

i. Preface

THIS NATURA IMPACT ASSESSMENT REPORT CONSISTS OF THE FOLLOWING DOCUMENTS:

Volume 1

- ❖ Main Report

Volume 2

❖ APPENDICES

- A Description of the proposed road development (As extracted from Chapter 4 of the Environmental Impact Assessment Report);
- Outline Erosion & Sediment Control Plan;
- Invasive Alien Species Management Plan.
- Appropriate Assessment Screening Decision;

Volume 3

- ❖ Figures

Document Control

Status	Issued For	Undertaken By			Client Checking and Formatting		
		Signed	Date	Approved	Signed	Date	Approved
FINAL	Publication	JH	February 2019	PR	FM	February 2019	EC



ii. Compilation

The Natura Impact Statement (NIS) has been prepared by McCarthy, Keville O'Sullivan Planning & Environmental Consultants Ltd. on the behalf of Sligo County Council and under the Project Management of the Sligo TII National Roads Project Office. It has been prepared to inform the Appropriate Assessment process for the N16 Lugatober (Drumkilsellagh to Lugnaqall) proposed road development.

Sections 1 and 2 of the appendices contained within this volume have been prepared by the Sligo TII National Roads Project Office.



iii. ADDITIONAL INFORMATION

Additional Information not included in this NIS, but which may be made available to interested parties includes *inter-alia*:

- Various Chapters as required of the N16 Lugatober (Drumkilsellagh to Lugnaqall) Environmental Impact Assessment Report, including but not limited to the following:
 - Chapter 3, Consideration of Alternatives;
 - Chapter 7, Noise & Vibration;
 - Chapter 8, Air Quality & climate Change;
 - Chapter 9, Biodiversity;
 - Chapter 11, Hydrology & Hydrogeology;
 - Chapter 12, Landscape & Visual;
- N16 Sligo to County Boundary Route Selection Report (2017)¹

¹ <http://www.sligococo.ie/N16/RouteSelectionReport/>

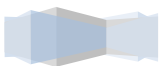




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1 Extract from Chapter 4 of the EIAR; Description of the Proposed Road Development

Preface

The following appendix to the Natura Impact Statement (NIS) has been extracted directly from Chapter 4 of the Environmental Impact Assessment Report for the N16 Lugatober (Drumkilsellaigh to Lugnaqall) Proposed Road Development.

It has been provided in order to permit a reader of the NIS to understand the physical characteristics of the project.

For readability in the context of the NIS, deletions have been marked herein, via cross through text, such as '~~the~~', with insertions provided within bold square brackets, such as '[this]'.

1.1 Introduction

This Chapter provides a description of the Design² for the *Proposed Road Development* including *inter-alia* details of:

- Road Type and Cross Section;
- Description of the Mainline Alignment;
- Existing and Projected Traffic Conditions;
- Road Safety;
- Structures;
- Drainage Design;
- Geotechnical;
- Route Lighting;
- Vulnerable Road Users;
- Boundary Fencing;
- Utilities and Services;
- Construction of the *Proposed Road Development*;
- Operation and Maintenance;
- Other Statutory Considerations.

The descriptions of the main elements of the design are presented in the following paragraphs covering the route from south to north. References are made herein and throughout the EIAR to chainage's (Ch.) denoting the distance in metres along the mainline; these chainage's should be considered as an approximate position only of the appropriate feature or element being described.

The chainage's and link lengths described within this chapter have been rounded for reasons of clarity. A fuller representation of chainage's and lengths may be obtained from the drawings included in Volume 3 of this ~~the~~ EIAR.

1.2 The road type and cross section

The following outlines the road type and cross section of the *Proposed Road Development*.

² Design means a design to satisfy the requirements of Phase 3 of the TII Project Management Guidelines.



1.2.1 Mainline cross section

1.2.1.1 Cross section

The cross section for the N16 was established following an assessment undertaken as part of the N16 Sligo to County Boundary Route Selection Report³ to be a Type 2 Single Carriageway arrangement as outlined in Figure 4.4.1 contained within Volume 3 of this ~~this~~ **[the]** EIAR.

This arrangement will include provision for cycle tracks where alternative off road routes are not available.

1.2.1.2 Verge widening

The desired verge width of 3m along the mainline, has been widened as required and as represented in Figure 4.1.1 and 4.1.2 for a number of reasons, including the provision of Stopping Sight Distance, the provision of cycle/pedestrian tracks within the verge, the widening of verge spaces for the provision of safety barrier, or to achieve a clear zone⁴ within the verge space.

1.2.2 Junction strategy, side roads and access tracks

As outlined in section 3.4.1 of this ~~this~~ **[the]** EIAR, the design of the *Proposed Road Development* has included detailed consideration of the local roads which the proposed N16 intercepts. The junction strategy for each of these junctions is described in the table below and presented figuratively in Figures 4.1.1 to 4.1.2 and Figures 4.3.1 to 4.3.7 contained within volume 3.

Table 1-1: Side Road Treatment

Side Road Ref	Severance		Severance Treatment
	Chainage (m)	Side (m)	
L3406-0	0m	LHS	Reconnected via roundabout at c. Ch. 0m
Existing N16	0m	RHS	Reconnected via roundabout at c. Ch. 0m
Existing N16	380m	LHS	Reconnected via simple T junction at c. Ch. 840m
L7415-0	700m	RHS	Reconnected via simple T junction at c. Ch. 685m
Existing N16	1,140m	LHS	Reconnected via simple T junction at c. Ch. 840m
Existing N16	1,140m	RHS	Reconnected via simple T junction at c. Ch. 1,155m
L7413-0	1,380m	LHS	Reconnected via simple T junction at c. Ch. 1,350m
Existing N16	2,050m	RHS	Reconnected via simple T junction at c. Ch. 1,155m
L34041-0	2,100m	LHS	Reconnected via simple T junction at c. Ch. 1,955m
L3404-0	2,180	LHS	Reconnected via simple T junction at c. Ch. 2,155m

With the exception of the roundabout selected for the southern tie-in, all the junctions selected for the project are simple T junctions. Considering traffic volumes and turning movements, there is

³ http://www.sligococo.ie/N16/RouteSelectionReport/Volume2/N16SCB_RSRVol2EngPARTB.pdf

⁴ An area adjacent to the road carriageway within which there are no hazards.



no requirement for a ghost island at any of the junction locations; however, each junction, will be supplemented with 2m wide nearside passing bays.

Figure 1-1 is referenced from TII DN-GEO-03060⁵ and provides an indicative pictorial overview of the proposed junctions.

Figure 1-1: DN-GEO-03060; Simple T Junction with Right/Left Stagger



The dwell area (15m approach) of the junctions as they intercept the national primary route, will be either 7m, or 8m wide (0.5m hard strip). Outside the dwell area, the cross section considers the existing cross sectional width of the local road's (which in some cases are less than 3m) and applies in most cases similar road widths, with a minimum defined width of 4m; the verges are considered in a similar way with an applied minimum width of 2m. The cross sections of local roads are shown figuratively in 4.4.2 contained within volume 3 of this [the] EIA.

1.2.2.1 Access tracks (agricultural, domestic and drainage service)

Direct accesses are defined in DN-GEO-03060⁵, as accesses which ...connects directly to a national road including field accesses and accesses serving one or more properties....

The existing situation has 22 direct accesses connecting to the national network. The overriding principle during the design process was to ensure direct vehicular accesses onto the proposed N16 could be avoided insofar as was reasonably practicable. However, due to the fact that the project predominately follows the existing alignment (although of a generally greenfield nature), there are instances where the provision of direct agricultural access are unavoidable due to existing access arrangements. In this regard, there are four no. direct accesses proposed along the c. 2.54km realigned section; this includes two agricultural accesses, one combined agricultural/maintenance access, and one further maintenance access. These accesses are described in *Table 1-2* and are outlined in Figures 4.1.1 and 4.1.2 contained within Volume 3.

⁵ <http://www.tiipublications.ie/>

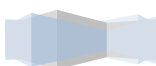


Table 1-2: Direct Accesses to Proposed N16

Access Type	Access Location
Agricultural	c. Ch. 550m (RHS)
Agricultural/Maintenance	c. Ch. 1,600m (LHS)
Agricultural	c. Ch. 2,225m (RHS)
Maintenance	c. Ch. 2,4601m

The cross sections proposed for direct accesses will be generally 4m overall carriageway widths, with 2m wide verges provided on each side, for agricultural/maintenance access tracks.

1.3 Description of mainline alignment

The mainline alignment which is indicated in plan and geometric terms in Figures 4.1.1-4.1.2 and 4.2.1-4.2.2 respectively (Volume 3 of this [the] EIAR) has been designed to produce a continuous flowing arrangement throughout. The following gives a brief drive-through perspective of its main characteristics as it transverses from south to north.

- The mainline alignment commences at a roundabout junction, which connects the proposed N16 to the north, with the existing N16 to the east and the L3406-0 to the west;
- The alignment initially commences at grade, but gradually increases to a fill section (c. 3m⁶ high at Ch. 280) between c. Ch. 160m and c. Ch. 480m, diverting offline predominately to the north at c. Ch. 380m;
- The alignment, navigating via a 720m radius horizontal curve, to a very slight north-west axis, crosses the Tully Stream at c. Ch. 610m, again in fill (c. 4.4m high at Ch. 620) between c. Ch. 530m and c. Ch. 720m. It severs the L7415-0 at c. Ch. 700m, reconnecting the local road back into the network via a simple T junction at c. Ch. 680m;
- The alignment begins to twist via a 720m radius horizontal curve to a slight north-east axis from c. Ch. 750m and cuts (c. 13m deep at Ch. 1,000m) into a topographical high between c. Ch. 760m and Ch. 1,120m. It also, at c. Ch. 840m, reconnects a severed section of the existing N16 to the proposed alignment, via a simple T junction;
- The aforementioned 720m radius horizontal curve continues to navigate the alignment in a slight north-east axis as it severs the existing N16 at c. Ch. 1,140m before passing on a high fill section through a valley in the townland of *Lugatober* between c. 1,140m and 1,340m.
- The alignment, severs the L7413-0, via a straight section of geometry at c. Ch. 1,380m, reconnecting the local road back into the network via a simple T junction at c. Ch. 1,350m.
- Prior to passing through a cut section between 1,350m and 1,600m (c. 3.4m deep at c. Ch. 1,400m), the alignment begins to divert to a more pronounced north-east axis, via a 720m radius curve from c. Ch. 1,500m, following the existing topography as closely as possible, but due to the steepness of same, resulting in cut/fill side slopes to the east and west respectively;
- The aforementioned 720m radius curve continues to c. Ch. 1,940m, where it begins to cut through (c. 4.5m deep at Ch. 2,080) a topographical high between c. Ch. 1,990m and Ch. 2,150m, before it continues on a straight section as it severs the L34041-0 at c. Ch. 2,100m reconnecting the local road back into the network via a simple T junction at c. Ch. 1,960m;

⁶ Vertical clearances are measured from the road centreline.



- The alignment severs the L3404-0 at c. Ch. 2180, tying the local road back into the existing network via a simple T junction at c. Ch. 2,155m. It then, via a 720m radius curve commencing at c. Ch. 2,200m, begins to reconnect the proposed route into the existing network on a north-east axis before it terminates at grade at Ch. 2,542m.

Embankment and cutting side slopes vary throughout and are generally prescribed as outlined in *Table 1-3*.

Table 1-3: Side slope ratios

Scenario	Side slope ratio	
	Horizontal	Vertical
Standard embankment (fill)	3	1
Standard embankment (fill) but requiring safety barrier due to identified hazards	2	1
Standard cut through glacial till	2	1
Standard cut through rock	1	1
Cut slope with landtake minimisation – Reinforced Earth Structure	0.5	1

1.4 Existing and Projected Traffic Conditions

1.4.1 Automatic Traffic Count

An Automatic Traffic Count (ATC) was undertaken in February and March of 2018 at the locations as outlined in Figure 4.5.1 of this [the] EIAR. The results of this ATC are outlined in *Table 1-4*.

Table 1-4: ATC Traffic Count 2018

Location	AADT	LGV	% HGV
ATC 1	3533	9.39%	5.50%
ATC 2	3456	10.65%	6.15%
ATC 3	740	9.49%	7.02%
ATC 4	109	6.36%	4.66%
ATC 5	155	7.61%	6.90%
ATC 6	337	8.88%	6.90%
ATC 7	2783	9.83%	6.47%

1.4.2 Forecast Demand Growth

The forecast demand growth was carried out in accordance with TII Project Appraisal Guidelines (PAG) Unit 5.3; 'Travel Demand Projections'⁷. A simple link based model was constructed based on the results described in *Table 1-5*, the geographical regional distributions as described in Figure 5.3.1. of PE-PAG-02017⁷ and the associated regional growth rates also as provided in the aforementioned document. Forecasts were determined for the Low, Central and High sensitivity scenarios under the following time horizons:

⁷ <http://www.tiipublications.ie/>



- 2021 Opening Year;
- 2036 Design Year (Opening Year + 15); and
- 2051 Forecast Year(Opening Year + 30);

This resulted in the derived growth forecasts, which are presented in the following table for the Central growth rate. In effect, the result is that all traffic (other than local direct accesses) on the existing N16 will be transferred to the new route where it is severed. The nature of the alignment and the design of reconnected local roads means that there will be no rerouting as a result of the *Proposed Road Development*.

Table 1-5: Traffic Projections – Central Sensitivity Growth Rate

Location	N16 Forecast Years (Total AADT)		Central Growth Rates		
	2018 Base		2021	2036	2051
	AADT	% HGV			
N16 Drumkilsellagh (ATC 1)	3533	6%	3662	4180	4444
N16 Castlegal (ATC 2)	3456	6%	3584	4096	4363
L3406-0 (ATC 3)	740	7%	767	879	938
L7415-0 (ATC 4)	109	5%	113	128	136
L7413-0 (ATC 5)	155	7%	161	185	197
L3404-0 (ATC 6)	337	7%	349	400	427
N16 Lugnaqall (ATC 7)	2783	6%	2886	3301	3519

1.4.3 Journey Times

Journey time calculations as outlined in Table 1-6, shows that the *Proposed Road Development*, in the Do-Something scenario provides a journey time saving of 52.2 seconds over the Do-Nothing situation. At circa 36%, this is an appreciable reduction in journey time.

Table 1-6: Journey Times

Option	Speed (kph)	Length (km)	Time (Sec)	Time Saving (Sec)
Do-Nothing	67	2.73	147	-
Do-Something	96	2.52	94.5	52.2

1.5 Road Safety

From a qualitative perspective, the construction of the project will provide safety and amenity benefits to future users of the existing route while maintaining to a large degree existing travel patterns of users on the existing local roads. The following engineering improvements will also provide significant safety benefits:

- An overall reduction in road length of circa 250m (c. 10%);
- The transference of 19 existing direct accesses from the national primary route;
- The improvement of Stopping Sight Distances at all junction locations to the Desirable Minimum standard for a 100kph road;
- The provision of dedicated facilities for Vulnerable Road Users;
- The provision of a dedicated drainage system which will remove current aqua plaining conditions on the road surface;

1.6 Structures

1.6.1 Introduction

There are a number of structures associated with the implementation of the *Proposed Road Development*. These structures, are defined within the following categories for the purposes of ~~this~~ **[the]** EIAR

- Principal Structures:
 - Structures which conform to Category 1, 2 and 3 of DN-STR-03001-03⁸;
- Minor Structures:
 - Structures which conform to Category 0 of DN-STR-03001-03.

The following provides an overview of the *maximum design characteristics* of these structures.

1.6.2 Principal Structures

There are three structures associated with the *Proposed Road Development*, which are considered to be Principal Structures satisfying the requirements of Category 1 of the aforementioned DN-STR-03001-03. These are structures which:

... can be analysed by statical methods and where all aspects of design are in accordance with current NRA Standards. Category 1 structures include simple structures, which contain no departures from, or aspects not covered by, current NRA Standards and which are: -

- (a) single simply supported spans less than 20m with less than 30° skew;...*
- (d) ...retaining walls with a retained height of less than 7m...*

These structures are described in *Table 1-7* and Figures 4.13.1, 4.13.2 and 4.13.3 contained within Volume 3 of this Design Report.

Table 1-7: Principal Structures

Structure	Location	Description
Clear Span River Bridge	Ch. 605m	A 15m clear span structure required to traverse the <i>Proposed Road Development</i> across the Tully Stream.
Vulnerable Road Users Underpass	Ch. 1,310	A 2.7m high x 4m wide x 34m long Vulnerable Road Users Underpass
Steepened Side Slope (Reinforced Earth Structure)	Ch. 1,350 – 1,420m	A 45m long x c. 3m-4.5m deep reinforced side slope to reduce impacts to a residential property in the townland of <i>Lugatober</i> .

1.6.3 Minor Structures

There are a number of Minor structures required, which satisfy the requirements of Category 0 (Item B) of DN-STR-03001-03:

Category 0 - *Minor structures, which conform in all respects to current NRA Standards. Individual structures for which all aspects of design and construction are covered by NRA Standards may be classified as Category 0 provided they are: -*

- (a) ...*
- (b) buried structures less than 3m clear span/diameter, or...*

⁸ 7



These structures in general are those which are required to traverse minor stream crossings as outlined in *Table 1-8*.

Table 1-8: Minor Structures

Location (approx.)	ID	Structure Type	Maximum Design Characteristics	
			Width	Height
1230m	<i>Lugatober Stream</i>	Bottomless Arch, or Box Culvert	1.2	1.8
1925m	<i>Collinsford Stream</i>	Bottomless Arch, or Box Culvert	1.2	1.8
2210m	<i>Lugnagall Stream</i>	Bottomless Arch, or Box Culvert	1.2	1.8

In addition, smaller structures will also be required for:

- The re-connection of land drainage systems with circa 1,200mm diameter pipes;
- Under embankment mammal passes comprising 900mm diameter pipes;
- Low level retaining walls (c. 0.5m high) which will be used in verge spaces to limit landtake on Residential properties, particularly within the townlands of *Drumkilsellagh* and *Doonally*.

1.7 Drainage Design

The following section of this **[Chapter 4 of the]** EIAR provides a description of the drainage design associated with the *Proposed Road Development*. Further technical detail, including Design Methodology, Design Checks and Analytical Factors are provided in Section 3 of Volume 4 (Appendices) to this **[the]** EIAR. The drainage design has been developed with regard to TII publications including *inter-alia*:

- DN-DNG-03022, Drainage Systems for National Roads;
- DN-DNG-03065, Road Drainage and the Water Environment;
- DN-DNG-03063, Vegetated Drainage Systems for Road Runoff;
- DN-DNG-03064, Drainage of Runoff from Natural Catchments;
- DN-DNG-03066, Design of Earthworks Drainage, Network Drainage, Attenuation & Pollution Control;
- DN-DNG-03071, Design of Outfall and Culvert Details;
- DN-DNG-03073, Grassed Surface Water Channels for Road Runoff;

Advice received from the expert undertaking the Hydrological & Hydrogeological Chapter of the EIAR has also influenced the design.

1.7.1 Outline & Objectives

In accordance with the provisions of the DN-DNG-03022⁹, *Drainage Systems for National Roads*, the drainage design (Operational Stage¹⁰) has been developed to achieve the design principles outlined in *Quote 1-1*.

⁹ <http://www.tiipublications.ie/>

¹⁰ Construction Stage requirements, which includes an Erosion & Sediment Control Plan are also provided within the Environmental Impact Assessment Report (Volume 4).



*Quote 1-1: DN-DNG-03022-05 Design Principles for Drainage Systems***Design Principles**

1.5 There are three major objectives in the drainage of national roads:

- a) the speedy removal of surface water to provide safety;
- b) provision of effective sub-surface drainage to maximise longevity of the pavement and its associated earthworks; and
- c) minimisation of the impact of the runoff on the receiving environment.

It is also necessary to provide for drainage of earthworks and structures associated with the road.

In achieving these design principles, the methodology for the drainage design¹¹, considered 2 general criteria:

- (1) The interception and diversion of existing land drainage including *inter-alia*;
 - a. The separation of intercepted land drainage from the surface water generated by the mainline road surface (and where feasible the local road surfaces);
 - b. The direction of that intercepted land drainage under the footprint of the *Proposed Road Development* at a suitable location, which will insofar as is reasonably practicable, maintain the existing surface water catchment of the water body (existing rivers, streams, boundary ditches);
- (2) Road surface drainage – Surface water conveyance and site control, including *inter-alia*:
 - a. Identification of appropriate outfall locations;
 - b. Determination of the most appropriate method of surface water conveyance;
 - c. Establishment and design of onsite facilities for water quantity and quality treatment;

The figurative output of the design process is provided in Fig. 4.7.1 to 4.7.2 contained within Volume 3. The following paragraphs provide a summation of its main characteristics.

1.7.1.1 Criterion 1: Infrastructure Provided

The main method of diverting this drainage will be via land drains (Toe-drains and cut-off-drains) while structures in the form of culverts and clear span bridges (in the case of the larger Tully Stream), will direct the surface water under the proposed road embankments.

Toe drain and cut-off drains

Land Drains (open drains) will be provided at the top of cut slopes and at the toe of embankments where the surrounding land slopes towards the realignment. These drains will prevent runoff from adjacent land flowing onto the proposed works, and the ponding of water at the toe of embankments.

Diversions of Existing Watercourse Channels

The nature of the *Proposed Road Development* requires the diversion and realignment of existing minor watercourses and drainage ditches. The purposes of these diversions is for a number of reasons including in the main ease of construction and reducing the length of culvert span required. The main watercourse crossings requiring diversion are outlined in Figures 4.7.6 (*Lugatober Stream*), 4.7.7 (*Lugatober Drain*), 4.7.8 (*Collinsford Stream*) and 4.7.9 (*Lugnaqall Stream*). These diversions will be carried out in accordance with the requirements of the Outline Erosion and Sediment Control Plan

¹¹ The term *drainage design* shall be construed in accordance with the meaning of *design* in the context of the TII PMG Phase 3.



contained with Volume 4 of ~~this~~ **[the]** EIAR and with the mitigation measures described in Chapter 11 (Hydrology & Hydrogeology) of ~~this~~ **[the]** EIAR.

Culverts and river bridges

Drainage structures have been designed for a 1 in 100 storm return period including a 20% increase in flows for Climate Change. The parameters for hydraulically sizing the structures include the following specific criteria which satisfy OPW requirements for applications under Section 50 of the Arterial Drainage Act 1945:

- Bridges or culverts are capable of passing a fluvial flood flow with a 1 % Annual Exceedance Probability or 1 in 100 year flow without significantly changing the hydraulic characteristics of the watercourse;
- Structures are capable of operating under the above design conditions while maintaining a freeboard of at least 300 mm;
- Where the land potentially affected does not include dwellings and infrastructure, culverts are capable of operating under the above design conditions while causing a hydraulic loss of no more than 300 mm (excluding the culvert gradient);
- Where the land potentially affected includes dwellings and infrastructure, it is demonstrated that those dwellings and/or infrastructure are not adversely affected by constructing the bridge or culvert;
- Culvert diameters, or height and width are not less than 900mm to facilitate maintenance access and reduce the likelihood of debris blockage.

Flood Flows for each of the crossing points have been established based on the principles already set out. *Table 1-9* describes the maximum design characteristics of the structures on those main watercourses crossed by the *Proposed Road Development*.

Table 1-9: Main Watercourse Crossings

Location (approx.)	ID	Structure Type	Maximum Design Characteristics		Comments
			Width	Height	
600m	Tully River (Stream)	Clear Span	3.3	3m	The structure is oversized from the required Hydrological opening size in order to satisfy IFI requirements (clear span) and construction tolerances (foundations set back from the river/stream bank)
1230m	<i>Lugatober</i> Stream	Box Culvert	1.2	1.8	Depress Invert by a further 300mm in accordance with IFI requirements.
1500m	<i>Lugatober</i> Ditch	Pipe Culvert	1.2m		N/A
1925m	<i>Collinsford</i> Stream	Box Culvert	1.2	1.8	Depress Invert by a further 300mm in accordance with IFI requirements.
2210m	<i>Lugnagall</i> Stream	Box Culvert	1.2	1.8	Depress Invert by a further 500mm in accordance with IFI requirements.

All such structures crossing watercourses will incorporate the requirements of the NRA publication; *Guidelines for the Crossing of Watercourses during the Construction of Road Projects*, additionally, they will incorporate where appropriate mammal ledges as identified in the Biodiversity Chapter of the EIAR (alternatively, separate 600mm diameter pipes will be placed adjacent to the main watercourse crossing).

In addition to the forgoing, other minor land drains will require diversion under the embankments of the *Proposed Road Development*, these crossings which will be 1200mm diameter circular culverts, which will be squared where possible to minimize the length of culvert require.

All crossings will be constructed in accordance with the requirements of the Outline Erosion & Sediment Control Plan which is appended to the EIAR.

The development of the drainage design has been aided by consultation with the Inland Fisheries Ireland (IFI). This consultation process, will be maintained throughout the detailed design¹² stage.

1.7.1.2 Criterion 2 – Infrastructure Provided

The following section of ~~this~~ **[the]** EIAR describes the infrastructure provided in relation to the Road surface drainage. Further technical details, as already outlined are provided in Volume 4 (Appendices) of ~~this~~ **[the]** EIAR.

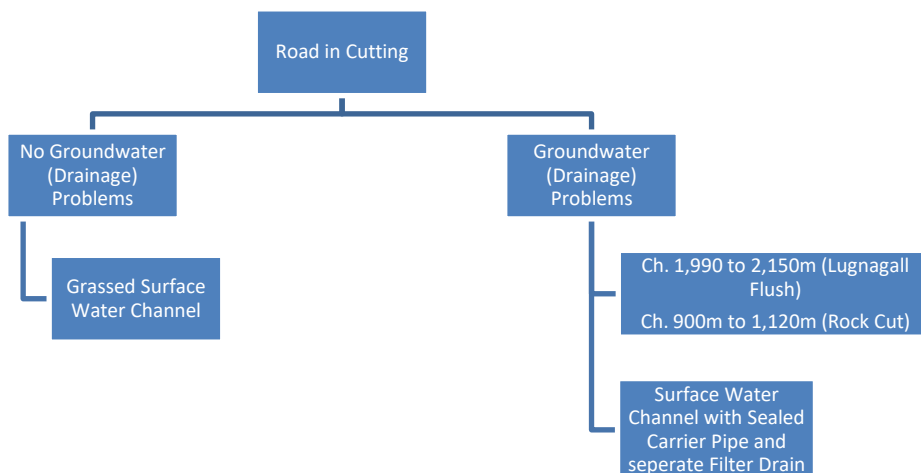
Surface Water Conveyance & Site Control;

The following text describes the Infrastructure provided for Surface Water Conveyance and Site Control.

Conveyance System

The conveyance system for the *Proposed Road Development* is outlined diagrammatically in Figure 4.7.1 to Figure 4.7.2 contained within Volume 3. The preceding *Figure 1-2* and *Figure 1-3*, provides a rationale to the selection of the various systems which are predominately Grassed and Concrete Surface Water Channels with Kerb & Gully systems, provided at junction locations for demarcation purposes. Each system will incorporate a sealed carrier pipe system where the channel capacity is exceeded.

Figure 1-2: Road in Cutting (Verge-Side Edge Drainage)



¹² Detailed design means a design prepared during Phase 5 and 6 of the TII Project Management Guidelines.



Figure 1-3: Road on Embankment (Verge-Side Edge Drainage)

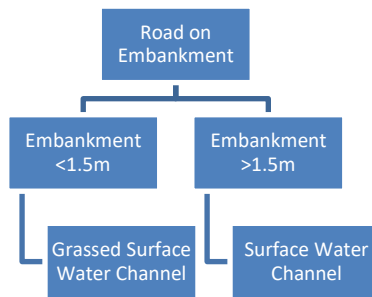


Figure 1-4: Schematic of Concrete Surface Water Channel¹³

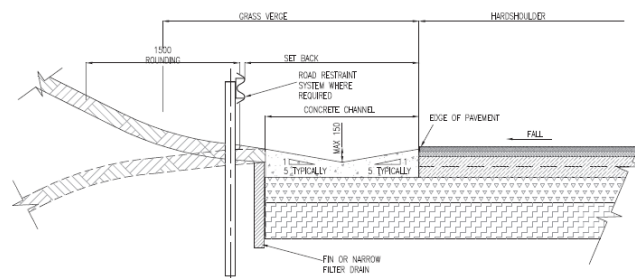
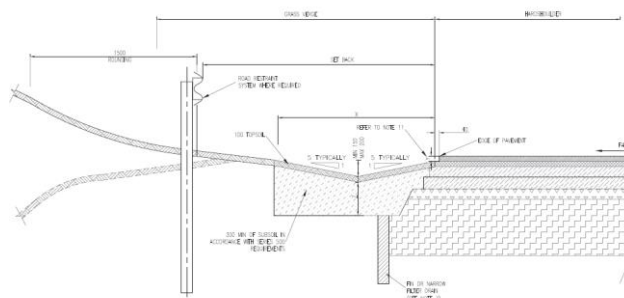


Figure 1-5: Schematic of Grassed Surface Water Channel¹⁴



Attenuation Ponds - Surface Flow Wetlands

Attenuation Ponds, in the form of Surface Flow Wetlands; will be provided at each outfall point discharging runoff from the paved area of the national primary route. These ponds, which will be in the form of vegetated systems (include Reeds (*Phragmites australis*) and Bulrush (*Typha latifolia*) for treatment purposes), will provide the treatment and flood storage requirements as set out in the preceding sections of this report.

Table 1-10 outlines the volume and surface area criteria required for each particular pond based on the various paved road areas contributing. Figures 4.7.3 (contained within Volume 3) present their plan locations while Figure 4.7.4 presents their typical geometric details. The outflows from these facilities will incorporate a penstock valve.

¹³ TII, SRW, Standard Construction Details, CC-SCD-00103

¹⁴ TII, SRW, Standard Construction Details, CC-SCD-00104-01



Table 1-10: Pond Volumes and Surface Areas

Outfall No.	Treatment Requirements			Storage Requirements		
	Storage Volume (Treatment)	Depth (B) (m)	Surface Area (m ²)	Storage Volume Attenuation	Depth (A) (m)	Surface Area (m ²)
Pond No. 01	153	0.4	382	203	0.3	675
Pond No. 02	98	0.4	245	130	0.3	433
Pond No. 03	418	0.7	597	535	0.7	765
Pond No. 04	52	0.4	130	66	0.3	221

Bypass Interceptors

Class 1 Petrol and oil bypass interceptors are proposed to be installed at outfalls from the mainline carriageway. These features are generally accepted as an effective means of controlling discharges of oil; particularly as such discharges primarily occur in first flush runoff when the receiving waters dilution levels can be low. They are also used for the containment of accidental spillages on the carriageway. Flows of up to 10% of peak flows are retained in a separation chamber for long enough to promote quiescent conditions, so that lighter than water pollutants such as oil and petrol can rise to the surface of the water. The pollutants are stored in a separator and the separated water discharges from the unit by gravity. If the flow rate rises above 10% of peak flows the excess is diverted by a bypass arrangement at the inlet and discharged without passing through the separation chamber. This ensures that peak flows will not cause 'wash out' of stored pollutants.

1.8 Geotechnical

1.8.1 Slope Stability

1.8.1.1 Cutting Slopes in Soil and Rock

A significant cutting of up to 13m depth (measured along the design centreline) in glacial till soils and limestone bedrock occurs between c. Ch. 900m and c. Ch. 1,160m along the route plus other minor cut areas of lesser depth below 5m.

Most permanent soil slopes will be constructed at an inclination of 2H¹⁵:1V¹⁶ but a local steepening (via a reinforced earth structure with a vegetated facing) of the earthworks eastern cut slope to 0.5H:1V is proposed near Ch. 1,375m.

Rock slopes may generally be formed at slopes of 1H:1V in competent limestone exhibiting RQD greater than 30% and free from clay filled discontinuities or adverse bedding / fracture planes relative to the cutting face. Temporary slopes to excavations may vary and are the responsibility of the Contractor and his earthworks designer.

Cuttings in mixed soil/weathered rock and competent rock will contain compound slopes as appropriate with a horizontal bench of width not less than 2m included at the upper surface of competent rock. Provision will be made for drainage in the cutting slopes where high groundwater is anticipated from Ch. 2,000m to c. Ch. 2,160m.

¹⁵ Horizontal

¹⁶ Vertical



1.8.1.2 Embankment Slopes

Embankments will be constructed of suitable fill material derived generally from tills and processed rock from the various cuttings or from the Soil Repository/Borrow Pit described in section 1.13.2.1 of this [the] EIAR.

Embankment slopes constructed from such glacial tills and rock fill, constructed on an adequate founding stratum, may generally be built at a minimum inclination of 2H: 1V (from a Geotechnical perspective).

Where a high fill embankment is required in excess of 10m at Ch. 1,160 to 1,320m, an access bench at least 2m wide will be incorporated into the embankment slope geometry at approximately the mid slope height (but not greater than 10m height).

This bench serves to provide access for maintenance and inspection, plus it provides flow break for vertical surface drainage thus limiting the risks of soil erosion on high slopes.

1.8.2 Road embankment design in soft ground areas

It has been identified that there are areas along the route of the *Proposed Road Development* where soft ground conditions will be encountered which are unsuitable to support the weight of the road embankment. These areas are outlined in Table 1-11 and Fig. 4.9.1 to 4.9.2 of Volume 3 for indicative purposes. The appropriate construction techniques to deal with these ground conditions will be confirmed during the detailed design and construction stage; however, for the purposes of assessing the environmental effects, the most potentially environmentally significant method of dealing with same has been considered, which is that the soft material unsuitable for supporting the weight of the proposed route would be dug out and replaced with suitable fill material.

This allows the engineering, environmental and monetary impacts of the *Proposed Road Development* to be determined and in particular to facilitate the Environmental Impact Assessment to be completed on a reasonable basis reflecting general practice within the industry.

The volume of soft materials expected to be encountered within these soft ground areas are expanded upon in section 1.13.2 of this Chapter.

Table 1-11: Indicative locations of soft ground conditions anticipated to be encountered

Chainage (m)		Average Depth (m)	Max Thickness (m)
From	To		
240	500	1.3	1.6
550	650	1.1	1.4
1,160	1,330	1.8	4
1,870	1,980	1.4	1.9
2,170	2,300	1.3	1.6

1.8.3 Drainage (For Geotechnical requirements)

A closed drainage system will be provided in areas of cutting occurring within zones of extreme aquifer vulnerability where limestone bedrock will be exposed in cuttings or soil cover reduced to less than 3m and also in areas where open drainage could affect discharge from natural petrifying springs. These sections extend from c. Ch. 750 to Ch. 1,120m; Ch. 1,330 to 1,500m; and from Ch. 1,980 to Ch.2150m. Separate recommendations regarding hydrogeology are outlined in Chapter 11 of this [the] EIAR.

The cutting between c. Ch. 1,980 and 2,150m appears to encounter high groundwater levels in glacial fine grained soils and may require the provision of both slope drains to cutting side slopes plus a drainage blanket.

1.9 Route Lighting

1.9.1 Introduction to lighting

This section describes the lighting (See Figure 4.12.1 contained within Volume 3) along the *Proposed Road Development*. The provisions are preliminary in nature and the final design of the road lighting system will be undertaken as part of the detailed design stage in accordance with the relevant standards as outlined below.

The preliminary lighting design has been undertaken using the performance characteristics of a particular proprietary lantern. This does not preclude proposing an alternative lantern, provided that the proposer can demonstrate equal or better performance with the alternative proposed.

1.9.2 Road Lighting Standards

The lighting shall be designed in accordance with the following standards:

- IS EN 13201-2: 2003 Road lighting Performance requirements;
- BS 5489 -1: 2013 Code of Practice for design of Road Lighting, Part 1: Lighting of Roads and Public Amenity Areas;
- DN-LHT-03038: Design of Road Lighting for the Strategic Motorway and All Purpose Truck Road Network; and
- Other various documentation in accordance with TII policy and associated BS codes of practice.

The design of lighting columns shall include the following;

- Slim galvanised steel construction without outreach brackets;
- The mounting height of the lanterns will be dictated by the overall road width and the Lighting Class applicable to the various category of road. In any case, columns will have a mounting height no higher than 10 metres;
- The lighting columns shall not be painted;
- The lanterns shall be light emitting diode (LED) type, fully cut off "Flat Glass" with Electronic control gear, Philips Luma type, or similarly approved. They will be installed with Zero tilt to minimise glare and light spill.
- All cabling associated with lighting will be located underground.

1.9.3 Road Lighting Proposals

The Southern tie-in, which comprises a three arm roundabout arrangement, is the only location which requires lighting on the *Proposed Road Development*.

Southern tie-in - Roundabout

It is proposed to light the roundabout with 10m columns and no bracket arms, situated around the periphery, each carrying a high quality LED lantern. The new route north of the roundabout will be lit with a single sided arrangement of lights to a distance of 139 metres from the roundabout. The single-carriageway south of the roundabout will be lit also to a distance of 139 metres with a single-sided arrangement of lights. The L3406-0 will be lit to a distance of 111 metres from the roundabout.

The lights on each of the roundabout approaches, will be 10 metre columns without bracket arms, and LED lanterns.

The lighting levels on the roundabout and approach roads shall comply with the recommendations for Class CE3 of IS EN13201 (15 lux average, Overall Uniformity U_o 0.4). See Tables A.3 and A.4 of BS 5489-1.

1.9.4 Environmental Impact

The main impact of the proposed installation on the environment is the visual impact by day and night. The lighting will operate on automatic "dusk to dawn" switching for approximately 4,150 hours of the year. By its nature, public lighting consumes mainly off peak electricity, thus allowing more efficient use of generating plant which might otherwise be underutilised or idle when industrial, commercial and domestic demand is low at night.

Visual Impact by Day

The recommended scheme, consisting of lighting columns of 10m in height throughout the project, will intrude somewhat on the vista of the roads. This effect will be minimised by the use of well-designed slim folded steel columns without outreach bracket arms, and compact LED lanterns. All public lighting circuit cables will be placed underground thus eliminating the visual intrusion of overhead cable systems.

Impact by Night

Because much of the *Proposed Road Development* runs through largely undeveloped rural areas, special measures are recommended to minimise the impact of the lighting installation on the night-time environment. The lanterns will be fully cut-off flat glass type mounted at zero degrees tilt to the horizontal, which will eliminate light emission above the horizontal, and effectively limit light spillage beyond the road boundary.

1.9.5 Route Signage and Road Markings

1.9.5.1 Introduction

Clear and unambiguous signage is essential for the safe and efficient operation of the road network. Signage includes signs on posts and carriageway markings. Traffic Signs are divided into three group's namely regulatory signs, information signs and warning signs.

1.9.5.1.1 *Regulatory Signs*

Regulatory traffic signs indicate the existence of road regulations or implement such regulations or both. Regulatory signs may be either mandatory or prohibitory.

1.9.5.1.2 *Information Signs*

Information signs give road users information about routes and facilities of interest. The colour of information signs depends on the route classification. In the case of the *Proposed Road Development*:

- Signs indicating a national route have white lettering with yellow route number and white border on a green background;
- Signs on routes other than national routes have black lettering, symbols and border on a white background.

Facilities of interest to tourists are shown with white lettering, symbols and border on a brown background.

1.9.5.1.3 Warning Signs

Warning signs give notification of a hazard ahead and are diamond shaped. The hazard is indicated by a black symbol on a yellow background.

1.9.5.2 Design of Signage

Traffic signage, including regulatory, warning and directional signs, are to be implemented following consultations with the TII in compliance with the relevant standards, specifications and guidelines of the TII, Department of Transport, Tourism and Sport, and the Department of the Environment, Community and Local Government, including:

- The tie in at the southern end of the *Proposed Road Development* will require a network of signage to convey the necessary information to the driver and to improve the safety of the road and junction arrangement. This signage will include advance directional signage at circa 2km, 1km and 500m distance prior to the junction, as well as junction off signs and route confirmation sign following the junction. These signs will be in conjunction with any regulatory signage required which will be addressed during the detailed design stage;
- New information signs will also be required to direct traffic to the various new junction arrangements along the *Proposed Road Development*. There will also be a requirement to remove, relocate or amend existing signage on the local surrounding network;
- Signage for facilities/tourist locations will include that for Glencar Lake and Waterfall, which will also be provided in accordance with policy documents and standards.

The proposed road signage will be examined in more detail during the detailed design stage. All of the proposed signs will be accommodated within the landtake of the *Proposed Road Development* or alternatively within existing road corridors controlled by the Local Authority.

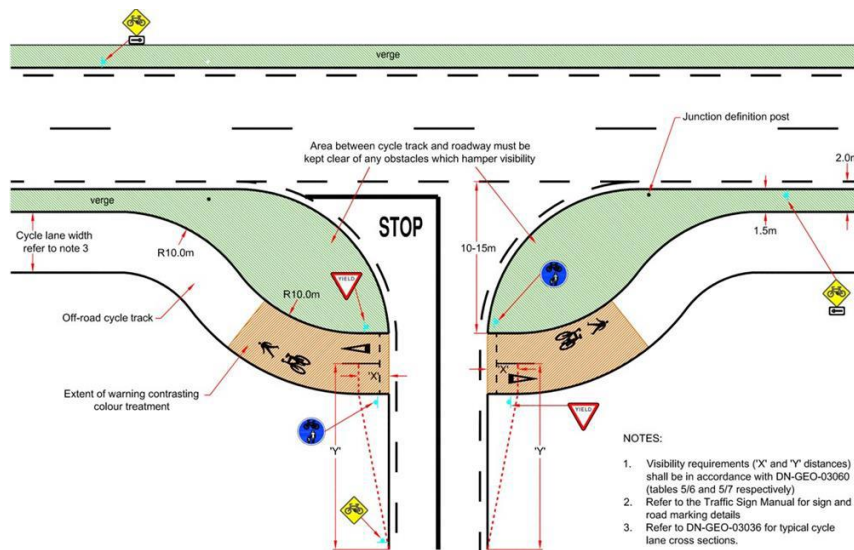
1.10 Vulnerable Road Users

The Vulnerable Road Users, including by extension the Cycleway and Pedestrian Strategy, is presented in Figure 4.8.1 and 4.8.2 contained within Volume 3 of the EIAR.

It is proposed that a dedicated online two way facility (within the verge space) be integrated with an offline facility (incorporating appropriate lining and signage) between *Drumkilsellaigh* and *Castlegal*. The connection point between the offline and online sections will be separated via a staggered approach barrier in accordance with Figure 7.5 of TII DN-GEO-03047⁷.

Conflict points with the local network and direct accesses are considered, due to the low volume of traffic concerned, to be low risk, and as such are designed as uncontrolled crossings in accordance with the requirements of DN-GEO-03060⁷. These crossings are in this regard designed as bend out crossings in accordance with section 5.4.1 of the aforementioned standard and as outlined indicatively in *Figure 1-6*.

Figure 1-6: Extract from DN-GEO-03060, Figure 5.7, Bend out Crossing

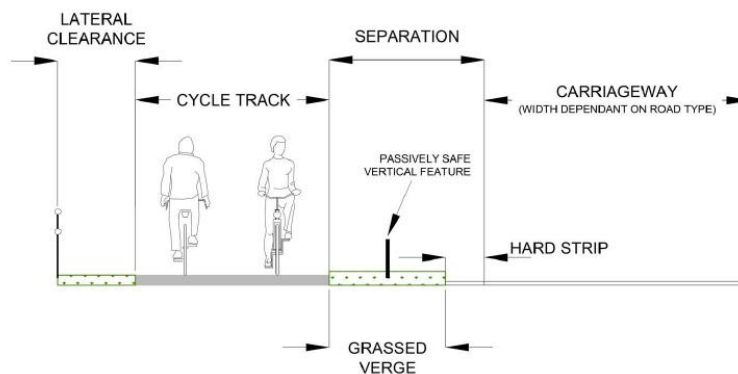


The mainline track will terminate at the proposed N16’s junction with the L3404-0; until such time as the remainder of the N16 Sligo to County Boundary Emerging Preferred Route is upgraded.

Table 1-12: Cycle Track Geometry

Element	Width (m)	Notes
Separation	2m (including 0.5m Hard Strip)	N/A
Cycle Track	2m	Shared use Two Way cycle facility with pedestrians
	3m	Mainline Chainage 100m to 370m – Extra ‘wobble room’ is provided considering the vertical gradient is c. 4.5%
Lateral Clearance	1m	N/A
Total Verge Width Required	4.5m	N/A

Figure 1-7: DN-GEO-03036: Ref. Figure 3.3: Off-Road Two-Way Cycle Track



Safety Barriers where required (see figure 4.11.1 and 4.11.2 contained within Volume 3 of this [the] EIAR) will be positioned between the carriageway and the cycle track. The minimum distance between the cycle track and the safety barrier shall be equal to the working width of the safety barrier and comply with the minimum lateral clearance requirements. In addition, any exposed safety barrier posts facing the cycle track will be of a type that would not snag cyclists. For safety reasons,

supplemental boundary fencing (to that outlined in section 1.11) will be provided where these tracks traverse fill slopes; these fences shall be positioned between the edge of the track and the top of the fill slope.

In accordance with Section 3.4 of DN-GEO-03060⁷ road markings and signs will be adequately provided at the entry and at suitable distances along the cycle route. Yield signs and road markings will be provided to indicate vehicle priority at junctions.

Table 1-13 outlines the local connectivity considerations where the local network intercepts the *Proposed Road Development*, this as outlined in Section 1.3.2 of Volume 2, has resulted in the provision of the Vulnerable Road Users underpass in the townland of *Lugatober*.

Table 1-13: Vulnerable Road Users – Local Connectivity

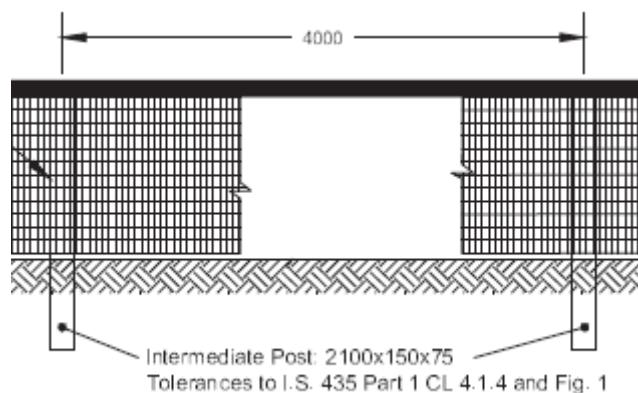
Number	Side Road Ref	Mainline Reference	Design pertaining to Vulnerable Road Users
SR01	L3406-0	Ch. 0m	Bend out crossing as per Figure 1-6, which in accordance with section 6.5 of DN-GEO-03060 is located between 10 and 15 metres from the circulatory carriageway of the roundabout.
SR02	Existing N16	Ch. 0m	
SR03	L7415-0	Ch. 685m	Diversion of Vulnerable Road Users to a mainline crossing point at c. Ch. 840m. Reconnection to the north/south is then provided via the dedicated cycleway with no further requirement to cross the mainline, other than at the southern tie in described above.
SR04	Severed N16 (<i>Castlegal</i>)	Ch. 840m	Reconnection to the north/south via the dedicated cycle with no further requirement to cross the mainline, other than instances where VMU's wish to access the L7415-0 as outlined above.
SR05	Severed N16 (<i>Castlegal</i>)	N/A	As above
SR06	Severed N16 (<i>Lugatober</i>)	Ch. 1,155m	This Side Road will be closed to VMU access via the provision of signing.
SR07	L7413-0	Ch. 1,350m	Reconnection to the north/south via the dedicated cycle with no requirement to cross the mainline, other than in the instances described above. Local access is maintained via a subway underpass.
SR08	L34041-0	Ch. 1,955m	Reconnection to the north/south via the dedicated cycle with no requirement to cross the mainline, other than in the instances described above. Local access is maintained via diversion and via the underpass (subway design) described above at the L7413-0.
SR09	L3404-0	Ch. 2,155m	Reconnection to the north/south via the dedicated cycle with no requirement to cross the mainline, other than in the instances described above. Local access is maintained via diversion and via the underpass (subway design) described above at the L7413-0.

1.11 Boundary Fencing

Boundary fencing for the *Proposed Road Development* will be timber post and tension mesh fence complying with CC-SCD-00320⁷ (as outlined indicatively in *Figure 1-8*). Where such fencing is required

to be mammal proof as outlined in 9.5 of this [the] EIAR, it shall comply with the provisions of CC-SCD-00324.

Figure 1-8: Boundary Fence



1.12 Utilities and Services

The construction of the *Proposed Road Development* will generally result in some limited impact on existing utilities.

Those companies and organisations whose plant may be affected have been consulted during the development of the project. These include:

- Electricity Supply Board (ESB);
- Electricity Supply Board International (ESBI);
- Irish Water; and
- Eircom (Telecommunications);

The disruption of utilities along the route has the following implications for the design and construction of the project:

- It will be necessary to re-route sections of existing services, with connections back to the existing apparatus at the terminal points of these services;
- Provision shall be made for proposed additional services and extensions to existing networks, in particular at bridge crossings;
- For existing services, it may be necessary to maintain these services as far as possible during construction. This may entail temporary service diversions and/ or staging of works during the construction phase;
- At detailed design stage, all existing services will be confirmed on site and the various utility companies and local authorities shall be consulted to confirm any additional and amended service infrastructure.

1.13 Construction of the *Proposed Road Development*

1.13.1 Programme & Contract

Subject to satisfactory completion of the statutory procedures and to the availability of finance; it is anticipated that advance works will commence in late 2019, with construction work commencing in 2020.

It is expected that the *Public Works Contract for the Provision of Civil Engineering Works Designed by the Employer (PW-CF3)* issued by the Department of Finance, will be the form of Contract to be used for the *Proposed Road Development*.

The construction period is anticipated to last approximately 18 months. Normal hours of work, unless specific restrictions are placed on certain activities within certain chapters of the EIAR will be:

- Monday to Friday: 08:00 to 19:00 hours;
- Saturday: 08.00 to 14:00 hours;
- Sunday: No Working.

Certain operations may however be carried out, outside of these hours with the permission of the contracting authority.

Where restrictions are placed on the Contractor due to seasonal constraints, consideration will be given to advance works being undertaken where appropriate.

1.13.2 Earthworks Volumes

The design stage of the *Proposed Road Development* has identified that earthworks balancing (cut:fill) when applied exclusively to the material won and generated in the course of the various design elements leads to a deficit of fill material and the generation of soft soil material which is unsuitable for the construction of road embankments. This is mainly as a consequence of:

- The mountainous and undulating nature of the topography;
- The characteristics of the glacial till deposits which the *Proposed Road Development* intercepts, insofar as the Ground Investigation results indicate that the material excavated from the upper surfaces of road cuts generally appears to be unsuitable for road construction purposes;
- The interception of areas of soft ground along the route which will require to be excavated from underneath proposed road embankments (as expanded upon in in section 1.8) and replaced with suitable fill material;

An overview of the likely earthworks volumes generated by the *Proposed Road Development* are outlined in the preceding table.

Table 1-14: Earthworks Materials

Description	Volume (approx.)
Topsoil excavated	19,000m ³
Overall Cut (Suitable + Unsuitable)	130,000m ³
Cut acceptable material (Rock and Glacial till)	93,000m ³
Cut unacceptable material (Glacial till) – Pre treatment	37,000m ³
Cut unacceptable material (Glacial till) – Post treatment	25,000m ³
Soft unacceptable material excavated underneath embankments (Glacial till and minor alluvial deposits) – Pre treatment	40,000m ³
Soft unacceptable material excavated underneath embankments (Glacial till and minor alluvial deposits) – Post treatment	34,000m ³
Embankment fill material requirement	158,000m ³
Additional fill underneath embankments (soft ground)	40,000m ³
Acceptable fill material arising from cut sections and following treatment (incl. treated soil from soft ground)	111,000m ³
Potential for Rock material to be processed into Capping	12,000m ³
Acceptable fill material remaining from Cut sections following processing into Capping	99,000m ³
Material Importation – Pre Soil Repository/Borrow Pit (SR/BP)	99,000m ³
[Brackets] indicate post SR/BP scenario – See proceeding section for details.	[40,000m ³]

1.13.2.1 Soft Soil management & additional site won material

1.13.2.1.1 *Outline of approach*

Soil Repository/Borrow Pits

The following is an outline of the characteristics pertaining to the Soil Repository/Borrow Pit (SR/BP) at *Castlegal* townland, an activity which has already been referred to in section 3.4.3.2 of this [the] EIAR.

Although there are some prescriptive design assumptions made; these should be construed as a demonstration of how the pits could be developed and the maximum envelope available for utilisation at the site. The intention is that the contractor can later select from within that envelope. This is done, notwithstanding the fact, that it will be the contractor's prerogative to determine onsite dimensions using the principles of adaptive management during the detailed design and construction stage respectively.

The Soil Repository/Borrow Pit configuration has been selected for backfilling predominately with glacial till material excavated during the course of the construction works and considered unsuitable for the construction of road embankments (but which are suitable for land infilling purposes).

The associated figure relating to the following text is provided in Figures 4.10.1 of volume 3.

Soil Repository/Borrow Pit Configuration (SR/BP)

Outline

The following are outline objectives for the site configuration:

- (1) The topographical slope following the landscape establishment period will resemble as close as possible its pre excavation slopes. The landscape establishment period shall be 24 months following reinstatement, or, in any event at a time when the settlement monitoring indicates that the material within the pit has fully consolidated itself and the grass sward has fully re-established itself. Should deviations be determined within this period, then an additional spread of topsoil shall be applied and seeded appropriately. During this 24 month period and following grass seeding, the appointed contractor shall manage the land as part of the landscape maintenance works for the *Proposed Road Development*. To demonstrate compliance with this, the contractor will be required to develop a method statement for backfilling the pit and a monitoring programme which shall outline the rate of settlement;
- (2) The topsoil quality and depth at the site shall be surveyed pre-excavation and returned to a similar state following the repository stage;
- (3) The lands will be made available for return to the original agricultural use (meadow crop and grassland grazing) following completion of the landscape establishment period;
- (4) The material volume characteristics of the Soil Repository/Borrow are:
 - a. The extraction volume (excavation of suitable material for road construction) will be balanced by the deposition volume of soft soil arising from the site (circa 59,000m³).

Material Extraction

The material extraction process shall generally be by machine excavation, with the potential for some blasting in accordance with the following general principles:

- (1) Prior to excavation, the contractor shall have the material required to reinstate the pit identified both in terms of quantity and source.
- (2) The upper surface of the drumlin which is determined by the contractor to be unsuitable for use in the embankments, environmental bunds or the constructed wetland attenuation facilities shall be set aside for eventual restoration as part of the repository stage;
- (3) The suitable material won from the pit shall in the first instance be used in the adjacent fill areas of the *Proposed Road Development*, where haulage is required further afield this shall be done principally within the confines of the CPO boundary on tracks which will be the responsibility of the contractor to provide;
- (4) Water quality management within the development of the pit shall be in accordance with the criteria set out in the outline Erosion and Sediment Control Plan;
- (5) In advance of any blasting or rock breaking being carried out in the pits, a pre-condition survey shall be carried out on all structural properties within a 500m radius of the pits. An additional survey shall be carried out within 6 weeks of the final extraction at the site;

Soil Repository Stage

- (1) The material to be deposited shall be from the glacial till subsoil material generated in the first instance from the adjacent road cut which is considered to be unsuitable for the purposes of road embankment construction;
- (2) Specific limits in terms of Noise & Vibration, Air Quality, Hydrology and Hydrogeology will apply during the extraction process of the pit. These relate to such things as vibration limits

from blasting, dust emissions and interception of groundwater flows and are expanded upon in the various chapters of the EIAR;

- (3) Land drains shall be provided as outlined in Figure 4.10.1 of Volume 3. Controls as outlined in the outline Erosion and Sediment Control Plan shall be incorporated into these drains prior to their discharge to the adjacent watercourse;

Benefits

In addition to returning the land to its pre-excitation state; the benefits arising from this approach are a reduction to negligible quantities of material which would otherwise be required to be exported offsite and a reduction in the earthworks import requirements from circa 111,000m³ to 40,000m³.

1.13.3 Construction & Demolition Waste Management Plan

An *Outline* Construction and Demolition Waste Management Plan has been prepared for the *Proposed Road Development* and is included within Section 4 of Volume 4 (Appendices) **[of the EIAR]**. This plan initiates the Construction and Demolition Waste Management process and an obligation as part of the contract documents for the project will be placed on the Contractor to develop, maintain and operate a more detailed Construction and Demolition Waste Management Plan.

The Outline plan addresses the following aspects of the project:

- Analysis of the waste arising/material surpluses;
- Waste handling and methods identified for the prevention, reuse and recycling of wastes;
- Material handling procedures;
- Roles including training and responsibilities for C&D waste; and
- Waste Auditing protocols.

1.13.4 Construction Compounds

A Construction Compound will be required for the duration of the works. Provision has been made for this compound to the west of the proposed mainline alignment at circa Ch. 500m as outlined in Figure 4.1.1 contained within Volume 3 of ~~this~~ **[the]** EIAR.

The activities at the compounds may include stores, offices, materials storage areas, materials processing areas, plant storage, parking of site and staff vehicles, and other ancillary facilities and activities. Controls in relation to the development and operation of the compound are described in section 5.3.5 of the Outline Erosion and Sediment Control Plan described in section 1.13.8 of ~~this~~ **[the]** EIAR.

Following completion of the construction period, the site location of this compound, shall be returned to its pre-use (agricultural grassland) state.

1.13.5 Temporary Access and Construction Traffic

Construction traffic will be generated by movement of material, equipment and supply vehicles. A small amount of traffic will be generated by site personnel.

Primary access to the site for all construction vehicles will be provided from the existing N16:

- At the southern tie in;
- In the townland of *Drumkilsellagh* at c. Ch. 400m;
- In the townland of *Lugatober* at c. Ch. 1,120m;
- In the townland of *Lugatober* at c. Ch. 2,150m;

It is anticipated that construction traffic will also use a haul road along the road corridor itself (within the landtake area), for access. The use by construction traffic of local roads will be limited to the works which are required to construct each particular local road.

Vehicle movements will be required for the movement of material on haul roads within the site boundary. At the peak construction times this may result in approximately 200 traffic movements a day (approximately 30 movements an hour).

In order to minimise disruption, a traffic management plan for the construction period will be developed.

The Contractor will be responsible for daily inspection and maintenance of roads to ensure that they are free of construction debris, dust and mud.

1.13.6 Temporary Road Diversions

The locations where temporary diversions during construction of the realignment are listed below. These diversions will in most cases be accommodated within the land-take required for construction of the *Proposed Road Development*. However, there are localised instances where diversions will be required via alternative routes on the local and regional road network.

All diversions will be planned in a manner, which will include advance notification and publicity of the diversion times and duration. The diversion routes themselves will be subject to appropriate traffic management and control which will include directional signing along the prescribed route.

In all additional cases to those described below, local road access shall be maintained throughout the construction process via localised treatment measures within the landtake required for the *Proposed Road Development*.

Table 1-15: Temporary Road Diversions

Location	Townland (s)	Temporary Diversion Required	Notes
L3406-0	<i>Doonally, Drumkilsellagh.</i>	No	Temporary access arrangements to be accommodated during construction (within the CPO) either on or adjacent to the L3406-0, the existing N16 and the construction site.
Existing N16	<i>Drumkilsellagh, Drum East, Lugatober.</i>	No	Temporary access arrangements to be accommodated during construction (within the CPO) on or adjacent to the existing N16 and the construction site.
	<i>Lugatober, Lugnagall.</i>	Yes	Temporary regional diversion (on the R280, R287, R288 and the R286) will be required for a period of c. 2 weeks. This will facilitate the completion of bulk earth works between c. Ch. 2,030m and c. Ch. 2,160 and the design/construction of traffic management measures which will facilitate temporary access arrangements thereafter (within the CPO) on or adjacent to the existing N16 and the construction site.
L7415-0	<i>Castlegal.</i>	No	Temporary access arrangements to be accommodated during construction (within the CPO) either on or adjacent to the L7415-0, the existing N16 and the construction site.
L7413-0	<i>Lugatober</i>	Yes	Temporary local diversion will be required for a period of c. 3 weeks. Prior to this diversion being put in place, the underpass at c. Ch. 1,300m will be open to pedestrian traffic, via a 1.2m (min width) temporary gravel access track. This will facilitate the completion of bulk earth works between c. Ch. 1,340m and c. Ch. 1,420 and the design/construction of traffic management measures which will facilitate temporary access

Location	Townland (s)	Temporary Diversion Required	Notes
			arrangements thereafter (within the CPO) on or adjacent to the L7412-0, the existing N16 and the construction site.
L34041-0	<i>Collinsford, Lugnagall.</i>	No	Temporary access arrangements to be accommodated during construction (within the CPO) either on or adjacent to the L34041-0, the existing N16 and the construction site.
L3404-0	<i>Lugnagall</i>	Yes	Temporary local diversion will be required for a period of c. 3 weeks. This will facilitate the completion of bulk earthworks/drainage along the local road and the design/construction of traffic management measures which will facilitate temporary access arrangements thereafter (within the CPO) on or adjacent to the existing N16 and the construction site.

1.13.7 Construction Works

The following outlines the likely stages of the construction works, general impacts and mitigation measures that will be employed during this stage.

1.13.7.1 Pre-Construction Works

Archaeological surveys and testing will be undertaken prior to the main works starting in order to resolve archaeological issues. Following resolution of the archaeology, site clearance will require the use of large machinery and vehicles. Advance works will include diversion of services where required and vegetation clearance.

1.13.7.2 Main Earthworks Activities

1.13.7.2.1 *Creation of Highway Formation, Structures and Drainage*

Materials brought to site will include concrete structural elements, concrete, materials for the road pavement, cement, hard-core/gravel, pipes, chemicals and oils. The construction of the roads and associated structures will involve earth movements, crossing services, site drainage and run off, dewatering operations, working near, or within watercourses and laying the road pavement.

1.13.7.2.2 *Fencing and Landscaping*

Fencing will be erected as required to delineate boundaries and to minimize disturbance to adjoining land. The majority of the major earthworks required for landscaping will be undertaken during the main construction phase. Landscaping works will be included as part of the main construction contract.

1.13.7.2.3 *Protection of Topsoil*

The contractor will be required to prepare and implement a Topsoil Management Plan as part of the contract Environmental Operating Plan. This will address issues of stripping, handling, storage and re-spreading to ensure that impacts on soil condition and ecology are minimised and the completed scheme maximises the environmental benefit of the soils reuse.

1.13.7.2.4 *Blasting*

There is potential that some blasting will be required in the cut between c. Ch. 900m and c. Ch. 1,160m and within the Soil Repository/Borrow Pit in the same area.

Blasting, if carried out, shall be in accordance with the mitigation measures outlined in Chapter 7 (Noise and Vibration) **[of the EIAR]** in addition to a pre-condition survey carried out on all structural

properties within a 500m radius of such locations. An additional survey shall be carried out within 6 weeks of the final extraction of material from the site.

1.13.7.3 Assessment of Effects, Mitigation Proposals and the Environmental Operating Plan

Details of the predicted impacts and mitigation associated with the construction of the *Proposed Road Development* are included within the relevant chapters. The environmental measures detailed within the EIA will be implemented as an integral part of the *Proposed Road Development*. An Environmental Operating Plan (EOP) will be prepared by the appointed contractor in accordance with TII Guidelines for *the Creation, Implementation and Maintenance of an Environmental Operating Plan*. This plan will outline procedures for the delivery of environmental mitigation measures and for addressing general day-to-day environmental issues that can arise during the construction phase of the *Proposed Road Development*. It will also include statutory obligations, recommendations and guidelines of statutory environmental bodies and agencies and current best practice related to environmental protection during construction.

Construction effects are generally of short-term duration and are localised in nature. In considering the possible methods of mitigation it is necessary to balance the severity of the impact with its duration. For example, it may be better to cause greater disruption over a shorter period than less disruption over an extended period. Disturbance arising from construction may result from various activities including preparatory works, diversion of services, noise and vibration from plant, excavation and fill operations, stockpiling and handling, construction traffic, severance of roads and accesses and the duration and timing of construction.

Disruption due to construction can be mitigated to a certain extent by imposing working restraints within the contract documentation. Mitigation will include:

- Adopting good working practices;
- Adequate site supervision;
- Development of working methods to protect areas of importance;
- Programming to minimise environmental disturbance (e.g. working hours, avoiding ecologically sensitive periods);
- Pollution control measures as described in the Outline Erosion and Sediment Control Plan described in section 1.13.8 of this Chapter;
- Access to agricultural holdings and property will be maintained where possible;
- Local liaison and involvement of regulatory bodies;
- Appropriate traffic management and signing (including restricting heavy construction traffic to approved routes and access points);
- Restriction of working hours and types of plant and machinery used;
- Supervision and control of deliveries and storage;
- Covering loads and stockpiles;
- Damping down during dry weather conditions.

1.13.8 Construction Stage Water Quality Considerations

1.13.8.1 Overview

An Outline Erosion and Sediment Control Plan (contained within volume 4 of this [the] EIA) has been prepared as a method of water quality mitigation to offset potential Construction Stage pollution

impacts from the *Proposed Road Development* to adjacent watercourses including the Tully Stream and tributaries of the Drumcliff River.

The Plan is intended to inform the Construction Stage Erosion and Sediment Control Plan which, in turn, will form an integral part of the Environmental Operating Plan for the *Proposed Road Development*. In particular, the mitigation, control, monitoring and emergency measures for the *Proposed Road Development* in relation to Erosion and Sediment Control are described in this document. The Plan is also used to:

- Inform the Hydrological & Hydro-geological and in turn the Biodiversity Impact Assessments; and
- Ensure sufficient lands have been included within the CPO to treat sediment runoff during the Construction Stage for the *Proposed Road Development*;

1.13.8.2 Principles of Erosion and Sediment Control

The principles of erosion and sediment control during the construction stage of a roads project as outlined in CIRIA C648 include.

- (1) Erosion control (preventing runoff) which is much more effective than sediment control in preventing water pollution. Erosion control is less susceptible to failure from high rainfall, requires less maintenance and is also less costly;
- (2) Plan erosion and sediment control at the design stage, as far as practicable, so that requirements can be built into the design and land requirement for the project and to inform the details of the Construction Stage Erosion and Sediment Control Plan;
- (3) Minimise erosion and potential for soiled water to be generated by minimising runoff;
- (4) Install drainage and runoff controls before starting site clearance and earthworks;
- (5) Minimise the area of exposed ground;
- (6) Prevent runoff entering the site from adjacent ground, as this creates additional polluted water;
- (7) Provide appropriate control and containment measures on site;
- (8) Monitor and maintain erosion and sediment controls throughout the construction period of the project;
- (9) Establish vegetation as soon as practical on all areas where soil has been exposed.

This Outline Erosion and Sediment Control Plan initiates these principles for eventual incorporation and expansion in the Construction Stage Erosion and Sediment Control Plan.

1.13.9 Monitoring of Environmental Commitments

The environmental commitments outlined in ~~this~~ **[the]** EIAR will as already discussed (section 1.13.7.3 of this Chapter) be included within the EOP to be developed by the Contractor. The Employer's Representative appointed by the Local Authority will be responsible for the auditing of this plan and for ensuring that commitments described in ~~this~~ **[the]** are implemented by the contractor.

1.14 Operation and Maintenance

During a period of 24 months after construction, remedial and maintenance works will be undertaken as required. During the period of establishment, landscaping maintenance will be carried out.

Routine maintenance on National Primary Roads is normally undertaken by the Local Authority. In general, routine maintenance comprises grass cutting, road sweeping, gully emptying, street light maintenance and landscape maintenance.

1.15 Other Statutory Considerations

1.15.1 Compulsory Purchase Order Considerations

The *Proposed Road Development* by its nature will require a permanent Compulsory Purchase Order (CPO) for an area of c. 23.85 of land (including roadbed) comprising in the main agricultural lands.

All lands included are considered necessary for the construction of the *Proposed Road Development*.

A CPO for the purchase of land for the purposes of road construction, other than a motorway, is effected by Local Authorities (being the Roads Authority) under section 76 of (and the Third Schedule to) the Housing Act 1966 as extended by Section 10 of the Local Government (No. 2) Act 1960 (as substituted by Section 86 of the Housing Act 1966) and amended and extended by section 6 (and the second schedule) of the Roads Act 1993 and the Planning and Development Acts 2000 to 2018, the Housing Acts 1966 to 2014, the Local Government Acts 1925 to 2016 and the Roads Act 1993 to 2016, which is published in accordance with article 4 (a) of the Third Schedule to the Housing Act 1966.

The following parameters have been used to identify the land required for the construction and operation of the *Proposed Road Development*:

- Proposed road footprint;
- Proposed footprints of attenuation wetland pond facilities;
- Areas required for other drainage elements including outfalls, culverts, ditches and petrol interceptors;
- Access tracks;
- Areas for landscaping;
- Areas for construction;
- Maintenance strip;
- Acquisition of severed land plots; and
- Areas required for soil repositories/borrow pits;

In addition, further areas required under a temporary Compulsory Purchase Order include:

- Areas required for temporary sediment controls which are described in the Outline Erosion and Sediment Control Plan contained within Volume 4 of this EIS and described in 1.13.8 of this chapter;
- Areas required for construction of the permanent fence boundary;
- Areas required to construct retaining walls to domestic properties;
- Area required for the proposed site compound.

1.15.1.1 Accommodation Works

Accommodations works are carried out to mitigate adverse effects of the *Proposed Road Development* on individual land and property owners. These works will be carried out as part of the main roadwork's contract and generally consist of providing items such as gateways, walls and fences, cattle pens, replacement services and such like. Further information is given in Chapter 14 and 15 of this [the] EIAR.

1.15.1.2 Access tracks:

1.15.1.2.1 *Agricultural & Domestic*

The land ownership mosaic has been used to establish access requirements and to evaluate side road and mainline realignments.

The access tracks proposed as already outlined in 1.2.2.1 will:

- Ensure landowners have access to the road network in the area;
- Eliminate direct accesses as far as it reasonably practicable onto the proposed N16;

1.15.1.2.2 *Service Tracks*

Access to drainage treatment locations as already outlined in 1.2.2.1 will where viable be incorporated with agricultural access tracks. Where additional sections of track are required for this purpose they will be constructed to the same standard as the agricultural tracks.

1.15.1.3 Extinguishments of Rights of Way

There are a number of both public and private rights of way, which shall be extinguished as a result of the *Proposed Road Development*; these are indicated on Figure 14.1.1 to 14.1.2 of volume 3.

The public rights of way on local roads, will generally be within the lands to be acquired and which require extinguishment. In addition there will be extinguishments required to the national primary route at its tie in points.

The extinguishments are further described in Part 1 of the Third Schedule to the Compulsory Purchase Order described in section 1.15.1 and are generally required for the following reasons:

- Construction of the proposed route, side roads and access tracks;
- Closure of existing junctions onto the proposed route;
- Widening of existing local roads;

Private rights of way are also being extinguished as a result of the *Proposed Road Development*. These are rights of way noted on landowners Land Registry Folios or where landowners have stated that one exists to their knowledge. Where a private right of way is extinguished an alternative access either exists or a new access is being provided as part of the *Proposed Road Development*. It is possible that further private rights of way which are not known about may exist across land being compulsorily acquired which will also be extinguished.

1.15.2 Effects on European Sites

In relation to European sites, an Appropriate Assessment Screening Assessment and Natura Impact Statement have been prepared to provide the competent authorities with the information necessary to complete an Appropriate Assessment for the *Proposed Road Development* in compliance with Part XAB of the Planning and Development Acts 2000 to 2018 and Article 6(3) of the Habitats Directive. The Natura Impact Statement is separate to, but compliments ~~this~~ **[the]** (and vice versa).

As outlined in section 9.4.2.2 (Biodiversity Chapter of ~~this~~ **[the]**):

... This EIAR chapter and the NIS concludes that the that the Proposed Development, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site.

1.16 Relevant Figures and Appendices

1.16.1 Figures contained in Volume 3

The following figures have been produced specifically for the purposes of this Chapter and are contained within Volume 3 of the EIAR **[they are also reproduced in Volume 3 of the NIS]**:

- Fig. 4.1: *Proposed Road Development* Location Map: Design Overview, Plan Mainline; Key Sheets;
- Fig. 4.1.1: Plan Mainline; Ch. 0m to Ch. 1,460m
- Fig. 4.1.2: Plan Mainline; Ch. 1,460m to Ch. 2,540m
- Fig. 4.2: *Proposed Road Development* Location Map: Design Overview, Mainline Geometrics; Key Sheets;
- Fig. 4.2.1: Design Overview; Geometrics Mainline; Ch. 0m to Ch. 1,460m
- Fig. 4.2.2: Design Overview; Geometrics Mainline; Ch. 1,460m to Ch. 2,540m
- Fig. 4.3: *Proposed Road Development* Location Map: Design Overview, Geometrics Side Roads; Key Sheets;
- Fig. 4.3.1: Design Overview; Geometrics Side Roads; SR01 & SR02
- Fig. 4.3.2: Design Overview; Geometrics Side Roads; SR03
- Fig. 4.3.3: Design Overview; Geometrics Side Roads; SR04 & 05
- Fig. 4.3.4: Design Overview; Geometrics Side Roads; SR06
- Fig. 4.3.5: Design Overview; Geometrics Side Roads; SR07
- Fig. 4.3.6: Design Overview; Geometrics Side Roads; SR08 & 09
- Fig. 4.3.7: Design Overview; Geometrics Side Roads; SR10
- Fig. 4.4.1: Design Overview; Typical Cross Sections; Proposed N16 Mainline
- Fig. 4.4.2: Design Overview; Typical Cross Sections; (Local Roads and Access Tracks)
- Fig. 4.5.1: Traffic Model Information
- Fig. 4.7: Drainage System - Catchment Map
- Fig. 4.7.1: Drainage System - Sheet 1 of 2
- Fig. 4.7.2: Drainage System - Sheet 2 of 2
- Fig. 4.7.3: Design Overview; Drainage System; Drainage System; Location of Constructed Wetland/Attenuation Ponds
- Fig. 4.7.4: Design Overview; Drainage System; Schematic detail of Constructed Wetland/Attenuation Ponds
- Fig. 4.7.6: Design Overview; Watercourse Diversion, *Lugatober* Stream
- Fig. 4.7.7: Design Overview; Watercourse Diversion, *Lugatober* Open Drain
- Fig. 4.7.8: Design Overview; Watercourse Diversion, *Collinsford* Stream
- Fig. 4.7.9: Design Overview; Watercourse Diversion, *Lugnagall* Stream
- Fig. 4.8.1: Design Overview; Vulnerable Road Users; Design Overview, Sheet 1 of 2

- Fig. 4.8.2: Design Overview; Vulnerable Road Users; Design Overview, Sheet 2 of 2
- Fig. 4.9.1: Design Overview; Geotechnical, Soft Ground, Sheet 1 of 2
- Fig. 4.9.2: Design Overview; Geotechnical, Soft Ground, Sheet 2 of 2
- Fig. 4.10.1: Design Overview; Soil Management - Soil Repository/Borrow Pit
- Fig. 4.11.1: Design Overview; Provision of Safety Barriers, Sheet 1 of 2
- Fig. 4.11.2: Design Overview; Provision of Safety Barriers, Sheet 2 of 2
- Fig. 4.12.1: Design Overview; Lighting - Southern Tie In
- Fig. 4.13.1: Design Overview; Principal Structures, Tully Stream
- Fig. 4.13.2: Design Overview; Principal Structures, Vulnerable Road Users, Subway
- Fig. 4.13.3: Design Overview; Principal Structures, Steepened Side Slope

1.16.2 Appendices contained in Volume 4

The following appendices have been produced specifically for the purposes of this Chapter and are contained within Volume 4 of the EIAR:

- Appendix 4.1: Chapter 4 (Main Report Reference); Drainage – Technical Details;
- Appendix 4.2: Chapter 4 (Main Report Reference); Outline Construction and Demolition Waste Management Plan [**reproduced in Volume 3 of the NIS**];
- Appendix 4.3: Chapter 4 (Main Report References); Outline Erosion and Sediment Control Plan;



2 Outline Erosion & Sediment Control Plan

2.1 Introduction

2.1.1 General

Sligo County Council is currently planning a 2.54km upgrade of the N16 National Primary Route, between the townlands of *Drumkilsellagh* and *Lugnaqall* and occurring predominately within the townland of *Lugatober*. The project location is depicted in *Figure 2-1*.

The project will remove a number of substantially deficient bends on this section of the route and in so doing, will improve aspects such as safety, sight distance, cross sectional width and drainage.

The road type proposed for the project corresponds to a Type 2 Single Carriageway arrangement as outlined in *Figure 2-2*. The design arrangement is described in detail within Chapter 4 of the EIAR.

Figure 2-1: Project Location

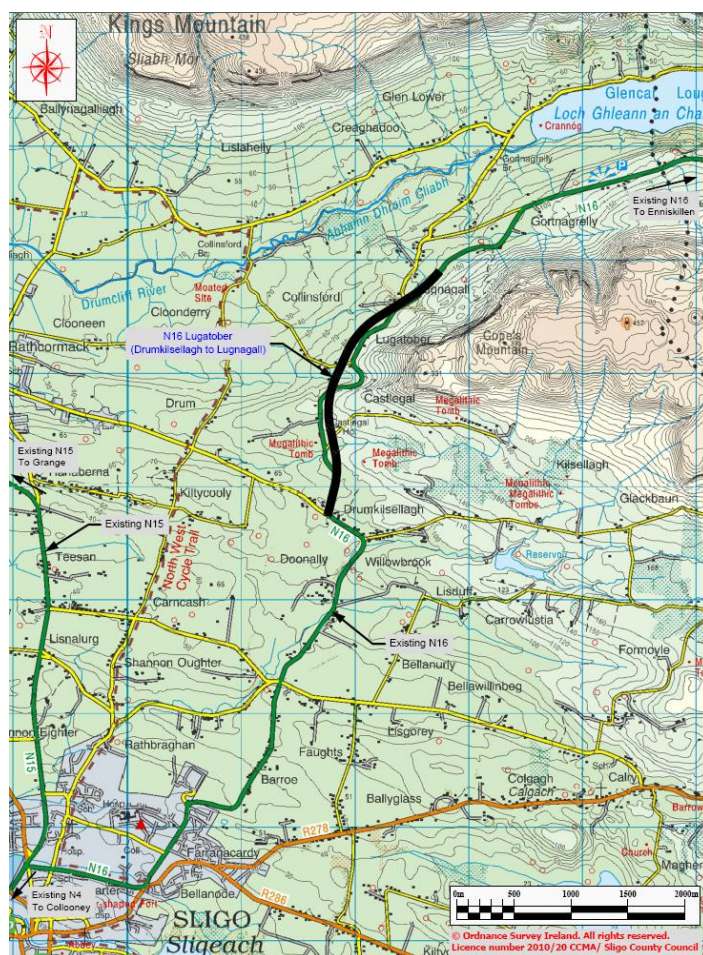
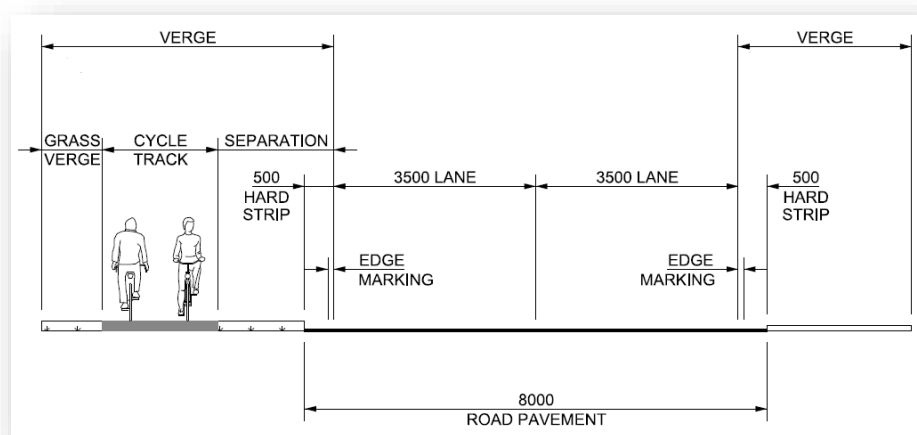


Figure 2-2: Type 2 Single Carriageway



This Outline Erosion and Sediment Control (OESC) Plan has been prepared as a method of water quality mitigation to offset potential Construction Stage pollution impacts from the N16 Lugatober Road Project to adjacent watercourses including the Willsborough Stream, the Tully Stream and various tributaries of the Drumcliff River.

The Plan is intended to be a **working** document and has been prepared to inform the Construction Stage Erosion and Sediment Control Plan, which, in turn, will form an integral part of the Environmental Operating Plan for the Project. In particular, the **mitigation, control, monitoring and emergency measures** for the Project in relation to Erosion and Sediment Control are described in this document. The Plan is also used to:

- Inform the Hydrological & Hydrogeological and in turn the Biodiversity Impact Assessments; and
- Ensure sufficient lands have been included on a permanent and temporary basis within the CPO to treat sediment runoff during the Construction Stage for the project;

Numerous references are contained herein. However, the main body of this report is guided by the technical guidance documents: *Control of water pollution from linear road projects*, and *Environmental Good Practice on Site Design (Fourth Edition)*, published by CIRIA (C648 and C741 respectively).

The main activities likely to give rise to sediment pollution include the construction of Earthworks and Stream/Drain crossings.

2.1.2 Principles of Erosion and Sediment Control

The principles of erosion and sediment control during the construction stage of a Roads Project as outlined in CIRIA C648 include.

- (10) Erosion control (preventing runoff) is much more effective than sediment control in preventing water pollution. Erosion control is less subject to failure from high rainfall, requires less maintenance and is also less costly;
- (11) Plan erosion and sediment control at the design stage, as far as practicable, so that requirements can be built into the design and land requirement for the project and to inform the details of the Construction Stage Erosion and Sediment Control Plan;
- (12) Minimise erosion and potential for soiled water to be generated by minimising runoff from the construction site;
- (13) Install drainage and runoff controls **before** starting site clearance and earthworks;
- (14) Minimise the area of exposed ground;

- (15) Prevent natural runoff entering the site from adjacent ground, as this creates additional polluted water;
- (16) Provide appropriate control and containment measures on site;
- (17) Monitor and maintain erosion and sediment controls throughout the project;
- (18) Minimise the site area disturbed and trafficked by construction vehicles
- (19) Establish vegetation as soon as practical on all areas where soil has been exposed.

This Outline ESC plan will initiate these principles for eventual incorporation and expansion in the Construction Stage ESC Plan.

2.1.3 Contents of Outline Plan

This plan contains the following information:

- (1) An identification of existing land use and the nature of the receiving environment;
- (2) An outline of the main construction activities likely to be relevant in relation to erosion and sediment generation;
- (3) An outline of the relevant S-P-R linkage which may cause potential for sediment pollution. A typical outline of S-P-R is outlined in *Table 2-1*;

Table 2-1: Source – Pathway – Receptor

SPC	Description
(S) Source	The construction activities which are likely to generate sediment runoff
(P) Pathway	The potential pathways for the above mentioned pollution to reach sensitive areas
(R) Receptor	Areas which are considered sensitive in terms of sediment laden runoff

- (4) An outline of available site information which allows for an appreciable understanding for the sediment runoff which is likely to be generated and particular risks which may be encountered in specific areas;
- (5) An outline of the controls determined at the current plan stage for incorporation and expansion within the detailed ESCP;
- (6) An overview of Monitoring and Audit Requirements; and
- (7) Emergency Procedures.

2.2 Site Characteristics

2.2.1 General

The following gives a general overview of the Site Characteristics which are considered to be relevant in terms of Erosion and Sediment Control.

2.2.2 Landscape Character

The topography within the study area is dominated by the tall massive mountains that lie to the north and south of Glencar Lake, which itself is located in a lower valley, occurring circa 1.6km to the north east of the road project. This lake discharges to the Drumcliff River which flows west to the Atlantic.

The existing N16 road extends to the south of the Lake and as it sits at a higher level in the topography, it is afforded views to the north across the Lake and the escarpments and summits of Kings Mountain beyond. Copes Mountain is less visible from the existing N16, due to the fact, that the existing road sits on the lower slopes of Copes Mountain and this close proximity restricts views.

2.2.3 Agriculture in the study area

In terms of land use, the area is used primarily for agriculture. Farming enterprises in the study area are predominantly involved in sheep and beef production with some dairy farming practices occurring to the south of the study area.

Agriculture land cover in the study area is defined by the drumlin topography and the suitability of the soils to agricultural use. The main soil association within the Project Area is the Mullanbane association (Figure 2-3 - Light orange) which is a Typical Brown Earth soils described as having a coarse loamy texture and derived from limestone drift. The soils are limited to grassland and forestry use due to poor drainage, soil structure and prevalence of steep slopes.

Figure 2-3: Study area soils map (Teagasc)



2.2.4 Solid Geology

A summary of the geological sequence and main rock types likely to be encountered along the route from north to south are shown in Table 2-2. These are based on the available information on the 1:100,000 scale Geological Survey of Ireland map of the area.

Table 2-2: Geological Formations occurring in the Study Area

PERIOD	FORMATION	ROCK TYPES
Carboniferous (Dinantian)	Glencar Limestone Formation	Dark fine limestone and calcareous shale
Carboniferous (Dinantian)	Ballyshannon Limestone	Pale grey calcite limestone
Carboniferous (Dinantian)	Mullaghmore Sandstone	Sandstone, siltstone and shale
	Benbulbin Shale Formation	Calcareous shale with minor calcarenite

2.2.5 Drainage Features

Glencar Lough, as already outlined occurs to the north east of the project. In terms of drainage features, it occurs upstream, therefore there no potential for runoff potentially emanating from the site reaching the lake.

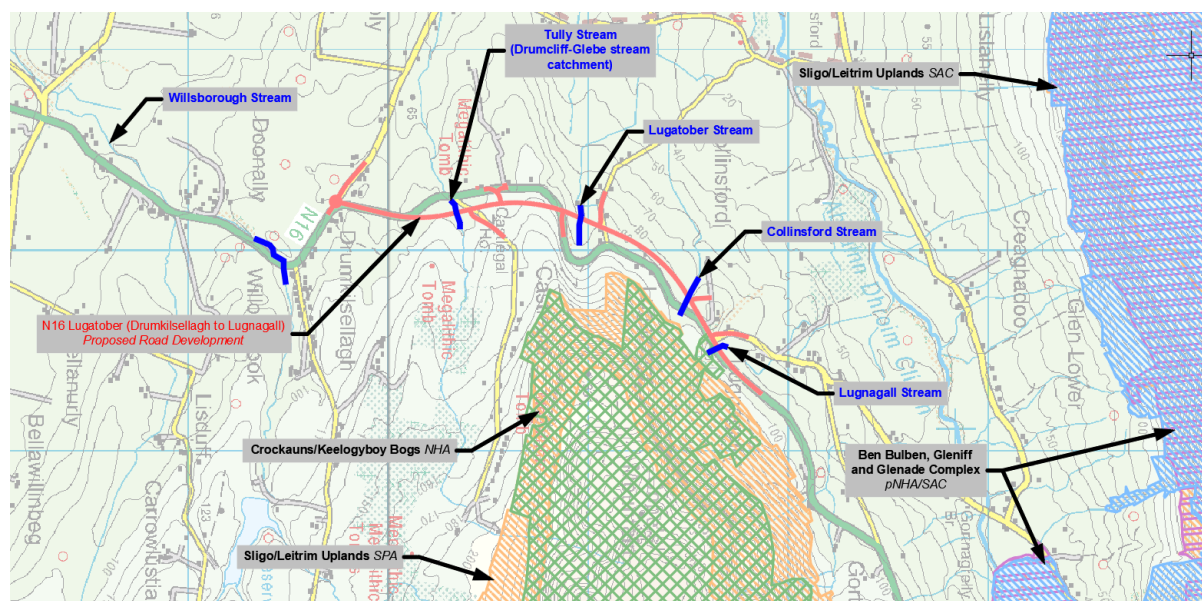


The largest river basin is the Drumcliff River catchment which discharges into Drumcliff Bay and which occurs to the north of the Project. This river has a total catchment area of approximately 61.3km². The Road Project crosses tributaries of the Drumcliff River as outlined in *Figure 2-4* and Table 2-5.

The main streams crossed by the project include:

- The Tully Stream;
- The Lugatober Stream;
- The Collinsford Stream;
- The Lugnagall Stream;

Figure 2-4: Streams Intercepted by the Proposed Road Development



Road crossings of watercourses represent a potential impact on the flow regime and morphology of the watercourse as a result of these features requiring bridging or culverting.

The existing N16 road within the study area is generally over the edge drainage with no drainage water treatment or attenuation provided. Some local gullies have been provided in sections prone to ponding which discharge over the edge.

2.2.6 Hydrogeological Features

2.2.6.1 Karst features

The bedrock formation for this area particularly the more pure limestones to the east and south, have a potential for karstification and the development of conduit flow preferential groundwater pathways to develop. Outcrop and sub-crop areas have been identified in the *Carncash* townland (to the south of the project extents) area and the hillslopes near *Lugatober* and *Lugnagall*. The OSI historical mapping shows the location of a number of small springs/risings and supply wells throughout the Study area which have been mapped and defined as hydrogeological Features. A walkover visit and the OSI historical mapping reveal little evidence of significant surface karst features present within the Study area except for a local zone of karstification near *Carncash* (occurring to the south of the project). There are no major springs, turloughs, swallow-holes or cave features present. There are a number of small doline features evident from the aerial photography of the area which may represent possible collapse features in the *Doonally* to *Carncash* townlands (occurring to the south of the project extents).

2.2.6.2 Water abstractions / groundwater supplies

There are no major group water sources, within the study area, or any designated source protection areas, located within or in proximity to the study area. Small local household borehole supplies and wells are used to supply a number of individual, or locally grouped households and agricultural supplies within the study area. The majority of these supply sources are located on the hill slopes up gradient to the East of the Existing N16 road. Generally, boreholes and sunk wells were found supplying households and small springs and dug wells supplying agriculture supply connections. The more elevated northern section of the route from *Lugatober* north is supplied by individual and grouped private wells and boreholes. South of *Lugatober* mains supply is available from Glackbaun public water supply.

2.2.7 Biodiversity

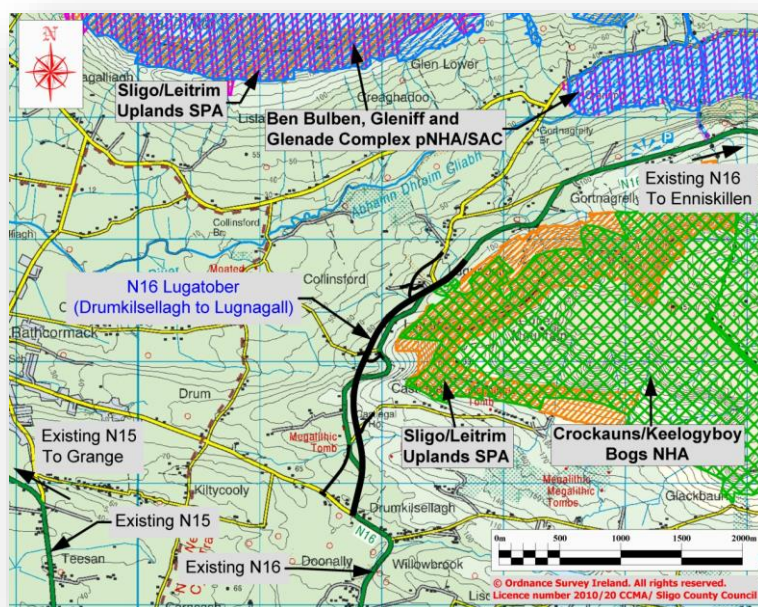
2.2.7.1 Relevant Designated Sites

The various designated sites in proximity to the Study area are:

- Crochauns/Keelogyboy Bogs NHA (002435);
- Sligo Leitrim Uplands SPA (004187);
- Ben Bulbin, Gleniff and Glenade Complex SAC and pNHA (000623);
- Cummeen Strand / Drumcliff Bay SAC and pNHA (000627) in the coastal and estuarine waters and shoreline area to the west of the Route options;
- Cummeen Strand SPA (004035);
- Drumcliff Bay SPA (004013);

The potential impact to these designated sites is limited to potential indirect impacts via watercourse discharges and groundwater flow.

Figure 2-5: Project Location with reference to designated sites



2.2.7.2 Groundwater Dependent Habitats

A number of groundwater dependant wetland habitat sites have been identified within the study area which have the potential of being impacted by the Project. A summary of these key groundwater dependant wetland habitat sites is presented in Table 2-3 below.

Table 2-3: Summary Description Groundwater Dependent Wetland Sites

Site name	Grid Reference	Annex I habitats	Ecological evaluation	Relevance to Road Project
Lugnaqall Flush – South of Existing N16	G725416	Small remnants of alkaline fen and petrifying springs	County Ecological Importance as supports two Annex I habitats and overlaps with Crockauns/ Keellogboy Bogs NHA	The Road Project is adjacent to, but downslope of this site.
Lugatober North, Flush			National ecological importance. Annex I priority habitat and are relatively extensive at the site. National ecological importance.	The Road Project is adjacent to, but downslope of this site.
South of Collinsford	G718413	Small areas of tufa formation and vegetation with affinity to petrifying springs	County Ecological Importance as has some affinity to the Annex I priority habitat and is associated with a small area of mature wet woodland.	The Road Project occurs approximately 250m upslope of this Site.
East of Drum	G713409	Rich fen and flush vegetation with some affinity to alkaline fen	Local (higher value) ecological importance as vegetation has a slight affinity to the Annex I habitat alkaline fen but is not considered to be a good example.	The Road Project occurs approximately 250m upslope of this Site.
West of Castlegal	G718409	Three petrifying springs with small amount of tufa formation within semi-natural woodland	County Ecological Importance as springs are small but are examples of an Annex I priority habitat.	The Road Project is proximate to but downslope of this site.

2.2.7.3 EPA Water Quality

The EPA Envision map viewer was consulted on 26th of July 2018 regarding the water quality status of the watercourses in the study area. There are no monitoring points of the Tully Stream or the two tributaries of the Drumcliff River in Lugatober. The Drumcliff River which is located downstream of the proposed works includes two sampling points downstream of the development site on watercourses: Station ID RS35D040400 and Station ID. RS35D040300.

Water quality sampling carried on two occasions as part of EIAR study found water quality in the Tully Stream to be unpolluted.

The Biotic Index of Water Quality (BIWQ) was developed in Ireland by the Environmental Protection Agency (EPA). Q-values are assigned using a combination of habitat characteristics and structure of the macro-invertebrate community within the waterbody. Individual macro-invertebrate families are, according to their sensitivity to organic pollution and the Q-value is assessed based primarily on their relative abundance within a sample. The current status of the Drumcliff River at the two sampling points downstream of the proposed road development is Q4 *Good Status*.

River Basin Management Plans (RBMPs) have been published for all River Basin Districts in Ireland in accordance with the requirements of the Water Framework Directive. The online EPA Envision map viewer provides access to water quality information at individual waterbody level and at Water Management Unit level for all the River Basin Districts in Ireland. Waterbodies can relate to surface

waters (these include rivers, lakes, estuaries [transitional waters] and coastal waters) or to groundwater.

2.2.7.4 Fisheries

The Project study area lies within the Western River Basin District and the WFD catchment delineated as Sligo Bay & Drowes.

The WFD waterbodies within or connected to the study area are listed in Table 2-4.

Table 2-4: WFD waterbodies within or connected to the Study Area indicating relevant WFD River Sub-basin and WFD Sub-catchment along with WFD Status and assessed fisheries status.

WFD River Sub-catchment	WFD River Sub-basin	WFD Status 2010-12	WFD Waterbody River / Lake	Fisheries status	Relevance to the Project
Drumcliff_SC_010	Drumcliff_010	Moderate	Glencar Lough	Important recreational fishery for salmon, sea trout & brown trout. Eels also likely to be present.	The Road Project is removed from this lake and any likely discharges will be to its outflow rather than inflow, or the lake itself.
			Upper Drumcliff River	Important recreational fishery for salmon, sea trout & brown trout. Eels & lamprey also likely to be present.	The Road Project is proximate to tributaries of this river. However its separation is 800m to 1,000m upslope.
	Drumcliff_020	Good	Lower Drumcliff River	Small coastal stream; trout and eels likely to be present; no angling interest.	The Road Project crosses this watercourse in the townland of <i>Drumkilsellagh/Castlegal</i> .
	Cregg_35_010	Unassigned	Tully Stream		

A description and evaluation of each waterbody within the study area in terms of aquatic ecology and fisheries is shown presented in *Table 2-5*.

Table 2-5: Waterbody Description and Evaluation (Fisheries and aquatic ecology).

Waterbody	Townland	Crossing location etc.	Aquatic Ecology & Fisheries Assessment	Relationship to Road Project
Tully Stream	Drum East	571743E 840296N	Good quality small stream with extensive trout spawning/ nursery habitat.	The Road Project crosses this watercourse in the townland of Drumkilsellagh/Castlegal.
Lugatober Stream	Lugatober	570763E 840937N	Moderate quality stream (possibly spring-fed); sand/ gravel/ cobble substrate	Occurs circa 400m downslope of the Road Project.
Collinsford Stream	Lugnagall	572250E 841483N	Small good quality stream; v steep gradient	The Road Project crosses this watercourse in the townland of Lugatober.
Lugnagall Stream	Lugnagall	572539E 841930N	Small good quality stream; steep gradient	Occurs circa 50m downslope of the Road Project.

2.3 Source – Pathway - Receptor

2.3.1 General

In order to establish the main effects which runoff from the Construction Stage of the project will have on the receiving environment, it is important to establish the:

- Source of such pollution;
- Potential pathway for this pollution to migrate; and
- Key receptors which this pollution could cause effects to;

Where there is a link between these three criteria it is important that appropriate mitigation in the form of erosion and sediment control is provided.

2.3.2 Potential Sources of Pollution

Pollution can damage the water environment in a number of various ways as indicated in *Table 2-6*.

Table 2-6: Common water pollutants and their effects on the aquatic environment.

Common Causes of Pollution	Adverse effect on the aquatic environment
Silt	Reduces water quality, clogs fish gills, covers aquatic plants.
Bentonite (very fine silt)	Reduces water quality, clogs fish gills, covers aquatic plants.
Cement or concrete wash water (highly alkaline)	Changes the chemical balance, is toxic to fish and other wildlife.
Hydrocarbons	Suffocates aquatic life, damaging other wildlife (e.g. Birds), and to water supplies including industrial abstractions.

The following paragraph's outlines what are considered to be the main sources of pollution arising from the Construction Stage of the Road Project.

2.3.2.1 Earthworks

The most significant area of concern regarding erosion and sediment control on any road construction project is those soil, subsoil and peat surfaces which are exposed during the earthworks operations.

Typically these surfaces are exposed during:

- The initial site clearance works;
- Excavation of cut slopes;
- Construction of fill slopes with acceptable glacial till material;
- Construction of haul roads for earthworks operations;
- The transport of soil materials and disposal
- Stockpiling of acceptable and unacceptable earthworks material for reuse or removal offsite;

2.3.2.2 Structures & Concrete

Concrete, grout and other cement-based products which would typically be used in the construction of structures are highly alkaline and corrosive and can have a devastating effect upon water quality. Cement-based products generate very fine, highly alkaline silt (11.5 pH) that can physically damage fish by burning their skin and blocking their gills. This alkaline silt can also smother vegetation and the bed of watercourses and can mobilise pollutants such as heavy metals by changing the water's pH. Concrete and grout pollution is often highly visible.

Particular risks are posed to water quality when construction is taking place over or near surface waters (eg bridges or headwalls).

2.3.2.3 Watercourse Crossings

Watercourses crossed by the project have already been outlined in section 2.2.5. The most sensitive watercourse is considered to be the Tully Stream which contains Brown Trout locally. The other watercourses which are considerably smaller are only fishery sensitive in their downstream reaches.

There will be no diversion permitted of the Tully Stream. As part of the drainage network design and culverting process, smaller streams and land drains will be severed as they pass underneath the alignment; these severed sections will be straightened and/or, made perpendicular to the alignment through the provision of precast culverts.

Modification of these channels has the potential to generate sediment laden pollution.

2.3.2.4 Construction Compounds & Machinery Re-fuelling/lubrication

The location of site specific construction compounds are set out in section 2.5.3.5 of this Plan. Particular considerations in relation to the location of such facilities and their generation of pollution during the construction stage include:

- Sanitary wastewater treatment;
- Hard-standing runoff;
- Potential for hydrocarbon pollution to groundwater and surface water;

2.3.3 Potential Pathways

The potential pathway link is the flow path from an area of exposed ground to an adjacent watercourse or sensitive habitat. This might include for example sheet flow over the edge of an exposed embankment which subsequently has a route via the ground topography to enter into adjacent land drains discharging to watercourses. Additionally, there is potential for pathways to be exacerbated, by the potential for sheet flow, surface water runoff coming from Copes Mountain. In general, potential pathways have been examined based on:

- An examination of watercourses mapped on the EPA Envision website and confirmed during site visits;
- Reference to watercourses mapped on the OSi mapping;
- An examination of the topography of the area in the vicinity of the project using detailed Digital Terrain Model (DTM) information;
- An examination of karst features in the area;

A Flow path may also be through the overburden cover or exposed bedrock to the groundwater table and travelling westward with the groundwater gradient providing baseflow to the streams and river reaches further downgradient.

2.4 Investigation and Survey Information

2.4.1 Soils and Geotechnical

A detailed ground investigation contract was completed between the period of February and September, 2018. The investigation was designed to gather geotechnical and groundwater information along the proposed alignment.

The programme of field works consisted of the following:

- 20 Cable Percussion boreholes;

- 11 Rotary boreholes;
- 23 Trial Pits;
- 12 Dynamic Probes;
- 2 Pavement Cores;
- 5 Standpipe Well Installations;
- In-situ Testing;
- Geophysical survey.

The results of these field investigations indicate that:

- Soils encountered along the route are all capable of being excavated employing conventional hydraulic plant;
- The only anticipated area of rock excavation is located in the cutting between c. Ch. 740 to c. Ch. 1,160m (and in the adjacent Soil Repository/Borrow Pit) which will encounter moderately strong to strong limestone;
- All topsoil is considered as suitable for landscaping purposes and can be stripped and stored for reuse;
- Made ground is predominantly reworked glacial till and is expected to have a reuse of 50%, provided that it is free of organic soils and domestic refuse, waste materials etc.;
- Circa 55% of cohesive glacial tills are expected to be directly re-useable within the embankment construction. The reuse of further cohesive fill materials can be improved by either natural drying or lime stabilisation to reduce the moisture content and MCV to within an acceptable range.;
- Areas of soft cohesive glacial till and made ground are unlikely to be suitable as foundations. Soft ground is defined as having an undrained shear strength below 40kPa for earthworks construction. A summary of anticipated soft ground beneath at grade sections and embankments along the project is provided in *Table 2-7* (See Figure 13.4.1 and 13.4.2 contained within Volume 3 of the EIAR). The maximum depth of soft ground does not exceed 4m thickness and the average depths are less than 2m, therefore excavation and replacement is considered to be the most appropriate solution in all cases.

Table 2-7: Soft Ground Areas

Location	Chainage (m)		Average Depth (m)	Max Thickness (m)
	From	To		
Drumkilsellagh	240	500	1.3	1.6
Tully Stream Valley	550	650	1.1	1.4
Lugatober Stream valley	1,160	1,330	1.8	4
L-34041-) Local Road junction	1,870	1,980	1.4	1.9
Lugnagall	2,170	2,300	1.3	1.6

2.4.2 Water Quality

The EPA carries out water quality assessments of rivers as part of a nationwide monitoring programme. Data is collected from physio-chemical and biological surveys, sampling both river water and the benthic substrate (sediment) in contact with the water.

Water sampling is carried out throughout the year and the main parameters analysed include: conductivity, pH, colour, alkalinity, hardness, dissolved oxygen, biochemical oxygen demand (BOD), ammonia, chloride, ortho-phosphate, oxidised nitrogen and temperature.

Biological surveys are normally carried out between the months of June and October. These examine the relationship between water quality and the relative abundance and composition of the macro-invertebrate communities in the sediment of rivers and streams. The macro-invertebrates include the aquatic stages of insects, shrimps, snails and bivalves, worms and leeches. It is generally found that the greater the diversity of species recorded, the better the water quality is.

The collated information relating the water quality and macro-invertebrate community composition is condensed to a numerical scale of Q-values or Biotic Index. The indices are grouped into four classes based on a river's suitability for beneficial uses such as water abstraction, fishery potential, amenity value, etc. (refer to Table 10.14 below).

Table 2-8: Biological River Water Quality Classification System

Biotic Index (Q value)	Quality Status	Quality Class	Condition
Q5, Q4-5, Q4	Unpolluted	Class A	Satisfactory
Q3-4	Slightly Polluted / Eutrophic	Class B	Transitional
Q3, Q2-3	Moderately Polluted	Class C	Unsatisfactory
Q2, Q1-2, Q1	Seriously Polluted	Class D	Unsatisfactory

The monitored rivers that traverse the *Proposed Road Development* vary in quality from being slightly polluted (Q3-4) to moderately unpolluted (Q2-3).

The EPA river water quality status for the Drumcliff River catchment (Drumcliff_SC_010) is "Good" based on the 2010 to 2015 monitoring period. The Q-rating is measured by the EPA at reference station RS35D040250 at Collinsford Bridge and at station RS35D040400 in the lower reach 500m upstream of Drumcliff Bridge. For the 2015 sampling result both sites achieved a Q-rating of 4 (unpolluted) and for the previous 2012 sampling 3-4 (slightly polluted) for the upper station and 4 (unpolluted) for the lower station. Both sites assessed are now in satisfactory condition for the first time since 2000. The water quality risk status for Drumcliff catchment is classed as "not at Risk".

The Tully Stream¹⁷ system is not monitored and is classed as "unassigned" and the risk status is also unassigned. No Q-Rating assessment has been carried out for this small catchment.

The EPA river water quality status for the Willsborough Stream¹⁸ catchment (Willsborough_35_010) is "Good" based on the 2010 to 2015 monitoring period. The Q-rating is measured by the EPA at three reference stations within the catchment located station RS35W010060 in the upper Reaches at bridge south of Glackbaun, and at RS35W010150 (in the middle reach at road bridge west of Willsborough and at RS35W010300 in the lower reach at Sligo-Bundoran road bridge. All three sites have good status (a Q-rating of 4) for 2015 assessment with slight decline in the upper station near Glackbaun from high to good quality. The water quality risk status for Willsborough catchment is classed as "not at Risk".

The water quality status of the downstream transitional waters of the Drumcliff Estuary and the Garavoge Estuary are classified as unassigned and good respectively. The risk status for these transitional waterbodies is "not at Risk" and "Review" respectively.

¹⁷ Described as labelled as 'Drumcliff_Glebe' on EPA Maps (<https://gis.epa.ie/EPAMaps/>);

¹⁸ Described as 'Willsborough (Stream)' on EPA Maps (<https://gis.epa.ie/EPAMaps/>). Also known locally as the 'Doonally Rover'.



2.5 Erosion and Sediment Controls

2.5.1 General

The principal objectives in relation to erosion and sediment control during the earthworks operation as will be:

- To keep the area exposed to the elements to an absolute minimum;
- To minimise the amount of runoff from the site;
- To have an efficient earthworks operation to ensure that fill is placed as material is removed;
- To ensure that the unacceptable material is removed and placed in controlled repository areas in an efficient manner;

2.5.2 Principal Avoidance Measures

The protection of watercourses from pollution arising from construction works is achieved by avoidance in the first instance. In this regard, the following measures will be implemented during the construction phase:

- (1) Site clearance involving topsoil stripping will progress with the earthworks and will not be carried out over large areas in advance resulting in these areas being exposed for long periods of time;
- (2) It is estimated, following onsite treatment measures that that there will be approximately 59,000 m³ of soft subsoil material excavated during the course of the earthworks operation. The majority of this material will remain onsite for the following purposes:
 - a. Landscaping Measures;
 - b. Construction of bunding surrounding Attenuation Ponds; and
 - c. Backfilling of the Soil Repository/Borrow Pit at *Castlegal*.

The Soil Repository/Borrow Pit is located centrally within the overall site configuration (c. Ch. 1,000m) and proximate to the largest section of embankment requiring Fill material (c. 1,150m to c. 1,325m). This will facilitate:

- a. An earthworks construction period that is as short as possible, thus minimising the period during which open ground is exposed
 - b. Minimisation of the transportation/journey lengths involved, thus minimising the opportunity for material to be spilled on haulage routes and enter the water system via road runoff;
 - c. Efficient earthworks operations ensuring that material can be removed and replaced with fill in the minimum amount of time thus reducing the ingress of water into the construction works and limiting the amount of dewatering of the works;
- (3) Internal haul roads will be limited to the confines of the Land Made Available (LMA). Haul roads outside the limits of the site or permanent earthworks are not anticipated;

2.5.3 Principal Control Measures

2.5.3.1 General

The control measures for specific construction tasks and in relation to particular features are outlined in the following sections.

- (1) Before works commence on site, the contractor will be required to prepare an Environmental Operating Plan (EOP) in accordance with the NRA guidance document for EOP's. The key elements of this plan will be as follows:
 - a. Appointment of an Environmental Manager by the main contractor;
 - b. Incorporation of environmental commitments and requirements;

- c. Outlining methods by which construction work will be managed to meet these environmental commitments and requirements;
 - d. Identification of roles and responsibilities of the main contractor's staff having regard to the main contractor's organisational structure;
 - e. Incorporation of procedures for communicating with the public and communicating within the main contractor's organisation;
 - f. Incorporation of procedures for environmental awareness training;
 - g. Incorporation of monitoring procedures and responses to the results of monitoring, where contractually required; and
 - h. Provision of a system of audit and review with regard to the effectiveness of the plan.
- In addition to the foregoing, the contractor will be required to incorporate a fully developed construction stage Erosion and Sediment Plan for the proposed works based on this Outline Plan. The contractor will be required to incorporate all of the avoidance and mitigation measures outlined in this Plan in the Construction Stage Plan. In addition, the Contractor will be required to consult with the NPWS and IFI in relation to the final detail of the Plan and shall include their requirements in this regard.
- (2) In order to prevent the potential for disturbance of ground outside the construction footprint, the site will be fenced off, prior to works commencing;
 - (3) Before earthworks commence on site (at each particular construction section) and before they are needed - drainage, erosion control and sediment control measures must be in place and functioning;
 - (4) Silt Fences¹⁹ will be erected along or just in front of the permanent land acquisition boundary in the following cases (sited inside any separate land drainage systems conveying land runoff from the lands outside the CPO (pt. 5 below):
 - a. At all sections of road construction where the works are at or above existing ground level and to extend linearly (along the earthworks perimeter) 50m along the adjacent cut section;
 - b. Along any other identified surface pathways for sediment laden runoff;
 - (5) Where land drains intersect the site boundary or where the adjacent land falls towards the construction site – temporary cut-off drains will be provided to intercept this clean runoff water and divert to the nearest watercourse. Small check dams at 50m centres, will be constructed in these cut-off drains to trap any sediment and prevent erosion. Silt fences will be provided immediately before the outfall to existing watercourses as a precaution and to allow a response time in the event of an emergency. These check dams will be subject to periodical checks and maintenance.
 - (6) All watercourses will be fenced off with double silt fences located at least 10m back from the watercourse bank until such time as the road crossing is constructed.
 - (7) All silt fences at watercourse crossings will be inspected on a daily basis and repairs or replacements carried out as required. A record of such inspections/ repairs/ replacements will be included as part of the Environmental Operating Plan.
 - (8) Dewatering and surface water runoff discharges from the construction site, including any advance works, during and for the duration of the construction works will be controlled, collected and routed via appropriate Construction treatment measures. These measures will be in accordance with the CIRIA publication's *Control of Water from Linear Construction Projects* and *Environmental Good practice on site guide (fourth edition)*. These measures shall include settlement lagoons, provided prior to each outfall discharge. Each pond will be provided with a double silt fence located before the discharge point. These facilities will be

¹⁹ Installed in accordance with the manufacturer's recommendations and in compliance with the Design Criteria outlined in CIRIA C648 Control of Water Pollution from Linear Construction Projects



- inspected/ maintained at least on a daily basis and the maintenance record will be available for inspection by the Client and other statutory organisations as part of the EOP;
- (9) Construction settlement ponds should be sized to provide a 6hour residence time for a 6hr duration 10year rain storm event (35mm).
 - (10) Direct connections between the settlement pond outfalls and the watercourse will not be allowed. Instead, the outfall will be allowed to disperse across at least 3m of undisturbed vegetated ground, covered with a coir mesh or similar matting prior to reaching the watercourse;
 - (11) Haul roads shall be constructed so that the natural contour is followed as clearly as possible and so that runoff is diverted to a treatment area;
 - (12) Silt fencing shall remain in place until ground vegetation has recovered. Any accumulated silt will then be removed and disposed of to a licensed facility.

2.5.3.2 Earthworks²⁰

2.5.3.2.1 *Cuts and Embankment Excavation*

The following principal controls will be put in place:

- (1) The area of the earthworks operation will be kept to an absolute minimum at any one time. Earthworks operations will be as self-contained as is practicable having regard to environmental constraints. The importation and placement of road foundation fill will be carried out in an integrated operation such that fill will be placed as soon as practicable after excavation.
- (2) The excavation of soft materials will be carried out in a manner that minimises the amount of water entering the face of the works. This will be achieved by placing fill in the excavated area as soon as is practicable (generally the same day).
- (3) Where pumping out of the excavation is necessary, this will be carried out using appropriately sized pumps. A clean stone filled perforated pipe (or similar) will be used as a sump for the pump intake. The pumped out water will be directed to the earthworks drainage system and to the settlement lagoon (or other) treatment system. The outlet from the pump shall be designed so as not to mobilise additional sediment – e.g. shall discharge onto plastic sheeting, rock pile, etc.

2.5.3.2.2 *Subsoil Stabilisation*

Subsoil Stabilisation is an activity which involves spreading powdered lime evenly over the surface of thin loose lifts (150-350 mm) of the Class U1 material, mixing it with the clay by rotavating, and then allowing the mix to dry or cure over a short period of time prior to compaction. Should this activity be proposed to be used by the contractor, the following controls will be applied:

- (1) The activity shall only be carried out under calm and dry metrological conditions. Lime application shall not be exposed to wind and where any risk occurs will be misted/sprayed down immediately;
- (2) The activity will not take place within 50m of any watercourse;
- (3) Following mixing (which should take place generally within 15 minutes of spreading the lime on the surface) the material shall be compacted within 1 hour and appropriately sealed²¹. In no case will this material be allowed to be left unsealed overnight;

²⁰ The following is in addition to those points outlined under 2.5.3.1

²¹ 'Sealed' for the purposes of this report shall mean covered with a minimum 300mm lift of suitable construction material.



2.5.3.2.3 *Transportation*

The transportation of materials, will be carried out, in an efficient manner, so as, to minimise the number of trips, minimise the length of individual trips, and minimise the escape of material from the trucks. The following principal controls will be put in place:

- (1) The construction operation will be managed so as to minimise journey lengths;
- (2) Where any excavated material is “sloppy” and presents a risk of splashing over the top of the trucks the capacity of the trucks will be limited to 75% of the height of the lowest side of the truck;
- (3) Trucks leaving and entering the site will do so via a defined/controlled construction entrance;
- (4) Road cleaning will be carried out at least daily to ensure that there is no build-up of sediment on the public roads;
- (5) In the event of a substantial quantity of spoil material being required to be exported offsite, then a proprietary mobile truck wheel wash system shall be installed at the relevant locations. All trucks leaving such sites will be required to pass through this facility. The water from the sediment tanks shall be discharged via the site runoff treatment system (i.e. settlement ponds, etc.) and the sediment portion shall be removed offsite to a licenced facility.

2.5.3.2.4 *Stockpiles*

It is envisaged that topsoil and soft subsoils will be the main material which will require to be stockpiled during the course of the construction period. The following controls will be in place for the stockpiling of this material:

- (1) Topsoil stripping over large areas in advance of main excavation works will not be permitted. It will be restricted to the minimum required for efficient earthworks operations and in any case will only be carried out in construction area units where earthworks is on-going.
- (2) Each construction area unit will be topsoiled as the works proceeds thus limiting both the amount and the length of time for which materials have to be stockpiled.
- (3) Stockpiles will not be located within 10m of a watercourse, or land drain, or within 25m of the Tully Stream, the Lugatober Stream, the Collinsford Stream, or the Lugnaqall Stream.
- (4) Runoff from a stockpile will be collected via a shallow toe drain, located outside the silt fence, which will have check dams at regular intervals and will be designed to have a retention time of at least 5 hours. Prior to outfall, straw wrapped in geotextile bags and inset into the base of the drain by at least 100mm shall be provided followed by a silt fence upstream of the outlet.
- (5) Stockpiles of non-granular materials shall be limited in height to not more than 2.5m.

2.5.3.3 Waterbodies and Sensitive Habitats²²

2.5.3.3.1 *Introduction*

The following outlines the control measures that will be put in place to protect waterbodies and sensitive habitats from sediment ingress during the construction stage – these are in parallel to the measures outlined elsewhere in this document.

- (1) All works in proximity to watercourses shall follow the best practice guidance outlined in the following documents:
 - a. TII/NRA ‘*Guidelines for the crossing of Watercourses During Construction of National Road Schemes (2008)*’;
 - b. Inland Fisheries Ireland, *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters, 2016*;

²² The following is in addition to those points outlined under 2.5.3.1



- (2) Preserve natural vegetation near watercourses and along the perimeter of the site as much as practically possible;
- (3) Leave a 5m grassed strip next to river banks when stripping topsoil or place grassed soil bunds along river banks to prevent site runoff directly entering watercourses;
- (4) Place straw bales or sand bags along the sides of temporary or existing bridges to prevent runoff entering the watercourse.

2.5.3.3.2 *Watercourses*

The following measures relate to crossings of existing watercourses traversed by the Road Project.

The Tully Stream

No diversion of the Tully Stream is permitted. The method of crossing this stream, in accordance with IFI requirements, shall be via a clear span structure as outlined in Chapter 4 of the EIAR.

Tributaries of the Drumcliff River

Other than the Tully Stream, permanent diversions are proposed on all streams crossed by the *Proposed Road Development*. The following control measures shall be applied in each instance:

- (1) General diversion works shall be undertaken in the dry. In-stream works will be required to connect the realigned section to the existing channel. The channels shall be free of any erosion potential prior to their opening, this may include fully established vegetation or the use of sediment control mats which are biodegradable. The opening shall be carried out in a carefully controlled manner and under the supervision of the EAO and an IFI representative.
- (2) All of these watercourse crossings will be maintained by precast box and pipe culverts as described in Chapter 4 of the EIAR;
- (3) Crossings will be provided with a silt trap and a sediment immediately downstream of the crossing point;
- (4) The silt trap shall be left in place for at least 6 weeks following completion of the work and shall be inspected and maintained at least 3 times per week;
- (5) The area of disturbance of the watercourse bed and bank shall be the absolute minimum required for the installation of the crossing;

The principal avoidance and control measures to be adopted at these crossings include:

- (6) No in-stream works will be carried out between 1st October and 1st May. In accordance with IFI recommendations, in-stream works shall be carried out in the period July to September (unless expressly agreed with the IFI in advance);
- (7) All works will be carried out under the supervision of the Clients Representative;
- (8) In-stream working will be kept to an absolute minimum, will be carried out in the close season only, NPWS and IFI will be informed at least 2 weeks prior to commencement, in-stream works will be allowed on a Permit-to-Work basis that must be signed by the Clients Representative at the commencement of the works and on a weekly basis thereafter;
- (9) Where in-stream or bank side works is for the purpose of constructing a structural element that requires the placing of concrete then a cofferdam shall be constructed and made as water tight as possible. Pumping out from the cofferdam shall be to a settlement tank of sufficient capacity to allow solids to settle prior to discharge;
- (10) Sand bags shall be double bagged and use washed sand only. Each bag shall be marked with a reference number and a record of placing and removal shall be maintained in the EOP;
- (11) There will be no machinery working in-stream. Where excavation, breaking, etc. is required at the bank, it will be carried out with machinery operating from the bank;
- (12) Machinery operating from the bank will work on "bog mats" to minimise damage to the vegetated banks;

2.5.3.4 Concrete Works²³

The use and management of concrete in or close to watercourses must be carefully controlled to avoid spillage which has a deleterious effect on water chemistry and aquatic habitats and species. Where the use of concrete near and in watercourses cannot be avoided the following control measures will be employed:

- (1) Hydrophilic grout and quick-setting mixes or rapid hardener additives shall be used to promote the early set of concrete surfaces exposed to water;
- (2) When working in or near the surface water and the application of in-situ materials cannot be avoided, the use of alternative materials such as biodegradable shutter oils shall be used;
- (3) Any plant operating close to the water will require special consideration on the transport of concrete from the point of discharge from the mixer to final discharge into the delivery pipe (tremie). Care will be exercised when slewing concrete skips or mobile concrete pumps over or near surface waters;
- (4) Placing of concrete near watercourses will be carried out only under the supervision of the Clients Representative;
- (5) There will be no hosing into surface water drains of spills of concrete, cement, grout or similar materials. Such spills shall be contained immediately and runoff prevented from entering the watercourse;
- (6) Washout from concrete lorries shall not be permitted to enter any surfacewater or groundwater bodies. The preferred option is to wash out the container and chute back at the batching plant, or, alternatively in a designated onsite concrete wash down area, which is set back at least 100m from any watercourse and is of an impermeable nature. Concrete waste shall be disposed of in accordance with the site specific Construction & Demolition Waste Management Plan;

Chute washout locations will be provided with appropriate designated, contained impermeable area and treatment facilities including adequately sized settlement tanks. The clear water from the settlement tanks shall be pH corrected prior to discharge (which shall be by means of one of the construction stage settlement facilities) or alternatively disposed of as waste in accordance with the contractor's Waste Management Plan included in the EOP.

2.5.3.5 Construction Compounds²⁴

2.5.3.5.1 *Introduction*

A Construction Compound will be required for the duration of the works. Provision has been made for this compound to the west of the proposed alignment at circa Ch. 500m as described in Chapter 4 of the EIAR.

The activities at the compounds may include stores, offices, materials storage areas, materials processing areas, plant storage, parking of site and staff vehicles, and other ancillary facilities and activities.

2.5.3.5.2 *Controls*

The Compound will have appropriate levels of security to deter vandalism, theft and unauthorised access.

²³ The following is in addition to those points outlined under 2.5.3.1

²⁴ The following is in addition to those points outlined under 2.5.3.1



Surface runoff from compounds will be minimised by ensuring that the paved/ impervious area is minimised. All surface water runoff will be intercepted and directed to appropriate treatment systems for the removal of pollutants prior to discharge.

The compounds will be fenced off and a silt fence erected and maintained on the site boundary.

Wastewater drainage from all site offices and construction facilities will be contained and disposed of in an appropriate manner to prevent water pollution and in accordance with the relevant statutory requirements.

The storage of fuels, other hydrocarbons and other chemicals within the construction compounds shall be in accordance with relevant legislation and with best practice. In particular:

- All fuel/ Hydrocarbon/ Chemical (fluid) storage areas shall be bunded to 110% of storage capacity;
- Storage of these materials within a compound shall be organised so as to be as far away from all water bodies as is practicable;
- The Emergency Response Plan shall include arrangements for dealing with accidental spillage and relevant staff shall be trained in these procedures;

2.5.4 Runoff Estimation

In order to appropriately size sediment control facilities for runoff, the following approach will be adopted. Runoff from the exposed surfaces is calculated using the Modified Rational (MR) Method and applying extreme rainfall information obtained from Met Éireann and specific to the area.

MR Formula:	Q	=	C x i x A
Where	Q	=	the peak discharge (m ³ /hour);
	C	=	Coefficient of permeability taken conservatively at 0.6 ²⁵
	i	=	rainfall intensity (m/hour) ²⁶ ;
	A	=	the contributing area (10,000m ²);

Resulting in:

Q	=	0.6 x 0.041 ²⁷ (m/hour) x 10,000m ²
Q	=	246 m ³ /hour for a 1Ha site
Q	=	4100 litres /minute

2.5.5 Land Availability

Areas required for sediment control treatment locations, will be included in the Compulsory Purchase Order of the Project.

2.6 Monitoring and Audit

2.6.1 Introduction

This Outline Erosion and Sediment Control Plan will be developed by the contractor into the Construction Erosion and Sediment Control Plan (CESCP) and will form part of the Environmental Operating Plan (EOP). While the final details of the CESCP will require agreement with the NPWS and

²⁵ For a stripped Construction Site.

²⁶ Depth of rainfall constituting a 1 in 100 year (1 hour) flood event.

²⁷ Based on Return Period Rainfall depths received from Met Eireann.



IFI, the minimum requirements of same shall include all of the controls, measures, mitigations and monitoring described in this document. The monitoring of all aspects of the EOP, including the CЕСP, will be carried out by the contractor as the responsible party. The responsibilities of the Employer will be discharged by the Employer's Site Representative staff.

2.6.2 Monitoring and Audit

2.6.2.1 General

The avoidance, control and mitigation measures outlined in this document will ensure that erosion and sediment arising from the works is controlled. They have been developed in accordance with best practice, and have been shown to work on other projects. As with all systems, there is a requirement to have monitoring, audit and feedback loops to demonstrate the operation of the system. The following describes the framework Pre-construction Monitoring and Construction Monitoring regime and the detailed construction stage monitoring by the Contractor and the Employers Representative are described in the subsequent paragraphs.

2.6.2.2 Pre-Construction and Construction Stage

Where activities close to the watercourse are being carried out that could potentially lead to pollution, a portable turbidity reading will be carried out daily to ensure that sediments from the construction site are being controlled.

This monitoring will be reviewed on an ongoing basis during construction. Should investigatory levels (a breach of the limits set out in the second schedule to the European Communities (Quality of Salmonid Waters) Regulations, 1988, measured at the point of discharge to the nearest watercourse) be reached (as a result of the construction works) then corrective action shall be taken.

2.6.2.2.1 *Contractor*

The procedures and monitoring and audit regime outlined in this section shall be used by the contractor to ensure and demonstrate the effective operation of the avoidance, control and mitigation measures for Erosion and Sediment control. It will facilitate use as a feedback loop to target any issues that may arise.

The following are the main procedures that will be followed:

- (1) The contractor shall appoint an Environmental Officer, whom shall be responsible for implementing/overseeing all aspects of this plan;
- (2) The contractor will be obliged to hold a full day training course for all site staff immediately before works commence on site on the EOP and in particular the CЕСP. The subject of this course shall be the measures that have been put in place to protect the environment and the procedures and monitoring and recording that is to be undertaken in accordance with the EOP.
- (3) Environmental Checklists shall be prepared for each operation. Responsibility for completion of these checklists will be assigned to individual members of the contractor's staff. The following operations will also require a Permit-to-Work before operations can commence each of which must be counter signed by the Employers Representative:
 - (a) Any in-stream works;
 - (b) Placing of concrete in, or within 50m of watercourses;
 - (c) Completion of sediment removal facilities prior to initial discharge to watercourse;
 - (d) Restart of works following any pollution incident
- (4) All environmental monitoring and checklists shall be recorded and added to the EOP on a daily basis;

- (5) The EOP shall assign particular responsibility and monitoring duties to particular named staff and the Site Agent/ Manager shall ensure that this is implemented in full. Training for each member of staff on their specific area of responsibility shall be carried out before the commencement of that operation. A record of all training carried out shall be maintained in the EOP and a further copy issued to the Employers Representative;
- (6) Monitoring for turbidity shall be undertaken as described at section 2.6.2.2. The results shall be relayed to the Employers Representative;
- (7) All other watercourses in the vicinity of the works shall be monitored on a daily basis and turbidity readings taken. The results shall be issued to the Employers Representative on a daily basis;
- (8) All mitigation/control measures shall be inspected daily by designated contractor staff and maintenance and repairs carried out immediately;
- (9) Any direct release of sediment to a watercourse causing plumes or exceedance's of the turbidity investigatory level shall trigger an investigation commencing with notification to the Employers Representative who shall determine the appropriate course of action which may involve the cessation of works, the initiation of emergency procedures and the notification to the NPWS and the IFI. In such a case of cessation, works shall not recommence until appropriate corrective measures to avoid any repetition are put in place. Such measures shall be agreed with the Employers Representative following consultation with the NPWS and IFI.

2.6.2.2.2 *Employers Representative*

Separate from the on-going and detailed monitoring carried out by the contractor as part of the EOP, the Employers Representative shall carry out the inspection/ monitoring regime described below on behalf of the employer. The results will be stored in the Employers Representative's Monitoring file and will be available for inspection/ audit by the Client, NPWS or IFI staff. All inspections/ monitoring/ results will be recorded on standard forms.

- (a) Inspect the principal control measures outlined in this plan on a monthly basis. Report findings to the Contractor;
- (b) Inspect surface water treatment measures (ponds, tanks, mini-dams, sandbags, etc.) and obtain turbidity readings;
- (c) Inspect all outfalls to watercourses and obtain turbidity/suspended solids as outlined in section 2.6.2.2 readings;
- (d) Visually inspect watercourses to which there is a discharge from the works and those where there is construction works in the vicinity;
- (e) Wheel wash facilities shall be inspected on a weekly basis;
- (f) Stockpiles shall be monitored while being filled or emptied;
- (g) Control measures for works at or near water bodies shall be inspected;
- (h) Concrete operations at or near watercourses shall be supervised and designated chute washing out facilities shall be inspected;
- (i) Site compounds shall be inspected;
- (j) The Contractor's EOP monitoring results shall be audited on a frequent basis (Once per month at a minimum);
- (k) Any and all exceedance of the investigatory level for turbidity/suspended solids shall be reported where deemed necessary to the NPWS and IFI and shall be investigated thoroughly by the Employers Representative and the Contractor. Where the works are identified as the source causing the exceedance, the procedure outlined in Item "I(i) to I(iv)" below shall be followed;
- (l) Any direct release of sediment to a watercourse causing plumes or exceedance of the turbidity/suspended solids investigatory levels shall result in:
 - (i) the relevant NPWS and IFI staff being notified immediately;

- (ii) the contractor will be required to take immediate action and to implement measures to ensure that such discharges do not re-occur;
 - (iii) Works if stopped shall not recommence until appropriate corrective measures to avoid any repetition are put in place. Such measures shall be agreed with the Employers Representative following consultation with the NPWS and IFI;
 - (iv) Works and/ or discharges from the works shall not recommence until written consent is received from the Employers Representative
- (m) Where the Employers Representative considers that the risk of a sediment release is high, he/she shall inform the contractor and request protective action to be taken. Where the contractor does not take immediate action the Employers Representative shall instruct the contractor to take action and same shall be reported to the Contract Manager and the Client.

2.7 Emergency Procedures

2.7.1 Introduction

Prior to commencing works, the Contractor shall prepare an Emergency Response Plan based on a thorough risk assessment. The plan shall detail the procedures to be undertaken in the event of the release of any sediment into a watercourse, serious spillage of chemical, fuel or other hazardous wastes (e.g. concrete), non-compliance incident with any permit or license, or other such risks that could lead to a pollution incident, including flood risks.

2.7.2 Resources

Relevant staff, including cover staff, shall be trained in the implementation of the Emergency Response Plan and the use of any spill kit/ control equipment as necessary. The contractor shall provide a list of all such staff to the Employer's Site Representative detailing the name, contact number, and training received, and the date of that training.

The Contractor shall provide a full list, including the exact locations, of all pollution control plant and equipment to the Employer's Site Representative. All such plant and equipment shall be maintained in place and in working order for the duration of the works.

2.7.3 Spill Response

The Emergency Response Plan shall include a simplified Spill Response with the following as a minimum:

- (1) Instruction to stop work;
- (2) Instruction to contain the spill;
- (3) Details of spill clean-up material location;
- (4) Name and contact details of responsible staff;
- (5) Measures particular to the location and the activity;
- (6) Instruction to contact the Employers Representative (including Name and Contact Details).

This Spill Response shall be displayed at several locations throughout the site and at all sensitive locations.

The Employers Representative shall be responsible for notifying the IFI/NPWS and shall also determine if and when works may proceed once corrective actions have been completed.

3 Invasive Alien Species Management Plan



Planning & Environmental Consultants



DOCUMENT DETAILS

Client: Sligo County Council

Project title: N16 Lugatober (Drumkilsellagh to Lugnagall) Road Project

Project Number: 170904

Document Title: Invasive Species Management Plan

Doc. File Name: ISMP F – 2019.02.11 - 170904

Prepared By: McCarthy Keville O’Sullivan Ltd.
Planning & Environmental Consultants
Block 1, G.F.S.C.
Moneenageisha Road, Galway



Document Issue:

Rev	Status	Issue Date	Document File Name	Author(s)	Approved By:
01	Final	11/02/2019	ISMP F – 2019.02.11 - 170904	LK	JH



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1 INTRODUCTION

1.1 General Introduction

Sligo County Council is currently planning a 2.54km upgrade of the N16 National Primary Route, between the townlands of Drumkilsellagh and Lugnagall and occurring predominately within the townland of Lugatober. The project location is depicted on Figure 1.1. The project will remove a number of substantially deficient bends on this section of the route and in so doing, will improve aspects such as safety, sight distance, cross sectional width and drainage.

A site-specific invasive species survey was carried out as part of the EIAR surveys in September and October 2017 and May 2018. The survey focused on those species listed on the Third Schedule of Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011). The only Third Schedule invasive species recorded in relation to the proposed works was Japanese Knotweed. This report provides management to prevent the spread of Third Schedule invasive species. The survey also noted any species listed on the 'the Union List' of invasive alien species [(EU) 1143/2014]). Union list species are noted as being a risk to Irish biodiversity, however their management has not yet come under Irish legislation. No union list species were recorded during the surveys.

This document constitutes an Invasive Species Management Plan the management of Knotweed and measures to avoid the spread of this Third Schedule species. Maps showing the locations of the invasive species recorded in relation to the site boundary of the proposed works are provided in Section 2 of this report.

This document has been prepared with reference to current legislation and best practice guidelines in the identification, treatment and management of invasive alien species listed on the 'Third Schedule' of Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011).

The objectives of this report are summarised below:

- Provide site specific best practice guideline measures for the control and management of invasive species.
- Provide detailed recommendations for the management of invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011).

The contractor employed to carry out the proposed construction work will be responsible for preparing a site-specific Method Statement in accordance with the site-specific management measures described in this report.

1.2 Statement of Authority

Field surveys were undertaken by John Hynes in September and October 2017 and May 2018. John has over 5 years consultancy experience and is a member of the Chartered Institute of Ecology and Environmental Management.

This report was prepared by Laoise Kelly, Ecologist with McCarthy Keville O'Sullivan. Laoise has undertaken a range of habitat surveys and mapping for various development led projects nationwide. She has also undertaken targeted invasive species surveys for sites located in Sligo, Roscommon, Wicklow, Cork and Donegal. This invasive species management plan was prepared by Laoise Kelly and reviewed by John Hynes (B. Sc. Env., M. Sc., CIEEM).

1.3 Legislative Framework

Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) include legislative measures to deal with the dispersal and introduction of invasive alien species:

Regulation 49

'a person shall be guilty of an offence if they: plant; disperse; allow or cause to disperse; spread or cause to grow the plant in the Republic of Ireland'. The list of species in the Third Schedule includes Japanese Knotweed, Giant Knotweed and their hybrid Bohemian Knotweed'.

Regulation 50

'an offence to or intend to; import; buy; sell; breed; reproduce or propagate; offer or expose for sale; advertise; publish a price list; transport; and distribute any plant species or vector material listed in the Third Schedule'.

Non-native species subject to restrictions under Regulations 49 and 50 are included in the 'Third Schedule' of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011). Invasive species included in this list include Japanese Knotweed, Giant Hogweed, Giant Knotweed, Giant Rhubarb, Himalayan Balsam, Himalayan Knotweed, Bohemian Knotweed and Rhododendron. Vector materials which aid in the spread of these species include soil or spoil taken from places infested with Japanese Knotweed (*Fallopia japonica*), Giant Knotweed (*Fallopia sachalinensis*) or their hybrid Bohemian Knotweed (*Fallopia x bohemica*). Two vector materials are referred to in the regulations (Third Schedule Part 3), one is blue mussel seed and the second is:

"Soil or spoil taken from places infested with Japanese Knotweed, Giant Knotweed or their hybrid Bohemian Knotweed".

1.3.1 Guidance Documents

The following guidance documents and literature sources were consulted during the preparation of this report:

- Regulation [EU] 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species (IAS Regulation)
- NRA (2010). *Guidelines on management of noxious weeds and non-native invasive plant species on national roads*. National Roads Authority.

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- Crushell, P., Foss, P., Hurley, C. & O'Loughlin, B. (2011). *County Kerry Invasive Species Survey 2011 - Pilot Mapping Study of the River Lee Catchment, Tralee*. Report prepared for Kerry County Council and The Heritage Council.
- O'Flynn, C. (2010) *Report on the Dirty Dozen Non-Native Invasive Species, Co. Donegal*. National Biodiversity Data Centre (NBDC).
- Stokes et al. (2004). Stokes, K., O'Neill, K. & McDonald, R.A. (2004) *Invasive species in Ireland*. Unpublished report.
- Actions for Biodiversity 2011-2016, Ireland's 2nd National Biodiversity Plan.
- Department of Environment (2013). *An Invasive Alien Species Strategy for Northern Ireland*. www.doeni.gov.uk
- Irish Water (2016) *Information and Guidance Document on Japanese Knotweed Asset Strategy and Sustainability*. Irish Water.
- Invasive Species Ireland (2016) *Best Practice Management Guidelines Japanese Knotweed Fallopia japonica*



2 DESCRIPTION OF THE PROPOSED WORKS

The Physical Characteristics of the Proposed Road Development are contained within the townlands of Drumkilsellagh, Doonally (ED Drumcliff East), Castlegal (ED Glencar), Drum East, Lugatober (occurring predominately within), Collinsford and Lugnaqall. The detailed description of the proposed road development is provided in Chapter 4 of the EIA. The outline description of the proposed road development is as follows:

- Circa 2.54km of Realignment to the existing N16 National Primary Route (c. 790m online and c. 1,750m offline);
- Junction Improvements including:
 - One At Grade Roundabout;
 - Six Simple T Junctions, including two Right/Left Staggered T Junctions;
- Circa 1,500km of realignment to the existing local road network (tie-in works);
- Three Direct Access connections to the National Primary network (including two agricultural and one Local Authority maintenance connections);
- Circa 1,500m of Vulnerable Road Users (Unsegregated cycle and pedestrian) tracks located predominately with the mainline verge space, interlinking as necessary with alternative offline routes;
- One Vulnerable Road Users Subway underpass;
- One River/Stream Clear Span Structure;
- Culverts and associated diversions of existing minor watercourses and drainage ditches;
- All the necessary drainage works associated with the Proposed Road Development;
- The diversion of services and utilities;
- Earthworks operations;
- 1 no. Steepened Cut Slope (Reinforced Earth) in the townland of Lugatober;
- One no. Soil Repository/Borrow Pit;
- Environmental mitigation works;
- The other consequential construction works necessary in order to complete the project.



3 JAPANESE KNOTWEED (*FALLOPIA JAPONICA*)

Japanese Knotweed (*Fallopia japonica*) is a tall, vigorous, ornamental plant that escaped cultivation in the late nineteenth century and has since become an aggressive invader in both rural and urban environments. The plant can grow up to 2-3m high and its root system can extend up to 3m into the ground and 7m laterally from the parent plant. As a result, a 7m buffer from the above-ground growth of the plant is applied to allow for potential root growth of the Knotweed. No works should take place within 7m of a stand of Knotweed prior to the preparation of a site-specific management plan. The reason this plant is such a threat is due to the nature of its regeneration. Cut fresh stems can produce fresh shoots and roots from nodes when immersed in soil or water. Very small fragments (0.7g) of fresh Knotweed shoot and root material have the potential to start a whole new plant.

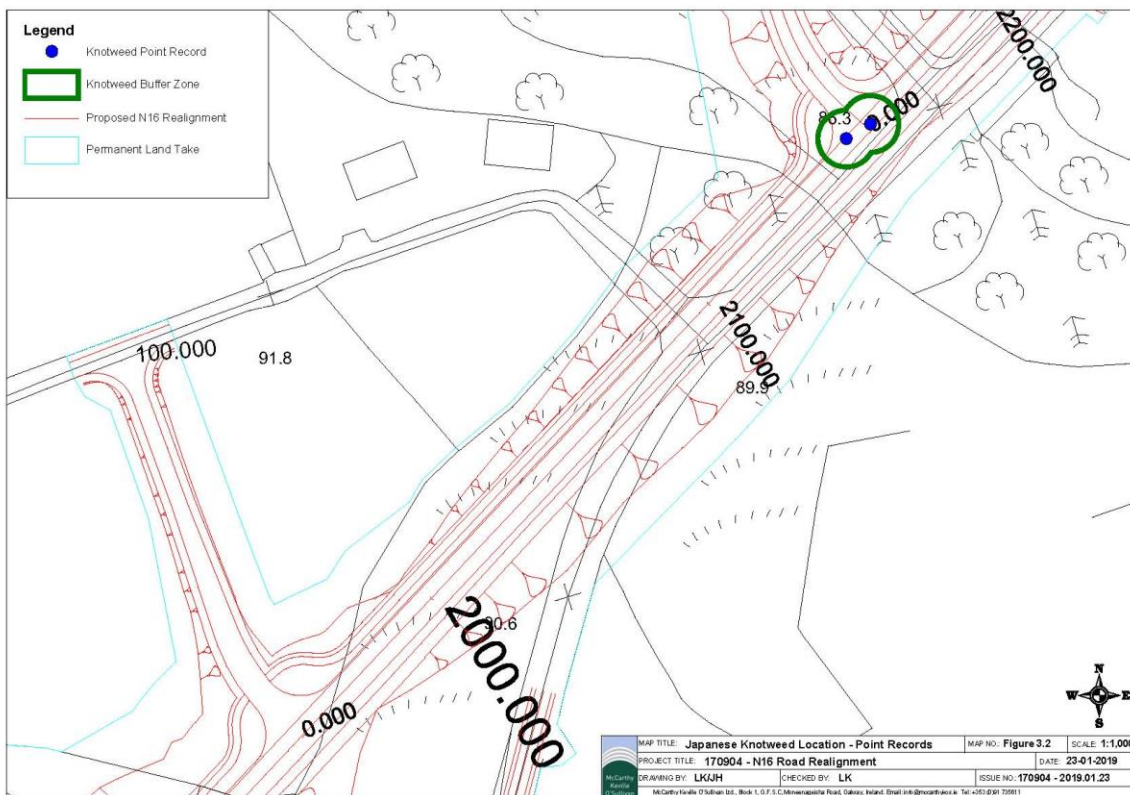
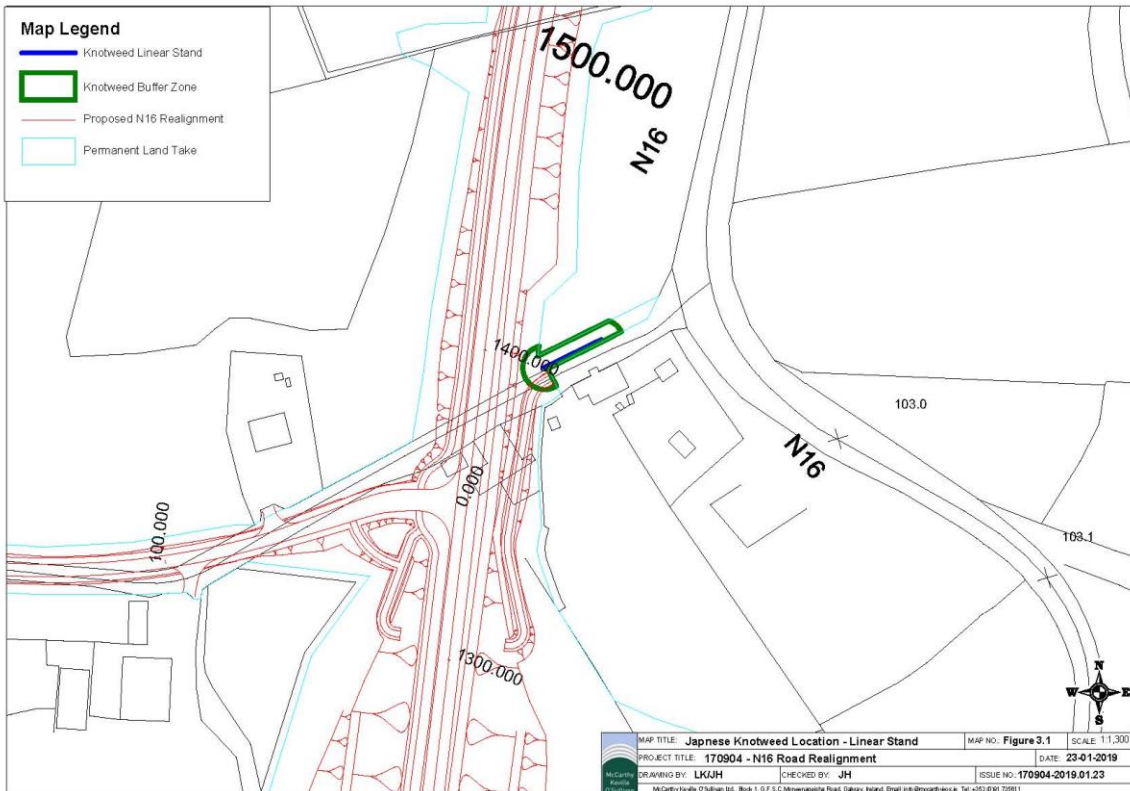
The non-native invasive species Japanese Knotweed (*Fallopia japonica*) was recorded on the *Proposed Road Development* in the townland of Lugatober (Grid Ref 571878 841098). This infestation consisted of a linear strip (approximately 20m) recorded in the road side hedgerow (Plate 3.1 and Figure 3.1).

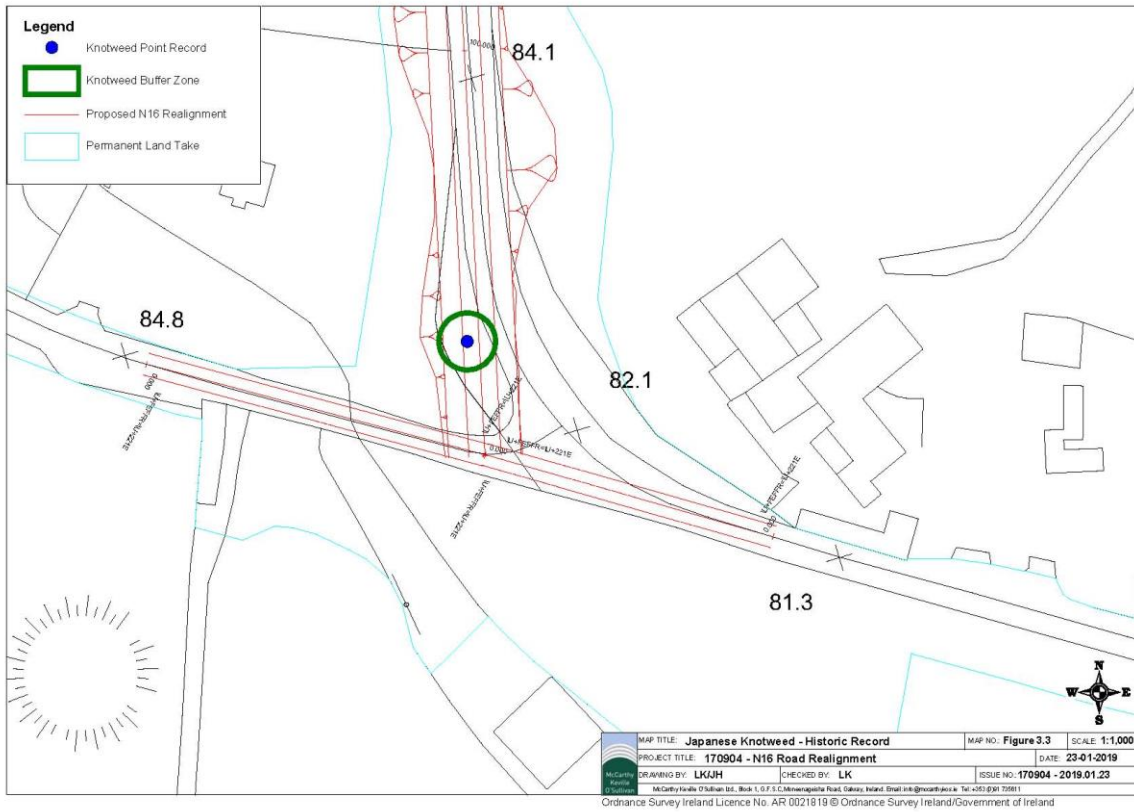
A second infestation was recorded in the townland of Lugnagall (Grid Ref 572380, 841629). The infestation consisted of two small stands which measures approximately 2m x 2m (Plate 3.2 and Figure 3.2).

There was also signage present at the Southern tie-in (Grid Ref 571723, 839775) which indicated that Japanese knotweed had been recorded and treated in the past. No evidence of Knotweed was recorded at this location during the 2017 and 2018 surveys. The location of this historic stand of Knotweed is shown in Figure 3.3.



Plate 3.1. Linear stand of Knotweed growing in association with residential hedge as shown on Figure 3.1





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Plate 3.2. Individual stands of Knotweed growing within field as shown in Figure 3.1 (seen as yellow leaved plants as per October 2017).



4 MANAGEMENT PLAN

The following paragraphs detail the proposed management of Japanese Knotweed within and adjacent to the proposed development site. All works will adhere to Invasive Species Ireland (2016) *Best Practice Management Guidelines Japanese Knotweed Fallopia japonica*. All excavation activities within 7m of a stand of Knotweed will be supervised by a suitably qualified ecologist.

4.1 Burial

The proposed road development will entail the use of a soil repository/borrow pit for the provision of material for the works, e.g. to create backfill for embankments. The location of this borrow pit is shown in Figure 4.1. According to Invasive Species Ireland Guidelines one option for the treatment of Knotweed is deep burial. This method includes the use of root barrier membrane to cover the Knotweed material before infilling with clean material at a minimum depth of 5m.

The proposed borrow pit will also act as a soil repository for the proposed works. The pit will measure approximately 30m wide and on average circa 11m-12m deep. It is proposed to bury Knotweed material that is impacting on the proposed works within this soil repository/borrow pit (this will include the remnants of the Knotweed stands that have undergone herbicide treatment described in section 4.1.1.2 of this report). A clearly defined area will be created within the soil repository pit for the deposition of contaminated Knotweed material. This will comprise plywood or other solid material in order to create a clearly defined, solid boundary. Based on trial pit excavations, expected volumes of Knotweed material will be estimated in order to inform the size of the deposition area/exclusion zone within the soil repository pit. Detailed measures on how this will be carried out are provided below.

4.1.1 Site Preparation

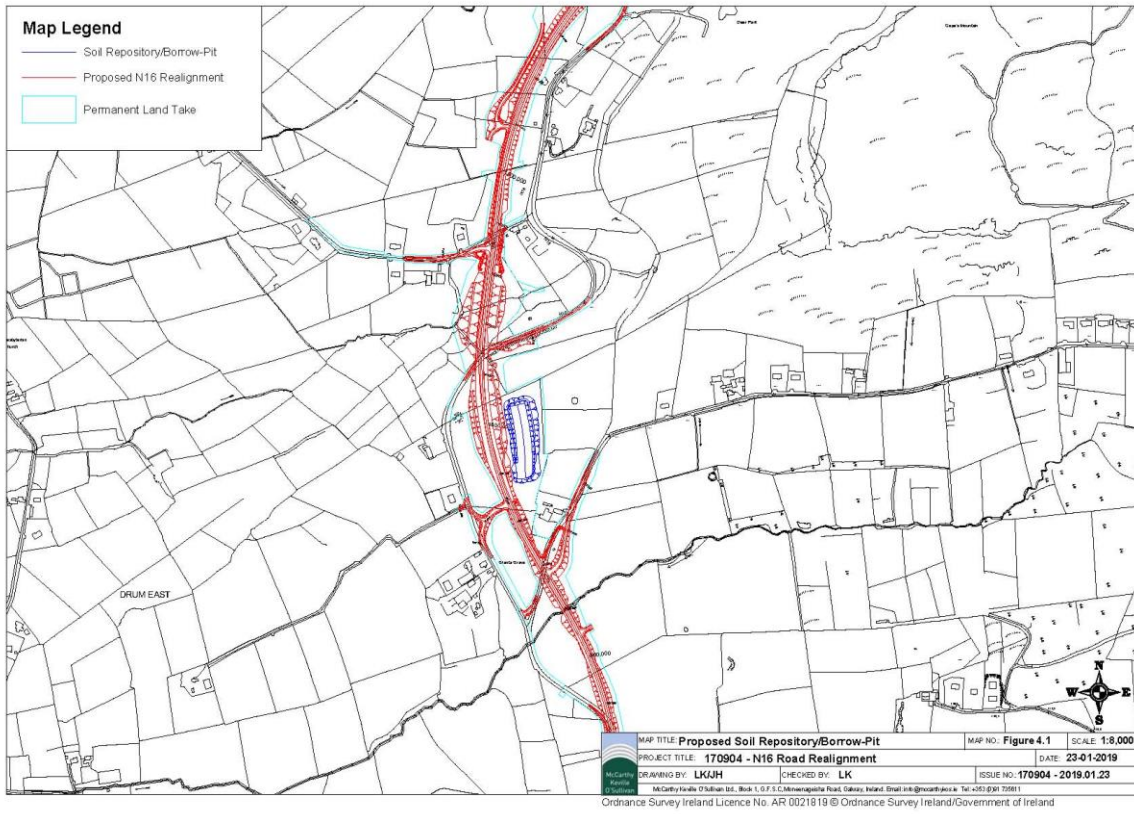
A pre-commencement survey will be carried out by the ecologist and the extents of Knotweed including a 7m buffer from the plant will be physically marked out. This will be done using wooden posts and tape and/or spray paint where the buffer extends into hard surface areas.

4.1.1.1 Trial Holes

- As the true extent of Knotweed cannot be determined until such a time as excavations commence, trial holes will be dug in proximity to a stand to ascertain the extent of Knotweed within the potentially contaminated area.
- Trial holes will be dug at the outer extent (within the CPO) of the 7m Knotweed buffer and work towards the centre of the Knotweed stand. This will determine the actual extent of the lateral and vertical root growth of the plant.
- Once the true extent of the plant is determined this will again be marked out using posts and tape and/or marker spray.
- All excavation activities within 7m of a stand of Knotweed will be supervised by a suitably qualified ecologist.

4.1.1.2 Herbicide Treatment

- The existing stands within the proposed works footprint (see Figure 3.2 and 3.3.) have been sprayed with two consecutive treatments herbicide in 2018, they will be sprayed again, twice annually in 2019 and again in 2020 in advance of construction.



4.1.1.3 Site Set-up

- Prior to commencement all staff will be given a toolbox talk on the characteristics of Japanese Knotweed and adherence to site hygiene during the proposed works.
- A pre-commencement survey will be carried out by the ecologist and the extents of Knotweed including a 7m buffer from the plant will be physically marked out. This will be done using wooden posts and tape and/or spray paint where the buffer extends into hard surface areas.
- Prior to works within the 7m Knotweed buffer zone of any stand, a designated bio-secure area will be set-up to facilitate brushing down of boots and machinery prior to leaving the contaminated area to prevent material being spread off site.
- A clearly defined area will be created within the soil repository pit for the deposition of contaminated Knotweed material. This will comprise plywood or other solid material in order to create a clearly defined, solid boundary. Based on trial pit excavations, expected volumes of Knotweed material will be estimated in order to inform the size of the deposition area/exclusion zone within the soil repository pit.
- The exclusion zone will be signed with warning signs in order to prevent access of machinery or personnel prior to and during the proposed works other than those designated for Knotweed works.

4.1.2 Knotweed Excavation and Burial

- Excavation within the CPO line will be carried out by a designated suitably sized excavator [preferably a rubber duck/non-tracked machine] under the supervision of a suitably qualified ecologist.
- The excavator will work from the centre of the Knotweed stand out towards its lateral extent. Contaminated material will be placed in a waiting dumper that is positioned on an impermeable membrane (radon barrier or equivalent).
- The dumper will only be three quarters filled. Before moving away from the membrane, the dumper wheels and machine body will be brushed down to remove any potentially contaminated material that was lost during filling and this material placed in the dumper bucket along with the other contaminated spoil.
- The dumper will drive slowly to the soil repository (see Figure 4.1.) and deposit the material within the already defined exclusion zone within the repository pit.
- The dumper will again be cleaned down prior to moving away from the exclusion zone and any loose material collected on a membrane and disposed of with the other contaminated material within the exclusion zone.
- The excavator will be cleaned down on location using brushes and shovels and all material disposed of by the methods previously described.
- The excavator will only move away from the Knotweed excavation area once completely cleaned down and signed off by the ecologist.
- This will be carried out at each of the locations where Knotweed is impacting on the development footprint.

4.1.3 Site Hygiene

The following measures will be adhered to during the construction works;

- The contractor will assign a member of their team as Environmental Officer.
- Prior to the commencement of works the Environmental Officer will ensure a 7m buffer will be temporarily fenced off/or marked out with marker-spray around identified stands of Japanese Knotweed to avoid accidental disturbance (The 7m buffer is provided in Figure 3.1 – 3.3).
- All works within the 7m Knotweed buffer will be carried out under the supervision of a suitably qualified ecologist.
- Ensure all site users are given a toolbox talk and are aware of the locations of the invasive species recorded and adhere to avoiding these locations.
- Only people familiar with identifying Japanese Knotweed will be allowed to work in close proximity to the plant.
- Clean down will be carried out using brushes and shovels and power washing avoided. This is to prevent potentially contaminated run-off spreading outside the site.
- Machinery used in the excavation works will be cleaned down in a clearly designated area as assigned by the contractor. All material removed from the machinery will be collected within the designated area and disposed of by means of one of the desired management options described above.

To avoid the introduction of invasive species to the site the following best practice measures are recommended.

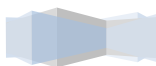
- Any material imported to the site will be screened for invasive species by a suitably qualified ecologist before transportation to the site.
- All machinery will be thoroughly cleaned down prior to arriving on the site to avoid the potential spread of invasive species from elsewhere.



5 CONCLUSIONS

The bespoke management plan for the treatment of invasive species outlined in this document has been designed to follow the guidance outlined in Section 1.3. Careful implementation of the prescribed management measures will ensure that the works are conducted within the confines of legislation as outlined in Section 1.2.

It should be noted that this management plan provides options for the management of Third Schedule invasive species only within the footprint of the current proposal.



4 Appropriate Assessment Screening

SLIGO COUNTY COUNCIL
COMHAIRLE CHONTAE SHLIGIGH

Chief Executive's Order No. ~~476~~ 19

Project Ref: PO 1010

Subject: N16 Lugatober (Drumkilsellagh to Lugnagall) Proposed Road Development
Part XAB of the Planning & Development Acts, 2000 to 2018
EU Habitats Directive (92/43/EEC)
EU Birds Directive (2009/147/EC)

Appropriate Assessment Screening Determination

Submitted: Mc Carthy Keville O'Sullivan, Planning & Environmental Consultants prepared an assessment report to inform the screening for appropriate assessment of the N16 Lugatober (Drumkilsellagh to Lugnagall) proposed road development, entitled 'Provision of Information for Appropriate Assessment Screening', attached.

Sligo County Council has reviewed the document entitled 'Provision of Information for Appropriate Assessment Screening'. Having regard to this document, the County Council has concluded, that it cannot be excluded, on the basis of objective information, that the proposed road development, individually or in combination with other plans and projects, would have a significant effect on the Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, Sligo/Leitrim Uplands SPA, Cummeen Strand SPA (004035) and Drumcliff Bay SPA. The screening for appropriate assessment has been completed in view of the best scientific knowledge.

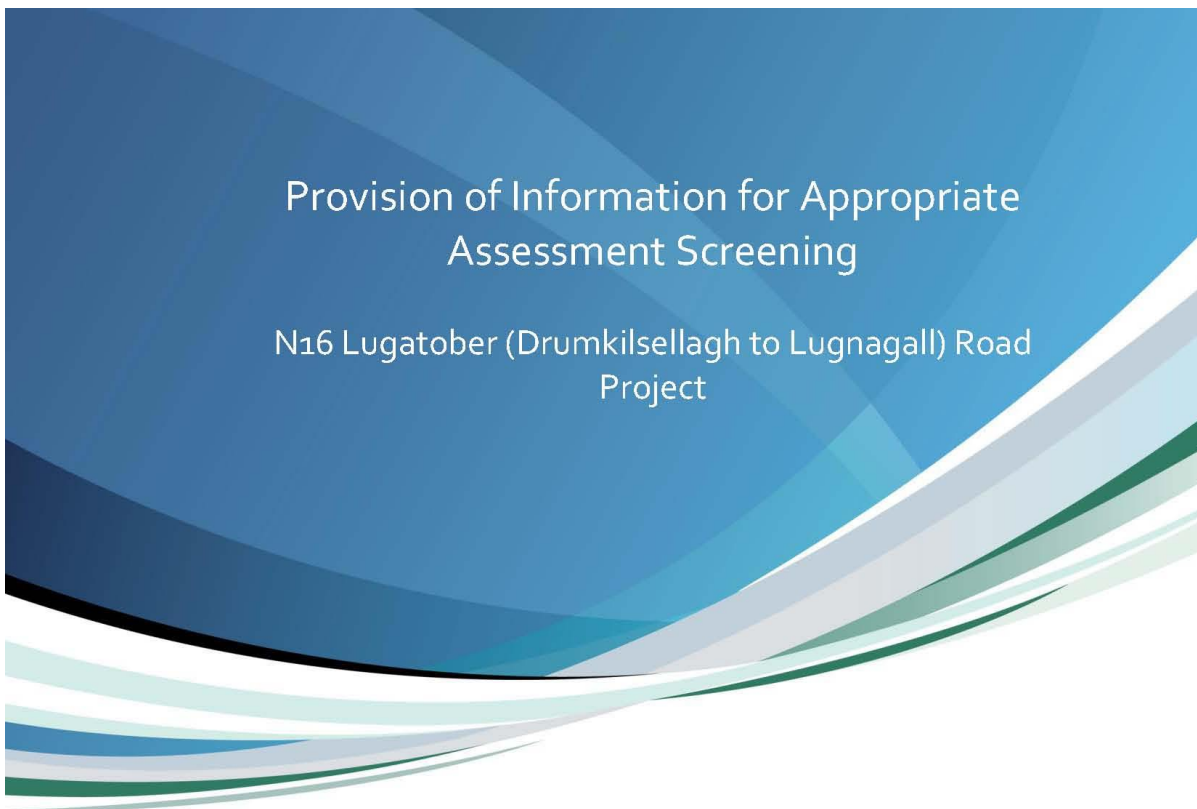
Recommendation from Fergus Meehan, A/SEE dated 30th January 2019, as endorsed by Emer Concannon, SE and approved by Tom Kilfeather, DoS that Sligo County Council determines that an Appropriate Assessment is required in order to assess the implications of the Project for the sites described above, in view of the relevant conservation objectives.

Order: Having regard to the above 'Provision of Information for Appropriate Assessment Screening' report as prepared by Mc Carthy Keville O'Sullivan, Planning & Environmental Consultants and recommendation, endorsement and approval of Tom Kilfeather, Director of Infrastructural Services, I hereby order that in accordance with Section 177AE of the Planning & Development Act, the County Council shall prepare, or cause to be prepared, a Natura Impact Statement and shall apply to An Bord Pleanála for approval.

Signed this 1st day of February 2019


Dorothy Clarke
Director of Services

*To whom this function has been delegated in accordance with the provisions of
Section 154 of the Local Government Act, 2001, by Order No. 6/19 dated 23rd
January 2019*



Provision of Information for Appropriate Assessment Screening

N16 Lugatober (Drumkilsellagh to Lugnaqall) Road Project



Planning & Environmental Consultants



Provision of Information for Appropriate Assessment Screening 170904 – AASR – 2019.01.30

DOCUMENT DETAILS

Client: Sligo County Council

Project title: N16 Lugatober (Drumkilsellagh to Lugnagall) Road Project

Project Number: 170904

Document Title: Provision of Information for Appropriate Assessment Screening

Doc. File Name: 170904– AASR – 2019.01.30– F

Prepared By: McCarthy Keville O’Sullivan Ltd.
 Planning & Environmental Consultants
 Block 1, G.F.S.C.
 Moneenageisha Road, Galway



Document Issue:

Rev	Status	Issue Date	Document File Name	Author(s)	Approved By:
01	Draft	15.01.2019	170904– AASR – 2019.01.15 – D1	JH	PR
01	Final	30.01.2019	170904– AASR – 2019.01.30 – F	JH	PR



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1 INTRODUCTION

McCarthy Keville O'Sullivan Ltd. (MKO) has been appointed to prepare a report to provide the information necessary to allow the competent authority to conduct an Article 6(3) Screening for Appropriate Assessment of the proposed N16 Lugatober (Drumkilsellagh to Lugnagall) Road Project, Co, Sligo.

The current project is not directly connected with, or necessary for, the management of any European Site, consequently the project has been subject to the Appropriate Assessment Screening process.

The assessment in this report is based on a desk study and field surveys undertaken in 2017 and 2018. It specifically assesses the potential for the proposed development to impact on European sites.

This Report has been prepared in accordance with the European Commission guidance document '*Assessment of Plans and Projects Significantly affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC*' (EC, 2001) and the Department of the Environment's Guidance on the Appropriate Assessment of Plans and Projects in Ireland (December 2009, amended February 2010).

In addition to the guidelines referenced above, the following relevant guidance was considered in preparation of this report:

1. *DoEHLG (2010) Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government,*
2. *European Communities (2018) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission,*
3. *European Communities (2000) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission,*
4. *Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission,*
5. *EC (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. European Commission,*
6. *EC (2013) Interpretation Manual of European Union Habitats. Version EUR 28. European Commission,*
7. *CIEEM (2016) Institute of Ecology and Environmental Management Guidelines for Ecological Impact Assessment.*

1.1 Appropriate Assessment

1.1.1 Screening for Appropriate Assessment

Screening is the process of determining whether an Appropriate Assessment is required for a plan or project. Under Part XAB of the Planning and Development Act, 2000, as amended, screening must be carried out by the Competent Authority to assess, in view of best scientific knowledge, if a land-use plan or proposed development, individually or in combination with another plan or project, is likely to have a significant effect on a European site. The Competent Authority's determination as to whether an Appropriate Assessment is required must be made on the basis of objective information and should be recorded and made publicly

available. The competent authority may request information to be supplied to enable it to carry out screening.

Consultants or project proponents may undertake a form of screening to establish if an Appropriate Assessment is required and provide advice or may submit the information necessary to allow the Competent Authority to conduct a screening with an application for consent.

Where it cannot be excluded, on the basis of objective information, if that plan or project, individually or in combination with other plans or projects will have a significant effect on a European site, an Appropriate Assessment of the plan or project is required. The screening for appropriate assessment must be completed in view of best scientific knowledge.

1.1.2 Appropriate Assessment (Natura Impact Statement)

The term Natura Impact Statement (NIS) is defined in legislation¹. An NIS, where required, should present the data, information and analysis necessary to reach a definitive determination as to 1) the implications of the plan or project, alone or in combination with other plans and projects, for a European site in view of its conservation objectives, and 2) whether there will be adverse effects on the integrity of a European site. The NIS should be underpinned by best scientific knowledge, objective information and by the precautionary principle.

¹ As defined in Section 177T of the Planning and Development Act, 2000 as amended, an NIS means a statement, for the purposes of Article 6 of the Habitats Directive, of the implications of a proposed development, on its own and in combination with other plans and projects, for a European site in view of its conservation objectives. It is required to include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for the European site in view of its conservation objectives



2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 Site Location

Sligo County Council is currently planning a 2.5km upgrade of the N16 National Primary Route, between the townlands of Drumkilsellagh and Lugnaqall and occurring predominately within the townland of Lugatober. The project location is depicted on Figure 2.1. The project will remove a number of substantially deficient bends on this section of the route and in so doing, will improve aspects such as safety, sight distance, cross sectional width and drainage.

2.2 Characteristics of the Proposed Development

The Physical Characteristics of the Proposed Road Development are contained within the townlands of Drumkilsellagh, Doonally (ED Drumcliff East), Castlegal (ED Glencar), Drum East, Lugatober (occurring predominately within), Collinsford and Lugnaqall. The detailed description of the proposed road development will be provided as an appendix to the Natura Impact Statement. The outline description of the proposed road development is as follows:

- Circa 2.54km of Realignment to the existing N16 National Primary Route (c. 790m online and c. 1,750m offline);
- Junction Improvements including:
 - One At Grade Roundabout;
 - Six Simple T Junctions, including two Right/Left Staggered T Junctions;
- Circa 1,340km of realignment to the existing local road network (tie-in works);
- Three Direct Access connections to the National Primary network (including two agricultural and one Local Authority maintenance connections);
- Circa 1,920m of Vulnerable Road Users (Unsegregated cycle and pedestrian) tracks located predominately with the mainline verge space, interlinking as necessary with alternative offline routes;
- One Vulnerable Road Users Subway underpass;
- One River/Stream Clear Span Structure;
- Culverts and associated diversions of existing minor watercourses and drainage ditches;
- All the necessary drainage works associated with the Proposed Road Development;
- The diversion of services and utilities;
- Earthworks operations;
- Soil Nailed cut Side Slope in the townland of Lugatober;
- One no. Soil Repository/Borrow Pit;
- Environmental mitigation works;
- The other consequential construction works necessary in order to complete the project.



3 IDENTIFICATION OF RELEVANT EUROPEAN SITES

3.1 Background to European Sites

The Habitats Directive (92/43/EEC) (together with the Birds Directive (2009/147/EC)) forms the cornerstone of Europe's nature conservation policy. It is built around two pillars: the Natura 2000 network of protected sites and the strict system of species protection. All in all the directive protects over 1,000 animal and plant species and over 200 "habitat types" (e.g. special types of forests, meadows, wetlands, etc.), which are of European importance.

With the introduction of the EU Habitats Directive and Birds Directive which were transposed into Irish law as S.I. No. 94/1997 *European Communities (Birds and Natural Habitats) Regulations 1997*, the European Union formally recognised the significance of protecting rare and endangered species of flora and fauna, and also, more importantly, their habitats. The 1997 Regulations and their amendments were subsequently revised and consolidated in S.I. No. 477/2011- *European Communities (Birds and Natural Habitats) Regulations 2011*. This legislation requires the establishment and conservation of a network of sites of particular conservation value that are to be termed 'European Sites'.

Habitats Directive/Special Areas of Conservation

Articles 3 – 9 of the EU Habitats Directive (92/43/EEC) provide the EU legislative framework of protecting rare and endangered species of flora and fauna, and habitats. Annex I of the Directive lists habitat types whose conservation requires the designation of Special Areas of Conservation (SAC). Priority habitats, such as Turloughs, which are in danger of disappearing within the EU territory are also listed in Annex I. Annex II of the Directive lists animal and plant species (e.g. Marsh Fritillary, Atlantic Salmon, and Killarney Fern) whose conservation also requires the designation of SAC. Annex IV lists animal and plant species in need of strict protection such as Lesser Horseshoe Bat and Otter, and Annex V lists animal and plant species whose taking in the wild and exploitation may be subject to management measures. In Ireland, species listed under Annex V include Irish Hare, Common Frog and Pine Marten.

Species can be listed in more than one Annex, as is the case with Otter and Lesser Horseshoe Bat which are listed on both Annex II and Annex IV.

Birds Directive/Special Protection Areas

Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds (Birds Directive) has been substantially amended several times. In the interests of clarity and rationality the said Directive was codified in 2009 and is now cited as Directive 2009/147/EC. The Directive instructs Member States to take measures to maintain populations of all bird species naturally occurring in the wild state in the EU (Article 2). Such measures may include the maintenance and/or re-establishment of habitats in order to sustain these bird populations (Article 3).

A subset of bird species have been identified in the Directive and are listed in Annex I as requiring special conservation measures in relation to their habitats. These species have been listed on account of inter alia: their risk of extinction; vulnerability to specific changes in their habitat; and/or due to their relatively small population size or restricted distribution. Special Protection Areas (SPAs) are to be identified and classified for these Annex I listed species and for regularly occurring migratory species, paying particular attention to the protection of wetlands (Article 4).

3.2 Identification of the Designated Sites within the Likely Zone of Impact of the Proposed Development

The most up to date GIS spatial datasets for European designated sites were downloaded from the NPWS websites (www.npws.ie) on the 30/01/2019. The GIS software, MapInfo

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(Version 10.0) and following rationale was used to assess which sites occur within the likely zone of impact.

Initially, sites within a 15km radius of the proposed development were identified (as per the DoEHLG Guidance (2010)) (see Figure 3.1). In addition, using the precautionary principle, European Sites located outside the 15km buffer zone were also taken into account and assessed where potential pathways for impact were identified and particularly where hydrological connectivity could be established. In this case, no potential for effects on sites located outside the 15km zone was identified.

Any likely direct or indirect impacts of the proposed development, both alone and in combination with other plans and projects, on European Sites by virtue of the following criteria: size and scale, land-take, distance from the European Site or key features of the site, resource requirements, emissions, excavation requirements, transportation requirements and duration of construction and operation have been considered in this Screening Assessment.

Table 3.1 provides the Screening Assessment and identification of the European Sites located within the likely zone of impact. The site synopses and conservation objectives of these sites, as per the NPWS website (www.npws.ie), were considered at the time of preparation of this report (30/01/2019).



Table 3.1 Identification of Designated sites within the Likely Zone of Impact

European Site	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (www.npws.ie , 30/01/2019)	Conservation Objectives	Likely Zone of Impact determination
Special Areas of Conservation			
Ben Bulbin, Gleniff and Glenade Complex SAC (000623) 1.3km north-east.	<ul style="list-style-type: none"> ▪ Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation (3260) ▪ Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010] ▪ European Dry Heaths (4030) ▪ Alpine and Boreal heaths (4060) ▪ <i>Juniperus communis</i> formations on heaths or calcareous grasslands (5130) ▪ Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210] ▪ Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] ▪ Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] ▪ Transition mires and quaking bogs [7140] ▪ Petrifying springs with tufa formation (7220)* ▪ Alkaline fens [7230] ▪ Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladanii</i>) [8110] ▪ Calcareous and calcshist screes of the montane to alpine levels (8120) ▪ Calcareous rocky slopes with chasmophytic vegetation (8210) ▪ <i>Vertigo geyeri</i> (Geyer's Whorl Snail) [1013] ▪ <i>Lutra lutra</i> (Otter) [1355] 	<p>This site has the generic conservation objective:</p> <p><i>To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.</i> (NPWS Generic version 6.0, 2018)</p>	<p>There will be no direct effects as the proposed development is located entirely outside the designated sites.</p> <p>There is no hydrological connectivity between the proposed road project and the European sites. Given the distance from the proposed road development there is no potential for disturbance related impacts to QI species. No complete impact source-pathway-receptor chain could be identified. The sites are not in the likely zone of impact and no further assessment is required.</p>
Lough Gill SAC (001976)	<ul style="list-style-type: none"> ▪ Natural eutrophic lakes with Magnopotamion or Hydrocharition – type vegetation (3150) 	<p>This site has the generic conservation objective:</p>	



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<p>3.2km south</p>	<ul style="list-style-type: none"> ▪ Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210] ▪ Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles (91A0) ▪ Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (91E0)* ▪ <i>Austropotamobius pallipes</i> (White-clawed crayfish) [1092] ▪ <i>Petromyzon marinus</i> (Sea Lamprey) [1095] ▪ <i>Lampetra planerii</i> (Brook Lamprey) ▪ <i>Lampetra fluviatilis</i> (River Lamprey) ▪ <i>Salmo salar</i> (Salmon) [1106] ▪ <i>Lutra lutra</i> (Otter) [1355] 	<p><i>'To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.'</i> (NPWS Generic version 6.0, 2018)</p>	
<p>Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC (000627)</p> <p>3.3km west</p>	<ul style="list-style-type: none"> ▪ Estuaries (1130) ▪ Mudflats and sandflats not covered by seawater at low tide (1140) ▪ Embryonic shifting dunes (2110) ▪ Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (2120) ▪ Fixed coastal dunes with herbaceous vegetation (2130)* ▪ <i>Juniperus communis</i> formations on heaths or calcareous grasslands (5130) ▪ Petrifying springs with tufa formation (7220) ▪ <i>Vertigo angustior</i> (Marsh snail) [1014] ▪ <i>Petromyzon marinus</i> (Sea Lamprey) [1095] ▪ <i>Lampetra fluviatilis</i> (River Lamprey) [1099] ▪ <i>Phoca vitulina</i> (Harbour seal) [1365] 	<p>Detailed conservation objectives for this site (Version 1, September 2013) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>There will be no direct effects as the project footprint is located entirely outside the designated site.</p> <p>No pathway for impact on the terrestrial or groundwater dependent habitats or species for which the SAC is designated exists.</p> <p>Given the distance from the proposed road development there is no potential for disturbance related impacts to QI species.</p> <p>Taking a precautionary approach, and given that the SAC is located hydrologically downstream, a potential pathway for indirect effects on the marine/surface water dependent Qualifying Interests was identified in the form of deterioration of surface water quality resulting from pollution, associated with the construction and operational phases of the development. The Qualifying Interests with the potential to be impacted via the identified pathway include:</p> <ul style="list-style-type: none"> ▪ Estuaries (1130)



			<ul style="list-style-type: none"> Mudflats and sandflats not covered by seawater at low tide [1140] <i>Petromyzon marinus</i> (Sea Lamprey) [1095] <i>Lampetra fluviatilis</i> (River Lamprey) [1099] <i>Phoca vitulina</i> (Harbour seal) [1365] <p>Consequently, the potential for significant effects on this European Site cannot be excluded with respect to QIs identified above. This site is therefore considered to be within the Likely Zone of Impact.</p>
Glenade Lough SAC (001919) 9.7km north-east	<ul style="list-style-type: none"> Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150] <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092] <i>Najas flexilis</i> (Slender Naiad) [1833] 	This site has the generic conservation objective: <i>'To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.'</i> (NPWS Generic version 6.0, 2018)	There will be no direct effects as the proposed development is located entirely outside the designated sites. There is no hydrological connectivity between the proposed road project and the European sites. Given the distance from the proposed road development there is no potential for disturbance related impacts to QI species. No complete impact source-pathway-receptor chain could be identified. The sites are not in the likely zone of impact and no further assessment is required.
Ballysadare Bay SAC (000622) 10km south-west	<ul style="list-style-type: none"> Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> [2120] Fixed coastal dunes with herbaceous vegetation [2130]* Humid dune slacks [2190] <i>Vertigo angustior</i> (Narrow mouthed whorl snail) [1014] <i>Phoca vitulina</i> (Harbour seal) [1365] 	Detailed conservation objectives for this site (Version 1, November 2013) were reviewed as part of the assessment and are available at www.npws.ie	
Arroo Mountain SAC (001403)	<ul style="list-style-type: none"> Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] 	Detailed conservation objectives for this site (Version 1, August 2016) were	

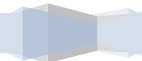


10.4km north-east	<ul style="list-style-type: none"> Blanket bogs (7130) Petrifying springs with tufa formation (7220)* Calcareous and calcshist screes of the montane to alpine levels (8120) Calcareous rocky slopes with chasmophytic vegetation (8210) 	reviewed as part of the assessment and are available at www.npws.ie	
Union Wood SAC (000638)	<ul style="list-style-type: none"> Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles (91A0) 	This site has the generic conservation objective:	
10.5km south	<ul style="list-style-type: none"> 	<i>'To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.'</i> (NPWS Generic version 6.0, 2018)	
Streedagh Point Dunes SAC (001680)	<ul style="list-style-type: none"> Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] <i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014] 	Detailed conservation objectives for this site (Version 1, March 2015) were reviewed as part of the assessment and are available at www.npws.ie	
10.6km north-west			
Bunduff Lough And Machair/Trawalua/Mullaghmore SAC (000625)	<ul style="list-style-type: none"> Mudflats and sandflats not covered by seawater at low tide [1140] Large shallow inlets and bays [1160] Reefs [1170] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] 	Detailed conservation objectives for this site (Version 1, March 2015) were reviewed as part of the	
10.9km north-west			



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	<ul style="list-style-type: none"> Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Machairs (* in Ireland) [21A0] <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130] Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210] Alkaline fens [7230] <i>Euphydryas aurinia</i> (Marsh Fritillary) [1065] <i>Petalophyllum ralfsii</i> (Petaltwort) [1395] 	assessment and are available at www.npws.ie	
Unshin River SAC (001898) 11km south	<ul style="list-style-type: none"> Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260] Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (g1E0)* <i>Salmo salar</i> (Salmon) [1106] <i>Lutra lutra</i> (Otter) [1355] 	This site has the generic conservation objective: <i>'To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.'</i> (NPWS Generic version 6.0, 2018)	
Special Protection Areas			
Sligo/Leitrim Uplands SPA (004187) 18m east (Adjacent to the eastern boundary of the site)	<ul style="list-style-type: none"> <i>Falco peregrinus</i> (Peregrine) [A103] <i>Pyrhacorax pyrrhocorax</i> (Chough) [A346] 	This site has the generic conservation objective: <i>'To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests of this SPA.'</i> (NPWS Generic version 6.0, 2018)	There will be no direct effects as the project footprint is located entirely outside the designated site. The proposed road development is located adjacent to the Sligo/Leitrim Uplands SPA. Taking a precautionary approach and based on proximity the potential for significant effects on the breeding Chough and Peregrine populations of this European Site cannot be excluded at this stage of the Appropriate Assessment process. This site is therefore considered to be within the Likely Zone of Impact .



<p>Cummeen Strand SPA (004035)</p> <p>3.3km south-west (>4.5km downstream via surface water).</p>	<ul style="list-style-type: none"> ▪ <i>Branta bernicla hrota</i> (Brent Goose) [A046] ▪ <i>Haematopus ostralegus</i> (Oystercatcher) [A130] ▪ <i>Tringa totanus</i> (Redshank) [A162] ▪ Wetlands (A999) 	<p>Detailed conservation objectives for this site (Version 1, September 2013) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>There will be no direct effects as the project footprint is located entirely outside the designated site.</p> <p>Given the distance from the proposed road development there is no potential for disturbance related impacts to QI species.</p>
<p>Drumcliff Bay SPA (004013)</p> <p>4.1km west (>5.09km downstream via surface water).</p>	<ul style="list-style-type: none"> ▪ <i>Calidris alba</i> (Sanderling) [A144] ▪ <i>Limosa lapponica</i> (Bar-tailed Godwit) [A157] ▪ Wetlands and Waterbires (A999) 	<p>Detailed conservation objectives for this site (Version 1, September 2013) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>Taking a precautionary approach, and given that the SPAs are located hydrologically downstream, a potential pathway for indirect effects on the surface water dependent Qualifying Interests 'Wetland and Waterbirds [A999]' was identified, in the form of deterioration of surface water quality resulting from pollution, associated with the construction and operational phases of the development.</p> <p>Consequently, the potential for significant effects on this European Site cannot be excluded at this stage of the Assessment process. These sites are therefore considered to be within the Likely Zone of Impact.</p>
<p>Ballintemple & Ballygilgan SPA (004234)</p> <p>7.2km north-west</p>	<ul style="list-style-type: none"> ▪ <i>Branta leucopsis</i> (Barnacle Goose) [A045] 	<p>This site has the generic conservation objective:</p> <p><i>'To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests of this SPA.'</i> (NPWS Generic version 6.0, 2018)</p>	<p>There will be no direct effects as the proposed development is located entirely outside the designated sites.</p> <p>There is no hydrological connectivity between the proposed road project and the European sites. Given the distance from the proposed road development there is no potential for disturbance related impacts to QI species.</p>
<p>Ballysadare Bay SPA (004129)</p> <p>10km south-west</p>	<ul style="list-style-type: none"> ▪ <i>Branta bernicla hrota</i> (Brent Goose) [A046] ▪ <i>Pluvialis squatarola</i> (Grey Plover) [A141] ▪ <i>Calidris alpine alpine</i> (Dunlin) [A149] ▪ <i>Limosa lapponica</i> (Bar-tailed Godwit) [A157] ▪ <i>Tringa totanus</i> (Redshank) [A162] ▪ Wetlands (A999) 	<p>Detailed conservation objectives for this site (Version 1, October 2013) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>No complete impact source-pathway-receptor chain could be identified. The sites are not in the likely zone of impact and no further assessment is required.</p>



4 ARTICLE 6(3) SCREENING STATEMENT AND CONCLUSIONS

The findings of this Screening Assessment are presented following the European Commission guidance document *Assessment of Plans and Projects Significantly affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC* (EC, 2001) and the Department of the Environment's Guidance on the Appropriate Assessment of Plans and Projects in Ireland (December 2009, amended February 2010).

4.1 Data Collected to Carry Out Assessment

In preparation of the report, the following sources were used to gather information:

- Review of NPWS Site Synopses, Conservation Objectives for the European Sites
- Review of 2013 and 2007 EU Habitats Directive (Article 17) Reports.
- Review of online web-mappers: National Parks and Wildlife Service (NPWS), Teagasc, EPA, Water Framework Directive (WFD), Geological Survey of Ireland (GSI), Inland Fisheries Ireland (IFI) & Irish Wetland Bird Survey I-WeBS.
- Review of specially requested records from the NPWS Rare and Protected Species Database for the hectads which overlap with the study area.
- Review of Bird Atlases: (Sharrock, 1976; Lack, 1986; Gibbons et al., 1993; Balmer et al., 2013).
- Review of Birds of Conservation Concern (BoCCI) in Ireland 2014-2019 (Colhoun & Cummins, 2013)
- Review of the Bat Conservation Ireland (BCI) Private Database
- Inland Fisheries Ireland (IFI) Reports
- Review of OS maps and aerial photographs of the site of the proposed project.
- Review of relevant databases including National Biodiversity Ireland Database and available literature of previous surveys conducted in the area.
- Review of other plans and projects within the area.

4.2 Concluding Statement

It cannot be excluded beyond reasonable scientific doubt, in view of best scientific knowledge on the basis of objective information and in light of the conservation objectives of the relevant European sites, that the proposed development, individually or in combination with other plans and projects, would have a significant effect on the Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, Sligo/Leitrim Uplands SPA, Cummeen Strand SPA (004035) and Drumcliff Bay SPA.

As a result, it is recommended to the competent authority that an Appropriate Assessment is required and that a Natura Impact Statement be prepared in respect of the proposed development.

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