

Leitrim County Council
**N4 Carrick-on-Shannon to
Dromod Project**
Option Selection Report

274219-ARUP-02-OS-RP-YE-000001

P07 | 14 March 2023

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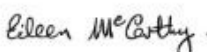
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4 Constraints Study

4.1 Introduction

4.1.1 Overview

A constraints study was undertaken to identify all the key constraints within the study area of the N4 Carrick-on-Shannon to Dromod Project to inform the development of alternatives and options which will provide a transport solution for the section of the N4 under consideration. It should be noted that some of these constraints are geographical, for example a railway line or a river and others are service constraints relating to existing public transport services.

The objective of the constraints study is to identify international, national, county, and local issues that must be considered when planning and designing the project so that the phases which follow (Option Selection Process and Evaluation of Environmental Constraints) can be properly informed.

This constraint chapter has been prepared in accordance with Transport Infrastructure Ireland's (TII) Project Management Guidelines (PMGs) PE-PMG-02041 December 2020¹ and has been compiled based on desk studies, field surveys and consultation with stakeholders. In addition, in compliance with Article 3 of the EIA Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU) as transposed into Irish Legislation S.I. No. 296 of 2018², environmental factors considered in the constraints study include, but are not limited to those listed in S.I. No. 296 of 2018 (i.e. Population and Human Health, Biodiversity, Land, Soil, Water, Air, Climate, Material Assets, Cultural Heritage and Landscape).

In accordance with the TII PMGs¹ the constraints are divided into three principal categories: Artificial Constraints, Natural Constraints and External Parameters. Artificial constraints are those which form part of the built environment and are detailed in Sections 4.2 to 4.10 (inclusive) of this chapter. Natural constraints are those which are naturally occurring landscapes and features and are detailed in Sections 4.11 to 4.15 (inclusive) of this chapter. External parameters include design standards, policies, procedural and legal issues and are detailed in Section 4.16 of this chapter.

4.1.2 Artificial Constraints

Artificial constraints are those which form part of the built environment. These are documented in the following sections:

- Section 4.2 Engineering

¹ Transport Infrastructure Ireland, 2020. Project Management Guidelines PE-PMG-02041. Available at: <https://www.tiipublications.ie/library/PE-PMG-02041-03.pdf>. These guidelines have since been updated in July 2022 and the updates do not affect the content of this report.

² European Union (Planning and Development) (Environmental Impact Assessment) Regulations S.I. No. 296/2018 2018, Dublin, Ireland. Available at: <https://www.irishstatutebook.ie/eli/2018/si/296/made/en/print>

- Section 4.3 Land Use and Planning
- Section 4.4 Population
- Section 4.5 Material Assets – Non-Agriculture
- Section 4.6 Material Assets – Agriculture
- Section 4.7 Air Quality
- Section 4.8 Climate
- Section 4.9 Noise and Vibration
- Section 4.10 Archaeological Architectural and Cultural Heritage

4.1.3 Natural Constraints

Natural constraints are those which are naturally occurring landscapes and features. These have been documented in the following sections:

- Section 4.11 Landscape and Visual
- Section 4.12 Biodiversity
- Section 4.13 Hydrology
- Section 4.14 Hydrogeology
- Section 4.15 Soils and Geology

4.1.4 External Parameters

External Parameters are those constraints which do not fall under the headings of Natural or Artificial Constraints. The external parameters which may influence the Project are detailed in the following sections:

- Section 4.16.2 Funding and Scope
- Section 4.16.3 Construction Phasing
- Section 4.16.4 Key Performance Indicators
- Section 4.16.5 Technical Standards
- Section 4.16.5.5 Access Control
- Section 4.16.6 Policy Documents
- Section 4.16.7 Procedural and Legal Requirements

4.1.5 Definition of the Study Area

4.1.5.1 Identification of the Study Area

The study area is a boundary within which key project constraints are identified and appropriate options and alternatives are examined and developed.

The definition of the study area was influenced by many factors, which include:

- topography within the area
- existing N4 corridor tie-in locations and safety considerations when determining same
- the locations of the River Shannon and Eidin Lake
- environmental criteria
- extent and catchment of public transport infrastructure
- potential zone of influence of alternatives and options

4.1.5.2 Description of the Study Area

The study area developed for the N4 Carrick-on-Shannon to Dromod Project is illustrated in Figure 4.1.1.1. The study area extends from the townland of Eidin in the northwest to the townland of Faulties in the southeast. The study area comprises an area of approximately 78.2km² and is 7.7km wide (at its widest point) and 18.3km long.

The study area boundary was developed with a view to ensuring a suitably sized and structured study area to allow full and extensive studies. These studies include the identification of key constraints to the project and the subsequent development of feasible alternatives and options for the creation of a transportation solution. The study area encompasses the extents of former design developments identified in previous studies, while also allowing for the development of additional options. It also fully includes the portion of the existing N4 under consideration and the extents of the towns and villages along the route.

4.1.6 Non-Statutory Public Consultation No. 1 on Constraints

Public participation is an important part of the development of a project and in particular during the early phases of a project. Public Consultation No. 1 helped identify additional key constraints and provided insight to the transport and safety issues experienced by the public using the section of the N4 within the study area.

Although an in-person consultation could not take place due to Government restrictions with respect to Covid-19, the consultation was conducted using an on-line virtual consultation space which allowed the public view the project material as if they were at an in-person event. Comment sheets were accepted by post, by email or via the public engagement feedback page on the project website.

The public consultation virtual room was live on the project website for two weeks between 5 October 2020 and 23 October 2020. A copy of the brochure and feedback form was posted to anyone who requested a hard copy.

A total of 42 submissions were received during the public consultation.

A response was provided to each submission in the same manner as received e.g. an emailed submission was provided with an email response; a letter was responded to in letter form etc.

A thematic analysis identified the following main feedback topics:

- Request to know where the planned road is going, worry that the project website isn't properly showing the location of the 'new road', and objection to the location of the new road even though there was no proposed road among the information presented
- Identification of a proposed Blueway that is currently at planning stage and objections to any interference with this
- Concerns that a road would have a negative effect on tourism, amenity and businesses in the area
- Conversely there was also much support for the project on the basis that it would be good for tourism and businesses in the area
- Criticism of the existing N4 Dromod Roosky Bypass road design for the following reasons:
 - The previous N4 improvements infringed on homeowners' properties
 - Stopping places and/or hard shoulder are required along any proposed road whilst also noting that the cross-section of the existing N4 Dromod Roosky Bypass is deficient due to the lack of same
 - Land plots/farms were severed and separated
- Noting that the 'Problem' is in Carrick-on-Shannon not in the rural areas at Dromod so any road should be near Carrick-on-Shannon, and that a single carriageway is sufficient in rural areas
- Support for the project and for the development of pedestrian and cycling infrastructure which needs to be considered as part of the project
- Concerns regarding flooding and a road interfering with the River Shannon flood plain and navigation abilities
- Concern regarding operational stage health and safety risks associated with a road being constructed near their home
- Concerns that there would be reduced response times for emergency services to individual homes with a dual carriageway design
- Concerns that the junction on the N4 beside Masonite is dangerous and requesting that this be rectified under the current project
- Offering of general support for the project, welcoming the removal of bottlenecks and positivity expressed that the project is going ahead after the previous project ceased

Other comments received to a lesser extent included:

- Highlighting the ancient Abbey of Annaduff
- Farmers requesting that their lands also be classed as 'high sensitivity'
- Objections to any proposal to quarry stone in the townland of Fearnaght

Full details of this consultation and submissions received from the public are included in Appendix A.4.1.1 Report on Public Consultation No. 1 – Constraints.

4.2 Engineering

4.2.1 Introduction

This section describes the engineering constraints identified within the study area for the N4 Carrick-on-Shannon to Dromod Project and should be read in conjunction with Figures 4.2.1.0 to 4.2.1.5.

Section 4.2.2 describes the methodologies and sources of information that were used to carry out the study. Section 4.2.3 describes the engineering constraints within the study area. A summary is presented in Section 4.2.4.

The objective of this engineering constraints study is to identify all the engineering constraints within the study area in order to inform the development of alternatives and options. The existing environment has been analysed under the headings of topography and landscape, rivers, existing road network, road safety characteristics of the existing road network, traffic, other transport modes, quarries and other amenities.

4.2.2 Methodology and Sources of Information

Research for this constraints study was undertaken as a desktop exercise. The following information sources were consulted to identify engineering constraints to the project:

- Bus Éireann
- Environmental Protection Agency (EPA)
- Geological Survey of Ireland (GSI)
- Iarnród Éireann
- Ordnance Survey Ireland (OSI)
- Road Safety Authority (RSA)
- Transport for Ireland (TFI)
- Westlink Coaches
- Information provided by Leitrim County Council on surveys to inform a previous road scheme through the study area in the early 2010s

4.2.3 Existing Environment

This section describes the engineering constraints within the study area. These constraints comprise the natural features (topography, landscape and rivers) and the main infrastructure (roads, railways and public transport) within the study area, and the road safety characteristics of the existing road network are addressed. Quarries are also identified as constraints in this section. Major utility constraints such as gas, water, electricity and telecommunications are detailed in Section 4.5 Material Assets Non-Agriculture and proposed developments are detailed in Section 4.3 Land Use and Planning.

4.2.3.1 Topography and Landscape

The study area incorporates the boundary of two counties namely, County Roscommon to the west and County Leitrim to the east. The River Shannon forms the boundary between the two counties.

The topography within the study area generally comprises undulating hills either side of the River Shannon. Elevations range from 40mOD along the banks of the river to peaks of over 90mOD in the townlands of Screeg to the west and Clogher to the east. Peaks of 80mOD to 90mOD are common throughout the study area³.

There are extensive floodplains in the low-lying ground either side of the River Shannon. As a result of this, there is risk of significant seasonal flooding within the study area.

Land use within the study area is typically agricultural, aside from the urban and residential areas of Carrick-on-Shannon, Cortober, Drumsna and Jamestown and Aghamore. There are some areas of forestry within the study area; the most extensive of which are located in the townlands of Mountcampbell and Charlestown.

4.2.3.2 Rivers

The River Shannon is the most notable river within the study area. The River Shannon is Ireland's longest river, flowing from the Shannon Pot, County Cavan to the Shannon Estuary, at the border of Counties Clare and Kerry. The river meanders through the study area from north to south. The primary river crossing, on the existing N4, is by the River Shannon bridge in Carrick-on-Shannon/Cortober. In the townland of Cloonavery, on the L3656 there are also two local road crossings of the River Shannon where it forms a horseshoe bend between Jamestown and Drumsna.

The study area lies between the major lakes of Lough Allen and Lough Ree on the River Shannon. There are two smaller lakes, Lough Corry and Lough Tap, along the river within the study area. Lough Key and Lough Eidin are upstream of the study area along the Boyle River.

There are a number of other smaller watercourses within the study area including the Killukin River, Jamestown Canal and numerous tributaries and streams either side of the River Shannon.

4.2.3.3 Existing Road Network

The existing road network within the study area comprises national, regional and local roads. This network provides connectivity among nearby towns and villages, as well as a strategic corridor from Dublin to the northwest of Ireland and the border counties.

³ Environmental Protection Agency, 2019. EPA Contours. Available at:
<https://dcenr.maps.arcgis.com/home/item.html?id=088740d9f8ad466788fc25e268394656>

National Road Network

The N4 is the only national road within the study area, running approximately 20km through the full length of the project, from Drumharlow to Faulties. This national primary road is a strategic corridor from Dublin to the northwest and border counties and is approximately 198km in length in total. The section of the N4 within the study area passes through both rural and urban environments, crossing the River Shannon and the Roscommon - Leitrim border at the River Shannon Bridge in Carrick-on-Shannon/Cortober. This river crossing is a narrow masonry arch bridge, dating from 1846, which is sub-standard in terms of alignment and cross-section. The need for all traffic to cross the River Shannon via a single bridge combined with a narrow carriageway, frequency of sharp bends and associated junctions continues to result in significant traffic congestion, especially during peak periods. Convergence of national, regional and local traffic in the town causes considerable congestion in the town centre and delays to through traffic.

There are 197 direct accesses onto the existing N4 throughout the study area, along with 52 junctions. The portion of the existing N4 within the study area is composed of single carriageway, apart from the southernmost 500m which is dual carriageway; forming part of the existing Dromod - Roosky bypass. Further detail of the current N4 is available from the Existing Road Condition Assessment (See Appendix A.6.4.1 – the Existing Road Condition Assessment is an Appendix to the Stage 1 Road Safety Impact Assessment (RSIA))

Regional Road Network

There are six regional roads contained within the study area which provide regional connections to the towns of Frenchpark, Elphin, Leitrim Village and Manorhamilton. These include the R280, the R370, the R368, the R903, the R299 and the R201; all of which connect directly to the N4 apart from the R370, which connects to the R368, within the study area. Each of the regional roads are composed of single carriageway.

The R280, Carrick-on-Shannon to Leitrim Village, enters the study area from the northern side of the project and runs southwest towards Carrick-on-Shannon, terminating at a roundabout junction with the N4. The entire 74km of the R280 typically runs in a north south direction between Carrick-on-Shannon and Bundoran County Donegal. The R280 also connects to the R207 to Drumshanbo.

The R370, Frenchpark to Carrick-on-Shannon, is approximately 21km long and enters the study area from the west. The R370 connects the R368 in Cortober, next to Carrick-on-Shannon Railway Station, with the R361 in Frenchpark, where traffic may join the N5. The R370 also crosses the N61, Athlone to Boyle road, at Ratallen.

The R368, Elphin to Carrick-on-Shannon, also enters the study area from the west and runs northeast towards Carrick-on-Shannon. The R368 runs under the railway line by the junction with the R370 and terminates at a roundabout junction with the N4 in Cortober. The R368 originates in Four Mile House, County Roscommon, on the N61, passes through the towns of Strokestown and Elphin en-route to Carrick-on-Shannon, and is approximately 36km long.

The R903 consists of Bridge Street and Main Street within Carrick-on-Shannon. This regional road runs from the roundabout east of River Shannon Bridge, to the R280 on the north side of the town.

The R299, Drumsna to Grange, crosses in and out of the study area along the northeast boundary. This regional road provides connection between the R280 and the N4. The R299 joins the N4 by the Drumsna grade separated junction and is approximately 7km in length.

The R201, Mohill to Annaduff, enters the study area from the east and runs for approximately 1.5km before connecting with the N4 in Annaduff. The R201 extends from Annaduff to the townland of Lisnamaine, County Cavan, where it connects with the N87 and is 50km long.

Local Road Network

There is an extensive local road network present within the study area. The rural roads are of varying quality and contain few dedicated facilities for pedestrians and other vulnerable road users apart from through villages and towns. Closer to Carrick-on-Shannon and Cortober the area becomes suburban and urban and comprises several residential, commercial and industrial estates.

The only crossings of the River Shannon by the local road network are 1.5km apart in the townland of Cloonavery on the L3656 to the west of Drumsna. These crossings traverse a horseshoe bend of the river.

4.2.3.4 Road Safety Characteristics of Existing Road Network

Current and future traffic volumes

A full transport modelling study of the study area has been carried out, refer to Chapter 3 for more details of the traffic constraints.

Collision data

Collision data for the study area was obtained from the RSA records. Table 4.2.1 presents the number of recorded fatal, serious and minor injuries resulting from collisions within the study area for the period between 1996 and 2016.

Accidents were recorded across the road network; on the national, regional and local roads. Fatalities and injuries were sustained by drivers, passengers, pedestrians and other road users.

Table 4.2.1 Collision Data within the Study Area

Year	Fatalities	Serious Injuries	Minor Injuries	Injury (Unknown Severity)
1996	0	0	3	0
1997	0	1	13	1
1998	2	0	12	0
1999	1	2	20	1
2000	0	2	11	0
2001	0	4	9	1
2002	0	2	23	0
2003	1	1	10	0
2004	0	0	8	0

Year	Fatalities	Serious Injuries	Minor Injuries	Injury (Unknown Severity)
2005	2	1	15	3
2006	0	2	0	0
2007	3	2	6	2
2008	0	1	6	0
2009	0	0	15	0
2010	0	0	9	0
2011	0	0	20	0
2012	0	1	22	0
2013	0	0	8	0
2014	0	2	11	0
2015	0	0	21	0
2016	0	0	19	0
Total	9	21	261	8

From 1996 and 2016 inclusive, nine fatalities were recorded as a result of road traffic accidents within the study area. During the same period 21 serious and 261 minor injuries were also recorded. A further eight injuries were sustained; however, the severity of these injuries is unknown.

4.2.3.5 Other Transport Modes

Rail

Carrick-on-Shannon Railway Station is located in the village of Cortober and opened on 3 December 1862⁴. The station is situated with Boyle Railway Station to the west and Dromod Railway Station to the east on the Dublin to Sligo railway line. The station serves the Dublin, Connolly to Sligo route. Iarnród Éireann provide services seven to eight times per day in both directions⁵.

The railway line enters the study area from the west and runs on the south side of the River Shannon before crossing the river from the townland of Moyglass to Derrylaur, just north of Lough Tap. The railway line crosses the existing road network ten times within the study area; by way of at-grade junction, underbridges and overbridges.

⁴ Ayres, B. Irish railways. Available at: https://www.railscot.co.uk/Ireland/Irish_railways.pdf.

⁵ Iarnród Éireann, 2022. Dublin Sligo Timetable. Available at: https://www.irishrail.ie/Admin/IrishRail/media/Timetable-PDF-s/Connolly-DART-timetables/07_dublin_sligo.pdf

Road based public transport

Bus Éireann⁶, TFI Local Link⁷ and Westlink Coaches⁸ operate several national and local bus services within the study area. These services are listed in Table 4.2.2.

Table 4.2.2 Bus Services within the Study Area

Provider	Route No.	Route
Bus Éireann	23	Dublin Airport to Sligo
Bus Éireann	468	Strokestown - Elphin - Carrick-on-Shannon
Bus Éireann	469	Drumkeeran - Drumshanbo - Carrick-on-Shannon - Longford
Local Link	564	Ballinamore - Mohill – Carrick-on-Shannon
Local Link	568	Carrick-on-Shannon to Arigna
Local Link	N/A	Carrick-on-Shannon to Manorhamilton
Westlink Coaches	N/A	Ballinamore to Athlone
Westlink Coaches	N/A	Ballinamore to Claregalway
Westlink Coaches	N/A	GMIT to Sligo
Westlink Coaches	N/A	Drumshanbo to Collooney

Many of these services do not operate multiple times per day, nor do they operate daily. For example, Bus Éireann's route 469 operates one service on a Saturday morning only. TFI Local Link's route, Carrick-on-Shannon to Manorhamilton, is limited to one service per day on Tuesdays, Thursdays and Saturdays only, while most of Westlink Coaches services operate only at weekends and on Bank Holiday Mondays. Bus Éireann's route 23 operates frequently and daily, with five services per day. This Bus Éireann route is the main link between the northwest counties and Dublin Airport.

There are three taxi companies located within the study area; all based in Carrick-on-Shannon. There are a number of other taxi companies based in nearby towns which likely travel within the study area also.

Greenways and Walking Routes

There are no dedicated greenways within the study area however, there are some recognised walking routes, namely the Anthony Trollope Trail and a signposted route through Carrick-on-Shannon town and the Riverfront Amenity Park. Although the route through the town is serviced with footpaths, such pedestrian facilities on the Anthony Trollope Trail can only be found in Drumsna Village. There is a further walking route in Derrycarne Wood known as the Lough Boderg Trail just outside the study area to the west of Faulties.

⁶ Bus Éireann, 2020. View Timetables. Available at: <https://www.buseireann.ie/>.

⁷ TFI Local Link. 2020. Sligo/Leitrim/Roscommon. Available at: <https://ua.locallink.ie/en/your-local-link/sligoleitrimroscommon/>.

⁸ Westlink Coaches, 2020. Timetables. Available at: <http://www.westlinkcoaches.ie/timetables.html>.

4.2.3.6 Quarries

Although there are no active quarries within the study area⁹, two quarries have been active in recent times but have not been endorsed by the local County Council. The first is Finnalaghta Quarry, a registered sandstone quarry, which the local authority has taken action against in the High Court to have it discontinued due to intensified quarrying in this location. The second, Kiltycarney Quarry, was authorised for activity during the construction of the Drumsna Bypass. It was a condition of the permission that the quarry be rehabilitated within six months of completion of the project. This did not occur and therefore this quarry is unauthorised however at present it is not active¹⁰.

There are 38 historical pits and quarries within the study area according to GSI records¹¹. See Sections 4.15.3.12 and 4.15.3.18 of the Soils and Geology section for more information on historic and active quarries respectively.

4.2.4 Summary

The purpose of this section is to provide analysis of the engineering constraints located within the study area in order to inform the development of alternatives and options for the project.

The engineering constraints within the study area include the undulating topography, the River Shannon and its associated floodplains. The primary infrastructural constraints comprise the existing road network, in particular the existing River Shannon Bridge itself, and the Dublin to Sligo railway line. The urban (commercial, industrial, retail, amenity etc.) and residential areas of Carrick-on-Shannon, Cortober, Drumsna and Jamestown and Aghamore also pose as major constraints. Other constraints in the built environment consist of disused quarries.

The River Shannon and its associated floodplains create significant risk of seasonal flooding. Careful consideration of this issue in association with any works or proposals is required, especially in the event of a new river crossing being introduced.

There is an extensive road network within the study area. The frequency of direct accesses and junctions, particularly onto the existing N4, must be observed as a constraint if any on-line upgrades are to be considered. The Dublin to Sligo railway line also provides an infrastructural constraint to the south of the study area.

There are also numerous historical pits and quarries throughout the study area, which may cause challenges for the development of alternatives and options within the project.

⁹ Geological Survey Ireland, 2020. Active Quarries and Pits Ireland. Available at: <https://dcenr.maps.arcgis.com/home/item.html?id=de18ea08ecd344b88c52b65b55fd9abb>

¹⁰ Roughan & O'Donovan Consulting Engineers, 2010. N4 Carrick-on-Shannon to Dromod Road Project - Constraints Study Report. Volume: 1

¹¹ Geological Survey Ireland, 2019. APM Pits and Quarries. Available at: <https://dcenr.maps.arcgis.com/home/item.html?id=a205a046a2474e82944f9823b6568ea0>

4.3 Land Use and Planning

4.3.1 Introduction

This section describes the land use and planning constraints identified within the study area for the N4 Carrick-on-Shannon to Dromod Project and should be read in conjunction with Figures 4.3.1.0 to 4.3.2.5.

The land use and planning constraints described in this section relate to planning designations (zonings associated with the development plans and granted planning permissions) identified within the study area. Existing land use in terms of material assets non-agriculture constraints are described in Section 4.5 and material assets agriculture constraints are described in Section 4.6.

Section 4.3.2 describes the methodologies and sources of information that were used to carry out the study. Section 4.3.3 describes the existing environment in terms of the land use and planning constraints within the study area which will help identify any county and local planning policy issues and pending or awarded planning decisions which may influence the development of alternatives and options. A summary is presented in Section 4.3.4.

4.3.2 Methodology and Sources of Information

The methodology for identifying existing land use and planning constraints involved a desk study of the relevant County Development Plans (CDPs) maps, Local Area Plans (LAPs) maps, Google Maps and MyPlan.ie maps to ascertain the existing land uses and potential future uses within the study area.

The following sources of information were utilised in the preparation of this study:

- Regional Spatial and Economic Strategy for the Northern and Western Region, 2020¹²
- Leitrim County Council Development Plan 2015-2021¹³
- Roscommon County Council Development Plan 2014-2020¹⁴
- Carrick-on-Shannon Local Area Plan, 2010¹⁵

¹² The Northern and Western Regional Assembly, 2020. Regional Spatial and Economic Strategy 2020-2032 (RSES). Available at: <https://www.nwra.ie/rses/>

¹³ Leitrim County Council, 2015. Leitrim County Development Plan 2015-2021. Available at: http://www.leitrimcoco.ie/eng/Services_A-Z/Planning-and-Development/Development-Plans/County-Development-Plan/County_Development_Plan_2015-2021/

¹⁴ Roscommon County Council, 2014. Roscommon County Development Plan 2014-2020. Available at: http://www.roscommoncoco.ie/en/Services/Planning/Roscommon-County-Council-Planning-Publications/Roscommon-County-Council-Planning-Publications/County_Development_Plan_2014_-_2020/County-Development-Plan-2014-2020/

¹⁵ Leitrim Council, 2018. Carrick-on-Shannon Local Area Plan 2010-2019. Available from http://www.leitrimcoco.ie/eng/Services_A-Z/Planning-and-Development/Development-Plans/Local-Area-Plan/Amendment-2-Carrick-on-Shannon-2010-2019/

- Cortober Area Plan, 2014¹⁶
- Draft Leitrim County Development Plan 2023-2029¹⁷
- Roscommon County Development Plan, 2022-2028¹⁸
- Leitrim County Council Website www.leitrimcoco.ie
- Roscommon County Council Website www.roscommoncoco.ie
- Central Statistics Office Website www.cso.ie

In addition, a review of planning applications lodged within the study area was carried out. This included new planning applications, as well as those granted within the past ten years, having regard to the five-year validity of planning applications with the exception of those given permission for a longer timeframe.

4.3.3 Existing Environment

4.3.3.1 Land Use and Planning

The primary land use within the study area is agricultural, with farming and the agri-food industry important elements of the local economy. Descriptions of material assets in terms of non-agriculture and agriculture are presented in Sections 4.5 and 4.6 respectively and not repeated in this section.

The River Shannon and its associated loughs also form part of the study area and large areas adjoining these water bodies are identified as flood risk zones. This is detailed further in Section 4.13 Hydrology.

These areas also have strong amenity value to the study area and significant parts along the river are identified as being of High Visual Amenity value in the Leitrim County Development Plan 2015-2021. This is detailed further in Section 4.11 Landscape and Visual.

There are a number of settlements within the study area. These include Carrick-on-Shannon, Cortober, Aghamore, Drumsna and Jamestown. These settlements are the focus for the majority of residential populations within the study area as well as local businesses and public, community, sporting and educational facilities. All will have to be considered as well as any new facilities proposed. A detailed review of the land use zonings related with these settlements is presented below.

¹⁶ Roscommon County Council, 2014. Cortober Area Plan 2014-2020. Available at: http://www.roscommoncoco.ie/en/Services/Planning/Roscommon-County-Council-Planning-Publications/Roscommon-County-Council-Planning-Publications/County_Development_Plan_2014_-_2020/County-Development-Plan-2014-2020/2-Cortober-Area-Plan.pdf

¹⁷ Leitrim County Council, 2022. Draft Leitrim County Development Plan 2023-2029. Available at: https://www.leitrimcoco.ie/eng/Services_A-Z/Planning-and-Development/Development-Plans/Leitrim-County-Development-Plan-2023-%E2%80%93-2029/Stage-3-%E2%80%93-Publication-of-Draft-Leitrim-County-Development-Plan-2023-2029.html This plan was adopted on 7 February 2023 and will become effective on 21 March 2023

¹⁸ Roscommon County Council, 2022. Roscommon County Development Plan, 2022-2028. Available at: <https://www.rosdevplan.ie/roscommon-county-development-plan-2022-2028/>

In addition, the study area exhibits dispersed one-off rural dwellings in the open countryside and a number of small development clusters, often in the form of ribbon development along existing public roads, including the existing N4.

There are a number of protected structures and other heritage listed buildings within the study area, mainly concentrated within the urban settlements. These are further detailed in Section 4.10.

Settlement Zoning

The study area encompasses lands which fall within the administrative jurisdiction of both Leitrim County Council and Roscommon County Council. As such, the current Leitrim County Development Plan 2015-2021¹³ and the Roscommon County Development Plan 2022-2028¹⁸ in conjunction with both the Carrick-on-Shannon Local Area Plan, 2010**Error! Bookmark not defined.** and the Cortober Area Plan 2014-2020¹⁶ were examined to inform this study.

A review was also undertaken of the recently published Draft Leitrim County Development Plan. The provisions of this Plan will not take effect until it becomes effective.

It should be noted that the Roscommon County Development Plan does not prescribe zoning objectives for lands within the study area.

The overall strategic aim of all these plans is to promote the sustainable development of their relevant counties and the settlements within same whilst protecting natural and environmental assets through a series of broad planning policies.

The plans promote development which reinforces and promotes development within existing towns and villages within the counties of Leitrim and Roscommon.

The main towns, villages and other urban settlements zoned within the study area include Carrick-on-Shannon, Cortober, Drumsna and Jamestown.

These settlements are zoned within the relevant County Development Plan or Local Area Plan, with development boundaries established for each. Within these development boundaries a series of land use zoning objectives are set out to regulate the development of lands.

The alternatives and options developed will endeavour not to impact these development boundaries and where feasible, take cognisance of the zoning strategies contained therein.

The land use zoning objectives for each settlement are shown in Figures 4.3.1.0 to 4.3.1.5.

The detail and nature of each of these land use zoning objectives is set out in the following sections.

Leitrim County Development Plan 2015

The Leitrim County Development Plan 2015-2021 is the current Development Plan for County Leitrim. The following land use zoning objectives apply in the settlements of Jamestown and Drumsna.

General Development

This designation relates primarily to Tier 4 Centres in the county and includes residential, commercial activity and enterprise and employment uses.

In determining the suitability of alternatives and options within this zone, regard is given to the environmental impact of any alternatives and options on neighbouring uses.

The following objective applies to these zones:

- **Objective 11** To seek the development of lands zoned ‘General Development’ for a suitable mix and pattern of development types.

Social & Community

This zone generally caters for community buildings, schools, hospitals and health centres, football pitches and other generic or specific social and community uses.

The following objective applies to these zones:

- **Objective 10** To seek the development of lands zoned ‘Social and Community’ for amenity, recreational, educational and health uses.

Open Space & Amenity

This zone generally comprises open space, public walkways and public recreational areas. Table 10.1 of the Development Plan sets out the Plan’s Land Use Zoning Matrix which establishes which uses are permitted within this zone.

Tourism Related Development

This zone generally provides for developments that are linked to tourism including guesthouses, hotels, hostels, holiday homes, restaurants, pubs and other tourism-related developments.

Objective 12 of the Development Plan applies.

- **Objective 12** To seek the development of lands zoned ‘Tourism Related Development’ for tourism-related development and activities

Draft Leitrim County Development Plan 2023-2029

The Draft Plan was adopted on 7 February 2023 and it is coming into effect on 21 March 2023.

The following land use zoning objectives are to apply in the settlements of Jamestown and Drumsna.

Town and Village Centre

The Council will encourage and facilitate the development of under-utilised land and brownfield sites creating a mix of uses to make the town and village centres attractive places to visit, shop and live in. The full use of upper floors in buildings, preferably for residential use, will be encouraged. The character of the town and village centres shall be protected and enhanced. Development proposals should

provide a use, scale, form, and design that accords with the role, function and size of the town or village centre. These areas require high levels of accessibility by all modes, including pedestrian, cyclist and public transport (where feasible).

The zoning objective is as follows:

To maintain and enhance the vitality and viability of existing town and village centres through consolidation with an appropriate mix of retailing, commercial, cultural and residential activities.

Mixed Use

A diversity of uses for both day and evening are encouraged. These areas also require high levels of accessibility for all modes, including pedestrian, cyclists, and public transport (where feasible). Compatible uses within this zone include residential, community buildings, civic buildings, entertainment, hotels, leisure and recreation, offices, professional/specialist services and restaurants.

The zoning objective is as follows:

To provide for a mixture of residential and compatible commercial uses

Existing Residential

This zoning allows for the conservation and enhancement of the quality and character of existing residential areas, to protect residential amenities and to allow for infill development which is appropriate to the character and pattern of development in the area. This zone is intended primarily to protect established housing development but may include a range of other uses particularly those that have the potential to support the residential function of residential communities such as schools, crèches, small shops, doctor's surgeries, amenities, etc.

The zoning objective is as follows:

To protect and enhance the established amenity of existing residential communities.

New Residential

High-quality residential schemes are encouraged with convenient and safe access to local services and the creation of a safe and pleasant local environment. New housing and infill developments should be of sensitive design, which are complementary to their surroundings. Adequate undeveloped lands have been zoned in the Plan for residential use to meet the requirements for both public and private house building over the Plan period. The Council will strive towards the ideal of mixed residential neighbourhoods, where people of different social and economic backgrounds, and of different ages, can live in proximity and harmony to one another.

This zone is intended primarily for housing development but may include a range of other uses particularly those that have the potential to foster the development of new residential communities. The Planning Authority will therefore consider favourably other appropriate uses which support the overall residential function of the area. The range of uses identified above in 'Existing Residential' zones are also appropriate in 'New Residential' zones.

The zoning objective is as follows:

To provide primarily for new residential development and community services at appropriate densities for the positioning of the centre in the Settlement Hierarchy and with an emphasis on quality of design.

Tourism Related Development

These lands seek to provide for developments linked to tourism including all types of accommodation - guesthouses, hotels, hostels, holiday homes, etc, along with restaurants, pubs and other tourism related offerings.

The zoning objective is as follows:

To provide for and improve tourist amenities in the county.

Social and Community

In addition to identifying lands to safeguard their future provisions, these lands also contain existing community and social facilities such as community buildings, schools, hospitals and health centres, places of worship, football pitches and other generic or specific civic, social and community uses where the objective of the Planning Authority will be to protect such uses.

The zoning objective is as follows:

To protect and provide for community, social, recreational and educational services and facilities.

Utilities

This zoning primarily provides for and preserves land in the ownership of the Council or other bodies charged with the provision of services such as electricity, telecommunications, water, wastewater etc. to individual towns and villages

The zoning objective is as follows:

To provide land for public infrastructure and public utilities

Constrained Land Use

The Land Use Zoning Objectives Maps for each settlement have excluded uses vulnerable to the effects of flooding on undeveloped areas identified as being at an elevated risk of flooding. The 'Constrained Land Use' designation extends to existing developed lands in a number of settlements which could include lands in the centre of towns and villages

The zoning objective is as follows:

To ensure the appropriate management and sustainable use of flood risk areas designated as 'Constrained Land Use' on Settlement Plans.

Open Space and Amenity

The use of land shall include the provision of land for parks, public woodland, pedestrian routes and greenways, riparian zones, development incidental to the enjoyment of open space (including playgrounds, outdoor recreation centres and sports centres, civic/market square, village greens, landscaped areas, shelters, sanitary conveniences, play equipment, dressing rooms and similar facilities). It also provides for the use of such land or such facilities for games, educational and recreational purposes. High standards of accessibility are essential. The Council will not normally permit development that would result in a loss of existing open space.

The zoning objective is as follows:

To preserve, provide for and improve active and passive recreational public and private open space.

Carrick-on-Shannon Local Area Plan 2010

A range of land uses are listed in the Plan's land use matrix in Table 2.4 together with an indication of their broad acceptability in the different land use zones. The following overall policy objective applies.

- **Policy 2.2a** It is the policy of the Council to seek the development of land in accordance with the Land Use Zoning Matrix set out in Table 2.1.

The following land use zoning objectives are set out in the Local Area Plan for the settlement of Carrick-on-Shannon.

Primarily Residential

Table 2.2 of the Plan sets out the extent of lands zoned of primarily residential development, including areas for low density residential development. These are listed in Table 4.3.1.

Table 4.3.1 Capacity of Vacant Residential Lands

	Vacant Lands		Total in Phase 1 & Phase 2
	Phase 1	Phase 2	
Residential Land	21.56 ha	44.3 ha	65.86 ha
Residential Land – Low Density	2.13 ha 3	3.51 ha	5.64 ha
Total Ha	23.69 ha	47.81 ha	71.5 ha
Total Housing Capacity	453	921	1,374
Total Population Capacity	1,137	2,312	3,449

The following policy objective applies:

- **Objective 2.3c** It is an objective of the Council to seek the development of lands zoned 'Primarily Residential' for residential and associated uses. Open space and recreational facilities must be provided in association with residential development in accordance with the standards set out in Section Three of this Plan.

Social and Community

This zone includes community buildings, churches, hospitals, health centres, football pitches, municipal treatment plants etc.

The following policy objective applies:

- **Objective 2.3g** It is an objective of the Council to seek the development of lands zoned 'Social & Community Use' for educational, sport and health related uses. The redevelopment of these lands for residential or commercial use will be considered by the Council where it is satisfied that the overall provision of educational and health services to the town would be improved by such a development. Uses indicated as being 'open for consideration' in the zoning matrix below will only be so considered in that context.

General Development

It is advised that the land uses associated with this designation in the context of the Carrick-on-Shannon Local Area Plan are not the same as those applicable in the context of the County Development Plan. As the function of 'General Development' is different in both Plans, the County Development Plan takes precedence in this instance.

In determining the suitability of development within this zone, regard is given to the environmental impact of the alternatives and options on neighbouring uses. The following policy objective applies:

- **Objective 2.3d** It is an objective of the Council to seek the development of lands zoned 'General Development' for commercial, retail, light industrial, educational, health, community and related uses.

Enterprise and Employment

The plan clusters heavy traffic generating activities related to enterprise and employment uses at the edge of the town, where there is good access onto the national road network and minimal impacts on residential areas.

The following policy objective applies.

- **Objective 2.3b** It is an objective of the Council to seek the development of lands zoned 'Enterprise & Employment' for industrial and employment generating uses.

Riverside Development

This zoning relates to leisure, amenity and tourism related uses associated with the River Shannon. The following policy objective applies.

- **Objective 2.3f** It is an objective of the Council to seek the development of lands zoned 'Riverside Development' for leisure, amenity and tourism related uses associated with the River Shannon.

Mixed Use

Zones designated as ‘Mixed Use’ have been identified in the core of the town centre, within which a mix of residential and commercial activity takes place. The following policy objective applies.

- **Objective 2.3a** It is an objective of the Council to seek the development of lands zoned ‘Mixed Use’ for commercial, cultural, residential, retail and related uses.

Open Space and Amenity

This zone includes public walkways, parks and open space. The following policy objective applies.

- **Objective 2.3e** It is an objective of the Council to seek the development of lands zoned ‘Open Space & Amenity’ for recreational and amenity uses.

River Navigation & Amenity

This zoning seeks to protect lands and water bodies for navigation and the conservation of riverine habitats.

The following policy objective applies.

- **Objective 2.3h** It is an objective of the Council to seek the protection of lands and water bodies zoned ‘River Navigation & Amenity’ for navigation and the conservation of riverine habitats. Development impacting on lands and water bodies zoned ‘River Navigation & Amenity’ will only be acceptable if they enhance the amenity value of the river, do not unduly impact on habitats or impede river navigation.

Cortober Local Area Plan 2014-2021

The following land use zoning objectives are set out for the urban area of Cortober:

Leisure and Amenity

3.4ha of land is zoned for Leisure and Amenity uses under the Plan. The overriding objective of this zoning is to provide for new leisure and amenity facilities such as bowling, swimming pool and hotel/gym/leisure facilities as well as cinema, theatre and associated retail facilities. Rivers and lakes may be included in this use.

Leisure Tourism

0.4ha of land is zoned for Leisure Tourism uses under the Plan. The overriding objective of this zoning is to consider developments for leisure and recreational based activities including water-based activities as well as appropriately scaled coffee shops, hotel, restaurant(s) and public house(s), etc.

Greenbelt

11.9ha of land is zoned for Greenbelt under the Plan. The overriding objective of this zoning is to protect the setting, character, and environmental quality of areas of high natural beauty and safeguard their environmental, archaeological and ecological amenities.

New Residential

3.46ha of lands are zoned for new residential development under the Plan. The overriding objective of this zoning is to provide for new residential development, including a mix of residential options, as well as appropriate local services and community facilities such as recreation, education, creche/playschool, community buildings, sheltered housing, and corner shops.

Community and Educational Facilities

0.3ha of lands are zoned for Community and Educational Facilities under the Plan. The overriding objective of this zoning is to provide for health, welfare, community, education, and institutional uses including schools, childcare, community meeting areas, churches, hospitals etc. in close proximity to existing and planned residential communities as well as the other ancillary services such as public services and recycling facilities.

Neighbourhood Centre

11.7ha of lands are zoned for neighbourhood centre uses under the Plan. The overriding objective of this zoning is to provide for the development of a mix of residential, commercial/retail uses including comparison shops and community facilities around a public/focal space, where appropriate, with associated facilities, within walking distance from the existing town centre, where practicable, which will serve the needs of a new/existing residential area.

Existing Residential

27.6ha of lands are zoned for existing residential uses under the Plan. The overriding objective of this zoning is to protect and enhance the residential amenities of existing and new residential communities and provide a high level of services within walking distances of residential developments.

Industrial Uses

8.5ha of land is zoned for industrial uses under the Plan. The overriding objective of this zoning is to reserve lands for the provision of heavy industry, incinerators and thermal treatment and employment related uses.

Public Utilities, Services and Facilities

6.1ha of lands are zoned for public utilities under the Plan. The overriding objective of this zoning is to provide for and improve public utilities such as electricity, telecommunications, water, wastewater, gas etc to ensure the long-term sustainability of these services and to meet wider regional and national objectives.

Local Centre

0.1ha of lands are zoned for Local Centre uses under the Plan. The overriding objective of this zoning is to protect, provide for and/or improve local centre facilities.

4.3.3.2 Proposed and Planned Developments

All applications submitted to Leitrim and Roscommon County Councils are recorded on their online planning registers.

Information recorded includes details of the type of development proposed, the name of the applicant and the status of the application, i.e., if the permission has been refused or granted and any conditions which may be attached.

A review of planning applications lodged within the study area has been carried out. This includes new planning applications, as well as those granted within the past five years, having regard to the five-year validity of planning applications except for wind farms which often have a validity of 10 years.

All planning applications which have been granted permission are constraints and are shown on Figures 4.3.2.0 to 4.3.2.5.

4.3.3.3 Visual Amenity and Scenic Views

A large area of land adjacent the River Shannon corridor is identified as a 'High Visual Amenity Area' in the Leitrim County Development Plan, 2015-2021.

This is shown on Figures 4.3.1.0 to 4.3.1.5.

Policy objectives in relation to this are set out in Section 4.8.7 of the Plan, where it is stated:

Areas of Outstanding Natural Beauty and High Visual Amenity are identified on Map 4.12. The Council will preserve and enhance these areas, as far as is practicable, by careful management and by the operation of special controls over development in these areas.

The following policy objective applies:

- **Policy 101** It is the policy of the Council to permit development in an area of High Visual Amenity only where the applicant has demonstrated a very high standard of site selection, site layout and design and where the planning authority is satisfied that the development could not be accommodated in a less-sensitive location.

Protected Views and Prospects identified in the Leitrim County Development Plan are shown on the Landscape and Visual Constraints Figures 4.11.1.0 to 4.11.1.5 and listed as follows:

Leitrim:

- **V25:** View of River Shannon from the N4 Faulties to Aughamore
- **V27:** View of River Shannon from Local Road LS07426
- **V28:** View of River Shannon from the N4 in the townlands of Minkill and Tully

Scenic Routes and Views as identified in the Landscape Character Assessment (LCA) which accompanies the Roscommon County Development Plan, 2022-2028 are shown on the Landscape and Visual Constraints Figures 4.11.1.0 to 4.11.1.5 and listed as follows:

Roscommon (LCA):

- V8: View from Hartly Bridge to north to Slieve Anierin, Eidin Lake to the south and windfarm on Kilronan Mountain to the north west. Low undulating sparsely populated landscape in the foreground.

The following policy objectives applies:

- **NH 10.25:** Minimise visual impacts on areas categorised within the County Roscommon Landscape Character Assessment including “moderate value”, “high value”, “very high value” and with special emphasis on areas classified as “exceptional value” and where deemed necessary, require the use of Visual Impact Assessment where proposed development may have significant effect on such designated areas.
- **NH 10.26:** Protect important views and prospects in the rural landscape and visual linkage between established landmarks, landscape features and views in urban areas.
- **NH 10.26:** To co-ordinate with all adjoining Local Authorities in reviewing Landscape Character Assessments (LCAs) to ensure consistency in classification and policy in adjoining areas of similar character. A targeted review of the LCA shall be undertaken following the completion of the National Landscape Character Assessment, and any associated statutory Guidelines as well as the Regional Landscape Character Assessment to be completed by the Regional Assembly.

The Draft Leitrim County Development Plan sets out a series of similar policies and objectives in relation to important views and prospects in the county. The potential for impact on these views is considered during the option selection process. Large areas of land adjacent to the River Shannon corridor are identified as Areas of High Visual Amenity (AHVA) (Ref. B11 River Shannon and Lakes) in the Leitrim County Development Plan, 2023-2029.

Policy objectives in relation to this are set out in Section 11.15.2 of the Plan, where it is stated:

A landscape is designated as high visual amenity due to a range of factors including natural, cultural and man-made influences. Table 11.7 identifies the Areas of High Visual Amenity in Co. Leitrim.

In section 11.15.3 it is stated:

The Council will seek to preserve and enhance the landscape character of Areas of and Areas of High Visual Amenity, as far as is practicable, by careful management and by the operation of special controls over development in these areas.

The following policy objectives have relevance:

LD POL 2 *To protect Areas of Outstanding Beauty and Areas of High Visual Amenity from inappropriate development and reinforce their character, distinctiveness and sense of place.*

LD POL 3 *To permit development in an Area of High Visual Amenity only where the applicant has demonstrated a very high standard of site selection,*

site layout and design and where the Planning Authority is satisfied that the development could not be accommodated in a less-sensitive location.

LD POL 4 *To require that a landscape and visual impact assessment, prepared by a suitably qualified professional, be submitted with planning applications for development which may have an impact on the landscape character of the area.*

LD POL 5 *To ensure that development proposals have regard to the Landscape Character Assessment, the value of the landscape, its character, importance, sensitivity and capacity to absorb change.*

LD OBJ 4 *To protect Areas of Outstanding Natural Beauty and Areas of High Visual Amenity from inappropriate forms of development. These areas are identified in Table 11.6 and Table 11.7 of this Plan and shown graphically on Map No. 11 'Proposed Landscape Designations' in Volume III (Book of Maps).*

4.3.4 Summary

The zoning objectives and relevant specific objectives set out in the Leitrim County Development Plan 2015-2021, the Roscommon County Development Plan, 2022-2028, the Carrick-on-Shannon Local Area Plan, 2010 and the Cortober Area Plan, 2014-2020 present constraints which will be considered in the development of alternatives and options.

The project should seek to ensure that the public amenity value of the study area is not diminished. Impacts on public amenity areas adjacent to the River Shannon and its associated lakes will be considered during the option selection process.

In addition, tourist facilities and areas along the River Shannon should be considered and impacts minimised where possible.

Areas of high visual amenity along the River Shannon corridor and those views identified and protected in both the Leitrim and Roscommon County Development Plans should be taken into consideration in the option selection process.

4.4 Population and Human Health

Introduction

This section describes the population constraints identified within the study area for the N4 Carrick-on-Shannon to Dromod Project and should be read in conjunction with Figures 4.4.1.0 to 4.4.1.5.

Population is a broad ranging topic which “*covers the existence, activities and health of people, usually considering people as groups or ‘populations’*” (EPA 2015)¹⁹.

The objective of this constraint study is to identify activities and locations of social or economic importance that could present constraints to the development of alternatives and options. These constraints are considered from the perspective of potential impacts that could arise from the proposed alternatives or options on journey patterns, journey amenity, general amenity, community severance, business, tourism and employment. Constraints which are relevant to “Population” include natural amenity, built and natural heritage, ecosystem services, material assets and nuisance and may be assessed in the first instance in the following sections:

- Section 4.3 - Land Use and Planning
- Section 4.5 - Material Assets Non-Agriculture (which contains details of residential properties and, by association, constraints in terms of individual dwellings)
- Section 4.6 - Material Assets – Agriculture
- Section 4.7 - Air Quality
- Section 4.9 - Noise and Vibration
- Section 4.10 - Archaeological, Architectural and Cultural Heritage
- Section 4.11 - Landscape and Visual
- Section 4.12 - Biodiversity
- Section 4.13 - Hydrology
- Section 4.14 - Hydrogeology
- Section 4.15 - Soils and Geology

Human health impacts are primarily considered through an assessment of the environmental pathways by which health can be affected such as air, noise, water or soil. Therefore, the human health constraints relate to the constraints identified for Air Quality (Section 4.7); Noise and Vibration (Section 4.9); Hydrology (Section 4.13); Hydrogeology (Section 4.14); and Soils and Geology (Section 4.15).

¹⁹ Extracted from the Advice Notes for Preparing Environmental Impact Statements (EPA draft September 2015)

Section 4.4.1 describes the methodologies and sources of information that were used to carry out the study. Section 4.4.2 describes the socio-economic constraints relating to human beings within the existing environment of the study area. A summary is presented in Section 4.4.4.

4.4.1 Methodology and Sources of Information

4.4.1.1 Legislation and Guidelines

The constraints study has been prepared in accordance with the following guidelines:

- Environmental Protection Agency (EPA): Guidelines on the Information to be contained in Environmental Impact Statements, 2002²⁰, and the Revised Guidelines (Draft, August 2017)²¹
- Environmental Protection Agency (EPA): Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) 2003²², and the revised Advice Notes for Preparing Environmental Impact Statements (Draft, September 2015)²³
- National Roads Authority: Environmental Impact Assessment of National Road Schemes - A Practical Guide (Revision 1, November 2008)²⁴

4.4.1.2 Methodology and Identification of Data Sources

An assessment of Population requires an understanding of the community. This is built up through background research, site visits, and conversations with local people and community representatives. The data to inform the constraints study was collected by means of:

- Primary data sources (e.g. demographic data from Census 2016 and Census 2011 produced by the Central Statistics Office)

²⁰ EPA, 2002. Environmental Protection Agency Guidelines on the Information to be contained in Environmental Impact Statements, 2002. Available at:

http://www.epa.ie/pubs/advice/ea/guidelines/EPA_Guidelines_EIS_2002.pdf

²¹ EPA, 2017. Environmental Protection Agency Revised Guidelines on the information to be contained in Environmental Impact Assessment Reports (Draft, August 2017). Available at:

<https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf>

²² EPA, 2003. Environmental Protection Agency Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) 2003. Available at:

http://www.epa.ie/pubs/advice/ea/guidelines/EPA_advice_on_EIS_2003.pdf

²³ EPA, 2015. Environmental Protection Agency the Revised Advice Notes for Preparing Environmental Impact Statements (Draft, September 2015). Available at:

<https://www.epa.ie/pubs/consultation/reviewofdrafteisguidelinesadvicenotes/Draft%20Advice%20Notes%20for%20preparing%20an%20EIS.pdf>

²⁴ NRA, 2008. National Roads Authority Environmental Impact Assessment of National Roads Schemes – A Practical Guide, Revision 1, November 2008. Available at:

<https://www.tii.ie/technical-services/environment/planning/Environmental-Impact-Assessment-of-National-Road-Schemes-Practical-Guide.pdf>

- Maps of the study area, including Ordnance Survey Ireland (OSi) 1:50,000 maps 50 (5th Edition, 2017)²⁵ and 56 (4th Edition 2018)²⁶
- Spatial data, including Google Maps and Google Streetview, Open Street Map, Department of Education school maps, and church and parish location maps, supplemented by site visits
- Relevant environmental data collected by other disciplines during their studies
- A review of relevant planning document including the Leitrim County Development Plan (2015-2021)¹³, Draft Leitrim County Development Plan 2023-2029¹⁷, the Roscommon County Development Plan (2014-2020)¹⁴, Roscommon County Development Plan 2022-2028¹⁸, the prevailing Carrick-on-Shannon Local Area Plan (2010-2019)¹⁵ and the Cortober Area Plan (2015)¹⁶
- A review of secondary sources including the National Planning Framework (GOI 2018a)²⁷ and the National Development Plan (GOI 2018b)²⁸, the Regional Spatial and Economic Strategy 2020-2032 (NWRA-RSES) (GOI 2018c)²⁹
- A review of previous road EIAs, including of the Environmental Impact Assessment Report for the N4 Dromod-Roosky Bypass (2004) and Information provided by Leitrim County Council on surveys to inform a previous road scheme through the study area in the early 2010s
- Observation of local settlement and travel patterns and identification of community facilities
- Public consultations undertaken by the project team and submission received in respect of these consultations
- Websites identifying local walks and trails, angling rivers and lakes³⁰

The constraints study involves the identification of settlement nodes, public transport routes and community facilities, including:

- Existing communities of more concentrated housing and development
- Pre-schools, schools and colleges
- Medical centres, nursing or residential care homes

²⁵ Ordnance Survey Discovery Series Map No. 50 Dublin, Kildare, Meath, Wicklow. 2017 (5th Edition) Map Scale 1:50,000

²⁶ Ordnance Survey Discovery Series Map No. no. 56 Wicklow, Dublin, Kildare. 2018 (4th Edition) Map Scale 1:50,000

²⁷ Government of Ireland, 2018a. Project Ireland 2040 Notional Planning Framework. Available From <https://npf.ie/wp-content/uploads/Project-Ireland-2040-NPF.pdf>

²⁸ Government of Ireland, 2018b. Project Ireland 2040 National Development Plan 2018-2027. Available at:

<https://www.gov.ie/pdf/?file=https://assets.gov.ie/37937/12baa8fe0dcb43a78122fb316dc51277.pdf#page=null>

²⁹ The Northern and Western Regional Assembly, 2020. Regional Spatial and Economic Strategy 2020-2032 (RSES). Available at: <https://www.nwra.ie/rses/>

³⁰ Available at: <https://leitrimtourism.com/things-to-do/walks-and-trails/>, <https://fishinginireland.info/coarse/shannon/carrickonshannon/>, <https://www.bluewaysireland.org/trails/>, <https://www.bikemap.net/en/r/7118798/#10.84/53.9559/-8.0682>.

- Churches or other places of worship and cemeteries
- Sports pitches and facilities
- Areas, foot and cycle paths used for amenity and recreation
- Rivers and lakes used for angling or other outdoor activity
- Retail outlets
- Pubs and restaurants
- Hotels and other accommodation
- Workplaces likely to include more than five employees

Constraints are listed as being of *slight* significance, *moderate* significance, *significant* or *profound*. This assessment is preliminary and relates to the community importance of the constraint, the degree to which alternatives or options could have a significant impact on public use of a community facility, or the potential for the constraint to absorb an impact or itself be moved to a new location. For businesses, the assessment is based mainly on a judgement as to the importance of the business for employment or local services.

The socio-economic constraints associated with transport projects fall into five key categories, namely:

- Journey characteristics, accessibility and connectivity, i.e. potential impacts on journey time, journey time reliability and travel patterns
- Journey amenity, i.e. factors that could affect the perceived or actual safety and the pleasantness of a journey due to proximity to traffic or exposure to e.g., noise, dirt, visual intrusion and air quality)
- Community severance with regard to the use of community facilities, particularly those used by older people, children or other vulnerable groups
- General Amenity, i.e. impacts on individual and community well-being due, for example, to people's exposure to the environmental impacts of traffic (e.g. safety, noise, dirt, visual intrusion and air quality)
- Impacts that could affect economic growth prospects and employment

Impacts can be positive or negative. Their significance depends, among other considerations, on the nature of the environment affected, the duration of an impact and the probability of its occurrence. It often follows that impacts of a socio-economic nature are a function of:

- a) The scale of the impact itself
- b) The numbers of people likely to be affected
- c) The impact on vulnerable or sensitive groups

4.4.2 Existing Environment

The following section describes the existing environment as regards human beings, specifically the demographic character of the study area, its economy, its amenities and community facilities.

4.4.2.1 General

Carrick-on-Shannon is the county town and so contains the principal administrative offices for Leitrim County Council as well as the key community facilities to be expected of the principal population centre such as The Dock arts centre, a library, medical centre, primary and secondary schools, churches, parks, and sports facilities (including the county GAA ground) as well as a range of retail shops and restaurants, including those included in the Carrick Shopping Centre & Retail Park. Carrick-on-Shannon is the important centre for employment locally, although some businesses are located on its outskirts, for example the large Masonite Factory. Carrick-on-Shannon is also a tourist centre and popular for weekend visits, with three hotels as well as numerous guest houses. Cruising on the River Shannon is a popular activity and two cruise hire companies are located in the town along with public moorings and three marinas for private craft. There is an amenity park with seating & access to the river for small boats from near the pedestrian bridge in Cortober along with a landscaped riverside park on the Carrick-on-Shannon side.

The Roscommon/Leitrim County boundary follows the River Shannon with the community of Cortober on the west bank falling within County Roscommon. A second retail centre is located just off the N4 in the village of Cortober, including a supermarket and cinema, while a commercial business park is located a little further west along the N4 on the edge of the village. Cortober also contains a sports ground and the local railway station for the Dublin to Sligo railway line.

The study area also contains the villages of Jamestown, Drumsna, and Aghamore. The nineteenth century author Anthony Trollope once lived in the village of Drumsna and a heritage trail follows the lanes around Lough Aduff through Fargrim, Annaduff Glebe, Drumsna and Drumcleavery. Jamestown is a small historic plantation town possessing the remains of the town wall, a friary, and a scenic weir. Parts of an earlier Iron Age earthen embankment, the Doon, are visible between Jamestown and Drumsna and along the river.

Amongst the most significant constraints in the study area are the River Shannon (with an associated Blueway on parts of it), which is of considerable importance given its importance for amenity and tourism including activities such as cruising, kayaking, and angling. Carrick-on-Shannon itself, and Cortober, are located alongside the river and benefit considerably from the landscape and amenity value it provides. The river is not navigable by boats between Drumsna and Jamestown Weir (although this section is popular for kayaking). The Jamestown Canal carries boat traffic for 2km between these locations. The Albert Marina moorings are on a parallel stretch of canal.

The River Shannon winds through the study area and is the principal amenity. The river is joined by the River Boyle just to the north of the study area. Both rivers widen into small and larger loughs along their course. The River Shannon from just downstream of Drumshanbo is designated as Blueway for boating and kayaking. A navigation canal has been cut in the centre of the study area separating off the loop of the river and the weir between Jamestown and Drumsna. The parallel cut provides a private marina for boats. Another linear amenity is a lightly used spur of the Southern Loop of the Kingfisher Cycle Trail through Counties Leitrim and

Cavan which follows Castlecara Road and Elysian Meadows into Carrick-on-Shannon. This local circuit also forms a Sli-na-Slaiste walking route.

The Dublin to Sligo railway line is another constraint which passes through the middle of the study area crossing the River Shannon above Lough Tap near to the large Masonite Factory.

Land use is principally given over to beef cattle with some dairy on the better land. There are areas of commercial forestry, scrub, peat bog (including some turbary - a place where turf or peat is dug or cut under the right of turbary) and riparian grazing meadow subject to regular flooding and of low agricultural productivity. There are numerous single house developments throughout the study area given the proximity to the town of Carrick-on-Shannon and the existing N4.

4.4.2.2 Population

Table 4.4.1 shows that the populations of the four counties in the region have shown small increases between 2011 and 2016 with that for County Longford having increased most, albeit by a modest 4.8%, continuing a trend of expansion for towns within a perceived commuting distance of Dublin. Table 4.4.2 shows that the populations of Carrick-on-Shannon, and of the main towns and settlements in its vicinity, have experienced a mixture of increases and decreases with the largest increases recorded for Leitrim Village and Dromod; relatively affluent communities where new housing estates have been built in recent years. However, given that there is a large amount of single house development outside of these main settlements, the data should be interpreted together with the population change experienced in the local Electoral Division (ED). A new Census was undertaken in 2022, with full analysis expected in 2023.

Table 4.4.1 Population - Counties

County	Population 2016	Population 2011	Per cent change
County Leitrim	32044	31798	0.8%
County Roscommon	64544	64065	0.7%
County Sligo	65535	65393	0.2%
County Longford	40873	39000	4.8%

Table 4.4.2 Population - Main Settlements

Settlement	Population 2016	Population 2011	Per cent change
Carrick-on-Shannon	4062	3980	2.1%
Boyle	2568	2588	-0.8%
Leitrim	594	485	22.5%
Drumshanbo	902	857	5.3%
Cootehall	184	N/A	-
Drumsna	240	247	-2.8%
Dromod (Dromod)	555	432	28.5%
Mohill	855	928	-7.9%

Settlement	Population 2016	Population 2011	Per cent change
Roosky	564	523	7.8%
Elphin	565	613	-7.8%
Longford	10008	9601	4.2%

Table 4.4.3 presents the population figures for those EDs which fall mostly within the study area along with those of the EDs just outside the study area. For the most part, the rural EDs in the study area have shown small reductions in population, but for a small increase in the ED for Carrick-on-Shannon and a larger increase of 12% for Drumod (containing the village of Dromod). A similar pattern is revealed for EDs just outside the study area, although, in line with the data for settlements, larger increases were recorded for Leitrim ED, Croghan, Killummod (from a small base) and, especially, Oakport, an ED which traverses the River Boyle in a scenic area to the north of Carrick-on-Shannon.

Table 4.4.3 Population Electoral Divisions (ED)

Electoral Division	Population 2016	Population 2011	Per cent change	Population density (km ²)
EDs mostly in the study area				
Carrick-on-Shannon	4080	3986	2.4%	168.2
Killukin (Co Roscommon)	274	286	-4.2%	21.9
Danesfort (Co Roscommon)	827	865	-4.4%	62.3
Aughrim East (Co Roscommon)	222	227	-2.2%	10.8
Cloonteen (Co Roscommon)	274	291	-5.8%	15.1
Drumsna (Co Leitrim)	685	701	-2.3%	31.5
Annaduff (Co Leitrim)	225	221	1.8%	18.8
Drumod (Co Leitrim)	869	776	12.0%	39.2
EDs outside or partly in study area				
Gowel (Co Leitrim)	325	333	-2.4%	24.1
Leitrim	1224	1123	9.0%	53.4
Tumna North (Co Roscommon)	166	178	-6.7%	11.9
Tumna South (Co Roscommon)	191	204	-6.4%	11.4
Oakport (Co Roscommon)	413	319	29.5%	26.9
Rockingham (Co Roscommon)	337	345	-2.3%	10.9
Croghan (Co Roscommon)	379	359	5.6%	15.8
Killummod (Co Roscommon)	120	107	12.1%	9.9
Aughrim West (Co Roscommon)	172	188	-8.5%	9.3
Kilmore (Co Roscommon)	178	184	-3.3%	9.3
Drumdoo (Co Leitrim)	303	299	1.3%	19.5
Bunnybeg (Co Leitrim)	153	169	-9.5%	11.7

Table 4.4.4 lists levels of absolute and relative social and economic disadvantage by ED as identified by the Pobal HP Deprivation Index (Haase & Pratschke, 2017)³¹. The absolute deprivation index is based on criteria of age dependency, population change, education, household occupancy, employment and social class, and has a mean of zero which is influenced by economic conditions for the country as a whole at that time. Relative disadvantage in an index relative to average levels across the country for the census period. This data is relevant to Accessibility and Social Inclusion assessment given that improved transport links can potentially reduce isolation and improve access to employment. The data for 2016 shows an improvement on the situation during the depth of the last recession in 2011, although only slightly for many EDs, including Carrick-on-Shannon. In terms of the relative level of affluence or deprivation nationally, Oakport performs best followed by Aughrim East within the study area (highlighted pink), while the highest level of social deprivation (highlighted brown) is recorded for the most rural EDs to the south and southwest of the study area in both counties Leitrim and Roscommon. Within Carrick-on-Shannon, estates with higher levels of social disadvantage are found in the north central and southeast.

Table 4.4.4 Population – Pobal HP Deprivation Index (by ED)

Electoral Division	2016 Absolute	2011 Absolute	2016 Relative
EDs mostly in the study area			
Carrick-on-Shannon	-6.6	-6.0	-2.2
Killukin (Co Roscommon)	-0.4	-1.1	3.2
Danesfort (Co Roscommon)	-1.1	-4.5	2.8
Aughrim East (Co Roscommon)	1.6	-4.7	4.9
Cloonteen (Co Roscommon)	-3.5	-4.6	.2
Drumsna (Co Leitrim)	-6.1	-7.9	-2.4
Annaduff (Co Leitrim)	-2.8	-3.4	1.1
Drumod (Co Leitrim)	-1.9	-5.3	2.1
EDs outside or partly in study area			
Gowel (Co Leitrim)	-3.1	-8.8	.7
Leitrim	0.7	-3.7	4.5
Tumna North (Co Roscommon)	-7.3	-12.2	-3.3
Tumna South (Co Roscommon)	-5.5	-9.3	-2.1
Oakport (Co Roscommon)	3.4	-1.5	8.3
Rockingham (Co Roscommon)	-0.9	-1.6	2.8
Croghan (Co Roscommon)	-2.7	-2.3	.9
Killummod (Co Roscommon)	-1.6	-2.2	2.1
Aughrim West (Co Roscommon)	-3.9	-5.9	-.5
Kilmore (Co Roscommon)	-3.9	-9.8	-.8

³¹ Haase & Pratschke, 2017. Pobal HP Deprivation Index. Available at: <https://data.gov.ie/dataset/pobal-hp-deprivation-index>

Electoral Division	2016 Absolute	2011 Absolute	2016 Relative
Drumdoo (Co Leitrim)	-8.9	-12.5	-5.6
Bunnybeg (Co Leitrim)	-10.2	-10.4	-6.8

4.4.2.3 Economy

Carrick-on-Shannon is the county town and, as such contains Leitrim County Council offices and the Leitrim County Enterprise Board as well as public facilities such as The Dock arts centre, Courthouse, Carrick-on-Shannon Garda Station, facilities for employment training and professional development, a fire station, library, primary and secondary schools. The town is a centre of employment with a range of businesses and services. Tourism is an important local industry supporting hotels, guest houses, restaurants, bars and specialist shops. The main street contains a range of shops in addition to four main retail centres in Carrick-on-Shannon and Cortober. Business and industrial estates are located off Castlecara Road, the N4 in Carrick-on-Shannon and the N4 in Cortober.

4.4.2.4 Community facilities

Carrick-on-Shannon has primary schools on Dublin Road (Scoil Mhuire) and on Castlecara Road (Gaelscoil Liatroma) on the edge of the town, as well as a Carrick-on-Shannon Community School on Glen Carrick in Summerhill and St Mary's Boy's School in Townparks. Medical facilities include St. Patrick's Community Hospital, a medical centre and retirement homes. Pairc Sean MacDiarmada is the county GAA stadium and there are other sports facilities for Gaelic and soccer in both Carrick-on-Shannon and Cortober. Churches are located on the Main Street in Carrick-on-Shannon and in Cortober. The town has a cineplex in Cortober beside the N4, a swimming pool and indoor sports centre. There are two riverside parks, a small one in Cortober south of the River Shannon Bridge and a second larger landscaped park along the River Shannon on the Carrick-on-Shannon side of the river which includes a walkway that is popular with both locals and visitors. There is a connecting park on the opposite side of the Dublin Road.

4.4.2.5 Transport

The N4 passes through Carrick-on-Shannon and Cortober connected by a single bridge which is accompanied by a joined pedestrian bridge. The R280 to Leitrim Village and Drumshambro commences at Main Street in Carrick-on-Shannon. The R368 to Elphin leaves from a roundabout with the N4 in Cortober and connects with the R370 to Croghan and Frenchpark. The Sligo to Dublin railway line is important for regional connectivity and development, with the station being located on the western edge of Cortober.

4.4.3 Residential development

There is much linear residential development on the edge of Carrick-on-Shannon, particularly to the northeast, representing the community of Hartley, and along the R280 Leitrim Road and Castlecara Road on the edge of the town. In Cortober, linear

development extends 500m from the railway station along the R368 and there are residential estates 500m from the station along the R370.

4.4.4 Summary

The principal community facilities, public facilities, businesses and employers, along with the greatest concentration of these facilities, are to be found in Carrick-on-Shannon and Cortober. Various of these facilities are, though, to be found on the outskirts of these communities, including sports facilities, retail estates and the gaelcoil in Carrick-on-Shannon and business estates, sports fields and the station in Cortober. Residential development extends outwards as ribbon development along secondary roads in both communities. The River Shannon threads through the study area and is the focus of much amenity and tourist activity as well as providing for the community's essential sense of place. There are guest houses and B&Bs close to the river and the N4. There are also moorings and marinas along the river, for example at Jamestown.

Several community facilities are located in the wider study area, including churches at Annaduff, Dangan and Kilmore, GAA sports facilities at Annaduff and a school at Annaduff. There is also a mixture of large and small businesses throughout the study area, of which the former includes the Masonite Factory at Annaduff and Rosderra Meats in Jamestown.

A summary of the social and economic constraints is included in Table 4.4.5 below and are shown on Figures 4.4.1.0 to 4.4.1.5.

Table 4.4.5 Social and Economic Constraints in the Study Area

Constraint	Significance
Jamestown	
Historic town walls, friary ruins, Mulvey's Arch Bar / shop, Cottage Restaurant, River Edge B&B, scenic weir, public moorings.	
Drumsna	
Church, Taylor's Bar, McLoughlins Bar, Thomas Duignan Bar, two grocery shops, garden centre, small museum, community resource centre, public moorings, riverside walk, Trollope heritage trail.	
Aghamore (Annaduff)	
St. Mary's Church, Annaduff National School, Leitrim GAA Centre of Excellence, Annaduff GAA, Lakelands B&B	
Carrick-on-Shannon, Cortober and Peripheral Area	
Tourism and amenity	
River Shannon & Blueway	Significant (Profound in places)
Kingfisher Cycle Trail spur	Significant
Trollope Heritage Trail	Significant
Springfield Lodge B&B	Slight
Angler's Rest Guest House	Slight
Ballinaboy Lodge B&B	Slight

Constraint	Significance
Clenahoo Guest House	Slight
Hartley House B&B	Slight
Hartley Lodge B&B	Slight
Carrick Camping	Slight
River Edge B&B	Slight
Public moorings Jamestown	Slight
Public moorings Albert Canal	Moderate
Albert Canal, Lock & Marina	Profound
Amenity (sports / other)	
Bullfield pitch, Cortober	Significant
Paire Seán Mac Diarmuida	Significant
Carrick RFC	Significant
Cartown night club	Moderate
Albert Canal moorings	Significant
Moorings Jamestown	Moderate
Moorings Drumsna	Significant
Gortconnellan Lough	Moderate
Lowfield Lough	Slight
Religious	
St. Ann's Church of Ireland	Profound
St Mary's Cemetery	Profound
Kilmore Church (within 500m)	Profound
St. Bridgid's Church, Dangan	Profound
Educational	
Dangan NS	Significant
Businesses / employment	
King & Moffatt	Significant
Knight Logistics / Wes-Chem	Closed
Wholesale Furniture	Moderate
CD Carrick Commercials	Significant
McLoughlin Transport	Significant
Westgate Business Park	Significant
Gannon & Sons Chickens	Moderate
Cartown night club	Moderate

Constraint	Significance
Drino Drinks Limited	Moderate
Commercial estate (Noone Carpets, Luxury Permanent Makeup, Gannon Poultry)	Significant
Connaught Gold	Significant
Durkin Concrete	Moderate
AC Direct (used cars)	Slight
Archway Products (road construction)	Slight
Rosderra Irish Meats	Significant
Masonite Doors & Windows	Profound
McDonaghs Feeds	Moderate
Tony Gill Agri. / Hanly's Garage	Moderate

4.5 Material Assets Non-Agriculture

4.5.1 Introduction

This section describes the non-agricultural material asset constraints identified within the study area for the N4 Carrick-on-Shannon to Dromod Project and should be read in conjunction with Figures 4.5.1.0 to 4.5.3.5.

Material assets – non-agriculture includes amenities, residential properties, commercial properties, industrial properties, utilities and services and waste facilities.

Section 4.5.2 describes the methodologies and sources of information that were used to carry out the study. Section 4.5.3 describes the material assets non-agricultural constraints within the study area. A summary is presented in Section 4.5.4.

4.5.2 Methodology and Sources of Information

The aim of this assessment is to first identify the non-agricultural material assets within the study area and to then assess these assets to distinguish if they are constraints.

The assessment methodology comprises a desktop study, site visits and information gathered through consultation with statutory organisations and service providers. The desktop study consists of an analysis of information contained within land registry records, statutory records, orthophotography and both Leitrim County and Roscommon County planning records. Table 4.5.1 contains a list of the information gathered and their sources.

Table 4.5.1 Material Assets Non-Agriculture Sources of Information

Information Type	Data Sources
Land ownership and land use details	- Property Registration Authority (Land Registry)³² - Orthophotography³³
Locations of properties	- Orthophotography³³ - Site visits along the existing N4 to identify non-agricultural properties
Planning Applications	- Leitrim County Council Planning database³⁴ - Roscommon County Council Planning database³⁵

³² Property Registration Authority, 2020. Land Registry: Available at: <https://www.landdirect.ie/>

³³ Google Maps. Available at: <https://www.google.ie/maps>

³⁴ Leitrim County Council, 2020. Map Based Planning Enquiry: Available at: <https://leitrimcoco.maps.arcgis.com/apps/webappviewer/index.html?id=8645fc340c8d457b99ce71ce20bd79f1>

³⁵ Roscommon County Council, 2020. Map Based Planning Enquiry. Available at: <https://roscoco.maps.arcgis.com/apps/webappviewer/index.html?id=84b0356c3b45483c9da36eccebd3aa93>

Information Type	Data Sources
ESB/ESBI	Consultation between the Design Team and ESB/ESBI representatives
Gas Networks Ireland (Bord Gáis)	Consultation between the Design Team and Gas Networks Ireland (Bord Gáis) representatives
Water, Wastewater, Stormwater (Irish Water and local authorities)	- Consultation between the Design Team and Irish Water representatives - Consultation between the Design Team and the Local Authorities
Virgin Media	Consultation between the Design Team and Virgin Media representatives
BT Ireland	Consultation between the Design Team and BT Ireland representatives
Eircom/Eir	Consultation between the Design Team and Eircom/Eir representatives
Vodafone	Consultation between the Design Team and Vodafone representatives
Three	Response not received
ComReg	Consultation between the Design Team and ComReg representatives
E-net	Consultation between the Design Team and E-net representatives

The data sources listed in Table 4.5.2 were consulted to identify the location of waste based constraints.

Table 4.5.2 Sources of Waste Facility Information

Information Type	Data Sources
Waste Facility Permits and Certificates of Registration issued by local authorities	Local Authority Waste Facility Register³⁶
Civic Amenity Sites	Repack Website³⁷
Existing waste applications, licences or environmental information	EPA Waste Licence Applications³⁸
Records of closed landfills	EPA Report- Focus on Landfilling in Ireland³⁹
Active and other landfills in the region	Connacht Ulster Waste Management Plan 2015-2021⁴⁰

³⁶ National Waste Collection Permit Office, 2020. Local Authority Waste Facility Register. Available at: <http://facilityregister.nwcpo.ie/>

³⁷ Repak, 2020. Recycling Register. Available at: <https://repak.ie/>

³⁸ Environmental Protection Agency, 2020. Licensing and Permitting, Waste Licence Search. Available at: <https://www.epa.ie/our-services/licensing/waste/>

³⁹ Environmental Protection Agency, 2010. EPA Report – Focus on Landfilling in Ireland. Available at: http://www.epa.ie/pubs/reports/waste/stats/EPA_Focus_on_Landfilling_Ireland.pdf

⁴⁰ Mayo County Council, 2015. Connacht - Ulster Region Waste Management Plan 2015 – 2021. Available at: <http://www.curwmo.ie/>

4.5.3 Existing Environment

4.5.3.1 Amenities (Open Spaces, Recreation and Tourism and Leisure Related)

There are many amenities and recreation spaces within the study area. Although most are located in or near to Carrick-on-Shannon, there are amenity areas located throughout the study area.

The River Shannon, which is central to the study area, is also the primary provider of tourism attractions, offering opportunities for angling, boating and other water related sporting activities. There is a rowing club, a boat club and two marinas either side of the river north of the River Shannon Bridge.

The Riverfront Amenity Park is an amenity space along the east bank of the River Shannon, to the south of the N4 inner relief road in Carrick-on-Shannon. The development was completed in 2007. The park includes pathways, seating and public lighting in an area of native tree planting along with selected decorative shrubbery. In addition, the 174m boardwalk extends onto the River Shannon and includes two viewing platforms.

Carrick-on-Shannon is an established tourism area and is a main centre for river cruising traffic and anglers. Accordingly, the areas within the study area zoned “Open Space and Amenity”, “Recreation and Amenity”, “Tourism Related Development” and “Leisure and Amenity” are all located in proximity to the River Shannon.

The “Leisure and Amenity” zoned area in Cortober is located along the banks of the Shannon and is bisected by the N4 bridge crossing. Not all the lands zoned are currently developed, as noted by the Cortober LAP, see Land Use and Planning Figures 4.3.1.0 and 4.3.1.5.

There are a number of hotels within Carrick-on-Shannon and various guest houses located throughout the study area. There is also an existing camping ground located on the bank of the River Shannon at Cordrehid.

There are three existing marinas located within the study area. The Marina St George’s Terrace is between Cortober and Carrick-on-Shannon on the northern bank of the River Shannon, adjacent to the Shannon Bridge. Further southeast along the Shannon, the second marina, Butlers’ Marina, is located in Attirory on the western bank of the River Shannon. The third marina, Albert Lock and Marina, is located on Jamestown Canal near Jamestown and Drumsna (see Population Figures 4.4.1.0 to 4.4.1.5). There are also various mooring locations along the route of the River Shannon within the study area at Carrick-on-Shannon Floating Moorings, Ardaffrin, Drumsna Old Harbour and Albert Lock (see Population Figures 4.4.1.0 to 4.4.1.5).

The “Recreation and Amenity” zoned lands in Cortober comprise The Bull Field which is a GAA, Soccer and ‘other’ field sports ground located south of the existing N4. Further to this, Leitrim GAA Centre of Excellence and Annaduff GAA field are located southeast of Annaduff (see Population Figures 4.4.1.0 to 4.4.1.5).

The Leitrim County Development Plan 2015-2021¹³ have zoned the banks of the River Shannon adjacent to Jamestown and Drumsna “Open Space and Amenity” while the lands approaching the Shannon banks in Drumsna are zoned for “Tourism Related Development”. These areas are located just south of the existing N4. See Land Use and Planning Figures 4.3.1.0 to 4.3.1.5.

There are a number of pitches within the study area which are used for a variety of sports. Carrick Town FC and Carrick-on-Shannon RFC have pitches in Drishoge and Keenaghan respectively. Five GAA facilities are located within the study area; Bull Field in Cortober, Páirc Seán Mac Diarmada and St. Mary’s GAA in Attifinlay and the Leitrim GAA - Centre of Excellence and Annaduff GAA in Moher. Carrick-on-Shannon Golf Club is located just outside the study area to the northwest in the townland of Usna.

Further amenities within Carrick-on-Shannon Town include Carrick Cineplex, The Dock Gallery and Theatre, Carrick Indoor Karting, Aura Leitrim Leisure Centre and tennis courts.

There are multiple churches and cemeteries located within the study area.

4.5.3.2 Residential Properties

With the exception of dense residential development in Carrick-on-Shannon, with a population of 3,250 and other notable settlements in the study area such as Cortober (~700 people), Dromod (673 people) and Drumsna (223 people); due to the rural nature of most of the N4 study area, much of the residential development consists of dispersed, rural style, one-off housing. The type of residential property varies from residential estates and apartment complexes within Cortober and Carrick-on Shannon to one-off, linear development and residential clusters in the remainder of the study area.

It should be noted that Leitrim County Development Plan 2015-2021 Housing Strategy⁴¹ has acknowledged that the issue of housing vacancy is comparatively high in Leitrim but that the issue is masked as, due to Leitrim’s environmental assets and low-price housing, many homes in the county are used as secondary holiday homes.

4.5.3.3 Industrial and Commercial Properties

Several areas within the study area are zoned “Industrial” or “Business Enterprise Park/Light Industry and Warehousing”. The main business parks and industrial estates located in the study area include:

- Westgate Business Park located on the N4 Boyle Road in Cortober
- Carrick Retail and Business Park located on the N4 Boyle Road in Cortober

⁴¹ Leitrim County Council, 2014. Leitrim County Development Plan 2015-2021 Housing Strategy. Available at: http://www.leitrimcoco.ie/eng/Services_A-Z/Planning-and-Development/Development-Plans/County-Development-Plan-2015-2021/

- Carrick Shopping Centre and Retail Park located on the N4 in Attifinlay, Carrick-on-Shannon
- Carrick-on-Shannon Business & Technology Park located on Castlecara Road, Carrick-on-Shannon
- Carrick Business Campus located in Attifinlay, Carrick-on-Shannon

The majority of the commercial properties within the study area are located within the environs of Carrick-on-Shannon. Two of the largest employers in the area are VistaMed located in the IDA Ireland Business & Technology Park and Avantcard in Carrick Business Campus.

Masonite Ireland Limited is one of the largest employers in the county. They occupy a large industrial building with associated settlement ponds, storage tanks and carparks located in Annaduff, east of Carrick-on-Shannon on the N4. There are various other industrial and commercial properties located outside of Carrick-on-Shannon and Cortober, the larger of which include Rosderra Irish Meats and Archway Products Limited located just outside Jamestown and Durkin Concrete in Drumkeeran (See Population Figures 4.4.1.0 to 4.4.1.5).

4.5.3.4 Proposed Developments (Non-Agricultural)

Proposed developments are detailed in Section 4.3 Land Use and Planning.

4.5.3.5 Utilities and Services

Irish Water (Water Supply and Foul Sewer Infrastructure)

Irish Water were consulted and provided the locations of known existing water supply and foul sewer infrastructure within the study area as shown on Material Assets Non-Agriculture Figures 4.5.1.0 to 4.5.1.5.

Public watermains are located in much of the existing N4 road; from Cloonman to Cortober, Carrick-on-Shannon to Tully and Mountcampbell to Fearnaght. Group Water Scheme (GWS) pipelines also tee off the public watermains within the study area. Aside from the existing N4, public watermains are present in the regional roads R299, R280, R368 and R370, and on many other local roads. The remainder of the properties in the study area are serviced by private wells (ref Section 4.1.4 for further details).

The public water abstraction point is located on the Shannon, upstream of the town of Carrick-on-Shannon. This is a large regional drinking water abstraction.

The public foul water network is primarily located in the town of Carrick-on-Shannon, which indicates that a large proportion of the study area is serviced by private septic tanks or other private systems. The public sewer network is located in the existing N4 from the R368 junction to the bridge, along the N4 inner relief road to the south of the town and crosses the existing N4 east of the Castlecara Road (L3408) Junction. There is also a Wastewater Treatment Plant (WWTP) located on the L3655 between Priors Point housing estate and Burke's Funeral Directors in the townland of Attirory.

ESB/ESBI electricity supply

Figures 4.5.2.0 to 4.5.2.5 show the high voltage 38kV, 110kV and 220kV ESB lines around Carrick-on-Shannon. Many of these lines converge at the 110kV sub-station adjacent to Carrick-on-Shannon railway station.

In total within the study area, there are:

- Three 38kV lines coming from Claremorris, Gorteen and Mohill which converge at the Carrick-on-Shannon 110kV substation
- Six 110kV lines, four of which converge at the Carrick-on-Shannon 110kV substation. Of these four, one connects to Corderry and another to Arva and the final two originate from the large Flagford 220kV station on the L1034 approximately 3km southwest of Carrick-on-Shannon. Two other 110kV lines pass through the study area, both originating from the large Flagford 220kV station, they connect to Sligo and the Masonite site south of Drumsna
- One 220kV line which passes through the southern portion of the study area travelling from Arva to the Flagford 220kV station

All lines are overhead except for a 1.5km section of the 38kV line connecting Carrick-on-Shannon and Mohill which goes underground through the Cnoc Na Sí housing estate before emerging on the other side of the existing N4.

The ESB high voltage network does not follow the path of the existing N4 but crosses the national road in five locations. Two overhead (OH) lines cross the N4 west of Cortober, in Cloonman and Cloonskeevan, one crosses just east of Carrick-on-Shannon in Lisseeghan and one crosses overhead in Moher. One high voltage underground (UG) power line crosses the existing N4 at the Cnoc na Sí housing estate, also in Lisseeghan. Further to the power lines crossing, there is a short 125mm diameter ESB duct that crosses the existing N4 just west of the River Shannon Bridge.

Eirgrid

Eirgrid are responsible for the development, management and operation of the electricity transmission grid in Ireland. Eirgrid were contacted in relation to the location of works on existing or proposed infrastructure which may form a constraint on the project. The locations of high voltage transmission lines within the study area boundary are shown on Figure 4.5.2.0.

It is noted that two of the existing high voltage transmission circuits that pass through the area, Flagford to Sligo and Arva to Carrick-on-Shannon 110 kV circuits, need a capacity increase. However, this is expected to be completed by re-using existing structures where possible and following the existing route of the circuits. The Flagford to Louth 220 kV circuit also passes through the study area and it is planned that this will also be refurbished. Again, the existing route and structures will be retained, with some hardware changes provided where needed.

Eirgrid confirmed that, at the time of writing this Constraints Study, there are no planned network developments that will add transmission infrastructure in the study area.

EIR

Eir were contacted and the locations of Eir infrastructure are shown in Figure 4.5.3.0 to 4.5.3.5. The Eir telecoms network follows the route of the existing N4 for most of the road within the study area. The Eir broadband network also follows the route of the existing N4 from Cloonman, through Carrick-on-Shannon, past the L3408 junction and again from the L7426 junction through to Faulties.

BT

BT were contacted in relation to the location of BT services within the study area. They confirmed that it is their policy to not provide electronic data for large swathes of areas however, they did confirm that there are BT fibre optic cables within the N4 study area. BT services are present within the N4 study area at the following locations:

- Leitrim Leisure Centre
- Rosebank Retail Park
- Along the railway line
- At the train station

Gas Networks Ireland (Bord Gáis) Gas Supply

Gas Networks Ireland (Bord Gáis) were contacted and have confirmed that there is no existing gas infrastructure within the study area boundary.

Vodafone

The locations of Vodafone' mobile phone antennas within the study area are shown on Figures 4.5.3.0 to 4.5.3.5.

Three

Three were contacted but did not respond. Three antennas within the study area were identified through use of the ComReg database (see proceeding section).

ComReg

The Commission for Communications Regulation (ComReg) is the statutory body responsible for the regulation of the electronic communications sector (telecommunications, radio-communications and broadcasting transmission) and the postal sector. They are the national regulatory authority for these sectors in accordance with EU law which is subsequently transposed into Irish legislation.

ComReg were contacted in relation to identifying the location of telecoms antennas within the study area who identified Eircom, Enet, Imagine, Meteor, Three and Vodafone.

They also provided information on the location of antennas which is included in Figures 4.5.3.0 to 4.5.3.5.

Virgin Media

Virgin Media was contacted by the project team and has confirmed that there is no record of underground services within the study area boundary.

Aurora (Telecom)

The Aurora Telecom Network Maps⁴² were consulted and there is no network located within the study area boundary.

ENet

ENet were contacted and confirmed that there is ENet infrastructure located in the road carriageway in both Carrick-on-Shannon and Cortober. The location of ENet infrastructure is shown on Figures 4.5.3.0 to 4.5.3.5.

COLT (Telecom)

The Colt online Fibre Availability Checker⁴³ was consulted and there is no network located within the study area boundary.

SIRO (Telecom)

The SIRO Roll-Out Map⁴⁴ was consulted and SIRO do not have any existing infrastructure within the study area.

4.5.3.6 Waste Facilities***Licensed Facilities***

The Environmental Protection Agency (EPA) provide licensing for certain activities in the waste sector. These include landfills, transfer stations, hazardous waste disposal and other significant waste disposal and recovery activities. A waste licence is a single integrated licence dealing with emissions to all environmental media and the environmental management of the facility.

There are two licensed facilities within the study area, and these are listed in Table 4.5.3. Carrick-on-Shannon landfill is a municipal waste landfill located approximately 3km north-east of Carrick-on-Shannon on the R280 and holds a Waste Licence W0064-01. Masonite Ireland Limited located in Derryoughter in Drumsna hold an Integrated Pollution Prevention and Control (IPPC) Licence P0021-02.

Table 4.5.3 EPA Waste Licensed Facilities

Licence No	Company	Address	IPC / IEL / Waste
P0021-02	Masonite Ireland	Derryoughter, Drumsna, Carrick-on-Shannon, Leitrim	IPC
W0064-01	Carrick-on-Shannon Landfill	Ballynamoney, Carrick-on-Shannon, Leitrim	Waste

⁴² Aurora, 2022. Network Maps. Available at: <https://www.auroratelecom.ie/network-maps/>

⁴³ Colt, 2022. Fibre Availability Checker. Available at: <https://www.colt.net/colt-network-map/>

⁴⁴ SIRO, 2022. SIRO Roll-Out Map. Available at: <https://siro.ie/roll-out/#Leitrim>

Closed/Historic Landfills

The EPA is obliged to process applications from local authorities in relation to “closed landfills” in accordance with the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations, 2008.

“Closed landfills” are also commonly referred to as historic landfills.

A search of the list of Historic Landfill-Certificates of Authorisation⁴⁵ available on the EPA website showed no Historic Landfills located within the study area boundary.

Waste Facility Permits/Certificate of Registration

The Waste Facility Permit and the Certificate of Registration Database is a register for waste facility permits and certificates of registration issued by local authorities under the Waste Management (Facility Permit and Registration) Regulations, S.I. No. 821 of 2007, as amended.

A search of the Local Authority Waste Facility Register³⁶ returned four Permits and Certificates of Registration for County Leitrim and 17 for County Roscommon. None of the Permits or Certificates of Registration identified are located within the study area boundary.

Civic Amenity Sites

The Leitrim County Council website⁴⁶ was consulted and there are no civic amenity sites located within the study area boundary.

The Roscommon County Council website⁴⁷ was consulted and there are no civic amenity sites located within the study area boundary.

Recycling

The Repak Recycling Register³⁷ was examined and although there are a number of Bring Banks located at various stores and car parks within the study area, there are no recycling facilities present which would act as a constraint to the Project.

4.5.3.7 Pits, Quarries and Mines

The presence of historic and active pits, quarries and mines are discussed in Section 4.15 – Soils and Geology.

⁴⁵ Environmental Protection Agency, 2020. Historic Landfill-Certificate of Authorisation. Available at: <https://epawebapp.epa.ie/terminalfour/HLF/index.jsp>

⁴⁶ Leitrim County Council, 2022. Civic Amenity Sites (Recycling Centres)- Information. Available at: http://www.leitrimcoco.ie/eng/Services_A-Z/Environment/Recycling_Waste_and_Litter_/Recycling-Centres/Leitrim-Recycling-Centres-Civic-Amenity-Sites.html

⁴⁷ Roscommon County Council, 2022. Civic Amenity Sites. Available at: https://www.roscommoncoco.ie/en/Services/Environment/Waste_Management,_Disposal_and_Recycling/Civic-Amenity-Sites/

4.5.4 Summary

In summary, there are many constraints relating to non-agricultural material assets present within the study area. The most significant of these include:

- Residential, Industrial, Business and Commercial Properties (see Land Use and Planning Figures 4.3.1.0 and 4.3.1.1)
- Amenities associated with the River Shannon (see Population Figures 4.4.1.0 to 4.4.1.5)
- Tourism and recreational attractions (see Population Figures 4.4.1.0 to 4.4.1.5)
- Major high voltage ESB transmission lines, related infrastructure and substation

4.6 Material Assets — Agriculture

4.6.1 Introduction

This section describes the material assets - agriculture constraints identified within the study area for the N4 Carrick-on-Shannon to Dromod Project and should be read in conjunction with the material assets – agriculture constraints shown on Figures 4.6.1.0 to 4.6.3.5.

Section 4.6.2 describes the methodologies and sources of information that were used to carry out the study. Section 4.6.3 describes the material assets - agricultural constraints within the study area. A summary is presented in Section 4.6.4.

4.6.2 Methodology and Sources of Information

4.6.2.1 Methodology

This constraints study is comprised of a desktop collation and interpretation of published data and a site survey of the study area that was undertaken on 25 August and 26 August 2020. The purpose of this constraints study is to identify features which reflect the agricultural potential and agricultural sensitivity of the study area. The identification of agricultural constraints and classification of agricultural land is completed by:

- Identification of generalised land use categories within the study area
- Measuring the area of agricultural land within the footprint of the study area
- Measuring the area of good agricultural land within study area. Poor land is where there is scrub, very heavy rush growth and boggy wet land. Good agricultural land is grass land without scrub and heavy rush infestations. For the purposes of this assessment land quality is identified using aerial photography and visual assessment from site surveys
- Numerating the quantity of farm yards and agricultural structures within the study area and identifying the number of high sensitivity farm yards (e.g. equine farms). For the purpose of this assessment these were identified using aerial photography and visual assessment from a site survey

4.6.2.2 Guideline and Legislation

The following guidelines and legislation were referenced to inform this constraints study:

- European Union (2018) (Planning and Development) (Environmental Impact Assessment) Regulations. (SI 296 of 2018)⁴⁸

⁴⁸ European Union, 2018. (Planning and Development) (Environmental Impact Assessment) Regulations. (SI 296 of 2018) Available at: <http://www.irishstatutebook.ie/eli/2018/si/296/made/en/print>

- Environmental Protection Agency (EPA) (August 2017) Guidelines on the Information to be contained in Environmental Impact Assessment Reports²¹
- Transport Infrastructure Ireland (TII) (2019) Project Management Guidelines PE-PMG-02041¹. In line with the 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

4.6.2.3 Sources of Information

The following sources of information informed the constraints study:

- Data from the Central Statistics Office:
- The Census of Agriculture⁴⁹. At the date of publication of this document the 2010 Agricultural Census publication is the only complete and finalised source of data which gives the number of farms for each farm enterprise at a county level. Only preliminary results are available for the most recent agricultural census in 2020. The 2010 county data is used as an indicator of the size of farms within the study area. It is possible to use the PxStat (CSO Main Data Dissemination Service)⁵⁰ to access this data at an Electoral Division (ED) level. This data is listed in Table 4.6.4 and Table 4.6.5
 - The average farm size has changed very little from 2010 to 2020. Although a complete set of data for all enterprise types has not been published by the CSO from the 2020 census, the available data indicates that while the number of specialist sheep farmers has increased since 2010, the number of dairy farms has not changed significantly and hence the overall number of high sensitivity and medium sensitivity farms will not have changed significantly since 2010.
 - The 2020 CSO June Crops and Livestock Survey⁵¹. This is the most up to date data source for the total number of dairy cows in Counties Leitrim and Roscommon (but does not provide the number of dairy farmers)
- Soil mapping data from the Teagasc Irish Soil Information System⁵² was used to identify the soil types within the study area. For example, rock, peat and low-lying 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

⁴⁹ Central Statistics Office, December 2012. Census of Agriculture 2010 – Final Results. Available at:

<https://www.cso.ie/en/media/csoie/releasespublications/documents/agriculture/2010/full2010.pdf>.

⁵⁰ Central Statistics Office, 2020. Databases, PxStat (CSO Main Data Dissemination Service), Business Sector, Census of Agriculture. Available at: <https://data.cso.ie/#>

⁵¹ Central Statistics Office, 2020. Statistics, Agriculture, Crops and Livestock June Final Results, Table 4. Available at:

<https://www.cso.ie/en/releasesandpublications/er/clsjf/cropsandlivestocksurveyjunefinal2018/>

⁵² Teagasc, 2019. Irish Soil Information System. Available from <http://gis.teagasc.ie/soils/>

- Corine data⁵³ on land use was examined for the study area
- Irish Forestry Geo-portal⁵⁴ was examined to identify forestry plots
- Bing⁵⁵ and Google³³ aerial maps were used to identify yards, farm facilities, forestry, scrub and rough boggy land
- The Property Registration Authority of Ireland (PRAI)³² open database was used to identify folio land parcels where grazing dairy cows and horses were noted during the site survey

The following features were identified from desktop information sources:

- Yards and farm facilities - farm yards and other yards and facilities such as sand arenas used by horses and farm paddocks and roadways typical of dairy farms were identified from aerial photography
- Dairy farms are generally of high sensitivity and equine enterprises are within the high to very high range of enterprise sensitivity. The PRAI open database was used to identify folio land parcels
- 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 and aerial photography and later verified with site surveying. Ordnance Survey Discovery mapping was used to identify upland areas

A site survey was conducted in August 2020. The 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 yards - farm yards and facilities such as stables, sand arenas and lounging areas were identified
- Fields with dairy cows
- Fields with horses
- Land quality - desktop information was verified and areas with forestry, scrub and marshes were noted

Table 4.6.1 lists a range of common Irish enterprise categories alongside their respective sensitivity dependent on their intensity/scale. Where farm enterprises were identified during the survey, the rating system set out in Table 4.6.1 was used to categorise the sensitivity. It should be noted that the information from the survey has been interpreted based on the professional judgement of the author.

⁵³ EPA, 2020. Corine Landcover 2018. Available from <http://gis.epa.ie/geonetwork/srv/eng/catalog.search#/metadata/e09739bf-abd1-4408-9fa5-510a156673ba>

⁵⁴ Irish Forestry Geo-portal, Available at <https://www.agriculture.gov.ie/forests-service/forests-service-general-information/forest-statistics-and-mapping/forest-map-viewer/geoportals/>

⁵⁵ Bing Aerial Mapping. Available at: <https://www.bing.com/maps>

Table 4.6.1 Farm Sensitivity

Farm enterprise type	Intensity / Scale	Sensitivity
Stud farms, farm shops / open farms / agri tourism farms are generally high or very high sensitivity. Intensive horticulture (mushroom farms) is generally high or very high sensitivity. Intensive agriculture (pigs and poultry) is high sensitivity	High	Very High
	Medium	High
	Low	Medium
Dairy farms and equine enterprises	High	High
	Medium	High
	Low	Medium
Non dairy grazing livestock enterprises (including beef, sheep and small non intensive equine) and grass cropping enterprise	High	Medium
	Medium	Low
	Low	Very Low
Tillage	High	Medium
	Medium	Low
	Low	Very Low
Rough Grazing, Bog, Forestry, Woodland	Low	Low or Very Low

4.6.3 Existing Environment

4.6.3.1 Land use (2018 Corine Data)

The study area, as illustrated in Figure 4.1.1.1, is approximately 7.7km at the widest point and extends approximately 18.3km from Drumharlow townland north of Carrick-on-Shannon to Faulties townland south of Aghamore and encompasses approximately 7,820 hectares (ha) of land within its boundary.

Table 4.6.2 Land Use within the Study Area ⁵³

Land Use Category	% of Study Area
Total Area (ha)	7,820
Discontinuous Urban Fabric	4%
Mineral Extraction Sites	0.3%
Pasture	59.2%
Land Principally used for Agriculture, with Significant Areas of Natural Vegetation	20%
Forestry (conifers and deciduous)	6%
Inland marshes	4.5%
Waterbodies	6%
Total	100%

Agricultural pasture land is the main land use within the study area; which combined with significant areas of natural vegetation account for 79% of the study

area. Some of the inland marshes (4.5%) are also used for agriculture. Forestry and waterbodies both account for 6% each of the total land cover. The Corine land cover data is presented in Figure 4.6.1.0 to 4.6.1.3.

4.6.3.2 Soil type (Teagasc Soils Data and survey data)

A review of the Irish Soils Information System Map Viewer⁵² was carried out to identify the soil types occurring within the study area.

The principal soils of the study area are surface water gleys mainly comprised of the Ballinamor (0760BN) and Kilrush (0700KR) series which account for approximately 44% of the study area. These are heavy, often poorly drained, clay loam gley type soils with intermediate agricultural potential and suited mainly for extensive pasture use. Luvisols are loam soils over a clay enriched subsoil and within this study area are often poorly drained. However, when adequately drained these are productive soils. These soils (Elton (1000ET) and Rathowen (1030RA) series) are located at the south side of the River Shannon and account for approximately 22% of the study area. Luvisols vary from intermediate to high agricultural potential depending on site specific factors such as drainage and management. Poor quality peat soils (1xx) are located throughout the study area and account for 15% of the study area. These are generally low agricultural potential soils. Alluvial soils occur along river channels and lakes and in marshes (05RIV). Making up for 10% of the study area, these are generally poorly drained, may be subject to flooding and have low to intermediate agricultural potential. Brown earths (Baggotstown (1150BG) series) are productive soils suitable for ploughing and are generally free draining. These are generally high agricultural potential soils and account for 1% of the study area. The Teagasc soil types are presented in Figures 4.6.2.0 to 4.6.2.5.

Table 4.6.3 Soils of the Study Area⁵²

Principle Soil type	% of Study Area
Total area (ha)	7,820
Surface Gley Soils [(Kilrush (0700KR), Ballinamore 0760BN)]	44%
Luvisols (loam top soil / clay subsoil) [Elton (1000 ET), Rathowen (1030RA)]	22%
Peat (1xx)	15%
Alluvial soils (05RIV) including marshes	10%
Brown earths [Baggotstown (1150BG), Mullabane (1100MB)]	1%
Water / manmade	8%
Total	100%

4.6.3.3 Enterprise types (CSO Data)

The primary source of data available on existing farm types in Ireland is the 2010 census data. However, although the 2010 census can be a useful indicator of agricultural data in the study area it should be interpreted with caution as National and European policy has changed in the interim. For example, milk quotas have

been abolished since 2015 and this abolition has resulted in an increase in the size of the national dairy herd. In County Roscommon dairy cow numbers have almost doubled from 4,891 in 2010 (2010 Census data) to 8,800 in 2020 (2020 CSO livestock survey June 2020)⁵⁶ while numbers of dairy cows in Leitrim have stayed relatively stable at approximately 1,900 dairy cows.

Table 4.6.4 Enterprise Types within the Study Area

Farm enterprise type (Table 2, 2010 Ag Census, CSO)	% of farms within each category		
	Leitrim	Roscommon	Nationally
Mainly dairy	1.2 (0.9)	1.5 (1.5)	11 (11.3)
Non-dairy grazing livestock (beef cattle) and mixed field crops	84.1	90.1	72.5
Specialist sheep	14.1 (19)	7.4 (9.7)	10 (12.9)
Mainly tillage	0.0	0.2	3.5
Mixed crops & livestock	0.1	0.4	2
Other	0.5	0.4	1
Total	100	100	100
Average size (ha)	25.1 (25.5)	27.1 (27.7)	32.7 (33.4)
(Figures in brackets are from the available 2020 Census of Agriculture preliminary results)			

⁵⁶ Central Statistics Office, 2020. Livestock Survey Final (Table 4). Available at: <https://www.cso.ie/en/releasesandpublications/er/clsjf/cropsandlivestocksurveyjunefinal2020/>

Table 4.6.5 Agricultural Statistical Data for Local Electoral Divisions ⁵⁷

Electoral Division	No of Farms	Size of farms (ha)	Grassland (ha)	Grassland Rough grazing(%)	Tillage (ha)	No. Beef cattle	No. Dairy cows	No. Sheep	No. Horses
County Leitrim EDs									
Carrick-on-Shannon	63	23.5	1355	9%	7	1153	0	438	26
Drumsna	78	19.6	1425	7%	0	1330	0	212	17
AnnaDuff	33	21.8	716	1%	0	816	0	435	1
Average		21.6		6%					
County Roscommon EDs									
Killukin	31	28.1	842	4%	0	876	69	0	6
Danesfort	36	29.4	1032	3%	0	997	72	232	6
Aughrim East	50	29	1413	3%	0	1641	0	193	6
Clonteen	53	29.6	1474	6%	0	1873	57	246	55
Average		29		4%					

⁵⁷ Central Statistics Office, 2020. General Statistics Office-Census of Agriculture Mapviewer. Available from: <http://census.cso.ie/agrimap/>

Size of farms

Table 2 of the 2010 Agricultural Census shows the average size of farms in Counties Leitrim and Roscommon to be approximately 25ha and 27.1ha respectively. These areas correspond closely to the EDs as described in Table 4.6.4. The 2020 Agricultural Census preliminary results show that neither the national or the County Leitrim and County Roscommon average farm size have varied significantly since 2010. The 25ha average size (i.e. as per Table 4.6.4 $(21.6 + 29) \div 2$) is significantly lower than the national average of 32.7ha.

Type of Enterprise

According to the 2010 Agricultural Census the principal enterprise type is beef cattle and land used for forage (hay/silage). As shown in Table 4.6.4 above there is a very low percentage of dairy farms in Counties Leitrim and Roscommon and this is reflected in the EDs statistics (i.e. no dairy cows in the three County Leitrim EDs and 4% of cattle in the Roscommon EDs are dairy cows). Table 8D of the 2010 Agricultural Census statistics shows that approximately 10% and 12% of farms in County Leitrim and County Roscommon have horses and ponies and these farms have an average of 5.3 horses per farm. The local ED statistics show a relatively high number of horses in Carrick-on-Shannon, Drumsna and Clonteen see Table 4.6.5.

4.6.3.4 Key Constraints

The key material assets - agricultural constraints identified within the study area during a site survey carried out in August 2020. From the aerial mapping surveys, they are identified as “agricultural land”, “farm yards” and “highly sensitive folios”, this is documented in Table 4.6.4. These are also shown on Figures 4.6.3.0 to 4.6.3.5 and described in detail in the proceeding sections.

Table 4.6.6 Farm Yard Types Identified in the Site Survey (Based on Professional Judgement)

Enterprise	Low – Medium sensitivity	High – Very High sensitivity
Equine	1	1
Dairy	-	2
Horticulture (mushroom)	1	1
Beef cattle / sheep / silage / hay	236	-
Poultry	-	2
Other	-	2
Total	238	8

Agricultural Land

Agricultural land is the dominant land use within the study area. Overall, the agricultural potential of the land in the study area is intermediate and its suitability is restricted to medium intensity pasture-based enterprises and is not suitable for tillage. There are some local exceptions, particularly in the south of the study area,

where there are high agricultural potential Luvisols and Brown Earth soils. Forestry and low agricultural potential soils such as peats, alluvial soils and river marshes have lower sensitivity than productive pastureland.

When urban land cover, waterbodies, quarries, forestry, inland marshes, alluvial soils and peat soils are deducted from the study area what remains is land with an intermediate agricultural potential and this is presented as a constraint in Figures 4.6.3.0 to 4.6.3.5. From an agricultural perspective, where possible, poorer quality land should be considered in preference to this land when identifying alternatives and options for the project transport solution.

Farm yards

All farm yards and associated facilities identified in the site survey and from aerial photography are identified as agricultural constraints and are presented on Figures 4.6.3.0 to 4.6.3.5 and should be avoided where possible. 246 agricultural yards/buildings were identified in the study area. Of these eight were identified as having high sensitivity and the remaining 238 were low – medium sensitivity. The high sensitivity enterprises are:

- One equine in Tonnagh, Co Leitrim – northwest of Carrick-on-Shannon
- Two dairy farms. One in Tullyleague, Co Roscommon – west of Carrick-on-Shannon and one in Liscolvan, Co Roscommon – southeast of Carrick-on-Shannon
- One farm shop in Tullyleague, Co Roscommon – west of Carrick-on-Shannon
- Two poultry houses. One in Tullyleague, Co Roscommon – west of Carrick-on-Shannon and one in Knockadalteen, Co Roscommon – west of Carrick-on-Shannon
- One mushroom farm in Cultyconeen, Co Roscommon – west of Carrick-on-Shannon
- One agri-tourism farm (quad-biking) in Cultyconeen, Co Roscommon – west of Carrick-on-Shannon

High sensitivity Areas

Four folios were mapped as high sensitivity areas (two dairy farms, one equine farm and one agri-tourism farm) and are illustrated as high sensitivity agricultural constraints in Figures 4.6.3.0 to 4.6.3.5.

4.6.4 Summary

The constraints study involved a site survey assessment and desktop information assessment. The study area encompasses approximately 7,820ha of land within its boundary of which approximately 79% is agricultural land (as determined from Corine 2018 data⁵³, the examination of aerial photography and DAFM Irish Forestry Geo-portal). The statistics for Counties Leitrim and Roscommon and seven local EDs were examined to determine the typical farm types, farm size and cropping for the study area. The farm type was also identified from the site survey. Forestry, waterbodies, mineral extraction land-cover, urban land-cover and inland marshes was identified from Corine 2018⁵³, aerial photography and DAFM Irish Forestry Geo-portal data⁵⁸. The Irish Soils Information system was examined to identify soil types. The site survey assessed that the majority of the agricultural land is of intermediate agricultural potential and is not a high sensitivity constraint. However, Figures 4.6.3.0 to 4.6.3.5 differentiates this intermediate agricultural potential land from poorer quality peats and alluvial soils and other low sensitivity areas such as land devoted to urban use, forestry, mineral extraction sites, inland marshes and waterbodies. The site survey identified 246 farm yards as constraints. Eight of these are high sensitivity enterprise farm yards (two dairy, one equine, one mushroom, one agri-tourism, one farm shop, two poultry). Four folios were digitised as high sensitivity areas (two dairy farms, one equine farm and one agri-tourism farm).

⁵⁸ Department of Agriculture, Food and the Marine, 2022. Irish Forestry Geo-Portal. Available at: <https://data.gov.ie/dataset/suggest/e08f7fc5-6fcb-4301-b996-49bacd0c4409>

4.7 Air Quality

4.7.1 Introduction

This Section describes the air quality constraints identified within the study area for the N4 Carrick-on-Shannon to Dromod Project and should be read in conjunction with the Population Constraints Figures 4.4.1.0 to 4.4.1.5, Biodiversity Constraints Figures 4.12.1.0 to 4.12.2.5 and Soils and Geology Constraints Figures 4.15.1.0 to 4.15.4.5.

Section 0 describes the methodologies and sources of information that were used to carry out the study. Section 4.7.3 describes the air quality constraints and the ambient air quality within the study area. A summary is presented in Section 4.7.4.

The main constraints associated with air quality are the numbers of sensitive locations in the study area and the assimilative capacity of the baseline air quality relative to limit values. The study area consists of high density urban residential to the north (Carrick-on-Shannon) and low density residential rural to the south.

4.7.2 Methodology and Sources of Information

4.7.2.1 Methodology

The air quality constraints study has been prepared in accordance with the Transport Infrastructure Ireland (TII) guidance document⁵⁹.

Section 2.3, *Route Selection Process Stage 1 Preliminary Options Assessment* of the above document⁵⁹ includes the initial steps to be taken to identify air quality constraints within a study area as follows:

“The initial step (Stage 1, i.e., Preliminary Options Assessment) in the Route Selection Process is to identify the nature and extent of significant constraints within a defined Study Area. These constraints should be documented and mapped so that feasible route options can be designed to avoid such constraints, where possible.

The first part of this data collection should be based on deskbound research studies. All known physical constraints from an air quality perspective should be identified and recorded on suitably scaled maps.

The specific objectives of the air quality input to the Stage 1 Preliminary Options Assessment of the Route Selection Process are to characterise the existing ambient air quality in the study area and to initially identify all sensitive receptor locations within the study area likely to be impacted by a proposed scheme before feasible route options are identified...”

⁵⁹ TII, 2011. Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes. Available at: <https://www.tii.ie/technical-services/environment/planning/Guidelines-for-the-Treatment-of-Air-Quality-during-the-Planning-and-Construction-of-National-Road-Schemes.pdf>

The above approach has been followed for this constraints study and the study area is as described in Section 4.1 and shown on Figure 4.1.1.1.

In addition, Section 2.3 of the TII guidance document⁵⁹ also describes the air quality input required for the Stage 1 Preliminary Options Assessment as follows:

1. *“Describe existing local air quality conditions within the study corridor in relation to nitrogen dioxide (NO₂) and PM₁₀. This should take full account of any existing monitoring data from networks established by the Environmental Protection Agency (EPA) and local authorities and monitoring carried out by other organisations, as relevant. It should also identify any areas where the standards are exceeded;*
2. *Describe any non-road sources that may significantly affect air quality within the study corridor, for example, industry, ports, areas of domestic solid fuel combustion, or powerstations;*
3. *Identify and record all sensitive receptor locations within the study area and all sensitive receptors within 50m of the carriageway of each feasible route option that are, or have the potential to be, significantly affected by a proposed scheme;*
4. *Take full account of all previous studies, local air quality assessments or reports, and any other air quality work undertaken by the TII (NRA), EPA or local authorities, and*
5. *Include a review of planning permissions granted within the Study Area of relevance from an air quality perspective (e.g. significant sensitive receptors and developments likely to have a significant impact on air quality)”.*

The requirements of the TII guidance document⁵⁹ have been considered in this assessment with the exception of Item 3 in relation to feasible options, as alternatives and options are developed after the Constraints Study.

Sensitive receptor locations are defined in the guidelines⁵⁹ as residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e. locations where members of the public are likely to be regularly present. These are shown on the Population Constraints Figures 4.4.1.0 to 4.4.1.5.

Designated habitats are also potentially sensitive receptors. Such sites include, Natural Heritage Areas (NHA), Special Areas of Conservation (SAC), Special Protection Areas (SPA), National Parks, Nature Reserves, Refuges for Fauna, Refuges for Flora, Wildfowl Sanctuaries, Ramsar Sites, Biogenetic Reserves and UNESCO Biosphere Reserves. The biodiversity receptors present within the study area are detailed in Section 4.12. and on the Biodiversity Constraints Figures 4.12.1.0 to 4.12.2.5. All ecologically sensitive sites identified will be considered in terms of nitrogen oxide concentrations.

4.7.2.2 Air Quality Standards and Limit Values

In order to reduce the risk of poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values are set for the protection of human health and ecosystems.

On 12 April 2011 the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011)⁶⁰ came into force and transposed Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe into Irish law.

The purpose of the Air Quality Standards Regulations 2011 is:

- to establish limit values and alert thresholds for concentrations of certain pollutants
- to provide for the assessment of certain pollutants using methods and criteria common to member states
- to ensure that adequate information on certain pollutant concentrations is obtained and made publicly available
- to provide for the maintenance and improvement of ambient air quality where necessary

The limit values established in these regulations are included in Table 4.7.1. Table 4.7.2 presents the United Nations Economic Commission for Europe (UNECE) Critical Loads for Nitrogen as presented in the TII guidance⁵⁹.

Table 4.7.1 Air Quality Standards (AQS) from Regulations 2011 (S.I No. 180 of 2011)

Pollutant	Limit value for the protection of:	Averaging period	Limit value (µg/m ³)	Basis of application of limit value
Nitrogen Dioxide (NO ₂)	Human Health	1-hour	200	≤18 exceedances p.a. (99.79 %-ile)
		Calendar year	40	Annual mean
Nitrogen Oxides (NO _x)	Vegetation	Calendar year	30	Annual mean
Particulate Matter (PM ₁₀)	Human Health	24-hours	50	≤35 exceedances p.a. (98.1%ile)
		Calendar year	40	Annual mean
Particulate Matter (PM _{2.5})	Human Health	Calendar year	25	Annual mean
		Calendar year	20	Annual mean
Carbon Monoxide (CO)	Human Health	8-hour Annual Average	10,000	8-hour Average

⁶⁰ Department of the Environment, Heritage and Local Government, 2011. Air Quality Standards Regulations 2011. Available at: <https://www.irishstatutebook.ie/eli/2011/si/180/made/en/print>

Pollutant	Limit value for the protection of:	Averaging period	Limit value ($\mu\text{g}/\text{m}^3$)	Basis of application of limit value
Benzene	Human Health	Calendar year	5	Annual mean

Table 4.7.2 UNECE Critical Loads for Nitrogen

Ecosystem type	Kg(N)/ha/yr	Reliability and indication of exceedance effects (see reliability key at end of table)
Forest habitats		
Temperate and boreal	10-20	# Changes in soil processes, ground vegetation, mycorrhiza, increased risk of nutrient imbalances and susceptibility to parasites
Heathland, scrub and tundra habitats		
Tundra	5-10 ^a	# Changes in biomass, physiological effects, changes in species composition in moss layer, decrease in lichens
Arctic, alpine and subalpine scrub habitats	5-15 ^a	(#) Decline in lichens, mosses and evergreen shrubs
Northern wet heath • 'U' Calluna dominated wet heath (upland moorland) • 'L' Erica tetralix dominated wet heath	10-20 10-25 ^{a,b}	(#) Decreased heather dominance, decline in lichens and mosses (#) Transition heather to grass
Dry heaths	10-20 ^{a,b}	## Transition heather to grass, decline in lichens
Grassland and tall forb habitats		
Sub-Atlantic semi-dry calcareous grassland	15-25	## Increase tall grasses, decline in diversity, increased mineralization, N leaching
Non-Mediterranean dry acid and neutral closed grassland	10-20	# Increase in graminoids, decline typical species
Inland dune pioneer grasslands	10-20	(#) Decrease in lichens, increase biomass
Inland dune siliceous grasslands	20-30	(#) Increase in tall grasses, decrease in diversity
Mountain hay meadows	10-20	(#) Increase in nitrophilous graminoids, changes in diversity
Moist and wet oligotrophic grasslands • <i>Molinia caerulea</i> meadows • Heath (<i>Juncus</i>) meadows and humic (<i>Nardus stricta</i>) swards	15-25 10-20	(#) Increase in tall graminoids, decreased diversity, decrease of bryophyte # Increase in tall graminoids, decreased diversity, decrease of bryophytes

Ecosystem type	Kg(N)/ha/yr	Reliability and indication of exceedance effects (see reliability key at end of table)
Alpine and subalpine grasslands	10-15	(#) Increase in nitrophilous graminoids, biodiversity change
Moss and lichen dominated mountain summits	5-10	# Effects upon bryophytes or lichens
<i>Mire, bog and fen habitats</i>		
Raised and blanket bogs	5-10 ^{a,c}	## Change in species composition, N saturation of Sphagnum
Poor fens	10-20	# Increase sedges and vascular plants, negative effects on peat mosses
Rich fens	15-35	(#) Increase tall graminoids, decrease diversity, decrease of characteristic mosses
Mountain rich fens	15-25	(#) Increase vascular plants, decrease bryophytes
<i>Inland and surface water habitats</i>		
Permanent oligotrophic waters		
• Softwater lakes	5-10	## Isoetid species negatively affected
• Dune slack pools	10-20	(#) Increased biomass and rate of succession
<i>Coastal habitat</i>		
Shifting coastal dunes	10-20	(#) Biomass increase, increase N leaching
Coastal stable dune grassland	10-20	# Increase tall grasses, decrease prostrate plants, increased N leaching
Coastal dune heaths	10-20	(#) Increased plant production, increase N leaching, accelerated succession
Moist to wet dune slacks	10-25	(#) Increased biomass, tall graminoids
<i>Marine habitats</i>		
Pioneer and low-mid salt marshes	30-40	(#) Increased late-successional species, increase productivity

Reliability key: ## reliable, # quite reliable, (#) expert judgement

^a Use towards high end of range at phosphorus limitation, and towards lower end if phosphorus is not limiting

^b Use towards high end of range when sod cutting has been practiced, use towards lower end of range with low intensity management

^c Use towards high end of range with high precipitation and towards low end of range with low precipitation

4.7.2.3 Sources of Information

The existing constraints have been determined through the review of published data from the EPA^{61,62}. The EPA collates all air quality monitoring data carried out by the EPA and local authorities.

4.7.3 Existing Environment

This section describes the existing local air quality conditions within the study area. Any non-road sources that may significantly affect air quality within the study area are also described. Finally, sensitive receptor locations within the study area are described.

4.7.3.1 Existing Local Air Quality Conditions within the Study Area

The existing air quality is determined from air quality data recorded by the EPA. The EPA divides Ireland into four zones, with air quality data recorded for each zone.

- Zone A includes Dublin City and its environs
- Zone B includes Cork City and its environs
- Zone C is defined by the EPA as 21 large towns in Ireland with a population greater than 15,000
- Zone D includes Rural Ireland, i.e. the remainder of the State excluding Zones A, B and C

Pollutants that are of concern in relation to transport projects are identified in Section 4.7.2.2. They are NO₂, NO_x, CO, PM and benzene. Table 4.7.3 presents baseline data for the most recent available years, 2021, 2020, and 2019 for each of these pollutants.

As the study area for the project is contained within Zone D, background data for this zone has been presented. Baseline values are compared to the limit values from the Air Quality Standards.

Table 4.7.3 Baseline Concentrations of Pollutants – Zone D

Year	Pollutant	Time Period	Concentration µg/m ³	Air Quality Standard µg/m ³	% of Air Quality Standard Limit
2021	NO ₂	Annual Average	7.5	40	18.75
	NO _x	Annual Average	14.2	30	47.3

⁶¹ EPA, Air Quality Reports. Available at, <http://www.epa.ie/pubs/reports/air/quality/>

⁶² EPA, EPA Maps. Available at, <https://gis.epa.ie/EPAMaps/>

Year	Pollutant	Time Period	Concentration $\mu\text{g}/\text{m}^3$	Air Quality Standard $\mu\text{g}/\text{m}^3$	% of Air Quality Standard Limit
	CO	8-hour Annual Average	300	10,000	0.003
	PM _{2.5}	Annual Average	8.7	25	34.8
	PM ₁₀	Annual Average	11.8	40	29.5
2020	NO ₂	Annual Average	7.6	40	19
	NO _x	Annual Average	15.8	30	52.6
	CO	8-hour Annual Average	400	10,000	0.004
	PM _{2.5}	Annual Average	7.8	25	31.2
	PM ₁₀	Annual Average	11.2	40	28
2019	NO ₂	Annual Average	5.7	40	14.3
	NO _x	Annual Average	7.8	30	26.0
	CO	8-hour Annual Average	-	10,000	-
	PM _{2.5}	Annual Average	10.3	25	41.2
	PM ₁₀	Annual Average	12.8	40	32.0

4.7.3.2 Ecologically Sensitive Areas

Nitrogen emissions are of importance in instances where any alternative or option crosses, or comes into close proximity to an ecologically sensitive area due to their harmful effect on vegetation. The study area includes the following ecologically sensitive areas; Lough Boderg and Lough Bofin pNHA and Lough Eidin pNHA.

Both sites are located within Zone D which has a background NO₂ concentration level of 13% of the limit value and a background NO_x concentration level of 25% of the limit value, refer to Table 4.7.3 **Error! Reference source not found..** In general, the air quality concentrations recorded in Zone D by the EPA are shown to

be well within Air Quality Standards and the assimilative capacity of the air in Zone D is considered good.

4.7.3.3 Existing Sources of Air Pollution in the Study Area

Table 4.7.4 presents the major road networks and volumes located in the study area. Annual average daily traffic (AADT) volumes are obtained from the TII's 'Traffic Counter Data Website'⁶³.

Table 4.7.4 AADT for Major Roads within Study Area

Roads	Year	Location	AADT
N4	2019	N4 Between Longford and Carrick-on-Shannon, Dromod Bypass, Co. Leitrim	7,528

The data presented in Table 4.7.4 show the 2019 (pre-Covid) volumes of traffic within the study area. The emissions to air from these vehicles are assumed to form part of the baseline concentration levels as presented in Table 4.7.3.

4.7.3.4 Non-Road Emission Sources in the Study Area

Table 4.7.5 presents a list of industrial facilities licenced by the EPA⁶⁴ within the study area, with Industrial Emissions Directive (IED), Integrated Pollution Control (IPC) or Waste Licences in place.

Table 4.7.5 EPA IED/IPC/Waste Licence Holders within the Study Area

Licence No	Company	Address	IPC/IEL/ Waste
P0021-02	Masonite Ireland	Derryoughter, Drumsna, Carrick-on-Shannon, Leitrim	IPC
W0064-01	Carrick-on-Shannon Landfill	Ballynamoney, Carrick-on-Shannon, Leitrim	Waste

The effect of the emission sources presented in Table 4.7.5 are likely to be reflected in the baseline air monitoring data presented in Table 4.7.3. No significant additional new sources have been determined through a review of planning permissions and draft EPA licences in the study area.

Sensitive receptor locations within the study area are defined in the guidelines⁵⁹, Refer to Population Constraints Figures 4.4.1.0 to 4.4.1.5 and Biodiversity Constraints Figures 4.12.1.0 to 4.12.2.5 for sensitive receptor locations. Designated habitats are also included in the Biodiversity Constraints, refer to Section 4.12 for further detail.

⁶³ Transport infrastructure Ireland (TII), Traffic Counter Data Website. Available at [https://www.nratrafficdata.ie/c2/gmapbasic.asp?sgid=ZvyVmXU8jBt9PJE\\$c7UXt6](https://www.nratrafficdata.ie/c2/gmapbasic.asp?sgid=ZvyVmXU8jBt9PJE$c7UXt6)

⁶⁴ Environmental Protection Agency, IED and IPC Licence Search. Available at <https://gis.epa.ie/EPAMaps/>

4.7.4 Summary

The existing air quality concentrations recorded by the EPA are shown to be within the air quality standards. The assimilative capacity of the air within the study area, Zone D, is considered high.

Two industrial facilities are located in the study area, however, any emissions from these sources are represented in the baseline environment.

The main constraint associated with air quality is the statutory requirement to continue to comply with Air Quality Standards for the protection of human health and vegetation.

4.8 Climate

4.8.1 Introduction

This section describes the climate constraints identified within the study area for the N4 Carrick-on-Shannon to Dromod Project.

Section 4.8.2 describes the methodologies and sources of information that were used to carry out the study. Section 4.8.3 describes the climate constraints and the climate in Ireland. A summary is presented in Section 4.8.4.

4.8.2 Methodology and Sources of Information

4.8.2.1 Methodology

The Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports²¹ outlines the topics to consider in assessing the impact of projects on climate. The topics include greenhouse gas emissions, acid rain, thermal pollution and climate change trends (macro and micro).

Furthermore, Document LA114 - Climate in the Design Manual for Roads and Bridges (DMRB)⁶⁵ Sustainability and Environment Appraisal section states that *“Environmental assessments must, as required by the EIA Directive, describe the likely significant effects of proposed projects on the environment resulting from the impact of the project on climate (greenhouse gas (GHG) emissions) and vulnerability of the project to climate change (adaptation)”*.

Consequently, this constraints study presents baseline climate information in terms of GHG emissions, the microclimate of the Midlands and the macroclimate of Ireland.

No significant variation in climatic constraints is expected which would influence the choice of alternatives and options as climate is a regional issue. However, climate is considered in the context of national emissions and Ireland’s EU and national climatic obligations, at the time of writing this assessment. In terms of climate change adaptation, flood risk is assessed separately in Hydrology in Section 4.13 of the Constraints Study.

⁶⁵ Highways England, 2021. LA114 Climate, Design Manual for Roads and Bridges. Available at: <https://www.standardsforhighways.co.uk/dmrbs/search/d1ec82f3-834b-4d5f-89c6-d7d7d299dce0>

4.8.2.2 Climate Commitments

National Climate Policy

Ireland's Climatic Obligations

The European Green Deal⁶⁶, published by the European Commission in 2019, provides an action plan which aims for the EU to be climate neutral by 2050. The European Green Deal will increase the GHG emissions reduction 2030 target to at least 55% in comparison to 1990 levels. The Commission's proposal for the first European Climate Law aims to write into law the goal set out in the European Green Deal – for Europe's economy and society to become climate-neutral by 2050.

In May 2019, the Government of Ireland declared a climate and biodiversity emergency. Following on from this, the Government of Ireland's first national Climate Action Plan⁶⁷ was published in 2019. It commits to achieving a net zero carbon energy systems objective for Ireland. The most recent Climate Action Plan (2023) was published in December 2022.

In October 2019, the Transport Climate Change Sectoral Adaption Plan⁶⁸ was published under the NCCAF. The Plan identifies the key vulnerabilities in the transport network and looks to promote greater resilience to safeguard its continued operation. There is a constraint in relation to ensuring the development of the project allows for the climate targets and commitments to be met.

The new Programme for Government: Our Shared Future⁶⁹, agreed in June 2020, accelerated the decarbonisation agenda, committing to a 7% average yearly reduction in overall greenhouse gases over the next decade, and to achieving net zero emissions by 2050.

The Government of Ireland's updated Climate Action Plan⁷⁰ (2023) sets out a detailed sectoral roadmap to deliver a cumulative reduction in emissions, building on the commitments of the first Climate Action Plan (2019). The policies to reduce transport emissions are through improving our town, cities and rural planning, and by adopting the Avoid-Shift-Improve approach: reducing or avoiding the need for travel, shifting to public transport, walking and cycling and improving the energy efficiency of vehicles.

The Climate Action and Low Carbon Development (Amendment) Act⁷¹ was enacted into national law in July 2021. The Act commits Ireland, in law, to move

⁶⁶ European Commission, 2019. European Green Deal. Available at:

https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

⁶⁷ Department of the Environment, Climate and Communications, 2019. Climate Action Plan.

Available at: <https://www.gov.ie/en/publication/ccb2e0-the-climate-action-plan-2019/>

⁶⁸ Department of Transport, 2019. Sectoral Adaptation Plan for Transport Infrastructure. Available at: <https://www.gov.ie/en/publication/a2444e-sectoral-adaptation-plan-for-transport-infrastructure/>

⁶⁹ Department of the Taoiseach, 2020. Programme for Government: Our Share Future. Available at: <https://www.gov.ie/en/publication/7e05d-programme-for-government-our-shared-future/>

⁷⁰ Department of the Environment, Climate and Communications, 2023. Climate Action Plan. Available at: <https://www.gov.ie/en/publication/7bd8c-climate-action-plan-2023/>

⁷¹ Climate Action and Low Carbon Development (Amendment) Act, 2021. Available at: <https://www.irishstatutebook.ie/eli/2021/act/32/section/15/enacted/en/html>

to a climate resilient and climate neutral economy by 2050 in alignment with the European Green Deal, and includes the following elements:

- Establishes a 2050 emissions target;
- Introduces a system of successive 5-year, economy-wide carbon budgets. The first two carbon budgets covering the periods 2021-2025 and 2026-2030 were announced by the Climate Change Advisory Council in 2021 (with a provisional budget from 2031). Once adopted by the Oireachtas, the carbon budgets will be used to prepare sectoral emissions ceilings for relevant sectors of the economy - this will include emission ceilings for the transport sector;
- Strengthens the role of the Climate Change Advisory Council in proposing carbon budgets;
- Introduces a requirement to annually revise the Climate Action Plan and prepare a National Long Term Climate Action Strategy at least every decade;
- Introduces a requirement for all Local Authorities to prepare individual Climate Action Plans which will include both mitigation and adaptation measures.

On 14 July 2021, the European Commission adopted a series of legislative proposals setting out how the EU intends to achieve climate neutrality by 2050 including the intermediate target of at least a 55% net reduction in greenhouse gas emissions by 2030. The package of proposals⁷² (known as the ‘Fit for 55 Package’) includes revisions to the legislation put forward as part of the Climate and Energy Framework 2021-2030, including the EU Emissions Trading System (ETS), Effort Sharing Regulation, transport and land use legislation. The package sets out in real terms the ways in which the Commission intends to reach EU climate targets under the European Green Deal. There is a new Emission Trading System proposed for the transport sector from 2026 as part of the package. The new ETS for road transport will be upstream focused, regulating fuel suppliers. The new ETS is proposed as emissions from road transport have risen in recent years.

There is a constraint in relation to meeting Ireland’s Climatic Obligations whereby the project must ensure alignment with the national and European targets and commitments for a low carbon future.

The first carbon budget programme proposed by the Climate Change Advisory Council was approved by Government and adopted by both Houses of the Oireachtas in April 2022.

The carbon budgets comprise of three successive 5-year budgets. The total emissions allowed under each budget is set out below in Table 4.8. as well as the average annual reduction for each 5-year period.

⁷² European Commission, 2021. Fit for 55 Package. Available at:
<https://www.consilium.europa.eu/en/policies/green-deal/eu-plan-for-a-green-transition/>

Table 4.8.1 Carbon Budgets Comprise of Three Successive 5-year Budgets

Period	Mt CO _{2eq}	Emission Reduction Target
2021-2025	295 Mt CO _{2eq}	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO _{2eq}	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO _{2eq}	Reduction in emissions of 3.5% per annum for the third provisional budget.

The CAP 2023 provides that the economy-wide carbon budgets will be supplemented by sectoral emissions ceilings, setting the maximum amount of GHG emissions that are permitted in a given sector of the economy during each five-year carbon budget. The Sectoral Emission Ceilings for each Sector, published in July 2022, is shown in Table 4.8.2. It should be noted that 5.25 MtCO_{2eq} of annual emissions reductions are currently unallocated on an economy-wide basis for the second carbon budget period (2026-2030). These will be allocated following a mid-term review and identification of additional abatement measures. The transport sector emitted approximately 12 MtCO_{2eq} in 2018 and has a ceiling of 6 MtCO_{2eq} in 2030 which is a 50% reduction over this period.

Table 4.8.2 Sectoral Emission Ceilings for each Sector

Sector	Reduction Required	2018 Emissions (MtCO _{2eq})	2030 Emission Ceiling (MtCO _{2eq})
Electricity	75%	10.5	3
Transport	50%	12	6
Buildings (Commercial and Public)	45%	2	1
Buildings (Residential)	40%	7	4
Industry	35%	7	4
Agriculture	25%	23	17.25
Other*	50%	2	1

* = F-gases, Petroleum Refining and Waste

Local Climate Policy

Leitrim County Council has prepared a Climate Change Adaptation Strategy for period 2019-2024⁷³. The Climate Change Adaptation Strategy takes on the role as the primary instrument at local level to:

- Ensure a proper comprehension of the key risks and vulnerabilities of climate change
- Bring forward the implementation of climate resilient actions in a planned and proactive manner
- Ensure that climate adaptation considerations are mainstreamed into all plans and policies and integrated into all operations and functions of Leitrim County Council

Roscommon County Council has prepared a Climate Change Adaptation Strategy for period 2019-2024⁷⁴. The Climate Change Adaptation Strategy takes on the role as the primary instrument at local level to

- Ensure a proper comprehension of the key risks and vulnerabilities of climate change
- Bring forward the implementation of climate resilient actions in a planned and proactive manner
- Ensure that climate adaptation considerations are mainstreamed into all plans and policies and integrated into all operations and functions of Leitrim County Council

The strategies provide for many actions that will be developed and implemented over a five-year period.

There is a constraint in relation to ensuring the development of the project allows for the local climate targets and commitments to be met.

4.8.2.3 Sources of Information

The existing constraints have been determined through the review of published data from the EPA and Met Eireann on existing and projected greenhouse gas emissions.

4.8.3 Existing Environment

This section describes the existing climate conditions in Ireland and the Midlands, and as such, within the study area.

⁷³ Leitrim County Council, 2019. Leitrim County Council Climate Change Adaptation Strategy 2019 - 2024. Available at: https://leitrimcoco.ie/eng/Services_A-Z/Environment/Climate-Change-Adaptation-Strategy/Leitrim-CCAS-2019-2024-.pdf

⁷⁴ Roscommon County Council, 2019. Roscommon County Council Climate Change Adaptation Strategy 2019 - 2024. Available at: https://www.roscommoncoco.ie/en/About_Us/Business-Units/Assets-Energy-Management/Climate-Change-Adaptation-Strategy-2019-%E2%80%93-2024/Final-Climate-Change-Adaptation-Strategy-2019-%E2%80%93-2024.pdf

4.8.3.1 Climate

The existing climate within the study area corresponds with the general climatic conditions for Ireland which is dominated by the Atlantic Ocean and its air and oceanic currents.

The World Meteorological Organization (WMO) recommends that climate averages are computed over a 30-year period of consecutive records. The period of 30 years is considered long enough to smooth out year to year variations. Met Eireann holds 30-year data⁷⁵ for the Mullingar Meteorological station, the closest station to the study area that holds such data. The average annual temperature is 9.3°C. Mean annual wind speed is 4 m/sec. Average rainfall in the Midlands region is approximately 950mm with, on average, 3.6 hours of sunshine per day.

According to the United Nations Integrated Panel on Climate Change, Ireland's average temperature has increased by 0.7°C over the last 100 years. Temperatures in Ireland are predicted to increase by 1.25 – 1.5°C by 2040 compared to 1961 to 2000. This rise has the potential to affect the intensity and frequency of storms in the North Atlantic. Rainfall is expected to increase in Ireland in winter by about 15% and summer projections range from no change to a 20% decrease.

4.8.3.2 Greenhouse Gas Emissions

In June 2022, the EPA released the report Ireland's Greenhouse Gas Emissions Projections 2021-2041⁷⁶, which includes total projected emissions and a breakdown of projected emissions per sector under the “With Existing Measures” and “With Additional Measures” scenarios.

Implementation of “Additional Measures” (including those in the 2021 Climate Action Plan), transport emissions are projected to decrease by 28% over the period 2020 to 2030 from 10.3 to 7.4 Mt CO₂ eq.

Table 4.8.3 outlines the projected emissions in 2030 for the ‘With Existing Measures’ and ‘With Additional Measures’ scenarios for the transport sector.

Table 4.8.3 Projected Emissions for the Transport Sector (EPA, 2022)⁷⁶

Scenarios	Projected Emissions for transport sector in 2030 (Mt CO ₂ eq.)
Projections (with existing measures)	10.3
Projections (with additional measures)	7.4

⁷⁵ Met Eireann, 2021. 30-year Climate Averages. Available at: <https://www.met.ie/climate/30-year-averages>

⁷⁶ EPA, 2022. Ireland's Greenhouse Gas Emissions Projections. Available at: <https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/EPA-Ireland's-GHG-Projections-Report-2021-2040v4.pdf>

There is a constraint in relation to ensuring the development of the project allows for the emissions reduction targets and carbon budgets to be met.

4.8.4 Summary

The main climate constraints relate to developing a transport solution in accordance with the requirements of Ireland's national carbon budgets and EU climate change commitments. This will be the main constraint for the N4 Carrick-on-Shannon to Dromod Project, as potential projected increases in carbon emissions due to the project will need to align with carbon budgets.

An objective of the project, as outlined in Section 1.5. of this report is as follows – *to ensure the improvement of the N4 with consideration of sustainable development principles and measures to minimise the effects on the environment in support the government's Climate Action Plan.*

It is essential that the N4 Carrick-on-Shannon to Dromod Project harnesses low carbon construction materials, material reuse, enables modal shift and lowered operational carbon to ensure the project aligns with climate targets and requirements.

4.9 Noise and Vibration

4.9.1 Introduction

This section describes the noise and vibration constraints identified within the study area for the N4 Carrick-on-Shannon to Dromod Project and should be read in conjunction with the noise and vibration constraints shown in Figures 4.9.1.0 to 4.9.2.5.

The specific objective of the noise and vibration constraints study is to identify any receptors that may be deemed to be particularly sensitive to noise and/or vibration. Examples of receptors include schools, hospitals, places of worship, heritage buildings, special habitats, amenity areas in common use and designated quiet areas. Residential buildings including houses, hotels, hostels etc. are also noise sensitive (Source: TII Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes⁷⁷ and Guidelines for the Treatment of Noise and Vibration in National Road Schemes⁷⁸). Some commercial or industrial uses can also be noise sensitive, for example noise recording studios and manufacturing facilities using noise or vibration-sensitive equipment.

Whilst it is preferable to locate new road developments away from noise sensitive areas where feasible, it is not always possible, particularly for roads located close to and through urban and sub-urban settings. For the proposed N4 Carrick-on-Shannon to Dromod Project, there is a high density of noise sensitive buildings and noise sensitive areas centred around Carrick-on-Shannon and its environs, and to a lesser extent around the towns of Drumsna and Jamestown.

From a constraints point of view for noise, the objective is largely to avoid, where necessary and where possible. The location of alternatives and options through built up areas with a large density of noise sensitive buildings, particularly those not already exposed to high volumes of traffic and associated road traffic noise should be avoided where possible.

Section 4.9.2 describes the methodologies and sources of information that were used to carry out the study. Section 4.9.3 describes the noise and vibration constraints within the study area. A summary is presented in Section 4.9.4.

4.9.2 Methodology and Sources of Information

The noise and vibration constraints study has been prepared in accordance with the following guidelines:

⁷⁷ National Roads Authority (NRA), 2014. Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes. Available at: https://www.tii.ie/technical-services/environment/planning/Good_Practice_Guidance_for_the_Treatment_of_Noise_during_the_Planning_of_National_Road_Schemes.pdf

⁷⁸ National Roads Authority (NRA), 2004. Guidelines for the Treatment of Noise and Vibration in National Road Schemes. Available at: https://www.tii.ie/technical-services/environment/planning/Guidelines_for_the_Treatment_of_Noise_and_Vibration_in_National_Road_Schemes.pdf

- National Roads Authority (NRA) (2014) Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes⁷⁷ (hereafter referred to as NRA 2014)
- NRA (2004) Guidelines for the Treatment of Noise and Vibration in National Road Schemes⁷⁸

The study consisted of a desk-based study and a preliminary site inspection of the project study area.

The following information was reviewed as part of this study:

- OS Mapping (2016/2017)
- Open Streetmap ⁷⁹
- Satellite Mapping (Google Earth Imagery Year – 2020))
- EPA Road Traffic Noise Maps Round 3 (2016)⁸⁰
- Leitrim County Council Noise Action Plan 2013 to 2018⁸¹
- Roscommon County Council Noise Action Plan 2018 to 2023⁸²
- Submissions received in relation to Public Consultation No. 1 - Constraints

4.9.3 Existing Environment

This section is set out as follows:

- Description of existing noise environment
- Identification of any receptors that may be deemed to be particularly sensitive to noise and/or vibration

4.9.3.1 Review of Published Noise Data

The study area comprises a mixture of rural, suburban and urban areas. Road traffic is likely the dominant source of noise across the study area to varying extents depending on the proximity of sensitive receptors to national roads (N4), regional roads (R370, R368, R280, R299 and R201) and the extensive network of local roads. Within the town of Carrick-on-Shannon and to lesser extent the smaller built up areas of Drumsna, Jamestown and Aghamore additional sources typically relate to commercial and business facilities etc. Outside these areas, background noise from agricultural sources and general environmental sources (e.g. foliage, bird

⁷⁹ OSM, 2021. Open Streetmap. Available at: <https://www.openstreetmap.org/>

⁸⁰ Environmental Protection Agency (EPA), 2020. EPA Webmapping Service. Available at: <https://gis.epa.ie/EPAMaps/>

⁸¹ Leitrim County Council, 2018. Noise Action Plan 2018 to 2023. Available at: http://www.leitrimcoco.ie/eng/Services_A-Z/Environment/Noise-Control/Noise-Action-Plan-2018-2023.pdf

⁸² Roscommon County Council, 2018. Noise Action Plan 2018 – 2023. Available at: <http://www.roscommoncoco.ie/en/Services/Environment/Air-and-Noise-Regulation/Noise/Noise-Action-Plan-2018-2023.pdf>

song, amenity activities etc.) are additional contributing sources over and above road traffic.

The road traffic noise mapping in the Round 3 Noise Mapping published by the EPA as part of the Environmental Noise Regulations⁸³ has been reviewed to determine the range of modelled traffic noise in the vicinity of the study area. As part of the noise mapping requirements, all roads with traffic flows greater than 3 million vehicle trips per annum, which is approximately 8,000 Annual Average Daily Traffic (AADT), were required to be mapped. Within the Leitrim County Council section of the study area, a small section of the N4 road met this criterion and was therefore included in the EPA noise modelling and mapping process. The extent of the mapped road is noted as follows:

- Carrick-on-Shannon: N4 Dublin Road from Attifinlay Roundabout to Carrick-on-Shannon Bypass Road/River Shannon Bridge (at the Roscommon/Leitrim county border)

Within the Roscommon County Council portion of the study area, a small section of the N4 road met this criterion and hence was included within the EPA noise modelling and mapping process. The extent of the mapped road is noted as follows:

- Carrick-on-Shannon: N4 River Shannon Bridge to Cortober

Noise levels due to road traffic sources from these sections of road have been modelled and the relevant noise maps prepared. The maps are presented in noise contour bands in increments of 5 decibels starting at 55dB L_{den} and 50dB L_{night} . Figure 4.9.1.0 to Figure 4.9.1.5 display the noise maps for the L_{den} period (Annual 24-hour average) which is the noise parameter used to assess road traffic noise in Ireland^{77,78}.

The results of the mapping indicate that along the mapped section of the N4 Road, noise sensitive buildings (residences and hotels) lie within the 60 dB to 64 dB L_{den} noise contours typically within 30 – 35m from the road edge, reducing to within the 55 dB to 59 dB L_{den} noise contour beyond approximately 35m from the road edge.

The Riverfront Amenity Park to the south of the N4 Carrick-on-Shannon bypass is mapped within the 65 dB to 69 dB L_{den} noise contour at distances of up to 15m from the road edge. At distances between 15m and 50m from the road edge, the park area is mapped within the 60 dB to 64 dB L_{den} noise contour. At distances beyond 50m from the road edge, the park area is mapped within the 55 dB to 59 dB L_{den} noise contour.

It should be noted that the noise contour maps extend only for the sections of the N4 which were included in the mapping. Traffic noise levels along the remainder of the N4 are likely to result in similar noise levels at the same distances from the road as those discussed above. Noise from road traffic along the regional and local roads within the study area will also contribute to the ambient noise levels in the vicinity of these roads.

⁸³ Government of Ireland, 2018. S.I. No. 549/2018 – European Communities (Environmental Noise) Regulations. Available at: <http://www.irishstatutebook.ie/eli/2018/si/549/made/en/print>

4.9.3.2 Identification of Noise and/or Vibration Sensitive Receptors

The study area was examined to identify the distribution of noise and/or vibration sensitive receptors and to determine the presence, if any, of significant constraints relating to noise and/or vibration.

Noise and/or vibration sensitive areas were grouped into the following categories:

- Education establishments (primary schools, secondary schools, college and university buildings)
- Hospitals/Medical facilities
- Amenity areas with noise sensitivity (camping areas, golf clubs, parks, fishing areas etc)
- Religious buildings
- Residential areas

The OS mapping and satellite imagery mapping were reviewed in order to identify the presence of these locations. These are discussed in the following sections.

Education Establishments

The location of schools within the study area have been identified and annotated as part of the constraint mapping process for the study. A total of four schools are identified within Carrick-on-Shannon. These school buildings are located off local roads to the west of Carrick-on-Shannon town. One school is located at Dangan and one at Annaduff. The presence of a school building does not preclude the development of alternatives or options in its vicinity; however, their presence should be included for consideration to avoid encroaching in proximity, which could cause high noise levels and potential impacts, particularly for those set back within quieter locations.

Hospitals/Nursing Homes

There are no hospital buildings within the study area. There are two nursing homes identified; Castlecara to the west of Carrick-on-Shannon, located off the Castlecara Road and St. Patricks Community Hospital nursing home at Summerhill.

Amenity Areas

The location of amenity areas which are considered sensitive to noise within the study area have been identified and annotated as part of the constraint mapping process for the study. The locations include the River Front Amenity Park within Carrick-on-Shannon, Carrick Camping site, Kingfisher Cycle Trail spur, Albert Canal Lock and Marina, Public Moorings at Jamestown, and Carrick-on-Shannon Marina. The length of the River Shannon has also been identified as a high amenity area given its use for boating, fishing, water sports, riverside walks etc. Where the prevailing noise environment in these areas is considered an important part of the area's character, consideration should be taken to preserve the noise environment within defined noise thresholds.

Leitrim and Roscommon County Council's Noise Action Plans (NAP) include an onset noise assessment level for measures to preserve the existing noise situation as the following in these identified amenity areas:

- 55dB L_{den}
- 45dB L_{night}

During the development of options in the study area, the prevailing noise environment within amenity areas will be considered to ensure those areas with noise levels below the onset noise assessment level for the preservation of the existing noise situation are protected, as far as practicable.

Religious Buildings

There are seven churches and five graveyards distributed within the study area. Three active churches and a graveyard are identified within Carrick-on-Shannon, one church within Dangan, and two active churches within Annaduff. Whilst these buildings and/or areas are noise sensitive when in use by the public, they are commonly located within urban and suburban settings in proximity to existing roads. The presence of a church or other religious building does not preclude the development of alternatives or options in its vicinity. The presence of these buildings and/or areas should, however, be considered when developing alternatives and options for the project, particularly for those set back within quieter locations.

Residential Areas and Accommodation Buildings

The overall study area is relatively low in housing density. The most densely populated residential areas are located at Carrick-on-Shannon and to lesser extents smaller built-up areas of Drumsna, Jamestown and Cortober. There are a number of guest houses, B&B's and hotels used for short term accommodation within Carrick-on-Shannon.

Within the remainder of the study area, residential dwellings are typically in ribbon style development along the local and regional roads and clustered at crossroads. Given the distribution of towns and villages, housing clusters and individual residential buildings along the extensive regional and local road network within the study area, it will not be possible for any off-line options to avoid passing in proximity to them. Consideration will however be given to development of options which minimise the number of residential buildings exposed to road traffic, as far as practicable. This will form part of the Option Selection process.

For the purpose of this assessment, individual residential buildings or short-term accommodation buildings have not been highlighted in the constraint mapping due to their number and distribution, however, the areas of Carrick-on-Shannon, Drumsna, Jamestown and Cortober are annotated. Whilst individual residential buildings and residential clusters are not specifically marked on mapping, the development of any off-line options will need to consider avoiding areas with a high density of noise sensitive locations which will include those passing through villages and urban areas.

It is important to note that the presence of the noise sensitive receptors listed above is not necessarily considered to be a strict constraint which would prevent the

development of alternatives or options in proximity to them. The purpose of this initial exercise is to highlight those areas which should be considered, where possible, when developing alternatives and options in conjunction with the other identified constraints. In this instance, where it is not possible to develop alternatives or options away from identified noise sensitive locations, consideration can be given to the vertical alignment, the use of natural screening or false cuttings to act as noise buffers and mitigation measures as part of the design of a road based option.

Residential dwellings make up most of the noise sensitive receptors within the study area extending out to all areas of the constraint boundaries. Other noise sensitive receptors include hotels, educational or religious buildings, and amenity areas. These tend to be located primarily in existing built-up areas and are generally less distributed across the study area compared to housing, so are easier to avoid.

In terms of the constraint study, the development of alternatives and options needs to consider the following for residential areas:

- Areas of housing clusters within areas set back from existing road traffic noise
- Areas of high-density housing in proximity to existing road traffic noise (e.g. those along the existing N4)
- Residential clusters at crossroads, townlands, village centres, etc.
- Ribbon style residential housing along local roads

In this instance, consideration will be given to a balance among protecting residential properties currently not exposed to high levels of road traffic noise and not increasing or generating significant negative impacts to residential properties already exposed to high levels of road traffic and other environmental sources. Where possible, alternatives and options passing through or in proximity to clusters of residential estates with large populations should be avoided.

For other noise sensitive areas, consideration will be given to the sensitivity of specific receptors depending on their use in addition to the existing noise environment in which they are located.

For all receptors, the availability for noise mitigation in the form of the horizontal and vertical alignments, natural screening and road surfaces will all be considered during the Phase 3 Design and Environmental Evaluation stage of the project.

4.9.4 Summary

The constraint study area for the N4 Carrick-on-Shannon to Dromod Project is made up of a mixture of urban, suburban and rural areas. The study area within and surrounding Carrick-on-Shannon contains the highest density of residential areas, schools and religious buildings. The River Shannon and adjacent amenity areas along its corridor extends from northwest of Carrick-on-Shannon to Lough Boderg southeast of the study area and therefore covers an extensive section of the study area. Outside of Carrick-on-Shannon, the study area consists of lower density villages and for much of the remaining study area is categorised as rural to semi-rural with low density residential and amenity areas with lower noise environments.

Whilst there is a mix of noise sensitive areas distributed across the study area, a large proportion of these are already exposed to road traffic noise to varying degrees depending on traffic volumes, distance from the road edge and screening.

During the development of alternatives and options, consideration will be given to protecting existing noise sensitive areas and incorporating noise mitigation into the base design including the use of natural topographical features and false cuttings, where feasible.

4.10 Archaeological, Architectural and Cultural Heritage

4.10.1 Introduction

This section describes the archaeological, architectural, and cultural heritage constraints identified within the study area for the N4 Carrick-on-Shannon to Dromod Project and should be read in conjunction with the archaeological, architectural, and cultural heritage constraints shown on Figure 4.10.1.0 to 4.10.1.5.

Section 4.10.2 describes the methodologies and sources of information that were used to carry out the study. Section 4.10.3 describes the archaeological, architectural, and cultural heritage constraints within the study area. A summary is presented in Section 4.10.4.

4.10.2 Methodology and Sources of Information

The 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 Scheme (2005b)⁸⁴. The assessment comprises a study of the archaeological, architectural, historical, and cultural background of the study area. This includes information from the Record of Monuments and Places (RMP) and the Sites and Monuments Records (SMR) of Counties Leitrim and Roscommon as well as a review of all relevant county development plans and the National Inventory of Architectural Heritage (NIAH).

This Constraints Study is a desktop survey, and the following sources were reviewed to identify archaeological, architectural, and cultural heritage constraints:

- Record of Monuments and Places (RMP) for County Leitrim and County Roscommon⁸⁵
- Sites and Monuments Record (SMR) for County Leitrim and County Roscommon⁸⁵
- Monuments in State Care Database⁸⁶
- Preservation Orders⁸⁷
- Register of Historic Monuments⁸⁵
- Leitrim County Development Plan, 2015-2021¹³

⁸⁴ TII, 2005. Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes. Available at: <https://www.tiipublications.ie/downloads/SRM/12-Archaeology-Planning-Guidelines-2005.pdf>

⁸⁵ Available at: <http://webgis.archaeology.ie/historicenvironment/>

⁸⁶ Available at: <https://www.archaeology.ie/national-monuments/search-by-county>

⁸⁷ National Monuments Service (June 2019) Preservation Orders, Available from <https://www.archaeology.ie/sites/default/files/media/publications/po19v1-all-counties.pdf>

- Roscommon County Development Plan, 2014-2020¹⁴
- Historic Ordnance Survey mapping (1835-6, 1838, 1882-7, 1889-95, 1907-13)^{85 88}
- National Inventory of Architectural Heritage (NIAH): Architectural and Garden Survey, County Leitrim and County Roscommon⁸⁹
- Excavations Bulletin (1970-2019)⁹⁰

Once all Archaeological Heritage (RMP/SMR) and Built Heritage (protected structures and NIAH structures) sites were identified during the initial research, the information was plotted onto a map of the study area. In addition, Designed Landscapes (also known as demesnes), which may not be subject to statutory protection, but which should nonetheless be considered as cultural heritage constraints, were also added, and mapped. These often include the site or ruins of former country houses.

The Draft Leitrim County Development Plan 2023-2029 was adopted on 7 February 2023, and it is coming into effect on 21 March 2023. There will be additions and deletions to the protected structures listed in the new Plan when it becomes effective. Of the 11 number additions, only one is relevant to the study area, and that is the addition of a façade to a shop in the town of Carrick-on-Shannon. There are nine structures to be removed, but only one of these is relevant to the study area, and it is not omitted fully, rather it is amalgamated with another existing entry on the list. Therefore, the new Plan will not affect this constraints study, and all figures are cross-referenced against the current Plan.

4.10.3 Existing Environment

The study area is characterised by a rural environment across the majority of the landscape, with suburban settlements such as Carrick-on-Shannon, Cortober, Jamestown, Drumsna, Dromod, and Aghamore. The rural landscape is mostly utilised for pastoral farming with some forestry also present. The cultural heritage resource is characterised by numerous recorded monuments from various periods, mainly the early medieval, protected structures, and a small number of designed landscapes dating to the 19th century.

4.10.3.1 Archaeological Heritage

RMP/SMR Sites within the Study Area

A total of 364 individual RMP/SMR sites have been identified within the study area, which covers an area measuring approximately 7,820 hectares (ha). The sites have been grouped in 307 sites, which allows for the identification of groups of monuments that may occur in association with one another. These sites are labelled as Archaeological Heritage (AH) sites in Figures 4.10.1.0 to 4.10.1.5 and listed in

⁸⁸ Available at: <http://www.askaboutireland.ie/griffith-valuation/index.xml?action=placeSearch>

⁸⁹ Available at: <http://www.buildingsofireland.ie/>

⁹⁰ Available at: <https://excavations.ie/>

Table 4.10.1. Where sites have been identified through archaeological excavation, the relevant excavation (EX) number is provided in Table 4.10.1.

Table 4.10.1 Archaeological Heritage Sites within the Study Area

AH No.	SMR Number	Name	Townland	Statutory Protection
AH 1	RO007-107	Barrow - ring-barrow	Woodbrook	Proposed RMP
AH 2	RO007-096	Burnt mound (EX 2)	Woodbrook	None
AH 3	RO007-097	Burnt mound (EX 2)	Woodbrook	None
AH 4	RO007-098	Excavation - miscellaneous (EX 2)	Cloongownagh	Proposed RMP
AH 5	RO007-099001	Excavation - miscellaneous (EX 2)	Cloongownagh	None
	RO007-099002	Excavation - miscellaneous (EX 2)	Cloongownagh	Proposed RMP
AH 6	RO011-008	Ringfort - rath	Cloongownagh	RMP
AH 7	RO007-100	Excavation - miscellaneous (EX 2)	Cloongownagh	None
AH 8	RO011-164001	Burnt mound (EX 1)	Cloongownagh	None
	RO011-164002	Excavation - miscellaneous (EX 1/2)	Cloongownagh	None
AH 9	RO007-095	Redundant record	Cloongownagh	None
AH 10	RO011-160001	Ringfort - rath (EX 1)	Cloongownagh	Proposed RMP
	RO011-160002	Enclosure (EX 1)	Cloongownagh	Proposed RMP
	RO011-160003	Hut site (EX 1)	Cloongownagh	None
	RO011-160004	Fulacht fia (EX 1)	Cloongownagh	None
	RO011-160005	Burnt mound (EX 1/10)	Cloongownagh	None
	RO011-160006	Burnt mound (EX 1)	Cloongownagh	Proposed RMP
	RO011-160007	Burnt mound (EX 1)	Cloongownagh	Proposed RMP
	RO011-160008	House - prehistoric (EX 1)	Cloongownagh	None
AH 11	RO011-005	Ringfort - rath	Dorrery	RMP
AH 12	RO011-009	Redundant record	Cuiltyconeen	None
AH 13	RO011-010	Ringfort - rath	Cuiltyconeen	RMP

AH No.	SMR Number	Name	Townland	Statutory Protection
AH 14	RO011-016	Ringfort - rath	Cuiltyconeen	RMP
AH 15	RO011-165001	Burnt mound (EX 2)	Cuiltyconeen	Proposed RMP
	RO011-165002	Burnt mound (EX 1)	Cuiltyconeen	Proposed RMP
AH 16	RO011-011	Redundant record	Meera	None
AH 17	RO011-017	Redundant record	Meera	None
AH 18	RO011-175	Ringfort - rath	Meera	Proposed RMP
AH 19	RO011-018	Ringfort - rath	Meera	RMP
AH 20	RO011-174	Ringfort - rath	Meera	Proposed RMP
AH 21	RO007-089	Ringfort - rath	Tumna	RMP
AH 22	RO007-090	Ringfort - rath	Tumna	RMP
	RO011-019	Ringfort - rath (EX 7)	Cloonmaan	RMP
AH 23	RO011-020001	Ringfort - rath	Cloonmaan	Proposed RMP
	RO011-020002	Hut site	Cloonmaan	Proposed RMP
AH 24	RO011-023	Ringfort - rath	Cloonskeeveen	RMP
AH 25	RO011-024001	Ringfort - rath	Cloonskeeveen	Proposed RMP
	RO011-024002	House - indeterminate date	Cloonskeeveen	Proposed RMP
AH 26	RO011-025	Ringfort - rath	Cloonskeeveen	RMP
AH 27	RO011-026	Ringfort - rath	Cloonskeeveen	RMP
AH 28	RO011-027	Ringfort - rath	Cloonskeeveen	RMP
AH 29	RO011-012	Ringfort - rath (EX 3)	Tawlaght (Boyle By., Killukin Ed)	RMP
AH 30	RO011-013	Ringfort - rath (EX 3)	Sroankeeragh	RMP
AH 31	RO011-014001	Ringfort - rath	Tawlaght (Boyle By., Killukin Ed)	Proposed RMP
	RO011-014002	Ringfort - rath	Tawlaght (Boyle By., Killukin Ed)	Proposed RMP

AH No.	SMR Number	Name	Townland	Statutory Protection
AH 32	RO011-015	Ringfort - cashel	Tawlaght (Boyle By., Killukin Ed)	RMP
AH 33	RO011-156	Ringfort - rath	Knockadalteen	RMP
AH 34	RO011-155	Ringfort - rath	Tawlaght (Boyle By., Killukin Ed)	RMP
AH 35	RO011-021	Ringfort - rath	Mullaghmore	RMP
AH 36	RO011-022	Ringfort - rath	Drishoge	RMP
AH 37	RO011-035	Ringfort - cashel	Scregg (Boyle By.)	RMP
AH 38	RO011-167	Mass-rock	Knockananima	Proposed RMP
AH 39	RO011-169	Ringfort - rath	Scregg (Boyle By.)	Proposed RMP
AH 40	RO011-177	Ringfort - rath	Knockadalteen	Proposed RMP
AH 41	RO011-178	Enclosure	Mullaghmore	Proposed RMP
AH 42	RO011-179	Ringfort - rath	Mullaghmore	Proposed RMP
	RO011-179001	Hut site	Mullaghmore	Proposed RMP
AH 43	RO011-189	Ringfort - rath	Mullaghmore	Proposed RMP
AH 44	RO018-005	Barrow - unclassified	Skeagh	RMP
AH 45	LE035-017	Standing stone	Fearnaght	RMP
AH 46	LE035-018	Bullaun stone	Fearnaght	RMP
	LE035-018001	Ritual site - holy well	Fearnaght	Proposed RMP
AH 47	RO011-157	Ringfort - rath	Killukin (Boyle By.)	RMP
AH 48	RO011-044001	Ringfort - cashel	Killukin (Boyle By.)	Proposed RMP
	RO011-044002	Redundant record	Killukin (Boyle By.)	None
AH 49	RO011-047001	Church	Killukin (Boyle By.)	RMP
	RO011-047002	Graveyard	Killukin (Boyle By.)	RMP
	RO011-047003	Ecclesiastical enclosure	Killukin (Boyle By.)	Proposed RMP

AH No.	SMR Number	Name	Townland	Statutory Protection
AH 50	RO011-166	Inscribed stone	Danesfort	Proposed RMP
AH 51	RO011-041	Ringfort - rath	Lodge	RMP
AH 52	RO011-042	Ringfort - rath	Deerpark (Boyle By., Danesfort Ed), Lodge	RMP
AH 53	RO011-043	Ringfort - rath	Deerpark (Boyle By., Danesfort Ed)	RMP
AH 54	RO011-045	Ritual site - holy well	Glebe (Boyle By., Danesfort Ed)	Proposed RMP
AH 55	RO011-046	Ringfort - rath	Danesfort	Proposed RMP
AH 56	RO011-048	Ringfort - rath	Danesfort	RMP
AH 57	RO011-049	Ringfort - rath	Danesfort	RMP
AH 58	RO011-162001	Mill - unclassified	Deerpark (Boyle By., Danesfort Ed)	Proposed RMP
AH 59	RO011-163	Enclosure - large enclosure	Deerpark (Boyle By., Danesfort Ed)	Proposed RMP
AH 60	RO011-073	Ringfort - rath	Cartron (Boyle By., Danesfort Ed)	RMP
AH 61	RO011-074	Ringfort - rath	Danesfort	RMP
AH 62	RO011-183	Ringfort - rath	Danesfort	Proposed RMP
AH 63	RO011-150001	House - 17 th century	Cortober	Proposed RMP
	RO011-150002	Bridge (EX 8)	Cortober	Proposed RMP
AH 64	LE031-005	Historic town (EX 21-26/29/32-38/40-46)	Townparks	RMP
	LE031-005001	Fortification (EX 8) (also BH 4)	Townparks	Proposed RMP, RPS
	LE031-005002	Church (Also BH 4)	Townparks	Proposed RMP, RPS
	LE031-005003	Mausoleum	Townparks	RPS
	LE031-005004	Bridge (also BH 4)	Townparks	Proposed RMP

AH No.	SMR Number	Name	Townland	Statutory Protection
AH 65	RO011-028	Ringfort - rath	Cordrehid	RMP
AH 66	RO011-180	Ringfort - rath	Cortober	Proposed RMP
AH 67	RO011-181	Ringfort - rath	Cortober	Proposed RMP
AH 68	RO011-182	Ringfort - rath	Cortober	Proposed RMP
AH 69	RO011-050	Enclosure	Danesfort	RMP
AH 70	RO011-051	Ringfort - rath	Danesfort	RMP
AH 71	LE031-099	Ringfort - rath	Townparks	RMP
AH 72	LE031-006	Ringfort - unclassified	Townparks	RMP
AH 73	LE031-001	Ringfort - rath	Lisnagat	RMP
AH 74	LE031-002	Ringfort - rath (EX 18)	Lisnagat	RMP
	LE031-002001	Hut site (EX 19)	Lisnagat	None
AH 75	LE027-099	Ringfort - rath	Hartley	RMP
AH 76	LE027-101	Ringfort - rath (EX 20)	Cartown	RMP
AH 77	LE027-143	Ringfort - rath	Cartown	Proposed RMP
AH 78	LE027-104	Ringfort - rath	Grange	RMP
AH 79	LE027-105001	Church	Drumheckil	Proposed RMP
AH 80	LE027-102	Ringfort - rath	Cloonsheebane	RMP
AH 81	LE027-103	Ringfort - rath	Ballynamony (Leitrim By.)	RMP
AH 82	LE031-003	Ringfort - rath (EX 39)	Ballynamony (Leitrim By.)	RMP
AH 83	LE031-004	Megalithic structure	Ballynamony (Leitrim By.)	RMP
AH 84	LE031-105	Ringfort - rath	Ballynamony (Leitrim By.)	Proposed RMP
AH 85	LE031-113	Ringfort - rath	Cloonsheebane	Proposed RMP
AH 86	LE027-106	Ringfort - rath	Drumlumman	RMP
AH 87	LE027-107	Ringfort - rath	Drumlumman	RMP
AH 88	LE027-108	Ringfort - rath	Grange	RMP
AH 89	LE027-109	Ringfort - rath	Grange	RMP
AH 90	LE027-110	Ringfort - rath	Drumlumman	RMP
AH 91	LE027-111	Ringfort - rath	Lismakeegan	RMP

AH No.	SMR Number	Name	Townland	Statutory Protection
AH 92	LE027-112	Ringfort - rath	Lismakeegan	RMP
AH 93	LE027-113	Enclosure	Lismakeegan	RMP
AH 94	LE027-114	Enclosure	Tonnagh	Proposed RMP
AH 95	LE027-115	Ringfort - rath	Tonnagh	RMP
AH 96	LE031-007	Ringfort - rath	Cloonmulligan	RMP
	LE031-007001	Enclosure	Cloonmulligan	Proposed RMP
AH 97	LE031-008	Ringfort - rath	Aghameeny	RMP
AH 98	LE031-009	Castle - unclassified	Aghancarra	None
AH 99	LE031-126	Ringfort - rath	Dromore (Leitrim By.)	Proposed RMP
AH 100	LE031-022	Ringfort - rath	Clogher (Leitrim By.)	RMP
AH 101	LE031-114	Ringfort - rath	Dromore (Leitrim By.)	Proposed RMP
AH 102	LE031-115	Enclosure	Clogher (Leitrim By.) Dromore (Leitrim By.)	Proposed RMP
AH 103	LE031-116	Redundant record	Clogher (Leitrim By.)	None
AH 104	LE031-117	Enclosure	Clogher (Leitrim By.)	Proposed RMP
AH 105	LE031-010	Ringfort - rath	Keenaghan	RMP
AH 106	LE031-011	Ringfort - rath	Keenaghan	RMP
AH 107	LE031-012	Ringfort - rath	Keenaghan	RMP
AH 108	LE031-013	Ringfort - rath	Correen	RMP
AH 109	LE031-014	Ringfort - rath	Correen	RMP
AH 110	LE031-015	Ringfort - rath (EX 58)	Dromore (Leitrim By.)	RMP
AH 111	LE031-016	Ringfort - rath (EX 58)	Cornaslieve	RMP
AH 112	LE031-017	Ringfort - rath	Cornaslieve	RMP
AH 113	LE031-018	Ringfort - rath	Correen	RMP
AH 114	LE031-019	Ringfort - rath	Lisduff (Leitrim By., Carrick-On-Shannon Ed)	RMP
AH 115	LE031-020001	Ringfort - rath	Lisduff (Leitrim By., Carrick-On-Shannon Ed)	Proposed RMP

AH No.	SMR Number	Name	Townland	Statutory Protection
	LE031-020002	Church	Lisduff (Leitrim By., Carrick-On-Shannon Ed)	Proposed RMP
AH 116	LE031-021	Ringfort - rath	Garvlough	RMP
AH 117	LE031-023	Ringfort - rath	Aughriman South	RMP
AH 118	LE031-024	Ringfort - rath	Aughriman South	RMP
AH 119	LE031-106	Enclosure	Garvlough	Proposed RMP
AH 120	LE031-043	Ringfort - rath	Kiltycarney	RMP
AH 121	LE031-044	Ringfort - rath	Kiltycarney	RMP
AH 122	LE031-045	Ringfort - rath	Kiltycarney	RMP
AH 123	LE031-046	Ringfort - rath	Kiltycarney	RMP
AH 124	LE031-047	Ringfort - rath	Kiltycarney	RMP
AH 125	LE031-048	Ringfort - rath	Greagh (Leitrim By., Carrick-On-Shannon Ed)	RMP
AH 126	LE031-049	Ringfort - rath	Aughriman South	RMP
AH 127	LE031-050	Ringfort - rath	Aughriman South	RMP
AH 128	LE031-051	Ringfort - rath	Kiltycarney	RMP
AH 129	LE031-052	Ringfort - rath	Kiltycarney	RMP
AH 130	LE031-053	Ringfort - rath	Kiltycarney	RMP
AH 131	LE031-054	Ringfort - rath	Tully (Leitrim By., Carrick-On-Shannon Ed)	RMP
AH 132	LE031-055	Enclosure	Tully (Leitrim By., Carrick-On-Shannon Ed)	RMP
AH 133	LE031-056	Crannog	River Shannon	RMP
AH 134	LE031-057	Ringfort - rath	Minkill	RMP
AH 135	LE031-058	Ringfort - rath	Minkill	RMP
AH 136	LE031-059	Ringfort - rath	Minkill	RMP
AH 137	LE031-060	Ringfort - rath	Kildorragh (Leitrim By.)	RMP
AH 138	LE031-110	Ringfort - rath	Tully (Leitrim By., Carrick-On-Shannon Ed)	Proposed RMP

AH No.	SMR Number	Name	Townland	Statutory Protection
AH 139	LE031-111	Redundant record	Tully (Leitrim By., Carrick-On-Shannon Ed)	None
AH 140	LE031-118	Ringfort - rath	Kiltycarney	Proposed RMP
AH 141	LE031-119	Ringfort - rath	Kiltycarney	Proposed RMP
AH 142	LE031-039	Burial ground	Attirory	RMP
	LE031-039001	Church	Attirory	Proposed RMP
	LE031-039002	Bullaun stone	Attirory	None
	LE031-039003	Ecclesiastical enclosure (EX 48-49)	Attirory	Proposed RMP
AH 143	LE031-040	Ringfort - rath (EX 16)	Lisseeghan	RMP
AH 144	LE031-041	Ringfort - rath	Drumkeeran (Leitrim By., Carrick-On-Shannon Ed)	RMP
AH 145	LE031-042	Ringfort - rath	Ballynacleigh	RMP
AH 146	LE031-072	Ringfort - rath	Rinnacurreen	RMP
AH 147	LE031-073	Ringfort - rath	Rinnacurreen	RMP
AH 148	LE031-096	Enclosure	Rinnacurreen	RMP
AH 149	LE031-120	Field system	Inishmucker Island	Proposed RMP
AH 150	LE031-098	Fulacht fia (EX 16)	Tully (Leitrim By., Carrick-On-Shannon Ed)	None
AH 151	LE031-101	Fulacht fia (EX 16)	Kiltycarney	None
AH 152	LE031-102	Mound	Tully (Leitrim By., Carrick-On-Shannon Ed)	Proposed RMP
AH 153	LE031-103	Burnt mound (EX 16)	Minkill	None
AH 154	LE031-104001	Fulacht fia (EX 16)	Kildorragh (Leitrim By.)	None
	LE031-104002	Hut site (EX 16)	Kildorragh (Leitrim By.)	None
AH 155	RO011-052	Redundant record	River Shannon	RMP
AH 156	RO011-053	Ringfort - rath	Charlestown	RMP
AH 157	LE031-074	Ringfort - rath	Drummaunroe	RMP
AH 158	LE031-075	Ringfort - rath	Lisgarney	RMP

AH No.	SMR Number	Name	Townland	Statutory Protection
AH 159	LE031-076	Ringfort - rath (EX 55)	Jamestown	RMP
AH 160	LE031-077	Ringfort - rath	Drummaunroe	RMP
AH 161	LE031-078	Ringfort - rath	Drummaunroe	RMP
AH 162	LE031-079	Ringfort - rath	Drummaunroe	RMP
AH 163	LE031-080	Ringfort - rath	Drummaunroe	RMP
AH 164	LE031-081	Ringfort - rath	Rue	RMP
AH 165	LE031-083	Redundant record	River Shannon	None
AH 166	LE031-089	Ringfort - rath	Cornacorroo	RMP
AH 167	LE031-090	Ringfort - rath	Adereen	RMP
AH 168	LE031-091	Ringfort - rath	Gort	RMP
AH 169	LE031-092	Enclosure - large enclosure	Gort	RMP
AH 170	LE031-093	Designed landscape - tree-ring	Jamestown, Rue	None
AH 171	LE031-094	Ringfort - rath	Jamestown	RMP
AH 172	LE031-097	Ringfort - rath (EX 55)	Tully (Leitrim By., Carrick-On-Shannon Ed)	RMP
AH 173	LE031-108	Ringfort - rath	Coraughrim	Proposed RMP
AH 174	LE031-109	Enclosure	Jamestown	Proposed RMP
AH 175	LE031-112	Ringfort - rath	Coraughrim	Proposed RMP
AH 176	LE031-121	Ringfort - rath	Jamestown	Proposed RMP
AH 177	LE031-082	Historic town (EX 28/30/50-54/56)	Jamestown	RMP
	LE031-082001	Gateway (also BH 6)	Jamestown	Proposed RMP, RPS
	LE031-082002	Town defences (Also BH 6)	Jamestown	Proposed RMP, RPS
	LE031-082003	Redundant record	Jamestown	None
	LE031-082004	Church	Jamestown	Proposed RMP
	LE031-082005	Bastioned fort	Jamestown	Proposed RMP

AH No.	SMR Number	Name	Townland	Statutory Protection
	LE031-082006	Religious house - Franciscan friars	Jamestown	Proposed RMP
	LE031-082007	Bridge (EX 15)	Jamestown	Proposed RMP
	LE031-082008	Bridge	Jamestown	None
	LE031-082009	Graveyard (alos BH 6)	Jamestown	Proposed RMP
AH 178	RO011-151001	Bridge (EX 15)	Cloonavery	RMP
	RO011-151002	Bridge (EX 15) (Also BH 6)	Cloonavery	RMP
AH 179	RO011-075	Ringfort - rath	Corry (Roscommon By.)	RMP
AH 180	RO011-076	Ringfort - rath	Corry (Roscommon By.)	RMP
AH 181	RO011-077	Ringfort - rath	Corry (Roscommon By.)	RMP
AH 182	RO011-078	Crannog	Lough Corry	RMP
AH 183	RO011-079	Ringfort - rath	Corry (Roscommon By.)	RMP
AH 184	RO011-080	Linear earthwork	Corry (Roscommon By.)	RMP
AH 185	RO011-081	Ringfort - rath	Corry (Roscommon By.)	RMP
AH 186	RO011-082	Ringfort - rath	Corry (Roscommon By.)	RMP
AH 187	RO011-083	Ringfort - rath	Corry (Roscommon By.)	RMP
AH 188	RO011-084	Ringfort - rath	Cloonfad Beg	RMP
AH 189	RO011-116----	Ringfort - rath	Corry (Roscommon By.)	RMP
AH 190	RO011-118	Ringfort - rath	Cloonfad Beg	RMP
	RO011-118001	Ringfort - rath	Cloonfad Beg	Proposed RMP

AH No.	SMR Number	Name	Townland	Statutory Protection
AH 191	RO011-185	Ringfort - rath	Corry (Roscommon By.)	Proposed RMP
AH 192	RO011-086	Ringfort - rath	Cuiltyconway	RMP
AH 193	RO011-087	Ringfort - rath	Cuiltyconway	RMP
AH 194	RO011-172	Ringfort - rath	Cuiltyconway	Proposed RMP
AH 195	RO011-188	Linear earthwork (EX 9)	Cuiltyconway	Proposed RMP
AH 196	RO011-085	Ringfort - rath	Corgullion	RMP
AH 197	RO011-121	Ringfort - rath	Moneyduff	RMP
AH 198	RO011-122	Ringfort - rath	Tawnagh More	RMP
AH 199	RO011-123	Ringfort - rath	Tawnagh More	RMP
AH 200	RO011-126	Ringfort - rath	Liscolvan	RMP
AH 201	RO011-127	Ringfort - rath	Tawnagh More	RMP
AH 202	RO011-128001	Church	Kilbride	RMP
	RO011-128002	Graveyard	Kilbride	RMP
	RO011-128003	Redundant record	Kilbride	None
	RO011-128004	Ecclesiastical enclosure	Kilbride	Proposed RMP
AH 203	RO011-129001	Ringfort - rath	Kilbride	RMP
	RO011-129002	Souterrain	Kilbride	Proposed RMP
AH 204	RO011-130	Ringfort - rath	Liscolvan	RMP
AH 205	RO011-135	Ringfort - rath	Cornasleehan	RMP
AH 206	RO011-159	Ringfort - rath	Liscolvan	RMP
AH 207	RO011-186	Redundant record	Corgullion	None
AH 208	RO011-088	Ringfort - rath	Dangan (Nugent)	RMP
AH 209	RO011-090001	Ringfort - rath	Corralara	Proposed RMP
	RO011-090002	Ringfort - rath	Corralara	Proposed RMP
AH 210	RO011-131	Ringfort - rath	Carrowmore (Ballintober North By.)	RMP
AH 211	RO011-132	Ringfort - rath	Carrowmore (Ballintober North By.)	RMP

AH No.	SMR Number	Name	Townland	Statutory Protection
AH 212	RO011-133	Ringfort - rath	Carrowmore (Ballintober North By.)	RMP
AH 213	RO011-134	Ringfort - rath	Cornasleehan	RMP
AH 214	RO011-136	Ringfort - rath	Ardmacroan	RMP
AH 215	RO011-137	Enclosure	Ardmacroan	RMP
AH 216	RO011-138	Ringfort - rath	Dangan (King)	RMP
AH 217	RO011-139	Castle - unclassified	Dangan (King)	RMP
AH 218	RO011-140	Ringfort - rath	Dangan (King), Dangan (Nugent)	RMP
AH 219	RO011-141001	Ringfort - rath	Dangan (King)	Proposed RMP
	RO011-141002	Ringfort - rath	Dangan (King)	Proposed RMP
AH 220	RO011-142	Ringfort - rath	Dangan (King)	RMP
AH 221	RO011-143	Enclosure	Dangan (King)	RMP
AH 222	RO011-152	Redundant record	Cartron (King)	RMP
AH 223	RO012-008	Ringfort - rath	Moyglass (Ballintober North By., Cloontem Ed)	RMP
AH 224	RO012-009	Ringfort - rath	Dangan (Nugent)	RMP
AH 225	RO012-010	Ringfort - rath	Dangan (Nugent)	RMP
AH 226	RO012-011	Crannog	Lowfield	RMP
AH 227	RO012-012	Ringfort - rath	Moyglass (Ballintober North By., Cloontem Ed)	RMP
AH 228	RO012-013	Redundant record	Moyglass (Ballintober North By., Cloontem Ed)	None
AH 229	RO012-014	Ringfort - rath	Tooloscan	RMP
AH 230	RO012-015	Ringfort - rath	Tooloscan	RMP
AH 231	RO012-016	House - 18 th /19 th century	Lowfield	RMP

AH No.	SMR Number	Name	Townland	Statutory Protection
AH 232	RO012-017	Standing stone	Tooloscan	RMP
AH 233	RO012-018	Ringfort - rath	Clogher (Ballintober North By.)	RMP
AH 234	RO012-019	Ringfort - rath	Clogher (Ballintober North By.), Kilmore (Ballintober North By.)	RMP
AH 235	RO012-021	Ringfort - rath	Clogher (Ballintober North By.)	RMP
AH 236	RO012-022	Burial	Cartron (King), Corry (Ballintober North By.)	Proposed RMP
AH 237	RO012-023	Ringfort - rath	Tooloscan	Proposed RMP
AH 238	RO012-025	Redundant record	Cartron (King)	None
AH 239	RO012-030	Ringfort - rath	Moyglass (Ballintober North By., Cloontem Ed)	Proposed RMP
AH 240	RO017-069	Earthwork	Carrowcuil	RMP
AH 241	RO011-054	Ringfort - rath	Cloonavery	RMP
AH 242	RO011-056	Ringfort - rath (EX 10)	Cloonavery	RMP
AH 243	RO011-057	Enclosure	Drumcleavry	RMP
	RO011-057001	Ring-ditch (EX 11)	Drumcleavry	Proposed RMP
AH 244	RO011-058	Linear earthwork (EX 12/14/17)	Cloonavery, Drumcleavry, Lackagh, Ardarafrin	RMP
AH 245	RO011-059	Ringfort - rath	Ardarafrin	RMP
AH 246	RO011-060	Ringfort - rath	Ardarafrin	RMP
AH 247	RO011-089	Ringfort - rath	Corry (Ballintober North By.)	RMP
AH 248	RO011-153	Redundant record (EX 13)	Cloonavery	RMP
	RO011-153001	Enclosure (EX 13)	Cloonavery	Proposed RMP

AH No.	SMR Number	Name	Townland	Statutory Protection
AH 249	RO011-187	Ringfort - rath	Drumcleavry	Proposed RMP
AH 250	RO012-001	Ringfort - rath	Charlestown	RMP
	RO012-001001	Redundant record	Charlestown	None
AH 251	RO012-002	Ringfort - rath	Drumcleavry	None
AH 252	RO012-004	Ringfort - rath	Lackagh	RMP
AH 253	RO012-005	Ringfort - rath	Corry (Ballintober North By.)	RMP
AH 254	RO012-006001	Ringfort - rath	Cloonteam	Proposed RMP
	RO012-006002	Enclosure	Cloonteam	Proposed RMP
AH 255	RO012-007	Redundant record	Cloonteam	None
AH 256	RO012-024	Ringfort - rath	Charlestown	Proposed RMP
AH 257	RO012-026	Ringfort - rath	Corry (Ballintober North By.)	Proposed RMP
AH 258	RO012-027	Ringfort - rath	Cloonteam	Proposed RMP
AH 259	RO012-028	Ringfort - rath	Cloonteam	Proposed RMP
AH 260	RO012-029	Ringfort - rath	Cloonteam	Proposed RMP
AH 261	LE031-061	Ringfort - rath	Drishoge	RMP
AH 262	LE031-062	Ringfort - rath	Mullaun (Leitrim By.)	RMP
AH 263	LE031-063	Ringfort - rath	Mullaun (Leitrim By.)	RMP
AH 264	LE031-066	Ringfort - rath	Foxborough	RMP
AH 265	LE031-067	Ringfort - rath	Lavagh (Leitrim By.)	RMP
AH 266	LE031-122	Ringfort - rath	Mountcampbell	Proposed RMP
AH 267	LE031-123	Ringfort - rath	Crickeen	Proposed RMP
AH 268	LE032-021	Ringfort - rath	Lavagh (Leitrim By.)	RMP
AH 269	LE031-068	Ringfort - rath	Drumsna	RMP
AH 270	LE031-069	Ringfort - rath (EX 16)	Drumsna	RMP

AH No.	SMR Number	Name	Townland	Statutory Protection
AH 271	LE031-070	Ringfort - rath	Gortconnellan	RMP
AH 272	LE031-071	Ringfort - rath	Gortconnellan	RMP
AH 273	LE031-084	Redundant record	Drumsna	None
AH 274	LE031-085	Ringfort - rath (EX 59)	Drumsna	RMP
	LE031-085002	Burial ground (EX 59) (also BH 7)	Drumsna	Proposed RMP
AH 275	LE031-086	Ringfort - rath	Drumsna	RMP
	LE031-086001	Ringfort - rath	Drumsna	Proposed RMP
AH 276	LE031-087	Ringfort - rath (EX 62)	Drumsna	RMP
AH 277	LE031-088	Ringfort - rath	Drumsna	RMP
AH 278	LE031-100	Enclosure	Drumsna	Proposed RMP
AH 279	LE031-107	Ringfort - rath	Drumsna	Proposed RMP
AH 280	LE031-124	Enclosure	Drumsna	Proposed RMP
AH 281	LE031-125	Ringfort - rath	Drumsna	Proposed RMP
AH 282	LE032-022	Ringfort - rath	Fargrim	RMP
AH 283	LE032-023	Ringfort - rath	Fargrim	RMP
AH 284	LE032-024	Ringfort - rath	Fargrim	RMP
AH 285	LE032-051	Crannog	Gortconnellan	RMP
AH 286	LE032-052-	Enclosure	Annaduff	Proposed RMP
AH 287	LE032-053	Barrow - mound barrow	Annaduff Glebe	RMP
AH 288	LE032-054001	Church (EX 16)	Annaduff	Proposed RMP
	LE032-054002	Graveyard (EX 16)	Annaduff	Proposed RMP, RPS
	LE032-054003	Architectural fragment (EX 16)	Annaduff	Proposed RMP
	LE032-054005	Ecclesiastical enclosure (EX 16)	Annaduff	Proposed RMP
AH 289	LE032-097	Mound	Annaduff	RMP
AH 290	LE032-101	Fulacht fia	Drumsna	Proposed RMP
AH 291	LE032-071	Crannog	Derryoughter	RMP

AH No.	SMR Number	Name	Townland	Statutory Protection
AH 292	LE032-072	Crannog	Derryoughter	RMP
AH 293	LE032-073	Redundant record	Gortinty	None
AH 294	LE032-074	Crannog	Gortinty	RMP
AH 295	LE032-075	Redundant record	Carrick (Leitrim By., Annaduff Ed)	None
AH 296	LE032-076	Redundant record	Carrick (Leitrim By., Annaduff Ed)	None
AH 297	LE032-077	Ringfort - rath	Drumgilra (Leitrim By.)	RMP
AH 298	LE032-078	Ringfort - rath	Drumgilra (Leitrim By.)	RMP
AH 299	LE032-080	Ringfort - rath	Drumcoora (Mohill By.)	RMP
AH 300	LE032-105	Ringfort - rath	Carrick (Leitrim By., Annaduff Ed)	Proposed RMP
AH 301	LE032-106	Ringfort - rath	Carrick (Leitrim By., Annaduff Ed)	Proposed RMP
AH 302	LE035-001	Ringfort - rath	Derrybrack	RMP
AH 303	LE035-002	Ringfort - rath	Aghamore (Mohill By., Drumod Ed)	RMP
AH 304	LE035-003	Ringfort - rath	Aghamore (Mohill By., Drumod Ed)	RMP
AH 305	LE035-005	Enclosure	Aghintass, Antfield	RMP
AH 306	LE035-042	Ringfort - rath	Aghamore (Mohill By., Drumod Ed)	Proposed RMP
AH 307	RO018-004	Ringfort - rath	Skeagh	RMP

Of the 364 individual RMP/SMR sites, none are listed as National Monuments in state ownership or guardianship, and none are listed as being subject to a Preservation Order.

Of the 364 individual archaeological sites recorded within the study area, 211 are listed on the RMP and are subject to statutory protection, 112 are proposed for inclusion in the RMP at its next revision and are therefore not currently subject to statutory protection and 41 are included in the SMR and are not subject to statutory protection. There is a total of 22 sites classed as ‘redundant records’; however, they have been included within the assessment as in the past, sites that have been made

redundant have occasionally been found to be archaeological in nature during road-scheme related archaeological testing or other archaeological investigations.

A total of five of the sites are listed as ‘Excavation – miscellaneous’, representing archaeological sites that have been subject to preservation by record. These are not subject to statutory protection, as they are either proposed for inclusion on the RMP or are listed on the SMR for information by the Archaeological Survey of Ireland. The SMR records sites of various date and form, which are not intended to be added to the RMP at the next revision.

The recorded monuments within the study area can be roughly divided into seven categories: prehistoric sites, early medieval sites, medieval sites, post-medieval sites, sites of indeterminate date, excavations 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 sites of indeterminate date. Where no firm date can be established for individual sites, on typological, morphological, written-historical or cartographic grounds, these have been assigned to a period on the basis of professional judgement. Plate 4.10.1 shows the overall percentage of sites in each category.

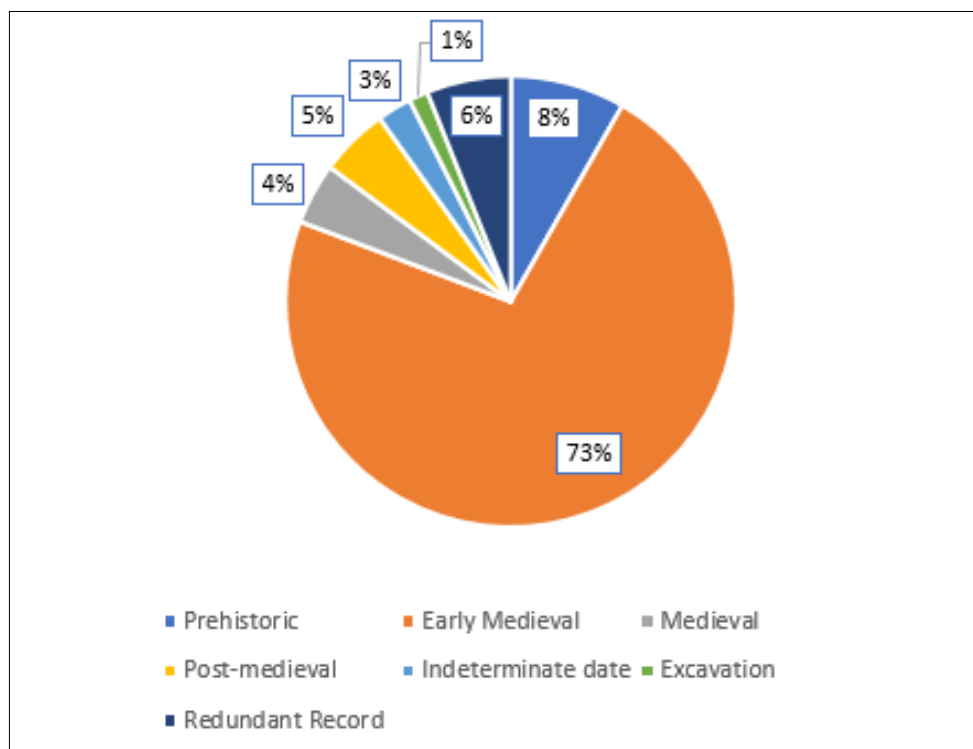


Plate 4.10.1 Percentages of Recorded Archaeological Sites within the Study Area

Prehistoric Period (c. 7000 BC-AD 500)

A total of 11 site classifications are included within the prehistoric category, see Plate 4.10.2. The most numerous are burnt mounds, which account for nine out of 30 sites in total. This site type presents as a mound of burnt stone, ash, charcoal and other combustible material, often with one or more (sometimes lined) troughs and can date from the Bronze Age to the early medieval period; however, a prehistoric date has been assumed for the purposes of this Constraints Study. No specific

concentrations of prehistoric sites within the Study Area have been identified during the course of this study.

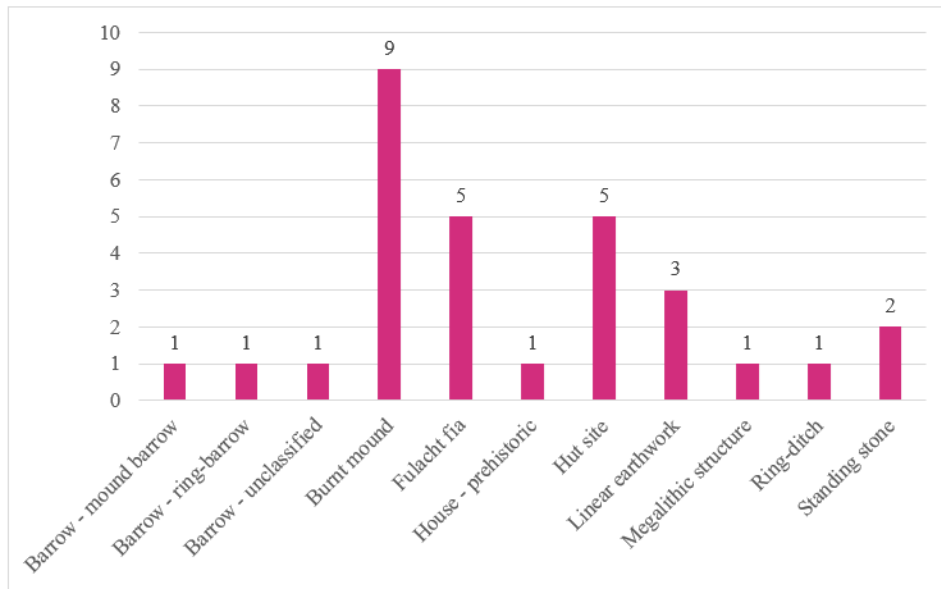


Plate 4.10.2 Number of Prehistoric Sites Located within the Study Area

Early Medieval Period (AD 500-1100)

A total of ten site classifications are included within the early medieval category Plate 4.10.3. By far the most numerous site types are ringforts, totalling 225 sites out of a total of 264. This is unsurprising as there are almost 60,000 sites of this type located across Ireland. They represent fortified rural farmsteads and can vary in size from a simple, single enclosing bank and ditch, to a large enclosure surrounded by multiple enclosing elements. There are no specific concentrations of early medieval sites within the Study Area with ringforts located across the overall area.

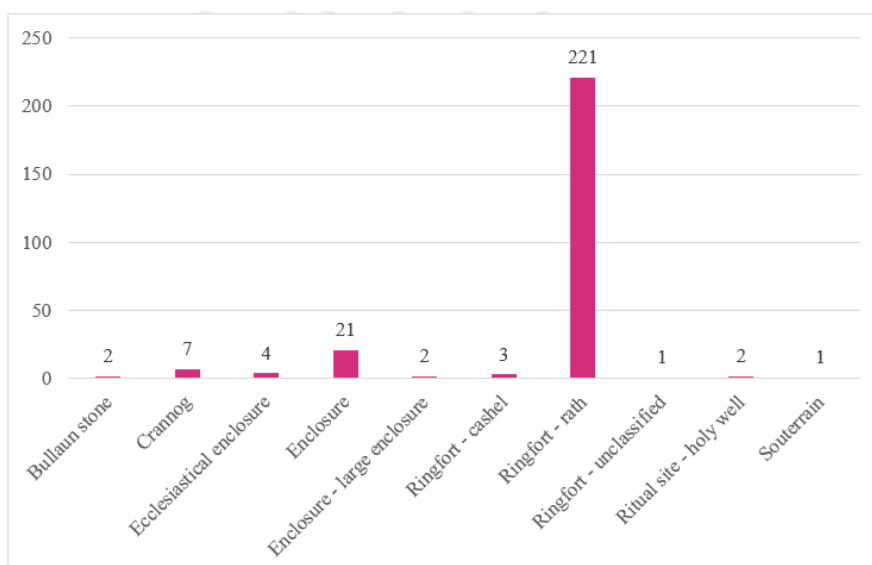


Plate 4.10.3 Number of Early Medieval Sites Located within the Study Area

Medieval Period (AD 1100-1600)

A total of seven site classifications are included within the medieval category, see Plate 4.10.4. The most numerous site type consists of churches, with six probable medieval churches located within the study area. Five of the churches are associated with a burial ground or graveyard, whereas one of the sites (AH115) may actually represent a medieval grange building, rather than a church site. It is possible that some of the church and graveyard sites are earlier in date, although for the purpose of the Constraints Study a medieval date has been assumed. There are no specific concentrations of medieval sites identified within the Study Area.

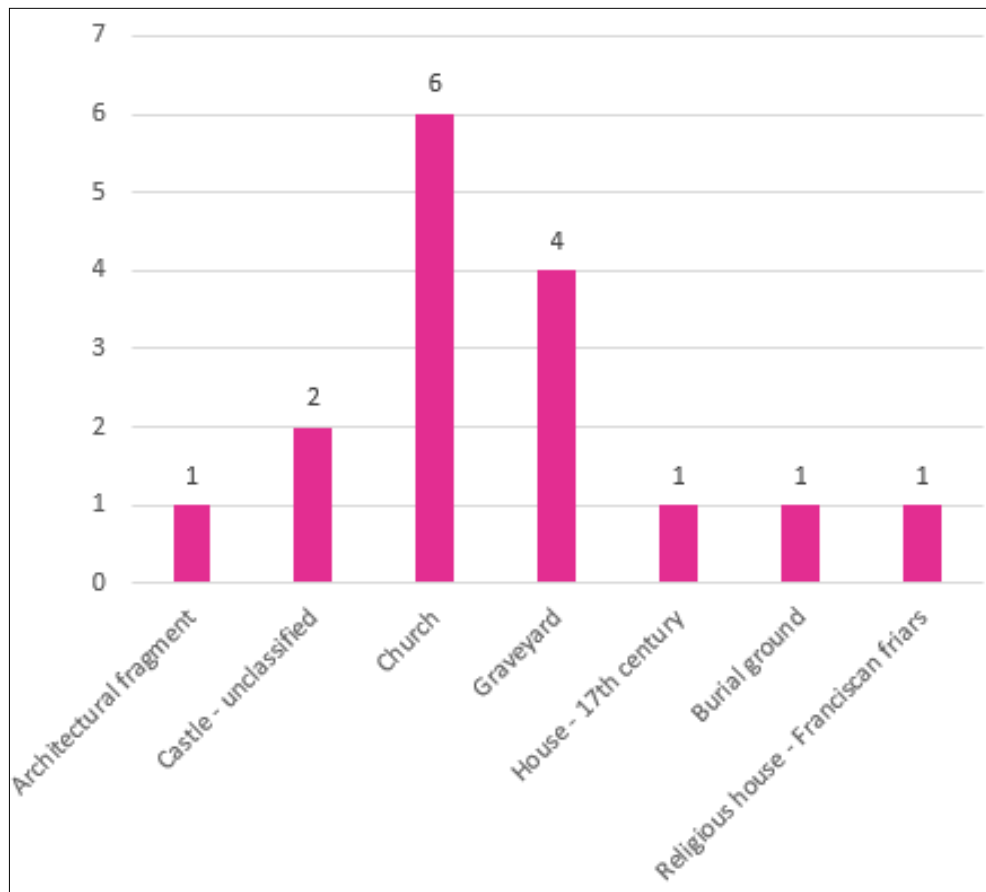


Plate 4.10.4 Number of Medieval Sites Located within the Study Area

Post-medieval Period (AD 1600-1900)

A total of 13 site classifications are included within the post-medieval category, see Plate 4.10.5. Bridges represent the most numerous site type with six recorded within the Study Area. The remaining categories are not as well represented within the archaeological record, due to an inconsistency as to whether post-medieval sites are recorded as ‘archaeological’ by the Archaeological Survey of Ireland.

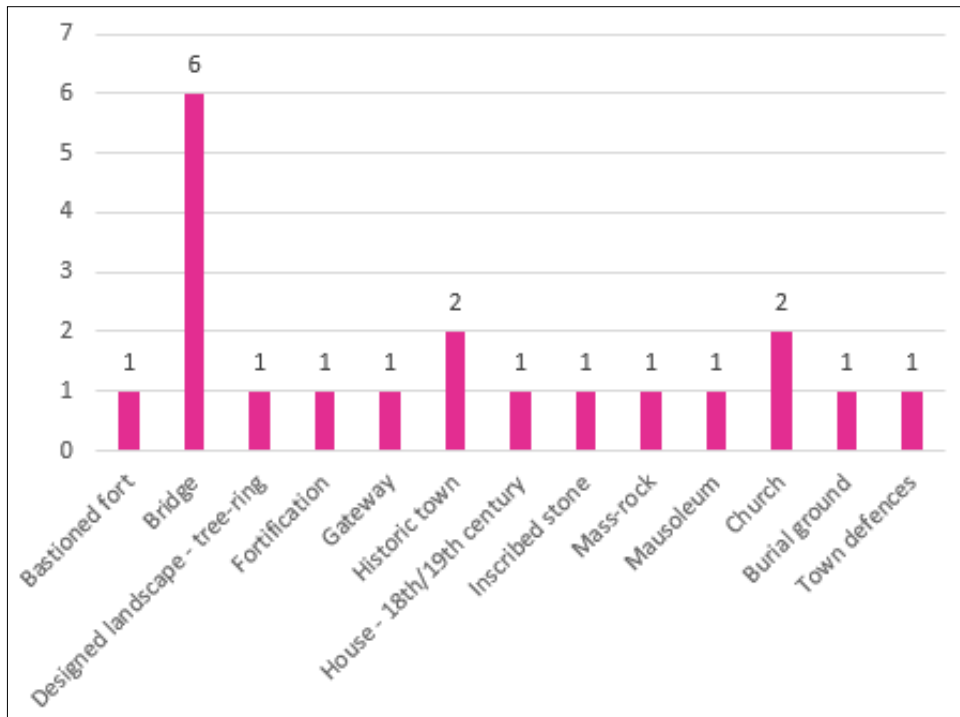


Plate 4.10.5 Number of Post-medieval Sites Located within the Study Area

A total of six site classifications are included within the sites of indeterminate date category (See Plate 4.10.6).

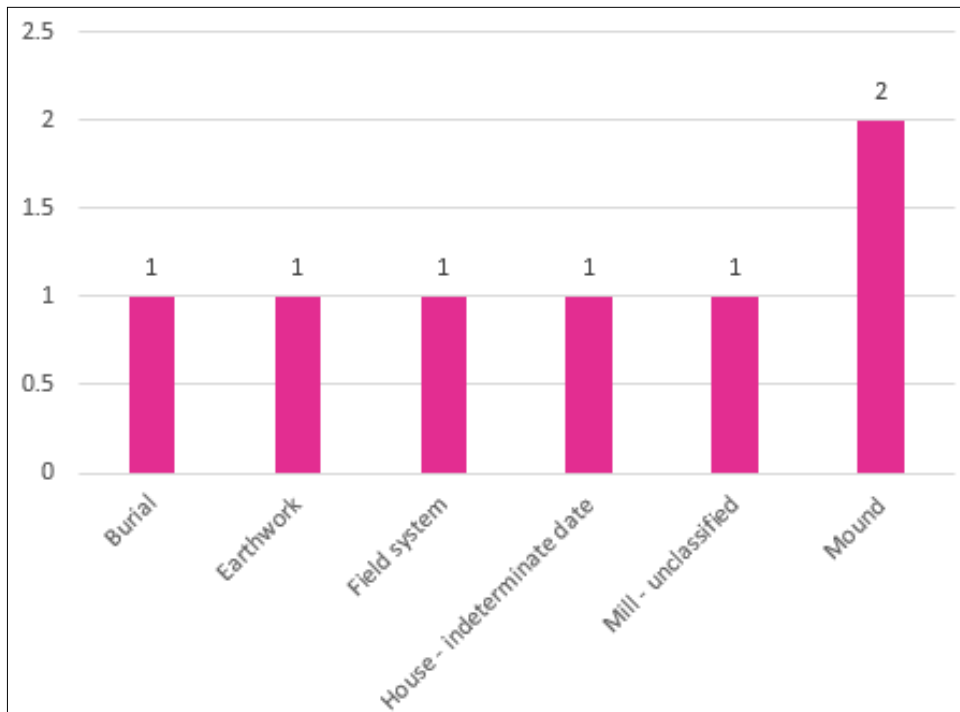


Plate 4.10.6 Number of Miscellaneous Sites Located within the Study Area

Summary of Previous Archaeological Fieldwork

A review of the Excavations Bulletin (1970-2021) has revealed that a number of archaeological investigations have been carried out within the study area. These have been assigned an Excavation (EX) number. Where these have been carried out at or near known archaeological sites, or have revealed archaeological remains which have subsequently been added to the SMR, these have been cross referenced with the relevant AH sites. These are summarised in Table 4.10.2 and EX numbers are also included in Table 4.10.1.

Table 4.10.2 Archaeological Excavations within the Study Area

EX No.	Licence	Reference	Description	Townland	AH Ref.
EX 1	99E0193 and ext.	Bennett 1999:765 and 2000:0849	Advance works for the realignment of the N4 between Boyle and Carrick-on-Shannon excavated a medieval enclosure. An Iron Age settlement comprising eight structures, an early medieval rath, a fulacht fiadh, and a burnt mound were also identified during the works.	Cloongownagh	AH 8/10
	99E0309 and ext.	Bennett 1999:774 and 2000:0847	Monitoring for the realignment of the N4 identified a fulacht fiadh in Hughestown. Two additional fulacht fiadh were identified and excavated.	Rockingham to Cortober	-
	99E0401	Bennett 1999:768	Realignment of the N4. Excavated a fulacht fiadh, two burnt mounds, a wooden trough, and three stone pathways to the immediate west of the study area.	Hughestown	-
EX 2	03E1374	Bennett 2003:1579	Monitoring of the realignment of the N4 from Hughestown to Meera identified a number of archaeological sites. Two burnt mounds were identified in Cloongownagh and two in Cultyconeen, all were preserved in situ.	Hughestown to Meera	AH 10/15
	03E1769	Bennett 2003:1560	Site 1 - burnt mound carbon dated to the Bronze Age.	Woodbrook	AH 2
	03E1770	Bennett 2003:1561	Site 2 - pit underlying a layer of broken stones and charred material.	Cloongownagh	AH 8

EX No.	Licence	Reference	Description	Townland	AH Ref.
			Site 3 - rectangular pit with shallow fill of charcoal. Possibly part of a corn-drying kiln.	Cloongownagh	AH 8
			Site 4 - truncated pit, possibly contemporary with Site 3.	Cloongownagh	AH 7
	03E1771	Bennett 2003:1562	Site 5 - burnt mound containing horse bones, no evidence of a trough.	Cloongownagh	AH 10
			Site 6 - a possible corn-drying kiln and industrial surface. Preserved in-situ.	Cloongownagh	AH 4
	03E1841	Bennett 2003:1563	Site 7 - burnt mound dated to the Bronze Age.	Woodbrook, Cloonagownagh	AH 3
	04E0375	Bennett 2004:1452	Site 8 - pit filled with charred organic material, preserved in situ and rectangular pit containing charcoal-rich material.	Cloongownagh	AH 5
EX 3	00E0180	Bennett 2000:0864	Pre-development testing between two enclosures did not identify any archaeological features.	Sroankeeragh	AH 29/30
EX 4	04E1597	Bennett 2004:1443	Testing for a proposed supermarket development failed to identify any features of archaeological significance.	Drishoge	-
	05E1337	Bennett 2005:1330			-
EX 5	07E0825	Bennett 2007:1489	Testing for a proposed development failed to identify any features of archaeological significance.	Cortober	-
EX 6	05E0592	Bennett 2005:1343	Testing for a proposed residential development failed to identify any archaeological features.	Mullaghmore	-
EX 7	11E033	Bennett 2011:523	Testing for the N4 Carrick to Dromod Road Scheme adjacent to a ringfort did not identify any archaeological features.	Cloonmaan	AH 22

EX No.	Licence	Reference	Description	Townland	AH Ref.
EX 8	07E0747	Bennett 2008:757	Monitoring of a sewage development in and around Carrick-on-Shannon identified three archaeological areas. The face of an old quay wall was identified at the Harbour. A wooden beam possibly associated with a post-medieval bridge over the Shannon at the Quay Road carpark. Material associated with the 17th-century O'Rourke castle on the Bypass Road.	Attifinlay, Ballynamony, Cloonsheebane, Drummagh, Keenaghan, Kilboderry, Lisnabrack, Townparks	AH 63/64
		Bennett 2008:1030	Monitoring of the sewage development near Carrick-on-Shannon in Co. Roscommon did not identify any archaeological features.	Cloonskeeveen, Cortober, Drishoge	-
EX 9	09E0526	Bennett 2010:575	An unauthorised development at the southern terminus of the Doon of Drumsna required monitoring of restoration works. No archaeological remains were exposed.	Cuiltyconway	AH 195
EX 10	06E1187	Bennett 2006:1717	A residential development adjacent to a ringfort did not uncover any archaeological features.	Cloonavery	AH 242
EX 11	05E0386 and ext.	Bennett 2005:1331 and 2005:1332	Testing for two single-house developments identified a ring-ditch, possibly represents enclosure (RO011-057) depicted on the first edition OS maps.	Drumcleavry	AH 243
EX 12	97E0347	Bennett 1997:452	Excavation near the inner bank of the Doon of Drumsna failed to identify any archaeological features.	Ardanaffrin	AH 244
	99E0029	Bennett 1999:759	Pre-development testing adjacent to the inner bank failed to produce archaeological material.	Ardanaffrin	AH 244
EX 13	19R0147	Leigh 2019	Geophysical survey disproved the presence of a recorded enclosure but identified a possible rectangular enclosure.	Cloonavery	AH 248
EX 14	04E1301	Bennett 2004:1430	Testing in the vicinity of the Doon of Drumsna failed to	Ardanaffrin	AH 244

EX No.	Licence	Reference	Description	Townland	AH Ref.
			uncover archaeological deposits.		
EX 15	03E1250	Bennett 2003:1564	Monitoring of development works on the east bank of the River Shannon, upstream of Jamestown Bridge did not identify archaeological features.	Cloonavery	AH 177/178
EX 16	94E0158	Bennett 1994:147	Monitoring of the Drumsna-Jamestown bypass exposed an area of burnt stone. Excavation identified the feature as a fulacht fiadh with a trough and associated hearth.	Drumsna	-
	94E0051	Bennett 1994:148	Testing was carried out at five sites along the Drumsna-Jamestown bypass. Site 1 - testing along the road take to the north of two churches. Recovered charcoal flecks, a lens of burning, and a clay pipe bowl. Site 2 - clear surface remains of ringfort to west of road take. No remains within road take. Site 3 - targeted possible settlement platform in road take. Natural feature. Site 4 - targeted possible enclosure, determined to be modern feature. Site 5 - Settlement platform visible to south of road take. No associated remains extended into road take. French drain identified during testing.	Annaduff, Drumsna, Kildorragh, Kiltycarney, Tully	AH 288/270
	94E0123	Bennett 1994:149	An archaeological site identified during monitoring of the N4 was excavated. This revealed a circular hut site and fulacht fiadh dated to the Late Neolithic / Early Bronze Age.	Kildorragh	AH 154
	94E0097	Bennett 1994:150	Monitoring for the Drumsna-Jamestown bypass exposed a burnt spread. Excavation determined the feature comprised a fulacht fiadh and trough.	Kiltycarney	AH 151
	94E0171	Bennett 1994:151	Testing adjacent to a ringfort in advance of the Drumsna-Jamestown bypass did not	Lisseeghan	AH 143

EX No.	Licence	Reference	Description	Townland	AH Ref.
			identify any archaeological features.		
	94E0100	Bennett 1994:152	Monitoring for the N4 Drumsna-Jamestown Bypass exposed and excavated a spread of burnt material	Minkill	AH 153
	94E0041	Bennett 1994:153	A fulacht fiadh was exposed and excavated during monitoring for the N4.	Tully	AH 150
EX 17		Bennett 1990:099	Examination of a section of the Doon of Drumsna suggested that the feature comprised a primary bank that was later enlarged and heightened by dumping.	Lackagh, Drumcleavry	AH 244
EX 18	01E0702	Bennett 2001:725	Testing adjacent to an enclosure, no archaeological features.	Lisnagat	AH 74
EX 19	05E1267	Bennett 2005:942	Testing for a residential development identified a prehistoric hut site.	Lisnagat	AH 74
EX 20	08E0851	Bennett 2008:755	Testing adjacent to a ringfort failed to identify any archaeological features.	Cartown	AH 76
EX 21	03E01637	Bennett 2003:1095	Monitoring at Bridge Street, no archaeological significance.	Townparks	AH 64
EX 22	04E1488	Bennett 2005:931	Monitoring of demolitions of additions to a Georgian building on Bridge Street. No archaeological significance.	Townparks	AH 64
EX 23	00E0527	Bennett 2000:0563	Monitoring of a development within Carrick-on-Shannon. No archaeological significance.	Townparks	AH 64
EX 24	01E0409	Bennett 2001:727	Testing at Priest's Lane did not identify any archaeological finds.	Townparks	AH 64
EX 25	97E0253	Bennett 1997:317	Testing off Priest's Lane did not identify any archaeological finds.	Townparks	AH 64
EX 26	98E0248	Bennett 1998:372	Testing for a commercial development within Carrick-on-Shannon failed to produce archaeological features or deposits.	Townparks	AH 64

EX No.	Licence	Reference	Description	Townland	AH Ref.
EX 27	00E0143	Bennett 2000:0562	Testing in the eastern outskirts of Carrick-on-Shannon failed to uncover anything of archaeological significance.	Townparks	-
EX 28	00E0269	Bennett 2000:0566	Testing on the east side of the Main Street, Jamestown produced no evidence of archaeology.	Jamestown	AH 177
EX 29	99E0521	Bennett 1999:470	Testing at the east end of the Main Street in Carrick-on-Shannon did not identify any archaeological features.	Townparks	AH 64
EX 30	00E0554	Bennett 2000:0567	Testing for a house along the Main Street, Jamestown recovered sherds of post-medieval pottery.	Jamestown	AH 177
EX 31	05E0389	Bennett 2005:938	Testing for a residential extension on the Main Street, Jamestown did not identify any archaeological features.	Jamestown	AH 177
EX 32	06E0117	Bennett 2006:1202	A development at Main Street and Priest's Lane, Carrick-on-Shannon did not identify any archaeological features.	Townparks	AH 64
EX 33	99E0257	Bennett 1999:469	Pre-development testing at Bridge Street, Carrick-on-Shannon failed to identify any archaeological remains.	Townparks	AH 64
EX 34	02E0039	Bennett 2002:1051	Testing at Bridge Street, Carrick-on-Shannon identified a wall foundation with a sherd of medieval pottery. The wall is possibly associated with a fortification recorded in the town.	Townparks	AH 64
		Bennett 2003:1097	Monitoring of works did not identify any further features.		
EX 35	02E1679	Bennett 2002:1052	Testing for a residential development failed to uncover archaeological features.	Townparks	AH 64
EX 36	03E0898	Bennett 2003:1098	Testing for a commercial development on the Dublin Road, Carrick-on-Shannon did not uncover archaeological features.	Townparks	AH 64
EX 37	04E0070	Bennett 2004:0954	Testing within Carrick-on-Shannon did not identify any archaeological features.	Townparks	AH 64

EX No.	Licence	Reference	Description	Townland	AH Ref.
EX 38	04E1357	Bennett 2004:0953	Testing for a proposed development to the rear of Bridge Street, Carrick-on-Shannon did not identify any archaeological remains.	Townparks	AH 64
EX 39	01E1178	Bennett 2001:724	Testing for a residential development adjacent to a ringfort failed to identify archaeological features.	Ballynamoney	AH 82
EX 40	02E0520	Bennett 2002:1049	Testing for a commercial development to the rear of Bridge Street, Carrick-on-Shannon did not uncover archaeological features.	Townparks	AH 64
EX 41	99E0223	Bennett 1999:471	Pre-development testing off Priest's Lane did not expose any archaeological remains.	Townparks	AH 64
EX 42	07E0947	Bennett 2007:1078	Monitoring for works for the Carrick-on-Shannon sewage scheme identified two dressed limestone blocks at the quayside.	Attifinlay, Ballynamony, Cloonsheebane, Drummagh, Keenaghan, Kilboderry, Lisnabrack, Townparks, Cloonskeveen, Cortober, Drishoge	AH 64
EX 43	01E0332	Bennett 2001:726	Testing and monitoring for a commercial development on Bridge Street exposed a stone surface of large slabs, which was preserved in situ. Monitoring uncovered evidence of 18 th / 19 th century efforts to raise the ground level.	Townparks	AH 64
EX 44	02E0359	Bennett 2002:1050	Monitoring for an accessway at New Public Road, Carrick-on-Shannon did not reveal archaeological features or finds.	Townparks	AH 64
EX 45	03E0652	Bennett 2003:1096	Monitoring and testing for a proposed development at Bridge Street and Quay Lane, Carrick-on-Shannon did not uncover archaeological features.	Townparks	AH 64

EX No.	Licence	Reference	Description	Townland	AH Ref.
EX 46	03E1193	Bennett 2003:1100	A development to the rear of the Bush Hotel, Main Street, Carrick-on-Shannon was tested. No features were identified.	Townparks	AH 64
EX 47	04E0133	Bennett 2004:0947	A rough stone surface, interpreted as the remains of a cattle byre, was uncovered during monitoring and testing for a residential development.	Attirory	-
	04E0133 ext.	Bennett 2004:0948	Continued monitoring did not identify any archaeological remains.	Attirory	-
	06E0344	Bennett 2006:1201	A final phase of monitoring failed to identify any archaeological features.	Attirory	-
EX 48	03E1788	Bennett 2003:1094	A residential development adjacent to an early medieval church site was monitored. No archaeological activity was exposed.	Attiror	AH 142
EX 49	18E0707	Bennett 2019:075	Testing for a proposed development identified two sections of an ecclesiastical enclosure. A series of post-holes and pits were uncovered within the interior suggesting the ecclesiastical site was for industrial activity including metalworking.	Attirory	AH 142
EX 50	96E0216	Bennett 1996:228	Testing within the stable yard of Jamestown House uncovered a post-medieval cobbled yard.	Jamestown	AH 177
EX 51	97E0306	Bennett 1997:319	Testing outside the north wall of Jamestown did not identify anything of archaeological significance.	Jamestown	AH 177
EX 52	01E1191	Bennett 2001:735	Pre-development testing identified a section of the western town wall.	Jamestown	AH 177
EX 53	04E1549	Bennett 2004:0958	Monitoring for a residential development outside the north wall of Jamestown did not reveal any archaeological remains.	Jamestown	AH 177

EX No.	Licence	Reference	Description	Townland	AH Ref.
EX 54	05E0593	Bennett 2005:937	Testing for a residential development to the immediate north of the walled town of Jamestown failed to reveal archaeological features.	Jamestown	AH 177
EX 55	06E1101	Bennett 2006:AD16	Pre-development testing in the vicinity of an enclosure and ringfort identified post-medieval finds near the ringfort.	Jamestown, Tully	AH 159/172
EX 56	C177, E2895	Bennett 2007:1084	Testing was carried out for a sewerage pipeline along the Main Street in Jamestown. A cobbled surface, interpreted as a post-medieval road, was encountered at the southern end.	Jamestown	AH 177
EX 57	07E1089	Bennett 2007:1158	Pre-development testing, no archaeological significance.	Lisduff	-
EX 58	10E0244	Bennett 2010:435	Testing for route selection of the N4 Carrick-on-Shannon to Dromod Road Scheme adjacent to a ringfort did not encounter archaeological features.	Cornaslieve	AH 111
	10E0243	Bennett 2010:436	Testing for route selection of the N4 Carrick-on-Shannon to Dromod Road Scheme adjacent to a ringfort uncovered an undated possible pit feature.	Dromore	AH 110
EX 59	01E0069	Bennett 2001:730	Pre-development testing near an enclosure and graveyard did not expose any features.	Drumsna	AH 274
EX 60	01E0106	Bennett 2001:731	Monitoring of a sewage scheme in Drumsna recovered sherds of post-medieval pottery and clay pipe fragments.	Drumsna	-
EX 61	03E1377	Bennett 2003:1110	A residential development at Drumsna did not identify any archaeological features.	Drumsna	-
EX 62	02E1235	Bennett 2002:1054	Monitoring of a residential development near a ringfort did not identify archaeological remains.	Drumsna	AH 276

EX No.	Licence	Reference	Description	Townland	AH Ref.
EX 63	94E0141	Bennett 1994:145	Monitoring for a road identified a spread of burnt material. Excavation determined it was due to tree clearance activity.	Crickeen	-
EX 64	09E0182	Bennett 2009:519	Monitoring of treatment plants for a sewage scheme in Ballinagleragh, Cloone, Dromahaire, Drumcong, Drumkeeran, Jamestown, Killarga, Kiltyclogher, Kinlough, and Roosky did not uncover archaeological features.		-
EX 65	05E0983	Bennett 2006:1214	Pre-development testing for the N4 Dromod Roosky bypass identified 25 sites of archaeological interest.	Fearnaght to Edercloon	-
	A031/001, E3288	Bennett 2006:1215	Excavated the badly disturbed remains of a post-medieval kiln.	Faulties	-

Areas of Archaeological Potential

Areas of Archaeological Potential (AAPs) can be defined as parts 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 bog. Rivers and lakes are a focus for human habitation due to the obvious transport and food resources. Rivers, lakes and 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. Wooden trackways dating to the Bronze Age period and later have been excavated within bogland throughout Ireland. 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 areas of bog/peat, rivers, streams, and bodies of water (both fresh and saltwater), and their margins, within the study area should be considered as possessing archaeological potential.

Within the Study Area, the main Area of Archaeological Potential is characterised by the River Shannon, its associated loughs (Lough Corry and Lough Tap) and riverine margins, which are often boggy or waterlogged in nature. In the eastern section of the Study Area is Lough Drumgilra (or Gortinty Lough), which is linked to the River Shannon. The smaller loughs of Cartron and Lowfield are located to the west of Lough Tap. In addition, there are multiple small watercourses crossing the landscape.

4.10.3.2 Architectural Heritage

A total of 112 structures of architectural heritage significance have been identified within the study area. These are either listed within the RPS (in the County Development Plans for Leitrim and Roscommon)^{13 14} or have been identified as part of the architecture survey carried out by the NIAH.⁹¹

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 planning authority for inclusion in their RPS.⁹²

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 shopfronts.

Local: These are structures or sites of some vintage that make a contribution to the architectural heritage, but this may not merit their 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.

Overall, there are 112 RPS and/or NIAH structures located within the Study Area, these have been grouped into 16 Built Heritage (BH) constraints and are marked as BH on the accompanying figures (Table 4.10.3 and Figures 4.10.1.0 to 4.10.1.5). A large portion of the structures are located within the urban centre of Carrick-on-Shannon (BH 4). Of the 112 structures, 76 are Protected Structures. These consist for the most part of country houses and elements of their associated demesnes,

⁹¹ National Inventory of Architectural Heritage (NIAH), 2022. Available at: <https://www.buildingsofireland.ie/>

⁹² Department of Culture, Heritage, and the Gaeltacht, 2017. NIAH Handbook. Available at: <https://www.buildingsofireland.ie/app/uploads/2019/10/NIAH-Handbook-Edition-September-2017.pdf>

vernacular houses, churches, railway infrastructure and bridges. Occasionally items such as water pumps and towers, steps and post boxes have been included within the record.

Table 4.10.3 Built Heritage Sites within the Study Area

BH No	RPS	NIAH	Name / Type	Townland	Statutory Protection
BH 1	00700105		Woodbrook House	Usna	RPS
BH 2	01100391	31807008	Carrick-on-Shannon Railway Station Foot bridge	Cortober	RPS
	01100392	31807009	Carrick-on-Shannon Railway Station	Cortober	RPS
	01100393	31807010	Carrick-on-Shannon Railway Station Waiting Room	Cortober	RPS
	01100394	31807011	Carrick-on-Shannon Railway Station Signal Box	Cortober	RPS
	01100396	31807013	Carrick-on-Shannon Railway Station Goods Shed	Cortober	RPS
	01100397	31807014	Carrick-on-Shannon Railway Station Warehouse	Cortober	RPS
		31807012	Carrick-on-Shannon Railway Station Water Tower	Cortober	None
BH 3	01100315		Semi-detached houses	Cortober	RPS
	01100316	31807005	Pair of semi-detached houses	Cortober	RPS
	01100389		Pair of semi-detached houses	Cortober	RPS
	01100390		Semi-detached houses	Cortober	RPS
		31807006	House	Cortober	None
BH 4	30813002	30813002	Old Barrel Store / Carrick-on-Shannon Tourist Information	Townparks	RPS
	30813005	30813005	Town Hall	Townparks	RPS
	30813007	30813007	National Irish Bank	Townparks	RPS
	30813012	30813012	Leitrim County Council (Gaol)	Townparks	RPS
	30813013	30813013	Governor House	Townparks	RPS
	30813014	30813014	Old Court House	Townparks	RPS
	30813015	30813015	Hatley Manor	Townparks	RPS
	30813016	30813016	Terrace House	Townparks	RPS
	30813017	30813017	Carrick-on-Shannon Post Office	Townparks	RPS
	30813018	30813018	Mc Cann Memorial Clock	Townparks	RPS
	30813020	30813020	Costello Memorial Chapel	Townparks	RPS
	30813021	30813021	P. Flynn & Co. end of terrace six bay three storey public house	Townparks	RPS

BH No	RPS	NIAH	Name / Type	Townland	Statutory Protection
	30813024	30813024	Reynold's Butchers / Moonstone Jewellers End of terrace 4 bay, 2 storey house	Townparks	RPS
	30813025	30813025	St. Mary's Catholic Church	Townparks	RPS
	30813026	30813026	James McGuire End of terrace three bay two storey former presbytery	Townparks	RPS
	30813027	30813027	Raval, End of terrace three bay two storey house	Townparks	RPS
	30813029	30813029	St. George Mausoleum	Townparks	RPS
	30813030	30813030	St. George's Church of Ireland Church (also AH 64)	Townparks	RPS
	30813039	30813039	Former District Hospital	Townparks	RPS
	30813040	30813040	Post Box	Townparks	RPS
	30813042	30813042	Summerhill Lodge	Townparks	RPS
	30813043	30813043	Infirmity, St. Patrick's Hospital (workhouse)	Townparks	RPS
	30813044	30813044	Carrick-on-Shannon Court House	Townparks	RPS
	01100386	31807002	Limestone steps	Cortober	RPS
	01100387	31807003	Post Box	Cortober	RPS
	01100388	31807004	Hollywell House	Cortober	RPS
		30813028	Just For Men / Paul Byron Shoes (house)	Townparks	None
		30813003	Campbell's Londis Supermarket	Townparks	None
		30813004	Frances Fashions (house)	Townparks	None
		30813006	Milestone / milepost	Townparks	None
		30813008	Victoria Parochial Hall	Townparks	None
		30813010	Carrick-on-Shannon Lawn Tennis Club (gates / railings / walls)	Townparks	None
		30813011	College	Townparks	None
		30813019	Armstrong (house)	Townparks	None
		30813022	Dunne's (house)	Townparks	None
		30813023	Allied Irish Bank	Townparks	None
		30813031	House	Townparks	None
		30813032	Aidan's Family Butcher (house)	Townparks	None
		30813033	House	Townparks	None
		30813034	Chez Fi Boutique (house)	Townparks	None
		30813035	Bank of Ireland (house)	Townparks	None

BH No	RPS	NIAH	Name / Type	Townland	Statutory Protection
		30813036	Tots to Teens / Irish House	Townparks	None
		30813037	Carrick-on-Shannon Rectory	Townparks	None
		30813038	House	Townparks	None
		30813041	Hillcrest Lodge	Townparks	None
		30813001, 31807001	Carrick-on-Shannon Bridge (alos AH 63)	Townparks, Cortober	None
	30500062		Former Dispensary	Townparks	RPS
	30500098		Water Tower	Townparks	RPS
	30500128		Post Box	Townparks	RPS
	30501006		Stable Folly, Hatley Manor	Townparks	RPS
	30501008		Glasshouse, Hatley Manor	Townparks	RPS
	30501036		End of terrace three bay two storey former presbytery	Townparks	RPS
	30501060		Carved Stone Plaque, Saint Georges Church Grounds	Townparks	RPS
	30501061		Peyton Tomb, Saint Georges Church Grounds	Townparks	RPS
	30501063		Wills Tomb, Saint Georges Church Grounds	Townland	RPS
	30501155		Old Quay Walls, Quayside	Townparks	RPS
	30501159		Remains of Tower (also AH 64)	Townparks	RPS
	30501170		Hoist, Quayside	Townparks	RPS
	30501204		Market Yard & Buildings	Townparks	RPS
	30501226		Teagasc	Townparks	RPS
	30501273		Presentation House - detached eight bay three storey former barracks	Townparks	RPS
	30501277		Presentation House - freestanding two bay single storey outbuilding	Townparks	RPS
	-		The Lodge	Townparks	RPS
BH 5		30931001	House	Cloonsheebane	None
BH 6	30800505	30814006	West Wall (Also AH 177)	Jamestown	RPS
	30814002	30814002	Weir - 4 bay sluice bridge	Jamestown, Charlestown	RPS
	30814003	30814003	Former Workhouse	Jamestown	RPS
	30814006	30814006	Jamestown Arch - North Gate (also AH 177)	Jamestown	RPS
	30814009	30814009	Inkwell, The Coach House (folly)	Jamestown	RPS

BH No	RPS	NIAH	Name / Type	Townland	Statutory Protection
	30814010	30814010	Jamestown Roman Catholic Church	Jamestown	RPS
	30814011	30814011	2 Storey L Shaped Plan House	Jamestown	RPS
	30814012	30814012	Stable Block, The Coach House (Jamestown House Outbuildings)	Jamestown	RPS
	30814015	30814015	Jamestown House Lodge	Jamestown	RPS
		30814005	Jamestown Roman Catholic Cemetery (also AH 177)	Jamestown	None
		30814008	Post box	Jamestown	None
		30814013	Jamestown House	Jamestown	None
		30814014	Water pump	Jamestown	None
		30814016	Jamestown Bridge	Jamestown	RMP
BH 7	30800516		Drumsna Quay	Drumsna	RPS
	30815001	30815001	St. Mary's Roman Catholic Church	Drumsna	RPS
	30815004	30815004	Cut Stone Gateway, Charlestown House	Drumsna	RPS
	30815009	30815009	3 Bay Two storey House, Quay Street	Drumsna	RPS
		30815002	Graveyard / cemetery (also AH 274)	Drumsna	None
		30815003	Milestone / milepost	Drumsna	None
		30815005	T. J. McLoughlin (house)	Drumsna	None
		30815006	House	Drumsna	None
		30815007	Drumsna Bridge	Drumsna	None
		30815008	House	Drumsna	None
		30815010	House	Drumsna	None
BH 8		30815011	Drumsna National School	Drumsna	None
BH 9	30815012	30815012	St. Ann's Church of Ireland Church	Annaduff	RPS
	30903203		Nesbitt Mausoleum	Annaduff	RPS
BH 10	01200549	31912002	Jamestown Canal Bridge	Corry	RPS
BH 11	01200548	31912001	Albert Lock	Cloonteen	RPS
BH 12	30903204		Shannon Bridge - Arched train viaduct over river	Derrylaur	RPS
BH 13	01100186		Church of St. Brigid	Dangan	RPS
BH 14	01800187	31918002	The Auld Thatch Cabin	Kilmore	RPS
BH 15	30935002	30935002	St. Mary's Roman Catholic Church	Aghamore	RPS

BH No	RPS	NIAH	Name / Type	Townland	Statutory Protection
BH 16	30903502		Two-storey house	Faulties	RPS

Architectural Conservation Areas (ACAs)

There are two ACAs within the Study Area; Carrick-on-Shannon ACA and Jamestown ACA. These are situated within the townlands of Townparks and Jamestown respectively in County Leitrim.

4.10.3.3 Designed Landscapes

A total of 16 designed landscapes have been identified from the desktop resource. These are listed in Table 4.10.4 and are marked as 'DL' on the accompanying figures. The NIAH⁹³ has carried out a desk-based survey of identifiable demesnes within Counties Leitrim and Roscommon. The NIAH survey should not be considered as a full survey, as some landscapes are not included in the survey results. In this instance only eight of the 16 identifiable demesnes are included within the NIAH survey. Of these landscapes two are associated with Protected Structures and therefore have the potential to fall within the remit of the Planning and Development Act 2000.

Table 4.10.4 Designed Landscapes within the Study Area

DL Ref.	Demesne Name	Townland	NIAH Garden	Statutory Protection	Condition
DL 1	Woodbrook House	Usna, Hughestown	4626	RPS	Principal building (BH 1) and parkland retained.
DL 2	Danesfort	Danesfort	4531	None	Footprint of principal building and site footprint are visible.
DL 3	Castlecarra	Aghancarra, Aghameeny	N/A	None	Principal building retained; site footprint visible.
DL 4	Jamestown Lodge	Jamestown	N/A	RPS	Principal building (BH 6) retained; site footprint visible.
DL 5	Charlestown House	Charlestown, Cloonavery	4513	None	Building and woodland indicated, principal building no longer survives.
DL 6	Mountcampbell House	Mountcampbell, Cricken	4475	None	Woodland indicated; principal building no longer survives. Major road runs through site.
DL 7	Belmont	Drumsna	N/A	None	Site footprint visible, no structures survive.

⁹³ National Inventory of Architectural Heritage, 2022. Garden Survey Data Download. Available at: <https://www.buildingsofireland.ie/resources/>

DL Ref.	Demesne Name	Townland	NIAH Garden	Statutory Protection	Condition
					Development within site.
DL 8	Lismoyle	Lismoyle	N/A	None	Principal structure survives and site footprint visible.
DL 9	Cloonteen Cottage	Cloonteen, Corry	4525	None	No surviving architectural features, woodland indicated.
DL 10	Glebe House	Carrowcuil	N/A	None	Principal building and site boundary survive. Rectory on later OS mapping.
DL 11	Aghaward	Kilmore, Skeagh	4485	None	Named Kilmore on later OS mapping. Principal structure survives. Northern half of demesne contains significant development.
DL 12	Headford House	Headford, Annaduff Glebe	4459	None	Site footprint visible but nothing else remains.
DL 13	Glebe House	Annaduff Glebe	4449	None	Principal building retained and site boundary visible. Annaduff Rectory on later OS mapping.
DL 14	Hartley House	Hartley	N/A	None	Boundaries visible, house no longer extant and eastern half of demesne now occupied by modern housing.
DL 15	Drumlumman	Drumlumman	N/A	None	Boundaries visible, house may survive. Mature planting along boundaries still extant.
DL 16	Shannon Lodge	Carrick-on-Shannon	N/A	None	Shown with formal garden and scattered planting on 1st edition map. Area now occupied by modern housing; no trace of demesne remains

4.10.4 Summary

The purpose of this Constraints Study is to provide analysis of the archaeological, architectural, and cultural heritage resources within the study area in order to identify the key heritage constraints. The results of this study then inform the design of potential alternatives and options for the N4 Carrick-on-Shannon to Dromod

Project. The study area is located within Counties Leitrim and Roscommon and covers an approximate area of 78km². The study has shown that there is a large cultural heritage resource within the area. The sites and areas listed within this chapter are shown on Figures 4.10.1.0 to 4.10.1.5 and should be considered as key constraints during the design process.

With the exception of the settlements of Carrick-on-Shannon, Jamestown, Drumsna, Dromod, Cortober and Aghamore, the remaining landscape is rural in nature containing some scattered settlement, small to large pastoral farming enterprises with some marginal scrubby areas. A total of 364 individual RMP/SMR sites dating from the prehistoric period through to the post-medieval period, are listed within the study area indicating a continuance of activity and settlement in the region. A substantial percentage of these sites, 73%, can be ascribed to the early medieval period, with ringforts being most frequent. The recorded archaeological resource is distributed relatively evenly across the study area, although marginal ground tends to be less active in terms of known archaeology (due to waterlogged nature of the environment). None of the recorded monuments are protected with Preservation Orders or are listed as National Monuments. All recorded archaeological sites should be considered as cultural heritage constraints during the design of potential alternatives and options and avoided where possible.

A survey of the Excavations Bulletin (1970-2021) has revealed that a number of investigations have taken place within the study area. A total of 69 individual or groups of investigations have been recorded. The majority of archaeological works are located along existing roads or are associated with modern housing developments associated with existing settlement centres.

There are numerous Areas of Archaeological Potential (AAPs) within the study area. These are characterised by the River Shannon, associated loughs and marginal ground, smaller loughs and multiple small watercourses. 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 study area has provided a holistic view of the built heritage resource, with the later years of the post-medieval period well represented by the presence of a number of country houses and demesnes, vernacular houses, bridges, railway infrastructure and churches. Structures that are architecturally and socially important are listed within the development plans and NIAH surveys of Counties Leitrim and Roscommon. A total of 112 individual built heritage structures are located within the study area, with a large portion recorded within the urban centre of Carrick-on-Shannon. All protected structures and NIAH structures should be considered as cultural heritage constraints during the design of the N4 Carrick-on-Shannon to Dromod Project with direct impacts and impacts on settings avoided where possible.

In addition, two Architectural Conservation Areas have been identified within the study area; the Carrick-on-Shannon ACA and the Jamestown ACA. The Jamestown ACA focusses on the village of Jamestown and includes the demesne landscape of Jamestown Lodge.

A total of 16 Designed Landscapes have been identified from the desktop resource within the study area, eight of which are included on the NIAH Garden Survey. Some of these landscapes retain their principal building and/or outbuildings, whereas others (such as Mount Campbell House and Charlestown House) have lost their houses and a large portion of the original designed landscape elements. Where the principal does survive, and is listed as a protected structure, the demesne can be viewed as attendant grounds to the same. These landscapes should be considered as cultural heritage constraints during the development of potential alternatives and options with demesnes retaining their principal structures being considered as key constraints

4.11 Landscape and Visual

4.11.1 Introduction

This section describes the landscape and visual constraints within the study area for the N4 Carrick-on-Shannon to Dromod Project and should be read in conjunction with the landscape and visual constraints shown on, Figures 4.11.1.0 to 4.11.1.5.

This constraints study examines the existing landscape and highlights landscape and visual features of significance and sensitivity that may influence the development of feasible options. The landscape and visual environment comprise both natural and built elements which include topography, water bodies, vegetation, wildlife habitats, open spaces, developed lands, buildings and structures and views to and from such elements.

Sections 4.11.2 describes the methodologies and sources of information that were used to carry out the study. Section 4.11.3 describes the landscape and visual constraints within the study area. A summary is presented in Section 4.11.4.

4.11.2 Methodology and Sources of Information

The landscape and visual constraints assessment involved desktop studies and fieldwork comprising professional evaluation by experienced landscape specialists.

The assessment is based on understanding the character of the existing landscape with specific reference to the Landscape Character Assessment of County Leitrim (and Section 4.8.6 of the Leitrim County Development Plan 2015-2021¹³ and the Landscape Character Assessment of County Roscommon (Volume II of Roscommon County Development Plan 2014-2020¹⁴), to other landscape and visual references in the County Development Plans, and to a site-based review of the landscape and visual environment.

The assessment has had regard to the following documents and data sources:

- Draft Advice Notes for Preparing Environmental Impact Statements, September 2015²³
- Guidelines on the information to be contained in Environmental Impact Assessment Reports, Draft August 2017²¹
- Guidelines for Landscape and Visual Impact Assessment, 3ed. April 2013⁹⁴
- Leitrim County Development Plan 2015-2021¹³
- Landscape Character Assessment for County Leitrim^{95 96}
- Draft Leitrim County Development Plan 2023-2029¹⁷

⁹⁴ Landscape Institute, 2013. Guidelines for Landscape and Visual Impact Assessment, 3ed. April 2013. Landscape Institute & Institute of Environmental Management and Assessment. London

⁹⁵ Environmental Resources Management, 2002. Comhairle Chontae Liatroma, Landscape Assessment of County Leitrim Reference 17896

⁹⁶ RPS, 2020. Leitrim Landscape Character Assessment 2019. Leitrim County Council

- Carrick-on-Shannon Local Area Plan 2010-2019 **Error! Bookmark not defined.**
- Roscommon County Development Plan 2022-2028¹⁸
- Landscape Character Assessment for County Roscommon, 2008, (Volume II of Roscommon County Development Plan 2014-2020)⁹⁷
- Landscape Character Assessment for Draft County Roscommon, 2022 (Roscommon County Development Plan 2022-2028)¹⁸
- Cortober Local Area Plan 2014-2020¹⁶
- Ordnance Survey Ireland Geohive (<http://map.geohive.ie/mapviewer.html>)⁹⁸
- Environmental Protection Agency GIS Mapping (<https://gis.epa.ie/EPAMaps/>)⁹⁹
- Google Aerial Photography and Mapping (<https://www.google.ie/maps>)³³

4.11.3 Existing Environment

The majority of the study area comprises a broad lowland valley bisected by the meandering corridor of the River Shannon. The River Shannon flows northwest to southeast through a series of online lakes and Carrick-on-Shannon, the principal town and urban settlement within the study area. This lowland valley is partly enclosed by rising Drumlins (70-80m above ordnance datum (AOD)) to the southwest and northeast of Carrick-on-Shannon, while the valley is more noticeably enclosed by an area of pronounced upland at Aghamore (80-85m AOD) near the eastern end of the study area.

The River Shannon only falls slightly in elevation (i.e. one to two metres) from northwest to southeast through the centre of the study area, accordingly, while often broad and impressive, the river is also slow moving. Despite the lowland nature of the broader river valley, it includes numerous low drumlin features (generally less than 70m AOD), which influences the meandering nature of the River Shannon through the study area. The prevailing alignment of the drumlin and ridge features is northeast/southwest.

The River Shannon is the primary watercourse/waterbody and major cruising and water-based amenity in the study area. The river includes many notable lakes – Lough Tap, Lough Nanoge and Lough Corry; with a number of other lakes in the immediate lowland valley (i.e. Drumgilra (or Gortinty) Lough, Lowfield Lough,

⁹⁷ MosArt Landscape-Architecture-Research, Macroworks, Judy Osborne et. al., 2008. Landscape Character Assessment of County Roscommon. Available at: http://www.roscommoncoco.ie/en/Services/Planning/Roscommon-County-Council-Planning-Publications/Roscommon-County-Council-Planning-Publications/Archived-Plans/County_Development_Plan_2008-2014_and_Variations/Landscape_Character_Assessment/

⁹⁸ Ordnance Survey Ireland, 2022. GeoHive Mapping Service. Available at: <http://map.geohive.ie/mapviewer.html>

⁹⁹ Environmental Protection Agency (EPA), 2022. EPA Webmapping Service Available at: <https://gis.epa.ie/EPAMaps/>

Cartron Lough, Gortconnellan (or Spa) Lough, Ballagh Lough and Kiltycarney Lough).

The predominant land use is grass-based agriculture, with some forestry, areas of peatland and native scrubland. Most low-lying and inter-drumlin areas are poorly drained and lands along the River Shannon are liable to flooding.

As the county town of Leitrim Carrick-on-Shannon, with a population of circa 5,000 persons, is the main urban settlement. The town is located to the northeast of the bridge over the River Shannon. Cortober is located in County Roscommon to the south-west of the River Shannon Bridge. Drumsna and Jamestown are attractive villages on the River Shannon and a small settlement is located on the N4 Aghamore overlooking the River Shannon and its lowland valley. Residential properties, either in clusters or more dispersed, are a notable feature along local roads throughout the study area.

While the majority of commerce and industry is located in Carrick-on-Shannon and Cortober, Masonite is a major industrial facility prominently located on an area of higher ground located between Drumgilra (or Gortinty) Lough to the east and the River Shannon to the west. Other smaller scale industries are also located in the rural landscape, e.g. Rosderra Meats (Jamestown) and Connaught Gold Western Rural Development Company Limited (Farnagh, Carrick-on-Shannon).

4.11.3.1 Leitrim County Development Plan 2015-2021

The Leitrim County Development Plan (LCDP) 2015-2021¹³ incorporates policies and objectives that are relevant to the landscape and visual environment of the area east of the River Shannon. The Draft Leitrim County Development Plan 2023-2029¹⁷ (DLCDP: January 2022) incorporates some changes to landscape and visual aspects – the principal change is referenced under Objective 82 in Table 4.11.1. The key policies and objectives (LCDP) identified are listed in Table 4.11.1.

Table 4.11.1 Key Landscape and Visual related Policies and Objectives (extract from LCDP 2015-2021)

Policy / Objective	Description
Policies and Objectives for Protection of the Natural Environment / Natural Heritage	
Objective 63	It is an objective of the Council to protect the character, appearance and quality of the habitats and semi-natural features in County Leitrim such as woodlands, hedgerows, peatlands, wetlands and artificial waterways of historic or ecological importance.
Objective 74	It is an objective of the Council to conserve peatlands and protect peatland landscapes within the County.
Policy 83	It is the Council's policy to ensure the preservation of sound deciduous trees, woodlands and native hedgerows, without excessively inhibiting development.
Objective 76	It is an objective of the Council to discourage the felling of healthy mature trees to facilitate development and to encourage the retention of healthy mature trees within developments.

Policy / Objective	Description
Objective 78	It is an objective of the Council to protect and preserve existing hedgerows and minimise their removal. Where their removal is necessary to seek their replacement with new hedgerow material native to the area.
Policy 85	It is the policy of the Council not to permit development on a floodplain other than in exceptional circumstances (where the development is of significant importance for the local community).
Policy 99	It is the policy of the Council to protect the floodplain of the Shannon. Planning permission for development on the floodplain will only be granted in exceptional circumstances and where the Council is satisfied that downstream (and upstream) consequences are insignificant. The Council must be satisfied that all floor levels in such developments are sufficiently high above the maximum recorded flood levels.
Policy 101	It is the policy of the Council to permit development in an area of High Visual Amenity only where the applicant has demonstrated a very high standard of site selection, site layout and design and where the planning authority is satisfied that the development could not be accommodated in a less-sensitive location.
Objective 81	It is an objective of the Council to protect the following Areas of High Visual Amenity, (Table 19 refers). (Table 19 includes B11: River Shannon, Derrycarne and environs – in effect the majority of the lands within County Leitrim adjoining the River Shannon).
Policy 102	It is the Council's policy to protect these views from intrusive development and enhance them by the removal of dereliction and eyesores. Lay-bys and viewing areas will be developed, as appropriate and as funds allow.
Objective 82	It is an objective of the Council to protect the following Views and Prospects, Table 20 of the Plan refers. (Table 20 of the LCDP 2015-2021 Plan includes the following protected views and prospects in the study area: V25 View of River Shannon from the N4 Faulties to Aughamore V27 View of River Shannon from Local Road LS07426 V28 View of River Shannon from the N4 in the townlands of Munkil [sic – Minkill] and Tully.) It is noted that the three above views and prospects are recommended for removal in the Leitrim Review of Views and Prospects carried out for and included in the Draft Leitrim County Development Plan 2023-2029 ¹⁷ (January 2022).
Policies and Objectives for Protection of the Built Environment	
Policy 104	It is the policy of the Council to protect all structures in the Record of Protected Structures (Appendix A Volume 2 of this plan).
Objective 84	It is an objective of the Council to seek the protection of all structures within the County that are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.
Objective 90	It is an objective of the Council to protect and enhance the areas identified as Architectural Conservation Areas. (The town centre of Carrick-on-Shannon is identified as an Architectural Conservation Area on Map 4.13 of LCDP).

Policy / Objective	Description
Policy 105	It is the policy of the Council to promote public awareness of the rich archaeological heritage that exists in County Leitrim.
Objective 93	It is an objective of the Council to ensure that any development (above or below ground), within the vicinity of a site of archaeological interest shall not be detrimental to the character of the archaeological site or its setting.
Policy 107	It is the policy of the Council to protect and enhance public accessibility to the County's industrial heritage.
Policies and Objectives for Recreation, Sports and Amenity	
Objective 97	It is an objective of the Council to improve and develop safe public access to the rivers and lakeshores.
Objective 98	It is an objective of the Council to protect the rivers, lakes and canals from ecological damage.
Policy 110	It is the policy of the Council to promote and protect managed public access to the County's rivers and lakes and to ensure appropriate environmental safeguards are put in place in the provision of such accessibility.
Policy 116	It is the policy of the Council to preserve public rights of way and to create new rights of way, where appropriate.
Objective 109	It is an objective of the Council to maintain and signpost walking routes.
Objective 112	It is an objective of the Council to maintain and signpost cycle routes.

4.11.3.2 Landscape Character Assessment of County Leitrim

A Landscape Character Assessment of County Leitrim was prepared in 2002 and reviewed in 2020¹⁰⁰. The review, which provided for ground truthing and updating of the original assessment is included at Appendix VI of the current Draft Leitrim County Development Plan 2023-2029¹⁷. The assessment (2020) divides the county into 17 generic Landscape Character Types (LCT) and 14 distinct Landscape Character Areas (LCA). The study area in County Leitrim lies within LCT 9: Drumlin Farmland and LCT 12: River Floodplain and within LCA 13: South Leitrim Drumlins and Shannon Basin.

LCT 9 Drumlin Farmland is described as:

“The Drumlin Farmland occupies a large part of the southern part of the county and features a distinctive drumlin hill topography. The consistent orientation of the hills gives the landscape a uniform grain and has its origins from the direction of ice flows during glaciation. The pattern or grain can be difficult to appreciate, being masked largely by the abundant mature hedgerows which race up and down the hillsides forming a patchwork pattern usually of small-scale. The drumlins have steep sides with broad rounded tops although their size and shape vary considerably throughout. Land cover is generally pasture with marshy areas within the inter drumlin hollows. Patches of commercial coniferous forestry are

¹⁰⁰ Environmental Resources Management, 2002. Comhairle Chontae Liatroma, Landscape Assessment of County Leitrim Reference 17896.

dispersed throughout this landscape, some areas being fairly extensive in size. The plantation coniferous forest is a frequent feature and has become influential in the local landscape character.”

LCT 12 River Floodplain is described as:

“...a flat, low lying pastoral river landscape associated with the Shannon. The river system comprises a number of loughs mostly connected with sluggish river sections. The drainage pattern features small feeder channels which drain the surrounding drumlin swarms and mountains. Water, both in the river channel and loughs, is an important landscape element. The meandering course of the Shannon is bordered by flat floodplains, gently sloping grazed banks, meadows and rough grazing. Landform is typically flat although slight undulations are present. Occasional floodplain trees such as Alder, Ash and Willow stand out as features. Pasture, grazed by cows in drier months, occurs in open fields bordering some stretches of the river. Field boundaries are typically defined by post and wire fences, often colonised by scrub species and ranker growth, giving the appearance of established hedgerows. There is virtually no settlement within this LCT. Roads are also generally absent. A small number of isolated houses do exist, occupying small undulating areas of land to escape flooding. These isolated dwellings tend to be accessed by narrow winding lanes and often enclosed by tall species rich hedgerows.”

LCA 13 South Leitrim Drumlins & Shannon Basin is described as:

“...extensive lowland in the southern part of County Leitrim. Its boundary is formed by Lough Allen, the foothills of Sliabh an Iarainn and the Ballinamore Loughlands in the north and by the Corrigan Uplands in the east. The southern part of this LCA is relatively flat and features pastoral farmland, peat bogs, marshy areas, small loughs and streams. Further north, the topography changes to distinctive drumlin hills. Mature hedgerows enclose a small-scale field pattern resulting in an intimate landscape. Occasionally enclosure is defined by post and wire fences and in some cases, stone walls. Lough of varying size feature throughout, the largest of which is Lough Rynn. Elevated views are possible across extensive areas from the top of some drumlins and isolated rocky outcrops which rise above the surrounding landscape.”

Key Characteristics include:

- *“Flat to undulating topography in the southern tip of the county transitions to become a more pronounced drumlin hill landscape further north of Drumod [sic – Dromod] and Lough Rynn. Drumlins vary in size, shape and orientation;*
- *Farmed landscape dominated by pastoral land textured with areas of rush and pasture on hills above surrounding damp lowlands, wetlands, loughs and raised peat bogs;*
- *Some large settlements and larger scale dwellings located along, or at junctions of major communication routes;*

- *River Shannon dominates the drainage pattern of the area and is a popular tourist and recreational resource;”*

County Landscape Designations, Views and Prospects include:

- *“Area of High Visual Amenity (AHVA) B11 River Shannon, Derrycarne and Environs;*
- *V25 View of River Shannon from the N4 Faulties to Aughamore;*
- *V27 View of River Shannon from Local Road LS07426; and*
- *V28 View of River Shannon from the N4 in the townlands of Munkil [sic – Minkill] and Tully.”*

NOTE: The three above views and prospects (V25, V27, V28) are recommended for removal in the Leitrim Review of Views and Prospects carried out for and included in the Draft Leitrim County Development Plan 2023-2029¹⁷.

Valued and Sensitive Attributes include:

- *Intimate Lake-land landscapes valued for their scenic quality, in particular Lough Rynn;*
- *Rural and tranquil wooded drumlin farmed landscape;*
- *River Shannon landscape as popular scenic destination;”*

4.11.3.3 Carrick-on-Shannon Local Area Plan 2010-2019

The Carrick-on-Shannon Local Area Plan 2010-2019¹⁵ includes policies and objectives that are relevant to the landscape and visual environment of Carrick-on-Shannon and surrounding area within County Leitrim. The key policies and objectives identified include:

- Designation of lands along the River Shannon for either ‘River Navigation and Amenity’, ‘Riverside Development’ or ‘Open Space and Amenity’
- Identification of ‘Protected Views and Prospects’ east and west from Carrick-on-Shannon Bridge and northwest and southeast from Hatley Manor in the town

4.11.3.4 Roscommon County Development Plan

The Roscommon County Development Plan (RCDP) 2022-2028¹⁸ includes policies and objectives that are relevant to the landscape and visual environment of the study area, west of the River Shannon. There are no appreciable changes to landscape and visual considerations in the Draft Roscommon County Development Plan 2021-2027. The key policies and objectives identified are as follows:

Chapter 10 (Natural Heritage) of the development plan addresses a wide range of natural heritage and biodiversity assets of value. Many of these are considered in the Biodiversity Assessment (Chapter 4.XX of this Report) and / or the Heritage Assessment (Chapter 4.XX of this Report) for the proposed project. Therefore, the following only consider those directly referencing the landscape / visual aspects.

It is a policy objective of Roscommon County Council to:

NH10.11 Preserve and protect sites of county geological importance from inappropriate development where they comprise designated sites or national heritage areas.

NH10.13 Encourage the retention of hedgerows and other distinctive boundary treatments in rural areas and prevent loss and fragmentation, where practically possible. Where removal of a hedgerow, stone wall or other distinctive boundary treatment is unavoidable, mitigation by provision of the same type of boundary will be required.

NH10.14 Promote and encourage planting of native hedgerow species in new developments.

NH10.25 Minimise visual impacts on areas categorised within the County Roscommon Landscape Character Assessment including “moderate value”, “high value”, “very high value” and with special emphasis on areas classified as “exceptional value” and where deemed necessary, require the use of Visual Impact Assessment where proposed development may have significant effect on such designated areas.

NH10.26 Protect important views and prospects in the rural landscape and visual linkage between established landmarks, landscape features and views in urban areas.

4.11.3.5 Roscommon Landscape Character Assessment

A Landscape Character Assessment of County Roscommon is included in Volume II of the RCDP, 2014-2020¹⁴. The assessment divides the county into seven generic Landscape Character Types (LCT), and 36 distinct Landscape Character Areas (LCA), to which it applies a landscape value rating of either ‘Moderate’, ‘High’, ‘Very High’ or ‘Exceptional’.

The Landscape Character Assessment of County Roscommon, which forms part of the County Development Plan, divides the county into 36 separate LCAs. The study area for the proposed development spans the boundary between LCA No. 3: Lough Corry Drumlin Landscape and No. 4: Kilglass Drumlin Landscape. Both LCAs are located within the ‘river corridor’ landscape character type (LCT) and are described as having ‘very high landscape value’ (refer to Figures 6, 7 & 8 of the Landscape Character Assessment of County Roscommon).

LCA 3: Lough Corry Drumlin Landscape (Very High Value)

The western portion of the study area within County Roscommon (west from Corgullion) and including Cortober, is located within LCA: 3, which is described as:

“The drainage pattern reflects the general alignment of drumlins which are arranged on a southwest to northeast alignment. The predominant land cover is dry grassland but there are areas of wet grassland as well as reclaimed blanket bog throughout. The latter two land cover types are typically found in the drumlin flats and hollows. Hedgerows comprise

mostly broadleaf species including ash. In some areas there is a strong sense of openness created by loose light hedgerows.”

“While there are no large settlements in this LCA, the town of Carrick-on-Shannon spills over the Shannon River into the northeastern corner and brings with it both residential and commercial development.”

“The overall image of this LCA is of a relatively well drained drumlin farmland, with strong tourist amenities along the River Shannon including Lough Corry.”

The landscape value is described as:

“The Lough Corry Drumlin Basin is classified as Very High Value to reflect the boating, fishing and scenic amenities along the River Shannon. It is valued by tourists for its peaceful and largely undeveloped condition.”

The forces of change within this LCA are described as:

“Inappropriate and poorly sited development on the shoreline of Lough Corry and along the River Shannon would have a negative visual and environmental impact on the wetland landscape. There is increasing development pressure along the R370 leading into Carrick-on-Shannon which is contributing to the erosion of the rural character of the area.”

LCA 4: Kilglass Drumlin Landscape (Very High Value)

The eastern portion of the study area within County Roscommon (east from Corgullion) and including the Albert Canal, is located within LCA: 4, which is described as:

“The area comprises low undulating drumlins which are well drained in the north and interspersed with a number of large lakes,” ... “The drumlins are aligned on a northeast southwest axis and this arrangement determines the pattern of lakes in the greater area. The lakes fan out from east to west similar to fingers extending into the rolling drumlin landscape. The effect of this pattern of lake and hill is unique in the context of the county.”

“The image of this landscape character area is of a drowned and dramatic drumlin lakeland and floodplain offering a tranquil boating amenity.”

The landscape value is described as:

“The Kilglass Drumlin Lakeland area is considered to be of Very High Value due to its tourist amenities including fishing, boating and extensive scenic views.”

The forces of change within this LCA are described as:

“The area is of very high visual amenity and thus tends to attract considerable interest in people wishing to build single rural dwellings. There are several locations where houses have been built in the recent past overlooking the lakes and this trend is likely to continue unless measures are put in place to afford greater protection to the landscape. There is also likely to be an increase in the extent of afforestation in this landscape due

to the marginal quality of farmland. The N5 [sic N4] is due to be realigned over a 32 kilometre length and therefore it may be anticipated that there will be increased demand for quarrying in the area.”

Scenic Routes and Scenic Views

The Landscape Character Assessment of County Roscommon identifies nine Scenic Routes in the county, none of which is located within the study area. The assessment also identifies 26 Scenic Views in the county, one of which is relevant to the study area (refer to Appendix 1, and specifically Figure 13, of Landscape Character Assessment of County Roscommon):

- View V8 is an almost 180° view northwest, west and southwest from Harlley Bridge (north of Carrick-on-Shannon). In the landscape character assessment that accompanied the previous development plan (Roscommon County Development Plan 2010-2020), the same view (V8) was described as:

“View from Hartly Bridge to north to Slieve Anierin, Eidin Lake to the south and windfarm on Kilronan Mountain to the northwest. Low undulating sparsely populated landscape in the foreground.”

4.11.3.6 Cortober Local Area Plan, 2014-2020

The Cortober Local Area Plan 2014-2020¹⁶ references the County LCA (as discussed in section 4.11.3.5) noting that Cortober lies within the Very High Value LCA 3: Lough Corry Drumlin Basin, stating:

“The predominant land cover is dry grassland but there are areas of wet grassland as well as reclaimed blanket bog throughout. The latter two land cover types are typically found in the drumlin flats and hollows. Hedgerows comprise mostly broadleaf species including ash. In some areas there is a strung [sic] sense of openness created by loose light hedgerows. This drumlin landscape is well drained and relatively dry compared to the drumlin landscapes found both in the north and south.”

4.11.3.7 Landscape Context

The key landscape constraints in the study area are:

- The River Shannon watercourse/waterbody (including Albert Canal/Lock) and adjoining lowland, drumlins and lakes and water-related amenities and marinas
- High Visual Amenity Areas along the River Shannon in County Leitrim
- The ‘Very High Value’ landscape character areas (i.e. LCA 3 Lough Corry Drumlin Basin and LCA 4 Kilglass Drumlin Lakelands) – especially within the ‘River Corridor’ landscape character type
- Elevated lands at Aghamore and higher ridgelines generally
- Clustered and dispersed residential properties in the landscape
- Town of Carrick-on-Shannon, Drumsna and Jamestown Villages and Aghamore settlement

- Amenity/Sports Facilities, including water-based activities/amenities/marinas, Killukin Waterfall and Annaduff/Leitrim GAA Facility (Aghamore), Carrick-on-Shannon Rugby Grounds (Keenaghan), Páirc Seán Mac Diarmada & St. Mary's Grounds (Carrick-on-Shannon) and Bull Field Sports Grounds (Cortober)
- Former demesne landscapes – notably remaining structures, entrances, boundaries, parkland, trees and woodlands
- High number of prominent archaeological sites (e.g. ringforts) in the landscape – many of which are located on drumlins and are densely planted

4.11.3.8 Visual Context

The key visual constraints in the study area are:

- Views to and from the River Shannon (and Albert Canal/Lock) watercourse/waterbody and its adjoining lowland, drumlin features, lakes and water-related amenities and marinas
- Protected Views and Prospects V25 (Aghamore-Faulties) and V27 and V28 (Minkull, Tully) within County Leitrim (It is noted that these views and prospects are recommended for removal in the Leitrim Review of Views and Prospects carried out for and included in the Draft Leitrim County Development Plan 2023-2029)¹⁷
- Protected Scenic View V8 (Hartley Bridge, north of Carrick-on-Shannon) within County Roscommon
- Protected Views (from Bridge, and Hatley Manor) in Carrick-on-Shannon
- Views from clustered and dispersed residential properties in the landscape
- Views from Carrick-on-Shannon, Drumsna and Jamestown – particularly to the River Shannon corridor and from the bridges over the river
- Views to and from the many prominent archaeological sites (e.g. ringforts) in the landscape – many of which are located on drumlins
- Views to and from the cultural heritage structures and properties in the landscape, including bridges, churches, protected structures

4.11.4 Summary

The study area is a high value, primarily lowland landscape, dominated by the corridor of the River Shannon and the associated towns and villages of Carrick-on-Shannon, Drumsna and Jamestown. The key landscape and visual constraints relate to the River Shannon and its settlements, its landscape and visual designations, and to the location of residential property clustered and dispersed throughout the landscape.

4.12 Biodiversity

4.12.1 Introduction

This section describes the biodiversity (flora and fauna) constraints identified within the study area for the N4 Carrick-on-Shannon to Dromod Project and should be read in conjunction with the biodiversity constraints presented in Figures 4.12.1.0 to 4.12.2.5.

Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. Alongside the term “biodiversity”, the terms “ecology” and “ecological” are also used throughout this section of the report as a broader term to refer to the relationships of biodiversity receptors to one another and to their environment.

Section 4.12.2 describes the methodologies and sources of information that were used to carry out the study. Section 4.12.3 describes the biodiversity constraints within the scheme study area. A summary is presented in Section 4.12.4.

4.12.2 Methodology and Sources of Information

This section describes the background legislation, policy context and guidance along with a summary of the methods used to collate information on the biodiversity constraints.

4.12.2.1 Relevant Legislation, Policy Documents and Plans, and Guidance Documents

The collation of baseline biodiversity data and the preparation of this section has had regard to the following legislation, policy and plans, and guidance documents.

Legislation:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (hereafter referred to as ‘the Habitats Directive’)¹⁰¹
- Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (hereafter referred to as ‘the Birds Directive’)¹⁰²
- Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of

¹⁰¹ European Union, 1992. Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043>

¹⁰² European Union, 2009. Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the Conservation of Wild Birds. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32009L0147>

certain public and private projects on the environment (hereafter referred to as ‘the EIA Directive’)¹⁰³

- European Communities (Birds and Natural Habitats) Regulations, 2011 (SI No. 477 of 2011) (as amended), (hereafter referred to as ‘the Birds and Habitats Regulations’)¹⁰⁴
- Planning & Development Acts 2000 to 2023 (hereafter referred to as ‘the Planning and Development Acts’)¹⁰⁵
- Wildlife Acts 1976 to 2022 (hereafter referred to as ‘the Wildlife Acts’)^{106 107 108 109 110 111}
- Flora (Protection) Order, 2022 (SI No. 356 of 2015)¹¹²
- Fisheries (Consolidation) Act, 1959, as amended (hereafter referred to as ‘the Fisheries Act’)¹¹³

Policies and Plans:

- National Biodiversity Action Plan 2017-2021¹¹⁴
- River Basin Management Plan for Ireland 2018-2021
- Leitrim County Development Plan 2015-2021¹³
- Roscommon County Development Plan 2014-2020¹⁴

¹⁰³ European Union, 2014. Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0052>

¹⁰⁴ Government of Ireland, 2011. S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011. Available at: <http://www.irishstatutebook.ie/eli/2011/si/477/made/en/print>

¹⁰⁵ Department of Housing, Local Government and Heritage, 2023. Planning and Development Act 2000. Available at: <https://www.gov.ie/en/publication/c0ac2-planning-legislation-primary-legislation/>

¹⁰⁶ Government of Ireland, 1976. Wildlife Act, 1976. Available at: <http://www.irishstatutebook.ie/eli/1976/act/39/enacted/en/html>

¹⁰⁷ Government of Ireland, 2000. Wildlife (Amendment) Act, 2000. Available at: <http://www.irishstatutebook.ie/eli/2000/act/38/enacted/en/html>

¹⁰⁸ Government of Ireland, 2010. Wildlife (Amendment) Act 2010. Available at: <http://www.irishstatutebook.ie/eli/2010/act/19/enacted/en/html>

¹⁰⁹ Government of Ireland 2012. Wildlife (Amendment) Act 2012. Available at: <http://www.irishstatutebook.ie/eli/2012/act/29/enacted/en/html>

¹¹⁰ Government of Ireland, 2018. Heritage Act 2018. Available at: <http://www.irishstatutebook.ie/eli/2018/act/15/enacted/en/html>

¹¹¹ Government of Ireland, 2021. Planning and Development, Heritage and Broadcasting (Amendment) Act 2021. Available at: <http://www.irishstatutebook.ie/eli/2021/act/11/enacted/en/html>

¹¹² Government of Ireland, 2022. S.I. No. 235/2022 - Flora (Protection) Order, 2022. Available at: <http://www.irishstatutebook.ie/eli/2022/si/235/made/en/pdfk.ie>

¹¹³ Government of Ireland, 1959. Fisheries (Consolidation) Act, 1959. Available at: <http://www.irishstatutebook.ie/eli/1959/act/14/enacted/en/html>

¹¹⁴ Department of Culture, Heritage and the Gaeltacht (2017) National Biodiversity Action Plan 2017 – 2021. Available at: <https://www.npws.ie/sites/default/files/publications/pdf/National%20Biodiversity%20Action%20Plan%20English.pdf>

- Nature and Wildlife in Roscommon, Action for Biodiversity¹¹⁵
- County Roscommon Hedgerow Survey Report¹¹⁶
- Kearney, P. (2011) Survey & Mapping of Habitats in County Roscommon. [Not available on-line, requested from Roscommon County Council]
- County Roscommon Heritage Plan 2017-2021, Incorporating County Roscommon Biodiversity Plan¹¹⁷
- Carrick-on-Shannon Local Area Plan 2010-2019 **Error! Bookmark not defined.**

Guidance Documents:

- Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports²¹
- Draft Advice Notes for Preparing Environmental Impact Statements²³
- Guidelines on the Information to be contained in Environmental Impact Statements²⁰
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements²²
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine¹¹⁸
- Environmental Impact Assessment of National Road Schemes – A Practical Guide²⁴
- Guidelines for Assessment of Ecological Impacts of National Road Schemes¹¹⁹
- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes¹²⁰

¹¹⁵ Roscommon County Council, 2012. Nature and Wildlife in Roscommon, Action for Biodiversity. Available at: <https://www.yumpu.com/en/document/read/25848958/nature-and-wildlife-in-roscommon-roscommon-county-council>

¹¹⁶ Roscommon County Council, 2005. County Roscommon Hedgerow Survey Report. Available at: <https://www.roscommoncoco.ie/en/download-it/heritage-publications/county-roscommon-hedgerow-survey-report.pdf>

¹¹⁷ Roscommon County Council, 2017. County Roscommon Heritage Plan 2017 – 2021, Incorporating County Roscommon Biodiversity Plan. Available at: <http://www.roscommoncoco.ie/en/Services/Community/Heritage/Heritage/County-Roscommon-Heritage-Plan-2017-2021/>

¹¹⁸ Chartered Institute of Ecology and Environmental Management, 2018. Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Available at: <https://cieem.net/resource/guidelines-for-ecological-impact-assessment-ecia/>

¹¹⁹ National Roads Authority, 2009. Guidelines for Assessment of Ecological Impacts of National Road Schemes. Available at: <https://www.tii.ie/technical-services/environment/planning/Guidelines-for-Assessment-of-Ecological-Impacts-of-National-Road-Schemes.pdf>

¹²⁰ National Roads Authority, 2008. Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. Available at: <https://www.tii.ie/technical-services/environment/planning/Ecological-Surveying-Techniques-for-Protected-Flora-and-Fauna-during-the-Planning-of-National-Road-Schemes.pdf>

- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes¹²¹
- Circular NPWS 1/10 & PSSP 2/10 Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities¹²²
- Circular Letter PD 2/07 and NPWS 1/07 Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites¹²³
- Circular Letter NPWS 2/07 Guidance on compliance with Regulation 23 of the Habitats Regulations 1997 – strict protection of certain species/applications for derogation licences¹²⁴

4.12.2.2 Study Area and Zone of Influence

The objective of the constraints study is to identify, at an early stage of a proposed road project, the international, national, county and local issues that must be taken into account when planning and designing a road in the follow-on phases of the project as per TII guidance. Following on from an evaluation of desk material (see section 4.12.2.3) and review of aerial orthophotography, walkover visits to publicly accessible parts of the study area were visited as part of the constraints study. Follow up walkover survey to confirm the identification of habitats that are identified as ecological sites are undertaken during the assessment of option corridors. These may in themselves provide supporting habitat/features for mobile wildlife, but in the absence of design development details and detailed biodiversity surveys, the Zone of Influence (ZoI) of the constraints study largely focusses on the study area, with consideration of various impacts that might affect identified/confirmed biodiversity features. All the ecological receptors are largely identified from within the study area, potential impact pathways to biodiversity outside of the study area were also considered and can include features such as hydrologically or hydrogeologically connected habitats and/or species, particularly in respect to mobile species that are associated with nearby designated sites (European, National etc.) as documented in the report.

¹²¹ National Roads Authority, 2006. Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes. Available at: https://www.tii.ie/technical-services/environment/planning/Best_Practice_Guidelines_for_the_Conservation_of_Bats_in_the_Planning_of_National_Road_Schemes.pdf

¹²² National Parks & Wildlife Service, 2010. Circular NPWS 1/10 & PSSP 2/10 Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Available at: <https://www.npws.ie/sites/default/files/general/Circular%20NPW1-10%20%26%20PSSP2-10%20Final.pdf>

¹²³ National Parks & Wildlife Service, 2007. Circular Letter PD 2/07 and NPWS 1/07 Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites. Available at: <https://www.npws.ie/sites/default/files/general/circular-pd-02-07.pdf>

¹²⁴ National Parks & Wildlife Service, 2007. Circular Letter NPWS 2/07 Guidance on compliance with Regulation 23 of the Habitats Regulations 1997 – strict protection of certain species/applications for derogation licences. Available at: <https://www.npws.ie/sites/default/files/general/circular-npws-2-07-reg-23-compliance.pdf>

4.12.2.3 Desk Study and Data Sources

The desktop study involved the collection and review of relevant published and unpublished sources of biodiversity information and data.

The following information sources and datasets were reviewed as part of this constraints study:

- On-line data available from the National Parks and Wildlife Service (NPWS) on Natura 2000 sites (hereafter referred to as European sites) ¹²⁵ and other Designated Sites protected at the national level (i.e. Natural Heritage Areas, or NHAs, and proposed Natural Heritage Areas, or pNHAs) ¹²⁶
- Records of rare and protected species from the NPWS for the 10km grid squares [G80, G90, H00, M89, M99 and N09] ¹²⁷
- National Biodiversity Data Centre (NBDC) Search of On-line Database for 10km Grid Squares [G80, G90, H00, M89, M99 and N09] ¹²⁸
- Orthophotography¹²⁹. Recent orthophotographs were reviewed and interpreted to initially identify and define sites of potential biodiversity value for the habitats present (hereafter referred to as 'ecological sites'). The final definition, description and evaluation of these ecological sites also takes into account the other habitat information collated as part of the desk study
- Information provided by Leitrim County Council on surveys to inform a previous road scheme through the study area in the early 2010's

Habitat GIS datasets available to download from the NPWS website, as follows:

- Ancient and Long-Established Woodland (updated 2012) ¹³⁰

¹²⁵ European sites are defined under the Habitats Directive (Article 3) as a European ecological network of Special Areas of Conservation and Special Protection Areas, composed of sites which host the natural habitat types listed in Annex I and habitats of the protected species listed in Annex II. The aim of the network is to aid the long-term survival of Europe's most vulnerable and threatened species and habitats. In Ireland, these sites are designated as European sites – defined under the Planning Acts and/or Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)

¹²⁶ NPWS, 2020. Protected Sites in Ireland. Available at: www.npws.ie/protectedsites/ and <http://webgis.npws.ie/npwsviewer/>

¹²⁷ NPWS, 2022. Unpublished records and records published on the NPWS Online Map Viewer. Available at: <http://webgis.npws.ie/npwsviewer/>. And the Flora Protection Order bryophyte map viewer available at: <https://www.npws.ie/maps-and-data/flora-protection-order-map-viewer-bryophytes>

¹²⁸ National Biodiversity Data Centre, 2020. Online Database. Available at: <https://maps.biodiversityireland.ie/Map>

¹²⁹ Google Maps, 2022. Online orthophotography. Available at: <https://www.google.com/maps> and Bing Maps, 2022. Available at: <https://www.bing.com/maps> , and Ordnance Survey Ireland orthophotography

¹³⁰ NPWS, 2012. GIS Dataset for Ancient and Long-Established Woodland. Available at: <https://www.npws.ie/maps-and-data/habitat-and-species-data>

- National Survey of Native Woodlands 2003-2008 (updated 2012) ¹³¹
- Article 17 Data for Annex I habitats (2019) ¹³²

Spatial data relating to watercourses and lakes, downloaded from the Environmental Protection Agency's (EPA) online Geo Portal¹³³, specifically, the following datasets:

- WFD River Water Bodies - 27/04/2017
- New Lake Water Bodies - 19/02/2016

Other available sources of habitat or species information, specifically the following publications:

- Online map of Irish wetlands ¹³⁴

4.12.2.4 Consultation

The following organisations/individuals with relevance to collating information on biodiversity constraints were consulted as part of the constraints study:

- NPWS [via the Development Applications Unit] – protected species records spreadsheet; response received on 3 September 2020
- NPWS [via virtual meeting consultation] on 22 October 2021
- Inland Fisheries Ireland (IFI) – response received on 21 December 2020
- Bat Conservation Ireland (BCI) – roost information obtained from BCI database
- BirdWatch Ireland (BWI)
- Botanical Society of Britain & Ireland (BSBI)

Further details of the data received is presented in Section 4.12.3 below.

4.12.2.5 Field Surveys

The following ecological field surveys were carried out to supplement the information collated during the desk study and consultations:

- Walkover surveys of ecological sites within the study area to ground truth and verify the orthophotography interpretation
- Habitat survey of lands within the River Shannon floodplain to the north-west of Carrick-on-Shannon

¹³¹ NPWS, 2012. GIS Dataset for the National Survey of Native Woodland 2003-2008. Available at: <https://www.npws.ie/maps-and-data/habitat-and-species-data>

¹³² NPWS, 2019. Article 17 Data for Annex I habitats. Available at: <https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17>

¹³³ Environmental Protection Agency, 2022. EPA Water Framework Directive (WFD) river water bodies and lake water bodies datasets. Available at: <http://gis.epa.ie/GetData/Download>

¹³⁴ Wetland Surveys Ireland, 2021. Map of Irish Wetlands. Available at: <http://www.wetlandsurveysireland.com/wetlands/map-of-irish-wetlands---/map-of-irish-wetlands---map/index.html>

- Habitat survey of lands within the River Shannon floodplain to the south of Carrick-on-Shannon

4.12.2.6 Walkover Surveys and Evaluation of Ecological Sites

A walkover survey of the ecological sites that lie within the study area was undertaken by Scott Cawley Ltd. in August and September 2020 to verify the orthophotography interpretation and selection of ecological sites, refine site boundaries identified during the desk study and to capture additional ecological information not identified during the desk study.

Where access allowed, the sites were walked, and notes taken on the habitats present. Where access was limited, ecological sites were viewed from the nearest accessible vantage point using binoculars. In some cases, due to the local topography or limited access, views of ecological sites were restricted. However, assumptions have been made on the value of those ecological sites based on professional judgement of orthophotography interpretation and local information gathered during the field surveys and desk study.

Where possible habitat types were classified using A Guide to Habitats in Ireland¹³⁵. The likelihood/potential for Annex I habitat types was inferred where possible based on the professional judgement of the surveyor, with reference to the Interpretation manual of European Union Habitats EUR 28¹³⁶ and definitions of Annex I habitat types published in the corresponding national habitat survey reports and NPWS wildlife manuals, as applicable. The nomenclature for Annex I habitats follows that of the Interpretation manual of European Union Habitats EUR28¹³⁶ with abbreviated names after those used in The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview¹³⁷. A precautionary approach was adopted with regards to the identification of the potential presence of Annex I habitats within an ecological site.

Ecological sites have been valued with regard to ecological valuation set out in Guidelines for Assessment of Ecological Impacts of National Road Schemes¹¹⁹ and Guidelines for Ecological Impact Assessment in the UK and Ireland; Terrestrial, Freshwater, Coastal and Marine¹¹⁸. The overall ecological valuation for each of the ecological sites was based upon the highest value receptor known to be present, or potentially present, within the ecological site at the time of this study.

All Annex I habitats that lie outside of European sites, are valued as being of national importance, given that these habitats are of high conservation concern. However, priority Annex I habitat types, (where they are confirmed or are on a precautionary basis considered to be present owing to conditions that could support their presence) are valued as being of international importance given that they are

¹³⁵ Fossitt, J.A. 2000. A Guide to Habitats in Ireland. Heritage Council, Kilkenny.

¹³⁶ CEC (Commission of the European Communities), 2013. Interpretation manual of European Union Habitats EUR28. European Commission, DG Environment. Available at:

https://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf

¹³⁷ NPWS, 2019. The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. NPWS report., available at:

https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf

of the highest conservation concern at a European level (*i.e.* natural habitat types in danger of disappearance¹³⁸).

4.12.2.7 Habitat Surveys

Habitat surveys were undertaken by Scott Cawley Ltd. at two locations within the River Shannon floodplain (see Figures 4.12.1.0 to 4.12.1.5):

- To the northwest of Carrick-on-Shannon in the townlands of Corryolus and Cloonman (which includes part of Lough Eidin pNHA)
- To the south of Carrick-on-Shannon in the townlands of Cortober, Cordrehid, Attirory, Rinnacurreen and Drumkeeran

The surveys were undertaken by Dr John Conaghan, in August and September 2020, following the methodology described in Best Practice Guidance for Habitat Survey and Mapping¹³⁹. All habitat types were classified using the Guide to Habitats in Ireland, recording the indicator species and abundance using the DAFOR scale¹⁴⁰ and recording any species of conservation interest. Vascular and bryophyte plant nomenclature generally follow that of The National Vegetation Database¹⁴¹, having regard to more recent taxonomic changes to species names after the New Flora of the British Isles¹⁴² and the British Bryological Society's Mosses and Liverworts of Britain and Ireland: A Field Guide¹⁴³. Annex I habitat types were classified after the Interpretation manual of European Union Habitats EUR28¹³⁶ with reference to the corresponding national habitat survey reports and NPWS wildlife manuals, as applicable. The nomenclature for Annex I habitats follows that of the Interpretation manual of European Union Habitats EUR28 with abbreviated names after those used in The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview.¹³⁷

4.12.2.8 Barn Owl Surveys

Dedicated Barn Owl surveys were undertaken by John Lusby within the study area for the project between March and July 2021. The methodology followed was that as defined by TII Standards (TII, 2021) and under licence to the National Parks and Wildlife Service (Licence No: 33/2021). A suitability assessment of all buildings and other potentially suitable structures within the study area was undertaken from public roads to determine whether the site was potentially suitable or unsuitable for breeding barn owls. Following this, all suitable sites received either a daytime or

¹³⁸ From the definition of “*priority natural habitat types*” in Article 1(d) of the Habitats Directive.

¹³⁹ Smith, G.F., O'Donoghue, P., O'Hara, K. & Delaney, E., 2011. Best Practice Guidance for Habitat Survey and Mapping. The Heritage Council Church Lane, Kilkenny, Ireland

¹⁴⁰ The DAFOR scale is an ordinal or semi-quantitative scale for recording the relative abundance of plant species. The name DAFOR is an acronym for the abundance levels recorded: Dominant, Abundant, Frequent, Occasional and Rare

¹⁴¹ Weekes, L.C. & FitzPatrick, Ú., 2010. The National Vegetation Database: Guidelines and Standards for the Collection and Storage of Vegetation Data in Ireland. Version 1.0. Irish Wildlife Manuals, No. 49. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland

¹⁴² Stace, C., 2019. New Flora of the British Isles. 4th Edition. C&M Floristics.

¹⁴³ Atherton, I., Bosanquet, S. & Lawley, M. 2010. Mosses and Liverworts of Britain and Ireland: A Field Guide. Latimer Trend & Co., Plymouth

nocturnal survey to determine barn owl occupancy. A nocturnal survey was carried out at all sites or areas where evidence of barn owls was noted to determine the breeding status of the site. A copy of the Barn Owl Survey Report is contained in Appendix A.4.12.1.

4.12.3 Existing Environment

4.12.3.1 Desktop Study

Designated Sites

European and Nationally Designated Sites

Special Areas of Conservation (SACs) are designated under the EC Habitats Directive (92/43/EEC) for the protection of habitats listed on Annex I and/or species listed on Annex II of the Directive. Special Protection Areas (SPAs) are designated under the Birds Directive (2009/147/EC) for the protection of bird species listed on Annex I of the Directive, regularly occurring populations of migratory species (such as ducks, geese or waders), and areas of international importance for migratory birds.

Natural Heritage Areas (NHAs) are designated under the Wildlife Acts to protect habitats, species or geology of national importance. In addition to NHAs there are proposed NHAs (referred to as pNHAs), which are also sites of significance for wildlife and habitats and were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. Proposed NHAs are offered protection in the interim period under county or city development plans which requires that planning authorities give due regard to their protection in planning policies and decisions.¹⁴⁴

European sites such as SACs and SPAs are of international importance from a biodiversity perspective, whilst pNHAs are regarded as being of national importance.

Several Designated Sites, including those protected at a European and national level, are located within, or downstream of, the study area. These Designated Sites are listed in Table 4.12.1 along with a brief description of the features for which the sites are designated. Designated Sites within the study area are shown on Figures 4.12.2.0 to 4.12.2.5.

There are no SAC, SPA or NHA sites located within, or in the immediate vicinity of, the study area.

The nearest SAC sites to the study area are Clooneen Bog SAC and Lough Forbes Complex SAC. Lough Forbes Complex SAC lies c.10km downstream of the study area, along the River Shannon. There are also four SAC sites at greater distances further downstream of the study area in the River Shannon catchment Lough Ree

¹⁴⁴ For example, Objective 66 of the Leitrim County Development Plan 2015-2021 states 'It is an objective of the Council to protect all Natural Heritage Areas and those proposed for designation either before or during the lifetime of this plan so as to recognise that the process of designation of such sites is ongoing, with new sites being added and boundaries of existing sites being adjusted, as better information becomes available.'

SAC, River Shannon Callows SAC, Lough Derg North-east Shore SAC, and the Lower River Shannon SAC.

The nearest SPA site to the study area is Ballykenny-Fisherstown Bog SPA, which lies c.10km downstream. There are also four SPA sites at greater distances further downstream of the study area in the River Shannon catchment: Lough Ree SPA, Middle Shannon Callows SPA, Lough Derg (Shannon) SPA, and the River Shannon and River Fergus Estuaries SPA.

The nearest NHA site to the study area is Corracramph Bog NHA which is located c.1.9km to the south of the study area. There are two pNHA sites within the study area: Lough Eidin pNHA and Lough Bodergh and Lough Bofin pNHA. There are also five pNHA sites downstream of the study area in the River Shannon catchment: Lough Ree pNHA, River Shannon Callows pNHA, Lough Derg pNHA, Fergus Estuary and Inner Shannon, North Shore pNHA and Inner Shannon Estuary - South Shore pNHA.

Table 4.12.1 Designated Sites Located within, or in the vicinity of, the Study Area

Site Name [Code]	Ecological Features for which the Sites are Designated (* = priority Annex I habitat)	Location
Special Areas of Conservation (SACs)		
Annaghmore Lough (Roscommon) SAC [001626]	Alkaline fens [7230] <i>Vertigo geyeri</i> (Geyer's whorl snail) [1013] NPWS (2019) <i>Conservation Objectives: Annaghmore Lough (Roscommon) SAC 001626. Version 1.</i> National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht	c. 11.4km southwest of the study area
Bricklieve Mountains and Keishcorran SAC [001656]	* Turloughs [3180] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>) [6510] Calcareous and calcshist screes of the montane to alpine levels (Thlaspietia rotundifolii) [8120] <i>Euphydryas aurinia</i> (Marsh fritillary) [1065] <i>Austropotamobius pallipes</i> (White-clawed crayfish) [1092] NPWS (2021) Conservation objectives for Bricklieve Mountains and Keishcorran SAC [001656]. Generic Version 8.0. Department of Housing, Local Government and Heritage	c. 14km northwest of the study area
Clooneen Bog SAC [002348]	Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the <i>Rhynchosporion</i> [7150] * Bog woodland [91D0] NPWS (2016) <i>Conservation Objectives: Clooneen Bog SAC 002348. Version 1.</i> National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.	c. 7.3km south of the study area

Site Name [Code]	Ecological Features for which the Sites are Designated (* = priority Annex I habitat)	Location
Cuilcagh - Anierin Uplands SAC [000584]	Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110] Natural dystrophic lakes and ponds [3160] Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] *Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] Blanket bogs (* if active bog) [7130] Transition mires and quaking bogs [7140] * Petrifying springs with tufa formation (Cratoneurion) [7220] Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>) [8110] Siliceous rocky slopes with chasmophytic vegetation [8220] <i>Hamatocaulis vernicosus</i>¹⁴⁵ (Slender Green Feather-moss) [6216] NPWS (2016) <i>Conservation Objectives: Cuilcagh - Anierin Uplands SAC 000584. Version 1.</i> National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.	c. 12.9km northeast of the study area
Lough Arrow SAC [001673]	Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140] NPWS (2021) Conservation objectives for Lough Arrow SAC [001673]. Generic Version 8.0. Department of Housing, Local Government and Heritage	c. 11km northwest of the study area
Lough Forbes Complex SAC [001818]	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150] * Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the <i>Rhynchosporion</i> [7150] * Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0] NPWS (2016) <i>Conservation Objectives: Lough Forbes Complex SAC 001818. Version 1.</i> National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht	c. 9.4km south, and c. 10km downstream of, the study area

¹⁴⁵ Recorded as *Drepanocladus vernicosus* within the conservation objectives, however name provided here as *Hamatocaulis vernicosus* to reflect updated nomenclature changes

Site Name [Code]	Ecological Features for which the Sites are Designated (* = priority Annex I habitat)	Location
Lough Ree SAC [000440]	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Degraded raised bogs still capable of natural regeneration [7120] Alkaline fens [7230] *Limestone pavements [8240] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles * Bog woodland [91D0] <i>Lutra lutra</i> (Otter) [1355] NPWS (2016) Conservation Objectives: <i>Lough Ree SAC 000440</i>. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.	c. 22.8km south, and c. 27.6km downstream of, the study area
River Shannon Callows SAC [000216]	<i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>) [6510] Alkaline fens [7230] *Limestone pavements [8240] *Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0] <i>Lutra lutra</i> (Otter) [1355] NPWS (2021) Conservation objectives for <i>River Shannon Callows SAC [000216]</i>. Generic Version 8.0. Department of Housing, Local Government and Heritage.	c. 50.8km south, and c. 59km downstream of, the study area
Lough Derg, North-east Shore SAC [002241]	<i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130] *Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> [7210] Alkaline fens [7230] *Limestone pavements [8240] *Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0] *<i>Taxus baccata</i> woods of the British Isles [91J0] NPWS (2019) Conservation Objectives: <i>Lough Derg, North-east Shore SAC 002241</i>. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.	c. 89.8km southwest, and c. 116km downstream of, the study area
Lower River Shannon SAC [002165]	Sandbanks which are slightly covered by sea water all the time [1110] Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] *Coastal lagoons [1150] Large shallow inlets and bays [1160]	c. 123.8km southwest, and c. 154km downstream of, the study area

Site Name [Code]	Ecological Features for which the Sites are Designated (* = priority Annex I habitat)	Location
	Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] <i>Salicornia</i> and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glaucio-Puccinellietalia maritima) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation [3260] <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] *Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0] <i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029] <i>Petromyzon marinus</i> (Sea Lamprey) [1095] <i>Lampetra planeri</i> (Brook Lamprey) [1096] <i>Lampetra fluviatilis</i> (River Lamprey) [1099] <i>Salmo salar</i> (Salmon) [1106] <i>Tursiops truncatus</i> (Common Bottlenose Dolphin) [1349] <i>Lutra lutra</i> (Otter) [1355] NPWS (2012) Conservation Objectives: <i>Lower River Shannon SAC 002165</i>. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	
Special Protection Areas (SPAs)		
Lough Gara SPA [004048]	Whooper swan (<i>Cygnus cygnus</i>) [A038] Greenland white-fronted goose (<i>Anser albifrons flavirostris</i>) [A395] NPWS (2021) Conservation objectives for Lough Gara SPA [004048]. Generic Version 8.0. Department of Housing, Local Government and Heritage	c. 14.7km west of the study area
Lough Arrow SPA [004050]	Little grebe (<i>Tachybaptus ruficollis</i>) [A004] Tufted duck (<i>Aythya fuligula</i>) [A061] Wetland and Waterbirds [A999] NPWS (2021) Conservation objectives for Lough Arrow SPA [004050]. Generic Version 8.0. Department of Housing, Local Government and Heritage	c. 11.8km northwest of the study area

Site Name [Code]	Ecological Features for which the Sites are Designated (* = priority Annex I habitat)	Location
Ballykenny-Fisherstown Bog SPA [004101]	Greenland white-fronted goose (<i>Anser albifrons flavirostris</i>) [A395] NPWS (2021) Conservation objectives for Ballykenny-Fisherstown Bog SPA [004101]. Generic Version 8.0. Department of Housing, Local Government and Heritage	c. 9.3km south, and c. 10km downstream of, the study area
Proposed Natural Heritage Areas (pNHAs)		
Clooncoe Wood and Lough pNHA [000424]	Lake and associated shoreline and wetland habitats, including wet woodland and bog woodland. NPWS (2009) <i>Site Synopsis Clooncoe Wood and Lough pNHA</i>	c. 4.7km east of the study area
Lough Allen, South End and Parts pNHA [000427]	[Site synopsis not available]	c. 9.3km north of the study area
Clooneen Bog pNHA [000445]	[Site synopsis not available] See also Clooneen Bog SAC above	c. 7.3km south of the study area
Cuilcagh - Anierin Uplands pNHA [000584]	[Site synopsis not available] See also Cuilcagh - Anierin Uplands SAC above	c. 12.9km northeast of the study area
Lough Gara pNHA [000587]	[Site synopsis not available] See also Lough Gara SPA above	c. 12.1km west of the study area
Corrigeenroe Marsh pNHA [000596]	Lakeshore and marsh habitat associated with Lough Key. NPWS (2009) <i>Site Synopsis Corrigeenroe Marsh pNHA</i>	c. 8.7km northwest of study area
Kilglass and Grange Loughs pNHA [000608]	Lake and associated shoreline and wetland habitats, including marsh. Important wintering waterfowl site. NPWS (2009) <i>Site Synopsis Kilglass and Grange Loughs pNHA</i>	c. 3km south of the study area
Ardagh Bog pNHA [001222]	[Site synopsis not available]	c.14.1km southwest of the study area
Annagheary Lough pNHA [001402]	Lake and associated shoreline and wetland habitats. NPWS (2009) <i>Site Synopsis Annagheary Lough pNHA</i>	c. 3.8km northeast of the study area
Drumhierny Wood pNHA [001412]	Oak <i>Quercus robur</i> woodland NPWS (2009) <i>Site Synopsis Drumhierny Wood pNHA</i>	c. 2.7km north of the study area
Lough Rinn pNHA [001417]	Calcareous lake and associated shoreline and wetland habitats, including semi-natural and wet woodland. Important wintering bird site supporting Greenland white-fronted geese and whooper swan NPWS (2009) <i>Site Synopsis Lough Rinn pNHA</i>	c. 4.7km east of the study area
Sheemore Wood pNHA [001421]	Semi-natural deciduous woodland NPWS (2009) <i>Site Synopsis Sheemore Wood pNHA</i>	c. 3.2km northeast of the study area
Annaghmore Lough (Roscommon) pNHA [001626]	[Site synopsis not available] See also Annaghmore Lough (Roscommon) SAC above.	c. 11.4km southwest of the study area

Site Name [Code]	Ecological Features for which the Sites are Designated (* = priority Annex I habitat)	Location
Drum Bridge (Lough Key) pNHA [001631]	Marsh habitat associated with Lough Key NPWS (2009) <i>Site Synopsis Drum Bridge (Lough Key) pNHA</i>	c. 7.2km northwest of the study area
Drumman's Island (Lough Key) pNHA [001633]	Semi-natural ash and oak woodland NPWS (2009) <i>Site Synopsis Drumman's Island (Lough Key) pNHA</i>	c. 6km northwest of the study area
Fin Lough (Roscommon) pNHA [001636]	Lake and associated shoreline and wetland habitats, including fens NPWS (2009) <i>Site Synopsis Fin Lough (Roscommon) pNHA</i>	c. 3.4km northwest of the study area
Hog's Island (Lough Key) pNHA [001638]	Wooded island habitat on Lough Key NPWS (2009) <i>Site Synopsis Hog's Island (Lough Key) pNHA</i>	c. 7.4km northwest of the study area
Lough Boderg and Lough Bofin pNHA [001642]	Lake and associated shoreline and wetland habitats, including semi-natural and wet woodlands, and bog habitats. Important wintering bird site supporting Greenland white-fronted geese NPWS (2009) <i>Site Synopsis Lough Boderg and Lough Bofin pNHA</i>	Within and downstream of the study area
Lough Eidin pNHA [001643]	Lake, lakeshore habitat and extensive areas of seasonally flooded wet grassland (callows). Important wintering bird site supporting Greenland white-fronted geese NPWS (2009) <i>Site Synopsis Lough Eidin pNHA</i>	Within and downstream of the study area
Tawnytaskin Wood (Lough Key) pNHA [001651]	Deciduous woodland NPWS (2009) <i>Site Synopsis Tawnytaskin Wood (Lough Key) pNHA</i>	c. 7.6km northwest of the study area
Bricklieve Mountains & Keishcorran pNHA [001656]	[Site synopsis not available] See also Bricklieve Mountains and Keishcorran SAC above	c. 14km northwest of the study area
Lough Arrow pNHA [001673]	[Site synopsis not available] See also Lough Arrow SAC and SPA above	c. 11.3km northwest of the study area
Lough Errew pNHA [001807]	Lake and associated shoreline and wetland habitats, including wet woodland NPWS (2009) <i>Site Synopsis Lough Errew pNHA</i>	c. 5.6km east of the study area
Lough Sallagh pNHA [001808]	Lake and associated shoreline and wetland habitats NPWS (2009) <i>Site Synopsis Lough Sallagh pNHA</i>	c. 6.5km east of the study area
Lough Forbes Complex pNHA [001818]	[Site synopsis not available] See also Lough Forbes Complex SAC and Ballykenny-Fisherstown Bog SPA above	c. 9.3km south, and c.10km downstream of, the study area
Carrickaport Lough pNHA [001920]	Calcareous lake and associated shoreline and wetland habitats NPWS (2009) <i>Site Synopsis Carrickaport Lough pNHA</i>	c. 7.6km northeast of the study area
Natural Heritage Areas (NHAs)		

Site Name [Code]	Ecological Features for which the Sites are Designated (* = priority Annex I habitat)	Location
Aghnamona Bog NHA [000422]	Peatland habitats, including raised bog. Site also used by Greenland white-fronted geese NPWS (2002) <i>Site Synopsis Aghnamona Bog NHA</i>	c. 3.5km southeast of the study area
Bella Bridge Bog NHA [000591]	Peatland habitats, including raised bog NPWS (2002) <i>Site Synopsis Bella Bridge Bog NHA</i>	c. 13.4km west of the study area
Cornaveagh Bog NHA [000603]	Peatland habitats, including raised bog NPWS (2002) <i>Site Synopsis Cornaveagh Bog NHA</i>	c. 13.6km west of the study area
Kilronan Mountain Bog NHA [000617]	Peatland habitats, including upland blanket bog NPWS (2002) <i>Site Synopsis Kilronan Mountain Bog NHA</i>	c. 10.8km north of the study area
Rinn River NHA [000691]	Peatland habitats, including raised bog. Site also used by Greenland white-fronted geese and whooper swans NPWS (2002) <i>Site Synopsis Rinn River NHA</i>	c. 5.6km southeast of the study area
Cashel Bog (Leitrim) NHA [001405]	Peatland habitats, including raised bog. Site also used by Greenland white-fronted geese NPWS (2002) <i>Site Synopsis Cashel Bog (Leitrim) NHA</i>	c. 3.3km southeast of the study area
Corracramph Bog NHA [001420]	Peatland habitats, including raised bog. Site also used by Greenland white-fronted geese NPWS (2002) <i>Site Synopsis Corracramph Bog NHA</i>	c. 1.9km southeast of the study area
Cloonageeher Bog NHA [001423]	Peatland habitats, including raised bog NPWS (2002) <i>Site Synopsis Cloonageeher Bog NHA</i>	c. 7.4km southeast of the study area
Tullaghan Bog (Roscommon) NHA [001652]	Peatland habitats, including raised bog NPWS (2002) <i>Site Synopsis Tullaghan Bog (Roscommon) NHA</i>	c. 11km west of the study area

Habitats

Non-designated Areas of Annex I Habitat

Based on a review of available desktop data, specifically Article 17 reporting data regarding the national distribution of Annex I habitats, the following non-designated Annex I habitats occur within the study area:

- *Molinia* meadows on calcareous, peaty or clayey-silt laden soils (Molinion caeruleae) [6410]
- * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [*91E0]

Annex I habitats are of national importance from a biodiversity perspective, whilst priority Annex I habitats are regarded as being of international importance.

In addition, *ex-situ* Annex I habitats may act as supporting features to habitats contained within Designated Sites (e.g. by acting as ecological stepping stones or corridors, providing connectivity for protected species, ensuring viable commuting and foraging routes, and providing habitats for supporting populations). Areas of

non-designated Annex I habitat within the study area are shown on Figures 4.12.2.0 to 4.12.2.5.

It should be noted that these known locations of Annex I habitats are based on desktop records, and it is possible that other areas of Annex I habitats, not currently recorded or mapped, may be present within the study area.

Non-Annex I Woodland Habitats

A review of databases available from the NPWS, specifically data relating to the Ancient and Long-Established Woodland¹³⁰ survey and the National Survey of Native Woodlands 2003 - 2008¹³¹, confirmed that areas of the following woodland habitat types are present within, or close to, the study area:

- Bog woodland* (WN7) at Danesfort – included within ecological site EC23. Described as corresponding with the *Betula pubescens* - *Molinia caerulea* woodland group and of a *Rubus fruticosus* - *Dryopteris dilatata* vegetation type.
- A possible ancient woodland site at Drumharlow (c.150m from the study area and within Lough Eidin pNHA) comprised of oak-ash-hazel woodland (WN2). Described as corresponding with the *Fraxinus excelsior* - *Hedera helix* woodland group and of a *Quercus robur* - *Rubus fruticosus* vegetation type.

Other areas of woodland exist within the study area and, excluding areas of conifer plantation, these have been captured within the ecological sites listed earlier.

Woodlands are of ecological value, due to the relative scarcity of woodland in Ireland, and the high degree of biodiversity they can support. In addition, woodlands provide habitats and foraging resources for a range of protected fauna species e.g. badger, red squirrel, pine marten, birds and bats. Woodlands can also provide ecological connectivity across the wider landscape and environment, including in some cases providing habitat links between Designated Sites.

In general, the ecological value of areas of non-Annex I woodland habitats ranges from local to national importance, depending on their vegetative composition, extent and age.

Records of Protected, Rare and Other Notable Species

Flora

Desktop records of protected, rare or other notable plant species are listed in Table 4.12.2. Flora that were identified as part of the field surveys are detailed in Section 4.12.3.2.

Table 4.12.2 Records of Protected, Rare or Notable Flora Recorded from the Desk Study within the Study Area

Common name / scientific name	Legal status ¹⁴⁶	Red list status ¹⁴⁷	Source	Known locations / habitat preferences
Irish fleabane <i>Inula salicina</i>	FPO	Endangered	NPWS Online Map Viewer 10km M89 1967	Typically found along stone, limestone shores and islands of Lough Derg, Counties Galway and Tipperary, unknown elsewhere ¹⁴⁸
<i>Cladonia portentosa</i>	HD V	Not Evaluated	NBDC online database G80	Found on heaths, peaty moorland and dunes ¹⁴⁹
Clustered earth-moss <i>Ephemerum cohaerens</i>	FPO	Vulnerable	NPWS Online Map Viewer	Jamestown, Co. Leitrim Grid coordinates M978978. Found on drying sediments in the periodically inundated zones beside lowland lakes, turloughs and the River Shannon Absent from the site during recent survey in 2016. ¹⁵⁰
Constricted feather-moss <i>Amblystegium humile</i>	N/A	Endangered	NBDC online database G80	Grows in marshes and muddy places, especially by pools, occurring on soil and tree bases, but it appears to be uncommon. It also occurs on stones and silty banks by streams
Large hook-moss <i>Pseudocalliergon lycopodioides</i>	N/A	Vulnerable	NBDC online database G80	Typically found in seasonal pools and turloughs (overlying limestone) with low fertility levels and only slightly fluctuating water levels
Twisting thread-moss <i>Bryum torquescens</i>	N/A	Vulnerable	NBDC online database G80	Typically grows on calcareous soil in open sunny places, especially on free-draining substrates on banks, in open patches in grassland, on roadsides, about old quarries, and on thin soil overlying rocks, especially limestone but also hard metamorphic rocks and concrete

¹⁴⁶ HDII/IV/V = Habitats Directive Annexes II/IV/V; FPO = Flora (Protection) Order, 2015; WA = Wildlife Acts

¹⁴⁷ Vascular Flora listed in threatened categories from the Irish Red List No. 10 Vascular Plants (Wyse-Jackson *et al.*, 2016); Bryophytes from the Irish Red List No. 8 Bryophytes- Mosses, Liverworts & Hornworts (Lockhart *et al.*, 2012).

¹⁴⁸ Parnell, J. & Curtis, T., 2012. Webb's An Irish Flora. Eighth Edition.

¹⁴⁹ Irish Lichens Website. Available at: <http://www.irishlichens.ie/pages-lichen/l-74.html>

¹⁵⁰ https://www.npws.ie/sites/default/files/fpo/taxon/Ephemerum_cohaerens_07_Jamestown.pdf

To note, the species listed in Table 4.12.2 includes all records of protected flora species within the 10km grid references G80, G90, H00, M89, M99 and N09. Given the habitats present a number of the above species are likely to occur within the study area.

Fauna

There are several European and nationally protected mammal, bird, fish, amphibian, reptile and invertebrate species which have been recorded within the study area. These are summarised in Table 4.12.3.

In the case of bird species, only those species listed in Annex I of the Birds Directive or on the Birds of Conservation Concern in Ireland (BoCCI) Red List are included in the table below.

Greenland white-fronted geese *Anser albifrons*, whooper swan *Cygnus cygnus* and hen harrier *Circus cyaneus* are known from the study area. The dedicated wintering bird surveys carried out to inform a previous road scheme through the study area in the early 2010s recorded Greenland white-fronted geese within the Rinn River and Lough Allen corridor. However, the report also noted that the usage of former local territory by Greenland white fronted geese had declined in recent years.

Whooper swans were observed at numerous locations across the study area during the dedicated wintering bird surveys for the 2011 N4 Carrick-on-Shannon to Dromod Road Project EIS. Flocks of whooper swan were noted around Lough Corry, Eidin Lough, Hartley Bog (to north-east of Eidin Lough) and to the west of the Carrick-on-Shannon golf club.

Evidence of hen harrier was also recorded at numerous sites throughout the study area including at Annaghgerry and Rooksy Lough. Additionally, during a 2008 winter bird survey to inform the N4 Carrick-on-Shannon to Dromod Road Project EIS, Hartley Bog was confirmed as a winter roost site for this species, with several sightings of a single male and one sighting of a pair.

There are also anecdotal records of kingfisher nesting approximately 400-500m north of the Drumsna Bridge over the River Shannon.

With regards to bat species, the following habitat features/areas, present within the study area, are likely to be important for local populations; areas of woodland, river corridors, agricultural lands with well-developed hedgerow/treeline network, old buildings, bridges and underground structures (e.g. icehouses, souterrains etc). Bats, and their breeding and resting places, are protected under the Wildlife Acts. All bat species are also listed on Annex IV of the EU Habitats Directive (whilst the lesser horseshoe bat is also listed as Annex II species) and are afforded strict protection under the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations, 2011. The NBDC database returned records of the following bat species within the vicinity of the proposed development: Daubenton's bat *Myotis daubentonii*, Leisler's bat *Nyctalus leisleri*, brown long-eared bat *Plecotus auritus*, Natterer's bat *Myotis nattereri*, soprano pipistrelle bat *Pipistrellus pygmaeus*, common pipistrelle bat *Pipistrellus pipistrellus*, Nathusius pipistrelle bat

Pipistrellus nathusii, whiskered bat *Myotis mystacinus* and lesser horseshoe bat *Rhinolophus hipposideros*¹⁵¹.

Additionally, a search of the Bat Conservation Ireland database returned records of four known roosts from within the study area. Three of these roosts, located within the townlands of Drumsna, Lisgarney and Tullyleague belong to brown long-eared bat while one, located within the townland of Cloongownagh, belongs to Natterer's bat.

There are records for the Annex II Marsh fritillary butterfly from within the study area, in the townland of Gortinty, and to the northwest of the study area along the west bank of the River Shannon in the townlands of Cleaheen and Annaghbeg. Devil's-bit scabious, *Succisa pratensis*, the main food plant and an essential component of suitable marsh fritillary butterfly habitat, was recorded within the townland of Kildorragh (ecological site EC78), directly adjacent to the existing N4 roadway.

Table 4.12.3 Records of Protected, Rare or Notable Fauna within the Study Area

Common Name / Scientific Name	Legal Status ¹⁵²	Red List Status ¹⁵³	Source
Amphibians			
Common frog <i>Rana temporaria</i>	HD V; WA	Least Concern	NBDC online database G80, G90, M89, M99, N09
Smooth newt <i>Lissotriton vulgaris</i>	WA	Least Concern	NBDC online database G80, G90, H00, M99
Reptiles			
Common lizard <i>Zootoca vivipara</i>	WA	Least Concern	NBDC online database G80
Invertebrates			
Freshwater white-clawed crayfish <i>Austropotamobius pallipes</i>	HD II, V; WA	Not Evaluated	NBDC online database G90, M89, M99, N09

¹⁵¹ Only one record of lesser horseshoe bat was returned from the desk study search, which was located at the far western portion of the search area. The study area falls outside of the natural range of this species

¹⁵² HDII/IV/V = Habitats Directive Annexes II/IV/V; FPO = Flora (Protection) Order, 2015; WA = Wildlife Acts; BD I/II/III= Birds Directive Annexes I/II/III

¹⁵³ Fauna species listed in threatened Red List categories: from Butterflies from the Irish Red List No. 4 Butterflies (Regan *et al.*, 2010); Amphibians, Reptiles & Fish from the Irish Red List No. 5 Amphibians, Reptiles & Freshwater Fish (King *et al.*, 2011); Terrestrial Mammals from the Irish Red List No.3 Terrestrial Mammals (Marnell *et al.*, 2009; Cartilaginous Fish from the Irish Red List no. 11 Cartilaginous Fish (Sharks, Skates, Rays & Chimaeras) (Clarke *et al.*, 2016); Birds from Birds of Conservation Concern in Ireland 2014-2019 (Colhoun & Cummins, 2013); Non-Marine Molluscs from Irish Red List No. 2 Non-Marine Molluscs (Byrne *et al.*, 2009); Water Beetles from Irish Red List No. 1 Water Beetles (Foster *et al.*, 2009); Mayflies from Irish Red List No.7 Mayflies (Ephemeroptera) (Kelly-Quinn & Regan, 2012); Bees from Regional Red List of Irish Bees (Fitzpatrick *et al.*, 2006)

Common Name / Scientific Name	Legal Status ¹⁵²	Red List Status ¹⁵³	Source
Marsh fritillary <i>Euphydryas aurinia</i>	HD II	Vulnerable	NBDC online database G90, H00, M89, N09
Large heath <i>Coenonympha tullia</i>	N/A	Vulnerable	NBDC online database H00
The hairy reed beetle <i>Donacia cinerea</i>	N/A	Vulnerable	NBDC online database N09
The variegated crawler water beetle <i>Halplus variegatus</i>	N/A	Vulnerable	NBDC online database G90
Irish damselfly <i>Coenagrion lunulatum</i>	N/A	Vulnerable	NBDC online database G90, H00, N09
Scarce blue-tailed damselfly <i>Ischnura pumilio</i>	N/A	Vulnerable	NPWS Data Request N09
Great yellow bumble bee <i>Bombus distinguendus</i>	N/A	Endangered	NBDC online database G80
Desmoulin's whorl snail <i>Vertigo moulinsiana</i>	HD II; WA	Endangered	NBDC online database G90
Lilljeborg's whorl snail <i>Vertigo lilljeborgi</i>	N/A	Vulnerable	NBDC online database G90
Marsh whorl snail <i>Vertigo antvertigo</i>	N/A	Vulnerable	NBDC online database G80, G90, M89, M99, N09
Geyer's whorl snail <i>Vertigo geyeri</i>	HD II; WA	Vulnerable	NPWS Article 17 Shapefile M9387
Geyer's whorl snail <i>Vertigo angustior</i>	HD II; WA	Vulnerable	NPWS Article 17 Shapefile M9387
Duck mussel <i>Anodonta anatina</i>	N/A	Vulnerable	NBDC online database G80, M99, N09
English chrysalis snail <i>Leiostryla anglica</i>	N/A	Vulnerable	NBDC online database G80, M89, N09
Glutinous snail <i>Myxas glutinosa</i>	N/A	Endangered	NBDC online database G80
Heath snail <i>Helicella itala</i>	N/A	Vulnerable	NBDC online database M99
Lake orb mussel <i>Musculium lacustre</i>	N/A	Vulnerable	NBDC online database G90
Lilljeborg's pea mussel <i>Pisidium lilljeborgii</i>	N/A	Endangered	NBDC online database G80
Iridescent pea mussel <i>Pisidium pulchellum</i>	N/A	Endangered	NBDC online database G90, N09
Plated snail <i>Spermodea lamellata</i>	N/A	Endangered	NBDC online database G80, N09

Common Name / Scientific Name	Legal Status ¹⁵²	Red List Status ¹⁵³	Source
Point snail <i>Acicula fusca</i>	N/A	Vulnerable	NBDC online database M99
Smooth grass snail <i>Vallonia pulchella</i>	N/A	Vulnerable	NBDC online database G90, M99
Smooth ramshorn <i>Gyraulus laevis</i>	N/A	Endangered	NBDC online database N09
Swan mussel <i>Anodonta cygnea</i>	N/A	Vulnerable	NBDC online database N09 Historic record
Tree snail <i>Balea perversa</i>	N/A	Vulnerable	NBDC online database G80, G90, N09
Whirlpool ramshorn <i>Anisus vortex</i>	N/A	Vulnerable	NBDC online database M89, M99, N09
Fish			
Brook lamprey <i>Lampetra planeri</i>	HD II	Least Concern	NBDC online database G80
Atlantic salmon <i>Salmo salar</i>	OSPAR Convention; HD II, V	Vulnerable	NPWS Article 17 shapefile H00, G80
European eel <i>Anguilla anguilla</i>	OSPAR Convention	Critically Endangered	NBDC online database G80, G90, H00, M89, M99, N09
Terrestrial Mammals			
Eurasian badger <i>Meles meles</i>	WA	Least Concern	NBDC online database G80, G90, H00, M89, M99, N09
Eurasian pygmy shrew <i>Sorex minutus</i>	WA	Least Concern	NBDC online database G80, G90, M89, N09
Eurasian red squirrel <i>Sciurus vulgaris</i>	WA	Near Threatened	NBDC online database G80, G90, H00, M89, M99, N09; NPWS Online Map Viewer G80
European otter <i>Lutra lutra</i>	HD II, IV; WA	least concern in Ireland as per the referenced red list. Near threatened across Europe separately.	NBDC online database G80, G90, H00, M89, M99, N09
Red deer <i>Cervus elaphus</i>	WA	Least Concern	NBDC online database G90
Fallow deer <i>Dama dama</i>	WA	Least Concern	NBDC online database G80, H00,

Common Name / Scientific Name	Legal Status ¹⁵²	Red List Status ¹⁵³	Source
			M89; NPWS Online Map Viewer G9000
West european hedgehog <i>Erinaceus europaeus</i>	WA	Least Concern	NBDC online database G90, H00, M89, M99, N09
Pine marten <i>Martes martes</i>	HD V; WA	Least Concern	NBDC online database G80, G90, H00, M89, M99, N09; NPWS Online Map Viewer G80
Irish hare <i>Lepus timidus subsp. hibernicus</i>	WA	Least Concern	NPWS Article 17 Shapefile G80, G90, M99, N09
Irish stoat <i>Mustela erminea subsp. hibernica</i>	WA	Least Concern	NPWS Online Map Viewer N0090, G8000, M89
Brown long-eared bat <i>Plecotus auritus</i>	HD IV; WA	Least Concern	NBDC online database G80, M89, M99, N09
Daubenton's bat <i>Myotis daubentonii</i>	HD IV; WA	Least Concern	NBDC online database G80, G90, H00, M89, M99, N09
Leisler's bat <i>Nyctalus leisleri</i>	HD IV; WA	Near Threatened	NBDC online database G80, H00, M89, M99, N09
Lesser horseshoe bat <i>Rhinolophus hipposideros</i>	HD II, IV; WA	Least Concern	NBDC online database G80
Nathusius's pipistrelle <i>Pipistrellus nathusii</i>	HD IV; WA	Least Concern	NPWS Article 17 Shapefile N09
Natterer's bat <i>Myotis nattereri</i>	HD IV; WA	Least Concern	NBDC online database G80, G90, M99, N09
Common pipistrelle <i>Pipistrellus pipistrellus</i>	HD IV; WA	Least Concern	NBDC online database M89, M99, N09
Soprano pipistrelle <i>Pipistrellus pygmaeus</i>	HD IV; WA	Least Concern	NBDC online database G80, M89, N09
Whiskered bat <i>Myotis mystacinus</i>	HD IV; WA	Least Concern	NBDC online database N09
Birds			
Black-headed gull <i>Chroicocephalus ridibundus</i>	WA	Red List	NPWS Data Request G90, N09
Common coot <i>Fulica atra</i>	BD I, II; WA	Amber List	NBDC online database G80, G90, H00, M89, M99, N09

Common Name / Scientific Name	Legal Status ¹⁵²	Red List Status ¹⁵³	Source
Common goldeneye <i>Bucephala clangula</i>	BD II; WA	Red List	NBDC online database G80, G90, H00, M89, M99, N09
Common kingfisher <i>Alcedo atthis</i>	BD I; WA	Amber List	NBDC online database G80, G90, M89, M99, N09 [EIS]
Common pochard <i>Aythya ferina</i>	BD II, III; WA	Red List	NBDC online database G80, G90, H00, M89, M99, N09
Common tern <i>Sterna hirundo</i>	BD I; WA	Amber List	NBDC online database G80, G90, H00, M89, M99, N09
Corn crake <i>Crex crex</i>	BD I; WA	Red List	NBDC online database G80, G90, H00, M89, M99, N09 (recorded pre-2000)
Eurasian curlew <i>Numenius arquata</i>	BD II; WA	Red List	NBDC online database G80, G90, H00, M89, M99, N09
Eurasian wigeon <i>Anas penelope</i>	BD II, III; WA	Red List	NBDC online database G80, G90, H00, M89, M99, N09
Eurasian woodcock <i>Scolopax rusticola</i>	BD II, III; WA	Red List	NBDC online database G80, G90, H00, M89, M99, N09
European golden plover <i>Pluvialis apricaria</i>	BD I, II, III; WA	Red List	NBDC online database N09
Greater white-fronted Goose <i>Answer albifrons</i>	BD I, II, III; WA	Amber List	NPWS Data Request G90
Grey partridge <i>Perdix perdix</i>	BD II, III; WA	Red List	NBDC online database G80, G90, N09 (recorded pre-1980)
Grey wagtail <i>Motacilla cinerea</i>	WA	Red List	NBDC online database G80, G90, H00, M89, M99, N09
Hen harrier <i>Circus cyaneus</i>	BD I; WA	Amber List	NBDC online database G80, G90, M89, M99, N09
Little egret <i>Egretta garzetta</i>	BD I; WA	Green List	NBDC online database N09
Meadow pipit <i>Anthus pratensis</i>	WA	Red List	NBDC online database G80, G90, H00, M89, M99, N09

Common Name / Scientific Name	Legal Status ¹⁵²	Red List Status ¹⁵³	Source
Merlin <i>Falco columbarius</i>	BD I; WA	Amber List	NBDC online database G90, H00, M89, M99, N09
Northern lapwing <i>Vanellus vanellus</i>	BD II; WA	Red List	NBDC online database G80, G90, H00, M89, M99, N09
Northern pintail <i>Anas acuta</i>	BD II, III; WA	Red List	NBDC online database G90, N09 (recorded pre-1990)
Northern shoveler <i>Anas clypeata</i>	BD II, III; WA	Red List	NBDC online database G90, M99, N09
Peregrine falcon <i>Falco peregrinus</i>	BD I; WA	Green List	NBDC online database G80 (recorded pre-1990)
Red grouse <i>Lagopus lagopus</i>	BD II, III; WA	Red List	NBDC online database N90
Short-eared owl <i>Asio flammeus</i>	BD I; WA	Amber List	NBDC online database G80 (recorded pre-2000)
Tufted duck <i>Aythya fuligula</i>	BD II, III; WA	Red List	NBDC online database G80, G90, H00, M89, N09
Whooper swan <i>Cygnus cygnus</i>	BD I; WA	Amber List	NBDC online database G80, G90, H00, M89, M99, N09

Rivers, Fisheries and the Aquatic Environment

According to the EPA data¹⁵⁴, several rivers, and their associated tributaries, are located within the study area. The main rivers and their associated sub-catchments are displayed in Table 4.12.4 below.

A consultation letter was sent to IFI on the 11 September 2020 requesting desktop information regarding the watercourses which lie within the study area, including any records of rare/protected species and any data regarding the fishery potential of relevant watercourses. A response was received on 21 December 2020, which outlined the following sensitive species as being present within the adjacent watercourses and the downstream receiving environment within the River Shannon: Atlantic salmon, brown trout and lamprey.

In addition to supporting rare/protected aquatic species these river systems are likely to also support terrestrial mammals such as otter (*Lutra lutra*), bat and bird species (e.g. kingfisher *Alcedo atthis*) which use aquatic systems for foraging and

¹⁵⁴ Environmental Protection Agency (EPA), 2020. Data available for download at <http://gis.epa.ie/GetData/Download>

commuting purposes. An old kingfisher nesting location is known from approximately 400-500m north of the bridge at Drumsna.

Table 4.12.4 Main Watercourses and their Associated Sub-catchments Located in the Study Area

Sub-catchment	River / Stream name
Eslin_SC_010 Sub-catchment	Eslin Antfield Unnamed stream - border of Cloonturk and Drumod Beg Fearnaght Fedaro
Boyle_SC_030 Sub-catchment	Ardglass Stream Clogher [Roscommon] Clooneigh 26 Cloonybrien Lismulkeare Tumna Woodbrook House Stream
Shannon[Upper]_SC_020 Sub-catchment	Unnamed Stream - Kilmaddoroe Lough to Bran Lough to Carrickevy Lough to the River Shannon
Shannon[Upper]_SC_040 Sub-catchment	Aghintass Annaduff Ardanaffrin Derryoughter 26 Drumcleavry Drumcree 26 Drumgilra Drumkeeran Drumsna Fargrim Finnalaghta Foxborough Gortconnellan Gortinty Kildorragh 26 Killasanowl Jamestown Canal Kiltycarney Lismoyle 26 Mountcampbell Moyglass; Unnamed stream – border of Annaduff Glebe and Gortinty Unnamed stream – Gortinty to Annaduff Glebe Unnamed stream – border of Annaduff and Gortinty Unnamed stream – border of Annaduff and Derryoughter Tooloscan

Sub-catchment	River / Stream name
	Unnamed stream - Muclaghan Lough to Drumcree Stream
Shannon[Upper]_SC_030 Sub-catchment	Aghameeny Aghancarra Attifinlay Attirory Cloonfad_beg Cornaslieve 26 Danesfort Drumercool Garvlough Greagh 26 Killukin Kilmaddaroe Knockananima Knockadalteen 26 Lisnagat Lisseeghan Unnamed stream – annaghbeg Unnamed stream – border of Annaghbeg and Cloonfad Unnamed stream – border of cornacoroo and coraughrim Pollnagappul Rock 26 Sallaghan 26 Shannon [Upper] Shanballybaun Tonnagh 26 Tonrevagh Unnamed stream - from the shannon at annaghbeg to drumlumman Unnamed stream flowing into corry lough

These watercourses and associated riparian habitats are of high ecological value due to the connectivity they can provide to other sites of ecological importance, and that they can also support a range of rare and protected aquatic species.

The watercourses contained within the study area are deemed to range in ecological value from local to national importance, owing to their nature conservation designations and the fact that they may support rare/protected species of conservation value and provide ecological connectivity across the study area.

Ecological Sites

Following a review of orthophotography and collation of available existing habitat information, 113 ecological sites were identified. A ground truthing exercise was subsequently undertaken to verify the orthophotography interpretation and refine the boundaries of the ecological sites, where they were in close proximity to, or overlapped with, an option corridor. The description and evaluation of the ecological sites are presented in the Ecological Sites section below and Table

4.12.5, with the locations of the ecological sites shown on Figures 4.12.1.0 to 4.12.1.5.

4.12.3.2 Field Surveys

This section details the results of field surveys undertaken to date to inform the constraints study and subsequent options selection process. All elements of the habitat map of relevance to identifying constraints (i.e. Annex I habitats) have been incorporated into the constraints GIS datasets and/or the ecological sites. Detailed studies of habitats at the southern and northern crossing points of the River Shannon were undertaken to help inform the constraints study given the likely impacts associated with these locations. However, as per NRA guidance, surveys at the constraints stage are typically walkover surveys and not detailed habitat surveys of individual ecological sites.

Terrestrial Habitats

Habitat Survey in the Townlands of Corryolus and Cloonman (which includes part of Lough Eidin pNHA)

The Corryolus area, which lies to the east of the River Shannon and north of Carrick-on-Shannon, is largely dominated by wet grassland (GS4) vegetation, with prominent soft rush *Juncus effusus*, which has developed on the poorly-drained, mineral soils. This vegetation dominates a wide ridge which runs in an east to west direction. Along the wide floodplain banks of the River Shannon, there is a wide band of tall freshwater marsh (GM1) vegetation, and these areas are generally subject to flooding for a significant proportion of the year. In places this zone of marsh vegetation can be around 200 metres wide. From a botanical perspective the marsh vegetation is relatively species-rich and undisturbed and is considered to be of high ecological value. Other habitats which occur include hedgerows (WL1), scrub (WS1) and wet grassland dominated by purple moor-grass (GS4) however the areas of these habitats are limited in extent.

The Cloonmaan area, which lies to the west of the River Shannon and northwest of Carrick-on-Shannon, is generally dominated by a mixture of wet grassland (GS1) which is often semi-improved throughout as a result of agricultural management. Smaller areas of improved agricultural areas also occur however it is possible that many of these areas would revert to wet grassland if agricultural practices such as grazing and silage cutting were abandoned. Along the banks of the River Shannon, a well-developed band of freshwater marsh (GM1) vegetation occurs in areas prone to flooding. This vegetation includes a small population of marsh pea *Lathyrus palustris* which has a restricted distribution in Ireland. This record would appear to be the first post-1930 record of the species from the Carrick-on-Shannon area¹⁵⁵. Two small blocks of riparian woodland (WN5) dominated by grey willow (*Salix cinerea oleifolia*) occur along the banks of the River Shannon in this area.

Habitat Survey in the Townlands of Cortober, Cordrehid, Attirory, Rinnacurreen and Drumkeeran.

¹⁵⁵ Botanical Society of Britain & Ireland (BSBI), 2022. Online maps. Available at: <https://bsbi.org/maps>

The Attirory area which lies to the east of the River Shannon is generally dominated by tall freshwater marsh (GM1) with smaller areas of wet grassland (GS2) and wet willow-alder-ash woodland (WN6) (with allegiances to priority Annex I Alluvial woodland habitat) also occurring throughout. In the middle of the area there is a large field of wet grassland which is regularly cut for silage. A prominent feature of marsh vegetation close to the River Shannon is the abundance of low (2 to 5 metres tall) willow *Salix cinerea oleifolia* and alder *Alnus glutinosa* bushes. These low shrubs have not generally formed closed canopy woodland at present however it is likely that this area will become progressively dominated by wet woodland in the near future. Other habitats which occur include improved agricultural grassland (GA1) and a small area of transition mire (PF3). The site supports relatively large areas of marsh and wet woodland habitat.

Most of the Cordrehid/Cortober area is dominated by wet grassland (GS4) with smaller areas of improved agricultural grassland occurring on the better-drained soils. A wide zone (c. 100m) of marsh (GM1) vegetation occurs along the western banks of the River Shannon. This area regularly floods during the winter/spring months. In the middle of the area there is a meandering river/stream, the Killukin River, which flows towards the River Shannon in a northeasterly direction. This slow-moving stream is generally between 5 and 7 metres wide and supports a narrow zone of marginal reed swamp vegetation in places. Areas adjoining this stream support a wide marshy floodplain dominated by soft rush with conspicuous wild angelica *Angelica sylvestris* and meadowsweet *Filipendula ulmaria*.

Most of the land to the west of the Killukin River comprises steeply sloping ground with a mineral soil dominated by wet grassland vegetation which is semi-improved in places. Other habitats which occur in this general area include hedgerows (WL1) and small areas of riparian woodland (WN5) and conifer plantation (WD4).

Walkover Surveys of Ecological Sites

The results of the walkover surveys of ecological sites have been incorporated into the descriptions provided in Table 4.12.5.

Ecological sites

Ecological sites are sites of ecological value: i.e. those likely or determined to be at least of a local importance (higher value) (refer to National Roads Authority, Guidelines for Assessment of Ecological Impacts of National Road Schemes 2009 for more detail). These are primarily defined based on the habitat types present or likely to be present but may also include important flora and fauna sites or populations.

The boundaries of the ecological sites have been defined based on the results of the desk study and interpretation of orthophotography. Refinement of these boundaries was completed following a ground truthing exercise at ecological sites identified within the option corridors to verify the types of habitats present.

Ecological sites identified in the study area are presented in Table 4.12.5 and displayed on Figure 4.12.1.0 to 4.12.1.5.

Table 4.12.5 Ecological Sites Identified in the Study Area

Ecological Site Number	Location	Description	Ecological Valuation
EC01	Usna Woodlands	Broadleaved woodland	Not surveyed
EC02	Drumharlow	Broadleaved woodland	Local Importance (Higher Value)
EC03	Woodbrook	Broadleaved woodland	Local Importance (Higher Value)
EC04	Woodbrook	Broadleaved woodland (including some recently planted) and scrub	Not surveyed
EC05	Drumharlow	Broadleaved woodland and scrub	International Importance
EC06	Woodbrook / Cloongownagh	Broadleaved woodland	International Importance
EC07	Clooneigh	Broadleaved / wet woodland and wet grassland. Potential for *91E0 habitat	Not surveyed
EC08	Cloongownagh	Broadleaved woodland	Not surveyed
EC09	Cloongownagh	Broadleaved woodland	Not surveyed
EC10	Cloongownagh	Broadleaved woodland and conifer plantation	Not surveyed
EC11	Dorrery	Broadleaved woodland	Not surveyed
EC12	Cultyconeen	Broadleaved woodland (including some recently planted)	Local Importance (Higher Value)
EC13	Knockananima	Broadleaved woodland, scrub and wet grassland.	Not surveyed
EC14	Tumna	Broadleaved / wet woodland / scrub on shore of Eidin Lough. Potential for *91E0 habitat	Not surveyed
EC15	Scregg	Broadleaved woodland, scrub and conifer plantation	Not surveyed
EC16	Cloonman	Broadleaved / wet woodland / scrub, marsh and wet grassland on bank of River Shannon. Areas of confirmed and potential *91E0 habitat	International Importance
EC17	Cloonskeeven	Broadleaved / wet woodland / scrub and wet grassland on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC18	Danesfort	Broadleaved woodland	Not surveyed
EC19	Deerpark	Broadleaved / wet woodland / scrub on bank of Killukin River. Potential for *91E0 habitat	Not surveyed

Ecological Site Number	Location	Description	Ecological Valuation
EC20	Danesfort	Broadleaved / wet woodland / scrub associated with Killukin River. Potential for *91E0 habitat	Not surveyed
EC21	Danesfort	Broadleaved woodland	Not surveyed
EC22	Danesfort	Broadleaved woodland	Not surveyed
EC23	Danesfort / Cartron	Broadleaved / wet woodland and bog woodland. Potential for 91D0 and *91E0 (due to hydrological connection to River Shannon floodplain)	Not surveyed
EC24	Cartron	Broadleaved / wet woodland. Potential for *91E0 (due to hydrological connection to River Shannon floodplain)	Not surveyed
EC25	Corry	Broadleaved woodland	Not surveyed
EC26	Corry	Broadleaved woodland	Not surveyed
EC27	Portaneoght	Broadleaved / wet woodland and scrub	Local Importance (Higher Value)
EC28	Portaneoght	Broadleaved / wet woodland and scrub. Possible *91E0	Local Importance (Higher Value)
EC29	Hartley	Broadleaved / wet woodland / scrub on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC30	Hartley	Broadleaved / wet woodland / scrub in River Shannon floodplain. Hydrologically connected to the river. Potential for 91E0 habitat	International Importance
EC31	Hartley	Broadleaved / wet woodland / scrub and wet grassland in River Shannon floodplain. Hydrologically connected to the river. Potential for 91E0 habitat	International Importance
EC32	Hartley	Broadleaved / wet woodland / scrub and wet grassland in River Shannon floodplain. Hydrologically connected to the river. Potential for 91E0 habitat	International Importance
EC33	Townparks	Broadleaved / wet woodland / scrub and wetland habitat on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC34	Townparks	Broadleaved / wet woodland / scrub on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC35	Cordrehid	Broadleaved / wet woodland / scrub and wet grassland / marsh habitat on bank of River Shannon. Potential for *91E0 habitat	Local Importance (Higher Value)

Ecological Site Number	Location	Description	Ecological Valuation
EC36	Cordrehid	Broadleaved / wet woodland / scrub on bank of River Shannon. Contains *91E0 habitat	Not surveyed
EC37	Cordrehid	Broadleaved / wet woodland / scrub on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC38	Island on Corry Lough	Riparian woodland / scrub in River Shannon island. Potential for *91E0	Not surveyed
EC39	Danesfort	Broadleaved / wet woodland/scrub on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC40	Danesfort / Cartron	Broadleaved / wet woodland and wet grassland. Potential for *91E0 (due to hydrological connection to River Shannon floodplain)	Not surveyed
EC41	Cartron	Broadleaved / wet woodland. Potential for *91E0 (due to hydrological connection to River Shannon floodplain)	Not surveyed
EC42	Cartron / Corry	Broadleaved / wet woodland / scrub on bank of River Shannon. Potential for *91E0 habitat.	Not surveyed
EC43	Corry	Broadleaved / wet woodland. Potential for *91E0 (due to hydrological connection to River Shannon floodplain)	Not surveyed
EC44	Corry	Wet woodland and wet grassland	Not surveyed
EC45	Corry	Broadleaved woodland	Not surveyed
EC46	Corry	Wet grassland and scrub	Not surveyed
EC47	Ballynamoney / Cornamucklagh / Kilboderry	Broadleaved woodland and scrub	Local Importance (Higher Value)
EC48	Aghancarra / Drumlumman	Broadleaved woodland / wet woodland	International Importance
EC49	River Shannon Island at Cordrehid / Attirory	Riparian woodland / scrub in River Shannon island. Potential for *91E0	Local Importance (Higher Value)
EC50	Attirory	Marsh, wet woodland, wet grassland and scrub. Contains areas of priority Annex I alluvial woodland habitat [*91E0] and an area of Annex I transition mires habitat [7140]. Potential for scrub to develop into *91E0 habitat in the short to medium term	National Importance
EC51	Attirory / Rinacurreen / Drumkeeran	Broadleaved / wet woodland, scrub and wet grassland. Potential for peatland habitats. *91E0 present	International Importance

Ecological Site Number	Location	Description	Ecological Valuation
EC52	Attirory / Drumkeeran / Lisseeghan	Broadleaved / wet woodland, scrub and wet grassland. Potential for peatland habitats. *91E0 present	International Importance
EC53	Rinacurreen Lough	Lake and associated wetland, broadleaved / wet woodland and scrub habitats. Potential for peatland habitats and *91E0	Not surveyed
EC54	Ballynacleigh	Broadleaved woodland	Not surveyed
EC55	Island on Corry Lough	Riparian woodland / scrub in River Shannon island. Potential for *91E0	Not surveyed
EC56	Cornacorroo	Broadleaved / wet woodland on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC57	Corry / Cloonfad Beg	Broadleaved / wet woodland / scrub on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC58	Ballagh Lough	Lake and associated wetland habitats	Not surveyed
EC59	Dromore / Clogher	Broadleaved woodland and mixed conifer / broadleaf woodland	Not surveyed
EC60	Clogher	Broadleaved woodland	Not surveyed
EC61	Greagh	Broadleaved woodland (including some recently planted)	Not surveyed
EC62	Kiltycarney	Artificial lake, semi-natural grassland and scrub	Local Importance (Higher Value)
EC63	Corbally / Lisgarney	Broadleaved / wet woodland and wet grassland	Local Importance (Higher Value)
EC64	Cloonfeacle / Drummaunroe/Gort	Broadleaved / wet woodland, scrub and wet grassland	Not surveyed
EC65	Cornacorroo / Coraughrim	Broadleaved / wet woodland, scrub and wet grassland along the River Shannon. Potential for peatland habitats and *91E0	Not surveyed
EC66	Corraughrim	Broadleaved / wet woodland / scrub on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC67	Corgullion	Wet grassland and scrub	Not surveyed
EC68	Corraughrim/Gort	Broadleaved / wet woodland/scrub on bank of River Shannon. Potential for *91E0 habitat. Annex I hay meadow [6510] habitat previously record for this site	Not surveyed
EC69	River Shannon Island at Gort / Cultyconway	Riparian woodland / scrub in River Shannon island. Potential for *91E0	Not surveyed

Ecological Site Number	Location	Description	Ecological Valuation
EC70	Cultyconway	Broadleaved / wet woodland / scrub on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC71	Cultyconway	Broadleaved / wet woodland / scrub on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC72	Jamestown	Broadleaved / wet woodland / scrub on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC73	Jamestown	Broadleaved / wet woodland / scrub on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC74	Jamestown	Broadleaved / wet woodland / scrub on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC75	Corralara	Wet woodland, scrub, wet grassland and peatland habitats. Likely to support Annex I peatland and potentially Annex I woodland habitats (e.g. 91D0 and *91E0)	Not surveyed
EC76	Dangan	Wet woodland, scrub, wet grassland and peatland habitats. Likely to support Annex I peatland and potentially Annex I woodland habitats (e.g. 91D0 and *91E0)	Not surveyed
EC77	Aughriman South	Broadleaved woodland, scrub, semi-natural grassland wet grassland. Potential for peatland habitats	International Importance
EC78	Minkill / Kildorragh	Broadleaved woodland and wet grassland. Wet grassland with <i>Succisa pratensis</i> and potential for marsh fritillary butterfly	Local Importance (Higher Value)
EC79	River Shannon Island at Tully / Charlestown	Riparian woodland / scrub in River Shannon island. Potential for *91E0	Not surveyed
EC80	Charlestown / Cloonavery	Broadleaved and conifer woodland along the River Shannon. Potential for *91E0	Local Importance (Higher Value)
EC81	Cloonavery	Broadleaved woodland	Not surveyed
EC82	Ardanafrin / Lackagh	Broadleaved woodland and scrub	Not surveyed
EC83	Johnstown Canal	Canal and associated treelines and riparian / wet woodland. Potential for *91E0	Not surveyed
EC84	Ardanafrin	Broadleaved woodland	Not surveyed
EC85	Cultyconway / Corralara	Broadleaved woodland	Not surveyed
EC86	Dangan	Wet grassland	Not surveyed

Ecological Site Number	Location	Description	Ecological Valuation
EC87	Mountcampbell	Broadleaved woodland and mixed conifer / broadleaf woodland	Local Importance (Higher Value)
EC88	Mountcampbell / Crickeen	Broadleaved and conifer woodland along the River Shannon. Potential for *91E0	Local Importance (Higher Value)
EC89	River Shannon Island at Mountcampbell / Charlestown	Riparian woodland / scrub in River Shannon island. Potential for *91E0	Not surveyed
EC90	Drumcleavry	Broadleaved / wet woodland on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC91	Cloonteen	Wet grassland	Not surveyed
EC92	Corry	Broadleaved / wet woodland. Hydrologically connected to the River Shannon. Potential for *91E0 habitat	Not surveyed
EC93	Cartron Lough	Lake and associated wetland habitats	Not surveyed
EC94	Lowfield Lough	Lake and associated wetland, broadleaved / wet woodland and scrub habitats. Potential for *91E0	Not surveyed
EC95	Foxborough	Broadleaved woodland (including some recently planted)	Not surveyed
EC96	Foxborough / Lavagh	Planted broadleaved woodland, wet grassland and scrub	Not surveyed
EC97	Gortconnellan Lough / Spa Lough	Lake and associated wetland habitats	County Importance
EC98	Annaduff / Glebe	Broadleaved woodland	Not surveyed
EC99	Derryoughter	Broadleaved / wet woodland, scrub and wet grassland on bank of River Shannon. Potential for *91E0 habitat	International Importance
EC100	Cloonteen	Broadleaved / wet woodland on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC101	Moyglass	Broadleaved/wet woodland and conifer plantation on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC102	Moyglass / Tooloscan / Skeagh	Broadleaved / wet woodland, scrub and wet grassland on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC103	Annaduff	Broadleaved woodland	Not surveyed
EC104	Gortinty	Broadleaved woodland	Not surveyed
EC105	Drumgilra Lough / Gortinty Lough	Lake and associated wetland, broadleaved / wet woodland and scrub habitats. Potential for *91E0	International Importance

Ecological Site Number	Location	Description	Ecological Valuation
EC106	Derrylaur / Derrybrack / Mullagh	Broadleaved / wet woodland, scrub and wet grassland on bank of River Shannon. Potential for *91E0 habitat	Not surveyed
EC107	Derrybrack	Broadleaved / wet woodland, scrub and wet grassland. Potential for peatland habitats and 91D0	Not surveyed
EC108	Aghamore	Broadleaved woodland	Not surveyed
EC109	Mullagh	Broadleaved / wet woodland	Not surveyed
EC110	Finnalaghta	Quarry pond, semi-natural grassland and scrub	Not surveyed
EC111	Fearnaght / Drumlon	Broadleaved woodland and planted mixed conifer / broadleaf woodland	Not surveyed
EC112	Fearnaght	Broadleaved woodland and scrub	Local Importance (Higher Value)
EC113	Bog Lough	Lake and associated wetland, peatland and woodland habitats. Likely to support Annex I peatland and potentially Annex I woodland habitats (e.g. 91D0 and *91E0)	International Importance

Rare and/or Protected Plant Species

No rare or protected plant species noted to date from the field surveys.

None of the species returned from the desk study and listed in Table 4.12.3 were recorded. No other rare or protected flora was recorded during the constraints walkover survey.

Non-Native Invasive Species

Planting, dispersing, or allowing/causing the dispersal, spread or growth of certain non-native plant species is controlled under Article 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended); and refers to plant or animal species listed on the Third Schedule of those regulations. The accidental spread of non-native invasive plant species as a result of construction works has the potential to impact upon terrestrial habitats within and immediately adjacent to potential Alternatives and Options; potentially affecting plant species composition, diversity and abundance over the long-term. The effects of introducing such non-native invasive plant species to highly sensitive and ecologically-important habitat areas (e.g. designated area for nature conservation or areas of Annex I habitat) have the potential to result in a likely significant negative effect, at geographic scales ranging from local to international.

There are several non-native invasive plant species which have been recorded within the study area. These are summarised in Table 4.12.6.

Table 4.12.6 Non-native Invasive Species Identified in the Study Area

Common Name / Scientific Name	Townland
Japanese knotweed <i>Reynoutria japonica</i>	Fearnaght
Japanese knotweed <i>Reynoutria japonica</i>	Lisseeghan
Japanese knotweed <i>Reynoutria japonica</i>	Fearnaght
Japanese knotweed <i>Reynoutria japonica</i>	Fearnaght
Japanese knotweed <i>Reynoutria japonica</i>	Faulties
Japanese knotweed <i>Reynoutria japonica</i>	Faulties / Fearnaght townland border
Japanese knotweed <i>Reynoutria japonica</i>	Faulties
Japanese knotweed <i>Reynoutria japonica</i>	Fearnaght

4.12.4 Summary

As outlined above, 113 ecological sites were identified within the study area based on an examination of aerial photography, information gathered during the desktop study and a ground truthing exercise carried out during a site survey. The Zone of Influence (ZoI) of the constraints study largely focusses on the study area, with consideration of various impacts that might affect identified/confirmed biodiversity features. These ecological sites comprise a variety of habitat types of varying ecological value including areas of mixed broadleaf woodland, areas of riparian woodland, scrub, wet grassland, marsh, areas of broadleaf/conifer plantations, quarries and lakes with associated surrounding wetland habitat. Although surveys associated with the constraints study focused on the study area, ecological receptors in the wider landscape were also considered and included features such as hydrologically or hydrogeologically connected habitats and/or species, particularly in respect to mobile species that are associated with nearby designated sites (European, National etc.). Thus, in addition to the 113 ecological sites identified, the following features were also noted as constraints:

- Designated sites in the vicinity of the study area and within the downstream receiving environment (including SACs, SPAs, NHAs and pNHAs)
- Designated Habitats (Annex I and priority Annex I habitats)
- Rare, protected and notable flora
- Invasive non-native flora species
- Rare, protected and notable fauna
- Waterbodies (including rivers, streams and lakes)
- Policies and objectives outlined within the relevant local area plans (i.e. Carrick-on-Shannon LAP) as well as higher level land and strategic plans

4.13 Hydrology

4.13.1 Introduction

This section describes the hydrological constraints identified within the study area for the N4 Carrick-on-Shannon to Dromod Project and should be read in conjunction with the constraint's figures, Figures 4.13.1.0 to 4.13.4.5.

Section 4.13.2 describes the methodologies and sources of information that were used to carry out the study. Section 4.13.3 describes the hydrological constraints within the N4 Project study area. A summary is presented in Section 4.13.4.

4.13.2 Methodology

This assessment was prepared taking cognisance of the requirements of the NRA guidance for the preparation of route selection reports for geology, hydrology and hydrogeology (NRA 2009)¹⁵⁶.

The guidelines provide useful criteria for ranking the importance of the identified hydrological and hydrogeological constraints. These criteria are presented in Table 4.13.1.

This desk study collated and reviewed the following sources of information to identify hydrological constraints within the study area:

- Current and historical Ordnance Survey maps available for the study area (1:2,500 and 1:10,560 scales)
- Aerial Photography
- OPW Arterial and Drainage District Mapping
- CFRAM Mapping and CFRAM Hydrology, Hydraulics and Flood Relief Options Reports for the Carrick-on-Shannon Study Area
- OPW Hydrometric Data for River and Lake Gauges
- EPA Environmental Mapping and GIS Layers
- EPA Water Quality Status Data
- EPA Water Framework Directive data
- Shannon River Basin Reports
- Roscommon County Development Plan (2021-2027)¹⁵⁷
- Leitrim County Development Plan (2015-2021)¹³

¹⁵⁶ NRA, 2009. Environmental Impact Assessment of National Road developments – Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Developments. Available at: <https://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf>

¹⁵⁷ Roscommon County Council, 2021. Draft Roscommon County Development Plan. Available at: <https://www.rosdevplan.ie/>

- Leitrim County Development Plan (2022-2028)¹⁷
- Carrick-on-Shannon Local Area Plan (2010)**Error! Bookmark not defined.**
- Geological Survey of Ireland Groundwater Database including
- Aquifer mapping, Bedrock Mapping, Karst Features, Aquifer Vulnerability, Groundwater Recharge mapping, Quaternary Mapping including soils and sub-soils and groundwater flood mapping

Table 4.13.1 Criteria for Rating the Importance of Identified Features (Based on NRA Guidelines (2009); Box 4.2: Criteria for Rating Site Attributes – Hydrology)

Importance	Criteria	Typical Example
Extremely High	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
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation – NHA status. Regionally important potable water source supplying >2500 homes. Quality Class A (Biotic Index Q4, Q5). Floodplain protecting more than 50 residential or commercial properties from flooding. Nationally important amenity site for wide range of leisure activities
High	Attribute has a high quality or value on a local scale	Salmon fishery. Locally important potable water source supplying >1000 homes. Quality Class B (Biotic Index Q3-4). Floodplain protecting between 5 and 50 residential or commercial properties from flooding. Locally important amenity site for wide range of leisure activities
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery. Local potable water source supplying >50 homes. Quality Class C (Biotic Index Q3, Q2- 3). Floodplain protecting between 1 and 5 residential or commercial properties from flooding
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities. Local potable water source supplying

4.13.3 Existing Environment

4.13.3.1 Introduction

The constraints study area extends northwest to southeast with an area of 78.2km² and is 18.3km long and 7.7km wide at its widest point. The entire constraints study area is located within the Upper River Shannon catchment, hydrological Area No. 26. The River Shannon runs almost longitudinally through the study area which extends from just south of Eidin Lake in the townland of Drumharlow to just east of Lough Boderg and north of Lough Scannal in the townland of Faulties in the southeast.

The surface hydrology constraints will be presented under the following sub-headings:

- Watercourse features
- Drainage
- Hydro-ecological features
- Flood Risk
- Surface Abstractions
- Surface discharges

4.13.3.2 Watercourses

Upper River Shannon

The River Shannon is the main river system within the study area, with all watercourses within the constraints study area out falling within a relatively short distance of the mainline River Shannon. The catchment area of the River Shannon which extends to just downstream of Eidin Lake (i.e. approximately 2km upstream of Carrick-on-Shannon Bridge) is 1283km²; to Carrick-on-Shannon Bridge it is 1,294km²; and at the inlet to Lough Boderg towards the downstream end of the study area it is 1427km². These catchment areas represent a reasonably large sized river catchment system through the study area.

The upstream end of the study area (northwest), the River Shannon catchment, can be split in two sub-catchments: (1) Boyle River catchment and (2) the Upper River Shannon catchment which includes Lough Allen. The Boyle River which discharges into Eidin Lake has a total catchment area of 635km² to its outlet from Eidin Lake. The Boyle River catchment is sluggish and has many upstream lakes and wetlands including Oakpart Lough, Lough Key and Lough Gara as well as Eidin Lake. These lakes and floodplain areas produce a sizable natural flood attenuation effect. The Upper Shannon sub-catchment which includes the Lough Allen and the Leitrim River is in general a steeper catchment than the Boyle River catchment. The Upper Shannon catchment extends northwards close to the Border between Leitrim and Fermanagh and has a total area to its confluence with the Boyle River of 610km².

Lough Allen represents a major lake of some 33.5km² in surface area and its outflow is strictly controlled by the ESB at Bellantra Sluices. Lough Allen is used by the ESB to provide strategic storage for the Lower Shannon Hydroelectric (Ardnacrusha) Scheme and therefore its outflow is controlled. Similarly, the downstream Lough Ree lake is also controlled by the ESB at Athlone for a similar purpose. The water level on Lough Allen and the outflow discharges are controlled by lifting sluice gates at the Bellantra Sluices and is used like Lough Ree to provide compensation flow to the Lower Shannon for low flow periods to maintain consistent hydropower generation at Ardnacrusha throughout the year.

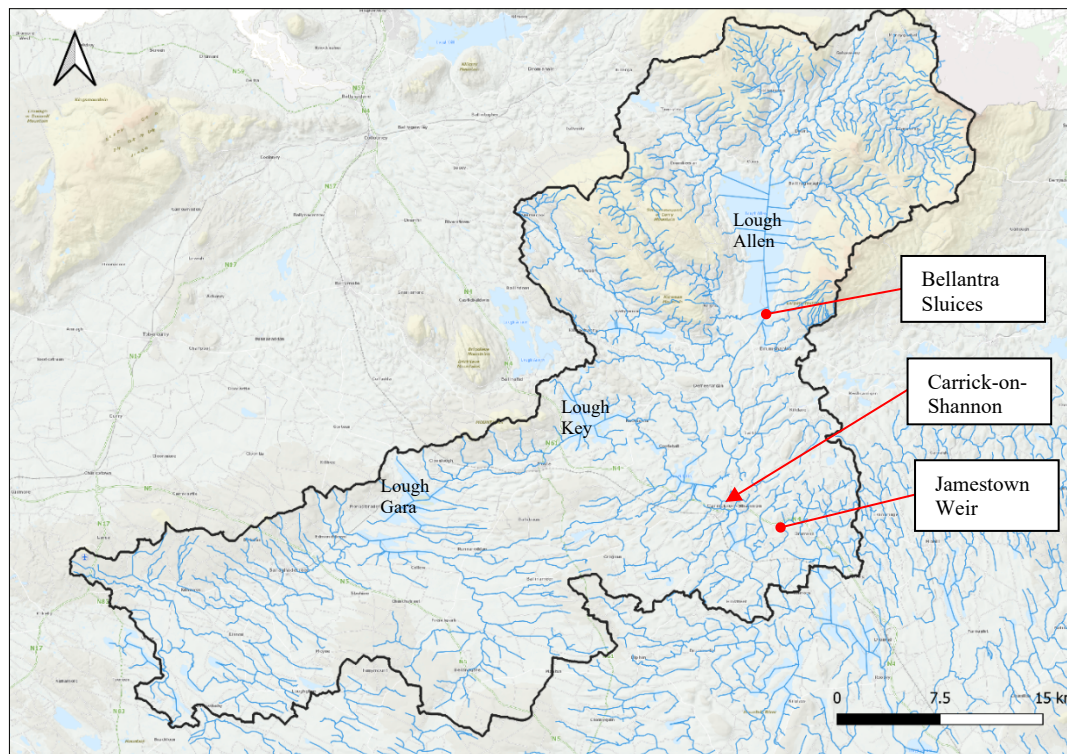


Plate 4.13.1 Upper Shannon Catchment Map to Jamestown Weir

A short distance downstream of Carrick-on-Shannon, the River Shannon flows through a large, elongated lake basin called Lough Corry. It has a relatively wide floodplain area as far as Jamestown Bridge. From Jamestown Bridge to Drumsna Village, the river floodplain is generally constrained by a narrow valley with steep sides on both banks of the river channel confining the river to an almost channelised reach section. This section of the river has a considerably higher gradient than the sluggish and wide lake like conditions that exist in the River Shannon upstream of Jamestown Bridge to Carrick-on-Shannon and upstream to Eidin Lake. A sluiced weir operated by Waterways Ireland, referred to as the Jamestown Weir, see Plate 4.13.3 is located 850m downstream of Jamestown Bridge which provides water level control for upstream navigation and the inflow to the Jamestown Canal. This is achieved through a broad crested weir section and gated section at the Jamestown Weir where sluices are manually lifted. In winter/autumn flood periods Waterways Ireland generally raise up all gates so as to avoid any potential significant effect on upstream flooding at Carrick-on-Shannon and surrounding callows.



Plate 4.13.2 Lough Allen Controlled Outflow at Bellantra Sluices



Plate 4.13.3 View from Jamestown Weir (taken 27 February 2020) (note all flow at that time within channel and discharging over the Permanent Weir Section also)



Plate 4.13.4 Summer Operation at Jamestown Weir with Levels Low and Not Discharging over the Permanent Weir Section

The catchment areas of the River Shannon to Jamestown Quay and to Drumsna Quay are 1374 km² and 1385km² respectively, ref Plate 4.13.8. The river channel section between Jamestown and Drumsna is not navigable, particularly in the low flow periods. A lock gated navigation canal (the Jamestown Canal) upstream of Jamestown at Ardarafrin townland on the left bank (southeast) c. 650m upstream of Jamestown Bridge connects via a constructed canal of almost 2.8km in length to Lough Nanoge on the River Shannon which avoids the unnavigable reach section between Jamestown and Drumsna Villages. The entire section of the River Shannon channel within the study area would be considered to be an important amenity and fishery river. However, the Upper Shannon River has not been designated as Salmonid water body.

ESB Control

As part of the Shannon hydroelectric scheme, the ESB control water levels in the Shannon Lakes through their control of Lough Allen at the Bellantra sluices, Lough Ree at Athlone weir and Lough Derg at Parteen weir. The control of lake levels enables ESB to ensure sufficient river flow throughout the year for Ardnacrusa whilst meeting lake and river level obligations in terms of navigation and low flows. Lough Allen, which controls the flow rate from c. a 442km² catchment area, is approximately 35km² in surface area and therefore a rise of 1m in lake level represents 35million cubic metres of lake storage. Such storage represents an effective rainfall depth of 80mm over the contributing catchment area. There is almost 80 years of recorded lake levels for Lough Allen and from the outflow channel downstream of Bellantra sluices. These levels are used with the ESB Rating Equation to estimate daily outflow based on daily water level readings taken at

9:00am. The ESB operation of the Bellantra sluices sets the outflow from Lough Allen which is circa 37% of the catchment area to Carrick-on-Shannon.

The control of Lough Allen and the released outflows to the Shannon are set out in the ESB Regulation and Guidelines for the Control of the River Shannon (Nov 2003). The regulation dictates the sluice gate opening settings, height and the speed of gate opening, the maximum permissible lake level and the minimum permissible lake outflow. In respect to normal operations, the regulations set out that the water level in the channel downstream of the Bellantra sluices should not drop below 46.40m OD, which approximates a discharge of 5m³/s. It recognises that it may not be possible to maintain this level during drought periods even when the sluices are fully open. Optimisation of storage from Lough Allen is no longer an important factor to the ESB in generation of power at Ardnacrusha with control primarily for navigation and flood requirements. However, storage which has built up in Lough Allen over the winter period may be released during the summer.

The ESB endeavour to maintain the level of Lough Allen above 48.16m OD Poolbeg during mid-March and the end of October (this is considered to represent the minimum navigation level for Lough Allen)¹⁵⁸. In order to achieve this, it is considered desirable that the level of the lake is above 48.6m OD Poolbeg during May and early June in order to achieve the minimum lake level and a 5m³/s discharge. Throughout the remainder of the year, a discharge from Lough Allen of 20 to 25m³/s is generally sufficient to keep the lake level at or above 49.68m OD Poolbeg (maximum normal operating level). At 49.68m OD Poolbeg with the Bellantra Sluice gate opening set to 400mm the discharge from Lough Allen is circa 30m³/s. The dam crest level at which a spill will occur for Lough Allen is 52.12m OD Poolbeg and the exceptional Reservoir Level is 51.12m OD (i.e. an allowance of 1m is made for wave surcharge on the earthen embankments).

The outflow relationship for the Bellantra Sluices set at flood control levels where the twin 6m wide gates are set with a bottom leaf of each gate set at an opening height of 400mm and the top of the upper leaf set at 49.68m OD.

Table 4.13.2 ESB Bellantra Sluice Flow Relationship for Lough Allen Outflow

Upstream Water Level Hydrometric Gauge 26073 mOD Poolbeg	Downstream Water Level Hydrometric Gauge 26030 mOD Poolbeg	Lough Allen Discharge Q (m ³ /s)
49.68	47.5	29.5
49.83	47.56	31.3
49.98	47.65	34
50.13	47.75	37.2
50.28	47.86	40.7
50.43	47.98	44.8

¹⁵⁸ Jacobs, 2004. Understanding Water Levels on the River Shannon; Shannon Catchment-based Flood Risk Assessment and Management (CFRAM) Study. OPW. Available at: http://shannoncfamstudy.jacobs.com/docs/Understanding%20water%20levels%20of%20the%20River%20Shannon_120814.pdf

Upstream Water Level Hydrometric Gauge 26073 mOD Poolbeg	Downstream Water Level Hydrometric Gauge 26030 mOD Poolbeg	Lough Allen Discharge Q (m ³ /s)
50.58	48.11	49.4
50.73	48.25	54.5
50.88	48.38	59.4
51.03	48.52	64.9
51.18	48.67	71
51.33	48.83	77.8

The desirable minimum outflow during summer period is 5m³/s.

The estimated 150year flood level by the ESB for Lough Allen is 51.25m OD which represents a controlled discharge of 74.1cumec.

Waterways Ireland Control

Waterways Ireland operate the Jamestown Weir such that they can maintain summer minimum upstream levels for navigation purposes. Jamestown Weir has a 17.2m long broad crested weir section for higher flood flows at a crest level of 42.9m OD Poolbeg, a gated sluice section with 12 No. 2.05m wide by 1.9m high openings at an invert of 40.9m OD Poolbeg. The structure has a 1.7m wide spill units for fish passage having a crest elevation of 41.88m OD Poolbeg. A second spillway on towards the right side of the channel and structure is 6.94m wide at an elevation of 42.62m OD Poolbeg.

The control imposed by Waterways Ireland is for navigation purposes only and is set to maintain summer levels for navigation throughout the Upper River Shannon channel which extends northwards into the Lough Allen navigation Canal. The gates are closed as necessary to achieve and maintain a normal summer operating level upstream at Jamestown of 42.98mOD. The 95-percentile water level recorded at Jamestown Hydrometric Gauge 26085 is 42.865m OD Poolbeg and median water level is 43.11m OD Poolbeg.

Based on the hydrometric record for hydrological years 2005 to 2019 (16 years of daily gauging record) the minimum recorded water level at Jamestown Hydrometric Gauge is 42.73m OD Poolbeg and the 99 and 95-percentile levels (exceeded 99 and 95% of the time) are 42.83m OD and 42.92m OD Poolbeg. In the autumn and winter periods when river is in flood all of the gates are opened.

In the 16 year period the typical range of water levels at Jamestown (difference between 1 and 99-percentile levels) is 1.48m.

Hydrometric Gauges

The River Shannon is hydrometrically gauged at a number of locations within and proximate to the study area. These river gauges include Lough Allen (26073 ESB), Bellantra Sluices tailwater channel (26030 EPA), Boyle River at Boyle Abbey (26108 OPW), River Shannon at COS Bridge (26324, EPA), River Shannon at

Jamestown Bridge (26085, OPW) and River Shannon at Drumsna Quay (26089, OPW).

Table 4.13.3 Hydrometric Gauging on the Upper River

Site	Gauge Ref No.	Hydrometric data	Area km ²
Boyle Abbey Bridge	26108	Flow and water level estimates	528
Bellantra Sluices	26030/26073	Flow and water level	417
Lough Allen	26073	Lake water level only	417
Carrick-on-Shannon Br.	26324	Water level only	1290
Jamestown	26085	Water level only	1374
Drumsna	26089	Water level only	1385
Athlone	26027	Flow and Water Level	4601

Additional recorders are being installed in the summer 2021 by the OPW as part of the COS Flood Relief Scheme Study being carried out by Leitrim Co. Co. in conjunction with the OPW at the Jamestown Weir facility

Bridge Structures on the River Shannon

The River Shannon has three existing bridge crossings within the study area. These are located at the narrower channel sections of the river at Drumsna, Jamestown and Carrick-on-Shannon. These structures are shown below and are similar, having 5 no. wide arches.



Plate 4.13.5 Carrick-on-Shannon Bridge Crossing



Plate 4.13.6 Jamestown Bridge Crossing



Plate 4.13.7 Drumsna Bridge Crossing

Tributaries

The main tributary streams and rivers within the constraints study area are presented in Table 4.13.4. All of these tributaries discharge to the River Shannon within a relatively short geometric distance from their catchment centroid. In terms of categorisation of drain, stream and river the catchment area is used as follows:

- small drainage channel $< 0.25\text{km}^2$
- small stream 0.25 to 5km^2
- medium stream 5 to 10km^2
- large stream 10 to 20km^2
- small river 20 to 100km^2
- medium river 100 to 500km^2
- Large river $> 500\text{km}^2$

It is assumed that all streams and rivers should be considered to be potentially fishery watercourses with spawning potential. The largest local tributary discharging into the River Shannon within the study area is the Killukin River located in Co. Roscommon and discharges in the Cortober area, downstream of Carrick-on-Shannon River Bridge on the southern side of the river. Based on this classification the watercourses within the study area are 3 no. small rivers, 2 no. large streams, 4 no. medium streams and 20 no. small streams.

Table 4.13.4 Details of Watercourses within the Study Area

Study ref	EPA Name	EPA Code	Catchment Area	Downstream receiving Watercourse
1	Clogher	26C18	28.6	Eidin Lake Boyle River
2	Ardglass Stream	26A12	2.9	Eidin Lake Boyle River
3	Woodbrook house Stream	26W01	2.5	Eidin Lake Boyle River
4	Clooneigh26	26C55	3.0	Eidin Lake Boyle River
5	Tumma	26T07	1.3	Eidin Lake Boyle River
6	Caldragh	N/A	1.65	Shannon upper 26S02
7	Kilmaddaroe Stream	N/A	5.79	Bran Lough and Mackan26
8	Knockadalteen26	26K30	3.5	Knockananima Stream
9	Knockananima Stream	26K25	7.6	Shannon upper 26S02 at COS
10	Lisnagat	26L18	1.9	Shannon upper 26S02 at COS
11	Attifinlay	26A18	1.1	Shannon upper 26S02 at COS
12	Drumercool	26D31	1.43	Killukin River
13	Killukin River	26D31	33.9	Shannon upper 26S02 at COS
14	Danesfort	26D49	0.2	Lough Corry
15	Tonrevagh R	26T97	21	Lough Corry
16	Rock26	26R17	2.4	Tonrevagh R
17	Attirory Stream	26A26	1.4	Lough Corry
18	Kilmaddaroe Stream	26K24	8.3	Lough Corry
19	Pollnagappul	26P05	0.9	Lough Corry
20	Sallaghan26	26S24	0.2	Shannon upper 26S02
21	Kiltycarney	26K39	0.5	Shannon upper 26S02
22	Lismoyle26	26L41	0.7	Shannon upper 26S02
23	Killasanowl	26K38	3.9	Shannon upper 26S02
24	KilDorragh26	26K41	0.6	Shannon upper 26S02
25	Drumsna R	26D53	17.2	Shannon upper 26S02
26	Gortinty Stream	26G35	8.5	Shannon upper 26S02
27	Drumcleavry R	26D57	13.4	Shannon upper 26S02
28	Ardanaffrin	26A40	0.5	Drumcleavry R
29	Antfield	26A30	1.5	Eislin River 26E01

There are many small local drains particularly within or close to the floodplain area not included in this list.

The additional catchment area from Eidin Lake which is part of the Boyle River System and the Upper Shannon confluence downstream to Carrick-on-Shannon Bridge is 12km² and is associated with small tributaries draining to the relatively short 2.5km reach between Eidin Lake and Carrick-on-Shannon Bridge. These tributaries are the Knockananima River (6.6km²) which joins the River Shannon on the southside and the Lisnagat Stream (1.8km²), which joins on the northside. The remainder is the River Shannon floodplain drainage area of c. 2km².

Downstream of Carrick-on-Shannon Bridge, the Killukin River drains to the River Shannon at Cortober on its southern side having a catchment area of 32km². Small, urbanised tributaries on the north side drain to the River Shannon downstream of the river bridge. These are the Attifinlay, Aghancarra and Attirory streams. Combined, all of the identified tributaries discharging to the River Shannon from downstream of Eidin Lake to Lough Tap has a total catchment area of 110km² representing 7.7% of the total river catchment area of the River Shannon. The River Shannon catchment to Carrick-on-Shannon is substantially rural with an urbanisation factor of just 0.3%.

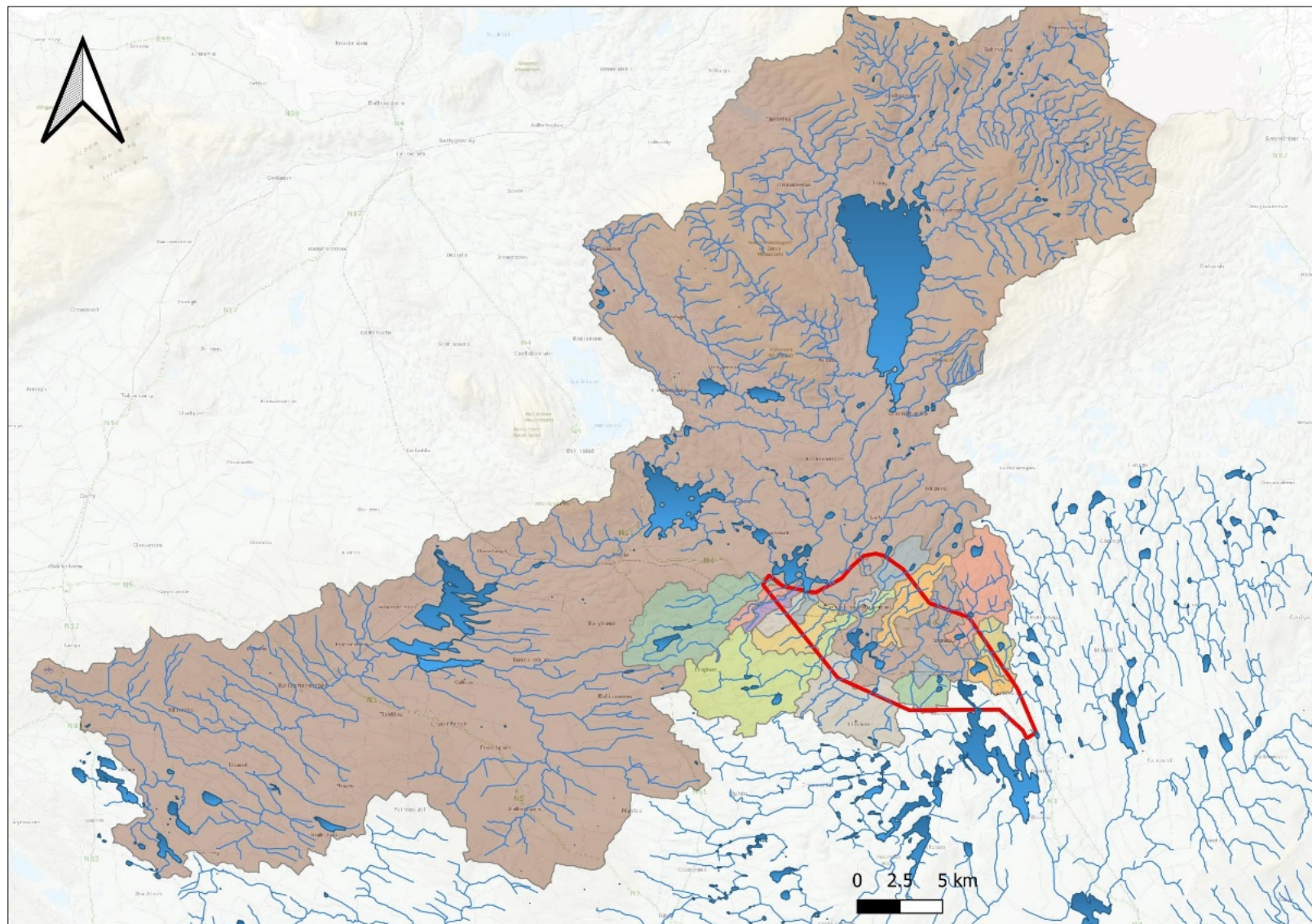


Plate 4.13.8 Context of Catchments Contributing to Watercourses within the Study Area

4.13.3.3 Lakes and Standing Waters

Within the study area and immediately upstream and downstream (see Figures 4.13.1.0 to 4.13.1.5) there are numerous large lakes and standing water features present on the Shannon System. The water lake features are summarised as follows:

Table 4.13.5 Lakes within and in proximity to the Study Area

Lake Name	Area ha
Eidin Lake	269.5
Lough Bran	12.5
Lough Corry	154
Ballagh Lough	5
Cartron Lough	8.5
Lowfield Lough	7
Gortconnellan / SPA Lough	13.5
Drumgilra / Gortinty Lough	42
Tap Lough	75
Bog Lough	7
Lough Boderg Lough Scannel Bofin Lough	966

Many of these lakes have relatively low residence times in summer period and have the potential to be prone to pollution. The WFD status of many of these lakes within the study area are under review by the EPA. Avoidance of direct encroachment into these lakes is important as they represent a county status, and for the bigger lakes a regional status.

4.13.3.4 Water Quality

The river waterbody WFD ecological status provided by the EPA is based on a five year monitoring period with the latest published cycle period available on the EPA Waters web site for the period 2016 – 2021. It shows that all water courses including the upper River Shannon_060 itself and its tributaries within the constraints study area are classified as at moderate status. The watercourses including the River Shannon below Jamestown (Shannon(upper)_070) are also assigned a moderate status. The lakes of Lough Eidin upstream of Carrick-on-Shannon and Lough Corry downstream are assigned poor status. The downstream Lakes of Tap North, Lough Boderg and Lough Bofin are assigned moderate ecological status.

All of river waterbodies have been identified to be at risk from catchment pressures and requiring action under the WFD river basin management plan. The risk status for the lakes within the study area are under review for Lough Eidin, Lough Corry and Lough Tap and at Risk for the lower lakes of Boderg and Bofin.

All of the watercourses discharging to the River Shannon from Leitrim Village downstream to Jamestown are designated as a protected drinking water body under Article 7 abstraction for Drinking Water which is associated with the large regional drinking water abstraction from the Shannon to the north of Carrick-on-Shannon. It is noted that Eidin Lake and the Boyle River and tributaries are not included in the protected drinking water body.

4.13.3.5 Flooding and Flood Risk

The River Shannon upstream of Jamestown Bridge has a very wide and extensive floodplain area. The Shannon Catchment Flood Risk Assessment and Management (CFRAM) study was one of seven River Basin District studies carried out across the Republic of Ireland from 2011 to 2016. The Carrick-on-Shannon area was included in the CFRAM assessment under Unit of Management (UoM) 25/26 (Shannon Upper and Lower, Hydrometric Areas 25 and 26). The CFRAM study included detailed hydrological and hydraulic modelling assessments to quantify the flood risk from fluvial and coastal sources and to identify management measures to protect vulnerable receptors.

Based on the Shannon CFRAM (Catchment Flood Risk Assessment and Management) study the 10-year, 100-year and 1000-year flood extents for the Shannon have been estimated and mapped. See Figures 4.13.1.0 to 4.13.1.5.

Table 4.13.6 Flood Levels for 10, 100 and 1000 Year Return Periods

Return Period	10yr	100yr	1000yr
Annual Exceedance Rate	0.1%	0.01%	0.001%
Flood Level H (m OD) Malin	41.74	42.31	42.86

The November 2009 flood event was historically the most significant flood at Carrick-on-Shannon Hydrometric Gauge and the Boyle Abbey Hydrometric Gauge and downstream Jamestown and Drumsna Hydrometric Gauges.

This event produced a recorded peak flood level of 42.672mOD Malin at Carrick-on-Shannon River Bridge Hydrometric Gauge 26324. The estimated peak flow at Boyle Abbey Bridge Hydrometric Gauge is 79m³/s and the corresponding peak outflow from Lough Allen is estimated based on ESB hydrometric data to have been 54m³/s. Taking account of the additional catchment area downstream of Boyle and Lough Allen (c. 326km²) to Carrick-on-Shannon, the peak flow in the Shannon through Carrick-on-Shannon is unlikely to have exceeded 190 m³/s for the November 2009 flood event.

Table 4.13.7 Flood Magnitudes and Estimated Return Period at Relevant Gauges for the Two Largest Flood Events Recorded

	Boyle River		Lough Allen Outflow		River Shannon Jamestown	
Flood Event	Peak Flow (m ³ /s)	Return Period (yrs)	Peak Flow (m ³ /s)	Return Period (yrs)	Peak Flow (m ³ /s)	Return Period (yrs)
2009	79.0	96	55.27	46	184.2	283
2015	72.5	57	53.04	37	160.6	80

The Carrick-on-Shannon Urban Area surrounding the River Shannon banks is highly sensitive to flood risk with extensive flooding occurring during the November 2009 flood event, but also regular flooding of some properties occurs each year. As a consequence, flood risk represents a significant hydrological constraint for the option selection process and particularly in light of the requirement by the flood risk management planning guidelines and amendments (2009, 2012) concerning avoidance of flood zones and passing a justification test with the requirement for minimising flood impact. In particular this applies to any potential new crossing of the River Shannon given its very extensive floodplain areas both upstream and downstream of Carrick-on-Shannon. See Figures 4.13.1.0 to 4.13.1.5.

4.13.3.6 Surface Water Abstraction

A large surface water abstraction from the River Shannon as part of the South Leitrim Regional Supply Scheme is located circa 1km upstream of Carrick-on-Shannon Bridge near the Town Parks area on the northern riverbank. The abstracted water is treated at the Carrick-on-Shannon water treatment plant to achieve drinking water standards and supplies the Carrick-on-Shannon and environs area. This abstraction would be considered a strategic asset and of regional importance and sensitive to hydrological regime change, particularly pollution and water quality effects. No other significant surface water abstractions were identified within the constraints study area.

4.13.3.7 Surface Discharges

There are a number of discharges identified and licensed by the EPA within the study area, including the Carrick-on-Shannon Waste Water Treatment Plant (WWTP) outfall discharge, and a number of commercial discharges and storm discharges. All of these are located downstream of the public water abstraction. There is a potential for combined impact with any potential development on the water quality of the receiving watercourses both during the construction phase activities and from the routine road drainage discharges. The presence of these outfalls would not be considered a significant constraint on a potential road development, but combined impacts would need to be determined.

4.13.3.8 Water Dependent Habitats

Water dependant habitats, generally associated with soft sediments, may be impacted by any potential development through accidental contamination, localised flooding through storm drainage or the alteration of that natural base-flow supplies to fens and marshlands. This could cause a change to the hydrological regime resulting in a drying out of such areas. Soft sediments are indicative of wet grasslands, peatland (wet heath, blanket bog cut over bid etc.) and alluvial woodland type habitats.

For the areas of soft sediments and peaty soils indicative of wet grassland and bog land areas, that are potentially sensitive to the hydrological regime and particularly to the road drainage, refer to Figures 4.13.4.0 to 4.13.4.5. These areas have a strong correlation with the mapped floodplain areas which is conducive to the presence of water dependant habitats. Along the riverbank of the River Shannon through the study there is potential for the presence of alluvial woodland, which is a priority Annex I habitat.

4.13.4 Summary

The important hydrological features that will influence the option selection are the river channel and floodplains of the larger streams and rivers and particularly the River Shannon floodplain area. All tributary streams and small rivers are classified as having local higher value. These watercourses will all discharge within a relatively short distance into the River Shannon and its associated lakes. The closest European Sites on the River Shannon are Clooneen Bog and Lough Forbes Complex at 8km and 10km downstream of the study area. These sites which have a high attribute value could potentially be indirectly impacted by the proposed road development through pollutant discharges both during construction and operation. Such water quality impacts are unlikely to be significant given the available high dilution in the River Shannon and its lakes. The large regional drinking water abstraction point 1km upstream of the River Shannon Bridge in Carrick-on-Shannon is a regionally important attribute and potentially sensitive to pollution from a proposed road development.

4.14 Hydrogeology

4.14.1 Introduction

This section describes the hydrogeological constraints identified within the study area for the N4 Carrick-on-Shannon to Dromod Project and should be read in conjunction with Figures 4.14.1.0 to 4.14.3.5.

Section 4.14.2 describes the methodology and sources of information that were used to carry out the study. Section 4.14.3 describes the hydrogeological constraints within the study area. A summary is presented in Section 4.14.4

4.14.2 Methodology and Sources of Information

4.14.2.1 Methodology

This assessment was prepared in accordance with the requirements of the Transport Infrastructure Ireland (TII), formerly National Roads Authority (NRA), Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes¹⁵⁹. This desktop study includes a review of the information listed in Section 4.14.2.2, to identify the constraints associated with hydrogeology within the study area.

The NRA guidelines¹⁵⁹ provide criteria for ranking the importance of the hydrogeological constraints identified, and these criteria are presented in Table 4.14.1.

The desk study includes a hydrogeological assessment of the following criteria:

- Karst features
- Aquifer type and classification
- Groundwater vulnerability
- Groundwater resources
- Hydro-ecology

¹⁵⁹ NRA, 2009. Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. Available at: <https://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf>

Table 4.14.1 Criteria for Rating the Importance of Identified Features (based on NRA Guidelines (2009) Box 4.3: Criteria for Rating Site Attributes) ¹⁵⁹

Importance	Criteria	Typical example
Extremely High	Attribute has a high quality or value on an international scale.	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale	Regionally Important Aquifer with multiple wellfields. Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – e.g. NHA status. Regionally important potable water source supplying >2500 homes. Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local scale	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer. Potable water source supplying >50 homes. Outer source protection area for locally important water source.
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer. Potable water source supplying <50 homes.

4.14.2.2 Sources of Information

The following list of data sources were the main information sources consulted to identify hydrogeological constraints:

- Ordnance Survey Discovery Series mapping (1:50,000)¹⁶⁰
- Bing Maps (2019) base mapping⁵⁵
- Google Maps (2020)³³

¹⁶⁰ Ordnance Survey Ireland (OSi) (Discovery Series) OSi Licence number 2021/OSI_NMA_139 & OSi Licence number 2021/18/CCMA

- Bedrock Geology Map (1:100,000)¹⁶¹
- Groundwater Resources (Aquifers)¹⁶¹
- Groundwater Vulnerability¹⁶¹
- Groundwater Rock Unit¹⁶¹
- GSI Groundwater Bodies¹⁶²
- Groundwater Source Protection Areas¹⁶¹
- Groundwater Wells and Springs¹⁶¹
- Groundwater Flooding Areas¹⁶³
- Karst Features and Tracer Test Database¹⁶¹
- Discharges and emissions¹⁶⁴
- Designated ecological areas¹⁶⁵
- Water Quality Monitoring Database and Reports¹⁶⁴

4.14.3 Existing Environment

This section describes the hydrogeological constraints identified within the study area. Constraints associated with aquifer type, groundwater vulnerability, groundwater resources and water dependant terrestrial ecosystems within the study area are described herein.

4.14.3.1 Karst Features

Karstic areas are those where the rock present is readily dissolved by water (relative to other rock types). Distinctive karstic features are formed along preferential groundwater flow paths such as fractures, fissures or joints. Karstic aquifers are the most common source of bedrock groundwater in Ireland. In these, groundwater

¹⁶¹ Geological Survey Ireland (GSI). Webviewer including: Bedrock Geology 1:100,000, Groundwater Rock Units, Groundwater Aquifers, Groundwater Vulnerability, Groundwater Wells and Springs, Karst Features and Tracer Test. Available at: <https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=3400f393afa844538e5b81679552205d> [Accessed: 13/08/2020]

¹⁶² Geological Survey of Ireland, Groundwater Bodies:
Geological Survey Ireland, Carrick on Shannon GWB: Summary of Initial Characterisation
Geological Survey Ireland, Kilglass Dromod GWB: Summary of Initial Characterisation
Geological Survey Ireland, Scramoge North GWB: Summary of Initial Characterisation
Available from: <https://www.gsi.ie/en-ie/programmes-and-projects/groundwater/activities/understanding-ireland-groundwater/Pages/Groundwater-bodies.aspx> [Accessed: 13/08/2020]

¹⁶³ Groundwater Flood Data.
<https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228> [Accessed: 13/08/2020]

¹⁶⁴ Environmental Protection Agency (EPA). Discharges and Emissions. Available at: <https://gis.epa.ie/EPAMaps/> [Accessed: 13/08/2020]

¹⁶⁵ National Parks & Wildlife Service (NPWS) Webviewer <https://www.npws.ie/maps-and-data>

flow is dominated by fissure flow, leading to potentially high yields and the aquifers can extend over large areas.

A single karst feature, as mapped by the GSI, is present within the boundary of the study area. A spring, namely Toberconellan, (GSI reference No. 1729SEK002) is situated approximately 1.5km south of the railway station at Carrick-on-Shannon.

It is expected that there are unmapped karst features within the study area as the GSI karst database is not comprehensive. A review of historical mapping by OSI¹⁶⁰ indicate there are numerous springs mapped in the region which are not in the GSI karst database.

A hydrogeological site survey was completed in October 2020 which included a review of potential karst features. The survey did not identify any clear karst features and the surveyed areas were not indicative of highly karstified terrain. Some karst spring type features were identified during the site walkover, however these were relatively minor drainage features and as such are not assigned a feature importance. While the underlying limestone aquifer has karst potential it may be the case that karst features are either buried under glacial till or manifest as deeper conduit flow systems discharging to the River Shannon. The field survey confirmed the presence of shallow groundwater in areas of soft ground some of which are associated with ecological sites.

The underlying aquifer is a regionally important aquifer and therefore all the springs are classified as high importance. The spring locations are shown in Figures 4.14.2.0 to 4.14.2.5.

4.14.3.2 Aquifer Classification and Groundwater Bodies

The Geological Survey Ireland (GSI) have classified geological strata for hydrogeological purposes based on the value of the groundwater resources and the hydrogeological characteristics. There are three principal categories of aquifer, corresponding to whether they are major, minor or unproductive resources whereby:

- Regionally Important Aquifers are capable of supplying regionally important abstractions (e.g. large public water supplies), or excellent yields ($>400 \text{ m}^3/\text{d}$)
- Locally Important Aquifers are capable of supplying locally important abstractions (e.g. smaller public water supplies, group schemes), or good yields ($100\text{--}400 \text{ m}^3/\text{d}$)
- Poor Aquifers are capable of supplying small abstractions (e.g. domestic supplies), or moderate to low yields ($<100 \text{ m}^3$)

The three principal aquifer categories are further subdivided into 10 aquifer sub-categories¹⁶¹ in Table 4.14.2.

Table 4.14.2 Aquifer Category¹⁶¹

Aquifer category	Sub-category description	Code
Regionally Important (R)	Karstified Bedrock dominated by diffuse flow	(Rkd)
	Karstified Bedrock dominated by conduit flow	(Rkc)
	Fissured bedrock	(Rf)
	Extensive sand & gravel	(Rg)
Locally Important (L)	Sand & gravel	(Lg)
	Bedrock which is Generally Moderately Productive	(Lm)
	Bedrock which is karstified to a limited degree or limited area	(Lk)
	Bedrock which is Moderately Productive only in Local zones	(Ll)
Poor (P)	Bedrock which is Generally Unproductive except for Local zones	(Pl)
	Bedrock which is Generally Unproductive	(Pu)

Examples of significant impacts to aquifers due to construction works and operation of transport infrastructure are as follows:

- The disruption of groundwater flow paths during earthworks
- Reduced yield and groundwater levels in groundwater supplies adjacent to earthworks or cuttings
- Disruption of baseflow to groundwater fed rivers or fens
- Contamination of the aquifer through accidental spillage

The aquifer classification and groundwater bodies within the study area are summarised in Table 4.14.3. Four aquifer classifications are present in the study area as shown in Figures 4.14.2.0 to 4.14.2.5. These are also listed in Table 4.14.3.

There are five types of groundwater rock units present within the study area:

- The Dinantian Pure Bedded Limestones are mapped across the majority of the study area and are classified as a Regionally Important Aquifer (Rkc)
- The Dinantian Sandstones are located in the southwestern part of the study area and are classified as a Locally Important Aquifer (Lm)
- The Mudbank Limestone is located in a small section to the south of the site and is classified as a Locally Important Aquifer (Ll)
- To the southwest of the study area, Ordovician Volcanics and Ordovician Metasediments are present which are classified as a Poor Aquifer (Pl)

There are no gravel aquifers mapped by the GSI within the study area.

Table 4.14.3 Aquifer Classification and Groundwater Bodies within the Study Area¹⁶¹ and NRA Importance Ranking¹⁵⁹

Aquifer classification	Bedrock formation (1:100,000 GSI Bedrock Map)	Groundwater rock unit	Groundwater body ¹⁶²	Constraint importance ranking (NRA)
Rkc	Croghan Limestone Formation & Bricklieve Limestone Formation & Ballymore Limestone Formation & Oakport Limestone Formation	Dinantian Pure Bedded Limestones	Carrick-on-Shannon	Very High
Lm	Fearnaght Formation	Dinantian Sandstones	Scramoge North	Medium
Ll	Mudbank limestone	Dinantian Pure Unbedded Limestones	Carrick-on-Shannon	Medium
Pl	Aghamore Formation	Ordovician Volcanics	Kilglass Dromod	Low
	Finnalaghta Formation	Ordovician Metasediments	Scramoge North	Low

4.14.3.3 Aquifer Vulnerability

Aquifer vulnerability is the term used to describe the intrinsic geological and hydrogeological characteristics which determine the ease with which a groundwater body may be contaminated by human activities.

Aquifer vulnerability is determined mainly by the permeability and thickness of the subsoils that underlie the topsoil. For example, bedrock with a thick, low permeability overburden is less vulnerable than bedrock with a thin, high permeability, gravel overburden. This is due to the ability of potential contaminants to reach the aquifer in a relatively short period and with little or no contaminant attenuation due to the thin or absent overburden.

Aquifer vulnerability classification guidelines, as published by the GSI¹⁶¹, are given in Table 4.14.4.

Table 4.14.4 GSI Vulnerability Rating Matrix¹⁶¹

Vulnerability rating	Hydrogeological conditions				
	Subsoil permeability (type) and thickness			Unsaturated zone	Karst features
	High permeability (sand / gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	Sand / gravel (aquifers only)	(<30m radius)
Extreme (E)	0 – 3.0m	0 – 3.0m	0 – 3.0m	0 – 3.0m	-
High (H)	>3.0m	3.0 – 10.0m	3.0 – 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 - 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

Notes: (1) N/A = not applicable

(2) Precise permeability values cannot be given at present

(3) Release point of contaminants is assumed to be 1-2 meters below ground surface

Groundwater vulnerability within the study area ranges from ‘Extreme’ where bedrock is close or at the surface to ‘Low’ vulnerability in areas where thick subsoil deposit is present, refer to Figures 4.14.1.0 to 4.14.1.5.

4.14.3.4 Groundwater Sources

Groundwater sources include springs, wells or boreholes which are used for groundwater abstraction by domestic, agricultural, commercial, industrial, local authority or group water scheme users. Groundwater sources can be impacted by lowering of the water-table which may reduce available supply and by accidental spillages or releases of contaminants which may impact the water quality.

Source Protection Zone (SPZ) reports have been produced by the GSI and the EPA. The reports aim to guide development planning and regulation to provide protection to groundwater sources. To date, there are no SPZ reports produced for any location within the study area. In addition, there are no groundwater Group Water Scheme abstraction points located in the study area.

A preliminary Domestic Well Audit was not carried out at this stage of the study, but a comprehensive audit will be carried out as part of Phase 3, Design and Environmental Evaluation, after selection of the preferred option. 69 features from the GSI Wells and Spring database are located within the study area, however, the records do not state which wells are currently used for abstraction. Note, 50 of the 69 features are listed as geotechnical boreholes, installed as part of previous ground investigations in the area. It is expected that the 19 remaining features are potable water sources supplying less than 50 homes, which is considered to be of low importance as a constraint (based on NRA Guidelines (2009) Box 4.3: Criteria for Rating Site Attributes)¹⁵⁹.

In terms of feature location accuracy (which refers to the location of a well or spring within a defined radius, the exact location is not known), there are 62 features within

10m, 20m and 50m accuracy, one within 200m, one within 500m and five within an accuracy of 1km.

The wells and springs are identified in Figures 4.14.3.0 to 4.14.3.5

4.14.3.5 Groundwater Contamination

The EPA Map Viewer¹⁶⁴ was consulted for their records of discharges and emissions which may affect groundwater quality within the study area. The discharge licences and emissions considered relevant are listed in Table 4.14.5 and identified in Figures 4.14.3.0 to 4.14.3.5.

Table 4.14.5 Discharge and Emissions Licenses within the Study Area

Licence No. / Reference number	Discharge / Emission
WPL/11/02	Rosderra Meat, Jamestown, Co. Leitrim – Wastewater Discharge Point
P0021-02	Masonite Ireland – Integrated Pollution Control (IPC) Site Emission Licence
W0064-01	Carrick-on-Shannon – Landfill Site

Sites containing potentially contaminated land are detailed in Section 4.15 (Soils and Geology). Some of these sites such as landfills and those associated with historical land use contamination may contain contaminated groundwater. These sites are listed under the following headings in Section 4.15.3:

- Landfills (licensed and historical)
 - Landfill locations identified have the potential to be associated with groundwater contamination. The landfills identified include licensed sites as well as areas where material of unknown nature has been disposed
- Pits, quarries and mines (active and historical)
 - Within the study area there are two historic iron mines south of Aghamore and the Kiltycarney Quarry
- Industrial facilities (licensed and historical)
 - Discharge and emission licenses relevant to groundwater are presented in Table 4.14.5
- Historical land use contamination
 - Historical industrial land uses within the study area include gas works, a power station, corn and flour mills, railway stations, corn stores and kilns, water pumps, water works and a pumping station. Contamination from historical land use is likely to be localised and therefore the impact on the groundwater is considered to be insignificant

4.14.3.6 Groundwater Flooding

The GSI Groundwater Flood Data Maps¹⁶³ were consulted and two small areas of historic groundwater flooding are recorded within the study area. The Kiltycarney Quarry is a former flooded quarry (GSI reference GW3236) and is located around 3km southeast of Carrick-on-Shannon within the townland of Kiltycarney. The area of groundwater flooding recorded was 1.2ha. The second historic groundwater flooding location (GSI reference GW3277) is located approximately 0.5km west of Cartron Lough, with a groundwater flooding area of 0.4ha recorded.

The two areas of historic groundwater flooding within the study area are identified in in Figures 4.14.3.0 to 4.14.3.5.

4.14.3.7 Hydro-ecology

Groundwater dependant habitats are hydrogeological constraints as they have the potential to be impacted as a result of changes in groundwater levels, flows or quality through, for instance, accidental spillages and dewatering causing deterioration in the flow and or quality of the baseflow to the habitat.

A conservative approach is taken regarding groundwater dependent habitats. All water dependant habitats are included as hydrogeological constraints until it is established, during the assessment of the preferred transport solution, if they are dependent on groundwater and/or surface water.

There are no European sites i.e. Special Protection Areas (SPA) designated under the Birds Directive or Special Areas of Conservation (SAC) designated under the Habitats Directive, within the study area or in immediate proximity to it.

There are no Natural Heritage Areas (NHA) located within the study area, however, two proposed Natural Heritage Areas (pNHA) are identified. Lough Eidin pNHA to the immediate northwest of Carrick-on-Shannon and Lough Boderg/Lough Bofin pNHA to the south of Drumsna. Both pNHAs are located partially within the study area. These habitats are listed in Table 4.14.6 and presented in Figures 4.14.3.0 to Figure 4.14.3.5. Further discussion of these habitats is provided in Section 4.12 Biodiversity.

The constraint importance ranking shown in Table 4.14.6 is only related to the hydrogeological importance ranking due to the site being a water dependant habitat.

Table 4.14.6 Water Dependant Habitats and NRA Importance Ranking

Site name	Site code	Designation	Characteristics	Constraint importance ranking (NRA)
Lough Boderg and Lough Bofin	001643	pNHA	Lake and associated wetlands	Very High
Lough Eidin	001643	pNHA	Lake, wetlands, overwintering birds	Very High

Non-designated Areas of Annex I Habitat

The biodiversity constraints study detailed in Section 4.12 has preliminarily identified, via desk study, interpretation of orthophotography and a site visit, habitat types present or likely to be present within the study area that may also include important flora and fauna sites and populations.

The following Annex I groundwater dependent habitats have been identified within the study area but outside a European site (*indicates priority habitat):

- *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [*91E0]
- Transition mires and quaking bogs [7140]
- *Bog woodland [*91D0]

Annex I habitats are of national importance, therefore are considered of ‘Extremely High’ importance by the NRA constraint ranking. These habitats are presented in Figure 4.12.1.0 to Figure 4.12.1.5. Summary of Hydrogeological Constraints.

The hydrogeological features that represent constraints within the study area include the following:

- **Aquifers:** the majority of the area is underlain by a regionally important karst aquifer with a conduit flow system (Rkc). This aquifer type can support regional groundwater supplies, large springs and regional groundwater flow. The aquifer is susceptible to karstification. There are smaller areas of locally important and poor aquifers in the southeast of the study area. There are no gravel aquifers mapped in the study area
- **Aquifer Vulnerability:** the aquifer vulnerability ranges from low, where there are thick low permeability subsoils, to extreme, where bedrock is close to surface
- **Karst:** the limestone underlying the majority of the catchment is classified as a karst aquifer, however only one karst feature is mapped in the study area. A karst site survey was completed to inform this stage of the assessment and did not identify any additional karst features. Further detailed karst feature mapping will be completed when the preferred transport solution is defined to identify any unmapped karst features
- **Groundwater resources:** there are no groundwater public, private or group water schemes identified within the study area and there are no groundwater source protection areas mapped within the study area
- **Potential contamination:** there are some potential areas of groundwater contamination associated with landfills and historical land contamination
- **Groundwater flooding:** two small areas of potential groundwater flooding have been identified by GSI which are included as constraints. The hydrogeological field mapping highlighted significant areas of shallow groundwater in soft soils adjacent the River Shannon corridor
- **Hydro-ecology:** two pNHA sites are identified within the study area which contain potential groundwater dependant terrestrial ecosystems. Additional

areas of alluvial woodlands, transition mires and quaking bogs and bog woodlands have been identified

4.14.4 Summary

Table 4.14.7 Summary of Hydrogeology Constraints

Category	Name	Relevant Characteristics	Constraint importance ranking (NRA)
Karst Features	Toberconnellan Spring	Drainage, dewatering and contamination of aquifers from construction works. Areas of extreme groundwater vulnerability	High Importance
	Historic Springs (1930s Mapping, numerous)		Unrecorded – importance yet to be defined
	Unrecorded Karst Features		
Aquifer	Regionally Important Bedrock Aquifer – Karstified	Associated with the Ballymore, Croghan and Bricklieve Limestone Formations. Extreme to low vulnerability	High Importance
	Locally Important Bedrock Aquifer	Associated with the Fearnaght and Mudbank Limestone Formations. Extreme to moderate vulnerability	Medium Importance
	Poor Bedrock Aquifer	Associated with the Aghamore and Finnlaghta Formations. Extreme to low vulnerability	Low Importance
Groundwater Resources	Groundwater wells / springs (GSI record) No group water schemes or public supply source protection areas.	Drainage, dewatering and contamination of aquifers from construction works	Low Importance
Groundwater Discharge Licences & Emissions	Wastewater Discharge Points & Section 4s (WPL/11/02 Rosderra Meats)	Potential contamination	
	IPC Site Emissions (Masonite Ireland P0021)	Potential contamination	
	Landfill Sites (Carrick-on-Shannon Landfill W0064) (See Figure 14.5.4.0)	Potential contamination	

Category	Name	Relevant Characteristics	Constraint importance ranking (NRA)
	Historical landfill sites, pits, quarries and mines	Potential contamination	
Groundwater Flooding	GW3236 and GW3277	Two small areas of historic groundwater flooding recorded by the GSI	Low Importance
Hydro Ecology	Lough Boderg and Lough Bofin – pNHA	Includes groundwater dependent habitat – lake & wetlands.	Very High Importance
	Lough Eidin – pNHA	Includes groundwater dependent habitat – lake, wetlands & overwintering birds	Very High Importance
	Non-designated areas of Annex I habitat	Alluvial forests [*91E0] transition mires and quaking bogs [7140] and bog woodland [*91D0]– attribute has a high quality of international importance	Extremely High Importance

4.15 Soils and Geology

4.15.1 Introduction

This section describes the soils and geological constraints identified within the study area for the N4 Carrick-on-Shannon to Dromod Project and should be read in conjunction with Figures 4.15.1.0 to 4.15.4.5.

Section 4.15.2 describes the methodologies and sources of information that were used to carry out the study. Section 4.15.3 describes the soils and geology constraints within the study area. A summary is presented in Section 4.15.4 and references are listed in Section 4.15.4.

4.15.2 Methodology and Sources of Information

4.15.2.1 Methodology

The study has been carried out in accordance with the National Roads Authority (NRA) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes¹⁶⁶ and in accordance with the Environmental Impact Assessment Directive (2014/52/EU)¹⁶⁷. The NRA is now known as Transport Infrastructure Ireland (TII), however for the purpose of this report the guidelines mentioned above are referred to as the NRA guidelines¹⁶⁶.

The assessment is based on the results of a Preliminary Sources Study Report (PSSR)¹⁶⁸ and historical publicly available ground investigation results. The PSSR¹⁶⁸ includes a review of the information sources listed in Section 4.15.2.2 to identify the constraints associated with soils and geology within the study area and is included in Appendix A.4.15.1 of this Option Selection Report.

The NRA guidelines¹⁶⁶ provide useful criteria for ranking the importance of the identified soils and geological constraints which are presented in Table 4.15.1. This assessment is generally consistent with the approach presented in the NRA guidelines and is undertaken using the criteria for rating the importance of identified features. Using this, it will allow the screening of potential alternatives and options for the project with respect to potentially contaminated soils and geological constraints.

¹⁶⁶ National Roads Authority, 2008. Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, Ireland: Available at: <https://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf>

¹⁶⁷ European Union, 2014. Directive 2014/52/EU of the European Parliament and of the Council. Official Journal of the European Union.

¹⁶⁸ Arup, 2021. N4 Carrick-on-Shannon to Dromod Preliminary Sources Study Report: 274219-ARUP-02-OS-RP-CG-000001

Table 4.15.1 Criteria for Rating the Importance of Identified Features (based on NRA Guidelines; Box 4.1 entitled ‘Criteria for Rating Site Attributes - Estimation of Importance of Soil and Geology Attributes’)¹⁶⁶

Importance	Criteria	Typical Example
Very High	Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and / or soft organic soil underlying route is significant on a national or regional scale. *	Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit. Proven economically extractable mineral resource.
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and / or soft organic soil underlying route is significant on a local scale. *	Contaminated soil on site with previous heavy industrial usage. Large recent landfill site for mixed wastes. Geological feature of high value on a local scale (County Geological Site). Well drained and / or high fertility soils. Moderately sized existing quarry or pit.
Medium	Attribute has a medium quality, significance or value on a local scale. Degree or extent of soil contamination is moderate on a local scale. Volume of peat and / or soft organic soil underlying route is moderate on a local scale. *	Contaminated soil on site with previous light industrial usage. Small recent landfill site for mixed wastes. Moderately drained and / or moderate fertility soils. Small existing quarry or pit.
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and / or soft organic soil underlying route is small on a local scale. *	Large historical and / or recent site for construction and demolition wastes. Small historical and / or recent landfill site for construction and demolition wastes. Poorly drained and / or low fertility soils. Uneconomically extractable mineral resource.

* relative to the total volume of inert soil disposed of and/or recovered

4.15.2.2 Sources of Information

This constraints study was undertaken as a desktop exercise. The following sources were studied in order to identify soils and geological constraints.

Topographical and Geographic Maps and Datasets

The following mapping and geographical datasets were reviewed as part of this study:

- Environmental Protection Agency (EPA) Contours¹⁶⁹
- Google Maps (2020)³³
- Bing Maps (2020) base mapping⁵⁵
- OSI Rivers and Lakes¹⁷⁰
- Corine Landcover¹⁷¹
- OSI Historic Map 6 Inch 1837 – 1842¹⁷²
- OSI Historic Map 25 Inch 1888 – 1913¹⁷²
- OSI 6 Inch Cassini 1930's¹⁷²
- 1995, 2000, 2005 OSI Aerial Photography¹⁷²
- Ordnance Survey Discovery series mapping¹⁷³

Publications

The following publications were referenced and reviewed as part of this study:

- National Roads Authority. (2008). *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*. Ireland¹⁶⁶
- National Roads Authority. (2009) *Environmental Impact Assessment of National Road Schemes – A Practical Guide*. Revision 1¹⁷⁴
- Environmental Protection Agency. (2017) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*. Draft²¹
- Matthew Parkes, R.M & S.P (2012). The Geological Heritage of Roscommon. An audit of County Geological Sites in Roscommon. Geological Survey Ireland¹⁷⁵

¹⁶⁹ Environmental Protection Agency, 2022. EPA Contours. Available at: <https://dcenr.maps.arcgis.com/home/item.html?id=088740d9f8ad466788fc25e268394656> .

¹⁷⁰ Ordnance Survey Ireland, 2022. OSI Rivers and Lakes. Available at: <https://gis.epa.ie/GetData/Download>

¹⁷¹ Environmental Protection Agency, 2018. Corine Landcover Available at: <https://gis.epa.ie/GetData/Download> .

¹⁷² Ordnance Survey Ireland, 2020. GeoHive. [Online] Available at: <http://map.geohive.ie/>

¹⁷³ Ordnance Survey Ireland. Discovery Sheet 1828, 1830, 2028 and 2030, s.l.: s.n.

¹⁷⁴ National Roads Authority, 2009. Environmental Impact Assessment of National Road Schemes – A Practical Guide. Revision 1

¹⁷⁵ Parkes, M., Meehan, R. & Preteseille, S., 2012. The Geological Heritage of Roscommon, An audit of County Geological Sites in Roscommon, s.l.: Geological Survey Ireland.

- TII ‘Managing Geotechnical Risk’ (2019) *DN-ERW-03083*¹⁷⁶

Solid Geology

The following digital datasets and maps from the GSI were reviewed as part of this study:

- Bedrock Geology of Ireland (1:100,000 scale)¹⁷⁷

Drift maps

The following drift maps were reviewed as part of this study:

- EPA National Soils Map (Teagasc Soils)¹⁷⁸
- Teagasc Soils Map¹⁷⁹
- Quaternary Geology of Ireland (1:50,000 scale)¹⁸⁰
- Quaternary Geomorphology (1:50,000 scale)¹⁸¹

Geological Survey Ireland datasets (GSI)

The following GSI datasets were consulted:

- GSI karst landform features and traced underground connections¹⁸²
- GSI landslide database¹⁸³
- GSI landslide Susceptibility Classification¹⁸⁴
- GSI Active Quarries and Pits¹⁸⁵
- GSI APM Historical Pits and Quarries¹⁸⁶
- GSI mineral localities¹⁸⁷

¹⁷⁶ Transport Infrastructure Ireland, 2019. Managing Geotechnical Risk DN-ERW-03083. Available at: <https://www.tiipublications.ie/library/DN-ERW-03083-01.pdf>

¹⁷⁷ Geological Survey of Ireland, 2020. Bedrock Geology 1:100,000. [Online] Available at: <https://dceur.maps.arcgis.com/home/item.html?id=a40f6a8ca91f4340a86b12649d831d74>

¹⁷⁸ Environmental Protection Agency. National Soils Map. [Online] Available at: <https://gis.epa.ie/GetData/Download>

¹⁷⁹ Geological Survey of Ireland, 2020. Teagasc Soils. [Online] Available at: <https://dceur.maps.arcgis.com/home/item.html?id=82f09cca5c2c4221aa983d1a6d610c78>

¹⁸⁰ Geological Survey of Ireland, 2020. Quaternary Sediments. [Online] Available at: <https://dceur.maps.arcgis.com/home/item.html?id=1bbf22e9391c484db4b84e4150313bae>

¹⁸¹ Geological Survey of Ireland, 2019. Quaternary Geomorphology. [Online] Available at: <https://dceur.maps.arcgis.com/home/item.html?id=6ed00a12b7de4a3eb5535bc0875191ee>

¹⁸² Geological Survey of Ireland, 2020. Groundwater Karst Data. [Online] Available at: <https://dceur.maps.arcgis.com/home/item.html?id=aaa493208ff04f059ce5107e96089a71>

¹⁸³ Geological Survey of Ireland, 2020. National Database of past landslide events in Ireland. [Online] Available at: <https://dceur.maps.arcgis.com/home/item.html?id=cc35e0d1462d45698dda2a14d609c4db>

¹⁸⁴ Geological Survey of Ireland, 2020. Landslide Susceptibility Classification. [Online] Available at: <https://dceur.maps.arcgis.com/home/item.html?id=1101f04b18e84ed790fa6e17021f57d8>

¹⁸⁵ Geological Survey of Ireland, 2020. Active Quarries and Pits Ireland. [Online] Available at: <https://dceur.maps.arcgis.com/home/item.html?id=de18ea08ecd344b88c52b65b55fd9abb>

¹⁸⁶ Geological Survey of Ireland, 2019. APM Pits and Quarries. [Online] Available at: <https://dceur.maps.arcgis.com/home/item.html?id=a205a046a2474e82944f9823b6568ea0>

¹⁸⁷ Geological Survey of Ireland, 2020. Mineral Localities. [Online] Available at: <https://dceur.maps.arcgis.com/home/item.html?id=43d66cb2f2f24d81b7e03b8acda00c6a>

- GSI aggregate potential mapping final scores for granular and rock deposits¹⁸⁸
189
- GSI geological heritage sites¹⁹⁰ 191
- GSI Geotechnical Boreholes Submitted by Industry¹⁹²
- GSI Verified Boreholes¹⁹³
- GSI Geotechnical Sites Submitted by Industry¹⁹⁴
- GSI Unverified Boreholes¹⁹⁵
- GSI Groundwater Vulnerability¹⁹⁶

Other Datasets

The following datasets were also consulted:

- EPA Licenced Waste Facilities¹⁹⁷ 198
- Water Framework Directive (WFD): Article 5 Landfill¹⁹⁹
- EPA Extractive Industries²⁰⁰ 199
- EPA Local Authority Waste Facility Register²⁰¹
- EPA Historic Landfill Register²⁰²

¹⁸⁸ Geological Survey of Ireland, 2019. APM Granular Aggregate Final Scores. [Online] Available at: <https://dcenr.maps.arcgis.com/home/item.html?id=8306d891261e44928b240f18edaeb4cc>

¹⁸⁹ Geological Survey of Ireland, 2019. APM Crushed Rock Aggregate Final Scores. [Online] Available at: <https://dcenr.maps.arcgis.com/home/item.html?id=647d87bb85c64c2691f0c1f21cfea273>

¹⁹⁰ Geological Survey of Ireland, 2020. Geological Heritage Audited Sites. [Online] Available at: <https://dcenr.maps.arcgis.com/home/item.html?id=35bb2b4ba2ca479ab7db513b445be7dc>

¹⁹¹ Geological Survey of Ireland, 2020. Geological Heritage Unaudited Sites. [Online] Available at: <https://dcenr.maps.arcgis.com/home/item.html?id=5203261e602d477da69ef0171f6f403b>

¹⁹² Geological Survey of Ireland, 2020. Geotechnical boreholes submitted by industry to GSI. [Online] Available at: <https://dcenr.maps.arcgis.com/home/item.html?id=a78d571ab90442e2a7ebc6d7d36c9a43>

¹⁹³ Geological Survey of Ireland, 2020. Boreholes verified by the Geological Survey Ireland. [Online] Available at: <https://dcenr.maps.arcgis.com/home/item.html?id=4737fa3211c54464b0a1d871f2093121>

¹⁹⁴ Geological Survey of Ireland, 2020. Geotechnical Site Investigations with Links to Reports. [Online] Available at: <https://dcenr.maps.arcgis.com/home/item.html?id=f2ecd636745d4f50b78f9469750d6d8c>

¹⁹⁵ Geological Survey of Ireland, 2020. GSI Bedrock Borehole Locations (Unverified). [Online] Available at: <https://dcenr.maps.arcgis.com/home/item.html?id=28a500216eba49ce8a32910d2c799620>

¹⁹⁶ Geological Survey of Ireland, 2020. Groundwater Vulnerability. [Online] Available at: <https://dcenr.maps.arcgis.com/home/item.html?id=0a4dfd3097c64aada6eea057b33ba65f>

¹⁹⁷ Environmental Protection Agency, 2020. Licenced Waste Facilities. [Online] Available at: <https://gis.epa.ie/GetData/Download>

¹⁹⁸ Environmental Protection Agency, 2020. Waste Licence Search. [Online] Available at: <http://www.epa.ie/terminalfour/waste/index.jsp?disclaimer=yes&Submit=Continue>

¹⁹⁹ Environmental Protection Agency. WFD Article 5 Point Pressures. [Online] Available at: <https://gis.epa.ie/GetData/Download>

²⁰⁰ Environmental Protection Agency, 2015. Extractive Industries Register. [Online] Available at: <http://www.epa.ie/ei/#/register>

²⁰¹ Environmental Protection Agency. Local Authority Waste Facility Register. [Online] Available at: <http://facilityregister.nwcpo.ie/>

²⁰² Environmental Protection Agency. Historic Landfill Application or Certificate of Authorisation. [Online] Available at: <http://www.epa.ie/terminalfour/HLF/index.jsp?disclaimer=yes&Submit=Continue>

- EPA IE and IPC Sites^{203 204}
- Urban Wastewater Treatment (UWWT) Plants^{205 206}
- WFD: Article 5 Mine¹⁹⁹
- WFD: Article 5 Wastewater Treatment Plants (WWTP)¹⁹⁹
- WFD: Article 5 Water Treatment Plants (WTP)¹⁹⁹
- WFD: Article 5 Section 4 Discharge Points¹⁹⁹
- WFD Section 4 Discharge Points²⁰⁷
- OPALS Viewer – Mineral Exploration and Mining²⁰⁸
- List and locations of licenced landfills, waste permitted sites, historic and active pits and quarries from Leitrim and Roscommon County Councils
- EPA Historic Mine Locations²⁰⁹
- WFD Article 5: Quarry¹⁹⁹

Other Sources of Information

- N4 Carrick-on-Shannon to Dromod PSSR, written by Arup¹⁶⁸
- Information provided by Leitrim County Council on surveys to inform a previous road scheme through the study area in the early 2010s

Historical Ground Investigation Reports

- Carrick-on-Shannon Bypass Ground Investigation Report No. 7435, IGSL 2001²¹⁰
- N4 Carrick-on-Shannon Bypass Geotechnical Ground Investigation Factual Report No. PC6044, Priority Geotechnical Limited 2006²¹¹
- N4: Carrick-on-Shannon to Dromod Preliminary Ground Investigation – Contract 1 Factual Report No. PC9081 Priority Geotechnical Limited 2010²¹²

²⁰³ Environmental Protection Agency, 2020. Industrial Emissions (IE) and Integrated Pollution Control (IPC) Facilities. [Online] Available at: <https://gis.epa.ie/GetData/Download>

²⁰⁴ Environmental Protection Agency. IE / IPC Register. [Online] Available at <http://www.epa.ie/terminalfour/ippc/index.jsp?disclaimer=yes&Submit=Continue>

²⁰⁵ Environmental Protection Agency. EPA Licensed UWWT Plants and 2018 Status. [Online] Available at: <https://gis.epa.ie/GetData/Download>

²⁰⁶ Environmental Protection Agency. Waste Water Discharge Authorisation Search. [Online] Available at: <http://www.epa.ie/terminalfour/wwda/wwda-search.jsp?countyName=Leitrim&Submit=Search+by+County>

²⁰⁷ Environmental Protection Agency, 2016. WFD Section 4 Discharges. [Online] Available at: <https://gis.epa.ie/GetData/Download>

²⁰⁸ Department of the Environment, Climate and Communications, 2021. OPALS Viewer. [Online] Available at: <https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=212642ca425f4739a36e247c64032b73>

²⁰⁹ Environmental Protection Agency. Historic Mines Project – Site Location. [Online] Available at: <https://gis.epa.ie/GetData/Download> [Accessed 01 August 2020]

²¹⁰ IGSL, 2001. Carrick-on-Shannon By Pass Ground Investigation Report No. 7435

²¹¹ Priority Geotechnical Limited, 2006. N4 Carrick-on-Shannon Bypass Geotechnical Ground Investigation Factual Report No. PC6044

²¹² Priority Geotechnical Limited, 2010. N4: Carrick-on-Shannon to Dromod Preliminary Ground Investigation – Contract 1 Factual Report No. PC9081

4.15.3 Existing Environment

This section describes the soils and geology constraints identified within the study area.

Constraints associated with geomorphology, soils and subsoil deposits, solid geology, landslide susceptibility, contaminated land, historic waste permit sites and existing licensed facilities, economic geology and geological heritage within the study area are described herein.

4.15.3.1 Overview

The study area is generally bounded by agricultural areas to the north, south, west and east. Kilronan Mountain and Slieve Anierin are located north of the study area near Lough Allen, the Curlew Mountains are located northwest of the study area near the town of Boyle and Slieve Bawn is located south of the study area. The River Shannon runs through the study area from the northwest corner to the southeast corner. There are many tributaries located both east and west that feed into the River Shannon. Along the rivers alignment there are numerous lakes, for example Eidin Lake which sits to the northwest of the study area on the river, Lough Corry to the south of Carrick-on-Shannon, Lough Tap and Drumgilra Lough which are located south of Drumsna. Lough Boderg, Lough Scannal and Lough Bofin are located along the river to the southeast of the study area.

The Jamestown Canal runs from east to west, just south of Jamestown.

The current alignment of the N4 runs west to east in the northwest of the study area, crosses the River Shannon west of Carrick-on-Shannon and then veers south, to the southeast of Carrick-on-Shannon. The Jamestown - Drumsna Bypass undertaken in 1996 and located to the southeast of Carrick-on-Shannon is a single lane carriageway located to the north of Jamestown and Drumsna. Further south, the Dromod-Roosky Bypass Scheme constructed in 2007 comprises a Type 2 Dual carriageway.

The main Dublin to Sligo railway line for the most part occupies the western side of the study area south of the River Shannon, crossing the Killukin River in the northwest and the Shannon west of Drumgilra Lough.

The primary land use within the study area is agricultural, with a number of areas of private managed forestry plantations. There are settlements within the study area, such as Carrick-on-Shannon, Cortober, Drumsna, Jamestown and Aghamore.

4.15.3.2 Topography

The regional topography and the surrounding landscape is dominated by mountains to the north of the study area surrounding Lough Allen with peaks greater than 580mOD. The Curlew Mountains (250mOD) are located west of the study area near Boyle and the Slieve Bawn mountain range (260mOD) is located south of the study area. On the lowlands, the topography is dominated by an undulating landscape with elevations ranging from 40mOD (along the River Shannon) to 90mOD (at the peaks of drumlins)¹⁶⁹. There are extensive areas of flood plain along the banks of

the River Shannon which are relatively flat lying at less than 40mOD. The landscape of the study area predominately comprises a hummocky landscape with peaks of 90mOD and hollows between the peaks of less than 50mOD.

The alignment of the existing N4 passes through elevations ranging from 40mOD to 70mOD.¹⁶⁹

4.15.3.3 Geomorphology

Geomorphology is the study of the landforms which comprise the earth's surface, the processes which have modified and shaped it in the past and which continue to modify and shape it at the present time.

Ireland has been most influenced by two epochs of glaciation, the Munsterian and Midlandian. The geomorphology presented within the study area is from the younger Midlandian glaciation. As the glaciers were retreating, they left behind glacial landforms and deposits known as Drumlins and Ribbed Moraines which occur frequently across the study area and are responsible for the undulating landscape. The swarm of Drumlins to the south of the River Shannon within the study area is known as the Irish southwestern most extreme of the 'Drumlin Belt'¹⁷⁵. A more detailed description of glacial processes and landforms that are found within the study area is presented in the PSSR¹⁶⁸ in Appendix A.4.15.1.

4.15.3.4 Soil Deposits

The soil deposits are predominately a function of the underlying parent material subsoils as detailed in Table 4.15.2. The soil types are shown on Figures 4.15.1.0 to 4.15.1.5.

Areas of made ground are extensive around Carrick-on-Shannon and extend westward out along the R368 and R370 for approximately 1km and eastwards along the N4 for approximately 0.6km. These are shown on Figure 4.15.4.0 to 4.15.4.5 in addition to other areas of made ground which include:

- An area associated with a licensed landfill (Active licence number W0064-01) just north of Carrick-on-Shannon at Ballynamoney. This location was used for the disposal of domestic, commercial and industrial waste in addition to sewerage sludge between 1965 and 2005
- Near the intersection of the N4 and L3656 north of Jamestown, an area associated with a disused quarry (Kiltycarney Quarry), the nature of the material at this location is unknown
- At the location of the Rosderra Meats industrial facility near Jamestown, the nature of the material at this location is unknown
- At the intersection of the N4 and R299 near Drumsna, the nature of the material at this location is unknown
- At Drumsna, the nature of the material at this location is unknown

Typically Made Ground is comprised of variable materials of varying strengths and depths with a potential for contamination.

Large areas of alluvium deposits are recorded along the banks of the River Shannon and its associated tributaries. A large area of alluvium is also recorded intersecting the Dublin to Sligo railway line and the R370 approximately 1.5km west of the Carrick-on-Shannon Railway Station.¹⁷⁸

Isolated pockets of lacustrine deposits exist throughout the study area adjacent to the tributaries of the River Shannon at the following locations:¹⁷⁸

- Approximately 2.0km southwest of Carrick-on-Shannon
- Adjacent to Drumgilra Lough
- Adjacent to Lough Tap
- Approximately 1.7km north of Faulties

Two areas of blanket peat are recorded at the eastern end of the site, approximately 1.3km north of Faulties.¹⁷⁸

Large areas of cutover/cutaway peat deposits exist throughout the study area, mainly in the hollows between the drumlin peaks.¹⁷⁸

Three areas of fen peat are shown throughout the study area at the following locations:¹⁷⁸

- Northwest of Carrick-on-Shannon
- Along the most easterly banks of Lough Corry
- Along the easterly bank of a smaller lough just south of Lough Corry

Though there are a large number of soil types throughout the study area, these can be summarised as follows:

- Made ground considered low importance for agriculture
- Well drained soils considered high importance for agriculture
- Poorly drained soils considered low importance for agriculture
- Alluvium considered medium importance for agriculture
- Peaty soils considered low importance for agriculture

Soils are also major components of ecosystems and a non-renewable resource. In accordance with the Environmental Impact Assessment Directive (2014/52/EU)¹⁶⁷, threats to soil functions such as organic matter, erosion, compaction and sealing from increased landtake needs to be limited and considered in the assessment of infrastructural projects.

The ranking of soils for agricultural purposes in this section is not the ranking system used for Material Assets – Agriculture.

Table 4.15.2 Summary of Soils within the Study Area (Teagasc Classification)^{178 179}

Soil Type	Teagasc Description ¹⁷⁹	EPA National Soils Description ¹⁷⁸
Made	Made ground	Made
AlluvMIN	Alluvial (mineral)	Mineral alluvium
Lac	Lacustrine type soils	Lacustrine
BktPt	Blanket peat	Blanket peat
Cut	Cutover / cutaway peat	Raised Bog cutaway / cutover
FenPt	Fen peat	Fen peat
AminDW	Deep well drained mineral (Mainly acidic)	Acid Brown Earths / Brown Podzolics
AminPD	Mineral poorly drained (Mainly acidic)	Surface water Gleys / Ground water Gleys Acidic
AminPDPT	Peaty poorly drained mineral (Mainly acidic)	Peaty Gleys Acidic
AminSP	Shallow poorly drained mineral (Mainly acidic)	Surface water Gleys / Ground water Gleys Shallow
AminSRPT	Shallow, rocky, peaty / non-peaty mineral complexes (Mainly acidic)	Podzols Peaty
BminDW	Deep well drained mineral (Mainly basic)	Grey-Brown Podzolics / Brown Earths Basic
BminPD	Mineral poorly drained (Mainly basic)	Surface water Gleys / Ground water Gleys Basic
BminPDPT	Peaty poorly drained mineral (Mainly basic)	Peaty Gleys Basic Parent Materials Basic
BminSP	Shallow poorly drained mineral (Mainly basic)	Surface water Gleys / Ground water Gleys Shallow
BminSRPT	Shallow, rocky, peaty / non-peaty mineral complexes (Mainly basic)	Lithosols Peats
BminSW	Shallow well drained mineral (Mainly Basic)	Renzinas / Lithosols

4.15.3.5 Subsoil Deposits

Subsoil deposits comprise the unconsolidated geological deposits which cover the solid geology and are shown on Figures 4.15.2.0 to 4.15.2.5. They are generally not considered an environmental constraint with the exception of soft ground and made ground due to the possible excavated material produced during road construction.

The subsoils mapping of the region indicate that the study area is dominated by glacial till derived from limestones. There are large areas of cutover raised peat and areas of alluvium. These are located along the alignment of the River Shannon and in the hollows between drumlin peaks. The remainder of the study area consists of made ground, blanket peat, fen peat, lacustrine sediments, till derived from Namurian sandstones and shales, bedrock outcrop or subcrops. The subsoil types

as classified by the GSI Quaternary mapping within the study area are listed in Table 4.15.3 below. Detail descriptions of the subsoil deposits are presented in the PSSR¹⁶⁸ in Appendix A.4.15.1.

The thickness of subsoil deposits is variable throughout the study area, with thinner subsoils in areas of shallow bedrock, including towards the northwest and southeast of the study area. Karstified bedrock outcrops are present at the western end and north of Carrick-on-Shannon.¹⁸⁰

Large areas of alluvium deposits are evident in many areas surrounding the River Shannon, with isolated pockets associated with the tributary streams such as the Killukin and Knockananima Rivers along the alignment of the Jamestown Canal, particularly south of Carrick-on-Shannon.¹⁸⁰

A large number of extensive peat deposits (blanket peat and cutover raised peat) are located across the study area, along the alignment of the River Shannon and in the hollows between the drumlin peaks.¹⁸⁰

Three fen peat deposit areas are present within the study area, the first is just northwest of Carrick-on-Shannon, one located on the most easterly banks of Lough Corry, and one located on the banks of a smaller lough just south of Lough Corry.¹⁸⁰ A fen is a wetland system with a high water level at, or just below, its surface. They are characterised by their distinct water chemistry which is mineral rich and differs from bogs which are acidic and low in minerals. Fens developed after the last glaciation in depressions occupied by shallow lakes. The soils in fens comprise normally consolidated highly organic soils that are extremely compressible.

Four areas are shown as comprising lacustrine sediments, the first two are on the southern bank of Drumgilra Lough, one on the eastern bank of Lough Tap and the fourth approximately 1.7km north of Faulties. A number of areas comprising lacustrine sediments are also shown to be sitting just outside of the study area to the west and east.¹⁸⁰

One small area of made ground is shown within the Drumgilra Lough.¹⁸⁰

Typically, made ground is comprised of variable materials of varying strengths and depths. It has the potential also to be contaminated.

Table 4.15.3 Summary of Subsoils (GSI Quaternary) within the Study Area¹⁸⁰

Soil Type	Description
Fill	Made Ground
A	Alluvium
L	Lacustrine sediments
BktPt	Blanket peat
Cut	Cut over raised peat
FenPt	Fen peat
TLs	Till derived from limestones
TNSSs	Till derived from Namurian sandstones and shales
KaRck	Karstified bedrock outcrop or subcrop

Soil Type	Description
Rck	Bedrock outcrop or subcrop

4.15.3.6 Bedrock Geology

The rock formations encountered in the study area are detailed in Table 4.15.4 and shown on Figures 4.15.3.0 to 4.15.3.5.

The bedrock geology of the study area is dominated by 330 million years old Lower Carboniferous Limestones of the Oakport, Croghan, Ballymore, Bricklieve Formations. Much older Ordovician rocks from the Finnalaghta and Aghamore formations are exposed at the surface in the Slieve Bawn mountains to the south of the study area. These are remnants of a former ocean floor that have been lifted up on the east side of the Strokestown Fault that trends northeast to southwest through the study area.¹⁷⁷

There are other faults also trending northeast to southwest within the study area, one separating the Oakport and Ballymore Formation in the northwest and another separating the Bricklieve and Croghan Formations. There is a parallel northeast to southwest fault to the east of the Strokestown Fault. There are two northwest to southeast trending faults to the north and south of the Aghamore Formation across the eastern end of the study area.¹⁷⁷

Detail descriptions of bedrock lithologies are presented in the PSSR¹⁶⁸ in Appendix A.4.15.1.

The older Ordovician meta sediments and volcanistic breccias to the southeastern end of the study area are possibly a harder rock type than the adjacent limestones mostly due to how they were formed. The chemical make-up of these formations increases the acid sulphate rock potential which could be significant if reusing this material as engineering fill.

Table 4.15.4 Summary of Bedrock Geology within the Study Area ¹⁷⁷

Geological Period	Formation	Description
Carboniferous	Mudbank Limestone	Mudbank Limestone.
Carboniferous	Bricklieve Limestone Formation	Lithological Summary: Bioclastic cherty limestone. The formation comprises 6 informal groups, which consist of medium to thickly bedded grey bioclastic limestones, generally wackestones and packstones devoid of internal bedding features. The groups are separated by lithostrotionid-rich intervals.
Carboniferous	Ballymore Limestone Formation	Lithological Summary: Black calcarenites and shales. A basal unit of medium bedded crinoidal calcarenites, followed by a middle unit 40m thick of thin bedded dark nodular limestones with thick interbeds of calcareous shale. A small carbonate mudbank occurs within the middle unit.

Geological Period	Formation	Description
Carboniferous	Croghan Limestone Formation	Lithological Summary: Muddy limestone and calcarenites. The lowest member comprises 40m of thin-bedded brown-weathering muddy limestone with irregular development of shale partings. The middle member is a distinctive 15m massive even-bedded crinoidal, occasionally oolitic, calcarenite.
Carboniferous	Oakport Limestone Formation	Lithological Summary: Dark crinoidal calcarenites and shales. A basal member, 27m thick, of clean fine calcarenite contains occasional coarse crinoidal beds and argillaceous wackestones. It is overlain by a distinctive unit dominated by fine peloidal calcilutites and laminated calcilutites.
Carboniferous	Fearnaght Formation	Lithological Summary: Cream conglomerate and red sandstone. It is composed of cream coloured quartz-pebble conglomerate with a sandy matrix, subarkose and red and purple micaceous flaggy sandstones and purple and brown quartzites.
Ordovician	Aghamore Formation	Lithological Summary: Lava and volcanoclastic breccia. Principally spilitic lavas and volcanoclastic conglomerate, with only relatively minor amounts of interflow sediments. These include greywacke, and chert and shale, which are most abundant in the southern parts.
Ordovician	Finnalaghta Formation	Lithological Summary: Blue-grey greywacke & black argillite. Almost entirely consists of bluish-grey, non-calcareous greywacke, which is composed of quartz, felsic igneous and micaschist detritus. Black argillites, 1m to 15m thick, also occur.

A review of the GSI Bedrock Outcrop, GSI Quaternary map and GSI Groundwater Vulnerability map was completed, locations of bedrock outcrops and subcrops provide an indication of areas with a greater potential of shallow bedrock.^{177 181 196}

The following areas have been identified as having a greater potential to shallow bedrock:

- Across the western end of the study area
- South of Carrick-on-Shannon
- North of Carrick-on-Shannon
- North of Jamestown
- South of Jamestown and the River Shannon
- Large areas across the eastern portion of the study area east of Drumgilra Lough

4.15.3.7 Karst Features

The GSI Karst database was consulted to determine if the Carboniferous limestone formations within the study area are karstic and contain karst solution features. There is one recorded feature within the study area in the Croghan Limestone formation; the Toberconellan spring located approximately 2.0km south of Carrick-on-Shannon, south of the railway station.

There are a significant number of karst features (including springs, enclosed depressions, turloughs and swallow holes) surrounding the study area (some of these features are approximately 500m offset from the study area boundary) recorded to the south and west of Carrick-on-Shannon within the Oakport Limestone, Ballymore Limestone and Croghan Limestone formations.¹⁸²

This indicates that these lithologies could be susceptible to karstification and karst features could exist within the study area. The karst features have either not been mapped or the limestone is locally less susceptible to karstification. This could be due to a lower calcium carbonate content, or it is overlain by subsoils which impede karstification or have infilled karst features. It is also notable that there is a relatively high density of small streams, tributaries to the River Shannon, in the study area which in places flow through areas mapped where rock is close to surface. This relatively high drainage density (length of river channels per unit area) is not expected in karst aquifers where drainage is predominately underground and again may suggest that the bedrock is less susceptible to karstification in the study area. Further detail on the karst features is presented in Section 4.14 Hydrogeology.

4.15.3.8 Landslide Susceptibility

The GSI has developed a landslide susceptibility map for the entire area of the Republic of Ireland.¹⁸⁴

Generally, landslide susceptibility is correlated to the topography, so the areas with higher landslide susceptibility are in the higher, steeper elevations, coastal cliffs and valley sides. The majority of the study area has a low landslide susceptibility with localised areas having a moderately low to moderately high susceptibility. These locations are recorded mainly in areas of peat and along the banks of the River Shannon. One significant area with a moderately high susceptibility rating is located along the R368 south of Carrick-on-Shannon in the town land of Killukin. This appears to be located on the eastern side of a drumlin in glacial till and shallow bedrock. There are no recorded landslides by the GSI within the study area.¹⁸³

4.15.3.9 Soft Ground and Compressible Soils

The extent of soft soil deposits is a key constraint within the study area, soft ground areas recorded on the GSI Quaternary map are shown on Figures 4.15.4.0 to 4.15.4.5. The deposits are so widespread that any potential option will impact these deposits. Typically, these subsoils will be excavated and replaced with suitable engineering fill or undergo ground improvement. The excavated soft soils may require a repository within the study area. In areas of cut, landtake in soft soils could be significant. It should be noted that the organic content of the peat deposits will significantly impact the CO₂ rating for potential options in the study area. Refer to

Section 4.15.3.5 for further details on locations of the soft soil deposits across the study area.

A request has been made to Leitrim and Roscommon County Councils for details and locations of any engineering problems and instabilities associated with soft ground throughout the study area. The following have been reported:

- **Embankment Failure at Corbally:** a localised section of the Jamestown Drumsna Bypass embankment failed near the townland of Corbally. The cause was deemed to be failure of the soft soils (approximately 3.0m deep) under the existing embankment during remedial works to widen the road.

The following significant area of soft ground has been reported:

- **N4 Piled Embankment:** Piled embankment constructed in 2001/2002 as part of the Jamestown to Drumsna Bypass, north of Drumgilra Lough across a 300m long section of soft ground, soft ground depths up to 8mbgl.

Soft organic soils such as peat and alluvium are highly compressible and subject to instability and significant long-term settlement if not engineered properly.

4.15.3.10 Contaminated Sites and Unsuitable Material

Potential sources of contamination within the study area have been investigated and identified into the following four categories as described in the following sections:

- Landfills (licensed and historical)
- Pits, quarries and mines (historical)
- Industrial facilities (licensed and historical)
- Historical land use contamination

Publicly available records from both online and within Leitrim and Roscommon County Councils have been consulted to determine the type and location of sites that are possibly contaminated or possibly store unsuitable material. It is possible there are such facilities that are not officially recorded and therefore these are not shown on Figures 4.15.4.0 to 4.15.4.5.

4.15.3.11 Landfills

In 1996 the EPA began licensing certain activities in the waste sector. These include landfills, transfer stations, hazardous waste disposal and other significant waste disposal and recovery activities. These are potential geological constraints as they may act as areas of contamination.

There is one EPA licensed waste facility^{197 198} (and Water Framework Directive Article 5 Landfill¹⁹⁹) recorded within the study area as shown on Figures 4.15.4.0 to 4.15.4.5, this facility has the following details:

- Carrick-on-Shannon Landfill, Ballynamoney – Active Licence Number W0064, operations ceased in 2005. Operated as a waste disposal facility for domestic,

commercial and industrial waste in addition to sewerage sludge between 1965 and 2005.

According to the EPA there is no known historical (or ‘legacy’) landfills within the study area.²⁰²

According to the EPA there are no Waste Facility Permits or Certificates of Registration within the study area.²⁰¹

Leitrim and Roscommon County Councils have been consulted for their records of landfills and waste related sites. The following areas of potential fill have been identified from information provided by Leitrim County Council on surveys undertaken to inform a previous road scheme through the study area in the early 2010s and are shown on Figures 4.15.4.0 to 4.15.4.5:

1. To the south of the Ballynamoney Landfill is an area of made ground or fill material. This site was identified as three old waste permit facilities which have since been filled in. These sites have been reported in earlier reports as comprising a mixture of clay, gravel and peat.
2. A waste permit site is located near the R280, north of Carrick-on-Shannon. This site is surrounded by heavily developed residential areas while this site remains undeveloped. The nature of the material at this site is unknown.
3. Close to Carrick-on-Shannon, west of the R280 is an old waste permit site, this site is situated to the rear of some older houses with large gardens and therefore remains somewhat undeveloped. The nature of the material at this site is unknown.
4. St. Mary’s GAA sports grounds were once registered as an old permit site and therefore as an alternative land use this site has been developed as a sports facility. The nature of the material at this site is unknown.
5. A waste permit site just west of Carrick-on-Shannon in the Drishoge Townland, operator unknown. The nature of the material at this site is unknown.
6. Three old permit sites were identified in the Roscommon area in the Cloongownagh Townland along the existing N4, approximately 2.5km west of Carrick-on-Shannon. These are thought to have been used for the recovery and disposal of material as part of the N4 realignment.
7. Three sites south of Carrick-on-Shannon station which has been reported as being used for the importing of natural subsoil to raise the level of the agricultural land.
8. A large waste site is located close to Finnalaghta with an area of 26,690m²; this site is located parallel to the existing N4. The nature of the material at this site is unknown.
9. Jon’s Civil Engineering Company who was the main Contractor on the Dromod-Rosky Bypass which was constructed in 2006/2007 has two registered waste sites in this area, a small site close to the road and a larger site near Fearnaght with an area of 15,421m². It is possible that these areas were used as borrow pits for earthworks on the Dromod-Rosky Bypass and

subsequently for disposal of unsuitable soft soils that were excavated and replaced along this section of new road. The 2009 ground investigation completed by Priority Geotechnical Ltd reported a mixture of peat, clay, silt, sand and sandstone, siltstone and limestone gravel.

4.15.3.12 Historical Pits, Quarries and Mines

Historical pits and quarries are potential sources of ground contamination or unsuitable material as the nature of backfill material is generally highly variable and unregulated. According to the GSI records there are 39 historical pits and quarries within the study area.¹⁸⁶

The Department of the Environment, Climate and Communications show no historic mines within the study area.²⁰⁸

The EPA records show there are no known WFD Article 5 Mines within the study area.¹⁹⁹

According to the EPA there are no historic mines within the study area.^{199 209}

From the review of the OSI 6 Inch 1837 to 1843 historic mapping there are two iron mines shown south of Aghamore at the eastern end of the study area, these two sites are not shown the OSI 25 Inch 1888 to 1913 historic mapping.¹⁷² The location of these two sites are currently listed as mineral locations (Mineral Location Reference 1736 and 1737) within the GSI Mineral Localities dataset.¹⁸⁷

Leitrim and Roscommon County Councils have been consulted for their records of historic pits, quarries and mines within the study area. The following site has been reported within the study area:

- Kiltycarney Quarry (Quarry currently not endorsed by the local County Council), was authorised for activity during the construction of the Jamestown – Drumsna Bypass. A condition of the permission given was that the quarry is rehabilitated within six months of completion of the scheme. This did not occur and therefore this quarry is unauthorised and at present it is not active.

The known historic quarries, pits and mines to the Local Authorities, the GSI and the EPA records are shown on Figures 4.15.4.0 to 4.15.4.5.

4.15.3.13 Industrial Facilities

Existing and historic industrial sites may potentially be a source of local contamination and/or restrictions due to site activities or licence controls. However, these sites operate within the EPA Industrial Emissions (IE) and Integrated Pollution Control (IPC) licence framework and due to the regulated nature of their activities, the risk of contamination is low. A request has been made to Leitrim and Roscommon County Councils for information pertaining to industrial facilities within the study area. The IE/IPC licenced sites listed in Table 4.15.5 and shown on Figures 4.15.4.0 to 4.15.4.5 have been reported within the study area.^{203 204}

Table 4.15.5 IE/IPC Licenced Industrial Facilities ^{203 204}

RegCD	Name	Licence Status	Licence Type	Address
P0641-01	Irish Rubber Components Limited	Surrendered	IE	Tullyleague, Carrick-on-Shannon Roscommon
P0021-02	Masonite Ireland	Licenced	IPC	Derryoughter, Drumsna, Carrick-on-Shannon, Leitrim

Similarly, sites which have been granted a wastewater discharge licence may be a source of contamination or developmental restrictions. There are a number of wastewater discharge sites listed by Irish Water and the EPA within the study area, summarised in Table 4.15.6.

Table 4.15.6 Urban Wastewater Treatment Plant locations (UWWTP) with a Wastewater Discharge Licence Recorded by Irish Water and the EPA within the Study Area ^{205 206}

Irish Water Reg No.	Name	Authorisation Type	Agglomeration Name	Licence Status
D0154-01	Irish Water	Licence	Carrick-on-Shannon	Licensed
A0465-01	Irish Water	Certificate	Jamestown	Certified
A0467-01	Irish Water	Certificate	Drumsna	Certified

There are two WFD Section 4 discharge points within the study area, these are summarised in Table 4.15.7.

Table 4.15.7 WFD Section 4 Discharge Points within the Study Area ^{207 199}

Registration Number	Status	Name	Location
WP 1-11A	Unknown	Jones Oil Ltd	Carrick-on-Shannon
WPL/11/02	Unknown	Rosderra Meats	Leitrim

4.15.3.14 Historic land use contamination

Land contamination is related to site history and previous land use which can leave contaminants in the ground depending on historic site activities. The extent of soil contamination from historic land uses are typically localised. The NRA guidelines¹⁶⁶ do not define specifically what is a heavy or light industry. The following categories are recommended.

Heavy Industries include

Medium to large scale industries, such as power stations, gas works, wastewater treatment plants, other municipal facilities, etc.

According to the review of the OSI 1830's and 1890's historic mapping and the EPA records, the following medium to large-scale industries are located within the study area and presented on Figures 4.15.4.1 to 4.15.4.5:¹⁷²

- One historic gas works site located on the western side of Carrick-on-Shannon near the Carrick-on-Shannon railway station (E:593042, N: 798676)
- One historic power station labelled as “Electric Light Works & Pumping Station” on the 25 Inch 1888-1913 historic map, located within Carrick-on-Shannon (E:593734, N: 800030)

Industries that involve significant amounts of harmful chemicals or metals such as dry cleaning, soap works, smithy, foundry, lime kilns etc.

According to the review of the OSI 1830's and 1890's historic mapping the following are located within the study area and are presented on Figures 4.15.4.0 to 4.15.4.5:¹⁷²

- Three historic corn mills; one south of Carrick-on-Shannon (E:592907, N:797726), one north of Carrick-on-Shannon and the other east of the River Shannon adjacent to the R201 (E: 602404, N:796798)
- Two historic rail station sites; one on the western side of Carrick-on-Shannon called Carrick-on-Shannon Station (E:592993, N: 798776); and the other south of Jamestown called Drumsna Station (E: 598800, N: 795684)

Light Industries include

According to the OSI 1830's, 1890's and Cassini historic mapping the following light industries exist across the study area but are not included on Figures 4.15.4.0 to 4.15.4.5¹⁷²:

- One historic Flour Mill in the town of Jamestown
- One historic corn store in the town of Drumsna
- Two historic corn kilns:
 - One in the townland of Corry
 - One on the western side of Lough Tap
- Four Historic water pumps:
 - Two in Carrick-on-Shannon
 - One in Jamestown
 - One approximately 600m east of Drumgilra Lough
- The Carrick-on-Shannon Water Works site located next to St Patricks Community Hospital in Carrick-on-Shannon
- One Historic pumping station adjacent to the South Leitrim Regional Water Treatment Plant in Carrick-on-Shannon

4.15.3.15 Economic Geology

The economic geological features within the study area have been subdivided into the following categories:

- Crushed rock aggregate potential
- Granular aggregate potential
- Active pits, mines and quarries
- Mineral resource locations
- Areas containing deep, well drained soils suitable for agriculture as detailed in Section 4.15.3.4

4.15.3.16 Crushed Rock Aggregate Potential

GSI carried out national crushed rock aggregate potential mapping between 2007 and 2013.¹⁸⁹ The maps are compiled based on the lithology, as well as existing and historic quarry activity. The final scores have five bands ranging from very low potential (blue) to very high potential (red) and have been applied to the entire area

of the Republic of Ireland. The portion of the study area north and east of the River Shannon ranges between moderately to very high potential with some pockets of low potential. The portion of the study area south of the River Shannon typically has a low potential with some large areas of moderately to high potential.

4.15.3.17 Granular Aggregate Potential

The GSI Granular Aggregate Potential Mapping categorises granular deposits in terms of aggregate resource into five levels, from very high potential to very low potential.¹⁸⁸ The study area has portions with very low to high potential. There are several zones of granular aggregate potential within the study area. The moderate to high potential granular aggregate deposits are located in the alluvial deposits along the alignment of the River Shannon and its tributaries as shown on Figures 4.15.4.0 to 4.15.4.5.

4.15.3.18 Active Pits, Mines and Quarries

The GSI 2014 Quarry Directory was consulted.¹⁸⁵ There are no recorded active pits, mines or quarries within the study area.

The Department of the Environment, Climate and Communications show no active mines within the study area.²⁰⁸

Leitrim and Roscommon County Councils have been consulted for their records of active pits, quarries and mines within the study area. The following areas of potential active pits, quarries and mines have been reported as being within the study area:

- Finnalaghta Quarry (not endorsed by the local County Council) situated to the east of the River Shannon, according to the GSI database, this was once a disused sandstone quarry. Presently it is a registered quarry, register number QS0226, EPA register details are presented in Table 4.15.8.

The EPA Extractive Industries Register (2015) was consulted.²⁰⁰ There is one recorded active quarry within the study area, details are provided in Table 4.15.8. The EPA Extractive Industries Register did not distinguish what the quarry is used for, i.e. sand/gravel or rock.

Table 4.15.8 EPA 2015 Registered Quarry Locations within the study area ²⁰⁰

Register Number	Name	Site Address
QS0226	Ballyfeeney Rock Ltd.	Aghamore, Carrick-on-Shannon, Co. Leitrim

The active and inactive pits and quarries known to the Local Authorities and according to the GSI and EPA records are shown on Figures 4.15.4.0 to 4.15.4.5.

4.15.3.19 Mineral Resource Locations

The location of mineral resources is shown on Figures 4.15.4.0 to 4.15.4.5. There are ten licences held for prospecting within the study area.²⁰⁸

Six of these are ‘Open – Exploration Incentives’ as follows:

- Prospecting Licence 2769
- Prospecting Licence 2766
- Prospecting Licence 4462
- Prospecting Licence 4463
- Prospecting Licence 1668
- Prospecting Licence 2705

Four are ‘Open’ as follows:

- Prospecting Licence 3585
- Prospecting Licence 3888
- Prospecting Licence 3889
- Prospecting Licence 3686

There are a number of mineral resource locations within the study area according to the GSI Mineral Localities database¹⁸⁷, these are summarised in Table 4.15.9 below.

Table 4.15.9 Summary of Mineral Localities (GSI) within the Study Area ¹⁸⁷

Mineral location reference	Key mineral	Townland
5054	Limestone	Hughestown
2589	Ironstone	Dergvone
4821	Fluorspar and pyrite	Tully
4822	Fluorspar and pyrite	Tully
4820	Fluorspar	Carrick
1736	Haematite	Gortinee
1737	Haematite	Gortinee
1734	Greywacke	Finnalaghta
1735	Sandstone	Fearnaghta

4.15.3.20 Geological Heritage

A database of geological heritage sites is maintained by the GSI in partnership with the National Parks and Wildlife Service (NPWS).^{190 191} There are no geological sites of national importance within the study area.

There is one County Geological Site (CGS) and two unaudited sites within the study area. The GSI was consulted on whether there are any imminent changes to the geological heritage sites database for County Leitrim and County Roscommon. There are no imminent changes for County Roscommon. It was noted by the GSI that County Leitrim is an ‘unaudited’ county and is currently being audited with

more information becoming available over the coming months. The three sites are detailed in Table 4.15.10 and are shown on Figures 4.15.4.0 to 4.15.4.5.

CGS do not receive statutory protection like Natural Heritage Areas (NHA) but receive an effective protection from their consideration in the planning system. However, GSI consider many of the County Geological Sites to be of national importance as they are the best representative example of particular geological formations or features. They will be formally proposed by the GSI, for designation as NHAs by the National Parks and Wildlife Service after due survey and consultation with landowners.

Table 4.15.10 Geological Heritage Sites ^{190 191}

Site name	Site code	Designation	Characteristics
Mid Roscommon Ribbed Moraines	RO022	CGS	This field of ribbed moraine forms part of a small, discrete field northwest of Slieve Bawn.
Gortinee	-	CGS (Unaudited)	Iron ore in tholeiitic volcanics, Mined as early as the 16 th C; smelted at Dromod and Arigna.
Finnalaghta Quarry	-	CGS (Unaudited), may be recommended for NHA	Lower Palaeozoic D1 structure, termed “transected monocline”.

4.15.4 Summary

4.15.4.1 Geological Constraints

The soils and geological features that represent constraints within the study area have been identified in this constraints study and are summarised in Table 4.15.11.

Table 4.15.11 Summary of Geological Constraints and Importance

Category	Name	Relevant Characteristics / Key Constraints	Importance
Geomorphology	Drumlins	Glacial till / sands and gravel, possible shallow bedrock (roche moutonnée) potential for variable reusability. Irregular topography.	High
	Ribbed Moraine	Glacial till / sands and gravel, potential for variable reusability. Irregular topography.	High
	The River Shannon, lakes and other surface water features	Associated soft ground, possible requirements to excavate. Need to locate a suitable repository within the study area.	High
Soils	Well Drained Soils	Importance for agriculture.	High
	Alluvium	Importance for agriculture.	Medium
	Lacustrine Deposits	Importance for agriculture.	Medium
	All	Limiting impact on soil ecosystem in accordance with EIA Directive (2014/52/EU).	High
Subsoils	Alluvium, Blanket Peat, Fen Raised Peat, Lacustrine Deposits	Soft compressible ground, possible requirements to excavate and deposit in a repository within the study area. Land take in areas of cut through soft ground could be significant. The CO2 emissions for any route chosen within the study area with the excavation of organic peat would need to be considered.	High
	Made Ground	Variable ground both consistency and content. This material will possibly need to be excavated and could potentially be contaminated.	High
Bedrock Geology	Limestone Formations	Potential for karst features and associated voids, potential to cause collapse of ground.	Low

Category	Name	Relevant Characteristics / Key Constraints	Importance
		Potential for irregular bedrock topography due to karst weathering and faulting which could adversely affect piled foundations for structures. A number of springs noted outside the study area to the northwest.	
	Volcanic Formations	Acid sulphate rock potential and variable rock strength.	Low to medium
	Bedrock Outcrops	Potential for shallow bedrock.	High
Landslide Susceptibility and Compressible Soil	Recorded Landslides	No recorded landslides in the GSI landslide database. Some localised areas have a moderately low to moderately high susceptibility.	Low
	Compressible Soils associated with River Shannon, lakes and areas of peat	Soft ground susceptible to instability during construction and significant long-term settlement. Embankment failure noted along the Jamestown to Drumsna Bypass at Corbally.	High
Contamination and Unsuitable Material	Landfills	Soft ground, variable material requirement to excavate, potentially contaminated. Important resource for the disposal of material.	High
	Historic Pits and Quarries	Soft ground, variable material requirement to excavate, potentially contaminated.	High
	Industrial Facilities	IPC Licenced Facilities. Potentially contaminated.	Low
	Wastewater Discharge Points	Potentially contaminated.	Low
	Historic Land Use Contamination	Contamination and variable material requirement to excavate from historic gas works, power station, mills, rail tram sites, gravel pit, quarries.	High
Economic Geology	Existing Pits and Quarries	Stability of quarry faces. Potential source of aggregate, licensed facility.	High
	Crushed Rock Aggregate Potential	The portion of the study area east of the River Shannon has a moderately to very high potential for crushed rock. The portion of the study area west of the River Shannon has a low potential with areas of moderately to high potential.	High

Category	Name	Relevant Characteristics / Key Constraints	Importance
	Granular Aggregate Potential	The granular aggregate potential varies from very low to high.	High
	Potential Mineral Resources	A number of prospecting licences are held within the study area with limited associated reports.	High
Geological Heritage	Mid Roscommon Ribbed Moraines	County Geological Site.	High
	Gortinee	IGH 15 Economic Geology.	High
	Finnalaghta Quarry	IGH 4 Cambrian – Silurian. (recommended for NHA status)	High

4.16 External Parameters

4.16.1 Introduction

In addition to the identification of natural and artificial constraints, various external parameters which may impact on the development of feasible alternatives and options must also be considered as part of the Constraints Study. These external parameters are covered in the following sections:

- Section 4.16.2 Funding and Scope
- Section 4.16.3 Construction Phasing
- Section 4.16.4 Key Performance Indicators
- Section 4.16.5 Technical Standards
- Section 4.16.5.5 Access Control
- Section 4.16.6 Policy Documents
- Section 4.16.7 Procedural and Legal Requirements

A summary is presented in Section 4.16.7.

4.16.2 Funding and Scope

Under the Roads Acts 1993 to 2007²¹³, Transport Infrastructure Ireland (TII) in conjunction with the Local Authorities are responsible for the planning, design and implementation of national roads projects. The N4 at Carrick-on-Shannon has been identified within the National Development Plan (2018 – 2027)²¹⁴ as a section of the national road network to be progressed through pre-appraisal and early planning during 2018.

As funding is subject to change, TII continuously monitor their commitments to on-going projects. The decision to proceed with the various phases of a scheme relies on the funding being made available by central government.

Leitrim County Council, on behalf of itself and on behalf Roscommon County Council, under an agreement made pursuant to Section 85 of the Local Government Act 2001, are developing a solution to the existing transportation issues along the N4 corridor between Faulties and Drumharlow. Funding has been provided to take the project through Phases 1 to 4 of the TII Project Management Guidelines (PMG)¹. This includes:

- Phase 1 - Scheme Concept and Feasibility

²¹³ Government of Ireland, Law Reform Commission, 2016. Roads Act 1993 REVISED Updated to 8 March 2016. Available at:

https://www.lawreform.ie/fileupload/RevisedActs/WithAnnotations/HTML/EN_ACT_1993_0014.htm

²¹⁴ Government of Ireland, Department of Public Expenditure and Reform, 2018. National Development Plan 2018-2027. Available at:

<https://www.gov.ie/pdf/?file=https://assets.gov.ie/37937/12baa8fe0dcb43a78122fb316dc51277.pdf#page=nul1>

- Phase 2 - Option Selection
- Phase 3 - Design and Environmental Evaluation
- Phase 4 - Statutory Processes

4.16.3 Construction Phasing

Construction phasing and sequencing is a key concern with any construction project. Successful site management minimises the length of time for which land disturbing activities are undertaken; essentially one part of the site is graded and completed before construction commences on other parts of the site. As well as planning and scheduling benefits, construction sequencing seeks to minimise the environmental impacts to an area, such as excess sedimentation.

Construction phasing becomes more critical at the interfaces with existing infrastructure (e.g. the railway line) and large natural features (e.g. River Shannon). At these locations, sequencing of work would also seek to minimise delay and impact on existing road users throughout the construction of the project. As the study area contains an urban area (i.e. Carrick-on-Shannon), the potential to affect a significant number of people increases the closer an option is to existing communities. Construction phasing then becomes key in seeking to reduce the amount of delay and nuisance caused to the public and also getting the project completed in a reasonable amount of time.

More precise details of exact construction sequencing will be developed during Phase 3 - Design and Environmental Evaluation of the project. Potential impacts due to any interim construction phasing arrangement will be assessed as part of the Environmental Impact Assessment Report which will be prepared during Phase 3 of the project.

4.16.4 Key Performance Indicators

Traditionally, the Level of Service concept was used to determine the quality of a roads project. Level of service is a quality measure describing operational conditions within a traffic system whereby it aims to understand the actual capacity of a road lane and relates this to a “Level of Service”. However, this measure was developed with the private motor car in mind and with the primary concern of keeping traffic congestion to a minimum.

More recently, the performance of a roads project has evolved to include all road users including pedestrians, cyclists and public transport users. Levels of Service relating to pedestrians and cyclists include wait time at junctions and actual route lengths in comparison to desire lines. The Level of Service of a public transport system includes wait time, frequency of available services, ease of interchange between different modes, access locations and journey comfort. Many of the specific objectives of the project such as reduced delay, improved journey time reliability and a reduction in collision frequency and severity, will ultimately be achieved if existing Levels of Service can be enhanced for all transport users.

In order to determine the Level of Service of the project, Key Performance Indicators (KPI) were identified, and the performance of each alternative and option

will be assessed against these individual KPIs to ensure that the project objectives are delivered.

4.16.5 Technical Standards

4.16.5.1 Roads

Any new national roads, associated link and connector roads and merge/diverge slip roads will be designed in accordance with the TII Publications.

Public streets and urban roads will be designed in accordance with the Department of Transport's Design Manual for Urban Roads and Streets (DMURS). Pedestrian facilities also comply with the guidelines outlined in DMURS.

Internal road networks of residential housing estates will be designed in accordance with "Recommendations for Site Development Works for Housing Areas" by the Department of the Environment and Local Government.

4.16.5.2 Cycle and Pedestrian Routes

Cyclist facilities will consider the recommendations outlined in the National Transport Authority, National Cycling Manual 2011, DMURS and the TII standards.

4.16.5.3 Drainage

The following will be designed in accordance with the requirements of the relevant TII publications:

- Runoff generated from any new road development
- Upgrades to the existing infrastructure
- Runoff from catchments which are impacted on by a new road development
- Upgrade to the existing infrastructure

Any public foul sewers impacted on by the works, will be designed in accordance with BS EN 752 "Drain and Sewer Systems Outside Buildings - Sewer System Management" and the Department of the Environment and Local Government "Recommendations for Site Development Works for Housing Areas" and will comply with any particular drainage requirements outlined by the relevant Local Authority as appropriate to the sewer in question.

Public surface water sewers will be designed in accordance with national best practice for drainage Works i.e. Greater Dublin Strategic Drainage Study Regional Drainage Policy Volume 2 – New Development (GDSDS-RDP Volume 2) and will comply with any particular drainage requirements outlined by the relevant Local Authority as appropriate to the sewer in question.

Works involving alteration to significant rivers or streams will be subject to Section 50 approval under the Office of Public Works Arterial Drainage Act 1945.

4.16.5.4 Structures

The design of structures will be carried out in accordance with the TII Publications and the relevant Eurocodes. Loading will be applied in accordance with EN 1991-2: Eurocode 1 - Actions on Structures – Part 2: Traffic loads on bridges and its associated National Annex.

4.16.5.5 Access Control

A controlled access road is a road which has been designed with unrestricted free flow of traffic on the mainline and access only provided at specific junctions. The extent of access control is also dependent on the final cross-section and ultimately could restrict access for learner drivers, vehicles under 50cc, slow moving vehicles (under 50km/h), invalid carriages, pedestrians, pedal cycles, and animals. In such a case, a safe alternative route for these road users must be provided.

While it is not anticipated that a motorway will be provided as part of this project, a road component of the transport solution may be designated as a protected road under the Roads Act 1993. A protected road approved by the Minister may restrict of all means of direct access to the protected road from or to specified lands. It can also restrict specific types and classes of vehicles, similar to those restricted on motorways. Again, a safe alternative route must be provided if a protected road is proposed as part of the Project.

4.16.6 Policy Documents

The national primary route N4, Dublin to Sligo is a strategic corridor from Dublin to the northwest and border counties and is approximately 198km in length. It is recognised as being of particular importance in enhancing accessibility to some of the most peripheral areas in the northwest (including Leitrim/Roscommon/Sligo and Donegal) and west of the River Shannon.

The N4 forms part of the EU TEN-T Comprehensive road network providing a strategic link between Dublin and Sligo, which was designated a regional centre in the 2018 National Development Plan and National Planning Framework. The N4 connects directly with the N5 and N6 national primary routes which also form part of the EU TEN-T Comprehensive road network.

In 2018, the Government published the Ireland National Development Plan 2018 – 2027 (NDP). The NDP sought to progress the strategic outcomes set out in the NPF and recognised the regional centre status of Sligo. In relation to the second National Strategic Outcome - Enhanced Regional Accessibility the NDP states:

“... the objective is to complete those linkages so that every region and all the major urban areas, particularly those in the North-West, which have been comparatively neglected until recently, are linked to Dublin by a high-quality road network.”

This project has been included in the TII National Roads Programme 2018 to 2027. A commitment to progressing the N4 Carrick-on-Shannon to Dromod “through pre-appraisal and early planning during 2018 to prioritise projects which are

proceeding to construction in the National Development Plan” is included in the NDP.

4.16.7 Procedural and Legal Requirements

The 2019 TII Project Management Guidelines (PE-PMG-02041)¹ outline a procedural framework for the phased approach to the development, management and delivery of Major National Road Schemes in Ireland. The guidelines set out the Project Phases and describe each of the Processes, Deliverables and Approvals required at each Phase throughout the development of a project so that it is delivered in accordance with the 2015 Roads Act.

Please note, the PMG are only a guide as to how National Road and Public Transport Capital Projects should progress. Deviations from the guide can be discussed and agreed with TII so to enact the most appropriate elements of the PMG for the project in question.

It is required that the detailed design shall comply with all relevant design standards.

It is a legal requirement that detailed design of the preferred transport solution shall be designed for safety in construction in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013.

It is a legal requirement to ensure compliance with the various environmental directives.

4.16.8 Summary

While there are various external parameters which are likely to constrain the project, the most notable are the legal constraints as the project must be deliverable within the bounds of the law.