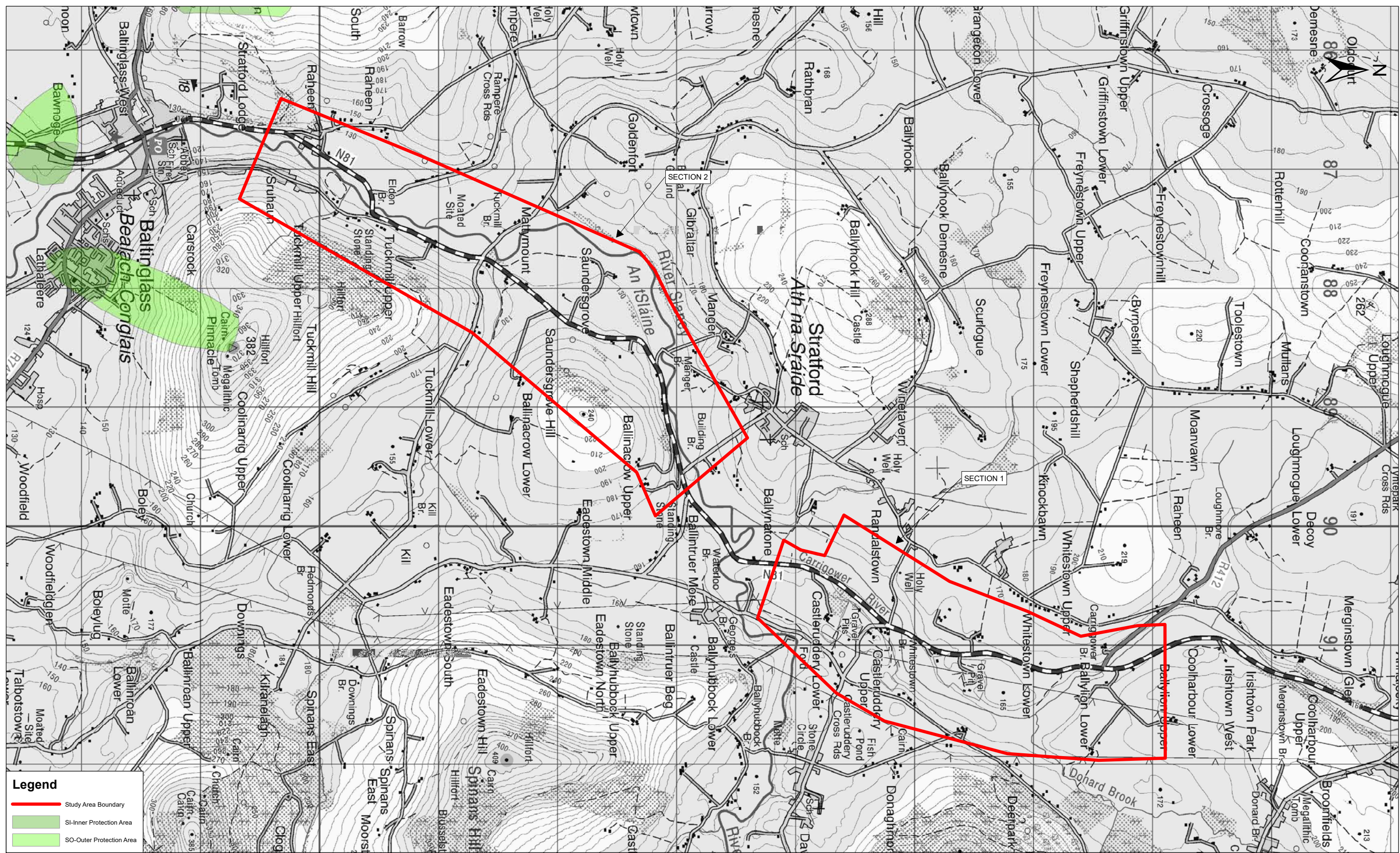


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Drawn	Designed	Checked	Approved	Suitability Code - Description
AC	AC	CC	RMJ	S0 - Work in Progress

Project Stage	PLANNING				
Project Title	N81 WHITESTOWN LOWER TO TUCKMILL				
Drawing Title	SUBSOIL PERMEABILITY				
Drawing Number	23127	ROD	EAC	SW_AE	DR - EN - 100012
Scale (A1)	1:15,000	Date:	August 2023	Job No:	23.127
		Rev:			P0

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**Legend**

- Study Area Boundary
- SI-Inner Protection Area
- SO-Outer Protection Area



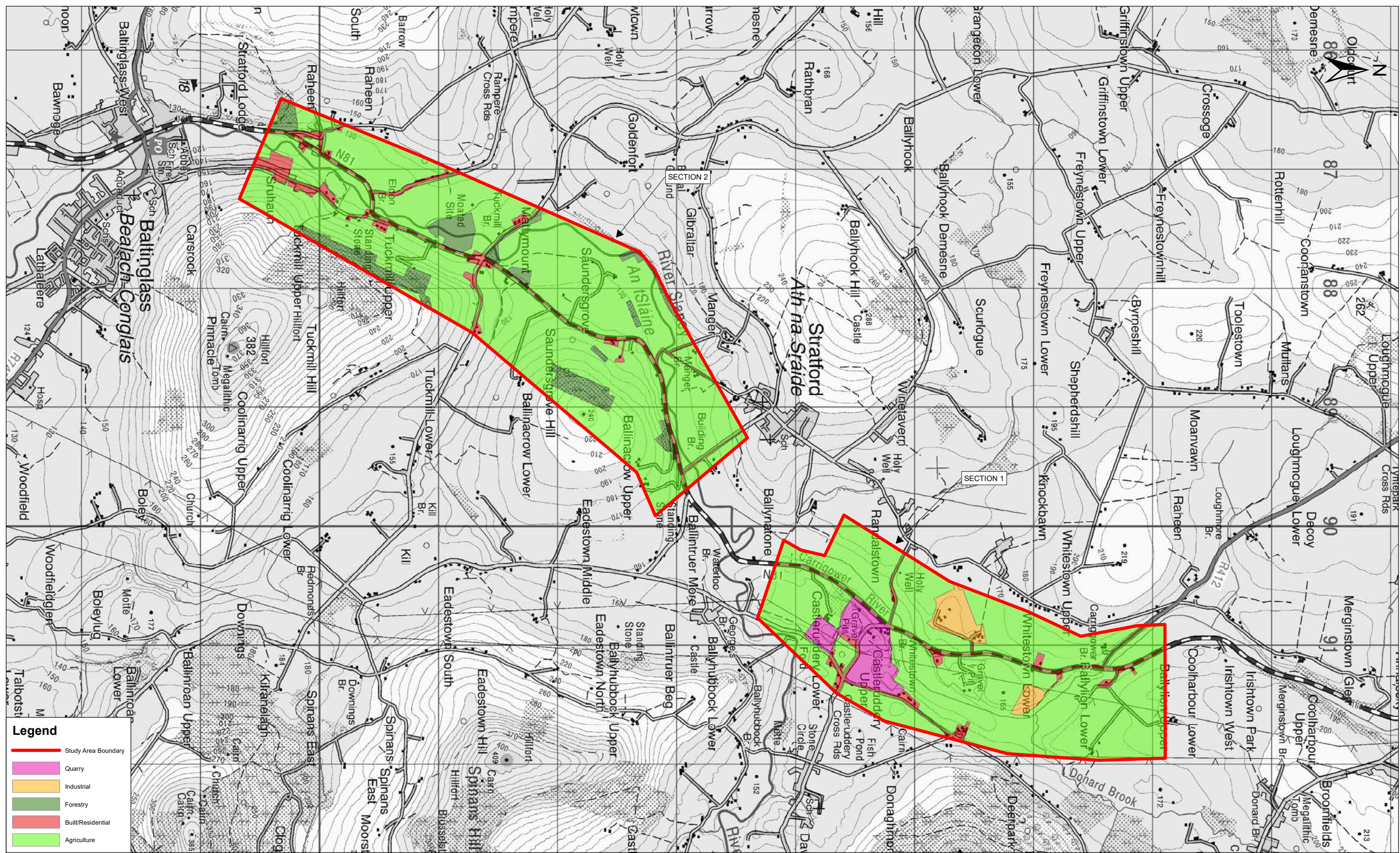
No.	Revision	Date	By	Chk'd	App'd

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Drawn	Designed	Checked	Approved	Suitability Code - Description
AC	AC	CC	RMJ	SO - Work in Progress

Project Stage	PLANNING						
Project Title	N81 WHITESTOWN LOWER TO TUCKMILL						
Drawing Title	SOURCE PROTECTION AREA						
Drawing Number	Project	Originator	Volume	Location	Type	Role	Number
23127	ROD	EAC	SW_AE	DR	EN		100013
Scale (A1)	1:15,000	Date	August 2023	Job No.	23.127	Rev.	P0



**Legend**

- Study Area Boundary
- Quarry
- Industrial
- Forestry
- Built/Residential
- Agriculture



No.	Revision	Date	By	Chk'd	App'd

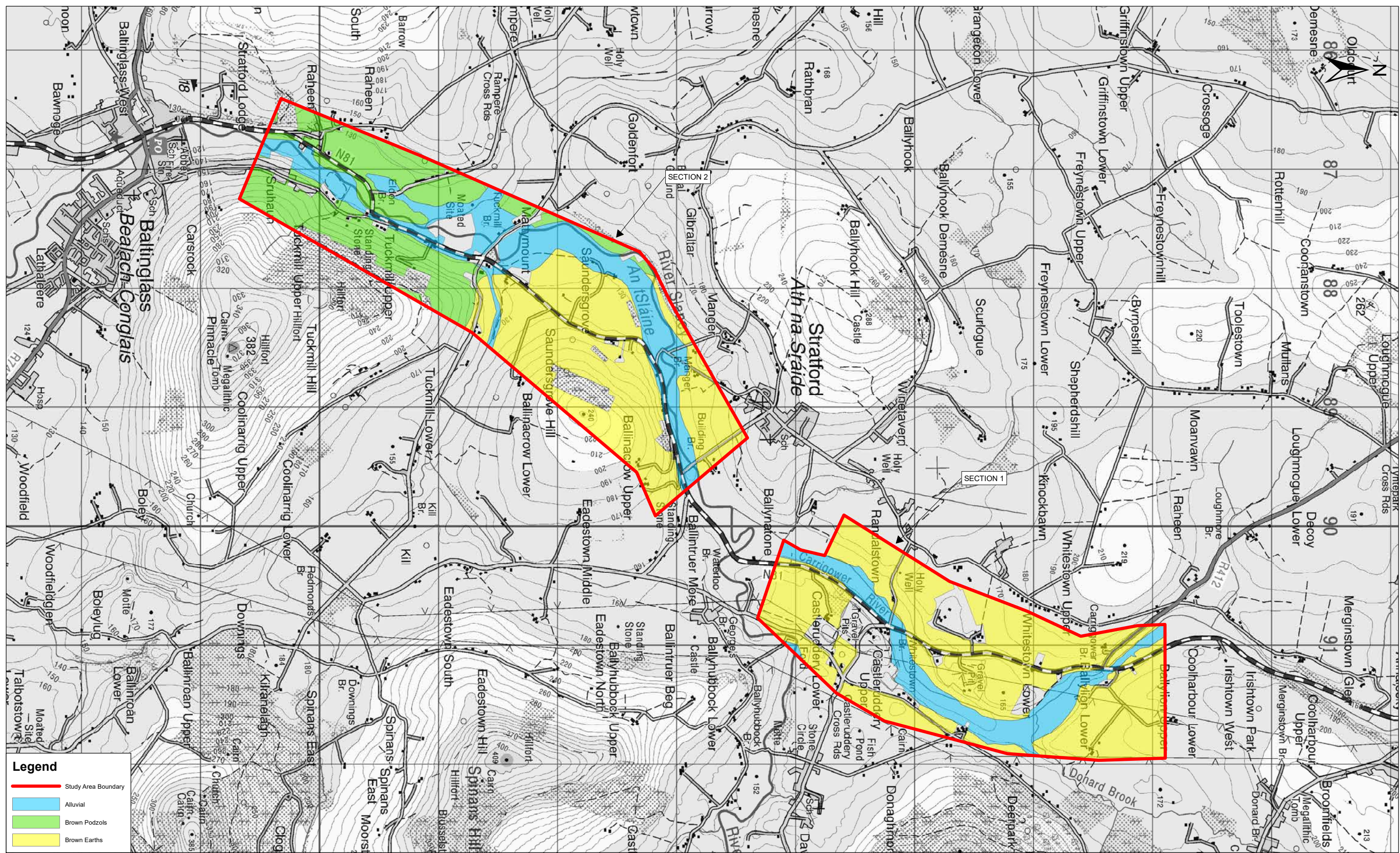


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Drawn	Designed	Checked	Approved	Suitability Code - Description
AC	AC	CC	RMJ	S0 - Work in Progress

Project Stage	PLANNING				
Project Title	N81 WHITESTOWN LOWER TO TUCKMILL				
Drawing Title	LAND USE				
Drawing Number	23127	Originator	ROD	Volume	EAC
Scale (A1)	1:15,000	Date	Sept 2023	Job No.	23.127
Rev.	PO	Type	DR	Role	EN
Number	100014	Location	SW_AE	Number	100014

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**Legend**

- Study Area Boundary
- Alluvial
- Brown Podzols
- Brown Earths



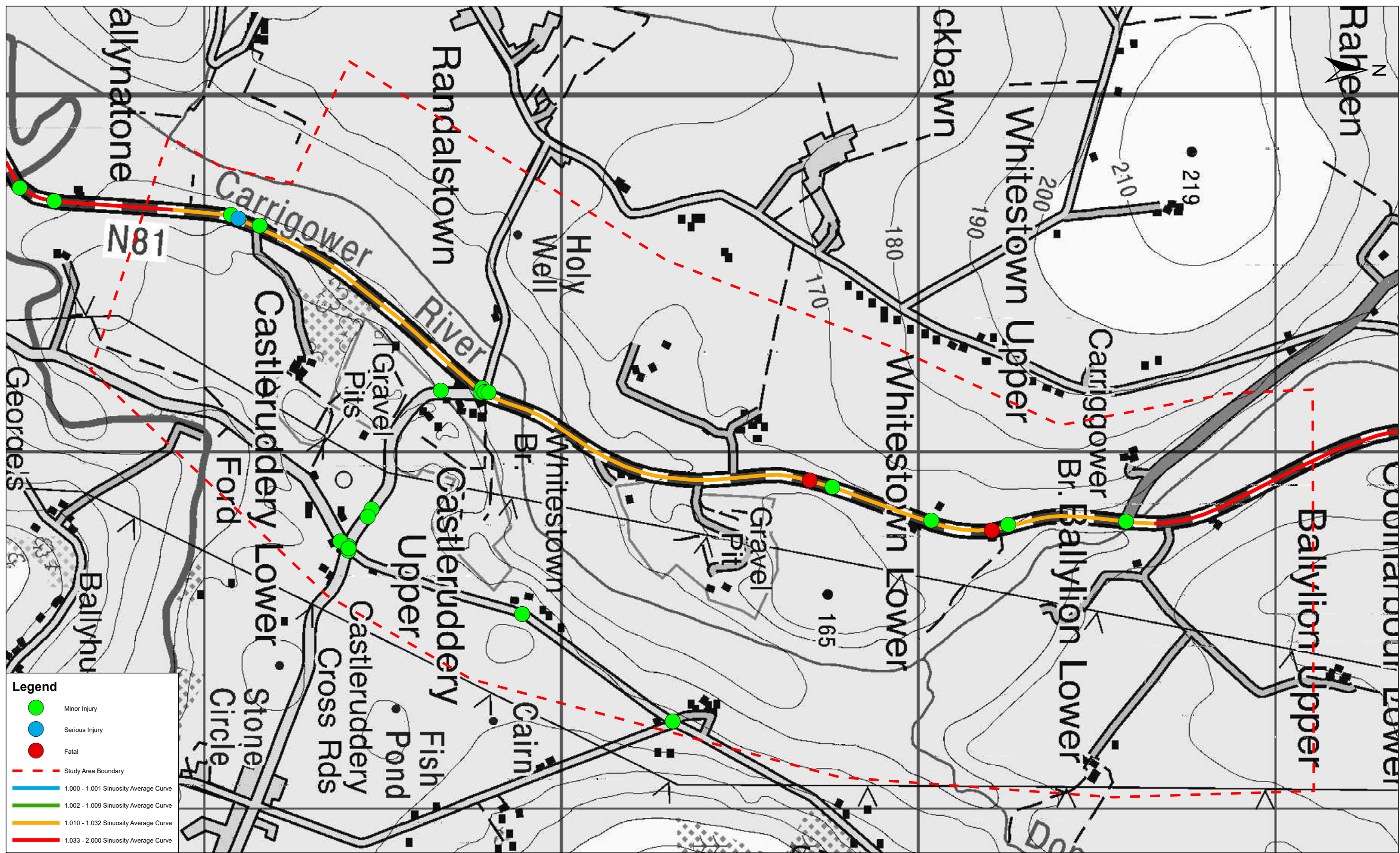
No.	Revision	Date	By	Chk'd	App'd

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AC	AC	CC	RMJ	S0 - Work in Progress

Project Stage	PLANNING						
Project Title	N81 WHITESTOWN LOWER TO TUCKMILL						
Drawing Title	SOIL TYPES						
Drawing Number	Project	Originator	Volume	Location	Type	Role	Number
23127	ROD	EAC	SW_AE	DR	EN		100015
Scale (A1)	1:15,000	Date	Sept 2023	Job No.	23.127	Rev.	P0



**Legend**

- Minor Injury
- Serious Injury
- Fatal
- - - Study Area Boundary
- 1.000 - 1.001 Sinuosity Average Curve
- 1.002 - 1.009 Sinuosity Average Curve
- 1.010 - 1.032 Sinuosity Average Curve
- 1.033 - 2.000 Sinuosity Average Curve



No.	Revision	Date	By	Chk'd	App'd

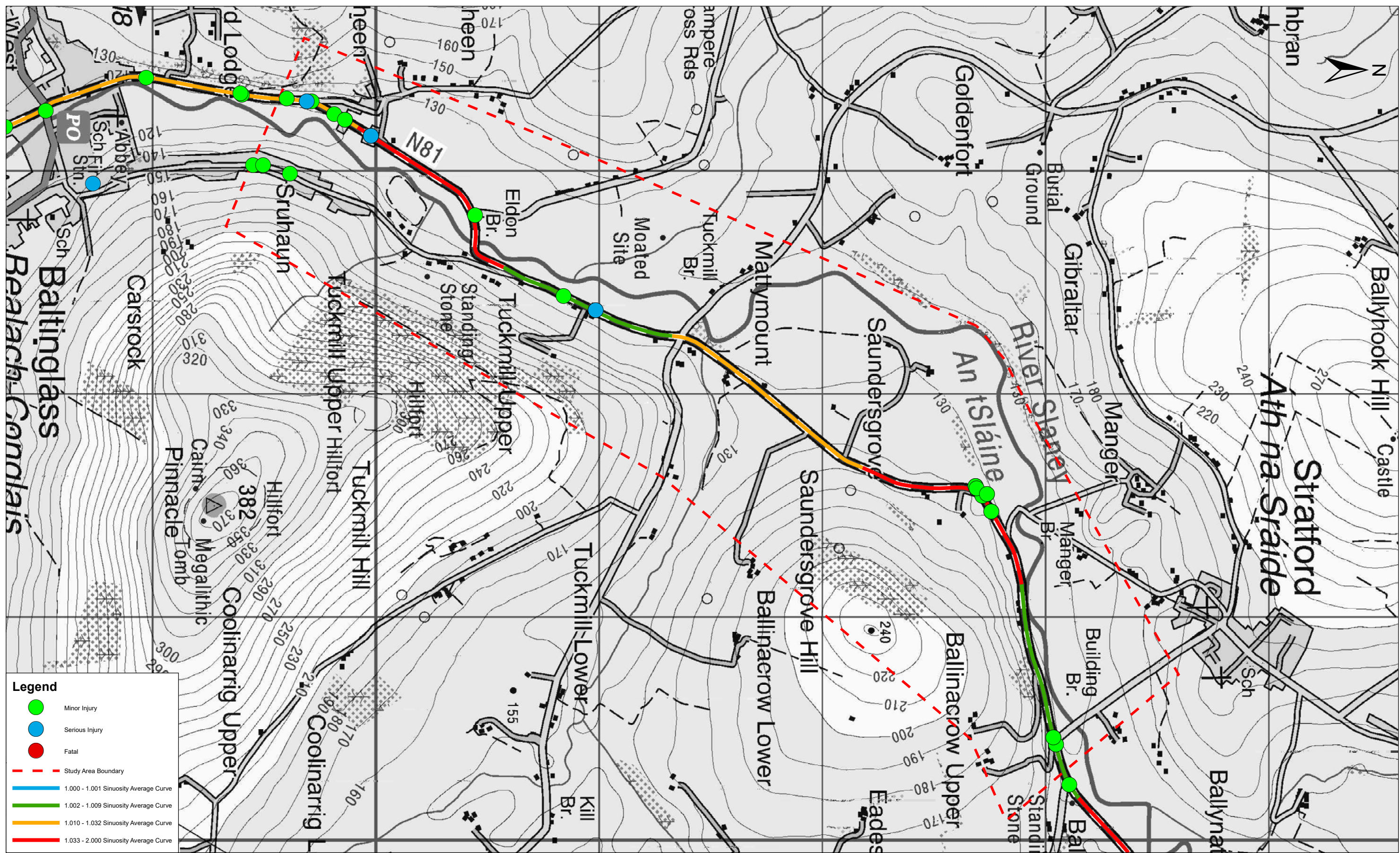


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Drawn	Designed	Checked	Approved	Suitability Code - Description
AC	AC	CC	RMJ	S0 - Work in Progress

Project Stage	PLANNING												
Project Title	N81 WHITESTOWN LOWER TO TUCKMILL												
Drawing Title	COLLISION DATA (2009-2019)												
Drawing Number	23127	Originator	ROD	Volume	VAS	Location	S1_AE	Type	DR	Role	TR	Number	100001
Scale (A1)	1:5,000	Date	Sept 2023	Job No.	23.127	Rev.	P0						





**Legend**

- Minor Injury
- Serious Injury
- Fatal
- - - Study Area Boundary
- 1.000 - 1.001 Sinuosity Average Curve
- 1.002 - 1.009 Sinuosity Average Curve
- 1.010 - 1.032 Sinuosity Average Curve
- 1.033 - 2.000 Sinuosity Average Curve



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Drawn	Designed	Checked	Approved	Suitability Code - Description
AC	AC	CC	RMJ	S0 - Work in Progress

Project Stage: PLANNING					
Project Title: N81 WHITESTOWN LOWER TO TUCKMILL					
Drawing Title: COLLISION DATA (2009-2019)					
Drawing Number	Project	Originator	Volume	Location	Type   Role   Number
23127	ROD	VAS	S2_AE	DR	TR - 100002
Scale (A1)	1:8,000	Date:	Sept 2023	Job No:	23.127
				Rev:	P0

## **APPENDIX B BIODIVERSITY DATA**

**Table 4.1.3 NBDC Records within the study area.**

Common Name	Scientific Name	Status
<b>Amphibians and Reptiles</b>		
Common Frog	<i>Rana temporaria</i>	WA, HD V
Common Lizard	<i>Zootoca vivipara</i>	WA
Smooth Newt	<i>Lissotriton vulgaris</i>	WA
<b>Birds</b>		
Barn Owl	<i>Tyto alba</i>	Red
Barn Swallow	<i>Hirundo rustica</i>	Amber
Cormorant	<i>Phalacrocorax carbo</i>	Amber
Grasshopper Warbler	<i>Locustella naevia</i>	Amber
House Martin	<i>Delichon urbicum</i>	Amber
House Sparrow	<i>Passer domesticus</i>	Amber
Kestrel	<i>Falco tinnunculus</i>	Amber
Lapwing	<i>Vanellus vanellus</i>	Red
Linnet	<i>Carduelis cannabina</i>	Amber
Little Egret	<i>Egretta garzetta</i>	BD I
Merlin	<i>Falco columbarius</i>	BD I, Amber
Peregrine Falcon	<i>Falco peregrinus</i>	BD I
Red Grouse	<i>Lagopus lagopus</i>	Red
Sand Martin	<i>Riparia riparia</i>	Amber
Sky Lark	<i>Alauda arvensis</i>	Amber
Snipe	<i>Gallinago gallinago</i>	Amber
Spotted Flycatcher	<i>Muscicapa striata</i>	Amber
Starling	<i>Sturnus vulgaris</i>	Amber
Swift	<i>Apus apus</i>	Amber
Water Rail	<i>Rallus aquatica</i>	Amber
Wheatear	<i>Oenanthe oenanthe</i>	Amber
Whooper Swan	<i>Cygnus cygnus</i>	BD I, Amber
Woodcock	<i>Scolopax rusticola</i>	Amber
Yellowhammer	<i>Emberiza citrinella</i>	Red
<b>Mammals</b>		
Badger	<i>Meles meles</i>	WA
Brown Long-eared Bat	<i>Plecotus auritus</i>	WA, HD IV
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	WA, HD IV
Daubenton's Bat	<i>Myotis daubentonii</i>	WA, HD IV
Leisler's Bat	<i>Nyctalus leisleri</i>	WA, HD IV
Nathusius's Pipistrelle	<i>Pipistrellus nathusii</i>	WA, HD IV
Natterer's Bat	<i>Myotis nattereri</i>	WA, HD IV
Otter	<i>Lutra lutra</i>	WA, HD II & IV

Common Name	Scientific Name	Status
Pine Marten	<i>Martes martes</i>	WA
Red Squirrel	<i>Sciurus vulgaris</i>	WA
Invertebrates		
Desmoulin's Whorl Snail	<i>Vertigo Moulinsiana</i>	WA, HD II
White-clawed Crayfish	<i>Austropotamobius pallipes</i>	WA, HD II
Marsh Fritillary	<i>Euphydryas aurinia</i>	HD II

Status (listing conferring protection or describing conservation status) abbreviations: Annex II/IV/V (non-avian species) = Habitats Directive (HD); Annex I, II, III = Birds Directive (BD); WA = Wildlife Acts and Red/Amber = Birds of Conservation Concern in Ireland, 2014 to 2019 (BOCCI).