Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Comhairle Contae Dhún na nGall
Donegal County Council

TEN-T Priority Route Improvement Project, Donegal

Phase 2, Option Selection Report
Volume D1- Section 1 Environmental Appendices

RPS BARRY TRANSPORTATION

Rialtas na hÉireann
Government of Ireland

Tionscadal Éireann
Project Ireland
2040

Co-financed by the Connecting Europe Facility of the European Union

Document Control Sheet

Client:	Donegal County Council
Project Title:	TEN-T Priority Route Improvement Project, Donegal
Document Title:	Volume D1 – Section 1 Environmental Appendices
Document No.:	TT-MGT0337-RPS-00-01-RP-Z-RP-2103

Rev. No.	Suitability	Effective Date	Revision Description	Checked	Approved
P01	S4	December 2019	Issue for Publication	TP / EC / ED	TP / EC / ED

The contents of this publication do not necessarily reflect the opinion of the European Union

This report has been prepared by RPS/Barry Transportation on behalf of Donegal County Council. Any other persons who use any information contained herein do so at their own risk.

© RPS Barry Transportation 2019

Contents

Appendix D1.1 – Section 1 Air Quality and Climate

Appendix D1.2 – Section 1 Noise

Appendix D1.3 – Section 1 Landscape and Visual

Appendix D1.4 – Section 1 Biodiversity (Terrestrial)

Appendix D1.5 – Section 1 Biodiversity (Aquatic)

Appendix D1.6 – Section 1 Soils, Geology and Hydrogeology

Appendix D1.7 – Section 1 Hydrology

Appendix D1.8 – Section 1 Cultural Heritage

Appendix D1.9 – Section 1 Material Assets (Agricultural)

Appendix D1.10 – Section 1 Material Assets (Non-Agricultural)

Appendix D1.11 – Section 1 Option 1G Link Road Assessment

Donegal County Council

TEN-T Priority Route Improvement Project, Donegal

Section 1: N15/N13 Ballybofey/Stranorlar Urban Region

Option Selection Report

Appendix D1.1 – Air and Climate

December 2019

Document Control Sheet

Client:	Donegal County Council
Project Title:	TEN-T Priority Route Improvement Project, Donegal – Section 1: N15 Ballybofey-Stranorlar Urban Region
Document Title:	Option Selection Report –Appendix D1.1 – Air and Climate
Document No.:	TT-MGT0337-RPS-00-01-RP-E-EN-1001

Rev. No.	Suitability	Effective Date	Revision Description	Checked	Approved
P01	S4	December 2019	Issue for publication	PC	GMcE

This report has been prepared by RPS/Barry Transportation on behalf of Donegal County Council. Any other persons who use any information contained herein do so at their own risk.

© RPS Barry Transportation 2019

Table of Contents

1 INTRODUCTION 1
1.1 Methodology 1
1.1.1 Assessment Criteria 1
2 EXISTING ENVIRONMENT 3
2.1 Desk Study 3
3 OPTION SELECTION 5
3.1 Assessment of Potential Impacts 5
3.2 Comparison of Options 7

List of Tables

Table 1-1: Impact Scoring Key (TII, 2016) 2
Table 2-1: Sensitive Receptors and Operation Year Traffic Flows 4
Table 3-1: Overall Change in Exposure to NO_x for Design Year 2028 5
Table 3-2: Overall Change in Exposure to PM_{10} for Design Year 2028 6
Table 3-3: Climate Impacts Associated with Options 7
Table 3-4: Option Scoring Matrix 8

1 INTRODUCTION

This report outlines the comparative assessment of options in relation to air quality and climate for 13 no. options for Section 1: N15 Ballybofey –Stranorlar Urban Region of the TEN-T Priority Route Improvement Project in Donegal. This assessment will form part of a Phase 2 – Option Selection Report to be issued by the National Roads Design Office, Donegal County Council. See Section 1.2 of the Option Selection Report for a description of the project.

This report assesses the air and climate impacts with reference to key sensitive receptors in proximity to the options. The impacts for each of the options are identified so that those with unacceptably high levels of impact can be avoided to the extent feasible as part of the overall option assessment process.

1.1 Methodology

This analysis was undertaken by means of a desktop assessment based on the following guidance and information sources:

- Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011);
- National Roads Authority "Guidance for the Treatment of Air Quality during Planning and Construction of National Road Projects" (May 2011);
- Transport Infrastructure Ireland *"Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis"* (2016);
- EPA Air Quality Monitoring Database https://www.epa.ie/air/quality/reports/
- UK Highways Agency "*Design Manual for Roads and Bridges, Volume 11, Section 3, Air Quality Assessment*" (2007);
- Road traffic predictions for each option as supplied by the traffic expert for the project; and
- Geodirectory information on sensitive receptors for each option.

The National Roads Authority document "*Guidance for the Treatment of Air Quality during Planning and Construction of National Road Projects 2011*" provides guidance on the assessment procedures utilised for air and climate of the option selection process. The primary aspects of the assessment relate to existing ambient air quality and the proximity of sensitive locations to each option. The guidelines require that "*the total number of sensitive receptors within 50m of the carriageway of each feasible route option should be recorded with a view to eliminating those routes with the greater number of sensitive receptors likely to be impacted by the proposed scheme*".

1.1.1 Assessment Criteria

The comparative evaluation of options was assisted by scoring of impacts to sensitive receptors using the Stage 2 project appraisal matrix similar to that shown in the *Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis* (TII, 2016, p.21). An assessment will be undertaken on each option to include both quantitative and qualitative assessment. Each impact is scored based on the seven-point scale as shown in **Table 1-1** (TII, 2016, p.3) and an integer will be assigned according to the impact level.

Following the completion of the individual appraisal of each sub-criterion within the Air and Climate assessments, an overall impact score is obtained for the combined assessment. This allows each option to be ranked and a preference to be determined. Preferences are grouped into one of three types:

- Preferred – the option(s) which have the least impact taking into account the project objectives.

- Intermediate – the option(s) where the impacts are considered to be reasonable in terms of the anticipated impacts and overall project objectives. Impacts are considered to be greater than those of the Preferred Option(s) but considerably better than those of the Least Preferred Option(s); and
- Least Preferred - the option(s) which does least to achieve the project objectives.

Where there are clear differences in the impact scores of the options, the ranking will be numbered accordingly and a preference assigned. For some options there will be very little between their impact scores and some may even have the same impact scores. In such circumstances, the author has applied expert judgement and evaluated each option comparatively against the other options, taking into account the quantitative and qualitative assessments. This has allowed the author to determine a rank and a preference for each option. In some instances, similar options may have the same rank and/or preference.

Table 1-1: Impact Scoring Key (TII, 2016)

7	Major or Highly Positive
6	Moderately Positive
5	Minor or Slightly Positive
4	Not Significant/Neutral
3	Minor or Minor or slightly negative
2	Moderately negative
1	Major or Highly negative

2 EXISTING ENVIRONMENT

2.1 Desk Study

Under the Clean Air for Europe Directive (2008/50/EC) EU Member States must designate "Zones" for the purpose of managing air quality. For Ireland, four Zones have been defined in the Air Quality Standards Regulations (2011); A, B, C and D. These zones are largely categorised based on population counts derived from 2016 CSO Census as follows;

- **Zone A**: Dublin
- **Zone B**: Cork
- **Zone C**: Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise.
- **Zone D**: Rural Ireland; i.e. the remainder of the State excluding Zones A, B and C.

Under Article 6 of the Regulations, the EPA must review the classification of zones at least every five years to reflect the results of the census and the changes made under separate regulation to the areas where bituminous coal is restricted. The most up to date zones can be viewed on the EPA's Map Viewer at https://gis.epa.ie/EPAMaps/.

Air quality is classified using a four-band scale of; Good, Fair, Poor, and Very Poor. Air quality in Zone D is consistently "*Good*" as measured by the EPA monitoring network and there have been no recorded breaches of the statutory limits for the protection of human health in recent years. This is a result of the relative absence of air pollution sources in the area and those existing sources such as road traffic have a low impact given the low volumes and ongoing legislative changes to vehicle emissions and fuel requirements.

The number of residential properties within 50m of the centre for each of the proposed N15/N13 options which has been identified for comparison and these are shown in **Table 2-1**. The projected operational year traffic patterns for each of the options are also presented in **Table 2-1**. Average speed is assumed as 98 kph for all options.

Table 2-1: Sensitive Receptors and Operation Year Traffic Flows

Option	Receptors (50m)	Length (km)	AADT	%HGVs	Average Speed (kph)
1A (Orange)	41	12.2	6930	3.3	98
1A1 (Orange)	28	16.04	6943	3.3	98
1B (Pink)	29	12.50	8293	2.6	98
1B1 (Pink)	15	14.01	9423	3.0	98
1C (Purple)	37	12.00	6943	3.4	98
1C1 (Purple)	25	15.71	6970	3.4	98
1D (Red)	12	14.50	9227	3.2	98
1D1 (Red)	12	13.63	8813	2.7	98
1E (Green)	11	13.50	8880	3.3	98
1E1 (Green)	11	13.85	9593	2.9	98
1F (Blue)	17	13.50	7803	3.0	98
1F1 (Blue)	14	13.63	9517	2.7	98
1G (Yellow)	14	13.57	9875	3.0	98

3 OPTION SELECTION

3.1 Assessment of Potential Impacts

The index exposure assessment was carried out using the methodology outlined in the NRA *Guidelines and the UK Highways Agency Design Manual for Roads and Bridges (UK DMRB 2007), Volume 11, Section 3, Air Quality Assessment.* The aim of the assessment is to estimate the overall change in people's exposure to the pollutants, in this case nitrogen dioxide, NO_2 and particulate matter, PM_{10}. The more negative the exposure score, the greater the improvement in air quality and hence, those with the lowest scores are the more preferred options. The overall changes in exposure for design year 2028 are outlined in **Table 3-1** and **Table 3-2**. However, it should be noted that the scores are dimensionless and do not represent the extent of any impact.

Table 3-1: Overall Change in Exposure to NO_x for Design Year 2028

Options	Receptors within 50m	Link Length (km)	Predicted Emission NOx kg/year	Rate (kg/km/yr)	NOx Score	Impact Level	Impact Score	Preference
1A (Orange)	41	12.2	11637	954	39107	Moderately negative	2	Least Preferred
1A1 (Orange)	28	16.04	15329	956	26759	Moderately negative	2	Intermediate
1B (Pink)	29	12.50	13528	1082	31385	Moderately negative	2	Intermediate
1B1 (Pink)	15	14.01	17767	1268	19022	Minor or slightly negative	3	Preferred
1C (Purple)	37	12.00	11553	963	35622	Moderately negative	2	Intermediate
1C1 (Purple)	25	15.71	15183	966	24161	Moderately negative	2	Intermediate
1D (Red)	12	14.50	18278	1261	15126	Minor or slightly negative	3	Preferred
1D1 (Red)	12	13.63	15799	1159	13909	Minor or slightly negative	3	Preferred
1E (Green)	11	13.50	16500	1222	13444	Minor or slightly negative	3	Preferred
1E1 (Green)	11	13.85	17745	1281	14094	Minor or slightly negative	3	Preferred
1F (Blue)	17	13.50	14177	1050	17853	Minor or slightly negative	3	Preferred
1F1 (Blue)	14	13.63	17059	1252	17523	Minor or slightly negative	3	Preferred
1G (Yellow)	14	13.57	18034	1329	18605	Minor or slightly negative	3	Preferred

Table 3-2: Overall Change in Exposure to PM_{10} for Design Year 2028

Option	Receptors within 50m	Link Length (km)	Predicted Emission PM10 kg/year	Rate (kg/km/yr)	PM_{10} Score	Impact Level	Impact Score	Preference
1A (Orange)	41	12.2	489	40	1642	Moderately negative	2	Least Preferred
1A1 (Orange)	28	16.04	644	40	1123	Moderately negative	2	Intermediate
1B (Pink)	29	12.50	592	47	1374	Moderately negative	2	Intermediate
1B1 (Pink)	15	14.01	759	54	813	Minor or slightly negative	3	Preferred
1C (Purple)	37	12.00	482	40	1487	Moderately negative	2	Intermediate
1C1 (Purple)	25	15.71	634	40	1009	Moderately negative	2	Intermediate
1D (Red)	12	14.50	772	53	639	Minor or slightly negative	3	Preferred
1D1 (Red)	12	13.63	687	50	605	Minor or slightly negative	3	Preferred
1E (Green)	11	13.50	693	51	564	Minor or slightly negative	3	Preferred
1E1 (Green)	11	13.85	763	55	606	Minor or slightly negative	3	Preferred
1F (Blue)	17	13.50	606	45	763	Minor or slightly negative	3	Preferred
1F1 (Blue)	14	13.63	742	54	762	Minor or slightly negative	3	Preferred
1G (Yellow)	14	13.57	770	57	795	Minor or slightly negative	3	Preferred

From the above tables, Option 1A (Orange) has the potential to impact on the greatest number of properties (41) relative to each of the other proposed options. Of these other options, 1E (Green) (11), 1E1 (Green) (11), 1D (Red) (12), and 1D1 (Red) (12) will impact on the least number of properties relative to the options 1F1 (Blue) (14), 1G (Yellow) (14), 1B1 (Pink) (15), 1F (Blue) (17), 1C1 (Purple) (25), 1A1 (Orange) (28), 1B (Pink) (29) and 1C (Purple) (27). The predicted emissions between the various options show lower variation as expected given the similarities in the traffic patterns and option lengths.

Therefore, the air quality scores are largely dominated by the trend in receptor numbers. Therefore, 1A (Orange) and 1A1 (Orange), 1C (Purple) and 1C1 (Purple) and 1B (Pink) are only moderately negative for air quality given the higher number of properties potentially impacted. While the remaining options will impact the least number of properties and are hence are considered to pose a minor or slightly negative impact to air quality and hence these options are preferred.

Climate impacts during the operation stage are based on total greenhouse gas (GHG) associated with traffic on the road network as calculated by the DMRB regional model. These results are presented in **Table 3-3** and illustrate no significant variation between the options which is unsurprising given the similarity in traffic patterns. Hence all options are classed as moderately negative for climate.

It is noted that at construction stage all proposed options will require material input (aggregates, concretes, etc.), material/personnel transport, energy use, etc. relative to the other proposed options. As the result there is the potential of a climate impact for the one-off construction stage event.

Table 3-3: Climate Impacts Associated with Options

Options	GHG (CO_{2eq}) (tonnes/year)	Impact Level	Impact Score	Preference
1A (Orange)	5951	Moderately negative	2	Intermediate
1A1 (Orange)	7839	Moderately negative	2	Intermediate
1B (Pink)	7091	Moderately negative	2	Intermediate
1B1 (Pink)	9181	Moderately negative	2	Intermediate
1C (Purple)	5889	Moderately negative	2	Intermediate
1C1 (Purple)	7740	Moderately negative	2	Intermediate
1D (Red)	9379	Moderately negative	2	Intermediate
1D1 (Red)	8254	Moderately negative	2	Intermediate
1E (Green)	8441	Moderately negative	2	Intermediate
1E1 (Green)	9203	Moderately negative	2	Intermediate
1F (Blue)	7326	Moderately negative	2	Intermediate
1F1 (Blue)	8910	Moderately negative	2	Intermediate
1G (Yellow)	9321	Moderately negative	2	Intermediate

3.2 Comparison of Options

Table 3-4 provides the summary of the overall combined assessment of both air quality and climate. For both parameters Options 1B1 (Pink), 1D (Red), 1D1 (Red), 1E (Green), 1E1 (Green), 1F (Blue), 1F1 (Blue) and 1G (Yellow) indicate the highest preference score as these options are the shortest and potentially impact on the lowest number of properties. These options are the preferred options for air quality and climate.

Conversely, Options 1A (Orange), 1A1 (Orange), 1B1 (Pink) and 1C (Purple) 1C1 (Purple) impact on the greatest number of properties. As such, these are intermediate in terms of both air quality and climate.

Table 3-4: Option Scoring Matrix

Option	Quantitative Assessment			Qualitative Assessment	Impact Score	Ranking	Overall Preference
	NO_x	PM_{10}	CO_2				
1A (Orange)	39107	1642	5951	Moderately negative	2	13	Least Preferred
1A1 (Orange)	26759	1123	7839	Moderately negative	2	10	Intermediate
1B (Pink)	31385	1374	7091	Moderately negative	2	11	Intermediate
1B1 (Pink)	19022	813	9181	Minor or slightly negative	3	7	Preferred
1C (Purple)	35622	1487	5889	Moderately negative	2	12	Intermediate
1C1 (Purple)	24161	1009	7740	Moderately negative	2	9	Intermediate
1D (Red)	15126	639	9379	Minor or slightly negative	3	4	Preferred
1D1 (Red)	13909	605	8254	Minor or slightly negative	3	3	Preferred
1E (Green)	13444	564	8441	Minor or slightly negative	3	1	Preferred
1E1 (Green)	14094	606	9203	Minor or slightly negative	3	2	Preferred
1F (Blue)	17853	763	7326	Minor or slightly negative	3	8	Preferred
1F1 (Blue)	17523	762	8910	Minor or slightly negative	3	6	Preferred
1G (Yellow)	18605	795	9321	Minor or slightly negative	3	5	Preferred

Donegal County Council

TEN-T Priority Route Improvement Project, Donegal

Section 1: N15/N13 Ballybofey/Stranorlar Urban Region

Option Selection Report

Appendix D1.2 - Noise

December 2019

Document Control Sheet

Client:	Donegal County Council
Project Title:	TEN-T Priority Route Improvement Project, Donegal – Section 1: N15/N13 Ballybofey/Stranorlar Urban Region
Document Title:	Options Selection Report – Appendix D1.2 - Noise
Document No. :	TT-MGT0337-RPS-00-01-RP-E-EN-1004

Rev. No.	Suitability	Effective Date	Revision Description	Checked	Approved
P01	S4	December 2019	Issue for publication	EMcK	GMcE

This report has been prepared by RPS/Barry Transportation on behalf of Donegal County Council. Any other persons who use any information contained herein do so at their own risk.

© RPS Barry Transportation 2019

Table of Contents

1 INTRODUCTION 1
1.1 Methodology 1
1.1.1 Noise buffering zones 1
1.1.2 Data output 2
1.1.3 Assessment Criteria 3
2 EXISTING ENVIRONMENT 4
2.1 Desk Study 4
2.2 Description of Options 4
2.3 Field Study 4
3 OPTION SELECTION 7
3.1 Quantitative Assessment of Potential Impact 7
3.2 Qualitative Assessment of Potential Impact 7
3.2.1 Assessment of Changes in Traffic Flow 7
3.2.2 Assessment of the Likely Need for Mitigation Measures 7
3.2.3 Summary of Qualitative Assessment 7
3.3 Comparison of Options 8

List of Figures

Figure 1-1: Sample Buffer Zones for Proposed Option 1A1 at Section 1 Ballybofey-Stranorlar 2
Figure 2-1: Noise and Vibration Sensitive Receptors (NVSRs) – Section 1 Options 5
Figure 2-2: Noise and Vibration Sensitive Receptors (NVSRs) – Section 1 Modified Options 6

List of Tables

Table 1-1: TII Impact Scoring Key (TII, 2016) 3
Table 3-1: Section 1 Property Counts and Banding 9
Table 3-2: Section 1 Potential Impact Rating 10
Table 3-3: Section 1 Noise Impact Score Matrix 11

1 INTRODUCTION

This section outlines the comparative assessment of options in relation to noise with reference to key sensitive receptors in proximity to the options. The impacts for each of the options are identified so that those with unacceptably high levels of noise can be avoided to the extent feasible as part of the overall option selection process.

1.1 Methodology

The methodology for the option assessment comprised of a desk study. The material sources consulted as part of the desk study consisted of the following;

- Review of Spatial data;
- Geodirectory data;
- A review of Ordnance Survey Ireland mapping and orthophotography;
- County Donegal Development Plan 2018-2024; and
- Donegal Local Authorities Noise Action Plan 2013 -2018.

In order to facilitate the use of the TII project appraisal matrix, spatial data selection was carried out using MapInfo software. Geodirectory data was used to identify the noise sensitivity and impacts of each proposed option in Section 1 Ballybofey-Stranorlar urban region.

1.1.1 Noise buffering zones

A buffering tool in MapInfo was used to facilitate the comparison of proposed options in the context of noise emissions. Each proposed option was assessed individually by applying a series of concentric ring buffers to the option centrelines. A total of four buffers were applied to each of the proposed options' centrelines. The first/innermost ring buffer captured an area of 0 – 50m from the centreline, and working outwards, the second captured 50 – 100m, the third 100 – 200m and the fourth/outermost captured 200 – 300m. This methodology allowed Geodirectory data to be captured in each ring buffer and analysed separately. Properties/buildings in the innermost buffers are likely to be affected by noise emissions in a more acute way, with noise sensitivity decreasing in the buffer zones furthest from the centreline of each option. This approach allowed for the visual comparison of acutely affected properties within the scope of each option, and ultimately, provided the basis for more detailed analysis using TII's project appraisal matrix as described in **Section 1.1.3** for example of buffer zone assessments.

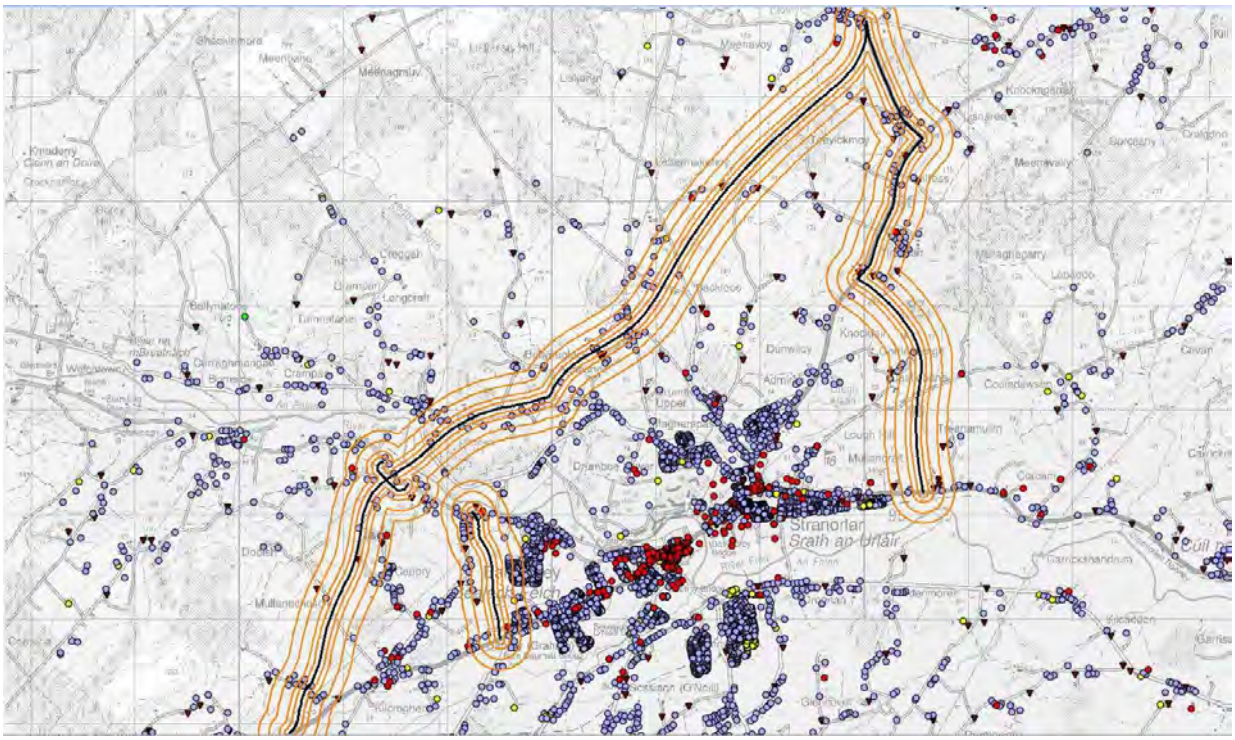


Figure 1-1: Sample Buffer Zones for Proposed Option 1A1 at Section 1 Ballybofey-Stranorlar

1.1.2 Data output

MapInfo also facilitates the exportation of spatial data to other applications for further analysis. In this instance, SQL queries were carried out on Geodirectory addresses which fell within buffer zones for each of the proposed options. The resultant output provided detailed Geodirectory information for individual properties and essentially, the number of properties which could be affected in noise sensitive zones. The SQL queries for each option were exported as comma delimited (.csv) files for data filtering and analysis using Microsoft Excel. The data were subsequently arranged according to buffer zone (smallest to highest) and property/building use (commercial, residential, both or unknown). Finally, each address was then counted in each buffer zone. The same process was carried out for each option, culminating in a table which accounts for each property according to building use and proximity to the centrelines for each of the proposed options. This table was used as the data source when applying TII's potential impact rating (PIR) matrix.

The total number of properties in each band is then multiplied by a rating factor. The rating factor is as follows:

- 4 for Band 1,
- 3 for Band 2,
- 2 for Band 3 and
- 1 for Band 4.

The resultant values are summed for each option to give a single number for each option, termed the PIR. The PIR values are used to assess the potential impact of each option; the larger the PIR the greater the potential impact.

1.1.3 Assessment Criteria

The NRA documents *Guidelines for the Treatment of Noise and Vibration in National Road Projects* (NRA, 2004) and the *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes* (NRA, 2014) were followed for the assessment of noise and vibration. The assessment of potential impact is based primarily upon property counts and the proximity of each option to those properties.

Objective rating based on property counts and proximity to the options is combined with an assessment of the changes in traffic flow and the likely need for mitigation measures to carry out an evaluation of the options.

A five-point scale was used for qualitative assessment based on the assessment of changes in traffic flow and the likely need for mitigation measures. Points are awarded at 100, 200, 300, 400 or 500 blocks and several options can receive the same rating. Lower scores are preferred.

The comparative evaluation of options was assisted by scoring of impacts to sensitive receptors using the impact scoring key in **Table 1-1:** TII Impact Scoring Key taken from the *Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis* (TII, 2016). An assessment will be undertaken on each option to include both quantitative and qualitative assessment. Each impact is scored based on the seven-point scale as below and an integer will be assigned according to the impact level.

Table 1-1: TII Impact Scoring Key (TII, 2016)

7	Major or Highly Positive
6	Moderately Positive
5	Minor or Slightly Positive
4	Not Significant/Neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or Highly negative

2 EXISTING ENVIRONMENT

2.1 Desk Study

Section 1 Ballybofey-Stranolar of the TEN-T Priority Route Improvement Project, Donegal, is located in an urban region. The options considered in Stage 2 of Phase 2 Option Selection are all north of the Twin Towns and very similar from an acoustic point of view. There are no significant noise constraints on those options being assessed. There are some noise sensitive locations, with residences with stables, a holy well and amenity areas along Section 1.

Residential development on the existing infrastructure is located in an irregular fashion on the approach roads to the towns of Ballybofey-Stranorlar with much of the development located a considerable distance from the town centre. The towns also benefit from key environmental assets such as the River Finn and associated flood plains, and wooded areas situated at Drumboe and Dunwiley.

There is a mix of commercial and residential development within the Twin Towns with a significant number of residential units contained within the study area for Section 1. The Core Strategy of the County Donegal Development Plan 2018- 2024 identifies a need for approximately 310 new housing units in Ballybofey-Stranorlar, with a requirement for housing land of 39 hectares. In February 2017, 10.3 ha of land was zoned for primarily residential development. To the west of the town is St. Joseph's hospital which is on the N15 route. Ballybofey/Stranolar golf club is also situated to the west of the town adjacent to the existing N15 route. The current levels of traffic on the N15/N13 Ballybofey/Stranolar give rise to significant road noise levels.

2.2 Description of Options

All options remove impact amenity areas. Option 1E & 1E1 (Green), 1E & 1E1 (Green), and 1D & 1D1 (Red) pass through Holywell Wood, located at Drumboe Lower, that are not represented as an amenity area within the County Development Plan, but are used locally for woodland walks.

All options, except 1C & 1C1 (Pink), pass through private woodland at Teevickmoy (to varying degrees) that contains a network of footpaths and is used as an educational facility, as well as a commercial forest.

Options 1A & 1A1 (Orange), 1C & 1C1 (Purple), and 1B & 1B1 (Pink) pass through large sections of woodland south of Trooper's Hill, that contain networks of footpaths that are used for recreational purposes, as well as access routes for commercial forestry operations.

The 1A & 1A1 (Orange) and 1C & 1C1 (Purple) options have link road options to the N15 Strabane road at Tircallan. The 1D & 1D1 (Red), 1E & 1E1 (Green), and 1E & 1E1 (Green), options have three link road options, one before Ballybofey linking to the N15 at Cappry, linking to the N13 to Letterkenny road at Dunwiley and the third at Mullandrait which links to the N15 to Strabane road. The 1B & 1B1 (Pink) option has two link road options. One at Dunwiley to connect to the N13 to Letterkenny road and one at Mullandrait which links the N13 to the N15 to Strabane road.

2.3 Field Study

A site visit was carried out on 15th-17th August 2018 by Eugene McKeown, Senior Associate – Acoustics, RPS. The purpose of the inspection was to conduct a windshield survey of the study area. A preliminary list of noise sensitive locations was prepared and is presented in **Figure 2-1** and **Figure 2-2** Ambient noise was checked at selected locations. Topography of the options and proximity to noise sensitive locations was noted.

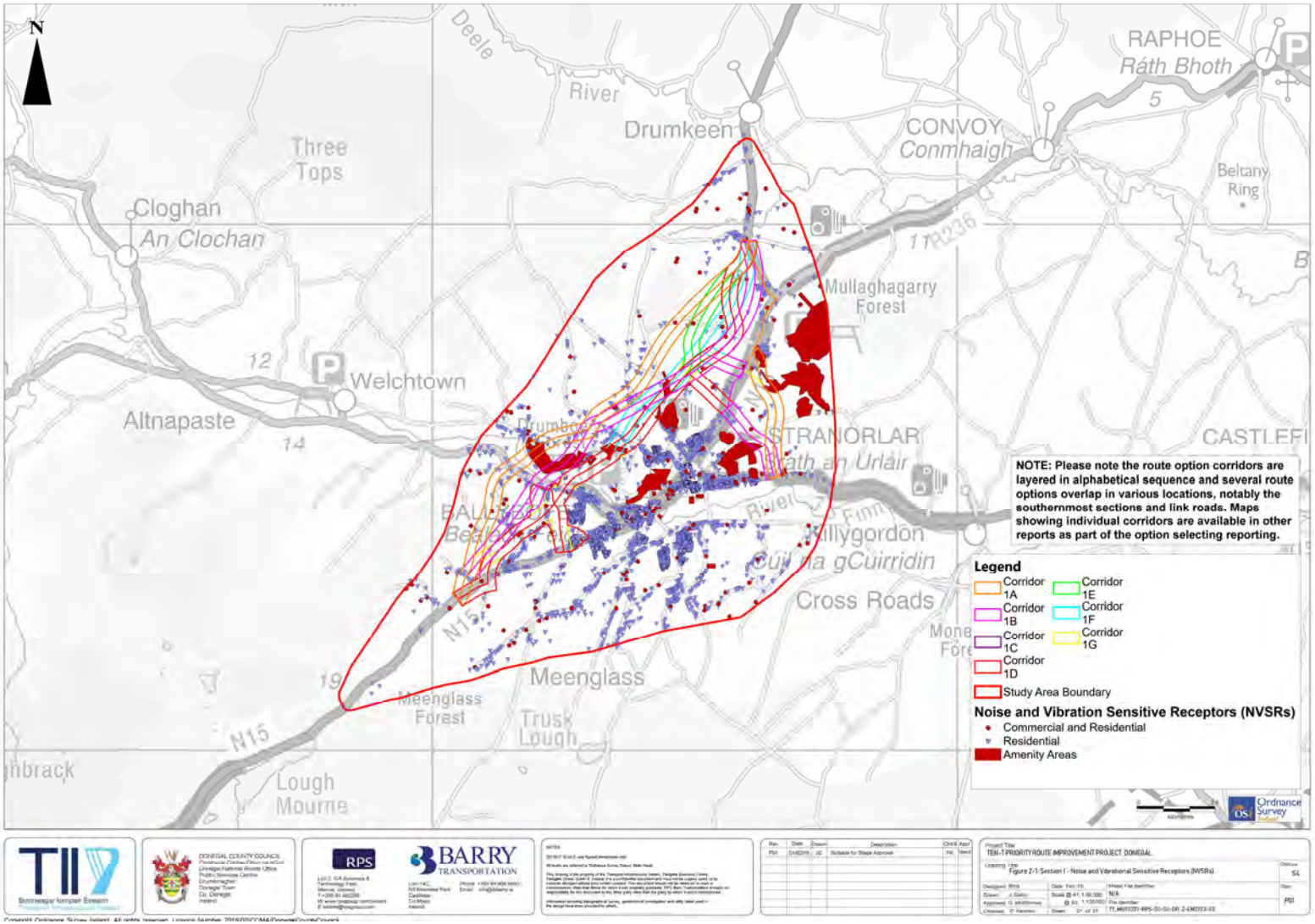


Figure 2-1: **Noise and Vibration Sensitive Receptors (NVSRs) – Section 1 Options**

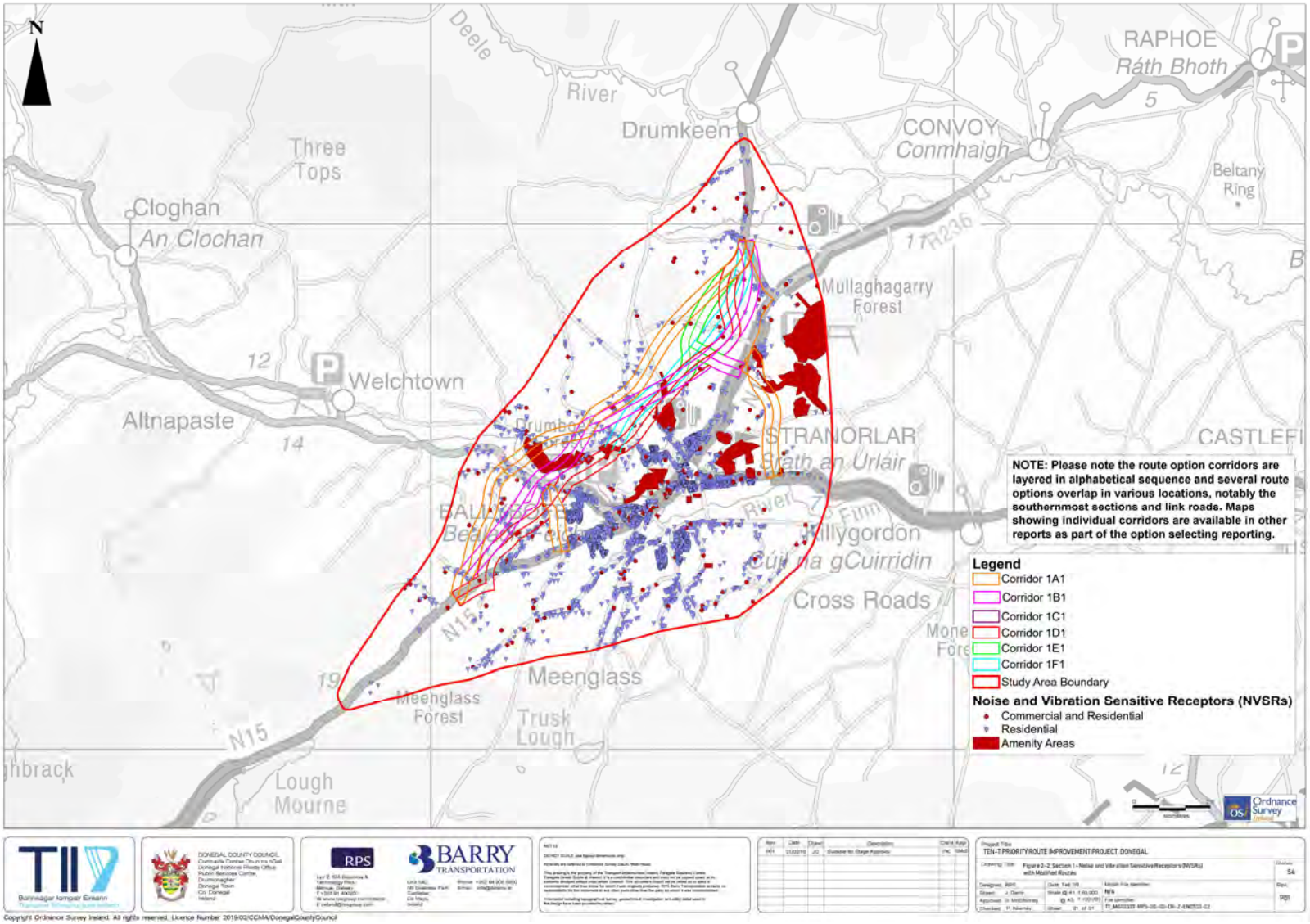


Figure 2-2: Noise and Vibration Sensitive Receptors (NVSRs) – Section 1 Modified Options

3 OPTION SELECTION

3.1 Quantitative Assessment of Potential Impact

All receptors within 300m of each option have been identified and put into one of four "bands". These bands are defined by their distance to either side of the centre line of each option. Band 1 is from 0 to 50m of the centre line, Band 2 is from 50 to 100m, Band 3 is from 100 to 200m and Band 4 is from 200 to 300m.

A receptor is defined as any dwelling house, hotel, hostel, health building, educational establishment, place of worship, entertainment venue or any other facility or area of high amenity which benefits from, or requires the absence of, high noise levels.

Property counts have been conducted using data from the Geodirectory. In order to include worst case scenarios commercial properties in urban areas are included as noise sensitive on the basis that the upper floors may have a residential content. Properties categorised as both residential and commercial and properties of unknown use have also been included in the property count analysis.

The property counts for each banding are summarised in **Table 3-1**. Based on the numbers of properties in each banding, a calculation of the potential impact rating (PIR) was undertaken as detailed in **Table 3-2.** This PIR number represents the quantitative assessment of each option in terms of noise impact.

3.2 Qualitative Assessment of Potential Impact

3.2.1 Assessment of Changes in Traffic Flow

Indicative traffic flow data has been made available in stick diagram format. For Section 1 the critical traffic changes are in the centre of Ballybofey/Stranolar just before the junction for the N13. The existing traffic scenario on the N15, at the centre of town, traffic is 12,200 AADT and increases to 13,000 in the design year.

The options with the lowest traffic flow through Ballybofey/Stranorlar are the 1E & 1E1 (Green) and 1G (Yellow) options. These options indicate traffic would reduce to under 5,000 AADT in the design year. This is equivalent to a 4.3 dB reduction in noise level due to the decrease in traffic, which is greater than a ‘noticeable’ difference. For the 1A & 1A1 (Orange) and 1C &1C1 (Purple) options in particular, the traffic decrease will be less than a noticeable difference.

Reducing the traffic flow through an urban area such as Ballybofey/Stranorlar will have a positive benefit for a large number of properties in that area balanced against a negative impact for a smaller number of properties for the proposed options.

3.2.2 Assessment of the Likely Need for Mitigation Measures

The existing N13 and N15 roads are all listed as ‘action planning areas’ in the Donegal Local Authority Noise Action Plan 2013 -2018. As such they need to be prioritised for further assessment and consideration of noise mitigation measures. The options outlined do not at this stage present any significant barrier to providing appropriate mitigation measures. See **Table 3-2** for the PIR rating for each option in Section 1.

3.2.3 Summary of Qualitative Assessment

There are no significant barriers to providing mitigation that would distinguish between the options at this point. The most densely populated section of the existing infrastructure is the N15 through Ballybofey which splits in Stranorlar at the N13/N15 junction. The most important factor in the subjective assessment is the reduction in traffic volumes through these options. A reduction in traffic noise along these options will have

a beneficial effect to the greatest number of people. The current traffic level through Ballybofey is 12,200 AADT and all options are showing a reduction in traffic levels through this area. The greatest reductions are for the 1D/1D1 (Red) and 1E/1E1 (Green) options which are awarded a score of 100 each. The next greatest reductions are on the 1F/1F1 (Blue) and 1G (Yellow) and 1B/1B2 (Pink) options which are awarded a subjective score of 200. The remaining options are scored at 300.

3.3 Comparison of Options

Table 3-3 summarises the impact score matrix for all options in Section 1. This overall impact has been determined based on the quantitative and qualitative assessments of each option and the receptors likely to be affected.

Based on the noise assessment for Section 1, it was deemed that Option 1E1 was the most preferred option from an acoustic perspective as it leads to a noticeable reduction in noise levels in the urban centre of Ballybofey-Stranorlar. There is only a marginal difference between Option 1E1 and Options 1B, 1D, 1D1, 1E and 1G which would see similar reductions in noise levels through the urban centre.

The least preferred options from a noise and vibration perspective are 1A1 and 1C1 with the highest number of properties outside the urban centre affected.

Table 3-1: Section 1 Property Counts and Banding

Banding	ORANGE		PINK		PURPLE		RED		GREEN		BLUE		YELLOW
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E 1	1F	1F1	1G
0-50m	**41**	**28**	**29**	**15**	**37**	**25**	**12**	**12**	**11**	**11**	**17**	**14**	**14**
Residential	33	25	26	14	31	23	12	12	11	11	14	11	13
Commercial	1	0	1	1	0	0	0	0	0	0	1	1	0
Both	7	3	2	0	6	2	0	0	0	0	2	2	1
Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0
50-100m	**44**	**49**	**36**	**43**	**46**	**47**	**31**	**26**	**32**	**27**	**38**	**32**	**32**
Residential	39	40	29	35	40	38	20	16	20	16	24	19	21
Commercial	0	2	0	2	1	2	3	3	3	3	3	3	3
Both	5	6	7	5	5	6	7	6	8	7	10	9	7
Unknown	0	1	0	1	0	1	1	1	1	1	1	1	1
100-200m	**73**	**138**	**85**	**133**	**92**	**146**	**142**	**146**	**142**	**144**	**132**	**135**	**141**
Residential	68	128	73	118	85	136	124	125	126	125	121	122	123
Commercial	0	1	1	1	1	2	5	5	5	5	3	3	5
Both	5	8	11	13	6	7	11	14	9	12	7	9	11
Unknown	0	1	0	1	0	1	2	2	2	2	1	1	2
200-300m	**78**	**166**	**114**	**160**	**88**	**162**	**175**	**173**	**174**	**172**	**181**	**176**	**174**
Residential	63	146	103	147	74	146	158	155	158	155	164	158	157
Commercial	4	6	4	2	5	4	5	5	5	5	4	4	4
Both	9	12	6	10	8	11	11	12	10	11	11	12	12
Unknown	2	2	1	1	1	1	1	1	1	1	2	2	1

Table 3-2: Section 1 Potential Impact Rating

Option	Band	Multiplier	Receptors	Sub-Total	Total PIR (Quantitative Score)
1A	0-50	4	41	164	520
	50-100	3	44	132	
	100-200	2	73	146	
	200-300	1	78	78	
1A1	0-50	4	28	112	701
	50-100	3	49	147	
	100-200	2	138	276	
	200-300	1	166	166	
1B	0-50	4	29	116	508
	50-100	3	36	108	
	100-200	2	85	170	
	200-300	1	114	114	
1B1	0-50	4	15	60	615
	50-100	3	43	129	
	100-200	2	133	266	
	200-300	1	160	160	
1C	0-50	4	37	148	558
	50-100	3	46	138	
	100-200	2	92	184	
	200-300	1	88	88	
1C1	0-50	4	25	100	695
	50-100	3	47	141	
	100-200	2	146	292	
	200-300	1	162	162	
1D	0-50	4	12	48	600
	50-100	3	31	93	
	100-200	2	142	284	
	200-300	1	175	175	
1D1	0-50	4	12	48	591
	50-100	3	26	78	
	100-200	2	146	292	
	200-300	1	173	173	
1E	0-50	4	11	44	598
	50-100	3	32	96	
	100-200	2	142	284	
	200-300	1	174	174	
1E1	0-50	4	11	44	585
	50-100	3	27	81	
	100-200	2	144	288	
	200-300	1	172	172	
1F	0-50	4	17	68	627
	50-100	3	38	114	
	100-200	2	132	264	
	200-300	1	181	181	

Option	Band	Multiplier	Receptors	Sub-Total	Total PIR (Quantitative Score)
1F1	0-50	4	14	56	598
	50-100	3	32	96	
	100-200	2	135	270	
	200-300	1	176	176	
1G	0-50	4	14	56	608
	50-100	3	32	96	
	100-200	2	141	282	
	200-300	1	174	174	

Table 3-3: Section 1 Noise Impact Score Matrix

Option	PIR Quantitative Assessment (from Table 3-2)	Qualitative Assessment	Overall Rating	Impact Level	Impact Score	Ranking	Preference
Orange 1A	520	300	820	Not Significant/Neutral	4	9	Intermediate
Orange 1A1	701	300	1001	Minor or slightly negative	3	13	Least Preferred
Pink 1B	508	200	708	Minor or slightly positive	5	4	Preferred
Pink 1B1	615	200	815	Not Significant/Neutral	4	8	Intermediate
Purple 1C	558	300	858	Not Significant/Neutral	4	11	Intermediate
Purple 1C1	695	300	995	Minor or slightly negative	3	12	Least Preferred
Red 1D	600	100	700	Minor or slightly positive	5	4	Preferred
Red 1D1	591	100	691	Minor or slightly positive	5	2	Preferred
Green 1E	598	100	698	Minor or slightly positive	5	3	Preferred
Green 1E1	585	100	685	Minor or slightly positive	5	1	Preferred
Blue 1F	627	200	827	Not Significant/Neutral	4	10	Intermediate
Blue 1F1	598	200	798	Not Significant/Neutral	4	7	Intermediate
Yellow 1G	608	100	708	Minor or slightly positive	5	5	Preferred

Donegal County Council

TEN-T Priority Route Improvement Project, Donegal

Section 1: N15/N13 Ballybofey/Stranorlar Urban Region

Option Selection Report

Appendix D1.3 – Landscape and Visual

December 2019

Document Control Sheet

Client:	Donegal County Council
Project Title:	TEN-T Priority Route Improvement Project, Donegal – Section 1: N15/N13 Ballybofey/Stranorlar Urban Region
Document Title:	Option Selection Report –Appendix D1.3 – Landscape and Visual
Document No. :	TT-MGT0337-RPS-00-01-RP-E-EN-1007

Rev. No.	Suitability	Effective Date	Revision Description	Checked	Approved
P01	S4	December 2019	Issue for publication	SA	GMcE

This report has been prepared by RPS/Barry Transportation on behalf of Donegal County Council. Any other persons who use any information contained herein do so at their own risk.

© RPS Barry Transportation 2019

Table of Contents

1 INTRODUCTION 1
1.1 Methodology 1
1.1.1 Assessment Criteria 1
2 EXISTING ENVIRONMENT 3
2.1 Landscape Character 3
2.2 Landscape Value 4
2.2.1 Land Cover 5
2.2.2 Visually Significant Trees 5
2.2.3 Existing Networks 5
2.2.4 Urban Form 6
2.3 Overall Landscape Sensitivity 6
2.4 Visual Context 6
3 OPTION SELECTION 7
3.1 Landscape Impact 7
3.1.1 Option 1A (Orange) 7
3.1.2 Option 1A1 (Orange) 8
3.1.3 Option 1B (Pink) 8
3.1.4 Option1B1 (Pink) 9
3.1.5 Option 1C (Purple) 10
3.1.6 Option 1C1 (Purple) 11
3.1.7 Option 1D (Red) 11
3.1.8 Option 1D1 (Red) 12
3.1.9 Option 1E (Green) 13
3.1.10 Option 1E1 (Green) 14
3.1.11 Option 1F (Blue) 15
3.1.12 Option 1F1 (Blue) 15
3.1.13 Option 1G (Yellow) 16
3.1.14 Summary of Landscape Assessment 17
3.2 Visual Impact 18
3.2.1 Option 1A (Orange) 19
3.2.2 Option 1A1 (Orange) 19
3.2.3 Option 1B (Pink) 19
3.2.4 Option 1B1 (Pink) 20
3.2.5 Option 1C (Purple) 20
3.2.6 Option 1C1 (Purple) 20
3.2.7 Option 1D (Red) 20
3.2.8 Option 1D1 (Red) 20
3.2.9 Option 1E (Green) 20
3.2.10 Option 1E1 (Green) 21
3.2.11 Option 1F (Blue) 21
3.2.12 Option 1F1 (Blue) 21
3.2.13 Section 1 - Option 1G (Yellow) 21
3.2.14 Summary of Visual Assessment 21
3.3 Summary and Preference 22

List of Figures

Figure 2-1: Landscape Character Area Map (Source: County Donegal Development Plan 2018 – 2024) ...3
Figure 2-2: Scenic Amenity (Source: County Donegal Development Plan 2018 – 2024).....4

List of Tables

Table 1-1: Impact Scoring Key (TII, 2016) 2
Table 3-1: Landscape Character Impact 17
Table 3-2: Residential Property (Only) Counts..... 18
Table 3-3: Index for Visual Impact on Residential Properties Only..... 19
Table 3-4: Visual Impact and Predicted TII Score..... 21
Table 3-5: Predicted Landscape and Visual Impacts Summary 23
Table 3-6: Summary of Assessment for Section1 N15 Ballybofey-Stranorlar Urban Region 27

1 INTRODUCTION

This appendix of the Option Selection Report relates to the landscape and visual assessment of the options considered for Section 1: N15 Ballybofey – Stranorlar Urban Region of the TEN-T Priority Route Improvement Project, Donegal. Please refer to the Option Selection Report for a full description of the project.

The project is being progressed in accordance with the phased approach to developing a major road scheme identified in the NRA *Project Management Guidelines* (2019) and follows the methodologies contained in the NRA document *Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis (2016)*.

1.1 Methodology

The landscape and visual assessment is derived from the methods described in *the Design Manual for Roads and Bridges* Volume 11, Section 3 for Stage Two Assessment (UK DMRB, 1994), and *Guidelines for Landscape and Visual Impact Assessment, Third edition* (LI & IEMA, 2013) which has been referred to as appropriate for the level of assessment necessary at this Option Selection process.

The objective is to undertake sufficient assessment to identify the landscape and visual receptors and the likely effects upon them which are then taken into consideration in developing and refining the options.

A desktop study was undertaken using the following sources of information:

- Ordnance Survey mapping;
- Aerial photography;
- County Donegal Development Plan (2018-2024) (CDDP);
- Map 6.2.1 Rural Area Types;
- Map 7.1.1 Scenic Amenity;
- Landscape Character Assessment of County Donegal (2016); and
- Online digital mapping accessed through Donegal Maps.

In addition, site visits were undertaken to establish an understanding of the landscape and visual context of the proposed options.

1.1.1 Assessment Criteria

Landscape and visual impact assessments are assessed as two discreet topics.

Landscape impact assessment is concerned with the alteration to the physical landscape which can give rise to changes in its character, how it is experienced and the ascribed value of the landscape.

Visual impact assessment is concerned with changes that arise in the overall effect on the area's visual amenity. Visual change is the alteration to a view or the experience of the view, and visual impact is the assessment of the significance of that change. Visual receptors considered as part of the Option Selection process include, but have not been limited to: residential receptors, tourists, receptors at identified protected views and prospects, and transitional receptors, e.g. those traveling through the study area in road vehicles.

The capacity of a landscape to accept change of the type proposed is assessed. The key landscape components are landform, vegetation, and historical and cultural components. Landform relates to topography and geology. Historical and cultural components include historic landscapes, listed buildings, conservation areas and historic designed landscapes.

The sensitivity of the landscape has been established using methods derived from the *Guidelines for Landscape and Visual Impact Assessment, Third edition* (LI & IEMA, 2013) and referenced from the County Donegal Development Plan (2018 – 2024) and the sensitivity rating criteria, listed in TII Guidelines *Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis (2016)*.

All of the options have been appraised in accordance with NRA/ TII Guidelines. The score has been based on the likely impact of each option under landscape and visual impact. Section 2 of the TII PAG provides a recommended scoring system. Each impact is scored on a scale of 1 (major or highly negative impact) to 7 (major or highly positive impact). A score of 4 represents a neutral or not significant impact. The predicted impacts for landscape and visual, without mitigation, have been scored as outlined in **Table 1-1**, below.

Table 1-1: Impact Scoring Key (TII, 2016)

7	Major or Highly Positive
6	Moderately Positive
5	Minor or Slightly Positive
4	Not Significant/Neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or Highly negative

2 EXISTING ENVIRONMENT

2.1 Landscape Character

A review of the Landscape Character Assessment accompanying the County Donegal Development Plan (CDDP) identified that the study area associated with Section 1 is restricted to a single Landscape Character Area (LCA): *Finn Valley LCA 14* (refer to **Figure 2-1** below), though does also touch the northern edge of the *Cashelnavern Borders and Uplands* LCA 40.

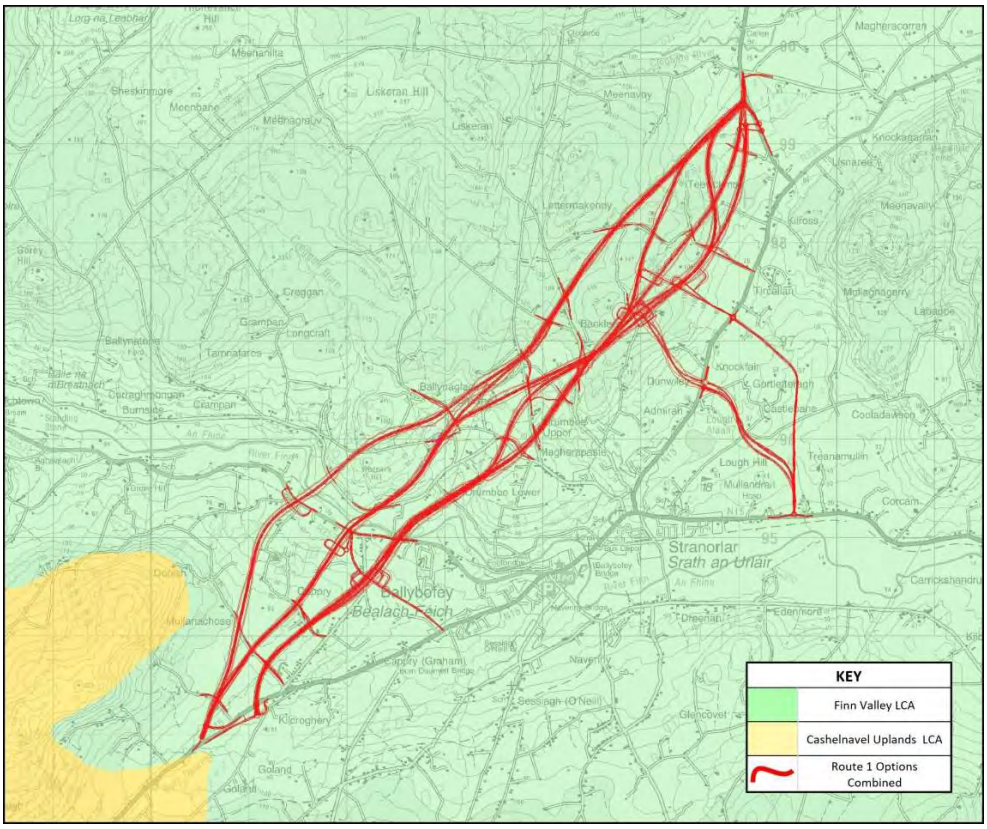


Figure 2-1: Landscape Character Area Map (Source: County Donegal Development Plan 2018 – 2024)

The landscape character assessment accompanying the CDDP states, under a variety of headings the following landscape characteristics:

- *The River Finn system flows through high peat covered mountains within the west of this LCA eastwards through a more rolling and then gently undulating agricultural landscape of varying quality, tying this landscape character area together.*
- *Ballybofey-Stranorlar: Ballybofey-Stranorlar are two separate towns co-joined by a bridge over the River Finn at a key point along the N15/N13 North South Transport Corridor (part of the wider Atlantic Corridor); collectively they comprise the 3rd largest urban centre in Donegal and function as a service centre in the heart of the 95 Finn Valley, offering high level retail, commercial, social, cultural and recreational centre facilities.*
- *Historic Landscape Characterisation identifies that this area is characterised by a patchwork of straight-sided and surveyed fields, indicating 18th- and 19th-century agricultural improvements and the remains of a windmill at Croaghan, itself a landmark. This landscape is overlooked by Raphoe, Beltany Ring and Croaghan (though only the latter is within this area) and was a major route through history (now taken by the N15 road).*
- *Ballybofey-Stranorlar is in the middle of this LCA and the point where a number of radial routes from this LCA link to the wider County and beyond including the N15 east to Co. Tyrone, N15 south to*

Donegal Town, N13 north to Letterkenny and Derry and Regional roads west to Glenties, Fintown and Dungloe and north-east to Raphoe.

- *Tree and hedgerow bound roads and laneways and the overgrown disused railway line all form important biodiversity corridors and linkages.*
- Clumps and clusters of native deciduous trees and woodland are dispersed throughout this LCA and of note are the important and historic woodlands of Drumboe and Dunwiley in Ballybofey-Stranorlar.
- Agricultural fields within this are mostly bound by native deciduous hedgerow and trees.
- Forestry plantations are sporadically located on higher lands throughout this landscape character area.

It is noted that the landscape assessment accompanying the CDDP does not provide any categorisation of the LCA with regards to sensitivity or condition, though does identify forces for change which include: linear development along rural local roads, renewable energy development, afforestation in upland areas, infrastructure development and expansion of Ballybofey and Stranorlar.

An appraisal of the Landscape Character Assessment, carried out as part of the CDDP, found that it generally reflects the study area associated with the Section 1: N15 Ballybofey – Stranorlar Urban Region Option.

2.2 Landscape Value

The landscape of the County has been categorised into three layers of value (illustrated on Map 7.1.1 of the CDDP refer to **Figure 2-2** below), which have been classified as areas of 'Especially High Scenic Amenity', areas of 'High Scenic Amenity' and areas of 'Moderate Scenic Amenity'. None of the landscapes of County Donegal have been classified as Low Value.

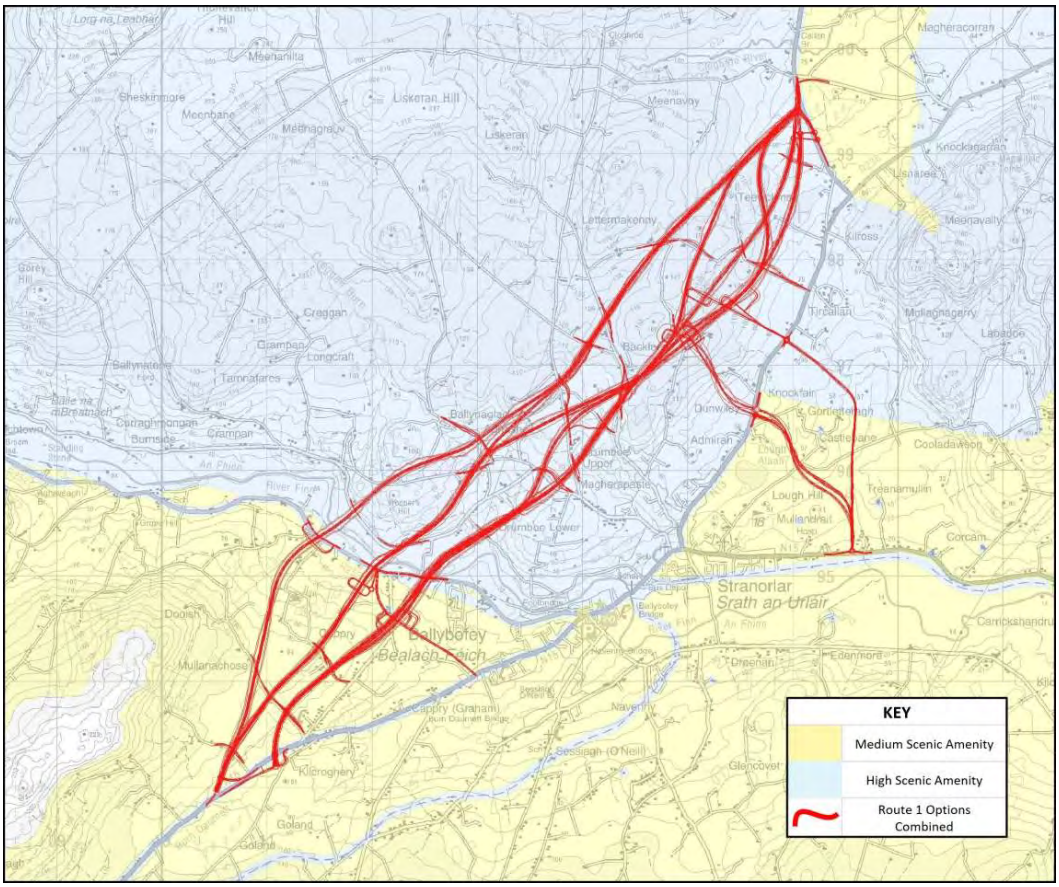


Figure 2-2: Scenic Amenity (Source: County Donegal Development Plan 2018 – 2024)

The study area associated with Section 1 is either classed as being of HSA or MSA, with the majority of the land within the study area considered to be of HSA designation.

The definitions for each of the areas of landscape value and classification are as detailed below:

- **Areas of Especially High Scenic Amenity** (EHSA) deemed to have extremely limited capacity to assimilate additional development;
- **Areas of High Scenic Amenity** (HSA) deemed to have capacity to absorb sensitively located development of scale, design and use that will enable assimilation into the receiving landscape and which does not detract from the quality of the landscape, subject to compliance with all other objectives and policies of the plan; and
- **Areas of Moderate Scenic Amenity** (MSA) deemed to have capacity to absorb suitable development.

All new development within the County must have regard to the specific landscape classification, in terms of integration and assimilation of development into the receiving landscape.

2.2.1 Land Cover

Land cover within the study area associated with Section 1 is varied though generally comprised of a fertile agricultural plain adjacent to the River Finn, set within a wider gently undulating mixed arable and pastoral agricultural landscape with large tracts of mixed species woodland and coniferous forestry on more elevated, poorer quality land throughout.

Fields are generally large to medium in scale and well defined by mixed species hedgerows of varying quality. In many places these hedgerows have become degraded, have developed gaps, become overgrown or over-mature, so that only lines of trees remain without hedgerow species to connect them. In other instances, field boundaries are defined by hedgerows with mature trees, which form a sense of enclosure, restricting views across the undulating agricultural landscape. Tree cover forms a strong element of the landscape, particularly in the northern portion of the study area, with groups and copses of tree cover limiting views from main arterial options, whist large to medium scale coniferous plantations on more elevated slopes provides a textural change within views.

2.2.2 Visually Significant Trees

Vegetation cover within the study area forms a distinct element of the landscape, with tree cover forming a visually significant element throughout.

In summary the key areas of visually significant vegetation are as follows:

- Coniferous plantation adjacent to the N13, north of the R236;
- Coniferous plantation at Teevickmoy;
- Mixed species woodland east and west of local road at Drumboe Upper;
- Mixed species woodland on northern facing slopes of hill at Drumboe Lower;
- Mixed species woodland on southern and eastern facing slopes of hill at Drumboe Lower;
- Mixed species woodland adjacent to River Finn (northern and southern banks);
- Mixed species woodland between local road and R252 north of Cappry; and
- Coniferous plantation to the north of N15 between Cappry and Kilcroghery.

2.2.3 Existing Networks

The study area is well served by national and regional road networks, which generally radiate from the urban form of Ballybofey and Stranorlar. The extensive local road network provides further linkage with the wider landscape, and generally fit well within the landscape, primarily screened by roadside vegetation and tree lined hedgerows.

2.2.4 Urban Form

Whilst the combined urban form of Ballybofey and Stranorlar dominates the landscape character within the central portion of the study area, views of the urban form are often restricted by existing vegetation cover and undulations in topography.

Development associated with Ballybofey has expanded along many of the local and rural road networks within the River Finn Valley, with singular residential housing and clusters of residential development apparent, forming linear development radiating south, east and west.

Residential development adjacent to local and rural road networks north of the River Finn is generally more constrained with a clearer separation between the development limit of Stranorlar and surrounding scattered residential development and farmsteads.

2.3 Overall Landscape Sensitivity

The existing environment of the study area associated with Section 1 includes land between Drumnacross to the north, Blackburn Bridge to the south, Cooladawson to the east and Creggan to the west, with the urban form of Stranorlar and Ballybofey forming the main urban form within the central portion of the study area. The landscape associated with the Section 1 study area, and wider environs, is dominated by the relatively wide valley associated with the River Finn and its many tributaries, with the River Finn traversing the central part of the study area in a generally east-west orientation. More elevated land to the north and west of the Ballybofey/ Stranorlar urban form provides a sense of enclosure to the flat, valley landscape.

Overall it is considered that the landscape within the study area is of a medium sensitivity as whilst much of the study area may be designated as HSA, the landscape is heavily influenced by existing road networks and frequent instances of urban/ built form characteristics and is considered to have the capacity to accommodate a degree of change.

2.4 Visual Context

Following a review of the CDDP and available information in relation to protected views and prospects, it has been established that there are no protected views or prospects contained within the study area associated with Section 1.

Within the northern portion of the study area, views from existing road networks are generally limited and constrained by roadside vegetation with field boundary hedgerows containing trees adding further visual containment. Mixed species woodland and coniferous plantations add further variety and textural interest to views where visible, particularly to elevated, southern facing slopes north of the River Finn which creates a backdrop to northern views.

To the south of the study area, views are considered to be more expansive in nature, where gaps in roadside vegetation permit views. More elevated land to the west and north provides distant enclosure, whilst existing vegetation cover provides enclosure at a more local level.

3 OPTION SELECTION

3.1 Landscape Impact

The landscape impacts are summarised in **Table 3-1** at the end of this section. The negative landscape impacts arising from each of the proposed options relate to the quality and sensitivity of the landscape areas affected. It is the key characteristics of each landscape area crossed that will influence the option selection process.

This category assesses how the following options fit within the existing landscape character described above and identified on **Figure 2-1** and **Figure 2-2**. Using both the landscape sensitivity and the preliminary road option design drawings, the impacts of each option are appraised.

The text below discusses the differences between the landscape impacts for each of the proposed options in combination with the proposed River Finn bridge crossing. The assessment assumes a worst-case scenario and does not include landscape mitigation.

3.1.1 Option 1A (Orange)

This option commences, via a new roundabout junction, on the N13 south of Callan Bridge where the proposed option heads generally south-west towards the River Finn crossing. The majority of the proposed option is to be constructed on new embankments, though localised cuttings to the east of Lettermakenny, north of Aghashel and north of Trooper's Hill are proposed. New embankments and cuttings associated with this northern portion of the proposed option, including alterations to the local road crossings and alignments has the potential to impact on visually significant vegetation, including coniferous forestry plantation, roadside hedgerows, field boundary hedgerows containing mature trees and extensive areas of broadleaved woodland on northern and western facing slopes associated with Trooper's Hill.

The proposed River Finn crossing and associated alterations to regional and local road accesses, including the proposed embankments has the potential to impact on visually significant mixed species woodland adjacent to the River Finn, field boundary vegetation and garden boundary vegetation associated with scattered residential properties in the vicinity, located in the more open River Finn valley.

To the west of the proposed River Finn crossing the proposed option aligns more to the south and is proposed to be constructed on a series of new embankments to the immediate west of the River Finn, with remainder of the option contained within new cuttings. The proposed option then crosses two local roads with alterations to alignments before terminating at a new roundabout junction to the immediate north of the existing N15 corridor, west of Kilcroghery. This proposed section of the option has the potential to impact on visually significant field boundary hedgerows, roadside vegetation adjacent to the local roads, garden boundary vegetation and scattered woodland copses including portions of coniferous plantation.

This option also includes a proposed new link road between the existing N13 and N15 road corridors to the east of Stranorlar. A proposed roundabout junction will form the connection to the N13, south-west of Tircallan, whilst a new roundabout junction is proposed on the N15, south-east of Lough Hill. This proposed link option has the potential to impact upon visually significant roadside vegetation adjacent to the N13 and N15, field boundary hedgerows including hedgerows with mature trees, mixed species woodlands and shelterbelts, coniferous plantation woodland and garden boundary vegetation.

With regard to Landscape Character Areas: this option mainline traverses through approximately 12.2km of the Finn Valley LCA. With regards to Scenic Amenity the Options mainline option and link roads traverse through approximately 7.2km of the HSA designation and 4.0km of MSA designation.

3.1.2 Option 1A1 (Orange)

This option commences at the junction of the N13 and local road to the south of Callan Bridge with proposed main line option following similar option as Option 1A between the N13, to the east and Backlees to the west. New embankments and cuttings associated with this northern portion of the proposed option, including alterations to the local road crossings and alignments has the potential to impact on visually significant vegetation, including coniferous forestry plantation, roadside hedgerows and field boundary hedgerows containing mature trees.

Between Backlees and the northern slopes of Troopers hill the Option 1A1 is aligned slightly further south than proposed Option 1A and has the potential to impact on visually significant vegetation including, roadside hedgerows, field boundary hedgerows containing mature trees and areas of broadleaved woodland.

On the approach to the proposed River Finn crossing Option 1A1 follows a similar alignment to Option 1A and has the potential to impact upon extensive areas of visually significant broadleaved and coniferous woodland on northern and western facing slopes of Troopers Hill. The proposed River Finn crossing and associated alterations to regional and local road accesses has the potential to impact on visually significant mixed species woodland adjacent to the River Finn, field boundary vegetation and garden boundary vegetation associated with scattered residential properties in the vicinity, located in the more open River Finn valley.

To the west of the proposed River Finn crossing the Option aligns more to the south and crosses two local roads with alterations to alignments before terminating at a new roundabout junction to the immediate north of the existing N15 corridor, west of Kilcroghery. This proposed section of the option has the potential to impact on visually significant field boundary hedgerows, roadside vegetation adjacent to the local roads, garden boundary vegetation and scattered woodland copses including portions of coniferous plantation.

New link roads are proposed as part of this Option and include; alterations to the existing alignment of the N13 between the start of Option 1A1 to a point south of Tircallan, new link road between N15 and N13 similar to proposed Option 1A and a new link road to the west of Ballbofey between the R252 and N15. The proposed alignment alterations to the N13 between the start of the scheme to a point south of Tircallan has the potential to impact upon roadside vegetation that includes hedgerows, hedgerows with trees and mixed broadleaved and coniferous woodland adjacent to the existing N13 option.

The proposed new link road between the existing N13 and N15 to the east of Stranorlar, has the potential to impact upon visually significant roadside vegetation adjacent to the N13 and N15, field boundary hedgerows including hedgerows with mature trees, mixed species woodlands and shelterbelts, coniferous plantation woodland and garden boundary vegetation.

To the south-east of the proposed River Finn crossing the proposed new link road to the west of Ballybofey has the potential to impact upon roadside vegetation adjacent to the R252 and N15, field boundary hedgerows with mature trees and small copses of mixed species tree planting associated with farm steadings.

With regard to Landscape Character Areas: this Options mainline traverses through approximately 16km of the Finn Valley LCA. With regards to Scenic Amenity the option mainline and link roads traverse through approximately 7.2km of the HSA designation and 5.2km of MSA designation.

3.1.3 Option 1B (Pink)

This option commences at the junction of the N13 and local road to the south of Callan Bridge and is to be constructed on a series of new embankments with cuttings proposed to the east of Teevickmoy, Backlees, Aghasheil and across the eastern slopes of Trooper's Hill. A new roundabout junction is to be provided

adjacent to the N13, whilst a new junction is to be provided to the west of Tircallan with embankments and overbridge proposed. Alterations are also proposed to the numerous local roads that the northern portion of this option crosses as it traverses the landscape further south than the proposed 1A Option. Proposed northern section of the option has the potential to impact on visually significant vegetation comprised of; field boundary hedgerows with trees, mixed species copses, roadside hedgerows, garden boundary vegetation associated with scattered residential properties, mixed species shelterbelt planting and extensive areas of mixed woodland on the eastern and southern slopes of Trooper's Hill.

The proposed River Finn crossing and associated alterations to regional and local road accesses, including proposed embankments, roundabout junction and overbridge has the potential to impact on visually significant mixed species woodland adjacent to the River Finn, field boundary vegetation and garden boundary vegetation associated with residential properties in the River Finn valley.

To the west of the proposed River Finn crossing the proposed option continues south-west and is proposed to be contained within cuttings generally, with new embankments and overbridges proposed at each of the minor road crossings. This portion of the option provides for a new roundabout junction in close proximity to the N15, with new linking roads proposed. This portion of the option has the potential to impact on visually significant vegetation that includes; field boundary hedgerows of varying quality including those with mature trees, garden boundary vegetation associated with scattered residential properties, tracts of coniferous forestry plantation and mixed species copses of trees.

This option also includes a proposed new link road between the existing N13 and N15 road corridors to the north-east of Stranorlar. A proposed roundabout junction will form the connection to the N13, west of Castlebane whilst a new roundabout junction is proposed on the N15, south-east of Lough Hill. This proposed link option has the potential to impact upon visually significant roadside vegetation adjacent to the N13 and N15, field boundary hedgerows including hedgerows with mature trees and garden boundary vegetation.

With regard to Landscape Character Areas: this option traverses through approximately 12.5km of the Finn Valley LCA. With regards to Scenic Amenity the options mainline and link roads traverse through approximately 7.4km of the HSA designation and 4.3km of MSA designation.

3.1.4 Option1B1 (Pink)

This option commences at the junction of the N13 and local road to the south of Callan Bridge and follows a similar alignment to the N13 before heading south-west towards Troopers Hill along a similar alignment to proposed Option 1B. Alterations are also proposed to the numerous local roads that the northern portion of this option crosses as it traverses the landscape further south than the proposed Option 1A. Proposed northern section of the option has the potential to impact on visually significant vegetation comprised of; field boundary hedgerows with trees, mixed species copses, roadside hedgerows, garden boundary vegetation associated with scattered residential properties, mixed species shelterbelt planting and extensive areas of mixed woodland on the eastern and southern slopes of Trooper's Hill.

The proposed River Finn crossing and associated alterations to regional and local road accesses, including proposed embankments, roundabout junction and overbridge has the potential to impact on visually significant mixed species woodland adjacent to the River Finn, field boundary vegetation and garden boundary vegetation associated with residential properties in the River Finn valley.

To the west of the proposed River Finn crossing the proposed option continues south-west and this portion of the proposed option has the potential to impact on visually significant vegetation that includes; field boundary hedgerows of varying quality including those with mature trees, garden boundary vegetation associated with scattered residential properties, tracts of coniferous forestry plantation and mixed species copses of trees.

New link roads are proposed as part of this option and include; new link road between proposed option and N15 to the north-east of Stranorlar similar to option 1A1 and a new link road to the west of Ballbofey between the R252 and N15. The proposed link road between the option and the N15 has the potential to impact on visually significant vegetation that includes field boundary hedgerows, roadside vegetation associated with the N13 and coniferous plantation to the south of Tircallan.

The proposed new link road between the existing N13 and N15 to the east of Stranorlar, has the potential to impact upon visually significant roadside vegetation adjacent to the N13 and N15, field boundary hedgerows including hedgerows with mature trees, mixed species woodlands and shelterbelts, coniferous plantation woodland and garden boundary vegetation.

With regard to Landscape Character Areas: this option traverses through approximately 14km of the Finn Valley LCA. With regards to Scenic Amenity the Options mainline option and link roads traverse through approximately 8.4km of the HSA designation and 5.2km of MSA designation.

3.1.5 Option 1C (Purple)

This option commences, via a new roundabout junction, on the N13 south of Callan Bridge at a location similar to proposed 1A option. The option heads generally south-west towards the River Finn crossing following a similar alignment to the 1A option; however the alignment takes the option across the eastern and southern slopes in a similar alignment to Option 1B as it approaches the River Finn. The majority of the option is to be constructed on new embankments, though localised cuttings to the east of Lettermakenny, north of Aghashel and east of Trooper's Hill are proposed. New embankments and cuttings associated with this northern portion of the proposed option, including alterations to the local road crossings and alignments has the potential to impact on visually significant vegetation, including coniferous forestry plantation, roadside hedgerows, field boundary hedgerows containing mature trees, garden boundary vegetation and extensive areas of mixed woodland on the eastern and southern slopes of Trooper's Hill.

The proposed River Finn crossing and associated alterations to regional and local road accesses, including proposed embankments, roundabout junction and overbridge is similar to Option 1B and has the potential to impact on visually significant mixed species woodland adjacent to the River Finn, field boundary vegetation and garden boundary vegetation associated with residential properties in the River Finn valley.

To the west of the proposed River Finn crossing the proposed option continues south-west and is proposed to be contained within cuttings generally, with new embankments and overbridges proposed at each of the minor road crossings. This portion of the option provides for a new roundabout junction in close proximity to the N15, with new linking roads proposed. This portion of the option has the potential to impact on visually significant vegetation that includes; field boundary hedgerows of varying quality including those with mature trees, garden boundary vegetation associated with scattered residential properties, tracts of coniferous forestry plantation and mixed species copses of trees.

This option also includes a proposed new link road between the existing N13 and N15 road corridors to the east of Stranorlar. A proposed roundabout junction will form the connection to the N13, south-west of Tircallan whilst a new roundabout junction is proposed on the N15, south-east of Lough Hill. This proposed link option has the potential to impact upon visually significant roadside vegetation adjacent to the N13 and N15, field boundary hedgerows including hedgerows with mature trees, mixed species woodlands and shelterbelts, coniferous plantation woodland and garden boundary vegetation.

With regard to Landscape Character Areas: this option traverses through approximately 12.0km of the Finn Valley LCA. With regards to Scenic Amenity the option mainline and link roads traverse through approximately 7.1km of the HSA designation and 4.0km of MSA designation.

3.1.6 Option 1C1 (Purple)

This option commences, via a new junction, on the N13 south of Callan Bridge at a location similar to proposed Option 1A . The option heads generally south-west towards the River Finn crossing following a similar alignment to the Option 1C; however the alignment takes the option across the eastern and southern slopes in a similar alignment to the Option 1B as it approaches the River Finn. New embankments and cuttings associated with this northern portion of the proposed option, including alterations to the local road crossings and alignments has the potential to impact on visually significant vegetation, including coniferous forestry plantation, roadside hedgerows, field boundary hedgerows containing mature trees, garden boundary vegetation and extensive areas of mixed woodland on the eastern and southern slopes of Trooper's Hill as the option approaches the River Finn crossing.

The proposed River Finn crossing and associated alterations to regional and local road accesses, including proposed embankments, roundabout junction and overbridge has the potential to impact on visually significant mixed species woodland adjacent to the River Finn, field boundary vegetation and garden boundary vegetation associated with residential properties in the River Finn valley.

To the west of the proposed River Finn crossing the option continues south-west and has the potential to impact on visually significant vegetation that includes; field boundary hedgerows of varying quality including those with mature trees, garden boundary vegetation associated with scattered residential properties, tracts of coniferous forestry plantation and mixed species copses of trees.

New link roads are proposed as part of this option and include; alterations to the existing alignment of the N13 between the start of Option 1C1 to a point south of Tircallan, new link road between N15 and N13 similar to proposed Option 1A and a new link road to the west of Ballbofey between the R252 and N15. The proposed alignment alterations to the N13 between the start of the scheme to a point south of Tircallan has the potential to impact upon roadside vegetation that includes hedgerows, hedgerows with trees and mixed broadleaved and coniferous woodland adjacent to the existing N13 option.

The proposed new link road between the existing N13 and N15 to the east of Stranorlar, has the potential to impact upon visually significant roadside vegetation adjacent to the N13 and N15, field boundary hedgerows including hedgerows with mature trees, mixed species woodlands and shelterbelts, coniferous plantation woodland and garden boundary vegetation.

To the south-east of the proposed River Finn crossing the proposed new link road to the west of Ballybofey has the potential to impact upon roadside vegetation adjacent to the R252 and N15, field boundary hedgerows with mature trees and small copses of mixed species tree planting associated with farm steadings.

With regard to Landscape Character Areas: this option traverses through approximately 15.7km of the Finn Valley LCA. With regards to Scenic Amenity the option mainline and link roads traverse through approximately 7.7km of the HSA designation and 5.2km of MSA designation.

3.1.7 Option 1D (Red)

This option commences, via a new roundabout junction, on the N13 south of Callan Bridge at a location similar to proposed Option 1A. The option heads generally south before the alignment turns south-west towards the proposed River Finn crossing. The majority of the proposed option north of the River Finn is to be constructed on new embankments, though localised cuttings at Teevickmoy, east of Backlees and north of Drumboe Lower are proposed. To the east of Backlees a new junction and overbridge are proposed with a new section of link road proposed to the south-east, linking the N13 and N15 to provide a bypass option to Stranorlar.

New embankments and cuttings associated with this northern portion of the proposed option, including alterations to the local road crossings and alignments has the potential to impact on visually significant vegetation, including coniferous forestry plantation, roadside hedgerows, field boundary hedgerows containing mature trees, garden boundary vegetation, mixed species shelterbelt planting, portions of mixed species woodland and planting adjacent to the River Finn. The proposed link road between Backlees junction and the N15, including the alterations to National roads and local roads has the potential to impact upon field boundary hedgerows containing mature trees, roadside vegetation, small portions of mixed species shelterbelt planting and garden boundary vegetation in the vicinity of the new roundabout junction on the N15 to the south.

The proposed River Finn crossing and associated alterations to regional road R252 has the potential to impact on visually significant mixed species woodland adjacent to the River Finn, field boundary vegetation and garden boundary vegetation associated with residential properties in the River Finn valley.

To the south-west of the proposed River Finn crossing the proposed option provides a new link road to the west of Ballybofey which includes for new overbridges, embankments and junction facility. The new link road between the R252 and N15 is proposed to be constructed on embankments generally which has the potential to impact upon roadside vegetation adjacent to the R252 and N15, field boundary hedgerows with mature trees and small copses of mixed species tree planting associated with farm steadings.

From the new junction facility the option progresses south-west before turning south and terminating at a new roundabout to the south of the existing N15 corridor at Kilcroghery. The proposed option will be constructed at grade, with a series of shallow cuttings provided where levels dictate. Alterations to local road alignments are to be provided at each juncture with new embankments and over bridges provided. This portion of the option has the potential to impact on visually significant vegetation that includes; field boundary hedgerows, garden boundary vegetation associated with scattered residential properties, mixed species woodland planting, including coniferous plantation and roadside vegetation adjacent to the N15.

New link roads between the existing N15 corridor and the roundabout junction are proposed at grade and have the potential to impact on roadside vegetation adjacent to the N15, field boundary hedgerows that contain mature trees and garden boundary vegetation.

With regard to Landscape Character Areas: this option traverses through approximately 14.5km of the Finn Valley LCA. With regards to Scenic Amenity the option mainline and link roads traverse through approximately 7.6km of the HSA designation and 5.6km of MSA designation.

3.1.8 Option 1D1 (Red)

This option commences on the N13 south of Callan Bridge at a location similar to proposed Option 1A. The option heads generally south before the alignment turns south-west towards the proposed River Finn crossing. The majority of the proposed option north of the River Finn is to be constructed on new embankments, though localised cuttings at Teevickmoy, east of Backlees and north of Drumboe Lower are proposed. To the east of Backlees a new junction and overbridge are proposed with new section of link road proposed to the south-east, linking the N13 and N15 to provide a bypass option to Stranorlar which is located further north than the similar link road proposed in Option 1D.

New embankments and cuttings associated with this northern portion of the option, including alterations to the local road crossings and alignments has the potential to impact on visually significant vegetation, including coniferous forestry plantation, roadside hedgerows, field boundary hedgerows containing mature trees, garden boundary vegetation, mixed species shelterbelt planting, portions of mixed species woodland and planting adjacent to the River Finn. The proposed link road between Option 1D1 and the N15, including the alterations to National roads and local roads has the potential to impact upon field boundary hedgerows containing mature trees, roadside vegetation, small portions of mixed species shelterbelt planting and garden boundary vegetation in the vicinity of the new roundabout junction on the N15 to the south.

The proposed River Finn crossing and associated alterations to regional road R252 has the potential to impact on visually significant mixed species woodland adjacent to the River Finn, field boundary vegetation and garden boundary vegetation associated with residential properties in the River Finn valley.

To the south-west of the proposed River Finn crossing the option provides a new link road to the west of Ballybofey similar to Option 1A1. The new link road between the R252 and N15 has the potential to impact upon roadside vegetation adjacent to the R252 and N15, field boundary hedgerows with mature trees and small copses of mixed species tree planting associated with farm steadings.

From the new junction facility the option progresses south-west before turning south and terminating at a new roundabout to the south of the existing N15 corridor at Kilcroghery. The proposed option has the potential to impact on visually significant vegetation that includes; field boundary hedgerows, garden boundary vegetation associated with scattered residential properties, mixed species woodland planting, including coniferous plantation and roadside vegetation adjacent to the N15.

New link road between the existing N15 corridor and the roundabout junction are proposed at grade and have the potential to impact on roadside vegetation adjacent to the N15, field boundary hedgerows that contain mature trees and garden boundary vegetation.

With regard to Landscape Character Areas: this option traverses through approximately 13.6km of the Finn Valley LCA. With regards to Scenic Amenity the option mainline and link roads traverse through approximately 8.6km of the HSA designation and 5.2km of MSA designation.

3.1.9 Option 1E (Green)

This option commences, via a new roundabout junction, on the N13 south of Callan Bridge at a location similar to Option1A. The option heads generally south before the alignment turns south-west towards the proposed River Finn crossing. The majority of the proposed option north of the River Finn is to be constructed on new embankments, though localised cuttings at Teevickmoy, east of Backlees and north of Drumboe Lower are proposed. To the east of Backlees a new junction and overbridge are proposed with new section of link road proposed to the south-east, linking the N13 and N15 to provide a bypass option to Stranorlar.

New embankments and cuttings associated with this northern portion of the proposed option, including alterations to the local road crossings and alignments has the potential to impact on visually significant vegetation, including coniferous forestry plantation, roadside hedgerows, field boundary hedgerows containing mature trees, garden boundary vegetation, mixed species shelterbelt planting, portions of mixed species woodland and planting adjacent to the River Finn. The proposed link road between Backlees junction and the N15, including the alterations to National roads and local roads has the potential to impact upon field boundary hedgerows containing mature trees, roadside vegetation, small portions of mixed species shelterbelt planting and garden boundary vegetation in the vicinity of the new roundabout junction on the N15 to the south.

The proposed River Finn crossing and associated alterations to regional road R252 has the potential to impact on visually significant mixed species woodland adjacent to the River Finn, field boundary vegetation and garden boundary vegetation associated with residential properties in the River Finn valley.

To the south-west of the proposed River Finn crossing the proposed option provides a new link road to the west of Ballybofey which includes for new overbridges, embankments and junction facility. The new link road between the R252 and N15 is proposed to be constructed on embankments generally which has the potential to impact upon roadside vegetation adjacent to the R252 and N15, field boundary hedgerows with mature trees and small copses of mixed species tree planting associated with farm steadings.

From the new junction facility the option progresses south-west before turning south and terminating at a new roundabout to the south of the existing N15 corridor at Kilcroghery. The option will be constructed at grade, with a series of shallow cuttings provided where levels dictate. Alterations to local road alignments are to be provided at each juncture with new embankments and over bridges provided. This portion of the option has the potential to impact on visually significant vegetation that includes; field boundary hedgerows, garden boundary vegetation associated with scattered residential properties, mixed species woodland planting, including coniferous plantation and roadside vegetation adjacent to the N15.

New link roads between the existing N15 corridor and the roundabout junction are proposed at grade and have the potential to impact on roadside vegetation adjacent to the N15, field boundary hedgerows that contain mature trees and garden boundary vegetation.

With regard to Landscape Character Areas: this option traverses through approximately 13.5km of the Finn Valley LCA. With regards to Scenic Amenity the option mainline and link roads traverse through approximately 7.3km of the HSA designation and 5.6km of MSA designation.

3.1.10 Option 1E1 (Green)

This option commences on the N13 south of Callan Bridge at a location similar to proposed Option 1A. The option heads generally south before the alignment turns south-west towards the proposed River Finn crossing. The majority of the proposed option north of the River Finn is to be constructed on new embankments, though localised cuttings at Teevickmoy, east of Backlees and north of Drumboe Lower are proposed. To the east of Backlees a new junction is proposed with new section of link road proposed to the south-east, linking the N13 and N15 to provide a bypass option to Stranorlar.

New embankments and cuttings associated with this northern portion of the option, including alterations to the local road crossings and alignments has the potential to impact on visually significant vegetation, including coniferous forestry plantation, roadside hedgerows, field boundary hedgerows containing mature trees, garden boundary vegetation, mixed species shelterbelt planting, portions of mixed species woodland and planting adjacent to the River Finn. The proposed link road between Backlees junction and the N15, including the alterations to National roads and local roads has the potential to impact upon field boundary hedgerows containing mature trees, roadside vegetation, small portions of mixed species shelterbelt planting and garden boundary vegetation in the vicinity of the new roundabout junction on the N15 to the south.

The proposed River Finn crossing and associated alterations to regional road R252 has the potential to impact on visually significant mixed species woodland adjacent to the River Finn, field boundary vegetation and garden boundary vegetation associated with residential properties in the River Finn valley.

To the south-west of the proposed River Finn crossing the option provides a new link road to the west of Ballybofey between the R252 and N15 which has the potential to impact upon roadside vegetation adjacent to the R252 and N15, field boundary hedgerows with mature trees and small copses of mixed species tree planting associated with farm steadings.

From the new junction facility the option progresses south-west before turning south and terminating to the south of the existing N15 corridor at Kilcroghery. Alterations to local road alignments are to be provided at each juncture with new embankments and over bridges provided. This portion of the option has the potential to impact on visually significant vegetation that includes; field boundary hedgerows, garden boundary vegetation associated with scattered residential properties, mixed species woodland planting, including coniferous plantation and roadside vegetation adjacent to the N15.

New link roads between the existing N15 corridor and the roundabout junction are proposed and have the potential to impact on roadside vegetation adjacent to the N15, field boundary hedgerows that contain mature trees and garden boundary vegetation.

With regard to Landscape Character Areas: this option traverses through approximately 13.8km of the Finn Valley LCA. With regards to Scenic Amenity the option mainline and link roads traverse through approximately 8.6km of the HSA designation and 5.2km of MSA designation.

3.1.11 Option 1F (Blue)

This option commences at the junction of the N13 and local road to the south of Callan Bridge and is to be constructed on a series of new embankments with cuttings proposed to the east of Teevickmoy, Backlees, Aghasheil and immediately north of Drumboe Lower. New roundabout junctions are to be provided on the initial section to provide a link to the existing N13, whilst a new junction is to be provided to the west of Tircallan with link road provided to the existing N13 corridor. Proposed embankments and overbridge are proposed as part of the junction arrangement. Alterations are also proposed to the numerous local roads that the northern portion of this option crosses. Proposed northern section of the option has the potential to impact on visually significant vegetation comprised of; field boundary hedgerows with trees, garden boundary vegetation, roadside vegetation, coniferous plantation, mixed species copses, and areas of mixed species woodland to the east of Trooper's Hill.

The approach to the River Finn crossing will be constructed on embankments and the proposed option includes alterations to regional road R252 and a new roundabout junction on the southern fringes of Ballybofey with new link roads to the R252 and N15 to the south. The proposed River Finn crossing, roundabout junction, associated link roads and embankments have the potential to impact upon visually significant vegetation comprised; roadside vegetation, tree lined river banks associated with the River Finn, field boundary hedgerows and garden boundary vegetation.

From the new junction facility the option progresses south-west before turning south and terminating at a new roundabout to the south of the existing N15 corridor at Kilcroghery. The proposed option will be constructed at grade, with a series of shallow cuttings provided where levels dictate. Alterations to local road alignments are to be provided at each juncture with new embankments and over bridges provided. This portion of the option has the potential to impact on visually significant vegetation that includes; field boundary hedgerows, garden boundary vegetation associated with scattered residential properties, mixed species woodland planting, including coniferous plantation and roadside vegetation adjacent to the N15.

This option also includes a proposed new link road between the existing N13 and N15 road corridors to the north-east of Stranorlar. A proposed roundabout junction will form the connection to the N13, west of Castlebane whilst a new roundabout junction is proposed on the N15, south-east of Lough Hill. This proposed link option has the potential to impact upon visually significant roadside vegetation adjacent to the N13 and N15, field boundary hedgerows including hedgerows with mature trees and garden boundary vegetation.

With regard to Landscape Character Areas: this option traverses through approximately 13.5km of the Finn Valley LCA. With regards to Scenic Amenity the option mainline and link roads traverse through approximately 7.5km of the HSA designation and 5.5km of MSA designation.

3.1.12 Option 1F1 (Blue)

This option commences at the junction of the N13 and local road to the south of Callan Bridge and is to be constructed on a similar alignment to proposed Option1F with a series of new embankments and cuttings proposed to the east of Teevickmoy, Backlees, Aghasheil and immediately north of Drumboe Lower. New roundabout junctions are to be provided on the initial section to provide a link to the existing N13, whilst a new junction is to be provided to the west of Tircallan with link road provided to the existing N13 and further link to the N15, east of Stranorlar to provide a bypass option. Alterations are also proposed to the numerous local roads that the northern portion of this option crosses. Proposed northern section of the option has the potential to impact on visually significant vegetation comprised of; field boundary hedgerows with trees,

garden boundary vegetation, roadside vegetation, coniferous plantation, mixed species copses, and areas of mixed species woodland to the east of Trooper's Hill.

The approach to the River Finn crossing will be constructed on embankments and the proposed option includes a new link road between regional road R252 and the N15 to the south similar to Option1A1. The proposed River Finn crossing, associated alterations to the R252 and proposed link road to the N15 have the potential to impact upon visually significant vegetation comprised; roadside vegetation, tree lined river banks associated with the River Finn, field boundary hedgerows and garden boundary vegetation.

From the proposed River Finn crossing the option progresses south-west, before turning south and terminating at a new roundabout, south of the existing N15 corridor at Kilcroghery. The option will be constructed at grade, with a series of shallow cuttings provided where levels dictate. Alterations to local road alignments are to be provided at each juncture with new embankments and over bridges provided. This portion of the option has the potential to impact on visually significant vegetation that includes; field boundary hedgerows, garden boundary vegetation associated with scattered residential properties, mixed species woodland planting, including coniferous plantation and roadside vegetation adjacent to the N15.

With regard to Landscape Character Areas: this ption traverses through approximately 13.6km of the Finn Valley LCA. With regards to Scenic Amenity the option mainline and link roads traverse through approximately 8.5km of the HSA designation and 5.1km of MSA designation.

3.1.13 Option 1G (Yellow)

This option commences at the junction of the N13 and local road to the south of Callan Bridge and follows a similar alignment to proposed Option 1F between the N13 to the north and Backlees to the south. The proposed alignment of Option1G then heads south-west, north of Drumboe Upper before assuming a similar alignment to Option1F to the north of Drumboe Lower on its approach to the River Finn crossing. This northern section of the proposed option also include a new link road with the N15 to provide a bypass option to the north-east of Stranorlar which follows a similar option to previous Option 1A1, 1B1 1C1 and 1D1. The proposed northern section of this option has the potential to impact on visually significant vegetation comprised of; field boundary hedgerows with trees, garden boundary vegetation, roadside vegetation, and portions of mixed species woodland to the east of Trooper's Hill immediately north of Drumboe Lower.

The approach to the River Finn crossing will be constructed on embankments and the proposed option includes a new link road between the R252 and N15 to the south-west of Ballybofey. The proposed River Finn crossing, associated link roads and embankments have the potential to impact upon visually significant vegetation comprised; roadside vegetation, tree lined river banks associated with the River Finn, field boundary hedgerows and garden boundary vegetation.

To the west of the proposed River Finn crossing the proposed option aligns more to the south and is proposed to be constructed on a series of new embankments to the immediate west of the River Finn, with remainder of the option contained within new cuttings. The proposed option then crosses two local roads with alterations to alignments before terminating on the existing N15 corridor, west of Kilcroghery. This proposed section of the option has the potential to impact on visually significant field boundary hedgerows, roadside vegetation adjacent to the local roads, garden boundary vegetation and scattered woodland copses including portions of coniferous plantation to the north of Kilcroghery.

This option also includes a proposed new link road between the proposed option and the N15 to the north-east of Stranorlar. This proposed link option has the potential to impact upon visually significant roadside vegetation adjacent to the N13 and N15, field boundary hedgerows including hedgerows with mature trees and garden boundary vegetation.

With regard to Landscape Character Areas: this option traverses through approximately 13.5km of the Finn Valley LCA. With regards to Scenic Amenity the option mainline and link roads traverse through approximately 8.8km of the HSA designation and 6.0km of MSA designation.

3.1.14 Summary of Landscape Assessment

Table 3-1 below outlines the predicted significance of landscape impact for each of the options.

Table 3-1: Landscape Character Impact

Option	Landscape Character Area	Landscape Character Area Sensitivity	Magnitude of change in landscape resource	Impact	Impact Score	Preference
1A Total Length 12.2km*	Finn Valley	Medium	Large	Major or Highly negative	1	Intermediate
1A1 Total Length 16.04*	Finn Valley	Medium	Large	Major or Highly negative	1	Least Preferred
1B Total Length 12.5km*	Finn Valley	Medium	Large	Major or Highly negative	1	Intermediate
1B1 Total Length 14.01km*	Finn Valley	Medium	Large	Major or Highly negative	1	Intermediate
1C Total Length 12.0km*	Finn Valley	Medium	Large	Major or Highly negative	1	Intermediate
1C1 Total Length 15.71km*	Finn Valley	Medium	Large	Major or Highly negative	1	Least Preferred
1D Total Length 14.5km*	Finn Valley	Medium	Large	Major or Highly negative	1	Intermediate
1D1 Total Length 13.63km*	Finn Valley	Medium	Large	Major or Highly negative	1	Intermediate
1E Total Length 13.5km*	Finn Valley	Medium	Large	Major or Highly negative	1	Intermediate
1E1 Total Length 13.85km*	Finn Valley	Medium	Large	Major or Highly negative	1	Intermediate
1F Total Length 13.5km*	Finn Valley	Medium	Large	Major or Highly negative	1	Intermediate
1F1 Total Length 13.63km*	Finn Valley	Medium	Large	Major or Highly negative	1	Intermediate
1G Total Length 13.57km*	Finn Valley	Medium	Large	Major or Highly negative	1	Preferred

** Note lengths quoted include the mainline length plus link roads for the purposes of comparing total LCA traversed.*

In summary, as shown in **Table 3-1** above, when landscape impacts are considered all options are considered to have broadly similar landscape impact.

Option 1G however, largely avoids impacts on coniferous plantation to the north of the study area. Whilst this option avoids impacts on larger areas of mixed species woodland on the southern slopes of Trooper's Hill, it does have the potential for limited impacts on a smaller mixed woodland to the west of Drumboe Lower though such impacts are considered to be less than those predicted for Option 1F or Option 1F1. Option 1G has the potential to impact on scattered coniferous forestry in the south of the study area, though such impacts are considered to be less than those predicted for other options. It is noted that the proposed River Finn crossing is in closer proximity to the built form of Ballybofey and as such is predicted to have a reduced landscape impact as proposed bridge would be seen within the existing urban context and as such Option 1G is preferred slightly over other options.

3.2 Visual Impact

The assessment of visual impacts has been based upon a desktop quantitative analysis of residential dwellings within 300m of the outer edge of each option as summarised in **Table 3-2** below.

A review of the available on-line information has identified that no protected views and prospects are located within the study area associated with Section 1 and it is therefore considered that there will be no impacts on protected views as a result of the proposed options.

The following visual assessment assumes a worst case scenario, for each of the options, and does not include landscape mitigation.

Table 3-2: Residential Property (Only) Counts

Option	Residential properties between 0–50m	Residential properties between 50–100m	Residential properties between 100–200m	Residential properties between 200–300m	Dwellings Total
1A	33	39	68	63	203
1A1	25	40	128	146	339
1B	26	29	73	103	231
1B1	14	35	118	147	314
1C	31	40	85	74	230
1C1	23	38	136	146	343
1D	12	20	124	158	314
1D1	12	16	125	155	308
1E	11	20	126	158	315
1E1	11	16	125	155	307
1F	14	24	121	164	323
1F1	11	19	122	158	310
1G	13	21	123	157	314

Additional assessment of visual intrusion and obstruction on an individual property basis is not required at this option appraisal stage and more detailed assessments are to be carried out at the full EIAR stage. **Table 3-3** below indicates the total number of properties lying within or between the specified distances in relation to the centre line of the options and a calculation of the overall impact. The calculation of overall

impact is based on the multiplication of the number of dwellings by 3, 2, 1 or 0.5 reflecting the severity of impact within 50m, 50-100m, 100-200m and 200-300m respectively.

Table 3-3: Index for Visual Impact on Residential Properties Only

Option	0-50m	50-100m	100-200m	200-300m	Dwellings Total	Impact Index	Visual Impact Rating
1A	99	78	68	31.5	203	276.5	5
1A1	75	80	128	73	339	356	13
1B	78	58	73	51.5	231	260.5	1
1B1	42	70	118	73.5	314	303.5	11
1C	93	80	85	37	230	295	10
1C1	69	76	136	73	343	354	12
1D	36	40	124	79	314	279	7
1D1	36	32	125	77.5	308	270.5	3
1E	33	40	126	79	315	278	6
1E1	33	32	125	77.5	307	267.5	2
1F	42	48	121	82	323	293	9
1F1	33	38	122	79	310	272	4
1G	39	42	123	78.5	314	282.5	8

3.2.1 Option 1A (Orange)

This option has the highest potential for visual impacts on properties within the 0-50m distance band than other options being considered, with approximately 8Nr. properties predicted to be directly affected by the proposed option at Ballynaglack, Aghashel and on northern slopes of Troopers Hill. This proposed option also has the second highest number of properties in the 50-100m and lowest numbers of residential properties in the 100-200m and 200-300m distance bands than other options being considered, resulting in an overall ranking of fifth.

3.2.2 Option 1A1 (Orange)

This option has a higher potential for visual impacts on properties within the 0-50m distance band than Option 1B1, 1C1 and 1D1 to 1G, with approximately 8Nr. properties predicted to be directly affected by the proposed option at Ballynaglack, Aghashel and on northern slopes of Troopers Hill. This option also the joint highest potential for visual impacts on properties within the 50-100m distance band along Option 1C. This option also has the second highest number of properties in the 100-200m distance band and fourth lowest numbers of residential properties in the 200-300m distance bands, resulting in an overall ranking of thirteenth.

3.2.3 Option 1B (Pink)

This option has a higher potential for visual impacts on properties within the 0-50m than Option 1A1, 1B1, 1C1, and 1D to 1G, with approximately 7Nr. properties predicted to be directly affected by the proposed option at Aghashel, in proximity to the R252 and Cappry. This option also has a higher potential for visual impacts on properties within the 50-100m distance bands than Option 1D, Option 1D1 and Option 1E to Option 1G inclusive. This o ptionhas less potential for visual impacts on properties in the 100-200m and 200-300m distance bands than Options 1A1, 1B1, 1C1, 1D, 1D1, 1E, 1E1, 1F, 1F1 and 1G, resulted in an overall ranking of first.

3.2.4 Option 1B1 (Pink)

This option has a higher potential for visual impacts on properties within the 0-50m than Option a 1D, 1D1, 1E, 1E1, 1F, 1F1 and 1G, with approximately 7Nr. properties predicted to be directly affected by the proposed option at Aghashel, in proximity to the R252 and Cappry. This option also has the fourth highest potential for visual impacts on properties within the 50-100m distance bands and has less potential for visual impacts on properties in the 100-200m and 200-300m distance bands than Options 1D, 1D1, 1E, 1E1, 1F, 1F1 and 1G, resulted in an overall ranking of eleventh.

3.2.5 Option 1C (Purple)

This option has the second highest potential for visual impacts on properties within the 0-50m distance band, with approximately 7Nr. properties predicted to be directly affected by the proposed option at Ballynaglack, and Cappry. This proposed option has the highest potential for visual impacts on properties within the 50-100m distance band overall,and has a higher potential for visual impacts on properties between 100-200m and 200-300m distance bands than Option 1A, resulting in an overall ranking of tenth.

3.2.6 Option 1C1 (Purple)

This option has the fifth highest potential for visual impacts on properties within the 0-50m distance band, with approximately 7Nr. properties predicted to be directly affected by the proposed option at Ballynaglack, and Cappry. This proposed option has the third highest potential for visual impacts on properties within the 50-100m distance band overall and, has a higher potential for visual impacts on properties between 100-200m and 200-300m distance bands than Options 1A, 1A1, 1B and 1C, resulting in an overall ranking of twelfth.

3.2.7 Option 1D (Red)

This option has a lower potential for visual impacts on properties within the 0-50m distance band than Option1A, 1A1, 1B, 1B1, 1C, 1C1, 1F and 1G options, with approximately 4Nr. properties predicted to be directly affected by the proposed option between the River Finn and Cappry. This proposed option has a similar potential for visual impacts on properties within the 50-100m distance band as Option 1E1, though has a higher potential for visual impacts on properties than the Option 1A, Option 1B, Option 1B1 or Option 1C in the 100 – 200m and 200-300m distance band resulting in an overall ranking of seventh.

3.2.8 Option 1D1 (Red)

Option 1D1 has a lower potential for visual impacts on properties within the 0-50m distance band than Options 1A, 1A1, 1B, 1B1, 1C, 1C1, 1F and 1G, with approximately 4Nr. properties predicted to be directly affected by the proposed option between the River Finn and Cappry. This proposed option has a similar potential for visual impacts on properties within the 50-100m distance band as Option1E1, though has a higher potential for visual impacts on properties than Option 1A, Option 1B, Option 1B1 or Option 1C in the 100 – 200m and 200-300m distance band resulting in an overall ranking of third.

3.2.9 Option 1E (Green)

Option 1E has the lowest potential for visual impacts on properties within the 0-50m and third lowest potential for visual impacts on properties within the 50-100m when compared against other options, with approximately 6Nr. properties predicted to be directly affected by the proposed option at Drumboe Upper, Cappry and Backlees. This option has the highest potential for visual impacts on properties in the 100-200m distance band and has a greater potential for visual impacts on properties in the 200-300m distance band than Option 1A, Option 1A1, Option 1B, Option 1B1, Option 1C or Option 1C1 resulting in an overall ranking of sixth.

3.2.10 Option 1E1 (Green)

Option 1E1 has the lowest potential for visual impacts on properties within the 0-50m and 50-100m distance bands when compared against other option, with approximately 5Nr. properties predicted to be directly affected by the proposed option at Drumboe Upper, Cappry and Backlees. This option has the second highest potential for visual impacts on properties in the 100-200m distance band and has a greater potential for visual impacts on properties in the 200-300m distance band than the Option 1A, Option 1A1, Option 1B, Option 1B1, Option 1C or Option 1C1 resulting in an overall ranking of second.

3.2.11 Option 1F (Blue)

Option 1F has the fourth lowest potential for visual impacts on properties within the 0-50m distance band, with approximately 9Nr. properties predicted to be directly affected by the proposed option between Drumboe Upper and Drumboe Lower and to the west of Ballybofey. The option has a lower potential for visual impacts on properties within the 50-100m distance band than Option 1A, Option 1A1, Option 1B, Option 1B1, Option 1C or Option 1C1 though has the greatest potential for visual impacts on properties within the 200-300m distance band when compared with other options, resulting in an overall ranking of ninth.

3.2.12 Option 1F1 (Blue)

Option 1F1 has a similar potential for visual impacts on properties within the 0-50m distance band as Option 1E and Option 1E1 though has the potential to directly affect approximately 9Nr. properties between Drumboe Upper and Drumboe Lower and to the west of Ballybofey. The option has a greater potential for visual impacts on properties within the 50-100m distance band than Option 1E1 and has greater potential for visual impacts on properties within the 100-200m and 200-300m distance bands when compared with Option 1A, Option 1B, Option 1B1 or Option 1C, resulting in an overall ranking of fourth.

3.2.13 Section 1 - Option 1G (Yellow)

This option has a greater potential for visual impacts on properties within the 0-50m distance band then Option 1D, Option 1D1, Option 1E, Option 1E1 or Option 1F1 and has the potential to directly affect approximately 6Nr. properties between Teevickmoy and Backlees and to the west of Ballybofey. The option has a greater potential for visual impacts on properties within the 50-100m distance band than Option 1D, Option 1D1, Option 1E, Option 1E1 and Option 1F1 and has similar potential for visual impacts on properties within the 100-200m and 200-300m distance bands when compared with Option 1D, Option 1D1, and Option 1F1 resulting in an overall ranking of eight.

3.2.14 Summary of Visual Assessment

Table 3-4 below outlines the predicted significance of visual impact for each of the options.

Table 3-4: Visual Impact and Predicted TII Score

Option	Impact	Impact Score	Preference
1A	Major or Highly Negative	1	Least Preferred
1A1	Major or Highly Negative	1	Least Preferred
1B	Major or Highly Negative	1	Least Preferred
1B1	Major or Highly Negative	1	Least Preferred
1C	Major or Highly Negative	1	Least Preferred
1C1	Major or Highly Negative	1	Least Preferred
1D	Major or Highly Negative	1	Intermediate

Option	Impact	Impact Score	Preference
1D1	Major or Highly Negative	1	Intermediate
1E	Major or Highly Negative	1	Intermediate
1E1	Major or Highly Negative	1	Intermediate
1F	Major or Highly Negative	1	Preferred
1F1	Major or Highly Negative	1	Preferred
1G	Major or Highly Negative	1	Preferred

3.3 Summary and Preference

The landscape and visual assessment summary is shown in **Table 3-5**, below.

When landscape impacts are considered overall for the proposed options there is a slight preference for Option 1G as this option avoids impacts on coniferous plantation to the north of the study area, avoids significant impact on mixed species woodland on southern facing slopes of Trooper's Hill than those predicted for Option 1F and Option 1F1. It has less potential for impacting on coniferous plantations to the south when compared against Option 1B, Option 1B1, Option 1C or Option 1C1. The River Finn crossing, associated with the Option 1G is also closer to the existing urban context of Ballybofey then locations proposed for Option 1A, Option 1A1, Option 1B, Option 1B1, Option 1C or Option 1C1 and would be viewed as part of this urban form.

The proposed Option 1A1 and Option 1C1 are least favoured, in landscape terms, as they both have the potential to impact on areas of coniferous plantation in the north of the study area, impacts on mixed woodland to the north of Trooper's Hill, have a crossing point furthest from the urban context of Ballybofey and impact on existing vegetation adjacent to the N13 where carriageway realignment is proposed. There is little difference between proposed Option 1D, Option 1D1, Option 1E and Option 1E1 as these options impact on coniferous plantation to the north of the study area, avoid potential impacts on mixed woodland on southern slopes of Trooper's Hill and impact on coniferous plantation to the south. A similar crossing point is proposed for both of these options on the River Finn, with the proposed bridge in proximity to the urban form of Ballybofey. There is also little difference between the Option 1B, Option 1B1, Option 1C and Option 1C1 as all options impact mixed species woodland on southern facing slopes of Trooper's Hill and have an identical location for the proposed River Finn crossing, which is closer than Option 1A though further west then that proposed for Option 1F, Option 1E or Option 1D.

When visual impacts are considered all options have the potential to directly affect existing residential properties to some degree. There is a preference for Option 1B1, Option 1D, Option 1D1, Option 1E, Option 1E1, Option 1F, Option 1F1 and Option1G over Option 1A, Option 1A1, Option 1B, Option 1C or Option 1C1 as these options have the fewest number of residential properties within the 0-50m. When potential impacts on residential properties within the 50-100m distance banding are considered there is a slight preference for Option 1D, Option 1D1, Option 1E, Option 1E1, Option 1F, Option 1F1 and Option 1G over Option 1A, Option 1A1, Option 1B, Option 1B1, Option 1C and Option 1C1 and are therefore considered to have a lesser visual impact. Of these seven options there would be a slight preference, in visual impact terms, for either the Option 1F or Option 1G as they of similar length, with a slight preference for the Option 1G as it has a lower number of residential properties within the 0-50m and 50-100m distance banding when compared against Option 1F.

Potential landscape and visual effects for the preferred option shall be mitigated by minimising the footprint of the new road in the landscape and by using carefully sited landscape screening and boundary treatments.

Table 3-5: Predicted Landscape and Visual Impacts Summary

Option	Summary of Impacts
Option 1A	▪ Second Shortest option at 12.2km ▪ Traverses approximately7.2km of HSA Designation ▪ River Finn crossing furthest north ▪ Visual impact: Highest number of residential properties within 0-50m distance band (33) ▪ Visual impact 203 dwellings within 300m of option ▪ Potential direct impacts on 8Nr. Properties ▪ Potential impacts on coniferous plantation within the north of the study area, impacts upon visually significant mixed species woodland on northern slopes of Trooper's Hill and coniferous plantation within southern portion of study area ▪ No predicted effects on Protected Views
Option 1A1	▪ Longest Option at 16.04km ▪ Traverses approximately 7.2km of HSA Designation ▪ River Finn crossing furthest north ▪ Visual impact: fourth highest number of residential properties within 0-50m distance band (25) ▪ Visual impact 231 dwellings within 300m of option ▪ Potential direct impacts on 8Nr. Properties ▪ Potential impacts on coniferous plantation within the north of the study area, impacts upon visually significant mixed species woodland on northern slopes of Trooper's Hill ▪ Impacts on roadside vegetation adjacent to the N13 associated with realignment works to N13 ▪ Impacts on vegetation associated with R252 and N15 link road to south-west of Ballybofey ▪ No predicted effects on Protected Views
Option 1B	▪ Third shortest option at 12.5km ▪ Traverses approximately 7.4km of HSA Designation ▪ River Finn crossing further south than Option 1A crossing ▪ Visual impact: third highest number of residential properties within 0-50m distance band (26) ▪ Visual impact: 231 dwellings within 300m of option ▪ Potential direct impacts on 7Nr. Properties ▪ Potential impacts on visually significant mixed species woodland on northern slopes of Trooper's Hill and coniferous plantations to the south. ▪ Approach to River Finn crossing considered to be of poorer landscape fit when compared against Option 1D, Option 1E and Option 1F due to cuttings on Trooper's Hill. ▪ No predicted effects on Protected Views
Option 1B1	▪ Fourth longest option at 14.01km ▪ Traverses approximately 8.4km of HSA Designation ▪ River Finn crossing further south than Option 1A crossing ▪ Visual impact: sixth highest number of residential properties within 0-50m distance band (14) ▪ Visual impact: 314 dwellings within 300m of option ▪ Potential direct impacts on 7Nr. Properties ▪ Potential impacts on visually significant mixed species woodland on northern slopes of Trooper's Hill and coniferous plantations to the south. ▪ Approach to River Finn crossing considered to be of poorer landscape fit when compared against Option 1D, Option 1E and Option 1F due to cuttings on Trooper's Hill. ▪ Impacts on vegetation between road option and N15 link road ▪ Impacts on vegetation associated with R252 and N15 link road to south-west of Ballybofey ▪ No predicted effects on Protected Views

Option	Summary of Impacts
Option 1C	▪ Shortest option length at 12.0km ▪ Traverses approximately 7.1km of HSA Designation ▪ River Finn crossing further south than Option 1A crossing and similar to Option 1B. ▪ Visual impact: second highest number of residential properties within 0-50m distance band (31) ▪ Visual impact: 230 dwellings within 300m of option ▪ Potential direct impacts on 7Nr. Properties ▪ Potential impacts on visually significant mixed species woodland on northern slopes of Trooper's Hill and coniferous plantations to the south. ▪ Approach to River Finn crossing considered to be of poorer landscape fit when compared against Option 1D, Option 1E and Option 1F due to cuttings on Trooper's Hill. ▪ No predicted effects on Protected Views
Option 1C1	▪ Second longest option length at 15.71km ▪ Traverses approximately 7.7km of HSA Designation ▪ River Finn crossing further south than Option1A crossing and similar to Option1B ▪ Visual impact: fifth highest number of residential properties within 0-50m distance band (23) ▪ Visual impact: 343 dwellings within 300m of option ▪ Potential direct impacts on 7Nr. Properties ▪ Potential impacts on visually significant mixed species woodland on northern slopes of Trooper's Hill and coniferous plantations to the south. ▪ Approach to River Finn crossing considered to be of poorer landscape fit when compared against Option 1D, Option 1E and Option 1F due to cuttings on Trooper's Hill. ▪ Impacts on roadside vegetation adjacent to the N13 associated with realignment works to N13 ▪ Impacts on vegetation associated with R252 and N15 link road to south-west of Ballybofey ▪ No predicted effects on Protected Views
Option 1D	▪ Third shortest option at 14.5km ▪ Traverses approximately 7.6km of HSA Designation ▪ River Finn crossing closer to Ballybofey urban form ▪ Visual impact: second lowest number of residential properties within 0-50m distance band (12) ▪ Visual impact: 314 dwellings within 300m of option ▪ Potential direct impacts on 4Nr. Properties ▪ Potential impacts on areas of coniferous plantation to the north, mixed woodland areas to the west of Drumboe Lower, though avoids larger areas of significant woodland on Trooper's Hill with the proposed bridge crossing in close proximity to the urban form of Ballybofey and impacts on coniferous plantation to the south. ▪ Introduction of new junction and earthworks into northern portion of study area with new link road ▪ Approach to River Finn crossing considered to be of better landscape fit when compared against Option 1A, Option 1B or Option 1C as option follows localised changes in topography. ▪ No predicted effects on Protected Views.
Option 1D1	▪ Similar option length to Option 1E at 13.6km ▪ Traverses approximately 8.6km of HSA Designation ▪ River Finn crossing closer to Ballybofey urban form ▪ Visual impact: second lowest number of residential properties within 0-50m distance band (12) ▪ Visual impact: 308 dwellings within 300m of option ▪ Potential direct impacts on 4Nr. Properties ▪ Potential impacts on areas of coniferous plantation to the north, mixed woodland areas to the west of Drumboe Lower, though avoids larger areas of

Option	Summary of Impacts
	significant woodland on Trooper's Hill with the proposed bridge crossing in close proximity to the urban form of Ballybofey and impacts on coniferous plantation to the south. ▪ Introduction of new junction and earthworks into northern portion of study area with new link road ▪ Approach to River Finn crossing considered to be of better landscape fit when compared against Option 1A, Option 1B or Option 1C as option follows localised changes in topography. ▪ Impacts on vegetation between Option and N15 link road ▪ Impacts on vegetation associated with R252 and N15 link road to south-west of Ballybofey ▪ No predicted effects on Protected Views.
Option1E	▪ Similar option length to Option 1D1 at 13.6km ▪ Traverses approximately 7.3km of HSA Designation ▪ River Finn crossing closer to Ballybofey urban form ▪ Visual impact: lowest number of residential properties within 0-50m distance band (11) ▪ Visual impact: 315 dwellings within 300m of option ▪ Potential direct impacts on 6Nr. Properties ▪ Potential impacts on areas of coniferous plantation to the north, mixed woodland areas to the west of Drumboe Lower, though avoids larger areas of significant woodland on Trooper's Hill with the proposed bridge crossing in close proximity to the urban form of Ballybofey and limited impacts on coniferous plantation to the south. ▪ Introduction of new junction and earthworks into northern portion of study area with new link road ▪ Approach to River Finn crossing considered to be of better landscape fit when compared against Option 1A, Option 1B or Option 1C as option follows localised changes in topography. ▪ No predicted effects on Protected Views.
Option 1E1	▪ Fifth shortest option at 13.8km ▪ Traverses approximately 8.6km of HSA Designation ▪ River Finn crossing closer to Ballybofey urban form ▪ Visual impact: lowest number of residential properties within 0-50m distance band (11) ▪ Visual impact: 307 dwellings within 300m of option ▪ Potential direct impacts on 5Nr. Properties ▪ Potential impacts on areas of coniferous plantation to the north, mixed woodland areas to the west of Drumboe Lower, though avoids larger areas of significant woodland on Trooper's Hill with the proposed bridge crossing in close proximity to the urban form of Ballybofey and limited impacts on coniferous plantation to the south. ▪ Approach to River Finn crossing considered to be of better landscape fit when compared against Option 1A, Option 1B or Option 1C as option follows localised changes in topography. ▪ Impacts on vegetation between Option and N15 link road ▪ Impacts on vegetation associated with R252 and N15 link road to south-west of Ballybofey ▪ No predicted effects on Protected Views.
Option 1F	▪ Similar option length to Option 1D1 and Option 1E at 13.5km length ▪ Traverses approximately 7.5km of HSA Designation ▪ River Finn crossing closer to Ballybofey urban form ▪ Visual impact: fourth lowest number of residential properties within 0-50m distance band (14) ▪ Visual impact: 323 dwellings within 300m of option ▪ Potential direct impacts on 9Nr. Properties ▪ Potential impacts on visually significant coniferous plantation to the north of the study area largely avoided. Option does impact on mixed woodland areas to the east of Drumboe Lower. This Option also avoids larger areas of significant

Option	Summary of Impacts
	woodland to the north-west of Ballybofey, with a bridge crossing in closer proximity to the urban form of Ballybofey, though does impact upon a portion of coniferous plantation to the south ▪ Approach to River Finn crossing considered to be of better landscape fit when compared against Option 1A, Option 1B or Option 1C as option follows localised changes in topography. ▪ No predicted effects on Protected Views.
Option 1F1	▪ Similar option length to Option 1D1 and Option 1E at 13.6km length ▪ Traverses approximately 8.5km of HSA Designation ▪ River Finn crossing closer to Ballybofey urban form ▪ Visual impact: joint lowest number of residential properties within 0-50m distance band (11) ▪ Visual impact: 310 dwellings within 300m of option ▪ Potential direct impacts on 9Nr. Properties ▪ Potential impacts on visually significant coniferous plantation to the north of the study area largely avoided. Option does impact on mixed woodland areas to the east of Drumboe Lower. This proposed option also avoids larger areas of significant woodland to the north-west of Ballybofey, with a bridge crossing in closer proximity to the urban form of Ballybofey, though does impact upon a portion of coniferous plantation to the south ▪ Approach to River Finn crossing considered to be of better landscape fit when compared against Option 1A, Option 1B or Option 1C as option follows localised changes in topography. ▪ Impacts on vegetation between Option and N15 link road ▪ Impacts on vegetation associated with R252 and N15 link road to south-west of Ballybofey ▪ No predicted effects on Protected Views.
Option 1G	▪ Similar option length to Option 1F at 13.57km length ▪ Traverses approximately 8.8km of HSA Designation ▪ River Finn crossing closer to Ballybofey urban form ▪ Visual impact: third lowest number of residential properties within 0-50m distance band (13) ▪ Visual impact: 314 dwellings within 300m of Option ▪ Potential direct impacts on 6Nr. Properties ▪ Potential impacts on visually significant coniferous plantation to the north of the study area largely avoided. Option does impact on mixed woodland areas to the east of Drumboe Lower, though potential effects considered less than Option 1F and Option 1F1. ▪ This proposed option also avoids larger areas of significant woodland to the north-west of Ballybofey, with a bridge crossing in closer proximity to the urban form of Ballybofey. ▪ Option impacts upon a portion of coniferous plantation to the south, though considered to be less than those predicted for Option 1C and Option 1C1. ▪ Approach to River Finn crossing considered to be of better landscape fit when compared against Option 1A, Option 1B or Option 1C as option follows localised changes in topography. ▪ Impacts on vegetation between optionand N15 link road ▪ Impacts on vegetation associated with R252 and N15 link road to south-west of Ballybofey ▪ No predicted effects on Protected Views.

Table 3-6: Summary of Assessment for Section1 N15 Ballybofey-Stranorlar Urban Region

Option	Quantitative Assessment	Qualitative Assessment	Score	Ranking	Preference
1A	13	Major or Highly Negative	1	5	Least Preferred
1A1	15	Major or Highly Negative	1	5	Least Preferred
1B	12	Major or Highly Negative	1	5	Least Preferred
1B1	14	Major or Highly Negative	1	5	Least Preferred
1C	12	Major or Highly Negative	1	5	Least Preferred
1C1	14	Major or Highly Negative	1	5	Least Preferred
1D	12	Major or Highly Negative	1	4	Intermediate
1D1	12	Major or Highly Negative	1	3	Intermediate
1E	12	Major or Highly Negative	1	4	Intermediate
1E1	13	Major or Highly Negative	1	3	Intermediate
1F	13	Major or Highly Negative	1	2	Intermediate
1F1	15	Major or Highly Negative	1	2	Intermediate
1G	12	Major or Highly Negative	1	1	Preferred

Donegal County Council

TEN-T Priority Route Improvement Project, Donegal

Section 1: N15/N13 Ballybofey/Stranorlar Urban Region

Option Selection Report

Appendix D1.4- Biodiversity (Terrestrial)

December 2019

Document Control Sheet

Client:	Donegal County Council
Project Title:	TEN-T Priority Route Improvement Project, Donegal – Section 1: N15/N13 Ballybofey/Stranorlar Urban Region
Document Title:	Option Selection Report – Appendix D1.4 – Biodiversity (Terrestrial)
Document No.:	TT-MGT0337-RPS-00-01-RP-E-EN-1010

Rev. No.	Suitability	Effective Date	Revision Description	Checked	Approved
P01	S4	December 2019	Issue for publication	ED/PK	GMcE

This report has been prepared by RPS/Barry Transportation on behalf of Donegal County Council. Any other persons who use any information contained herein do so at their own risk.

© RPS Barry Transportation 2019

Table of Contents

1 INTRODUCTION 1
1.1 Methodology 1
1.2 Study Area and Zone of Influence 2
1.2.1 Assessment Criteria 5
2 EXISTING ENVIRONMENT 8
2.1 Desk Study 8
2.1.1 Habitats 8
2.1.2 Designated Sites of Conservation Importance 10
2.1.3 Flora Atlas 16
2.1.4 Rare and Protected Species Databases 16
3 OPTION SELECTION 23
3.1 Comparison of Options 23
3.2 Ecological Impact Assessment 28
3.2.1 Option 1A (Orange) 28
3.2.2 Option 1A1 (Orange) 28
3.2.3 Option 1B (Pink) 28
3.2.4 Option 1B1 (Pink) 29
3.2.5 Option 1C (Purple) 29
3.2.6 Option 1C1 (Purple) 29
3.2.7 Option 1D (Red) 29
3.2.8 Option 1D1 (Red) 29
3.2.9 Option 1E (Green) 30
3.2.10 Option 1E1 (Green) 30
3.2.11 Option 1F (Blue) 30
3.2.12 Option 1F1 (Blue) 31
3.2.13 Option 1G (Yellow) 31
3.3 Conclusion 37

Appendix

Appendix 1 European Site Risk Assessment
Appendix 2 Ecological Impact Risk Matrix

List of Figures

Figure 1-1: Option Selection Overview 3
Figure 1-2: Option Selection Overview with Modified Options 4
Figure 2-1: Designated European Sites within Zones of Influence 12
Figure 2-2: Designated European Sites within Zones of Influence with Modified Options 13
Figure 2-3: National Designated Sites within Zones of Influence 14
Figure 2-4: National Designated Sites within Zones of Influence with Modified Options 15

List of Tables

Table 1.1: Ecological Site Evaluation Scheme....5
Table 1.2: Ecological Receptor Evaluations and Scoring....6
Table 1.3: Impact Scoring Key (TII, 2016)....7
Table 2.1: River Finn SAC Qualifying Interests....9
Table 2.2: Ecological Receptor (ER) Description and Category Evaluation Rating.... 17
Table 3.1: Ecological Receptors Intersected by the Proposed Options by Ecological Evaluation.... 24
Table 3.2: Impact Significance on the Ecological Receptors Intersected by the Proposed Options 25
Table 3.3: Summary of Impact to Ecological Receptors 27
Table 3.4 Option Scoring Matrix.... 32

1 INTRODUCTION

This report examines the terrestrial biodiversity aspects of the environment of the 13 no. options for the Section 1 N15 Ballybofey-Stranorlar Urban Region of the TEN-T Priority Route Improvement Project in Donegal and will form part of a Phase 2 - Option Selection Report to be issued by the National Roads Design Office, Donegal County Council. See Section 1.2 of the Option Selection Report for Project Description.

The principal objectives of the study are to:

- Complete a desk study and field surveys to obtain relevant terrestrial ecological data for each option;
- Identify and describe sites of known potential ecological interest;
- Assess the significance of the likely impacts of the proposed road scheme on each of these environmental aspects along each option;
- To evaluate and compare each option based on ecological criteria, as per National Road Authority (NRA)[1] *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (2009) hereafter NRA Guidelines 2009), taking into account interactions with other environmental disciplines;
- To assess each option in accordance with the TII *Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis* (2016); and
- Based on the above assessment, to assess, compare and rank the preferred option in order of preference.

In fulfilling these objectives, an assessment on the likely impacts of the options on ecological receptors, can be carried out. An informed choice can therefore be made with the knowledge of the potential ecological consequences. This enables the importance of the proposed effects and the scope for mitigating these to be appropriately evaluated.

The extent of the overall study areas within the three sections have been identified and detailed in the main body of the Option Selection Report. This appendix D4.1 to the Options Selection Report provides the details of the biodiversity related constraints associated with Section 1 that require consideration during the project lifetime.

1.1 Methodology

The methodology for the option selection comprised a desk study and field surveys undertaken throughout 2018 and early 2019. These elements are used to identify and describe areas of known or potential ecological value. The material sources consulted as part of the desk study are as follows:

- The National Parks and Wildlife Service (NPWS) database, consulted for designated sites of nature conservation interest in the study area, accessed September 2019 (https://www.npws.ie);
- The NPWS database, consulted for data on rare/ protected/ threatened species for Irish National Grid 10km squares (hectads), accessed online September 2019 (https://www.npws.ie);
- The National Biodiversity Data Centre (NBDC) database (http://maps.biodiversityireland.ie), consulted for records of rare, protected and invasive species for Irish National Grid 10km squares, accessed online September 2018 (http://www.biodiversityireland.ie);
- GeoHive online mapping (http://map.geohive.ie/mapviewer.html);

[1] The National Roads Authority (NRA) and the Railway Procurement Agency were merged to become Transport Infrastructure Ireland (TII) in 2015. Hereafter referred to as TII.

- Environmental Protection Agency – water bodies and water quality (http://epa.ie);
- Environmental Protection Agency Catchments resource (https://www.catchments.ie/maps);
- Geological Survey of Ireland – geology, soils and hydrogeology (https://www.gsi.ie);
- WFD website (http://www.wfdireland.ie);
- Information on the conservation status of birds in Ireland (Colhoun & Cummins, 2013)[2];
- New Atlas of the British and Irish Flora (CD-ROM);
- Botanical Society of Britain & Ireland Distribution Database, last accessed online September 2019 (https://database.bsbi.org);
- A review of Ordnance Survey Ireland mapping and orthophotography; and
- Donegal County Development Plan 2018-2024.

1.2 Study Area and Zone of Influence

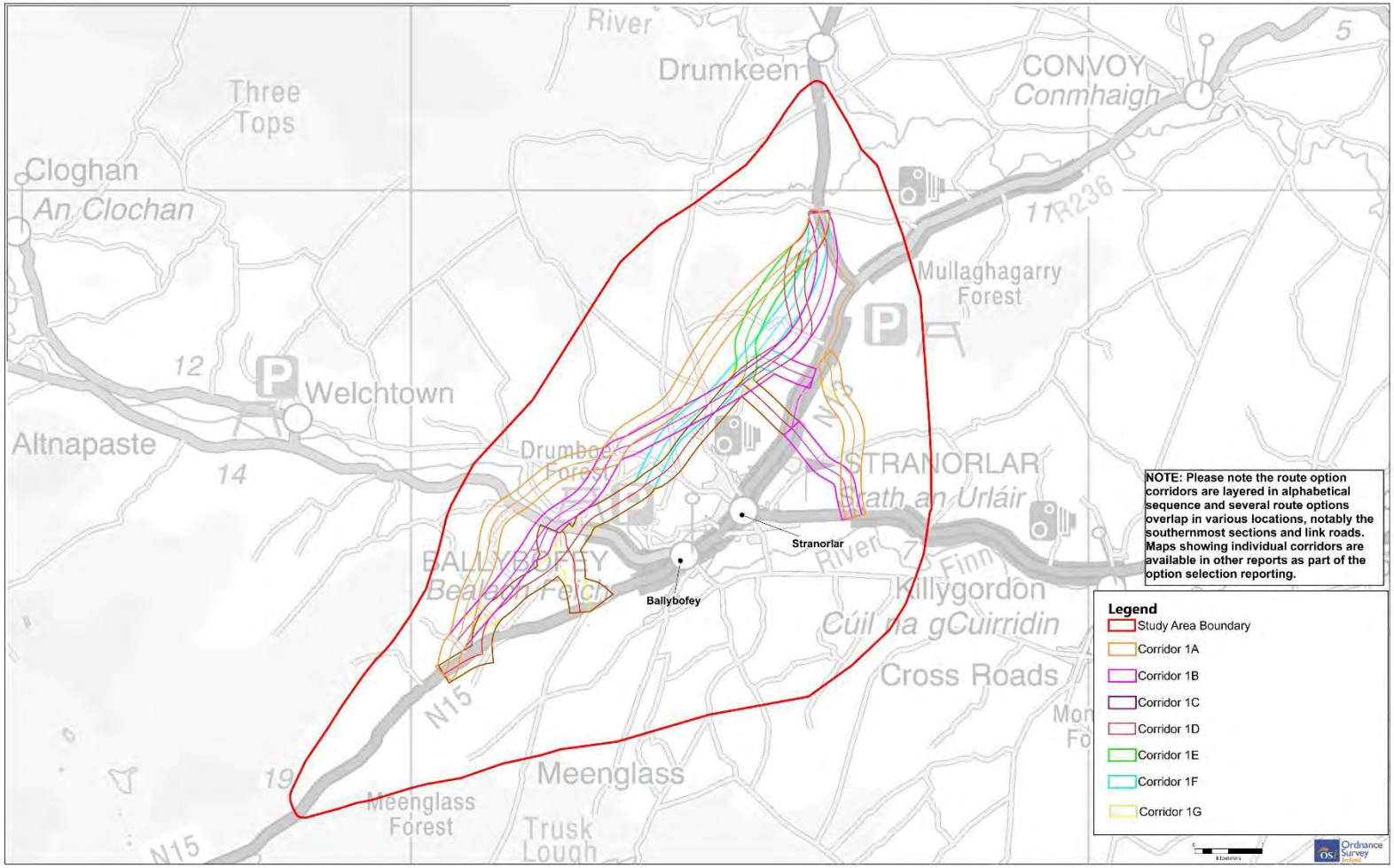
The study area covers an area of approximately 321ha and extends from the townland of Teevickmoy approximately 4.6km north of Stranorlar, to the townland of Kilcroghery, located approximately 3.75km to the south-west of Ballybofey.

The study area contains 13 no. options, including Options 1A and 1A1, Options 1B and 1B1, Options 1C and 1C1, Options 1D and 1D1, Options 1E and 1E1, Options 1F and 1F1 and Option 1G (see **Figure 1-1** and **Figure 1-2**).

The Zone of Influence (ZoI) for the biodiversity constraints assessment considered the project's requirements and deliverables against the biodiversity receptors within the project footprint, in addition to all ecological receptors that could be connected to and subsequently impacted by the project through abiotic and biotic vectors. A buffer zone of 15km is typically taken as the initial ZoI extending beyond the reach of the footprint of the study area, as per guidance (DoEHLG, 2010). However, there may be scientifically appropriate reasons for extending this ZoI further afield depending on the pathway of potential impacts.

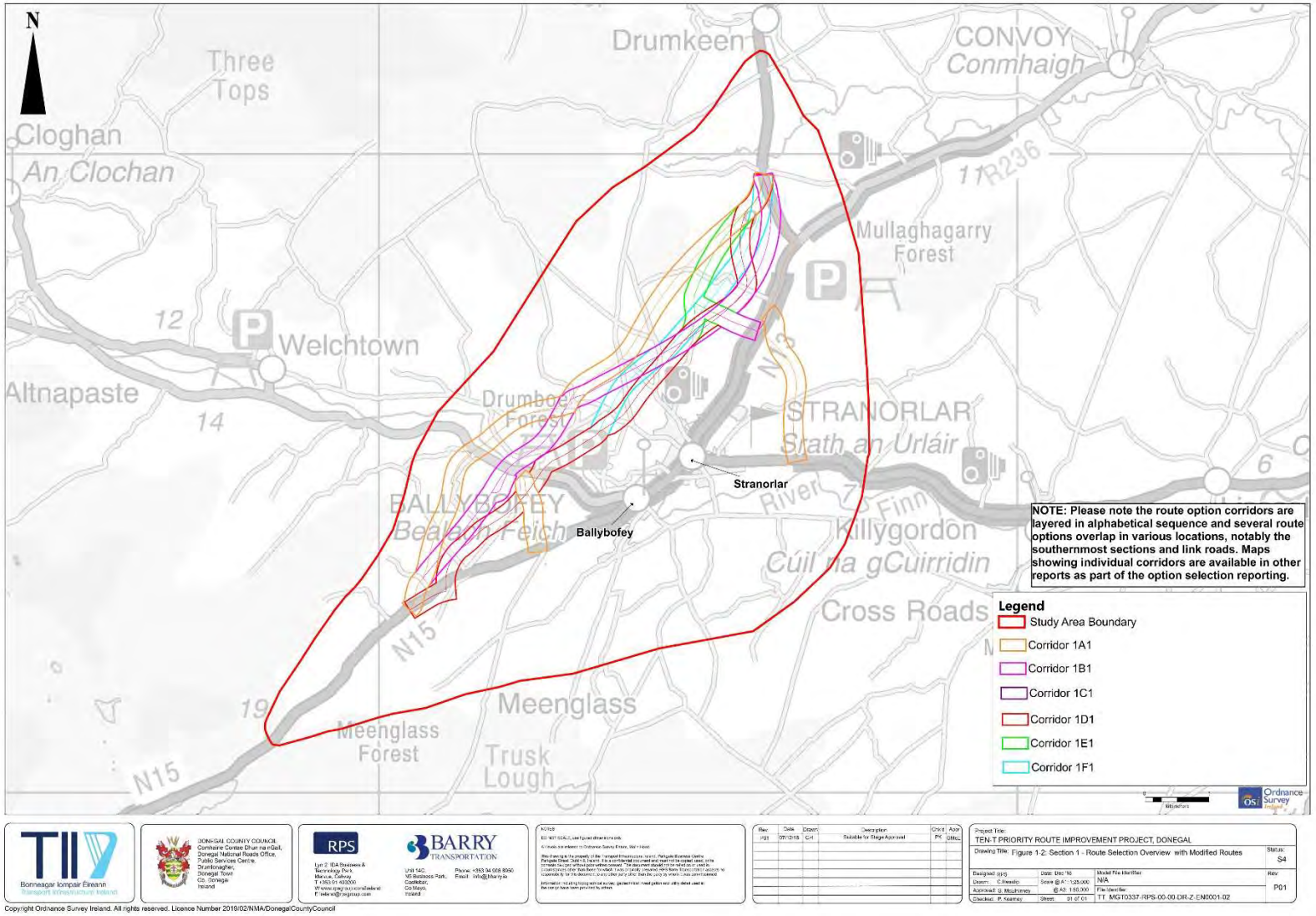
To this end, the ZoI extends outside of the study area to include ERs connected to the project through overlap / intersection, proximity and connectivity through features such as watercourses and waterbodies in addition to potential connectivity via groundwater sources and features and migratory/commuting pathways of fauna. Therefore, in delineating the ZoI, the 15km buffer zone from the study area boundary and the Lough Foyle catchment boundary were combined to form the ZoI. The ZoI mapping is provided in the **OSR, Volume B, Constraints Study, Figure 6.1** and **Figure 6.2**.

[2] Colhoun, K. & Cummins, S. (2013) Birds of Conservation Concern in Ireland 2014-2019, Irish Birds, 9, pp. 523-544.



Copyright Ordnance Survey Ireland. All rights reserved. Licence Number 2019/02/NMA/DonegalCountyCouncil

Figure 1-1: Option Selection Overview



Copyright Ordnance Survey Ireland. All rights reserved. Licence Number 2019/02/NMA/Donegal/CountyCouncil

Figure 1-2: Option Selection Overview with Modified Options

1.2.1 Assessment Criteria

The criteria for site evaluation are outlined below and sourced from the NRA Guidelines 2009. This guidance document defines Ecological Receptors (ERs) as *sites, habitats, features, assemblages, species or individuals that occur in the vicinity of a project and upon which impacts are possible*. These receptors are then weighted for their level of importance on a geographical scale as set out within the guidance document and as presented in **Table 1.1** below. All ERs within the project's ZoI were assessed according to the criteria in **Table 1.1** below for site evaluation. The geographic frame of reference used to determine the ecological value of receptors as they occur within the project ZoI are presented in **Table 1.1**.

Table 1.1: Ecological Site Evaluation Scheme

Ecological Valuation
International Importance: ▪ 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. ▪ Proposed Special Protection Area (pSPA). ▪ Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). ▪ Features essential to maintaining the coherence of the Natura 2000 Network. ▪ Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. ▪ Resident or regularly occurring populations (assessed to be important at the national level) of the following: – Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or – Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. ▪ Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). ▪ World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). ▪ Biosphere Reserve (UNESCO Man & the Biosphere Programme). ▪ Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). ▪ Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). ▪ Biogenetic Reserve under the Council of Europe. ▪ European Diploma Site under the Council of Europe. ▪ Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).
National Importance: ▪ Site designated or proposed as a Natural Heritage Area (NHA). ▪ Statutory Nature Reserve. ▪ Refuge for Fauna and Flora protected under the Wildlife Acts. ▪ National Park. ▪ Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park. ▪ Resident or regularly occurring populations (assessed to be important at the national level) of ▪ the following: – Species protected under the Wildlife Acts; and/or – Species listed on the relevant Red Data list. ▪ Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.

Ecological Valuation
County Importance: ▪ Area of Special Amenity. ▪ Area subject to a Tree Preservation Order. ▪ Area of High Amenity, or equivalent, designated under the County Development Plan. ▪ Resident or regularly occurring populations (assessed to be important at the County level) of the following: – Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; – Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; – Species protected under the Wildlife Acts; and/or – Species listed on the relevant Red Data list. ▪ Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance. ▪ County important populations of species or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, if this has been prepared. ▪ Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county. ▪ Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Local Importance (higher value): ▪ Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; ▪ Resident or regularly occurring populations (assessed to be important at the Local level) of the following: – Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; – Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; – Species protected under the Wildlife Acts; and/or – Species listed on the relevant Red Data list. ▪ Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; ▪ Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local Importance (lower value): ▪ Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; ▪ Sites or features containing non-native species that are of some importance in maintaining habitat links.

An evaluation category has been assigned to each of the ecological evaluations in **Table 1.1,** as shown in **Table 1.2** below**.**

Table 1.2: Ecological Receptor Evaluations and Scoring

Ecological Evaluation	Ecological Category
International Importance	A
National Importance	B
County Importance	C
Local Importance (higher value)	D
Local Importance (lower value)	E

The impact significance associated with an option on an Ecological Receptor was quantified using the Impact Scoring Key presented in the *Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria*

Analysis (TII, 2016)[3]. The Impact Scoring Key is displayed in **Table 1.3**. Impacts were quantified using a combination by determining the importance of the Ecological Receptor and the extent and duration of the likely impact on that site. The rationale for assigning impact significance to each receptor is presented in **Appendix 2**.

Table 1.3: Impact Scoring Key (TII, 2016)

7	Major or Highly Positive
6	Moderately Positive
5	Minor or Slightly Positive
4	Not Significant or Neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or Highly negative

[3] http://www.tiipublications.ie/library/PE-PAG-02031-01.pdf

2 EXISTING ENVIRONMENT

2.1 Desk Study

A review of aerial photography was undertaken, and a high-level desk based assessment of the habitats within each option was carried out in advance of multi-disciplinary field surveys being conducted. Desk based habitat mapping of areas within the overall study area boundary were carried out between 11th – 22nd December 2017, 2nd – 31st January 2018 and 1st – 28th February 2018. These surveys provided a baseline assessment and informed survey methodology and surveys effort required for the site walkover / field surveys.

The habitats found in the study area, are classified in accordance with the guidelines set out in *'A Guide to Habitats in Ireland*' (Fossitt, 2000), which classifies habitats based on the vegetation present and management history. The classification is a standard system for identifying, describing and classifying wildlife habitats in Ireland. The classification is hierarchical and operates at three levels, outlining the correlation between its habitat categories and the phytosociological units (plant communities) of botanical classifications.

Due to the proximity of European sites, the habitats identified were also considered in terms of their links to Annex I habitats as per the *Interpretation Manual of European Union Habitats – EUR28*[4] and *The Status of EU Protected Habitats and Species in Ireland Volume 2*[5]. The 'Interpretation Manual' is a scientific reference document published by the European Commission for the interpretation of Priority and Non-Priority Annex I habitat types of the Habitats Directive. '*The Status of EU Protected Habitats and Species in Ireland*' provides up-to-date details on the status of listed habitats and species and provides refined lists of typical species for the habitat in an Irish context. In addition the relevant published and unpublished NPWS Irish Wildlife Manuals for National Survey and Conservation Assessment Guidelines for woodlands, grasslands and upland habitats were also consulted regarding the classification of habitats and vegetation communities.

Surveys were also conducted for over-wintering birds on 22nd October, 20th November, 11th December 2018, 30th January, 28th February and 27th March 2019. Winter mammal surveys were also conducted on these dates for badger. Targeted mammal surveys for otter along the River Finn were carried out on 24th January and 25th September 2018. Invasive species surveys along the River Finn were carried out on 22nd August, 04th September and 25th September 2018. On 3rd October 2018, woodland relevés[6] were carried out along the riparian woodland present along the banks of the River Finn where potential crossing options are situated. Freshwater aquatic ecology surveys were conducted from 10th – 13th August 2018.

2.1.1 Habitats

The northern half of the Section 1 study area is comprised of improved agricultural grassland, with intermittent areas of wet grassland. Scattered patches of broadleaved woodland are located throughout with areas of conifer woodland. The Cloghroe River flows through the north of the study area and is a tributary of the River Deele. The River Deele flows into the River Foyle two kilometres downstream of the Lifford

[4] http://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf
[5] https://www.npws.ie/article-17-reports-0/article-17-reports-2013
[6] Surveys carried out in accordance with methods set out in the National Survey of Native Woodlands 2003 – 2008 (Perrin et.al) (https://www.npws.ie/sites/default/files/publications/pdf/Perrin_et_al_2008_NSNW_V1.pdf)

Bridge. The Deele and its tributaries are traditionally known as excellent sea trout rivers from June onwards, and get a reasonably good run of summer salmon from early July.

The River Finn flows through Stranorlar and Ballybofey and flows through the study area in a west to east direction. It is designated under the River Finn SAC (Site Code: 002301). The qualifying interests on the River Finn SAC are provided in **Table 2.1** below.

Table 2.1: River Finn SAC Qualifying Interests

Site Code	Site Name	Qualifying Interests Habitats and Species (*=Priority Habitats)
002301	River Finn SAC	**Habitats** Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110][7] Northern Atlantic wet heaths with *Erica tetralix* [4010] Blanket bogs (* if active bog) [7130] Transition mires and quaking bogs [7140] **Species** *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355]

The River Finn and its' tributary, the Reelin River, further west of the study area are noted for being the most prolific salmon and grilse rivers in Donegal and the Foyle catchment[8]. Salmon is an Annex II species and is a qualifying interest of the River Finn SAC. The River Finn is known as a spring salmon river and the grilse arrive in late June and July. The River Finn floodplain and margins support improved grassland, wet grassland, riparian woodland, planted broadleaved woodland and made ground where it passes through the study area.

Otter is a qualifying interest of the River Finn SAC and may be found throughout the watercourses within the study area. Otters are largely solitary, territorial and nocturnal animals and in many areas their distribution is scarce. They are rarely found far from water and tend to occupy linear home ranges along watercourses and coasts. In general, however, otters exploit a narrow strip of habitat at the aquatic – terrestrial interface (O'Neill, 2008). The extent of otter habitat in Ireland has been estimated on the basis of four classes of water bodies: rivers, streams, lakes and coast (high water mark). In addition to the aquatic habitat, a 10m riparian buffer (both banks) is considered to comprise part of the otter habitat as discussed in the Threat Response Plan for otter prepared by the National Parks and Wildlife Service (NPWS, 2009). Therefore, watercourses and their riparian zone connected to the River Finn within the study area are considered to provide potential habitat for otter.

Lough Alaan is a small lake located north of Stranorlar and supports a good population of brown trout (*Salmo trutta*). Its outflowing stream meets the River Finn north of Ballybofey Bridge.

Significant areas of broadleaved woodland can be found at Drumboe and Dunwiley. To the south of Ballybofey, the N15 traverses through an area supporting heath, blanket bog and conifer plantations in the

[7] Habitat/Species codes relate to the unique identifier reference code as per the Interpretation Manual of European Union Habitats – EUR28 (European Commission, 2013) for species and habitats listed under the EU Habitats Directive. http://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf

[8] http://www.fishinginireland.info/salmon/loughs/finn.htm

region of Lough Mourne. Throughout the study area, the agricultural fields support hedgerow, treeline and stonewall boundaries.

The full list of habitat types classified using (Fossitt, 2000) likely to be present within the study area, discerned from aerial photography and field surveys are listed in the **OSR Volume B, Constraints Study Appendix A.**

2.1.2 Designated Sites of Conservation Importance

The site synopses, produced by NPWS, are a source of information used when investigating important habitats or species likely to be found within areas that have been officially designated because of their conservation importance.

The main types of designation are:

- Special Area of Conservation (SAC)[9];
- Special Protection Area (SPA);
- Natural Heritage Area (NHA); and
- Proposed Natural Heritage Area (pNHA).

In Ireland, the Natura 2000 network of European sites comprises Special Areas of Conservation (SACs, including candidate SACs), and Special Protection Areas (SPAs, including proposed SPAs). SACs are selected for conservation under the Habitats Directive 92/43/EEC and include habitats listed on Annex I (including priority types which are in danger of disappearance) and Annex II listed species. SPAs are selected for the conservation under the EU Birds Directive protecting birds listed on Annex I and other regularly occurring migratory birds and their habitats. The EU Habitats Directive and EU Birds Directive are both transposed into Irish Law through the European Communities (Birds and Natural Habitats) Regulations 2011 (Statutory Instrument No. 477/2011 (2011, as amended)).

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) comprise of nationally protected sites. NHAs are protected under the Wildlife Amendment Act 2000 (as amended), many of which overlap with European Sites. The pNHAs were published on a non-statutory basis in 1995, but have not since been statutorily proposed or designated, however they do have some protection under schemes such as Rural Environment Protection Scheme (REPS), Agri-Environmental Options Scheme (AEOS) and County Development Plans.

Section 1 is situated within the Foyle Water Framework Directive (WFD) Catchment area, with many of the watercourses designated as European sites. Therefore, due cognisance of the WFD requirements regarding water quality is included in this assessment and is considered in greater detail in the **OSR Volume D, Appendix 1.5 Aquatic Biodiversity**.

There are a total of 16 European sites within the ZoI of Section 1. They are as follows:

1) Cloghernagore Bog and Glenveagh National Park SAC (Site Code:002047);
2) Lough Eske and Ardnamona Wood SAC (Site Code:0022047);
3) Meentygrannagh Bog SAC (Site Code: 000173);
4) River Finn SAC (Site Code: 002301);
5) Dunragh Loughs/ Pettigo Plateau SAC (Site Code: 001125);

[9] Some SAC sites are present within the 15km buffer zones are located within Northern Ireland and fall within the jurisdiction of the Northern Ireland Environment Agency (NIEA). The SAC sites in the Republic of Ireland are under the jurisdiction of the NPWS

6) Croaghonagh Bog SAC (Site Code: 000129);
7) Leennan River SAC (Site Code: 002176);
8) Lough Swilly SAC (Site Code: 002287);
9) Meenaguse Scragh Bog SAC (Site Code: 001880);
10) Meenaguse /Ardbane Bog SAC (Site Code: 000172;
11) River Foyle and Tributaries NI SAC (Site Code: UK0030320);
12) Moneygal Bog NI SAC (Site Code: UK0030211);
13) Pettigo Plateau Nature Reserve SPA (Site Code: 004099);
14) Lough Derg (Donegal) SPA (Site Code: 004057);
15) Lough Swilly SPA (Site Code: 004075); and
16) Derryveagh and Glenadown Mountains SPA (Site Code: 004039).

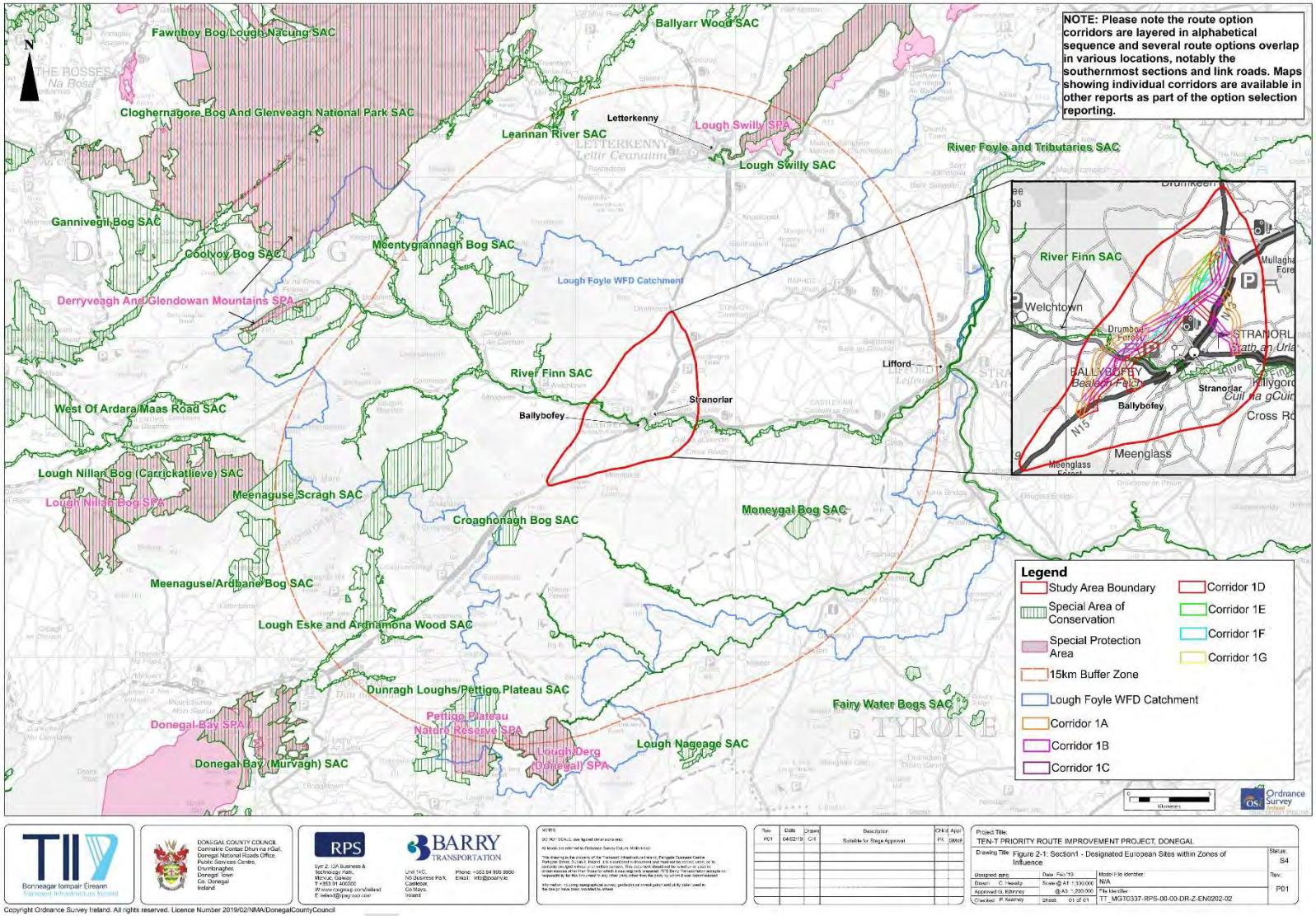
There are 4 nationally designated NHA and 18 pNHA sites within the ZoI of the study area of Section 1:

1) Cashelnavean Bog NHA (Site Code: 000122);
2) Meenagarranroe Bog NHA (Site Code: 0002437);
3) Barnesmore Bog NHA (Site Code: 002375);
4) Lough Hill Bog NHA (Site Code: 002452);
5) Croaghonagh Bog pNHA (Site Code: 000129);
6) Port Lough pNHA (Site Code:000180);
7) Lough Derg (Donegal) pNHA (Site Code: 000162);
8) Lough Eske and Ardnamona Wood pNHA (Site Code:000163);
9) Lough Swilly Including Big Isle, Blanket Nook & Inch Lake pNHA (Site Code: 000166);
10) Meenaguse/Ardbane Bog pNHA (Site Code: 000172);
11) Meentygrannagh Bog pNHA (Site Code: 000173);
12) Dunragh Loughs/Pettigo Plateau pNHA (Site Code: 001125);
13) Feddyglass Woods pNHA (Site Code:001129);
14) Leannan Valley Woods pNHA (Site Code:001155);
15) Lough Finn pNHA (Site Code: 001163);
16) Tullytrasna Bog pNHA (Site Code: 001870);
17) Meenaguse Scragh pNHA (Site Code: 001880);
18) River Foyle pNHA (Site Code:001129);
19) River Swilly Valley Woods pNHA (Site Code:002011);
20) River Foyle, Mongavlin to Carrigans pNHA (Site Code: 002067);
21) Owendoo and Cloghervaddy Bogs pNHA (Site Code: 002046); and
22) Cloghernagore and Glenveagh National Park pNHA (Site Code: 002047).

Details of the key features of conservation importance for these sites are provided in the **OSR Volume B, Constraints Study, Appendix A**. Details of the Qualifying Interests, their distance from the study area and potential connectivity of each designated site within the ZoI are outlined. The listed sites of European and National Importance are displayed in **Figure 2-1** to **Figure 2-4** below.

The proposed 13 options intersect the River Finn SAC (Site Code: 002301) at various points west of Ballybofey/Stranorlar. No other designated European site is intersected by the proposed options. The River Finn SAC is designated for six qualifying features as follows:

- Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110];
- Northern Atlantic wet heaths with *Erica tetralix* [4010];
- Blanket bogs (* if active bog) [7130];
- Transition mires and quaking bogs [7140];
- Salmon (*Salmo salar*) [1106]; and
- Otter (*Lutra lutra*) [1355].



Copyright Ordnance Survey Ireland. All rights reserved. Licence Number 2019/02/NMA/DonegalCountyCouncil

Figure 2-1: Designated European Sites within Zones of Influence

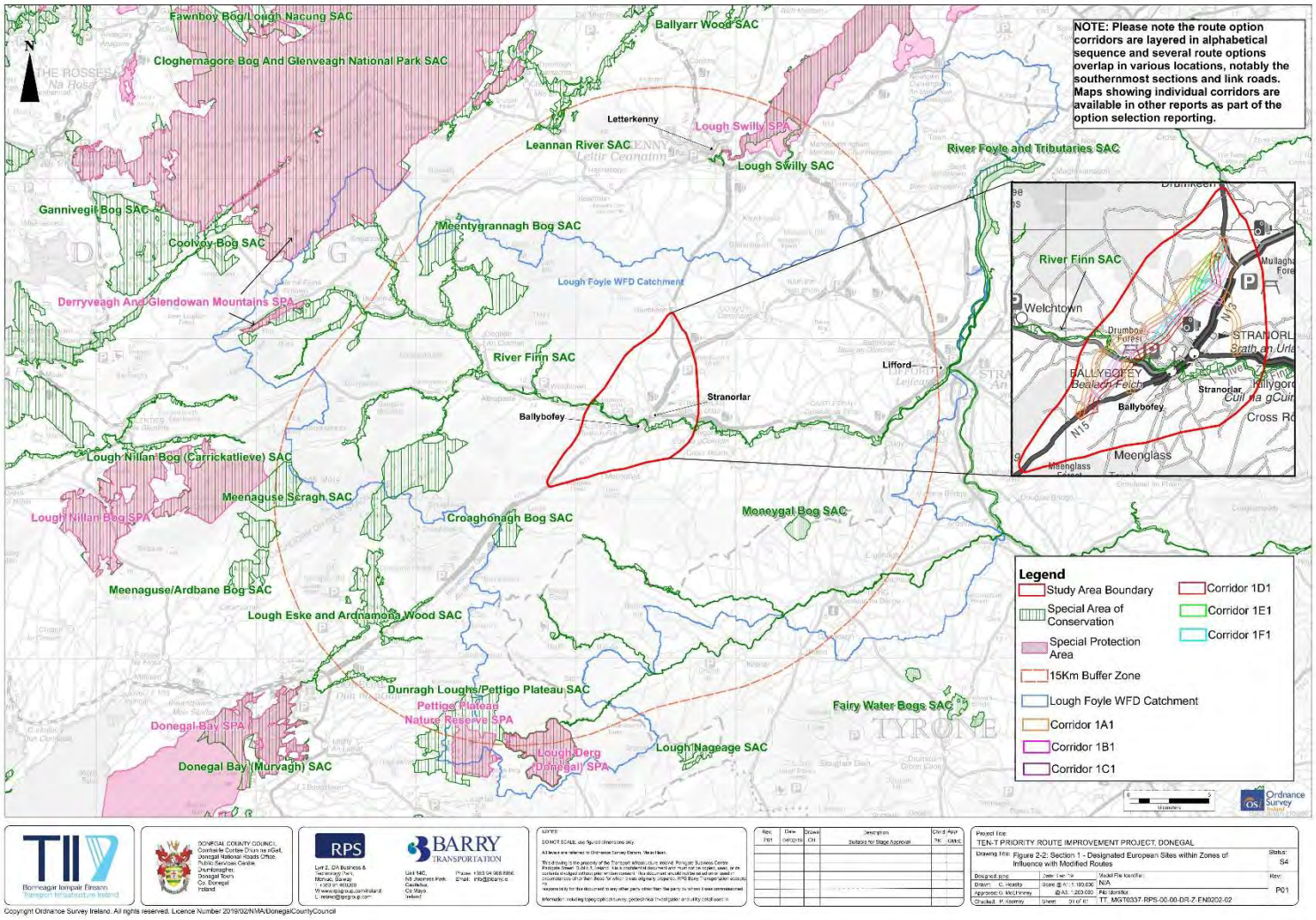


Figure 2-2: Designated European Sites within Zones of Influence with Modified Options

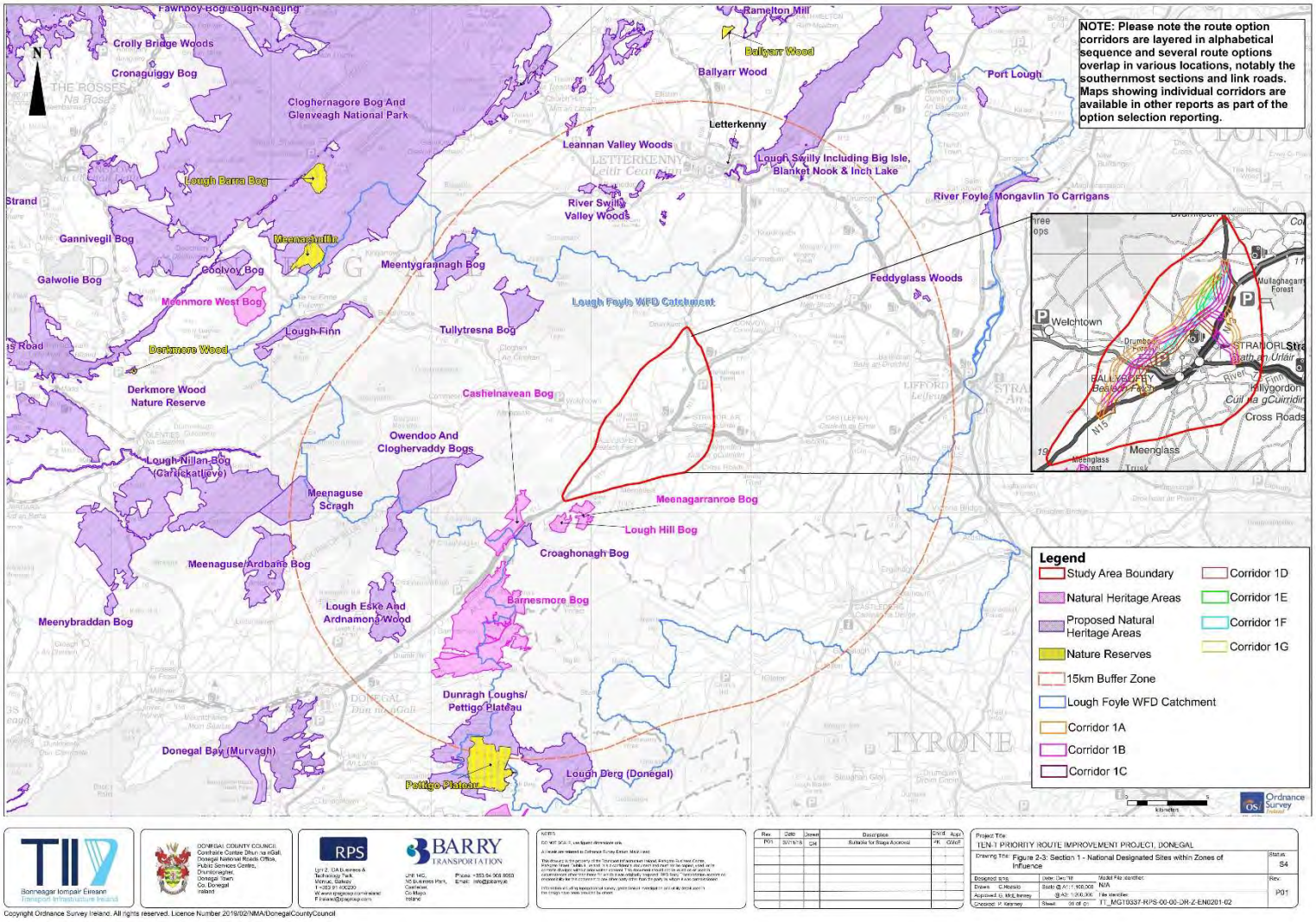


Figure 2-3: National Designated Sites within Zones of Influence

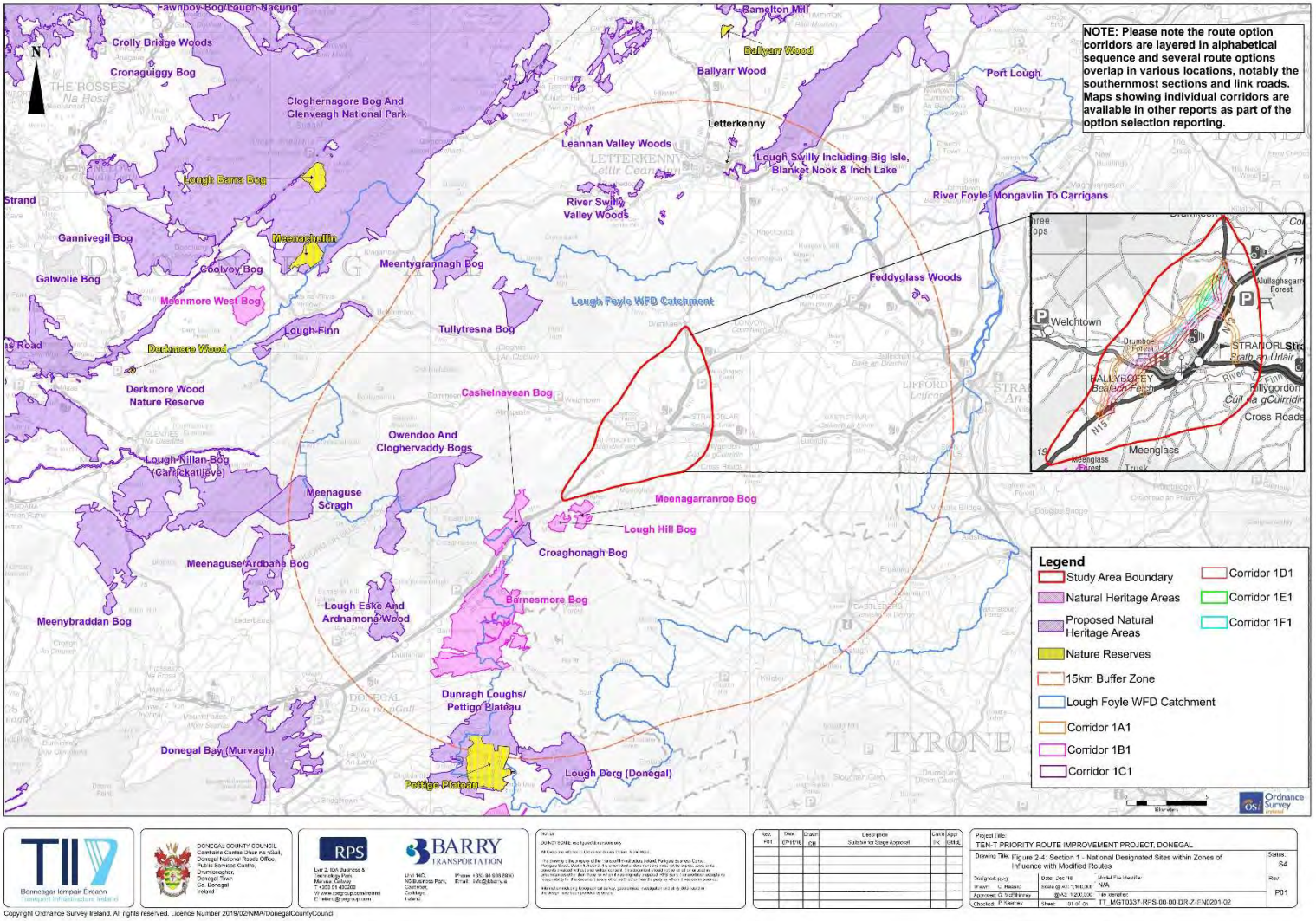


Figure 2-4: National Designated Sites within Zones of Influence with Modified Options

2.1.3 Flora Atlas

The principal source of information regarding the distribution of flora in Ireland is the New Atlas of the British and Irish Flora (Preston *et al*., 2002). The data included in this atlas is from the 1987-1999 atlas survey. This atlas shows data for vascular plants in individual hectads (10km^2 squares). The hectads relevant to the study area include hectads C10, H19 and H09. The hectads were searched for any rare or protected species which may be recorded in the square during the 1987-1999 atlas survey (and previous surveys) carried out by the Botanical Society of the British Isles (BSBI). The search included the vascular plants listed in Annex II of the EU Habitats Directive, Flora Protection Order (FPO) of 2015 and the Irish Red Data Book (IRDB). The searches also included The BSBI Distribution Database[10], and the National Biodiversity Data Centre database[11].The results of the data search are detailed in the **OSR Volume B, Constraints Study, in Appendix 2, Table A2.1**. The protected species recorded within the boundaries of the Section 1 study area include shining flapwort (*Jungermannia paroica*), pale bog-moss (*Sphagnum strictum*), Irish lady's-tresses (*Spiranthes romanzoffiana*), bird cherry (*Prunus padus*), acute sedge (*Carex acuta*), globe flower (*Trollis europaeus*), large flowered hemp nettle (*Galeopsis speciosa*), Irish whitebeam (*Sorbus hibernica*), reindeer moss (*Cladonia portentosa*), reindeer lichen (*Cladonia arbuscula*), and Drummond's Pincushion (*Ulota drummondii*).

2.1.4 Rare and Protected Species Databases

The NPWS rare and protected species database was consulted for all records of rare and protected species within the study area. In addition, as the NPWS rare and protected species records are known to be incomplete, the National Biodiversity Data Centre online species database (www.biodiversityireland.ie) was also consulted. A species list was generated for each hectad within the study area and all species which are provided protection under Irish or EU law were noted. Records for rare and protected species which occur within these hectads are presented in the **OSR, Volume B, Constraints Study, Appendix 2 Tables A2.4** and **Table A2.7**. Some of the rare and protected mammal, reptile and aquatic species, found within the study area include common frog (*Rana temporaria*), Marsh Fritillary (*Euphydryas aurinia*), three deer spp., Irish Hare (*Lepus timidus subsp. Hibernicus*), Otter (*Lutra lutra*), Pine Marten *(Martes martes),* Badger *(Meles meles),* Irish Stoat *(Mustela erminea subsp. Hibernica),* red squirrel (*Sciurus vulgaris*) and seven bat species, all of these species are listed under Schedule 5 of the Wildlife Act 1976 (as amended). Bird species listed under Annex I of the Birds Directive found within the study are include Kingfisher (*Alcedo atthis*), Corncrake (*Crex crex*), Whooper Swan (*Cygnus cygnus*), Dunlin (*Calidris alpina*), Hen Harrier (*Circus cyaneus*), Peregrine Falcon (*Falco peregrinus*), Golden Plover (*Pluvialis apricaria*), Merlin (*Falco columbarius*). In addition, barn owl (*Tyto alba*), a Red-listed Bird of Conservation Concern in Ireland[12], has been recorded within the study area. Barn owls are the most common raptor recorded as road casualty. This species may be impacted by the development of national road schemes through the loss of nesting sites and displacement of nesting pairs, and through direct mortality due to vehicle collisions during the operational phase of road networks (TII, 2017)[13].

[10] https://database.bsbi.org/
[11] https://maps.biodiversityireland.ie/Map
[12] Protection status following criteria set out in Birds of Conservation Concern in Ireland 2014 - 2019 (Colhoun & Cummins, 2013) - Red-listed species are those of highest conservation priority
[13] Barn Owl Surveying Standards for National Road Projects, RE-ENV-07005 (TII, 2017)

Table 2.2: Ecological Receptor (ER) Description and Category Evaluation Rating

ER Site No.	Habitat Description	Category	Rating Rationale
1	River Finn Special Area of Conservation (SAC). This traverses directly across the full width of the study area.	A	**SACs** are European sites, therefore this site is afforded the International Importance valuation in accordance with the NRA Guidelines, 2009. The footprint area (km^2) of each option that intersects the SAC is presented as follows: ▪ Orange 1A = 0.023km^2 ▪ Orange 1A1 = 0.023km^2 ▪ Pink 1B = 0.031km^2 ▪ Pink 1B1 = 0.031km^2 ▪ Purple 1C = 0.031km^2 ▪ Purple 1C1 = 0.031km^2 ▪ Red 1D = 0.018km^2 ▪ Red 1D1 = 0.016km^2 ▪ Green 1E = 0.018km^2 ▪ Green 1E1 = 0.016km^2 ▪ Blue 1F = 0.018km^2 ▪ Blue 1F1 = 0.016km^2 ▪ Yellow 1G = 0.017km^2
2	Otter (*Lutra lutra*) (Qualifying Interest of the River Finn SAC) range within the River Finn and also extends to the tributaries of the River Finn and the within the study area also.	A	This species is listed as a **QI for the River Finn SAC** and is an Annex II and Annex IV species under the Habitats Directive, and therefore Otter are assigned the **International Importance** valuation in accordance with the NRA Guidelines, 2009.
3	Conifer plantation (WD4) providing refuge for wildlife. Buzzard (x1) recorded soaring over the trees.	E	The habitat offers a refuge/corridor service to the mobile species within the landscape and therefore satisfies the **"Sites containing small areas of semi-natural habitat that are of some local importance for wildlife"** valuation criteria in NRA Guidelines 2009, warranting an "E" category for the ER.
4	Conifer woodland with moderately dense scrub (WS1) and wet grassland (GS4) habitat associated with the boundaries of the woodland. This is part of several smaller plantations in the area providing refuge potential for wildlife in a predominantly open/agricultural landscape.	E	The habitat offers a refuge/corridor service to the mobile species within the landscape and therefore satisfies the **"Sites containing small areas of semi-natural habitat that are of some local importance for wildlife"** valuation criteria in NRA Guidelines 2009, warranting an "E" category for the ER.
5	(Mixed) Conifer woodland (WD3) with small broadleaf element within it providing a refuge feature for wildlife as part of the clusters of conifers (ER3 & ER4).	E	The habitat offers a refuge/corridor service to the mobile species within the landscape and therefore satisfies the **"Sites containing small areas of semi-natural habitat that are of some local importance for Wildlife"** valuation criteria in NRA Guidelines 2009, warranting an "E" category for the ER.
6	2no. riparian woodland (WN5) associated with the River Finn. These are some of the few semi-natural habitats present within the study area. The habitats are drier than ER 7 and have scrub encroachment occurring, which lowers the biodiversity value of the habitats.	D	Both are classified as WN5 habitat under Fossitt (2000) classification system, they are relatively drier and of lower biodiversity than other WN5 habitats in proximity. Though the fact that there are limited instances of semi-natural habitats, particularly wet habitats, it is of value to the area. The woodlands are of a lower category than ER7 due to their size and species composition. They are most suited to the **"Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or**

ER Site No.	Habitat Description	Category	Rating Rationale
			populations of species that are uncommon in the locality" description in the NRA Guidelines 2009, affording it a "D" category.
7	Large linear riparian woodland (WN5) is located on the banks of the River Finn and is located partially within the SAC boundary. This semi-natural woodland habitat may also provide suitable commuting and potential holt/couching habitat for otter.	C	This woodland is approximately 0.02km^2 in area and comprises a large, albeit narrow and linear woodland along the River Finn. It is partially within the boundaries of the River Finn SAC and offers ecosystem services to Otter (a QI of the SAC). Though not corresponding with Annex I wet woodland habitat criteria, it is one of the few larger, **semi-natural woodland habitats** in the study area with a higher level of naturalness than most. Therefore, it is afforded a "C"-level category as per the NRA Guidelines 2009.
8	4no. small stands of conifer plantation providing a corridor link between the River Finn and its associated riparian habitats to the Troopers Hill woods area for Wildlife Act 1976 (as amended) species.	E	These stands of conifers are very mature but have little biodiversity value as a habitat; this is due to poor flora species diversity. However, in the wider landscape, they do provide a corridor between the riparian zones along the River Finn SAC to the Troopers Hill woods and surrounding landscape. Therefore, satisfying the "**Sites or features containing non-native species that are of some importance in maintaining habitat links"** as per the NRA Guidelines 2009, warranting an "E" category for the ER.
9	Troopers Hill Woods and amenity trails.	D	Given the dominant planted conifer species present, the woodland does not support a wide diversity of flora species. There are areas, particularly along the path edges that have been planted with broadleaf species, comprising mainly of Beech (*Fagus sylvatica*). The woodland itself is more of interest with regards to providing a refuge/corridor service for species. The conifer woodland has been assigned a "D" category on this basis. In, addition, there was a sighting of the Red Squirrel (*Sciurus vulgaris*) (protected species under the Wildlife Act 1976 (as amended) see ER24A) and Grey Squirrel (*Sciurus carolinensis*) during site walkover surveys. In summary, both large plots of woodland are of low botanical diversity but provide valuable refuge/corridor habitat for protected species in the wider landscape. Though a protected species was recorded in the woodland, it cannot be determined it the habitat hosts 1% of the local population. However, cognisance is given to the presence of red squirrel in the impacts assessment. Given the lack of census data available to establish resident populations of protected species, the species signs are assigned a "B" category and addressed within their own ER. Following the NRA Guidelines 2009, the site most satisfies the "**Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value**", affording a "D" category to be assigned to the ER.
10	Mixed broadleaf conifer woodland (WD2) (Holy Well Woods) with good specimens of mature oak (*Quercus* spp.) trees (3no.) and evidence of protected species present through observed squirrel feeding signs.	D	The woodland does not support a wide diversity of ground flora to qualify for a County Importance category, as it is comprised of large stands of bramble (*Rubus fruticosus*) or exposed/bare ground layer component within its broadleaf areas and little to none ground flora in the conifer plantation patches. There are some mature tree species of value in the woodland (oaks) and some indicative signs of squirrel (species not confirmed) feeding which most correspond to the criteria within the NRA Guidelines 2009 for "**Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality**", affording a "D" category to be assigned to the ER.
11	Scrub-dominated woodland with potential to act as a commuting corridor for protected species in the area.	E	This is an isolated patch of habitat on an elevated area of ground in the topographic landscape. There is little biodiversity within it with rocky outcrops and a sparse gorse (*Ulex*

ER Site No.	Habitat Description	Category	Rating Rationale
			europaeus) and bramble-dominated understorey. Canopy height is less than 8m comprised of a mix of hazel (*Corylus avellana*), alder (*Alnus glutinosa*), ash with some sycamore (*Acer pseudoplatanus*) and silver birch (*Betula pendula*) present in the middle of the habitat. There are few linear treeline features extending from the site providing species-corridor potential. On the basis of the habitat providing refuge and corridor services, it satisfies the NRA Guidelines 2009 for **"Sites containing small areas of semi-natural habitat that are of some local importance for wildlife"** to receive an "E" category.
12	Horticultural lands (BC2) which have the potential for sustaining pollinator species in the area.	E	The area is of very low biodiversity value with regards to semi-natural habitats. However, it does offer good potential to host pollinator species, in addition to providing a valuable **corridor/habitat link** for volant and non-volant species in the landscape. This indicates the area falls within the category of an "E" category due to it satisfying the NRA Guidelines 2009 criteria of **"Sites or features containing non-native species that are of some importance in maintaining habitat links"**.
13	Oak-birch-holly woodland (WN1) semi-natural woodland habitat.	C	This is a large WN1 woodland within a landscape region hosting few and sparsely distributed semi-natural habitats. Given the lack of semi-natural habitats, particularly woodlands, in the area the habitat is assigned a "C" category as it satisfies the NRA Guidelines 2009 for **"Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county"**.
14	Hazel (*Corylus avellana*) dominated scrub with evidence of small-scale coppicing associated with Lough Alaan. Providing a refuge location for protected species and waterfowl associated with Lough Alaan.	E	This is an area of scrub woodland that was retained within a grouping of one-off residential houses. The habitat indicates that the hazel species within the habitat have historically been coppiced. The ground layer is ivy-dominated and there is a small stream/drain feeding into Lough Alaan. Overall the habitat is of low ecological value. It does correspond to the **"Sites containing small areas of semi-natural habitat that are of some local importance for wildlife"** as per the NRA Guidelines 2009 for a category of "E", due it's potential as a refuge and corridor feature for the species associated with Lough Alaan.
15	Dunwiley Ring Fort (BC1) which has overgrown tree-species and scrub habitat associated with it that may host an inactive badger sett and potential to provide ecosystem service to protected species in the area.	E	This is an elevated feature that has become overgrown by a scrub-dominated habitat. This scrub-type feature offers potential as a refuge for wildlife in an agriculturally dominated landscape. One burrow or inactive mammal entrance was observed though it was determined that no badger (*Meles meles*) or WA species was actively using it, though may have been utilised historically. On this basis, the feature satisfies the NRA Guidelines 2009 for an "E" category regarding criteria for **"Sites containing small areas of semi-natural habitat that are of some local importance for wildlife"**.
16	Horticultural lands (BC2) that are hosting nesting Barn Swallows (*Hirundo rustica*), good habitat for pollinator species and also connected to a larger area to the north offering protected species commuting corridor potential.	E	The area is of very low biodiversity value. However, it does offer a good hosting potential for pollinator species, in addition it is a valuable **corridor/habitat link** for volant and non-volant species in the landscape. This indicates the area falls within the category of an "E" category due to it satisfying the NRA Guidelines 2009 criteria of **"Sites or features containing non-native species that are of some importance in maintaining habitat links"**.

ER Site No.	Habitat Description	Category	Rating Rationale
17	A large valley-glen type habitat hosting a mosaic of habitats. The habitat mosaic is comprised of Scrub/Wet willow-alder-ash woodland/Wet grassland/Wet Heath/Conifer woodland (WS1/WN6/GS4/HH3/WD4) within a natural dip in the landscape topography. This topography is naturally draining the elevated areas and feeding the wet habitats at the base. This area is of high value as a nesting site, with breeding Buzzard (*Buteo buteo*) were confirmed and commuting corridor feature for various protected species. It also offers a clear connection to a large expansive (Mixed) Conifer woodland in the Teevickmoy townland to the north.	D	This ER is comprised of a variety of habitats suited for providing shelter/refuge and for maintaining habitat links to the surrounding environment. It offers the greatest corridor opportunity in the study area for volant and non-volant species to access the wider landscape. Given the presence of such an expansive mosaic of semi-natural habitats, the confirmed breeding bird activity and high likelihood of hosting more breeding activity, this feature is most suited to satisfy the "D" category criteria as per the NRA Guidelines 2009 regarding **"Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality"**.
18	This is a planted, though now semi-naturalised broadleaf component of a larger (Mixed) Conifer woodland area in the Teevickmoy area. The woodland has badger tracks and commuting corridor activity recorded, while hosting a large diversity of butterfly and moth species.	D	This is a planted broadleaf woodland associated with a large private commercial forestry/conifer plantation. It is over 20 years old and has a very good mix of native and non-native broadleaf trees which is providing a valuable corridor and refuge potential for mammals and invertebrate species (moths and butterflies). Mammal commuting corridor paths were observed within the habitat and are likely to be badger. The area is used frequently by deer and is also connected to ER 17. Given the species diversity composition within the habitat and the mammal hosting potential it holds, it is to be considered to satisfy the NRA Guidelines 2009 to be classified as a "C" category regarding **"Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county"**.
19	This is a conifer-species dominated element of the large (Mixed) Conifer woodland in Teevickmoy. This area has evidence of deer activity (droppings and wallow hole) along with nesting buzzard and a historically used as a badger sett (now inactive).	D	This a large conifer plantation associated with ER18, and by extension ER17. The woodland itself hosts evidence of deer activity and a historically used badger sett (though now inactive) along with nesting bird activity. Given the commuting corridor potential and evidence of frequent usage by protected species, the habitat corresponds to a "C" category as per the NRA Guidelines 2009 for **"Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county"**.
20	(Mixed) Conifer Plantation north of Teevickmoy. This planation has a dense amount of rough/scrub ground, adding value to it as a corridor and refuge area for protected species in the vicinity.	E	This is a moderately sized conifer plantation with a broadleaf species treeline planted along the boundaries of the conifer plots. Vehicle and pedestrian access tracks are overgrown and beginning to revert to scrub habitat. The area is of low ecological value though has the potential to provide foraging and commuting corridor services to volant and non-volant species in the area. Therefore, it only qualifies within the NRA Guidelines 2009 for an "E" category for **"Sites or features containing non-native species that are of some importance in maintaining habitat links"**.
21	A small patch of wet woodland/scrub fed by roadside ditches along the road edge.	E	This is a low-value wet woodland being fed by roadside drainage ditches and is reverting to scrub habitat with poor species diversity. It is being afforded an "E" category as it can be considered as one of the **"Sites containing small areas of semi-natural habitat that are of some local importance for wildlife"** as per the NRA Guidelines 2009.
22	Farm sheds hosting nesting barn swallows, foraging common pipistrelle (*Pipistrellus pipistrellus*) & soprano pipistrelle (*Pipistrellus pygmaeus*) bat activity, barn owl (*Tyto alba*) activity signs. The	B	This is a cluster of sheds and associated treelines that are providing nesting, roosting and foraging services for species protected under both **Annex IV of the Habitats Directive** and the **Wildlife Act (1976, as amended)**.

ER Site No.	Habitat Description	Category	Rating Rationale
	location is also close to an active badger sett and within the territory range of badger.		
23	Active farm sheds with potential to host bat roost and suitable habitat surroundings.	D	This is an area of old stone sheds (actively used for farming activities) and associated treelines that are provided nesting, roosting and foraging services for species protected under both **Annex IV of the Habitats Directive** and the **Wildlife Act (1976, as amended)**. They have potential to host bat species though further surveys are likely required to confirm this.
24	Several species protected under the Wildlife Act 1976 (as amended) species were recorded within the study area during field surveys. These records were in the form of tracks, scats, feeding and confirmed visual sightings. Each of the species have been assigned a National Importance[14] ranking. Species encountered include: ▪ **24A Red Squirrel**: feeding signs found within Troopers Hill Woods and Holy Well Woods considered and unconfirmed sighting in Troopers Hill (See ER9 & ER10); ▪ **24B Bats:** 2no. bat roosts in private dwellings in the Drumboe Lower/Troopers Hill area; ▪ **24C Badger:** Active Badger sett found within the Teevickmoy townland, various signs of mammal commuting and foraging activity within the territory range of Badger; Badger tracks within conifer woods in Teevickmoy townland; and ▪ **24D Deer**: Deer droppings and potential wallow hole recorded within the conifer plantation of Teevickmoy Woods.	B	These species protected under the **Wildlife Act 1976 (as amended)** are afforded a "B" category as part of this assessment. The NRA Guidelines, 2009 state that *'It is suggested that, in general, 1% of the national population of such species qualifies as a nationally important population. However, a smaller population may qualify as internationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.'* Given that relatively little is known about the local populations of these species within the study area, as a precaution all populations are considered to be of National Importance. The habitats within which specific protected species were recorded are also considered as part of the assessment, have been evaluated under separate ER's (See ER9, ER10 and ER 17-19).
Invasive Species	Various riparian and terrestrial habitats across the study area were found to have invasive plant species. Invasive plant species were recorded along the whole reach of the River Finn surveyed, encompassing all three proposed crossing points with Himalayan balsam (*Impatiens glandulifera*), montbretia (*Crocosmia x crocosmiiflora*), and dense stands of Japanese knotweed (*Fallopia japonica*). Invasive species (Snowberry and Japanese knotweed) were also recorded along some of the existing local road networks in proximity of the options and Grey Squirrel was observed within several woodlands.	-	Invasive species, particularly plant species, are not considered as ERs though cognisance should be given towards them when considering design and construction impacts. Actions that may result in the spread of the invasive species or improper removal of the species could result in structural integrity damages at the operational phase. Invasive species records were observed at the following locations: **Third Schedule Non-native Plant Species** ▪ **Japanese knotweed (*Fallopia japonica*)** – Kilcroghery townland, outside of the options being assessed (Grid Ref: H 611343 893506); – Mullanchose townland, outside of the options being assessed (Grid Ref: H 610294 893461);

[14].

ER Site No.	Habitat Description	Category	Rating Rationale
	Himalayan balsam, Japanese knotweed, giant rhubarb, rhododendron and grey squirrel are listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended and are subject to restrictions under Regulation 49. Snowberry and montbretia are not listed in the Third Schedule of the 2011 Birds and Habitats Regulations as amended, however as they are an amber listed species under Invasive Species Ireland, measures to avoid interaction and spread of the species are recommended and should be managed in accordance with the NRA Guidance document *Guidelines for the Management of Noxious Weeds and Non- Native Invasive Plant Species on National Roads* (NRA, 2010).		– Cappry townland (Grid Ref: H 611160 894517); – Meenavoy townland, outside of the options being assessed (Grid Ref: H 615123 899194); – Cappry townland and Ballybofey as a moderate sized stand between Grid Ref H 612326 895109 to H 612322 895112; – Between the Cappry townland and Ballybofey at H 612172 895176; – South of Troopers Hill woods, west of Ballybofey (Grid Ref: H 611933 895240); – South of Troopers Hill woods, west of Ballybofey (Grid Ref: 611830 895325); and – South of Troopers Hill woods, west of Ballybofey (Grid Ref: 611808 895340). ▪ **Giant rhubarb (*Gunnera tinctoria*)** – Located along existing local road in the Backlees townland (Grid Ref: H 614357 896740); ▪ **Rhododendron (*Rhododendron ponticum*)** – Residential housing estate at the Tircallan townland adjacent to the N13 road (Grid Ref: H 616167 897713) ▪ **Himalayan Balsam (*Impatiens glandulifera*)** – Located along the north bank downstream of Logue's Bridge/Mill Cottage Bridge, in the Cappry townland (Grid ref: H 612518 895023). **Third Schedule Non-native Animal Species** ▪ **Grey Squirrel (*Sciurus carolinensis*)** – Grey Squirrel sighted within the Troopers Hill Woods (Grid Ref: H 612045 895745); – Grey Squirrel sighted within the large commercial Forestry plantation in the Teevickmoy townland (Grid Ref: H 615219 898525). **Amber Listed Species** ▪ **Snowberry (*Symphoricarpos albus*)** – located along existing road/lane within the Ballynaglack townland (Grid Ref: H 613488 896541); Snowberry present along local road within a hedgerow in the Lettermakenny townland, outside of the options being assessed (Grid Ref: H 613986 897875); ▪ **Montbretia (*Crocosmia x crocosmiiflora*)** – Sporadically spread along the roadsides within the study area. No specific grid references gathered.

3 OPTION SELECTION

3.1 Comparison of Options

The *Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis* (TII, 2016) were used to inform and quantify the assessment of potential impacts from this project. Impact significance rationale follows the criteria presented in **Appendix 2** of this report.

Each option was assessed in terms of the significance of their interaction with each ER as listed above in **Table 2.2**.

Table 3.1 presents the quantitative assessment with the number of interactions each option has with ERs according to their biodiversity value in a geographical context.

Table 3.2 provides a breakdown the risk impact sensitivity of each individual ER and the number of intersections likely to occur to each ER per option. The risk sensitivity values were assigned using the criteria set out in **Table 1.3** and the Ecological Impact Risk Matrix presented in **Appendix 2** of this report.

Table 3.3 summarises the analysis of data shown in **Table 3.1** and **Table 3.2** regarding qualitative and qualitative impacts to the ERs intersected by each option, as per the TII Impact Scoring Key (**Table 1.3**).

Table 3.1: Ecological Receptors Intersected by the Proposed Options by Ecological Evaluation[15]

ER Evaluation Category	Orange		Pink		Purple		Red		Green		Blue		Yellow
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
A[16]	13	13	10	11	13	13	13	14	13	14	12	13	14
B	4	4	4	4	3	3	5	5	4	4	6	6	6
C	1	1	1	1	1	1	2	2	2	2	1	1	2
D	5	5	3	3	5	5	2	2	3	3	4	4	4
E	4	4	8	7	6	6	8	7	8	7	6	5	6
Number of ERs	**27**	**27**	**26**	**26**	**28**	**28**	**30**	**30**	**30**	**30**	**29**	**29**	**32**

[15] Some ERs may be counted twice, such as Option 1B, where ER24C hosts a badger sett to the south boundary and evidence of mammal activity on the northern boundary likely to be within range of badger which severs territory range for badger in the area. Therefore it is counted as two potential intersections for ER24C; one for the badger sett and another for severance of territory range. This is a similar approach to that taken when assessing intersections of ER2. **Table 3.2** details the intersections an ER has if there is more than one intersection per ER.

[16] Tallies take into account the specific number of watercourses associated with the range of ER2 (otter). It is considered a single ER comprised of the number of watercourses intersected by options in addition to the River Finn. i.e. Option 1A is to be assessed as one ER for otter as a QI of the River Finn SAC, and also has 12 watercourses with potential for otter range connected to the River Finn, including the River Finn itself. Therefore 12 overall potential intersections with ER2 and one intersection with the River Finn SAC tallies to 13 potential category "A" ERs for Option 1A.

Table 3.2: Impact Significance on the Ecological Receptors Intersected by the Proposed Options[17]

ER No.	Category	Orange		Pink		Purple		Red		Green		Blue		Yellow
		1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
1	A	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)
2	A	Major-ve (12)	Major-ve (12)	Major-ve (9)	Major-ve (10)	Major-ve (12)	Major-ve (12)	Major-ve (12)	Major-ve (13)	Major-ve (12)	Major-ve (13)	Major-ve (11)	Major-ve (12)	Major-ve (13)
3	E	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve
4	E	-	-	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve
5	E	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	-	-	-	-	-	-	-
6	D	Minor-ve	Minor-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	-	-	-	-	-	-	-
7	C	Major-ve	Major-ve	Major-ve	Major-ve	Major-ve	Major-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve
8	E	-	-	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Not significant/ Neutral	Not significant/ Neutral	Not significant / Neutral	Not significant/ Neutral	Minor-ve	Minor-ve	-
9	D	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	-	-	-	-	-	-	-
10	D	-	-	-	-	-	-	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve
11	E	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	-	-	-	-	-	-	-
12	E	-	-	-	-	-	-	Minor-ve	Minor-ve	Minor-ve	Minor-ve	-	-	Minor-ve
13	C	-	-	-	-	-	-	Mod-ve	Mod-ve	Mod-ve	Mod-ve	-	-	Mod-ve
14	E	-	-	Minor-ve	-	-	-	Minor-ve	-	Minor-ve	-	Minor-ve	-	-
15	E	-	-	-	-	-	-	Minor-ve	Minor-ve	Minor-ve	Minor-ve	-	-	Minor-ve
16	E	-	-	Minor-ve	Minor-ve	-	-	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve

[17] A hyphen (-) symbol indicates that specific receptor does not interact with the relevant option. Numbers within brackets indicate the number of individual intersections each option has with that specific ER. The suffix (-ve) denotes *negative* impact e.g. a Major negative impact is reflected as *Major-ve* in the table.

ER No.	Category	Orange		Pink		Purple		Red		Green		Blue		Yellow
		1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
17	D	Mod-ve	Mod-ve	-	-	Mod-ve	Mod-ve	-	-	-	-	-	-	-
18	D	Mod-ve	Mod-ve	-	-	Mod-ve	Mod-ve	-	-	Mod-ve	Mod-ve	Minor-ve	Minor-ve	Minor-ve
19	D	Mod-ve	Mod-ve	-	-	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Major-ve	Major-ve	Mod-ve	Mod-ve	Mod-ve
20	E	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve
21	E	-	-	-	-	-	-	-	-	-	-	-	-	-
22	B	-	-	Mod-ve	Mod-ve	-	-	Major-ve	Major-ve	-	-	Major-ve	Major-ve	Major-ve
23	D	-	-	Minor-ve	Minor-ve	-	-	-	-	-	-	Mod-ve	Mod-ve	Mod-ve
24A	B	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)
24B	B	Major-ve (1)	Major-ve (1)	-	-	-	-	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)
24C	B	Major-ve (1)	Major-ve (1)	Mod-ve (2)	Mod-ve (2)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (2)	Major-ve (2)	Major-ve (2)
24D	B	Major-ve (1)	Major-ve (1)	-	-	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)	Major-ve (1)

Table 3.3: Summary of Impact to Ecological Receptors[18]

Impact Key		Orange		Pink		Purple		Red		Green		Blue		Yellow
		1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
1	Major or Highly Negative	18	18	12	13	17	17	18	19	18	19	18	19	20
2	Moderately Negative	4	4	5	5	5	5	4	4	4	4	4	4	5
3	Minor or Slightly Negative	5	5	9	8	6	6	7	6	7	6	7	6	7
4	Not Significant/ Neutral	0	0	0	0	0	0	1	1	1	1	0	0	0
5	Minor or Slightly Positive	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Moderately Positive	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Major or Highly Positive	0	0	0	0	0	0	0	0	0	0	0	0	0
Total No. of ERs intersected		**27**	**27**	**26**	**26**	**28**	**28**	**30**	**30**	**30**	**30**	**29**	**29**	**32**

[18] Totals take into account the specific number of watercourses associated with the range of ER2 (otter). It is assessed as a single ER comprised of the number of watercourses intersected by options in addition to the River Finn. I.e. Option 1A has 12 watercourses with potential for otter range connected to the River Finn, including the River Finn itself. Therefore 12 overall potential intersections with ER2 and one intersection with the River Finn SAC tallies to 13 potential ERs for Option 1A.

3.2 Ecological Impact Assessment

The options proposed at this stage of the project all connect or overlap with many common features of conservation interest, e.g. the River Finn SAC, the River Finn Freshwater Pearl Mussel (*Margaritifera margaritifera*) sensitive area and riparian woodlands (WN5) with varying degrees of severity. It is to be assumed that these features are included when discussing options below.

Owing to the ecological sensitivity and conservation designation of the River Finn SAC the potential effects of each option on European sites is conducted to inform the Option Selection Report (OSR). This risk assessment is provided in **Appendix 1** of this report.

Table 3.4 at the end of this section summarises the impact option scoring matrix for each option, it provides a quantitative and qualitative assessment of the ecological receptors and the impact score of the options as per the TII *Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis* (2016). The preference score for each option is also highlighted.

The qualitative assessment on each option is provided in the following sub-sections.

3.2.1 Option 1A (Orange)

Option 1A would require land take from the north-western extents of Troopers Hill woods and intersects with a reported bat roost adjacent to the woods. The large stand of mixed conifer /broadleaved woodland in the Teevickmoy townland will be significantly severed, likely resulting in a negative impact to species mobility and hosting capacity in the area. The option also impacts the valley-type topography present between the Lettermakenny and Teevickmoy townlands. This area is of higher local ecological value as it has several habitat mosaics providing ecosystem services such as commuting corridor protection for mammals and nesting birds protected under the Wildlife Act (1976, as amended). The option also intersects a confirmed bat roost location situated within a residential house in the Troopers Hill area. Given these factors, the option has the potential for *major or highly negative* significant ecological impacts on the landscape.

3.2.2 Option 1A1 (Orange)

Option 1A1 follows the majority of the main footprint of Option 1A as detailed above with the description of Option 1A. Additional modifications to Option 1A1 include, the centreline of the northernmost link road located in the east of the study area near Tircallan has shifted approximately 160m south of the residential housing estate to connect to the existing N13 road earlier. A new link road, *hereafter the southern link road*, in the south west of study area is situated spanning the Cappry townland (immediately south-west of Ballybofey) terminating at R252 road south of the River Finn. This southern link road primarily traverses agricultural grasslands interspersed with some one-off houses and scrub/wet grassland areas. In addition, a new junction option is included within the centreline footprint along the south edge of the R252, north of Cappry townland. This option is considered to have potential for *major or highly negative* significant ecological impacts on the landscape.

3.2.3 Option 1B (Pink)

Option 1B also impacts a large segment of Troopers Hill woods, similar to the Option 1C. However, the northern extents of the option do not impact ecologically sensitive receptors. It does directly sever a large-scale horticultural land holding. The option boundaries in the northern reaches have bats, nesting barn swallow and badger sett recorded on the option footprint perimeters. Though still directly impacting some high value ERs, this option has the least significant impact as it has the least amount of intersections with ERs in total. Given this criteria, Option 1B has the potential for *moderately negative* ecological impacts on the landscape comparatively against other options.

3.2.4 Option 1B1 (Pink)

The footprint of Option 1B1 follows the majority of the footprint of Option 1B, though includes the additional southern link road proposed between the R252 and N15 roads in the Cappry townland (immediately south-west of Ballybofey). The northern link road in the Tircallan townland has also had a revised alignment. This re-alignment moves the link road northwards of Lough Alaan, where it's footprint now also overlaps with the northern link road option of Option 1A1. Option 1B1 continues north-west of the N13, rather than following the existing road, to connect with the mainline footprint of Option 1B. In addition, Option 1B1 intersects a higher number of watercourses identified for potential otter ranges than Option 1B. Given that, and the other existing ERs with potential for impacts, this makes Option 1B more preferable than Option 1B1 as it has the slightly fewer ERs at risk for negative impacts. With these updates considered, Option 1B1 has the potential for *moderately negative* significant ecological impacts on the landscape but is less preferable than 1B as it intersects additional ERs ranked as having potential *major or highly* sensitive ecological impacts.

3.2.5 Option 1C (Purple)

Option 1C intersects several mixed woodland parcels with potential for commuting corridor and hosting species. The large stand of mixed conifer /broadleaved woodland in the Teevickmoy townland will be significantly severed, likely resulting in a negative impact to species mobility and hosting capacity in the area. The option also significantly severs the Troopers Hill woods which is one of the larger woodlands in the study area and has high capacity for mammal activity. There is a valley-type topography present between Lettermakenny and Teevickmoy townlands. This area has several habitat mosaics providing ecosystem services such as commuting corridor protection for mammals making it of high value for species mobility. The area also has a confirmed breeding buzzard nest. This area of habitat is likely the most important refuge zone for species within the scope of the study area. This has the potential for *major or highly negative* significant ecological impacts on the landscape.

3.2.6 Option 1C1 (Purple)

The mainline footprint of Option 1C1 follows the majority of the footprint of Option 1C. This option has the same southern link road footprint as detailed in Option 1B1. The northern link road also covers the same footprint of Option 1A1, which has been categorised as having potential for *major or highly negative* significant ecological impacts on the landscape. Given there are the potential for 2no. link roads with Option 1C1 and only 1no. link road with Option 1C there is a greater likelihood of landtake with Option 1C1 which would result in a higher loss of general biodiversity. Option 1C1 has the potential for *major or highly negative* significant ecological impacts on the landscape.

3.2.7 Option 1D (Red)

Option 1D significantly severs woodland and point location ERs it interacts with. The large stand of mixed conifer/broadleaved woodland in the Teevickmoy townland will be significantly severed, likely resulting in a negative impact to species mobility and hosting capacity in the area. The level of severance to each receptor shows this option to be least favourable as it will reduce the capacity of the study area for commuting and hosting potential of species along with a permanent loss of habitat. The option also intersects a confirmed bat roost location within a residential house in the Drumboe Lower townland. Given these factors, this option has the high potential for *major or highly negative* significant ecological impacts on the landscape.

3.2.8 Option 1D1 (Red)

Option 1D1 has two northern link roads which are not within the mainline footprint of Option 1D. One overlaps the same small section of link road of Option 1B1 which intersects and continues north-west of the N13. The second northern link road also overlaps the footprint of Option 1A1 and 1C1 where it joins

to the N13 but it does not follow the existing road infrastructure. This Option 1D1 intersects a higher number of watercourses identified for potential otter ranges than Option 1D. Given these factors, this option has the potential to result in *major or highly negative* significant ecological impacts on the landscape.

3.2.9 Option 1E (Green)

Option 1E does not impact the Troopers Hill woods. The option does impact the majority of the Holy Well Woods mixed broadleaved/conifer habitat. The option overlaps with the northern extent of an Oak-birch-holly woodland (WN1) woodland surveyed as part of the National Survey of Native Woodlands[19]. The large stand of mixed conifer/broadleaved woodland in the Teevickmoy townland will be significantly severed, likely resulting in a negative impact to species mobility and hosting capacity in the area. The option boundaries also have some Japanese knotweed present along the borders of the existing road infrastructure. The option also intersects a confirmed bat roost location within a residential house in the Drumboe Lower townland. Given these factors, the option has the potential for *major or highly negative* significant ecological impacts on the landscape, particularly semi-natural habitats and areas hosting species protected under the Wildlife Act (1976 as amended).

3.2.10 Option 1E1 (Green)

Option 1E1 follows the mainline footprint of Option 1E. In the same manner as Option 1D1, Option 1E1 has two northern link roads which are not within the mainline footprint of Option 1E. One overlaps the same small section of link road of Option 1B1, which intersects and continues north-west of the N13. The second northern link road also overlaps the footprint of Option 1A1 and 1C1 where it joins to the N13 but it does not follow the existing road infrastructure. Option 1E1 is the option which similar to some other options has the potential to impact the higher number of ERs (19) categorised as being *major or highly sensitive*, with the exception of Option 1G which intersects 20 *major or highly sensitive* ERs. Given this and the fact that the option itself has the likelihood to impact the second highest total number of ERs, it is to be categorised as likely to result in *major or highly negative* significant ecological impacts on the landscape.

3.2.11 Option 1F (Blue)

Option 1F does not impact the Troopers Hill woods. The option does impact the majority of the Holy Well Woods mixed broadleaved/conifer habitat. The option boundaries also have some Japanese knotweed present along the borders of the existing road infrastructure. The northern reaches of the option impact the eastern extent of the large stand of mixed conifer/broadleaved woodland in the Teevickmoy townland. In the Teevickmoy area the option also impacts a farmyard with confirmed barn swallow nests and is a foraging and commuting area for common and soprano pipistrelle bats. This location has historically had barn owl recorded as being present, though not confirmed during site walkovers. Unconfirmed badger activity was noted adjacent to the large commercial forestry in the Teevickmoy area. Buzzard were also audibly noted to be within the north/north-east corner of the large commercial forestry, located in the area which falls within the option footprint. The option also intersects a confirmed bat roost location within a residential house in the Drumboe Lower townland. Given these factors, the option is not considered suitable as it has the potential for *major or highly negative* significant ecological impacts on the landscape, particularly semi-natural habitats and areas hosting species protected under the Wildlife Act (1976, as amended).

[19] http://www.botanicalenvironmental.com/wp-content/uploads/2011/03/Volume-I.pdf

3.2.12 Option 1F1 (Blue)

Option 1F1 follows the mainline footprint of Option 1F. In the same manner as 1D1, Option 1F1 has two northern link roads which are not within the mainline footprint of 1F. One overlaps the same small section of link road of Option 1B1 which intersects and continues north-west of the N13. The second northern link road also overlaps the footprint of Option 1A1 and 1C1 where it joins to the N13, but it does not follow the existing road infrastructure. Option 1F1 intersects a higher number of watercourses identified as potential range for otter associated with the River Finn SAC than those identified in 1F1. Given these factors, the option has the potential for *major or highly negative* significant ecological impacts on the landscape, particularly semi-natural habitats and areas hosting species protected under the Wildlife Act (1976, as amended).

3.2.13 Option 1G (Yellow)

Option 1G is a composite option comprising elements of options previously discussed including options 1C, 1C1, 1D,1D1, 1E, 1E1, 1F and 1F1. Option 1G intersects 13no. watercourses identified as having a high likelihood of being within the range for otter which is a qualifying interest of the River Finn SAC. The option heavily impacts Holy Well Woods, which hosts broadleaved species along with indicative signs of hosting wildlife act species such as squirrel. The option has the potential to impact the north-west area of Dunwiley woods, a native woodland habitat. The option also intersects areas that have been identified as hosting foraging bat species and likely within the territory range of badger. Option 1G also intersects sections of the Teevickmoy conifer woodland which hosts deer species and likely other wildlife act species of conservation interest. The option intersects the greatest total number of ERs of all the options assessed. Given these factors, the option is not considered suitable as it has the potential for *major or highly negative* significant ecological impacts on the landscape.

Table 3.4 Option Scoring Matrix

Option	Quantitative Assessment	Qualitative Assessment and Analysis[20]	Impact	Impact Score	Preference Ranking	Preference
1A (Orange)	18 Major or Highly Negative Impacts 4 Moderately Negative Impacts 5 Minor or Slightly Negative Impacts	This option impacts the River Finn SAC and the identified range for otter, a QI of the SAC – both rated as being of International importance in this assessment. Option 1A will likely intersect with 0.023km^2 of the River Finn SAC land cover. The option intersects 12 watercourses identified as potential range for otter outside of the River Finn SAC range for the species. There is a junction option within the footprint immediately south of the R252 road which spans a watercourse, which poses a risk of inputs into the proximal River Finn SAC during works. The option does impact a large segment of the western extent of the Troopers Hill plantation woods but to a lesser degree than other options. It directly impacts a known bat roost within a private dwelling house, giving it a National importance category value. The option also has a significantly negative direct impact on the large grouping of ERs in the Lettermakenny/Teevickmoy areas, which acts as a critical corridor and area of breeding potential for several wildlife act species whose signs were recorded on-site. Due to the number of ERs directly impacted by this option and the condition/nature of the ERs, this option should be considered to likely result in *Major or Highly Negative Impacts* overall. This option will potentially impact a greater number of ERs at risk for Major or Highly Negative Impacts and is therefore considered to be Intermediate.	Major or Highly negative	1	3	Intermediate
1A1 (Orange)	18 Major or Highly Negative Impacts 4 Moderately Negative Impacts 5 Minor or Slightly Negative Impacts	See Qualitative Assessment of Option 1A. The modified new southern link road does not impact any additional identified ER's than Option 1A. The additional modified southern link road adds another potential opportunity of increased net biodiversity loss and land take (hedgerows etc.) due to proximity with the River Finn SAC. This combined with the other identified ERs for the option has resulted in it being assigned a less preferable ranking than Option 1A. Due to the number of ERs directly impacted by this option and the condition/nature of the ERs, this option is considered to result in *Major or Highly Negative* Impacts. This option will potentially impact a greater number of ER's at risk for *Major or Highly Negative* Impacts and is therefore considered to be Intermediate.	Major or Highly negative	1	4	Intermediate
1B (Pink)	12 Major or Highly Negative Impacts 5 Moderately Negative Impacts	Option 1B intersects both the River Finn SAC and otter range for the River Finn SAC species population, both are rated as being of International importance in this assessment. The option would intersect 0.031km^2 of the landcover of the SAC. The option intersects 9 watercourses identified as potential range for otter species. The option also	Moderately negative	2	1	Preferred

[20] Habitat classification codes are assigned as per Fossitt, J. A, (2000) "*A Guide to Habitats in Ireland*".

Option	Quantitative Assessment	Qualitative Assessment and Analysis[20]	Impact	Impact Score	Preference Ranking	Preference
	9 Minor or Slightly Negative Impacts	would likely have direct negative impacts that would sever the middle-to-eastern extents of the Troopers Hill plantation woodland which is of lower ecological value, however it is hosting red squirrel, a species protected under the Irish Wildlife Act (1976, as amended). Indirect impacts include the peripheries of the option that could potentially impact on the farmyard sheds in Teevickmoy hosting nesting swallows, bat foraging activity and likely barn owl usage. It could sever access for a badger sett, and the wider refuge opportunities areas in Teevickmoy. Though the other protected species recorded in the area will not be impacted and their commuting ranges not impeded. This option has the joint lowest potential interactions with ERs and the least potential impact to ERs categorised as International, National or County Importance. Therefore, this option is considered to be Preferred.				
1B1 (Pink)	13 Major or Highly Negative Impacts 5 Moderately Negative Impacts 8 Minor or Slightly Negative Impacts	The same Qualitative Assessment carried out for option 1B applies. With the exception of the fact Option 1B1 intersects 10 watercourses rather than 9 associated with Option 1B, and that these watercourses have been identified potential range for otter species. It also avoids impacting an area of Hazel-dominated scrub woodland (ER 14) adjacent to Lough Alaan. This option is also ranked as having the potential for *Moderately negative impacts.* Given the ERs associated with Option 1B1 and that it intersects a higher number of watercourses identified for otter ranges than Option 1B, Option 1B1 is marginally less preferred than 1B. The additional modified southern link road adds another potential opportunity of increased net biodiversity loss and land take (hedgerows etc.) due to proximity with the River Finn SAC. Option 1B1 will potentially impact more (13) ERs categorised as International, National or County Importance than 1B (12) and far fewer than the remaining options. Therefore, this option is considered to be Preferred.	Moderately negative	2	2	Preferred
1C (Purple)	17 Major or Highly Negative Impacts 5 Moderately Negative Impacts 6 Minor or Slightly Negative Impacts	The option significantly severs some of the few refuges for wildlife, conifer plantations, in the south-east area of Ballybofey. It traverses 0.031km^2 of the River Finn SAC and otter habitat and range potential, both are ERs assigned International Importance category values. The option intersects 12 watercourses identified as potential range for otter species. Option 1C also has a large-scale severance impact on the Trooper's Hill woodland which hosts Wildlife Act species. The option has a significant impact on a large grouping of receptors in the Lettermakenny/ Teevickmoy areas, acting as a critical corridor and breeding potential for several wildlife act species whose signs were recorded on-site. This option is being considered to be at risk to result in *Major or Highly Negative Impacts*. This option will potentially impact a greater number of ERs at risk for Major or Highly Negative Impacts and is therefore considered to be Intermediate.	Major or Highly negative	1	5	Intermediate
1C1 (Purple)	17 Major or Highly Negative Impacts 5 Moderately Negative Impacts	See Qualitative Assessment of Option 1C. Though the southern link road boundary is in proximity to the River Finn SAC, the footprint does not interact with any identified ER. Therefore, no change to the number of ERs impacted by either Option 1C or 1C1. The additional modified southern link road adds another potential risk of increased net	Major or Highly negative	1	6	Intermediate

Option	Quantitative Assessment	Qualitative Assessment and Analysis[20]	Impact	Impact Score	Preference Ranking	Preference
	6 Minor or Slightly Negative Impacts	biodiversity loss and land take (hedgerows etc.) due to proximity with the River Finn SAC. This option will potentially impact a greater number of ERs at risk for *Major or Highly Negative* Impacts and is therefore considered to be Intermediate.				
1D (Red)	18 Major or Highly Negative Impacts 4 Moderately Negative Impacts 7 Minor or Slightly Negative Impacts 1 Not Significant/Neutral Impact	The option traverses 0.018km^2 of the River Finn SAC. The option also intersects the range identified for otter as part of the River Finn SAC. The option intersects 12 watercourses identified as potential range for otter outside of the River Finn SAC range for the species. Option 1D does heavily impact the Holy Well woods (WD2) area hosting semi-natural tree specimens and has signs of squirrel feeding activity. Semi-natural habitats are scarce within the study area and the option impacts a section of a WN1 semi-natural woodland in the Drumboe Upper area. The option impacts an isolated farmyard with three sheds hosting nesting barn swallows, signs of barn owl activity and the associated treelines are used as a foraging/commuting corridor for common & soprano pipistrelle bats. It is not confirmed, however these sheds have potential to support bats or are structurally suitable to support bats. The conifer element of the private forestry plantation in Teevickmoy is largely impacted by this option. The plantation has signs of deer and buzzard activity during the breeding season within it. Impacts associated with this large plantation could also have negative impacts to the badger activity range, which have also been recorded within the area. This option will potentially impact a greater number of ER's at risk for *Major or Highly Negative Impacts* and is therefore considered to be Intermediate.	Major or Highly negative	1	9	Intermediate
1D1 (Red)	19 Major or Highly Negative Impacts 4 Moderately Negative Impacts 6 Minor or Slightly Negative Impacts 1 Not Significant/Neutral Impact	The same Qualitative Assessment carried out for Option 1D applies. With the exception being the Option 1D1 traverses an area of the River Finn SAC totalling 0.016km^2. This option also intersects one more watercourse than Option 1D identified as part of ER2 for otter range. Given the additional intersection with a watercourse for ER2 and the loss of scrub woodland offering refuge potential resulting in general net biodiversity loss, Option 1D1 is marginally less preferable than 1D. This option will potentially impact a greater number of ERs at risk for *Major or Highly* Negative Impacts. Therefore, this option is considered to be Intermediate.	Major or Highly negative	1	10	Intermediate
1E (Green)	18 Major or Highly Negative Impacts 4 Moderately Negative Impacts 7 Minor or Slightly Negative Impacts 1 Not Significant/Neutral Impact	Option 1E will intersect both the River Finn SAC and the range for otter, a QI for the SAC and both Internationally important receptors. Option 1E will likely intersect 0.018km^2 of the River Finn SAC land cover. The option intersects 12 watercourses identified as potential range for otter outside of the River Finn SAC range for the species. It will have a major impact on the Holy Well woods which also supports signs of hosting protected species (e.g. squirrel). The option overlaps with the northern extent of an Oak-birch-holly woodland (WN1) woodland surveyed as part of the National Survey of Native	Major or Highly negative	1	11	Intermediate

Option	Quantitative Assessment	Qualitative Assessment and Analysis[20]	Impact	Impact Score	Preference Ranking	Preference
		Woodlands[21]. A confirmed bat roost in a private dwelling will also be directly impacted by the option. The option does not directly impact the habitats forming the large wildlife corridor area in the Lettermakenny/Teevickmoy areas as significantly as other options, however it passes through the middle of these areas which may result in potential fragmentation which is another significantly limiting impact to the protected species in the area. Due to the number of ERs impacted by this option and the condition of the ERs, this option should be considered to likely result in *Major or Highly Negative Impacts* within the study area. This option will potentially impact a greater number of ERs at risk for Major or Highly Negative Impacts and is therefore considered to be Intermediate.				
1E1 (Green)	19 Major or Highly Negative Impacts 4 Moderately Negative Impacts 6 Minor or Slightly Negative Impacts 1 Not Significant/Neutral Impact	The same Qualitative Assessment carried out for Option 1E applies. With the exception being that Option 1E1 traverses an area of the River Finn SAC totalling 0.016km^2. This option intersects 13 watercourses identified as potential range areas for otter (ER2) associated the with the River Finn SAC, whereas Option 1E intersects 12, The greater number of major or highly sensitive ERs likely impacted result in Option 1E1 being marginally less preferable to Option 1E. Given this level of potential impacts to ERs associated with Option 1E1, it is considered to result in a risk for *Major or Highly Negative Impacts*. This option will potentially impact a greater number of ERs at risk for Major or Highly Negative Impacts and is therefore considered to be Intermediate.	Major or Highly negative	1	12	Intermediate
1F (Blue)	18 Major or Highly Negative Impacts 4 Moderately Negative Impacts 7 Minor or Slightly Negative Impacts	Option1F directly intersects the River Finn SAC. The option will likely intersect 0.018km^2 of the SAC land cover. The option intersects 11 watercourses identified as potential range for otter outside of the River Finn SAC range for the species. A confirmed bat roost within a private dwelling is directly impacted by the option. Holy Well woods is majorly impacted and is expected to be within range for protected species (red squirrel) with feeding signs evident. The farmyard sheds in the Teevickmoy area that host nesting swallows, bat foraging and potential barn owl signs are directly impacted by this option. The territory range for badger and other protected species is severed by this option also. The north-east and east edges of the Teevickmoy forestry plantation are impacted which limits the range for the identified protected species recorded within the habitat parcel. This option will potentially impact a greater number of ERs at risk for *Major or Highly* Negative Impacts. Therefore, this option is considered to be Intermediate.	Major or Highly negative	1	7	Intermediate

[21] http://www.botanicalenvironmental.com/wp-content/uploads/2011/03/Volume-I.pdf

Option	Quantitative Assessment	Qualitative Assessment and Analysis[20]	Impact	Impact Score	Preference Ranking	Preference
1F1 (Blue)	19 Major or Highly Negative Impacts 4 Moderately Negative Impacts 6 Minor or Slightly Negative Impacts	The same Qualitative Assessment carried out for Option 1F applies. With the exception of the option traverses an area of the River Finn SAC totalling 0.016km^2. In addition, it does not impact an area of hazel-dominated scrub woodland (ER14) adjacent to Lough Alaan. Option 1F1 also intersects 12 watercourses identified as being part of the potential range for otter associated with the River Finn SAC. Overall, Option 1F1 intersects a greater number of major or highly sensitive ERs than 1F and therefore is marginally less preferable than 1F. Overall, this option will potentially impact a greater number of ERs at risk for *Major or Highly* Negative Impacts. Therefore, this option is considered to be Intermediate.	Major or Highly negative	1	8	Intermediate
1G (Yellow)	20 Major or Highly Negative Impacts 5 Moderately Negative Impacts 7 Minor or Slightly Negative Impacts	This option impacts the River Finn SAC, rated as being of International importance. The option also intersects 13 watercourses identified as potential ranges for otter, a QI species for the SAC. Option 1G will likely intersect with 0.017m^2 of the River Finn SAC land cover, comparably less preferable than other options spanning the SAC. A confirmed bat roost within a private dwelling is directly impacted by the option. Holy Well woods is majorly impacted which supports the range for protected species (red squirrel) with feeding signs evident. Semi-natural habitats are scarce within the study area and the option impacts a section of a WN1 semi-natural woodland in the Drumboe Upper area. The farmyard sheds in the Teevickmoy area that host nesting swallows, bat foraging and barn owl signs are directly impacted by this option. The territory range for badger and other protected species is severed by this option also. The north-east and east edges of the Teevickmoy forestry plantation are impacted which limits the range for the identified protected species recorded within the habitat. Therefore, this option is considered to be Intermediate.	Major or Highly negative	1	13	Intermediate

3.3 Conclusion

There are no individual options that offer a neutral or negligible impact when addressing potential ecological impacts as part of the project. Comparatively all of the options assessed display similar potential negative impacts to the identified Ecological Receptors when assessed at both the qualitative and quantitative levels.

Of the individual options assessed, Option 1B and 1B1 are considered to be *Preferred* as they impact the least number of ERs categorised as International, National or County Importance (see **Table 3.1**) in comparison to the other options assessed. Option 1B has the potential to impact the least number of ERs overall (26). Option 1B1 also affects the least number of ERs, however the additional modified southern link road increases the potential net biodiversity loss and land take (hedgerows etc.) and further construction in proximity to the River Finn SAC. The remaining options potentially impact between 27 and 32 Ecological Receptors and will potentially impact more ERs categorised as International, National or County Importance, than 1B and 1B1. These options are considered to be less preferable than 1B and 1B1 and are therefore classified as *Intermediate*.

In conclusion, the emerging preferred option in relation to Biodiversity (Terrestrial) is Option 1B and 1B1**,** given the limited number of risks to the identified ERs when compared to other options assessed.

Appendix 1:
European Sites Risk Assessment

Introduction

All options considered for Section 1 require crossing of the River Finn, which is designated under the River Finn Special Area of Conservation (SAC). SACs and Special Protection Areas (SPAs) form part of the Natura 2000 network of important ecological sites as defined under Article 3 of the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as "The Habitats Directive". Under the European Communities (Birds and Natural Habitats) Regulations, S.I. No. 477 of 2011 (as amended), SACs and SPAs are known collectively as European sites.

Owing to the ecological sensitivity and conservation designation of the River Finn SAC the potential effects of each option on European sites is conducted to inform the Option Selection Report (OSR).

This risk assessment is used to inform the OSR and does not constitute a Screening for Appropriate Assessment (AA) which is required on all plans and projects in accordance with the requirements of Article 6(3) of the Habitats Directive. The Screening for AA will be carried out on the preferred option (the project) to determine in view of best scientific knowledge, if the project individually or in combination with another plan or project is likely to have a significant effect on a European site. If it is determined that the project will have significant effects on a European site, a Natura Impact Statement (NIS) will be prepared to inform the AA to be conducted by the competent authority.

It should be noted that this risk assessment, although using the language and basic criteria of the Article 6(3) of the Habitats Directive Appropriate Assessment (AA) process, does not purport to be sufficient to inform the AA. It is not possible, nor indeed practical, at this stage of the proposed project to subject each of the options to scientifically robust evaluation. Indeed the level of road design available for the options is not sufficiently advanced to inform the assessment. In this regard the risk assessment is not compliant in respect of Article 6(3) of the Habitats Directive and does not prejudice the determination by a Competent Authority.

In conducting this European site risk assessment, the following assumptions are made in this risk assessment:

- All options cross the SAC, and they are therefore likely to have a significant effect on the European sites;
- The assessment also assumes that avoidance and or mitigation can be applied to avoid or reduce impacts to acceptable, non-significant levels; and
- Only in circumstances where avoidance or mitigation measures will not be effective and significant impacts remain, adverse effects on the integrity of the site are deemed to be likely.

Therefore, this risk assessment comprises an assessment of whether the options would adversely affect the integrity of a European site and ultimately fail the core AA text.

Table 1: River Finn SAC Qualifying Interests

Site Code	Site Name	Qualifying Interests Habitats and Species (*=Priority Habitats)
2301	River Finn	**Habitats** Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110][22] Northern Atlantic wet heaths with *Erica tetralix* [4010] Blanket bogs (* if active bog) [7130] Transition mires and quaking bogs [7140] **Species** *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355]

[22] [22] Habitat/Species codes relate to the unique identifier reference code as per the Interpretation Manual of European Union Habitats – EUR28 (European Commission, 2013) for species and habitats listed under the EU Habitats Directive. http://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf

Surveys

In order to undertake the risk assessment for the project, additional surveys, beyond those normally undertaken at the options assessment phase were required to inform the process. In particular, these included seasonally appropriate surveys such as habitats, flora and invasive alien plant species as well as repeat surveys to ensure as comprehensive understanding of the ecological features to which the risk assessment pertained to. These included a number of dedicated visits to the River Finn to confirm earlier records and confirm, as far as was practical, otter activity/habitation. The survey of the main River Finn channel also allowed for greater characterisation of the habitats.

Table 2: River Finn SAC Qualifying Interest Targeted Survey Details

Survey Date	European site QI/SCI	Comment
11th – 22nd December 2017, 2nd – 31st January 2018 and 1st – 28th February 2018; 02nd – 6th July 2018; 2nd, 3rd and 14th August 2018	**Habitats** ▪ Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] [23] ▪ Northern Atlantic wet heaths with *Erica tetralix* [4010] ▪ Blanket bogs (* if active bog) [7130] ▪ Transition mires and quaking bogs [7140]	▪ Windshield and multidisciplinary walkover surveys conducted for each option confirmed the terrestrial QI habitats for which the SAC is designated are not present within the study area.
10th ,11th and 12th July2018; 24th -25th January 2018; 24th January 2019	▪ *Lutra lutra* (Otter) [1355]	▪ Surveys for otter were carried out in conjunction with the aquatic ecology surveys. Signs of commuting or habitation were searched for. Targeted otter activity surveys were also conducted independent of aquatic ecology surveys. Surveys found indicative signs of commuting activity though no holts within the option footprints of any river crossing option. Cognisance is required during the design and AA assessment phase on severance impacts to commuting options of otter resulting from the construction and operational phases of the proposed project
10th,11th and 12th July 2018; 10th – 13th August 2018	▪ *Salmo salar (Salmon) [1106]*	▪ Aquatic Surveys were conducted of the watercourses that were accessible associated with the options within the study area.

* indicates a priority Annex I habitat.

The risk assessment matrices presented in the below sections are based on an evaluation of the targets of the COs for each of the six qualifying features for the River Finn SAC as listed on the NPWS website[24]. It is recommended that site-specific COs be used when evaluating likely significant impacts on qualifying interest (QI) of European sites.

[23] Aquatic habitats and species are assessed in full in the OSR Volume D, Appendix 1.5 Aquatic Biodiversity
[24] https://www.npws.ie/protected-sites

Option 1A

This proposed crossing point at the River Finn is the western-most routing. The SAC territory spanned by the option is 0.023km^2 and is characterised by linear riparian woodland and scrub within the SAC boundary along both sides of the river bank.

The bridge construction will avoid instream works and the elevated road would sit atop abutments set back in excess of 10 metres from the river bank. Nonetheless the construction of the abutments on the either side of the river would require the removal of some riparian woodlands, which has been surveyed and does not correspond to the Annex I habitat Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) (91E0).

Table 3: Ecological Risk Associated with River Finn SAC – Option 1A

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]	No Impact pathway, upstream of the proposed works	None	None
Northern Atlantic wet heaths with *Erica tetralix* [4010]	No Impact pathway, upstream of the proposed works	None	None
Blanket bogs (* if active bog) [7130]	No Impact pathway, upstream of the proposed works	None	None
Transition mires and quaking bogs [7140]	No Impact pathway, upstream of the proposed works	None	None
Alkaline fens [7230]	No Impact pathway, upstream of the proposed works	None	None
Atlantic Salmon (*Salmo salar*) [1106]	Potential impact pathways identified - changes in water quality during construction phase impacting habitat in main River Finn channel and tributaries. Outside of main River Finn channel, inappropriately sized culverts impeding movement along the associated tributaries of the river.	Pollution incident during construction and/or operation within SAC aquatic territory. Disturbance of migrating patterns and spawning habitat.	None if design and works carried out in appropriate season and in accordance to best practice design criteria.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Otter (*Lutra lutra*) [1355]	Impact pathways identified - Although no holt confirmed, the level of activity and secondary evidence recorded on numerous visits within this option was identified along the River Finn. Also evidence of offline Otter activity along the River Finn and associated tributaries.	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter territory along the River Finn and its associated tributaries, proposed works could interfere with territory and/or maternal holts if present despite the application of a 10 metre riparian buffer zone between River Finn river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting options during construction work cannot be ruled out.	Until ongoing otter surveys are completed, cannot rule out adverse effects to the qualifying interest at this option.

Option 1A1

This proposed crossing point at the River Finn is the western-most routing. The SAC territory spanned by the option is 0.023km^2 and is characterised by linear riparian woodland and scrub within the SAC boundary along both sides of the river bank.

The bridge construction will avoid instream works and the elevated road would sit atop abutments set back in excess of 10 metres from the river bank. Nonetheless the construction of the abutments on the either side of the river would require the removal of some riparian woodlands, which has been surveyed and does not correspond to the Annex I habitat Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) (91E0).

Table 4: Ecological Risk Associated with River Finn SAC – Option 1A1

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]	No Impact pathway	None	None
Northern Atlantic wet heaths with *Erica tetralix* [4010]	No Impact pathway	None	None
Blanket bogs (* if active bog) [7130]	No Impact pathway	None	None
Transition mires and quaking bogs [7140]	No Impact pathway	None	None
Alkaline fens [7230]	No Impact pathway	None	None
Atlantic Salmon (*Salmo salar*) [1106]	Potential impact pathways identified - changes in water quality during construction phase impacting habitat in main River Finn channel and tributaries. Outside of main River Finn channel, inappropriately sized culverts impeding movement along the associated tributaries of the river.	Pollution incident during construction and/or operation within SAC aquatic territory. Disturbance of migrating patterns and spawning habitat.	None if design and works carried out in appropriate season and in accordance to best practice design criteria.
Otter (*Lutra lutra*) [1355]	Impact pathways identified - Although no holt confirmed, the level of activity and secondary evidence recorded on	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter territory along the River	Until ongoing otter surveys are completed, cannot rule out adverse effects to the qualifying interest at this option.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
	numerous visits within this option was identified along the River Finn. Also evidence of offline Otter activity along the River Finn and associated tributaries.	Finn and its associated tributaries, proposed works could interfere with territory and/or maternal holts if present despite the application of a 10 metre riparian buffer zone between River Finn river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting corridors during construction work cannot be ruled out.	

Option 1B

This proposed crossing point at the River Finn is to the west of Ballybofey, traveling through the Cappry townland before crossing the River Finn and moving north-east towards Ballinaglack. The SAC territory spanned by the option is 0.031km^2 and is characterised by linear riparian woodland and scrub within the SAC boundary along both sides of the river bank.

The bridge construction will avoid instream works and the elevated road would sit atop abutments set back in excess of 10 metres from the river bank. Nonetheless the construction of the abutments on the either side of the river would require the removal of some riparian woodlands, which has been surveyed and does not correspond to the Annex I habitat Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) (91E0).

Table 4: Ecological Risk Associated with River Finn SAC – Option 1B

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]	No Impact pathway	None	None
Northern Atlantic wet heaths with *Erica tetralix* [4010]	No Impact pathway	None	None
Blanket bogs (* if active bog) [7130]	No Impact pathway	None	None
Transition mires and quaking bogs [7140]	No Impact pathway	None	None
Alkaline fens [7230]	No Impact pathway	None	None
Atlantic Salmon (*Salmo salar*) [1106]	Potential impact pathways identified - changes in water quality during construction phase impacting habitat in main River Finn channel and tributaries. Outside of main River Finn channel, inappropriately sized culverts impeding movement along the associated tributaries of the river.	Pollution incident during construction and/or operation within SAC aquatic territory. Disturbance of migrating patterns and spawning habitat.	None if design and works carried out in appropriate season and in accordance to best practice design criteria.
Otter (*Lutra lutra*) [1355]	Impact pathways identified - Although no holt confirmed, the level of activity and secondary	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter	Until ongoing otter surveys are completed, cannot rule out adverse effects to the qualifying interest at this option.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
	evidence recorded on numerous visits within this option was identified along the River Finn. Also evidence of offline Otter activity along the River Finn and associated tributaries.	territory along the River Finn and its associated tributaries, proposed works could interfere with territory and/or maternal holts if present despite the application of a 10 metre riparian buffer zone between River Finn river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting corridors during construction work cannot be ruled out.	

Option 1B1

This proposed crossing point at the River Finn is to the west of Ballybofey, traveling through the Cappry townland before crossing the River Finn and moving north-east towards Ballnaglack and Teevickmoy. The SAC territory spanned by the option is 0.031km^2 and is characterised by linear riparian woodland and scrub within the SAC boundary along both sides of the river bank.

The bridge construction will avoid instream works and the elevated road would sit atop abutments set back in excess of 10 metres from the river bank. Nonetheless the construction of the abutments on the either side of the river would require the removal of some riparian woodlands, which has been surveyed and does not correspond to the Annex I habitat Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) (91E0).

Table 5: Ecological Risk Associated with River Finn SAC – Option 1B1

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]	No Impact pathway	None	None
Northern Atlantic wet heaths with *Erica tetralix* [4010]	No Impact pathway	None	None
Blanket bogs (* if active bog) [7130]	No Impact pathway	None	None
Transition mires and quaking bogs [7140]	No Impact pathway	None	None
Alkaline fens [7230]	No Impact pathway	None	None
Atlantic Salmon (*Salmo salar*) [1106]	Potential impact pathways identified - changes in water quality during construction phase impacting habitat in main River Finn channel and tributaries. Outside of main River Finn channel, inappropriately sized culverts impeding movement along the associated tributaries of the river.	Pollution incident during construction and/or operation within SAC aquatic territory. Disturbance of migrating patterns and spawning habitat.	None if design and works carried out in appropriate season and in accordance to best practice design criteria.
Otter (*Lutra lutra*) [1355]	Impact pathways identified - Although no holt confirmed, the level of activity and secondary	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter	Until ongoing otter surveys are completed, cannot rule out adverse effects to the qualifying interest at this option.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
	evidence recorded on numerous visits within this option was identified along the River Finn. Also evidence of offline Otter activity along the River Finn and associated tributaries.	territory along the River Finn and its associated tributaries, proposed works could interfere with territory and/or maternal holts if present despite the application of a 10 metre riparian buffer zone between River Finn river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting corridors during construction work cannot be ruled out.	

Option 1C

This proposed crossing point at the River Finn is to the west of Ballybofey, traveling through the Cappry townland before crossing the River Finn and moving north-east towards Ballinaglack and Teevickmoy. The SAC territory spanned by the option is 0.031km^2 and is characterised by linear riparian woodland and scrub within the SAC boundary along both sides of the river bank.

The bridge construction will avoid instream works and the elevated road would sit atop abutments set back in excess of 10 metres from the river bank. Nonetheless the construction of the abutments on the either side of the river would require the removal of some riparian woodlands, which has been surveyed and does not correspond to the Annex I habitat Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) (91E0).

Table 6: Ecological Risk Associated with River Finn SAC – Option 1C

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]	No Impact pathway	None	None
Northern Atlantic wet heaths with *Erica tetralix* [4010]	No Impact pathway	None	None
Blanket bogs (* if active bog) [7130]	No Impact pathway	None	None
Transition mires and quaking bogs [7140]	No Impact pathway	None	None
Alkaline fens [7230]	No Impact pathway	None	None
Atlantic Salmon (*Salmo salar*) [1106]	Potential impact pathways identified - changes in water quality during construction phase impacting habitat in main River Finn channel and tributaries. Outside of main River Finn channel, inappropriately sized culverts impeding movement along the associated tributaries of the river.	Pollution incident during construction and/or operation within SAC aquatic territory. Disturbance of migrating patterns and spawning habitat.	None if design and works carried out in appropriate season and in accordance to best practice design criteria.
Otter (*Lutra lutra*) [1355]	Impact pathways identified - Although no holt confirmed, the level of activity and secondary	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter	Until ongoing otter surveys are completed, cannot rule out adverse effects to the qualifying interest at this option.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
	evidence recorded on numerous visits within this option was identified along the River Finn. Also evidence of offline Otter activity along the River Finn and associated tributaries.	territory along the River Finn and its associated tributaries, proposed works could interfere with territory and/or maternal holts if present despite the application of a 10 metre riparian buffer zone between River Finn river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting corridors during construction work cannot be ruled out.	

Option 1C1

This proposed crossing point at the River Finn is to the west of Ballybofey, traveling through the Cappry townland before crossing the River Finn and moving north-east towards Ballinaglack and Teevickmoy. The SAC territory spanned by the option is 0.031km^2 and is characterised by linear riparian woodland and scrub within the SAC boundary along both sides of the river bank.

The bridge construction will avoid instream works and the elevated road would sit atop abutments set back in excess of 10 metres from the river bank. Nonetheless the construction of the abutments on the either side of the river would require the removal of some riparian woodlands, which has been surveyed and does not correspond to the Annex I habitat Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) (91E0).

Table 7: Ecological Risk Associated with River Finn SAC – Option 1C1

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]	No Impact pathway	None	None
Northern Atlantic wet heaths with *Erica tetralix* [4010]	No Impact pathway	None	None
Blanket bogs (* if active bog) [7130]	No Impact pathway	None	None
Transition mires and quaking bogs [7140]	No Impact pathway	None	None
Alkaline fens [7230]	No Impact pathway	None	None
Atlantic Salmon (*Salmo salar*) [1106]	Potential impact pathways identified - changes in water quality during construction phase impacting habitat in main River Finn channel and tributaries. Outside of main River Finn channel, inappropriately sized culverts impeding movement along the associated tributaries of the river.	Pollution incident during construction and/or operation within SAC aquatic territory. Disturbance of migrating patterns and spawning habitat.	None if design and works carried out in appropriate season and in accordance to best practice design criteria.
Otter (*Lutra lutra*) [1355]	Impact pathways identified - Although no holt confirmed, the level of activity and secondary	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter	Until ongoing otter surveys are completed, cannot rule out adverse effects to the qualifying interest at this option.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
	evidence recorded on numerous visits within this option was identified along the River Finn. Also evidence of offline Otter activity along the River Finn and associated tributaries.	territory along the River Finn and its associated tributaries, proposed works could interfere with territory and/or maternal holts if present despite the application of a 10 metre riparian buffer zone between River Finn river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting corridors during construction work cannot be ruled out.	

Option 1D

This proposed crossing point at the River Finn is to the west of Ballybofey, traveling through the Cappry townland before crossing the River Finn and moving north-east towards Drumboe (Upper/Lower) and Teevickmoy. The SAC territory spanned by the option is 0.018km^2 and is characterised by linear riparian woodland and scrub within the SAC boundary along both sides of the river bank.

The bridge construction will avoid instream works and the elevated road would sit atop abutments set back in excess of 10 metres from the river bank. Nonetheless the construction of the abutments on the either side of the river would require the removal of some riparian woodlands, which has been surveyed and does not correspond to the Annex I habitat Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) (91E0).

Table 8: Ecological Risk Associated with River Finn SAC – Option 1D

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]	No Impact pathway	None	None
Northern Atlantic wet heaths with *Erica tetralix* [4010]	No Impact pathway	None	None
Blanket bogs (* if active bog) [7130]	No Impact pathway	None	None
Transition mires and quaking bogs [7140]	No Impact pathway	None	None
Alkaline fens [7230]	No Impact pathway	None	None
Atlantic Salmon (*Salmo salar*) [1106]	Potential impact pathways identified - changes in water quality during construction phase impacting habitat in main River Finn channel and tributaries. Outside of main River Finn channel, inappropriately sized culverts impeding movement along the associated tributaries of the river.	Pollution incident during construction and/or operation within SAC aquatic territory. Disturbance of migrating patterns and spawning habitat.	None if design and works carried out in appropriate season and in accordance to best practice design criteria.
Otter (*Lutra lutra*) [1355]	Impact pathways identified - Although no holt confirmed, the level of activity and secondary	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter	Until ongoing otter surveys are completed, cannot rule out adverse effects to the qualifying interest at this option.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
	evidence recorded on numerous visits within this option was identified along the River Finn. Also evidence of offline Otter activity along the River Finn and associated tributaries.	territory along the River Finn and its associated tributaries, proposed works could interfere with territory and/or maternal holts if present despite the application of a 10 metre riparian buffer zone between River Finn river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting corridors during construction work cannot be ruled out.	

Option 1D1

This proposed crossing point at the River Finn is to the west of Ballybofey, traveling through the Cappry townland before crossing the River Finn and moving north-east towards Drumboe (Upper/Lower) and Teevickmoy. The SAC territory spanned by the option is 0.016km^2 and is characterised by linear riparian woodland and scrub within the SAC boundary along both sides of the river bank.

The bridge construction will avoid instream works and the elevated road would sit atop abutments set back in excess of 10 metres from the river bank. Nonetheless the construction of the abutments on the either side of the river would require the removal of some riparian woodlands, which has been surveyed and does not correspond to the Annex I habitat Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) (91E0).

Table 9: Ecological Risk Associated with River Finn SAC – Option 1D1

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]	No Impact pathway	None	None
Northern Atlantic wet heaths with *Erica tetralix* [4010]	No Impact pathway	None	None
Blanket bogs (* if active bog) [7130]	No Impact pathway	None	None
Transition mires and quaking bogs [7140]	No Impact pathway	None	None
Alkaline fens [7230]	No Impact pathway	None	None
Atlantic Salmon (*Salmo salar*) [1106]	Potential impact pathways identified - changes in water quality during construction phase impacting habitat in main River Finn channel and tributaries. Outside of main River Finn channel, inappropriately sized culverts impeding movement along the associated tributaries of the river.	Pollution incident during construction and/or operation within SAC aquatic territory. Disturbance of migrating patterns and spawning habitat.	None if design and works carried out in appropriate season and in accordance to best practice design criteria.
Otter (*Lutra lutra*) [1355]	Impact pathways identified - Although no holt confirmed, the level of activity and secondary	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter	Until ongoing otter surveys are completed, cannot rule out adverse effects to the qualifying interest at this option.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
	evidence recorded on numerous visits within this option was identified along the River Finn. Also evidence of offline Otter activity along the River Finn and associated tributaries.	territory along the River Finn and its associated tributaries, proposed works could interfere with territory and/or maternal holts if present despite the application of a 10 metre riparian buffer zone between River Finn river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting corridors during construction work cannot be ruled out.	

Option 1E

This proposed crossing point at the River Finn is to the west of Ballybofey, traveling through the Cappry townland before crossing the River Finn and moving north-east towards Drumboe (Upper/Lower) and Teevickmoy after the crossing. The SAC territory spanned by the option is 0.018km^2 and is characterised by linear riparian woodland and scrub within the SAC boundary along both sides of the river bank.

The bridge construction will avoid instream works and the elevated road would sit atop abutments set back in excess of 10 metres from the river bank. Nonetheless the construction of the abutments on the either side of the river would require the removal of some riparian woodlands, which has been surveyed and does not correspond to the Annex I habitat Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) (91E0).

Table 10: Ecological Risk Associated with River Finn SAC – Option 1E

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]	No Impact pathway	None	None
Northern Atlantic wet heaths with *Erica tetralix* [4010]	No Impact pathway	None	None
Blanket bogs (* if active bog) [7130]	No Impact pathway	None	None
Transition mires and quaking bogs [7140]	No Impact pathway	None	None
Alkaline fens [7230]	No Impact pathway	None	None
Atlantic Salmon (*Salmo salar*) [1106]	Potential impact pathways identified - changes in water quality during construction phase impacting habitat in main River Finn channel and tributaries. Outside of main River Finn channel, inappropriately sized culverts impeding movement along the associated tributaries of the river.	Pollution incident during construction and/or operation within SAC aquatic territory. Disturbance of migrating patterns and spawning habitat.	None if design and works carried out in appropriate season and in accordance to best practice design criteria.
Otter (*Lutra lutra*) [1355]	Impact pathways identified - Although no holt confirmed, the level of activity and secondary	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter	Until ongoing otter surveys are completed, cannot rule out adverse effects to the qualifying interest at this option.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
	evidence recorded on numerous visits within this option was identified along the River Finn. Also evidence of offline Otter activity along the River Finn and associated tributaries.	territory along the River Finn and its associated tributaries, proposed works could interfere with territory and/or maternal holts if present despite the application of a 10 metre riparian buffer zone between River Finn river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting corridors during construction work cannot be ruled out.	

Option 1E1

This proposed crossing point at the River Finn is to the west of Ballybofey, traveling through the Cappry townland before crossing the River Finn and moving north-east towards Drumboe (Upper/Lower) and Teevickmoy. The SAC territory spanned by the option is 0.016km^2 and is characterised by linear riparian woodland and scrub within the SAC boundary along both sides of the river bank.

The bridge construction will avoid instream works and the elevated road would sit atop abutments set back in excess of 10 metres from the river bank. Nonetheless the construction of the abutments on the either side of the river would require the removal of some riparian woodlands, which has been surveyed and does not correspond to the Annex I habitat Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) (91E0).

Table 11: Ecological Risk Associated with River Finn SAC – Option 1E1

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]	No Impact pathway	None	None
Northern Atlantic wet heaths with *Erica tetralix* [4010]	No Impact pathway	None	None
Blanket bogs (* if active bog) [7130]	No Impact pathway	None	None
Transition mires and quaking bogs [7140]	No Impact pathway	None	None
Alkaline fens [7230]	No Impact pathway	None	None
Atlantic Salmon (*Salmo salar*) [1106]	Potential impact pathways identified - changes in water quality during construction phase impacting habitat in main River Finn channel and tributaries. Outside of main River Finn channel, inappropriately sized culverts impeding movement along the associated tributaries of the river.	Pollution incident during construction and/or operation within SAC aquatic territory. Disturbance of migrating patterns and spawning habitat.	None if design and works carried out in appropriate season and in accordance to best practice design criteria.
Otter (*Lutra lutra*) [1355]	Impact pathways identified - Although no holt confirmed, the level of activity and secondary	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter	Until ongoing otter surveys are completed, cannot rule out adverse effects to the qualifying interest at this option.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
	evidence recorded on numerous visits within this option was identified along the River Finn. Also evidence of offline Otter activity along the River Finn and associated tributaries.	territory along the River Finn and its associated tributaries, proposed works could interfere with territory and/or maternal holts if present despite the application of a 10 metre riparian buffer zone between River Finn river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting corridors during construction work cannot be ruled out.	

Option 1F

This proposed crossing point at the River Finn is to the west of Ballybofey, traveling through the Cappry townland before crossing the River Finn and moving north-east towards Drumboe (Upper/Lower) and Teevickmoy. The SAC territory spanned by the option is 0.018km^2 and is characterised by linear riparian woodland and scrub within the SAC boundary along both sides of the river bank.

The bridge construction will avoid instream works and the elevated road would sit atop abutments set back in excess of 10 metres from the river bank. Nonetheless the construction of the abutments on the either side of the river would require the removal of some riparian woodlands, which has been surveyed and is not ascribable Annexed Alluvial woodland.

Table 12: Ecological Risk Associated with River Finn SAC – Option 1F

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]	No Impact pathway	None	None
Northern Atlantic wet heaths with *Erica tetralix* [4010]	No Impact pathway	None	None
Blanket bogs (* if active bog) [7130]	No Impact pathway	None	None
Transition mires and quaking bogs [7140]	No Impact pathway	None	None
Alkaline fens [7230]	No Impact pathway	None	None
Atlantic Salmon (*Salmo salar*) [1106]	Potential impact pathways identified - changes in water quality during construction phase impacting habitat in main River Finn channel and tributaries. Outside of main River Finn channel, inappropriately sized culverts impeding movement along the associated tributaries of the river.	Pollution incident during construction and/or operation within SAC aquatic territory. Disturbance of migrating patterns and spawning habitat.	None if design and works carried out in appropriate season and in accordance to best practice design criteria.
Otter (*Lutra lutra*) [1355]	Impact pathways identified - Although no holt confirmed, the level of activity and secondary evidence recorded on	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter territory along the River	Until ongoing otter surveys are completed, cannot rule out adverse effects to the qualifying interest at this option.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
	numerous visits within this option was identified along the River Finn. Also evidence of offline Otter activity along the River Finn and associated tributaries.	Finn and its associated tributaries, proposed works could interfere with territory and/or maternal holts if present despite the application of a 10 metre riparian buffer zone between River Finn river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting corridors during construction work cannot be ruled out.	

Option 1F1

This proposed crossing point at the River Finn is to the west of Ballybofey, traveling through the Cappry townland before crossing the River Finn and moving north-east towards Drumboe (Upper/Lower) and Teevickmoy. The SAC territory spanned by the option is 0.016km^2 and is characterised by linear riparian woodland and scrub within the SAC boundary along both sides of the river bank.

The bridge construction will avoid instream works and the elevated road would sit atop abutments set back in excess of 10 metres from the river bank. Nonetheless the construction of the abutments on the either side of the river would require the removal of some riparian woodlands, which has been surveyed does not correspond to the Annex I habitat Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) (91E0).

Table 13: Ecological Risk Associated with River Finn SAC – Option 1F1

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]	No Impact pathway	None	None
Northern Atlantic wet heaths with *Erica tetralix* [4010]	No Impact pathway	None	None
Blanket bogs (* if active bog) [7130]	No Impact pathway	None	None
Transition mires and quaking bogs [7140]	No Impact pathway	None	None
Alkaline fens [7230]	No Impact pathway	None	None
Atlantic Salmon (*Salmo salar*) [1106]	Potential impact pathways identified - changes in water quality during construction phase impacting habitat in main River Finn channel and tributaries. Outside of main River Finn channel, inappropriately sized culverts impeding movement along the associated tributaries of the river.	Pollution incident during construction and/or operation within SAC aquatic territory. Disturbance of migrating patterns and spawning habitat.	None if design and works carried out in appropriate season and in accordance to best practice design criteria.
Otter (*Lutra lutra*) [1355]	Impact pathways identified - Although no holt confirmed, the level of activity and secondary	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter	Until ongoing otter surveys are completed, cannot rule out adverse effects to the qualifying interest at this option.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
	evidence recorded on numerous visits within this option was identified along the River Finn. Also evidence of offline Otter activity along the River Finn and associated tributaries.	territory along the River Finn and its associated tributaries, proposed works could interfere with territory and/or maternal holts if present despite the application of a 10 metre riparian buffer zone between River Finn river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting corridors during construction work cannot be ruled out.	

Option 1G

This proposed crossing point at the River Finn is to the west of Ballybofey, traveling through the Cappry townland before crossing the River Finn and moving north-east towards Drumboe (Upper/Lower) and Teevickmoy. The SAC territory spanned by the option is 0.017km^2 and is characterised by linear riparian woodland and scrub within the SAC boundary along both side of the river bank.

The bridge construction will avoid instream works and the elevated road would sit atop abutments set back in excess of 10 metres from the river bank. Nonetheless the construction of the abutments on the either side of the river would require the removal of some riparian woodlands, which has been surveyed and does not correspond to the Annex I habitat Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) (91E0).

Table 14: Ecological Risk Associated with River Finn SAC – Option 1G

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]	No Impact pathway	None	None
Northern Atlantic wet heaths with *Erica tetralix* [4010]	No Impact pathway	None	None
Blanket bogs (* if active bog) [7130]	No Impact pathway	None	None
Transition mires and quaking bogs [7140]	No Impact pathway	None	None
Alkaline fens [7230]	No Impact pathway	None	None
Atlantic Salmon (*Salmo salar*) [1106]	Potential impact pathways identified - changes in water quality during construction phase impacting habitat in main River Finn channel and tributaries. Outside of main River Finn channel, inappropriately sized culverts impeding movement along the associated tributaries of the river.	Pollution incident during construction and/or operation within SAC aquatic territory. Disturbance of migrating patterns and spawning habitat.	None if design and works carried out in appropriate season and in accordance to best practice design criteria.
Otter (*Lutra lutra*) [1355]	Impact pathways identified - Although no holt confirmed, the level of activity and secondary	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter	Until ongoing otter surveys are completed, cannot rule out adverse effects to the qualifying interest at this option.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
	evidence recorded on numerous visits within this option was identified along the River Finn. Also evidence of offline Otter activity along the River Finn and associated tributaries.	territory along the River Finn and its associated tributaries, proposed works could interfere with territory and/or maternal holts if present despite the application of a 10 metre riparian buffer zone between River Finn river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting corridors during construction work cannot be ruled out.	

Appendix 2:
Ecological Impact Risk Matrix

Criteria for impact magnitude (derived from TII, Unit 12, PAG, 2011)[25] and amended to meet the scoring criteria of the TII Unit 7.0 PAG 2016

Impact Magnitude	Internationally important (A sites)	Nationally important (B sites)	County Importance (C sites)	Higher Value Local Importance (D sites)	Lower Value Local Importance (E sites)
1 Major Negative	Any permanent impacts	Permanent impacts on a large part of a site	Permanent impacts on a large part of a site		
2 Moderate Negative	Temporary impacts on a small part of a site.	Temporary impact on a large part of a site	Permanent impacts on a small part of a site	Permanent impact on a large part of a site	
3 Minor Negative		Temporary impacts on a small part of a site	Temporary impacts	Permanent impact on a small part of a site	Permanent impact on a large part of a site
4 Neutral	No impacts	No impacts	No impacts	No impact or temporary impact	Temporary impact or impact on a small part of a site
5 Minor Positive				Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site
6 Moderate Positive			Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site	
7 Major Positive	Permanent beneficial impacts	Permanent beneficial impacts	Permanent beneficial impacts on a large part of a site		

[25] It is to be noted that the most recent publications of the TII (NRA) Project Appraisal Guidelines (2016) were used to conduct the assessment of potential impacts from this project. However, the impact significance risk rationale is not included in the 2016 guidelines but are contained within the TII (NRA) *Project Appraisal Guidelines Unit 12.0 document* (NRA/TII, 2011)[25]. Therefore, the NRA/TII 2011 guidelines matrix was adopted to inform the magnitude of risk to ecological receptors only in order to qualify impact magnitudes in accordance with the Impact Scoring of *Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis* TII (2016).

Donegal County Council

TEN-T Priority Route Improvement Project, Donegal

Section 1: N15/N13 Ballybofey/Stranorlar Urban Region

Option Selection Report

Appendix D1.5 – Biodiversity (Aquatic)

December 2019

Document Control Sheet

Client:	Donegal County Council
Project Title:	TEN-T Priority Route Improvement Project, Donegal – Section 1: N15/N13 Ballybofey/Stranorlar Urban Region
Document Title:	Option Selection Report – Appendix D1.5 – Biodiversity (Aquatic)
Document No. :	TT-MGT0337-RPS-00-01-RP-E-EN-1011

Rev. No.	Suitability	Effective Date	Revision Description	Checked	Approved
P01	S4	December 2019	Issue for publication	PK	GMcE

This report has been prepared by RPS/Barry Transportation on behalf of Donegal County Council. Any other persons who use any information contained herein do so at their own risk.

© RPS Barry Transportation 2019

Table of Contents

1 INTRODUCTION 1
1.1 Methodology 2
1.1.1 Desk Study 2
1.1.2 Field Studies 2
1.1.3 Assessment Criteria 4
2 EXISTING ENVIRONMENT 6
2.1 Desk Study 6
2.1.1 River Finn and Tributaries 6
2.1.2 Cloghroe River (Deele Catchment) 7
2.1.3 Lough Alaan 8
2.2 Field Survey 9
2.2.1 Options 9
2.2.2 Link Options 18
2.2.3 Freshwater Peal Mussel Survey 22
2.3 Ecological Valuation of Watercourses 23
3 OPTION ASSESSMENT 27
3.1 Construction Phase Impacts 27
3.2 Operation Phase Impacts 28
3.3 Potential Impacts by Watercourse 29
4 OPTION SELECTION 31
4.1 Comparison of Options 31
4.2 Option Scoring Matrix 34
5 CONCLUSION 42
6 REFERENCES 44

Appendices

Appendix 1: Ecological Valuation Criteria

Appendix 2: Ecological Impact Risk Matrix

Appendix 3: Option Comparison Calculations

List of Figures

Figure 4-1:Total Watercourse Intersection (m) per option by Ecological Category 31

List of Tables

Table 1-1: EPA Biological Water Quality & Ecological Status Summary 3
Table 1-2: Impact Score Key (TII, 2016) 4
Table 1-3: Glossary of Impact Duration 5
Table 2-1: EPA Water Quality Monitoring Data 7
Table 2-2: EPA Water Quality Monitoring Data 8
Table 2-3: Location of River Finn FPM Survey (ITM) 22
Table 2-4: Ecological Valuation of Watercourses 23
Table 4-1: Watercourse Intersection Length (m) Main / Link Options by Ecological Category 32
Table 4-2: Number of Impact Category Occurrences per Option 32
Table 4-3: Comparison of Mean Impact Score and Total Option Intersection Length (m) 33
Table 4-4: Option Scoring Matrix 35

1 INTRODUCTION

This report examines the terrestrial biodiversity aspects of the environment of the 13 no. options for the Section 1 N15 Ballybofey-Stranorlar Urban Region of the TEN-T Priority Route Improvement Project in Donegal and will form part of a Phase 2 - Option Selection Report to be issued by the National Roads Design Office, Donegal County Council. See Section 1.2 of the Option Selection Report for Project Description.

Watercourses intersecting thirteen options (1A, 1A1, 1B, 1B1, 1C, 1C1, 1D, 1D1, 1E, 1E1, 1F, 1F1, 1G) and their associated link Options, were comprehensively investigated. This involved desk and field studies in order to characterise habitats and identify aquatic ecological value of all potentially affected waterbodies intercepted by, or within the Zone of Influence of, each of the options.

The objective of the study was to evaluate and compare potential impact of alternative options on aquatic ecological resources. This took into account all relevant markers of quality of freshwater habitats including; fisheries value; presence/absence of protected aquatic species and habitats; hydromorphology and biological indicators of water quality. The extent and qualifying interests of European and Irish designated sites and their relevant Conservation Objectives were considered. Potential aquatic ecological impacts for each of the options were broadly identified, with the aim of avoiding unacceptably high levels of adverse impact as part of the overall option selection process.

Watercourses intersected by the proposed options lie within the River Finn and River Deele (Cloghroe River) sub-catchments of the greater River Foyle catchment. The majority of the potentially affected surface waters are of the River Finn catchment, with one small tributary potentially affected in the Cloghroe River. The main channel of the River Finn is a designated [1]Salmonid Water and [2]Special Area of Conservation (River Finn SAC: Site Code 002301).

Fieldwork was undertaken in good weather conditions during July 2018, towards the end of an extended period of drought. Aquatic ecological studies and assessments were undertaken by Lauren Williams CIEEM, a qualified freshwater ecologist with 18 years of professional experience specialising in water quality, freshwater habitat, hydromorphology and aquatic Ecological Impact Assessment (EcIA) in relation to major engineering projects, including transport and energy infrastructure developments.

[1] S.I. No. 293 of 1988. EC (Quality of Salmonid Waters) Regulations

[2] EU Directive on the Conservation of Habitats, Flora and Fauna (92/43/EEC) 'Habitats Directive'

1.1 Methodology

This option selection report (Aquatic Ecology) involved investigation of all the main inland surface waters (rivers, streams) that are intersected by each of the 13 options to identify details and descriptions of ecological value, including their fisheries habitats and importance and any relevant designations. This is pursuant to *Guidelines for Ecological Impact Assessment* (NRA, 2009) and was achieved using a combination of desk and field studies as set out below.

1.1.1 Desk Study

To fully assess potential presence/absence of protected species and habitats, fisheries importance of watercourses, and distribution of qualifying interests of the River Finn SAC, a thorough desk-based search of available information was undertaken including:

- Drawings of the proposed development area;
- Maps and aerial photography of the potentially affected areas;
- Site synopses and qualifying interest data for all protected areas potentially affected;
- Previous EIS documents;
- Water Framework Directive (WFD) fish monitoring data and reports;
- Formal Data Request to National Parks and Wildlife Service (NPWS);
- A range of relevant peer reviewed, international literature and reports of scientific research.

Various online resources were used to assist the desk study including:

- National Biodiversity Centre Live maps: http://www.biodiversityireland.ie/biodiversity-data/access-biodiversity-data/
- EPA Envision Mapping: http://maps.epa.ie/InternetMapViewer/mapviewer.aspx
- NPWS Maps and Data: http://www.npws.ie/mapsanddata/
- WFD and River Basin Management site: http://www.wfdireland.ie/
- Watermaps at: http://www.wfdireland.ie/maps.html

1.1.2 Field Studies

Study Approach

Fieldwork was conducted in good weather conditions on July 10th, 11th and 12th, 2018. In as much was possible with regards to access, all intersections between surface waters and proposed options were subject to walkover survey in the field. In the main, field surveys focused on key sites, features or option sections that appear to be of particular ecological value. Assessment of ecological value was then backed up by desk study. Where possible the downstream Zone of Influence (ZoI) was also investigated.

The aim of field studies was to characterise instream habitats in terms of presence/absence of important aquatic species and habitats and potential fisheries values. A range of surveys were carried out depending on habitat encountered at each site. At a minimum, all sites were subject to general habitat description and fisheries habitat assessment. Select sites were sampled for biological water quality classification (Q-assessment). Not all sites were suitable for Q-assessment owing to unsuitable habitat, very low flow or relatively minor nature of the watercourse. Freshwater pearl mussel survey was carried out on the main channel of the River Finn.

Fisheries Habitat Assessment

Field-based fisheries habitat assessments involved walking the channels of each potentially affected watercourse reach, visually assessing the principle in-channel and bank-side habitats (e.g., substrates, flow type), and the suitability of the latter as spawning and or nursery sites for fish (salmonids & lampreys).

General Habitat Descriptions

Sites were visually assessed as to bank-side and in-channel habitats. Site habitat characteristics recorded included: substrate and flow types, depth and width, shading, surrounding land-use and general morphological character. The latter were assessed, generally based on criteria for river hydromorphology using the principles of the Rapid Hydromorphology Assessment Technique (RHAT) (Anon, 2009).

Freshwater Pearl Mussel Survey

Stage 1 Freshwater Pearl Mussel (FPM) Survey was conducted on the main channel of the River Finn on July 12th 2018. The survey was carried out under NPWS license C58/2018 (Exp. Dec 31st 2018) using standard Stage 1 FPM survey methodology (Anon., 2004). The survey is a basic presence/absence survey that determines whether there is a mussel population in the river reach in question. It involves manually searching for mussels within patches of most suitable habitat. In addition, all smaller streams were assessed in terms of their suitability for freshwater pearl mussel based on hydromorphological features such as size, depth, flow, substrate type.

Biological Water Quality Assessment

Macroinvertebrate samples were collected according to the EPA standard biological river monitoring procedures, adhering to ISO Standard for kick sampling and utilising the EPA's Quality Rating System (Q-Value). Under this system, standard 2-minute, travelling, kick-samples are taken in the fast flowing (riffle) areas of the rivers using a long-handled sampling net (250 mm width, mesh size 0.25mm). Riffle areas of streams receive preference in sampling, as the fauna of riffles tends to be more sensitive to pollution impacts. Stone washing is employed to ensure that "clinging" species, e.g. leeches and gastropods, are adequately collected. Samples were identified in the field, using a large white plastic tray with a volume of water, recording relative abundance of faunal groups for Q-assessment purposes. Specimens were identified to the lowest taxonomic level possible, predominantly genus/species or family. Relative abundance and taxonomic richness data was used to assign Q-values. The macroinvertebrate EQR calculated for water quality / ecological status interpretation is set out in**Table 1-1.**

Table 1-1: EPA Biological Water Quality & Ecological Status Summary

Biotic Index	EQR[3]	Quality Status	Water Quality	Ecological Status
Q5	1.0	Unpolluted	Good	High
Q4-5	0.9	Unpolluted	Fair-to-Good	High
Q4	0.8	Unpolluted	Fair	Good
Q3-4	0.7	Slightly Polluted	Doubtful-to- Fair	Moderate
Q3	0.6	Moderately Polluted	Doubtful	Poor
Q2-3	0.5	Moderately Polluted	Poor-to-Doubtful	Poor
Q2	0.4	Seriously Polluted	Poor	Bad
Q1-2	0.3	Seriously Polluted	Bad-to-Poor	Bad
Q1	0.2	Seriously Polluted	Bad	Bad

[3] EQR = Environmental Quality Ratio (Observed/Reference);

1.1.3 Assessment Criteria

Ecological Valuation of Watercourses

The criteria used for assessment of ecological value of watercourses are adapted from NRA (now Transport Infrastructure Ireland - TII) Ecological Impact Guidelines (NRA, 2009) involving careful consideration of fisheries value, water quality and, in as much as possible, consideration of contextual information for the resource at a geographic level. Ecological value was thus assigned to the receiving watercourses on the basis of (actual or perceived) rarity, status and geographical distribution. The evaluation criteria used to classify sites is shown in **Appendix 1.**

Observations and biological sample results were assessed in the context of national trends, guidelines and standards and EU Water Framework Directive (WFD) standards, as appropriate. In the absence of any standards or guidelines, the scientific literature was consulted for direction.

Impact Assessment

Types of direct, indirect and cumulative impacts that could arise from the proposed options are outlined. This does not constitute a full assessment of impacts but, was applied at a level that assisted the option appraisal. Impact assessment criteria were in line with International and National Guidelines for EcIA, including EPA (2017), CIEEM (2018) and NRA (2009). The magnitude, extent, timing and duration of potential impacts have been considered as well as their likelihood of occurring (CIEEM, 2018). Impact types and levels of significance were assigned according to the terminology of EPA (2017). Special consideration was given to the prediction of how proposed measures may affect the integrity of River Finn SAC and the conservation status of any Annex I habitats and Annex II species affected.

Scoring of Water Resources

The comparative evaluation of options was assisted by scoring of aquatic ecological resources using an Impact Scoring Key as set out in **Table 1-2**. This exercise was conducted with reference to relevant NRA Ecological Impact Assessment Guidelines (NRA, 2009) and Project Appraisal Guidelines (TII, 2016).

Table 1-2: Impact Score Key (TII, 2016)

7	Major or Highly Positive
6	Moderately Positive
5	Minor or Slightly Positive
4	Not Significant/Neutral
3	Minor or Minor or slightly negative
2	Moderately negative
1	Major or Highly negative

The scoring system prioritises impacts based on a matrix approach that takes into account:

- The importance of the waterbody e.g. presence of protected species such as salmon, lamprey, freshwater pearl mussel, crayfish;
- Extent of the water body likely to be impacted and whether impacts are temporary or ongoing; and
- Rarity of suitable habitat for protected species.

Scores for each watercourse crossing on each option were assigned based on expert judgement using a combination of qualitative and quantitative valuation. The qualitative valuation was based on the Evaluation of Ecological Value classification (**Appendix 1**). The quantitative evaluation was conducted by a broad calculation of the linear length (extent) of watercourses directly affected by each option. Note – these are not definitive linear intersection lengths, they were calculated using measurements taken from large scale maps that showed watercourses overlain by options. They provide a robust estimate of linear intersection for the purpose of option selection.

Appendix 2 shows the Impact Risk Matrix by which risk scores were assigned. Assessment of impact duration for the purposes of risk score evaluation (**Appendix 2**) was applied according to **Table 1-3**. The Impact Risk Score rates each watercourse intersection on a scale from 1 (Major Negative) – to – 7 (Major Positive).

Table 1-3: Glossary of Impact Duration

Impact Duration	No. Years
Temporary	≤1
Short-term	1 to 7
Medium-term	7 to 15
Long-term	15 to 60
Permanent	>60

As per NRA Guidelines (2009), the levels of impact assigned to options make the assumption that general mitigation measures will be implemented. This includes all Best Management Practise (BMP) in relation to construction of roads, especially in relation to the run-off of pollutants (e.g., sediment, hydrocarbons, concrete) and in maintenance of appropriate hydrological connection for the purpose of fish passage. Site-specific mitigation designs/measures and specific water management measures, e.g., diversions, culverting, timing of works and concerns in relation to fisheries restrictions etc., were excluded in the assessments.

2 EXISTING ENVIRONMENT

2.1 Desk Study

Watercourses intersected by the proposed options lie within the River Finn and River Deele (Cloghroe River) sub-catchments of the greater River Foyle catchment. The majority of the potentially affected surface waters are of the River Finn catchment, with one small tributary of the Cloghroe River affected.

2.1.1 River Finn and Tributaries

The River Finn rises in the 1Fstack mountain range in central County Donegal, Republic of Ireland, draining in a p1Dominantly easterly direction through Ballybofey /Stranorlar to confluence with the tidal River Foyle in the Lifford/Strabane area.

The main channel of the River Finn is a designated [4]Salmonid Water and [5]Special Area of Conservation (River Finn SAC: Site Code 002301). It is considered one of Ireland's premier spring salmon (*Salmo salar*) waters.

Aquatic qualifying interests of the SAC are Annex I Habitat 3110 - Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) and Atlantic salmon *(Salmo salar*) (NPWS, 2017). Habitat 3110 is confined to upland lakes within the designation and do not occur within the current study area. Only Atlantic salmon occur within the relevant study area.

Fish surveys are carried out on the River Finn by the Loughs Agency under Water Framework Directive (WFD) surveillance monitoring. Two sites are monitored: Stranagoppoge and Clady Bridge, c.20km u/s and d/s of Ballybofey respectively. The most recent data available (summer 2016) showed good numbers of 0+ and reasonable numbers of 1+ salmon at both surveillance sites using single pass electrofishing over 100m^2. Trout (*Salmo trutta*) were very scarce at both sites. Lampreys (species not defined) were recorded at Clady Bridge; European Eel (*Anguilla anguilla*) at both stations. The Clady Bridge site was at High Status for fish stocks, while Stranagoppoge was Moderate (Niven & McCauley, 2017). Overall, however, the River Finn consistently failed to meet its Conservation Limit for salmon over recent years (Niven et al., 2016).

The Loughs Agency conducts regular catchment-wide fish surveys in the Finn, using semi-quantitative (5-minute single-pass) electrofishing at numerous sites. Main channel and tributary sites that occur within the current study area are surveyed. Results over a number of years consistently show that in the reach upstream of Ballybofey where potential crossings of the River Finn occur, salmon fry (0+ year old) are absent or present in low numbers, while trout fry are absent. Parr (1+ year old) are generally present through the reach in 'Fair' numbers (5-14 fish per 5-min pass). Trout fry regularly occur in the lower reaches of the Drumboe Upper Burn (Trib. of R. Finn), while parr can be found in low numbers throughout this tributary. Both trout and salmon fry and parr occur in the Burn Daurnett consistently over the survey years in mainly 'Fair', up to 'Excellent' numbers (Niven *et al*., 2011b, 2016; Niven & Mc Cauley 2016; 2017).

The potentially affected reach encompassing the three River Finn crossing options was classified by Niven *et al*. (2011b) as mainly Grade 1 and 2 nursery habitat for salmonids, with small patches of Grade 2 holding and Grade 3 spawning habitats (Scale = 1 (excellent) - to - 4 (poor)).

[4] S.I. No. 293 of 1988. EC (Quality of Salmonid Waters) Regulations

[5] EU Directive on the Conservation of Habitats, Flora and Fauna (92/43/EEC) [Habitats Directive]

Combining the above information, it is evident that the River Finn main channel in the relevant reach upstream of Ballybofey, is an important salmonid nursery area (1+ fish), but holding and spawning potential, is limited and very sub-optimal. Of the main tributaries potentially affected by the options, the Burn Daurnett is a reasonably important salmonid (trout & salmon) spawning and nursery stream, while Drumboe Upper Burn is sub-optimal for spawning, especially in the upper catchment, but has some nursery habitat value throughout. Trout, rather than salmon, are more likely to occur in the other smaller tributaries. Brook lamprey (*Lampetra planeri*) and Eel would be present on the main channel and in tributaries.

The River Finn is a *Margaritifera* Sensitive Catchment classified as a "Catchment of other extant populations" (NPWS, 2017b). NPWS hold two historical records for freshwater pearl mussel (*Margaritifera margaritifera*) on the River Finn, near Castlefinn: 1 live adult (1989), 1 dead shell (1994). Mussels appear currently absent on the Finn, even though suitable habitat exists, which is suggested to be owing to pearl fishing having severely reduced or eliminated the species (Beasley & Roberts, 1999).

Biological water quality is monitored by the EPA on the River Finn and Burn Daurnett at stations upstream and downstream of the study area. Results over recent years are shown in**Table 2-1**. The River Finn and the Burn Daurnett, at stations upstream and downstream of the proposed development, are currently at Poor Ecological Status, equating to waters that are 'Moderately Polluted' and of 'Doubtful' quality. The Burn Daurnett is Poor-to-Doubtful quality upstream of the proposed development.

Table 2-1: EPA Water Quality Monitoring Data

EPA Code	Station Name	2011	2013	2016
01F010600	Finn - Bridge 2.5 km u/s Ballybofey	3-4	3-4	3
01F010800	Finn - Br S of Stranorlar	3-4	3-4	3
01F010900	Finn - Bridge S. of Killygordon	3-4	4	3
01B020010	Burn Daurnett - Blackburn Br	2-3	2-3	2-3
01B020200	Burn Daurnett - Bridge N.W. of Daisy Hill	3	3	3

2.1.2 Cloghroe River (Deele Catchment)

At the northern end of the proposed development, Teevickmoy Burn is intercepted to varying degrees by all proposed options. Teevickmoy Burn is a small tributary of the Cloghroe River, a tributary of the Deele River. The River Deele rises in the Cark Mountain plateau between the Derryveagh and Stack Mountains and flows in mainly an easterly direction towards the River Foyle at Lifford. Teevickmoy Burn joins the Cloghroe River about 1.5km downstream of the N13 road and the Cloghroe River then joins the Deele River a few hundred metres downstream.

Loughs Agency fish monitoring surveys show the River Deele to have reasonable numbers of salmon ('Fair' to 'Good') and trout ('Good'-to-'Excellent') fry (0+) in the region near the Cloghroe River confluence (Niven *et al*., 2011a, 2016; Niven & Mc Cauley, 2016). With Parr (1+) included, the total salmonid stocks near the Cloghroe/Deele confluence are generally 'Good' to 'Excellent' (e.g., Niven et al., 2011a).

Niven *et al*. (2011a) classified the Cloghroe River as mainly Grade 2 and 3 nursery habitats for salmonids, with small patches of Grade 3 holding and one tiny reach Grade 3 spawning habitat. There was no specific information found for the Teevickmoy Burn itself, but it would appear that it is has good potential as a trout spawning tributary of the Cloghroe River.

Biological water quality is monitored by the EPA on the Cloghroe and Deele Rivers. Relevant stations near the study area are shown in **Table 2-2**. The river reaches in the vicinity of the proposal are currently at Poor Ecological Status, equating to waters that are 'Moderately Polluted' and of 'Doubtful' quality.

Table 2-2: EPA Water Quality Monitoring Data

EPA Code	Station Name	2011	2013	2016
01C050400	Cloghroe - Br d/s Callan Bridge	3-4	3-4	3
01D010200	Deele (Donegal) - 2nd Br d/s Br near Newtown	4	4	3

2.1.3 Lough Alaan

Lough Alaan is set between Lough Hill to its east and the N13 road to the west, adjacent to Ballybofey and Stranorlar Golf Club. Lough Alaan is known as a wild trout lake and thus has high local amenity and recreational value, including angling. Its feeder tributary stream, which is intercepted by a number of the proposed link options, flows into the lake in a north-south direction, parallel and right next to the existing N13 road. Loughs Agency staff conducted a fish stock assessment at Lough Alaan in July 2013 using dutch-fyke and multi-mesh gill nets. Two species were recorded with a total of 37 fish captured: 18 brown trout, 19 eel (Niven & McCauley, 2015). The study identified presence of stratification within the lough, with a thermocline ranging from 23°C at the surface to 15°C at 6m. Dissolved oxygen was very low in the deeper lake levels (hypolimnion) compared to shallower levels (epilimnion). In summer there would typically be no mixing between these layers, meaning oxygen depletion (anoxia) occurs in the hypolimnion. Anoxia at depth would mean the deeper area of the lough is uninhabitable to fish. Indeed trout were only captured in the epilimnion in the 2013 study. The lough inflow and outflow streams are not monitored by the EPA.

2.2 Field Survey

2.2.1 Options

Burn Daurnett Main Channel [All Options]

- 1A, 1A1; 1B, 1B1; 1C, 1C1; 1G – short section of c. 150m intersects with east side of options;
- 1F, 1F1; 1D, 1D1; 1E, 1E1 – longer section of c.1000m intersects with centre line/east side of options.

Image 2-1	**Image 2-2**
ITM: 610612 892870 Burn Daurnett, typical habitat at u/s end of affected reach – all options (10th July 2018)	**ITM: 611153 893256 Burn Daurnett, typical habitat at d/s end of reach affected by longer interception options. (10th July 2018)**

Habitat / Fisheries Assessment: The Burn Daurnett is a moderate sized, moderate-to fast flowing lowland meandering stream (**Image 2-1** and **Image 2-2**). It has obvious signs of being drained historically, but has recovered reasonably natural instream morphology, forming a series of mainly riffle/run and glide sequences over substrates of gravel, cobble and coarse sand with reaches of bedrock. Instream vegetation comprised mainly aquatic mosses (*Fontinalis antipyretica, Brachythecium* spp.) and mats of *Phormidium* algae. The affected reach has a riparian corridor of broadleaf trees and shrubs, mainly willow; ash; sycamore; some conifer, with rough grazing pasture beyond. The Burn Daurnett has good salmonid nursery habitat with reasonable patches of salmonid spawning habitat and a few deeper holding areas for larger fish. It would support spawning lampreys most likely brook lamprey, although silt deposition is limited in the channel, meaning juvenile lamprey habitat is sub-optimal. It holds high local importance on account of fisheries value. This stream is in the C category (County importance – salmon and lamprey spawning habitat immediately upstream of SAC).

Biological Water Quality: A standard macroinvertebrate sample was taken and analysed on the bankside. The community was comprised of mainly moderately tolerant groups: Black fly larvae (Simuliidae); midges (Chironomidae); uncased caddisflies (*Rhyacophila*, Polycentropidae); Baetid mayflies, plus a few moderately sensitive stoneflies, *Leuctra* spp. The sample merited a Q3 rating, equating to moderately polluted and Poor Ecological Status.

Burn Daurnett Tributary (Mullanachose)

- 1B, 1B1, 1C, 1C1, 1G – short u/s section c.150m intersects with east side of options;
- 1F, 1F1, 1D, 1D1, 1E, 1E1 – c.300m reach intersects with center line/east side of options.

Image 2-3	**Image 2-4**
ITM: 611141 893537 Burn Daurnett Tributary (Mullanachose) u/s section – dry (10th July 2018)	**ITM: 611273 893507 Burn Daurnett Tributary (Mullanachose) d/s section, stagnant drain (10th July 2018)**

Habitat / Fisheries Assessment: This small tributary stream of the Burn Daurnett was dry in the u/s section (1B, 1B1, 1C, 1C1, 1G; **Image 2-3**) and was a stagnant field drain in the lower reaches during surveys of July 2018 (1F, 1F1, 1D, 1D1, 1E, 1E1; **Image 2-4**). The stagnant reach was choked with grass and water was highly turbid, slick and humic. This tributary within the intersecting zones is in the E Category (Local Importance (lower value) - little or no fisheries value).

Biological Water Quality: Not applicable, owing to unsuitable habitat for kick-sampling and Q-assessment.

River Finn Crossing A [1A, 1A1]

- 1A, 1A1 Options – entire 300m wide option intersects with River Finn main channel.

River Finn Crossing B [1B, 1B1, 1C, 1C1]

- 1B, 1B1, 1C, 1C1 Options - entire 300m wide option intersects with River Finn main channel.

River Finn Crossing C [1F, 1D, 1E]

- 1F, 1F1, 1D, 1D1, 1E, 1E1, 1G Options - entire 300m wide option intersects with River Finn main channel.

Habitat / Fisheries Assessment: The habitat at each of the River Finn crossing sites was broadly similar and will be described here as such for the purposes of option appraisal, see **Image 2-5** to **Image 2-10**, below. Water levels were extremely low during survey; visibility was excellent owing to clear water, low levels of surface glare and extended preceding drought conditions. The River Finn in the potentially affected reaches is a large, lowland reasonably fast flowing meandering river (bank-width 25-30m; wet width 17m; depth up to 0.7m in glides during drought). The dominant flow type was glide/run over mixed substrates of mainly large and small boulder cobble and bedrock outcrops, with patches of coarse gravel and sand deposited in hydraulic refuges behind boulders and interstitial spaces. Sections of bedrock and boulder form higher gradient cascade and step pool morphology, while low gradient reaches form slower glides between outcropped boulders. Instream plants were mainly aquatic mosses, primarily *Fontinalis squamosa, Brachythecium* spp., *Racomitrium* spp., and liverworts: *Chiloscyphus*. The banks were steep and fairly

uniform, indicative of historical drainage, with a broadly continuous riparian strip of mature trees and shrubs, including Ash, Alder, Willow, Poplar, Birch, Birdwood with understorey of mixed tall herb, bramble and ferns. A number of invasive plant species were recorded along the whole reach surveyed, encompassing all three crossing points: Himalayan balsam (*Impatiens glandulifera*), Montbretia (*Crocosmia x crocosmiiflora*), and dense stands of Japanese knotweed (*Fallopia japonica*).

The River Finn along the reach encompassing the three crossing options generally had low potential for salmonid spawning owing to a paucity of suitable areas of stable gravel/cobble, although limited spawning cannot be ruled out. The reaches all had patches of good or very good salmonid nursery habitat, with numerous young salmonids (parr) being observed in glides and riffle zones. There were only a few pools or deeper areas suitable for holding larger fish, e.g., resident trout. Eels are likely to be present. Fine sediment deposits were rare, meaning habitat was generally unsuitable for juvenile lamprey, and lamprey spawning potential was also considered low. Category A (designated Salmonid Water and SAC status).

Image 2-5

ITM: 611585 895450 River Finn Crossing A, 1A, 1A1 option- view d/s from centre line over option (12t July 2018)

Image 2-6

ITM: 611585 895450 River Finn Crossing A, 1A, 1A1 option -view u/s from near centre line over option (12th July 2018)

Image 2-7

ITM: 612044 895130 River Finn Crossing B, 1B/1C Options - view d/s from near centre line over option (12th July 2018)

Image 2-8

ITM: 612180 895111 River Finn Crossing B, 1B/1C Options - view u/s showing rapids and step/cascade nature within option (12th July 2018)

Image 2-9	**Image 2-10**
ITM: 612710 895015 River Finn Crossing C, 1F/1D/1E/1G Options - view u/s over option (12th July 2018)	**ITM: 612319 895100 River Finn Crossing C, 1F/1D/1E/1G Option - view d/s over option(12th July 2018)**

Biological Water Quality: A standard macroinvertebrate sample was taken and analysed on the bankside at the River Finn one lane bridge upstream of Ballybofey. The community was of low abundance and diversity comprised of mainly moderately tolerant and tolerant groups: Black fly larvae (Simuliidae); midges (Chironomidae); Tubificid worms; cased and uncased caddisflies (*Rhyacophila*, Hydropsychidae, Glossosomatidae); Baetid and *Serratella* mayflies, plus some moderately sensitive stoneflies, *Leuctra* spp. There were no Group A species; the sample merited a Q3 rating, equating to moderately polluted and Poor Ecological Status. This concurs with recent EPA monitoring at this site.

Finn Tributary D (Dooish)

- 1A, 1A1 Options intersects with centerline/west side of option for c.600m of stream length.

Habitat / Fisheries Assessment: Moderately small stream (wet width 0.65m; 5cm depth) with permanent, though very low flow in drought (**Image 2-11**). Stony substrates, mainly angular cobble, small and large boulder with aquatic mosses and liverworts (*Thamnobryum, Pellia epiphylla*). Clearly a spate stream with strong flows at times. No evidence of salmonid spawning habitat in lower reaches surveyed, but certainly possesses reasonable trout nursery habitat: Category D (Local Importance (higher value) -higher local fisheries value).

Biological Water Quality: Not carried out at this stage owing to very low flow conditions and relatively minor nature of watercourse.

Finn Tributary E (Cappry)

- 1D, 1D1, 1E, 1E1, 1F, 1F1, 1G Options intersects for c.30m u/s of Finn River confluence.

Habitat / Fisheries Assessment: This tiny tributary (**Image 2-12**) was not visible as surface water in the intersection zone. The stream was located as a piped outfall to the River Finn from a reinforced boulder rock-armour wall next to the R252. It appeared to be fully piped / culverted along its length u/s of the Finn confluence. It was dry during July 2018 survey. Category E (Local Importance (lower value) - no fisheries value).

Biological Water Quality: Not applicable, as watercourse was dry and/or sub-surface (piped).

Image 2-11

ITM: 611482 895462 Finn Tributary D (Dooish) [1A, 1A1 Options] Typical habitat, lower reach (12th July 2018)

Image 2-12

ITM: 612561 894982 Finn Tributary E (Cappry) confluence with River Finn [1D, 1D1, 1E, 1E1, 1F, 1F1, 1G Options] Dry, fully piped / culverted (12th July 2018)

Finn Tributary F (Drumboe Lower)

- 1D, 1D1, 1E, 1E1, 1F, 1F1, 1G Options intersects with 90m of open stream and c.400m of currently piped/culverted stream.

Image 2-13

ITM: 613032 895367 Entire stream piped under field at centreline of 1D, 1D1, 1E, 1E1, 1F, 1F1, 1G Options (11th July 2018)

Image 2-14

ITM: 613042 895286 Typical habitat Finn Trib. F (Lower Drumboe) within SAC - d/s of piped section (11th July 2018)

Habitat / Fisheries Assessment: A small tributary of the River Finn that has been entirely piped / culverted for the majority of its course (**Image 2-13** to **Image 2-14**). The open stream in the lower reach is moderately small (0.7 – 1.0m width) with quite swift flow forming a riffle/run, glide/pool series over substrates of gravel,

pebble and cobble with coarse sand with aquatic mosses. Numerous juvenile salmonids were observed. It's possible that young fish forage up from the Finn downstream, although there was some potential spawning habitat up to the point where the stream is piped. The lower (un-piped) reach is Category A (within SAC boundary); the upper (piped) reach is Category E (no fisheries value).

Biological Water Quality: Not Applicable, owing to minor nature and majority sub-surface (piped).

Drumboe Upper Burn (North) [1A, 1A1; 1B, 1B1]

- 1A, 1A1, 1B, 1B1 Options intersect c.350m of channel length.

Drumboe Upper Burn (Mid) [1C, 1C1; 1F, 1F1]

- 1C, 1C1, 1F, 1F1 Options intersect for c.400m of channel length each.

Drumboe Upper Burn (South) [1D, 1D1; 1E, 1E1; 1G]

- 1D, 1D1, 1E, 1E1, 1G Options intersect along c.570m of channel length.

Habitat / Fisheries Assessment: The habitat at each of the Drumboe Upper Burn sites was broadly similar for the purposes of option appraisal. It is a moderate sized (1.5-2.0m wet width, 15cm depth), spatey and in parts fast flowing mountain stream with variable gradient set in a mainly agricultural and rural housing area. It is comprised of mainly step/pool and run/glide habitat over cobble and small boulder with limited pockets of deposited gravel and fines. Some sections of bedrock form steeper cascade and step-pool morphology. Instream plants were mainly aquatic mosses and liverworts, with a broadly continuous riparian strip of mainly native trees and shrubs, including Ash, Hawthorn, Alder, Willow, Hazel, bracken and ferns. The entire stream was turbid during survey, coloured slightly milky white, the source of which was not evident. There was very little suitable salmonid spawning habitat evident in the reaches surveyed, although the stream would be very good salmonid nursery habitat. The reach with best potential for spawning was within the mid crossing point (1C, 1C1, 1F, 1F1) options, where there was a lower gradient (**Image 2-15** and **Image 2-17**). Northern crossing point (**Image 2-15**) and southern crossing point (**Image 2-18**) options were of higher gradient with more boulder bedrock chutes/rapids and cascades and less fine substrate available for spawning. There were no fish observed during surveys, but presence of trout and probably brook lamprey cannot be ruled out. This was considered to mainly be a potential trout stream of Category D (Local Importance – higher value).

Biological Water Quality: A standard macroinvertebrate sample was taken at the 1D/1E Options crossing location. The community was comprised of mainly moderately tolerant and tolerant groups: Black fly larvae (Simuliidae); midges (Chironomidae); uncased caddisflies (*Rhyacophila*, Polycentropidae); Baetid and *Serratella* mayflies, plus some moderately sensitive stoneflies, *Leuctra* spp. and Cased Caddisflies, *Sericostoma*. Presence of the latter two groups mean the sample merited a Q3 (3-4) rating, equating to slight-to-moderately polluted and Poor/Moderate Ecological Status.

Image 2-15

ITM: 613898 897020 Drumboe Upper Burn (North) 1A, 1A1, 1C, 1C1 Options - at crossing point (10th July 2018)

Image 2-16

ITM: 613963 896648 Drumboe Upper Burn (Mid) 1C, 1C1 Options - near crossing point (10th July 2018)

Image 2-17

ITM: 613911 896514 Drumboe Upper Burn (Mid) near crossing point for 1F, 1F1 Options (10th July 2018)

Image 2-18

ITM: 613836 896124 Drumboe Upper Burn (South) 1D, 1D1, 1E, 1E1, 1G Options - at crossing point (10th July 2018)

Image 2-19	**Image 2-20**
ITM: 613912 897025 Lettermackenny Trib. (lower), just u/s Drumboe Upper Burn confluence (10th July 2018)	ITM: 614196 897607 Lettermackenny Trib. in mid catchment within forestry at centreline of 1A, 1A1, 1C, 1C1 options (11th July 2018)

Lettermackenny Tributary of Upper Drumboe Burn [1A, 1A1; 1C, 1C1]

- 1A, 1A1 and 1C, 1C1 Options intersect with this small stream over its whole length from headwater to Drumboe Upper Burn confluence, to the magnitude of c.1465m, i.e., the entire stream falls within the footprint of these options.

Habitat / Fisheries Assessment: The habitat varied along the length of the stream, largely influenced by agriculture, forestry and some rural housing. The lower 220m reach (**Image 2-19**) was a small (0.8m wet width, 6cm depth) mainly stony bottomed stream forming a moderate gradient step/pool, riffle/run sequence. Substrates were mainly gravel and small cobble with occasional small boulders and pockets of coarse sand and finer sediments. There was a dense riparian hedgerow strip of Hazel, Hawthorn, Willow, Alder, Ash and Ivy shading the stream. Flows were exceptionally low in July 2018. Very little suitable spawning habitat was evident in the lower 220m reach surveyed, although there was reasonable potential for trout nursery. In the mid-catchment the stream was very small and highly modified by drainage and forestry (**Image 2-20**), possessing no fisheries value. Substrates in the mid- and upper catchment (**Image 2-21**) were mainly silt with sluggish glide flows, possessing no fisheries importance. The lower 220m was considered a potential trout nursery area is Category D (Local Importance – higher value); the remaining 1245m upstream to headwater is considered Category E (Local Importance (lower value) - low or no fisheries importance).

Biological Water Quality: A standard macroinvertebrate sample was taken 20m u/s of the Drumboe Upper Burn confluence. The community was comprised of mainly moderately tolerant and tolerant groups: Black fly larvae (Simuliidae); midges (Chironomidae); uncased caddisflies (*Rhyacophila*, *Philopotamus*); Baetid mayflies, plus a few moderately sensitive stoneflies, *Leuctra* spp. There were no Group A sensitive species. The sample merited a Q3 rating, equating to moderately polluted and Poor Ecological Status.

Image 2-21	**Image 2-22**
ITM: 614729 898131 Lettermackenny Tributary, upper catchment headwater (11th July 2018)	**ITM: 614259 896536 Magherapaste Trib. near option centreline crossing point (10th July 2018)**

Magherapaste Tributary [1D, 1D1, 1E, 1E1, 1G]

- 1D, 1D1, 1E, 1E1, 1G Options intersect to the magnitude of c.230m at the upper end of this tributary of the Drumboe Upper Burn.

Habitat / Fisheries Assessment: Tiny stream (0.45m wet width, 3cm depth) with trickle flow over silty gravel / pebble substrates (**Image 2-22**) forming riffle/ run and moderate gradient step/pool in parts. The plant nursery business on the True Left bank has modified the bank and also inserted a small dam for irrigation purposes. Tadpoles present. Very little fisheries potential, although flows were so low during the July 2018 drought it was difficult to judge. Category D/E (Local Importance (higher/lower value) - little or no fisheries potential)

Biological Water Quality: Not Applicable, owing to very minor nature and virtually dry.

Teevickmoy Burn [All Options]

- 1A, 1A1, 1C, 1C1 Options – total overlay of stream to magnitude of 1750m, follows on center line and in west side of option.
- 1E, 1E1 Options – overlay of stream to magnitude of 1500m, follows mainly on west side of option, with centerline close to stream.
- 1D, 1D1 Options – overlay of stream to magnitude of 950m, follows mainly on west side of option, with centerline close to stream.
- 1F, 1F1, 1G Options – intersection (diagonal) with stream at northern end to magnitude of 450m.
- 1C, 1C1 Options - intersection (diagonal) with stream at northern end to magnitude of 300m.

Image 2-23	**Image 2-24**
ITM: 615959 899580 Convergence crossing point for all options (11th July 2018)	**ITM: 615647 899200 Typical habitat of Teevickmoy Burn (11th July 2018)**

Habitat / Fisheries Assessment: Teevickmoy Burn is a tributary of the Cloghroe River, a tributary of the Deele River, which joins the River Foyle. It is a moderately small (2m bank width, 1m wet width, 3cm depth) stony bottomed stream forming a low-to-moderate gradient riffle/run sequence (**Image 2-23** and **Image 2-24**). Substrates were mainly gravel, pebble and small cobble with occasional small boulders and pockets of coarse sand and finer sediments. A dense riparian hedgerow was shading the stream on True Right bank: Hawthorn, Willow, Alder, Ash and Birch. Flows were exceptionally low in July 2018. The stream has reasonable salmonid spawning and nursery habitat, although it was suffering from stock trampling in places. The stream would be considered a reasonable trout habitat, with Eel and Brook lamprey also likely. The stream is contained in a long culvert (>50m) under the existing N13 road, with the 150m d/s of the culvert forming a deep drain with sluggish flow, silty substrates, dense emergent macrophytes and low fisheries potential. The majority of Teevickmoy Burn u/s of the N13 road was considered to have reasonable trout spawning and nursery potential is Category D (Local Importance-Higher Value); the lower 150m d/s N13 road is Category E (Local Importance (lower value) - low-to-no fisheries importance), although it is a migration route to upstream habitats.

Biological Water Quality: A standard macroinvertebrate sample was taken 15m u/s of the N13 culvert. The community was comprised of mainly moderately tolerant and tolerant groups: Black fly larvae (Simuliidae); midges (Chironomidae); cased caddisflies (Limnephilidae); Baetid mayflies, plus a few moderately sensitive stoneflies, *Leuctra* spp. There were no Group A sensitive species. The sample merited a Q3 rating, equating to moderately polluted and Poor Ecological Status.

Teevickmoy Burn Tributary [All Options]

- Small intersection (c.70m) with east side of option on all options, see Section 2.2.2, below, for Teevickmoy Burn Tributary habitat description (Category E).

2.2.2 Link Options

Teevickmoy Burn Tributary [1A, 1A1; 1B, 1B1]

- Intercepts with east side of options 1A, 1A1 and 1C, 1C1 Link Options for c.230m.

Habitat / Fisheries Assessment: Teevickmoy Burn Tributary (**Image 2-25**) is a deep canal-like, drain with a low volume of stagnant water (0.2m width, 5cm depth) and iron-stained, soft muddy substrates. It was completely overgrown with grasses and rushes. Banks were steep and overgrown with rosebay willowherb and bramble. Category E (Local Importance (lower value) -no fisheries potential).

Biological Water Quality: Not applicable, as silty habitat was unsuitable, of a minor nature and virtually dry.

Image 2-25

ITM: 616265 899376 Teevickmoy Burn Tributary, typical habitat (11th July 2018)

Image 2-26

ITM: 615536 896394 Lough Alaan Trib. adjacent N13 at d/s end of 1D, 1E, 1C, 1F Link options (11th July 2018)

Lough Alaan Tributary [All Eastern Link Options]

- 1D & 1E Link Options – slightly diagonal crossing covering c.320m of stream.
- 1C & 1F Link Options – overlay of stream to magnitude of c.1000m, follows mainly on centerline over whole reach.
- Short section (c.80m) in extreme upper headwater intercepted by 1A1, 1C1, 1B1, 1D1, 1E1, 1F1, 1G link options.

Image 2-27

ITM: 615578 896535 Lough Alaan Trib. – typical habitat within and downstream of eastern Link options (11th July 2018)

Image 2-28

ITM: 616188 896988 Finn Trib. G (Upper) Tircallan - near eastern Link Options centreline crossing point (11th July 2018)

Habitat / Fisheries Assessment: Lough Alaan Trib. (**Image 2-26**) flows south along the eastern side of the N13 road (Plate 24). It has clearly been altered historically; deepened and channelised as part of N13 road construction. It is a small stream, generally 1 m bank width (0.6m wet width, 3cm depth in July 2018) with trickle flow over silty gravel / pebble substrates (**Image 2-27**) forming riffle/ run and moderate gradient step/pool in parts. Banks were steep and high, and the stream is tunnelled by Hawthorn, Ivy, nettles and bramble. There appeared to be some limited fisheries potential, perhaps low-quality spawning habitat for brook lamprey and trout, although flows were so low during the July 2018 drought that it was difficult to judge. The stream was considered to be a moderately sensitive receptor, given it flows to Lough Alaan: a known wild brown trout lake. Category D (Local Importance (higher value) – some trout / brook lamprey spawning potential).

Biological Water Quality: Not carried out at this stage owing to very low flow and minor nature of watercourse.

Finn Tributary G Tircallan (Upper Reach) **[All Eastern Link Options]**

- 1A, 1A1, 1C, 1C1, 1B1, 1D1, 1E1, 1F1, 1G Link Options overlay upper 400m of stream headwater.

Finn Tributary G Treanamullin (Mid- Lower Reach) **[All Eastern Link Options]**

- 1A, 1A1, 1C, 1C1, 1B1, 1D1, 1E1, 1F1, 1G Link Options overlay c.1280m of the stream in the mid-catchment area, follows mainly east side of option and close to centerline at southern end.
- 1D, 1E, 1B, 1F Link Options – the stream runs parallel just outside east side of option boundary with small intersection (<100m) near N15.

Habitat / Fisheries Assessment: The habitat at each of the Finn Tributary G Treanamullin sites was broadly similar for the purposes of option appraisal (**Image 2-28** to **Image 2-30**). It is a medium sized (1.5-2.0m wet width in upper reaches, 3.0-3.5m in lower reaches, 15cm depth during drought), fairly fast flowing mountain-type stream with variable gradient. Hydromorphology was considered quite natural and well recovered from obvious historical drainage (deepened). Flows were mainly step/pool and run/glide habitat over cobble and small boulder, but with very limited pockets and reaches of deposited gravels or fines. Some sections of bedrock formed steeper cascades and rapids. Instream plants were mainly aquatic mosses and liverworts, with a broadly continuous riparian strip of mainly native trees and shrubs, including Ash, Hawthorn, Alder, Willow, Birch, Holly. The entire stream was turbid during survey, coloured slightly milky white, the source of which was not apparent (quarry run-off perhaps). There was very little suitable spawning habitat evident in the reaches surveyed, although the stream comprises very good salmonid nursery habitat. The reach with best potential for spawning was in the lower reaches towards the River Finn confluence. The 2007 EIS stated "*The tributary of the River Finn at Treanamullin … does not support significant fish stocks though brown trout do occur in is lower reaches*." There were no fish observed during the current surveys, but presence of trout and brook lamprey cannot be ruled out. River lamprey may occur in the lower reaches. Category D (Local Importance -higher value)).

Biological Water Quality: Not carried out at this stage, will require further investigation during next stage as all link options intercept this stream to some extent.

Image 2-29

ITM: 616188 896988 Finn Trib. G (Upper, Tircallan) - Within option near centreline of all Eastern Link Options (11th July 2018)

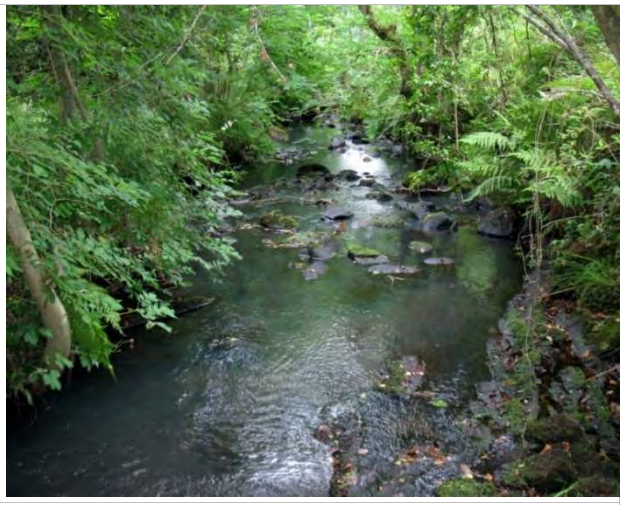


Image 2-30

ITM: 616554 895710 Finn Trib. G (Mid-Lower, Treanamullin) - Within east side option near centreline of all Eastern Link Options (11th July 2018)

Image 2-31

ITM: 616586 895216 Finn Trib. G (Mid-Lower, Treanamullin) – just upstream existing N15 Bridge (11th July 2018)

Image 2-32

ITM: 616542 895714 Typical habitat of Lough Hill Branch of Finn Trib. G at Treanamullin (11th July 2018)

Finn Tributary G Treanamullin - Lough Hill Branch **[All Eastern Link Options]**

- 1A, 1A1, 1C, 1C1, 1B1, 1D1, 1E1, 1F1, 1G Link Options intercept (c. 250m) this low-quality tributary of the Treanamullin Stream.
- 1D, 1E, 1B, 1F Link Options overlay entire stream branch to magnitude of c.640m, follows mainly on centerline and east side option.

Habitat / Fisheries Assessment: This tiny branch of Finn Trib. G Treanamullin was a more-or less insignificant field drainage channel with trickle flow or small stagnant pools over peaty silt substrates (**Image 2-32**). Overgrown with bramble and densely shaded by hedgerow. Category E (Local Importance (lower value) - no fisheries value)

Biological Water Quality: Not applicable, as silty habitat was unsuitable, of a minor nature and virtually dry.

2.2.3 Freshwater Peal Mussel Survey

Water levels were at an historic low level on the River Finn owing to extended drought conditions during spring/summer 2018 presenting ideal conditions for Stage 1 Freshwater Pearl Mussel survey. Two reaches were surveyed. Upstream and downstream co-ordinates (ITM) are shown in**Table 2-3**. Site F1 was the full 1.5km reach encompassing the three potential River Finn main channel crossing locations. Site F2 was the 300m reach downstream of Drumboe Lower Tributary (downstream of F1).

Freshwater pearl mussels were absent from both reaches surveyed, covering a total of almost 2km of river channel. There was plenty of suitable habitat opportunity for the species, although biological water quality (Q3 / Poor Status) was sub-optimal for this pollution sensitive invertebrate. Filamentous green algae recorded on substrates and in slow glides and margins, indicated nutrient enrichment - a poor indicator for Freshwater Pearl Mussels. Instream habitats are described in detail in **Section 2.2.1**(above) for River Finn Crossings A, B and C.

Table 2-3: Location of River Finn FPM Survey (ITM)

Site		Easting	Northing
Finn - F1	U/S	611536	895547
	D/S	612710	895015
Finn - F2	U/S	613121	895128
	D/S	613249	894877

Habitat opportunity for mussels included stable patches of gravel and coarse sand deposited downstream of large boulders / bedrock outcrops; plus stable cobble and pebble glides with pockets of fine interstitial bed material. Aquatic mosses (*Fontinalis squamosa*) and liverworts (*Chiloscyphus*) were the dominant instream vegetation type. The types of habitats available ought to support a good mussel population. There were numerous salmonid parr observed, which would suggest good opportunity for parasitism by mussel glochidia (juveniles), although water quality was sub-optimal for both mussels and salmonids. Silt was generally absent owing to fairly swift flows and rooted macrophytes were scarce.

Image 2-33

FPM Survey reach - River Finn downstream of Drumboe Lower Tributary, view d/s (12th July 2018)

Image 2-34

FPM Survey reach - River Finn downstream of Drumboe Lower Tributary, view d/s (12th July 2018)

The reach downstream of the Drumboe Lower Tributary confluence was broadly similar in habitat to those encompassing the proposed crossing sites, although there was considerably more cobble/pebble forming riffle/run hydromorphology going downstream (**Image 2-33**) as opposed to bouldery glides further upstream (**Image 2-34**). Riffle areas had patches of stable interstitial gravel/coarse sand and were considered to offer potential suitable habitat for pearl mussel.

The absence of mussels was surprising given there was considerable habitat opportunity. This finding tends to concur with observations of Beasley & Roberts (1999) who proposed that even though habitat was suitable, historical pearl fishing may have eliminated the River Finn population.

2.3 Ecological Valuation of Watercourses

Table 2-4 shows the Ecological Valuation of Watercourses intersected along each option. The classification is assigned according to criteria in **Appendix 1**, and this forms the basis of the qualitative assessment in terms of aquatic ecology for each watercourse potentially affected by options.

Table 2-4: Ecological Valuation of Watercourses

Options	Watercourse	Ecological Class.	No. Intersections
1A /1A1 Options	Burn Daurnett	C	12
	River Finn Crossing A	A	
	Finn Trib. D (Dooish)	D	
	Drumboe Upper Burn	D	
	Lettermackenny Trib.	D/E	
	Teevickmoy Burn	D	
	Teevickmoy Burn Trib.	E	
Link (1A /1A1) Options	Lough Alaan Tributary	D	
	Teevickmoy Burn Trib.	E	
	Finn Trib. G - Tircallan	D	
	Finn Trib. G - Treanamullin	D	
	Finn Trib. G - Lough Hill Branch	E	
1B Option	Burn Daurnett	**C**	9
	Burn Daurnett Tributary	**E**	
	River Finn Crossing B	**A**	
	Drumboe Upper Burn	**D**	
	Teevickmoy Burn	**D**	
	Teevickmoy Burn Trib.	**E**	
Link (1B) Option	Lough Alaan Tributary	**D**	
	Finn Trib. G Treanamullin	**D**	
	Treanamullin - Lough Hill Branch	**E**	
1B1 Option	Burn Daurnett	**C**	10
	Burn Daurnett Tributary	**E**	
	River Finn Crossing B	**A**	
	Drumboe Upper Burn	**D**	

Options	Watercourse	Ecological Class.	No. Intersections
	Teevickmoy Burn	**D**	
	Teevickmoy Burn Trib.	**E**	
Link (1B1) Option	Lough Alaan Tributary	**D**	
	Finn Trib. G Tircallan	**D**	
	Finn Trib. G Treanamullin	**D**	
	Finn Trib. G - Lough Hill Branch	**E**	
1C / 1C1 Options	Burn Daurnett	**C**	12
	Burn Daurnett Tributary	**E**	
	River Finn Crossing B	**A**	
	Drumboe Upper Burn	**D**	
	Lettermackenny Trib.	**D/E**	
	Teevickmoy Burn	**D**	
	Teevickmoy Burn Trib.	**E**	
Link (1C / 1C1) Options	Lough Alaan Tributary	**D**	
	Teevickmoy Burn Trib.	**E**	
	Finn Trib. G Tircallan	**D**	
	Finn Trib. G Treanamullin	**D**	
	Finn Trib. G - Lough Hill Branch	**E**	
1D Option	Burn Daurnett	**C**	12
	Burn Daurnett Tributary	**E**	
	River Finn Crossing C	**A**	
	Finn Trib. E (Cappry)	**E**	
	Finn Trib. F (Lower Drumboe)	**A/E**	
	Drumboe Upper Burn	**D**	
	Magherapaste Trib.	**E**	
	Teevickmoy Burn	**D**	
	Teevickmoy Burn Trib.	**E**	
Link (1D) Option	Lough Alaan Tributary	**D**	
	Finn Trib. G Treanamullin	**D**	
	Treanamullin - Lough Hill Branch	**E**	
1D1 Option	Burn Daurnett	**C**	13
	Burn Daurnett Tributary	**E**	
	River Finn Crossing C	**A**	
	Finn Trib. E (Cappry)	**E**	
	Finn Trib. F (Lower Drumboe)	**A/E**	
	Drumboe Upper Burn	**D**	
	Magherapaste Trib.	**E**	
	Teevickmoy Burn	**D**	
	Teevickmoy Burn Trib.	**E**	

Options	Watercourse	Ecological Class.	No. Intersections
1D1 Link Option	Lough Alaan Tributary	**D**	
	Finn Trib. G Tircallan	**D**	
	Finn Trib. G Treanamullin	**D**	
	Finn Trib. G - Lough Hill Branch	**E**	
1E Option	Burn Daurnett	**C**	12
	Burn Daurnett Tributary	**E**	
	River Finn Crossing C	**A**	
	Finn Trib. E (Cappry)	**E**	
	Finn Trib. F (Lower Drumboe)	**A/E**	
	Drumboe Upper Burn	**D**	
	Magherapaste Trib.	**E**	
	Teevickmoy Burn	**D**	
	Teevickmoy Burn Trib.	**E**	
	Lough Alaan Tributary	**D**	
Link (1E) Option	Lough Alaan Tributary	**D**	
	Finn Trib. G Treanamullin	**D**	
	Treanamullin - Lough Hill Branch	**E**	
1E1 Option	Burn Daurnett	**C**	13
	Burn Daurnett Tributary	**E**	
	River Finn Crossing C	**A**	
	Finn Trib. E (Cappry)	**E**	
	Finn Trib. F (Lower Drumboe)	**A/E**	
	Drumboe Upper Burn	**D**	
	Magherapaste Trib.	**E**	
	Teevickmoy Burn	**D**	
	Teevickmoy Burn Trib.	**E**	
Link (1E1) Option	Lough Alaan Tributary	**D**	
	Finn Trib. G Tircallan	**D**	
	Finn Trib. G Treanamullin	**D**	
	Finn Trib. G - Lough Hill Branch	**E**	
1F Option	Burn Daurnett	**C**	11
	Burn Daurnett Tributary	**E**	
	River Finn Crossing C	**A**	
	Finn Trib. E (Cappry)	**E**	
	Finn Trib. F (Lower Drumboe)	**A/E**	
	Drumboe Upper Burn	**D**	
	Teevickmoy Burn	**D**	
	Teevickmoy Burn Trib.	**E**	
Link (1F) Option	Lough Alaan Trib.	**D**	

Options	Watercourse	Ecological Class.	No. Intersections
	Finn Trib. G Treanamullin	**D**	
	Treanamullin - Lough Hill Branch	**E**	
1F1 Option	Burn Daurnett	**C**	12
	Burn Daurnett Tributary	**E**	
	River Finn Crossing C	**A**	
	Finn Trib. E (Cappry)	**E**	
	Finn Trib. F (Lower Drumboe)	**A/E**	
	Drumboe Upper Burn	**D**	
	Teevickmoy Burn	**D**	
	Teevickmoy Burn Trib.	**E**	
1F1 Link Option	Lough Alaan Tributary	**D**	
	Finn Trib. G Tircallan	**D**	
	Finn Trib. G Treanamullin	**D**	
	Finn Trib. G - Lough Hill Branch	**E**	
1G Option	Burn Daurnett	**C**	13
	Burn Daurnett Tributary	**E**	
	River Finn Crossing C	**A**	
	Finn Trib. E (Cappry)	**E**	
	Finn Trib. F (Lower Drumboe)	**A/E**	
	Drumboe Upper Burn	**D**	
	Magherapaste Trib.	**E**	
	Teevickmoy Burn	**D**	
	Teevickmoy Burn Trib.	**E**	
Link Option	Lough Alaan Tributary	**D**	
	Finn Trib. G Tircallan	**D**	
	Finn Trib. G Treanamullin	**D**	
	Finn Trib. G - Lough Hill Branch	**E**	

3 OPTION ASSESSMENT

Potential impacts on watercourses and aquatic ecology are categorised on a number of levels, fundamentally those that occur in either construction or operational phases of the project. Types of impacts are further divided into direct, indirect and cumulative impacts, and are assessed for significance in terms of impact duration, scale and overall magnitude. For the purpose of option appraisal (i.e., in the absence of detailed design and/or construction methods at this stage in the process), only broad types of impacts are described below.

3.1 Construction Phase Impacts

Release of Sediment

The nature of the project means that there is a potential for the release of sediment during the construction phase which can have direct (local) and indirect (downstream) effects on aquatic ecology. This arises as a result of large-scale earth movement and excavation. Such effects would be more likely during very heavy rain giving rise to run-off of silt-laden water. Sediment loss to watercourses may also result from instream works as part of the scheme including culverting, channel realignment, bridge works etc. Sediment loss can result in increased sedimentation, which, in turn, can adversely impact macroinvertebrates and aquatic habitat quality. Elevated suspended solids levels within the water column can damage the gills of salmonid fish and benthic macroinvertebrates and can smother fish spawning areas when deposited.

The habitat of the River Finn main channel, for example is such that juvenile salmon and trout will be present in varying densities depending on specific habitat type. Riffles, runs and shallow glides are important nursery areas for salmonids even in small high local value watercourses, whist a few pools and deeper glides will hold older fish. Juvenile fish are more susceptible to gill damage than older fish as a result of temporary increases in suspended solids. Lamprey ammocoetes, if present, would not be expected to be adversely impacted by sediment release as a result of works since they inhabit areas of silt deposition during their nursery stage.

Loss of Cement and Hydrocarbons

The nature of the project means that there is a potential for the loss of cement or hydrocarbons such as diesel and hydraulic fluids during the construction phase. Bulk liquid concrete is also a fundamental part of road, bridge and culvert construction works and this gives rise to the possibility that spills could occur and reach rivers, streams and Lough Alaan. Cement is highly alkaline and can give rise to very serious fish kills with similar effects on benthic macroinvertebrates. Wash off from poorly cured cement can also be highly alkaline and potentially dangerous to fish. Careful supervision of cement handling, curing times, and general good engineering practice can greatly reduce the risk from concrete-related impacts so that the likelihood of impacts is best described as low. Hydrocarbon spills from poorly secured or non-bunded fuel storage areas, leaks from vehicles or plant or spills during re-fuelling can all give rise to the escape of hydrocarbons from construction sites to water courses. These spills can give rise to tainting of fish or, if large enough, fish kills and invertebrate kills. Just like cement, the likelihood of this occurring from a well-equipped, maintained and managed construction site is low.

Timing of works

Any direct instream works, for example; culverting, permanent or temporary channel diversions and channel realignments, have greatest potential for negative impacts during spawning / breeding and early nursery periods for aquatic species in the study area. In addition, large scale out of stream works with potential for excessive sediment wash out can have the same negative effect.

With regards to this project, potential impacts relate mainly to the River Finn main channel crossings; any possible instream impacts in the Burn Daurnett; crossings of the Upper Drumboe Burn and direct physical impact on the Teevickmoy Burn. To some extent, the Treanamullin - Finn Tributary G is also potentially sensitive, although there is less likelihood of any notable salmonid spawning occurring there. In general, there can be no instream or potentially significantly damaging out of river works occurring during fisheries restricted periods. The timing of such works must be agreed with relevant authorities (IFI and Loughs Agency).

Disturbance of Habitats and Species

Direct physical disturbance occurs when watercourses are diverted (temporary or short-term) or permanently realigned. Although newly created or highly disturbed instream habitats can recover over time, even to pre-construction quality, the level of impact depends on the degree to which realignments, for example, are engineered in order to reinstate pre-existing habitats.

Nutrient Loss to Watercourses

There is some risk of increased nutrient loss to watercourses during the construction phase, though limited mainly to nutrient in the sediment bound phase, for example, sediment bound Phosphorus (measured as Total-P). The main source of soluble nutrient loss could be where tracts of coniferous forestry were clear-felled to facilitate the option. This may be an issue on 1A, 1A1 and 1B Options in the Lettermackenny Trib. and Teevickmoy Burn, but the areas of forestry in question do not appear to be of any great magnitude.

3.2 Operation Phase Impacts

Habitat Loss /Fragmentation

When a watercourse is culverted for example, the habitat is essentially permanently lost to instream species, including fish and macroinvertebrates. Obviously, the impact of this depends on the overall linear length of watercourse culverted, the exact location of the culvert and the existing condition / habitats of the watercourse in question. It can also depend on the type of culvert used. Improperly designed or maintained culverts can also form barriers to fish passage, thus fragmenting habitats, in streams that currently or potentially support fish. This can affect all species, especially those species that migrate: salmon, sea trout, lampreys and eel.

Hydraulic Changes

Poorly designed crossings can disrupt natural river hydraulics leading to increased erosion, flooding as a result of flow changes, blockage by debris and problems with fish passage through structures, culverts in particular (Cocchiglia *et al*., 2012). Fish passage through culverts can be affected by slope, water velocity, water depth and bed roughness within culverts and at culvert ends. Inappropriately positioned culverts or bridge piers can result in bank and/or riverbed scour and erosion. There will be little hydraulic impact on the River Finn main channel assuming a large, clear-span crossing structure is used. Careful design of crossing structures / culverts at streams such as the Drumboe Upper, Burn Daurnett, Teevickmoy Burn and Treanamullin (Trib. of Finn) is required as these should be treated as fish bearing.

Hydromorphology Changes

Crossing structures and permanent channel realignments can alter instream hydromorphology with the potential to affect instream and riparian habitats for fish and macroinvertebrates. Such impacts can be avoided by careful design and/or reinstatement of suitable habitat that broadly matches, or improves, pre-existing habitats. Shading effects of bridges or darkness within culverts are not considered particularly deleterious to fish passage as fish can migrate in dark or light. Culverts should ideally be straight with light penetrating at both ends. Clear-span bridges have no effect on fish movement. A large clear span bridge

may cast shade on the river bed, but this would result in only minor changes to instream habitats, mainly in the reduction of macroalgae or phytobenthos growth. The overall shadow effect would depend on the height and width of the structure. This may have minor effects on instream productivity in areas that experience constant shadow, with probably imperceptible impacts on feeding behaviour of juvenile salmonids. There may be a slight reduction in aquatic moss cover, but this won't significantly impact on habitats for fish or macroinvertebrates. A broadly north-south aligned (as proposed) clear span bridge across the Finn may still have reasonable light incidence for part of each day.

Road Runoff Pollution

Road runoff contains pollutants such as suspended solids, heavy metals and hydrocarbons (e.g. polycyclic aromatic hydrocarbons (PAHs)), representing a risk to surface waters if the runoff is not appropriately treated. The pollutants can be sediment bound and/or in soluble form, although much of the pollutant load, including PAHs, is sediment bound (TII, 2014). It is essential, therefore, that the suspended solid load is treated before allowing discharge to surface waters.

For a road project of this scale and type, it is to be assumed for this stage of the option selection process that all drainage and storm-water run-off controls installed will be designed to comply with the highest Best Management Practice Standards, including such measures as discussed in Drainage Design for National Road Schemes - Sustainable Drainage Options (TII, 2014).

3.3 Potential Impacts by Watercourse

River Finn

The River Finn will be crossed by a single span structure and it is envisaged that there will be no in-stream works. Impacts on the River Finn, if any, are most likely to occur during the construction phase. Each of the possible options over the River Finn occur within a zone of important salmonid nursery habitat, but lack spawning and holding reaches, even for some distance downstream. However, the international importance and designation of the channel (SAC, Salmonid Water) means that any impact, even temporary or short-term in the construction phase, is considered potentially Major or Significantly Negative. This is the most sensitive watercourse intersection ('A' Classification), affecting all options, however, the single span structure means that long term impacts are likely to be negligible.

Potential indirect impacts on the River Finn main channel (SAC) could also arise from construction phase works in proximity to the river, for example, in association with the link option intersection at Cappry (R252) near the River Finn south bank. There are also potential cumulative effects as a result of in-combination works on various tributaries and parts of tributaries of the River Finn, all of which flow to the main channel.

Burn Daurnett

Within the scheme, the Burn Daurnett ('C' Classification), is the 2nd most sensitive channel within the study area, supporting a reasonable population of trout and salmon. 1D, 1D1, 1E, 1E1, 1F, 1F1 Options have a greater intersection with this stream than the other options. The impact will depend on specific measures proposed and whether the channel is physically altered or impacted permanently. The risk for each option is evaluated based on the degree of intersection involved.

Upper Drumboe Burn

This tributary of the River Finn is crossed by each of the options. This is the 3rd most sensitive channel in the scheme ('D' Classification, with some trout spawning in lower reaches within the ZoI). Salmonid nursery habitat is intersected by all Options. The linear length of channel affected is greatest for 1D, 1D1, 1E, 1E1 and 1G Option, given the angle of intersection. Crossing structure type, (culvert/bridge) and design will determine potential impacts in the next stage.

Teevickmoy Burn

This small tributary of the Cloghroe River (Deele catchment) is considered the 4th most sensitive channel ('D' Classification – potential trout spawning, certainly trout nursery habitat). The linear length of channel affected is greatest for 1A, 1A1, 1C, 1C1 Options. 1D, 1D1 has a moderate intersection, while 1F, 1F1 followed by 1B options intersecting least. The impact would depend on the degree of intersection and specific location of option in relation to the stream and/or realignment design.

Finn Tributary G – Tircallan/Treanamullin

This medium sized stream has a high degree of naturalness in its hydromorphology, albeit recovered from historical drainage. It generally lacks salmonid and lamprey spawning substrates but is certainly good nursery habitat, although it was turbid and appeared slightly polluted ('D' Classification). All of the potential link option have an interception with this stream at 3 locations: Treanamullin (Mid-Lower), Tircallan and the Lough Hill Branch. The impact of the Link Options would depend on actual option alignment in relation the watercourse and specific measures proposed. The degree of intervention associated with the link options has considerable potential for indirect and cumulative construction phase impact in terms of pollutant export to the River Finn downstream. In this case, the greater the degree of interception, the greater the potential indirect cumulative impact.

Lough Alaan Tributary

Highly modified in its current state owing to existing N13 road infrastructure, but potentially a trout stream ('D' Classification), this stream is intercepted to some degree by all eastern link options. Potential impacts during construction phase would be considered Moderate at best, given the presence of the Lough Alaan wild trout recreational fishery downstream. Operational phase impacts would depend on the degree of modification proposed at the N13 junction and specific measures included.

Minor Streams

Remaining streams are largely minor ('E' Classification) with little or no fisheries value. Potential direct impacts are mainly considered Minor or Neutral and Not Significant. Note, however, that more significant indirect and cumulative impacts can arise through downstream mobilisation of pollutants via minor streams to better quality habitats downstream.

4 OPTION SELECTION

4.1 Comparison of Options

Option comparison calculations are shown in Appendix 3. These are the combined qualitative and quantitative assessments of aquatic ecological impacts pertaining to each potential watercourse intersection, per option. Total linear length (m) of watercourse intersection is divided up according to ecological quality classification. The results are illustrated in **Figure 4-1** below. **Table 4-1** separates the total linear intersection length (m) into main option and link. In terms of the overall magnitude of linear intersection length (m) the following order (least to highest) applies: 1B < 1B1 < 1G < 1F < 1D < 1F1 < 1E < 1D1 < 1C/1C1 ≤ 1E1 < 1A/1A1.

Each option has a similar level of intersection with higher valuation waters, all relating to the River Finn crossing (category 'A'). Note that this intersection is a proposed clear-span crossing with set-back abutments which likely eliminates potential residual impacts following the construction phase. The shading effect of this bridge would depend on the height and width, which may determine residual light incidence. In any case, shading effects are very likely to be negligible, certainly not affecting upstream and downstream movement of fish.

The majority of watercourse intersections along each of the options, certainly over the greater distances, are with waters of lower ecological value, i.e., 'D' and 'E' class waters.

Options 1B, 1B1 and 1G show least intersection with waters of either high or lower ecological value. Options 1A, 1A1, 1C and 1C1 have the greatest level of intersection overall, albeit mainly with lower class waters, although a significant proportion of the lower-class waters are potentially fish bearing ('D' Class). Options 1D, 1D1, 1F, 1F1, 1E, 1E1 show a more considerable intersection with 'C' class waters, relating to potential impact on the Burn Daurnett, a salmon and trout spawning tributary of the Finn, at the southern end of the scheme.

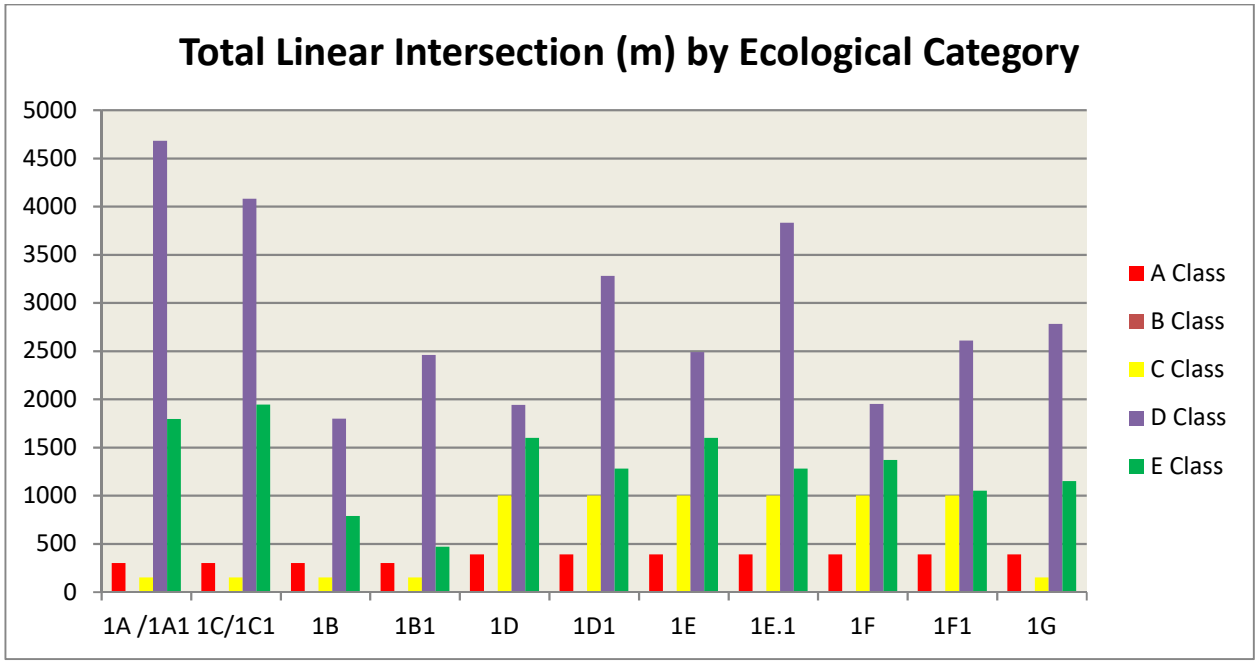


Figure 4-1:Total Watercourse Intersection (m) per option by Ecological Category

Table 4-1: Watercourse Intersection Length (m) Main / Link Options by Ecological Category

Option	A Class	B Class	C Class	D Class	E Class	Total (m)	Grand Total (m)
1A/1A1 Main	300	0	150	2920	1315	4685	6925
1A/1A1 Link	0	0	0	1760	480	2240	
1C/1C1 Main	300	0	150	2320	1465	4235	6475
1C/1C1 Link	0	0	0	1760	480	2240	
1B Main	300	0	150	700	220	1370	3040
1B Link	0	0	0	1100	570	1670	
1B1 Main	300	0	150	700	220	1370	3380
1B1 Link	0	0	0	1760	250	2010	
1D Main	390	0	1000	1520	1030	3940	4930
1D Link	0	0	0	420	570	990	
1D1 Main	390	0	1000	1520	1030	3940	5950
1D1 Link	0	0	0	1760	250	2010	
1E Main	390	0	1000	2070	1030	4490	5480
1E Link	0	0	0	420	570	990	
1E1 Main	390	0	1000	2070	1030	4490	6500
1E1 Link	0	0	0	1760	250	2010	
1F Main	390	0	1000	850	800	3040	4710
1F Link	0	0	0	1100	570	1670	
1F1 Main	390	0	1000	850	800	3040	5050
1F1 Link	0	0	0	1760	250	2010	
1G Main	390	0	150	1020	900	2460	4470
1G Link	0	0	0	1760	250	2010	

Table 4-2: Number of Impact Category Occurrences per Option

Option	Major (-)	Moderate (-)	Mod-Minor (-)	Minor (-)	Neutral
1A/1A1	1	4	2	3	2
1C/1C1	1	3	2	3	3
1B	1	3	-	3	2
1B1	1	3	2	2	2
1D	3*	2	-	4	3
1D1	3*	3	2	2	3
1E	3*	2	-	4	3
1E1	3*	3	2	2	3
1F	3*	3	-	2	3
1F1	3*	3	2	1	3
1G	2*	3	2	3	3

**One of these potentially Major Impacts relates to a very short length of River Finn Tributary (Lower Drumboe) that is within the SAC boundary and may be permanently affected. It is unlikely to affect Conservation Objectives of the site but must be treated as potentially 'Major (-)' according to NRA Guidelines.*

Table 4-2 shows occurrences of watercourse impact categories along each option (including associated link options). Option 1B showed the best profile, followed by 1B1, which is very similar to 1G. 1D1, 1E1, 1F1 tend to show the poorest profiles.

Note that one of the 'Major' impacts on each of the thirteen options is the single-span River Finn crossing, which is very likely to have a neutral long-term impact following a temporary / short term disturbance in the construction phase. Another of the potentially 'Major' Impacts (*) relates to a very short length of River Finn Tributary (Lower Drumboe) that is within the SAC boundary and may be permanently affected. It is unlikely to affect Conservation Objectives or integrity of the SAC site but must be treated as potentially 'Major (-)' according to NRA Guidelines.

Mean Impact Score (MIS) per option was calculated (details in **Appendix 3**) to indicate weighting of qualitative impact per option (MIS = Impact Score per watercourse intersection / total No. watercourse intersections). **Table 4-3** shows that all options have an "average" impact of between Moderate and Minor (Score 2-3). Options 1F1 and 1F show a tendency towards higher potential impact on average (2.42 / 2.45), while Options 1C/1C1 shows the lowest mean impact score (2.71).

Mean impact scores broadly represent the combined quantitative and qualitative impact on each watercourse intersection, however, when total linear length of option watercourse intersection is factored in (as represented in Table 4.3), Option1B clearly has a lower magnitude of impact overall, followed by Option 1B1, then, 1F broadly equal to 1G.

The eastern link option that has potentially has considerable intersection with Finn Tributary G – Treanamullin (1A/1A1, 1C/1C1, 1B1, 1D1, 1E1, 1F1, 1G) may give rise to sizeable (Moderate, possibly Major) potential cumulative impact given the magnitude of overall intersection. This depends on the actual option alignment in relation to the stream and specific measures proposed in the final design.

Although there is no actual watercourse intersection, the design, alignment and location of the intersection at the R252 link near the River Finn could give rise to cumulative impact (indirect inputs of sediment and pollutants) on the River Finn SAC. It is indicated that in all cases the R252/Finn interchange will be located on the far side of the existing R252, away from the river, having no direct impact on the river bank. In relation to the R252 interchanges for all options, issues such as specific measures to prevent excessive run-off of pollutants during construction, plus operational phase drainage treatment will be crucial and must be taken into account in the final design.

Table 4-3: Comparison of Mean Impact Score and Total Option Intersection Length (m)

Option	Mean Impact Score (MIS)	Magnitude
1A/1A1	2.54	6925m
1C/1C1	2.71	6475m
1B	2.67	3040m
1B1	2.6	3380m
1D	2.54	4930m
1D1	2.46	5950m
1E	2.54	5480m
1E1	2.46	6500m
1F	2.45	4710m
1F1	2.42	5050m
1G	2.62	4470m

Taking all of the above into account, and with expert judgement applied: Option1B emerges as the preferred option from an aquatic ecology perspective, with Option1B1 and 1G second equal, followed by 1D, 1C/1C1, 1F=1E, 1D1=1F1, 1E1, 1A/1A1, and; in that descending order of preference.

4.2 Option Scoring Matrix

Table 4-4 shows the overall quantitative and qualitative assessments. The 'Score' assigned to each option is based on potential impacts of each option without specific mitigation by design and/or specific measures. Preference has been assigned from the most preferable options to intermediate options and finally the least preferable options from an aquatic ecology perspective.

Table 4-4: Option Scoring Matrix

Option	[6]Quantitative Assessment	Qualitative Assessment	MIS	Impact	Impact Score	Preference Ranking	Preference
1A/1A1	Total linear length of watercourses intersected by option = 6925m. Total watercourse interceptions = 12	**Major Negative (x 1)** River Finn (Designated SAC & Salmonid Water) temporary-to- short term negative during construction phase, but with correct drainage and storm-water run-off treatment as per NRA Sustainable Drainage BMPs, long term impact of single span bridge design is considered Not Significant. **Moderate Negative (x 4)** Drumboe Upper Burn, Teevickmoy Burn, Finn Trib. D (Dooish) & Finn Trib. G (Treanamullin). Extensive lengths of channels affected. Impacts would be difficult to fully mitigate, unless by specific design, e.g., alignment that avoids extensive physical impact or overlay on channels. **Moderate-to-Minor (x 3)** Lettermackenny Trib., Finn Trib. G –Tircallan; Lough Alaan Trib. owing to permanent impact on extensive reach of fish bearing channel(s), plus cumulative and indirect impacts on higher quality waters downstream. Specific design may alleviate potential impact level, e.g., alignment that avoids extensive physical impact or direct overlay on the channels. **Minor Negative (x 2)** Burn Daurnett - owing to temporary impact on short section of higher quality channel + more extensive impact Lough Hill Branch – Finn Trib. G. **Neutral (x 2)** Teevickmoy Burn Trib. x 2 (main option and link option).	2.54	Moderately negative	2	8	Least Preferred
1B	Total linear length of watercourses intersected by option = 3040m. Total watercourse interceptions = 9	**Major Negative (x 1)** River Finn (Designated SAC & Salmonid Water) temporary-to- short term negative during construction phase, but with correct drainage and storm-water run-off treatment as per NRA Sustainable Drainage BMPs, long term impact of single span bridge design is considered Not Significant. **Moderate Negative (x 3)** Drumboe Upper Burn, Teevickmoy Burn, Lough Alaan Trib. - owing to permanent impact on extensive reach of fish bearing channel(s), and/or cumulative and indirect impacts on higher quality waters downstream.	2.67	Moderately Negative	2	1	Preferred

[6] See Appendix 3 for full table of calculations

Option	[6]Quantitative Assessment	Qualitative Assessment	MIS	Impact	Impact Score	Preference Ranking	Preference
		Specific design may alleviate potential impact level, e.g., alignment that avoids extensive physical impact or direct overlay on channels. **Minor Negative (x 3)** Burn Daurnett, Finn Trib. G - Lough Hill Branch; Finn Trib. G (Treanamullin) - temporary impact on higher quality channel (Burn Daurnett) and indirect /cumulative impacts at Finn Trib. G (likely to be adequately mitigated with specific measures). **Neutral (x 2)** Burn Daurnett Trib.; Teevickmoy Burn Trib.					
1B1	Total linear length of watercourses intersected by option = 3380m. Total watercourse interceptions = 10	**Major Negative (x 1)** River Finn (Designated SAC & Salmonid Water) temporary-to- short term negative during construction phase, but with correct drainage and storm-water run-off treatment as per NRA Sustainable Drainage BMPs, long term impact of single span bridge design is considered Not Significant. **Moderate Negative (x 3)** Drumboe Upper Burn, Teevickmoy Burn, Finn Trib. G (Treanamullin) - owing to permanent impact on extensive reach of fish bearing channel(s), plus cumulative and indirect impacts on higher quality waters downstream. Specific design may alleviate potential impact level, e.g., alignment that avoids extensive physical impact or direct overlay on channels. **Moderate-to-Minor (x 2)** Finn Trib. G –Tircallan; Lough Alaan Trib. owing cumulative and indirect impacts on higher quality waters downstream. **Minor Negative (x 3)** Burn Daurnett, Finn Trib. G - Lough Hill Branch: temporary impact on higher quality channel (Burn Daurnett) and indirect /cumulative impact at Finn Trib. G (likely to be adequately mitigated with specific measures). **Neutral (x 2)** Burn Daurnett Trib.; Teevickmoy Burn Trib.	2.60	Moderately Negative	2	2	Preferred
1C/1C1	Total linear length of watercourses intersected by option = 6475m. Total watercourse interceptions = 12	**Major Negative (x 1)** River Finn (Designated SAC & Salmonid Water) temporary-to- short term negative during construction phase, but with correct drainage and storm-water run-off treatment as per NRA Sustainable Drainage BMPs, long term impact of single span bridge design is considered Not Significant. **Moderate Negative (x 4)** Drumboe Upper Burn, Teevickmoy Burn, Finn Trib. D (Dooish) & Finn Trib. G (Treanamullin). Extensive lengths of channels affected. Impacts would be difficult to fully mitigate, unless by specific design, e.g., alignment that avoids extensive physical impact or overlay on channels. **Moderate-to-Minor (x 3)** Lettermackenny Trib., Finn Trib. G –Tircallan; Lough Alaan Trib. owing to permanent impact on extensive reach of fish bearing channel(s), plus cumulative and indirect impacts on higher quality waters	2.71	Moderately Negative	2	4	Intermediate

Option	[6]Quantitative Assessment	Qualitative Assessment	MIS	Impact	Impact Score	Preference Ranking	Preference
		downstream. Specific design may alleviate potential impact level, e.g., alignment that avoids extensive physical impact or direct overlay on the channels. **Minor Negative (x 2)** Burn Daurnett - owing to temporary impact on short section of higher quality channel + more extensive impact Lough Hill Branch – Finn Trib. G. **Neutral (x 3)** Teevickmoy Burn Trib. x 2 (main option and link option); Burn Daurnett Trib.					
1D	Total linear length of watercourses intersected by option= 4930m. Total watercourse interceptions = 12	**Major Negative (x 3)** (1) River Finn (Designated SAC & Salmonid Water) temporary-to- short term negative during construction phase, but with correct drainage and storm-water run-off treatment as per NRA Sustainable Drainage BMPs, long term impact of single span bridge design is considered Not Significant. (2) Burn Daurnett owing to overall length of channel potentially affected, fisheries status and permanent nature of intervention; and (3) Drumboe Lower (within SAC boundary and may be lost -impact unlikely to affect Conservation Objectives of SAC but must be treated as 'Major (-)' according to NRA Guidelines. These impacts could likely be adequately mitigated with specific design/ measures. It may be possible that the Burn Daurnett is not altered under the scheme if the road was located in the west side of the option. **Moderate Negative (x 2)** Drumboe Upper Burn; Teevickmoy Burn - owing to permanent impact on extensive reach of fish bearing channel(s), plus cumulative and indirect impacts on higher quality waters downstream. Specific design may alleviate potential impact level, e.g., alignment that avoids extensive physical impact or direct overlay on the channels. **Moderate-to-Minor (x 1)** Lough Alaan Trib, indirect impact on d/s trout fishery. **Minor Negative (x 3)** Magherapaste Trib.; Finn Trib. G - Lough Hill Branch, Finn Trib. G - Treanamullin - indirect /cumulative downstream impacts. (likely to be adequately mitigated with specific measures). **Neutral (x 3)** Burn Daurnett Trib.; Teevickmoy Burn Trib., Finn Trib E (Cappry).	2.54	Moderately Negative	2	3	Intermediate
1D1	Total linear length of watercourses intersected by option = 5950m. Total watercourse interceptions = 13	**Major Negative (x 3)** (1) River Finn (Designated SAC & Salmonid Water) temporary-to- short term negative during construction phase, but with correct drainage and storm-water run-off treatment as per NRA Sustainable Drainage BMPs, long term impact of single span bridge design is considered Not Significant. (2) Burn Daurnett owing to overall length of channel potentially affected, fisheries status and permanent nature of intervention; and Drumboe Lower (within SAC boundary and may be lost -impact unlikely to affect Conservation Objectives of SAC, but must be treated as 'Major (-)' according to	2.46	Moderately Negative	2	6	Intermediate

Option	[6]Quantitative Assessment	Qualitative Assessment	MIS	Impact	Impact Score	Preference Ranking	Preference
		NRA Guidelines. These impacts could likely be adequately mitigated with specific design/ measures. It may be possible that the Burn Daurnett is not altered under the scheme if the road was located in the west side of the option. **Moderate Negative (x 3)** Drumboe Upper Burn, Teevickmoy Burn, Finn Trib. G (Treanamullin) - owing to permanent impact on extensive reach of fish bearing channel(s), plus cumulative and indirect impacts on higher quality waters downstream. Specific design may alleviate potential impact level, e.g., alignment that avoids extensive physical impact or direct overlay on the channels. **Moderate-to-Minor (x 2)** Finn Trib. G –Tircallan; Lough Alaan Trib. owing cumulative and indirect impacts on higher quality waters downstream. **Minor Negative (x 2)** Magherapaste Trib.; Finn Trib. G - Lough Hill Branch - indirect /cumulative downstream impacts at both channels. These impacts are likely to be adequately mitigated with specific measures. **Neutral (x 3)** Burn Daurnett Trib.; Teevickmoy Burn Trib., Finn Trib E (Cappry).					
1E	Total linear length of watercourses intersected by option = 5480m. Total watercourse interceptions = 12	**Major Negative (x 3)** (1) River Finn (Designated SAC & Salmonid Water) temporary-to- short term negative during construction phase, but with correct drainage and storm-water run-off treatment as per NRA Sustainable Drainage BMPs, long term impact of single span bridge design is considered Not Significant. (2) Burn Daurnett owing to overall length of channel potentially affected, fisheries status and permanent nature of intervention; and (3) Drumboe Lower (within SAC boundary and may be lost -impact unlikely to affect Conservation Objectives of SAC, but must be treated as 'Major (-)' according to NRA Guidelines. These impacts could likely be adequately mitigated with specific design/ measures. It may be possible that the Burn Daurnett is not altered under the scheme if the road was located in the west side of the option. **Moderate Negative (x 2)** Drumboe Upper Burn; Teevickmoy Burn - owing to permanent impact on extensive reach of fish bearing channel(s), plus cumulative and indirect impacts on higher quality waters downstream. Specific design may alleviate potential impact level, e.g., alignment that avoids extensive physical impact or direct overlay on the channels. **Moderate-to-Minor (x 1)** Lough Alaan Trib: indirect impact on d/s trout fishery. **Minor Negative (x 3)** Magherapaste Trib.; Finn Trib. G - Lough Hill Branch, Finn Trib. G - Treanamullin - indirect /cumulative downstream impacts. (likely to be adequately mitigated with specific measures). **Neutral (x 3)** Burn Daurnett Trib.; Teevickmoy Burn Trib., Finn Trib E (Cappry).	2.54	Moderately Negative	2	5	Intermediate

Option	[6]Quantitative Assessment	Qualitative Assessment	MIS	Impact	Impact Score	Preference Ranking	Preference
1E1	Total linear length of watercourses intersected by option = 6500m. Total watercourse interceptions = 13	**Major Negative (x 3)** (1) River Finn (Designated SAC & Salmonid Water) temporary-to- short term negative during construction phase, but with correct drainage and storm-water run-off treatment as per NRA Sustainable Drainage BMPs, long term impact of single span bridge design is considered Not Significant. (2) Burn Daurnett owing to overall length of channel potentially affected, fisheries status and permanent nature of intervention; and (3) Drumboe Lower (within SAC boundary and may be lost -impact unlikely to affect Conservation Objectives of SAC, but must be treated as 'Major (-)' according to NRA Guidelines. These impacts could likely be adequately mitigated with specific design/ measures. It may be possible that the Burn Daurnett is not altered under the scheme if the road was located in the west side of the option. **Moderate Negative (x 3)** Drumboe Upper Burn, Teevickmoy Burn, Finn Trib. G (Treanamullin) - owing to permanent impact on extensive reach of fish bearing channel(s), plus cumulative and indirect impacts on higher quality waters downstream. Specific design may alleviate potential impact level, e.g., alignment that avoids extensive physical impact or direct overlay on the channels. **Moderate-to-Minor (x 2)** Finn Trib. G –Tircallan; Lough Alaan Trib. owing cumulative and indirect impacts on higher quality waters downstream. **Minor Negative (x 2)** Magherapaste Trib.; Finn Trib. G - Lough Hill Branch - indirect /cumulative downstream impacts at both channels. These impacts are likely to be adequately mitigated with specific measures. **Neutral (x 3)** Burn Daurnett Trib.; Teevickmoy Burn Trib., Finn Trib E (Cappry).	2.46	Moderately Negative	2	7	Intermediate
1F	Total linear length of watercourses intersected by option = 4710m. Total watercourse interceptions = 11	**Major Negative (x 3)** (1) River Finn (Designated SAC & Salmonid Water) temporary-to- short term negative during construction phase, but with correct drainage and storm-water run-off treatment as per NRA Sustainable Drainage BMPs, long term impact of single span bridge design is considered Not Significant. (2) Burn Daurnett owing to overall length of channel potentially affected, fisheries status and permanent nature of intervention; and (3) Drumboe Lower (within SAC boundary and may be lost -impact unlikely to affect Conservation Objectives of SAC, but must be treated as 'Major (-)' according to NRA Guidelines. These impacts could likely be adequately mitigated with specific design/ measures. It may be possible that the Burn Daurnett is not altered under the scheme if the road was located in the west side of the option. **Moderate Negative (x 3)** Drumboe Upper Burn, Teevickmoy Burn; Lough Alaan Trib - owing to permanent impact on extensive reaches of fish bearing channel(s), plus cumulative and indirect impacts on higher quality waters	2.45	Moderately Negative	2	5	Intermediate

Option	[6]Quantitative Assessment	Qualitative Assessment	MIS	Impact	Impact Score	Preference Ranking	Preference
		downstream. Specific design may alleviate potential impact level, e.g., alignment that avoids extensive physical impact or direct overlay on the channels. **Minor Negative (x 2)** Finn Trib. G (Treanamullin; Finn Trib. G - Lough Hill Branch - indirect /cumulative downstream impacts on Finn Trib. G + River Finn. Impact likely to be adequately mitigated with specific measures. **Neutral (x 3)** Burn Daurnett Trib.; Teevickmoy Burn Trib., Finn Trib E (Cappry).					
1F1	Total linear length of watercourses intersected by option = 5050m. Total watercourse interceptions = 12	**Major Negative (x 3)** (1) River Finn (Designated SAC & Salmonid Water) temporary-to- short term negative during construction phase, but with correct drainage and storm-water run-off treatment as per NRA Sustainable Drainage BMPs, long term impact of single span bridge design is considered Not Significant. (2) Burn Daurnett owing to overall length of channel potentially affected, fisheries status and permanent nature of intervention; and (3) Drumboe Lower (within SAC boundary and may be lost -impact unlikely to affect Conservation Objectives of SAC, but must be treated as 'Major (-)' according to NRA Guidelines. These impacts could likely be adequately mitigated with specific design/ measures. It may be possible that the Burn Daurnett is not altered under the scheme if the road was located in the west side of the option. **Moderate Negative (x 3)** Drumboe Upper Burn, Teevickmoy Burn, Finn Trib. G (Treanamullin) - owing to permanent impact on extensive reach of fish bearing channel(s), plus cumulative and indirect impacts on higher quality waters downstream. Specific design may alleviate potential impact level, e.g., alignment that avoids extensive physical impact or direct overlay on the channels. **Moderate-to-Minor (x 2)** Finn Trib. G –Tircallan; Lough Alaan Trib. owing cumulative and indirect impacts on higher quality waters downstream. **Minor Negative (x 1)** Finn Trib. G - Lough Hill Branch - indirect /cumulative downstream impacts on Finn Trib. G + River Finn. Impact likely to be adequately mitigated with specific measures. **Neutral (x 3)** Burn Daurnett Trib.; Teevickmoy Burn Trib., Finn Trib E (Cappry).	2.42	Moderately Negative	2	6	Intermediate
1G	Total linear length of watercourses intersected by option = 4470m. Total watercourse interceptions = 13	**Major Negative (x 2)** River Finn (Designated SAC & Salmonid Water) temporary-to- short term negative during construction phase, but with correct drainage and storm-water run-off treatment as per NRA Sustainable Drainage BMPs, long term impact of single span bridge design is considered Not Significant.	2.62	Moderately Negative	2	2	Preferred

Option	[6]Quantitative Assessment	Qualitative Assessment	MIS	Impact	Impact Score	Preference Ranking	Preference
		Drumboe Lower (within SAC boundary and may be lost -impact unlikely to affect Conservation Objectives of SAC, but must be treated as 'Major (-)' according to NRA Guidelines. **Moderate Negative (x 3)** Drumboe Upper Burn, Teevickmoy Burn, Finn Trib. G (Treanamullin) - owing to permanent impact on extensive reach of fish bearing channel(s), plus cumulative and indirect impacts on higher quality waters downstream. Specific design may alleviate potential impact level, e.g., alignment that avoids extensive physical impact or direct overlay on the channels. **Moderate-to-Minor (x 2)** Finn Trib. G –Tircallan; Lough Alaan Trib. owing cumulative and indirect impacts on higher quality waters downstream. **Minor Negative (x 2)** Magherapaste Trib.; Finn Trib. G - Lough Hill Branch - indirect /cumulative downstream impacts at both channels. These impacts are likely to be adequately mitigated with specific measures. **Neutral (x 3)** Burn Daurnett Trib.; Teevickmoy Burn Trib., Finn Trib E (Cappry).					

5 CONCLUSION

The River Finn is a designated SAC and Salmonid Water and has high quality salmonid nursery habitat within the proposed crossing zones in the study area. Atlantic salmon (*Salmo salar*) is the relevant SAC Qualifying Interest present in the study area, identified as the most sensitive receptor by this aquatic assessment. Freshwater pearl mussels were absent from the River Finn at, and for some distance downstream of, river crossing locations proposed under the scheme. The records for *Margaritifera* in the Finn are historical and scarce (2 records – 1 dead and 1 live individual since 1989). The species appears to be currently absent from the River Finn, most probably as a result of historical pearl fishing. Each of the tributaries investigated were unsuitable for the species.

The Burn Daurnett, a tributary of the Finn, is a trout and salmon spawning and nursery stream, although water quality is currently not optimal for fish bearing purposes. Drumboe Upper Burn, also a tributary of the Finn, has some potential for salmonid spawning in the lower reaches and is at least a trout nursery stream within the vicinity of the three proposed crossing locations.

Potentially affected watercourses of the Finn catchment tend to have quite natural hydromorphology despite evidence of historical drainage. This lends them to value as trout nursery habitat, which is why many of the waters investigated were 'D' class (higher local value with fisheries potential).

This said, water quality is currently impaired (Poor Status) in the Finn main channel and in most of the tributaries, meaning instream habitat is not currently optimal, particularly for salmonids.

Lough Alaan is a proven brown trout lake, although stratification of the lake with anoxic conditions in the hypolimnion limit the total area of fishery potential. Even so, any crossing and activity in the inflowing Lough Alaan Tributary stream will require specific measures to protect the fishery value and possible spawning habitat in the stream itself.

At the northern end of the proposed scheme, Teevickmoy Burn, a tributary of the Cloghroe / Deele Rivers, had slightly better water quality, with hydromorphology suitable for salmonids (likely trout); comprising potential spawning and certainly nursery habitats for trout.

The option assessment for the aquatic ecology element took both quantitative and qualitative factors into account. It would clearly be advantageous to limit the overall magnitude (linear length) of intersection with any watercourses. This applies particularly to waters of international (SAC, 'A' class) or high local fisheries importance ('C' class), but also with waters with some level of fish bearing capacity and/or a high degree of naturalness ('D').

The above option comparison tends to show the Option 1B as the preferred option in terms of aquatic ecology. The ranking in order of preference is shown in Section 4, above. On balance, there is little to separate 1B, 1G and 1B1 as preferred options.

Option 1B is slightly preferable on a number of counts, in terms of limiting combined intersection magnitude and potential impact significance. Option 1B has the least number of watercourse intersections, the least overall length of watercourse intersection (m), and the majority of intersections are with options of lesser ecological value. Overall, this option tends to have marginally less overall potential for direct, indirect and cumulative impacts on aquatic habitats and hydromorphology.

Options 1G and 1B1 have good profiles in terms of impact minimisation on the main option. However, their associated eastern link option raises the potential impact level in terms of intersection magnitude and indirect cumulative impact on the River Finn arising at Treanamullin. The latter applies to all options with a high level of intersection with Finn Tributary G – Treanamullin in the eastern option (1A/1A1, 1C/1C1, 1D1, 1E1, 1F1, 1G).

Options 1D, 1D1, 1E, 1E1, 1F and 1F1 are in the middle of the rankings, owing to magnitude of direct impact on the Burn Daurnett (c.1000m) which raises potential impact significance. Such impact may be lessened

if specific design was to locate the road in the west side of the option options at the southern end, so that the Burn Daurnett is not physically altered.

1D, 1D1, 1E, 1E1 and 1G Options have slightly greater magnitude of potential impact at the Upper Drumboe crossings compared to others owing to the crossing angle. The same is evident at the northern end of Teevickmoy Burn where the stream is fairly extensively overlaid by 1D, 1D1, 1E, 1E1 options. Such impacts may be able to be mitigated by specific crossing design, e.g., open-bottom culvert or bridge versus box culvert. The gradient / design of any culvert must meet guidelines to ensure fish passage at the Drumboe Burn crossing.

Option1A/1A1 and 1C/1C1 cover significant channel lengths of small streams. These streams are mainly of moderate and low local ecological value, but potential impact significance is exacerbated by the extensive nature of the intersections. Potentially negative cumulative impact may be exacerbated where these channels drain to higher quality waters, e.g., Drumboe Upper and Finn catchment, plus Cloghroe catchment. The impact would tend to be greater during the construction phase, e.g., at the Lettermackenny Trib. There would be far greater potential for operational phase impacts at Teevickmoy Burn, where fish bearing waters could be extensively overlaid by the option and there may be no recovery in, for example, a realigned channel. Although 1C/1C1 come out at 4th in the overall ranking, these would be considered, based on expert judgement, to be two of the least desirable options along with 1A/1A1.

All of the longer eastern link options (1A/1A1, 1C/1C1, 1B1, 1D1, 1E1, 1F1, 1G) have fairly extensive potential for impact on River Finn Tributary G – Treanamullin. This stream has higher value local significance (Category 'D'), with a high degree of naturalness and some salmonid nursery potential. It is intercepted over almost its entire length by each of these link options, upstream of the N15. This stream drains a short distance to the main channel of the River Finn, a designated SAC and Salmonid Water.

Construction phase impacts at Finn Tributary G - Treanamullin could be Moderate Negative (at least), perhaps Major Negative (cumulative) depending on design details, given the extensive nature of watercourse intersection indicated and the near proximity to the River Finn main channel. It is difficult to see at this stage how the extensive nature of watercourse interceptions indicated on this link may be mitigated given the potential for direct, indirect and cumulative impacts on the River Finn SAC, downstream. Specific design and alignment to avoid major direct physical impact on the watercourse should be an important consideration in the final design stage.

A single span structure is proposed to form the new River Finn crossing, applying to all options. There are no pearl mussels present in the Zone of Influence, but salmon (SAC Qualifying Interest) nursery habitat is excellent. According to NRA Guidelines, the crossing must be considered to carry potential for Major Negative impact (temporary to short-term, localised impact) during the construction phase. It would be considered that, with correct drainage and storm-water run-off treatment as per NRA Sustainable Drainage BMPs, the residual impact of a well-designed, single-span bridge, with abutments well set back from channel and banks, and would likely be considered Not Significant in the long-term and would not affect conservation objectives of the River Finn SAC. Road surface drainage must be treated appropriately at all locations where there is potential for adverse effects on water quality of important fish bearing waters, especially salmon waters.

Consultation with IFI and Loughs Agency would be essential in agreeing appropriate design and timing of works for any culverts, bridges, channel diversions and realignments associated with the project, whether temporary or permanent. Design of crossings and culverts must ensure fish bearing waters retain fish passage and essential habitats for fish.

6 REFERENCES

Anon (2004) *Margaritifera margaritifera*. Stage 1 and Stage 2 survey guidelines. Irish Wildlife Manuals, No. 12. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Anon. (2009) River Hydromorphology Assessment Technique (RHAT). Northern Ireland Environment Agency.

Beasley, C.R. and Roberts, D. (1999) Towards a strategy for the conservation of the freshwater pearl mussel *Margaritifera margaritifera* in County Donegal, Ireland. Biological Conservation 89 (1999) 275-284.

CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

Cocchiglia, L., Purcell, P.J. & Kelly-Quinn, M (2012) A critical review of the effects of motorway river-crossing construction on the aquatic environment. Freshwater Review 5: 141-168 Available at: https://www.fba.org.uk/journals/index.php/FRJ/article/viewFile/489/329 (accessed August, 2018)

EPA (2017) Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EIAR), Environmental Protection Agency, PO Box 3000, Johnstown Castle Estate, Wexford, Ireland. Niven, A.J & McCauley, M. (2017) Loughs Agency Water Framework Directive Fish in Rivers Classification Report 2016. Loughs Agency, 22, Victoria Road, Derry Londonderry. Available at: http://www.loughs-agency.org/wp-content/uploads/2017/09/LA-WFD-Report-2016.pdf (August 2018).

Niven, A.J. & McCauley, M. (2015) Stillwater Status Report: Lough Alaan, County Donegal. Loughs Agency, 22, Victoria Road, Derry Londonderry.

Niven, A.J., McCauley, M. & Scott, R. (2016) Foyle Area and Tributaries Catchment Status Report 2015. Loughs Agency, 22, Victoria Road, Derry~Londonderry. Available at: https://www.loughs-agency.org/wp-content/uploads/2016/09/Foyle-Status-Report-2016.pdf (accessed August 2018).

Niven, A.J. & McCauley, M. (2016) Sea Trout Status Report: Loughs Agency, 22, Victoria Road, Derry Londonderry. Available at: http://www.loughs-agency.org/wp-content/uploads/2017/03/Sea-Trout-Status-Report-2016.pdf (accessed August 2018).

Niven, A.J., Santiago, R., O'Connor, M. & Lawlor, D. (2011a) River Deele and Tributaries Catchment Status Report Loughs Agency, 22, Victoria Road, Derry Londonderry.

Niven, A.J., Santiago, R., O'Connor, M. & Lawlor, D. (2011b) River Finn and Tributaries Catchment Status Report Loughs Agency, 22, Victoria Road, Derry Londonderry.

NPWS (2017a) Conservation Objectives: River Finn SAC 002301. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2017b) *Margaritifera* Sensitive Areas Map- Version 08, May 2017. Available at: https://www.npws.ie/maps-and-data/habitat-and-species-data (accessed August 2018).

NRA (2009) Guidelines for assessment of ecological impacts of National road schemes. Revision 2 National Roads Authority, Dublin.

TII (2011) Project Appraisal Guidelines Unit 12.0. Available at: www.tii.ie/tii-library/strategic-planning/project-appraisal-guidelines/unit-12-National-Secondary-Roads-Project.pdf (accessed August 2018)

TII (2014) Drainage Design for National Road Schemes - Sustainable Drainage Options. Transport Infrastructure Ireland., Parkgate Business Centre, Parkgate Street, Dublin 8, Ireland. Available at: http://www.tiipublications.ie/library/RE-CPI-07001-01.pdf (accessed August 2018)

TII (2016) Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis PE-PAG-02031 Standards and Research Section, Transport Infrastructure Ireland Parkgate Business Centre, Parkgate Street, Dublin 8, D08 DK10)

Appendix 1:
Ecological Valuation Criteria

Table 1.1 Ecological Valuation Criteria (*Adapted from NRA, 2009*)

Relevant Criteria (*Adapted from NRA, 2009*)	**Category**
International Importance: ▪ European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. ▪ Features essential to maintaining the coherence of the Natura 2000 Network. ▪ Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. ▪ Resident or regularly occurring populations (assessed to be important at the national level) of species of animal and plants listed in Annex II and/or IV of the Habitats Directive. ▪ Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988). ▪ Major salmon fishery rivers.	A
National Importance: ▪ Site designated or proposed as a Natural Heritage Area (NHA). ▪ Statutory Nature Reserve. ▪ Refuge for Fauna and Flora protected under the Wildlife Acts. ▪ National Park. ▪ Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park. ▪ Resident or regularly occurring populations (assessed to be important at the national level) of species protected under the Wildlife Acts; and/or; species listed on the relevant Red Data list. ▪ Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive. ▪ Major trout fishery rivers ▪ Commercially important coarse fisheries ▪ Waterbodies with high amenity value.	B
County Importance: ▪ Area of Special Amenity. ▪ Area of High Amenity, or equivalent, designated under the County Development Plan. ▪ Resident or regularly occurring populations (assessed to be important at the County level)10 of species of animal and plants listed in Annex II and/or IV of the Habitats Directive, and/or; species protected under the Wildlife Acts; and/or; species listed on the relevant Red Data list. ▪ Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance. ▪ • County important populations of species, or viable areas of semi-natural habitats identified in the national or Local BAP if this has been prepared. ▪ Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county. ▪ Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.	C
Local Importance (Higher Value): ▪ Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; ▪ Resident or regularly occurring populations (assessed to be important at the Local level) of species of animal and plants listed in Annex II and/or IV of the Habitats Directive, and/or; species protected under the Wildlife Acts; and/or; species listed on the relevant Red Data list. ▪ Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; ▪ Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value. ▪ Sites of 'High' water quality status (Q4-5, Q5) ▪ Water body with some fisheries values and potential salmonid habitat.	D
Local Importance (Lower value): ▪ Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;	E

▪ Sites or features containing non-native species that are of some importance in maintaining habitat links. ▪ Waterbody with no fisheries value and/or poor fisheries habitat.	

Appendix 2:
Ecological Impact Risk Matrix

Criteria for impact magnitude (derived from TII, 2011)

Impact Magnitude	**Internationally important** (A sites)	**Nationally important** (B sites)	**County Importance** (C sites)	**Higher Value Local Importance** (D sites)	**Lower Value Local Importance** (E sites)
Severe Negative **Risk Score = 0**	Short-, Medium-, Long-term or permanent impacts, extensive + Medium & Long-term, localized.	Medium- and Long-term or permanent impacts, extensive			
Major Negative **Risk Score = 1**	Short-term impacts on a small part of a site.	Temporary & Short-term impacts, extensive + medium & long term local impact	Medium or Long-term impacts, extensive.		
Moderate Negative **Risk Score = 2**	Temporary impacts on a small part of a site.	Temporary & short-term impacts, localized	Temporary & short-term, extensive + short-, medium- & long-term, localized	Permanent, Medium or Long-term impacts, extensive	Permanent or Long-Term impact on a site if part of a designated site
Minor /Slight Negative **Risk Score = 3**			Temporary impacts, localized	Temporary & short-term, extensive + short-, medium- & long-term, localized	Medium & long-term & permanent impact, extensive
Neutral / Not Significant **Risk Score = 4**			No impact	Temporary impacts; localized	Temporary & Short term, extensive + any localized impact
Slight Positive **Risk Score = 5**			Any beneficial impact	Any beneficial impact	Any beneficial impact
Moderate Positive Risk Score = 6	Beneficial, local	Beneficial, local	Beneficial, extensive		
Major / Highly Positive Risk Score = 7	Beneficial, extensive	Beneficial, extensive			

Appendix 3:
Option Comparison Calculations

Table 3.1: Option Comparison Calculations

Option	Watercourse	Ecological Classification					Total (m)	Score	N	MIS
		A	B	C	D	E				
1A/1A1 (Orange)	Burn Daurnett			150				3		
	River Finn Crossing A	300						1		
	Finn Trib. D (Dooish)				600			2		
	Drumboe Upper Burn				350			2		
	Lettermackenny Trib.				220	1245		2.5		
	Teevickmoy Burn				1750			2		
	Teevickmoy Burn Trib.					70		4		
Link (1A/1A1)	Teevickmoy Burn Trib.					230		4		
	Lough Alaan Tributary				80			2.5		
	Finn Trib. G. Tircallan				400			2.5		
	Finn Trib. G Treanamullin				1280			2		
	Treanamullin - Lough Hill Branch					250		3		
TOTAL (1A/1A1)		**300**	**0**	**150**	**4680**	**1795**	**6925**	**30.5**	**12**	**2.54**
(Main Option)		**300**	**0**	**150**	**2920**	**1315**	**4685**			
(Link)		**0**	**0**	**0**	**1760**	**480**	**2240**			
1B (Pink)	Burn Daurnett			150				3		
	Burn Daurnett Tributary					150		4		
	River Finn Crossing B	300						1		
	Drumboe Upper Burn				400			2		
	Teevickmoy Burn				300			2		
	Teevickmoy Burn Trib.					70		4		
Link (1B)	Lough Alaan Tributary				1000			2		
	Finn Trib. G Treanamullin				100			3		
	Treanamullin - Lough Hill Branch					570		3		

Option	Watercourse	Ecological Classification					Total (m)	Score	N	MIS
		A	B	C	D	E				
TOTAL (1B)		**300**	**0**	**150**	**1800**	**790**	**3040**	**24**	**9**	**2.67**
(Main Option)		**300**	**0**	**150**	**700**	**220**	**1370**			
(Link)		**0**	**0**	**0**	**1100**	**570**	**1670**			
1B1 (Pink)	Burn Daurnett			150				3		
	Burn Daurnett Tributary					150		4		
	River Finn Crossing B	300						1		
	Drumboe Upper Burn				400			2		
	Teevickmoy Burn				300			2		
	Teevickmoy Burn Trib.					70		4		
Link (1B1) (Pink)	Lough Alaan Tributary				80			2.5		
	Finn Trib. G . Tircallan				400			2.5		
	Finn Trib. G Treanamullin				1280			2		
	Treanamullin - Lough Hill Branch					250		3		
TOTAL (1B1)		**300**	**0**	**150**	**2460**	**470**	**3380**	**26**	**10**	**2.60**
(Main Option)		**300**	**0**	**150**	**700**	**220**	**1370**			
(Link)		**0**	**0**	**0**	**1760**	**250**	**2010**			
1C/1C1 (Purple)	Burn Daurnett			150				3		
	Burn Daurnett Tributary					150		4		
	River Finn Crossing B	300						1		
	Drumboe Upper Burn				350			2		
	Lettermackenny Trib.				220	1245		2.5		
	Teevickmoy Burn				1750			2		
	Teevickmoy Burn Trib.					70		4		
Link (1C/1C1) (Purple)	Teevickmoy Burn Trib.					230		4		
	Lough Alaan Tributary				80			2.5		

Option	Watercourse	Ecological Classification					Total (m)	Score	N	MIS
		A	B	C	D	E				
	Finn Trib. G . Tircallan				400			2.5		
	Finn Trib. G Treanamullin				1280			2		
	Treanamullin - Lough Hill Branch					250		3		
TOTAL (1C/1C1)		**300**	**0**	**150**	**4080**	**1945**	**6475**	**32.5**	**12**	**2.71**
(Main Option)		**300**	**0**	**150**	**2320**	**1465**	**4235**			
(Link)		**0**	**0**	**0**	**1760**	**480**	**2240**			
1D (Red)										
	Burn Daurnett			1000				1		
	Burn Daurnett Tributary					300		4		
	River Finn Crossing C	300						1		
	Finn Trib. E (Cappry)					30		4		
	Finn Trib. F (Lower Drumboe)	90				400		1		
	Drumboe Upper Burn				570			2		
	Magherapaste Trib.					230		3		
	Teevickmoy Burn				950			2		
	Teevickmoy Burn Trib.					70		4		
Link (1D) (Red)	Lough Alaan Tributary				320			2.5		
	Finn Trib. G Treanamullin				100			3		
	Treanamullin - Lough Hill Branch					570		3		
TOTAL (1D)		**390**	**0**	**1000**	**1940**	**1600**	**4930**	**30.5**	**12**	**2.54**
(Main Option)		**390**	**0**	**1000**	**1520**	**1030**	**3940**			
(Link)		**0**	**0**	**0**	**420**	**570**	**990**			
1D1 (Red)										
	Burn Daurnett			1000				1		
	Burn Daurnett Tributary					300		4		
	River Finn Crossing C	300						1		

Option	Watercourse	Ecological Classification					Total (m)	Score	N	MIS
		A	B	C	D	E				
	Finn Trib. E (Cappry)					30		4		
	Finn Trib. F (Lower Drumboe)	90				400		1		
	Drumboe Upper Burn				570			2		
	Magherapaste Trib.					230		3		
	Teevickmoy Burn				950			2		
	Teevickmoy Burn Trib.					70		4		
Link (1D1) (Red)	Lough Alaan Tributary				80			2.5		
	Finn Trib. G . Tircallan				400			2.5		
	Finn Trib. G Treanamullin				1280			2		
	Treanamullin - Lough Hill Branch					250		3		
TOTAL (1D1)		**390**	**0**	**1000**	**3280**	**1280**	**5950**	**32**	**13**	**2.46**
(Main Option)		**390**	**0**	**1000**	**1520**	**1030**	**3940**			
(Link)		**0**	**0**	**0**	**1760**	**250**	**2010**			
1E (Green)	Burn Daurnett			1000				1		
	Burn Daurnett Tributary					300		4		
	River Finn Crossing C	300						1		
	Finn Trib. E (Cappry)					30		4		
	Finn Trib. F (Lower Drumboe)	90				400		1		
	Drumboe Upper Burn				570			2		
	Magherapaste Trib.					230		3		
	Teevickmoy Burn				1500			2		
	Teevickmoy Burn Trib.					70		4		
Link (1E) (Green)	Lough Alaan Tributary				320			2.5		
	Finn Trib. G Treanamullin				100			3		
	Treanamullin - Lough Hill Branch					570		3		
TOTAL (1E)		**390**	**0**	**1000**	**2490**	**1600**	**5480**	**30.5**	**12**	**2.54**

Option	Watercourse	Ecological Classification					Total (m)	Score	N	MIS
		A	B	C	D	E				
(Main Option)		**390**	**0**	**1000**	**2070**	**1030**	**4490**			
(Link)		**0**	**0**	**0**	**420**	**570**	**990**			
1E1 (Green)	Burn Daurnett			1000				1		
	Burn Daurnett Tributary					300		4		
	River Finn Crossing C	300						1		
	Finn Trib. E (Cappry)					30		4		
	Finn Trib. F (Lower Drumboe)	90				400		1		
	Drumboe Upper Burn				570			2		
	Magherapaste Trib.					230		3		
	Teevickmoy Burn				1500			2		
	Teevickmoy Burn Trib.					70		4		
Link (1E1) (Green)	Lough Alaan Tributary				80			2.5		
	Finn Trib. G . Tircallan				400			2.5		
	Finn Trib. G Treanamullin				1280			2		
	Treanamullin - Lough Hill Branch					250		3		
TOTAL (1E1)		**390**	**0**	**1000**	**3830**	**1280**	**6500**	**32**	**13**	**2.46**
(Main Option)		**390**	**0**	**1000**	**2070**	**1030**	**4490**			
(Link)		**0**	**0**	**0**	**1760**	**250**	**2010**			
1F (Blue)	Burn Daurnett			1000				1		
	Burn Daurnett Tributary					300		4		
	River Finn Crossing C	300						1		
	Finn Trib. E (Cappry)					30		4		
	Finn Trib. F (Lower Drumboe)	90				400		1		
	Drumboe Upper Burn				400			2		
	Teevickmoy Burn				450			2		
	Teevickmoy Burn Trib.					70		4		

Option	Watercourse	Ecological Classification					Total (m)	Score	N	MIS
		A	B	C	D	E				
Link (1F) (Blue)	Lough Alaan Trib.				1000			2		
	Finn Trib. G Treanamullin				100			3		
	Treanamullin - Lough Hill Branch					570		3		
TOTAL (1F)		**390**	**0**	**1000**	**1950**	**1370**	**4710**	**27**	**11**	**2.45**
(Main Option)		**390**	**0**	**1000**	**850**	**800**	**3040**			
(Link)		**0**	**0**	**0**	**1100**	**570**	**1670**			
1F1 (Blue)	Burn Daurnett			1000				1		
	Burn Daurnett Tributary					300		4		
	River Finn Crossing C	300						1		
	Finn Trib. E (Cappry)					30		4		
	Finn Trib. F (Lower Drumboe)	90				400		1		
	Drumboe Upper Burn				400			2		
	Teevickmoy Burn				450			2		
	Teevickmoy Burn Trib.					70		4		
Link (1F1) (Blue)	Lough Alaan Tributary				80			2.5		
	Finn Trib. G . Tircallan				400			2.5		
	Finn Trib. G Treanamullin				1280			2		
	Treanamullin - Lough Hill Branch					250		3		
TOTAL (1F1)		**390**	**0**	**1000**	**2610**	**1050**	**5050**	**29**	**12**	**2.42**
(Main Option)		**390**	**0**	**1000**	**850**	**800**	**3040**			
(Link)		**0**	**0**	**0**	**1760**	**250**	**2010**			
1G Option (Yellow)	Burn Daurnett			150				3		
	Burn Daurnett Tributary					170		4		
	River Finn Crossing C	300						1		
	Finn Trib. E (Cappry)					30		4		
	Finn Trib. F (Lower Drumboe)	90				400		1		

Option	Watercourse	Ecological Classification					Total (m)	Score	N	MIS
		A	B	C	D	E				
	Drumboe Upper Burn				570			2		
	Magherapaste Trib.					230		3		
	Teevickmoy Burn				450			2		
	Teevickmoy Burn Trib.					70		4		
Link (1G) (Yellow)	Lough Alaan Tributary				80			2.5		
	Finn Trib. G . Tircallan				400			2.5		
	Finn Trib. G Treanamullin				1280			2		
	Treanamullin - Lough Hill Branch					250		3		
TOTAL (1G)		**390**	**0**	**150**	**2780**	**1150**	**4470**	**34**	**13**	**2.62**
(Main Option)		**390**	**0**	**150**	**1020**	**900**	**2460**			
(Link)		**0**	**0**	**0**	**1760**	**250**	**2010**			

Donegal County Council

TEN-T Priority Route Improvement Project, Donegal

Section 1: N15/N13 Ballybofey/Stranorlar Urban Region

Option Selection Report

Appendix D1.6 – Soils, Geology and Hydrogeology

December 2019

Document Control Sheet

Client:	Donegal County Council
Project Title:	TEN-T Priority Route Improvement Project, Donegal – Section 1: N15/N13 Ballybofey/Stranorlar Urban Region
Document Title:	Option Selection Report – Appendix D1.6- Soils, Geology and Hydrogeology
Document No.:	TT-MGT0337-RPS-00-01-RP-E-EN-1014

Rev. No.	Suitability	Effective Date	Revision Description	Checked	Approved
P01	S4	December 2019	Issue for publication	RS	GMcE

This report has been prepared by RPS/Barry Transportation on behalf of Donegal County Council. Any other persons who use any information contained herein do so at their own risk.

© RPS Barry Transportation 2019

Table of Contents

1 INTRODUCTION 1
1.1 Methodology 1
1.1.1 Study Area 1
1.1.2 Guidelines 2
1.1.3 Scope of Assessment 2
1.1.4 Previous Site Investigations 4
2 EXISTING ENVIRONMENT 6
2.1 Desk Study 6
2.1.1 Soils and Subsoils 6
2.1.2 Geology 6
2.1.3 Hydrogeology 7
2.1.3.3 Groundwater Resources and Water Supply 8
3 OPTION SELECTION 20
3.1 Soils and Geology 20
3.1.1 Summary and Preference 22
3.2 Hydrogeology 22
3.2.1 Option 1A (Orange) 22
3.2.2 Option 1A1 (Orange) 23
3.2.3 Option 1B (Pink) 24
3.2.4 Option 1B1 (Pink) 24
3.2.5 Option 1C (Purple) 25
3.2.6 Option 1C1 (Purple) 26
3.2.7 Option 1D (Red) 26
3.2.8 Option 1D1 (Red) 27
3.2.9 Option 1E (Green) 28
3.2.10 Option 1E1 (Green) 28
3.2.11 Option 1F (Blue) 29
3.2.12 Option 1F1 (Blue) 30
3.2.13 Option 1G (Yellow) 30
3.2.14 Summary and Preference 31
3.3 Comparison of Options 32
4 CONCLUSION 34

List of Figures

Figure 2-1: Soils 10
Figure 2-2: Soils with Modified Options 11
Figure 2-3: Subsoils 12
Figure 2-4: Subsoils with Modified Options 13
Figure 2-5: Bedrock Geology 14
Figure 2-6: Bedrock Geology with Modified Options 15
Figure 2-7: Aquifers 16
Figure 2-8: Aquifers with Modified Options 17
Figure 2-9: Groundwater Vulnerability 18
Figure 2-10: Groundwater Vulnerability with Modified Options 19

List of Tables

Table 1-1: Rating Criteria for Soil and Geology Attributes (NRA, 2008) 3
Table 1-2: Rating Criteria for Hydrogeology Attributes (NRA, 2008) 3
Table 1-3: Rating Criteria for Impact Significance at Option Selection (NRA, 2008) 4
Table 1-4: Impact Scoring Key (TII 2016) 4
Table 1-5: Summary of Ground Investigation in Section 1 Study Area 5
Table 2-1: Groundwater Body Risk and Quality Status 7
Table 2-2: GSI Vulnerability Mapping Guidelines 8
Table 3-1: Assessment of Land and Soils impacts for 13 Options 20
Table 3-2: Summary of Land and Soil Impacts for each Option 22
Table 3-3: Assessment of Hydrogeology Impacts for Option 1A (Orange) 23
Table 3-4: Assessment of Hydrogeology Impacts for Modified Option 1A1 (Orange) 23
Table 3-5: Assessment of Hydrogeology Impacts for Option 1B (Pink) 24
Table 3-6: Assessment of Hydrogeology Impacts for Modified Option 1B1 (Pink) 25
Table 3-7: Assessment of Hydrogeology Impacts for Option 1C (Purple) 26
Table 3-8: Assessment of Hydrogeology Impacts for Modified Option 1C1 (Orange) 26
Table 3-9: Assessment of Hydrogeology Impacts for Option 1D (Red) 27
Table 3-10: Assessment of Hydrogeology Impacts for Modified Option 1D1 (Red) 27
Table 3-11: Assessment of Hydrogeology Impacts for Option 1E (Green) 28
Table 3-12: Assessment of Hydrogeology Impacts for Modified Option 1E1 Green) 29
Table 3-13: Assessment of Hydrogeology Impacts for Option 1F (Blue) 29
Table 3-14: Assessment of Hydrogeology Impacts for Modified Option 1F1 (Blue) 30
Table 3-15: Assessment of Hydrogeology Impacts for Option 1G (Yellow) 31
Table 3-16: Summary of Hydrogeology Impacts for each Option 31
Table 3-17: Summary of Geology, Soils and Hydrogeology Impacts for each Option 32
Table 3-18: Predicated TII Impact Score and Option Preferences 32

1 INTRODUCTION

This report examines the soils, geology and hydrogeology attributes of the thirteen options for Section 1 N15 Ballybofey – Stranorlar Urban Region of the TEN-T Priority Route Improvement Project in Donegal and will form part of a Phase 2 - Option Selection Report to be issued by the National Roads Design Office, Donegal County Council. See Section 1.2 of the Option Selection Report for a description of the project.

There are currently seven main options, within which there are six associated variations, the options are identified as 1A, 1A1,1B, 1B1, 1C, 1C1, 1D, 1D1, 1E, 1E1, 1F, 1F1 and 1G.

This assessment examines each option in terms of their importance and the possible impacts resulting from the construction of a proposed option. The options will be compared and impacts assessed from a land, soil, and hydrogeological perspective. It should be noted that the optimum option from a soils, geology and hydrogeology perspective may not be the overall optimum option when other environmental, economic, and engineering impacts are taken into account.

1.1 Methodology

The methodology for the option selection comprised of a desk study. A desktop study was undertaken at constraints stage, (refer to Appendix A - Constraints Report). These elements are used to identify and describe the soil, geology and hydrogeological attributes of the options. The sources of information that were referenced as part of the desk study are summarised below:

- Geological Survey of Ireland (GSI) geology, landslide susceptibility and geological heritage mapping (https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx);
- Environmental Protection Agency (EPA), soils, subsoils and extractive industry mapping (https://gis.epa.ie/EPAMaps/) ;
- Aerial photography (https://gis.epa.ie/EPAMaps/) ;
- GSI Active Quarries List (https://www.gsi.ie/en-ie/publications/Pages/Quarry-Directory.aspx) ;
- EPA Extractive Industries Register (http://watermaps.wfdireland.ie/ExtractiveFacilities/SearchTheRegister.aspx));
- Geological Survey of Ireland (GSI) aquifer, groundwater vulnerability mapping (https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx));
- GSI Karst Features mapping (https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx)):
- Environmental Protection Agency (EPA) Water Framework Directive (WFD) mapping (http://www.wfdireland.ie/maps.html) ;
- GSI Water Supply Source Protection Zones (https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx); and
- EPA Discharges Database (https://gis.epa.ie/EPAMaps/)

1.1.1 Study Area

The study area encompasses approximately 321ha which contains 13 no. option including Options 1A and 1A1 (Orange), Option1B and 1B1 (Pink), 1C and 1C1 (Blue), Options1D and 1D1(Red), Option 1E and 1E1 (Green), Option 1F and 1F1 (Blue) and a composite Option 1G (Yellow). The area examined extends from the townland of Teevickmoy approximately 4.6km north of Stranorlar, to the townland of Kilcroghery, located approximately 3.75km to the south-west of Ballybofey.

1.1.2 Guidelines

This assessment has been undertaken in accordance with the National Roads Authority NRA) *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Roads Projects*[1] (NRA, 2008) and has regard to the TII *Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis Guidelines* (2016)[2] .

1.1.3 Scope of Assessment

The Zone of Influence (ZoI) for soils, geology and hydrogeology attributes is a 250m buffer either side of the options being assessed, this also takes into consideration junctions and ring roads. This ZoI may increase as relevant to consider attributes which extend beyond this. The options were assessed with respect to their likely impacts on both soils, geology and hydrogeological attributes. In order to compare the options, the assessment has taken into account and appraised the following attributes.

Soils and Geology

- Geological heritage sites;
- Landfills and historic waste sites;
- Quarries;
- Karst features;
- Agricultural soils; and
- Extent of peat and soft ground.

It should be noted that the quality and distribution of agriculture soils and their use are considered separately under the impact assessment for Agriculture.

Hydrogeology

- Aquifers;
- Groundwater vulnerability;
- Source Protection Areas; and
- Important abstractions for water supply.

The significance of an impact is defined by first considering the importance of the attribute impacted and secondly the magnitude of the impact. The importance of geological and hydrogeological attributes (rating criteria) is defined in accordance with the NRA Guidelines on *Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*. This guidance uses the same significance terminology as the Environmental Protection Agency (EPA)[3]. It includes intermediate steps for rating site importance (**Table 1-1** and **Table 1-2**) and impact significance (**Table 1-3**). The assessment then considers the number of impacts in order to assign a ranking/ preference. The number of impacts forms the Quantitative Assessment aspect of the comparative assessment. The Qualitative Assessment reviews the impacts identified during the Quantitative Assessment and assigns a ranking/preference to each option. The Quantitative and Qualitative Assessments are used to assign an option impact as per the TII Guidelines (**Table 1-4**)

[1] TII Publications (http://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf)

[2] TII Publications (http://www.tiipublications.ie/library/PE-PAG-02031-01.pdf)

[3] EPA (2015), Draft Revised Guidelines on the Information to be contained in Environmental Impact Statements

Table 1-1: Rating Criteria for Soil and Geology Attributes (NRA, 2008)

Importance	Criteria	Typical Examples
Very high	Attribute has a high quality or value on a regional scale.	Geological feature rare on a regional or national scale (NHA), large existing quarry or pit
High	Attribute has a high quality or value on a local scale.	Geological feature of high value on a local scale (County Geological Site), moderately sized existing quarry or pit
Medium	Attribute has a medium quality or value on a local scale	Small existing quarry or pit, small recent landfill for mixed wastes
Low	Attribute has a low quality or value on a local scale	Poorly drained and/or low fertility soils, small historical and/or recent landfill site for construction and demolition waste

Table 1-2: Rating Criteria for Hydrogeology Attributes (NRA, 2008)

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale.	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status
Very High	Attribute has a high quality or value on a regional scale.	Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source
High	Attribute has a high quality or value on a local scale.	Groundwater provides large proportion of baseflow to local rivers Locally important potable water source supplying >1000 homes Outer source protection area for regionally important water source Inner source protection area for locally important water source
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer Potable water source supplying >50 homes. Outer source protection area for locally important water source
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer Potable water source supplying <50 homes

Table 1-3: Rating Criteria for Impact Significance at Option Selection (NRA, 2008)

Impact Level	Attribute Importance				
	Extremely High	Very High	High	Medium	Low
Profound	Any permanent impact on attribute	Permanent impact on significant proportion of attribute			
Significant	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute		
Moderate	Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute	
Slight		Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute
Imperceptible/ Neutral			Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute

Table 1-4: Impact Scoring Key (TII 2016)

7	Major or Highly Positive
6	Moderately Positive
5	Minor or Slightly Positive
4	Not Significant/Neutral
3	Minor or Minor or slightly negative
2	Moderately negative
1	Major or Highly negative

1.1.4 Previous Site Investigations

In 2013 Geotech Specialists Limited (GSL) completed a ground investigation between the towns of Ballybofey and Stranorlar. The investigation involved excavation of 88 trial pits, and the drilling of 40 cable percussion boreholes and 42 rotary core boreholes. Monitoring wells were installed in 13 of the rotary core boreholes. See **Table 1-5** below for a summary of the works that were undertaken.

Table 1-5: Summary of Ground Investigation in Section 1 Study Area

Type	Quantity	Maximum Depth (m)
Cable Percussion Boring	40	11.3
Rotary Core Drilling	42	20.8
Trial Pits	88	4.5

In order to ensure each option is being compared on an equal basis, the comparison between options is being made on the basis of desktop study and GIS.

2 EXISTING ENVIRONMENT

2.1 Desk Study

This section outlines the baseline soil, geology and hydrogeology of the receiving environment in relation to the study area's ZoI. The key soils, geology and hydrogeology features are illustrated in **Figure 2-1** to **Figure 2-10.**

2.1.1 Soils and Subsoils

Topography is elevated in the north-west and south west, and, to a lesser degree, in the north-east and south-east of the study area. The topography slopes towards the centre of the study area and the River Finn cuts east – west across the centre of the study area.

The dominant subsoil is metamorphic till. It is present both north and south of Ballybofey and Stranorlar. Pockets of blanket bog and rock outcrop at surface are present in the north-west of the study area, the area of highest elevation.

The overlying soil reflects the underlying till. In the north-west, it is predominantly poorly drained acid soils (surface water gleys). In the south of the study area, the poorly drained acid soils (surface water gleys) are mixed with areas of well drained acid soils. There are alluvial (river/floodplain) deposits along the River Finn which intersects west to east across the centre of the study area.

The CORINE 2012[4] landcover for Section 1 is dominated by Pastures (CORINE 2012 code: 231) with significant distributions of Landcover principally occupied by agriculture with areas of natural vegetation (CORINE 2012 code: 243) in the south-west and western region. There is a dense clustering of Discontinuous Urban Fabric (CORINE 2012 code: 112) within the centre of the study area and these are the population centres of Ballybofey and Stranorlar.

2.1.2 Geology

The study area is underlain by three metamorphic rock types which were originally sedimentary rocks that subsequently metamorphosed. The Precambrian bedrock stratigraphy in this part of Donegal trends roughly south-west to north-east. The dominant underlying geology is Lough Eske Psammite Formate which is comprised of feldspatic psammite and quartzite. North of Stranorlar are narrow bands of Killeter Quartzite and Aghyaran and Killygordon Limestone.

There are no recorded karst features in the study area, which is expected given the metamorphic geology of the region. There are no Geological Heritage Sites of regional or national heritage value within the ZoI. There are no landfills, historically contaminated sites, active quarries or mineral locations within the ZoI of each option.

There are no records of landslides held by the GSI within the study area or the surrounding environment. According to the GSI's Landslide Susceptibility[5] mapping, the majority of the study area is rated as having 'Low' landslide susceptibility. There are small areas of 'Moderately Low' to 'Moderately High' susceptibility

[4] Spatial Mapping of landcover (http://www.epa.ie/soilandbiodiversity/soils/land/corine/)
[5] GSI Geohazards Mapping (https://www.gsi.ie/en-ie/data-and-maps/Pages/Geohazards.aspx)

in the areas of high elevation in north-west and south-west, and areas of 'Moderately High' to 'High' susceptibility in the north-east.

2.1.3 Hydrogeology

2.1.3.1 Groundwater Body and Aquifer Characteristics

The bedrock aquifer classification for the study area corresponds with the bedrock types discussed in **Section 2.1.2.** The Lough Eske Psammite Formation and the Killeter Quartzite form a Poor Aquifer (Pl) - Bedrock which is Generally Unproductive except for Local Zones. The Aghyaran and Killygordon Limestone formation, located in the north of the study area, forms a Locally Important (Ll) Aquifer - Bedrock which is Moderately Productive only in Local Zones.

The study area is underlain by the Ballybofey and Raphoe Groundwater Bodies (GWB). Groundwater quality is currently at 'Good' status for the 2010-2015 Water Framework Directive (WFD) reporting period for both groundwater bodies, see **Table 2-1.**

The Ballybofey GWB intersects with the south, centre and portion of the north of the study area and corresponds with the Poor Aquifer. The GSI's summary of characterisation GWBs indicates that transmissivity and storativity of the groundwater bodies are likely to be low. With low permeability, the majority of groundwater flow is likely to occur in the upper 3m of the bedrock. Water enters the aquifers via diffuse recharge percolating through the thinner subsoil and rock outcrops. In the centre and south of the study area, where the underlying aquifer is Pl, the GSI's groundwater recharge map indicates that the maximum recharge capacity is low, ranging from 51 – 100mm/year. In the north of the study area, where the underlying aquifer is Ll, the maximum recharge capacity is slightly higher, ranging from 100 – 200mm/year. Excess recharge will discharge to surface waters. Groundwater flow pathways are likely to be short (30 – 300m) with groundwater discharging rapidly to the streams crossing the aquifer, and to small springs and seeps.

Table 2-1: Groundwater Body Risk and Quality Status

Groundwater Body	Element	Rating for Groundwater Body (WFD Status 2010-2015)	Objectives	Measures to Achieve Objectives
Ballybofey	Water Quality Status	Good	- Restore_2021 - Prevent Deterioration - Restore Good Status - Reduce Chemical Pollution - Achieve Protected Areas Objectives	**Basic Measures** - The Bathing Water Directive (2006/7/EC) - The Habitats Directive (92/43/EEC) - The Drinking Water Directive (98/83/EC) - The Major Accidents (Seveso) Directive (96/82/EC) - The Environmental Impact Assessment Directive (85/337/EEC) - The Sewage Sludge Directive (86/278/EEC) - The Urban Waste Water Treatment Directive (91/271/EEC) The Plant Protection Products Directive (91/414/EEC) - The Nitrates Directive (91/676/EEC)
	Risk Category	Not at Risk		

Groundwater Body	Element	Rating for Groundwater Body (WFD Status 2010-2015)	Objectives	Measures to Achieve Objectives
Raphoe	Water Quality Status	Good		- The Integrated Pollution Prevention Control Directive (96/61/EEC). **Specific Measures** – Cost recovery for water use - Promotion of efficient and sustainable water use - Protection of drinking water sources - Control of abstraction and impoundments - Control of point source discharges - Control of diffuse source discharges - Authorisation of discharges to groundwater - Controls on other activities impacting on water status - Prevention or reduction of the impact of accidental pollution incidents
	Risk Category	Not at Risk		

2.1.3.2 Groundwater Vulnerability

Groundwater vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease at which groundwater may be contaminated by human activities at or near the surface, see **Table 2-2**. The groundwater vulnerability map (**Figure 2-9** and **Figure 2-10**) for the study area indicates areas of 'Extreme' (E) vulnerability across the north, south-west and south east. This is due to subsoil thickness of less than three metres. Groundwater vulnerability in the centre and east of the study area is 'High' (H). Where the vulnerability is rated as 'High', cut greater than 3m could push the vulnerability into 'Extreme' category and represent a risk to the groundwater, particularly in the absence of mitigation measures.

Table 2-2: GSI Vulnerability Mapping Guidelines

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type & Thickness)			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. sandy subsoil)	Low permeability (e.g. clayey subsoil, clay, peat)	(Sand / Gravel Aquifers only)	(<30m radius)
Extreme (E)	0 – 3.0m	0 – 3.0m	0 – 3.0m	0 – 3.0m	-
High (H)	>3.0m	3.0-10.0m	3.0 – 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 – 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

2.1.3.3 Groundwater Resources and Water Supply

Groundwater resources include the aquifers (bedrock or gravel) themselves, particularly close to any feature which can be used for abstraction. GSI mapping of groundwater wells indicate that there are a number of smaller wells within the ZoI of each option, with a high level of location uncertainty. The GSI

well database indicates area of historic use, or for local domestic and agricultural use. The NRA Guidelines indicates that little to no weighting should be given to the number of wells along each option. There is no reliance on groundwater by a public or group water supply within the study area. The public water supply for the Ballybofey/Stranorlar area is Lough Mourne located 8km (approx.) to the southwest.

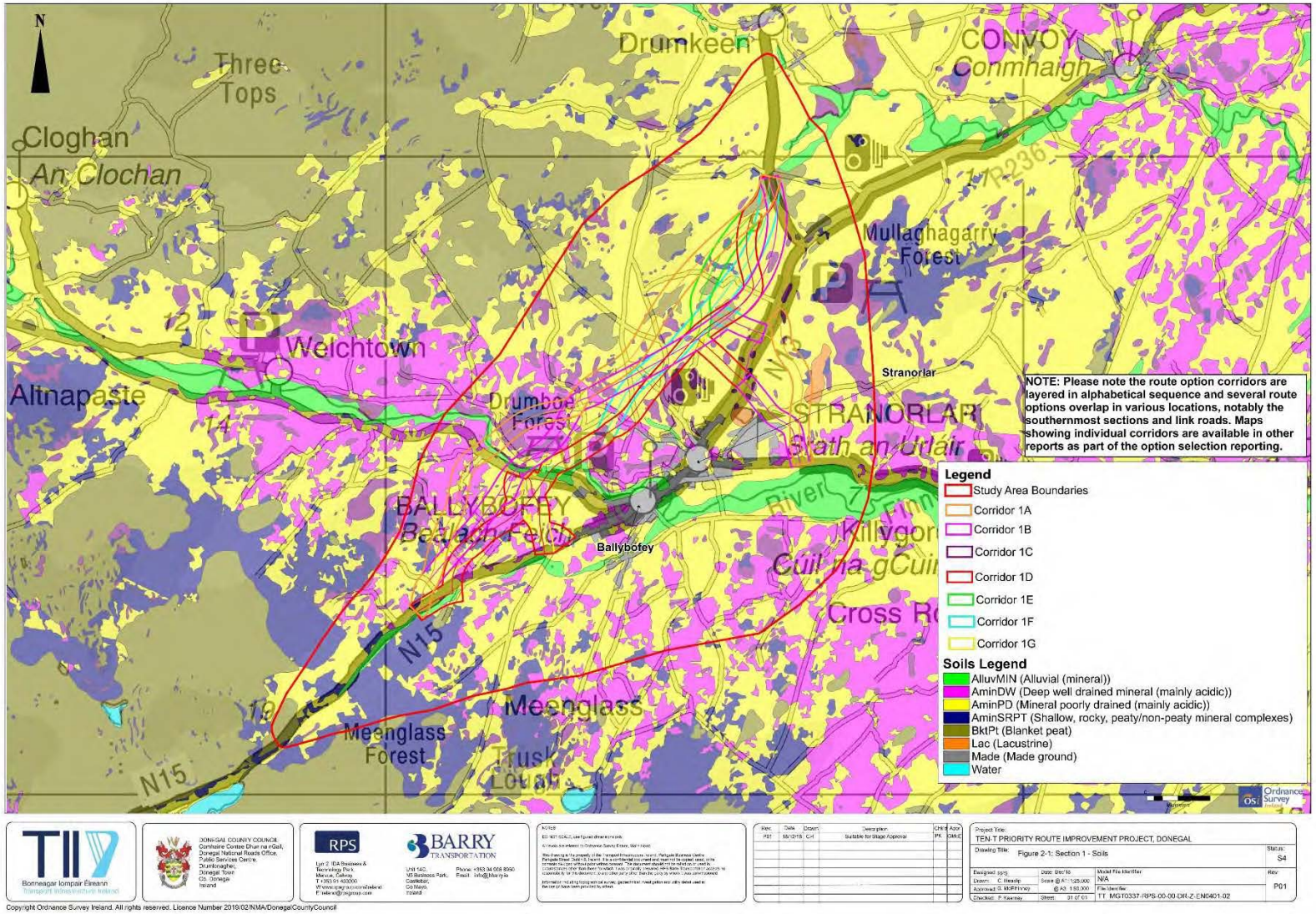


Figure 2-1: Soils

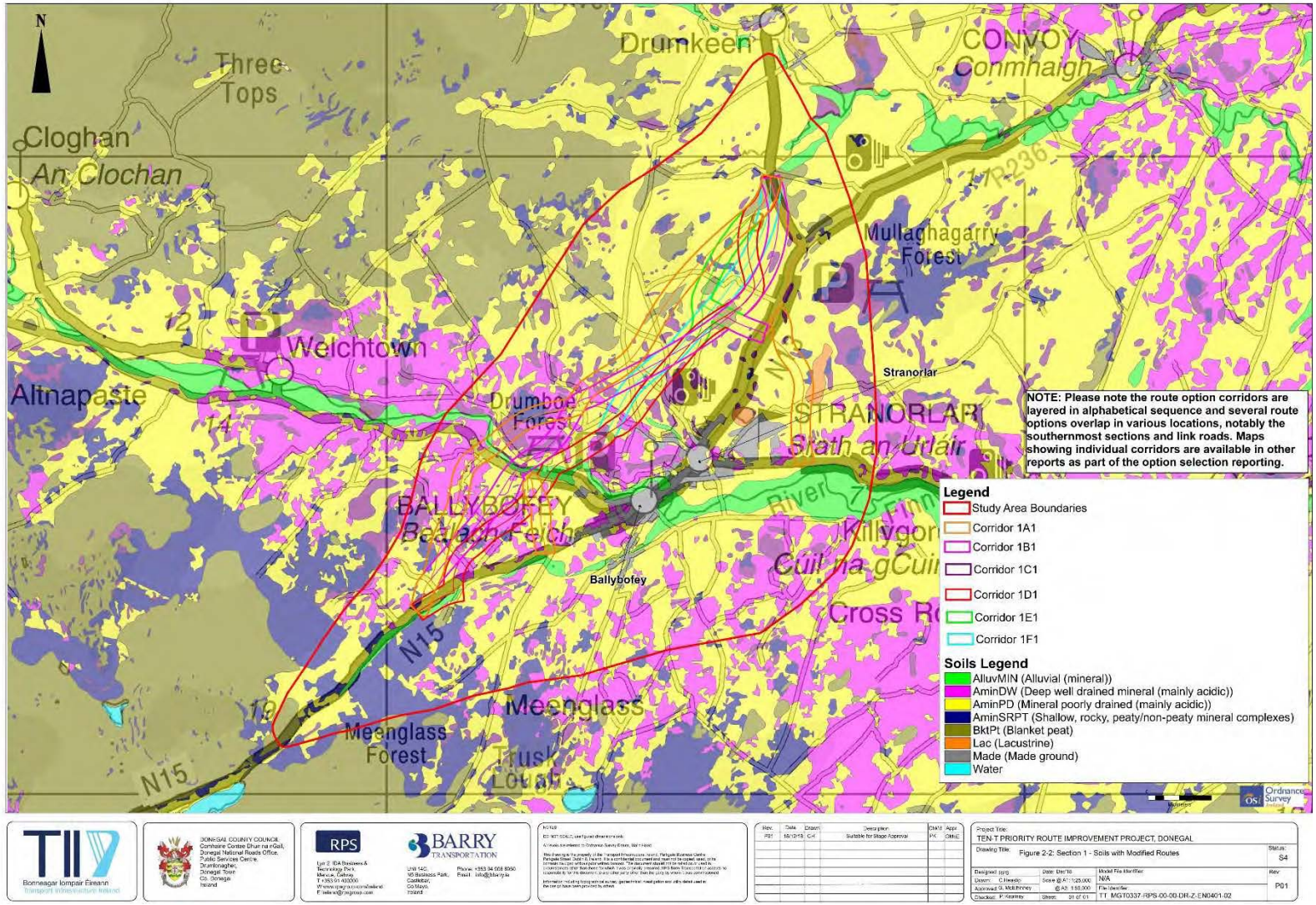


Figure 2-2: Soils with Modified Options

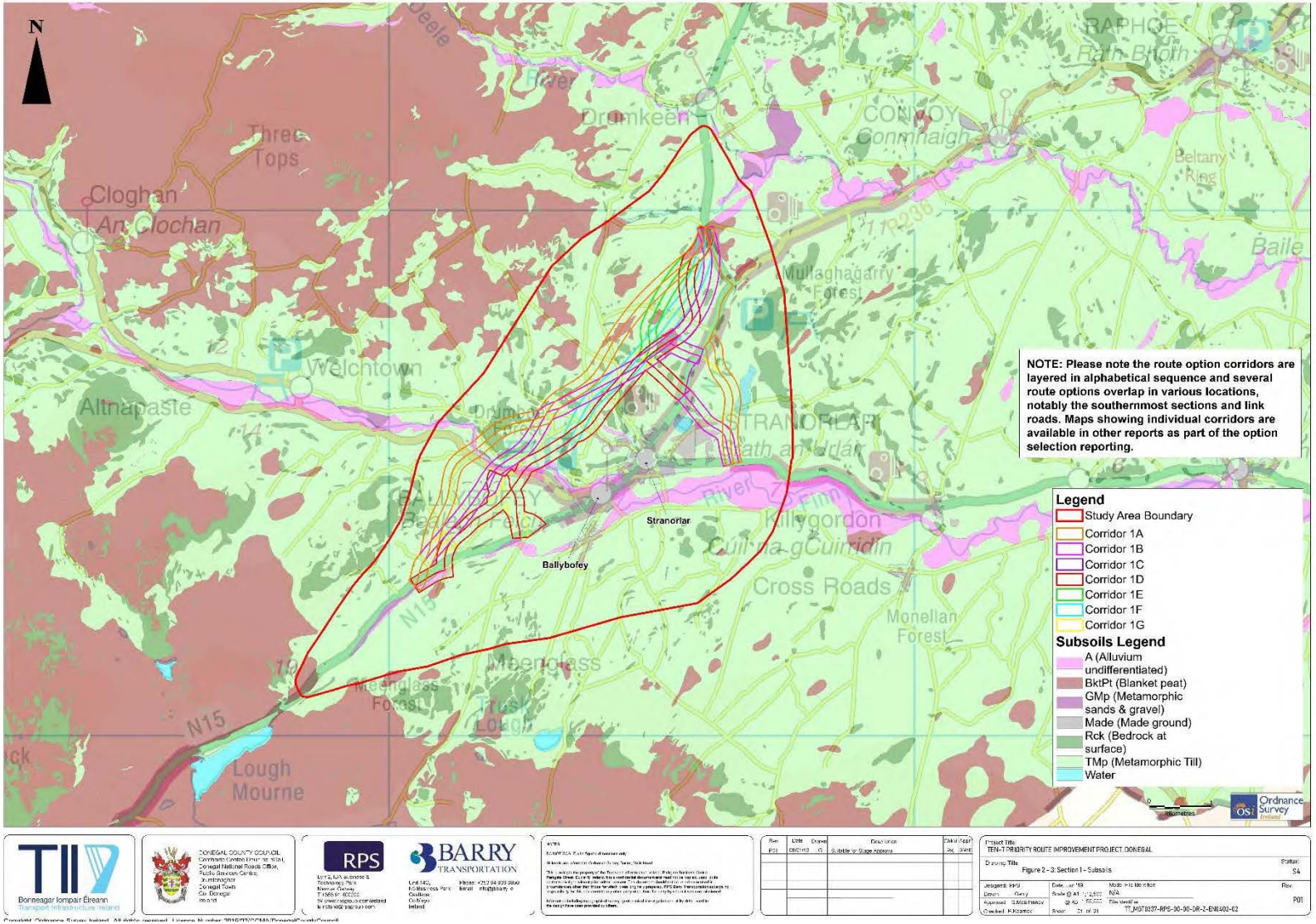


Figure 2-3: Subsoils

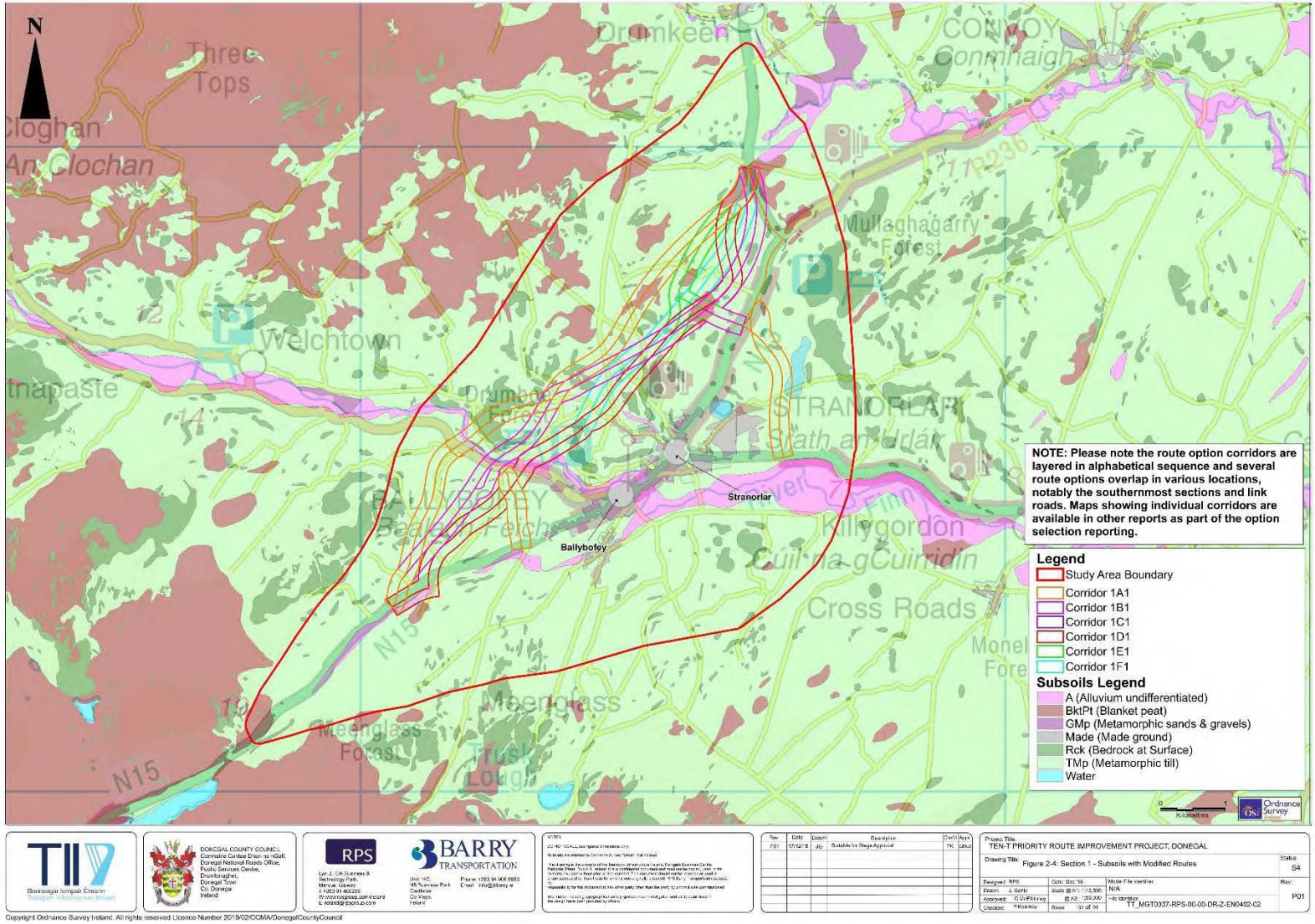


Figure 2-4: Subsoils with Modified Options

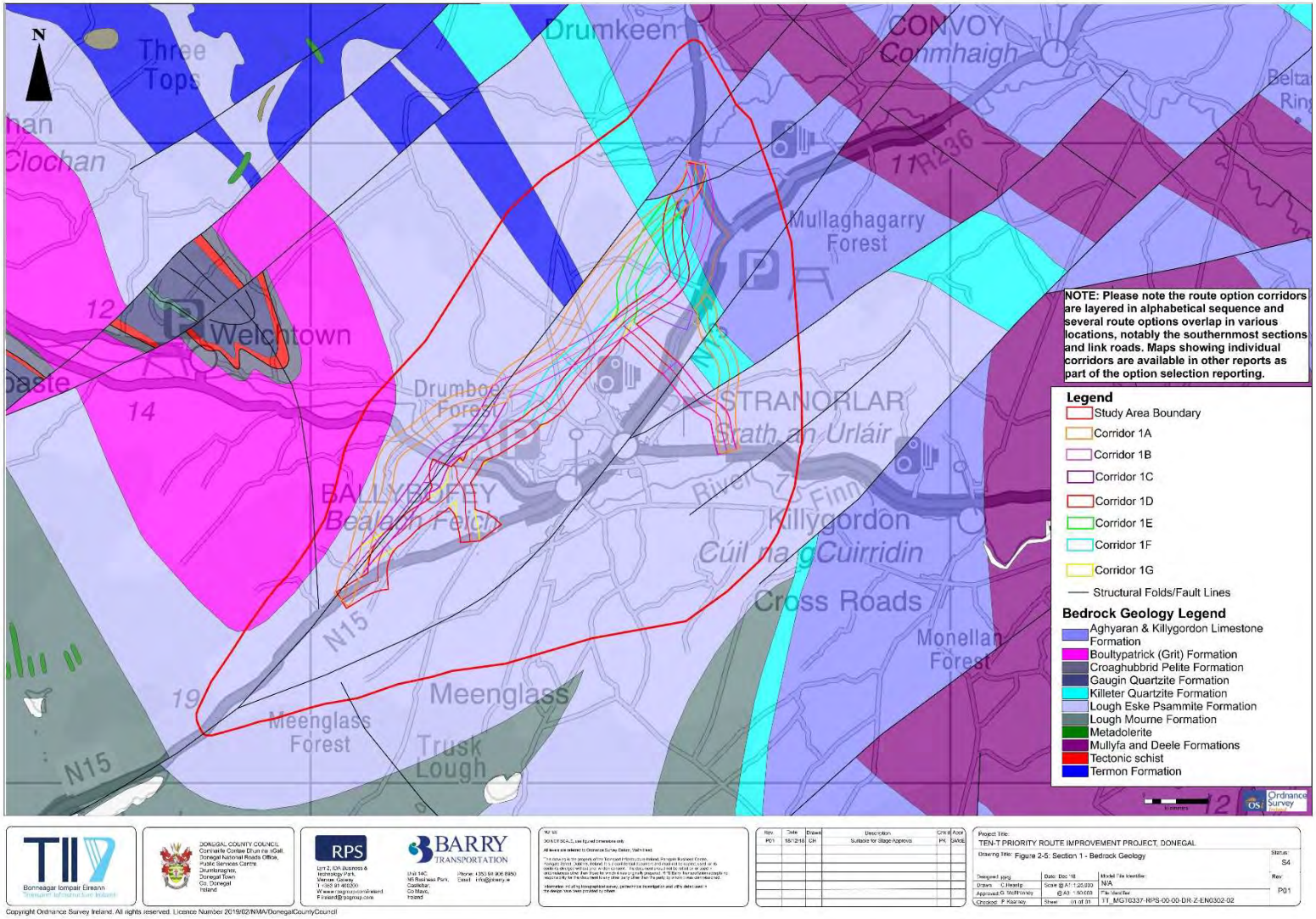


Figure 2-5: Bedrock Geology

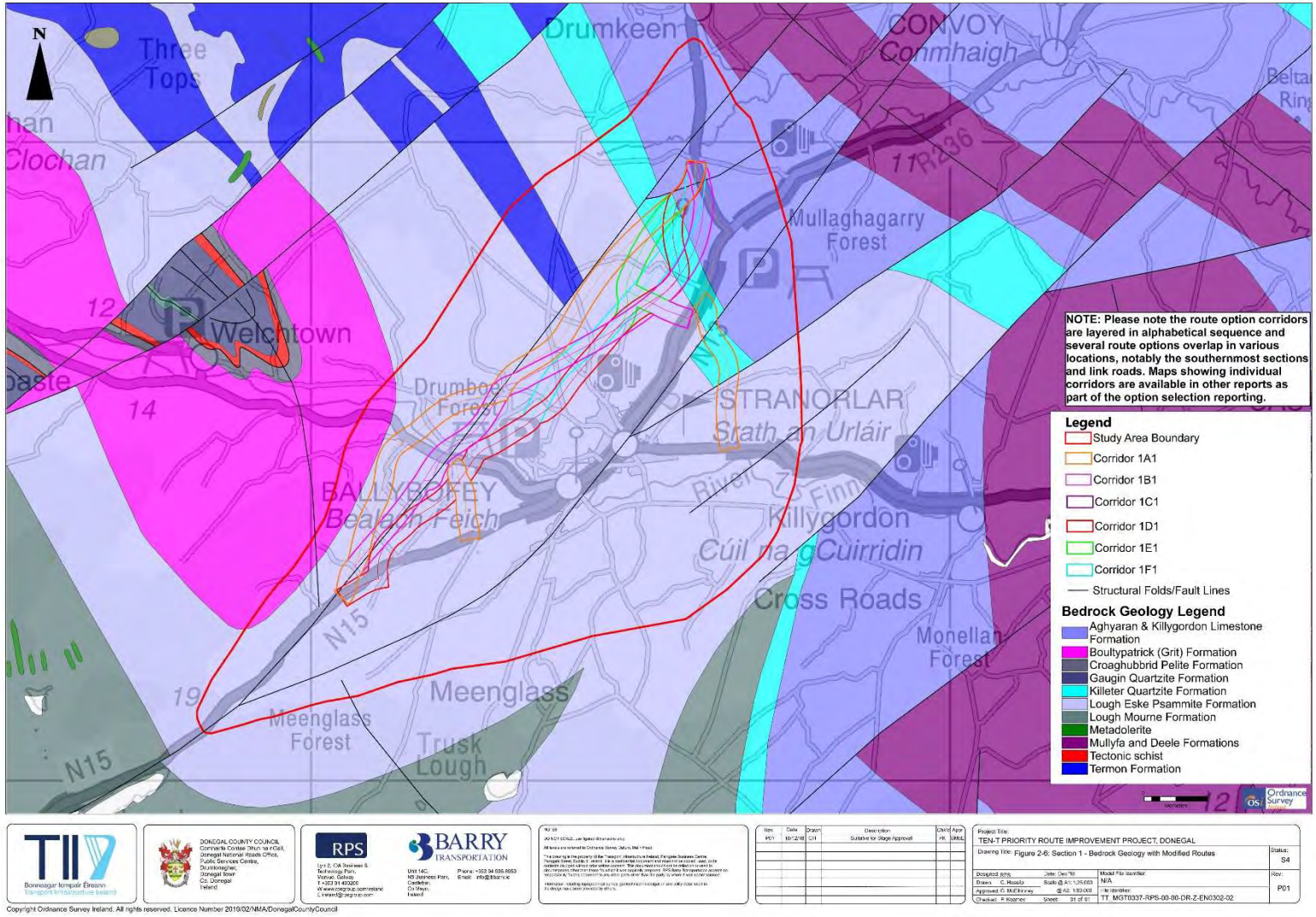


Figure 2-6: Bedrock Geology with Modified Options

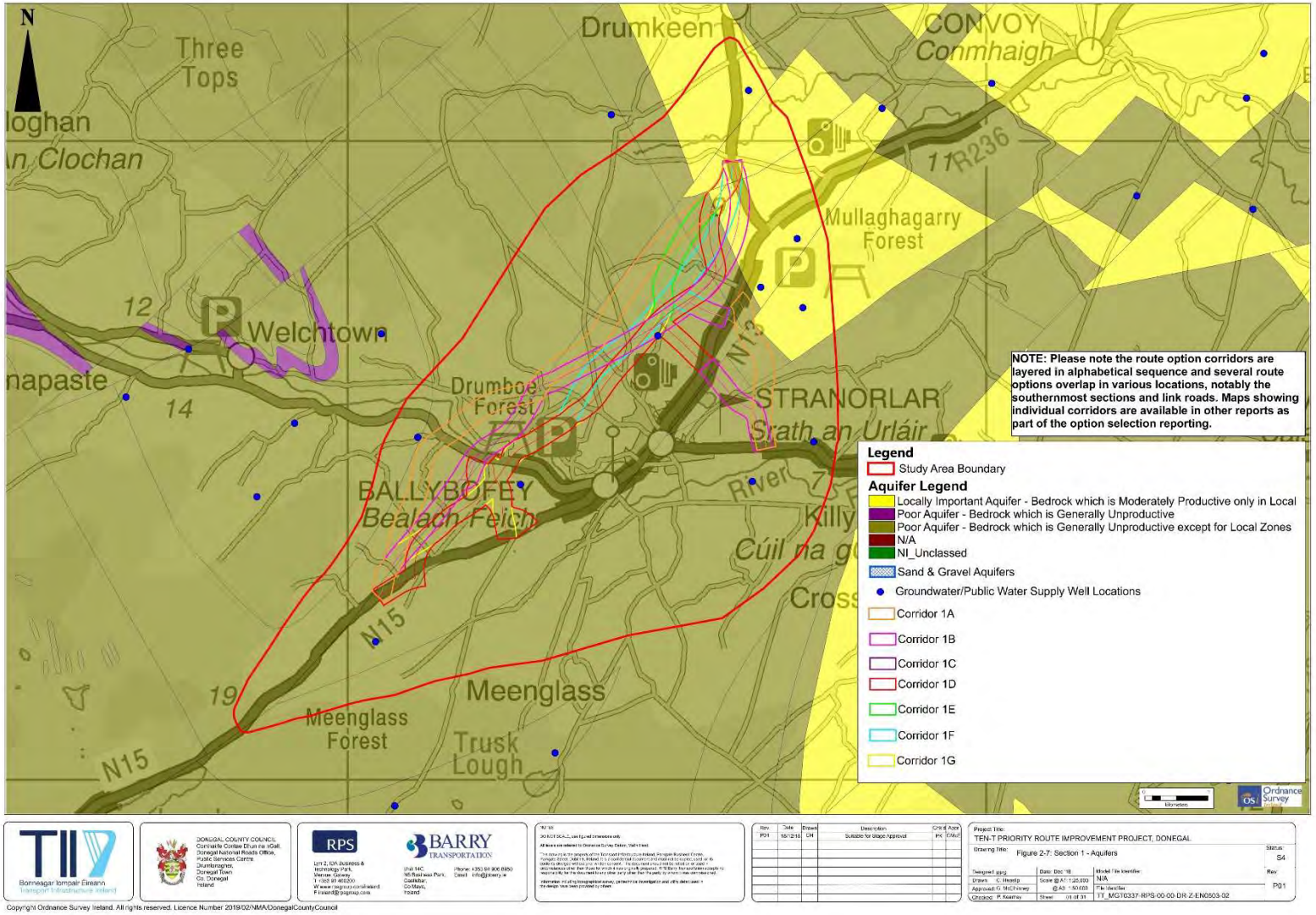


Figure 2-7: Aquifers

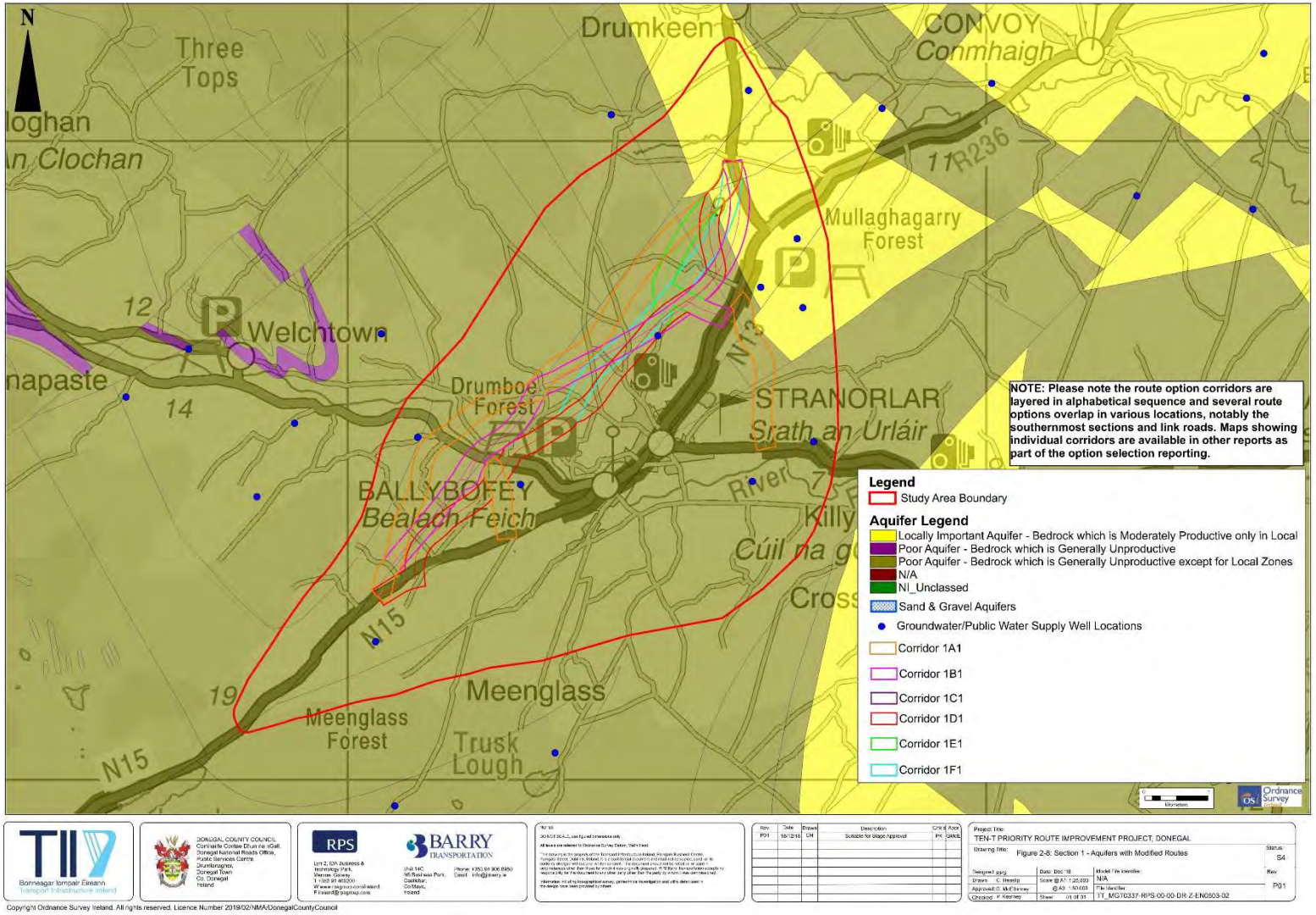


Figure 2-8:Aquifers with Modified Options

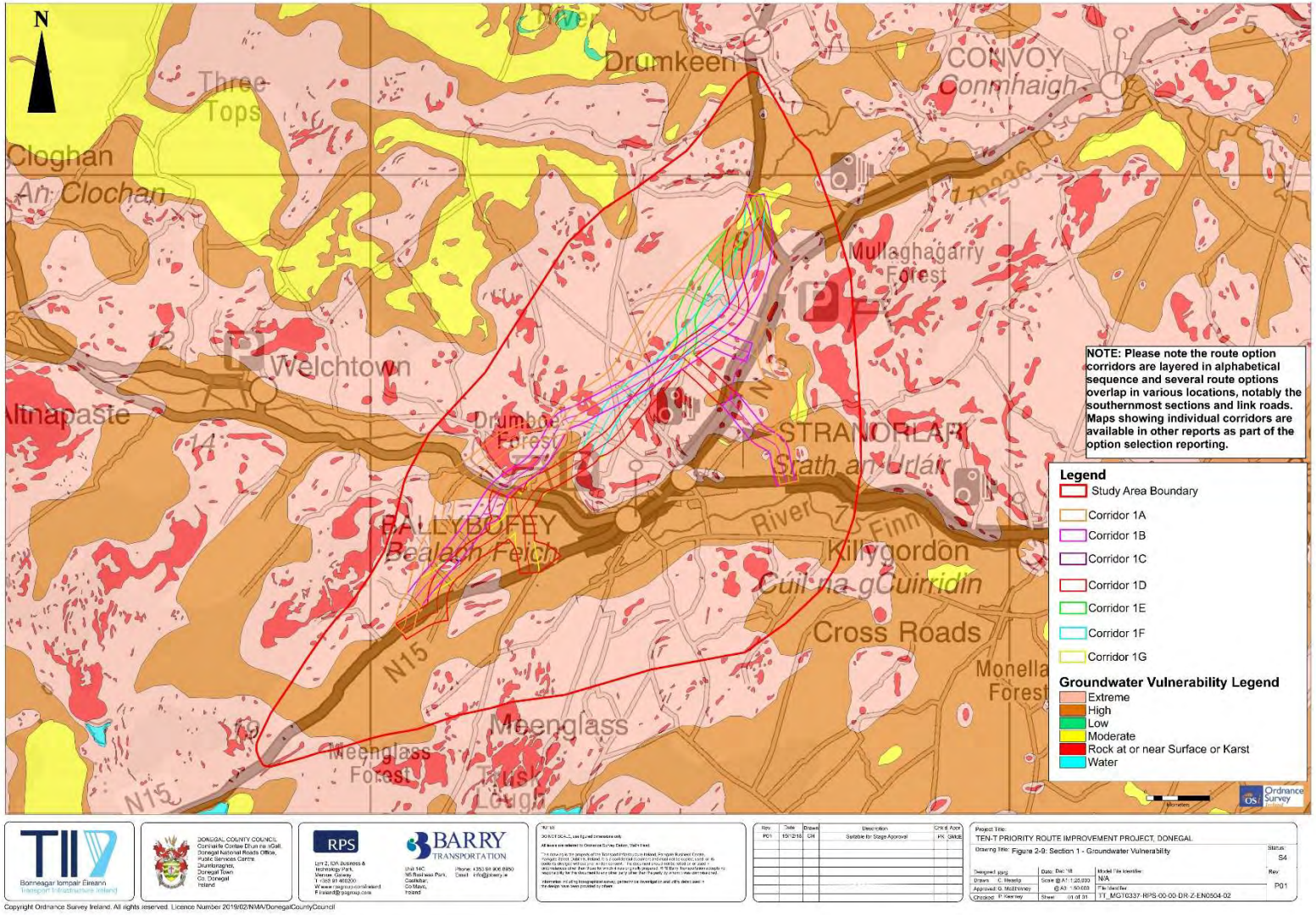


Figure 2-9: Groundwater Vulnerability

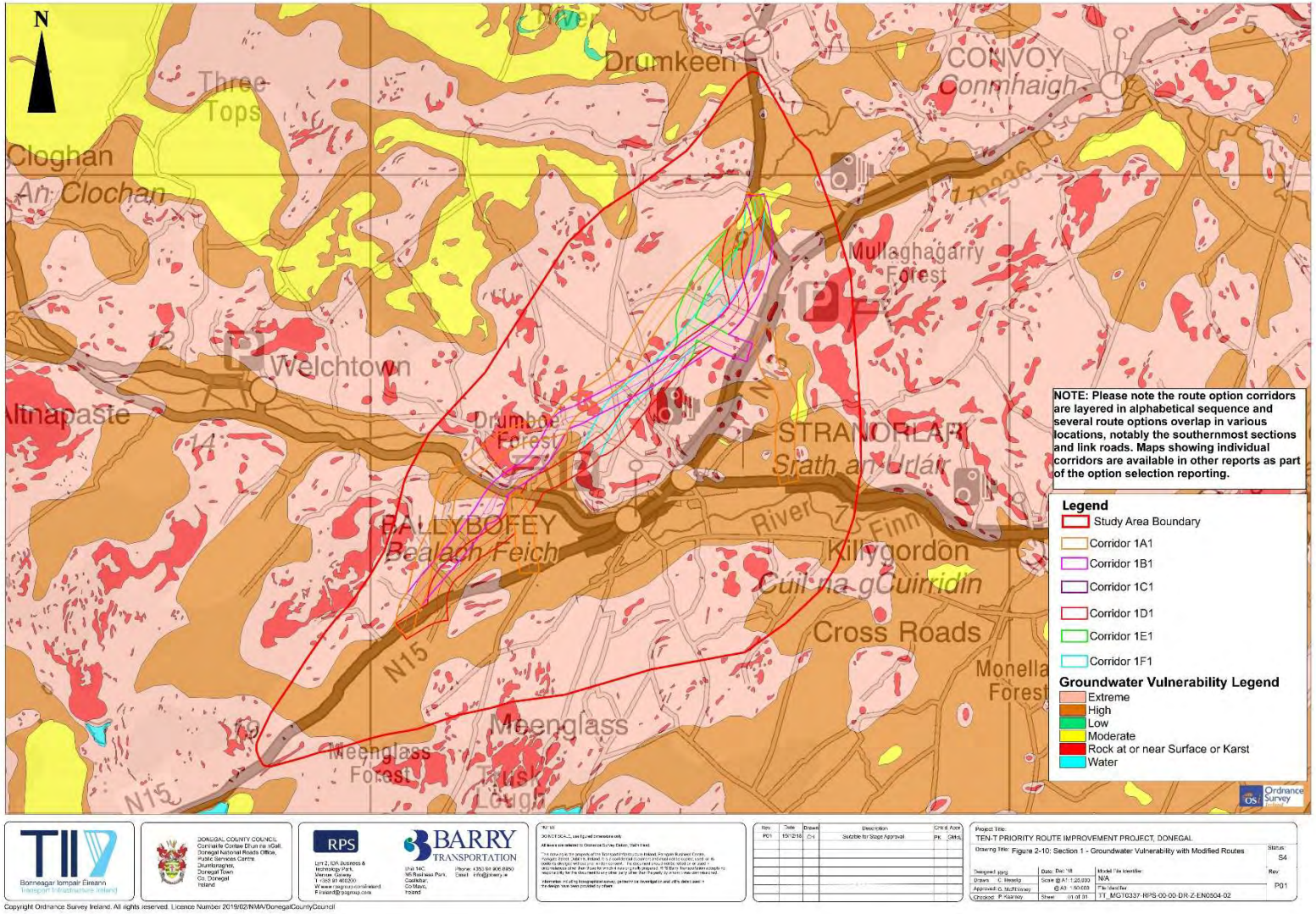


Figure 2-10: Groundwater Vulnerability with Modified Options

3 OPTION SELECTION

There are no recorded karst features, geological heritage areas, active quarries, mineral sites, landfills or contaminated land in the ZoI of each option. The main impact is associated with each option is excavation of soft soil deposits. The quantitative aspect of the comparative assessment of impacts is carried out along the centre-line of each option. The estimate of the volume of soft soils to be removed assumes a 21.5 metres wide carriageway and an excavation of 4 metres deep.

The potential impact on the seven options and six modified options (to include link roads) are described below under the relevant headings. Due to the limited number of impacts associated with each option, the summary of key impacts are presented on one table, **Table 3 1.**

3.1 Soils and Geology

All options cross areas of alluvial soils associated with the River Finn and areas of mapped peat. Both alluvium and peat were grouped together to determine the proportion of each option that will cross soft soils. The proportion ranges from 5% of total option length (1G Yellow) to 16% of total option length (1A1 Orange). The estimated volumes of soils to be removed ranges from approximately 59,220m^3, along the 1F/1F1 (Blue), to 146,450m^3, along the 1D/1D1 (Red). There is a Low attribute importance associated with soft soils (NRA Guidelines). In a regional context, the proportion of the attribute that will be removed is considered small. Therefore, the impact associated with removal of soft soils is considered Neutral for all six options.

Table 3-1: Assessment of Land and Soils impacts for 13 Options

Option	Attribute	Attribute Importance	Impact	Level of Impact
1A(Orange)	Poor/ soft ground* (entire option)	Low	The option length is 8,745m. The proportion of the option that will cross soft ground comprises **13%** (1,160m) of total length. It is estimated that **99,760m^3** of soft soils will need to be excavated along this option.	Neutral
1A1(Orange)	Poor/ soft ground* (entire option)	Low	The option length is 8,745m of mainline and 4,935m of link roads. The proportion of the total option that will cross soft ground comprises **16%** (2,183m) of total length. It is estimated that 156,018m^3 of soft soils will need to be excavated along this option.	Neutral
1B(Pink)	Poor/ soft ground* (entire option)	Low	The option length is 8,700m. The length of the option that will cross soft ground comprises **12%** (1,071m) of total length. It is estimated that **92,106m^3** of soft soils will need to be excavated along this option.	Neutral
1B1 (Pink)	Poor/ soft ground* (entire option)	Low	The option length is 8,700m of mainline and 9,583m of link roads. The proportion of the total option that will cross soft ground comprises **7%** (1,323m) of total length. It is estimated that **105,198m^3** of soft soils will need to be excavated along this option.	Neutral
1C(Purple)	Poor/ soft ground* (entire option)	Low	The option length is 8,580m. The length of the option that will cross soft ground comprises **13%** (1,090m) of total length. It is estimated that **93,740m^3** of soft soils will need to be excavated along this option.	Neutral

Option	Attribute	Attribute Importance	Impact	Level of Impact
1C1 (Purple)	Poor/ soft ground* (entire option)	Low	The option length is 8,580m of mainline and 7890m of link roads. The proportion of the total option that will cross soft ground comprises **7%** (1,198m) of total length. It is estimated that **96,320m^3** of soft soils will need to be excavated along this option.	Neutral
1D (Red)	Poor/ soft ground* (entire option)	Low	The option length is 8,440m. The length of the option that will cross soft ground comprises **16%** (1,342m) of total length. It is estimated that **115,412m^3** of soft soils will need to be excavated along this option.	Neutral
1D1 (Red)	Poor/ soft ground* (entire option)	Low	The option length is 8,440m of mainline and 10,990m of link roads. The proportion of the total option that will cross soft ground comprises **12%** (2,296m) of total length. It is estimated that **146,450m^3** of soft soils will need to be excavated along this option.	Neutral
1E (Green)	Poor/ soft ground* (entire option)	Low	The option length is 8,195m. The length of the option that will cross soft ground comprises **16%** (1,278m) of total length. It is estimated that 109,908m^3 of soft soils will need to be excavated along this option.	Neutral
1E1 (Green)	Poor/ soft ground* (entire option)	Low	The option length is 8,195m of mainline and 10,700m of link roads. The proportion of the total option that will cross soft ground comprises **12%** (2,200m) of total length. It is estimated that **144,910m^3** of soft soils will need to be excavated along this option.	Neutral
1F (Blue)	Poor/ soft ground* (entire option)	Low	The option length is 7,980 m. The length of the option that will cross soft ground comprises **11%** (904m) of total length. It is estimated that **78,002m^3** of soft soils will need to be excavated along this option.	Neutral
1F1 (Blue)	Poor/ soft ground* (entire option)	Low	The option length is 7,980 m of mainline and 10,170m of link roads. The proportion of the total option that will cross soft ground comprises **8%** (1,390m) of total length. It is estimated that **91,150m^3** of soft soils will need to be excavated along this option.	Neutral
1G (Composite Yellow)	Poor/ soft ground* (entire option)	Low	The option length is 8,590m of mainline and 8,850m of link roads. The proportion of the total option that will cross soft ground comprises **5%** (860m) of total length. It is estimated that **59,218m^3** of soft soils will need to be excavated along this option.	Neutral

* Derived from the EPA soil mapping (2006) to include ALLUVMin, AMinSRPT and BktPT

3.1.1 Summary and Preference

The summary of the impact assessment for each impact level is outlined in **Table 3-2.** All seven options and six modified options have one impact status - not significant/neutral impact.

Table 3-2: Summary of Land and Soil Impacts for each Option

TII Rating Key	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Major or Highly negative	-	-	-	-	-	-	-	-	-	-	-	-	-
Moderately Negative	-	-	-	-	-	-	-	-	-	-	-	-	-
Minor or Slightly negative	-	-	-	-	-	-	-	-	-	-	-	-	-
Not significant/ neutral	1	1	1	1	1	1	1	1	1	1	1	1	1
Minor or Slightly positive	-	-	-	-	-	-	-	-	-	-	-	-	-
Moderately Positive	-	-	-	-	-	-	-	-	-	-	-	-	-
Major or Highly Positive	-	-	-	-	-	-	-	-	-	-	-	-	-

3.2 Hydrogeology

The aquifers in the area are predominantly poorly productive aquifers which are generally unproductive except for local zones. A locally important bedrock aquifer, that is moderately productive only in local zones, is mapped in the north of the study area. All options traverse aquifers which have groundwater vulnerability ratings ranging from high, extreme to areas where rock is at or near the surface (denoted 'X' by the GSI). Such areas are more prone to pollution and run-off as the attenuation capacity of the overlying surficial deposits of soil and subsoil is limited by the soil strata thickness or lack of soils in the area.

The amount of cut which is required along each option has been calculated based on the preliminary option design by the Engineering team. This has been considered in the assessment where cut is greater than 3m depth and traverses areas of high groundwater vulnerability; this could increase the vulnerability rating to extreme through removal of soil and subsoil cover.

The potential impact on the options are described below under the relevant headings. There is minimal impact on hydrogeology receptors. The potential impacts of each option on the key hydrogeology attributes along each option are set out in **Table 3-3** to **Table 3-15** below.

3.2.1 Option 1A (Orange)

Option1A (Orange) is 8,745 metres long and 489 metres (6% of total length) crosses a Locally Important Aquifer (LI) and the remaining 8,256 metres (94% of total length) crosses a Poor Aquifer (Pl); this is similar to Options 1C, 1D and 1E. The main aquifer impacts are dewatering and drawdown during the construction phase, and localised lowering of the water table where intercepted. In the context of the wider regional

hydrogeology, these are considered neutral impacts, in areas underlain by PI, and minor negative impacts, in areas underlain by LI.

Approximately 71% (6,224m) of the total mainline length is estimated to be cut where vulnerability is rated as X (rock outcrop at surface) or extreme (rock < 3 metres from the surface). The entire length of the 6,224m is underlain by Poor Aquifer and therefore this is considered a neutral impact. In addition, 13% (1,136m) of the total mainline length is estimated to be cut by more than three metres along High vulnerability. The entire length of this is also underlain by Poor Aquifer and is therefore considered to be a neutral impact. Both impact types are similar to Options 1C, 1D and 1E.

Table 3-3: Assessment of Hydrogeology Impacts for Option 1A (Orange)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (PI)	Low	**94%** (8,256m) traverses Poor Aquifer (PI)	Neutral
Proportion of option that crosses locally important aquifer (LI)	Medium	**6%** (489m) traverses Locally important aquifer (LI)	Minor Negative
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	Approximately **71%** (6,224m) of the option is cut through X/Extreme groundwater vulnerability. Traverses Poor Aquifer (PI).	Neutral
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Low	**13%** (1,136m) of the option is cut >3m in areas of High vulnerability. 100% of this cut length traverses a PI Traverses Poor Aquifer (PI).	Neutral

3.2.2 Option 1A1 (Orange)

The modified 1A1 (Orange) option is approximately 13,680m long in total (including link roads). Approximately 7% (910m) crosses a Locally Important Aquifer (LI). The remaining 12,770m (93% of the total option) crosses a Poor Aquifer (PI). The main aquifer impacts are considered to be dewatering and drawdown during the construction phase, and localised lowering of the water table where intercepted. In the context of the wider regional hydrogeology, these are considered neutral impacts, in areas underlain by PI, and minor negative impacts in areas underlain by LI.

Approximately 29% (3,930m) of the total option length is estimated to be cut where vulnerability is rated as X (rock outcrop at surface) or extreme (rock < 3 metres from the surface). The entire length of the 3,930m is underlain by Poor Aquifer and therefore this is considered a neutral impact. In addition, 6% (825m) of the total option length is estimated to be cut by more than three metres along High vulnerability. The entire length of this is also underlain by Poor aquifer and is therefore considered to be a neutral impact. Both impact types are similar to Options 1C1 (Purple) and 1E1 (Green).

Table 3-4: Assessment of Hydrogeology Impacts for Modified Option 1A1 (Orange)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (PI)	Low	**93%** (12,770m) traverses Poor Aquifer (PI)	Neutral
Proportion of option that crosses locally important aquifer (LI)	Medium	**7%** (910m) traverses Locally important aquifer (LI)	Minor Negative
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	Approximately **62%** (8,448m) of the option traverses through areas of X/Extreme groundwater vulnerability. All of the areas of extreme groundwater vulnerability are located within Poor Aquifer (PI) zones.	Neutral

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Low	**6**% (825m) of the option is cut >3m in areas of High vulnerability. 100% of this cut length traverses a PI Traverses Poor Aquifer (PI).	Neutral

3.2.3 Option 1B (Pink)

Option 1B option (Pink) is 8,700 metres long and 1,249 metres (14% of total length) and crosses a Locally Important Aquifer (LI) and the remaining 7,451 metres (86% of total length) traverse a Poor Aquifer (PI). This option crosses the highest proportion of Locally Important Aquifer. The main aquifer impacts are considered to be dewatering and drawdown during the construction phase, and localised lowering of the water table where intercepted. In the context of the wider regional hydrogeology, these are considered neutral impacts, in areas underlain by PI, and minor negative impacts, in areas underlain by LI.

Approximately 67% (5,856m) of the total mainline length is estimated to be cut where vulnerability is rated as X (rock outcrop at surface) or extreme (rock < 3 metres from the surface); 3 % of this (151m) is underlain by a locally important aquifer and the remaining 97% (5,705m) is underlain by a Poor Aquifer. This is the only option where the mainline is estimated to be cut in areas where vulnerability is rated X or extreme and the underlying aquifer is Locally Important. This is considered a Minor Negative impact.

Approximately 26% (2,248m) of the option is due to be cut by more than three metres along an area of High vulnerability. 94% (2,119m) traverses a PI. The remaining 6% (129m) traverses a LI; this option has the second highest proportion of cut in areas of High vulnerability underlain by a LI. Owing to the importance of the underlying aquifer, the impact associated with this is Minor Negative. The impact associated with the proportion of the option that crosses the PI is neutral.

Table 3-5: Assessment of Hydrogeology Impacts for Option 1B (Pink)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (PI)	Low	**86%** (7,451m) of the total length traverses Poor Aquifer (PI)	Neutral
Proportion of option that crosses locally important aquifer (LI)	Medium	**14%** (1,249m) of the total length traverses Locally important aquifer (LI)	Minor Negative
Proportion of option that crosses X Extreme Groundwater Vulnerability and is underlain by a Poor Aquifer	Low	Approximately **67%** (5,856m) of the option is cut through X/Extreme groundwater vulnerability. **97%** (5,705m) of the length of option in Extreme Groundwater Vulnerability areas traverses PI Aquifer.	Neutral
Proportion of option that crosses X Extreme Groundwater Vulnerability and is underlain by a Locally Important Aquifer	Medium	Approximately **67%** (5,856m) of the option is cut through X/Extreme groundwater vulnerability. **3%** (151m) crosses LI Aquifer.	Minor Negative
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Low	**26%** (2,248) of the option is cut >3m in areas of High vulnerability. **94%** (2,119m) traverses Poor Aquifer (PI).	Neutral
	Medium	**26%** (2,248) of the option is cut >3m in areas of High vulnerability. **6%** (129m) traverses locally important aquifer (LI).	Minor Negative

3.2.4 Option 1B1 (Pink)

The modified 1B1 (Pink) option is 18,283 metres long in total and 1,440 metres (8% of total length) crosses a Locally Important Aquifer (LI) and the remaining 16,843 metres (92% of total length) crosses a Poor Aquifer (PI). This option crosses the highest proportion of Locally Important Aquifer (LI). The main aquifer impacts

are considered to be dewatering and drawdown during the construction phase, and localised lowering of the water table where intercepted. In the context of the wider regional hydrogeology, these are considered neutral impacts, in areas underlain by PI, and minor negative impacts, in areas underlain by LI.

Approximately 25% (4,574m) of the total option length is estimated to be cut where vulnerability is rated as X (rock outcrop at surface) or extreme (rock < 3 metres from the surface); 3% of this (152m) is underlain by a locally important aquifer and the remaining 97% (4,422m) is underlain by a Poor Aquifer. This is the only option where the mainline is estimated to be cut in areas where vulnerability is rated X or extreme and the underlying aquifer is Locally Important. This is considered a Minor Negative impact.

Approximately 17% (3,153m) of the option is due to be cut by more than three metres along an area of High vulnerability. 93% 2,944m) traverses a PI. The remaining 7% (209m) traverses a LI. Owing to the importance of the underlying aquifer, the impact associated with this is Minor Negative. The impact associated with the proportion of the option that crosses the PI is neutral.

Table 3-6: Assessment of Hydrogeology Impacts for Modified Option 1B1 (Pink)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (PI)	Low	**92%** (16,843m) of the total length traverses Poor Aquifer (PI)	Neutral
Proportion of option that crosses locally important aquifer (LI)	Medium	**8%** (1,440m) of the total length traverses Locally important aquifer (LI)	Minor Negative
Proportion of option that crosses X Extreme Groundwater Vulnerability and is underlain by a Poor Aquifer	Low	**59%** (10,856m) of the total option traverses areas of X/Extreme groundwater vulnerability.	Neutral
Proportion of option that crosses X Extreme Groundwater Vulnerability and is underlain by a Locally Important Aquifer	Medium	**1%** (152m) of the total option length is underlain by areas of extreme groundwater vulnerability and a Locally Important Aquifer	Minor Negative
Proportion of option that crosses High Groundwater Vulnerability cut >3m	Low	**17%** (3,153m) of the total option length comprising a >3m cut traverses areas of High Groundwater Vulnerability. **93% (2,944m)** of the option is located in areas of Poor Aquifer.	Neutral
	Medium	**17%** (3,153m) of the total option length comprising a >3m cut traverses areas of High Groundwater Vulnerability. **7%** (209m) of the option located over areas of High Vulnerability is located in areas of Locally Important Aquifer	Minor Negative

3.2.5 Option 1C (Purple)

Option 1C is 8,580 metres long, 475 metres (6% of total length) crosses a Locally Important Aquifer (LI) and the remaining 8,105 metres (94% of total length) crosses a Poor Aquifer (PI); this is similar to Options 1A, 1D and 1E. The main aquifer impacts are considered to be dewatering and drawdown during the construction phase, and localised lowering of the water table where intercepted. In the context of the wider regional hydrogeology, these are considered neutral impacts, in areas underlain by PI, and minor negative impacts, in areas underlain by LI.

Approximately 62% (5,315m) of the total mainline length is estimated to be cut where vulnerability is rated as X (rock outcrop at surface) or extreme (rock < 3 metres from the surface). The entire length of the 5,315m is underlain by Poor Aquifer and therefore this is considered a Neutral Impact. In addition, 26% (2,232m) of the total mainline length is estimated to be cut by more than three metres along High vulnerability. The entire length of this is also underlain by Poor aquifer and is therefore considered to be a neutral impact.

Table 3-7: Assessment of Hydrogeology Impacts for Option 1C (Purple)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (Pl)	Low	**94%** (8,105m) traverses Poor Aquifer (Pl)	Neutral
Proportion of option that crosses locally important aquifer (Ll)	Medium	**6%** (475m) traverses Locally important aquifer (Ll)	Minor Negative
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	Approximately **62%** (5,315m) of the option is cut through X/Extreme groundwater vulnerability. Traverses Poor Aquifer (Pl).	Neutral
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Low	**26%** (2,232 m) of the option is cut >3m in areas of High vulnerability. 100% of this traverses a Pl Traverses Poor Aquifer (Pl).	Neutral

3.2.6 Option 1C1 (Purple)

The modified 1C1 option (Purple) is 16,470 metres long including the link roads, 892m (5% of total length) crosses a Locally Important Aquifer (Ll) and the remaining 95% (15,578m) traverses a Poor Aquifer (Pl). The main aquifer impacts are considered to be dewatering and drawdown during the construction phase. And localised lowering of the water table where intercepted. In the context of the wider regional hydrogeology, these are considered neutral impacts, in areas underlain by Pl, and minor negative impacts, in areas underlain by Ll.

Approximately 21% (3,408m) of the total option length is estimated to be cut where vulnerability is rated as X (rock outcrop at surface) or extreme (rock <3 metres from the surface). The length of this cut in extreme vulnerability areas is underlain by Poor Aquifer (Pl). The main aquifer impacts are considered to be dewatering and drawdown during the construction phase, and localised lowering of the water table where intercepted. In the context of the wider regional hydrogeology, these are considered neutral impacts in areas underlain by Pl.

Table 3-8: Assessment of Hydrogeology Impacts for Modified Option 1C1 (Orange)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (Pl)	Low	**95%** (15,578m) traverses Poor Aquifer (Pl)	Neutral
Proportion of option that crosses locally important aquifer (Ll)	Medium	**5%** (892m) traverses Locally important aquifer (Ll)	Minor Negative
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	Approximately **54%** (8,924m) of the option is cut through X/Extreme groundwater vulnerability. Traverses Poor Aquifer (Pl).	Neutral
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Low	**19%** (3,061m) of the option is cut >3m in areas of High vulnerability. 100% of this length traverses a Pl Traverses Poor Aquifer (Pl).	Neutral

3.2.7 Option 1D (Red)

The 1D option (Red) is 8,440 metres long, 515 metres (6% of total length) crosses a Locally Important Aquifer (Ll) and the remaining 7,925 metres (94% of total length) crosses a Poor Aquifer (Pl); this is similar to Options 1A, 1C and IE. The main aquifer impacts are considered to be dewatering and drawdown during the construction phase, and localised lowering of the water table where intercepted. In the context of the wider regional hydrogeology, these are considered neutral impacts, in areas underlain by Pl, and minor negative impacts, in areas underlain by Ll.

Approximately 51% (4,319m) of the total mainline length is estimated to be cut where vulnerability is rated as X (rock outcrop at surface) or extreme (rock < 3 metres from the surface). The entire length of the 5,315m is underlain by Poor Aquifer and therefore this is considered a neutral impact. In addition, 30% (2,523m) of the total mainline length is estimated to be cut by more than three metres along High vulnerability. The entire length of this is also underlain by Poor aquifer and is therefore considered to be a neutral impact

Table 3-9: Assessment of Hydrogeology Impacts for Option 1D (Red)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (Pl)	Low	**94%** (7,925m) traverses Poor Aquifer (Pl)	Neutral
Proportion of option that crosses locally important aquifer (Ll)	Medium	**6%** (515m) traverses Locally important aquifer (Ll)	Minor Negative
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	Approximately **51%** (4319m) of the option is cut through X/Extreme groundwater vulnerability. Traverses Poor Aquifer (Pl).	Neutral
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Low	**30%** (2,523 m) of the option is cut >3m in areas of High vulnerability. 100% of this length traverses a Pl.	Neutral

3.2.8 Option 1D1 (Red)

The modified 1D1 option (red) is 19,431 metres long including link roads, of which 964 metres (5% of total length) crosses a Locally Important Aquifer (Ll) and the remaining 18,467 metres (95% of total length) crosses a Poor Aquifer (Pl). The main aquifer impacts are considered to be dewatering and drawdown during the construction phase, and localised lowering of the water table where intercepted. In the context of the wider regional hydrogeology, these are considered neutral impacts, in areas underlain by Pl, and minor negative impacts, in areas underlain by Ll.

Approximately 13% (2,503m) of the total option length is estimated to be cut where vulnerability is rated as X (rock outcrop at surface) or extreme (rock < 3 metres from the surface); all which is underlain by a Poor Aquifer.

Approximately 18% (3,435m) of the option is due to be cut by more than three metres along an area of High vulnerability. 96% (3,305m) traverses a Pl. The remaining 4% (130m) traverses a Ll. Owing to the importance of the underlying aquifer, the impact associated with this is Minor Negative. The impact associated with the proportion of the option that crosses the Pl is neutral

Table 3-10: Assessment of Hydrogeology Impacts for Modified Option 1D1 (Red)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (Pl)	Low	**95%** of the total option (18,467m) traverses Poor Aquifer (Pl)	Neutral
Proportion of option that crosses locally important aquifer (Ll)	Medium	**5%** (964m) traverses Locally important aquifer (Ll)	Minor Negative
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	Approximately **44%** (8526m) of the option is traverses X/Extreme groundwater vulnerability.	Neutral
	Low	**18%** (3,435m) of the total option length comprising a >3m cut traverses areas of High Groundwater	Neutral

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses High Groundwater Vulnerability and cut >3m		Vulnerability. **96% (**3,305m) of the option is located in areas of Poor Aquifer.	
	Medium	**18%** (3,435m) of the total option length comprising a >3m cut traverses areas of High Groundwater Vulnerability.130m (**4%**) of this length traverses a Locally Important Aquifer	Minor Negative

3.2.9 Option 1E (Green)

Option 1E (Green) is 8,195 metres long, 485 metres (6% of total length) crosses a Locally Important Aquifer (LI) and the remaining 7,710 metres (94% of total length) crosses a Poor Aquifer (PI); this is similar to Option 1A, 1C and 1D. The main aquifer impacts are considered to be dewatering and drawdown during the construction phase, and localised lowering of the water table where intercepted. In the context of the wider regional hydrogeology, these are considered neutral impacts, in areas underlain by PI, and minor negative impacts, in areas underlain by LI.

Approximately 52% (4,246m) of the total mainline length is estimated to be cut where vulnerability is rated as X (rock outcrop at surface) or extreme (rock < 3 metres from the surface). The entire length of the 4,246m is underlain by Poor Aquifer and therefore this is considered a neutral impact. In addition, 19% (1,594m) of the total mainline length is estimated to be cut by more than three metres along High vulnerability. The entire length of this is also underlain by Poor aquifer and is therefore considered to be a neutral impact.

Table 3-11: Assessment of Hydrogeology Impacts for Option 1E (Green)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (PI)	Low	**94%** (7,710m) traverses Poor Aquifer (PI)	Neutral
Proportion of option that crosses locally important aquifer (LI)	Medium	**6%** (485m) traverses Locally important aquifer (LI)	Minor Negative
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	Approximately **52%** (4,246m) of the option is cut through X/Extreme groundwater vulnerability. Traverses Poor Aquifer (PI).	Neutral
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Low	**19%** (1,594 m) of the option is cut >3m in areas of High vulnerability. 100% of this length traverses an area underlain by PI.	Neutral

3.2.10 Option 1E1 (Green)

The modified 1E1 (Green) option is 18,896 metres long in total, including the link roads. Of this option 904 metres (5% of total length) crosses a Locally Important Aquifer (LI) and the remaining 17,922 metres (95% of total length) crosses a Poor Aquifer (PI); this is similar to Option 1A(1) and 1C(1). The main aquifer impacts are considered to be dewatering and drawdown during the construction phase, and localised lowering of the water table where intercepted. In the context of the wider regional hydrogeology, these are considered neutral impacts, in areas underlain by PI, and minor negative impacts, in areas underlain by LI.

Approximately 21% (3,979m) of the total option length is estimated to be cut where vulnerability is rated as X (rock outcrop at surface) or extreme (rock < 3 metres from the surface). The entire length of the 3,979m is underlain by Poor Aquifer and therefore this is considered a neutral impact. In addition, 9% (1,712m) of

the total option length is estimated to be cut by more than three metres along High vulnerability. The entire length of this is also underlain by Poor aquifer and is therefore considered to be a neutral impact.

Table 3-12: Assessment of Hydrogeology Impacts for Modified Option 1E1 Green)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (Pl)	Low	**95%** (17,992m) traverses Poor Aquifer (Pl)	Neutral
Proportion of option that crosses locally important aquifer (Ll)	Medium	**5%** (904m) traverses Locally important aquifer (Ll)	Minor Negative
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	Approximately **43%** (8055m) of the option traverses X/Extreme groundwater vulnerability.	Neutral
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Low	9% (1,712m) of the option is cut >3m in areas of High vulnerability, of which none is located in areas of Locally Important Aquifer. .	Neutral

3.2.11 Option 1F (Blue)

Option 1F (Blue) is 7,980 metres long, 1,032 metres (13% of total length) crosses a Locally Important Aquifer (Ll) and the remaining 6,948 metres (87% of total length) crosses a Poor Aquifer (Pl). After Option 1B, this option contains the second highest proportion of an option that crosses a Locally Important Aquifer. The main aquifer impacts are considered to be dewatering and drawdown during the construction phase, and localised lowering of the water table where intercepted. In the context of the wider regional hydrogeology, these are considered neutral impacts, in areas underlain by Pl, and minor negative impacts, in areas underlain by Ll.

Approximately 53% (4,206m) of the total mainline length is estimated to be cut where vulnerability is rated as X (rock outcrop at surface) or extreme (rock < 3 metres from the surface). The entire length of the 4,206m is underlain by Poor Aquifer and therefore this is considered a neutral impact.

Approximately 24% (1,928m) of the option is due to be cut by more than three metres along an area of High vulnerability. 76% (1,459m) traverses a Pl. The remaining 24% (469m) traverses a Ll. This option contains the highest proportion of cut > 3metres across a Ll. Owing to the importance of the underlying aquifer, the impact associated with this is Minor Negative. The impact associated with the proportion of the option that crosses the Pl is neutral.

Table 3-13: Assessment of Hydrogeology Impacts for Option 1F (Blue)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (Pl)	Low	**87%** (6,948m) of the total length traverses Poor Aquifer (Pl)	Neutral
Proportion of option that crosses locally important aquifer (Ll)	Medium	**13%** (1,032m) of the total length traverses Locally important aquifer (Ll)	Minor Negative
Proportion of option that crosses X Extreme Groundwater Vulnerability and is underlain by a Poor Aquifer	Low	Approximately **53%** (4,206m) of the option is cut through X/Extreme groundwater vulnerability. Traverses Pl Aquifer.	Neutral

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses High Groundwater Vulnerability cut >3m	Low	**24%** (1,928) of the option is cut >3m in areas of High vulnerability. **76%** (1,459m) traverses Poor Aquifer (Pl).	Neutral
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Medium	**24%** (1,928) of the option is cut >3m in areas of High vulnerability. **24%** (469m) traverses locally important aquifer (Ll).	Minor Negative

3.2.12 Option 1F1 (Blue)

The modified 1F1 (Blue) option is 18,147metres long including link roads, of which 902 metres (5% of total length) crosses a Locally Important Aquifer (Ll) and the remaining 17,227 metres (95% of total length) crosses a Poor Aquifer (Pl). After Option 1B & 1B1, this option contains the second highest proportion of option that crosses a Locally Important Aquifer. The main aquifer impacts are considered to be dewatering and drawdown during the construction phase, and localised lowering of the water table where intercepted. In the context of the wider regional hydrogeology, these are considered neutral impacts, in areas underlain by Pl, and minor negative impacts, in areas underlain by Ll.

Approximately 45% (8,212m) of the total option length is estimated to be cut where vulnerability is rated as X (rock outcrop at surface) or extreme (rock < 3 metres from the surface). All of this distance overlays Pl areas.

Approximately 9% (1,617m) of the option is due to be cut by more than three metres along an area of High vulnerability. 81% (1,315m) traverses a Pl. The remaining 19% (302m) traverses a Ll. This modified option contains the highest proportion of cut > 3metres across a Ll. Owing to the importance of the underlying aquifer, the impact associated with this is Minor Negative. The impact associated with the proportion of the option that crosses the Pl is neutral.

Table 3-14: Assessment of Hydrogeology Impacts for Modified Option 1F1 (Blue)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (Pl)	Low	**95%** (17,227m) of the total length traverses Poor Aquifer (Pl)	Neutral
Proportion of option that crosses locally important aquifer (Ll)	Medium	**5%** (920m) of the total length traverses Locally important aquifer (Ll)	Minor Negative
Proportion of option that crosses X Extreme Groundwater Vulnerability and is underlain by a Poor Aquifer	Low	Approximately **28%** (5,029m) of the option is cut through X/Extreme groundwater vulnerability. All of this cut distance traverses Pl Aquifer.	Neutral
Proportion of option that crosses High Groundwater Vulnerability cut >3m	Low	**9%** (1,617m) of the option is cut >3m in areas of High vulnerability. **81%** (1,315m) of this distance is located in areas of Pl.	Neutral
	Medium	**19%** (1,617m) of the option is cut >3m in areas of High vulnerability. 19% (302m) is located in areas of Ll	Minor Negative

3.2.13 Option 1G (Yellow)

The 1G (Yellow) option is 17,436 metres long, of which 872 metres (5% of total length) crosses a Locally Important Aquifer (Ll) and the remaining 16,564m (95% of total length) crosses a Poor Aquifer (Pl).The main

aquifer impacts are considered to be dewatering and drawdown during the construction phase, and localised lowering of the water table where intercepted. In the context of the wider regional hydrogeology, these are considered neutral impacts, in areas underlain by PI, and minor negative impacts, in areas underlain by LI.

Approximately 46% (8,023m) of the total option length is estimated to be cut where vulnerability is rated as X (rock outcrop at surface) or extreme (rock < 3 metres from the surface). The entire length of the 8,023m is underlain by Poor Aquifer and therefore this is considered a neutral impact.

Approximately 20% (3,546m) of the option is due to be cut by more than three metres along an area of High vulnerability. 98% (3,480m) traverses a PI. The remaining 2% (66m) traverses a LI. Owing to the importance of the underlying aquifer, the impact associated with this is Minor Negative. The impact associated with the proportion of the option that crosses the PI is neutral.

Table 3-15: Assessment of Hydrogeology Impacts for Option 1G (Yellow)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (PI)	Low	**95%** (16,564m) of the total length traverses Poor Aquifer (PI)	Neutral
Proportion of option that crosses locally important aquifer (LI)	Medium	**5%** (872m) of the total length traverses Locally important aquifer (LI)	Minor Negative
Proportion of option that crosses X Extreme Groundwater Vulnerability and is underlain by a Poor Aquifer	Low	Approximately **46%** (8,023m) of the option traverses X/Extreme groundwater vulnerability. All of this cut distance traverses PI Aquifer.	Neutral
Proportion of option that crosses High Groundwater Vulnerability cut >3m	Low	**20%** (3,546m) of the option is cut >3m in areas of High vulnerability. **98%** (3,840m) of this distance traverses Poor Aquifer (PI).	Neutral
	Medium	**20%** (3,546m) of the option is cut >3m in areas of High vulnerability. **2%** (98m) traverses locally important aquifer (LI).	Minor Negative

3.2.14 Summary and Preference

The summary of the impact assessment for each impact level is outlined in**Table 3-16**. Options 1A, 1A1, 1C, 1C1, 1D, 1D1, 1E and 1E1 all have three neutral and one minor negative impact associated with them. Options 1D1, 1F, 1F1 and 1G has three neutral and two minor negative impacts while Options 1B and 1B1 has three neutral and three minor negative impacts.

Table 3-16: Summary of Hydrogeology Impacts for each Option

TII Rating Key	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Major or Highly negative													
Moderately Negative													
Minor or Slightly negative	1	1	3	3	1	1	1	2	1	1	2	2	2
Not significant/neutral	3	3	3	3	3	3	3	3	3	3	3	3	3
Minor or Slightly positive													
Moderately Positive													
Major or Highly Positive													

3.3 Comparison of Options

The summary of the soils, geology and hydrogeology impact assessment for each impact level is outlined in **Table 3-17** and **Table 3-18** outlines the Quantitative and Qualitative elements of the assessment along with the TII impact score and the order of preference for each option.

Table 3-17: Summary of Geology, Soils and Hydrogeology Impacts for each Option

TII Rating Key	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Major or Highly negative													
Moderately Negative													
Minor or Slightly negative	1	1	3	3	1	1	1	2	1	1	2	2	2
Not significant/neutral	4	4	4	4	4	4	4	4	4	4	4	4	4
Minor or Slightly positive													
Moderately Positive													
Major or Highly Positive													

Table 3-18: Predicated TII Impact Score and Option Preferences

Option	Quantitative Assessment	Qualitative Assessment	Impact Score	Impact Score	Ranking	Preference
1A (Orange)	× 4 Neutral impacts ×1 Minor Negative	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI) Traverses X/extreme vulnerability. Poor Aquifer.	Not significant or Neutral	4	1	Preferred
1A1 (Orange)	× 4 Neutral impacts ×1 Minor Negative	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI) Traverses X/extreme vulnerability. Poor Aquifer.	Not significant or Neutral	4	1	Preferred
1B (Pink)	× 4 Neutral impacts ×3 Minor Negative	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI) Traverses X/extreme vulnerability. 97% Poor Aquifer. Traverses X/extreme vulnerability. 3% LI Aquifer. Traverses High vulnerability (>3m cut) 6% LI	Minor or slightly negative	3	3	Least Preferred
1B1 (Pink)	× 4 Neutral impacts ×3 Minor Negative	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI) Traverses X/extreme vulnerability. 59% Poor Aquifer. Traverses X/extreme vulnerability. 1% LI Aquifer. Traverses High vulnerability (>3m cut) 17% LI	Minor or slightly negative	3	3	Least Preferred
1C (Purple)	× 4 Neutral impacts ×1 Minor Negative	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI) Traverses X/extreme vulnerability. Poor Aquifer.	Not significant or Neutral	4	1	Preferred
1C1 (Purple)	× 4 Neutral impacts ×1 Minor Negative	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI) Traverses X/extreme vulnerability. Poor Aquifer.	Not significant or Neutral	4	1	Preferred
1D (Red)	× 4 Neutral impacts ×1 Minor Negative	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI) Traverses X/extreme vulnerability. Poor Aquifer.	Not significant or Neutral	4	1	Preferred

Option	Quantitative Assessment	Qualitative Assessment	Impact Score	Impact Score	Ranking	Preference
1D1 (Red)	× 4 Neutral impacts ×1 Minor Negative	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI) Traverses X/extreme vulnerability. Poor Aquifer.	Not significant or Neutral	4	1	Preferred
1E (Green)	× 4 Neutral impacts ×1 Minor Negative	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI) Traverses X/extreme vulnerability. Poor Aquifer.	Not significant or Neutral	4	1	Preferred
1E1 (Green)	× 4 Neutral impacts ×1 Minor Negative	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI) Traverses X/extreme vulnerability. Poor Aquifer.	Not significant or Neutral	4	1	Preferred
1F (Blue)	× 4 Neutral impacts ×2 Minor Negative	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI) Traverses X/extreme vulnerability. Poor Aquifer. Traverses High vulnerability (>3m cut) 24% LI	Minor or slightly negative	3	2	Intermediate
1F1 (Blue)	× 4 Neutral impacts ×2 Minor Negative	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI) Traverses X/extreme vulnerability. Poor Aquifer. Traverses High vulnerability (>3m cut) 19% LI	Minor or slightly negative	3	2	Intermediate
1G (Yellow)	× 4 Neutral impacts ×2 Minor Negative	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI) Traverses X/extreme vulnerability. Poor Aquifer. Traverses High vulnerability (>3m cut) 2% LI	Minor or slightly negative	3	2	Intermediate

4 CONCLUSION

From the review of the impacts of each proposed option on the soil, geology and hydrogeology in the Zone of Influence, Options 1A, 1A1, 1C, 1C1, 1D, 1D1, 1E and 1E1 are the most favourable options with the same number of minor negative and neutral impacts. All eight of these options traverse poor or soft ground that requires excavation, and all eight option traverse areas of Locally important aquifer (Ll & Lg) and areas of extreme groundwater vulnerability. Option 1B and 1B1 are the least preferred with respect to their impact on the soil, geology and hydrogeology in the Zone of Influence, since these options traverse and cut through longer areas of high groundwater vulnerability and locally important aquifer than the other option.

Option 1A, 1A1, 1C, 1C1, 1D, 1D1, 1E and 1E1 have an overall impact score of 'not significant or neutral' on the soil, geology and hydrogeology in the TEN-T Section 1 Zone of Influence with an impact rating of 'minor negative' applied to all other option in Section 1.

Donegal County Council

TEN-T Priority Route Improvement Project, Donegal

Section 1: N15/N13 Ballybofey/Stranorlar Urban Region

Option Selection Report

Appendix D1.7 - Hydrology

December 2019

Document Control Sheet

Client:	Donegal County Council
Project Title:	TEN-T Priority Route Improvement Project, Donegal – Section 1: N15/N13 Ballybofey/Stranorlar Urban Region
Document Title:	Option Selection Report – Appendix D1.7 – Hydrology
Document No. :	TT-MGT0337-RPS-00-01-RP-E-EN-1016

Rev. No.	Suitability	Effective Date	Revision Description	Checked	Approved
P01	S4	December 2019	Issue for publication	PJG	GMcE

This report has been prepared by RPS/Barry Transportation on behalf of Donegal County Council. Any other persons who use any information contained herein do so at their own risk.

© RPS Barry Transportation 2019

Table of Contents

1 INTRODUCTION 1
1.1 Methodology 1
1.2 Assessment Criteria 5
2 EXISTING ENVIRONMENT 6
2.1 Desk Study 6
2.1.1 Overview of Watercourses and their Catchments & Sub-Catchments 6
2.1.2 Overview of Flows in Watercourses 10
2.1.3 Overview of Drainage Issues 12
2.1.4 Overview of Flooding Aspects and Floodplains 15
2.1.5 Overview of Surface Water Quality 16
2.1.6 Overview of Water Supply Sources 22
2.1.7 Overview of Abstractions from Surface Water 22
2.1.8 Overview of Discharges to Surface Water 22
2.1.9 Overview of Ecological Issues 25
3 OPTION ASSESSMENT 28
3.1 Comparison of Options 29
3.1.1 Option 1A (Orange) 29
3.1.2 Option 1A1 (Orange) 31
3.1.3 Option 1B (Pink) 32
3.1.4 Option 1B1 (Pink) 33
3.1.5 Option 1C (Purple) 34
3.1.6 Option 1C1 (Purple) 35
3.1.7 Option 1D (Red) 36
3.1.8 Option 1D1 (Red) 38
3.1.9 Option 1E (Green) 38
3.1.10 Option 1E1 (Green) 40
3.1.11 Option 1F (Blue) 41
3.1.12 Option 1F1 (Blue) 42
3.1.13 Option 1G (Yellow) 43
3.2 Summary of Option Comparison 44
4 CONCLUSIONS & RECOMMENDATIONS 46

List of Figures

Figure 1-1: Section 1 Options Overview....3
Figure 1-2: Option Selection - Overview Modified Options....4
Figure 2-1: Section 1 - Surface Water....7
Figure 2-2: Section 1 - Surface Water with Modified Options....8
Figure 2-3: Catchment Boundaries and HEPs....11
Figure 2-4: Location of Historical Water Feature at Magherapaste....12
Figure 2-5: Flood Mapping....13
Figure 2-6: Flood Mapping with Modified Options....14
Figure 2-7: Locations of Historical Floods (Source: www.floodinfo.ie)....15
Figure 2-8: Section 1 - River Quality Status....17
Figure 2-9: River Quality Status with Modified Options....18
Figure 2-10: WFD River Risk Status....20
Figure 2-11: WFD River Risk Status - Section 1: Option 1A1 -1F1....21
Figure 2-12: UWWT Emission Points and Section 4 Discharges - Section 1: Option 1A-1G....23
Figure 2-13: UWWT Emissions Points and Section 4 Discharges – Section 1: Option 1A1 – 1F1....24
Figure 2-14: Designated Sites, Freshwater Pearl Mussel Catchment and Surface Water Interactions - Section 1: Option Corridors 1A-1G....26
Figure 2-15: Designated Sites, Freshwater Pearl Mussel Catchment and Surface Water Interactions – Section 1: Option Corridors 1A1 - 1F1....27

List of Tables

Table 1.1: Sources of Hydrological Information....2
Table 1.2 Impact Scoring Key (TII, 2016)....5
Table 2.1: Overview of Potentially Impacted Watercourses and their Catchments....9
Table 2.2: Overview of Potentially Impacted Watercourses and their Catchments....11
Table 3.1: Criteria for Rating Site Attributes - Estimation of importance of Hydrological Attributes....28
Table 3.2: Criteria for Rating Impact Significance at Option Selection Stage....28
Table 3.3: Flood Impact Assessments for Option 1A (Orange)....29
Table 3.4: Water Quality Impact Assessments for Option 1A (Orange)....30
Table 3.5: Flood Impact Assessments for the additional Link Options for Option 1A1 (Orange)....31
Table 3.6: Water Quality Impact Assessments for the additional Link Roads for Option 1A1 (Orange)....32
Table 3.7: Flood Impact Assessments for Option 1B (Pink)....32
Table 3.8: Water Quality Impact Assessments for Option 1B (Pink)....33
Table 3.9: Water Quality Impact Assessments for Option 1C (Purple)....34
Table 3.10: Water Quality Impact Assessments for Option 1C (Purple)....35
Table 3.11 : Flood Impact Assessments for Option 1D (Red)....36
Table 3.12: Water Quality Impact Assessments for Option 1D (Red)....37
Table 3.13: Flood Impact Assessments for Option 1E (Green)....38
Table 3.14: Water Quality Impact Assessments for Option 1E (Green)....40
Table 3.15: Flood Impact Assessments for Option 1F (Blue)....41
Table 3.16: Water Quality Impact Assessments for Option 1F (Blue)....42
Table 3.17: Flood Impact Assessments for Option 1G (Yellow)....43
Table 3.18: Water Quality Impact Assessments for Option 1G (Yellow)....44
Table 3.19: Option Scoring Matrix....45

1 INTRODUCTION

This report examines the hydrological environment associated with 13 options (as shown in **Figure 1-1** and **Figure 1-2**) for Section 1 N15 Ballybofey-Stranorlar project of the TEN-T Priority Route Improvement Project in Donegal and will form part of the Phase 2 Option Selection Report.

The principal objectives of this report are to:

- Complete a desk study and to obtain relevant hydrological data for each option,
- Identify and describe sites of known or potential hydrological interest,
- Assess the significance of the likely impacts of the proposed road scheme on the existing hydrological environment along each option,
- To evaluate and compare each option based on hydrological criteria taking into account interaction with other environmental, engineering and economic criteria,
- To assess each option in line with the *Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis* issued by the TII[1] in October 2016, and
- Based on the above assessment, to assess, compare and rank the preferred option in order of preference.

In fulfilling these objectives, a full consideration of the likely hydrological environmental effects of the identified option can be carried out. An informed choice can therefore be made with the knowledge of hydrological consequences. This enables the importance of the proposed effects and the scope for mitigating these to be appropriately evaluated. This report shall be read in conjunction with the other technical appendices to the Environmental Assessment.

1.1 Methodology

This report is prepared having regard to the TII *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*[2] as recommended by the TII *Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis*[3].

A comparative evaluation of the options is undertaken, having regard to the specific hydrological impacts associated with each option in order to identify a preferred option. The data required to inform the hydrological section of the Option Corridor Selection Report is obtained by;

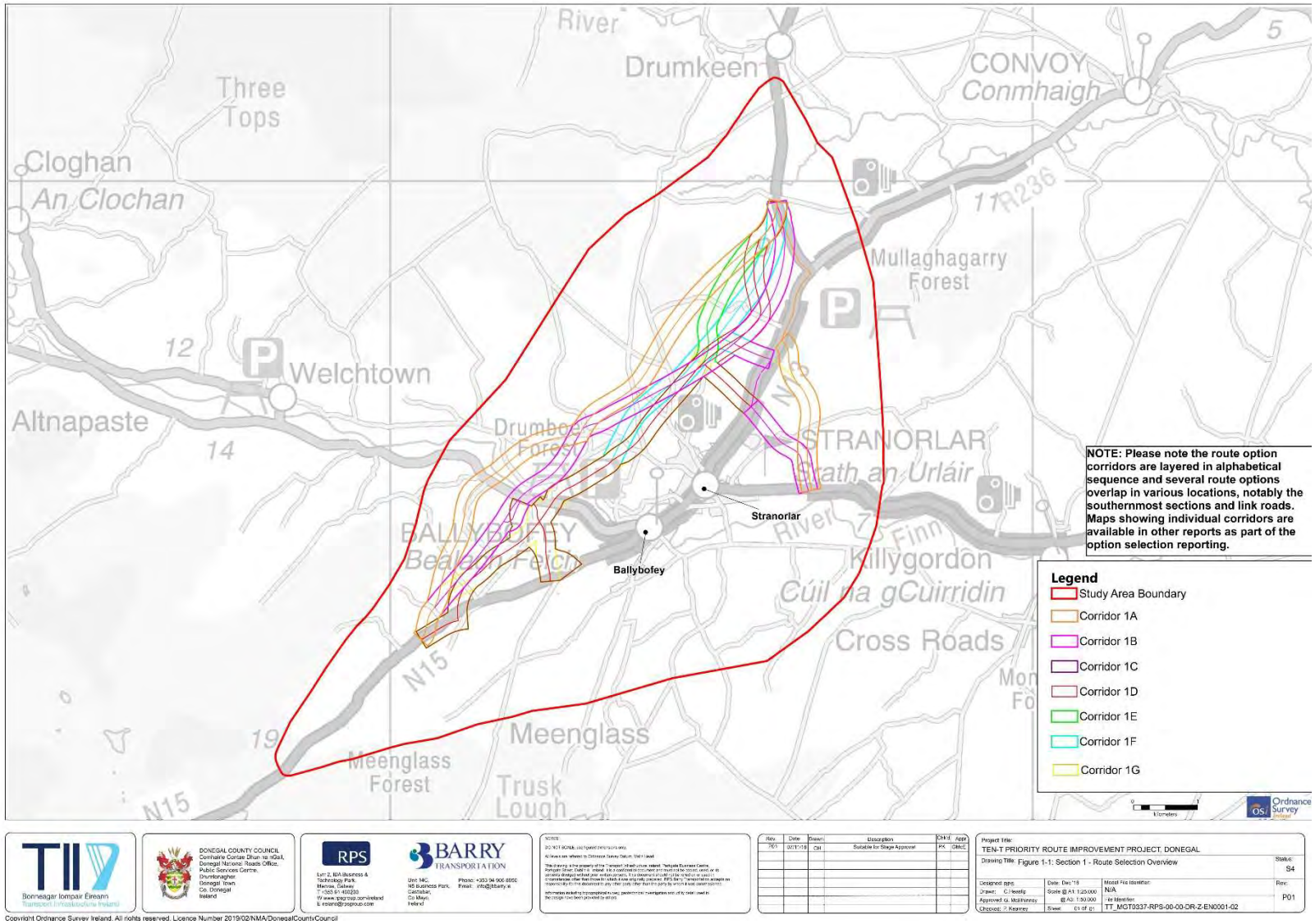
- Undertaking a desk study to identify and retrieve relevant published information on the hydrology of the defined study area. Sources of information to be consulted are identified in **Table 1.1**;
- Consulting with statutory consultees and relevant Government agencies, local authorities and non-governmental organisations in order to confirm official designations and legislative requirements in respect of protected sites, surface waters and aquifers;
- Supplementing the above desk study information with any further readily retrievable data specifically relating to the option, including the examination of any locally relevant information or data;
- Use of stereoscopic aerial photographs to identify previously unmapped soft or disturbed ground, potential geohazards or hydrogeological features in the vicinity of the option;

[1] The National Roads Authority (NRA) and the Railway Procurement Agency were merged to become Transport Infrastructure Ireland (TII) in 2015.
[2] TII http://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf
[3] TII PE-PAG-02031, (October 2016)

- A targeted drive-by (windshield) survey, if appropriate, along option to verify (or 'ground truth') the available data and identify any unrecorded changes in the landscape associated with more recent human activity (e.g. filled ground, recent drainage works, diverted watercourses), and
- Field inspections of important sites and features identified at Constraints Study stage which are likely to be of geological, hydrological or hydrogeological significance in order to assess the significance of any likely environmental impacts on them (e.g. geological heritage features, springs, swallow holes, large supply wells).

Table 1.1: Sources of Hydrological Information

Hydrological Attribute	Sources
Surface Water Features	1:50,000 Discovery Series Maps (Ordnance Survey Ireland) 1:10,560 Maps (Ordnance Survey Ireland) EPA
Catchments	Rivers and their Catchment Basins, Map by Ordnance Survey (1958) River Basin Management Projects (http://www.wfdireland.ie/) Local Authorities (Environment Section) EPA OPW Flood Studies Update Web Portal
River Flows	Hydrometric Section, Office of Public Works (www.opw.ie) HydroNet site, EPA OPW Flood Studies Update Web Portal OPW Flood Hazard & Flood Risk Information (FloodInfo.ie)
Flooding	Engineering Services Section, Office of Public Works Flooding Records at National Flood Hazard Website http://www.floodmaps.ie/ OPW Flood Hazard & Flood Risk Information (FloodInfo.ie) OPW Preliminary Flood Risk Assessment Mapping
Water Quality	EPA
Public Water Supply	Irish Water Local Authorities Group Water Schemes



Copyright Ordnance Survey Ireland. All rights reserved. Licence Number 2019/02/NMA/DonegalCountyCouncil

Figure 1-1: Section 1 Options Overview

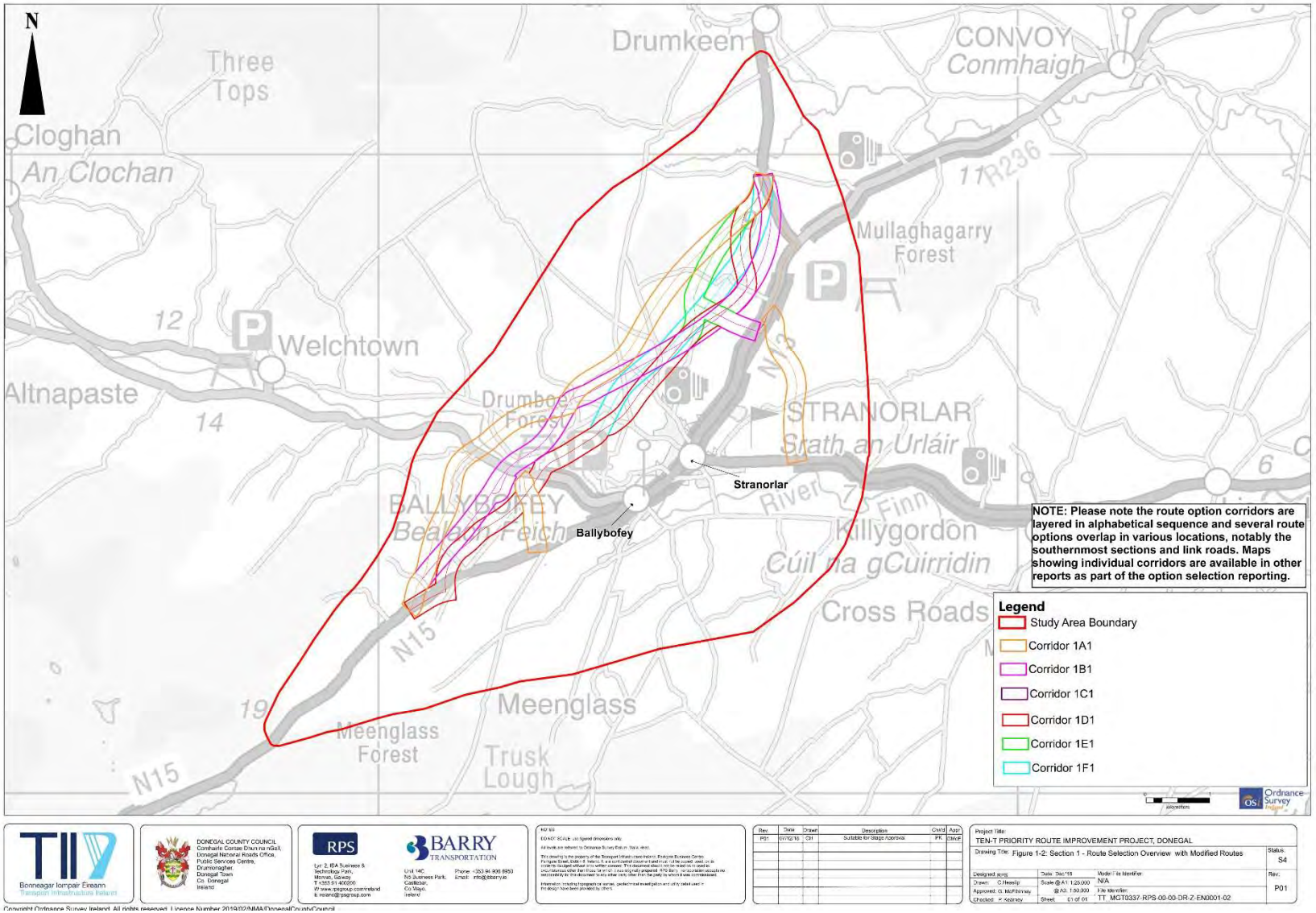


Figure 1-2: Option Selection - Overview Modified Options

1.2 Assessment Criteria

Most of the potential environmental impacts for watercourses occur close to the points where the proposed option cross the water channel, aside from the potential to cause flooding both upstream and downstream and reduce water and biological quality downstream. The TII *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* recommends the following attributes (and impacts) to be assessed for each option for the hydrology (surface water) topic:

- Watercourses crossed by each option and potential impact on water quality arising from re-alignment works and discharge of surface water run-off;
- Aquatic ecological sites close to and downstream of water crossings;
- Surface water abstraction close to and downstream of water crossings;
- established amenity value of surface waters traversed by each option, and
- Potential increase (or reduction) in flood risk to existing properties.

The impact of the options on hydrology has been assessed based on flood risk, water quality and hydroecology. The comparative evaluation of options was assisted by scoring of impacts to sensitive receptors using the Impact Scoring Key in **Table 1.2** taken from the *Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis* (TII, 2016).

Table 1.2 Impact Scoring Key (TII, 2016)

7	Major or Highly Positive
6	Moderately Positive
5	Minor or Slightly Positive
4	Not Significant/Neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or Highly negative

2 EXISTING ENVIRONMENT

2.1 Desk Study

The entire study area lies within the River Foyle Catchment and forms part of the National Hydrometric Area – 01. The main surface water features potentially impacted by the option extents include the River Finn and its tributaries and also a tributary to the River Deele (Donegal).

The River Finn is one of the major tributaries of the greater Foyle catchment (HA 01) and emanates from the Bluestack and Glendowan Mountains in the interior of Donegal. The River Finn flows into the River Mourne to form the River Foyle at Lifford/Strabane. The Finn catchment is a medium to large sized catchment (502km^2) with a mixture of peat, pasture and forest coverage. The study area is also affected by a number of tributaries of the Finn with catchments ranging in size from 2km^2 to 26km^2. The largest of these is the Daurnett Burn which flows from the south west of the study area. The tributaries largely emanate from farmland within the Finn Valley although the Daurnett Burn represents a more upland catchment with a fair degree of peat land coverage.

The River Deele is a medium sized catchment (134km^2) that forms part of the greater Foyle Catchment and originates in the hilly area to the west of the village of Convoy. The catchment is largely agricultural land with some peat and forest land coverage also. The River Deele flows into the River Foyle approximately 2.8km downstream of the River Finn/River Foyle confluence.

2.1.1 Overview of Watercourses and their Catchments & Sub-Catchments

An overview of each watercourse and their respective catchments and sub-catchments potentially impacted by the proposed overall option extents are presented in **Table 2.1** and also illustrated in **Figure 2-1** (seven main options) and **Figure 2-2** (six main options with links) below. The impacts of each of these instances will be assessed individually later in **Section 3.**

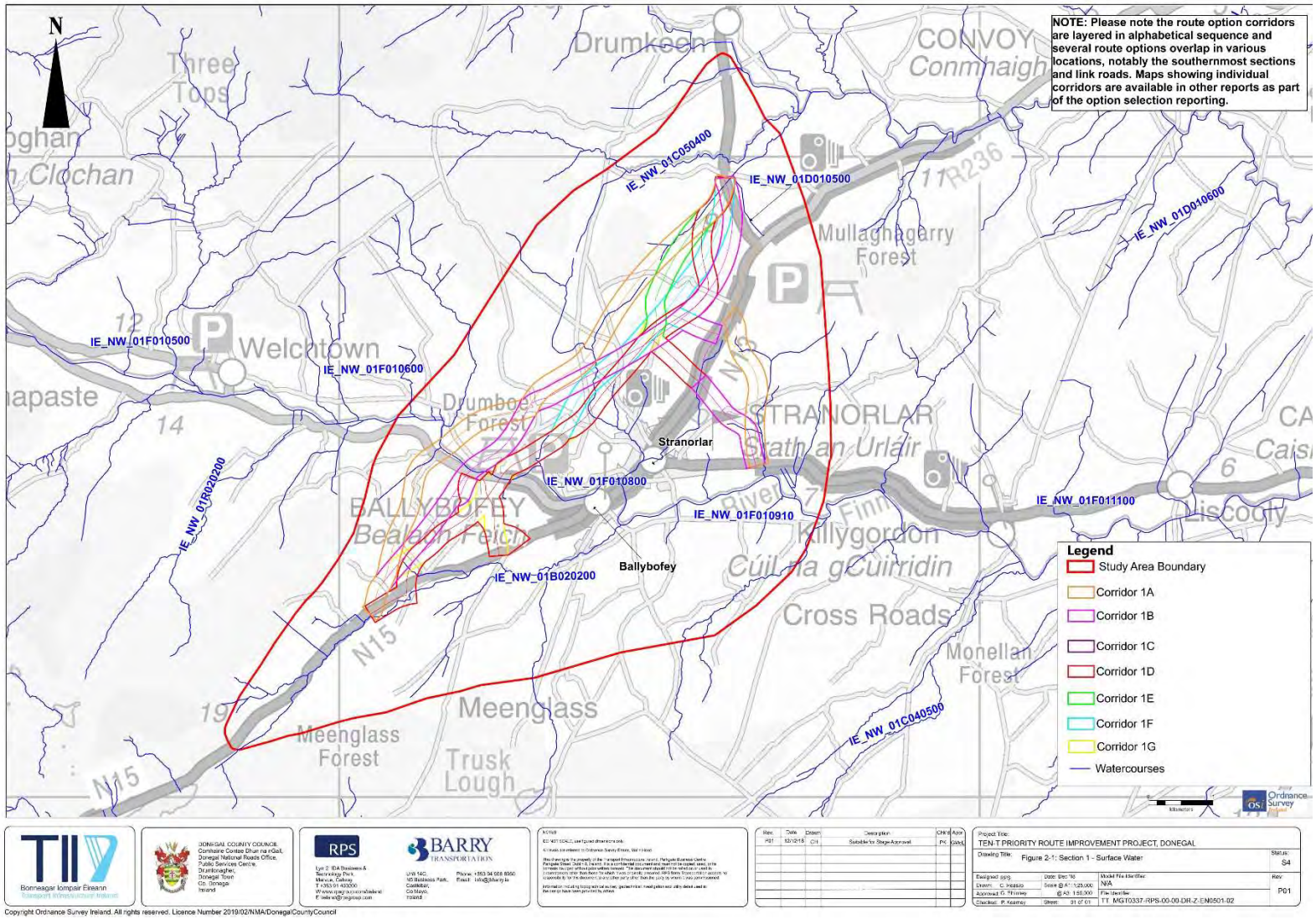
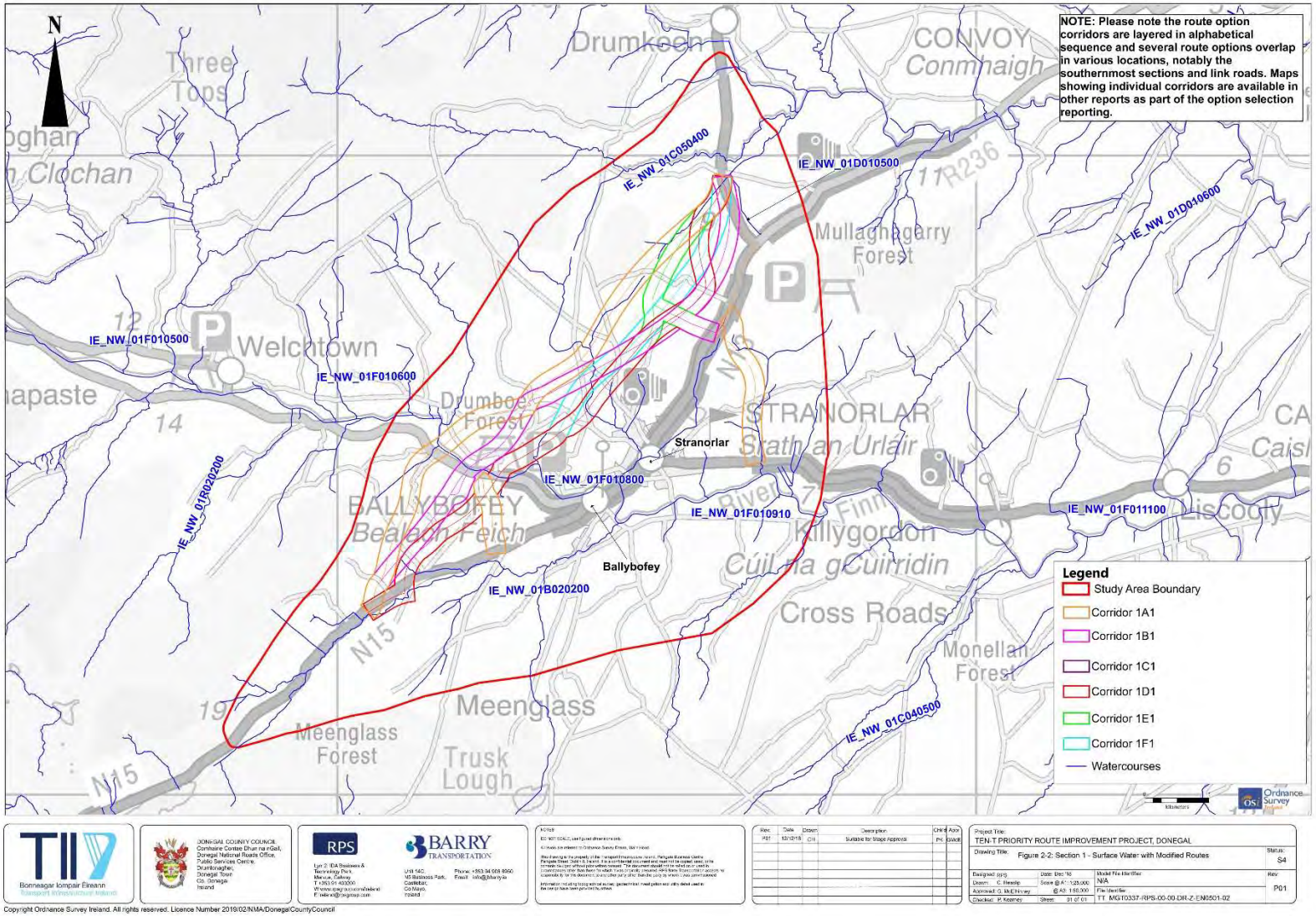


Figure 2-1: Section 1 - Surface Water



Copyright Ordnance Survey Ireland. All rights reserved. Licence Number 2019/02/NMA/DonegalCountyCouncil

Figure 2-2: Section 1 - Surface Water with Modified Options

Table 2.1: Overview of Potentially Impacted Watercourses and their Catchments

ID	EPA Name	EU River Waterbody Code	Watercourse Segment Code	WFD Catchment	WFD Sub Catchment	WFD River Sub Basin
1	NA	IE_NW_01B02 0200	01_1826	Foyle	Finn(Donegal)_SC_ 040	BURN DAURNETT_010
2	(Burn) Daurnett	IE_NW_01B02 0200	01_1815	Foyle	Finn(Donegal)_SC_ 040	BURN DAURNETT_010
3	CAPPRY	IE_NW_01B02 0200	01_1816	Foyle	Finn(Donegal)_SC_ 040	BURN DAURNETT_010
4	(Burn) Daurnett	IE_NW_01B02 0200	01_1828	Foyle	Finn[Donegal]_SC_ 040	BURN DAURNETT_010
5	Finn [Donegal]	IE_NW_01F01 0600	01_809	Foyle	Finn[Donegal]_SC_ 030 /Finn[Donegal]_SC _040	FINN (DONEGAL)_050
6	MULLANACH OSE	IE_NW_01F01 0600	01_808	Foyle	Finn(Donegal)_SC_ 040	FINN (DONEGAL)_050
7	Finn [Donegal]	IE_NW_01F01 0600	01_810	Foyle	Finn[Donegal]_SC_ 030 /Finn[Donegal]_SC _040	FINN (DONEGAL)_050
8	Finn [Donegal]	IE_NW_01F01 0800	01_7147	Foyle	Finn[Donegal]_SC_ 030 /Finn[Donegal]_SC _040	FINN (DONEGAL)_060
9	Aghasheil	IE_NW_01F01 0800	01_553	Foyle	Finn(Donegal)_SC_ 040	FINN (DONEGAL)_060
10	Finn [Donegal]	IE_NW_01F01 0800	01_590	Foyle	Finn[Donegal]_SC_ 030 /Finn[Donegal]_SC _040	FINN (DONEGAL)_060
11	Drumboe lower	IE_NW_01F01 0800	01_589	Foyle	Finn[Donegal]_SC_ 030	FINN (DONEGAL)_060
12	Greenhills 01	IE_NW_01F01 0800	01_70	Foyle	Finn[Donegal]_SC_ 030	FINN (DONEGAL)_060
13	Backlees	IE_NW_01F01 0800	01_186	Foyle	Finn[Donegal]_SC_ 030	FINN (DONEGAL)_060
14	Backlees	IE_NW_01F01 0800	01_184	Foyle	Finn[Donegal]_SC_ 030	FINN (DONEGAL)_060
15	Teevickmoy	IE_NW_01F01 0800	01_185	Foyle	Finn[Donegal]_SC_ 030	FINN (DONEGAL)_060
16	Kilross 01	IE_NW_01F01 0800	01_543	Foyle	Finn[Donegal]_SC_ 030	FINN (DONEGAL)_060
17	Finn [Donegal]	IE_NW_01F01 0910	01_1445	Foyle	Finn[Donegal]_SC_ 030	FINN (DONEGAL)_070
18	Finn [Donegal]	IE_NW_01F01 0910	01_1446	Foyle	Finn[Donegal]_SC_ 030	FINN (DONEGAL)_070
19	Mullaghagarry	IE_NW_01F01 0910	01_776	Foyle	Finn[Donegal]_SC_ 030	FINN (DONEGAL)_070
20	Treanamullin	IE_NW_01F01	01_66	Foyle	Finn[Donegal]_SC_	FINN (DONEGAL)_070

ID	EPA Name	EU River Waterbody Code	Watercourse Segment Code	WFD Catchment	WFD Sub Catchment	WFD River Sub Basin
		0910			030	
21	Mullaghagarry	IE_NW_01F01 0910	01_68	Foyle	Finn[Donegal]_SC_ 030	FINN (DONEGAL)_070
22	Castlebane 01	IE_NW_01F01 0910	01_67	Foyle	Finn[Donegal]_SC_ 030	FINN (DONEGAL)_070
23	Mullaghagarry	IE_NW_01F01 0910	01_69	Foyle	Finn[Donegal]_SC_ 030	FINN (DONEGAL)_070
24	Tircallan	IE_NW_01F01 0910	01_1766	Foyle	Finn[Donegal]_SC_ 030	FINN (DONEGAL)_070
25	NA	IE_NW_01F01 0910	01_4	Foyle	Finn[Donegal]_SC_ 030	FINN (DONEGAL)_070
26	Tircallan	IE_NW_01F01 0910	01_3	Foyle	Finn[Donegal]_SC_ 030	FINN (DONEGAL)_070
27	NA	IE_NW_01D0 10500	01_1025	Foyle	Deele[Donegal]_SC _010	DEELE (DONEGAL)_030
28	Magheracorra n	IE_NW_01D0 10500	01_1023	Foyle	Deele[Donegal]_SC _010	DEELE (DONEGAL)_030
29	Magheracorra n	IE_NW_01D0 10500	01_1024	Foyle	Deele[Donegal]_SC _010	DEELE (DONEGAL)_030
30	Lisnaree	IE_NW_01D0 10500	01_928	Foyle	Deele[Donegal]_SC _010	DEELE (DONEGAL)_030
31	Magheracorra n	IE_NW_01D0 10500	01_1530	Foyle	Deele[Donegal]_SC _010	DEELE (DONEGAL)_030

2.1.2 Overview of Flows in Watercourses

As part of the North Western - Neagh Bann Catchment Flood Risk Assessment and Management (CFRAM) Plan Study, a detailed hydrology report was prepared by RPS in 2015 for the Unit of Management (UoM) 01 (Donegal)[4]. Ballybofey/Stranorlar was one of twenty-six Areas for Further Assessment (AFAs) identified during the Preliminary Flood Risk Assessment process in UoM 01 for further hydrological and hydraulic analysis. Design flows of various return periods were calculated along the River Finn and its tributaries using best practice guidance for Irish catchments generally as outlined in the Flood Studies Update (FSU) and supplemented with other methodologies where these were considered more appropriate. The index flood flow and design flood flows were calculated for each sub-catchment at Hydrological Estimation Points (HEP) located at the following locations along the watercourses: the upstream limits of the model, where tributaries enter the modelled channels, hydrometric gauging stations, intermediate points on the modelled channels and at the downstream limit of the model.

Table 2.2 provides a summary of the design flows at each watercourse that may be potentially impacted by the overall corridor extents. See **Figure 2-3** for location of HEPs.

[4]North Western – Neagh Bann CFRAM Study – UoM 01 Hydrology Report, RPS 2015 (http://www.cfram.ie/otherprojects/IBE0700Rp0006_UoM01%20Hydrology%20Report_F02.pdf)

Table 2.2: Overview of Potentially Impacted Watercourses and their Catchments

River	Watercourse Segment Code	Node ID_CFRAMS	AREA (km^2)	Q_{med} (m^3/s)	Q10 (m^3/s)	Q100 (m^3/s)	Q1000 (m^3/s)
Burn (Daurnett)	01_1815	01_1815_2_RA	8.93	8.01	12.16	19.77	32.22
Goland	01_1825	01_1825_3_RA	3.46	3.25	4.93	8.01	13.06
Finn	01_810	01_810_2_RA	309.97	257.90	369.31	553.71	825.54
Backlees	01_186	01_186_2_RA	4.63	3.21	4.87	7.93	12.92
Kilross 01	01_543	01_543_U	0.08	0.06	0.09	0.14	0.23
Kilross 01	01_543	01_543_2_RA	1.16	0.82	1.25	2.03	3.31
Mullaghagarry	01_69	01_69_2_RA	4.84	2.34	3.55	5.78	9.41
Finn	01_1446	01_776_3_RA	5.90	3.17	4.81	7.82	12.75

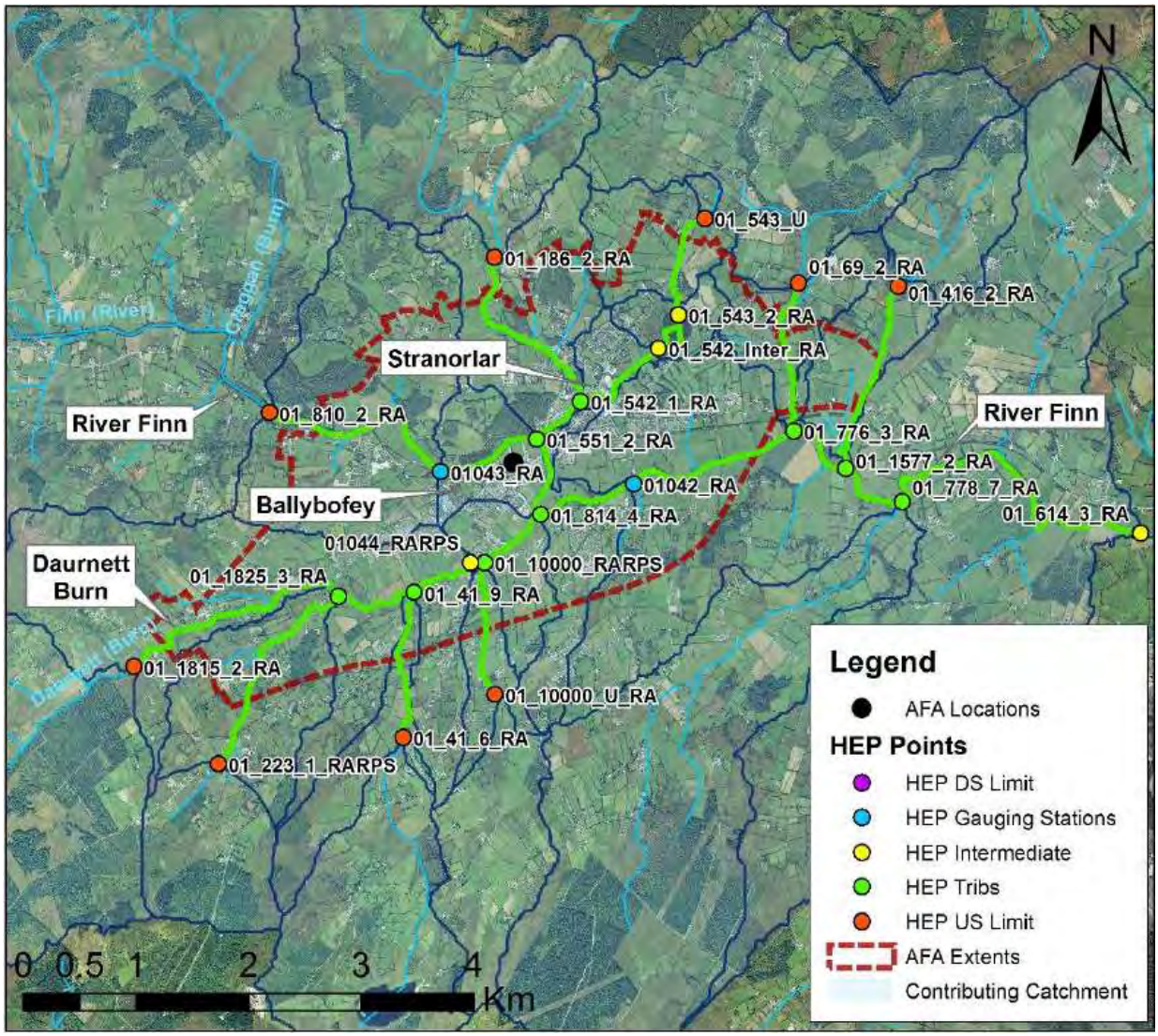


Figure 2-3: Catchment Boundaries and HEPs

2.1.3 Overview of Drainage Issues

Historical 6-inch mapping has revealed very little change in drainage regimes in the study area. One noticeable feature identified in the 6-inch mapping is a body of water just north of the Ash Meadows housing estate at Magherapaste (see **Figure 2-4**)**.** There is a label beside it reading “Mill Dam”. This mill dam has evidently since been abandoned and there is no evidence of any ponding at this location presently. A similar pre-existing mill dam pond is visible on 6-inch mapping near the intersection of N13 and N15. This has also been abandoned and there is no evidence of ponding at this location presently.

The OPW Arterial drainage mapping was also consulted and there is no evidence of arterial drainage in the study area (see **Figure 2-4**)

Figure 2-4: Location of Historical Water Feature at Magherapaste

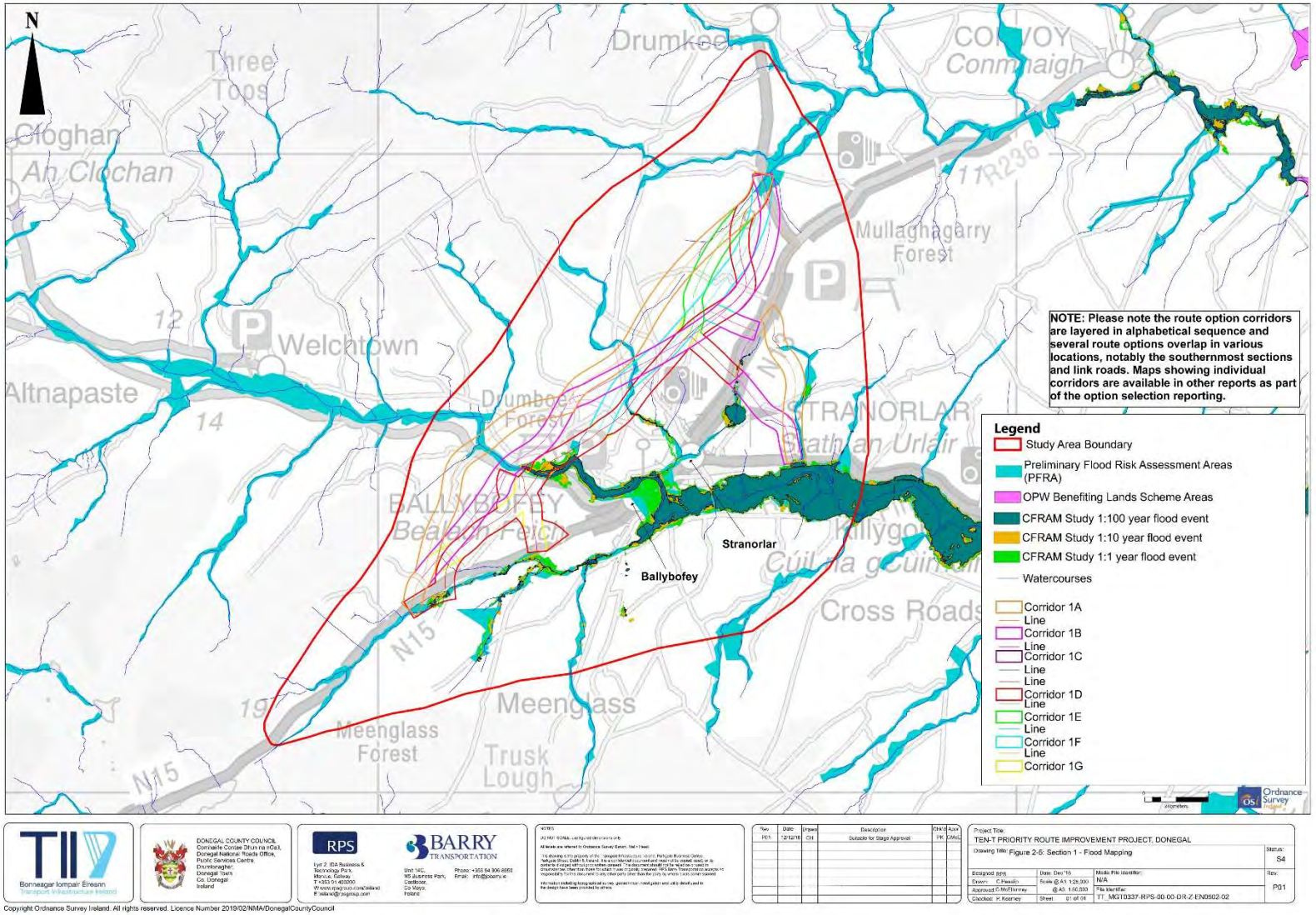


Figure 2-5: Flood Mapping

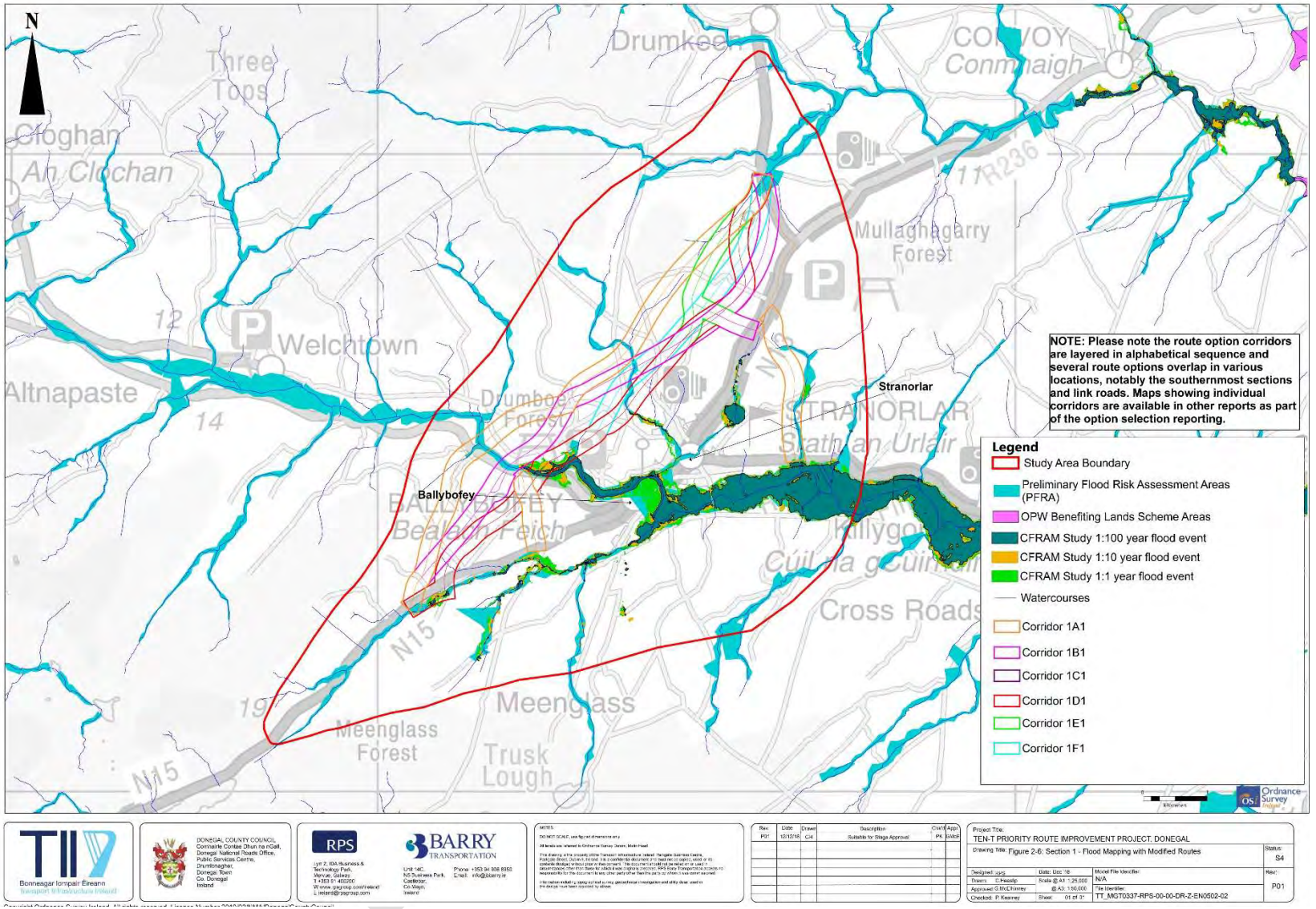


Figure 2-6: Flood Mapping with Modified Options

2.1.4 Overview of Flooding Aspects and Floodplains

The OPW maintained database (www.floodinfo.ie) has been consulted and a report generated for all recorded flood events within the vicinity of the study area. There were several instances of flooding reported in the Ballybofey-Stranorlar area but none of these events coincide with the proposed option extents (see **Figure 2-7**).

Figure 2-7: Locations of Historical Floods (Source: www.floodinfo.ie[5])

As mentioned in **Section 2.1.2** above, Ballybofey/Stranorlar has been identified as an Area for Further Assessment (AFA) as part of the OPW CFRAM study. AFAs were identified through the generation of Preliminary Flood Risk Assessment (PFRA) Mapping. These maps were prepared by generating flood flow estimates for a range of flood event probabilities at major nodes every 500m, and upstream and downstream of confluences, on the entire river network in the country (based on the EPA 'blue-line' GIS data).

Once the AFAs were identified, a detailed 2D hydraulic model was created for each area and flood extents were produced for floods with return periods of 10, 100 and 1000 years.

The PFRA mapping at the site and proposed option extents can be seen in **Figure 2-5** to **Figure 2-6** in along with CFRAM mapping with the proposed option extents overlaid.

[5]Floodinfo.ie website: https://www.floodinfo.ie/map/floodmaps/

It is difficult to predict how each proposed option will impact the predicted flood extents and surrounding lands without detailed hydraulic modelling. The areas of flood water encroached upon by the proposed option are examined in **Section 3.1** below and serve as a preliminary indication as to which option would be more favourable from a hydrological viewpoint.

The CFRAM flood extents were used to inform this analysis. In locations where CFRAM extents were not available, PFRA flood extents were used. There is less confidence in using the PFRA flood maps due to the broad brush approach taken in their preparation, but they still may serve a purpose where information is otherwise unavailable.

The infilling of floodplains for construction of any kind should be avoided at all times. Spanning the flood plains may be an option so long as adequate freeboard is provided and it can be proven that any supports required in the flood plain have a negligible effect on the displacement of flood waters.

2.1.5 Overview of Surface Water Quality

Water Quality records for watercourses in the study area are sourced from EPA online database.[6]. These results show that the majority of the watercourses are of moderate (yellow) Water Framework Directive (WFD) status which corresponds to a biotic index (Q value) of Q3-4 (see **Figure 2-8**).The Daurnett Burn to the south has a poor (orange) WFD status which corresponds to a biotic index of Q3, Q2-3. The tributary of the River Deele that is impacted by the proposed option also has poor (orange) WFD status.

[6] www.epa.ie

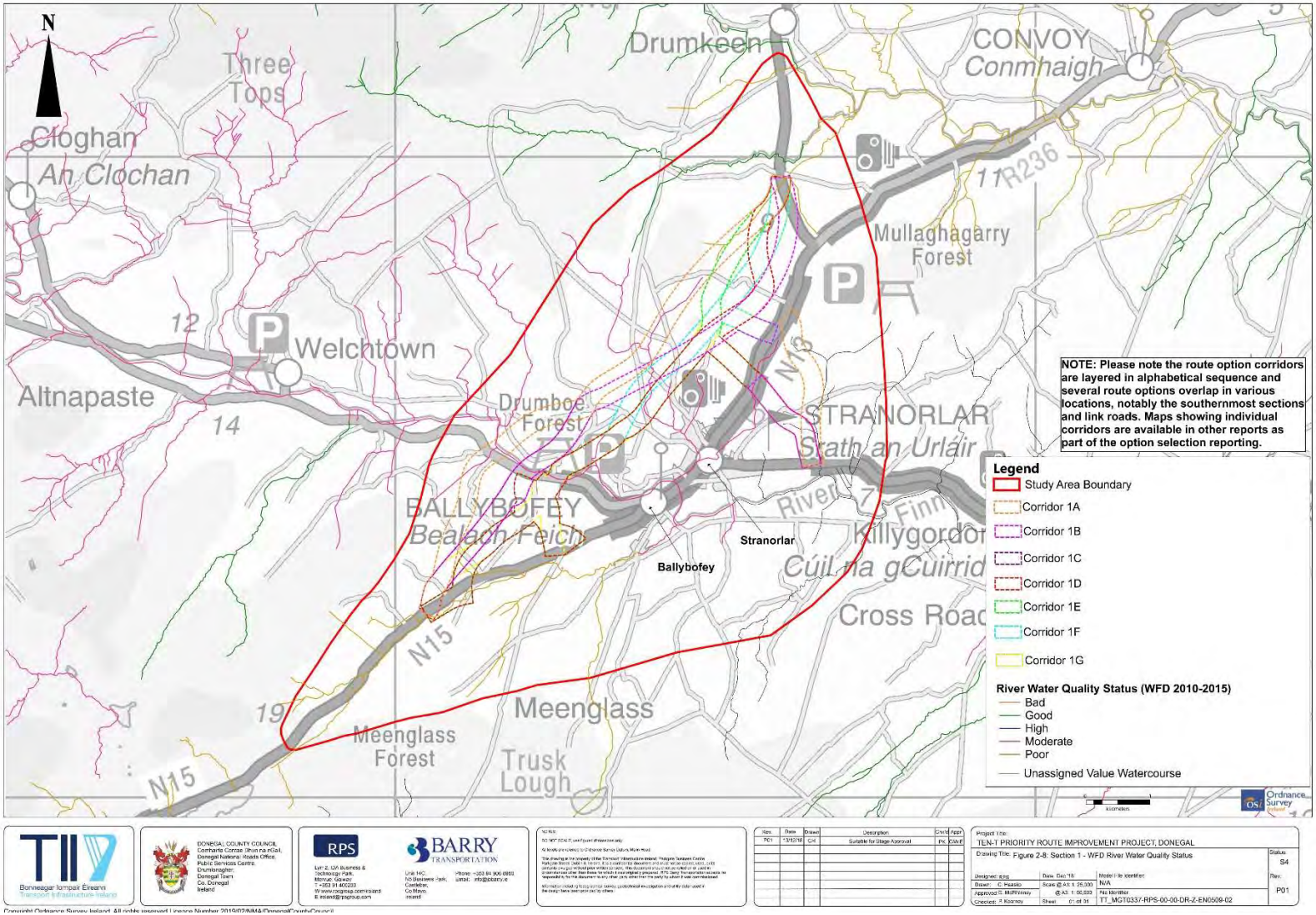


Figure 2-8: Section 1 - River Quality Status

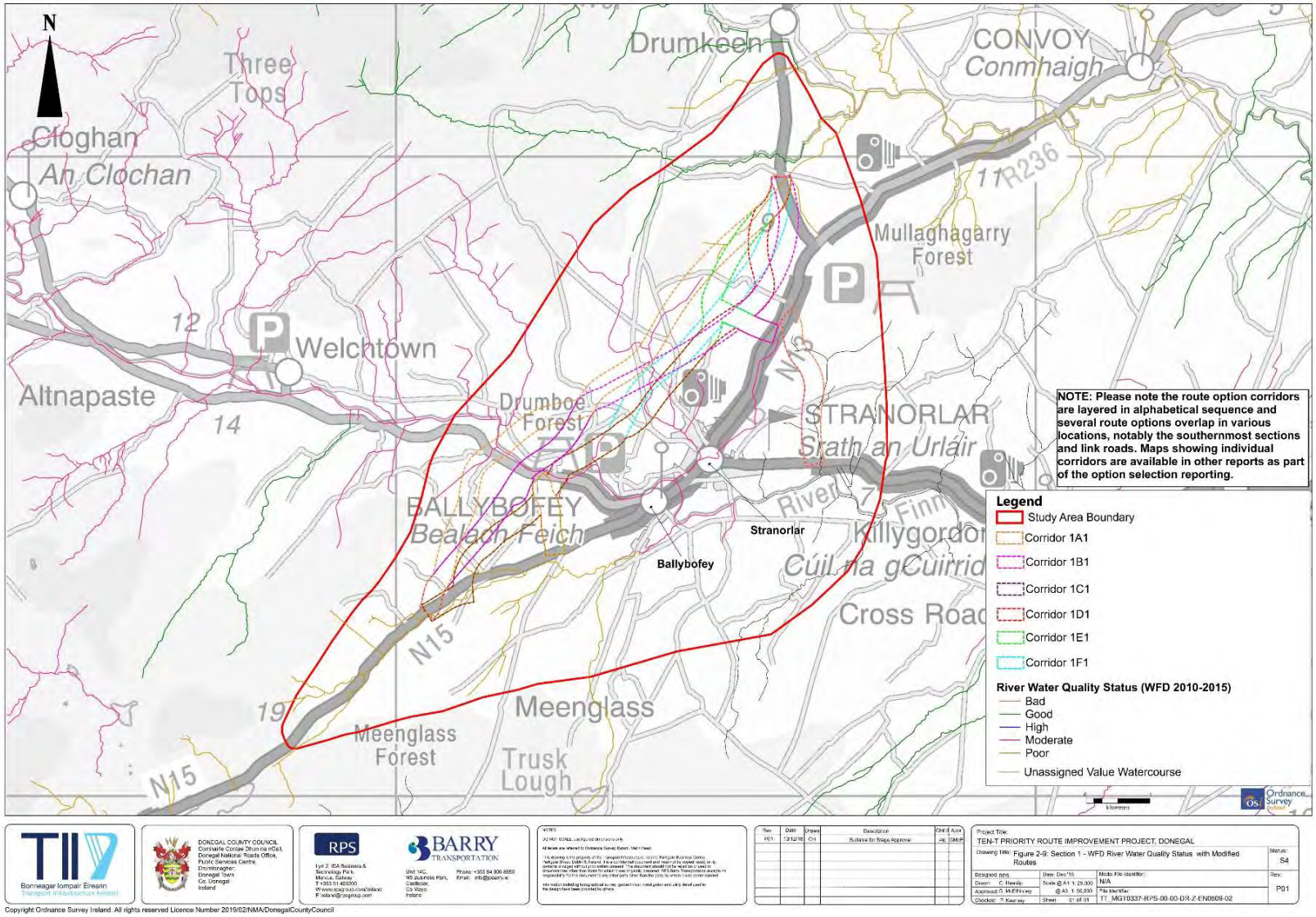


Figure 2-9: River Quality Status with Modified Options

The below map (see **Figure 2-10 - Figure 2-11**) indicates characterisation of water bodies at risk of not meeting their WFD objectives. The characterisation of water bodies is based on the three following components:

- An analysis of its physical characteristics, i.e., the physical information that describes the water bodies including water body boundaries, typologies, reference conditions, the geology and hydrogeology of groundwater bodies including the nature of the overlying strata, linked groundwater and surface water systems, etc.
- A review of the impact of human activity on the status of surface waters and groundwater, and
- An economic analysis of water use.

It can be seen that much of the watercourses in the study area is At Risk (red) to not meet their WFD objectives. Mullaghagarry stream is highlighted for review (orange) as the degree of confidence in the waterbody's characterisation is weak.

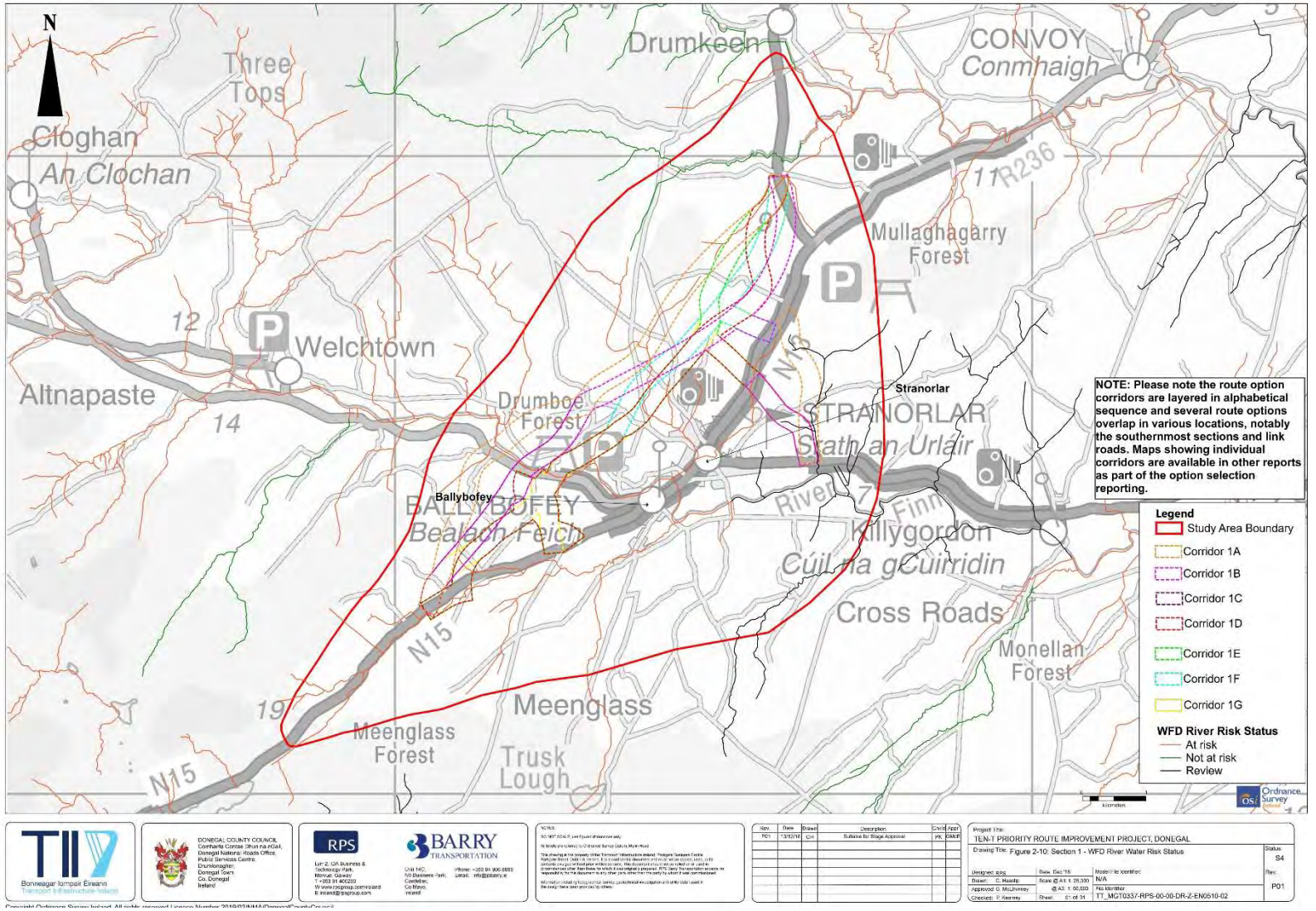


Figure 2-10: WFD River Risk Status

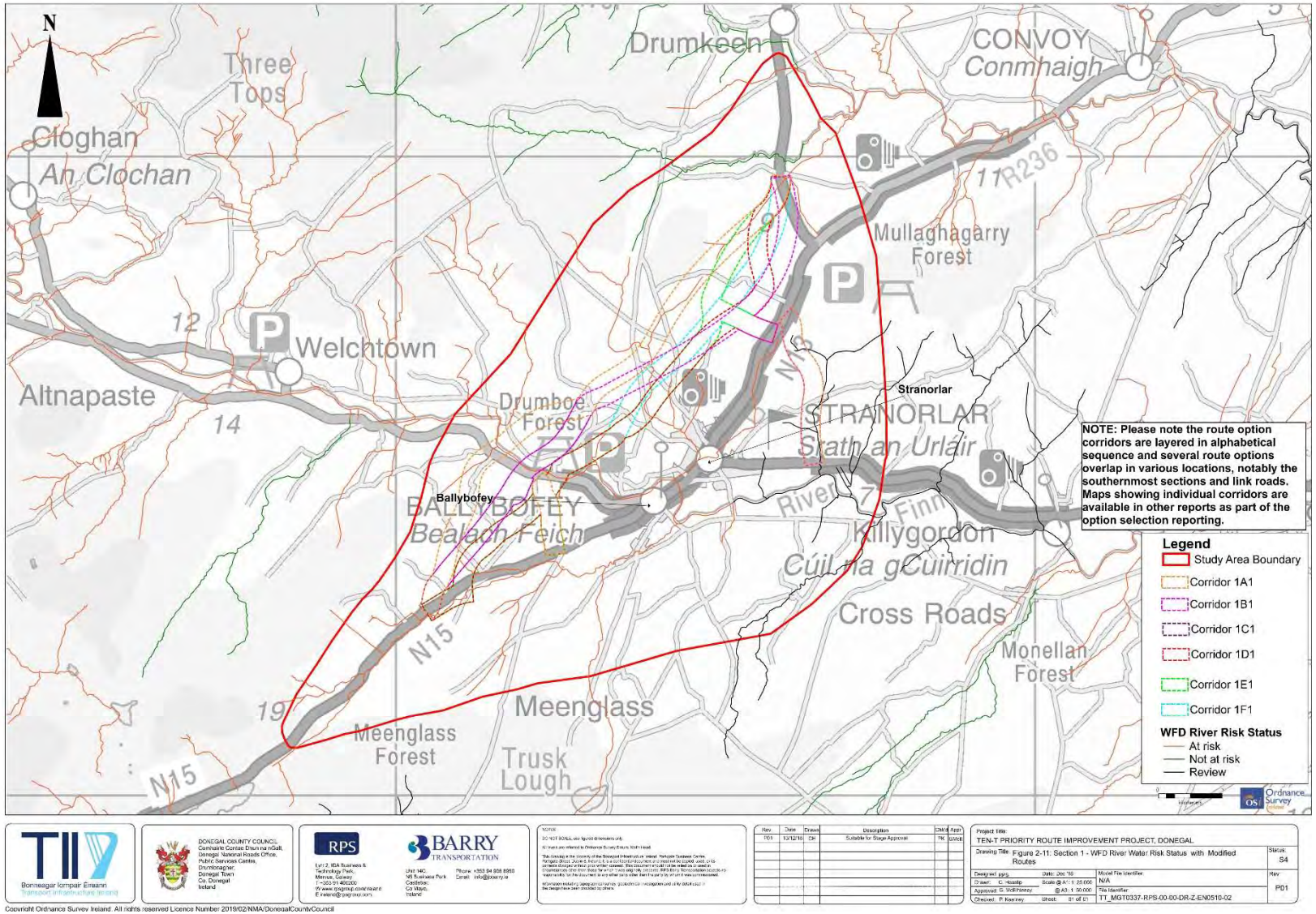


Figure 2-11: WFD River Risk Status - Section 1: Option 1A1 -1F1

2.1.6 Overview of Water Supply Sources

There are no drinking water abstraction points within the study area. The nearest drinking water source is at Lough Mourne (highlighted in green), though outside of the study area, which is upstream of the proposed works on the Daurnett Burn.

2.1.7 Overview of Abstractions from Surface Water

There are no Group Water Schemes, municipal or industrial abstraction points within the study area.

2.1.8 Overview of Discharges to Surface Water

Figure 2-12 - Figure 2-13 below illustrates the locations of discharge points from industrial and municipal sewage effluent discharges. There can be seen to be three industrial discharges (blue), one primary effluent emission point (red), and five storm water overflows (green) in the study area.

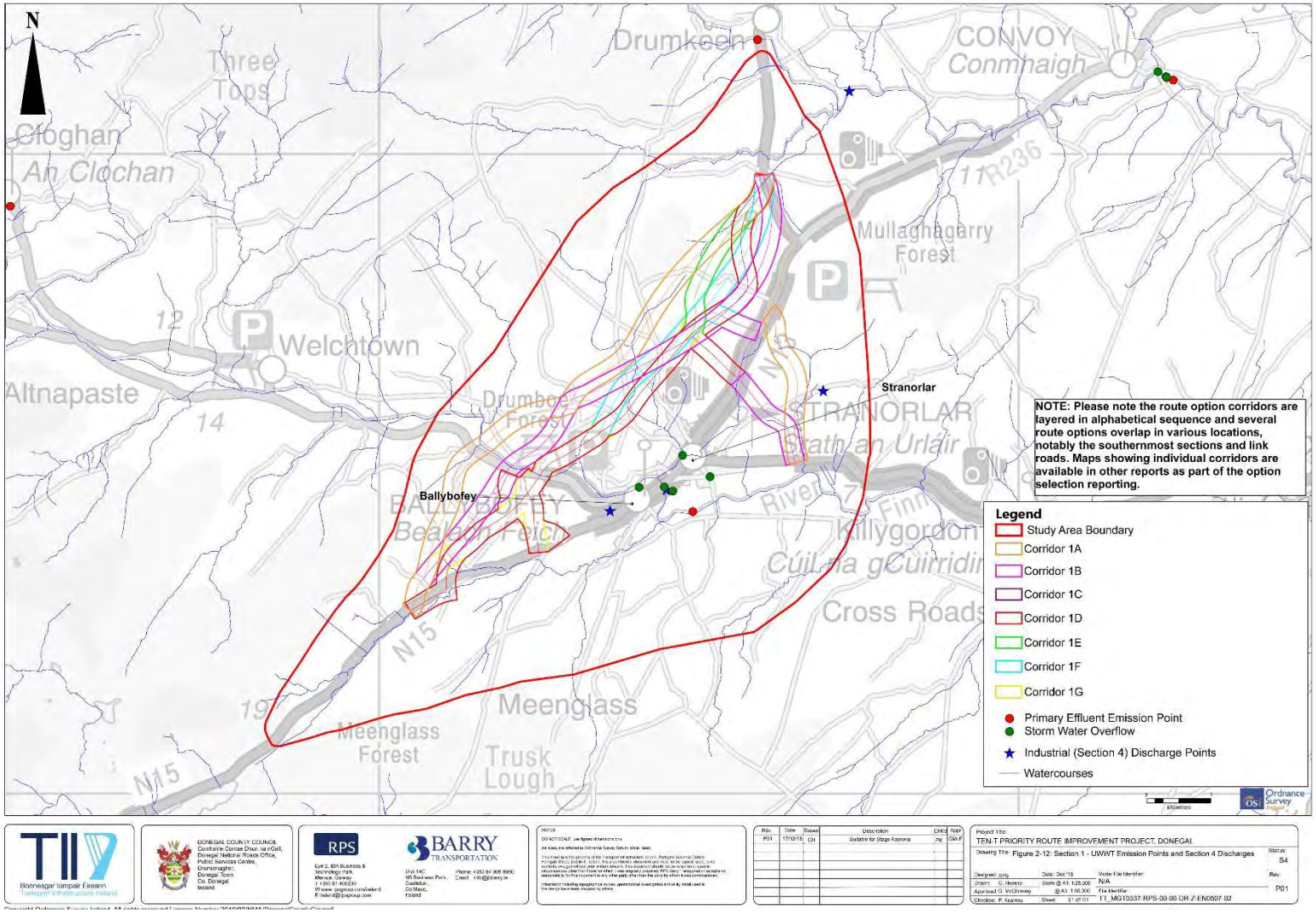


Figure 2-12: UWWT Emission Points and Section 4 Discharges - Section 1: Option 1A-1G

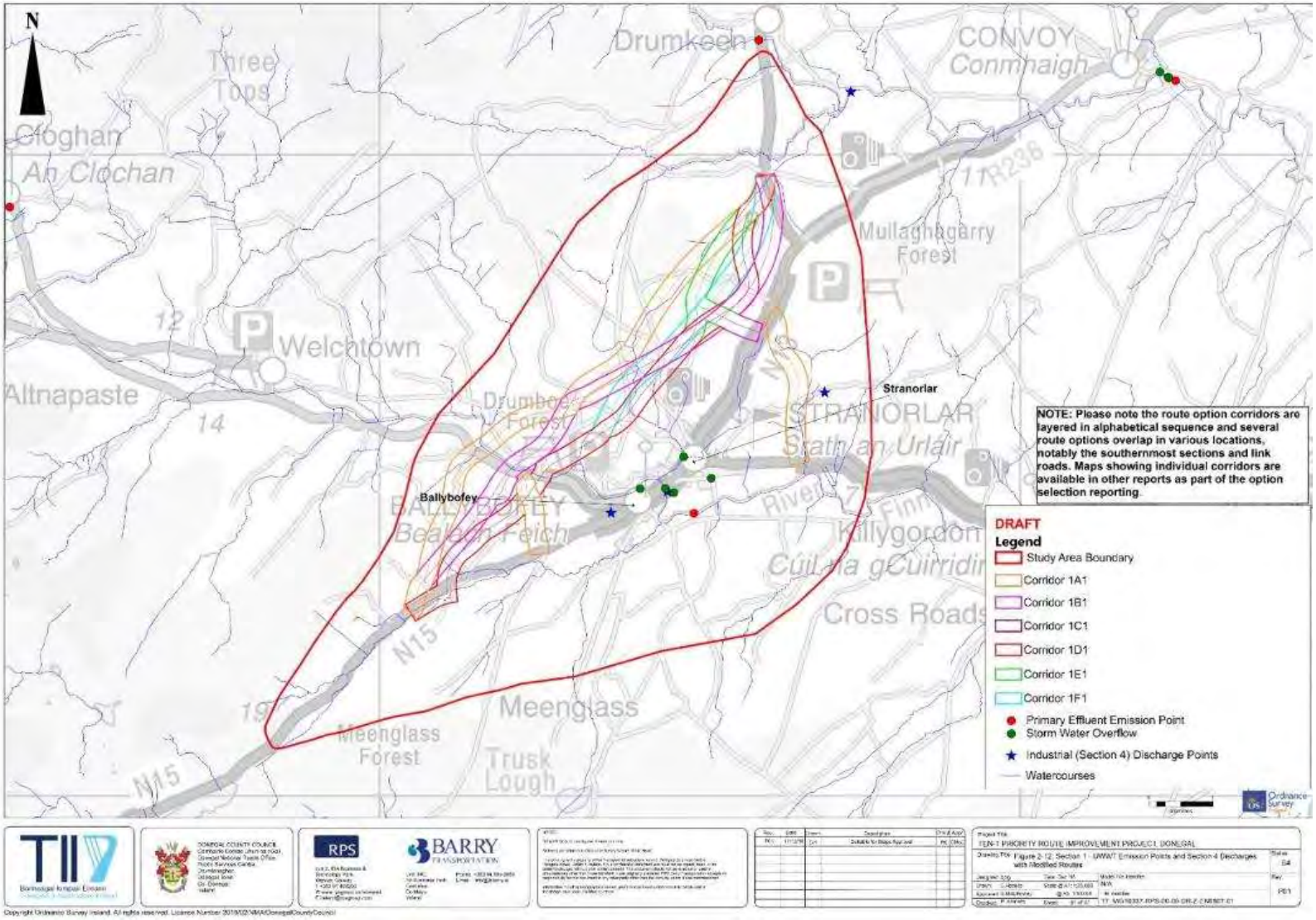


Figure 2-13: UWWT Emissions Points and Section 4 Discharges – Section 1: Option 1A1 – 1F1

2.1.9 Overview of Ecological Issues

The River Finn is designated as a Salmonid River.

The River Finn Special Area of Conservation (SAC) Qualifying interests for which it is designated are; Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110], Northern Atlantic wet heaths with *Erica tetralix* [4010], Blanket bogs [7130], Transition mires and quaking bogs [7140], *Salmo salar* (Salmon) [1355] and *Lutra lutra* (Otter) [1355]. **Figure 2-14** below shows the designated sites, Freshwater Pearl Mussel catchment and surface water interactions with Section 1 study area. See Appendices B4.1 Biodiversity (Terrestrial) and B4.2 Biodiversity (Aquatic) for greater in-depth description of identified ecological issues within Section 1 study area.

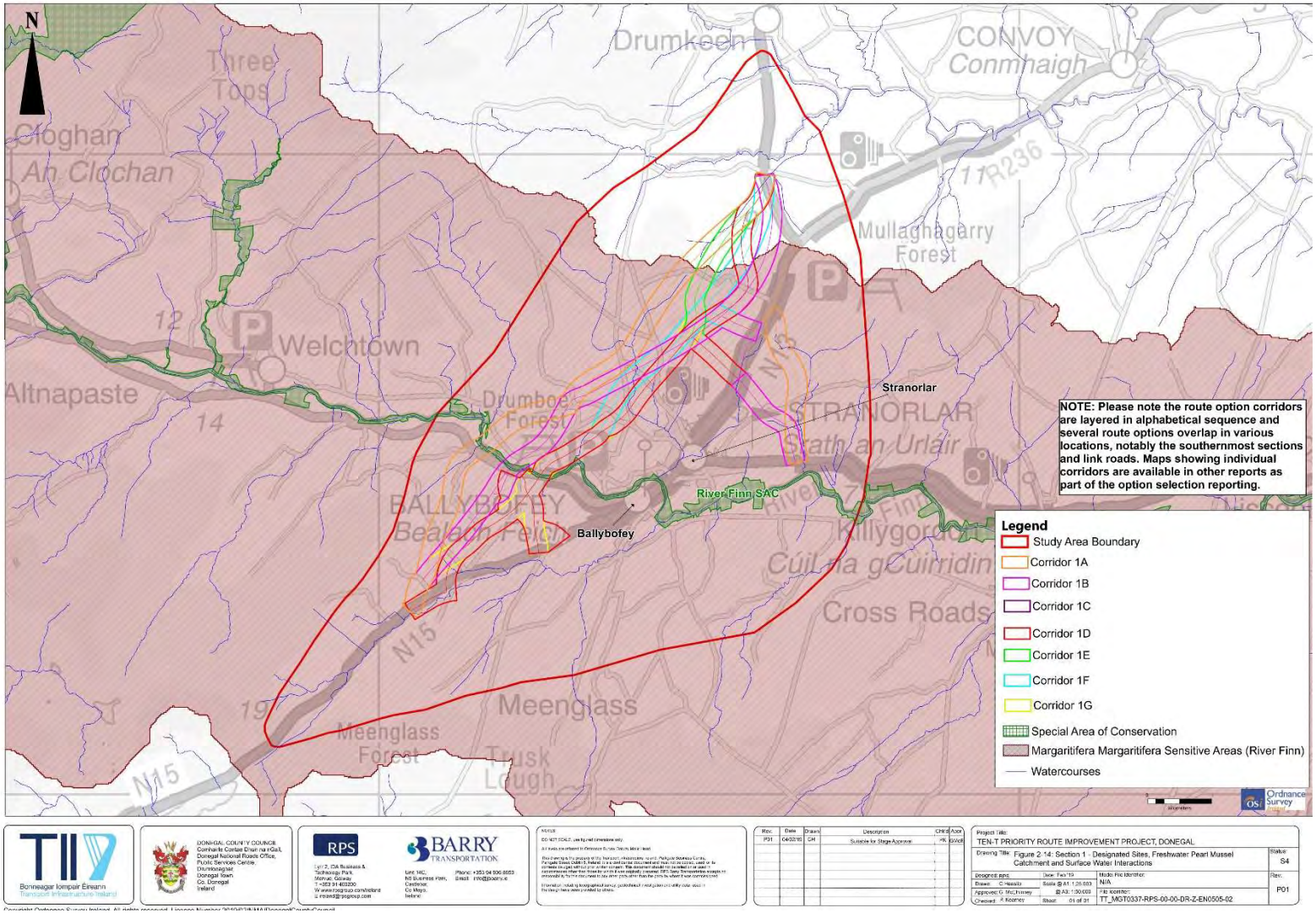


Figure 2-14: Designated Sites, Freshwater Pearl Mussel Catchment and Surface Water Interactions - Section 1: Option Corridors 1A-1G

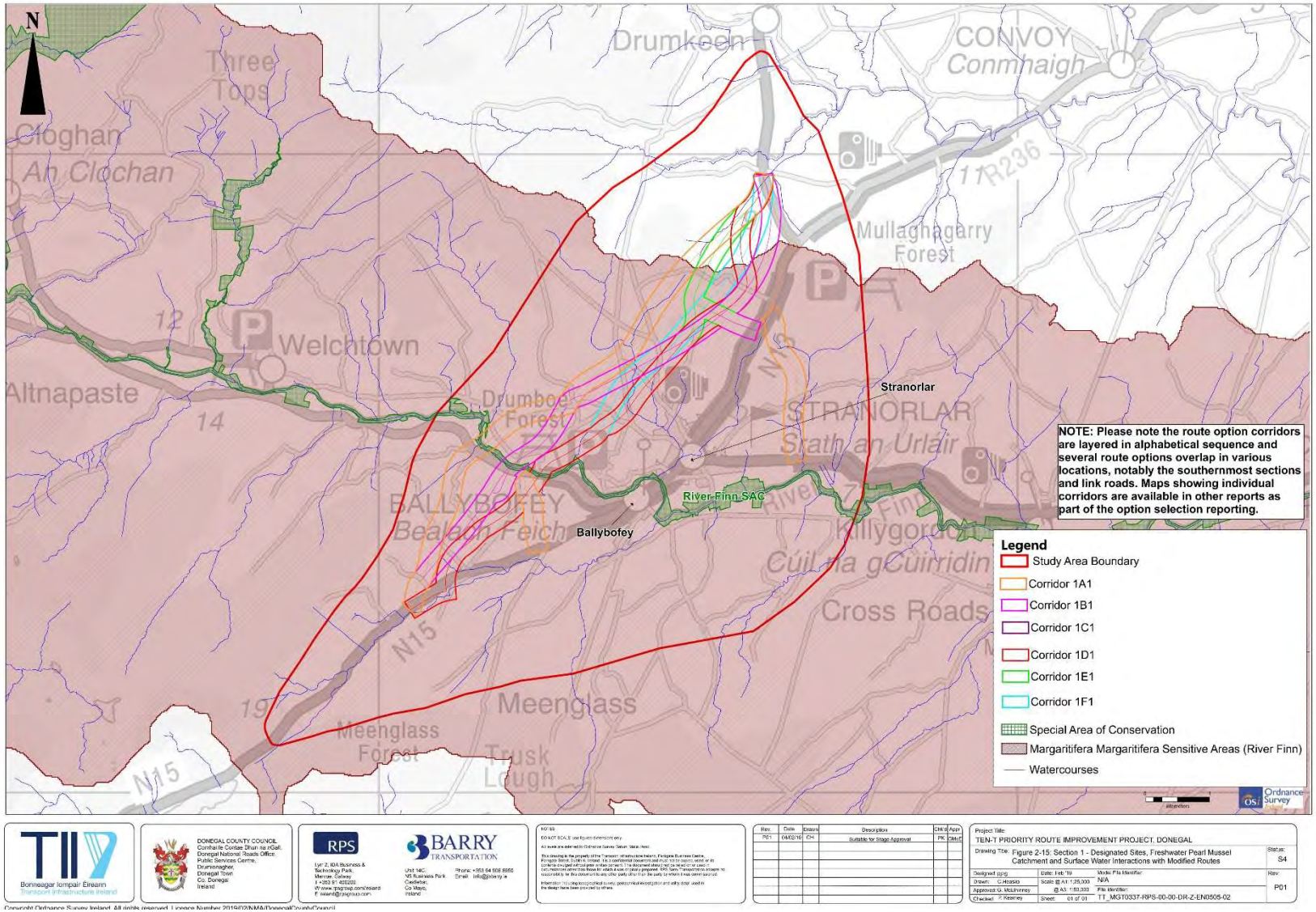


Figure 2-15: Designated Sites, Freshwater Pearl Mussel Catchment and Surface Water Interactions – Section 1: Option Corridors 1A1 - 1F1

3 OPTION ASSESSMENT

This section details the assessment of the options with respect to the hydrological constraints identified in **Section 2.1** of this report. **Table 3.1** and **Table 3.2** have been extracted from the aforementioned guidelines and provide the basis for the option assessment.

Table 3.1: Criteria for Rating Site Attributes - Estimation of importance of Hydrological Attributes

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Quality Class A (Biotic Index Q4, Q5) Flood plain protecting more than 50 residential or commercial properties from flooding Nationally important amenity site for wide range of leisure activities
High	Attribute has a high quality or value on a local scale	Salmon fishery Locally important potable water source supplying >1000 homes Quality Class B (Biotic Index Q3-4) Flood plain protecting between 5 and 50 residential or commercial properties from flooding Locally important amenity site for wide range of leisure activities
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2-3) Flood plain protecting between 1 and 5 residential or commercial properties from flooding
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding Amenity site used by small numbers of local people

Table 3.2: Criteria for Rating Impact Significance at Option Selection Stage

Impact Level	Attribute Importance				
	Extremely High**	**Very High**	**High**	**Medium**	**Low**
Profound	Any permanent impact on attribute	Permanent impact on significant proportion of attribute			
Significant	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute		

Impact Level	Attribute Importance				
	Extremely High**	Very High	High	Medium	Low
Moderate	Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute	
Slight		Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute
Imperceptible			Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute

** In rating impacts on an 'European site' account must be taken of Article 6(3) and 6(4) of the Habitats Directive (Council Directive 92/43/EEC). Also see guidance contained within Guidelines for Assessment of Ecological Impacts of National Road Schemes (Rev 2, National Roads Authority, 2008)

3.1 Comparison of Options

A detailed description for each of the options is described in Section 1.2 of the Option Selection Report. The assessment of impacts on the hydrological attributes, as outlined in the hydrological constraints in **Section 2.1**, is provided below for each of the options.

3.1.1 Option 1A (Orange)

The impact of the Option 1A (Orange) on the flood risk of local watercourses from south to north is outlined in the **Table 3.3** below.

Table 3.3: Flood Impact Assessments for Option 1A (Orange)

Option 1A (Orange)			
Watercourse EPA name	**Segment Code**	**Crossing / Encroachment**	**Details**
Mullanachose	01_808	Crossing & Encroachment	The proposed option is constructed atop the Mullanachose stream for approximately 600m. The proposed alignment may need to be adjusted to reduce the impact on the stream and reduce the length of culvert required. Appropriate hydrological analysis, hydraulic structure design and a Section 50 application will be required.
Finn	01_810	Crossing & Encroachment	The proposed option crosses the River Finn. The proposed main line may need to be realigned to avoid the confluence of the Mullanachose stream and the River Finn. There are no CFRAM extents at this location for the River Finn, but there are PFRA flood extents. This encroachment on flood plains may be avoided by spanning the flood plain completely (140m) as long as adequate freeboard is provided and any support structures in the flood plain can be proven to have a negligible effect on the existing flooding regime. Due to the broadbrush methodology used in preparing PFRA extents a detailed hydraulic model may be required to understand the full effects of any proposed road works at this location.
Backlees	01_184 01_186	Crossing	The proposed option crosses the Backlees. This may require realignment to avoid the confluence of the Backlees with the Teevickmoy Stream. There are no CFRAM extents at this location, but there are PFRA flood extents. The encroachment on flood plains may

Option 1A (Orange)			
Watercourse EPA name	**Segment Code**	**Crossing / Encroachment**	**Details**
			be avoided by spanning the flood plain completely (60m) as long as adequate freeboard is provided and it is proven that any support structures in the flood plain have a negligent impact on the flood levels. Due to the broadbrush methodology used in preparing PFRA extents a detailed hydraulic model may be required to understand the full effects of any proposed road works at this location.
Teevickmoy	01_185	Crossing	The proposed option impacts upon the Teevickmoy. The proposed alignment may need to be adjusted to reduce the impact on the stream and reduce the length of culvert required. Appropriate hydrological analysis, hydraulic structure design and a Section 50 application will be required. The Teevickmoy is also impacted by two proposed underpasses at existing roads approximately 5700m and 6050m along the main line. There are existing culverts at these two locations and any replacement or alterations of bridges or culverts will require a Section 50 application.
Magheracorran	01_1024 01_1025	Crossing & Encroachment	The proposed option impacts upon the Magheracorran watercourse. The proposed option may need to be adjusted to reduce the impact on the stream and reduce the length of culvert required. There may be potential to realign the stream, but this could pose ecological and hydraulic concerns. The proposed tie in (roundabout) with the N13 encroaches upon the PFRA extents. The existing layout of the N13 lies within these flood extents and so there would be minimal difference between impact of proposed works and the do nothing scenario.

In terms of water quality impact, considerable levels of storm water attenuation and treatment will be required before out falling to any of the watercourses traversed by the option. Every watercourse encountered along the option is characterised as *At Risk* to not achieve its WFD objectives. The River Finn has its own SAC designation and many of the watercourses flow either directly or indirectly into the SAC. The following table summarises the biotic indices and risk characterisation of the watercourses impacted by Option 1A (Orange).

Table 3.4: Water Quality Impact Assessments for Option 1A (Orange)

Option 1A (Orange)				
Watercourse EPA name	**Segment Code**	**Biotic Index**	**River Waterbodies Risk**	**Importance of Hydrological Attribute**
Mullanachose	01_808	Unknown	At Risk	NA
Finn	01_810	Q3	At Risk	Medium
Backlees	01_184 01_186	Unknown	At Risk	NA
Teevickmoy	01_185	Unknown	At Risk	NA
Magheracorran	01_1024 01_1025	Unknown	At Risk	NA

3.1.2 Option 1A1 (Orange)

This alternative option comprises of the mainline 1A1 (Orange) and two additional link options, namely, (i) *Cappry Link Option* - a new link road between the R252 and N15, southwest of the study area in the Cappry Townland, and (ii) *R252 Junction* - a new junction along the south edge of the R252, north of Cappry townland. In addition, the centreline of link option (*Link Option direct north*) changes slightly in the east of the study area near the Tircallan townland. Refer to **Figure 2-2** for the alignment of 1A1 (Orange).

Since the mainline of this option follows the same alignment of 1A, it will cross the same number of watercourses as identified and assessed in **Table 3.3**. The affected watercourses along this option, namely -Mullananachose, Finn, Backless, Teevickmoy & Magheracorran, have been designated as "*At Risk*" in terms of water quality.

As mentioned above, the 1A1 (Orange) option also comprises of three other additional link roads/junctions. **Table 3.5** below outlines the flood impacts of these link options on the local watercourses:

Table 3.5: Flood Impact Assessments for the additional Link Options for Option 1A1 (Orange)

Option 1A1 (Orange)- Link Roads				
Link Road	**Watercourse EPA name**	**Segment Code**	**Crossing / Encroachment**	**Details**
Cappry Link Option	Does not affect any watercourses			
R252 Junction	Mullanachose (Finn Tributary)	01_808	Crossing & Encroachment	The proposed junction of the mainline option with the existing R252 road encroaches upon the floodplain of the Mullanachose River. A detailed flood impact assessment should be carried out to identify the significance of the impacts and appropriate mitigation measures should be carried out.
Link Option Direct North	Mullaghagarry (River Finn Tributary)	01_776, 01_68 & 01_69	Encroachment	The subject link road runs along these sections of the Mullaghagarry river and encroaches upon the floodplain / CFRAM identified flood extents. A detailed flood impact assessment will be required and appropriate mitigation measures should be implemented.
	Treanamullin (River Finn Tributary)	01_66	Crossing & Encroachment	The link option crosses this section of the watercourse. A section 50 approval should be obtained from OPW. A detailed flood impact assessment will be required and appropriate mitigation measures should be implemented.
	Tricullan (River Finn Tributary)	01_4	Crossing & Encroachment	The link option crosses this section of the watercourse. A section 50 approval should be obtained from OPW.
	Kilross (River Finn Tributary)	01_543	Crossing & Encroachment	The link option crosses this section of the watercourse. A section 50 approval should be obtained from OPW.
	Megheracorran (River Deel tributary)	01_1024	Crossing	The link option crosses this section of the watercourse. A section 50 approval should be obtained from OPW.

Table 3.6 below summarises the biotic indices and risk characterisation of the watercourses impacted by the proposed Link roads of Option 1A1 (Orange).

Table 3.6: Water Quality Impact Assessments for the additional Link Roads for Option 1A1 (Orange)

Option 1A1 (Orange) - Link Roads					
Link Road	**Watercourse EPA name**	**Segment Code**	**Biotic Index**	**River Waterbodies Risk**	**Importance of Hydrological Attribute**
Cappry Link Option	Does not affect any watercourses				
R252 Junction	Mullanachose (Finn Tributary)	01_808	Unknown	At Risk	Medium
Link Option Direct North	Mullaghagarry (River Finn Tributary)	01_776, 01_68 & 01_69	Unknown	Unknown (Review stage)	Medium
	Treanamullin (River Finn Tributary)	01_66	Unknown	Unknown (Review stage)	NA
	Tricullan (River Finn Tributary)	01_4	Unknown	Unknown (Review stage)	NA
	Kilross (River Finn Tributary)	01_543	Unknown	At Risk	NA
	Megheracorran (River Deel tributary)	01_1024	Unknown	At Risk	Medium

In order to reduce the water quality impacts of associated watercourses, both during the construction and post construction stages, appropriate mitigation measures, including storm water attenuation and treatment will be required before out falling to any of the watercourses traversed along the proposed option.

3.1.3 Option 1B (Pink)

The impact of Option 1B (Pink) on the flood risk of local watercourses from south to north is outlined in the table below.

Table 3.7: Flood Impact Assessments for Option 1B (Pink)

Option 1B (Pink)			
Watercourse EPA name	**Segment Code**	**Crossing / Encroachment**	**Details**
Finn	01_810	Crossing & Encroachment	The proposed main line crosses the River Finn. There are no CFRAM extents at this location for the River Finn, but there are PFRA flood extents. This encroachment on flood plains may be avoided by spanning the flood plain completely (105m) as long as adequate freeboard is provided and any support structures in the flood plain can be proven to have a negligible effect on the existing flooding regime. Due to the broadbrush methodology used in preparing PFRA extents a detailed hydraulic model may be required to understand the full effects of any proposed road works at this location.

Option 1B (Pink)			
Watercourse EPA name	**Segment Code**	**Crossing / Encroachment**	**Details**
Backlees	01_186	Crossing & Encroachment	The proposed main line crosses the Backlees. This may require realignment to avoid the confluence of the Backless with the Teevickmoy Stream. There are no CFRAM extents at this location, but there are PFRA flood extents. The encroachment on flood plains may be avoided by spanning the affected PFRA extents completely (55m) as long as adequate freeboard is provided and it is proven that any support structures in the flood plain have a negligent impact on the flood levels. Due to the broadbrush methodology used in preparing PFRA extents a detailed hydraulic model may be required to understand the full effects of any proposed road works at this location.
Magheracorran	01_1024	Crossing & Encroachment	The proposed main line crosses the Magheracorran. There are no CFRAM extents at this location for the River Finn, but there are PFRA flood extents. The encroachment on flood plains may be avoided by spanning the flood plain completely (230m) as long as adequate freeboard is provided and any support structures in the flood plain can be proven to have a negligible effect on the existing flooding regime. Due to the broadbrush methodology used in preparing PFRA extents a detailed hydraulic model may be required to understand the full effects of any proposed road works at this location.

In terms of water quality impact, considerable levels of storm water attenuation and treatment will be required before out-falling to any of the watercourses traversed along the mainline. Every watercourse encountered along the mainline is characterised as *At Risk* to not achieve its WFD objectives. The River Finn has its own SAC designation and many of the watercourses flow either directly or indirectly into the SAC. The **Table 3.8** summarises the biotic indices and risk characterisation of the watercourses impacted by Option 1B (Pink).

Table 3.8: Water Quality Impact Assessments for Option 1B (Pink)

Option 1B (Pink)				
Watercourse EPA name	**Segment Code**	**Biotic Index**	**River Waterbodies Risk**	**Importance of Hydrological Attribute**
Finn	01_810	Q3	At Risk	Medium
Backlees	01_186	Unknown	At Risk	NA
Magheracorran	01_1024	Unknown	At Risk	NA

3.1.4 Option 1B1 (Pink)

This alternative option comprises of the mainline from Option 1B (Pink) and an additional new link road, namely, *Cappry Link Option* - between the R252 and N15, southwest of the study area in the Cappry Townland. In addition, the centreline of the link option changes slightly in the east of the study area near the Tircallan townland. Refer to **Figure 2-2** for the alignment of Option 1B1 (Pink).

Since the mainline 1B1 Option follows the same alignment of Option 1B, it will cross the same number of watercourses as identified and assessed in **Table 3.7**. The affected waterbodies along this option - Finn, Backless & Magheracorran have been designated as '*At Risk*' in terms of water quality.

In addition to the above-mentioned watercourses, the two link roads cross/ encroach a number of tributaries of River Finn. The eastern link road crosses/ encroaches four smaller tributaries (Mullaghagarry, Treanamullin, Tricullan & Kilross) of the River Finn. Further details of the anticipated flood impacts on these watercourses have been discussed in **Table 3.5** above. A detailed flood impact assessment along with OPW Section 50 approval will be required for all associated river crossings.

In terms of water quality, the Kilross river has been designated as '*At Risk*'. While the other three Finn Tributaries are currently at review stage. In order reduce the water quality impacts of associated watercourses, both during the construction and post construction stages, appropriate mitigation measures, including storm water attenuation and treatment will be required before out-falling to any of the watercourses traversed along the proposed option.

3.1.5 Option 1C (Purple)

The impact of Option 1C (Purple) on the flood risk of local watercourses from south to north is outlined in the table below.

Table 3.9: Water Quality Impact Assessments for Option 1C (Purple)

Option 1C (Purple)			
Watercourse EPA name	**Segment Code**	**Crossing / Encroachment**	**Details**
Finn	01_810	Crossing & Encroachment	The proposed main line crosses the River Finn. There are no CFRAM extents at this location for the River Finn, but there are PFRA flood extents. This encroachment on flood plains may be avoided by spanning the flood plain completely (105m) as long as adequate freeboard is provided and any support structures in the flood plain can be proven to have a negligible effect on the existing flooding regime. Due to the broadbrush methodology used in preparing PFRA extents a detailed hydraulic model may be required to understand the full effects of any proposed road works at this location.
Backlees	01_186 01_184	Crossing & Encroachment	The proposed main line crosses the Backlees. There are no CFRAM extents at this location for the River Finn, but there are PFRA flood extents. This encroachment on flood plains may be avoided by spanning the flood plain completely (55m) as long as adequate freeboard is provided and any support structures in the flood plain can be proven to have a negligible effect on the existing flooding regime. Due to the broadbrush methodology used in preparing PFRA extents a detailed hydraulic model may be required to understand the full effects of any proposed road works at this location.
Teevickmoy	01_185	Crossing	The main line impacts upon the Teevickmoy at two locations for a total length of approximately 250m. The proposed alignment may need to be adjusted to reduce the impact on the stream and reduce the length of culvert required. Appropriate hydrological analysis, hydraulic structure design and a Section 50 application will be required. The Teevickmoy is also impacted by two proposed underpasses at existing roads approximately 5600m and 5950m along the main line. There are existing culverts at these two locations and any replacement or alterations of bridges or culverts will require a Section 50 application.
NA	01_1025	Crossing	The proposed main line traverses an unnamed stream. Adequate hydrological analysis, hydraulic structure design and a Section 50 application will be required.
Magheracorran	01_1024	Crossing &	The proposed main line slightly encroaches upon the

Option 1C (Purple)			
Watercourse EPA name	**Segment Code**	**Crossing / Encroachment**	**Details**
	01_1530	Encroachment	Magheracorran stream at one location. Realignment of the road to avoid any impact may be necessary. There are no CFRAM extents at this location for the River Finn, but there are PFRA flood extents. The encroachment on flood plains at the tie in with the N13 may be avoided by spanning the flood plain completely (230m) as long as adequate freeboard is provided and any support structures in the flood plain can be proven to have a negligible effect on the existing flooding regime. Due to the broadbrush methodology used in preparing PFRA extents a detailed hydraulic model may be required to understand the full effects of any proposed road works at this location. Flood relief culverts underneath the embankments may also provide a pathway for flood levels to reach the extents of the natural flood plain.

In terms of water quality impact, considerable levels of storm water attenuation and treatment will be required before out-falling to any of the watercourses traversed along the mainline. Every watercourse encountered along the mainline is characterised as '*At Risk*' to not achieve its WFD objectives. The River Finn has its own SAC designation and many of the watercourses flow either directly or indirectly into the SAC.

Table 3.10 summarises the biotic indices and risk characterisation of the watercourses impacted by Option 1C (Purple).

Table 3.10: Water Quality Impact Assessments for Option 1C (Purple)

Option 1C (Purple)				
Watercourse EPA name	**Segment Code**	**Biotic Index**	**River Waterbodies Risk**	**Importance of Hydrology Attribute**
Finn	01_810	Q3	At Risk	Medium
Backlees	01_186 01_184	Unknown	At Risk	NA
Teevickmoy	01_185	Unknown	At Risk	NA
NA	01_1025	Unknown	At Risk	NA
Magheracorran	01_1024 01_1530	Unknown	At Risk	NA

3.1.6 Option 1C1 (Purple)

This alternative option comprises of the mainline of 1C and a new additional link option, namely, *Cappry Link Option* - between the R252 and N15 in the southwest of the study area in the Cappry Townland. In addition, the centreline of link option changes slightly in the east of the study area near the Tircallan townland. Refer to **Figure 2-2** for the alignment of Option 1C1 (Purple).

Since the mainline of 1C1 follows the same alignment of 1C, it will cross the same number of watercourses as identified and assessed in **Table 3.9** above. Its construction will have similar impacts

on the flooding and water quality scenarios. The affected waterbodies- River Finn, Backless, Teevickmoy & Magheracorran have been designated as '*At Risk'* in terms of water quality.

In addition to the above-mentioned watercourses, the eastern link road crosses/ encroaches four smaller tributaries (Mullaghagarry, Treanamullin, Tricullan & Kilross) of the River Finn and a tributary (Megheracorran) of the River Deel at Callan Townland. Further details of the anticipated flood impacts of these watercourses have been discussed in **Table 3.5** above. A detailed flood impact assessment along with OPW Section 50 approval will be required for all associated river crossings.

In terms of water quality, the Kilross and Megheracorran rivers have been designated as *'At Risk'*. While the other three Finn Tributaries are currently at review stage. In order reduce the water quality impacts of associated watercourses, both during the construction and post construction stages, appropriate mitigation measures, including storm water attenuation and treatment will be required before out-falling to any of the watercourses traversed along the proposed option.

3.1.7 Option 1D (Red)

The impact of Option 1D (Red) on the flood risk of local watercourses from south to north is outlined in the table below.

Table 3.11 : Flood Impact Assessments for Option 1D (Red)

Option 1D (Red)			
Watercourse EPA name	**Segment Code**	**Crossing / Encroachment**	**Details**
(Burn) Daurnett	01_1815	Encroachment	Proposed tie in (roundabout) with existing local road L6544 encroaches upon CFRAM 0.1% AEP extents. Existing road also encroaches upon these extents. Minimal impact between proposed works and the do nothing scenario as the existing road is already encroaching upon the flood extents.
Cappry	01_1816	Crossing	Proposed main line crosses stream at one location. There are no flood extents for this stream. Appropriate hydrological analysis, hydraulic structure design and a Section 50 application will be required. A proposed tie in with local road also crosses Cappry stream. There is already an existing crossing at this location but any bridge/culvert alterations/replacements will require Section 50 applications.
Finn	01_7147 01_590 01_591	Crossing & Encroachment	The main line crosses the River Finn and there is also a considerable encroachment on the 0.1% AEP extents. This may be avoided by spanning the flood plain completely (360m) as long as adequate freeboard is provided and any support structures in the flood plain can be proven to have a negligible effect on the existing flooding regime. The main line also encroaches upon the flood extents at two other locations.
Aghasheil	01_553	Crossing & Encroachment	Proposed underpass for R252 crosses the Aghasheil stream while also encroaching upon the 0.1% AEP flood extents.
Drumboe Lower	01_589	Crossing	The main line crosses the Drumboe Lower Stream. There are no flood extents for this stream. Appropriate hydrological analysis, hydraulic structure design and a Section 50 application will be required.
Backlees	01_186	Crossing	The mainline crosses the Backlees stream. There are no available flood extents for this stream. Appropriate hydrological analysis, hydraulic structure design and a Section 50 application will be required. The proposed underpass for the Drumboe Cottages lane also straddles the river bank. Detailed modelling will be required to

Option 1D (Red)			
Watercourse EPA name	**Segment Code**	**Crossing / Encroachment**	**Details**
			ensure that any proposed earthworks do not impact upon the existing flood levels.
Greenhills 01	01_70	Crossing	A proposed underpass crosses the Greenhill 01 stream. There is already an existing road and crossing at this location. Any replacement or alterations of bridges or culverts will require a Section 50 application.
Kilross 01	01_543	Crossing & Encroachment	A Link road option crosses the Kilross stream. The existing N13 also encroaches upon the 0.1%AEP flood extents.
Treanamullin	01_66	Crossing	A Link road crosses/straddles the Treanamullin stream at one location. There are no flood extents for this stream. Appropriate hydrological analysis, hydraulic structure design and a Section 50 application will be required.
Mullaghagarry	01_776	Crossing & Encroachment	Proposed tie in with N15 crosses the Mullaghagarry stream. There is an existing bridge at this location. Any replacement or alterations of bridges or culverts will require a Section 50 application. The proposed tie in roundabout also encroaches upon the 0.1%AEP flood extents.
Magheracorran	01_1024	Crossing	The proposed main line slightly encroaches upon the Magheracorran stream at one location. Realignment of the road to avoid any impact may be necessary. There are no CFRAM extents at this location for the River Finn, but there are PFRA flood extents. The encroachment on flood plains at the tie in with the N13 may be avoided by spanning the flood plain completely (230m) as long as adequate freeboard is provided and any support structures in the flood plain can be proven to have a negligible effect on the existing flooding regime. Due to the broadbrush methodology used in preparing PFRA extents a detailed hydraulic model may be required to understand the full effects of any proposed road works at this location. Flood relief culverts underneath the embankments may also provide a pathway for flood levels to reach the extents of the natural flood plain.

In terms of water quality impact, considerable levels of storm water attenuation and treatment will be required before out-falling to any of the watercourses traversed along the mainline. Every watercourse encountered along the mainline is characterised as '*At Risk*' to not achieve its WFD objectives. The River Finn has its own SAC designation and many of the watercourses flow either directly or indirectly into the SAC.

The following table summarises the biotic indices and risk characterisation of the watercourses impacted by Option 1D (Red).

Table 3.12: Water Quality Impact Assessments for Option 1D (Red)

Option 1D (Red)				
Watercourse EPA name	**Segment Code**	**Biotic Index**	**River Waterbodies Risk**	**Importance of Hydrology Attribute**
(Burn) Daurnett	01_1815	Q2-3 to Q3-4	At Risk	Medium - High
Cappry	01_1816	Unknown	At Risk	NA

Option 1D (Red)				
Watercourse EPA name	**Segment Code**	**Biotic Index**	**River Waterbodies Risk**	**Importance of Hydrology Attribute**
Finn	01_7147 01_590 01_591	Q3	At Risk	Medium
Aghasheil	01_553	Unknown	At Risk	NA
Drumboe Lower	01_589	Unknown	At Risk	NA
Backlees	01_186	Unknown	At Risk	NA
Greenhills 01	01_70	Unknown	At Risk	NA
Kilross 01	01_543	Unknown	At Risk	NA
Treanamullin	01_66	Unknown	Review	NA
Mullaghagarry	01_776	Unknown	Review	NA
Magheracorran	01_1024	Unknown	At Risk	NA

3.1.8 Option 1D1 (Red)

This alternative option comprises of the mainline 1D with a slight change in the centreline of the eastern link option near the Tircallan townland. Refer to **Figure 2-2** for the alignment of the 1D1 (Red) Option.

Since the mainline 1D1 follows the same alignment of 1D, it crosses the same number of watercourses as identified and assessed in **Table 3.11** above. The affected waterbodies, River Finn, Backless & Daurnett Cappry , Mullaghagarry Greenhills, Kilross Greenhills Drumboe Lower & Aghasheil have been designated as '*At Risk*' in terms of water quality.

The eastern Link Road crosses/ encroaches four smaller tributaries (Mullaghagarry, Treanamullin, Tricullan & Kilross) of the River Finn. Further details of the anticipated flood impacts of these watercourses have been discussed in **Table 3.5** above. A detailed flood impact assessment along with OPW Section 50 approval will be required for all associated river crossings.

In terms of water quality, the Kilross River has been designated as *'At Risk'*, while the other three Finn Tributaries are currently at review stage. In order to reduce the water quality impacts of the associated watercourses, both during the construction and post construction stages, appropriate mitigation measures including storm water attenuation and treatment will be required before out-falling to any of the watercourses traversed along the proposed option.

3.1.9 Option 1E (Green)

The impact of Option 1E (Green) on the flood risk of local watercourses from South to North is outlined in the table below.

Table 3.13: Flood Impact Assessments for Option 1E (Green)

Option 1E (Green)			
Watercourse EPA name	**Segment Code**	**Crossing/Encroachment**	**Details**
(Burn) Daurnett	01_1815	Encroachment	Proposed tie in (roundabout) with existing local road L6544 encroaches upon CFRAM 0.1%AEP extents. Existing road also encroaches upon these extents. Minimal impact between

Option 1E (Green)			
Watercourse EPA name	**Segment Code**	**Crossing/Encroachment**	**Details**
			proposed works and do nothing scenario as the existing road is already encroaching upon the flood extents.
Cappry	01_1816	Crossing	Proposed main line crosses stream at one location. There are no flood extents available for this stream. Appropriate hydrological analysis, hydraulic structure design and Section 50 applications will be required. A proposed tie in with a local road also crosses Cappry stream. There is already an existing crossing at this location but any bridge/culvert alterations/replacements will require a Section 50 application.
Finn	01_7147 01_590 01_591	Crossing& Encroachment	The main line crosses the River Finn and there is also a considerable encroachment on the 0.1% AEP extents. This may be avoided by spanning the flood plain completely (360m) as long as adequate freeboard is provided and any support structures in the flood plain can be proven to have a negligible effect on the existing flooding regime. The main line also encroaches upon the flood extents.
Aghasheil	01_553	Crossing & Encroachment	Proposed underpass for R252 crosses the Aghasheil stream while also encroaching upon the 0.1% AEP flood extents.
Drumboe Lower	01_589	Crossing	The main line crosses the Drumboe Lower Stream.There are no flood extents available for this stream. Appropriate hydrological analysis, hydraulic structure design and a Section 50 application will be required.
Backlees	01_186	Crossing	The mainline crosses the Backlees stream. There are no flood extents available for this stream. Adequate hydrological analysis, hydraulic structure design and a Section 50 application will be required. The proposed underpass for the Drumboe Cottages lane also straddles the river bank. Detailed modelling will be required to ensure that any proposed earthworks do not impact upon the existing flood levels.
Greenhills 01	01_70	Crossing	A proposed underpass crosses the Greenhill 01 stream. There is already an existing road and crossing at this location. Any replacement or alterations of bridges or culverts will require a Section 50 application.
Kilross 01	01_543	Crossing& Encroachment	A Link road crosses the Kilross stream. The existing N13 also encroaches upon the 0.1%AEP flood extents.
Treanamullin	01_66	Crossing	A Link road crosses/straddles the Treanamullin. There are no flood extents available for this stream. Adequate hydrological analysis, hydraulic structure design and a Section 50 application will be required.
Mullaghagarry	01_776	Crossing & Encroachment	Proposed tie in with N15 crosses the Mullaghagarry stream. There is an existing bridge at this location. Any replacement or alterations of bridges or culverts will require a Section 50 application. The proposed tie in (roundabout) also encroaches upon the 0.1%AEP flood extents.
Magheracorran	01_1024	Crossing	The mainline section straddles the Magheracorran stream for approximately 350m. It is recommended to alter the line of the section to reduce the impact upon the stream. If this is not possible, appropriate hydrological analysis, hydraulic structure design and a Section 50 application will be required.
Magheracorran	01_530	Crossing	A proposed link road crosses the Magheracorran stream. Appropriate hydrological analysis, hydraulic structure design

Option 1E (Green)			
Watercourse EPA name	**Segment Code**	**Crossing/Encroachment**	**Details**
			and a Section 50 application will be required.

In terms of water quality impact, considerable levels of storm water attenuation and treatment will be required before out-falling to any of the watercourses traversed along the mainline. Every watercourse encountered along the mainline is characterised as '*At Risk'* to not achieve its WFD objectives. The River Finn has its own SAC designation and many of the watercourses flow either directly or indirectly into the SAC.

The following table summarises the biotic indices and risk characterisation of the watercourses impacted by Option 1E (Green).

Table 3.14: Water Quality Impact Assessments for Option 1E (Green)

Option 1E (Green)				
Watercourse EPA name	**Segment Code**	**Biotic Index**	**River Waterbodies Risk**	**Importance of Hydrological Attribute**
(Burn) Daurnett	01_1815	Q2-3 to Q3-4	At Risk	Medium - High
Cappry	01_1816	Unknown	At Risk	NA
Finn	01_7147 01_590 01_591	Q3	At Risk	Medium
Aghasheil	01_553	Unknown	At Risk	NA
Drumboe Lower	01_589	Unknown	At Risk	NA
Backlees	01_186	Unknown	At Risk	NA
Greenhills 01	01_70	Unknown	At Risk	NA
Kilross 01	01_543	Unknown	At Risk	NA
Treanamullin	01_66	Unknown	Review	NA
Mullaghagarry	01_776	Unknown	Review	NA
Magheracorran	01_1024	Unknown	At Risk	NA
Magheracorran	01_530	Unknown	At Risk	NA

3.1.10 Option 1E1 (Green)

This alternative option comprises of the mainline E1 (Green) Option with a slight change in the centreline of the eastern link option near the Tircallan townland. Refer to **Figure 2-2** for the alignment of the 1E1 (Green) Option.

Since the mainline of 1E1 follows the same alignment of 1E, it crosses the same number of watercourses as identified and assessed in **Table 3.13** above. The affected waterbodies - River Finn, Backless, Daurnett, Cappry, Mullaghagarry, Greenhills, Kilross Greenhills Drumboe Lower & Aghasheil have been designated as "*At Risk*" in terms of water quality.

The eastern link road crosses/ encroaches four smaller tributaries (Mullaghagarry, Treanamullin, Tricullan & Kilross) of the River Finn. Further details of the anticipated flood impacts of these watercourses have been discussed in **Table 3.5** above. A detailed flood impact assessment along with OPW Section 50 approval will be required for all associated river crossings.

In terms of water quality, the Kilross River has been designated as *'At Risk'*, while the other three Finn Tributaries are currently at review stage. In order to reduce the water quality impacts of the associated watercourses, both during the construction and post construction stages, appropriate mitigation measures including storm water attenuation and treatment will be required before out-falling to any of the watercourses traversed along the proposed option.

3.1.11 Option 1F (Blue)

The impact of Option 1F (Blue) on the flood risk of local watercourses from south to north is outlined in the table below.

Table 3.15: Flood Impact Assessments for Option 1F (Blue)

Option 1F (Blue)			
Watercourse EPA name	**Segment Code**	**Crossing / Encroachment**	**Details**
(Burn) Daurnett	01_1815	Encroachment	Proposed tie in (roundabout) with existing local road L6544 encroaches upon CFRAM 0.1%AEP extents. Existing road also encroaches upon these extents. Minimal impact between proposed works and the do nothing scenario as the existing road is already encroaching upon the flood extents.
Cappry	01_1816	Crossing	Proposed main line crosses stream at one location. There are no flood extents available for this stream. Appropriate hydrological analysis, hydraulic structure design and a Section 50 application will be required. A proposed tie in with local road also crosses Cappry stream. There is already an existing crossing at this location but any bridge/culvert alterations/replacements will require Section 50 applications.
Finn	01_7147 01_590 01_591	Crossing & Encroachment	The main line crosses the River Finn and there is also a considerable encroachment on the 0.1%AEP extents. This may be avoided by spanning the flood plain completely (360m) as long as adequate freeboard is provided and any support structures in the flood plain can be proven to have a negligible effect on the existing flooding regime. The main line also encroaches upon the flood extents at two locations.
Aghasheil	01_553	Crossing & Encroachment	A proposed underpass for R252 crosses the Aghasheil stream while also encroaching upon the 0.1% AEP flood extents.
Drumboe Lower	01_589	Crossing	The main line crosses the Drumboe Lower Stream at one location. There are no flood extents available for this stream. Appropriate hydrological analysis, hydraulic structure design and a Section 50 application will be required.
Backlees	01_186	Crossing & Encroachment	The proposed main line crosses the Backlees at one location. This may require realignment to avoid the confluence of the Backless with the Teevickmoy Stream. There are no CFRAM extents at this location, but there are PFRA flood extents. This may be avoided by spanning the affected PFRA extents (65m) completely as long as adequate freeboard is provided and it is proven that any support structures in the flood plain have a negligent impact on the flood levels. Due to the broadbrush methodology used in preparing PFRA extents a detailed hydraulic model may be required to understand the full effects of any proposed road works at this location.
Magheracorran	01_1024	Crossing & Encroachment	The proposed main line crosses the Magheracorran at one location. There are no CFRAM extents at this location for the River Finn, but there are PFRA flood extents. The encroachment on flood plains may be avoided by spanning the flood plain completely (230m) as long as adequate freeboard is provided and any support structures in the flood plain can be proven to have

			a negligible effect on the existing flooding regime. Due to the broadbrush methodology used in preparing PFRA extents a detailed hydraulic model may be required to understand the full effects of any proposed road works at this location. Flood relief culverts underneath the embankments may also provide a pathway for flood levels to reach the extents of the natural flood plain.

In terms of water quality impact, considerable levels of storm water attenuation and treatment will be required before out-falling to any of the watercourses traversed along the mainline. Every watercourse encountered along the mainline is characterised as '*At Risk'* to not achieve its WFD objectives. The River Finn has its own SAC designation and many of the watercourses flow either directly or indirectly into the SAC.

The following table summarises the biotic indices and risk characterisation of the watercourses impacted by the 1F (Blue) Option.

Table 3.16: Water Quality Impact Assessments for Option 1F (Blue)

Option 1F (Blue)				
Watercourse EPA name	**Segment Code**	**Biotic Index**	**River Waterbodies Risk**	**Importance of Hydrology Attribute**
(Burn) Daurnett	01_1815	Q2-3 to Q3-4	At Risk	Medium - High
Cappry	01_1816	Unknown	At Risk	NA
Finn	01_7147 01_590 01_591	Q3	At Risk	Medium
Aghasheil	01_553	Unknown	At Risk	NA
Drumboe Lower	01_589	Unknown	At Risk	NA
Backlees	01_186	Unknown	At Risk	NA
Magheracorran	01_1024	Unknown	At Risk	NA

3.1.12 Option 1F1 (Blue)

This alternative option comprises of the mainline of 1F with slight changes in the centreline of the eastern link option near the Tircallan townland. Refer to **Figure 2-2** for the alignment of Option 1F1 (Blue).

Since the mainline of 1F1 follows the same alignment of 1F, it crosses the same number of watercourses as identified and assessed in **Table 3.15** above. The affected waterbodies-River Finn, Backless, Daurnett, Cappry, Magheracorran, Drumboe Lower & Aghasheil have been designated as '*At Risk*' in terms of water quality.

The eastern link road crosses/ encroaches four smaller tributaries (Mullaghagarry, Treanamullin, Tricullan & Kilross) of the River Finn. Further details of the anticipated flood impacts of these watercourses have been discussed in **Table 3.5** above. A detailed flood impact assessment along with OPW Section 50 approval will be required for all associated river crossings.

In terms of water quality, the Kilross river has been designated as *'At Risk'*, while the other three Finn Tributaries are currently at review stage. In order to reduce the water quality impacts of the associated watercourses, both during the construction and post construction stages, appropriate mitigation measures including storm water attenuation and treatment will be required before out-falling to any of the watercourses traversed along the proposed option.

3.1.13 Option 1G (Yellow)

The impact of Option 1G (Yellow) on the flood risk of local watercourses from south to north is outlined in the table below.

Table 3.17: Flood Impact Assessments for Option 1G (Yellow)

Option 1G (Yellow)			
Watercourse EPA name	**Segment Code**	**Crossing / Encroachment**	**Details**
(Burn) Daurnett	01_1815	Encroachment	Proposed tie in with existing N15 is located in close vicinity of the Daumett River. Minimal impact can be expected from the proposed works.
Cappry	01_1816	Crossing	Proposed main line crosses a stream. There are no flood extents for this stream. Appropriate hydrological analysis, hydraulic structure design and a Section 50 application will be required. Proposed tie in with local road also crosses Cappry stream. There is already an existing crossing at this location, but any bridge/culvert alterations/replacements will require Section 50 applications.
Finn	01_7147 01_590 01_591	Crossing & Encroachment	The main line crosses the River Finn where there is also a considerable encroachment on the 0.1%AEP extents. This may be avoided by spanning the flood plain completely (360m) as long as adequate freeboard is provided and any support structures in the flood plain can be proven to have a negligible effect on the existing flooding regime. The main line also encroaches upon the flood extents.
Aghasheil	01_553	Crossing & Encroachment	Proposed underpass for R252 of main line crosses the Aghasheil stream while also encroaching upon the 0.1% AEP flood extents.
Drumboe Lower	01_589	Crossing	The main line crosses the Drumboe Lower Stream. There are no flood extents for this stream. Appropriate hydrological analysis, hydraulic structure design and a Section 50 application will be required.
Backlees	01_186	Crossing	The mainline crosses the Backlees stream. There are no available flood extents for this stream. Appropriate hydrological analysis, hydraulic structure design and a Section 50 application will be required. The proposed underpass for the Drumboe Cottages lane also straddles the river bank. Detailed modelling will be required to ensure that any proposed earthworks do not impact upon the existing flood levels.
Greenhills 01	01_70	Crossing	The proposed underpass crosses the Greenhill 01 stream. There is already an existing road and crossing at this location. Any replacement or alterations of bridges or culverts will require a Section 50 application.
Kilross 01	01_543	Crossing & Encroachment	Link road of the main line crosses the Kilross stream. The existing N13 also encroaches upon the 0.1% AEP flood extents.
Treanamullin	01_66	Crossing	Link road of main line crosses/straddles the Treanamullin stream. There are no flood extents for this stream. Appropriate

			hydrological analysis, hydraulic structure design and a Section 50 application will be required.
Mullaghagarry	01_776	Crossing & Encroachment	Proposed tie in with N15 crosses the Mullaghagarry stream. There is an existing bridge at this location. Any replacement or alterations of bridges or culverts will require a Section 50 application. The proposed tie in roundabout also encroaches upon the 0.1%AEP flood extents.

In terms of water quality impact, considerable levels of storm water attenuation and treatment will be required before out-falling to any of the watercourses traversed along the mainline. Every watercourse encountered along the mainline is characterised as '*At Risk'* to not achieve its WFD objectives. The River Finn has its own SAC designation and many of the watercourses flow either directly or indirectly into the SAC.

The following table summarises the biotic indices and risk characterisation of the watercourses impacted by Option 1G (Yellow).

Table 3.18: Water Quality Impact Assessments for Option 1G (Yellow)

Option 1G (Yellow)				
Watercourse EPA name	**Segment Code**	**Biotic Index**	**River Waterbodies Risk**	**Importance of Hydrology Attribute**
(Burn) Daurnett	01_1815	Q2-3 to Q3-4	At Risk	Medium - High
Cappry	01_1816	Unknown	At Risk	NA
Finn	01_7147 01_590 01_591	Q3	At Risk	Medium
Aghasheil	01_553	Unknown	At Risk	NA
Drumboe Lower	01_589	Unknown	At Risk	NA
Backlees	01_186	Unknown	At Risk	NA
Greenhills 01	01_70	Unknown	At Risk	NA
Kilross 01	01_543	Unknown	At Risk	NA
Treanamullin	01_66	Unknown	Review	NA
Mullaghagarry	01_776	Unknown	Review	NA

3.2 Summary of Option Comparison

An overall assessment was undertaken on each option to include both quantitative and qualitative assessment. Each option is scored based on the seven-point scale outlined in **Section 1.2** and an impact score assigned according to the impact level. **Table 3.19** below outlines the option scoring matrix based on the quantitative and qualitative assessment of each option.

Table 3.19: Option Scoring Matrix

Option	Quantitative Assessment	Qualitative Assessment	Impact	Impact Score	Ranking	Preference
1A (Orange)	3 Major, 1 Moderate, 1 Minor	4th least interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	4	Intermediate
1A1 (Orange)	3 Major, 3 Moderate, 4 Minor	Joint 5th least interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	5	Intermediate
1B (Pink)	1 Major, 1 Moderate, 1 Minor	Least interaction with water course & associated flood risk and water quality concerns.	Minor or slightly negative	3	1	Preferred
1B1 (Pink)	2 Major, 2 Moderate, 3 Minor,	3rd least interaction with water course & associated flood risk and water quality concerns.	Minor or slightly negative	3	3	Preferred
1C (Purple)	2 Major, 1 Moderate,2 Minor,	2nd least interaction with water course & associated flood risk and water quality concerns.	Minor or slightly negative	3	2	Preferred
1C1 (Purple)	3 Major, 3 Moderate, 4 Minor,	Joint 5th least interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	5	Intermediate
1D (Red)	3 Major, 3 Moderate, 5 Minor,	Joint 6th least interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	6	Intermediate
1D1 (Red)	4 Major, 4 Moderate, 6 Minor,	8th least interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	8	Least Preferred
1E (Green)	3 Major, 3 Moderate, 6 Minor	7th least interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	7	Intermediate
1E1 (Green)	4 Major, 5 Moderate, 7 Minor	9th least (or most) interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	9	Least Preferred
1F (Blue)	3 Major, 2 Moderate, 2 Minor	5th least interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	5	Intermediate
1F1 (Blue)	3 Major, 3 Moderate, 5 Minor	Joint 6th least interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	6	Intermediate
1G (Yellow)	3 Major, 3 Moderate, 5 Minor	Joint 6th least interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	6	Intermediate

4 CONCLUSIONS & RECOMMENDATIONS

This preliminary hydrological assessment has highlighted the environs of Option 1B/1B1 (Pink) as the preferred option. This is primarily on the basis of the avoidance of areas with a potential for flooding and reduction in required river crossing lengths.

In terms of drainage of road runoff and water quality issues, each option would have similar effects both during and after construction. Again, the 1B/1B2 (Pink) option would be considered the preferred option as it encounters the fewest number of watercourses along its length.

It is recommended that the ultimate preferred option be aligned as necessary to avoid encroaching upon watercourses and their potential flood extents. Any required crossings will require detailed hydrological and hydraulic analysis so as to eliminate any risk of flooding to adjacent lands. Adequate storm water attenuation and treatment will be required before out-falling to any watercourse along the option due to every watercourse being *At Risk* to not meet its WFD objectives.

Donegal County Council

TEN-T Priority Route Improvement Project, Donegal

Section 1: N15/N13 Ballybofey/Stranorlar Urban Region

Option Selection Report

Appendix D1.8– Cultural Heritage

December 2019

Document Control Sheet

Client:	Donegal County Council
Project Title:	TEN-T Priority Route Improvement Project, Donegal – Section 1: N15/N13 Ballybofey/Stranorlar Urban Region
Document Title:	Option Selection Report – Appendix D1.8 Cultural Heritage
Document No. :	TT-MGT0337-RPS-00-01-RP-E-EN-1018

Rev. No.	Suitability	Effective Date	Revision Description	Checked	Approved
P01	S4	December 2019	Issue for publication	SM	GMcE

This report has been prepared by RPS/Barry Transportation on behalf of Donegal County Council. Any other persons who use any information contained herein do so at their own risk.

© RPS Barry Transportation 2019

Table of Contents

1 INTRODUCTION 1
1.1 Methodology 1
1.1.1 Assessment Criteria 1
1.1.2 Relevant Legislation 2
2 EXISTING ENVIRONMENT 7
2.1 Desk Study 7
2.2 Field Survey 8
2.3 Options: Cultural Heritage Environment 11
2.3.1 Option 1A Corridor (Orange): 500m Cultural Heritage Constraints 11
2.3.2 Option 1A1 Corridor (Orange): 500m Cultural Heritage Constraints 12
2.3.3 Option 1B Corridor (Pink): 500m Cultural Heritage Constraints 13
2.3.4 Option 1B1 Corridor (Pink): 500m Cultural Heritage Constraints 13
2.3.5 Option 1C Corridor (Purple): 500m Cultural Heritage Constraints 14
2.3.6 Option 1C1 Corridor (Purple): 500m Cultural Heritage Constraints 15
2.3.7 Option 1D Corridor (Red): 500m Cultural Heritage Constraints 15
2.3.8 Option 1D1 Corridor (Red): 500m Cultural Heritage Constraints 16
2.3.9 Option 1E Corridor (Green): 500m Cultural Heritage Constraints 17
2.3.10 Option 1E1 Corridor (Green): 500m Cultural Heritage Constraints 18
2.3.11 Option 1F Corridor (Blue): 500m Cultural Heritage Constraints 19
2.3.12 Option 1F1 Corridor (Blue): 500m Cultural Heritage Constraints 20
2.3.13 Option 1G Corridor (Yellow): 500m Cultural Heritage Constraints 21
3 OPTION SELECTION 22
3.1 Option Corridor Impact Assessment 22
3.1.1 Option 1A Corridor (Orange): Cultural Heritage Assessment 23
3.1.2 Option 1A1 Corridor (Orange): Cultural Heritage Assessment 24
3.1.3 Option 1B Corridor (Pink): Cultural Heritage Assessment 25
3.1.4 Option 1B1 Corridor (Pink): Cultural Heritage Assessment 26
3.1.5 Option 1C Corridor (Purple): Cultural Heritage Assessment 27
3.1.6 Option 1C1 Corridor (Purple): Cultural Heritage Assessment 28
3.1.7 Option 1D Corridor (Red): Cultural Heritage Assessment 29
3.1.8 Option 1D1 Corridor (Red): Cultural Heritage Assessment 30
3.1.9 Option 1E Corridor (Green): Cultural Heritage Assessment 32
3.1.10 Option 1E1 Corridor (Green): Cultural Heritage Assessment 33
3.1.11 Option 1F Corridor (Blue): Cultural Heritage Assessment 34
3.1.12 Option 1F1 Corridor (Blue): Cultural Heritage Assessment 35
3.1.13 Option 1G Corridor (Yellow): Cultural Heritage Assessment 37
3.2 Comparison of Option Corridors 38
4 CONCLUSIONS 49
5 REFERENCES 50

Appendices

Appendix 1: Inventory of Cultural Heritage

Appendix 2: Photographic Record

Appendix 3: Cultural Heritage Option Corridor Mapping

List of Figures

Figure 2-1: Areas of high archaeological potential 9

List of Tables

Table 1-1: Impact Scoring Key (TII, 2016) 2
Table 2-1: Cultural Heritage Items located within the 500m wide Option 1A Corridor (Orange) 12
Table 2-2: Cultural Heritage Items located within the 500m wide Option 1A1 Corridor (Orange) 12
Table 2-3: Cultural Heritage Items located within 500m wide Option 1B Corridor (Pink) 13
Table 2-4: Cultural Heritage Items located within 500m wide Option 1B1 Corridor (Pink) 14
Table 2-5: Cultural Heritage Items located within 500m wide Option 1C Corridor (Purple) 14
Table 2-6: Cultural Heritage Items located within 500m wide Option 1C1 Corridor (Purple) 15
Table 2-7: Cultural Heritage Items located within 500m wide Option 1D Corridor (Red) 16
Table 2-8: Cultural Heritage Items located within 500m wide Option 1D1 Corridor (Red) 17
Table 2-9: Cultural Heritage Items located within 500m wide Option 1E Corridor (Green) 18
Table 2-10: Cultural Heritage Items located within 500m wide Option 1E1 Corridor (Green) 18
Table 2-11: Cultural Heritage Items located within 500m wide Option 1F Corridor (Blue) 19
Table 2-12: Cultural Heritage Items located within 500m wide Option 1F1 Corridor (Blue) 20
Table 2-13: Cultural Heritage Items located within 500m wide Option 1G Corridor (Yellow) 21
Table 3-1: Impact Assessment on Cultural Heritage, Option 1A Corridor (Orange) 23
Table 3-2: Impact Assessment on Cultural Heritage, Option 1A1 Corridor (Orange) 24
Table 3-3:Impact Assessment on Cultural Heritage, Option 1B Corridor (Pink) 25
Table 3-4: Impact Assessment on Cultural Heritage, Option 1B1 Corridor (Pink) 26
Table 3-5: Impact Assessment on Cultural Heritage, Option 1C Corridor (Purple) 27
Table 3-6: Impact Assessment on Cultural Heritage, Option 1C1 Corridor (Purple) 28
Table 3-7: Impact Assessment on Cultural Heritage, Option 1D Corridor (Red) 29
Table 3-8: Impact Assessment on Cultural Heritage, Option 1D1 Corridor (Red) 30
Table 3-9: Impact Assessment on Cultural Heritage, Option 1E Corridor (Green) 32
Table 3-10: Impact Assessment on Cultural Heritage, Option 1E1 Corridor (Green) 33
Table 3-11: Impact Assessment on Cultural Heritage, Option 1F Corridor (Blue) 34
Table 3-12: Impact Assessment on Cultural Heritage, Option 1F1 Corridor (Blue) 36
Table 3-13: Impact Assessment on Cultural Heritage, Option 1G Corridor (Yellow) 37

1 INTRODUCTION

This report examines the cultural heritage aspects of the study area for 13 no. options for Section 1: N15 Ballybofey-Stranorlar Urban Region of the TEN-T Priority Route Improvement Project in Donegal (see **Appendix 3: Cultural Heritage Option Corridor Mapping**) and will form part of a Phase 2 – Option Selection Report to be issued by the National Roads Design Office, Donegal County Council. See Section 1.2 of the Option Selection Report for a description of the project. The term 'Cultural Heritage' includes all archaeological and built (architectural) heritage elements including (but not limited to) recorded archaeological sites and monuments, areas of archaeological potential (incl. areas of peatland and underwater environments), artefact findspots, placename evidence, field patterns and associated stone/earthen walls and boundaries, folklore and tradition, public, religious and vernacular architecture and industrial heritage.

The study area, north of Ballybofey-Stranorlar, has a long history of human settlement, as demonstrated by the archaeological and historical record. The River Finn has excellent fishing resources, and this fertile river valley, with gently undulating hillslopes, coupled with the fact that the River is navigable towards the River Foyle and Lough Foyle, ultimately out to sea, indicates that it was an important natural resource in social, economic and political terms since earliest prehistoric times.

The general area was settled by the English during the Plantation of Ulster and by 1622 a small village was in existence at both Ballybofey and Stranorlar (the towns today, connected by a bridge over the Finn are commonly known as the 'Twin Towns'). Drumboe Castle and demesne is located close to the northern bank of the river Finn on the periphery of present day Ballybofey. Although it is uncertain whether the structure pre-dates 1700, an estate was in existence there by 1622. The castle became the Donegal General Headquarters for the Irish Free State forces during the Irish Civil War of 1922-23 and was the location of the execution of the 'Drumboe Martyrs', four Anti-Treaty Republicans shot by firing squad by order of the Irish Free State.

The settlements at Ballybofey and Stranorlar continued to develop during the 19th century mainly due to the growth of the linen industry in the region. The 19th century saw the connection of Stranorlar to the railway network when a standard gauge line extended from the town to a junction with the Londonderry & Enniskillen Railway (1863-1960) at Strabane.

1.1 Methodology

1.1.1 Assessment Criteria

The criteria for site evaluation at Stage 1 Preliminary Options Assessment outlined in *TII Project Management Guidelines 2010* and *TII Project Appraisal Guidelines (2016)* refer to a consideration of Archaeology and Cultural Heritage (comparative impact on Recorded Monuments and Places (RMPs), areas of archaeological potential, Architectural Heritage, and any other areas of cultural significance) as per *TII Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes (2005)* and *Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes (2005)*.

The comparative evaluation of each overall option corridor was assisted by scoring of impacts to the overall presence of sensitive receptors using the Preference Rating Key in **Table 1-1** per the *Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis* (TII, 2016). An impact assessment was undertaken on each option to include both quantitative and qualitative assessment. Each option is scored based on the seven-point scale per below and an integer was assigned according to the overall impact level. Finally, an overall order of preference score from a Cultural Heritage perspective was assigned for each of the 13 no. options.

Table 1-1: Impact Scoring Key (TII, 2016)

7	Major or Highly Positive
6	Moderately Positive
5	Minor or Slightly Positive
4	Not Significant/Neutral
3	Minor or Minor or slightly negative
2	Moderately negative
1	Major or Highly negative

A 500m wide corridor for each option (250m either side of centre-line) contains the study area with an extension of land area(s) where required at junction layouts and/or upgrade of side roads. Due cognisance has also been taken of site types and potential groupings/complexes and inter-associations across a given landscape.

Methodological principles applied in this assessment have been both desk and field-based.

- **Desk-Study**: further expansion of information gathered during the constraints study, including the examination of historical cartographic sources, NMI files, aerial mapping/photography and relevant published information.
- **Field-Study**: primarily a windshield survey of the environs, topography and landscape and observations therein with a view to identifying significant cultural heritage impacts and/or areas of archaeological potential. This has been coupled with site specific visits, as required, in order to determine level of impact and extent and condition of the heritage asset.

The compilation of a cultural heritage constraints inventory has been undertaken to include core locational and descriptive data, as well as identification of the distance to the option and the type of impact (direct/indirect).

The compilation of impact assessment tables for each option includes assessment of the level of impact for each constraint per EPA Guidelines (2003) *Appendix 4, Glossary of Terms* as well as having due regard for the assessment of impacts contained within the *Draft EPA Guidelines on the Information to be contained in EIARs* (2017). Mapping of cultural heritage constraints accompanies each option in Appendix 3.

The compilation of the comparison options table presents the results of each option and provides both a quantitative and qualitative assessment in order to determine an emerging preferred corridor from a Cultural Heritage perspective. This includes a review of the nature and magnitude of the impact to include assessment of the quality, duration and type of impact per EPA Guidelines provided in *Advice Notes on Current Practice in the preparation of Environmental Impact Statements* (2003).

1.1.2 Relevant Legislation

The management and protection of cultural heritage in Ireland is achieved through a framework of international conventions and national laws and policies (*Framework and Principles for the protection of the Archaeological Heritage*, Department of Arts, Heritage, Gaeltacht and the Islands 1999, 35). This is undertaken in accordance with the provisions of the '*European Convention on the Protection of the Archaeological Heritage*' (the Valletta Convention, ratified in 1997) and '*European Convention on the Protection of Architectural Heritage*' (Grenada Convention, ratified in 1997).

The Code of Practice for Archaeology agreed between the Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs and Transport Infrastructure Ireland (TII) (2017) provides *'a framework within existing legislation (National Monuments Act 1930 to 2014 and Roads Act 2015) and policy to enable TII to progress with its programme of work in accordance with the Government's transport strategy, whilst carrying out appropriate archaeological assessment and mitigation having regard to a set of principles and actions agreed by both parties'*. Due cognisance of the agreed principles in the *Code of Practice* (2017) has been taken in the preparation of this assessment report.

The Minister for Culture, Heritage and Gaeltacht is presently responsible for the statutory functions and the administration of the national policy in relation to archaeological heritage management. The National Monuments Act 1930 (as amended) , the Heritage Act 1995 and relevant provisions of the National Cultural Institutions Act 1997 are the primary means of ensuring the satisfactory protection of archaeological remains, which are held to include all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes.

There are a number of mechanisms under the National Monuments Act that are applied to secure the protection of archaeological monuments. These include designating sites of national significance as National Monuments, or entering them on the Register of Historic Monuments, the Record of Monuments and Places (RMP), the Sites and Monuments Record or placing Preservation Orders and Temporary Preservation Orders on endangered sites. Donegal County Council's policies and objectives for the protection of the archaeological resource within the county are also presented below.

National Monuments

The term 'national monument' as defined in Section 2 of the National Monuments Act (1930) refers to a monument '*the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto*...'. National Monuments may be acquired by the Minister by agreement or by compulsory order and the State or Local Authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the Local Authority as guardian of that monument if the State or Local Authority agrees. Once the site is in ownership or guardianship of the State it may not be interfered with without the written consent of the Minister. Archaeological monuments within lands in Local Authority ownership are also designated as National Monuments and this may often apply to features such as historic graveyards and their associated church ruins as well as town defences.

Preservation Orders

Recorded archaeological sites that have been deemed to be in danger of damage or destruction can be allocated Preservation Orders under the National Monuments Act 1930 which make any interference to these sites illegal. Temporary Preservation Orders can also be attached under the 1954 National Monuments (Amendment) Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation relevant to the site must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders by the written consent, and at the discretion, of the Minister. A Preservation Order has been placed on a Ringfort and a Souterrain (DG068-022001- & DG068-022002-) in Creggan (Stranorlar Ed) townland (PO ref. 5/1973) however this is not affected by any of the proposed options.

Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP)

The Sites and Monument Record was compiled in the 1980s and early 1990s and comprises lists of all known archaeological sites within the country. The SMR formed the basis of the Record of Monuments and Places (RMP) which was established under Section 12(1) of the 1994 National Monuments (Amendment) Act. The SMR and RMP both comprise lists of monuments and relevant places with accompanying maps that show the recorded archaeological monuments and places for each county within the State. The 1994 Act provides statutory protection to monuments listed in the RMP under the provision that:

'where the owner or occupier (other than the Minister for Environment and Local Government) of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the Minister for Environment and Local Government to carry out work and shall not, except in the case of urgent necessity and with the consent of the Minister, commence the work until two months after the giving of notice.'

Register of Historic Monuments

Historic monuments and archaeological areas listed on the register are afforded statutory protection under the 1987 National Monuments (Amendment) Act. The register was made largely redundant with the establishment of the Record of Monuments and Places (RMP) under the National Monuments (Amendment) Act, 1994.

Donegal County Development Plan 2018-2024

The relevant development plan at the time of writing is the *County Donegal Development Plan 2018-2024*. This outlines the Council's policies for the protection of the archaeological resource within the administrative area and the policies relevant to this study comprise the following:

AH-P-1 It is a policy of the Council to protect and enhance the integrity of Archaeological Monuments and their settings and to secure the preservation in-situ of all archaeological monuments included in the Record of Monuments and Places.

AH-P-3 It is the policy of the Council to protect the character, settings of and views from National Monuments/ Recorded Monuments and to manage development which would be considered to (visually or physically) intrude upon or inhibit the enjoyment of the amenities of these sites.

AH-P-4 It is a policy of the Council to protect where appropriate, the character and setting of any unrecorded archaeological object or site.

AH-P-5 It is the policy of the Council to protect and preserve archaeological sites, their characters and the settings which have been identified subsequent to the publication of the Record of Monuments and Places.

AH-P-7 It is the policy of the Council to protect and preserve underwater archaeological sites in rivers, lakes, intertidal and sub-tidal locations.

AH-P-8 It is the policy of the Council to protect known battlefield sites and their settings.

Architectural Heritage

Protection of the architectural heritage in Ireland is provided for through a range of legal instruments that include the Heritage Act, 1995, the Architectural Heritage (National Inventory) and National Monuments (Misc. Provisions) Act, 1999, and the Local Government (Planning and Development) Act 2000.

Section 2.1 of the Heritage Act, 1995, describes architectural heritage as:

'all structures, buildings, traditional and designed, and groups of buildings including streetscapes and urban vistas, which are of historical, archaeological, artistic, engineering, scientific, social or technical interest, together with their setting, attendant grounds, fixtures, fittings and contents, and, without prejudice to the generality of the foregoing, includes railways and related buildings and structures and any place comprising the remains or traces of any such railway, building or structure'.

Under the Local Government (Planning and Development) Act, 2000, all Planning Authorities are obliged to keep a 'Record of Protected Structures' (RPS) of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. As of the 1st January 2000, all structures listed for protection

in current Development Plans, have become 'protected structures. Since the introduction of this legislation, planning permission is required for any works to a protected structure that would affect its character. If a protected structure is endangered, planning authorities may issue a notice to the owner or occupier requiring works to be carried out. The Act contains comprehensive powers for local authorities to require the owners and occupiers to do works on a protected structure if it is endangered, or a protected structure or a townscape of special character that ought to be restored. The Architectural Heritage Act, 1999, requires the Minister to establish a survey to identify; record and evaluate the architectural heritage of the country. The function of the National Inventory of Architectural Heritage (NIAH) is to record built heritage structures within the Republic of Ireland and to advise local authorities in relation to structures of interest within their areas.

The relevant development plan at the time of writing is the *County Development Plan 2018-2024*. This outlines the Council's policies for the protection of the architectural heritage resource within the administrative area and the examples relevant to this study include the following:

BH-P-1 It is a Policy of the Council to conserve and protect all structures (or parts of structures) and sites contained in the Record of Protected Structures that are of special architectural, historic, archaeological, artistic, cultural, scientific, social or technical interest.

BH-P-2 It is a policy of the Council to review the RPS on an ongoing basis, and to add structures (or parts of structures) of special interest as appropriate.

BH-P-3 It is a policy of the Council to ensure retention of historic structures (and parts of structures), including their functional and decorative details [in accordance with current conservation guidelines and best practice].

BH-P-4 It is a policy of the Council to ensure the repair, reuse and appropriate refurbishment of vernacular/historic buildings, which make a positive contribution to the built heritage of the area including those as referred to on any National Inventory of Architectural Heritage listing.

BH-P-5 It is a policy of the Council to protect and preserve vernacular and/or historic industrial and maritime buildings.

BH-P-17 It is a policy of the Council to require that any historic structures that have to be demolished or significantly altered are photographed and recorded (using scaled drawings) to agreed professional standards.

BH-P-18 It is a policy of the Council to preserve the integrity of Historic Gardens and Designed Landscape sites in County Donegal identified in the National Inventory of Architectural Heritage.

Landscape Character Assessment, Co. Donegal (2016)

The Landscape Character Assessment of Co. Donegal was actioned as a result of the following objective, NH-0-7, of the *County Donegal Development Plan 2012-2018*:

> *"To prepare a Landscape Character Assessment that shall provide a framework for identification, assessment, protection, management and planning of the landscape (and including seascape) of County Donegal in accordance with current legislation and ministerial guidelines, and having regard to the European Landscape Convention 2000".*

Current legislation and guidance documents refers to *The Planning and Development Act 2011*; *Planning Policy Statement 2015* (Dept of Env, Community & Local Government); 'A National Landscape Strategy for Ireland 2015-2025 (Dept of Arts, Heritage and the Gaeltacht*); Regional Planning Guidelines (2010-2022)* of the Border Regional Authorities; and *County Donegal Development Plan 2018-2024*.

The Landscape Character Assessment of County Donegal (May 2016) describes the study area as being located within LCA 14 Finn Valley. Within this LCA the study area for the options is described as *'a* [broad] *and* [level] *valley of larger square agricultural fields* [than those to the west] *overlooked by mountainous areas of upland bog. The landscape eastwards from Ballybofey-Stranorlar towards Castlefinn is a fertile agricultural plain alongside the river within a wider gently undulating agricultural landscape of large square fields similar to the adjoining Laggan Valley and Foyle Valley LCAs'*.

2 EXISTING ENVIRONMENT

2.1 Desk Study

The proposed options for Section 1: N15 Ballybofey-Stranorlar Urban Region comprise thirteen (13 no.) options: 1A and 1A1 (Orange), 1B and 1B1 (Pink), 1C and 1C1 (Purple), 1D and 1D1 (Red), 1E and 1E1 (Green), 1F and 1F1(Blue) and 1G (Yellow) (see **Appendix 3: Cultural Heritage Option Corridor Mapping**). The proposed bypass is *c.* 9km and in addition there are potential link options associated with each option *c.* 2km in length providing access to the Ballybofey and Stranorlar urban areas.

The principal source reviewed for the assessment of the known archaeological resource is the online form of the *Archaeological Survey of Ireland* (ASI). Between 1984 and 1992, the ASI compiled a Site and Monument Record (SMR) which comprises a published series of lists and maps that identify the recorded archaeological resource within each county in the State. The SMR formed the basis for the statutory Record of Monuments and Places (RMP) established under Section 12 of the National Monuments (Amendment) Act 1994. The ASI has continued to record and add entries to the SMR and has developed an online "Historic Environment Viewer"[1] which facilitates online access to the SMR databases as well as the National Inventory of Architectural Heritage (NIAH).

The principal sources for the identification of the architectural heritage resource within the study area were the Record of Protected Structures (RPS), as published in the *Donegal County Development Plan 2018-2024*, and the *National Inventory of Architectural Heritage* (NIAH) (Buildings and Garden Surveys).

A number of other sources were consulted in order to collate a preliminary assessment for the potential presence of unrecorded archaeological sites within the study areas. This included various literary sources in order to assess the written archaeological, historical and architectural record of the study area.

The *Database of Irish Excavation Reports* contains summary accounts of excavations carried out in Ireland from 1970 to 2017. It has been compiled from the published Excavations Bulletins and an online database[2]. An analysis of same for the study area has been undertaken with a view to determining the level of archaeological potential for hitherto undiscovered sites.

The *National Museum of Ireland* (NMI), Kildare Street, Dublin holds an archive of Topographical Files which record the townlands in which the artefacts within their collections were discovered. This is an important resource as the discovery of apparently stray artefacts can be an early indicator for the presence of unrecorded archaeological sites within an area. The Kildare Street archive was inspected on the 20th October and the 8th November 2017 and the information on the archaeological artefacts discovered within townlands in the study area are presented in Appendix 1.

The detail on *historical cartographic sources* can indicate past settlement and land-use patterns and may also highlight the increased impact of modern developments and land improvement works. This information can aid in the identification of the location and extent of unrecorded, or partially levelled, features of archaeological or architectural heritage interest. The cartographic sources examined for the study area included various editions of the Ordnance Survey (OS) maps, including the 1st editions of the 6-inch and 25-inch maps surveyed during the 19th and early 20th centuries.

[1] www.archaeology.ie
[2] www.excavations.ie

The *Place-names Branch* (Department of Arts, Heritage and the Gaeltacht) provides a comprehensive management system for data, archival records and place names research conducted by the State. Its primary function is to undertake research in order to establish the correct Irish language forms of the place names of Ireland and in collaboration with Fiontar at the Dublin City University to publish them on a public website (www.logainm.ie). The Irish language origins of many place names can provide information on the presence of sites of archaeological interest and thereby act as indicators of known and/or unknown archaeological sites.

A full inventory of Cultural Heritage Items (RMPs/SMRs, NIAH/RPS structures, excavations, NMI finds, historic cartographic items, placenames and literary references) located within the 500m wide corridor of each of the options for Section 1 is included in Appendix 1. Summarised data of the Cultural Heritage items located within a 500m wide corridor for each of the proposed options is presented in the tables below.

2.2 Field Survey

The study area, north of Ballybofey-Stranorlar, has a long history of human settlement, as demonstrated by the archaeological and historical record. The River Finn has excellent fishing resources, and this fertile river valley, coupled with the fact that the River is navigable towards the River Foyle and Lough Foyle, ultimately out to sea, indicates that it was an important natural resource in terms of social, economic and political terms since earliest times. There are a number of examples of built heritage of vernacular importance scattered throughout the area, and the Historic Landscape Characterisation (HLC) of the Finn Valley LCA (*Draft Historic Landscape Characterisation of County Donegal, Feb 2014*) identifies that it is characterised by *'a patchwork of straight-sided and surveyed fields, indicating 18th and 19th century agricultural improvements'*. The area forms part of a major natural highway from the north and east of the County, through the mountainous terrain of the County's central and southern geology, demarcating important political and territorial boundaries from early times.

Field survey was undertaken within the study area during August and September 2018 and consisted of a windshield survey and site visits by a team of suitably qualified archaeologists per TII Guidelines, 2005. The topography within the study area consists of a combination of fertile river valley floors and gently rising hillslopes of improved undulating agricultural lands with pockets of commercial forestry plantation and upper reaches of boggy mountainous terrain.

The options extend from the Burn Daurnett, a tributary of the River Finn, *c.* 1.5km southwest of the urban environs of Ballybofey, in a northeasterly direction where they cross the River Finn, and extend north of Ballybofey, along the southern slopes of Trooper's Hill (106m OD). There is forestry plantation on the lower slopes of the latter, as the options extend north-easterly, crossing an inter-connecting tributary of the Rivers Cloghroe to the north and Finn to the south. The topography rises and the option corridors traverse along the eastern hillslopes at Lettermakenny, Backlees and Teevickmoy at *c.* 140m OD, before reaching the lower river valley floor of Cloghroe River (which runs eastwards to the River Deele) at the north-easterly termination point south of Callan Bridge.

The proposed link road options extend from the existing N15 east of Stranorlar and traverse north/north-westwards linking with the N13 and the relevant options at Backlees. This area is predominantly comprised of the northern banks of the river Finn valley, and riverine lowlands including the location of Lough Alaan.

A number of areas of high archaeological potential were identified following a review of the local topography, recorded archaeological records and locational data, historic cartographic sources and aerial mapping which was supplemented by observations in the field. These areas of high archaeological potential have been identified at 6 no. locations and have been abbreviated as Section 1 Area of Archaeological Potential_01 to 06 (S1AAP_01 to S1AAP_06) and indicative areas are presented in **Figure 2-1** (see also **Appendix 3: Cultural Heritage Option Corridor Mapping** for more detail).

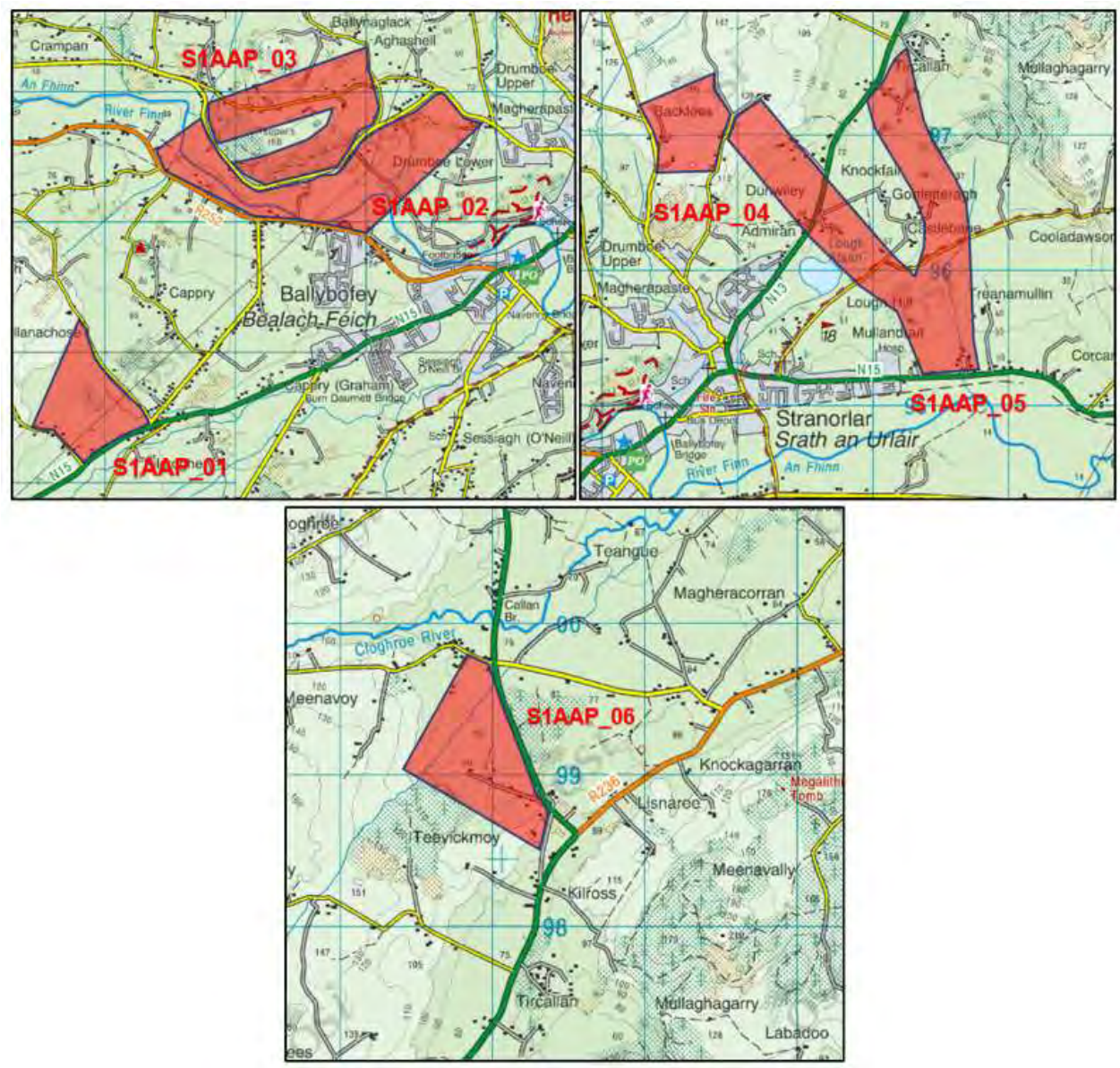


Figure 2-1: Areas of high archaeological potential

S1-AAP01

This area is located at the south-westerly starting point of all of the proposed options, at the Burn Daurnett river lowlands and south-west of the urban environs of Ballybofey. There are five (5 no.) recorded RMPs within the immediate area to the south-west at Goland/Cappry and also at Dooish to the west: DG077-012--- (ringfort), DG077-013--- (ringfort), DG077-026--- (standing stone), DG077-027--- (standing stone) and DG077-033--- (souterrain). This riverine environment would have been attractive to early settlers since prehistoric times, providing good food and transport resources, and although marshy and wet in places, this type of natural environment is also conducive to sites Bronze Age cooking sites such as *fulachta fiadh*.

S1-AAP02

This area is located along the southwest and north-eastern banks of the River Finn, demarcated by the R252 to the south-west and the local road network skirting along the lower slopes of Trooper's Hill and incorporating Drumboe Lower. The eastern portion of this Area of Archaeological Potential at Drumboe Lower also forms part of the north-western area of Garden Demesne lands associated with Drumboe Castle (NIAH Garden ID DG0047), although the demesne grounds are now largely fragmented by modern housing

development. Within this area is also Holy Well Woods – an amenity woodland with a cultural holy well site that is well maintained, regularly visited and in use. It is possible that this site may have original associations with the adjacent site of Drumboe Abbey (site of), *c.* 300m to the south. The river Finn itself is an important natural resource and would have been vital to early settlers in terms of transport, socio-economics and politics/territorial boundaries. Trooper's Hill overlooks the river valley floor at the north and has 3 no. recorded archaeological sites: DG077-009--- (ringfort); DG077-010--- (ringfort) and DG077-011--- (enclosure). Further to the west is the recorded remains of Drumboe Abbey (no surface trace, but with significant potential for sub-surface remains, including burials) near a bend in the River Finn, at its northern banks (DG078-005---). Rivers were regarded as sacred places, particularly during the Bronze Age, when ritual deposition of important artefacts (often elaborate metalwork) took place. It is possible that there may be underwater archaeological potential to discover prehistoric finds/features at this crossing location. Furthermore, the valley floor would have been an attractive location from earliest times, and as such, there is high potential to uncover site types ranging from the prehistoric era to medieval times.

S1-AAP03

This area is located along both the lower and upper southern slopes of Trooper's Hill, which fall down towards the local road network and beyond to the River Finn. South-facing, well-drained sloping ground is favourable to past human settlement, particularly earthen early medieval monuments and Trooper's Hill is testament to this as there are 3no. recorded ringfort/enclosure sites at this area: DG077-009--- (ringfort); 'Black Fort' DG077-010--- (ringfort) and DG077-011--- (enclosure). Also of note is the proximity to Drumboe Abbey (DG078-005---) to the south-east and the bend in the River Finn. These south-facing slopes, already home to recorded archaeological sites, are considered to be of high potential to reveal additional and/or associated finds and/or features of archaeological significance, potentially from prehistoric to medieval times.

S1-AAP04

This area is located at Backlees/Dunwiley, *c.* 1km west of the existing N15, at the lower and upper southerly slopes of a northwest/southeast extending ridge (160m OD). The terrain is of well-drained good quality agricultural lands, with good siting within the surrounding topography, all of which is conducive to past human settlement. There is a recorded ringfort (DG078-003---) of substantial construction, within the southern portion and a findspot of 22 worked flints (NMI 1979:103:1-11) at the north-western area. Given the natural topography and the presence of the recorded archaeology, this area is deemed be of high archaeological potential for finds and/or features dating from prehistoric times to medieval times.

S1-AAP05

This area is located at the northerly terminus of the proposed options at Teevickmoy and Meenavoy, south of the Cloghroe River (which flows into the River Deele, further to the east) along a wider valley floor, east of higher ground (170m OD) and north-east of areas of commercial forestry, bounded by the N15 at its eastern side. The riverine environment of the Cloghroe River and its connection to the River Deele (an excellent sea trout and salmon river) provide an important natural resource that would have been very attractive to past human settlement in terms of food, transport, politics and socio-economics. The archaeological record displays a ringfort (DG069-024---) and bullaun stone (DG069-023---) at Meenavoy to the north of the area, near the river yet commanding a view over the road 'highway' of the N15 to the east. In addition, there is the site of a ringfort, in excellent ground, further south of this area, at Teevickmoy (DG069-028---), the placename of which may translate to *Taobh Mhic Muaí* meaning 'hillside of [the son of] Muaí'. Given the ground conditions and proximity to the river and natural 'highway' through the wider terrain, this area is considered to be of high archaeological potential.

S1-AAP06

This area (comprising a proposed link corridor(s)) is located north of Stranorlar urban environs and consists of an area north of a significant bend on the River Finn and the existing N15, which extends northwards to gently rising ground, east of Lough Alaan, across the existing N13, within lands of good agricultural quality. The adjacent location of both the River Finn as well as Lough Alaan on gently rising ground would have been an attractive natural resource for early settlers. This is attributed by the archaeological record by the remains of a megalithic tomb at Knockfair (DG078-044---) as well as a holy well site DG078-007--- at Lough Hill and significant ringforts at Dunwiley (DG078-003--- and DG078-004--), the placename of which translates as *Dún Mhaoile*, meaning 'fort of the bare or flat-topped hillock'. Given the good terrain and topography as well as the natural water sources, and recorded archaeological sites from prehistoric to medieval times, this area for the proposed link corridor(s) is deemed to be of high archaeological potential.

2.3 Options: Cultural Heritage Environment

Below are tabulated all cultural heritage assets that are located within a 500m wide corridor (250m either side of centre-line) for each of the proposed options for Section 1. Details of these recorded assets are contained in **Appendix 1**. For assessment purposes a 300m wide corridor (150m either side of centre-line) has been allocated to each option in order to consider design elements (cut and fill) of the project; whilst for purposes of Cultural Heritage (and in accordance with current TII Guidelines) a 500m corridor has been assessed in order to determine whether further indirect impact(s) may occur, in order to inform both a quantitative and qualitative assessment.

It is important to note that it is the option corridor that has been subject to assessment and review, and at this stage, the centre-line is an arbitrary line only, and not representative of a preferred alignment(s) in itself. Furthermore, any identified site(s) located within the 300m option corridor(s) are considered 'direct' impacts at this stage of the design process; however, such identified 'direct' impacts may be avoided completely, or significantly reduced, as the design process refines from option assessment analyses to designed preferred option alignment.

To facilitate option assessment, distance measurements have been taken from the centre-line of the proposed options to the representative ITM location per Historic Environment Viewer datasets managed by the Department of Culture, Heritage and the Gaeltacht. Where visible extant remains/structures exist, measurements have been taken from the proposed option's centre-line to the edge of the closest extant perimeter remains.

2.3.1 Option 1A Corridor (Orange): 500m Cultural Heritage Constraints

Option 1A (Orange) has a total of 8 no. cultural heritage assets located within the 500m wide assessment corridor (see **Table 2-1**). These consist of four ringforts and an associated bullaun stone, a possible enclosure site identified from aerial photography (S1-AP02) and an NIAH recorded house 40906913 at Teevickmoy as well as Shancreggan House at Creggan townland (S1-BH03). It should also be noted that with reference to ringfort sites DG077-009--- and DG077-010--located on Trooper's Hill within the corridor, there is also another (potentially associated) recorded ringfort DG077-011--- sited on this hill, 424m south of the 1A (Orange) centreline.

It should also be noted that outside the assessment corridor, a protected structure RPS 40907836Workhouse/Famine graveyard at St. Joseph's Community Hospital in Stranorlar, is located 445m distant from the 1A (Orange) centreline as well as Finn View House (NIAH Ref. 40907838) which is located 304m from the 1A (Orange) centreline.

Option 1A (Orange) traverses all six areas of archaeological potential: S1AAP_01 to S1AAP_06.

Table 2-1: Cultural Heritage Items located within the 500m wide Option 1A Corridor (Orange)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG069-023---	MEENAVOY	Bullaun stone	221m
DG069-024---	MEENAVOY	Ringfort - unclassified	239m
DG077-009---	CREGGAN (Stranorlar ED)	Ringfort - unclassified	119m
DG077-010---	CREGGAN	Ringfort - rath	179m
DG078-002---	BALLYNAGLACK	Ringfort - unclassified	114m
40906913	TEEVICKMOY	House	207m
S1-AP02	MULLANACHOSE	Possible Enclosure	37m
S1-BH03	CREGGAN	Setting: Shancreggan House	16m

2.3.2 Option 1A1 Corridor (Orange): 500m Cultural Heritage Constraints

Option 1A1 (Orange) has a total of 9 no. cultural heritage assets located within the 500m wide assessment corridor (see**Table 2-2**). These consist of four ringforts and an associated bullaun stone, a possible enclosure site identified from aerial photography (S1-AP02) and an NIAH recorded house 40906913 at Teevickmoy, an outbuilding 40907720 at Cappry, as well as Shancreggan House at Creggan townland (S1-BH03).

It should also be noted that with reference to ringfort sites DG077-009--- and DG077-010--located on Trooper's Hill within the corridor, there is also another (potentially associated) recorded ringfort DG077-011--- sited on this hill, 424m south of the 1A1 (Orange) centreline. It should also be noted that outside the assessment corridor, a protected structure RPS 40907836Workhouse/Famine graveyard at St. Joseph's Community Hospital in Stranorlar, is located 445m distant from the 1A1 (Orange) centreline as well as Finn View House (NIAH Ref. 40907838) which is located 304m from the 1A1 (Orange) centreline.

Table 2-2: Cultural Heritage Items located within the 500m wide Option 1A1 Corridor (Orange)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG069-023---	MEENAVOY	Bullaun stone	221m
DG069-024---	MEENAVOY	Ringfort - unclassified	239m
DG077-009---	CREGGAN (Stranorlar ED)	Ringfort - unclassified	119m
DG077-010---	CREGGAN	Ringfort - rath	179m
DG078-002---	BALLYNAGLACK	Ringfort - unclassified	114m
40906913	TEEVICKMOY	House	207m
S1-AP02	MULLANACHOSE	Possible Enclosure	37m
40907720	CAPPRY	Outbuilding	199m
S1-BH03	CREGGAN	Setting: Shancreggan House	16m

2.3.3 Option 1B Corridor (Pink): 500m Cultural Heritage Constraints

Option 1B (Pink) has a total of 10 no. Cultural Heritage Assets located within the 500m wide assessment corridor (see **Table 2-3**). These consist of four ringfort/enclosure sites, a holy well site, a megalithic tomb and a bullaun stone. It should be noted that the latter site, a bullaun stone, also has an associated ringfort site DG069-024--- located just outside the 500m assessment corridor, 320m distant from the Pink 1B centreline. Enclosure site DG077-011--- on Trooper's Hill has two potential associated ringfort sites on the hill DG077-009--- and DG077-010---. In addition, another ringfort site DG078-002--- is located just outside the assessment corridor (305m from 1B (Pink) centre-line) at Ballynaglack.

There are two NIAH structures: a house at Teevickmoy (40906913) and a cornmill at Ironworks (40907708) as well as a potential 19th century farmstead at Creggan, Ref. S1-BH01 identified from aerial and historical cartographic sources.

It should also be noted that outside the assessment corridor, Dunwiley House and outbuildings Ref. 40907835, are located *c.* 510m southeast of the 1B (Pink) centreline, within an area of agricultural terrain; a protected structure RPS 40907836 Workhouse/Famine graveyard at St. Joseph's Community Hospital in Stranorlar, is located 355m distant from the 1B (Pink) centreline as well as Finn View House (NIAH Ref. 40907838) which is located 395m from the 1B (Pink) centreline.

Option1B (Pink) traverses five areas of archaeological potential: S1AAP_01 to S1AAP_02 and S1AAP_04 to S1AAP_06.

Table 2-3: Cultural Heritage Items located within 500m wide Option 1B Corridor (Pink)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG069-023---	MEENAVOY	Bullaun stone	221m
DG069-028---	TEEVICKMOY	Ringfort - unclassified	120m
DG077-011---	CREGGAN	Enclosure	129m
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	198m
DG078-004---	DUNWILEY	Ringfort - cashel	97m
DG078-007---	LOUGH HILL (Stranorlar ED)	Ritual site - holy well	149m
DG078-044---	KNOCKFAIR	Megalithic tomb - unclassified	143m
40906913	TEEVICKMOY	House	178m
40907708	IRONWORKS	Corn Mill	186m
S1-BH01	CREGGAN	C19th Farmstead	0m

2.3.4 Option 1B1 Corridor (Pink): 500m Cultural Heritage Constraints

The 1B1 (Pink) option has a total of 8 no. Cultural Heritage Assets located within the 500m wide assessment corridor (see**Table 2-4**). These consist of three ringfort/enclosure sites and a bullaun stone. It should be noted that the latter bullaun stone also has an associated ringfort site DG069-024--- located just outside the 500m assessment corridor, 266m distant from the Pink 1B1 centreline; and also, site DG077-011--- on Trooper's Hill has two potential associated ringfort sites on the hill DG077-009--- and DG077-010---. In addition, another ringfort site DG078-002--- is located just outside the assessment corridor (305m from 1B1 (Pink) centre-line) at Ballynaglack. There are three NIAH structures: a house at Teevickmoy (40906913), a cornmill at Ironworks (40907708) and an outbuilding at Cappry (40907720) as well as a potential 19th century farmstead at Creggan, Ref. S1-BH01 identified from aerial and historical cartographic sources.

It should also be noted that outside the assessment corridor, Dunwiley House and outbuildings Ref. 40907835, are located *c.* 510m southeast of the 1B1 (Pink) centreline, within an area of agricultural terrain; a protected structure RPS 40907836 Workhouse/Famine graveyard at St. Joseph's Community Hospital in Stranorlar, is located 441m distant from the 1B1(Pink) centreline as well as Finn View House (NIAH Ref. 40907838) which is located 313m from the 1B1 (Pink) centreline and outbuildings at Castlebane (NIAH Ref. 40907837), 283m from 1B1 (Pink) centreline.

Option 1B1 (Pink) traverses five areas of archaeological potential: S1AAP_01 to S1AAP_02 and S1AAP_04 to S1AAP_06.

Table 2-4: Cultural Heritage Items located within 500m wide Option 1B1 Corridor (Pink)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG069-023---	MEENAVOY	Bullaun stone	221m
DG069-028---	TEEVICKMOY	Ringfort - unclassified	120m
DG077-011---	CREGGAN	Enclosure	129m
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	198m
40906913	TEEVICKMOY	House	178m
40907708	IRONWORKS	Corn Mill	186m
40907720	CAPPRY	Outbuilding	199m
S1-BH01	CREGGAN	C19th Farmstead	0m

2.3.5 Option 1C Corridor (Purple): 500m Cultural Heritage Constraints

Option 1C (Purple) has a total of 7 no. Cultural Heritage assets located within the 500m wide assessment corridor (see **Table 2-5**). These consist of three ringforts/enclosures and an associated bullaun stone, an NIAH recorded house (40906913) at Teevickmoy and cornmill (40907708) at Ironworks. In addition, there is a possible 19th century farmstead at Creggan (S1-BH01) identified from aerial and historic cartographic sources located along the Purple 1C option.

It should also be noted that outside the assessment corridor, ringfort site DG077-011--- on Trooper's Hill has two potential associated ringfort sites on the hill DG077-009--- and DG077-010---. In addition, a protected structure RPS 40907836 Workhouse/Famine graveyard at St. Joseph's Community Hospital in Stranorlar, is located 448m distant from the 1C (Purple) centreline as well as Finn View House (NIAH Ref. 40907838) which is located 297m from the 1C (Purple) centreline.

Option1C (Purple) traverses five areas of archaeological potential: S1AAP_01 to S1AAP_02 and S1AAP_04 to S1AAP_06.

Table 2-5: Cultural Heritage Items located within 500m wide Option 1C Corridor (Purple)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG069-023---	MEENAVOY	Bullaun stone	221m
DG069-024---	MEENAVOY	Ringfort - unclassified	240m
DG077-011---	CREGGAN	Enclosure	123m

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG078-002---	BALLYNAGLACK	Ringfort - unclassified	115m
40906913	TEEVICKMOY	House	175m
40907708	IRONWORKS	Corn Mill	204m
S1-BH01	CREGGAN	C19th Farmstead	0m

2.3.6 Option 1C1 Corridor (Purple): 500m Cultural Heritage Constraints

Option 1C1 (Purple) has a total of 8 no. Cultural Heritage assets located within the 500m wide assessment corridor (see**Table 2-6**). These consist of three ringforts/enclosures and an associated bullaun stone, an NIAH recorded house (40906913) at Teevickmoy, cornmill (40907708) at Ironworks and outbuilding (40907720) at Cappry. In addition, there is a possible 19th century farmstead at Creggan (S1-BH01) identified from aerial and historic cartographic sources located along the 1C1 (Purple) option.

It should also be noted that outside the assessment corridor, ringfort site DG077-011--- on Trooper's Hill has two potential associated ringfort sites on the hill DG077-009--- and DG077-010---. In addition, a protected structure RPS 40907836 Workhouse/Famine graveyard at St. Joseph's Community Hospital in Stranorlar, is located 448m distant from the 1C1 (Purple) centreline as well as Finn View House (NIAH Ref. 40907838) which is located 297m from the 1C1 (Purple) centreline.

Option1C1 (Purple) traverses five areas of archaeological potential: S1AAP_01 to S1AAP_02 and S1AAP_04 to S1AAP_06.

Table 2-6: Cultural Heritage Items located within 500m wide Option 1C1 Corridor (Purple)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG069-023---	MEENAVOY	Bullaun stone	221m
DG069-024---	MEENAVOY	Ringfort - unclassified	240m
DG077-011---	CREGGAN	Enclosure	123m
DG078-002---	BALLYNAGLACK	Ringfort - unclassified	115m
40906913	TEEVICKMOY	House	175m
40907708	IRONWORKS	Corn Mill	204m
40907720	CAPPRY	Outbuilding	199m
S1-BH01	CREGGAN	C19th Farmstead	0m

2.3.7 Option 1D Corridor (Red): 500m Cultural Heritage Constraints

Option 1D (Red) has a total of 15 no. Cultural Heritage assets located within the 500m wide assessment corridor (see**Table 2-7**). These consist of four ringforts and an associated bullaun stone, a church site, a holy well site, a megalithic tomb, and a possible ringfort/enclosure identified from aerial photography (S1-A01). At Drumboe Lower there is 'Holy Well Woods' and its associated well site (not an RMP site), whilst the woods are also within the overall original garden demesne lands associated with Drumboe Castle. There are also built heritage items at Drumboe Upper: a house (protected structure and NIAH Ref. 40907834) and

a possible 18th century farmstead (S1-BH02) identified from aerial photography and historic cartographic sources, as well as an outbuilding (NIAH 40907720) and a cornmill (NIAH 40907708).

It should also be noted that outside the assessment corridor, Dunwiley House and outbuildings Ref. 40907835, are located *c.*400m southwest and *c.*530m southeast of the 1D (Red) centreline, within an area of agricultural terrain; a protected structure RPS 40907836Workhouse/Famine graveyard at St. Joseph's Community Hospital in Stranorlar, is located 366m distant from the 1D (Red) centreline as well as Finn View House (NIAH Ref. 40907838) which is located 363m from the 1D (Red) centreline.

Option 1D (Red) option traverses five areas of archaeological potential: S1AAP_01 to S1AAP_02 and S1AAP_04 to S1AAP_06.

Table 2-7: Cultural Heritage Items located within 500m wide Option 1D Corridor (Red)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG069-023---	MEENAVOY	Bullaun stone	230m
DG069-024---	MEENAVOY	Ringfort - unclassified	234m
DG069-028---	TEEVICKMOY	Ringfort - unclassified	145m
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	93m
DG078-004---	DUNWILEY	Ringfort - cashel	243m
DG078-005---	DRUMBOE LOWER	Church	170m
DG078-007---	LOUGH HILL (Stranorlar ED)	Ritual site - holy well	148m
DG078-044---	KNOCKFAIR	Megalithic tomb - unclassified	140m
40907834 (incl. RPS)	DRUMBOE UPPER	House	102m
40907720	CAPPRY	Outbuilding	90m
40907708	IRONWORKS	Corn Mill	110m
S1-BH02	DRUMBOE UPPER	Possible 18th C farmstead	0m
S1-AP01	BALLYNAGLACK	AP Site - Possible ringfort/enclosure	118m
S1-CH01	DRUMBOE LOWER	Holy Well Woods (well site)	0m
DG0047	DRUMBOE LOWER	Drumboe Castle Garden Demesne	0m

2.3.8 Option 1D1 Corridor (Red): 500m Cultural Heritage Constraints

Option 1D1 (Red) has a total of 12 no. Cultural Heritage assets located within the 500m wide assessment corridor (see **Table 2-8**). These consist of three ringforts and an associated bullaun stone, a church site and a possible ringfort/enclosure identified from aerial photography (S1-AP01). At Drumboe Lower there is 'Holy Well Woods' and its associated well site (S1-CH01; not an RMP site), whilst the woods are also within the overall original garden demesne lands associated with Drumboe Castle (DG0047). There are also built heritage items at Drumboe Upper: a house (protected structure and NIAH Ref. 40907834) and a possible 18th century farmstead (S1-BH02) identified from aerial photography and historic cartographic sources, as well as an outbuilding (NIAH 40907720) and a cornmill (NIAH 40907708).

It should also be noted that outside the assessment corridor, Dunwiley House and outbuildings Ref. 40907835, are located *c.*400m southwest and *c.*530m southeast of the 1D1 (Red) centreline, within an area of agricultural terrain; a protected structure RPS 40907836 Workhouse/Famine graveyard at St. Joseph's Community Hospital in Stranorlar, is located 441m distant from the 1D1 (Red) centreline as well as Finn

View House (NIAH Ref. 40907838) which is located 313m from the 1D1 (Red) centreline and an outbuilding at Castlebane (NIAH Ref. 40907837), 283m from 1D1 (Red) centreline.

Option 1D1 (Red) traverses five areas of archaeological potential: S1AAP_01 to S1AAP_02 and S1AAP_04 to S1AAP_06.

Table 2-8: Cultural Heritage Items located within 500m wide Option 1D1 Corridor (Red)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG069-023---	MEENAVOY	Bullaun stone	230m
DG069-024---	MEENAVOY	Ringfort - unclassified	234m
DG069-028---	TEEVICKMOY	Ringfort - unclassified	145m
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	93m
DG078-005---	DRUMBOE LOWER	Church	175m
40907834 (incl. RPS)	DRUMBOE UPPER	House	102m
40907720	CAPPRY	Outbuilding	90m
40907708	IRONWORKS	Corn Mill	110m
S1-BH02	DRUMBOE UPPER	Possible 18th C farmstead	0m
S1-AP01	BALLYNAGLACK	AP Site - Possible ringfort/enclosure	118m
S1-CH01	DRUMBOE LOWER	Holy Well Woods (well site)	0m
DG0047	DRUMBOE LOWER	Drumboe Castle Garden Demesne	0m

2.3.9 Option 1E Corridor (Green): 500m Cultural Heritage Constraints

Option 1E (Green) has a total of 14 no. Cultural Heritage assets located within the 500m wide assessment corridor (see **Table 2-9**). These consist of three ringforts and an associated bullaun stone, a church site, a holy well site, an unclassified megalithic tomb, and a potential ringfort/enclosure aerial photographic site (S1-AP01). At Drumboe Lower there is 'Holy Well Woods' and its associated well site (not an RMP site), whilst the woods are also within the overall original garden demesne lands associated with Drumboe Castle. There is a protected structure (house) at Drumboe Upper as well as a NIAH recorded outbuilding at Cappry and a corn mill at Ironworks. There is also a possible 18th century farmstead Ref. S1-BH02 at Drumboe Upper, identified from aerial and historic cartographic sources.

It should also be noted that outside the assessment corridor, Dunwiley House and outbuildings Ref. 40907835, are located *c.* 400m southwest and *c.* 530m southeast of the 1E (Green) centreline, within an area of agricultural terrain. In addition, a protected structure RPS 40907836 Workhouse/Famine graveyard at St. Joseph's Community Hospital in Stranorlar, is located 368m distant from the 1E (Green) centreline as well as Finn View House (NIAH Ref. 40907838) which is located 398m from the 1E (Green) centreline.

Option1E (Green) traverses five areas of archaeological potential: S1AAP_01 to S1AAP_02 and S1AAP_04 to S1AAP_06.

Table 2-9: Cultural Heritage Items located within 500m wide Option 1E Corridor (Green)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG069-023---	MEENAVOY	Bullaun stone	221m
DG069-024---	MEENAVOY	Ringfort - unclassified	237m
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	94m
DG078-004---	DUNWILEY	Ringfort - cashel	244m
DG078-005---	DRUMBOE LOWER	Church	175m
DG078-007---	LOUGH HILL (Stranorlar ED)	Ritual site - holy well	147m
DG078-044---	KNOCKFAIR	Megalithic tomb - unclassified	143m
40907834 (incl. RPS)	DRUMBOE UPPER	House	107m
40907720	CAPPRY	Outbuilding	91m
40907708	IRONWORKS	Corn Mill	98m
S1-AP01	BALLYNAGLACK	AP Site - Possible ringfort/enclosure	118m
S1-BH02	DRUMBOE UPPER	Possible 18thC farmstead	0m
S1-CH01	DRUMBOE LOWER	Holy Well Woods (well site)	0m
DG0047	DRUMBOE LOWER	Drumboe Castle Garden Demesne	0m

2.3.10 Option 1E1 Corridor (Green): 500m Cultural Heritage Constraints

Option 1E1 (Green) has a total of 11 no. Cultural Heritage assets located within the 500m wide assessment corridor (see**Table 2-10**). These consist of two ringforts and an associated bullaun stone, a church site and a potential ringfort/enclosure aerial photographic site (S1-AP01). At Drumboe Lower there is 'Holy Well Woods' and its associated well site (S1-CH01, not an RMP site), whilst the woods are also within the overall original garden demesne lands associated with Drumboe Castle (DG0047). There is a protected structure (house) at Drumboe Upper as well as a NIAH recorded outbuilding at Cappry and a corn mill at Ironworks. There is also a possible 18th century farmstead Ref. S1-BH02 at Drumboe Upper, identified from aerial and historic cartographic sources.

It should also be noted that outside the assessment corridor, Dunwiley House and outbuildings Ref. 40907835, are located *c.* 400m southwest and *c.* 530m southeast of the 1E1(Green) centreline, within an area of agricultural terrain. In addition, a protected structure RPS 40907836 Workhouse/Famine graveyard at St. Joseph's Community Hospital in Stranorlar, is located 441m distant from the 1E1(Green) centreline as well as Finn View House (NIAH Ref. 40907838) which is located 313m from the 1E1(Green) centreline and an outbuilding at Castlebane (NIAH Ref. 40907837), 283m from 1E1 (Green) centreline. Option1E1 (Green) traverses five areas of archaeological potential: S1AAP_01 to S1AAP_02 and S1AAP_04 to S1AAP_06.

Table 2-10: Cultural Heritage Items located within 500m wide Option 1E1 Corridor (Green)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG069-023---	MEENAVOY	Bullaun stone	221m
DG069-024---	MEENAVOY	Ringfort - unclassified	237m
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	94m

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG078-005---	DRUMBOE LOWER	Church (site of)	175m
40907834 (incl. RPS)	DRUMBOE UPPER	House	107m
40907720	CAPPRY	Outbuilding	91m
40907708	IRONWORKS	Corn Mill	98m
S1-AP01	BALLYNAGLACK	AP Site - Possible ringfort/enclosure	118m
S1-BH02	DRUMBOE UPPER	Possible 18thC farmstead	0m
S1-CH01	DRUMBOE LOWER	Holy Well Woods (well site)	0m
DG0047	DRUMBOE LOWER	Drumboe Castle Garden Demesne	0m

2.3.11 Option 1F Corridor (Blue): 500m Cultural Heritage Constraints

The 1F (Blue) Option has a total of 13 no. Cultural Heritage assets located within the 500m wide assessment corridor (see **Table 2-11**). These consist of three ringforts, a church site, a holy well site, an unclassified megalithic tomb, and a potential ringfort/enclosure aerial photographic site. There is also a bullaun stone at Meenavoy at the northern terminus of the proposed option, although it should also be noted that there is an associated ringfort site just outside the 500m wide corridor also (DG069-024---). At Drumboe Lower there is 'Holy Well Woods' and its' associated well site (not an RMP site), whilst the woods are also within the overall original garden demesne lands associated with Drumboe Castle. There is a protected structure (house) at Drumboe Upper as well as a NIAH recorded outbuilding at Cappry and a corn mill at Ironworks.

It should also be noted that outside the assessment corridor, Dunwiley House and outbuildings Ref. 40907835, are located 526m southeast of the 1F (Blue) centreline, within an area of agricultural terrain; a protected structure RPS 40907836 Workhouse/Famine graveyard at St. Joseph's Community Hospital in Stranorlar, is located 373m distant from the 1F (Blue) centreline as well as Finn View House (NIAH Ref. 40907838) which is located 395m from the 1F (Blue) centreline.

Option 1F (Blue) also traverses five areas of archaeological potential: S1AAP_01 to S1AAP_02 and S1AAP_04 to S1AAP_06.

Table 2-11: Cultural Heritage Items located within 500m wide Option 1F Corridor (Blue)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG069-023---	MEENAVOY	Bullaun stone	230m
DG069-028---	TEEVICKMOY	Ringfort - unclassified	180m
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	242m
DG078-004---	DUNWILEY	Ringfort - cashel	105m
DG078-005---	DRUMBOE LOWER	Church (site of)	175m
DG078-007---	LOUGH HILL (Stranorlar ED)	Ritual site - holy well	148m
DG078-044---	KNOCKFAIR	Megalithic tomb - unclassified	144m
40907834 (incl. RPS)	DRUMBOE UPPER	House	123m
40907720	CAPPRY	Outbuilding	93m
40907708	IRONWORKS	Corn Mill	101m

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
S1-AP01	BALLYNAGLACK	AP Site - Possible ringfort/enclosure	0m
S1-CH01	DRUMBOE LOWER	Holy Well Woods (well site)	60m
DG0047	DRUMBOE LOWER	Drumboe Castle Garden Demesne	0m

2.3.12 Option 1F1 Corridor (Blue): 500m Cultural Heritage Constraints

Option 1F1 (Blue) has a total of 10 no. Cultural Heritage assets located within the 500m wide assessment corridor (see**Table 2-12**). These consist of two ringforts, a church site and a potential ringfort/enclosure aerial photographic site. There is also a bullaun stone at Meenavoy at the northern terminus of the proposed option, although it should also be noted that there is an associated ringfort site just outside the 500m wide corridor also (DG069-024---). At Drumboe Lower there is 'Holy Well Woods' and its associated well site (S1-CH01, not an RMP site), whilst the woods are also within the overall original garden demesne lands associated with Drumboe Castle (DG0047). There is a protected structure (house) at Drumboe Upper as well as a NIAH recorded outbuilding at Cappry and a corn mill at Ironworks.

It should also be noted that outside the assessment corridor, Dunwiley House and outbuildings Ref. 40907835, are located 526m southeast of the 1F1 (Blue) centreline, within an area of agricultural terrain; a protected structure RPS 40907836 Workhouse/Famine graveyard at St. Joseph's Community Hospital in Stranorlar, is located 414m distant from the 1F1 (Blue) centreline as well as Finn View House (NIAH Ref. 40907838) which is located 313m from the 1F1 (Blue) centreline, and outbuildings at Castlebane (NIAH Ref. 40907837), 283m from 1F1 (Blue)centreline.

Option 1F1 (Blue) also traverses five areas of archaeological potential: S1AAP_01 to S1AAP_02 and S1AAP_04 to S1AAP_06.

Table 2-12: Cultural Heritage Items located within 500m wide Option 1F1 Corridor (Blue)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG069-023---	MEENAVOY	Bullaun stone	230m
DG069-028---	TEEVICKMOY	Ringfort - unclassified	180m
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	242m
DG078-005---	DRUMBOE LOWER	Church (site of)	175m
40907834 (incl. RPS)	DRUMBOE UPPER	House	123m
40907720	CAPPRY	Outbuilding	93m
40907708	IRONWORKS	Corn Mill	101m
S1-AP01	BALLYNAGLACK	AP Site - Possible ringfort/enclosure	0m
S1-CH01	DRUMBOE LOWER	Holy Well Woods (well site)	60m
DG0047	DRUMBOE LOWER	Drumboe Castle Garden Demesne	0m

2.3.13 Option 1G Corridor (Yellow): 500m Cultural Heritage Constraints

The 1G (Yellow) Option has a total of 10 no. Cultural Heritage assets located within the 500m wide assessment corridor (see**Table 2-13**). These consist of two ringforts, a church site and a potential ringfort/enclosure aerial photographic site. At Drumboe Lower there is 'Holy Well Woods' and its associated well site (S1-CH01, not an RMP site), whilst the woods are also within the overall original garden demesne lands associated with Drumboe Castle (DG0047). There is a protected structure (house) at Drumboe Upper as well as a NIAH recorded outbuilding at Cappry and a corn mill at Ironworks. There is also a possible 18th century farmstead Ref. S1-BH02 at Drumboe Upper, identified from aerial and historic cartographic sources.

It should also be noted that outside the assessment corridor a protected structure RPS 40907836 Workhouse/Famine graveyard at St. Joseph's Community Hospital in Stranorlar, is located 441m distant from the 1G (Yellow) centreline as well as Finn View House (NIAH Ref. 40907838) which is located 313m from the 1G (Yellow) centreline, and outbuildings at Castlebane (NIAH Ref. 40907837), 283m from 1G (Yellow) centreline.

The 1G (Yellow) option also traverses through five areas of archaeological potential: S1AAP_01 to S1AAP_02 and S1AAP_04 to S1AAP_06.

Table 2-13: Cultural Heritage Items located within 500m wide Option 1G Corridor (Yellow)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG078-005---	DRUMBOE LOWER	Church (site of)	157m
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	92m
DG069-028---	TEEVICKMOY	Ringfort - unclassified	173m
40907708	IRONWORKS	Corn Mill	96m
40907720	CAPPRY	Outbuilding	94m
40907834 (incl. RPS)	DRUMBOE UPPER	House	105m
S1-CH01	DRUMBOE LOWER	Holy Well Woods (well site)	0m
DG0047	DRUMBOE LOWER	Drumboe Castle Garden Demesne	0m
S1-AP01	BALLYNAGLACK	AP Site - Possible ringfort/enclosure	117m
S1-BH02	DRUMBOE UPPER	Possible 18thC farmstead	0m

3 OPTION SELECTION

3.1 Option Corridor Impact Assessment

In order to prepare a quantitative and qualitative comparison of the options, an impact assessment table has been prepared for each corridor in Tables 3.1 to 3.13.

TII Guidelines, for the *Assessment of Archaeological Heritage Impacts on National Road Schemes* (2005a) note that as the archaeological component of the option corridor selection process largely involves a desk-survey, it can be difficult to assess the exact level of potential of an archaeological site and therefore impact, due to (a) possible associated below ground remains with a recorded monument, (b) unknown extent of a recorded monument, (c) potential to reveal archaeological sites given the type of terrain or (d) possible recorded and newly identified sites may prove natural when tested or excavated.

An extensive desktop and windshield survey of the proposed option corridors have identified (a) known and recorded Cultural Heritage sites (b) potential Cultural Heritage sites (from aerial photography and historic cartographic sources) and (c) areas of high archaeological potential (based on a number of factors including terrain, proximity to recorded sites and topography).

The quality, significance, extent, duration and type of effect on all likely impacts on the Cultural Heritage resource has been considered per EPA EIA Guidelines and Advice Notes (2002 and 2003) as well as more recent EPA draft EIAR Guidelines and Advice Notes (2015 and 2017).

The project design corridors are 300m wide (as opposed to the 500m wide corridor assessed for this Cultural Heritage study, per TII Guidelines, 2005a & 2005b). Likely impacts have been defined as Negative, and either Direct, Indirect, or Potential Direct.

Direct/potential direct impacts have been categorised as any asset falling <150m of the centre-line (i.e. within the designed 300m corridor). Indirect impacts have been categorised as any asset falling >150m and <250m of the centre-line (i.e. beyond the designed 300m corridor but within an overall 500m assessment corridor). (In some instances, recorded extant assets located outside the 500m assessment corridor have been considered in order to take due cognisance of the landscape setting and visual amenity therein.)

In addition, the Zone of Notification for each RMP site can average between *c.* 20m - 60m or more in overall diameter, depending on the site type (e.g. a 'site of' a recorded burial ground could be much more extensive), and as such, due cognisance has been taken of the zone and the impact therein when considering the Level of Impact on the recorded archaeological site.

It is important to note that the centre-line is an arbitrary line for design purposes at option assessment stage, and may be subject to change, in order to avoid unacceptably high-level negative magnitude impact(s) on the known cultural heritage resource. Furthermore, any impacts identified as 'direct' in **Tables 3-1 to 3-13** below are classified as such by virtue of the site(s) being located within the 300m wide designed option corridor. These identified direct impacts may be avoided and/or reduced, as the design process refines from option corridor analyses to designed preferred option alignment, for purposes of the overall *TEN-T Priority Route Improvement Project, Donegal, Section 1: Ballybofey-Stranorlar Urban Region.*

The level of impact is determined based on the significance (value) of the asset having due regard to an overall assessment of the condition/preservation/quality of the asset; and the duration and extent of the quality of impact on that asset.

3.1.1 Option 1A Corridor (Orange): Cultural Heritage Assessment

Table 3-1 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 1A (Orange) Option. In addition to identified constraints per **Table 2-1**–**Table 2-13** above, impacts have been assessed for additional sites located in some instances beyond the 500m wide corridor (in order to address impacts of a visual nature) as well as identification of areas of archaeological potential.

Table 3-1: Impact Assessment on Cultural Heritage, Option 1A Corridor (Orange)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG069-023---	MEENAVOY	Bullaun stone	221m	Indirect	Imperceptible
DG069-024---	MEENAVOY	Ringfort - unclassified	239m	Indirect	Slight
DG077-009---	CREGGAN (Stranorlar ED)	Ringfort - unclassified	119m	Direct	Moderate
DG077-010---	CREGGAN	Ringfort - rath	179m	Indirect	Moderate
DG078-002---	BALLYNAGLACK	Ringfort - unclassified	114m	Direct	Moderate
40906913	TEEVICKMOY	House	207m	Indirect	Imperceptible
S1-AP02	MULLANACHOSE	Possible Enclosure	37m	Potential Direct	Potential Moderate
DG077-011---	CREGGAN	Grouping: Enclosure	424m	Indirect	Moderate
40907836 (incl. RPS)	MULLANDRAIT	Setting: Workhouse/ Famine Graveyard	445m	Indirect	Slight
40907838	TREANAMULLIN	Setting: Finn View House	304m	Indirect	Imperceptible
S1-BH03	CREGGAN	Setting: Shancreggan House	16m	Direct	Significant
S1-AAP01	Burn Daurnett River lowlands and SW of Ballybofey	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP02	SW & NE banks of River Finn, incl. river crossing, and lower slopes Trooper's Hill to Drumboe Lower	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP03	Lower and Upper slopes of Trooper's Hill	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP04	Backlees/Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP05	Teevickmoy & Meenavoy, S of Cloghroe River and valley floor	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP06	N of Stranorlar & River Finn, rising ground at Lough Alaan to Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

3.1.2 Option 1A1 Corridor (Orange): Cultural Heritage Assessment

Table 3-2sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 1A1 (Orange) Option. In addition to identified constraints per **Table 2-1**–**Table 2-13** above, impacts have been assessed for additional sites located in some instances beyond the 500m wide corridor (in order to address impacts of a visual nature) as well as identification of areas of archaeological potential.

Table 3-2: Impact Assessment on Cultural Heritage, Option 1A1 Corridor (Orange)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG069-023---	MEENAVOY	Bullaun stone	221m	Indirect	Imperceptible
DG069-024---	MEENAVOY	Ringfort - unclassified	239m	Indirect	Slight
DG077-009---	CREGGAN (Stranorlar ED)	Ringfort - unclassified	119m	Direct	Moderate
DG077-010---	CREGGAN	Ringfort - rath	179m	Indirect	Moderate
DG078-002---	BALLYNAGLACK	Ringfort - unclassified	114m	Direct	Moderate
40906913	TEEVICKMOY	House	207m	Indirect	Imperceptible
S1-AP02	MULLANACHOSE	Possible Enclosure	37m	Potential Direct	Potential Moderate
DG077-011---	CREGGAN	Grouping: Enclosure	424m	Indirect	Moderate
40907836 (incl. RPS)	MULLANDRAIT	Setting: Workhouse/ Famine Graveyard	445m	Indirect	Slight
40907838	TREANAMULLIN	Setting: Finn View House	304m	Indirect	Imperceptible
40907720	CAPPRY	Outbuilding	199m	Indirect	Imperceptible
S1-BH03	CREGGAN	Setting: Shancreggan House	16m	Direct	Significant
S1-AAP01	Burn Daurnett River lowlands and SW of Ballybofey	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP02	SW & NE banks of River Finn, incl. river crossing, and lower slopes Trooper's Hill to Drumboe Lower	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP03	Lower and Upper slopes of Trooper's Hill	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP04	Backlees/Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP05	Teevickmoy & Meenavoy, S of Cloghroe River and valley floor	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP06	N of Stranorlar & River Finn, rising ground at Lough Alaan to Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

3.1.3 Option 1B Corridor (Pink): Cultural Heritage Assessment

Table 3-3 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 1B (Pink) Option. In addition to identified constraints per **Table 2-1**– **Table 2-6** above, impacts have been assessed for additional sites located in some instances beyond the 500m wide corridor (in order to address impacts of a visual nature) as well as identification of areas of archaeological potential.

Table 3-3:Impact Assessment on Cultural Heritage, Option 1B Corridor (Pink)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG069-023---	MEENAVOY	Bullaun stone	221m	Indirect	Imperceptible
DG069-028---	TEEVICKMOY	Ringfort - unclassified	120m	Direct	Moderate
DG077-011---	CREGGAN	Enclosure	129m	Direct	Moderate
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	198m	Indirect	Moderate
DG078-004---	DUNWILEY	Ringfort - cashel	97m	Direct	Moderate
DG078-007---	LOUGH HILL (Stranorlar ED)	Ritual site - holy well	149m	Direct	Moderate
DG078-044---	KNOCKFAIR	Megalithic tomb - unclassified	143m	Direct	Slight
40906913	TEEVICKMOY	House	178m	Indirect	Imperceptible
40907708	IRONWORKS	Corn Mill	186m	Indirect	Imperceptible
S1-BH01	CREGGAN	C19th Farmstead	0m	Direct	Moderate
DG077-009--- & DG077-010---	CREGGAN (Stranorlar ED)	Grouping: Ringfort – unclassified Grouping: Ringfort - rath	414m & 284m	Indirect	Moderate
DG078-002---	BALLYNAGLACK	Ringfort	305m	Indirect	Imperceptible
DG069-024---	MEENAVOY	Setting/Associated remains: Ringfort - unclassified	266m	Indirect	Imperceptible
40907835	DUNWILEY	Setting: Dunwiley House	510m	Indirect	Imperceptible
40907836 (incl. RPS)	MULLANDRAIT	Setting: Workhouse/Famine Graveyard	355m	Indirect	Slight
40907838	TREANAMULLIN	Setting: Finn View House	395m	Indirect	Imperceptible
S1-AAP01	Burn Daurnett River lowlands and SW of Ballybofey	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP02	SW & NE banks of River Finn, incl. river crossing, and lower slopes Trooper's Hill to Drumboe Lower	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP04	Backlees/Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP05	Teevickmoy & Meenavoy, S of	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
	Cloghroe River and valley floor				
S1-AAP06	N of Stranorlar & River Finn, rising ground at Lough Alaan to Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

3.1.4 Option 1B1 Corridor (Pink): Cultural Heritage Assessment

Table 3.4 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 1B1 (Pink) Option. In addition to identified constraints per Tables 2.1 – 2.13 above, impacts have been assessed for additional sites located in some instances beyond the 500m wide corridor (in order to address impacts of a visual nature) as well as identification of areas of archaeological potential.

Table 3-4: Impact Assessment on Cultural Heritage, Option 1B1 Corridor (Pink)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG069-023---	MEENAVOY	Bullaun stone	221m	Indirect	Imperceptible
DG069-028---	TEEVICKMOY	Ringfort - unclassified	120m	Direct	Moderate
DG077-011---	CREGGAN	Enclosure	129m	Direct	Moderate
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	198m	Indirect	Moderate
40906913	TEEVICKMOY	House	178m	Indirect	Imperceptible
40907708	IRONWORKS	Corn Mill	186m	Indirect	Imperceptible
40907720	CAPPRY	Outbuilding	199m	Indirect	Imperceptible
S1-BH01	CREGGAN	C19th Farmstead	0m	Direct	Moderate
DG077-009--- & DG077-010---	CREGGAN (Stranorlar ED)	Grouping: Ringfort – unclassified Grouping: Ringfort - rath	414m & 284m	Indirect	Moderate
DG078-002---	BALLYNAGLACK	Ringfort	305m	Indirect	Imperceptible
DG069-024---	MEENAVOY	Setting/Associated remains: Ringfort - unclassified	266m	Indirect	Imperceptible
40907835	DUNWILEY	Setting: Dunwiley House	510m	Indirect	Imperceptible
40907836 (incl. RPS)	MULLANDRAIT	Setting: Workhouse/Famine Graveyard	441m	Indirect	Slight
40907837	CASTLEBANE	Outbuilding	283m	Indirect	Imperceptible
40907838	TREANAMULLIN	Setting: Finn View House	313m	Indirect	Imperceptible
S1-AAP01	Burn Daurnett River lowlands and SW of Ballybofey	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
S1-AAP02	SW & NE banks of River Finn, incl. river crossing, and lower slopes Trooper's Hill to Drumboe Lower	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP04	Backlees/Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP05	Teevickmoy & Meenavoy, S of Cloghroe River and valley floor	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP06	N of Stranorlar & River Finn, rising ground at Lough Alaan to Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

3.1.5 Option 1C Corridor (Purple): Cultural Heritage Assessment

Table 3-5 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 1C (Purple) Option. In addition to identified constraints per **Table 2-1** – **Table 2-6** above, impacts have been assessed for additional sites located in some instances beyond the 500m wide corridor (in order to address impacts of a visual nature) as well as identification of areas of archaeological potential.

Table 3-5: Impact Assessment on Cultural Heritage, Option 1C Corridor (Purple)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG069-023---	MEENAVOY	Bullaun stone	221m	Indirect	Imperceptible
DG069-024---	MEENAVOY	Ringfort - unclassified	240m	Indirect	Slight
DG077-011---	CREGGAN	Enclosure	123m	Direct	Moderate
DG078-002---	BALLYNAGLACK	Ringfort - unclassified	115m	Direct	Moderate
40906913	TEEVICKMOY	House	175m	Indirect	Imperceptible
40907708	IRONWORKS	Corn Mill	204m	Indirect	Imperceptible
S1-BH01	CREGGAN	C19th Farmstead	0m	Direct	Moderate
DG077-009--- & DG077-010---	CREGGAN (Stranorlar ED)	Grouping: Ringfort – unclassified & Grouping: Ringfort - rath	429m & 283m	Indirect	Moderate
40907836 (incl. RPS)	MULLANDRAIT	Setting: Workhouse/ Famine Graveyard	448m	Indirect	Slight
40907838	TREANAMULLIN	Setting: Finn View House	297m	Indirect	Imperceptible
S1-AAP01	Burn Daurnett River lowlands and SW of Ballybofey	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
S1-AAP02	SW & NE banks of River Finn, incl. river crossing, and lower slopes Trooper's Hill to Drumboe Lower	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP04	Backlees/Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP05	Teevickmoy & Meenavoy, S of Cloghroe River and valley floor	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP06	N of Stranorlar & River Finn, rising ground at Lough Alaan to Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

3.1.6 Option 1C1 Corridor (Purple): Cultural Heritage Assessment

Table 3-6 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 1C1 (Purple) Option. In addition to identified constraints per **Table 2-1** - **Table 2-13** above, impacts have been assessed for additional sites located in some instances beyond the 500m wide corridor (in order to address impacts of a visual nature) as well as identification of areas of archaeological potential.

Table 3-6: Impact Assessment on Cultural Heritage, Option 1C1 Corridor (Purple)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG069-023---	MEENAVOY	Bullaun stone	221m	Indirect	Imperceptible
DG069-024---	MEENAVOY	Ringfort - unclassified	240m	Indirect	Slight
DG077-011---	CREGGAN	Enclosure	123m	Direct	Moderate
DG078-002---	BALLYNAGLACK	Ringfort - unclassified	115m	Direct	Moderate
40906913	TEEVICKMOY	House	175m	Indirect	Imperceptible
40907708	IRONWORKS	Corn Mill	204m	Indirect	Imperceptible
40907720	CAPPRY	Outbuilding	199m	Indirect	Imperceptible
S1-BH01	CREGGAN	C19th Farmstead	0m	Direct	Moderate
DG077-009--- & DG077-010---	CREGGAN (Stranorlar ED)	Grouping: Ringfort – unclassified & Grouping: Ringfort - rath	429m & 283m	Indirect	Moderate
40907836 (incl. RPS)	MULLANDRAIT	Setting: Workhouse/ Famine Graveyard	448m	Indirect	Slight
40907838	TREANAMULLIN	Setting: Finn View House	297m	Indirect	Imperceptible

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
S1-AAP01	Burn Daurnett River lowlands and SW of Ballybofey	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP02	SW & NE banks of River Finn, incl. river crossing, and lower slopes Trooper's Hill to Drumboe Lower	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP04	Backlees/Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP05	Teevickmoy & Meenavoy, S of Cloghroe River and valley floor	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP06	N of Stranorlar & River Finn, rising ground at Lough Alaan to Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

3.1.7 Option 1D Corridor (Red): Cultural Heritage Assessment

Table 3-7 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 1D (Red) Option. In addition to identified constraints per **Table 2-1** - **Table 2-6** above, impacts have been assessed for additional sites located in some instances beyond the 500m wide corridor (in order to address impacts of a visual nature) as well as identification of areas of archaeological potential.

Table 3-7: Impact Assessment on Cultural Heritage, Option 1D Corridor (Red)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG069-023---	MEENAVOY	Bullaun stone	230m	Indirect	Imperceptible
DG069-024---	MEENAVOY	Ringfort - unclassified	234m	Indirect	Slight
DG069-028---	TEEVICKMOY	Ringfort - unclassified	145m	Direct	Moderate
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	93m	Direct	Significant
DG078-004---	DUNWILEY	Ringfort - cashel	243m	Indirect	Slight
DG078-005---	DRUMBOE LOWER	Church (site of)	175m	Direct	Significant
DG078-007---	LOUGH HILL (Stranorlar ED)	Ritual site - holy well	148m	Direct	Moderate
DG078-044---	KNOCKFAIR	Megalithic tomb - unclassified	140m	Direct	Slight
40907834 (incl. RPS)	DRUMBOE UPPER	House	102m	Direct	Significant
40907720	CAPPRY	Outbuilding	90m	Direct	Moderate
40907708	IRONWORKS	Corn Mill	110m	Direct	Moderate

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
S1-BH02	DRUMBOE UPPER	Possible 18th C farmstead	0m	Direct	Moderate
S1-AP01	BALLYNAGLACK	AP Site - Possible ringfort/enclosure	118m	Potential Direct	Potential Moderate
S1-CH01	DRUMBOE LOWER	Holy Well Woods (well site)	0m	Direct	Moderate
DG0047	DRUMBOE LOWER	Drumboe Castle Garden Demesne	0m	Direct	Moderate
40907835	DUNWILEY	Setting: Dunwiley House	400m	Indirect	Imperceptible
40907836 (incl. RPS)	MULLANDRAIT	Setting: Workhouse/Famine Graveyard	366m	Indirect	Slight
40907838	TREANAMULLIN	Setting: Finn View House	363m	Indirect	Imperceptible
S1-AAP01	Burn Daurnett River lowlands and SW of Ballybofey	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP02	SW & NE banks of River Finn, incl. river crossing, and lower slopes Trooper's Hill to Drumboe Lower	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP04	Backlees/Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP05	Teevickmoy & Meenavoy, S of Cloghroe River and valley floor	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP06	N of Stranorlar & River Finn, rising ground at Lough Alaan to Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

3.1.8 Option 1D1 Corridor (Red): Cultural Heritage Assessment

Table 3-8 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 1D1 (Red) Option. In addition to identified constraints per **Table 2-1 - Table 2-13** above, impacts have been assessed for additional sites located in some instances beyond the 500m wide corridor (in order to address impacts of a visual nature) as well as identification of areas of archaeological potential.

Table 3-8: Impact Assessment on Cultural Heritage, Option 1D1 Corridor (Red)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG069-023---	MEENAVOY	Bullaun stone	230m	Indirect	Imperceptible

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG069-024---	MEENAVOY	Ringfort - unclassified	234m	Indirect	Slight
DG069-028---	TEEVICKMOY	Ringfort - unclassified	145m	Direct	Moderate
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	93m	Direct	Significant
DG078-005---	DRUMBOE LOWER	Church (site of)	175m	Direct	Significant
40907834 (incl. RPS)	DRUMBOE UPPER	House	102m	Direct	Significant
40907720	CAPPRY	Outbuilding	90m	Direct	Moderate
40907708	IRONWORKS	Corn Mill	110m	Direct	Moderate
40907837	CASTLEBANE	Outbuilding	283m	Indirect	Imperceptible
S1-BH02	DRUMBOE UPPER	Possible 18th C farmstead	0m	Direct	Moderate
S1-AP01	BALLYNAGLACK	AP Site - Possible ringfort/enclosure	118m	Potential Direct	Potential Moderate
S1-CH01	DRUMBOE LOWER	Holy Well Woods (well site)	0m	Direct	Moderate
DG0047	DRUMBOE LOWER	Drumboe Castle Garden Demesne	0m	Direct	Moderate
40907835	DUNWILEY	Setting: Dunwiley House	400m	Indirect	Imperceptible
40907836 (incl. RPS)	MULLANDRAIT	Setting: Workhouse/Famine Graveyard	441m	Indirect	Slight
40907838	TREANAMULLIN	Setting: Finn View House	313m	Indirect	Imperceptible
S1-AAP01	Burn Daurnett River lowlands and SW of Ballybofey	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP02	SW & NE banks of River Finn, incl. river crossing, and lower slopes Trooper's Hill to Drumboe Lower	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP04	Backlees/Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP05	Teevickmoy & Meenavoy, S of Cloghroe River and valley floor	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP06	N of Stranorlar & River Finn, rising ground at Lough Alaan to Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

3.1.9 Option 1E Corridor (Green): Cultural Heritage Assessment

Table 3-9 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 1E (Green) Option. In addition to identified constraints per **Table 2-1** -**Table 2-6**– 2.6 above, impacts have been assessed for additional sites located in some instances beyond the 500m wide corridor (in order to address impacts of a visual nature) as well as identification of areas of archaeological potential.

Table 3-9: Impact Assessment on Cultural Heritage, Option 1E Corridor (Green)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG069-023---	MEENAVOY	Bullaun stone	221m	Indirect	Imperceptible
DG069-024---	MEENAVOY	Ringfort - unclassified	237m	Indirect	Slight
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	94m	Direct	Significant
DG078-004---	DUNWILEY	Ringfort - cashel	244m	Indirect	Slight
DG078-005---	DRUMBOE LOWER	Church (site of)	175m	Direct	Significant
DG078-007---	LOUGH HILL (Stranorlar ED)	Ritual site - holy well	147m	Direct	Moderate
DG078-044---	KNOCKFAIR	Megalithic tomb - unclassified	143m	Direct	Slight
40907834 (incl. RPS)	DRUMBOE UPPER	House	107m	Direct	Significant
40907720	CAPPRY	Outbuilding	91m	Direct	Moderate
40907708	IRONWORKS	Corn Mill	98m	Direct	Moderate
S1-AP01	BALLYNAGLACK	AP Site - Possible ringfort/enclosure	118m	Potential Direct	Potential Moderate
S1-BH02	DRUMBOE UPPER	Possible 18thC farmstead	0m	Direct	Moderate
S1-CH01	DRUMBOE LOWER	Holy Well Woods (well site)	0m	Direct	Moderate
DG0047	DRUMBOE LOWER	Drumboe Castle Garden Demesne	0m	Direct	Moderate
40907835	DUNWILEY	Setting: Dunwiley House	400m	Indirect	Imperceptible
40907836 (incl. RPS)	MULLANDRAIT	Setting: Workhouse/ Famine Graveyard	368m	Indirect	Slight
40907838	TREANAMULLIN	Setting: Finn View House	398m	Indirect	Imperceptible
S1-AAP01	Burn Daurnett River lowlands and SW of Ballybofey	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP02	SW & NE banks of River Finn, incl. river crossing, and lower slopes Trooper's Hill to Drumboe Lower	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
S1-AAP04	Backlees/Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP05	Teevickmoy & Meenavoy, S of Cloghroe River and valley floor	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP06	N of Stranorlar & River Finn, rising ground at Lough Alaan to Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

3.1.10 Option 1E1 Corridor (Green): Cultural Heritage Assessment

Table 3-10 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 1E1 (Green) Option. In addition to identified constraints per **Table 2-1 - Table 2-13** above, impacts have been assessed for additional sites located in some instances beyond the 500m wide corridor (in order to address impacts of a visual nature) as well as identification of areas of archaeological potential.

Table 3-10: Impact Assessment on Cultural Heritage, Option 1E1 Corridor (Green)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG069-023---	MEENAVOY	Bullaun stone	221m	Indirect	Imperceptible
DG069-024---	MEENAVOY	Ringfort - unclassified	237m	Indirect	Slight
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	94m	Direct	Significant
DG078-005---	DRUMBOE LOWER	Church (site of)	175m	Direct	Significant
40907834 (incl. RPS)	DRUMBOE UPPER	House	107m	Direct	Significant
40907720	CAPPRY	Outbuilding	91m	Direct	Moderate
40907708	IRONWORKS	Corn Mill	98m	Direct	Moderate
S1-AP01	BALLYNAGLACK	AP Site - Possible ringfort/enclosure	118m	Potential Direct	Potential Moderate
S1-BH02	DRUMBOE UPPER	Possible 18thC farmstead	0m	Direct	Moderate
S1-CH01	DRUMBOE LOWER	Holy Well Woods (well site)	0m	Direct	Moderate
DG0047	DRUMBOE LOWER	Drumboe Castle Garden Demesne	0m	Direct	Moderate
40907835	DUNWILEY	Setting: Dunwiley House	400m	Indirect	Imperceptible
40907836 (incl. RPS)	MULLANDRAIT	Setting: Workhouse/ Famine Graveyard	441m	Indirect	Slight

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
40907837	CASTLEBANE	Outbuilding	283m	Indirect	Imperceptible
40907838	TREANAMULLIN	Setting: Finn View House	313m	Indirect	Imperceptible
S1-AAP01	Burn Daurnett River lowlands and SW of Ballybofey	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP02	SW & NE banks of River Finn, incl. river crossing, and lower slopes Trooper's Hill to Drumboe Lower	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP04	Backlees/Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP05	Teevickmoy & Meenavoy, S of Cloghroe River and valley floor	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP06	N of Stranorlar & River Finn, rising ground at Lough Alaan to Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

3.1.11 Option 1F Corridor (Blue): Cultural Heritage Assessment

Table 3-11 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the Blue Option. In addition to identified constraints per **Table 2-1 - Table 2-6**–above, impacts have been assessed for additional sites located in some instances beyond the 500m wide corridor (in order to address impacts of a visual nature) as well as identification of areas of archaeological potential.

Table 3-11: Impact Assessment on Cultural Heritage, Option 1F Corridor (Blue)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG069-023---	MEENAVOY	Bullaun stone	230m	Indirect	Imperceptible
DG069-028---	TEEVICKMOY	Ringfort - unclassified	180m	Indirect	Slight
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	242m	Indirect	Moderate
DG078-004---	DUNWILEY	Ringfort - cashel	105m	Direct	Moderate
DG078-005---	DRUMBOE LOWER	Church (site of)	175m	Direct	Significant
DG078-007---	LOUGH HILL (Stranorlar ED)	Ritual site - holy well	148m	Direct	Moderate
DG078-044---	KNOCKFAIR	Megalithic tomb - unclassified	144m	Direct	Slight
40907834 (incl. RPS)	DRUMBOE UPPER	House	123m	Direct	Significant

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
40907720	CAPPRY	Outbuilding	93m	Direct	Moderate
40907708	IRONWORKS	Corn Mill	101m	Direct	Moderate
S1-AP01	BALLYNAGLACK	AP Site - Possible ringfort/enclosure	0m	Potential Direct	Potential Moderate
S1-CH01	DRUMBOE LOWER	Holy Well Woods (well site)	60m	Direct	Moderate
DG0047	DRUMBOE LOWER	Drumboe Castle Garden Demesne	0m	Direct	Moderate
DG069-024---	MEENAVOY	Setting/Associated remains: Ringfort - unclassified	266m	Indirect	Imperceptible
40907835	DUNWILEY	Setting: Dunwiley House	526m	Indirect	Imperceptible
40907836 (incl. RPS)	MULLANDRAIT	Setting: Workhouse/Famine Graveyard	373m	Indirect	Slight
40907838	TREANAMULLIN	Setting: Finn View House	395m	Indirect	Imperceptible
S1-AAP01	Burn Daurnett River lowlands and SW of Ballybofey	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP02	SW & NE banks of River Finn, incl. river crossing, and lower slopes Trooper's Hill to Drumboe Lower	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP04	Backlees/Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP05	Teevickmoy & Meenavoy, S of Cloghroe River and valley floor	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP06	N of Stranorlar & River Finn, rising ground at Lough Alaan to Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

3.1.12 Option 1F1 Corridor (Blue): Cultural Heritage Assessment

Table 3-12 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 1F1 (Blue) Option. In addition to identified constraints per **Table 2-1 - Table 2-13** above, impacts have been assessed for additional sites located in some instances beyond the 500m wide corridor (in order to address impacts of a visual nature) as well as identification of areas of archaeological potential.

Table 3-12: Impact Assessment on Cultural Heritage, Option 1F1 Corridor (Blue)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG069-023---	MEENAVOY	Bullaun stone	230m	Indirect	Imperceptible
DG069-028---	TEEVICKMOY	Ringfort - unclassified	180m	Indirect	Slight
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	242m	Indirect	Moderate
DG078-005---	DRUMBOE LOWER	Church (site of)	175m	Direct	Significant
40907834 (incl. RPS)	DRUMBOE UPPER	House	123m	Direct	Significant
40907720	CAPPRY	Outbuilding	93m	Direct	Moderate
40907708	IRONWORKS	Corn Mill	101m	Direct	Moderate
S1-AP01	BALLYNAGLACK	AP Site - Possible ringfort/enclosure	0m	Potential Direct	Potential Moderate
S1-CH01	DRUMBOE LOWER	Holy Well Woods (well site)	60m	Direct	Moderate
DG0047	DRUMBOE LOWER	Drumboe Castle Garden Demesne	0m	Direct	Moderate
DG069-024---	MEENAVOY	Setting/Associated remains: Ringfort - unclassified	266m	Indirect	Imperceptible
40907835	DUNWILEY	Setting: Dunwiley House	526m	Indirect	Imperceptible
40907836 (incl. RPS)	MULLANDRAIT	Setting: Workhouse/Famine Graveyard	441m	Indirect	Slight
40907837	CASTLEBANE	Outbuilding	283m	Indirect	Imperceptible
40907838	TREANAMULLIN	Setting: Finn View House	313m	Indirect	Imperceptible
S1-AAP01	Burn Daurnett River lowlands and SW of Ballybofey	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP02	SW & NE banks of River Finn, incl. river crossing, and lower slopes Trooper's Hill to Drumboe Lower	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP04	Backlees/Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP05	Teevickmoy & Meenavoy, S of Cloghroe River and valley floor	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP06	N of Stranorlar & River Finn, rising ground at Lough Alaan to Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

3.1.13 Option 1G Corridor (Yellow): Cultural Heritage Assessment

Table 3-13 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 1G (Yellow) Option. In addition to identified constraints per **Table 2-1 - Table 2-6** above, impacts have been assessed for additional sites located in some instances beyond the 500m wide corridor (in order to address impacts of a visual nature) as well as identification of areas of archaeological potential.

Table 3-13: Impact Assessment on Cultural Heritage, Option 1G Corridor (Yellow)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG078-005---	DRUMBOE LOWER	Church (site of)	157m	Direct	Significant
DG078-003---	BACKLEES, DUNWILEY	Ringfort - rath	92m	Direct	Significant
DG069-028---	TEEVICKMOY	Ringfort - unclassified	173m	Indirect	Slight
40907708	IRONWORKS	Corn Mill	96m	Direct	Moderate
40907720	CAPPRY	Outbuilding	94m	Direct	Moderate
40907834 (incl. RPS)	DRUMBOE UPPER	House	105m	Direct	Significant
40907836 (incl. RPS)	MULLANDRAIT	Setting: Workhouse/Famine Graveyard	441m	Indirect	Slight
40907837	CASTLEBANE	Outbuilding	283m	Indirect	Imperceptible
40907838	TREANAMULLIN	Setting: Finn View House	313m	Indirect	Imperceptible
S1-CH01	DRUMBOE LOWER	Holy Well Woods (well site)	0m	Direct	Moderate
S1-AP01	BALLYNAGLACK	AP Site - Possible ringfort/enclosure	117m	Potential Direct	Potential Moderate
S1-BH02	DRUMBOE UPPER	Possible 18thC farmstead	0m	Direct	Moderate
DG0047	DRUMBOE LOWER	Drumboe Castle Garden Demesne	0m	Direct	Moderate
S1-AAP01	Burn Daurnett River lowlands and SW of Ballybofey	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP02	SW & NE banks of River Finn, incl. river crossing, and lower slopes Trooper's Hill to Drumboe Lower	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP04	Backlees/Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP05	Teevickmoy & Meenavoy, S of Cloghroe River and valley floor	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound
S1-AAP06	N of Stranorlar & River Finn, rising ground at Lough Alaan to Dunwiley	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

3.2 Comparison of Option Corridors

The following tables set out an Option Appraisal based on both a qualitative and quantitative assessment of the Cultural Heritage assets affected by each option. A comparison of the options has been considered in terms of the level of impact(s) identified in **Section 3.1** and the archaeological potential of each corridor. However, it should be noted (and TII Guidelines 2005a refer) that the Appraisal does have certain limitations in that it is difficult to ascertain the exact level of impact due to the potential to reveal, in the future, previously unknown and buried archaeological sites as part of an archaeological testing strategy. As such, the Appraisal and comparison is based on data available at the time of writing. In addition, it is important to note that the assessed option design corridors may be open to change and augmentation, in order to avoid unacceptably high magnitude negative impacts on the known cultural heritage resource.

Option 1C Corridor (Purple) is considered the 1st preferred option from a Cultural Heritage perspective. This corridor has the least amount of identified impacts (total 15) and as well as the quantitative assessment of same, the qualitative assessment of the significance of those 15 identified impacts are deemed less than any of the other proposed options. The 1C (Purple) option has no identified direct (significant) impacts. The 1C (Purple) option has direct (moderate) impact on ringfort DG078-002--- and enclosure DG077-011---; as well as (an unrecorded) 19th century dis-used farmstead S1-BH01. This corridor also traverses five areas of archaeological potential.

Option 1C1 Corridor (Purple) is considered the 2nd preferred option from a Cultural Heritage perspective. The 1C1 (Purple) Option has no identified direct (significant) impacts. There is very limited differentiation between this corridor and the 1C (Purple) option, with an additional constraint (total 16), NIAH outbuilding 40907720, measuring as an indirect (imperceptible) impact on Option 1C1 (Purple). This corridor also traverses five areas of archaeological potential.

Option 1A Corridor (Orange) is considered the 3rd preferred option from a Cultural Heritage perspective. This corridor has 17 identified impacts (less than all the other options except 1C and 1C1 (Purple) options), although it does have a direct (significant) impact on the grounds/entrance of Shancreggan House (S1-BH03). Despite this identified significant impact, this corridor has less direct (moderate) impacts overall on the cultural heritage resource than that for options (Pink) 1B and 1B1 and (Blue) 1F and 1F1. This corridor traverses all six areas of identified archaeological potential as well as potential AP site S1-AP02.

Option 1A1 Corridor (Orange) is considered the 4th preferred option from a Cultural Heritage perspective. This corridor has 18 identified impacts and the only differentiation between this and Option 1A (Orange) is a measurable indirect (imperceptible) impact on an NIAH outbuilding (40907720) and is only marginally less preferred in this regard. All other measured impacts are equal to that of Option 1A (Orange) option. This corridor traverses all six areas of identified archaeological potential as well as potential AP site S1-AP02.

Option 1B1 Corridor (Pink) is considered the 5th preferred option from a Cultural Heritage perspective. This corridor has a total of 20 identified impacts, similar to 1F and 1F1 (Blue) options in quantitative terms and also, greater in quantity than Option 1G (Yellow), however these latter options have less preferred qualitative associated impacts. The 1B1 (Pink) Option has no identified direct (significant) impacts. Option 1B1 (Pink) has direct (moderate) impact on two ringforts (DG069-028--- and DG077-011--- on Trooper's Hill) and a 19th century farmstead S1-BH01, as well as indirect (moderate) impact on Dunwiley Fort (DG078-003---). It is marginally less preferred to that of the Orange 1A and 1A1 options. This corridor traverses five areas of archaeological potential.

Option 1B Corridor (Pink) is considered the 6th preferred option from a Cultural Heritage perspective. This option has a total of 21 identified impacts, with the overall magnitude of impact on same is slightly increased than that for the 1B1 (Pink) corridor. Option 1B (Pink) has direct (moderate) impact on three

ringforts (DG069-028---, DG077-011---, and DG078-004---); a holy well (DG078-007---, and a 19th century farmstead S1-BH01. This corridor traverses five areas of archaeological potential.

Option 1F1 Corridor (Blue) is considered the 7th preferred option from a Cultural Heritage perspective. This option has a total 20 identified impacts. Although slightly more quantitative impacts to that of Option 1B (Pink) and 1G (Yellow), this option has direct (significant) impact on a protected structure (long-house) 40907834 at Drumboe Upper. Although just outside the 300m design corridor, this corridor also traverses the area associated with the 'site of' Drumboe Abbey (DG078-005---) which has high possibility of associated sub-surface remains, including burials. As such, the latter is also classified as a direct (significant) impact. The 1F1 Blue corridor has 4 no. measurable direct (moderate) impacts on part of the original demesne garden lands associated with Drumboe Castle (DG0047), a well site at Holy Well woods (S1-CH01), as well as NIAH structures 40907720 (outbuilding) and 40907708 (cornmill). This corridor traverses five areas of archaeological potential as well as potential AP site S1-AP01.

Option 1F Corridor (Blue) is considered the 8th preferred option from a Cultural Heritage perspective. This option has a total 22 identified impacts and is marginally less preferred to Option 1F1 (Blue). The primary differentiation between the options 1F and 1F1 (Blue) are the additional measurable direct (moderate) impacts on ringfort DG078-004--- and holy well DG078-007---. This corridor traverses five areas of archaeological potential as well as potential AP site S1-AP01).

Option 1G Corridor (Yellow) is considered the 9th preferred option from a Cultural Heritage perspective. This option has 18 identified impacts and is equal in quantitative terms to that of Option 1A1 (Orange), and only marginally more than the 1A (Orange), however the qualitative impact of Option 1G (Yellow) is considered greater. The 1G (Yellow) option has direct (significant) impact on three sites: Dunwiley Fort DG078-003--- (a large, impressive site); a protected structure (long-house) 40907834 at Drumboe Upper; and although just outside the 300m design corridor, this corridor also traverses the area associated with the 'site of' Drumboe Abbey (DG078-005---) which has high possibility of associated sub-surface remains, including burials. As such, the latter is also classified as a direct (significant) impact. This corridor also has direct (moderate) impact on 5 no. sites including part of the original demesne garden lands associated with Drumboe Castle (DG0047), a well site S1-CH01 at Holy Well Woods, an 18th century farmstead (S1-BH02) and two NIAH structures 40907720 (outbuilding) and 40907708 (cornmill). This corridor traverses five identified areas of archaeological potential as well as a potential AP site S1-AP01.

Option 1E1 Corridor (Green) is considered the 10th preferred option from a Cultural Heritage perspective. This option has 20 identified impacts and is marginally less preferred than the 1G (Yellow) option. Option 1E1 (Green) has the same identified measurable impacts and constraints as the Option 1G (Yellow), save for an additional two sites with indirect (imperceptible) impacts: Dunwiley House NIAH 40907835 and Bullaun stone DG069-023---. This corridor traverses five areas of archaeological potential as well as potential AP site S1-AP01.

Option 1D1 Corridor (Red) is considered the 11th preferred option, from a Cultural Heritage perspective. This option has 21 identified impacts, with the same constraints and impacts as the 1E1 (Green) option save for one additional direct (moderate) impact on ringfort DG069-028---. This option traverses five areas of archaeological potential as well as potential AP site S1-AP01.

Option 1E Corridor (Green) is considered the 12th preferred option, from a Cultural Heritage perspective. This option has 22 identified impacts. Option 1E (Green) has the same direct (significant) impacts to that of options 1D and 1D1 (Red), 1E1 (Green), and 1G (Yellow): Dunwiley Fort DG078-003---; a protected structure (long-house) 40907834 at Drumboe Upper, as well as the area associated with the 'site of' Drumboe Abbey (DG078-005---) which has high possibility of associated sub-surface remains, including burials. This corridor also has the same quantity of direct (moderate) impacts to that of Option 1D1 however there is slight differentiation on comparable direct (slight) impact with Option 1E (Green) having a measurable impact on an unclassified megalithic tomb site (DG078-044---) as well as indirect (slight) impact

on ringforts (DG069-024--- and DG078-004---). This corridor traverses five areas of archaeological potential as well as potential AP site S1-AP01.

Option 1D Corridor (Red) is considered the 13th preferred option, from a Cultural Heritage perspective. Option 1D (Red) has 23 identified impacts, the most from a quantitative perspective, of all the options. The constraints are the same as that for Option 1E (Green) save for one additional site: ringfort DG069-028--- which has a direct (moderate) impact. As such, the measured impacts are marginally less preferred to that of Option 1E (Green), and of all other options available, meaning it is the least preferred from both a quantitative and qualitative assessment. This corridor traverses five areas of archaeological potential as well as potential AP site S1-AP01.

A full consideration of the other direct and indirect impacts of a slight and imperceptible level across all the options and the qualitative effects therein has been undertaken and contributes to the results per the ranking of preference outlined above.

Table 3. 1: Option Appraisal: Cultural Heritage

Corridor Options	Orange		Pink		Purple		Red		Green		Blue		Yellow
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Negative Profound	-	-	-	-	-	-	-	-	-	-	-	-	
Negative Significant	**1 Site:** Grounds and setting of Shancreggan House S1-BH03 (direct)	**1 Sites:** Grounds and setting of Shancreggan House S1-BH03 (direct)	-	-	-	-	**3 Sites:** Dunwiley Fort DG078-003---(direct) Protected structure long-house 40907834 (direct) 'Site of' former Drumboe Abbey DG078-005---(direct)	**3 Sites:** Dunwiley Fort DG078-003---(direct) Protected structure long-house 40907834 (direct) 'Site of' former Drumboe Abbey DG078-005---(direct)	**3 Sites:** Dunwiley Fort DG078-003---(direct) Protected structure long-house 40907834 (direct) 'Site of' former Drumboe Abbey DG078-005---(direct)	**3 Sites:** Dunwiley Fort DG078-003---(direct) Protected structure long-house 40907834 (direct) 'Site of' former Drumboe Abbey DG078-005---(direct)	**2 Sites:** Protected structure long-house 40907834 (direct) 'Site of' former Drumboe Abbey DG078-005---(direct)	**2 Sites:** Protected structure long-house 40907834 (direct) 'Site of' former Drumboe Abbey DG078-005---(direct)	**3 Sites:** Dunwiley Fort DG078-003---(direct) Protected structure long-house 40907834 (direct) 'Site of' former Drumboe Abbey DG078-005---(direct)
Negative Moderate	**4 Sites:** Ringfort DG078-002---(direct) Ringfort DG077-009---(direct) Ringfort DG077-010---(indirect) Grouping: three ringforts on Trooper's Hill incl. DG077-011---(indirect)	**4 Sites:** Ringfort DG078-002---(direct) Ringfort DG077-009---(direct) Ringfort DG077-010---(indirect) Grouping: three ringforts on Trooper's Hill incl. DG077-011---(indirect)	**7 Sites:** Ringfort DG069-028---(direct) Ringfort DG077-011---(direct) Ringfort DG078-004---(direct) C19th farmstead S1-BH01 (direct) Holy well DG078-007---(direct) Dunwiley Fort DG078-003---(indirect) Grouping: Trooper's Hill ringforts DG077-009--- & DG077-010---(indirect)	**5 Sites:** Ringfort DG069-028---(direct) Ringfort DG077-011---(direct) C19th farmstead S1-BH01 (direct) Dunwiley Fort DG078-003---(indirect) Grouping: Trooper's Hill ringforts DG077-009--- & DG077-010---(indirect)	**4 Sites:** Ringfort DG078-002---(direct) Ringfort DG077-011---(direct) C19th farmstead S1-BH01 (direct) Grouping: Trooper's Hill ringforts DG077-009--- & DG077-010---(indirect)	**4 Sites:** Ringfort DG078-002---(direct) Ringfort DG077-011---(direct) C19th farmstead S1-BH01 (direct) Grouping on Trooper's Hill ringforts DG077-009--- & DG077-010---(indirect)	**7 Sites:** Demesne garden landscape DG0047 associated with Drumboe Castle (direct) Well site S1-CH01 at Holy Well Woods (direct) Ringfort DG069-028---(direct) Holy well DG078-007---(direct) C18th farmstead S1-BH02 (direct) Outbuilding NIAH 40907720 (direct) Cornmill NIAH 40907708 (direct)	**6 Sites:** Demesne garden landscape DG0047 associated with Drumboe Castle (direct) Well site S1-CH01 at Holy Well Woods (direct) Ringfort DG069-028---(direct) C18th farmstead S1-BH02 (direct) Outbuilding NIAH 40907720 (direct) Cornmill NIAH 40907708 (direct)	**6 Sites:** Demesne garden landscape DG0047 associated with Drumboe Castle (direct) Well site S1-CH01 at Holy Well Woods (direct) Holy well DG078-007---(direct) C18th farmstead S1-BH02 (direct) Outbuilding NIAH 40907720 (direct) Cornmill NIAH 40907708 (direct)	**5 Sites:** Demesne garden landscape DG0047 associated with Drumboe Castle (direct) Well site S1-CH01 at Holy Well Woods (direct) C18th farmstead S1-BH02 (direct) Outbuilding NIAH 40907720 (direct) Cornmill NIAH 40907708 (direct)	**7 Sites:** Demesne garden landscape DG0047 associated with Drumboe Castle (direct) Ringfort DG078-004---(direct) Holy well DG078-007---(direct) Well site S1-CH01 at Holy Well Woods (direct) Outbuilding NIAH 40907720 (direct) Cornmill NIAH 40907708 (direct) Dunwiley Fort DG078-003---(indirect)	**5 Sites:** Demesne garden landscape DG0047 associated with Drumboe Castle (direct) Well site S1-CH01 at Holy Well Woods (direct) Outbuilding NIAH 40907720 (direct) Cornmill NIAH 40907708 (direct) Dunwiley Fort DG078-003---(indirect)	**5 Sites:** Demesne garden landscape DG0047 associated with Drumboe Castle (direct) Well site S1-CH01 at Holy Well Woods (direct) Outbuilding NIAH 40907720 (direct) Cornmill NIAH 40907708 (direct) C18th farmstead S1-BH02 (direct)

Corridor Options	Orange		Pink		Purple		Red		Green		Blue		Yellow
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Negative Slight	**2 Sites:** Ringfort DG069-024--- (indirect) Protected structure Famine Graveyard 40907836 (indirect)	**2 Sites:** Ringfort DG069-024--- (indirect) Protected structure Famine Graveyard 40907836 (indirect)	**2 Sites:** Megalithic tomb DG078-044--- (direct) Protected structure Famine Graveyard 40907836 (indirect)	**1 Site:** Protected structure Famine Graveyard 40907836 (indirect)	**2 Sites:** Ringfort DG069-024--- (indirect) Protected structure Famine Graveyard 40907836 (indirect)	**2 Sites:** Ringfort DG069-024--- (indirect) Protected structure Famine Graveyard 40907836 (indirect)	**4 Sites:** Megalithic tomb DG078-044--- (direct) Ringfort DG078-004— (indirect) Ringfort DG069-024--- (indirect) Protected structure Famine Graveyard 40907836 (indirect)	**2 Sites:** Ringfort DG069-024--- (indirect) Protected structure Famine Graveyard 40907836 (indirect)	**4 Sites:** Megalithic tomb DG078-044--- (direct) Ringfort DG078-004--- (indirect) Ringfort DG069-024--- (indirect) Protected structure Famine graveyard 40907836 (indirect)	**2 Sites:** Ringfort DG069-024--- (indirect) Protected structure Famine Graveyard 40907836 (indirect)	**3 Sites:** Megalithic tomb DG078-044--- (direct) Ringfort DG069-028--- (indirect) Protected structure Famine graveyard 40907836 (indirect)	**2 Sites:** Ringfort DG069-028--- (indirect) Protected structure Famine graveyard 40907836 (indirect)	**2 Sites:** Ringfort DG069-028--- (indirect) Protected structure Famine graveyard 40907836 (indirect)
Negative Imperceptible	**3 Sites:** Bullaun Stone DG069-023--- (indirect) House NIAH 40906913 (indirect) Finn View House NIAH 40907838 (indirect)	**4 Sites:** Bullaun Stone DG069-023--- (indirect) House NIAH 40906913 (indirect) Finn View House NIAH 40907838 (indirect) Outbuilding 40907720 (indirect)	**7 Sites:** Bullaun Stone DG069-023--- (indirect) Ringfort DG069-024--- (indirect) House NIAH 40906913 (indirect) Cornmill NIAH 40907708 (indirect) Ringfort DG078-002--- (indirect) Dunwiley House NIAH 40907835 (Indirect) Finn View House NIAH 40907838 (indirect)	**9 Sites:** Bullaun Stone DG069-023--- (indirect) Ringfort DG069-024--- (indirect) House NIAH 40906913 (indirect) Cornmill NIAH 40907708 (indirect) Ringfort DG078-002--- (indirect) Dunwiley House NIAH 40907835 (indirect) Finn View House NIAH 40907838 (indirect) Outbuilding NIAH 40907720 (indirect) Outbuilding NIAH	**4 Sites:** Bullaun Stone DG069-023--- (indirect) House NIAH 40906913 (indirect) Cornmill NIAH 40907708 (indirect) Finn View House NIAH 40907838 (indirect)	**5 Sites:** Bullaun Stone DG069-023--- (indirect) House NIAH 40906913 (indirect) Cornmill NIAH 40907708 (indirect) Finn View House NIAH 40907838 (indirect) Outbuilding NIAH 40907720 (indirect)	**3Sites:** Bullaun Stone DG069-023--- (indirect) Dunwiley House NIAH 40907835 (indirect) Finn View House NIAH 40907838 (indirect)	**4 Sites:** Bullaun Stone DG069-023--- (indirect) Dunwiley House NIAH 40907835 (indirect) Finn View House NIAH 40907838 (indirect) Outbuilding NIAH 40907837 (indirect)	**3 Sites:** Bullaun Stone DG069-023--- (indirect) Dunwiley House NIAH 40907835 (indirect) Finn View House NIAH 40907838 (indirect)	**4 Sites:** Bullaun Stone DG069-023--- (indirect) Dunwiley House NIAH 40907835 (indirect) Finn View House NIAH 40907838 (indirect) Outbuilding NIAH 40907837 (indirect)	**4 Sites:** Bullaun Stone DG069-023--- (indirect) Ringfort DG069-024--- (indirect) Dunwiley House NIAH 40907835 (indirect) Finn View House NIAH 40907838 (indirect)	**5 Sites:** Bullaun Stone DG069-023--- (indirect) Ringfort DG069-024--- (indirect) Dunwiley House NIAH 40907835 (indirect) Finn View House NIAH 40907838 (indirect) Outbuilding NIAH 40907837 (indirect)	**2 Sites:** Finn View House NIAH 40907838 (indirect) Outbuilding NIAH 40907837 (indirect)

Corridor Options	Orange		Pink		Purple		Red		Green		Blue		Yellow
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
				40907837 (indirect)									
Potential Negative Profound	**6 Sites:** Areas of Archaeological Potential: S1-AAP01, S1-AAP02, S1-AAP03, S1-AAP04, S1-AAP05 and S1-AAP06 (direct)	**6 Sites:** Areas of Archaeological Potential: S1-AAP01, S1-AAP02, S1-AAP03, S1-AAP04, S1-AAP05 and S1-AAP06 (direct)	**5 Sites:** Areas of Archaeological Potential: S1-AAP01, S1-AAP02, S1-AAP04, S1-AAP05 and S1-AAP06 (direct)	**5 Sites:** Areas of Archaeological Potential: S1-AAP01, S1-AAP02, S1-AAP04, S1-AAP05 and S1-AAP06 (direct)	**5 Sites:** Areas of Archaeological Potential: S1-AAP01, S1-AAP02, S1-AAP04, S1-AAP05 and S1-AAP06 (direct)	**5 Sites:** Areas of Archaeological Potential: S1-AAP01, S1-AAP02, S1-AAP04, S1-AAP05 and S1-AAP06 (direct)	**5 Sites:** Areas of Archaeological Potential: S1-AAP01, S1-AAP02, S1-AAP04, S1-AAP05 and S1-AAP06 (direct)	**5 Sites:** Areas of Archaeological Potential: S1-AAP01, S1-AAP02, S1-AAP04, S1-AAP05 and S1-AAP06 (direct)	**5 Sites:** Areas of Archaeological Potential: S1-AAP01, S1-AAP02, S1-AAP04, S1-AAP05 and S1-AAP06 (direct)	**5 Sites:** Areas of Archaeological Potential: S1-AAP01, S1-AAP02, S1-AAP04, S1-AAP05 and S1-AAP06 (direct)	**5 Sites:** Areas of Archaeological Potential: S1-AAP01, S1-AAP02, S1-AAP04, S1-AAP05 and S1-AAP06 (direct)	**5 Sites:** Areas of Archaeological Potential: S1-AAP01, S1-AAP02, S1-AAP04, S1-AAP05 and S1-AAP06 (direct)	**5 Sites:** Areas of Archaeological Potential: S1-AAP01, S1-AAP02, S1-AAP04, S1-AAP05 and S1-AAP06 (direct)
Potential Negative Significant	-	-	-	-	-	-	-	-	-	-	-	-	-
Potential Negative Moderate	**1 Site:** AP site S1-AP02 possible enclosure (direct)	**1 Site:** AP site S1-AP02 possible enclosure (direct)	-	-	-	-	**1 Site:** AP potential ringfort/enclosure site S1-AP01 (direct)	**1 Site:** AP potential ringfort/enclosure site S1-AP01 (direct)	**1 Site:** AP site S1-AP01 possible ringfort/enclosure (direct)	**1 Site:** AP site S1-AP01 possible ringfort/enclosure (direct)	**1 Site:** AP site S1-AP01 possible ringfort/enclosure (direct)	**1 Site:** AP site S1-AP01 possible ringfort/enclosure (direct)	**1 Site:** AP potential ringfort/enclosure site S1-AP01 (direct)
Potential Negative Slight	-	-	-	-	-	-	-	-	-	-	-	-	-
Potential Negative Imperceptible	-	-	-	-	-	-	-	-	-	-	-	-	-
Preference Level	**3rd Preference 17 Sites**	**4th Preference 18 Sites**	**6th Preference 21 Sites**	**5th Preference 20 Sites**	**1st Preference 15 Sites**	**2nd Preference 16 Sites**	**13th Preference 23 Sites**	**11th Preference 21 Sites**	**12th Preference 22 Sites**	**10th Preference 20 Sites**	**8th Preference 22 Sites**	**7th Preference 20 Sites**	**9th Preference 18 Sites**

Table 3.2: Corridor Option Scoring Matrix

Corridor Option	Quantitative Assessment	Qualitative Assessment	Impact	Impact Score	Preference
Orange 1A	17 no. identified impacts	7 no. Major/Highly Negative 5 no. Moderately Negative 2 no. Slightly Negative 3 no. Not Significant 3 direct (significant/moderate) impacts on the *known recorded* resource including two ringforts and Shancreggan House. Of the 17 impacts, the level of impact on the recorded resource is of greater extent and significance than corridor Options 1C & 1C1 (Purple) and as such is considered 3rd preferred option.	Moderately Negative	2	Intermediate
Orange 1A1	18 no. identified impacts	7 no. Major/Highly Negative 5 no. Moderately Negative 2 no. Slightly Negative 4 no. Not Significant 3 direct (significant/moderate) impacts on the *known recorded* resource including Shancreggan House and two ringforts. Of the 18 impacts, the level of impact on the recorded resource is of greater extent and significance than Purple 1C & 1C1; whilst only marginally greater than the Orange 1A option (an additional indirect (imperceptible) impact on an outbuilding at Cappry), and as such is considered 4th preferred option	Moderately Negative	2	Intermediate
Pink 1B	21 no. identified impacts	5 no. Major/Highly Negative 7 no. Moderately Negative 2 no. Slightly Negative 7 no. Not Significant No direct (significant impacts). 5 no. direct (moderate) impacts on the *known recorded* resource including three ringforts, C19th farmstead, and a holy well. Of the 21 identified impacts, the level of impact and the significance of those impacts (direct and moderate) on the recorded Cultural Heritage	Moderately Negative	2	Intermediate

Corridor Option	Quantitative Assessment	Qualitative Assessment	Impact	Impact Score	Preference
		resource are deemed more than that for options Pink 1B1, Orange 1A and 1A1 and as such is considered 6th preferred option			
Pink 1B1	20 no. identified impacts	5 no. Major/Highly Negative 5 no. Moderately Negative 1 no. Slightly Negative 9 no. Not Significant No direct (significant) impacts. 3 no. direct (moderate) impacts on the *known recorded* resource including two ringforts and a C19th farmstead. Of the 20 identified impacts, the level of impact and the significance of those impacts on the recorded Cultural Heritage resource are deemed less than that for Pink 1B, but more than that for Orange 1A & 1A1 and as such is considered 5th preferred option	Moderately Negative	2	Intermediate
Purple 1C	15 no. identified impacts	5 no. Major/Highly Negative 4 no. Moderately Negative 2 no. Slightly Negative 4 no. Not Significant No direct (significant) impacts. 3 no. direct (moderate) impacts on the *known recorded* resource including two ringforts and a C19th farmstead. Of the 15 impacts on the recorded Cultural Heritage Resource the level and significance of those impacts are less than for all of the other options both in quantitative and qualitative terms and is considered 1st preference	Moderately Negative	2	Preferred
Purple 1C1	16 no. identified impacts	5 no. Major/Highly Negative 4 no. Moderately Negative 2 no. Slightly Negative 5 no. Not Significant No direct (significant) impacts. 3 no. direct (moderate) impacts on the *known recorded* resource including two ringforts and a C19th farmstead. Of the 16 impacts on the recorded Cultural Heritage Resource the level and significance of those impacts are less than for all of the other options, except the Purple 1C option, both in quantitative and qualitative terms and is considered 2nd preference. The preference is only marginally less than the Purple 1C option as the differentiation is an indirect (imperceptible) impact on an outbuilding at Cappry	Moderately Negative	2	Preferred

Corridor Option	Quantitative Assessment	Qualitative Assessment	Impact	Impact Score	Preference
Red 1D	23 no. identified impacts	8 no. Major/Highly Negative 8 no. Moderately Negative 4 no. Slightly Negative 3 no. Not Significant 10 no. direct (significant/moderate impacts) on the *known recorded* resource including 3 no. significant impacts on Dunwiley Fort, a protected structure (long-house), and the site of Drumboe Abbey, as well as 7 no. moderate impacts on a demesne landscape (Drumboe Castle), a well site at Holy Well Woods, a ringfort, holy well, outbuilding, corn mill, and C18th farmstead. Of the 23 identified impacts, the level and significance of impact on the Red 1D option, is marginally more than that for the Green 1E option and for all other options, and is considered least preferred, from a Cultural Heritage perspective, of the options available	Major or Highly Negative	1	Least Preferred
Red 1D1	21 no. identified impacts:	8 no. Major/Highly Negative 7 no. Moderately Negative 2 no. Slightly Negative 4 no. Not Significant 9 no. direct (significant/moderate) impacts on the *known recorded* resource including 3 no. significant impacts on Dunwiley Fort, a protected structure (long-house) and the site of former Drumboe Abbey; as well as 6 no. moderate impacts on demesne landscape (Drumboe Castle) a well site at Holy Well Woods, a ringfort, an outbuilding, a corn mill and a C18th farmstead. Of the 21 identified impacts, the level and significance of impact on the Red 1D1 option, is marginally more than that for the Green 1E1 option and is considered 11th preferred, to the remaining options Red 1D and Green 1E	Major or Highly Negative	1	Least Preferred
Green 1E	22 no. identified impacts	8 no. Major/Highly Negative 7 no. Moderately Negative 4 no. Slightly Negative 3 no. Not Significant 9 direct (significant/moderate impacts) on the *known recorded* resource including 3 no. significant impacts on Dunwiley Fort, a protected	Major or Highly Negative	1	Least Preferred

Corridor Option	Quantitative Assessment	Qualitative Assessment	Impact	Impact Score	Preference
		structure (long-house) and the site of Drumboe Abbey; as well as 6 no. moderate impacts on demesne landscape (Drumboe Castle), a well site at Holy Well Woods, a holy well, outbuilding, corn mill, and C18th farmstead. Of the 22 identified impacts the level of impact and significance of same is marginally less than that for the Red 1D option (least preferred option), and as such is considered 12th preferred option			
Green 1E1	20 no. identified impacts	8 no. Major/Highly Negative 6 no. Moderately Negative 2 no. Slightly Negative 4 no. Not Significant 8 no. direct (significant/moderate) impacts on the *known recorded* resource including 3 no. significant impacts on Dunwiley Fort, a protected structure (long-house), and the site of Drumboe Abbey; as well as 5 no. moderate impacts on a demesne landscape (Drumboe Castle), a well site at Holy Well Woods, an outbuilding, a corn mill and C18th farmstead. Of the 20 identified impacts the level of impact and significance of same is marginally less than that for the Green 1E and Red 1D1 and 1D Options, and as such is considered 10th preferred option	Major or Highly Negative	1	Least Preferred
Blue 1F	22 no. identified impacts	7 no. Major/Highly Negative 8 no. Moderately Negative 3 no. Slightly Negative 4 no. Not Significant 8 no. direct (significant/moderate) impacts on the *known recorded* resource including 2 no. significant impacts on a protected structure (long-house) and the site of Drumboe Abbey; and 6 no. moderate impacts on garden demesne (Drumboe Castle), a ringfort, holy well, outbuilding, corn mill and a well site at Holy Well woods. Of the 22 identified impacts the level of impact and significance of same is more than that for Blue 1F1, Pink 1B & 1B1, Orange 1A & 1A1, and Purple 1C and 1C1 options, and is considered 8th preferred option	Moderately Negative	2	Intermediate
Blue 1F1	20 no. identified impacts	7 no. Major/Highly Negative 6 no. Moderately Negative	Moderately Negative	2	Intermediate

Corridor Option	Quantitative Assessment	Qualitative Assessment	Impact	Impact Score	Preference
		2 no. Slightly Negative 5 no. Not Significant 6 no. direct (significant/moderate) impacts on the *known recorded* resource including 2 no. significant impacts on a protected structure (long-house) and the site of Drumboe Abbey; as well as 4 no. moderate impacts on garden demesne (Drumboe Castle), an outbuilding, corn mill and a well site at Holy Well woods. Of the 20 identified impacts the level of impact and significance of same is more than that for Pink 1B & 1B1, Orange 1A & 1A1, and Purple 1C and 1C1 options and is considered 7th preferred option			
Yellow 1G	18 no. identified impacts	8 no. Major/Highly Negative 6 no. Moderately Negative 2 no. Slightly Negative 2 no. Not Significant 8 no. direct (significant/moderate) impacts on the *known recorded* resource including 3 no. significant impacts on Dunwiley Fort, a protected structure (long-house), and the site of Drumboe Abbey; as well as 5 no. moderate impacts on a garden demesne (Drumboe Castle), a well site at Holy Well Woods, an outbuilding, a cornmill and a C18th farmstead. Of the 18 identified impacts the level of impact and significance of same is less than that for the Green 1E & 1E1 and Red 1D & 1D1 options, and is considered 9th preferred option	Moderately Negative	2	Intermediate

4 CONCLUSIONS

The project consists of the provision of an alternative option, selected from one of the thirteen corridor options available. The impacts on each of these options are detailed above in **Section 3.** From a Cultural Heritage perspective and based on a quantitative and qualitative assessment; the Purple 1C Option is the preferred option, followed by, in order of preference: 1C1 (Purple), 1A (Orange), 1A1 (Orange), 1B1 (Pink), 1B (Pink), 1F1 (Blue), 1F (Blue), 1G (Yellow), 1E1 (Green), 1D1 (Red), 1E (Green), and 1D (Red).

None of the proposed options have a direct negative profound impact on the recorded known Cultural Heritage resource.

5 REFERENCES

Department of Arts, Heritage, Gaeltacht and the Islands (1999) *Framework and Principles for the protection of the Archaeological Heritage*

County Donegal Development Plan 2012-2018

Donegal County Development Plan 2018-2024

Draft Historic Landscape Characterisation of County Donegal. Donegal County Council Central Planning Unit (February 2014)

EPA (2002) *Guidelines on the Information to be contained in Environmental Impact Statements*

EPA (2003) *Advice Notes on Current Practice on the preparation of Environmental Impact Statements*

EPA (2015) *Draft Advice Notes for preparing Environmental Impact Statements*

EPA (2017) *Draft Guidelines on the Information to be contained in EIARs*

Landscape Character Assessment of County Donegal. Planning & Policy Unit, Community, Enterprise & Planning Services, Donegal County Council (May 2016)

TII (2005a) *Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes*

TII (2005b) *Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes*

TII (2010) *Project Management Guidelines*

TII (2016) *Project Appraisal Guidelines for National Roads Unit 7.0 – Multi-Criteria Analysis*

TII (2017) *Code of Practice for Archaeology* agreed between the Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs

Online Sources

Irish Heritage Council Map: www.heritagemaps.ie

National Excavations Database: www.excavations.ie

National Monuments Service: www.archaeology.ie

Ordnance Survey of Ireland: www.osi.ie/mapviewer

Placename index of Ireland: www.logainm.ie

Appendix 1:
Inventory of Cultural Heritage

Recorded finds from National Museum of Ireland (NMI) from Section 1 Study Area

Townland	NMI ref.	Artefact types	Notes
Backlees	1979:103:1-11	22 worked flints comprising retouched objects, cores and fragments of waste	Found in potato field
Croaghonagh	2006:31	Rope (straw?)	Excavated by NMI staff in bogland
Dooish	SA1899:64	Stone axe	Polished
Liskeran	1960:545/514	Flint and polished stone axe	Donated by County Donegal Historical Society
Ballybofey	1930:544	Polished stone axe	
Drumboe Upper	1972:212	Flint scraper	
Dreenan	1941:1419 1935:525/526	Stone axe Flint flake/Stone axe	Found in bog Found at base of hill, near a fort
Teevickmoy	1959:34	Rotary quern stone	

Placename evidence from the Study Area: Section 1 Study Area

Townland	Irish	Translation	Notes on SMR entries
Croaghonagh	Cruach Eoghanach	'Peak of Cenél nEógain'	Possible association with tribal group
Ironworks	-	-	There are no entries for metal-working sites within this townland
Corrafrin	Corr Aifrinn	'Round hill of the mass'	There are entries for churches or mass-rocks in this townland
Dunwiley	Dún Mhaoile	'Ringfort of the bald hill'	There is a recorded cashel site located within this townland (DG078-004----)
Castlebane	An Caiseal Bán	'White cashel'	There are no recorded cashels within this townland
Treanamullin	Trian an Mhuilinn	Muileann - mill Train – third (i.e. medieval land unit)	There are no entries for mill sites within this townland

Cultural Heritage Constraints within 500m Option Corridors for Section 1 Study Area

Unique Identification No.	
Legal Status	RMP
Reference No.	DG069-023---
Address/Townland	Meenavoy
Site Type	Bullaun Stone
ITM	615739, 899724
Description	A probable bullaun stone set in rock outcrop or a large boulder by the side of a laneway. It consists of an opening, .2m wide and 0.2m high in the rock. At the base of this opening is a further .2m depression. The hole suggests a covered bullaun.
Sources	The above description was derived from the 'Archaeological Survey of County Donegal. A description of the field antiquities of the County from the Mesolithic Period to the 17th century.' Compiled by: Brian Lacey with Eamon Cody, Claire Cotter, Judy Cuppage, Noel Dunne,

	Vincent Hurley, Celie O'Rahilly, Paul Walsh and Seán Ó Nualláin (Lifford: Donegal County Council, 1983). In certain instances, the entries have been revised and updated. http://webgis.archaeology.ie/historicenvironment/
Approx. Distance from Corridor centre-line	230m (Blue 1F & Blue 1F1) 221m (Green 1E & Green 1E1) 221m (Orange 1A & Orange 1A1) 221m (Pink 1B & Pink 1B1) 221m (Purple 1C & Purple 1C1) 230m (Red 1D & Red 1D1)
Type of Impact	Indirect & Imperceptible (Blue 1F & Blue 1F1) Indirect & Imperceptible (Green 1E & Green 1E1) Indirect & Imperceptible (Orange 1A & Orange 1A1) Indirect & Imperceptible (Pink 1B & Pink 1B1) Indirect & Imperceptible (Purple 1C) Indirect & Imperceptible (Red 1D & Red 1D1)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG069-024---
Address/Townland	Meenavoy
Site Type	Ringfort - unclassified
ITM	615698, 899517
Description	Internal diam. 20m-13.5m. Marked 'Fort' on the 1st edition of the OS 6-inch map, the site consists of a mainly natural rock platform levelled off 1m to 2m above the surrounding land. It is roughly oval in shape without any surviving enclosing element. It is situated in wet land and drops steeply on the E to a small stream. It commands a main roadway. In the lane leading to the site is a Bullaun Stone.
Sources	The above description was derived from the 'Archaeological Survey of County Donegal. A description of the field antiquities of the County from the Mesolithic Period to the 17th century.' Compiled by: Brian Lacey with Eamon Cody, Claire Cotter, Judy Cuppage, Noel Dunne, Vincent Hurley, Celie O'Rahilly, Paul Walsh and Seán Ó Nualláin (Lifford: Donegal County Council, 1983). In certain instances the entries have been revised and updated. http://webgis.archaeology.ie/historicenvironment/
Approx. Distance from Corridor centre-line	266M (Blue 1F & Blue 1F1) 237m (Green 1E & Green 1E1) 239m (Orange 1A & Orange 1A1) 266m (Pink 1B & Pink 1B1) 240m (Purple 1C & Purple 1C1) 234m (Red 1D & Red 1D1)
Type of Impact	Indirect & Imperceptible (Blue 1F & Blue 1F1) Indirect & Slight (Green 1E & Green 1E1) Indirect & Slight (Orange 1A & Orange 1A1) Indirect & Imperceptible (Pink 1B, Pink 1B1) Indirect & Slight (Purple 1C & Purple 1C1) Indirect & Slight (Red 1D & Red 1D1)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG069-028---
Address/Townland	Teevickmoy
Site Type	Ringfort - unclassified
ITM	615811, 898332
Description	Marked on the 1st and 2nd editions of the OS 6-inch maps. No trace of this 'Fort' is visible now. It is situated on excellent land with good views to N and W.
Sources	The above description was derived from the 'Archaeological Survey of County Donegal. A description of the field antiquities of the County from the Mesolithic Period to the 17th century.' Compiled by: Brian Lacey with Eamon Cody, Claire Cotter, Judy Cuppage, Noel Dunne, Vincent Hurley, Celie O'Rahilly, Paul Walsh and Seán Ó Nualláin (Lifford: Donegal County Council, 1983). In certain instances the entries have been revised and updated. http://webgis.archaeology.ie/historicenvironment/
Approx. Distance from Corridor centre-line	180m (Blue 1F & Blue 1F1) 120m (Pink 1B & Pink 1B1) 145m (Red 1D & Red 1D1) 173m (Yellow 1G)
Type of Impact	Indirect & Slight (Blue 1F & Blue 1F1) Direct & Moderate (Pink 1B & Pink 1B1) Direct & Moderate (Red 1D & Red 1D1) Indirect & Slight (Yellow 1G)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG077-009---
Address/Townland	Creggan (Stranorlar ED)
Site Type	Ringfort unclassified
ITM	612193, 895774
Description	The S half of what appears to have been a single ringed enclosure is marked here on the 2nd edition of the OS 6-inch map. There is no sign of it now. It was situated c. 150m W of a ringfort on a small hillock in grazing land with excellent views over the Finn Valley.
Sources	The above description was derived from the 'Archaeological Survey of County Donegal. A description of the field antiquities of the County from the Mesolithic Period to the 17th century.' Compiled by: Brian Lacey with Eamon Cody, Claire Cotter, Judy Cuppage, Noel Dunne, Vincent Hurley, Celie O'Rahilly, Paul Walsh and Seán Ó Nualláin (Lifford: Donegal County Council, 1983). In certain instances the entries have been revised and updated. http://webgis.archaeology.ie/historicenvironment/
Approx. Distance from Corridor centre-line	119m (Orange 1A, Orange 1A1) 414m (Pink 1B, Pink 1B1) 429m (Purple 1C & Purple 1C1)
Type of Impact	Direct & Moderate (Orange 1A, Orange 1A1) Indirect & Moderate (Pink 1B, Pink 1B1) Indirect & Moderate (Purple 1C & Purple 1C1)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG077-010---
Address/Townland	Creggan
Site Type	Ringfort – rath
ITM	612374, 895782
Description	Internal diam. 32m. A subcircular area known as 'Black Fort' enclosed by an earthen bank 1.5m high surviving only in the W and N sectors. There are traces of a fosse in the W sector and a concentric field fence might indicate an original outer bank. It is situated on a small hillock in rolling pasture land with good views of the Finn Valley.
Sources	The above description was derived from the 'Archaeological Survey of County Donegal. A description of the field antiquities of the County from the Mesolithic Period to the 17th century.' Compiled by: Brian Lacey with Eamon Cody, Claire Cotter, Judy Cuppage, Noel Dunne, Vincent Hurley, Celie O'Rahilly, Paul Walsh and Seán Ó Nualláin (Lifford: Donegal County Council, 1983). In certain instances the entries have been revised and updated. http://webgis.archaeology.ie/historicenvironment/
Approx. Distance from Corridor centre-line	179m (Orange 1A, Orange 1A1) 284m (Pink 1B, Pink 1B1) 283m (Purple 1C & Purple 1C1)
Type of Impact	Indirect & Moderate (Orange 1A, Orange 1A1) Indirect & Moderate (Pink 1B, Pink 1B1) Indirect & Moderate (Purple 1C & Purple 1C1)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG077-011---
Address/Townland	Creggan
Site Type	Enclosure
ITM	612288, 895485
Description	No trace of the single-ringed enclosure, shown on the second edition of the OS 6-inch map, is now visible. The site which was a rocky knoll on the S side of Troopers Hill is now afforested.
Sources	The above description was derived from the 'Archaeological Survey of County Donegal. A description of the field antiquities of the County from the Mesolithic Period to the 17th century.' Compiled by: Brian Lacey with Eamon Cody, Claire Cotter, Judy Cuppage, Noel Dunne, Vincent Hurley, Celie O'Rahilly, Paul Walsh and Seán Ó Nualláin (Lifford: Donegal County Council, 1983). In certain instances the entries have been revised and updated. http://webgis.archaeology.ie/historicenvironment/
Approx. Distance from Corridor centre-line	424m (Orange 1A, Orange 1A1) 129m (Pink 1B, Pink 1B1) 123m (Purple 1C & Purple 1C1)
Type of Impact	Indirect & Moderate (Orange 1A, Orange 1A1) Direct & Moderate (Pink 1B, Pink 1B1) Direct & Moderate (Purple 1C & Purple 1C1)

Unique Identification No.	

Legal Status	RMP
Reference No.	DG078-002---
Address/Townland	Ballynaglack
Site Type	Ringfort – unclassified
ITM	613259, 896650
Description	Only a curving field fence and local tradition indicates the situation of 'Ganges' Fort'. It was situated on the edge of a sharp drop to the W and S in good land with wide views.
Sources	The above description was derived from the 'Archaeological Survey of County Donegal. A description of the field antiquities of the County from the Mesolithic Period to the 17th century.' Compiled by: Brian Lacey with Eamon Cody, Claire Cotter, Judy Cuppage, Noel Dunne, Vincent Hurley, Celie O'Rahilly, Paul Walsh and Seán Ó Nualláin (Lifford: Donegal County Council, 1983). In certain instances the entries have been revised and updated. http://webgis.archaeology.ie/historicenvironment/
Approx. Distance from Corridor centre-line	114m (Orange 1A, Orange 1A1) 305m (Pink 1B, Pink 1B1) 115m (Purple 1C & Purple 1C1)
Type of Impact	Direct & Moderate (Orange 1A, Orange 1A1) Indirect & Imperceptible (Pink 1B and Pink 1B1) Direct & Moderate (Purple 1C & Purple 1C1)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG078-003---
Address/Townland	Backlees
Site Type	Ringfort - rath
ITM	614615, 896875
Description	Internal diam. 12.5m N-S, 17m E-W. A massive fortification consisting of an oval area enclosed by an inner earthen bank up to 1m high. Below this is a terrace and below this again a fosse and second outer bank. The inner bank has gone on the SE sector and the outer bank in the S sector. The outer bank is revetted by a stone wall on the N side which is probably modern. There is an entrance consisting of breaks in the banks and a causeway across the fosse at the E side where the approaching slope is more gradual. Rock outcrop breaks through in several places particularly along the middle terrace. It is situated on the summit of a hill commanding the neighbouring area of excellent farming land.
Sources	The above description was derived from the 'Archaeological Survey of County Donegal. A description of the field antiquities of the County from the Mesolithic Period to the 17th century.' Compiled by: Brian Lacey with Eamon Cody, Claire Cotter, Judy Cuppage, Noel Dunne, Vincent Hurley, Celie O'Rahilly, Paul Walsh and Seán Ó Nualláin (Lifford: Donegal County Council, 1983). In certain instances the entries have been revised and updated. http://webgis.archaeology.ie/historicenvironment/
Approx. Distance from Corridor centre-line	242m (Blue 1F & Blue 1F1) 94m (Green 1E & Green 1E1) 93m (Red 1D & Red 1D1) 198m (Pink 1B, Pink 1B1) 92m (Yellow 1G)
Type of Impact	Indirect & Moderate (Blue 1F & Blue 1F1) Direct & Significant (Green 1E & Green 1E1) Direct & Significant (Red 1D & Red 1D1) Indirect & Moderate (Pink 1B, Pink 1B1)

	Direct & Significant (Yellow 1G)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG078-004---
Address/Townland	Dunwiley
Site Type	Ringfort – cashel
ITM	615541, 896875
Description	Internal diam. c. 16.5m-20m. A very damaged site comprising a scatter of small boulders in a roughly circular line. This also incorporates some rock outcrop on the N side. The outcrop drops away 2m on the W side but is level with the field on the E, situated in good land sloping NW to a small stream.
Sources	The above description was derived from the 'Archaeological Survey of County Donegal. A description of the field antiquities of the County from the Mesolithic Period to the 17th century.' Compiled by: Brian Lacey with Eamon Cody, Claire Cotter, Judy Cuppage, Noel Dunne, Vincent Hurley, Celie O'Rahilly, Paul Walsh and Seán Ó Nualláin (Lifford: Donegal County Council, 1983). In certain instances the entries have been revised and updated. http://webgis.archaeology.ie/historicenvironment/
Approx. Distance from Corridor centre-line	105m (Blue 1F) 244m (Green 1E) 97m (Pink 1B) 243m (Red 1D)
Type of Impact	Direct & Moderate (Blue 1F) Indirect & Slight (Green 1E) Direct & Moderate (Pink 1B) Indirect & Slight (Red 1D)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG078-005---
Address/Townland	Drumboe Lower
Site Type	Church (site of)
ITM	613389, 895443
Description	Traditionally believed to be the site of an 'Abbey' and marked as the site of a church on the OS 6-inch maps, there are no traces of any antiquity. The site is located in the valley of the River Finn in excellent but now wooded land.
Sources	The above description was derived from the 'Archaeological Survey of County Donegal. A description of the field antiquities of the County from the Mesolithic Period to the 17th century.' Compiled by: Brian Lacey with Eamon Cody, Claire Cotter, Judy Cuppage, Noel Dunne, Vincent Hurley, Celie O'Rahilly, Paul Walsh and Seán Ó Nualláin (Lifford: Donegal County Council, 1983). In certain instances the entries have been revised and updated. http://webgis.archaeology.ie/historicenvironment/
Approx. Distance from Corridor centre-line	175m (Blue 1F & Blue 1F1) 175m (Green 1E & Red 1D1 & Green 1E1) 170m (Red 1D) 157m (Yellow 1G)

Type of Impact	Direct & Significant (Blue 1F & Blue 1F1) Direct & Significant (Green 1E & Green 1E1) Direct & Significant (Red 1D & Red 1D1) Direct & Significant (Yellow 1G)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG078-007---
Address/Townland	Lough Hill (Stranorlar ED)
Site Type	Ritual Site – holy well
ITM	615799, 896005
Description	A well dedicated to St. Brigid with contemporary votive offerings. Described by Ó Muirgheasa in 1936 as 'St. Brigid's Holy Well, south-east of Lough-a-Lann, and about half a mile from Stranorlar. Stations are yet made, but at no specified time.' (Ó Muirgheasa 1936, 155). (Ó Muirgheasa No. 74)
Sources	The above description was derived from the 'Archaeological Survey of County Donegal. A description of the field antiquities of the County from the Mesolithic Period to the 17th century.' Compiled by: Brian Lacey with Eamon Cody, Claire Cotter, Judy Cuppage, Noel Dunne, Vincent Hurley, Celie O'Rahilly, Paul Walsh and Seán Ó Nualláin (Lifford: Donegal County Council, 1983). In certain instances the entries have been revised and updated. http://webgis.archaeology.ie/historicenvironment/
Approx. Distance from Corridor centre-line	148m (Blue 1F) 147m (Green 1E) 149m (Pink 1B) 148m (Red 1D)
Type of Impact	Direct & Moderate (Blue 1F) Direct & Moderate (Green 1E) Direct & Moderate (Pink 1B) Direct & Moderate (Red 1D)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG078-044---
Address/Townland	Knockfair
Site Type	Megalithic tomb - unclassified
ITM	615948, 896292
Description	A feature named 'Druid's Altar in ruins', shown on a pre-publication field map, was omitted from the published OS 6-inch map of 1845-8. There is no information about it in OS documents, nor are there any remains at the site now. Its nature remains uncertain.
Sources	The above description was published in the 'Survey of the Megalithic Tombs of Ireland. Volume VI, County Donegal.' Compiled by: Eamon Cody (Dublin: Stationery Office, 2002). http://webgis.archaeology.ie/historicenvironment/
Approx. Distance from Corridor centre-line	144m (Blue 1F) 143m (Green 1E) 143m (Pink 1B) 140m (Red 1D)

Type of Impact	Direct & Slight (Blue 1F) Direct & Slight (Green 1E) Direct & Slight (Pink 1B) Direct & Slight (Red 1D)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40907708
Address/Townland	Ironworks
Site Type	Corn Mill
ITM	612476, 895211
Description	Detached three-bay three-storey former flax mill on L-shaped plan, built c. 1800, extended c. 1850 and in use as a corn mill and saw mill. Possibly formerly in use as ironworks. Extended, altered and converted to use as apartments\residential accommodation c. 2000. Replacement pitched natural slate roofs with projecting cut stone eaves course, modern cement rendered coping to gable ends, and with modern rooflights. Rubble stone walls, formerly rendered, with flush roughly dressed and squared rubble stone quoins to the corners. Modern steel balconies to the south elevation. Square-headed window openings with cut stone sills, roughly dressed rubble stone voussoirs, and modern windows. Square-headed doorways, some with roughly dressed rubble stone voussoirs, having replacement fittings. Former segmental-headed carriage-arch to the west end of the south elevation, now infilled, having red brick voussoirs; former segmental-headed carriage-arch to the west end of the north elevation, now infilled, having roughly dressed rubble stone voussoirs to arch. Set well back from road in own grounds with modern landscaping to site. Former mill equipment and machinery (included sandstone millstones) to site. Building rubble from demolished flax mill adjacent to site, remains of former mill race to west. Located to the north bank of the River Finn, and to the north-west of Ballybofey. Modern housing adjacent to the west.
Sources	http://www.buildingsofireland.ie/niah/search.jsp?county=DG&regno=40907708&type=record
Approx. Distance from Corridor centre-line	101m (Blue 1F & Blue 1F1) 98m (Green 1E & Green 1E1) 186m (Pink 1B, Pink 1B1) 204m (Purple 1C & Purple 1C1) 110m (Red 1D & Red 1D1) 96m (Yellow 1G)
Type of Impact	Direct & Moderate (Blue 1F & Blue 1F1) Direct & Moderate (Green 1E & Green 1E1) Indirect & Imperceptible (Pink 1B, Pink 1B1) Indirect & Imperceptible (Purple 1C & Purple 1C1) Direct & Moderate (Red 1D & Red 1D1) Direct & Moderate (Yellow 1G)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40907720
Address/Townland	Cappry
Site Type	Outbuilding
ITM	612106, 894673

Description	Detached five-bay two-storey outbuilding associated with altered two-storey house, built c. 1820, having external flight of cut stone steps giving access to doorway at first floor entrance to west gable end. Pitched natural slate roof with cast-iron rainwater goods. Uncoursed limewashed rubble stone walls, smooth cement rendered walls to the west gable end. Square-headed window openings at ground floor level to both main elevations (north and south) having cast-iron fixed-framed diamond and squared paned windows. Square-headed door openings having battened timber and replacement doors, square-headed loading bay to centre of north elevation at first floor level. Set in yard to rear (west) of three-bay two-storey house (altered) to the west of Ballybofey. Modern outbuildings to site.
Sources	http://www.buildingsofireland.ie/niah/search.jsp?county=DG&regno=40907720&type=record
Approx. Distance from Corridor centre-line	93m (Blue 1F & Blue 1F1) 91m (Green 1E & Green 1E1) 90m (Red 1D & Red 1D1) 199m (Orange 1A1, Pink 1B1 & Purple 1C1) 94m (Yellow 1G)
Type of Impact	Direct & Moderate (Blue 1F & Blue 1F1) Direct & Moderate (Green 1E & Green 1E1) Direct & Moderate (Red 1D & Red 1D1) Indirect & Imperceptible (Orange 1A1, Pink 1B1, Purple 1C1) Direct & Moderate (Yellow 1G)

Unique Identification No.	
Legal Status	RPS/NIAH
Reference No.	40907834
Address/Townland	Drumboe Upper
Site Type	House
ITM	613895, 896285
Description	Detached three-bay single-storey vernacular house, built c. 1780, having canted windbreak porch to the south-west end of the front elevation (south-east), bed out-shot to the rear (north-west), single-bay two-bay byre\outbuilding attached to the north-east gable end with water trough projection, and with two single-storey outbuildings to the south-west. Section of rubble stone walling adjacent to porch. House now out of use. Pitched corrugated-metal roof with raised whitewashed rendered verges to the gable ends (rubble stone to the north-east gable end), some surviving sections of cast-iron rainwater goods, and with two rendered chimneystacks (one to the north-west gable end and one to the centre. Formerly thatched. Whitewashed rubble stone walls. Irregularly-spaced square-headed window openings with cut stone sills and with eight-over-eight and six-over-six pane timber sliding sash windows. Square-headed doorway to front face of canted porch having plinth blocks and battened timber door. Attached two-bay single-storey outbuilding to the north-east having pitched corrugated-metal roof, rubble stone walls, square-headed doorway with battened timber door, and with square-headed carriage-arch having corrugated-metal gate. Attached single-bay single-storey outbuilding to the south-west gable end having pitched corrugated-metal roof, rendered rubble stone walls, and square-headed carriage-arch with sliding corrugated-metal double gates; attached four-bay single-storey outbuilding to the extreme south-west having pitched natural slate roof, cast-iron rainwater goods, rubble stone walls, and square-headed window and door openings with timber fittings. Set back from road in own grounds with yard to the front (south-east) and with later three-bay two-storey house adjacent to the south. Located in the rural countryside to the north-west of Stranorlar. Wrought-iron flat-bar gates to site.
Sources	http://www.buildingsofireland.ie/niah/search.jsp?county=DG&regno=40907834&type=record
Approx. Distance from Corridor centre-line	123m (Blue 1F & Blue 1F1) 107m (Green 1E & Green 1E1) 102m (Red 1D & Red 1D1) 105m (Yellow 1G)

Type of Impact	Direct & Significant (Blue 1F & Blue 1F1) Direct & Significant (Green 1E & Green 1E1) Direct & Significant (Red 1D & Red 1D1) Direct & Significant (Yellow 1G)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40907835
Address/Townland	Dunwiley
Site Type	Setting: Dunwiley House
ITM	• 614773, 896488 • 614779, 896526
Description	Detached three-bay two-storey house with attic level, built c. 1860, having single-bay single-storey flat-roofed entrance porch to the centre of the main elevation (south), and with central single-bay single-storey return to the rear (north) having single-storey addition attached to the west side. Pitched natural slate roof (purple slates\Bangor blue) having cast-iron rainwater goods, clay ridge tiles, and with a central pair of rendered chimneystacks with corbelled heads and terracotta pots over. Mono-pitched natural slate roof to return and extension. Channelled smooth rendered walls over projecting smooth rendered plinth course to main elevation (south) and to porch with cut stone (?) block-and-start quoins to the corners of the main body of building. Cut stone or render cornice to porch. Smooth rendered ruled-and-lined walls to the side elevations (east and west) and to rear return, smooth rendered walls to extension. Square-headed window openings having moulded render architraved surrounds, cut stone sills on decorative corbels, and with six-over-six pane timber sliding sash windows. Square-headed window openings to the rear and side elevations with six-over-six, two-over-two, and three-over six (attic level) pane timber sliding sash windows. Square-headed doorway to the east face of porch having timber panelled double-doors with decorative metal door knocker and keyhole, and with decorative render door surround comprising Doric pilasters over plinth blocks, and with moulded entablature over. Set back from road in mature grounds to the north of Stranorlar with garden to front and yard to rear. Complex of single- and two-storey outbuilding arranged around a courtyard to the north. Detached five-bay two-storey outbuilding with pitched natural slate roof, projecting eaves course, and remaining cast-iron rainwater goods. Rendered rubble stone walls (render now failing). Square-headed window openings with red brick voussoirs, cut stone sills, and remains of timber windows and shutters; oculus window openings at ground floor level with red brick surrounds and cast-iron framed fixed windows with radial glazing bars. Square-headed door openings having voussoirs, cut stone plinth blocks, and timber framed matchboard doors and half-doors, one with louvered vents over. Collection of single-storey outbuildings to site having mainly replacement pitched-corrugated-metal roofs, rubble stone walls, and square-headed window and door openings with timber fittings. Oculus window openings at ground floor level to one outbuilding having red brick surrounds and cast-iron framed fixed windows with radial glazing bars. Single-storey byre to site having mono-pitched natural slate roof, rubble stone walls, and square-headed openings or carriage-arches. Main gateway to site to the south-west of house comprising a pair of smooth rendered ruled-and-lined gate piers and a pair of hooped wrought-iron gates. Sandstone mill wheel built into wall to rear of site.
Sources	http://www.buildingsofireland.ie/niah/search.jsp?county=DG&regno=40907835&type=record
Approx. Distance from Corridor centre-line	526m (Blue 1F & Blue 1F1) 400m (Green 1E & Green 1E1) 510m (Pink 1B & Pink 1B1) 400m (Red 1D & Red 1D1)
Type of Impact	Indirect & Imperceptible (Blue 1F) Indirect & Imperceptible (Green 1E & Green 1E1) Indirect & Imperceptible (Pink 1B & Pink 1B1) Indirect & Imperceptible (Red 1D & Red 1D1)

Unique Identification No.	
Legal Status	RPS/NIAH
Reference No.	40907836
Address/Townland	Mullandrait
Site Type	Setting: Workhouse/Famine Graveyard
ITM	616012, 895514
Description	Former union workhouse graveyard on rectangular-plan, in use c. 1845 - 51 and into twentieth century, containing unmarked graves of victims of the Great Famine. Originally associated with Stranorlar Union Workhouse, demolished sometime during the mid-twentieth century. Now out of use. Uncoursed rubble stone boundary walls with rubble stone coping over, modern repairs in places (c. 1996) and east wall now collapsed. Gates replaced to centre of north and south sections of boundary walls, c. 1996. Square-headed door opening to south wall having red brick voussoirs, and with battened timber framed with horizontal wrought-iron bands. Cut stone memorial plaque (undated) to site reading 'In Charity Pray for the Soul of Owen Laughlin, Late of Drumfries, Erected by his Sister Jane'. Modern polished stone plaque, erected 1996, reading 'memory of the victims of famine and all those buried in this graveyard. Erected by Ballybofey and Stranorlar Golf Club 9-12-1996.' Set back from road to the rear (north) of the site of Stranorlar Union Workhouse and to the north of modern hospital complex, golf course adjacent to site. Site accessed from road by pathway from the south.
Sources	http://www.buildingsofireland.ie/niah/search.jsp?county=DG&regno=40907836&type=record
Approx. Distance from Corridor centre-line	373m (Blue 1F) 368 (Green 1E) 445m (Orange 1A, Orange 1A1) 355m (Pink 1B) 441m (Pink 1B1 & Red 1D1 & Green 1E1, Blue 1F1) 448m (Purple 1C & Purple 1C1) 366m (Red 1D) 441 (Yellow 1G)
Type of Impact	Indirect & Slight (Blue 1F & Blue 1F1) Indirect & Slight (Green 1E & Green 1E1) Indirect & Slight (Orange 1A, Orange 1A1) Indirect & Slight (Pink 1B & Pink 1B1) Indirect & Slight (Purple 1C & Purple 1C1) Indirect & Slight (Red 1D & Red 1D1) Indirect & Slight (Yellow 1G)

Unique Identification No.	
Legal Status	RPS/NIAH
Reference No.	40907837
Address/Townland	Castlebane
Site Type	Outbuilding
ITM	616209, 896377
Description	Attached four-bay two-storey outbuilding, built c. 1860, having flight of external stairs to the main elevation (south-west) giving access to doorway at first floor level, and with attached two-bay single-storey addition to the north-west gable end having single-storey shed attached to the north-west gable with mono-pitched roof over. Associated with detached three-bay single-storey house with attic level to the south (not in survey). Pitched natural slate roof with some remaining sections of cast-iron rainwater goods. Limewashed rubble stone construction with modern repairs in places. Square-headed window openings with remains of timber-framed windows, generally unglazed. Single multi-pane timber window survives to the rear (north-

	east). Square-headed door openings having early and replacement battened timber doors. Modern square-headed carriage-arch to the west end of the main elevation having corrugated-metal doors. Attached two-bay single-storey outbuilding to the north-west having pitched corrugated-metal roof, rubble stone walls, and square-headed openings with timber fittings, ruinous single-bay single-storey shed to the extreme north-west gable end having mono-pitched corrugated metal roof, rubble stone walls, and square-headed openings. Set back from road in own grounds to the north-east of Stranorlar. Associated three-bay single-storey house with attic level adjacent to the south having pitched corrugated-metal roof, roughcast rendered walls, and square-headed window and door openings with replacement fittings, two-bay single-storey outbuilding attached to the north gable end of house having pitched corrugate-metal roof, rubble stone walls, and square-headed openings. This substantial utilitarian two-storey outbuilding, of mid-to-late nineteenth-century date, retains much of its original character and form despite becoming increasingly dilapidated. It is well-built using local rubble stone masonry while the retention of the natural slate roofs adds to its integrity and appeal. The external flight of steps to the main elevation giving access to a doorway at first floor level is a common feature of such outbuildings in Donegal. The associated house to the south, now altered, was thatched as recently as 1994. This simple outbuilding is a modest addition to the built heritage of the local area, adding interest to the landscape to the north-east of Stranorlar.
Sources	http://www.buildingsofireland.ie/niah/search.jsp?type=record&county=DG&regno=40907837
Approx. Distance from Corridor centre-line	283m (Pink 1B1, Red 1D1, Green 1E1, Blue 1F1, Yellow 1G)
Type of Impact	Indirect & Imperceptible (Pink 1B1, Red 1D1, Green 1E1, Blue 1F1, Yellow 1G)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40907838
Address/Townland	Treanamullin
Site Type	Setting: Finn View House
ITM	616763, 895674
Description	Detached three-bay two-storey house, built c. 1905, having projecting gable-fronted single-bay glazed entrance porch to the centre of the front elevation (south), and with two-bay two-storey return to rear (north). Pitched natural slate roof (Bangor blue\purple slate) having terracotta\clay ridge tiles, profiled cast-iron gutters and cast-iron downpipes, decorative pierced timber bargeboards to the side elevations (east and west), and with yellow brick chimneystacks to the gable ends (east and west) having corbelled heads. Pitched natural slate roof to porch having cast-iron rainwater goods, decorative pierced timber bargeboards to the south gable with timber finial to gable apex. Smooth rendered ruled-and-lined walls over projecting smooth rendered plinth course to front elevation (south) and to porch, and with render block-and-start quoins to the corners of the front elevation and to the east gable end. Smooth rendered walls to the west gable end, roughcast rendered walls to the east elevation, the rear elevation, and to the return. Square-headed window openings to the front elevation at first floor level having corbelled sills, rendered hoodmouldings over, and with two-over-two pane timber sliding sash windows; paired square-headed window openings at ground floor level having moulded rendered classical pilasters with entablature over, central mullion, and with one-over-one pane timber sliding sash windows. Square-headed window openings to other elevations having two-over-two and one-over-one pane timber sliding sash windows. Narrow square-headed window openings to the east gable end having render surrounds, render hoodmouldings over, and with one-over-one pane timber sliding sash windows. Multi-pane fixed timber windows to glazed porch over smooth rendered ruled-and-lined base. Square-headed door opening to the east side of entrance porch having replacement panelled door, overlight and concrete. Set well back from road in own grounds to the north-east of Stranorlar with complex of single- and two-storey outbuildings arranged around a yard to the rear (north), and with garden to the front (south). Detached two-bay two-storey outbuilding to the rear, c. 1860, having external flight of

	steps to the front elevation giving access to doorway at first floor level, and attached single-storey outbuilding to one gable end. Pitched natural slate roof. Rubble stone walls. Square-headed window and door openings with red brick surrounds and voussoirs, and with remains of timber fittings. Detached multi-bay single-storey outbuilding to the rear (north) having pitched corrugated-metal roof, rubble stone walls, and square-headed openings.
Sources	http://www.buildingsofireland.ie/niah/search.jsp?county=DG&regno=40907838&type=record
Approx. Distance from Corridor centre-line	395m (Blue 1F) 398m (Green 1E) 304m (Orange 1A, Orange 1A1) 395m (Pink 1B) 313m (Pink 1B1 & Red 1D1 & Green 1E1 & Blue 1F1) 297m (Purple 1C & Purple 1C1) 363m (Red 1D) 313m (Yellow 1G)
Type of Impact	Indirect & Imperceptible (Blue 1F & Blue 1F1) Indirect & Imperceptible (Green 1E & Green 1E1) Indirect & Imperceptible (Orange 1A, Orange 1A1) Indirect & Imperceptible (Pink 1B, Pink 1B1) Indirect & Imperceptible (Purple 1C & Purple 1C1) Indirect & Imperceptible (Red 1D & Red 1D1) Indirect & Imperceptible (Yellow 1G)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40906913
Address/Townland	Teevickmoy
Site Type	House
ITM	616228, 898609
Description	Detached five-bay two-storey house, built 1878, having modern gable-fronted entrance porch to the centre of the front elevation (south-east), and with shallow projection to the rear (north-west) at the south-west corner. Single-storey extension attached to the south-west gable. Pitched artificial slate roof with projecting cut stone eaves course, smooth rendered chimneystacks to the gable ends (north-east and south-west), and with surviving sections of cast-iron rainwater goods to rear (north-west). Roughcast rendered rubble stone walls. Square-headed window openings with replacement timber casement windows, smooth rendered surrounds to front elevation, and with cut stone sills; single six-over-six pane timber sliding sash window survives to the centre of the rear elevation (north-west). Square-headed doorway to north-east side of modern porch having modern timber panelled doors; original door to building having timber panelled door and fanlight over. Set back from road in extensive grounds to the north of Stranorlar and to the south-west of Convoy. Detached six-bay two-storey outbuilding to rear (north-west), built c. 1875. Pitched corrugated-metal roof having projecting cut stone eaves course and cast-iron rainwater goods. Limewashed randomly coursed rubble stone walls to front elevation with roughly dressed quoins to the corners. Square headed window openings with roughly dressed stone voussoirs and cast-iron pivoting windows or battened timber fittings; cut stone sill to central window at first floor level. Square-headed doorways with roughly dressed stone voussoirs, cut stone plinth blocks, and battened timber doors. Detached two-bay single-storey outbuilding to the rear (north-west) of farmyard, built c. 1880, having pitched corrugated- metal roof, random rubble stone walls with flush roughly squared quoins, square-headed door openings with timber lintels, cut stone plinth blocks and remains of timber doors, and with square-headed window opening to the gable end having timber casement window and projecting stone sill/platform. Gateway to the north-east having a pair of rendered gate piers (on square-plan).
Sources	http://www.buildingsofireland.ie/niah/search.jsp?county=DG&regno=40906913&type=record

Approx. Distance from Corridor centre-line	207m (Orange 1A, Orange 1A1) 178m (Pink 1B, Pink 1B1) 175m (Purple 1C & Purple 1C1)
Type of Impact	Indirect & Imperceptible (Orange 1A, Orange 1A1) Indirect & Imperceptible (Pink 1B, Pink 1B1) Indirect & Imperceptible (Purple 1C & Purple 1C1)

Unique Identification No.	
Legal Status	N/A
Reference No.	S1-AP01
Address/Townland	Ballynaglack
Site Type	AP Site – Possible Ringfort/enclosure
ITM	613515, 895915
Description	Aerial cropmark, circular, c. 25m diameter. S of possible relict watercourse to N. Local road network has a significant bend at this location (possibly following said watercourse). E-W extending ridge to E with central E-W depression (watercourse?). Site of Drumboe Abbey to SW (475m). Possible relict field boundary to N of the site, as well as beyond in field N of bend in the road. Sited at shared locational point of three townland boundaries: Ballynaglack, Magerapaste and Drumboe Upper (at E field boundary). Political/territorial implications as well as water source – all very conducive to this site type. Site is within AAP2.
Sources	
Approx. Distance from Corridor centre-line	0m (Blue 1F & Blue 1F1) 118m (Green 1E & Green 1E1) 118m (Red 1D & Red 1D1) 117m (Yellow 1G)
Type of Impact	Potential Direct & Potential Moderate (Blue 1F & Blue 1F1) Potential Direct & Potential Moderate (Green 1E & Green 1E1) Potential Direct & Potential Moderate (Red 1D & Red 1D1) Potential Direct & Potential Moderate (Yellow 1G)

Unique Identification No.	
Legal Status	N/A
Reference No.	S1-AP02
Address/Townland	Mullanachose
Site Type	Possible Enclosure
ITM	610914, 894130
Description	Apparent circular enclosed area, c. 18m diameter in improved pasture, with field boundary to W indicated on 1st ed OS and enclosing northern boundary indicated on 2nd ed OS. Possible crop mark of southern enclosing bank. Area of scrub/wetland to E.
Sources	
Approx. Distance from Corridor centre-line	37m (Orange 1A, Orange 1A1)
Type of Impact	Potential Direct & Potential Moderate (Orange 1A, Orange 1A1)

Unique Identification No.	
Legal Status	N/A
Reference No.	S1-BH01
Address/Townland	Creggan
Site Type	C 19th Farmstead
ITM	612778, 895886
Description	Small farmstead marked on 1st and 2nd ed OS maps. Consists of a derelict single-storey dwelling and associated derelict stone-built outbuildings.
Sources	
Approx. Distance from Corridor centre-line	0m (Pink 1B, Pink 1B1) 0m (Purple 1C & 1C1)
Type of Impact	Direct & Moderate (Pink 1B, Pink 1B1) Direct & Moderate (Purple 1C & 1C1)

Unique Identification No.	
Legal Status	N/A
Reference No.	S1-BH02
Address/Townland	Drumboe Upper
Site Type	Possible 18th C Farmstead
ITM	613969, 896215
Description	Possible 18th C farmstead at Drumboe Upper, 95m SE of Rec Protected Structures 18th C possible longhouse 40907834. Marked along with the latter on both 1st and 2nd ed OS maps. This well-constructed barn has an inscribed stone of '1904' but may have earlier origins. In good condition.
Sources	
Approx. Distance from Corridor centre-line	0m (Green 1E & Green 1E1) 0m (Red 1D & Red 1D1) 0m (Yellow 1G)
Type of Impact	Direct & Moderate (Green 1E & Green 1E1) Direct & Moderate (Red 1D & Red 1D1) Direct & Moderate (Yellow 1G)

Unique Identification No.	
Legal Status	N/A
Reference No.	S1-BH03
Address/Townland	Creggan
Site Type	Shancreggan House
ITM	612159, 895940
Description	Shancreggan House. Not on 1st ed OS but on 2nd ed OS. Local historical associations.
Sources	

Approx. Distance from Corridor centre-line	16m (Orange 1A & Orange 1A1)
Type of Impact	Direct & Significant (Orange 1A & Orange 1A1)

Unique Identification No.	
Legal Status	N/A
Reference No.	S1-CH01
Address/Townland	Drumboe Lower
Site Type	Well site: Holywell Woods
ITM	
Description	A much visited well site, approached via a formal pathway through Holywell Woods. Although not a recorded holy well site, it has many holy (Roman Catholic) venerations in the form of rags, medals, statues, candles etc. The area is marked with a native mature tree from which a stone-lined stream extends to the east/southeast. A designated seating area is installed for reflection purposes (and is a commemoration to a local? person/group - engraving was indecipherable during field visit). The well is sited within the environs of the 'site of' Drumboe Abbey DG078-005--- and may have associations with same.
Sources	JCA field survey
Approx. Distance from Corridor centre-line	0m (Red 1D, Red 1D1, Green 1E, Green 1E1, Yellow 1G) 60m (Blue 1F, Blue 1F1)
Type of Impact	Direct & Moderate (Red 1D, Red 1D1, Green 1E, Yellow 1G) Direct & Moderate (Blue 1F, Blue 1F1)

Unique Identification No.	
Legal Status	NIAH Garden Inventory
Reference No.	DG0047
Address/Townland	Drumboe Lower
Site Type	Garden Demesne
ITM	613666, 895276 (approx. centre-point)
Description	Large demesne set on a slight rise on the northern side of the River Finn on the western side of Stranorlar. Castle originally established in the 17th century, to protect a ford across the river. The Georgian house was demolished in 1945 and the site is now a car park for Drumboe Wood, managed by Coillte.
Sources	http://www.buildingsofireland.ie/Surveys/Gardens/gardensapp/ViewSite.jsp?gardenId=DG0047
Approx. Distance from Corridor centre-line	0m (Red 1D, Red 1D1, Green 1E, Green 1E1, Blue 1F, Blue 1F1, Yellow 1G)
Type of Impact	Direct & Moderate (Red 1D, Red 1D1, Green 1E, Blue 1F, Blue 1F1, Yellow 1G)

Unique Identification No.	
Legal Status	N/A
Reference No.	S1-AAP01
Address/Townland	Burn Daurnett River lowlands and SW of Ballybofey
Site Type	Area of High Archaeological Potential

ITM	
Description	**S1AAP_01** This area is located at the south-westerly starting point of all of the proposed options, at the Burn Daurnett river lowlands and south-west of the urban environs of Ballybofey. There are five (5 no.) recorded RMPs within the immediate area to the south-west at Goland/Cappry and also at Dooish to the west: DG077-012--- (ringfort), DG077-013--- (ringfort), DG077-026--- (standing stone), DG077-027--- (standing stone) and DG077-033--- (souterrain). This riverine environment would have been attractive to early settlers since prehistoric times, providing good food and transport resources, and although marshy and wet in places, this type of natural environment is also conducive to sites Bronze Age cooking sites such as *fulachta fiadh*.
Sources	
Approx. Distance from Corridor centre-line	0m (Blue 1F & Blue 1F1) 0m (Green 1E & Green 1E1) 0m (Orange 1A & 1A1) 0m (Pink 1B & 1B1) 0m (Purple 1C & Purple 1C1) 0m (Red 1D & Red 1D1) 0m (Yellow 1G)
Type of Impact	Potential Direct & Potential Profound (Blue 1F & Blue 1F1) Potential Direct & Potential Profound (Green 1E & Green 1E1) Potential Direct & Potential Profound (Orange 1A &1A1) Potential Direct & Potential Profound (Pink 1B & 1B1) Potential Direct & Potential Profound (Purple 1C & Purple 1C1) Potential Direct & Potential Profound (Red 1D & Red 1D1) Potential Direct & Potential Profound (Yellow 1G)

Unique Identification No.	
Legal Status	N/A
Reference No.	S1-AAP02
Address/Townland	SW & NE banks of River Finn, including river crossing and lower slopes Trooper's Hill to Drumboe Lower
Site Type	Area of High Archaeological Potential
ITM	
Description	This area is located along the southwest and north-eastern banks of the River Finn, demarcated by the R252 to the south-west and the local road network skirting along the lower slopes of Trooper's Hill and incorporating Drumboe Lower. The eastern portion of this Area of Archaeological Potential at Drumboe Lower also forms part of the north-western area of Garden Demesne lands associated with Drumboe Castle (NIAH Garden ID DG0047), although the demesne grounds are now largely fragmented by modern housing development. Within this area is also Holy Well Woods – an amenity woodland with a cultural holy well site that is well maintained, regularly visited and in use. It is possible that this site may have original associations with the adjacent site of Drumboe Abbey (site of), *c.* 300m to the south. The river Finn itself is an important natural resource and would have been vital to early settlers in terms of transport, socio-economics and politics/territorial boundaries. Trooper's Hill overlooks the river valley floor at the north and has 3 no. recorded archaeological sites: DG077-009--- (ringfort); DG077-010--- (ringfort) and DG077-011--- (enclosure). Further to the west is the recorded remains of Drumboe Abbey (no surface trace but high potential for buried remains) near a bend in the River Finn, at its northern banks (DG078-005---). Rivers were regarded as sacred places, particularly during the Bronze Age, when ritual deposition of important artefacts (often elaborate metalwork) took place. It is possible that there may be underwater archaeological potential to discover prehistoric finds/features at this crossing location. Furthermore, the valley floor would have been an attractive location from earliest times, and as

	such, there is high potential to uncover site types ranging from the prehistoric era to medieval times.
Sources	
Approx. Distance from Corridor centre-line	0m (Blue 1F & Blue 1F1) 0m (Green 1E & Green 1E1) 0m (Pink 1B & 1B1) 0m (Purple 1C & Purple 1C1) 0m (Orange 1A & 1A1) 0m (Red 1D & Red 1D1) 0m (Yellow 1G)
Type of Impact	Potential Direct & Potential Profound (Blue 1F & Blue 1F1) Potential Direct & Potential Profound (Green 1E & Green 1E1) Potential Direct & Potential Profound (Pink 1B & 1B1) Potential Direct & Potential Profound (Purple 1C & Purple 1C1) Potential Direct & Potential Profound (Orange 1A & 1A1) Potential Direct & Potential Profound (Red 1D & Red 1D1) Potential Direct & Potential Profound (Yellow 1G)

Unique Identification No.	
Legal Status	N/A
Reference No.	S1-AAP03
Address/Townland	Lower & Upper slopes of Trooper's Hill
Site Type	Area of High Archaeological Potential
ITM	
Description	This area is located along both the lower and upper southern slopes of Trooper's Hill, which fall down towards the local road network and beyond to the River Finn. South-facing, well-drained sloping ground is favourable to past human settlement, particularly earthen early medieval monuments and Trooper's Hill is testament to this as there are 3no. recorded ringfort/enclosure sites at this area: DG077-009--- (ringfort); 'Black Fort' DG077-010--- (ringfort) and DG077-011--- (enclosure). Also of note is the proximity to Drumboe Abbey (DG078-005---) to the south-east and the bend in the River Finn. These south-facing slopes, already home to recorded archaeological sites, are considered to be of high potential to reveal additional and/or associated finds and/or features of archaeological significance, potentially from prehistoric to medieval times.
Sources	
Approx. Distance from Corridor centre-line	0m (Orange 1A & 1A1)
Type of Impact	Potential Direct & Potential Profound (Orange 1A & 1A1)

Unique Identification No.	
Legal Status	N/A
Reference No.	S1-AAP04
Address/Townland	Backlees/Dunwiley
Site Type	Area of High Archaeological Potential
ITM	

Description	This area is located at Backlees/Dunwiley, *c.* 1km west of the existing N15, at the lower and upper southerly slopes of a northwest/southeast extending ridge (160m OD). The terrain is of well-drained good quality agricultural lands, with good siting within the surrounding topography, all of which is conducive to past human settlement. There is a recorded ringfort (DG078-003---) of substantial construction, within the southern portion and a findspot of 22 worked flints (NMI 1979:103:1-11) at the north-western area. Given the natural topography and the presence of the recorded archaeology, this area is deemed be of high archaeological potential for finds and/or features dating from prehistoric times to medieval times.
Sources	
Approx. Distance from Corridor centre-line	0m (Blue 1F & Blue 1F1) 0m (Green 1E & Green 1E1) 0m (Orange 1A & 1A1) 0m (Pink 1B & Pink 1B1) 0m (Purple 1C & Purple 1C1) 0m (Red 1D & Red 1D1) 0m (Yellow 1G)
Type of Impact	Potential Direct & Potential Profound (Blue 1F & Blue 1F1) Potential Direct & Potential Profound (Green 1E & Green 1E1) Potential Direct & Potential Profound (Orange 1A & Orange 1A1) Potential Direct & Potential Profound (Pink 1B & Pink 1B1) Potential Direct & Potential Profound (Purple 1C & Purple 1C1) Potential Direct & Potential Profound (Red 1D & Red 1D1) Potential Direct & Potential Profound (Yellow 1G)

Unique Identification No.	
Legal Status	N/A
Reference No.	S1-AAP05
Address/Townland	Teevickmoy & Meenavoy, S of Cloghroe River and valley floor
Site Type	Area of High Archaeological Potential
ITM	
Description	This area is located at the northerly terminus of the proposed options at Teevickmoy and Meenavoy, south of the Cloghroe River (which flows into the River Deele, further to the east) along a wider valley floor, east of higher ground (170m OD) and north-east of areas of commercial forestry, bounded by the N15 at its eastern side. The riverine environment of the Cloghroe River and its connection to the River Deele (an excellent sea trout and salmon river) provide an important natural resource that would have been very attractive to past human settlement in terms of food, transport, politics and socio-economics. The archaeological record displays a ringfort (DG069-024---) and bullaun stone (DG069-023---) at Meenavoy to the north of the area, near the river yet commanding a view over the road 'highway' of the N15 to the east. In addition, there is the site of a ringfort, in excellent ground, further south of this area, at Teevickmoy (DG069-028---), the placename of which may translate to *Taobh Mhic Muaí* meaning 'hillside of [the son of] Muaí'. Given the ground conditions and proximity to the river and natural 'highway' through the wider terrain, this area is considered to be of high archaeological potential.
Sources	
Approx. Distance from Corridor centre-line	0m (Blue 1F & Blue 1F1) 0m (Green 1E & Green 1E1) 0m (Orange 1A & Orange 1A1) 0m (Pink 1B & Pink 1B1) 0m (Purple 1C & Purple 1C1) 0m (Red 1D & Red 1D1)

	0m (Yellow 1G)
Type of Impact	Potential Direct & Potential Profound (Blue 1F & Blue 1F1) Potential Direct & Potential Profound (Green 1E & Green 1E1) Potential Direct & Potential Profound (Orange 1A & Orange 1A1) Potential Direct & Potential Profound (Pink 1B & Pink 1B1) Potential Direct & Potential Profound (Purple 1C & Purple 1C1) Potential Direct & Potential Profound (Red 1D & Red 1D1) Potential Direct & Potential Profound (Yellow 1G)

Unique Identification No.	
Legal Status	N/A
Reference No.	S1-AAP06
Address/Townland	N of Stranorlar & River Finn, rising ground at Lough Alaan to Dunwiley
Site Type	Area of High Archaeological Potential
ITM	
Description	This area (comprising a proposed link corridor(s)) is located north of Stranorlar urban environs and consists of an area north of a significant bend on the River Finn and the existing N15, which extends northwards to gently rising ground, east of Lough Alaan, across the existing N13, within lands of good agricultural quality. The adjacent location of both the River Finn as well as Lough Alaan on gently rising ground would have been an attractive natural resource for early settlers. This is attributed by the archaeological record by the remains of a megalithic tomb at Knockfair (DG078-044---) as well as a holy well site DG078-007--- at Lough Hill and significant ringforts at Dunwiley (DG078-003--- and DG078-004--), the placename of which translates as *Dún Mhaoile*, meaning 'fort of the bare or flat-topped hillock'. Given the good terrain and topography as well as the natural water sources, and recorded archaeological sites from prehistoric to medieval times, this area for the proposed link corridor(s) is deemed to be of high archaeological potential.
Sources	
Approx. Distance from Corridor centre-line	0m (Blue 1F & Blue 1F1) 0m (Green 1E & Green 1E1) 0m (Orange 1A & 1A1) 0m (Pink 1B & 1B1) 0m (Purple 1C & Purple 1C1) 0m (Red 1D & Red 1D1) 0m (Yellow 1G)
Type of Impact	Potential Direct & Potential Profound (Blue 1F and Blue 1F1) Potential Direct & Potential Profound (Green 1E & Green 1E1) Potential Direct & Potential Profound (Orange 1A & Orange 1A1) Potential Direct & Potential Profound (Pink 1B & 1B1) Potential Direct & Potential Profound (Purple 1C & Purple 1C1) Potential Direct & Potential Profound (Red 1D & Red 1D1) Potential Direct & Potential Profound (Yellow 1G)

Appendix 2: Photographic Record

Plate 1: View towards south, all options proposed starting point at N15 west of Ballybofey

Plate 2: View towards east and S1AAP02 and S1BH02 to right of image

Plate 3: View towards south and ringfort DG077-009--- at Trooper's Hill

Plate 4: Entrance Gates and boundary walling at Shancreggan House, Trooper's Hill S1-BH03

Plate 5: 19th century farmstead at Creggan S1-BH01

Plate 6: 19th century farmstead outbuildings at Creggan S1-BH01

Plate 7: View towards north and lower slopes of Trooper's Hill

Plate 8: Rear façade of renovated Cornmill NIAH 40907720 at Ironworks townland

Plate 9: Well site at Holy Well Woods S1-CH01

Plate 10: View to southwest (all options) from Holy Well Woods

Plate 11: View to west, Dunwiley Fort DG078-003---

Plate 12: View to south (Orange & Purple Options) between Lettermackenny and Backlees townlands

Plate 13: View to north towards all options terminus near Cloghroe River S1AAP05

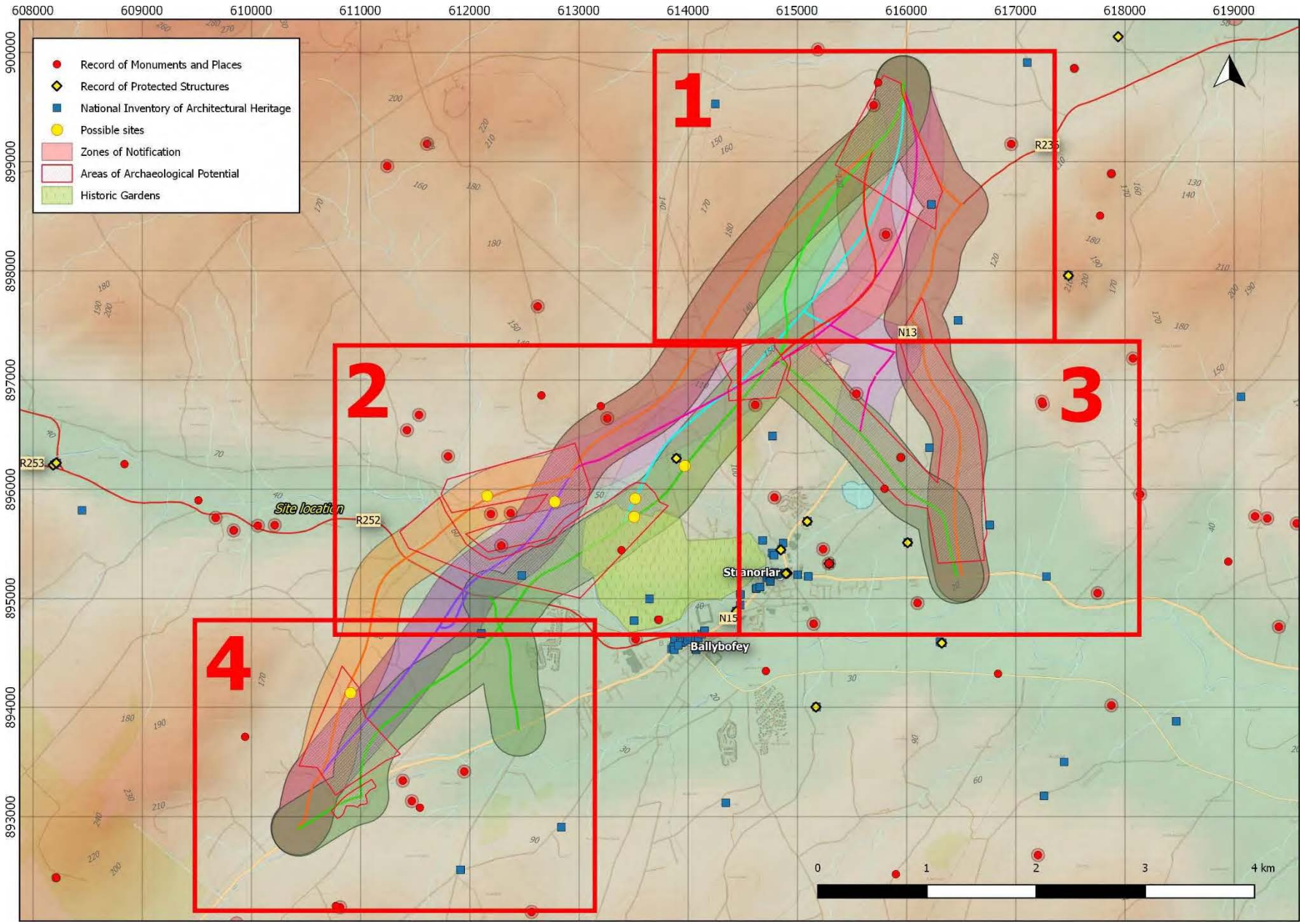
Plate 14: View towards east (from Dunwiley/Tircallen) towards proposed Link Roads

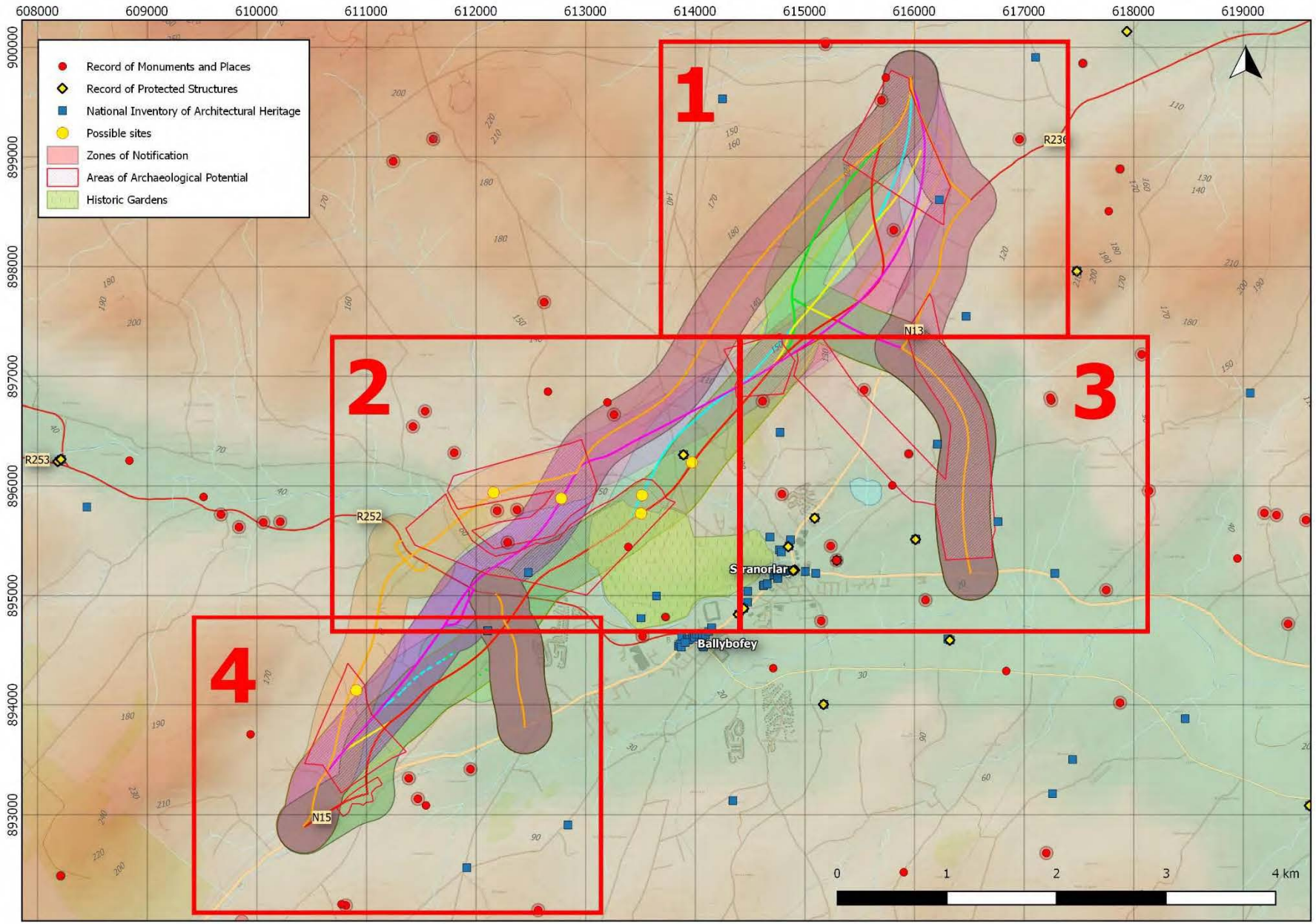
Plate 15: View towards southeast at Lough Aalen and proposed Link Roads

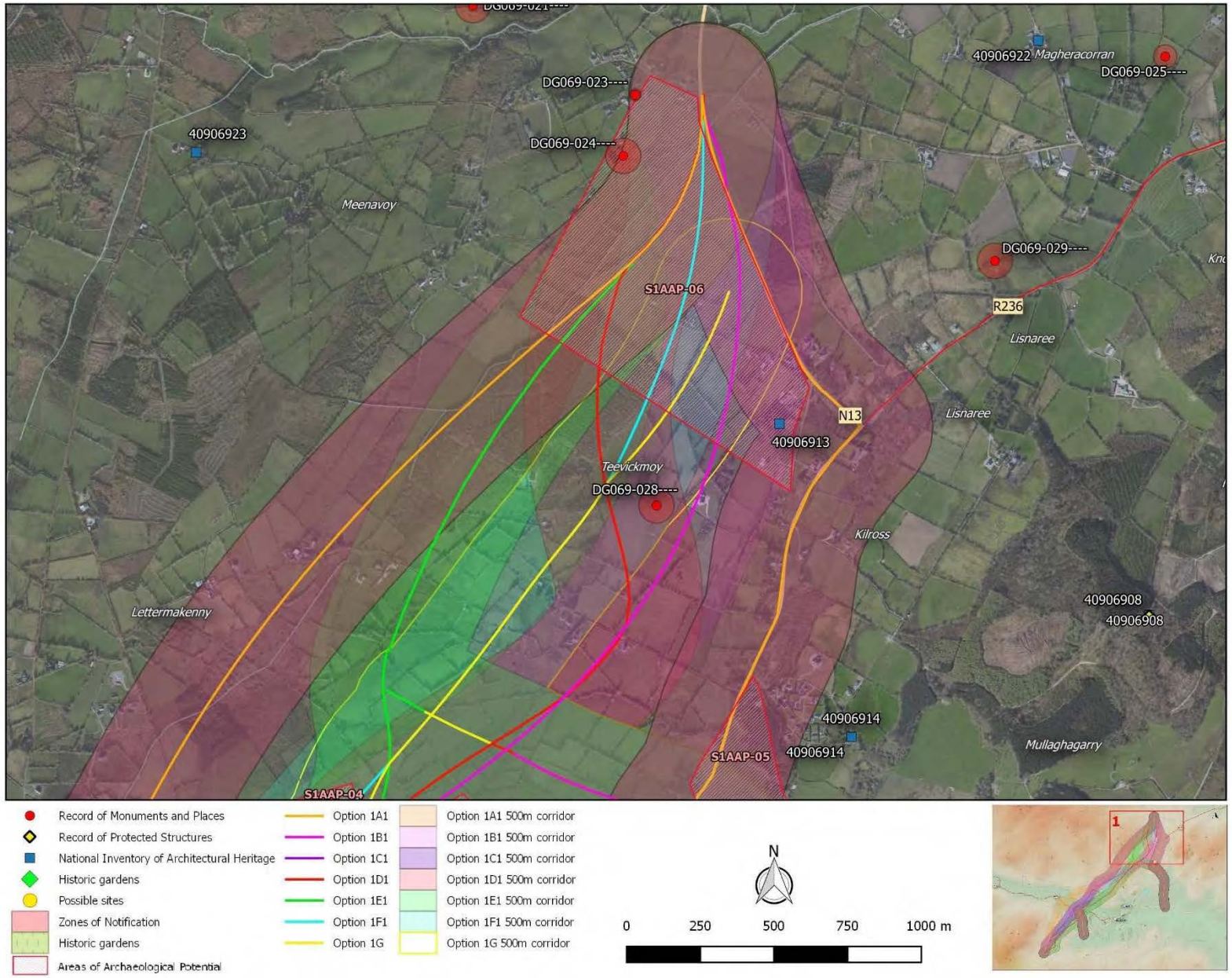
Plate 16: View towards south and Proposed Link Roads, at S1-AAP06, north of Golf Course

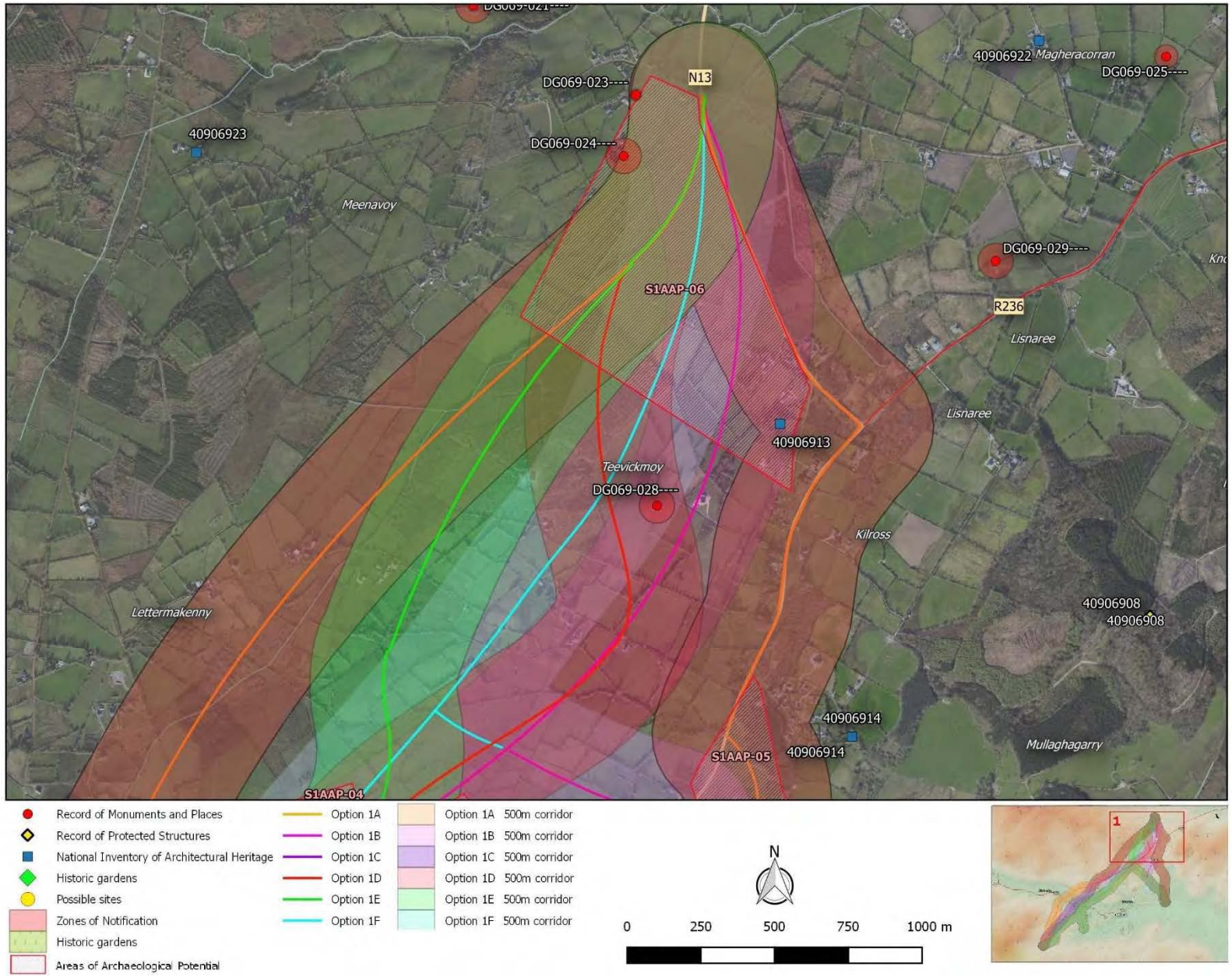
Plate 17: View of front elevation to Barn at S1-BH02

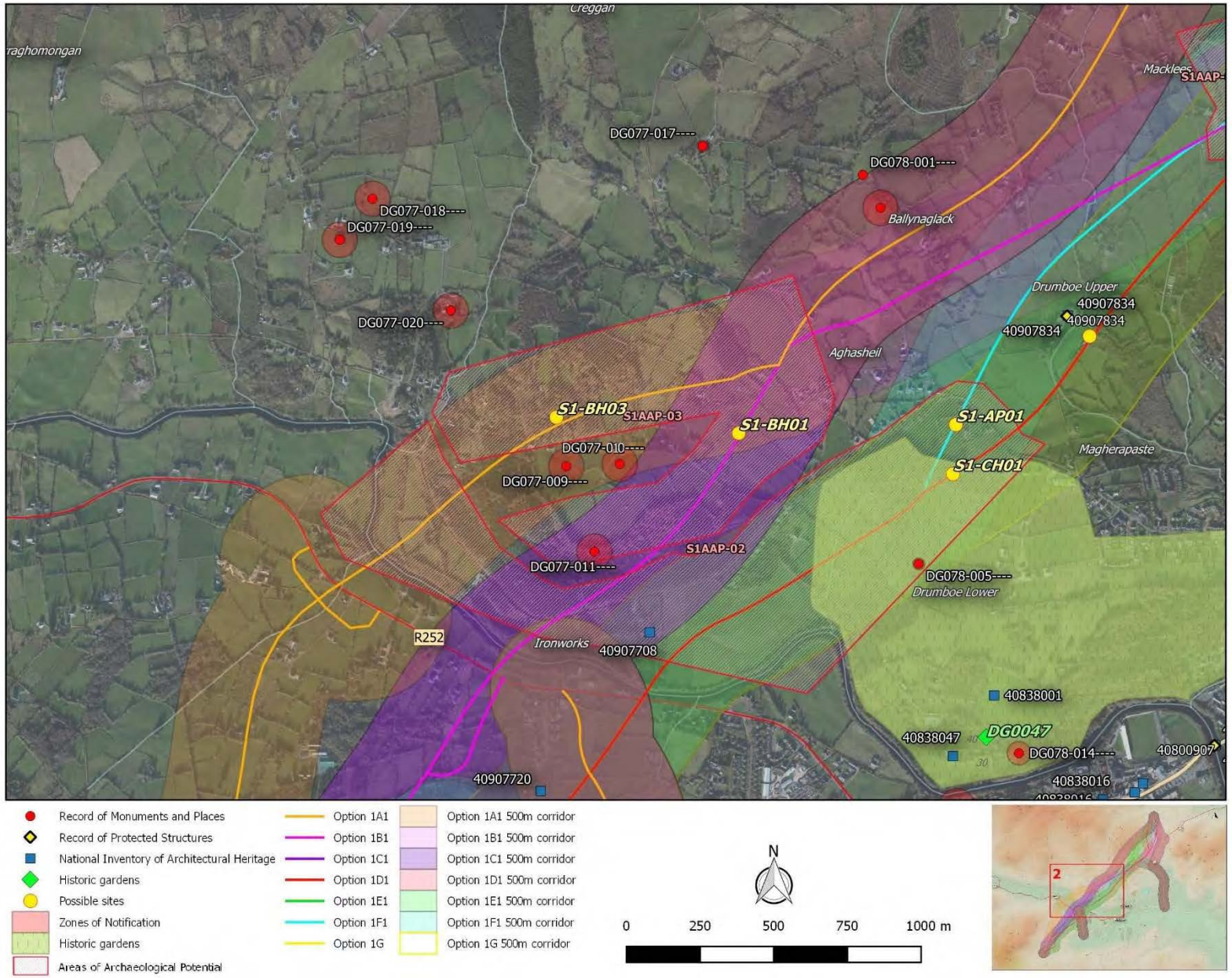
Appendix 3:
Cultural Heritage Constraint Options Mapping

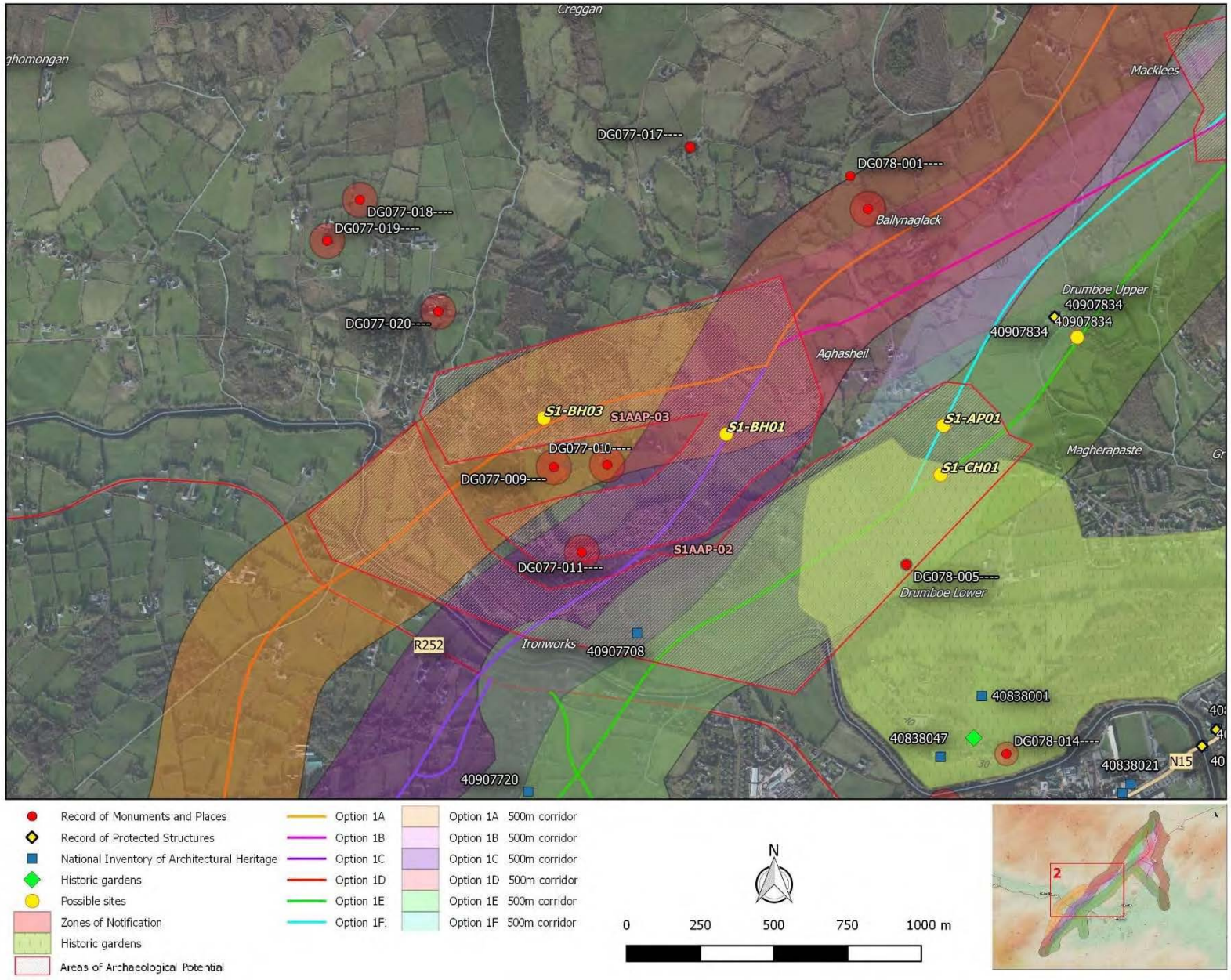

608000
609000
610000
611000
612000
613000
614000
615000
616000
617000
618000
619000
900000
899000
898000
897000
896000
895000
894000
893000
Record of Monuments and Places
Record of Protected Structures
National Inventory of Architectural Heritage
Possible sites
Zones of Notification
Areas of Archaeological Potential
Historic Gardens
1
2
3
4
R235
N13
R253
Site location
R252
Stranorlar
N15
Ballybofey
0
1
2
3
4 km

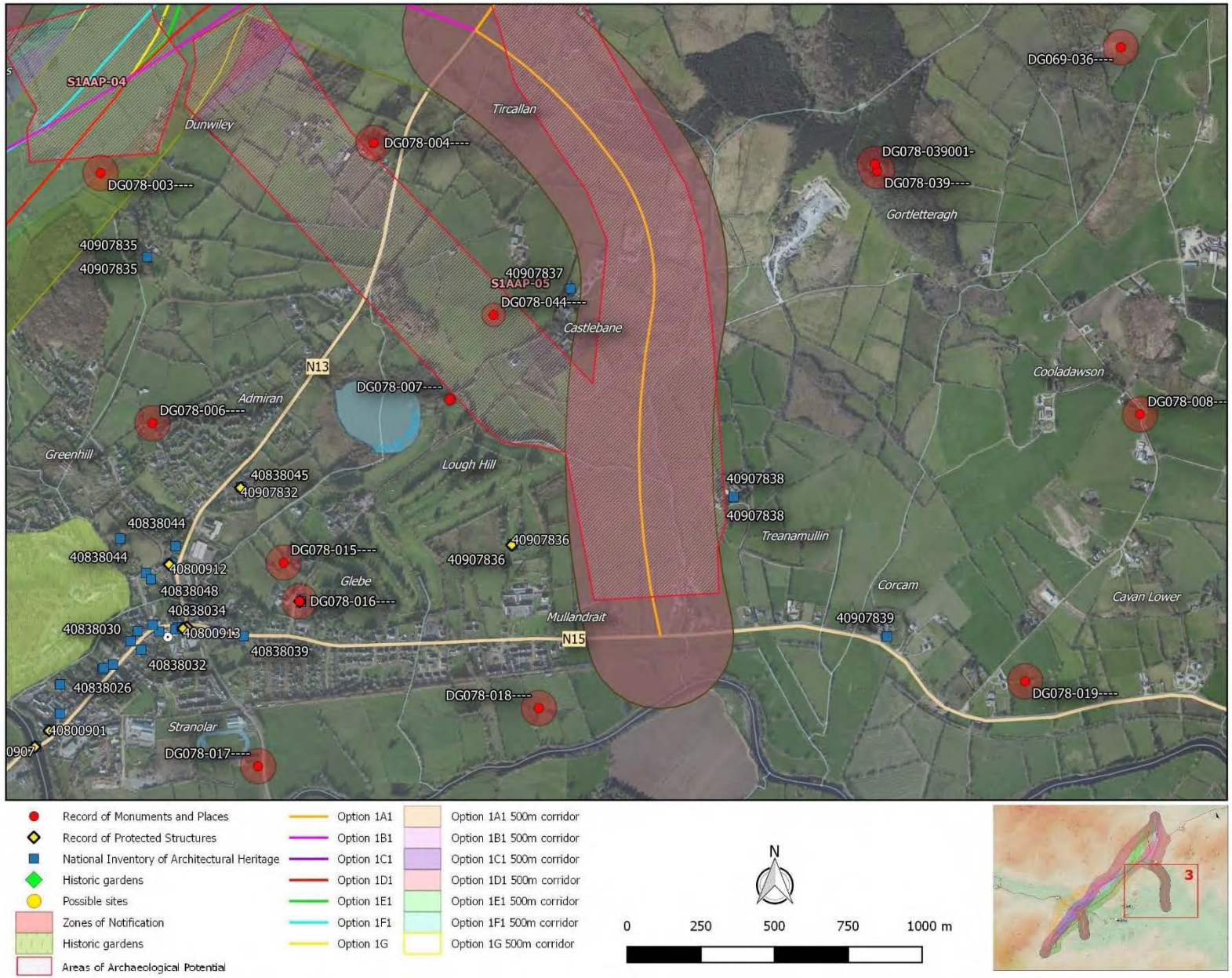

608000
609000
610000
611000
612000
613000
614000
615000
616000
617000
618000
619000
900000
899000
898000
897000
896000
895000
894000
893000
Record of Monuments and Places
Record of Protected Structures
National Inventory of Architectural Heritage
Possible sites
Zones of Notification
Areas of Archaeological Potential
Historic Gardens
1
2
3
4
R230
N13
R253
R252
Stranorlar
Ballybofey
N15
0
1
2
3
4 km

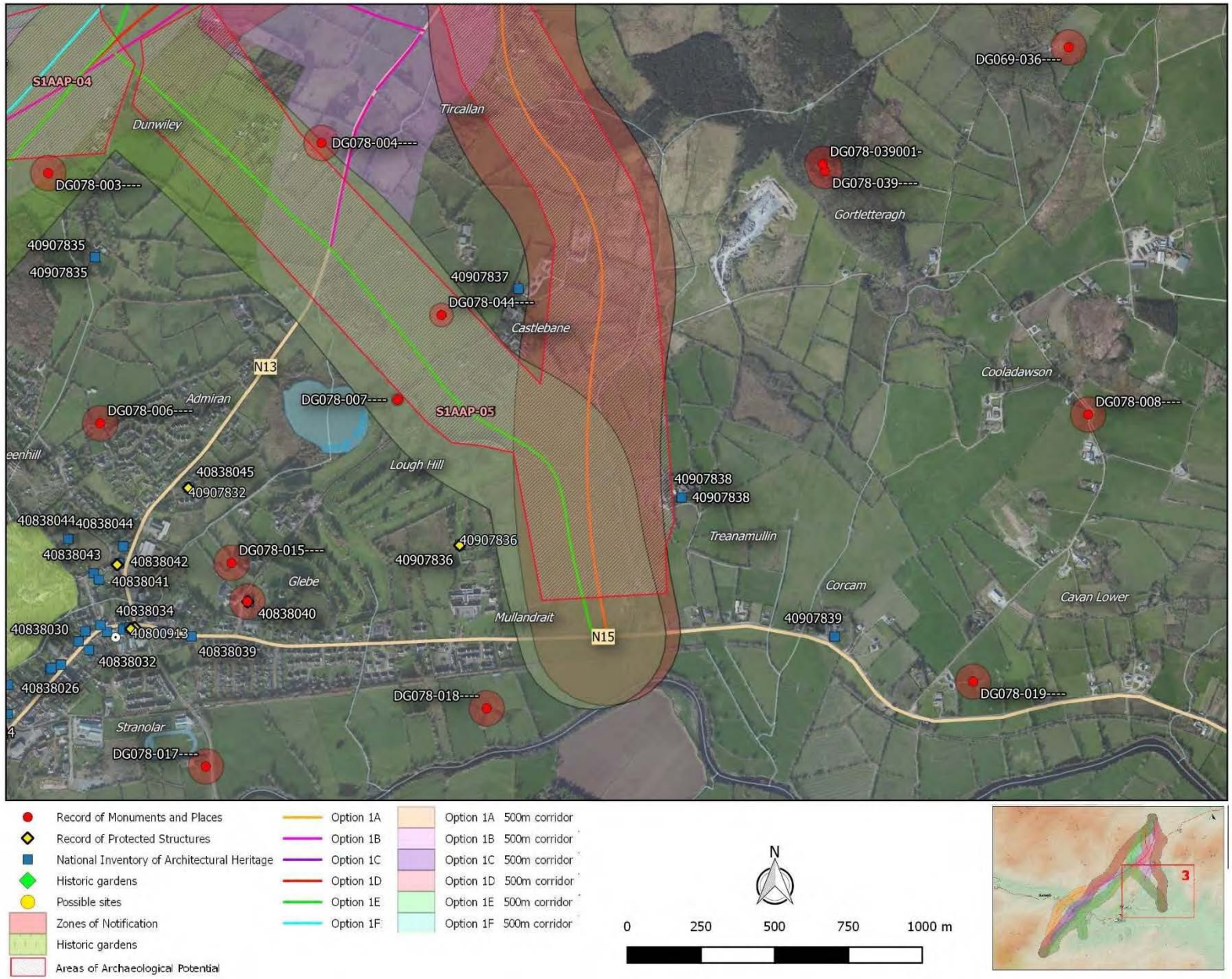

DG069-023----
DG069-024----
DG069-025----
DG069-029----
40906922 Magheracorran
40906923
Meenavoy
S1AAP-06
R236
Lisnaree
N13
40906913
Teevickmoy
DG069-028----
Kilross
Lettermakenny
40906908
40906908
40906914
40906914
S1AAP-05
Mullaghagarry
S1AAP-04
Record of Monuments and Places
Record of Protected Structures
National Inventory of Architectural Heritage
Historic gardens
Possible sites
Zones of Notification
Historic gardens
Areas of Archaeological Potential
Option 1A1
Option 1B1
Option 1C1
Option 1D1
Option 1E1
Option 1F1
Option 1G
Option 1A1 500m corridor
Option 1B1 500m corridor
Option 1C1 500m corridor
Option 1D1 500m corridor
Option 1E1 500m corridor
Option 1F1 500m corridor
Option 1G 500m corridor
N
0
250
500
750
1000 m
1

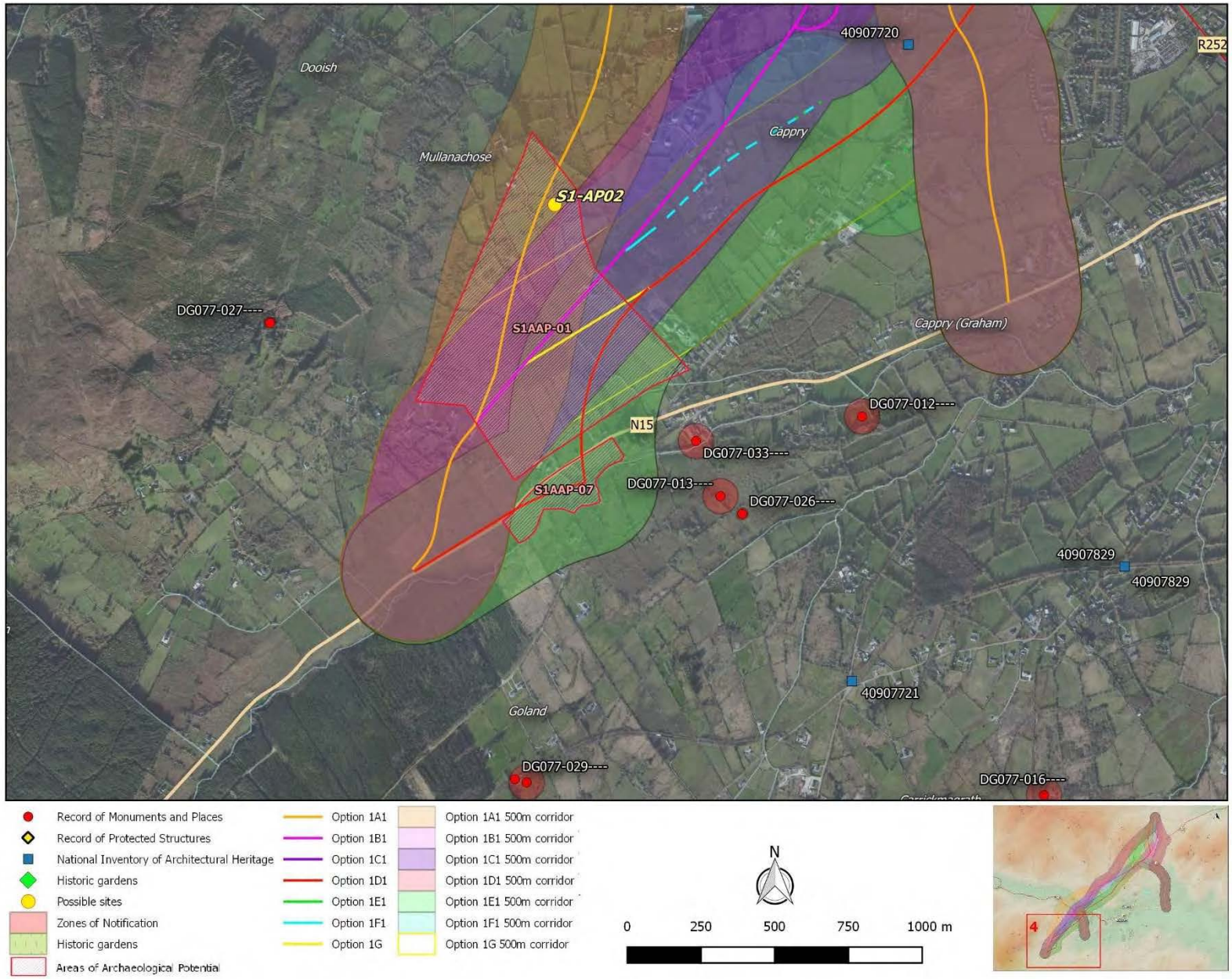

DG069-021----
40906922 Magheracorran
DG069-025----
DG069-023----
N13
40906923
DG069-024----
Meenavoy
DG069-029----
S1AAP-06
R236
Lisnaree
Lisnaree
40906913
Teevickmoy
DG069-028----
Kilross
Lettermakenny
40906908
40906908
40906914
40906914
S1AAP-05
Mullaghagarry
S1AAP-04
Record of Monuments and Places
Record of Protected Structures
National Inventory of Architectural Heritage
Historic gardens
Possible sites
Zones of Notification
Historic gardens
Areas of Archaeological Potential
Option 1A
Option 1B
Option 1C
Option 1D
Option 1E
Option 1F
Option 1A 500m corridor
Option 1B 500m corridor
Option 1C 500m corridor
Option 1D 500m corridor
Option 1E 500m corridor
Option 1F 500m corridor
N
0
250
500
750
1000 m
1

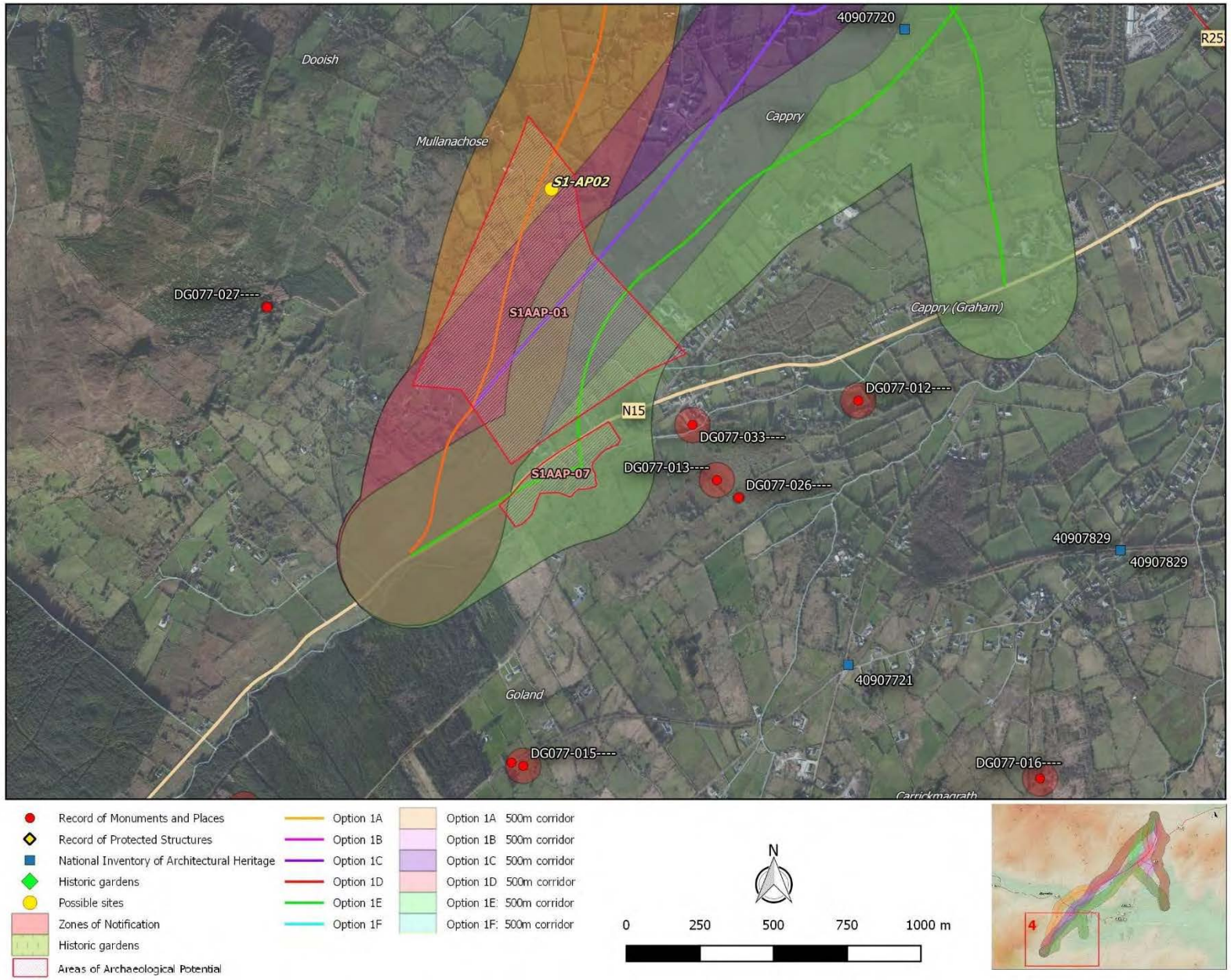

Creggan
raghomongan
Macklees
S1AAP-
DG077-017----
DG078-001----
DG077-018----
DG077-019----
Ballynaglack
Drumboe Upper
40907834
40907834
40907834
DG077-020----
Aghasheil
S1-BH03
S1AAP-03
S1-BH01
S1-AP01
DG077-010----
Magherapaste
S1-CH01
DG077-009----
S1AAP-02
DG077-011----
DG078-005----
Drumboe Lower
R252
Ironworks
40907708
40838001
40838047
DG0047
DG078-014----
40800907
40907720
40838016
Record of Monuments and Places
Record of Protected Structures
National Inventory of Architectural Heritage
Historic gardens
Possible sites
Zones of Notification
Historic gardens
Areas of Archaeological Potential
Option 1A1
Option 1B1
Option 1C1
Option 1D1
Option 1E1
Option 1F1
Option 1G
Option 1A1 500m corridor
Option 1B1 500m corridor
Option 1C1 500m corridor
Option 1D1 500m corridor
Option 1E1 500m corridor
Option 1F1 500m corridor
Option 1G 500m corridor
N
0
250
500
750
1000 m
2


Creggan
Macklees
DG077-017----
DG078-001----
DG077-018----
DG077-019----
Ballynaglack
Drumboe Upper
40907834
40907834
40907834
DG077-020----
Aghasheil
S1-BH03
S1AAP-03
S1-BH01
S1-AP01
DG077-010----
DG077-009----
S1-CH01
Magherapaste
S1AAP-02
DG077-011----
DG078-005----
Drumboe Lower
R252
Ironworks
40907708
40838001
40838047
DG078-014----
40838021
N15
40907720
Record of Monuments and Places
Record of Protected Structures
National Inventory of Architectural Heritage
Historic gardens
Possible sites
Zones of Notification
Historic gardens
Areas of Archaeological Potential
Option 1A
Option 1B
Option 1C
Option 1D
Option 1E:
Option 1F:
Option 1A 500m corridor
Option 1B 500m corridor
Option 1C 500m corridor
Option 1D 500m corridor
Option 1E 500m corridor
Option 1F 500m corridor
N
0
250
500
750
1000 m
2


S1AAP-04
Dunwiley
Tircallan
DG078-004----
DG078-003----
DG069-036----
DG078-039001-
DG078-039----
Gortletteragh
40907835
40907835
40907837
S1AAP-05
DG078-044----
Castlebane
N13
DG078-007----
Admiran
DG078-006----
Cooladawson
DG078-008---
Greenhill
Lough Hill
40838045
40907832
40907838
40907838
Treanamullin
40838044
40838044
DG078-015----
40907836
40907836
40800912
Glebe
40838048
DG078-016----
Corcam
Cavan Lower
40838034
40838030
40800913
Mullandrait
40907839
N15
40838039
40838032
40838026
DG078-018----
DG078-019----
40800901
Stranolar
0907
DG078-017----
Record of Monuments and Places
Record of Protected Structures
National Inventory of Architectural Heritage
Historic gardens
Possible sites
Zones of Notification
Historic gardens
Areas of Archaeological Potential
Option 1A1
Option 1B1
Option 1C1
Option 1D1
Option 1E1
Option 1F1
Option 1G
Option 1A1 500m corridor
Option 1B1 500m corridor
Option 1C1 500m corridor
Option 1D1 500m corridor
Option 1E1 500m corridor
Option 1F1 500m corridor
Option 1G 500m corridor
N
0
250
500
750
1000 m
3


S1AAP-04
Dunwiley
DG078-003----
DG078-004----
Tircallan
DG069-036----
DG078-039001-
DG078-039----
Gortletteragh
40907835
40907835
40907837
DG078-044----
Castlebane
N13
Admiran
DG078-006----
DG078-007----
S1AAP-05
Cooladawson
DG078-008----
Lough Hill
40838045
40907832
40907838
40907838
40838044
40838044
40838043
40838042
40838041
DG078-015----
40907836
40907836
Treanamullin
Glebe
40838040
Corcam
Cavan Lower
40838034
40838030
40800913
Mullandrait
N15
40907839
40838039
40838032
40838026
DG078-018----
DG078-019----
Stranolar
DG078-017----
Record of Monuments and Places
Record of Protected Structures
National Inventory of Architectural Heritage
Historic gardens
Possible sites
Zones of Notification
Historic gardens
Areas of Archaeological Potential
Option 1A
Option 1B
Option 1C
Option 1D
Option 1E
Option 1F
Option 1A 500m corridor
Option 1B 500m corridor
Option 1C 500m corridor
Option 1D 500m corridor
Option 1E 500m corridor
Option 1F 500m corridor
N
0
250
500
750
1000 m
3


Dooish
Mullanachose
Cappry
Cappry (Graham)
Goland
S1-AP02
S1AAP-01
S1AAP-07
DG077-027----
DG077-012----
DG077-033----
DG077-013----
DG077-026----
DG077-029----
DG077-016----
40907720
40907829
40907829
40907721
R252
N15
Record of Monuments and Places
Record of Protected Structures
National Inventory of Architectural Heritage
Historic gardens
Possible sites
Zones of Notification
Historic gardens
Areas of Archaeological Potential
Option 1A1
Option 1B1
Option 1C1
Option 1D1
Option 1E1
Option 1F1
Option 1G
Option 1A1 500m corridor
Option 1B1 500m corridor
Option 1C1 500m corridor
Option 1D1 500m corridor
Option 1E1 500m corridor
Option 1F1 500m corridor
Option 1G 500m corridor
N
0
250
500
750
1000 m
4


40907720
R25
Dooish
Cappry
Mullanachose
S1-AP02
DG077-027----
S1AAP-01
Cappry (Graham)
DG077-012----
N15
DG077-033----
DG077-013----
S1AAP-07
DG077-026----
40907829
40907829
40907721
Goland
DG077-015----
DG077-016----
Carrickmagrath
Record of Monuments and Places
Record of Protected Structures
National Inventory of Architectural Heritage
Historic gardens
Possible sites
Zones of Notification
Historic gardens
Areas of Archaeological Potential
Option 1A
Option 1B
Option 1C
Option 1D
Option 1E
Option 1F
Option 1A 500m corridor
Option 1B 500m corridor
Option 1C 500m corridor
Option 1D 500m corridor
Option 1E 500m corridor
Option 1F 500m corridor
N
0
250
500
750
1000 m
4

Donegal County Council

TEN-T Priority Route Improvement Project, Donegal

Section 1: N15/N13 Ballybofey/Stranorlar Urban Region

Option Selection Report

Appendix D1.9 - Material Assets (Agricultural)

December 2019

Document Control Sheet

Client:	Donegal County Council
Project Title:	TEN-T Priority Route Improvement Project, Donegal – Section 1: N15/N13 Ballybofey/Stranorlar Urban Region
Document Title:	Option Selection Report –Appendix D1.9 – Material Assets (Agricultural)
Document No. :	TT-MGT0337-RPS-00-01-RP-E-EN-1021

Rev. No.	Suitability	Effective Date	Revision	Checked	Approved
P01	S4	December 2019	Issue for publication	CW	GMcE

This report has been prepared by RPS/Barry Transportation on behalf of Donegal County Council. Any other persons who use any information contained herein do so at their own risk.

© RPS Barry Transportation 2019

Table of Contents

1 INTRODUCTION 1
1.1 Methodology 1
1.1.1 Assessment Criteria 3
2 EXISTING ENVIRONMENT 6
2.1 Baseline Information 6
3 OPTION SELECTION 7
3.1 Option 1A (Orange) 7
3.2 Option 1A1 (Orange) 7
3.3 Option 1B (Pink) 7
3.4 Option 1B1 (Pink) 7
3.5 Option 1C (Purple) 7
3.6 Option 1C1 (Purple) 8
3.7 Option 1D (Red) 8
3.8 Option 1D1 (Red) 8
3.9 Option 1E (Green) 8
3.10 Option 1E1 (Green) 8
3.11 Option 1F (Blue) 9
3.12 Option 1F1 (Blue) 9
3.13 Option 1G (Yellow) 9
3.14 Comparison of Options 9

List of Tables

Table 1-1: Assessment of Environmental Value - Agriculture 3
Table 1-2: Assessment of Significance – Agriculture 4
Table 1-3: Impact Score Key (TII, 2016) 4
Table 2-1: Summary of Agricultural Constraints within Scheme 1 N15 Ballybofey-Stranorlar Urban Region 6
Table 3.1: Summary of assessment for Section1: N15 Ballybofey-Stranorlar Urban Region 10

1 INTRODUCTION

This report examines the Material Assets (Agricultural) aspects of the 13 no. options for Section 1: N15 Ballybofey-Stranorlar Urban Region of the TEN-T Priority Route Improvement Project in in Donegal, and the likely significant impacts that these proposed r options may have on agriculture. It will form part of a Phase 2 – Option Selection Report to be issued by the National Roads Design Office, Donegal County Council. See Section 1.2 of the Option Selection Report for Project Description.

The extent of the overall study areas within the three sections have been identified and detailed in the main body of the Option Selection Report. This technical appendix provides the details of the material assets (agricultural) related constraints associated with Section 1 that require consideration during the project lifetime.

The impacts that an option may have on agricultural material assets are a function of the following factors:

- Area of lands acquired;
- Area and orientation of lands severed;
- Removal of farm buildings and/or facilities;
- Farm enterprises; and
- Intensity and viability of farming practices.

1.1 Methodology

Guidelines

The following publications and documents were considered in undertaking this comparative assessment:-

- *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (Draft), EPA, August 2017;
- *Guidelines on the Information to be Contained in Environmental Impact Statements*, EPA, 2002;
- *Guide to Process and Code of Practice for National Road Project Planning and Acquisition of Property for National Roads*, March 2003 (revised 2005);
- EPA/ Teagasc/ GSI GIS Map of National Soil Types, 2006;
- Census of Agriculture 2010, final results;
- *Environmental Impact Assessment of National Road Schemes – A Practical Guide,* NRA, November *2008;*
- *Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5, HA 205/08* (Highways Agency *et al*., 2008) with respect to overarching assessment principles;
- *DMRB Section Volume 11, Section 3, Part 6 'Land Use'* (Highways Agency *et al*., 2001) for the assessment of effects on land use assets;
- Agricultural Land Classification of England and Wales, MAFF, 1988;
- Aerial Photography; and
- *Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis, PE-PAG-02031*, (TII, October 2016).

Scope of Assessment

The following aspects were considered in the quantitative assessment for the option selection process from an agriculture perspective;

- Land to be acquired – Landtake is one of the more significant impacts that can occur from an agricultural perspective. At this stage of the project the exact landtake is not known. However, there is a strong correlation between length of a proposed option and landtake. Therefore, the longer an

option the greater the landtake is likely to be, and consequently the least preferred from an agricultural perspective.

- Area and orientation of lands severed – Land severance can be a very significant impact particularly with dairy farms where milking facilities may be isolated from grazing paddocks due to a new scheme. While the extent of all land holdings may not be fully understood at this early stage of the project, the folios for each landparcel are available, and consideration of severance based on the folio data has been used in this option selection assessment.
- Removal of farm buildings and/or facilities – Removal of farm buildings and/or facilities will have a significant effect on an agricultural property. The significance of this effect is accentuated in dairy and high intensity faculties such as pig or poultry units. The removal of remote cattle/sheep handling facilities, while significant can generally be replaced and therefore be readily mitigated.
- Farm enterprises – As stated previously some farm enterprises are less able to absorb effects of a new road scheme. This can be particularly relevant for dairy farms and pig/poultry units but, depending on landtake and severance, may also significantly affect other enterprises such as beef and tillage.
- The proposed options may affect different farm enterprises as follows;
  - **Drystock:** Drystock farming (sheep, beef and sucklers) is the most common farm enterprise in the vicinity of the options. These animals, particularly the beef and sucklers, associated with this enterprise type are generally of a quiet disposition. These animals normally do not require moving on a daily basis but will require daily access and water, and facilities affected by a proposed option would have to be re-instated, even temporarily, as soon as is practicable unless otherwise agreed with the landowner.
  - **Dairy:** Dairy farming is generally considered one of the more profitable farming enterprises in this country. These farms require stock to be moved to and from the place of milking to the grazing area, usually close to the milking facilities, twice daily. Due to this frequency of animal movement the management of a dairy farm may be affected if access is restricted, even temporarily. Furthermore, landtake, even temporary, is potentially more significant on a dairy farm than other enterprises. There are a number of dairy farms (5 No.) potentially affected by the proposed options.
  - **Tillage:** Tillage farming is undertaken in the vicinity of the proposed options and while tillage farms may not require daily or even weekly access they do require regular access and do require access that is suitable for large machinery. Furthermore, the effective operation of large machinery benefits from large square fields. Triangulation of a field due to severance or reduction in field size due to landtake may reduce the effective operation of large machinery.
  - **Equine:** Horses, particularly thoroughbred horses are of a more nervous disposition than other stock types and are prone to stress caused by unaccustomed noise. Construction activities associated with the proposed road project may cause stress due to associated noise levels. There are no stud farms along the proposed options[1], but a number of farms do have sport horses and do partake in equine activities. Furthermore, land take and severance of land parcels may result in fields of an irregular shape (e.g. triangular shaped fields with sharp/narrow corners). These fields may be less suitable for grazing with horses due to an increased risk of injury.
  - **Pig/Poultry Facilities:** There are a number of intensive agricultural pig and poultry facilities situated in Co. Donegal. These facilities operate strict disease control protocols and cognisance of these disease protocols will be required before access is made to lands and/facilities associated with these enterprises. As a rule these facilities do not occupy large

[1] Stud farm as listed in the "Directory of the Turf"
http://www.directoryoftheturf.com/search_results.cfm/searchcategory/Stud%20Farms/searchcounty/Co%20Dublin

areas for the actual facilities but may require substantial spread lands and loss and/or severance from these lands may potentially impact the operation of these facilities. Noise may also be an issue, particularly for poultry units.

- **Horticulture:** These enterprises by their nature are intensively managed producing a high value product. These enterprises may have associated facilities such as polyethylene tunnels, glass houses or specialised irrigation/feeding systems. Landtake and severance will be a concern for these enterprise types.

- Intensity and viability of farming practices – Intensity and viability of farming practices can vary considerably within a study area and while the intensity is commonly dependent on the farmer's ability, it is also dependent on area farmed, enterprise type, soil type, topography etc. Consequent to reviewing the EPA/Teagasc soil mapping, discussions with landowners at public consultation meetings, and from undertaking windscreen surveys, there would appear to be very little difference in the intensity of many of the tillage and drystock farms in the region. Significant landtake and/or severance of these properties will potentially affect the management of these properties and in some instances tillage will no longer be viable in fields heavily triangulated and these fields will have to revert to drystock grazing.
- There are a number of large and very well managed dairy farms in the region and these farms, from observations and discussions, are managed very intensively. The viability of these farms to remain in dairy will be potentially affected by any proposed option that severs critical areas of the farm or has a substantial landtake. These farms will be considered in the option selection process.
- There is also a number of pig facilities potentially affected. These facilities appear to be intensively managed and, as such, may be limited to absorb the impacts of a new road acquiring or severing spreadlands.

1.1.1 Assessment Criteria

The following tables (**Table 1-1** and **Table 1-2**) consider the sensitivity of various agricultural operations, and the significance of the potential impact on agriculture. These assessments are broadly based on *Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5, HA 205/08* (Highways Agency *et al*., 2008) with respect to overarching assessment principles and *DMRB Section Volume 11, Section 3, Part 6 'Land Use*' (Highways Agency *et al*., 2001) and the requirements of the *Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis*, *PE-PAG-02031*, October 2016.

Table 1-1: Assessment of Environmental Value - Agriculture

Value (sensitivity)	Descriptions
Very high	▪ Stud farms; ▪ Equine therapy facilities; and ▪ Deer farms.
High	▪ Riding stables; ▪ Horse training facilities; and ▪ Poultry units;
Medium	▪ Dairy; ▪ Horticultural units; ▪ Pig units; and ▪ Forestry;
Low	▪ Sheep farms; ▪ Beef farms; ▪ Tillage farms; and ▪ Fodder conservation areas.
Negligible	▪ Fallow ▪ Scrub land

Table 1-2: Assessment of Significance – Agriculture

Significance category	Description of effect
Major (negative)	Effect of a proposed option on agricultural are such that the choice of this option is likely to be material in the decision making process.
Moderate (negative)	Effect of the proposed option on agricultural is important but unlikely to be key in the decision making process unless a large number of agricultural properties experience this effect.
Minor (negative)	Effect of the proposed option on agriculture is locally significant. The effects are unlikely to be critical in the decision making process but will be important in enhancing the subsequent design of the proposed road.
Neutral	Agriculture can absorb the effects of the proposed road.

Each option was assessed in line with the *Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis* TII[2] in October 2016. The comparative evaluation of options was assisted by scoring of agricultural receptors using an Impact Category Key as set out in **Table 1-3**.

Table 1-3: Impact Score Key (TII, 2016)

7	Major or Highly Positive
6	Moderately Positive
5	Minor or Slightly Positive
4	Not Significant/Neutral
3	Minor or Minor or slightly negative
2	Moderately negative
1	Major or Highly negative

Information Sources Used

The following information sources were utilised;

- Submissions made by landowners and other stakeholders;
- Discussions with landowners during consultation events; and
- Aerial photography.

Field Surveys Undertaken

No in-field surveys were undertaken for this comparative assessment of different proposed options. However, a number of windscreen surveys were undertaken.

Assumptions

The following assumptions were used for the comparative analysis between proposed options.

[2] The National Roads Authority (NRA) and the Railway Procurement Agency were merged to become Transport Infrastructure Ireland (TII) in 2015.

- Only properties where the land folio was greater than 0.5ha were considered 'agriculture' in the comparative analysis, unless a property, less than 0.5ha, contained an intensive agricultural industry or a critical facility on a separate and associated folio.
- For comparative purposes, the landtake was assumed to be on average 25m either side of the centreline of the proposed options.
- Strong correlation between road length and landtake.
- Portions of severed land that were less than 0.25ha were assumed to be of little value to the landowner, even if access could be provided and were therefore consumed into the overall assumed landtake for the project.
- Only options that potentially impacted agricultural lands were considered in this comparative analysis and sections online at the tie-in locations were not considered. Therefore, the length of an option was from the point the option went off-line through agricultural land.

Consultations

Consultations were undertaken by the project team, in particular by members of the dedicated Landowner Liaison Team, with members of the public, which included landowners.

2 EXISTING ENVIRONMENT

2.1 Baseline Information

According to the Census of Agriculture 2010[3] there are 9,240 farms in Co. Donegal utilising approximately 257,796 hectares. The most widespread type of farming in Co. Donegal is beef and sheep production which represents 74% of the farms compared, to a national average of 65%. There are 180 specialist dairy farms in the county, which represents approximately 2% of the total number of farms in the County.

A summary of these areas within Section 1 are described in **Table 2-1**, below.

Table 2-1: Summary of Agricultural Constraints within Scheme 1 N15 Ballybofey-Stranorlar Urban Region

Description	Area (ha)	Approx. No. of Farms[4]	Soils Grade 3a and higher (%)	Soils Grade 3b and lower (%)	Possible constraining enterprises within study area ('sensitive' farms)
Section 2 study area, the soil type and topography limit the type of agriculture and little or no tillage occurs in this area. The farms appear to be primarily drystock, with some forestry occurring on the more elevated areas and in particular in the south west of the study area. The River Finn runs through the centre of the study area and the towns of Ballybofey and Stranorlar are situated in the centre of the study area. There is considerable single house development in the surrounding areas.	5,233	133	28	72	▪ 2 Horticultural facilities ▪ 2 Equine facilities

[3] Central Statistics Office (2012) Census of Agriculture 2010 Final Results.
[4] Based on average farm size for the County and area of Study Area.

3 OPTION SELECTION

3.1 Option 1A (Orange)

- Landtake: This option is ranked 9th for length and is 8% longer than the shortest option. This option will affect 81 folios.
- Severance: The centreline of this option will significantly sever 44 folios.
- Constraining factors: This option does not appear to potentially affect any of the more sensitive farms identified in this section.
- Conclusion: This option is one of the longest options and is ranked 8th for overall preference.

3.2 Option 1A1 (Orange)

- Landtake: This option is ranked 12th for length and is the longest option in this section. This option is 19% longer than the shortest option. This option will affect 98 folios.
- Severance: The centreline of this option will significantly sever 54 folios.
- Constraining factors: This option does not appear to potentially affect any of the more sensitive farms identified in this section.
- Conclusion: This option is longest options and is the least preferred option.

3.3 Option 1B (Pink)

- Landtake: This option is ranked 1st for length and is the shortest option. This option will affect 74 folios.
- Severance: The centreline of this option will significantly sever 49 folios.
- Constraining factors: This option does appear to potentially affect one of the more sensitive farms identified in this section.
- Conclusion: This option is the shortest option but due to the number of folios that are significantly severed and the potential effect on sensitive farms, is ranked joint 3rd for overall preference.

3.4 Option 1B1 (Pink)

- Landtake: This option is ranked 8th length and is 8% longer than the shortest option. This option will affect 87 folios.
- Severance: The centreline of this option will significantly sever 56 folios.
- Constraining factors: This option does appear to potentially affect one of the more sensitive farms identified in this section.
- Conclusion: This option affects a high number of folios and a sensitive farm and is therefore ranked the 10th preferred option

3.5 Option 1C (Purple)

- Landtake: This option is ranked 10th for length and is 9% longer than the shortest option. This option will affect 75 folios.
- Severance: The centreline of this option will significantly sever the lowest number of folios, 34.
- Constraining factors: This option does not appear to potentially affect any of the more sensitive farms identified in this section.
- Conclusion: This option is one of the longest options. However, it does not appear to affect any sensitive farms and affects the lowest number of folios. Therefore this option is ranked joint 3rd for overall preference.

3.6 Option 1C1 (Purple)

- Landtake: This option is ranked 11th for length and is 18% longer than the shortest option. This option will affect 86 folios.
- Severance: The centreline of this option will significantly sever 38 folios.
- Constraining factors: This option does not appear to potentially affect any of the more sensitive farms identified in this section.
- Conclusion: This option is one of the second longest options but does not appear to affect any sensitive farms and is ranked the 7th for overall preference.

3.7 Option 1D (Red)

- Landtake: This option is ranked 3rd for length and is 3% longer than the shortest option. This option will affect 71 folios.
- Severance: The centreline of this option will significantly sever 37 folios.
- Constraining factors: This option will potentially affect two of the more sensitive farms identified in this section.
- Conclusion: This option is one of the shortest options and severs a lower number of folios. However, it does potentially affect two sensitive farms and is ranked the 2nd for overall preference.

3.8 Option 1D1 (Red)

- Landtake: This option is ranked 5th for length and is 5% longer than the shortest option. This option will affect 74 folios.
- Severance: The centreline of this option will significantly sever 40 folios.
- Constraining factors: This option will potentially affect two of the more sensitive farms identified in this section.
- Conclusion: This option is one of the middle options and ranked joint 4th for overall preference.

3.9 Option 1E (Green)

- Landtake: This option is ranked 2nd for length and is 1% longer than the shortest option. This option will affect 71 folios.
- Severance: The centreline of this option will significantly sever 36 folios.
- Constraining factors: This option will potentially affect two of the more sensitive farms identified in this section.
- Conclusion: This option is the second shortest option and severs the second least number of folios and is ranked 1st for overall preference.

3.10 Option 1E1 (Green)

- Landtake: This option is ranked 7th for length and is 7% longer than the shortest option. This option will affect 74 folios.
- Severance: The centreline of this option will significantly sever 39 folios.
- Constraining factors: This option will potentially affect two of the more sensitive farms identified in this section.
- Conclusion: This option is one of the longer options, although it affects the 2nd lowest number of folios and is therefore ranked the 5th for overall preference.

3.11 Option 1F (Blue)

- Landtake: This option is ranked 6th for length and is 6% longer than the shortest option. This option will affect 71 folios.
- Severance: The centreline of this option will significantly sever 42 folios.
- Constraining factors: This option does appear to potentially affect one of the more sensitive farms identified in this section.
- Conclusion: This option does affect the least number of folios (ranked joint 1st for number of folios affected along with 1D and 1E) it is a fairly long option and is therefore ranked joint 4th for overall preference.

3.12 Option 1F1 (Blue)

- Landtake: This option is ranked 5th length and is 5% longer than the shortest option. This option will affect 77 folios.
- Severance: The centreline of this option will significantly sever 45 folios.
- Constraining factors: This option does appear to potentially affect one of the more sensitive farms identified in this section.
- Conclusion: This option is one that severs a larger number of folios and as such is ranked 6th for overall preference.

3.13 Option 1G (Yellow)

- Landtake: This option is ranked 4th for length and is 5% longer than the shortest option. This option will affect 78 folios.
- Severance: The centreline of this option will significantly sever 57 folios.
- Constraining factors: This option will potentially affect two of the more sensitive farms identified in this section.
- Conclusion: This option potentially severs the largest number of folios and is ranked 9th for overall preference.

3.14 Comparison of Options

A comparison of each option is presented in **Table 3.1**.

Table 3.1: Summary of assessment for Section1: N15 Ballybofey-Stranorlar Urban Region

Option	Quantitative Assessment[5]	Qualitative Assessment/ Impact	Impact Score	Ranking	Preference
1A	24	Moderately negative	2	8	Intermediate
1A1	33	Moderately negative	2	11	Intermediate
1B	15	Moderately negative	2	3	Intermediate
1B1	30	Moderately negative	2	10	Intermediate
1C	15	Moderately negative	2	3	Intermediate
1C1	23	Moderately negative	2	7	Intermediate
1D	10	Moderately negative	2	2	Intermediate
1D1	16	Moderately negative	2	4	Intermediate
1E	8	Moderately negative	2	1	Preferred
1E1	17	Moderately negative	2	5	Intermediate
1F	16	Moderately negative	2	4	Intermediate
1F1	20	Moderately negative	2	6	Intermediate
1G	25	Moderately negative	2	9	Intermediate

[5] The quantitative assessment used a simple model that applied a score to the following parameters:
- Length of centreline;
- Number of constraints potentially affected;
- Number of folios intersected; and
- Number of folios significantly severed.

Donegal County Council

TEN-T Priority Route Improvement Project, Donegal

Section 1: N15/N13 Ballybofey/Stranorlar Urban Region

Option Selection Report

Appendix D1.10 – Material Assets (Non-Agricultural)

December 2019

Document Control Sheet

Client:	Donegal County Council
Project Title:	TEN-T Priority Route Improvement Project, Donegal – Section 1: N15/N13 Ballybofey/Stranorlar Urban Region
Document Title:	Option Selection Report –Appendix D1.10 Material Assets (Non-Agricultural)
Document No.:	TT-MGT0337-RPS-00-01-RP-E-EN-1024

Rev. No.	Suitability	Effective Date	Revision Description	Checked	Approved
P01	S4	December 2019	Issue for publication	GMcE	TP

This report has been prepared by RPS/Barry Transportation on behalf of Donegal County Council. Any other persons who use any information contained herein do so at their own risk.

© RPS Barry Transportation 2019

Table of Contents

1 INTRODUCTION 1
1.1 Methodology 1
1.1.1 Assessment Criteria 2
2 INFRASTRUCTURE 4
2.1 Introduction 4
2.2 Utilities 4
2.2.1 Electricity 5
2.2.2 Renewable Energy 5
2.2.3 Telecommunications 6
2.2.4 Water and Wastewater 6
2.2.5 Summary of Utilities 6
2.3 Transport 8
2.3.1 Roads 8
2.3.2 Rail 9
2.3.3 Summary of Transport 9
2.4 Waste 10
2.4.1 Waste Management 10
2.4.2 Waste 10
2.5 Forestry 11
3 PROPERTIES 12
3.1 Introduction 12
3.2 Existing Environment 14
3.2.1 Settlements, Zoning and Policy Objectives 14
3.2.1.1 Settlements 14
3.2.1.2 Rural Area Types 15
3.2.1.3 Landscape Designations 15
3.2.1.4 Development Zoning 15
3.3 Options Assessment 16
3.3.1 Comparison of Options 16
3.3.1.1 Settlements and Zoning 16
3.3.1.2 Potential to Impact on Residential Properties 18
3.3.1.3 Existing Commercial Properties 19
3.3.1.4 Existing Community Facilities 21
3.3.1.5 Community Severance 23
3.3.1.6 Tourism 24
4 CONCLUSION 26

List of Figures

Figure 2-1: Telecommunications and Electrical Networks in Donegal County 4

List of Tables

Table 1-1: Criteria Assessed under Material Assets (Non-agricultural) 2
Table 1-2: Impact Scoring Key (TII, 2016) 3
Table 2-1: Electricity Line Impacts 5
Table 2-2: Renewable Energy Impacts 5
Table 2-3: Telecommunications Impacts 6
Table 2-4: Water and Wastewater Impacts 6
Table 2-5: Utilities Impacts 7
Table 2-6: Road Network Impacts 9
Table 2-7: Rail Network Impacts 9
Table 2-8: Transport Impacts 9
Table 2-9: Waste Facility Impacts 10
Table 2-10: Waste Impacts 11
Table 2-11: Forestry Impacts 11
Table 3-1: Settlements and Zoning Impacts 17
Table 3-2: Residential Properties Impacts 19
Table 3-3: Commercial Properties Matrix 20
Table 3-4: Community Facilities Matrix 23
Table 3-5: Community Severance Matrix 24
Table 3-6: Tourism Matrix 25
Table 4-1: Option Preference Matrix 27
Table 4-2: Option Impact Scoring Matrix 28

1 INTRODUCTION

This report examines the Material Assets (Non-agricultural) for Section 1: N15 Ballybofey-Stranorlar Urban Region of the TEN-T Priority Route Improvement Project in Donegal and will form part of the Phase 2 Option Selection Report. Refer to Section 1.2 of the Option Selection Report for a description of the project.

Thirteen proposed options are assessed in this report, namely: Options 1A (Orange), 1A1 (Orange), 1B (Pink), 1B1 (Pink), 1C (Purple), 1C1 (Purple), 1D (Red), 1D1 (Red), 1E (Green), 1E1 (Green), 1F (Blue), 1F1 (Blue) and 1G (Yellow).

The principal objectives of the assessment are to:

- Complete a desk study and to obtain relevant data relating to material assets including infrastructure and properties each option;
- Assess the significance of the likely direct physical impacts of the proposed road scheme on non-agricultural material assets along each option within a 300m wide corridor;
- Evaluate and compare the impact on non-agricultural material assets for each option taking into account interactions with other environmental, engineering and economic criteria;
- Assess each option in line with the Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis issued by the NRA[1] in October 2016; and
- Based on the above assessments, compare and rank the options in order of preference.

The extent of the overall study areas within the three sections have been identified and detailed in the main body of the Option Selection Report.

1.1 Methodology

The methodology adopted for the assessments comprised primarily of a desktop study and information gathered during windscreen surveys in Section 1. These elements, including transport infrastructure, utilities and non-agricultural landuse, were used to identify and describe areas of potential infrastructural value or sensitivity. Information sources used in the assessments included the following:

- OSi mapping;
- Aerial photography (online resources);
- Utilities datasets (ESB, GNI, broadband, telecoms);
- Water and wastewater treatment infrastructure datasets (EPA and Irish Water);
- County Donegal Development Plan 2018-2024;
- Seven Strategic Towns Local Area Plan 2018-2024;
- An Post GeoDirectory;
- Fáilte Ireland and Discover Ireland websites; and
- Site visit including a windscreen survey of the surrounding area was undertaken.

The assessment has been carried out in two parts. The first part in **Section 2** covers the impacts associated with infrastructure and the second part in **Section 3** covers impacts on properties. The overall impact assessment for Material Assets (non-agricultural) is then summarised at the end of this report in **Section 4**.

[1] The National Roads Authority (NRA) and the Railway Procurement Agency were merged to become Transport Infrastructure Ireland (TII) in 2015.

1.1.1 Assessment Criteria

The assessment scores each of the 13 no. options against the criteria set out in this section. The criteria for assessment have been selected in accordance with the '*Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis PE-PAG-02031'* TII, 2016, (hereafter referred to as the *PAG Unit 7*) and the *EPA Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (EIAR)[2] (EPA, 2017). The criteria that have been used for the assessment of Material Assets (Non-agricultural) are provided in **Table 1-1**.

Table 1-1: Criteria Assessed under Material Assets (Non-agricultural)[3]

Environmental Factor	Criterion
Infrastructure	Utilities covering: • Electricity • Renewable energy • Telecommunications • Water and wastewater
	Transport Infrastructure covering: • Roads • Rail
	Waste Management covering • Waste facilities • Waste[4]
	Forestry
Properties	Settlements and Zoning
	Residential
	Commercial
	Community Facilities
	Community Severance
	Tourism

Table 1-2 below sets out the seven impact scoring ratings used in this assessment as outlined in PAG Unit 7.

[2] http://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf
[3] Content sourced from EPA Guidelines (2017) http://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf
[4] Waste is a standalone topic under Unit 7 of the PAG. The impact scores are therefore considered within that topic and are not brought forward into the impact scores for Material Assets (Non-agricultural).

Table 1-2: Impact Scoring Key (TII, 2016)

7	Major or Highly Positive
6	Moderately Positive
5	Minor or Slightly Positive
4	Not Significant/Neutral
3	Minor or Minor or slightly negative
2	Moderately negative
1	Major or Highly negative

2 INFRASTRUCTURE

2.1 Introduction

Material assets can be defined as economic assets of natural and human origin, or cultural assets of a physical and social type. This section identifies the constraints of the proposed scheme in relation to Material Assets (Non-agricultural) with particular reference to utilities, transport infrastructure, and non-agricultural land use.

2.2 Utilities

Utilities covers the electricity transmission and distribution systems, renewable energy infrastructure, telecommunications infrastructure, water and wastewater infrastructure. There are no gas pipelines in the north west of Ireland.

Figure 2-1 illustrates the telecommunication and electricity network infrastructure within County Donegal from the County Donegal Development Plan (2018-2024).

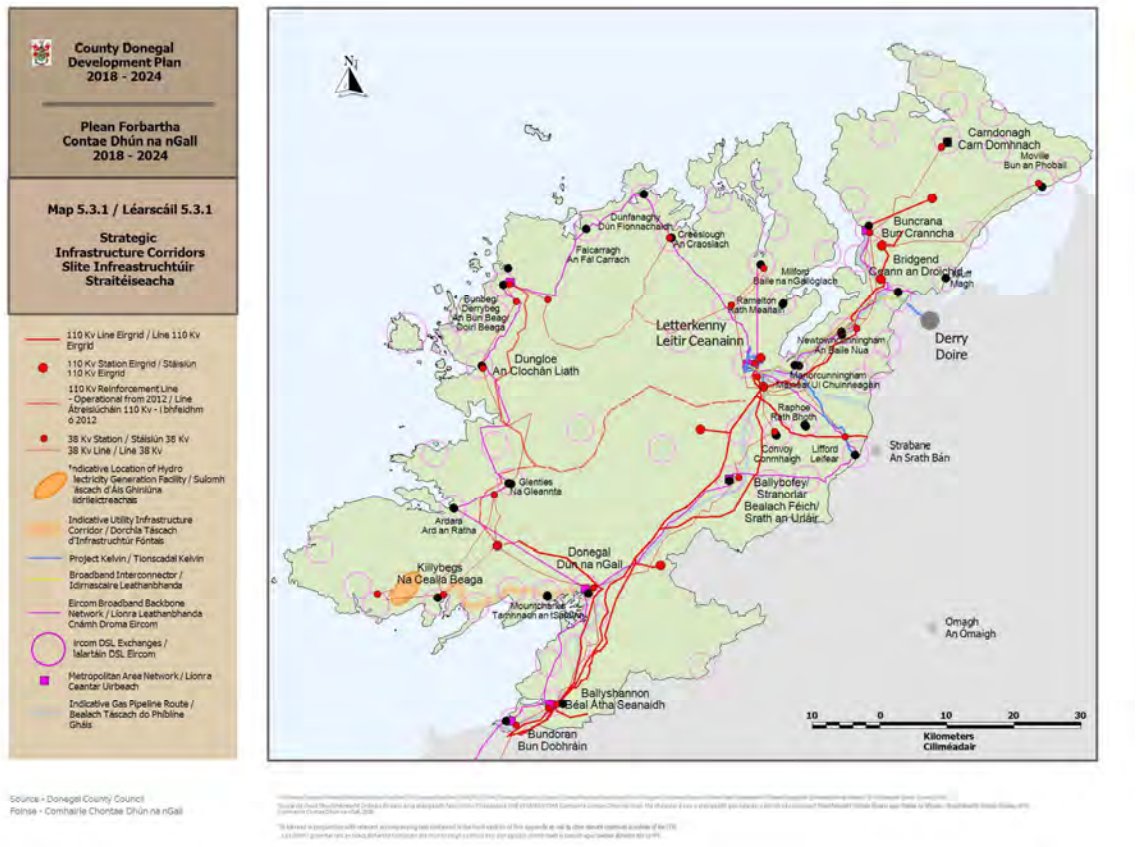


Figure 2-1: Telecommunications and Electrical Networks in Donegal County[5]

[5] http://www.donegalcoco.ie/media/donegalcountyc/planning/pdfs/viewdevelopmentplans/countydonegaldevelopmentplan2018-2024/partaandb/Map%205.3.1%20Strategic%20Infrastructure%20Corridor.pdf

2.2.1 Electricity

The Section 1 study area hosts 2 no. 110kV Eirgrid transmission lines, one on either side of N15 along with one 110kV Eirgrid station west of the Drumkeen area proximal to the study area. A 38kV Eirgrid distribution line transects the study area boundary in a south-west to north-east direction overlapping with Ballybofey-Stranorlar and the N15 in several places. This line continues to the Convoy area where it also connects to Letterkenny, within the Section 2 study area. The Ballybofey area hosts the 38kV substation associated with this 38kV line.

The area is serviced for the phone and broadband networks by Eircom which owns a DSL exchange within the study area at Ballybofey.

Options 1A, 1A1 (Orange), 1B, 1B1 (Pink), 1C and 1C1 (Purple) cross the northern 110kV line twice, while Options 1D, 1D1 (Red), 1E and 1E1 (Green) 1F, 1F1 (Blue) and 1G (yellow) cross the same line four times as they run in close proximity to the line for a distance of approximately 2.8km. None of the options impact the substation in Ballybofey. All options impact local electricity supplies.

Table 2-1: Electricity Line Impacts

Electricity	Orange		Pink		Purple		Red		Green		Blue		Yellow
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Crossings	2No. 110kV + local	2No. 110kV + local	2No. 110kV + local	2No. 110kV + local	2No. 110kV + local	2No. 110kV + local	4No. 110kV + local	4No. 110kV + local	4No. 110kV + local	4No. 110kV + local	4No. 110kV + local	4No. 110kV + local	3No. 110kV + local
Impact description	Slight-ve	Slight-ve	Slight-ve	Slight-ve	Slight-ve	Slight-ve	Slight -ve	Slight -ve	Slight -ve	Slight -ve	Slight -ve	Slight -ve	Slight -ve
Score	3	3	3	3	3	3	3	3	3	3	3	3	3

2.2.2 Renewable Energy

The County Donegal Development Plan 2018 – 2024 aims to facilitate the development of a diverse energy portfolio by the sustainable harnessing of the potential for wind, solar, hydro, wave, tidal, biomass, oil and gas.

Planning applications to Donegal County Council were checked in September 2018 and no planning applications relating to renewable energy projects within the project study area had been submitted.

The options are located within relatively close proximity to each other, are located several kilometres away from the nearest windfarm, are not located close to coastal areas, and do not cross any existing oil or gas lines. Therefore, all options will have a neutral impact on renewable energy.

Table 2-2: Renewable Energy Impacts

Renewable Energy	Orange		Pink		Purple		Red		Green		Blue		Yellow
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Impact on Sites	None	None	None	None	None	None	None	None	None	None	None	None	None
Impact description	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Score	4	4	4	4	4	4	4	4	4	4	4	4	4

2.2.3 Telecommunications

Progress had been achieved through national and EU co-funded projects in addressing the broadband core network and international connectivity deficits, through the implementation of the Metropolitan Area Networks Schemes in towns such as Ballybofey-Stranorlar.

None of the options impact the Eircom DSL exchange or the Metropolitan Area Network, although all options will impact local communication lines at road crossings.

Table 2-3: Telecommunications Impacts

Telecomms	Orange		Pink		Purple		Red		Green		Blue		Yellow
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Supplies crossed	local	local	local	local	local	local	local	local	local	local	local	local	local
Impact description	Slight -ve	Sligh t-ve	Slight-ve	Slight-ve	Slight -ve	Slight -ve	Slight-ve	Slight-ve	Slight-ve	Slight-ve	Slight-ve	Slight-ve	Slight-ve
Score	3	3	3	3	3	3	3	3	3	3	3	3	3

2.2.4 Water and Wastewater

The study area is located in the Finn/ Derg/ Foyle Water Management Unit (WMU) Action Plan area. Lough Mourne is the public water supply source for Ballybofey-Stranorlar and its environs. Lough Mourne is located approximately 7.6km south of Ballybofey town, immediately east of the N15. The N15 is located adjacent to the Burn Daurnett, a tributary of the River Finn.

The primary waste water treatment (WWT) plant located with the study area is Ballybofey-Stranorlar WWT. The WWT was assigned a “Pass” grade by the EPA’s Urban WWT 2015 assessment[6].

None of the options impact the WWT, although all options will impact local water supplies (including private wells).

Table 2-4: Water and Wastewater Impacts

Water Supply and waste water	Orange		Pink		Purple		Red		Green		Blue		Yellow
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Supplies crossed	local	local	local	local	local	local	local	local	local	local	local	local	local
Impact description	Slight -ve	Slight -ve	Slight - ve	Slight-ve	Slight - ve	Slight-ve	Slight -ve	Slight - ve	Slight - ve	Slight - ve	Slight -ve	Slight -ve	Slight -ve
Score	3	3	3	3	3	3	3	3	3	3	3	3	3

2.2.5 Summary of Utilities

A summary of the utilities impacts and preferences is provided in **Table 2-5**.

[6] Urban Waste Water Treatment in 2015 Report:
https://www.epa.ie/pubs/reports/water/wastewater/2015%20urban%20waste%20water%20report_Web%20Version.pdf

Table 2-5: Utilities Impacts

Option	Electricity	Renewables	Telecomms	Water & Wastewater	Impact	Impact Score	Preference
1A (Orange)	3	4	3	3	Minor to slightly negative	3	Preferred
1A1 (Orange)	3	4	3	3	Minor to slightly negative	3	Preferred
1B (Pink)	3	4	3	3	Minor to slightly negative	3	Preferred
1B1 (Pink)	3	4	3	3	Minor to slightly negative	3	Preferred
1C (Purple)	3	4	3	3	Minor to slightly negative	3	Preferred
1C1 (Purple)	3	4	3	3	Minor to slightly negative	3	Preferred
1D (Red)	3	4	3	3	Minor to slightly negative	3	Least Preferred
1D1 (Red)	3	4	3	3	Minor to slightly negative	3	Least Preferred
1E (Green)	3	4	3	3	Minor to slightly negative	3	Least Preferred
1E1 (Green)	3	4	3	3	Minor to slightly negative	3	Least Preferred
1F (Blue)	3	4	3	3	Minor to slightly negative	3	Least Preferred
1F1 (Blue)	3	4	3	3	Minor to slightly negative	3	Least Preferred
1G (Yellow)	3	4	3	3	Minor to slightly negative	3	Intermediate

2.3 Transport

2.3.1 Roads

The three key transport routes in County Donegal are the N56/N13, N14 and N15. The N56/N13 is a strategic route connecting Letterkenny and north Donegal to Belfast via Derry and the rest of the National Primary network in County Donegal. The N13 and N14 are linked at Manorcunningham, joining Letterkenny to Lifford (the County Town) and onto the A5 at Strabane in County Tyrone, Northern Ireland. The N15 runs from the border with Northern Ireland at Lifford through Ballybofey and Stranorlar to Leitrim and Sligo, forming the key route to Galway. It is the only national primary route connecting Donegal directly to the rest of the Republic of Ireland and is also a key route linking south Donegal to Derry and Belfast. It is the Section 1: N15 Ballbofey-Stranorlar Urban Region that is being assessed within this Technical Appendix.

A lack of available transport modes increases reliance on the road network for private and commercial movements. The TEN-T network in County Donegal performs a variety of functions and is particularly important for the following:

- Businesses – supporting cross-border relations and key transport hubs, including Killybegs harbour, Ireland's largest fishing port.
- Commuters – providing access to employment and facilitating cross border trips.
- Leisure, including tourist trips – providing connectivity between County Donegal and the rest of the island of Ireland.

Each of the options will directly impact on the existing national road network at the termination points during construction. At the southern end of Section 1, all options tie in with the N15 while at the northern end of Section 1 they tie in with the N13. However, the temporary to short-term impacts associated with the construction phase will be greatly outweighed by the permanent operation of a new national road bypassing the twin-towns and providing greater connectivity to the north and north-west of the country. This will substantially decrease the volume of traffic currently passing through the centres of the towns.

For Section 1, in addition to the existing TEN-T national primary routes, there are a number of regional roads within and associated with the study area. These include:

- R252 which forms a junction with the N15 in Ballybofey town centre in Section 1.
- R236 which begins north of Stranorlar at a priority junction with the N13 within the Section 1 study area and aligns in a westerly direction through the towns of Convoy and Raphoe until it crosses the N14 in the Section 3 Study area. At this crossing point, the R236 forms a staggered junction with the existing N14 and continues onto St. Johnston. The regional road then continues along the River Foyle to form a cross-border route into Derry.

Each option requires a crossing of the R252 with link roads creating junctions to this regional road. The proposed new national road will provide connection points with the existing regional road network, thereby providing greater connectivity within the regions.

All options will impact the local road network where the proposed alignment crosses the local roads. Where feasible, existing local road connectivity will be retained by the provision of alternative routes, an underbridge or an overbridge. None of the proposed options directly impact existing rail, road or river bridges.

There will be disruption and temporary to short-term impacts on local roads during the construction phase of the proposed new national road. In certain cases, some local roads may be permanently closed or re-directed. This may lead to increased travel times for local road users. However, the majority of local roads directly impacted by the alignment of the proposed national road will see permanent benefits after the construction period including better alignments with improved safety, improved junctions, and improved connectivity to the regional road network.

Overall there are moderately positive impacts associated with the transport infrastructure in Section 1 taking into consideration the impacts on the national, regional and local road networks. **Table 2-6** summarises the road network impacts at each proposed option.

Table 2-6: Road Network Impacts

Transport Infrastructure	Orange		Pink		Purple		Red		Green		Blue		Yellow
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Impact description	Mod +ve	Mod +ve	Mod +ve	Mod +ve	Mod +ve	Mod +ve	Mod +ve	Mod +ve	Mod +ve	Mod +ve	Mod +ve	Mod +ve	Mod +ve
Score	6	6	6	6	6	6	6	6	6	6	6	6	6

2.3.2 Rail

No live railway network exists in Donegal. There is a dismantled railway line within the study area, located to the south and east of the towns. None of the options impact the dismantled railway line.**Table 2-7** outlines the rail network impacts.

Table 2-7: Rail Network Impacts

Rail Network	Orange		Pink		Purple		Red		Green		Blue		Yellow
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Rail network impacted	None	None	None	None	None	None	None	None	None	None	None	None	None
Impact	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Score	4	4	4	4	4	4	4	4	4	4	4	4	4

2.3.3 Summary of Transport

A summary of the transport impacts and preferences is provided in **Table 2-5**. As the rail impacts are neutral the overarching impact is the impacts on the road network. As discussed in that section, the overall impacts will be moderately positive for each option. All options are preferred.

Table 2-8: Transport Impacts

Option	Road	Rail	Impact	Impact Score	Preference
1A (Orange)	6	4	Moderately positive	6	Preferred
1A1 (Orange)	6	4	Moderately positive	6	Preferred
1B (Pink)	6	4	Moderately positive	6	Preferred
1B1 (Pink)	6	4	Moderately positive	6	Preferred
1C (Purple)	6	4	Moderately positive	6	Preferred
1C1 (Purple)	6	4	Moderately positive	6	Preferred
1D (Red)	6	4	Moderately positive	6	Preferred
1D1 (Red)	6	4	Moderately positive	6	Preferred
1E (Green)	6	4	Moderately positive	6	Preferred
1E1 (Green)	6	4	Moderately positive	6	Preferred
1F (Blue)	6	4	Moderately positive	6	Preferred
1F1 (Blue)	6	4	Moderately positive	6	Preferred
1G (Yellow)	6	4	Moderately positive	6	Preferred

2.4 Waste

2.4.1 Waste Management

Waste management considers the physical infrastructure associated with licenced waste facilities that may be impacted by the construction of a proposed option. There is one recycling centre located in Stranorlar which is operated by Bryson recycling which accepts a range of recyclable materials free of charge, while charges are applied to other household waste. This facility is located on Railway Road in Stranorlar, a location in close proximity to the town centre. None of the options impact the Bryson recycling centre, so all are neutral impact, as summarised in **Table 2-9**.

Table 2-9: Waste Facility Impacts

Waste Facilities	Orange		Pink		Purple		Red		Green		Blue		Yellow
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Impact description	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Score	4	4	4	4	4	4	4	4	4	4	4	4	4
Preference	Prefer.	Prefer.	Prefer.	Prefer.	Prefer.	Prefer.	Prefer.	Prefer.	Prefer.	Prefer.	Prefer.	Prefer.	Prefer.

2.4.2 Waste

For the purposes of the Option Selection Report, the topic of Waste is a standalone criterion as per PAG Unit 7. However, the topic is presented here, in Material Assets (Non-agricultural), as it is naturally associated with waste management. In terms of the impact scores and preferences from this Waste section, the information is presented here for information purposes only and the information from this section is used to inform the impact assessment for that criterion within the Option Selection Report in Volume A. In order to prevent double counting of waste impacts the information in this section does not form part of the overall Material Assets (Non-agricultural) impact assessment presented in **Section 3** below.

Waste is defined as any substance or object which the holder discards or intends or is required to discard. In terms of a road construction project, most naturally occurring materials excavated as part of the works will not be considered a waste as they can be re-used within the works. All excavated material from the site of the proposed road will be managed in accordance with best practice to ensure in so far as possible that there is minimal waste generated.

Any excavated contaminated material will be removed off-site for disposal at an authorised waste management facility. Currently, there is no indication of contaminated material being present within the footprint of the options.

Where there is a deficit of fill material for the construction of the project then clean soil and stones must be imported from other sources to make up the shortfall.

The cut/fill balance estimates associated with each option are summarised in **Table 2-10** below. The total figures presented below **do not** represent the volume of waste that will be generated from each option. They are an indication of an excess in either cut or fill from initial road alignments designed during Phase 2. It is only in Phase 3, following detailed site investigation, that an estimation of the likely quantities of unsuitable material can be determined. Following that, an estimation can be made on any unsuitable material that may not be capable of being processed into an acceptable material and therefore will require disposal as a waste.

There is a significant variance in the cut/fill volumes of material associated with the options. All options have high earthwork operations given the varying topographic nature of the site, with significant cuttings and

embankments on all options. As there is only a preliminary alignment available at this Phase 2 Options Selection process, the figures presented in **Table 2-10** are best estimates and subject to change in Phase 3.

Options 1F1 and 1G have the lowest cut/fill differences and therefore score a neutral impact, Options 1D1 and 1E1 require an import of material and therefore have a neutral impact for waste. Options 1D and 1E is the option with the largest difference and is therefore considered to have a major negative impact. All other options range between minor to slightly negative and moderately negative.

Table 2-10: Waste Impacts

Waste	Orange		Pink		Purple		Red		Green		Blue		Yellow
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Cut/Fill difference ('000 m3)	184	191	590	524	145	152	1,171	-204	1,991	-85	171	99	29
Impact description	Mod - ve	Mod - ve	Mod - ve	Mod -ve	Mod -ve	Mod - ve	Maj-ve	Neutral	Maj-ve	Neutral	Mod -ve	Slight - ve	Neutral
Score	2	2	2	2	2	2	1	4	1	4	2	3	4
Preference	Interm	Interm	Interm	Interm	Interm	Interm	Least Prefer.	Prefer.	Least Prefer.	Prefer.	Interm	Interm.	Prefer

2.5 Forestry

Teevickmoy, Troopers hill and Holywell Woods are the areas of commercial forestry impacted by the options and comprises a combination of conifer and broadleaf forests over a total area of approximately 75 hectares.

The area of forestry impacted by the option corridors and the associated impact scores are presented in **Table 2-11**.

Table 2-11: Forestry Impacts

Forestry	Orange		Pink		Purple		Red		Green		Blue		Yellow
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Area of commercial forestry Impacted (Hectares)	9.5	9.5	17.8	17.8	24.2	24.2	11.4	11.4	13.8	13.8	9.7	9.7	10.0
Impact description	Slight - ve	Slight - ve	Mod - ve	Mod - ve	Mod - ve	Mod - ve	Slight - ve	Slight - ve	Slight - ve	Slight - ve	Slight - ve	Slight - ve	Slight - ve
Score	3	3	2	2	2	2	3	3	3	3	3	3	3
Preference	Interm	Interm	Least Pref	Least Pref	Least Pref	Least Pref	Interm.	Interm.	Interm.	Interm.	Interm.	Interm.	Interm.

3 PROPERTIES

3.1 Introduction

In terms of the assessment on properties, as detailed in this section, the assessments take account of existing planning permissions within each option which may be impacted by the proposed road development. The planning permissions referenced are based on a search of the Donegal County Council online planning register system on 4th February 2019. Those included relate only to those developments which are permitted but as yet do not appear to have been implemented.

A windshield survey and site visit was undertaken on 5th September 2018 which comprised driving each of the options to ground-truth the findings of the desktop survey and provide further detail with respect to physical structures and land uses such as schools, playing pitches, local businesses, tourist attractions and amenity facilities such as walkways and trails.

The assessments focus on the following areas:

Potential to Impact on Land Zoned for Development or other Purposes

Impacts on County Donegal Development Plan 2018 - 2024 and the Seven Strategic Towns Local Area Plan 2018-2024 zoning objectives.

Potential to Impact Existing Properties (Residential, Commercial, Community Facilities, Community Severance and Tourism)

Existing Residential Properties

This assessment compares the options with respect to potential impact on residential properties. It does not specifically identify noise impacts, traffic delays / disruption impacts or visual impacts etc. as these topics are dealt with in separate assessments by the relevant specialists. Instead, it considers the overall impact to residential amenity in terms of the proximity of each of the options to residential properties. Data from the An Post GeoDirectory system was utilised to map and calculate the number of properties within bands of 0-50m, 50-100m, 100-200m and 200-300m from the centreline of each option.

The GeoDirectory data categorises properties into residential, commercial, both or unknown. For the purposes of this assessment, 'residential' and 'both' categories have been considered together to represent the various numbers of residential properties. The 'unknown' properties have been excluded for the purposes of this assessment.

Each option represents a 300m wide assessment corridor, within which the road itself would be situated. It is acknowledged that the road itself could be located outside the current identified centreline of each option following more detailed survey and, assessment and detailed design. For the purposes of this assessment however, it is assumed that the centreline of the option represents the centreline of the proposed final road and therefore the properties within the 0-50m band will experience a more negative impact to residential amenity than those in the 50-100 and 100-300m bands, the latter of which represents up to 300m from the centreline and is equivalent to up to 150m from the edge of the option. While the road alignment may be adjusted in future within a selected option, at this stage of assessment, this cannot be confirmed.

Dwellings within 0-50m of the centreline are assumed to have greater potential for significant to profound adverse impacts where environmental impact assessment is being carried out on a final option, i.e. dwelling houses within this banding have the greatest potential for demolition or at the least significant reduction of property size and / or encroachment close to a residence such as its residential amenities will be

substantially affected. In such cases, considerable mitigation measures would be necessary and not all difficulties would be overcome.

While the impact on individual properties may be deemed to be significant to profound during environmental impact assessment, at this stage of assessment it is not considered appropriate to allocate a 'major impact' scoring on the basis of impacts to individual properties. The potential level of impact is considered in light of potential room for manoeuvre within the option so as to avoid potentially impacted properties and for mitigation measures to be applied. Scoring is also considered relative to the scale and purpose of the proposed development and its setting.

Beyond this 0-50m band, given the likely scale of the proposed option (i.e. completed width of road and associated infrastructure / land take) and given the potential for movement of the road alignment within the selected assessment corridor, properties within 300m are considered. Those within 100m of the current centreline having the next highest potential for impact, albeit at a reduced risk to those within 0-50m, of significant to profound impact. The greatest potential for successful mitigation applying to those between 100m and 300m.

Scoring is based on an assignment of minor negative where <25 residential properties are located within 50m of the centreline, moderate negative where 25-50 residential properties is the number identified within this band and major where >50 such properties are located within the band. Qualitative considerations can result in adjustment where necessary, e.g. where a particular impact is identified on review of mapping or documentation or during site visit. While quantified within the ratings / assessment table, the number of properties in the outer bands are reviewed for any particular anomalies or areas of concern. These will not necessarily influence the scoring.

Commercial Properties

The assessment for commercial properties has followed a similar methodology to that of residential properties. Geodirectory data for 'commercial' and 'both' were used, and properties identified as 'unknown' were discounted at this level of assessment. A site visit clarified the extent and type of commercial properties within the various assessment corridors. With respect to commercial properties, the numbers of properties within 0-50m are again given the priority level of consideration for scoring, with a minor negative assigned where 0-10 no. commercial properties are located within 0-50m of the centreline, a moderate negative assigned where 10-25 no. such properties are located within that band and a major negative assigned where there are >25 no. commercial properties within 50m of the centreline. Again, the numbers of commercial properties within the 50-100m band and 100-300m band is recorded and reviewed for any anomalies of significance with allowance made of adjustment on qualitative grounds where necessary.

Community Facilities

This section focusses on the number and type (sensitivity) of community facilities such as schools, churches, amenity grounds such as playing pitches and walkways, medical facilities and childcare service providers located within or near the options.

A minor negative rating is applied to options where there are no receptors or a very low number of receptors within an assessment corridor and the receptors identified serve relatively small number of people that do not comprise particularly sensitive groupings. A major negative would be assigned where there is potential for direct significant or profound impacts to facilities serving large population numbers (e.g. large hospitals or major recreational facilities) or a large number of locally important facilities or where particularly sensitive groupings are substantially affected. A moderate negative scoring is assigned to impacts which lie between these parameters, whereby local facilities are potentially impacted to a significant extent or larger facilities could be impacted but to a lesser extent than a direct significant or profound extent.

Community Severance

There is a risk of creating community severance where new options are provided that intersect existing pedestrian linkages in particular and / or significantly increase vehicular journey times from residential areas to community facilities and other services. Severance can be created by either a physical or psychological barrier. A major negative impact would apply in an instance for example where a large-scale housing development would be cut off from its local shops, services and other community facilities. A moderate negative impact would apply where substantial clusters of residential development outside of major housing areas are potentially cut off from one or more important local services or facilities. A minor or slight negative impact would apply where a low number of properties are potentially cut off from local services but where mitigation is likely to be most effective.

This assessment is based on a high-level appraisal of GeoDirectory data based on mapped locations as opposed to numerical analysis and a review of development plan mapping to identify any severance of residential properties from nearby services. This is considered appropriate to this stage of assessment, particularly as the options have little interaction with substantial settlements.

Tourism

The assessment is based on the number and nature of known tourism attractions, tourist accommodation and / or amenity facilities that are of benefit to tourists, and which may also be of amenity value to the local resident and working community.

A major negative would be applied where a large-scale or internationally or nationally branded tourist facility is significant impacted. A moderate impact is applied where a regionally important visitor attraction, a large-scale accommodation facility such as a hotel or an amenity facility that has a regional function is potentially directly impacted or indirectly impacted to result in a significant or profound impact. A minor or slightly negative impact is assigned where a facility that is of importance to the local tourist economy and serves and amenity function to the local population is potentially impacted.

3.2 Existing Environment

3.2.1 Settlements, Zoning and Policy Objectives

3.2.1.1 Settlements

The proposed options are located in and close to the twin towns of Ballybofey and Stranorlar, which are considered as a single settlement for the purposes of this assessment and indeed are considered a single town within relevant planning policy documents. Outside of the settlement boundary for the twin towns, there are no other identified towns or villages within the study area. The settlement pattern largely comprises of linear or scattered one-off dwellings.

There are 2 no. identified concentrations of dwellings in the Aughasheil and Cappry areas. These are considered separately in the context of proximity of residential receptors to proposed options.

Ballybofey-Stranorlar is a Strategic Town as identified within the core strategy of the Donegal County Development Plan 2018-2024 (the CDP). These towns are key locations for population growth as discussed later in this report. Ballybofey-Stranorlar has been placed in this category of town based on the following factors:

- Development Centre focusing on the towns as a Centre of Excellence for Sport and Recreation
- Educational hub
- Proximity to Northern Ireland border and associated cross border context
- Extent of retail offering.

3.2.1.2 Rural Area Types

The proposed options are situated within three separate rural area types designated in the CDP: Urban Area, Stronger Rural Area and Area under Strong Urban Influence according to both Map 2A.1 '*Core Strategy Schematic Map*' and Map No. 6.2.1 '*Rural Area Types'*. All options begin in the west of the study area in an Area under Strong Urban Influence and all options culminate in the east in a Stronger Rural Area. The intervening areas comprises of a combination of all three of these rural area types.

3.2.1.3 Landscape Designations

The CDP has three landscape designation categories – 'moderate', 'high' and 'especially high'. These are illustrated in Map No. 7.1.1 'Scenic Amenity' of the CDP. All routes originate in the west of the study area in an area of moderate scenic amenity and then travel east through an area of high scenic amenity. The only exceptions to this with respect to the proposed new road routes are the sections of potential link roads indicated as to be located to the south of the N13. These are located in a moderate scenic area.

3.2.1.4 Development Zoning

With regard to local zoning objectives within Ballybofey-Stranorlar, the main sections of the 1B/1B1 (Pink), 1C/1C1 (Purple) and 1A/1A1 (Orange) options are all outside of the development boundary to Ballybofey-Stranorlar and therefore not specifically zoned for development. The westernmost combined portion of the 1F/1F1 (Blue), 1E/1E1 (Green), and 1D/1D1 (Red) options and other sections of each of these options further north and east intersect areas zoned for 'Local Environment' and 'Recreation and Amenity'. In the case of the latter the options sever a large plot of land potentially developable for substantial recreational facilities. The 1G (Yellow) option also bisects same and intersects lands zoned for 'Local Environment'.

In all cases the link options intersect a negligible area of land zoned for 'Recreation and Amenity' uses at the east of the towns.

The following objectives are the relevant objectives of the LAP:

> *"Local Environment: To provide for limited one-off housing and small-scale economic development so as to ensure the continued settlement pattern and sequential and transitional development of the towns through to rural areas….*
>
> *Recreation and Amenity: To reserve and enhance land for formal and informal open space and amenity purposes, and to make provision for new amenity and recreation facilities."*

The 1F/1F1 (Blue), 1E/1E1 (Green), 1D/1D1 (Red) and 1G (Yellow) options also slightly overlap with an area of woodland at Troopers Hill zoned as 'Masterplan Area', specifically with areas outlined as 'Passive Open Space / Recreation and Amenity' and 'Heavily Wooded Areas'. Policy BS-TR-4 refers to this Masterplan area and states the following in relation to both of the above-named specific areas:

> "*It is a policy of the Council to consider development proposals within Masterplan Area 2 (Figure 5.8 refers) Drumboe where they would comply with the following policy framework:*
>
> ***"2. Passive Open Space, Recreation, Amenity and Tourism**: These areas are particularly important visually. They shape and support the special character and recreational value of the masterplan area. Together with the wooded areas, the amenity areas establish a green lung for the towns. Therefore, development will not be permitted within these zones, as it would detract from the unique recreational, historical, cultural and social value of the area. However, passive recreational use may be acceptable in amenity areas in the form of extension of walkways, seating, signage or provision of a playground, where it can be accommodated without comprising the character of the area.*

> ***7. Heavily Wooded Zones:*** *No development will be permitted within such areas with the exception of proposals for passive recreational use of these areas. This policy is to ensure the protection of these lands as well as the rich flora and fauna, which it accommodates. The woodland areas form and contribute to the provision of a green lung, which forms part of the unique recreational value of the area. It is an objective of the masterplan to identify linked access routes to the wooded areas and to advocate the opening of same for public enjoyment."*

Areas identified for pedestrian linkages are intersected by some of the option.

3.3 Options Assessment

Options have been scored with reference to the criteria set out in **Table 1-2** relating to proximity to and number of residential, community and commercial properties, tourism resources and severance of communities.

3.3.1 Comparison of Options

Section 3.3.1.1 to **3.3.1.6** present the assessments of each option with reference to the criteria set out above. These assessments are based on a combination of qualitative and quantitative assessments as appropriate to the particular criterion. The particular basis for the assessments is provided for each criterion.

3.3.1.1 Settlements and Zoning

The existing road runs through the settlement of Ballybofey-Stranorlar, thus bringing all associated traffic through a built-up area. All of the proposed options are close to the town but will provide a bypass route. The 1D/1D1 (Red), 1F/1F1 (Blue) and 1E/1E1 (Green) options and the 1G (Yellow) options are the closest to the existing built-up area with parts of same being located within the settlement boundary of the town. These have more potential for impact on outlying developed areas and future potential expansion of the settlement. The 1A/1A1 (Orange), 1B/1B1 (Pink) and 1C/1C1 (Purple) are slightly more favourable in that they have less intersection with the 'settlement' as per the settlement boundary of the towns provided for within the relevant planning policy documents.

All options will contribute to the Core Strategy Objectives of the current County Donegal Development Plan through improvements in connectivity and will therefore be positive as set out in Volume A of the Options Selection Report.

Spatial elements and differentials associated with same are considered below with respect to specific mapped objectives for the TEN-T Project and for the zoning of lands to facilitate growth.

Rural area type zonings are largely provided for the management of proposals for single dwellings. While it is noted that new entrances to future development proposals are unlikely to be permitted along the proposed new road (as per TII policy for national roads), access to individual sites will still be achievable from the local road network. Therefore, the implementation of these zoning objectives will not be impeded by the proposed options. There is limited, if any, differential of any significance between the proposed options with respect to interaction with rural area types and the impact is considered neutral in all cases.

With respect to landscape zoning, as all options traverse an area of high scenic amenity, this will result in a negative scoring. There are no significant differentials between the options. The areas can absorb some development according to the CDP objectives and the significance is considered minor to slightly negative at this stage with respect to policy compliance on the assumption siting and design mitigation can be applied.

None of the proposed options will involve land take for residentially or commercially zoned land. The main potential for impact with respect to land use zonings relates to recreation and amenity zonings, particularly

a plot that is zoned for recreation and amenity zonings that is bisected by the 1D/1D1 (Red), 1F/1F1 (Blue), 1E/1E1 (Green) and 1G (Yellow) options.

An intersection with a Masterplan zoning objective is considered negligible with respect to any potential for future land take and it is likely that the final alignment of a road along any of those options that intersect same could easily avoid it if this is even necessary. However, the amenity value of the northern part of the Masterplan area may be impacted by the proximity of a major road and may need to be mitigated in the implementation of that Masterplan depending on the final alignment.

The 1D/1D1 (Red), 1F/1F1 (Blue), 1E/1E1 (Green) options also intersect pedestrian linkages as identified within the CDP, 1 no. in the case of the 1F/1F1 (Blue) options and 2 no. in the case of the 1D/1D1 (Red), 1E/1E1 (Green) and 1G (Yellow) options.

Each of the 1D/1D1 (Red), 1F/1F1 (Blue), 1E/1E1 (Green) and 1G (Yellow) options have been allocated a moderately negative scoring. This is due to their location (longer sections than other options) within the settlement boundary, their impacts on zoned recreation and amenity areas, intersection of objectives for pedestrian linkages, and proximity to zoned Masterplan lands for amenity use. The overall importance of recreation in the identification of the town as having a strategic role within Donegal is noted in this context.

Each of the 1B/1B1 (Pink), 1C/1C1 (Purple) and 1A/1A1 (Orange) options have been assigned a minor to slightly negative scoring due to the partial location in high scenic landscape zoning.

Table 3-1: Settlements and Zoning Impacts

Option	Qualitative Assessment	Score	Impact Score	Preference
1A (Orange)	Limited zoned lands impacted and local environment zoning. Partially in high scenic amenity area.	Minor to slightly negative	3	Preferred
1A1 (Orange)	Limited zoned lands impacted and local environment zoning. Partially in high scenic amenity area.	Minor to slightly negative	3	Preferred
1B (Pink)	Limited zoned lands and local environment zoning with link road corridor intersecting recreation and amenity zoning at east but partially in high scenic amenity area.	Minor to slightly negative	3	Preferred
1B1 (Pink)	Limited zoned lands impacted and local environment zoning. Partially in high scenic amenity area.	Minor to slightly negative	3	Preferred
1C (Purple)	Limited zoned lands impacted and local environment zoning. Partially in high scenic amenity area.	Minor to slightly negative	3	Preferred
1C1 (Purple)	Limited zoned lands impacted and local environment zoning. Partially in high scenic amenity area.	Minor to slightly negative	3	Preferred
1D (Red)	Significant length of the option inside settlement boundary. Intersects with pedestrian linkages in CDP and Local Environment, Recreation and Amenity and Masterplan Area in zoning map. Bisects a recreation and amenity zoning and is partially within high scenic amenity area.	Moderately negative	2	Intermediate
1D1 (Red)	Significant length of the option inside settlement boundary. Intersects with pedestrian linkages in CDP and Local Environment, Recreation and Amenity and Masterplan Area in zoning map. Bisects a recreation and amenity zoning and is partially within high scenic amenity area.	Moderately negative	2	Intermediate
1E (Green)	Significant length of the option inside settlement boundary. Intersects with pedestrian linkages in CDP and Local Environment, Recreation and Amenity and Masterplan Areas in zoning map. Bisects a recreation and amenity zoning and partially within high scenic amenity area.	Moderately negative	2	Intermediate

Option	Qualitative Assessment	Score	Impact Score	Preference
1E1 (Green)	Significant length of the option inside settlement boundary. Intersects with pedestrian linkages in CDP and Local Environment, Recreation and Amenity and Masterplan Areas in zoning map. Bisects a recreation and amenity zoning and partially within high scenic amenity area.	Moderately negative	2	Intermediate
1F (Blue)	Significant length of the option inside settlement boundary. Intersects with pedestrian link in CDP and Local Environment, Recreation and Amenity and Masterplan Areas in zoning map. Bisects a recreation and amenity zoning and partially within high scenic amenity area.	Moderately negative	2	Intermediate
1F1 (Blue)	Significant length of the option inside settlement boundary. Intersects with pedestrian link in CDP and Local Environment, Recreation and Amenity and Masterplan Areas in zoning map. Bisects a recreation and amenity zoning and partially within high scenic amenity area	Moderately negative	2	Intermediate
1G (Yellow)	Significant length of the option inside settlement boundary. Intersects with pedestrian linkages in CDP and Local Environment, Recreation and Amenity and Masterplan Area in zoning map. Bisects an amenity zoning and is partially within high scenic amenity area.	Moderately negative	2	Intermediate

3.3.1.2 Potential to Impact on Residential Properties

The options with the lowest number of properties in the 0-50m band (11-16 no.) are 1E/1E1 (Green) 1D/1D1 (Red), 1F1 (Blue) option, the 1B1(Pink) option, 1G (Yellow) option, and the 1F (Blue) option. As all of these have numbers of residential properties below 25 in this band, a minor or slight negative score has been assigned. The remainder of the options have a higher number of properties in the 0-50m band (28-40 no.) and are assigned a moderate negative score due to the increased number of sensitive receptors within the 0-50m band, where the potential for direct impact or significant indirect impacts are higher.

There are between 23 and 46 no. residential properties within the 50-100m band for each of the options and given the length of the options, a differential of such significance as to alter the scoring is not considered to apply.

For the 100-300m band, only the 1A (Orange), 1B (Pink) and 1C (Purple) options have less than 200 residential properties (but conversely have 25-50 residential properties in the 0-50m band). The 1E/1E1 (Green), 1F/1F1 (Blue), 1D/1D1 (Red), 1G (Yellow) and 1C1 (Purple) options all have 300+ residential properties in this band.

All options have over 200 residential properties within 300m of the centreline in total and counts in this band exceed 300 such properties in total for the 1D/1D1(Red), 1E/1E1 (Green), 1F/1F1 (Blue), and 1G (Yellow) options. This is consistent with the location of these options in the context of the settlement boundary as discussed previously. However, these options have low numbers within the 0-50m and 0-100m bands and it is considered that with some avoidance and mitigation, significant to profound impact on a substantial number of individual properties could be avoided with respect to issues associated with land take and resultant negative impact on residential amenity. As advised above, these options have been scored minor or slightly negative, particularly when the length and purpose of the options are considered.

There are no qualitative aspects that are considered to impact on the outcome of the above in the case of the options assessed; as discussed above, it is considered premature to consider potential land take aspects for residential properties and this will be addressed at a later stage of the process.

A review of extant planning permissions indicates that there are less than 10 no. potential new residential developments along the options, the largest number being along option 1A (Orange). The numbers are not considered to be of such a scale as to result in modifications to the scoring.

Table 3-2: Residential Properties Impacts

Option	Quantitative Assessment	Score	Score	Score
1A (Orange)	40 residential properties within 50m. 44 residential properties in 50-100m band. 145 residential properties within 100-300m.	Moderately negative	2	Intermediate
1A1 (Orange)	28 residential properties within 50m. 46 residential properties within 50-100m. 294 residential properties within 100-300m.	Moderately negative	2	Intermediate
1B (Pink)	28 residential properties within 50m. 36 residential properties within 50-100m. 193 residential properties within 100-300m.	Moderately negative	2	Intermediate
1B1 (Pink)	14 residential properties within 50m. 40 residential properties within 50-100m. 288 residential properties within 100-300m.	Minor or slightly negative	3	Preferred
1C (Purple)	37 residential properties within 50m. 45 residential properties within 50-100m. 173 residential properties within 100-300m.	Moderately negative	2	Intermediate
1C1 (Purple)	25 residential properties within 50m. 44 residential properties within 50-100m. 300 residential properties within 100-300m.	Moderately negative	2	Intermediate
1D (Red)	12 residential properties within 50m. 27 residential properties within 50-100m. 304 residential properties within 300m.	Minor or slightly negative	3	Preferred
1D1 (Red)	12 residential properties within 50m. 24 residential properties within 50-100m. 306 residential properties within 300m.	Minor or slightly negative	3	Preferred
1E (Green)	11 residential properties within 50m. 28 residential properties within 50-100m. 303 residential properties within 300m.	Minor or slightly negative	3	Preferred
1E1 (Green)	11 residential properties within 50m. 23 residential properties within 50-100m. 303 residential properties within 300m.	Minor or slightly negative	3	Preferred
1F (Blue)	16 residential properties within 50m. 34 residential properties within 50-100m. 303 residential properties within 100-300m.	Minor or slightly negative	3	Preferred
1F1 (Blue)	13 residential properties within 50m. 28 residential properties within 50-100m. 301 residential properties within 100-300m.	Minor or slightly negative	3	Preferred
1G (Yellow)	14 residential properties within 50m. 28 residential properties within 50-100m. 303 residential properties within 100-300m.	Minor or slightly negative	3	Preferred

3.3.1.3 Existing Commercial Properties

There are very low numbers of commercial properties located within the various options. The 1A (Orange) and 1C (Purple) options have the highest number of commercial properties located closest to the centreline of each option (8 no. and 6 no. respectively in the 0-50m band). There are 3 no. in the same band for the 1A1 (Orange), 1B (Pink) and 1F /1F1 (Blue) options.

Four of the options, i.e. each of the 1D/1D1 (Red) and 1E/1E1 (Green) options, have no properties within the 0-50m band according to the GeoDirectory output. However, it is cautioned that these results must be considered in the context of the presentation of that data. While the 1D/1D1 (Red) and 1E/1E1 (Green) options data output shows no commercial properties within 0-50m, site visits and review of aerial photography show that the 1D/1D1 (Red) and 1E/1E1 (Green) options do intersect two separate plant nursery businesses given the extent of the landholding of those premises that are in commercial use. One of these nurseries is also located within both to the 1F /1F1 (Blue) and 1B (Pink) and the 1G (Yellow) options.

Depending on the final alignment of a road within those assessment corridors, a significant to profound impact is possible on the individual operation of one or both of these businesses, the greatest difficulties arising regarding Finn Valley Nursery which appears to be wholly located within some of the options (1F/ 1F1 (Blue) and 1B (Pink)and the 1G (Yellow)).

There are between 5 no. and 13 no. commercial properties within the 50m-100m band, which is proportionate to the option locations close to urban settlement. Avoidance or mitigation should be possible to avoid significant adverse impacts.

With regards to the number of properties within the 100-300m band, the numbers vary from 18 no. to 36 no. properties. Given the potential for avoidance and mitigation, it is not considered necessary to make qualitative adjustments to scoring applied on the basis of the 0-50m counts, which is considered the most appropriate band on which to apply scoring given the greater potential for direct impact or significant direct impact.

In general, the number of commercial properties between 0-50m of the centreline is low in all options, 8 no. being the highest. In that case, given the scale, purpose and location of the project, the scoring at this level of assessment is considered to be minor or slightly negative for all options in the context of impact on properties collectively impacted by the proposed new road.

It is noted that commercial properties in proximity to the new road may benefit from improved access and passing trade dependent on detailed design.

A review of extant planning permissions indicates that there are no potential new commercial developments along the options and hence there is no resultant impact on impact scoring.

Table 3-3: Commercial Properties Matrix

Option	Qualitative Assessment	Score	Impact Score	Preference
1A (Orange)	8 no. properties within 50m band. 5 no. properties in 50-100m 18 no. properties in 100-300m	Minor or slightly negative	3	Intermediate
1A1 (Orange)	3 no. properties within 50m band. 8 no. properties in 50-100m 27 no. properties in 100-300m	Minor or slightly negative	3	Intermediate
1B (Pink)	3 no. properties within 50m band including plant nursery. 7 no. properties in 50-100m 22 no. properties in 100-300m	Minor or slightly negative	3	Intermediate
1B1 (Pink)	1 no. properties within 50m band including plant nursery. 7 no. properties in 50-100m 26 no. properties in 100-300m	Minor or slightly negative	3	Intermediate
1C (Purple)	6 no. properties within 50m band. 6 no. properties in 50-100m 20 no. properties in 100-300m	Minor or slightly negative	3	Intermediate

Option	Qualitative Assessment	Score	Impact Score	Preference
1C1 (Purple)	2 no. properties within 50m band. 8 no. properties in 50-100m 24 no. properties in 100-300m	Minor or slightly negative	3	Intermediate
1D (Red)	0 properties located within 50m band. 10 no. properties in 50-100m 32 no. properties in 100-300m 2 no. plant nurseries located within assessment corridor	Minor or slightly negative	3	Intermediate
1D1 (Red)	0 properties located within 50m band. 9 no. properties in 50-100m 36 no. properties in 100-300m 2 no. plant nurseries located within assessment corridor	Minor or slightly negative	3	Intermediate
1E (Green)	0 properties located within 50m band. 11 no. properties in 50-100m 29 no. properties in 100-300m 2 no. plant nurseries located within assessment corridor	Minor or slightly negative	3	Intermediate
1E1 (Green)	0 properties located within 50m band. 10 no. properties in 50-100m 33 no. properties in 100-300m 2 no. plant nurseries located within assessment corridor	Minor or slightly negative	3	Intermediate
1F (Blue)	3 no. properties within 50m band including plant nursery. 13 no. properties in 50-100m 25 no. properties in 100-300m	Minor or slightly negative	3	Intermediate
1F1 (Blue)	3 no. properties within 50m band including plant nursery. 12 no. properties in 50-100m 24 no. properties in 100-300m	Minor or slightly negative	3	Intermediate
1G (Yellow)	1 no. properties within 50m band including plant nursery. 10 no. properties in 50-100m 32 no. properties in 100-300m	Minor or slightly negative	3	Intermediate

3.3.1.4 Existing Community Facilities

Drumboe Woods, located to the north of Ballybofey, west of Stranorlar and east of the River Finn provides a considerable amenity to residents in the twin towns. The woods form part of a former estate associated with Drumboe Castle. Drumboe Avenue, which is a very popular walking route, leads from Stranorlar north through woodland intertwined with trails and through surfaced third class roads through the woodland. The area has benefited from investment in recent years in car parking and picnic areas and appears to be managed by a joint initiative between Coillte, Donegal County Council and Ballybofey and Stranorlar Tidy Towns. The wider area north of Ballybofey and east of the River Finn is characterised by pockets of mixed woodland in both Drumboe and Troopers Hill and the intervening areas. Drumboe Woods serves as one of the main recreational areas within the towns and will not be impacted directly by any of the options.

The woodland at Troopers Hill, known locally as Creggan Forest Walk, will be physically impacted by each of the orange, pink and purple options; although less developed in terms of facilities and less connected to the developed urban area than Drumboe Woods, recent path development has occurred at Troopers Hill according to information from site visit and public consultation events. Impact is considered minor or slightly negative.

Each of the 1F/1F1 (Blue), 1D/1D1 (Red) and 1E/1E1(Green) options and the 1G (Yellow) option will impact on local roads connecting both areas of woodland and providing amenity value for walking and running to residents of the area generally, but these are public roads as opposed to formal recreation routes. These options also partially intersect an area of woodland between Drumboe Woods and Trooper's Hill known as the Holy Well Wood at the very north of same where some informal recreational activity (walking) appears to occur. The intersection is towards the edge of the woodland and direct impact may be avoidable, however some further mitigation may be required to protect amenity.

Cappry Rovers football pitches and clubhouse are located within the assessment corridor for each of the 1F/1F1 (Blue), 1D/1D1 (Red) and 1E/1E1(Green) options and the 1G (Yellow) option with potential for direct impact associated with land take and for indirect amenity impacts.

North West Equine Assisted Therapy is located on lands north of the twin towns and is located closest to both of the 1B/1B1 (Pink) options, while the lands adjacent to Tír Chonaill Equestrian Centre are close to the 1A/1A1 (Orange), 1C/1C1 (Purple) and 1B/1B1 (Pink) options. Lands associated with same appear to be located within the 1A/1A1 (Orange) options.

One of the link road options (associated with the 1B (Pink), 1F/1F1 (Blue), 1D (Red) and 1E (Green) options) located to the east of Stranorlar identified in order to provide connectivity in a north–south axis to the east of Stranorlar has the potential to impact directly and indirectly on lands forming part of Ballybofey and Stranorlar Golf Course. It should be possible to avoid direct impact however this is dependent on the final alignment. The link options for other options do avoid this constraint, including the 1B1 (Pink), 1D1 (Red) and 1E1 (Green) options, which are variants of the afore-mentioned.

The proposed link option at the south-eastern extent of the scheme, for relevant options, is located to the east of St. Joseph's Hospital on the N15 however there is a farmyard and a field between the westernmost extent of the option and the hospital grounds and no impact of any significance is anticipated.

The link roads here also traverse an identified walking and cycling way-marked route connecting The Glebe (via local road) to Gortletteragh Waterfall and an amenity area to the south east. There is a way-marked walking route on OSi Discovery mapping intersected by the link options. This is the case for all options and mitigation will be needed at a later stage of the project.

No major negative impacts have been recorded in this assessment. While there is potential for significant to profound impacts to be identified to individual facilities and thus to the community they serve, there are no potential direct impacts to facilities serving large numbers of population (e.g. major recreational facilities, large hospitals) and no single option impacts on a large number of individual community facilities.

The most sensitive receptor recorded as part of this assessment is that of an equine therapy centre. While individuals may spend a relatively small amount of time at this centre it should be noted that this serves a sensitive section of the community and alternative facilities providing the same service are unlikely to be available locally. The 1B/1B1 (Pink) options are close to same and therefore are allocated a moderate negative scoring. While other receptors are included within that option, the therapy centre is that of most concern given that it could potentially be incompatible with the proposed development, particularly if the final alignment moved towards the southern side of the option corridor for any reason.

The 1D/1D1 (Red), 1E/1E1 (Green), and 1F/1F1 (Blue) options and the 1G (Yellow) have been provided with a moderate negative scoring in that there is potential for adverse impact on a formal recreational facility that serve the settlement (Cappry Rovers Grounds), local roads used for walking and jogging are impacted close to the town, there is slight potential for impact on Holy Well Wood and the link roads associated with these options also intersect way-marked walking and cycling routes. Some of these options, due to their link roads, also intersect with the Ballybofey and Stranorlar Golf Club. While there is potential to avoid or mitigate some of these impacts, at this stage of assessment, when taken cumulatively, this moderate negative scoring is considered appropriate.

Table 3-4: Community Facilities Matrix

Option	Qualitative Assessment	Score	Impact Score	Preference
1A (Orange)	Hostel and stables close to option. Removal of sections of Creggan Forest. Link road impact to way-marked routes.	Minor or slightly negative	3	Preferred
1A1 (Orange)	Hostel and stables close to option. Removal of sections of Creggan Forest. Link road impact to way-marked routes.	Minor or slightly negative	3	Preferred
1B (Pink)	Equine therapy centre partially within option. Hostel and stables close to option. Removal of sections of Creggan Forest. Link road impact to golf course and way-marked routes.	Moderately negative	2	Intermediate
1B1 (Pink)	Equine therapy centre partially within option. Hostel and stables close to option. Removal of sections of Creggan Forest. Link road impact to way-marked routes.	Moderately negative	2	Intermediate
1C (Purple)	Hostel and stables close to option. Removal of sections of Creggan Forest. Link road impact to way-marked routes.	Minor or slightly negative	3	Preferred
1C1 (Purple)	Hostel and stables close to option. Removal of sections of Creggan Forest. Link road impact to way-marked routes.	Minor or slightly negative	3	Preferred
1D (Red)	Cappry Rovers. Separating woodland connections. Potential impact to Holy Well Wood. Link road impact to golf course and way-marked routes.	Moderately negative	2	Intermediate
1D1 (Red)	Cappry Rovers. Separating woodland connections. Potential impact to Holy Well Wood. Link road impact to way-marked routes.	Moderately negative	2	Intermediate
1E (Green)	Cappry Rovers. Potential impact to Holy Well Wood. Separating woodland connections. Link road impact to golf course and way-marked routes.	Moderately negative	2	Intermediate
1E1 (Green)	Cappry Rovers. Potential impact to Holy Well Wood. Separating woodland connections. Link road impact to way-marked routes.	Moderately negative	2	Intermediate
1F (Blue)	Cappry Rovers. Potential impact to Holy Well Wood. Separating woodland connections. Link road impact to golf course and way-marked routes.	Moderately negative	2	Intermediate
1F1 (Blue)	Cappry Rovers. Potential impact to Holy Well Wood. Separating woodland connections. Link road impact to way-marked routes.	Moderately negative	2	Intermediate
1G (Yellow)	Cappry Rovers. Potential impact to Holy Well Wood. Separating woodland connections. Link road impacts to way-marked routes.	Moderately negative	2	Intermediate

3.3.1.5 Community Severance

The proposed options will all result in a large new road that cuts across existing routes to the towns' facilities from clusters of residential development to the north. The 1F/1F1 (Blue), 1E/1E1 (Green), 1D/1D1 (Red) and 1G (Yellow) options, given that they are located closer to the town and are within the settlement boundary of the town's development plan, have increased potential for severance.

In these cases, clusters of residential development including concentrations of linear development between the Cappry area at the west of the option and the Aughnashiel area (approximately centrally located along these options) are potentially separated from the town and its facilities and amenities by the proposed new road. Notwithstanding same, the areas potentially severed from the town do not include any large-scale housing developments which could result in a major negative scoring but rather groupings of single houses that have developed close to but outside of the main built of area. A moderate negative scoring is considered appropriate.

Each of the 1B/1B1 (Pink), 1C/1C1 (Purple) and 1A/1A1 (Orange) options, because of their location outside of the settlement boundary and increased distance from the town, have less potential for severance and are scored minor negative in that options from the hinterland to the town will be impacted to a lesser degree for smaller numbers of residential receptors.

The assessment is based on a high-level appraisal of Geo-Directory data based on mapped locations as opposed to numerical analysis and a review of development plan mapping. This is considered appropriate to this stage of assessment.

The potential to create severance to Dooish National School located northwest of Ballybofey on the R252 has been considered however this located on a regional road and it is considered reasonable to assume that access will be maintained.

The options in the scoring matrix below have been scored with reference to community severance.

Table 3-5: Community Severance Matrix

Option	Qualitative Assessment	Score	Impact Score	Preference
1A (Orange)	Largely outside of town development boundary. Will sever some properties from the town and its facilities.	Minor or slightly negative	3	Preferred
1A1 (Orange)	Largely outside of town development boundary. Will sever some properties from the town and its facilities.	Minor or slightly negative	3	Preferred
1B (Pink)	Largely outside of town development boundary. Will sever some properties from the town and its facilities.	Minor or slightly negative	3	Preferred
1B1 (Pink)	Largely outside of town development boundary. Will sever some properties from the town and its facilities.	Minor or slightly negative	3	Preferred
1C (Purple)	Largely outside of town development boundary. Will sever some properties from the town and its facilities.	Minor or slightly negative	3	Preferred
1C1 (Purple)	Largely outside of town development boundary. Will sever some properties from the town and its facilities.	Minor or slightly negative	3	Preferred
1D (Red)	Within settlement boundary and cross between the settlement and relatively higher number of residential properties.	Moderately negative	2	Intermediate
1D1 (Red)	Within settlement boundary and cross between the settlement and relatively higher number of residential properties.	Moderately negative	2	Intermediate
1E (Green)	Within settlement boundary and cross between the settlement and relatively higher number of residential properties.	Moderately negative	2	Intermediate
1E1 (Green)	Within settlement boundary and cross between the settlement and relatively higher number of residential properties.	Moderately negative	2	Intermediate
1F (Blue)	Within settlement boundary and cross between the settlement and relatively higher number of residential properties.	Moderately negative	2	Intermediate
1F1 (Blue)	Within settlement boundary and cross between the settlement and relatively higher number of residential properties.	Moderately negative	2	Intermediate
1G (Yellow)	Within settlement boundary and cross between the settlement and relatively higher number of residential properties.	Moderately negative	2	Intermediate

3.3.1.6 Tourism

No major tourism destinations have been identified. The study area and proposed options do not form part of the Wild Atlantic Way; however, the newly improved network will contribute to improved connectivity, safety and journey times to sections of the Wild Atlantic Way, and tourist attractions along same, both to the north and south of the twin towns. This is a positive benefit associated with all options.

The impact to golfing facilities in the area has been discussed above in **Section 3.3.1.5** as this amenity provides a community recreational benefit also. A non-specialist equestrian centre is part of the tourism resource of the areas and this aspect is covered herein. There are impacts to walking and cycling routes by

link options as documented previously; these could potentially be used by tourists as could forest walks such as those at Creggan and Holy Well Wood.

Angling is carried out in the River Finn (salmon) and at Lough Alaan (trout); fisheries impacts will be considered at this stage in the aquatic ecology assessment, but it is noted that at EIA stage, corresponding impacts on recreational amenities will be assessed. Assuming appropriate mitigation to avoid impacts on water quality and the fisheries resource, no impacts are anticipated at this stage. There are link options coming close to the lake but no potential for direct impact is evident at this stage. As a buffer will be in place between any link road and the lake, the potential for any impacts to the amenity benefits or the use of the lake for fishing is considered limited.

In terms of hospitality, there are several Bed & Breakfast and hotels located along the existing N13 and N15 on the approaches to the town and in the town centre itself. This assessment focuses on any facilities that serve as a potential constraint to new options.

Finn Farm Hostel, which provides tourist accommodation, is close to the 1A/1A1 (Orange), 1B/1B1 (Pink) and 1C/1C1 (Purple) options; while existing access could be severed, given the number of properties at Cappry Lane it is considered reasonable to assume alternative access would be provided.

The 1A/1A1 (Orange) option potentially partially intersects an equestrian facility (lands) at Cappry Lane. The equestrian centre buildings line close to the 1A/1A1 (Orange), 1B/1B1 (Pink) and 1C/1C1 (Purple) options.

Table 3-6: Tourism Matrix

Option	Qualitative Assessment	Score	Impact Score	Preference
1A (Orange)	Close to stables and hostel. Removal of part of Creggan forest walks. Link road intersects way-marked routes.	Minor or slightly negative	3	Intermediate
1A1 (Orange)	Close to stables and hostel. Removal of part of Creggan forest walks. Link road intersects way-marked routes.	Minor or slightly negative	3	Intermediate
1B (Pink)	Close to hostel and equestrian centre. Impacts to forest walks, golf course and waymarked routes may have minor impact on tourism.	Minor or slightly negative	3	Intermediate
1B1 (Pink)	Close to hostel and equestrian centre. Impacts to forest walks and waymarked routes may have minor impact on tourism.	Minor or slightly negative	3	Intermediate
1C (Purple)	Close to hostel and equestrian centre. Removal of woodland walks. Way-marked walks	Minor or slightly negative	3	Intermediate
1C1 (Purple)	Close to hostel and equestrian centre. Removal of woodland walks. Way marked walks	Minor or slightly negative	3	Intermediate
1D (Red)	Impacts to forest walks, golf course and walks.	Minor or slightly negative	3	Intermediate
1D1 (Red)	Impacts to forest walks and way marked walks	Minor or slightly negative	3	Intermediate
1E (Green)	Impacts to forest walks, golf course and waymarked walks.	Minor or slightly negative	3	Intermediate
1E1 (Green)	Impacts to forest walks and waymarked walks	Minor or slightly negative	3	Intermediate
1F (Blue)	Impacts to forest walks, golf course and way marked walks.	Minor or slightly negative	3	Intermediate
1F1 (Blue)	Impacts to forest walks and waymarked walks	Minor or slightly negative	3	Intermediate
1G (Yellow)	Impacts to forest walks and way marked walks	Minor or slightly negative	3	Intermediate

4 CONCLUSION

Table 4-1 summarises the preferences with regard to each option while **Table 4-2** outlines the impact scoring for each option.

In terms of the impacts, the sum of each impact score under each criterion is totalled to give an overall impact score. This provides a guide only to the relative impacts of each option. Subsequently each option has been assigned an overall impact score on the scale of 1 to 7 as set out in **Section 1.1.1**. All of the options, except Options 1E/1E1, score very similarly across the range of criteria, and overall have impact scores of 3 – minor or slightly negative. The 1E/1E1 (Green) options perform worst overall in terms of potential impacts and so have an impact score of 2 – moderately negative.

As noted in **Section 2.4.2**, Waste is not considered in this scoring as it has its own criterion in the Option Selection Report.

Table 4-1: Option Preference Matrix

Option	Infrastructure				Properties						Overall Preference	Ranking
	Utility Infrastructure	Transport Infrastructure	Waste Management	Forestry	Settlements & Zoning	Residential	Commercial	Community Facilities	Community Severance	Tourism		
1A	Preferred	Preferred	Preferred	Intermediate	Preferred	Intermediate	Intermediate	Preferred	Preferred	Intermediate	Preferred	2
1A1	Preferred	Preferred	Preferred	Intermediate	Preferred	Intermediate	Intermediate	Preferred	Preferred	Intermediate	Preferred	1
1B	Preferred	Preferred	Preferred	Least Preferred	Preferred	Intermediate	Intermediate	Intermediate	Preferred	Intermediate	Least Preferred	13
1B1	Preferred	Preferred	Preferred	Least Preferred	Preferred	Preferred	Intermediate	Intermediate	Preferred	Intermediate	Intermediate	12
1C	Preferred	Preferred	Preferred	Least Preferred	Preferred	Intermediate	Intermediate	Preferred	Preferred	Intermediate	Intermediate	11
1C1	Preferred	Preferred	Preferred	Least Preferred	Preferred	Intermediate	Intermediate	Preferred	Preferred	Intermediate	Intermediate	10
1D	Least Preferred	Preferred	Preferred	Intermediate	Intermediate	Preferred	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	9
1D1	Least Preferred	Preferred	Preferred	Intermediate	Intermediate	Preferred	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	8
1E	Least Preferred	Preferred	Preferred	Intermediate	Intermediate	Preferred	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	4
1E1	Least Preferred	Preferred	Preferred	Intermediate	Intermediate	Preferred	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	5
1F	Least Preferred	Preferred	Preferred	Intermediate	Intermediate	Preferred	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	7
1F1	Least Preferred	Preferred	Preferred	Intermediate	Intermediate	Preferred	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	6
1G	Intermediate	Preferred	Preferred	Intermediate	Intermediate	Preferred	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	3

Table 4-2: Option Impact Scoring Matrix

Option	Infrastructure				Properties						Summed Impact Scores	Overall Impact Score	Overall Impact
	Utilities	Transport	Waste Management	Forestry	Settlements & Zoning	Residential	Commercial	Community Facilities	Community Severance	Tourism			
1A	3	6	4	3	3	2	3	3	3	3	33	3	Minor or slightly negative
1A1	3	6	4	3	3	2	3	3	3	3	33	3	Minor or slightly negative
1B	3	6	4	2	3	2	3	2	3	3	31	3	Minor or slightly negative
1B1	3	6	4	2	3	3	3	2	3	3	32	3	Minor or slightly negative
1C	3	6	4	2	3	2	3	3	3	3	32	3	Minor or slightly negative
1C1	3	6	4	2	3	2	3	3	3	3	32	3	Minor or slightly negative
1D	3	6	4	3	2	3	3	2	2	3	31	3	Minor or slightly negative
1D1	3	6	4	3	2	3	3	2	2	3	31	3	Minor or slightly negative
1E	3	6	4	3	2	3	3	2	2	3	31	3	Minor or slightly negative
1E1	3	6	4	3	2	3	3	2	2	3	31	3	Minor or slightly negative
1F	3	6	4	3	2	3	3	2	2	3	31	3	Minor or slightly negative
1F1	3	6	4	3	2	3	3	2	2	3	31	3	Minor or slightly negative
1G	3	6	4	3	2	3	3	2	2	3	31	3	Minor or slightly negative

Donegal County Council

TEN-T Priority Route Improvement Project, Donegal

Section 1: N15/N13 Ballybofey/Stranorlar Urban Region

Option Selection Report

Appendix D1.11 - Option 1G Link Road Option Assessment

December 2019

Document Control Sheet

Client:	Donegal County Council
Project Title:	TEN-T Priority Route Improvement Project, Donegal – Section 1: N15/N13 Ballybofey/Stranorlar Urban Region
Document Title:	Option Selection Report – Appendix D1.11 – Option 1G Link Road Option Assessment
Document No.:	TT-MGT0337-RPS-00-01-RP-E-EN-1011

Rev. No.	Suitability	Effective Date	Revision Description	Checked	Approved
P01	S4	December 2019	Issue for publication	PK	GMcE

This report has been prepared by RPS/Barry Transportation on behalf of Donegal County Council. Any other persons who use any information contained herein do so at their own risk.

© RPS Barry Transportation 2019

Table of Contents

1 INTRODUCTION 1
1.1 Methodology 7
2 ENVIRONMENTAL APPRAISAL 9
2.1 Air and Climate 9
2.2 Noise 12
2.3 Landscape and Visual 17
2.4 Terrestrial Biodiversity 25
2.5 Aquatic Biodiversity 30
2.6 Soils, Geology and Hydrogeology 35
2.7 Hydrology 41
2.8 Cultural Heritage 46
2.9 Material Assets (Agricultural) 57
2.10 Material Assets (Non-Agricultural) 59
3 OPTION SELECTION 73

Appendix

Appendix A Cultural Heritage Inventory
Appendix B Cultural Heritage - Photographic Record

List of Figures

Figure 1-1: Link Road Option A 2
Figure 1-2: Link Road Option B 3
Figure 1-3: Link Road Option C 4
Figure 1-4: Link Road Option D 5
Figure 1-5: Link Road Option E 6
Figure 2-1: Cultural Heritage Items within 500m Corridor: Option 1G – Ballybofey Link Road Option A ... 50
Figure 2-2: Cultural Heritage Items within 500m Corridor: Option 1G - Ballybofey Link Road Option B 51
Figure 2-3: Cultural Heritage Items within 500m Corridor: Option 1G - Ballybofey Link Road Option C 52
Figure 2-4: Cultural Heritage Items within 500m Corridor: Option 1G - Ballybofey Link Road Option D 53
Figure 2.5: Cultural Heritage Items within 500m Corridor: Option 1G - Ballybofey Link Road Option E 54

List of Tables

Table 1-1: Impact Scoring Key (TII, 2016) 8
Table 2-1: Sensitive Receptors and Operation Year Traffic Flows 10
Table 2-2: Overall Change in Exposure to NO_x for Design Year 2028 11
Table 2-3: Overall Change in Exposure to PM10 for Design Year 2028 11
Table 2-4: Climate Impacts Associated with Options 12
Table 2-5: Air Quality and Climate Option Scoring Matrix 12
Table 2-6:Section 1 Link Roads Options Property Counts and Banding 14
Table 2-7:Section 1 Link Road Options Potential Impact Rating 15
Table 2-8: Section 1 Link Road Options Noise Impact Score Matrix 17

Table 2-9: Landscape Character Impact 20
Table 2-10: Residential Property (Only) Counts 21
Table 2-11: Index for Visual Impact on Residential Properties Only 21
Table 2-12: Visual Impact and Predicted TII Score 23
Table 2-13: Section 1 Landscape and Visual Assessment – 1G Link Road Option Scoring Matrix 23
Table 2-14: Option Scoring Matrix – Section 1 Terrestrial Biodiversity Scoring Matrix 28
Table 2-15: Aquatic Biodiversity Scoring Matrix 35
Table 2-16: Assessment of Soils and Geology impacts for the five Ballybofey Link Road Options 37
Table 2-17: Summary of Land and Soil Impacts for each Option 37
Table 2-18: Soils and Geology Scoring Matrix 38
Table 2-19: Ballybofey Link Road Option Lengths 39
Table 2-20: Assessment of Hydrogeology Impacts for Ballybofey Link Road Options A-E 39
Table 2-21: Summary of Hydrogeology Impacts for each Option 40
Table 2-22: Soils, Geology and Hydrology Option Scoring Matrix 41
Table 2-23: Hydrology Option Scoring Matrix 44
Table 2-24: Cultural Heritage Items located within 500m Corridor: Option 1G - Ballybofey Link Road Option A 50
Table 2-25: Cultural Heritage Items located within 500m Corridor: Option 1G - Ballybofey Link Road Option B 51
Table 2-26: Cultural Heritage Items located within 500m Corridor: Option 1G - Ballybofey Link Road Option C 53
Table 2-27: Cultural Heritage Items located within 500m Corridor: Option 1G - Ballybofey Link Road Option D 54
Table 2-28: Cultural Heritage Items located within 500m Corridor: Option 1G - Ballybofey Link Road Option E 55
Table 2-29 Option 1G - Ballybofey Link Road Option Appraisal 56
Table 2-30: Options Scoring Matrix – Cultural Heritage Section 1 56
Table 2-31: Material Assets (Agriculture) Option Scoring Matrix 57
Table 2-32: Impact Scores and Preferences for Link Roads 69
Table 2-33: Material Assets (Non-agricultural) Option Scoring Matrix 70
Table 3-1 Multi-Criteria Project Appraisal Matrix Section 1 - 1G Ballybofey Link Road Options 73
Table 3-2: Section 1 - 1G Ballybofey Link Road Options Preference Summary 73

LIST OF IMAGES

Image 2.1: ITM: 612561 894982 Finn Tributary E (Cappry) confluence with River Finn. Dry, fully piped / culverted (12th July 2018) 30
Image 2.2: ITM: 612710 895015 River Finn Crossing C near 1G Link Options - view upstream (12th July 2018) 30

1 INTRODUCTION

This report outlines the comparative assessment of the proposed Ballybofey link road options on the emerging preferred option 1G for Section 1: N15 Ballybofey – Stranorlar Urban Region of the TEN-T Priority Route Improvement Project in Donegal.

During the Stage 2 assessment of options, a local link for Ballybofey was included equally for each option that provided connectivity from the proposed junction on the proposed scheme at Cappry to the existing road network.

The preferred Option 1G included this local connection that took the form of two separate links from the proposed junction, the first connecting with the R252 in the vicinity of Logues Bridge and the second connecting to the existing N15 in the vicinity of Woodland Road / Aishling Court. Both the mainline and associated links were subject to a Stage 2 assessment in accordance the Project Appraisal Guidelines (PAG) for National Roads Unit 7.0 - Multi Criteria Analysis (TII, 2016).

Following the identification of Option 1G as the preferred option, further detailed consideration was given to the optimisation of the Ballybofey Link to explore if there were alternative, better alignments and junction arrangements for this link. In doing so, 14 preliminary options for the Ballybofey link road were identified and underwent a Stage 1 assessment, from which four options were shortlisted. These four options for the Ballybofey link road were presented to the public at a consultation event held on 14th March 2019 at Jacksons Hotel in Ballybofey between 2pm and 8pm which attracted 252 attendees.

Since Option 1G was selected as the preferred option including one of the four shortlisted link road options to the N15 at Ballybofey, the final selection of the link road will either be the same option, or better than that already considered, the final selection of the Ballybofey link road will not change the conclusion that Option 1G is the preferred option.

Following further consultation an additional 4 preliminary options for the Ballybofey link road were identified and underwent a Stage 1 assessment, from which one additional option was shortlisted, Ballybofey Link Road Option E.

The proposed 1G - Ballybofey Link Road Options are named as follows:

- Link Road Option A (original link road)
- Link Road Option B
- Link Road Option C
- Link Road Option D
- Link Road Option E

The Ballybofey Link Road options are shown in **Figure 1-1 to Figure 1-5.**

This assessment of the link roads is included in **Volume D** to the **Option Selection Report (OSR)**. This report assesses the link road options with reference to environmental receptors in proximity to the options. The impacts for each of the link road option are identified so that those with unacceptably high levels of impact can be avoided where possible as part of the overall option assessment process.

Figure 1-1: Link Road Option A

Figure 1-2: Link Road Option B

Figure 1-3: Link Road Option C

Figure 1-4: Link Road Option D

Figure 1-5: Link Road Option E

1.1 Methodology

The TII PAG (2016) were used to inform and quantify the assessment of potential impacts from this project. The methodology and impact significance rationale applied in this option assessment of the proposed 1G link roads follows the criteria presented in each of the technical appendices provided in the **Volume D** of the **OSR**, as follows:

- D1.1 Air and Climate
- D1.2 Noise
- D1.3 Landscape and Visual
- D1.4 Terrestrial Biodiversity
- D1.5 Aquatic Biodiversity
- D1.6 Soils and Geology
- D1.7 Hydrology
- D1.8 Cultural Heritage
- D1.9 Material Assets (Agricultural)
- D1.10 Material Assets (Non-Agricultural)

An assessment of the 1G link road options under each of these environmental aspects will be provided in this report, therefore the corresponding technical appendix to the environmental aspect should be read in conjunction with this report.

1.1.1 Assessment Criteria

The comparative evaluation of the 1G link road options is conducted by scoring of impacts to sensitive receptors using the Stage 2 project appraisal matrix similar to that shown in the TII PAG (TII, 2016). An assessment will be undertaken on each option to include both quantitative and qualitative assessments. Each impact is scored based on the seven-point scale as shown in **Table 1-1** (TII PAG, 2016, p.3) and an integer will be assigned according to the impact level.

Following the completion of the individual appraisal of each sub-criterion within this assessment, an overall impact score is obtained for the combined assessment. This allows each option to be ranked and a preference to be determined. Preferences are grouped into one of three types:

- Preferred – the option(s) which have the least impact taking into account the project objectives.
- Intermediate – the option(s) where the impacts are considered to be reasonable in terms of the anticipated impacts and overall project objectives. Impacts are considered to be greater than those of the Preferred Option(s) but considerably better than those of the Least Preferred Option(s); and
- Least Preferred - the option(s) which does least to achieve the project objectives.

Where there are clear differences in the impact scores of the options, the ranking will be numbered accordingly, and a preference assigned. For some options there may be very little between their impact scores and some may even have the same impact scores. In such circumstances, each environmental technical expert will apply expert judgement and evaluate each option comparatively against the other options, taking into account the quantitative and qualitative assessments. This will facilitate the determination of a rank and preference for each option. In some instances, similar options may have the same rank and/or preference.

Table 1-1: Impact Scoring Key (TII, 2016)

7	Major or Highly Positive
6	Moderately Positive
5	Minor or Slightly Positive
4	Not Significant/Neutral
3	Minor or Minor or slightly negative
2	Moderately negative
1	Major or Highly negative

2 ENVIRONMENTAL APPRAISAL

2.1 Air and Climate

This section outlines the comparative assessment of options in relation air quality and climate with reference to key sensitive receptors in proximity to the options. The impacts for each of the options are identified so that those with unacceptably high levels of impact can be avoided to the extent feasible as part of the overall option assessment process.

The methodology and assessment criteria used in this Air and Climate assessment is outlined in full in **Volume D, Appendix D1.1**.

2.1.1 Link Road Option A

Link Road Option A commences at the junction of the R252 and a local road to the west of Ballybofey, to the south of the River Finn and traverses in a generally north-south alignment to the N15. The properties in the area are largely residential with ribbon development along existing road infrastructure and housing estates in Blue Cedars and Aishling Court. There are 16 properties within the 50m zone from the corridor centreline.

2.1.2 Link Road Option B

Link Road Option B commences at the proposed junction with preferred Option 1G, to the south of the proposed River Finn bridge crossing and traverses in a generally south-east alignment, with a link to the N15 between two houses and a new link back to the R252, north of Cois na Finn housing estate. This corridor intersects the Blue Cedars and Cois na Finn housing estates and skirts the back of Hawthorn Close. There are 12 properties within the 50m zone from the corridor centreline.

2.1.3 Link Road Option C

Similar to Link Road Option B, Link Road Option C commences at the proposed junction with preferred Option 1G, to the south of the proposed River Finn bridge crossing and traverses in a generally south-east alignment and ties in with the N15 to the east of Hawthorn Close. A new link between the existing R252 and the N15 between the Bramble Hill industrial estate and Glenview housing estate is also provided. This corridor also intersects the Hawthorn Close, Blue Cedars and Cois na Finn housing estates. There are 31 properties within the 50m zone from the corridor centreline.

2.1.4 Link Road Option D

Similar to Link Road Options B and C, Link Road Option D commences at the proposed junction with preferred Option 1G, to the south of the proposed River Finn bridge crossing and traverses in a generally south-east alignment and provides a new link with the N15 to the immediate west of Ballybofey. This link lies between the Bramble Hill industrial estate and Glenview housing estate. This corridor also intersects the Blue Cedars and Cois na Finn housing estates and skirts the back of Hawthorn Close. There are 28 properties within the 50m zone from the corridor centreline.

2.1.5 Link Road Option E

Similar to Link Road Options B, C, and D, Link Road Option E commences at the proposed junction with preferred Option 1G Route, to the south of the proposed River Finn bridge crossing and traverses in a generally south-east alignment and provides a new link with the N15 to the immediate west of Ballybofey. This link lies between the Bramble Hill industrial estate and Glenview housing estate. This corridor also

intersects the Blue Cedars and Cois na Finn housing estates and skirts the back of Hawthorn Close. There are 16 properties within the 50m zone from the corridor centreline.

2.1.6 Desk Study

Under the Clean Air for Europe Directive (2008/50/EC) EU Member States must designate "Zones" for the purpose of managing air quality. For Ireland, four Zones have been defined in the Air Quality Standards Regulations (2011); A, B, C and D. These zones are largely categorised based on population counts derived from 2016 CSO Census as follows:

- **Zone A**: Dublin
- **Zone B**: Cork
- **Zone C**: Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise.
- **Zone D**: Rural Ireland; i.e. the remainder of the State excluding Zones A, B and C.

The location of the study area is within Zone D, Rural Ireland. Under Article 6 of the Regulations, the EPA must review the classification of zones at least every five years to reflect the results of the census and the changes made under separate regulation to the areas where bituminous coal is restricted. The most up to date zones can be viewed on the EPA's Envision Map at http://gis.epa.ie/Envision.

Air quality is classified using a four-band scale of; Good, Fair, Poor, and Very Poor. Air quality in Zone D is consistently "*Good*" as measured by the EPA monitoring network and there have been no recorded breaches of the statutory limits for the protection of human health in recent years. This is a result of the relative absence of air pollution sources in the area and those existing sources such as road traffic have a low impact given the low volumes and ongoing legislative changes to vehicle emissions and fuel requirements.

There are several properties within the 50m of the centreline for each of the proposed options which has been identified for inter-comparison and these are shown in **Table 2-1.** The projected operational year (2028) traffic patterns for each of the options are also presented in **Table 2-1**. Average speed is assumed as 60 kph for all options.

Table 2-1: Sensitive Receptors and Operation Year Traffic Flows Option 1G Ballybofey Link Road Options

Route Option	Receptors (50m)	Length (km)	AADT	%HGVs	Average Speed (kph)
A (Original)	16	2.06	2000	3.0	60
B	12	2.43	2400	3.0	60
C	31	2.56	3400	3.0	60
D	28	1.87	3300	3.0	60
E	16	3.17	3300	3.0	60

2.1.7 Options Assessment

2.1.7.1 Assessment of Potential Impacts

The index exposure assessment of each option was carried out using the methodology outlined in the *NRA Guidelines 2011 and the UK Highways Agency Design Manual for Roads and Bridges (UK DMRB 2007), Volume 11, Section 3, Air Quality Assessment.* The aim of the assessment is to estimate the overall

change in people's exposure to the pollutants, in this case nitrogen dioxide (NO_2) and particulate matter (PM_{10}). The more negative the exposure score, the greater the improvement in air quality and hence, those with the lowest scores are the more preferred options. The overall changes in exposure for design year 2028 is summarised in **Table 2-2** and **Table 2-3.** It should be noted that the scores are dimensionless and do not represent the extent of any impact.

Table 2-2: Overall Change in Exposure to NO_x for Design Year 2028

Options	Receptors within 50m	Link Length (km)	Predicted Emission NO_x kg/year	Rate (kg/km/yr)	NO_x Score	Impact Level	Impact Score	Preference
Link Road Options								
A (Original)	16	2.06	419	203	3256	Minor or slightly negative	3	Preferred
B	12	2.43	592	244	2930	Minor or slightly negative	3	Preferred
C	31	2.56	887	346	10723	Moderately negative	2	Intermediate
D	28	1.87	629	336	9401	Moderately negative	2	Intermediate
E	16	3.17	1064	336	5370	Minor or slightly negative	3	Preferred

Table 2-3: Overall Change in Exposure to PM10 for Design Year 2028

Route Option	Receptors within 50m	Link Length (km)	Predicted Emission PM10 kg/year	Rate (kg/km/yr)	PM_{10} Score	Impact Level	Impact Score	Preference
Link Road Options								
A (Original)	16	2.06	14	7	107	Minor or slightly negative	3	Preferred
B	12	2.43	19	8	96	Minor or slightly negative	3	Preferred
C	31	2.56	29	11	351	Moderately negative	2	Intermediate
D	28	1.87	21	11	308	Moderately negative	2	Intermediate
E	16	3.17	35	11	177	Minor or slightly negative	3	Preferred

Table 2-2 and **Table 2-3** indicate that for the Ballybofey Link Road Options, Option C has the potential to impact on the greatest number of properties (31) relative to each of the other proposed options and along with Option D is intermediate in ranking. Options C and D are classed as moderately negative for air quality given the higher number of properties potentially impacted. Of the other options, Options B (12) and A (16) and E (16) will impact on the least number of properties and are considered to pose a minor or slightly negative impact to air quality and these are considered the preferred route for air quality for this route.

Climate impacts during the operation stage are based on total greenhouse gas (GHG) associated with traffic on the road network as calculated by the DMRB regional model. These results are presented in **Table 2-4** and illustrate no significant variation between the options which is unsurprising given the similarity in traffic patterns. Hence all options are classed as moderately negative for climate.

It is noted that at construction stage all proposed options will require material input (aggregates, concretes, etc.), material/personnel transport, energy use, etc. relative to the other proposed options. As the result there is the potential of a climate impact for the one-off construction stage event.

Table 2-4: Climate Impacts Associated with Options

Options	GHG (CO_{2eq}) (tonnes/year)	Impact Level	Impact Score	Preference
Option 1G Ballybofey Link Road Options				
A (Original)	129	Moderately negative	2	Intermediate
B	215	Moderately negative	2	Intermediate
C	340	Moderately negative	2	Intermediate
D	176	Moderately negative	2	Intermediate
E	504	Moderately negative	2	Intermediate

2.1.8 Conclusion

Table 2-5 provides the summary of the overall combined assessment of both air quality and climate. For the Ballybofey Link Road Options both parameters combined result in routes Option A, B and E indicate the highest preference score and as a result these options are the preferred options for air quality and climate.

Table 2-5: Air Quality and Climate Option Scoring Matrix

Option	Quantitative Assessment			Qualitative Assessment	Impact Score	Preference Ranking	Overall Preference
	NO_x	PM_{10}	CO_2				
Option 1G Ballybofey Link Road Options							
A (Original)	3256	107	129	Minor or slightly negative	3	2	Preferred
B	2930	96	215	Minor or slightly negative	3	1	Preferred
C	10723	351	340	Moderately negative	2	5	Intermediate
D	9401	308	176	Moderately negative	2	4	Intermediate
E	5370	177	504	Minor or slightly negative	3	3	Preferred

2.2 Noise

This section outlines the comparative assessment of options in relation to noise with reference to key sensitive receptors in proximity to the options. The impacts for each of the options are identified so that those with unacceptably high levels of noise can be avoided to the extent feasible as part of the overall option selection process.

The methodology and assessment criteria used in this assessment is outline in full in the **Volume D, Appendix D1.2**.

2.2.1 Option Descriptions

2.2.1.1 Link Road Option A

This Link Road Option commences at the junction of the R252 and a local road to the west of Ballybofey, to the south of the River Finn and traverses in a generally north-south alignment to the N15. The properties in the area are largely residential with ribbon development along existing road infrastructure and housing estates in Blue Cedars and Aishling Court. There are 16 properties within the 50m zone from the corridor centreline.

2.2.1.2 Link Road Option B

Link Road Option B commences at the proposed junction with preferred Option 1G Option, to the south of the proposed River Finn bridge crossing and traverses in a generally south-east alignment, with a link to the N15 between two houses and a new link back to the R252, north of Cois na Finn housing estate. This corridor intersects the Blue Cedars and Cois na Finn housing estates and skirts the back of Hawthorn Close. There are 12 properties within the 50m zone from the corridor centreline.

2.2.1.3 Link Road Option C

Similar to Link Road Option B, Link Road Option C commences at the proposed junction with preferred Option 1G Option, to the south of the proposed River Finn bridge crossing and traverses in a generally south-east alignment and ties in with the N15 to the east of Hawthorn Close. A new link between the existing R252 and the N15 between the Bramble Hill industrial estate and Glenview housing estate is also provided. This corridor also intersects the Hawthorn Close, Blue Cedars and Cois na Finn housing estates. There are 31 properties within the 50m zone from the corridor centreline.

2.2.1.4 Link Road Option D

Similar to Link Road Options B and C, Link Road Option D commences at the proposed junction with preferred Option 1G Option, to the south of the proposed River Finn bridge crossing and traverses in a generally south-east alignment and provides a new link with the N15 to the immediate west of Ballybofey. This link lies between the Bramble Hill industrial estate and Glenview housing estate. This corridor also intersects the Blue Cedars and Cois na Finn housing estates and skirts the back of Hawthorn Close. There are 28 properties within the 50m zone from the corridor centreline.

2.2.1.5 Link Road Option E

Similar to Link Road Options B, C, and D, Link Road Option E commences at the proposed junction with preferred Option 1G Route, to the south of the proposed River Finn bridge crossing and traverses in a generally south-east alignment and provides a new link with the N15 to the immediate west of Ballybofey. This link lies between the Bramble Hill industrial estate and Glenview housing estate. This corridor also intersects the Blue Cedars and Cois na Finn housing estates and skirts the back of Hawthorn Close. There are 16 properties within the 50m zone from the corridor centreline

2.2.2 Quantitative Assessment of Potential Impact

A buffering tool in MapInfo was used to facilitate the comparison of proposed options in the context of noise emissions. Each proposed option was assessed individually by applying a series of concentric ring buffers to the option centrelines with the following ranges, 0 – 50m, 50 – 100m, 100 – 200m and 200 – 300m. This methodology allowed Geodirectory data to be captured in each ring buffer and analysed separately.

The Geodirectory data is subsequently arranged and counted within each buffer zone (smallest to highest) and property/building use (commercial, residential, both or unknown). Finally, each address was then

counted in each buffer zone. This table is used as the data source when applying TII's potential impact rating (PIR) matrix. The total number of properties in each band is then multiplied by a rating factor. The rating factor is as follows:

4 for Band 1,
3 for Band 2,
2 for Band 3 and
1 for Band 4.

The resultant values are summed for each option to give a single PIR value number for each option. The PIR values are used to assess the potential impact of each option; the larger the PIR the greater the potential impact.

Properties/buildings in the innermost buffers are likely to be affected by noise emissions in a more acute way, with noise sensitivity decreasing in the buffer zones furthest from the centreline of each option. This approach allowed for the visual comparison of acutely affected properties within the scope of each option, and ultimately, provided the basis for more detailed analysis using TII's project appraisal matrix as described in the methodology in Section 1.1 of Appendix D1.2.

All receptors within 300m of each option have been identified and put into one of four "bands". These bands are defined by their distance to either side of the centre line of each option. Band 1 is from 0 to 50m of the centre line, Band 2 is from 50 to 100m, Band 3 is from 100 to 200m and Band 4 is from 200 to 300m.

A receptor is defined as any dwelling house, hotel, hostel, health building, educational establishment, place of worship, entertainment venue or any other facility or area of high amenity which benefits from, or requires the absence of, high noise levels.

Property counts have been conducted using data from the Geodirectory. In order to include worst case scenarios some commercial properties in urban areas are included as noise sensitive on the basis that the upper floors may have a residential content. Properties categorised as both residential and commercial and properties of unknown use have been included in the property count analysis.

The property counts for each banding are summarised in **Table 2-6.** Based on the numbers of properties in each banding, a calculation of the potential impact rating (PIR) was undertaken as detailed in **Table 2-7.** This PIR number represents the quantitative assessment of each option in terms of noise impact. The noise impact score is provided in **Table 2-8.**

Table 2-6:Section 1 Link Roads Options Property Counts and Banding

Banding	Option 1G - Ballybofey Link Road Options				
	A (Original)	**B**	**C**	**D**	**E**
0-50m	**16**	**12**	**31**	**28**	**16**
Residential	15	12	29	25	15
Commercial			1	2	1
Both	1		1	1	
Unknown					
50-100m	**8**	**58**	**89**	**105**	**44**
Residential	6	55	81	96	42
Commercial	1	2	8	8	0

Banding	Option 1G - Ballybofey Link Road Options				
	A (Original)	**B**	**C**	**D**	**E**
Both	1				2
Unknown		1		1	
100-200m	**30**	**224**	**193**	**253**	**186**
Residential	25	213	173	228	172
Commercial	1	7	12	15	11
Both	2	4	7	10	3
Unknown	2		1		
200-300m	**97**	**247**	**227**	**186**	**185**
Residential	95	221	203	171	171
Commercial	1	22	11	5	7
Both	1	2	7	4	6
Unknown		2	6	6	1

Table 2-7:Section 1 Link Road Options Potential Impact Rating

Option	Band	Multiplier	Receptors	Sub-Total	Total PIR (Quantitative Score)
Option 1G Ballybofey Link Road Options					
A (Original)	**0-50m**	4	16	64	245
	50-100m	3	8	24	
	100-200m	2	30	60	
	200-300m	1	97	97	
B	**0-50m**	4	12	48	917
	50-100m	3	58	174	
	100-200m	2	224	448	
	200-300m	1	247	247	
C	**0-50m**	4	31	124	1004
	50-100m	3	89	267	
	100-200m	2	193	386	
	200-300m	1	227	227	
D	**0-50m**	4	28	112	1119
	50-100m	3	105	315	
	100-200m	2	253	506	
	200-300m	1	186	186	
E	**0-50m**	4	16	64	753
	50-100m	3	44	132	
	100-200m	2	186	372	

Option	Band	Multiplier	Receptors	Sub-Total	Total PIR (Quantitative Score)
	200-300m	1	185	185	
	50-100m	3	4	12	
	100-200m	2	13	26	
	200-300m	1	28	28	

2.2.3 Qualitative Assessment of Potential Impact

2.2.3.1 Assessment of Changes in Traffic Flow

As these options are link roads there is limited potential for changes in traffic flow. Link road Option A provides a new direct link between the R252 and the N15 whereas the link is indirect with other four link road options. Option A is also located further out of town than Options B, C, D and E and as a result, Options B, C, D and E carry a greater level of traffic (2,400 to 3,300 AADT) than Option A (2,000 AADT). While the comparative difference in flows is significant, the magnitude of the change in flows is low in acoustic terms (less than 3 dB) and so this difference in traffic flows does not make a significant difference to the road traffic noise levels.

2.2.3.2 Assessment of the Likely Need for Mitigation Measures

The proposed junction with preferred Option 1G Route has the same configuration in Options B, C and D. In these three options the link road is on embankment overlooking the houses at Cappry. Option A and E on the other hand, the junction is in cut nearest to these houses resulting in better noise screening. It should also be noted that these properties have a level of noise exposure due to the existing link between the R252 and the N15.

Link road Option A goes directly south to the N15 through open country requiring little mitigation. Options B, C, D and E turn east and are routed south of The Park and Blue Cedars. As a result these links bring the proposed link alignment closer to these residences. Options B and C route traffic close to the Cois na Finn estate whereas Option D and E routes traffic south to join the N15 close to residences at Hawthorn Close. Options B, C, D and E will require more mitigation than Option A.

2.2.3.3 Summary of Qualitative Assessment

Link road Option A provides a short route through open country requiring the least mitigation. The other four link road options are routed significantly closer to residential areas, have higher PIR scores and would require significant mitigation. Link road Option A does not route traffic close to The Park and Blue Cedars whereas the other options bring the link road close to them. The increase in traffic noise above baseline if Option A is not selected will be noticeable at some properties.

2.2.4 Comparison of Options

Table 2-8 summarises the impact score matrix for all link road options in Section 1. This overall impact has been determined based on the quantitative and qualitative assessments of each option and the receptors likely to be affected.

Based on the noise assessment for Link Roads for Section 1, it was deemed that Link Road Option A was the most preferred option from an acoustic perspective.

The least preferred options from a noise and vibration perspective are Link Road D.

Table 2-8: Section 1 Link Road Options Noise Impact Score Matrix

Option	Quantitative Assessment	Qualitative Assessment	Overall PIR Rating	Impact Level	Impact Score	Ranking	Preference
Option 1G Ballybofey Link Road Options							
A	PIR Score: 245	PIR Score: 100	345	Not Significant/Neutral	4	1	Preferred
B	PIR Score: 917	PIR Score: 300	1217	Minor or slightly negative	3	3	Intermediate
C	PIR Score: 1004	PIR Score: 300	1304	Minor or slightly negative	3	4	Intermediate
D	PIR Score: 1119	PIR Score: 300	1419	Minor or slightly negative	3	5	Least Preferred
E	PIR Score: 753	PIR Score: 300	1053	Minor or slightly negative	3	2	Intermediate

2.3 Landscape and Visual

2.3.1 Landscape Impact

The landscape impacts are summarised in **Table 2-9** below. The negative landscape impacts arising from each of the proposed Link Road Options relates to the quality and sensitivity of the landscape areas affected. It is the key characteristics of each landscape area crossed that will influence the selection process.

This category assesses the proposed Link Road Options fit within the existing landscape character described and identified in the Landscape and Visual technical appendix **D1.3**; of the Option Selection Report. Using both the landscape sensitivity and the preliminary Link Road Options design drawings, the impacts of each option are appraised.

The text below discusses the differences between the landscape impacts for each of the proposed Link Road Options and assumes a worst case scenario which does not include landscape mitigation.

2.3.1.1 Option 1G - Ballybofey Link Road Option A

This Link Road Option commences at the junction of the R252 and a local road to the west of Ballybofey, to the south of the River Finn. The Link Road Option, traverses in a generally north-south alignment and provides a new link between the existing R252 and N15 with new linkages to the preferred Option 1G Route.

From the R252, Link Road Option A is to be generally constructed at grade, utilising the alignment of the local road. Minor alterations, including localised embankments and cuttings, will directly affect existing property boundaries of approximately 12Nr. residential properties before the Link Road Option A route aligns south-east within a series of cuttings below the Option 1G Route. The western link to Option 1G Route is proposed to be constructed within cuttings, which has the potential to impact on existing vegetation that includes field boundary hedgerows and a group of visually significant mature trees to the rear of an existing farm. The eastern link to Option 1G Route is proposed to be constructed on embankments and has the potential to impact on field boundary hedgerows.

To the south of the proposed Option 1G Route, the Link Road Option A traverses in a southerly direction on a proposed embankment, which has the potential to impact on existing field boundary hedgerows. On its approach to the N15, Link Road Option A is contained within cuttings, before connecting with the N15. The proposed cutting has the potential to impact on visually significant field boundary hedgerows, containing mature trees.

With regard to Landscape Character Area: this Link Road Option traverses through approximately 2.06km of the Finn Valley LCA. With regards to Scenic Amenity this Link Road Option is wholly located within the Medium Scenic Amenity (MSA) designation, though connections with the R252 and N15 are located within High Scenic Amenity (HSM) designation.

2.3.1.2 Option 1G - Ballybofey Link Road Option B

Link Road Option B commences at the proposed junction with preferred Option 1G Route, to the south of the proposed River Finn bridge crossing. Link Road Option B, traverses in a generally south-east alignment and provides a new link between the existing R252 and the N15 to the west of Ballybofey.

From the proposed junction with preferred Option 1G Route, access to Link Road Option B is provided on new embankments to the immediate east and west of Option 1G Route. These proposed embankments have the potential to impact on visually significant vegetation that includes field boundary hedgerows. From this junction, Link Road Option B traverses in a south-eastern direction, contained within a significant cutting, which skirts existing residential development to the south-west of Ballybofey. This cutting has the potential to impact upon field boundary vegetation, which contains mature trees.

As the Link Road Option approaches the N15, a new junction is to be formed which provides a linkage with the existing R252 to the north-east. This section of Link Road Option B is contained within a series of shallow embankments and cuttings, which have the potential to impact on visually significant vegetation comprised of field boundary hedgerows. The junction with the R252, will require localised re-alignment works, which has the potential to impact on well-maintained roadside hedgerows to the west of Cois Na Finn residential access.

Connection to the N15 from Link Road Option B traverses an agricultural field, forming separation between areas of residential development on the south-western edge of Ballybofey. This section of Link Road Option B is contained within a shallow cutting and has the potential to impact on visually significant field boundary hedgerows.

With regard to Landscape Character Area: this Link Road Option traverses through approximately 2.42km of the Finn Valley LCA. With regards to Scenic Amenity this Link Road Option is wholly located within the Medium Scenic Amenity (MSA) designation, though connections with the R252 and N15 are located within the High Scenic Amenity (HSM) designation.

2.3.1.3 Option 1G - Ballybofey Link Road Option C

The proposed junction alignment and connection to Option 1G Route associated with Link Road Option C, is similar to Link Road Option B. Link Road Option C, traverses in a generally south-east alignment and provides a new link between the existing R252 and the N15 to the immediate west of Ballybofey.

From the proposed junction with preferred Option 1G Route, access to Link Road Option C is provided on new embankments to the immediate east and west of Option 1G Route. These proposed embankments have the potential to impact on visually significant vegetation that includes field boundary hedgerows. From this junction, Link Road Option C traverses in a south-eastern direction, contained within a cutting, which skirts existing residential development to the south-west of Ballybofey before the

alignment changes to a more easterly direction. This section of Link Road Option C has the potential to impact upon field boundary vegetation, which contains instances of mature trees.

On the approach to the R252, Link Road Option C is proposed to be constructed on a series of embankments, with the connection and realignment of the R252 also proposed on embankments. This section has the potential to impact upon visually significant field boundary hedgerows and roadside hedgerows which currently form the boundary of the existing R252 alignment as well as visually significant vegetation forming the northern boundary of industrial facility at Bramble Hill and garden boundary vegetation as a consequence of the R252 being re-aligned and widened.

Connection to the N15 is provided within the existing urban context of Ballybofey, with Link Road Option C utilising existing storage areas and a strip of land between industrial units at Bramble Hill and existing residential properties in Glenview Park to the west of Ballybofey town centre. This section of Link Road Option C is proposed to be contained within a series of shallow cuttings, which has the potential to impact on visually significant vegetation.

With regard to Landscape Character Area: this Link Road Option traverses through approximately 2.56km of the Finn Valley LCA. With regards to Scenic Amenity this Link Road Option is wholly located within the Medium Scenic Amenity (MSA) designation, though connections with the R252 and N15 are located within High Scenic Amenity (HSM) designation.

2.3.1.4 Option 1G - Ballybofey Link Road Option D

The proposed junction alignment and connection to Option 1G Route associated with Link Road Option D, is similar to Link Road Option B and Link Road Option C. Link Road Option D, traverses in a generally south-east alignment and provides a new link with the N15 to the immediate west of Ballybofey.

From the proposed junction with preferred Option 1G Route, access to Link Road Option D is provided on new embankments to the immediate east and west of Option 1G Route. These proposed embankments have the potential to impact on visually significant vegetation that includes field boundary hedgerows. From this junction, Link Road Option D traverses in a south-eastern direction, contained within a cutting, which skirts existing residential development to the south-west of Ballybofey before the alignment changes to a more easterly direction. This section of Link Road Option D has the potential to impact upon field boundary vegetation, which contains instances of mature trees.

On the approach to the N15, Link Road Option D is proposed to be constructed on a series of embankments, with the Link Road Option utilising existing pasture land between residential clusters adjacent to the N15. This section of Link Road Option D has the potential to impact upon visually significant field boundary hedgerows and a roadside hedgerow which currently forms the southern field boundary adjacent to the N15.

An additional connection between R252 and the N15 is provided within the existing urban context of Ballybofey, with Link Road Option D utilising existing storage areas and a strip of land between industrial units at Bramble Hill and existing residential properties in Glenview Park to the west of Ballybofey town centre. This section of Link Road Option D is proposed to be contained within a series of shallow cuttings, which has the potential to impact on visually significant vegetation.

With regard to Landscape Character Area: this Link Road Option traverses through approximately 1.87km of the Finn Valley LCA. With regards to Scenic Amenity this Link Road Option is wholly located within the Medium Scenic Amenity (MSA) designation, though the connection to the N15 is located within an area of High Scenic Amenity (HSM) designation.

2.3.1.5 Option 1G - Ballybofey Link Road Option E

This Link Road Option commences to the west of the existing junction of the R252 and local road, to the west of Ballybofey and south of the River Finn. Link Road Option E, traverses in a generally east-west alignment and provides a new link between the existing R252 and N15 with links provided to preferred Option 1G Route from new roundabout junctions to the east and west.

From the R252, Link Road Option E traverses south and is to be constructed in new cuttings which have the potential to impact on existing field boundary hedgerows before the Link Road Option E aligns the western roundabout. A new link to the Option 1G Route from the western roundabout is proposed to be constructed within new cuttings, which have the potential to impact on existing field boundary hedgerows, which contain mature trees. The proposed east-west link between the two roundabout junctions is proposed to be constructed within cuttings, passing below preferred Option 1G Route, which has the potential to impact on a visually significant hedgerow with trees, forming field boundary and has the potential to directly affect a single residential property as the proposed link crosses the existing local road.

Proposed link between the eastern roundabout and preferred Option 1G Route is proposed to be constructed on new embankments which have the potential to impact upon a visually significant field boundary hedgerow. Further link to the existing local road from the eastern roundabout is proposed to be constructed within a short section of cutting which has the potential to impact upon a field boundary hedgerow.

From the eastern roundabout, the Link Road Option E traverses in an easterly direction, contained within a variety of cuttings which skirt the existing residential development to the south-west of Ballybofey before the alignment changes to a more south-easterly direction. This section of Link Road Option E has the potential to impact upon field boundary vegetation, which contain instances of mature trees.

On the approach to the N15, Link Road Option E is proposed to be constructed on a series of embankments, with the Link Road Option utilising existing pasture land between residential clusters adjacent to the N15. This section of Link Road Option E has the potential to impact upon visually significant field boundary hedgerows and a roadside hedgerow which currently forms the southern field boundary adjacent to the N15. The roundabout junction forming the proposed link between Link Road Option E and the N15 has the potential to impact on existing open space adjacent to the N15, forming the frontage to residential properties at Ard Mac Carron

With regard to Landscape Character Area: this Link Road Option traverses through approximately 3.17km of the Finn Valley LCA. With regards to Scenic Amenity this Link Road Option is wholly located within the Medium Scenic Amenity (MSA) designation, though connections with the R252 and N15 are located within High Scenic Amenity (HSA) designation.

Table 2-9: Landscape Character Impact

Link Road Option	Landscape Character Area	Landscape Character Area Sensitivity	Magnitude of change in landscape resource	Predicted significance of landscape impact
A Total Length 2.06km*	Finn Valley	Medium	Medium	Moderately negative
B Total Length 2.42km*	Finn Valley	Medium	Large	Major or Highly negative
C Total Length 2.56km*	Finn Valley	Medium	Large	Major or Highly negative

Link Road Option	Landscape Character Area	Landscape Character Area Sensitivity	Magnitude of change in landscape resource	Predicted significance of landscape impact
D Total Length 1.87km*	Finn Valley	Medium	Medium	Moderately negative
E Total Length 3.17km*	Finn Valley	Medium	Large	Major or Highly negative

** Note lengths quoted include link roads and local connecting roads for the purposes of comparing total LCA traversed.*

2.3.2 Visual Impact

The assessment of visual impacts has been based upon a desktop quantitative analysis of residential dwellings within 300m of the outer edge of each Link Road Option as summarised in **Table 2-10** below.

A review of the available on-line information has identified that no Protected Views and Prospects are located within close proximity to any of the Link Road Options and it is therefore considered that there will be no impacts on protected views as a result of the proposed options.

The following visual assessment assumes a worst case scenario, for each of the Options, and does not include landscape mitigation.

Table 2-10: Residential Property (Only) Counts

Link Road Option	Residential properties between 0–50m	Residential properties between 50–100m	*Residential properties between 100–200m*	Residential properties between 200–300m	Dwellings Total
A	15	6	25	95	141
B	12	55	213	221	501
C	29	81	173	203	486
D	25	96	228	171	520
E	15	41	172	171	399

Additional assessment of visual intrusion and obstruction on an individual property basis is not required at this stage and more detailed assessments are to be carried out at the full EIAR stage. **Table 2-11** below indicates the total number of properties lying within or between the specified distances in relation to the centre line of the Link Road Options and calculation of the overall impact. The calculation of overall impact is based on the multiplication of the number of dwellings by 3, 2, 1 or 0.5 reflecting the severity of impact within 50 m, 50-100 m, 100-200 m and 200-300 m respectively.

Table 2-11: Index for Visual Impact on Residential Properties Only

Link Road Option	0-50m	50-100m	100-200m	200-300m	Dwellings Total	Impact Index	Visual Impact Rating
A	45	8	25	47.5	141	125.5	1
B	36	110	213	110.5	501	469.5	3

Link Road Option	0-50m	50-100m	100-200m	200-300m	Dwellings Total	Impact Index	Visual Impact Rating
C	87	162	173	101.5	486	523.5	4
D	75	192	228	85.5	526	580.5	5
E	45	82	172	85.5	399	384.5	2

2.3.2.1 Option 1G - Ballybofey Link Road Option A

This Link Road Option has a higher potential for visual impacts on properties within the 0-50m distance band than Link Road Option B. This Link Road Option has the lowest potential for visual impacts on properties within the 50-100m, 100 – 200m and 200 – 300m distance bands than Link Road Options B, C, D or E resulting in an overall ranking of first.

2.3.2.2 Option 1G - Ballybofey Link Road Option B

This Link Road Option has a lower potential for visual impacts on properties within the 0-50m distance band than Link Road Option A, C, D or E. This Link Road Option has a higher potential for visual impacts on properties within the 50-100m distance band then Link Road Option A or E, though has the fourth highest potential for visual impacts on properties within the 100-200m distance band when compared with other Link Road Options and has the greatest potential for visual impacts on properties within the 200-300m distance band, resulting in an overall ranking of third.

2.3.2.3 Option 1G - Ballybofey Link Road Option C

This Link Road Option has a higher potential for visual impacts on properties within the 0-50m distance band then Link Road Option A, B, D or E. This Link Road Option has a higher potential for visual impacts on properties within the 50-100m distance band than Link Road Options A, B or E. This Link Road Option also has a higher potential for visual impacts on properties within the 100-200m distance band than Link Road Option A or E and a higher potential for visual impacts on properties within the 200-300m distance band than Link Road Options A, D or E resulting in an overall ranking of fourth.

2.3.2.4 Option 1G - Ballybofey Link Road Option D

This Link Road Option has the third highest potential for visual impact on properties within the 0-50m distance band when compared with other Link Road Options. This Link Road Option has the highest potential for visual impacts on properties within the 50-100m and 100-200m distance bands when compared with other Link Road Options, though has a lower potential for visual impacts on properties within the 200-300m distance band than Link Road Option B or C, resulting in an overall ranking of fifth.

2.3.2.5 Option 1G - Ballybofey Link Road Option E

This Link Road Option has a similar potential for visual impact on properties within the 0-50m distance band when compared with other Link Road Option A. This Link Road Option has the second highest potential for visual impacts on properties within the 50-100m when compared with other Link Road Options. This Link Road Option has the second highest potential for visual impacts on properties within the 100-200m distance band when compared with other Link Road Options, though has a lower potential for visual impacts on properties within the 200-300m distance band than Link Road Option B or C resulting in an overall ranking of second.

Table 2-12: Visual Impact and Predicted TII Score

Link Road Option	TII Scoring (based on Table 1-1)
A	2 (Moderately Negative)
B	1 (Major or Highly Negative)
C	1 (Major or Highly Negative)
D	1 (Major or Highly Negative)
E	1 (Major or Highly Negative)

2.3.3 Summary and Preference

A summary of the findings and order of preference is provided in **Table 2-13.**

Table 2-13: Section 1 Landscape and Visual Assessment – 1G Link Road Option Scoring Matrix

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
1G (Ballybofey Link Road Option A)	10	Moderately Negative ▪ Second Shortest Link Road Option at 2.06km ▪ Wholly contained within MSA designation with localised impacts on areas of HAS Designation ▪ Visual impact: Second highest number of residential properties within 0-50m distance band (15) and lowest number of residential properties within 50-100m distance band (6). ▪ Visual impact 141 dwellings within 300m of Option ▪ No predicted effects on Protected Views ▪ Link Road Option considered to be best landscape fit, when compared to Link Road Option B, C or D due to limited extent of embankments ▪ Link Road Option considered to have lowest potential for visual impact	2	1	Preferred
1G (Ballybofey Link Road Option B)	14	Major or Highly Negative ▪ Second Longest Link Road Option at 2.42km ▪ Wholly contained within MSA designation with localised impacts on areas of HAS Designation ▪ Visual impact: lowest number of residential properties within 0-50m distance band (12) and second highest number of residential properties within 50-100m distance band (55). ▪ Visual impact 501 dwellings within 300m of Option	1	3	Intermediate

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
1G (Ballybofey Link Road Option C)	14	Major or Highly Negative ▪ Longest Link Road Option at 2.56km ▪ Wholly contained within MSA designation with localised impacts on areas of HAS Designation ▪ Visual impact: highest number of residential properties within 0-50m distance band (29) and second highest number of residential properties within 50-100m distance band (81). ▪ Visual impact 486 dwellings within 300m of Option ▪ Link Road Option considered to be better landscape fit, when compared to Link Road Option B due to reduced extent of cuttings to south-west of Ballybofey	1	4	Least Preferred
1G (Ballybofey Link Road Option D)	13	Major or Highly Negative ▪ Shortest Link Road Option at 1.87km ▪ Wholly contained within MSA designation with localised impacts on areas of HAS Designation ▪ Visual impact: second highest number of residential properties within 0-50m distance band (25) and highest number of residential properties within 50-100m distance band (96). ▪ Visual impact 520 dwellings within 300m of Option ▪ Link Road Option considered to be better landscape fit, when compared to Link Road Option B and C due to reduced extent of cuttings to south-west of Ballybofey	1	2	Intermediate
1G (Ballybofey Link Road Option E)	14	Major or Highly Negative ▪ Longest Link Road Option at 3.17km ▪ Wholly contained within MSA designation with localised impacts on areas of HSA Designation ▪ Visual impact: Third highest number of residential properties within 0-50m distance band (15) and second highest number of residential properties within 50-100m distance band (41). ▪ Visual impact 399 dwellings within 300m of Option ▪ Potential impacts on existing open space within Ballybofey Urban context associated with N15 junction	1	5	Least Preferred

When landscape impacts are considered overall for the proposed Link Road Options there is a slight preference for Link Road Option A as it is considered to introduce fewer newer features into the landscape than the other Link Road Options being assessed and is the second shortest in overall length. Link Road Options B, C, D and E introduce significant new features in to the landscape as a consequence of junction connection with the Option 1G Route corridor, with Link Road Options B, C and D introducing newer features (embankments) immediately west of Ballybofey.

When visual impacts are considered overall Link Road Option A; whilst having the second highest potential for impacts on residential properties in the 0-50m distance band is preferred as such impacts are already experienced by residential properties adjacent to the local road utilised as the link to the R252 and the Link Road Option has the lowest potential for visual impacts on residential properties within 300m of the Option.

When both landscape and visual impacts are combined there is a preference for Link Road Option A, as it introduces fewer new features into the landscape to the south of the River Finn and has the lowest overall potential for visual impacts on residential properties.

2.4 Terrestrial Biodiversity

The Terrestrial Biodiversity of the mainline corridor for Option 1G has been assessed in **OSR, Volume D, Appendix D1.4**. Several link road options have been proposed for Option 1G that are subject to assessment, carried out in **Sections 2.4.1** to **below**.

All of the link road options assessed are situated within or adjoining the area spanned by Option 1G between the townland of Cappry and rural area immediately west of Ballybofey town. It is to be noted that Option 1G intersects the River Finn Special Area of Conservation (SAC) which is identified under two Ecological Receptors (ER) including the River Finn SAC (ER1) and otter (*Lutra lutra*) (ER2) which is a Qualifying Interest (QI) for the SAC. The options assessed below take cognisance of this interaction.

The link road options are being considered in addition to the original option selection surveys. Therefore, the lands through which they traverse were not included in the field assessments conducted as part of the option selection. Subsequently, site surveys have been conducted of the link roads study area where one additional ER was identified. This ER, ER25[1], is a small clustered mosaic of habitats which comprises poor fen and flush/wet grassland/marsh habitat mosaic (Habitat Codes[2]: PF2/GS4/GM1) which is being fed by a spring from the sloped land to the rear of Hawthorn Close housing estate (ITM: 613143, 894272). Potential dug wells were also identified within the field boundaries identified at ITM 613043,894430 and ITM 613110,894386, possibly created as a water source for livestock. The wetland habitat is classified as *Local Importance (Higher Value)* as per the Guidelines for Assessment of Ecological Impacts of National Roads Schemes (NRA, 2009).

2.4.1 Option 1G - Ballybofey Link Road Option A

Link Road Option A intersects a tributary of the River Finn (ER1), which is also identified as part of the watercourse network within the potential otter range associated with River Finn SAC (ER2). The link road boundary also adjoins the boundary of ER1, the River Finn SAC.

[1] ER ID numbering is a continuation of numbering applied in OSR, Volume D, Appendix D1.4 – Biodiversity (Terrestrial) (Document No. TT-MGT0337-RPS-00-01-RP-E-EN-1010). See Document TT-MGT0337-RPS-00-01-RP-E-EN-1010 for full list of ERs 1- 24.
[2] Habitat classification codes are assigned as per Fossitt, J. A, (2000) "*A Guide to Habitats in Ireland*".

This link road option extends beyond the original 1G corridor at two locations to the north west, at the Cappry Road junction with the R252 and to the west of the Cappry Road. At the Cappry Road junction, the boundary of the Link Road Option A intersects ecological receptor ER6 which is an area of riparian woodland/scrub (WN5/WS1). This habitat extends beyond the SAC boundary to the edge of the R252 and comprises a semi-natural woodland supporting a diversity of flora and fauna. WN5 woodland habitat may support associations with the Annex I habitat Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-padion, Alnion incanae, Salicion albae) (91E0), however the ER6 habitat does not correspond to the Annex I habitat. The habitats to the west of the Cappry Road comprise GA1 and farmyard (BL3) habitats.

Link Road Option A traverses habitats comprised of primarily improved agricultural grassland (GA1) with some occasional wet grassland (GS4), two small parcels of scrub/woodland (WS1/WD1), residential housing, commercial areas and the existing road infrastructure (BL3). The GA1 habitats are bounded by a mix of mature hedgerow (WL1) and treeline (WL2) habitats. The study area of Link Road Option A has high potential for commuting and foraging activity of volant and non-volant mammals. Given these factors, and the specific interactions with two ERs identified as being of International Importance, the option should be considered as having the potential for significant impacts on ecological receptors. A summary of the preference rankings for the Link Road options is presented in **Table 2-14.**

Link Road Option A has the potential to impact three individual ERs, two of which are considered to be of International Importance (ER1 and ER2) and one considered to be of Local Importance (Higher Value) (ER6). The option directly overlaps ER2 via the small stream present at the north-eastern edge of the option, a tributary of the River Finn. Its boundaries adjoin ER1 by terminating at the boundary of the River Finn SAC (ER1). It also intersects the south-east corner of ER6.

2.4.2 Option 1G - Ballybofey Link Road Option B

Link Road Option B intersects a small watercourse identified as part of ER2 and adjoins the boundary of ER1 similar to Link Option A, located approximately 190m east of the Logue's Bridge/Mill Cottage Bridge in the north-east region of the Cappry townland. Both ERs are ranked as being of International Importance. The boundary of this option also intersects with both ER1 and ER2 downstream at its easternmost extent at the footbridge crossing of the River Finn approximately 380m west of Jackson's Hotel in Ballybofey town.

Overall the link option spans habitats comprised of primarily agricultural and wet grassland mosaics. The option sweeps in a south easterly direction around the existing large residential and commercial estate west of Ballybofey. Its eastern extents span an area made up of smaller clusters of agricultural fields all bordered by a dense network of mature hedgerow/treeline mosaic. Notably the south-western area of this hedgerow/treeline network is an area of poor fen and flush/wet grassland/marsh habitat mosaic (PF2/GS4/GM1) (ER25) which is being fed by a water source from the top of slightly sloped land present at the southern boundary of this field system. In addition, 2no. dug wells are also located within the field boundaries adjacent to this habitat. This wetland habitat is to be considered an ecological receptor with a ranking of Local Importance (higher value). The habitats to the centre of the option are dominated by agricultural grasslands with the western extents comprised of agricultural and wet grassland mosaics (GA1/GS4) and some interspersed farmyard and residential housing areas (BL3). The north-east hosts a small area of scrub/(mixed) broadleaf woodland (WS1/WD2). The area has a high potential for commuting and foraging activity of volant and non-volant mammals protected under the Wildlife Act 1976 (as amended).

The option corridor interacts with two ERs of International Importance at two locations, and one ER of Local Importance (Higher Value), ER25. This option corridor has a significantly larger intersection with ER1 and ER2 in comparison to Option A and includes the full surface area of ER25. Therefore, the link

option has a potential for significant negative impacts on ecological receptors. A summary of the preference rankings for the Link Road is presented in **Table 2-14.**

2.4.3 Option 1G - Ballybofey Link Road Option C

Link option C intersects the same ERs as Option B, ER1 and ER2, approximately 190m east of the Logue's Bridge/Mill Cottage Bridge in the north-east region of the Cappry townland. However, it has a wider footprint at the north-eastern corner at the intersection of the River Finn, at the footbridge west (approximately 285m upstream) of Jackson's Hotel, Ballybofey town. This option has a more narrow, curved corridor than Option B at the southern extents. Several existing residential housing estates and commercial business areas are intersected by Link Road Option C. The Link Road Option C corridor spans a mosaic of agricultural and wet grassland habitats throughout which host hedgerow/treeline field boundaries. Notably the south-western area of this hedgerow/treeline network supports the habitat mosaic PF2/GS4/GM1 (ER25) which is being fed by a surface water source from the sloped land present at the southern boundary of this field system. In addition, the 2no. dug wells are also located within the field boundaries adjacent to this habitat. The ER25 wetland habitat is considered to be an ER with a ranking of Local Importance (higher value). There is a small scrub woodland (WS1/WD1) present at the north-western corner of the corridor that has potential to support Wildlife Act 1976 (as amended) species. The overall corridor area has a high potential for commuting and foraging activity of protected volant and non-volant mammals.

The option corridor interacts with two ERs of International Importance, ER1 and ER2, and one ER of Local Importance (Higher Value), ER25. The option has the same number of interactions with ER1 and ER2 as Option B. However, Option C has a larger corridor footprint that covers a larger surface area of the River Finn watercourse and consequently has a greater risk of negative impacts occurring to ER1 and ER2. The option also has a significant impact of ER25, however, link option C impacts 0.0003481 sq.km less surface area of ER25 than Link option B. A summary of the preference rankings for the Link Road is presented in **Table 2-14.**

2.4.4 Option 1G - Ballybofey Link Road Option D

Link option D intersects ER2 once via a stream connected to the River Finn and also adjoins the boundary of the River Finn SAC (ER1), approximately 190m east of the Logue's Bridge/Mill Cottage Bridge in the north-east region of the Cappry townland. The corridor spans residential and commercial areas to a lesser degree than other link road options. The habitats associated with Option D are primarily agricultural and wet grassland habitat types with a complex of hedgerow and treeline field boundaries. Notably the western area hosts the greatest network of hedgerow/treeline/small field systems, which supports the habitat mosaic PF2/GS4/GM1 (ER25) which is being fed by a water source from the sloped land present at the southern boundary of this field system. The presence of 2no. dug well features are located in the field boundaries adjacent to this habitat. This wetland habitat considered is to be an ecological receptor with a ranking of Local Importance (higher value). The overall corridor area has a high potential for commuting and foraging activity of volant and non-volant mammals protected under the Wildlife Act (1976 as amended).

Similar to Link Road Option A, Link Road Option D has two direct interactions with ER1 and ER2 compared to Option B and Option C which have four interactions on ER1 and ER2. The overall corridor footprint still poses a risk of potential significant negative impacts to ER1 and ER2 due to hydrological connectivity to the River Finn and the direct overlap with ER2. In addition, this option corridor covers the full surface area of ER25, however it does not intersect ER6 in comparison to Link Road Option A. Given these factors, and the specific interactions with two ERs identified as being of International Importance, the option should be considered as having the potential for significant impacts on ecological receptors. However, when compared against the other link road options, Option D has the least number of potential

vectors for which major or highly negative impacts can occur to the wider environment. A summary of the preference rankings for the Link Road is presented in **Table 2-14.**

2.4.5 Option 1G - Ballybofey Link Road Option E

Link option E intersects ecological receptor ER25, which comprises a habitat mosaic PF2/GS4/GM1 which is being fed by a water source from the sloped land present at the southern boundary of this field system. There are 2no. dug well features are located in the field boundaries adjacent to this habitat. This wetland habitat is to be considered an ecological receptor with a ranking of Local Importance (higher value). It does not directly interact with any other ER identified within the study area. It is adjacent to, separated by a local road, to ER6. The corridor spans residential and commercial areas to a lesser degree than other link road options. The habitats associated with option E are primarily agricultural and wet grassland habitat types with a complex of hedgerow and treeline field boundaries. Notably, to the east of the corridor, the landscape hosts the greatest network of hedgerow/treeline/small field systems. The lands west of the link option E corridor where it joins the Option 1G mainline corridor is also is comprised of primarily grassland habitats, including both improved agricultural (GA1) and wet grassland (GS4) habitats. Each field is bounded by linear treelines and hedgerows. The overall corridor area has a high potential for commuting and foraging activity of volant and non-volant mammals protected under the Wildlife Act (1976 as amended).

2.4.6 Conclusion

Table 2-14 below provides the detailed findings of the Link Road assessment for Section 1, with Option D as the preferred Ballybofey Link Road option.

Table 2-14: Option Scoring Matrix – Section 1 Terrestrial Biodiversity Scoring Matrix

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
1G (Ballybofey Link Road Option A)	2 Moderately Negative Impacts 1 Minor Negative Impact	This option interacts with three individual ERs, identified during the option selection process, two of which are considered to be of International Importance (ER1 and ER2) and one considered to be of Local Importance (Higher Value) (ER6). The option directly overlaps ER2 via a tributary of the River Finn located to the north-eastern edge of the option. This option also borders the River Finn SAC (ER1). It also intersects the south-east corner of ER6 which does not support the Annex I habitat 91E0, however this woodland lies partially within the River Finn SAC and is an area of high biodiversity value within the wider landscape.	2	3	Intermediate
1G (Ballybofey Link Road Option B)	2 Major or Highly Negative Impact 4 Moderately Negative Impacts	The option corridor has a significantly larger interaction with ER1 and ER2 in comparison to link option A. The option fully overlaps ER25 which is a wetland habitat. Overall, the option interacts with ERs ranked to be of International Importance and has potential for significant impacts to ER25. Given the agricultural habitats dominating the landscape, wetland habitats are	1	4	Intermediate

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
		scarce and link option B has the greater risk of significant negative impacts to ER25 when compared to link option A. Compared against link option A, the option B spans a larger surface area of open grassland and hedgerow/treeline network which has the potential for negative impacts to commuting volant and non-volant mammals and bird species protected under the Wildlife Act 1976 (as amended). Overall, link option B has a greater potential for negative impacts to occur to ERs ranked as being of International Importance.			
1G (Ballybofey Link Road Option C)	2 Major or Highly Negative Impact 4 Moderately Negative Impacts	The option has the same number of direct interactions with ER1, ER2 and ER25 as Option B. However, Option C has a larger corridor footprint that covers a larger surface area of the River Finn watercourse and SAC (ranked to be of International Importance) and consequently has a greater risk of negative impacts occurring to ER1 and ER2. The option may also have a significant impact on ER25, however, link option C impacts less of the surface area of ER25 (0.0003481 sq.km) than Link option B.	1	5	Least Preferred
1G (Ballybofey Link Road Option D)	4 Moderately Negative Impacts	The option only has two direct interactions with ER1 and ER2 compared to Option B and Option C which all have 4 interactions on ER1 and ER2. The overall corridor footprint has still a risk of potential significant negative impacts to ER1 and ER2 due to hydrological connectivity to the River Finn and the direct intersection with ER2. In addition, this option corridor covers the full surface area of ER25, however it does not intersect ER6 in comparison to Link Road Option A.	2	2	Intermediate
1G (Ballybofey Link Road Option E)	1 Moderately Negative Impact	This option only has one interaction with an identified ER, ER25. It is also in close proximity to, though not intersecting ER6. Both of these ERs are identified as being of Local Importance (higher value). There are no international or nationally important ERs associated with this link option. The overall corridor area has a high potential for commuting and foraging activity of volant and non-volant mammals protected under the Wildlife Act (1976 as	2	1	Preferred

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
		amended). Therefore, when compared against the other link road options, Option E has the least number of potential vectors for which negative impacts can occur.			

2.5 Aquatic Biodiversity

Ballybofey Link Road Options - Baseline Aquatic Ecology

River Finn Tributary E (Cappry) Baseline Description

- 1G Ballybofey Link Road Option Corridors intersect this tiny tributary for various distances upstream of the River Finn confluence, although the option centreline is a minimum of 75m away from the tributary it does not directly intercept the watercourse at any location.

Habitat / Fisheries Assessment: This tiny tributary was not visible as surface water in the corridor footprint during July 2018. The stream was located as a piped outfall to the River Finn from a reinforced boulder rock-armour wall next to the R252 (**Image 2.1**). It appeared to be fully piped / culverted upstream of the River Finn confluence for some distance, and as a field boundary drain in the upper reaches. It is only 350m in total length with a small fairly flat catchment area. The stream was dry during July 2018 survey. The watercourse has no fisheries value and is Category E - Local Importance (lower value).

Biological Water Quality: Not applicable, as watercourse was dry and/or sub-surface (piped).

Image 2.1: ITM: 612561 894982 Finn Tributary E (Cappry) confluence with River Finn. Dry, fully piped / culverted (12th July 2018)

Image 2.2: ITM: 612710 895015 River Finn Crossing C near 1G Link Options - view upstream (12th July 2018)

River Finn Baseline Description

- 1G Ballybofey Link Road Option Centrelines are c. 75m away from the River Finn main channel at the closest point. The corridors intercept over short distances with the main channel, but there is no direct impact on the River Finn main channel within these corridor widths.

Habitat / Fisheries Assessment: The main channel of the River Finn is a designated Salmonid Water and Special Area of Conservation (River Finn SAC: Site Code 002301). It is considered one of Ireland's premier spring salmon (*Salmo salar*) waters.

Fish surveys are carried out on the River Finn by the Loughs Agency under Water Framework Directive (WFD) surveillance monitoring. Two sites are monitored including the Stranagoppoge and Clady Bridge, c.20km u/s and d/s of Ballybofey respectively. The most recent data available (summer 2016) showed good numbers of 0+ and reasonable numbers of 1+ salmon at both surveillance sites using single pass electrofishing over 100m^2. Trout (*Salmo trutta*) were very scarce at both sites. Lampreys (species not defined) were recorded at Clady Bridge; European Eel (*Anguilla anguilla*) at both stations. The Clady Bridge site was at High Status for fish stocks, while Stranagoppoge was Moderate (Niven & McCauley, 2017). Overall, however, the River Finn consistently failed to meet its Conservation Limit for salmon over recent years (Niven et al., 2016).

The Loughs Agency conducts regular catchment-wide fish surveys in the Finn, using semi-quantitative (5-minute single-pass) electrofishing at numerous sites. Main channel and tributary sites that occur within the current study area are surveyed. Results over a number of years consistently show that in the reach upstream of Ballybofey where potential crossings of the River Finn occur, salmon fry (0+ year old) are absent or present in low numbers, while trout fry are absent. Parr (1+ year old) are generally present through the reach in 'Fair' numbers (5-14 fish per 5-min pass).

Aquatic qualifying interests of the SAC includes the Annex I Habitat 3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*), and Atlantic salmon (NPWS, 2017). Habitat 3110 is confined to upland lakes within the designation and does not occur within the current study area. Only Atlantic salmon occur within the relevant study area.

The River Finn in the potentially affected reach (in proximity to the link options) is a large, lowland, reasonably fast flowing meandering river: bank-width 25-30m; wet width 17m; depth up to 0.7m in glides (during drought) (**Image 2.2**). The dominant flow types are glide/run over mixed substrates of mainly large and small boulder cobble and bedrock outcrops, with patches of coarse gravel and sand deposited in hydraulic refuges behind boulders and in the interstitial spaces. Shorter sections of bedrock and boulder form higher gradient cascade and step pool morphology, while low gradient reaches form slower glides over pebble and gravel between outcropped boulders. Instream plants were mainly aquatic mosses, primarily *Fontinalis squamosa, Brachythecium* spp., *Racomitrium* spp., and liverworts including *Chiloscyphus* spp. The banks were steep and fairly uniform, indicative of historical drainage, with a broadly continuous riparian strip of mature trees and shrubs, including ash, alder, willow, poplar, birch and bird cherry with understorey of mixed tall herb, bramble and ferns.

The River Finn along the reach in proximity and downstream of the link road option corridors, generally has low potential for salmonid spawning owing to a paucity of suitable areas of stable gravel/cobble, although limited spawning cannot be ruled out. In contrast the relevant reaches have patches of good or very good salmonid nursery habitat, with numerous young salmonids (parr) being observed in glides and riffle zones. There are a few pools or deeper glide areas suitable for holding larger fish, e.g., resident trout. Eels are likely to be present. Fine sediment deposits were rare, meaning habitat was generally unsuitable for juvenile lamprey. Lamprey spawning potential was also considered low but cannot be ruled out. The ecological valuation is Category A (designated Salmonid Water and SAC status).

Biological Water Quality: A standard macroinvertebrate sample was taken and analysed on the bankside at the River Finn one lane bridge upstream of Ballybofey. The community was of low abundance and diversity comprised of mainly moderately tolerant and tolerant groups: Black fly larvae (Simuliidae), midges (Chironomidae), Tubificid worms, cased and uncased caddisflies (*Rhyacophila*, *Hydropsychidae* and *Glossosomatidae*), *Baetid* and *Serratella* mayflies, plus some moderately sensitive stoneflies, *Leuctra*

spp. There were no Group A species as the sample merited a Q3 rating, equating to moderately polluted and Poor Ecological Status. This concurs with recent EPA monitoring at this site.

Ballybofey Link Road Options – Aquatic Ecology Assessments

2.5.1 Option 1G – Ballybofey Link Road Option A

The River Finn Tributary E (Cappry) is partly within this link road option corridor (c.130m watercourse length), however, there is no interception of the link road centreline with the watercourse. The link road centreline is a minimum of c.180m away from the River Finn Tributary, and c.200m (at the closest point) from the River Finn.

The River Finn Tributary E (Cappry) is a very minor watercourse, with low ecological value. It is piped along the lower reaches with apparently little surface water upstream of the piped reach. The potential construction and operational phase impacts of Option A on this tiny tributary are considered '**Minor'** and temporary during construction with likely imperceptible downstream effects on the River Finn (and SAC as a whole) during operation. The risk of any impact on the River Finn during construction phase is very low given the distance of the construction from the main channel, so long as run-off pathways are managed to avoid and mitigate sediment and other pollutant export to the tributary. Run-off pathways between the construction site and the Finn main channel must be adequately managed (e.g., sediment export reduction - ponds/traps etc.). There is just one location where such run-off effects carry risk to the River Finn, near the main channel crossing point. The cumulative impact of this option in association with the Finn main channel crossing is minimal, especially compared to the alternative options.

Option A joins the N15 and at that point would be c.300m away from the Burn Daurnett. While the risk of negative indirect impacts on the Burn Daurnett is low over that distance of separation, there would need to be good management of flow paths towards the Burn Daurnett during the construction phase and stringent Best Management Practices (BMPs) as mitigation in the areas of sediment, hydrocarbon and concrete loss.

Option A is the least impactful of the link road options from aquatic ecology perspective, both quantitatively and qualitatively.

2.5.2 Option 1G - Ballybofey Link Road Option B

The River Finn Tributary E (Cappry) is entirely within this link road option corridor (350m watercourse length), however, there is no interception of the link road centreline with the watercourse. The link road centreline is a minimum of c.75m away from the River Finn Tributary E (Cappry). The corridor for Option B covers c.400m of the River Finn main channel; the centreline is c.75m, at the closest point, from the River Finn.

The River Finn Tributary E (Cappry) is a very minor watercourse, with low ecological value. It is piped along the lower reaches with apparently little surface water upstream of the piped reach. The potential construction and operational phase impacts of Option B on this tiny tributary are considered '**Minor'** and temporary during construction with likely imperceptible downstream effects on the River Finn (and SAC as a whole) during operation. In contrast, there is potential for '**Moderate'**, temporary indirect adverse effects (temporary effects on a small part of River Finn SAC) in association with potential for contaminated run-off (e.g., sediment, hydrocarbons, concrete) to the River Finn during the construction phase. This could occur in the absence of BMPs and if run-off pathways between the construction site and the Finn main channel were not adequately managed (e.g., sediment export reduction - ponds/traps etc.).

There are two locations where such run-off effects to the River Finn carry most risk: near the main channel crossing point and c.1km east of there, where Option B again re-joins the R252. The cumulative impact

of Option B in association with the Finn main channel crossing is elevated (potentially Moderate - temporary, negative, localised), especially compared to Option A.

Option B joins the N15 at a point c.400m away from the Burn Daurnett. While the risk of negative indirect impacts on the Burn Daurnett is low over that distance of separation, there would need to be good management of flow paths towards the Burn Daurnett during the construction phase and stringent BMPs (as mitigation) in the areas of sediment, hydrocarbon and concrete loss.

2.5.3 Option 1G - Ballybofey Link Road Option C

The River Finn Tributary E (Cappry) is entirely within this link road option corridor (350m watercourse length), however, there is no interception of the link road centreline with the watercourse. The link road centreline is a minimum of c.80m away from the River Finn Tributary (Cappry). The corridor for Option C covers c.450m of the River Finn main channel; the centreline is c.90m, at the closest point, from the River Finn.

The River Finn Tributary E (Cappry) is a very minor watercourse, with low ecological value. It is piped along the lower reaches with apparently little surface water upstream of the piped reach. The potential construction and operational phase impacts of Option C on this tiny tributary are considered '**Minor'** and temporary during construction with likely imperceptible downstream effects on the River Finn (and SAC as a whole) during operation. In contrast, there is potential for '**Moderate'**, temporary indirect adverse effects (temporary effects on a small part of River Finn SAC) in association with potential for contaminated run-off (e.g., sediment, hydrocarbons, concrete) to the River Finn during the construction phase. This could occur in the absence of BMPs and if run-off pathways between the construction site and the Finn main channel were not adequately managed (e.g., sediment export reduction - ponds/traps etc.). There are two locations where such run-off effects to the River Finn carry most risk including near the main channel crossing point and c.1km east of there, where Option C again re-joins the R252.

Option CB joins the N15 at a point c.500m away from the Burn Daurnett. While the risk of negative indirect impacts on the Burn Daurnett is low over that distance of separation, there would need to be good management of flow paths towards the Burn Daurnett during the construction phase and stringent BMPs (as mitigation) in the areas of sediment, hydrocarbon and concrete loss.

The cumulative impact of Option C in association with the Finn main channel crossing is elevated (potentially Moderate - temporary, negative, localised), especially compared to Option A.

2.5.4 Option 1G - Ballybofey Link Road Option D

The River Finn Tributary E (Cappry) is entirely within this link road option corridor (350m watercourse length), however, there is no interception of the link road centreline with the watercourse. The link road centrelines are a minimum of c.80m away from the River Finn Tributary E (Cappry). The corridor for Option D covers c.300m of the River Finn main channel; the centreline is c.100m, at the closest point, from the River Finn.

The River Finn Tributary E (Cappry) is a very minor watercourse, with low ecological value. It is piped along the lower reaches with apparently little surface water upstream of the piped reach. The potential construction and operational phase impacts of Option D on this tiny tributary are considered '**Minor'** and temporary during construction with likely imperceptible downstream effects on the River Finn (and SAC as a whole) during operation. In contrast, there is potential for '**Moderate'**, temporary indirect adverse effects (temporary effects on a small part of River Finn SAC) in association with potential for contaminated run-off (e.g., sediment, hydrocarbons, concrete) to the River Finn during the construction phase. This could occur in the absence of BMPs and/or if run-off pathways between the construction site and the Finn main channel were not adequately managed (e.g., sediment export reduction - ponds/traps etc.). There

is just one location where such run-off effects carry potential risk to the River Finn, near the main channel crossing point. The cumulative impact of Option B in association with the Finn main channel crossing is elevated (potentially Moderate - temporary, negative, localised), especially compared to Option A.

Option D joins the N15 and at that point would be c.500m away from the Burn Daurnett. While the risk of negative indirect impacts on the Burn Daurnett is low over that distance of separation, there would need to be good management of flow paths towards the Burn Daurnett during the construction phase and stringent BMPs as mitigation in the areas of sediment, hydrocarbon and concrete loss.

2.5.5 Option 1G - Ballybofey Link Road Option E

The River Finn Tributary E (Cappry) is not intercepted by either the corridor or centreline of this link road option. This link road centreline is a minimum of c.200m away from the River Finn Tributary. The western arm of this link road option (connecting to R252) is, however, c.60m at the closest point to the River Finn.

The River Finn Tributary E (Cappry) is a very minor watercourse, with low ecological value. It is piped along the lower reaches with apparently little surface water upstream of the piped reach. There are not predicted to be any construction and operational phase impacts of Option E on this tiny tributary, hence impact level is considered '**Neutral'**. In contrast, there is potential for '**Slight-to-Moderate'**, temporary indirect adverse effects (temporary effects on a small part of River Finn SAC) in association with potential for contaminated run-off (e.g., sediment, hydrocarbons, concrete) to the River Finn during the construction phase. This could occur in the absence of BMPs and if run-off pathways between the construction site and the Finn main channel were not adequately managed (e.g., sediment export reduction - ponds/traps etc.). There is one location where such run-off effects carry risk to the River Finn: at the point where the western arm of the link road joins the R252. The cumulative impact of this option in association with the Finn main channel crossing is minimal compared to alternative link route options other than Option A.

Option E link joins the N15 at a point c.500m away from the Burn Daurnett. While the risk of negative indirect impacts on the Burn Daurnett is very low over that distance of separation, there would need to be good management of flow paths towards the Burn Daurnett during the construction phase and stringent Best Management Practices (BMPs) as mitigation in the areas of sediment, hydrocarbon and concrete loss.

The cumulative impact of Option E in association with the Finn main channel crossing is slightly elevated (potentially Slight - temporary, negative, localised) compared to Option A. Option E has a greater construction phase footprint in terms of earthworks and potential for sediment contaminated run-off. Although this construction is set well back from the River Finn main channel, the works all occur within the Finn catchment and do carry slightly elevated risk during rainfall and storm events, for example.

2.5.6 Conclusion

The summary of the findings of the Link Road assessment for Section 1 regarding Aquatic Biodiversity is provided in **Table 2-15**, with Option A as the preferred Ballybofey Link Road option.

Table 2-15: Aquatic Biodiversity Scoring Matrix

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
1G (Ballybofey Link Road Option A)	c.130m corridor intersection with minor trib. (Cappry) + no corridor (0m) intersection with R. Finn.; no centreline crossing with any watercourse. Distant indirect impact potential with Burn Darnett (N15 link).	Minor or slightly negative Neutral – to – Minor, temporary, localised: imperceptible effects on River Finn main channel / SAC during construction and operation. Low risk of indirect impact on Burn Daurnett.	3	1	Preferred
1G (Ballybofey Link Road Option B)	c.350m corridor intersection with minor trib. (Cappry) + c. 400m corridor intersection with R. Finn.; no centreline crossing with any watercourse. Distant indirect impact potential with Burn Darnett (N15 link).	Neutral impact on Cappry trib.; Minor-to-Moderate, temporary, localised negative on R. Finn: Higher risk of construction phase impact on R. Finn + elevated cumulative impact with R. Finn crossing. Likely imperceptible effects on River Finn main channel / SAC during operation. Low risk of indirect impact on Burn Daurnett.	2	4	Intermediate
1G (Ballybofey Link Road Option C)	c.350m corridor intersection with minor trib. (Cappry) + c.450m corridor intersection with R. Finn.; no centreline crossing with any watercourse. Distant indirect impact potential with Burn Darnett (N15 link).	Neutral impact on Cappry trib.; Minor-to-Moderate, temporary, localised negative on R. Finn: Higher risk of construction phase impact on R. Finn + elevated cumulative impact with R. Finn crossing. Likely imperceptible effects on River Finn main channel / SAC during operation. Low risk of indirect impact on Burn Daurnett.	2	5	Least preferred
1G (Ballybofey Link Road Option D)	c.350m corridor intersection with minor trib. (Cappry) + c.300m corridor intersection with R. Finn.; no centreline crossing with any watercourse. Distant indirect impact potential with Burn Darnett (N15 link).	Neutral impact on Cappry trib.; Minor-to-Moderate, temporary, localised negative on R. Finn: Higher risk of construction phase impact on R. Finn + elevated cumulative impact with R. Finn crossing. Likely imperceptible effects on River Finn main channel / SAC during operation. Low risk of indirect impact on Burn Daurnett.	2	2	Intermediate
1G (Ballybofey Link Road Option E)	c.0m corridor intersection with minor trib. (Cappry) + no corridor (0m) intersection with R. Finn.; no centreline crossing with any watercourse. Distant indirect impact potential with Burn Darnett (N15 link).	Neutral impact on Cappry trib.; Minor-to-Moderate, temporary, localised negative on R. Finn: Higher risk of construction phase impact on R. Finn + slightly elevated cumulative impact with R. Finn crossing. Likely imperceptible effects on River Finn main channel / SAC during operation. Low risk of indirect impact on Burn Daurnett.	2	3	Intermediate

2.6 Soils, Geology and Hydrogeology

This section of the report examines the Soils, Geology and Hydrogeology attributes of the five Ballybofey link road Options (A-E) for Section 1 N15 Ballybofey – Stranorlar Urban Region of the TEN-T Priority

Route Improvement Project in Donegal. The soil and geology attributes for Option 1G are assessed in the technical appendix in the **OSR, Volume D, Appendix D1.6**.

This assessment examines each option in terms of their importance and the possible impacts resulting from the construction of a proposed option. The options will be compared, and impacts assessed from a land, soil, and hydrogeological perspective. It should be noted that the optimum option from a soils, geology and hydrogeology perspective may not be the overall optimum option when other environmental, economic, and engineering impacts are taken into account.

The methodology, scope of assessment and desk study of the area for the route options is described in the **OSR, Volume D, Appendix D1.6**. The Ballybofey Link Roads are located at the south and centre of the original study area, the extents of the study area for this report are the same.

Topography is elevated in the north-west and south west, and, to a lesser degree, in the north-east and south-east of the Section 1 study area. The topography slopes towards the centre of the study area and the River Finn cuts east – west across the centre of the study area.

The dominant subsoil is metamorphic till. It is present both north and south of Ballybofey and Stranolar. Pockets of blanket bog and rock outcrop at surface are present in the north-west of the study area, the area of highest elevation.

The overlying soil reflects the underlying till. In the north-west, it is predominantly poorly drained acid soils (surface water gleys). In the south of the study area, the poorly drained acid soils (surface water gleys) are mixed with areas of well drained acid soils. There are alluvial (river/floodplain) deposits along the River Finn which intersects west to east across the centre of the study area.

The study area is underlain by three metamorphic rock types which were originally sedimentary rocks that subsequently metamorphosed. The Precambrian bedrock stratigraphy in this part of Donegal trends roughly south-west to north-east. The dominant underlying geology is Lough Eske Psammite Formate which is comprised of feldspatic psammite and quartzite. North of Stranorlar are narrow bands of Killeter Quartzite and Aghyaran and Killygordon Limestone.

There are no recorded karst features in the Section 1 study area, which is expected given the metamorphic geology of the region. There are no Geological Heritage Sites of regional or national heritage value within the ZoI. There are no landfills, historically contaminated sites, active quarries or mineral locations within the ZoI of each option.

There are no records of landslides held by the GSI within the study area or the surrounding environment. According to the GSI's Landslide Susceptibility[3] mapping, the majority of the study area is rated as having 'Low' landslide susceptibility. There are small areas of 'Moderately Low' to 'Moderately High' susceptibility in the areas of high elevation in north-west and south-west, and areas of 'Moderately High' to 'High' susceptibility in the north-east.

There are no recorded karst features, geological heritage areas, active quarries, mineral sites, landfills or contaminated land in the Zone of Influence (ZoI) of each option. The main impact is associated with each option is excavation of soft soil deposits. The quantitative aspect of the comparative assessment of impacts is carried out along the centre-line of each option. The estimate of the volume of soft soils to be

[3] GSI Geohazards Mapping (https://www.gsi.ie/en-ie/data-and-maps/Pages/Geohazards.aspx)

removed assumes a 21.5 metres wide carriageway along the considered road options, and an excavation of four metres deep.

2.6.1 Soils and Geology Impact Assessment

Alluvium and peat were grouped together to determine the proportion of each option that will cross soft soils. All Ballybofey Link road options were examined and although there are soft soils within the ZoI of some of the proposed routes, none of the proposed carriageways are located in areas of soft soil. There is a Low attribute importance associated with soft soils (NRA Guidelines). No soft soils are required to be removed for any of the considered options and as a result there is no impact associated with their removal. The impact is therefore considered Neutral for all options.

The potential impact on the options are described below under the relevant headings. Due to the limited number of impacts associated with each option, the summary of key impacts is presented on one table, **Table 2-16.**

Table 2-16: Assessment of Soils and Geology impacts for the five Ballybofey Link Road Options

Option 1G	Attribute	Attribute Importance	Impact	Level of Impact
Ballybofey Link Road Option A	Poor/ soft ground* (entire option)	Low	The option length is 2,057m. The proportion of the option that will cross soft ground comprises **0%** (0m) of total length. No soft soils will require excavation along this option.	Neutral
Ballybofey Link Road Option B	Poor/ soft ground* (entire option)	Low	The option length is 2,425m. The proportion of the option that will cross soft ground comprises **0%** (0m) of total length. No soft soils will require excavation along this option.	Neutral
Ballybofey Link Road Option C	Poor/ soft ground* (entire option)	Low	The option length is 2,564m. The proportion of the option that will cross soft ground comprises **0%** (0m) of total length. No soft soils will require excavation along this option.	Neutral
Ballybofey Link Road Option D	Poor/ soft ground* (entire option)	Low	The option length is 1,874m. The proportion of the option that will cross soft ground comprises 0% (0m) of total length. No soft soils will require excavation along this option.	Neutral
Ballybofey Link Road Option E	Poor/ soft ground* (entire option)	Low	The option length is 3,173m. The proportion of the option that will cross soft ground comprises 0% (0m) of total length. No soft soils will require excavation along this option.	Neutral

Notes: *Peat and/or Alluvium

2.6.2 Summary and Preference

The summary of the impact assessment for each impact level is outlined in **Table 2-17.** All five Link Road Options have one impact status - not significant/neutral impact.

Table 2-17: Summary of Land and Soil Impacts for each Option

TII Rating Key	Ballybofey Link Roads				
	Option A	Option B	Option C	Option D	Option E
Major or Highly negative	-	-	-	-	-
Moderately Negative	-	-	-	-	-

TII Rating Key	Ballybofey Link Roads				
	Option A	Option B	Option C	Option D	Option E
Minor or Slightly negative	-	-	-	-	
Not significant/ neutral	1	1	1	1	1
Minor or Slightly positive	-	-	-	-	-
Moderately Positive	-	-	-	-	-
Major or Highly Positive	-	-	-	-	-

Table 2-18: Soils and Geology Scoring Matrix

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
1G (Ballybofey Link Road Option A)	× 4 Neutral impacts	▪ Poor/ soft ground does not require excavation ▪ Traverses Poor aquifer (Pl) ▪ Traverses High vulnerability.	4	1	No Preference
1G (Ballybofey Link Road Option B)	× 4 Neutral impacts	▪ Poor/ soft ground does not require excavation ▪ Traverses Poor aquifer (Pl) ▪ Traverses High vulnerability.	4	1	No Preference
1G (Ballybofey Link Road Option C)	× 4 Neutral impacts	▪ Poor/ soft ground does not require excavation ▪ Traverses Poor aquifer (Pl) ▪ Traverses High vulnerability.	4	1	No Preference
1G (Ballybofey Link Road Option D)	× 4 Neutral impacts	▪ Poor/ soft ground does not require excavation ▪ Traverses Poor aquifer (Pl) ▪ Traverses High vulnerability.	4	1	No Preference
1G (Ballybofey Link Road Option E)	× 4 Neutral impacts	▪ Poor/ soft ground does not require excavation ▪ Traverses Poor aquifer (Pl) ▪ Traverses High vulnerability.	4	1	No Preference

2.6.3 Hydrogeology Impact Assessment

A review of the hydrogeology of the Section 1 study area is provided in the **OSR, Volume D, Appendix D1.6**, which includes the area of Option 1G. The aquifers in the area are predominantly poorly productive aquifers which are generally unproductive except for local zones. A locally important bedrock aquifer, that is moderately productive only in local zones, is mapped in the north of the study area. The Ballybofey Link Road options traverse Highly vulnerable aquifers, which are classified as such due to the thickness of overburden in the area. As the aquifer classification underlying the Link road options is 'Poor Aquifer' and

there is little reliance of the groundwater as a resource the impact of the proposed routes on the aquifer is neutral.

The amount of cut which is required along each option has been calculated based on the preliminary option design by the Engineering team. This has been considered in the assessment where cut is greater than 3m depth and traverses' areas of high groundwater vulnerability; this could increase the vulnerability rating to extreme through removal of soil and subsoil cover. At this stage in the route selection process no ground investigations have been undertaken in the vicinity of the five Ballybofey Link Road Options, and the depth to rock is based on the GSI groundwater vulnerability mapping.

The potential impact on the options are described below under the relevant headings. There is minimal impact on hydrogeology receptors. The potential impacts of each option on the key hydrogeology attributes along each option are set out in **Table 2-20** and **Table 2-21**, respectively.

The main aquifer impacts are dewatering and drawdown during the construction phase, and localised lowering of the water table where intercepted. In the context of the wider regional hydrogeology, these are considered neutral impacts, in areas underlain by PI.

None of the link road lengths for the options are estimated to be in areas of cut where vulnerability is rated as X (rock outcrop at surface) or extreme (rock< 3 metres from surface). The full lengths of each option are underlain by a Poor Aquifer with High groundwater vulnerability – considered a neutral impact.

2.6.4 Option 1G - Ballybofey Link Road Options A-E

Ballybofey Link Road Option lengths are outlined below in **Table 2-19** and an assessment of hydrogeology impact are provided in **Table 2-20.** A review of the GSI database indicates that there are four recorded abstraction wells in the vicinity of the route options, however the impact of the proposed routes is considered neutral due to the poor yield of this aquifer in general, and general lack of use as a groundwater source/supply.

Table 2-19: Ballybofey Link Road Option Lengths

Link Road Option	Length (m)
Option A	2057
Option B	2425
Option C	2564
Option D	1874
Option E	3173

Table 2-20: Assessment of Hydrogeology Impacts for Ballybofey Link Road Options A-E

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (Pl)	Low	**100%** of all the link road options (A-E) traverses a Poor Aquifer	Neutral
Proportion of option that crosses locally important aquifer (Ll)	Medium	None of the link road options traverse a Locally important aquifer (Ll)	Neutral

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	None of the link road options **0%** (0m) are cut through X/Extreme groundwater vulnerability. Traverses Poor Aquifer (Pl).	Neutral
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Low	**25%** (522m) of Link road option A is cut >3m in areas of High vulnerability. 100% of this cut length traverses a Pl Traverses Poor Aquifer (Pl).	Neutral
		27% (649m) of Link Road Option B is cut >3m in areas of High vulnerability. 100% of this cut length traverses a Pl Traverses Poor Aquifer (Pl).	
		26% (671m) of Link road Option C is cut >3m in areas of High vulnerability. 100% of this cut length traverses a Pl Traverses Poor Aquifer (Pl).	
		3% (51m) of link road Option D is cut >3m in areas of High vulnerability. 100% of this cut length traverses a Pl Traverses Poor Aquifer (Pl).	
		6% (295m) of link road Option E is cut >3m in areas of High vulnerability. 100% of this cut length traverses a Pl Traverses Poor Aquifer (Pl).	

2.6.5 Summary and Preferences

The summary of the impact assessment for each impact level is outlined in **Table 2-21.** All of the five Ballybofey Link Road Options have the same impact score of 4 neutral impacts.

Table 2-21: Summary of Hydrogeology Impacts for each Option

TII Rating Key	Ballybofey Link Roads				
	Option A	Option B	Option C	Option D	Option E
Major or Highly negative	-	-	-	-	
Moderately Negative	-	-	-	-	
Minor or Slightly negative	-	-	-	-	
Not significant/ neutral	4	4	4	4	4
Minor or Slightly positive	-	-	-	-	
Moderately Positive	-	-	-	-	
Major or Highly Positive	-	-	-	-	

2.6.6 Conclusion

From the review of the impacts of each proposed option on the soils, geology and hydrogeology in the ZoI, each the options have a similar degree of neutral impacts as presented in **Table 2-22.** None of the five route options traverse poor or soft ground that requires excavation or traverse areas of Locally important aquifer (Ll & Lg). Areas of extreme groundwater vulnerability were not identified in the areas of Ballybofey Link Roads. However, as the underlying aquifer is a Poor Aquifer, this is still considered a neutral impact. In assessing a preferred route option from a geological and hydrogeological perspective, the impacts are all similar and as such, each route option has equal ranking.

Table 2-22: Soils, Geology and Hydrology Option Scoring Matrix

Option		Quantitative Assessment	Qualitative Assessment	Impact Score	Impact Score	Preference Ranking	Preference
Ballybofey Link Road Options	A	× 4 Neutral impacts	Poor/ soft ground does not require excavation Traverses Poor aquifer (Pl) Traverses High vulnerability.	Not significant or Neutral	4	1	No Preference
	B	× 4 Neutral impacts	Poor/ soft ground does not require excavation Traverses Poor aquifer (Pl) Traverses High vulnerability.	Not significant or Neutral	4	1	
	C	× 4 Neutral impacts	Poor/ soft ground does not require excavation Traverses Poor aquifer (Pl) Traverses High vulnerability.	Not significant or Neutral	4	1	
	D	× 4 Neutral impacts	Poor/ soft ground does not require excavation Traverses Poor aquifer (Pl) Traverses High vulnerability.	Not significant or Neutral	4	1	

2.7 Hydrology

This section has been completed by undertaking a desk study to identify and retrieve published information on the hydrology of the area with respect to the five link road options. The following sub-sections will primarily summarize the impacts of each option on the existing hydrology and predictive flood extents of the local watercourses. The locations of watercourses were identified through consultation of the Environmental Protection Agency (EPA) Next Generation Maps[4]. OS mapping was also examined to identify any land drains that may be affected by the proposed options.

Potential impacts of the options on flood risk in the area were quantitatively assessed by comparing the Catchment Flood Risk Assessment and Management (CFRAM) predictive flood extents for the 1% and 0.1% Mid-Range Future Scenario (MRFS) events for Ballybofey[5].

The site was also reviewed for instances of historical flooding through examination of past flood events recorded by the Office of Public Works (OPW). No such events were recorded at any of the five link road options.

The impact of the remainder of the preferred route option 1G on hydrology will not be included as part of this assessment as these impacts will be consistent across all link road options. The previously completed

[4] https://gis.epa.ie/EPAMaps/
[5] https://www.floodinfo.ie/map/floodmaps/ (Office of Public Works (OPW), 2017)

hydrological assessment of the preferred option route 1G may be viewed in **the OSR Report, Volume D, Appendix D1.7**.

2.7.1 Option 1G - Ballybofey Link Road Option A

Examination of Ballybofey Link Road Option A reveals that the preliminary road corridor and associated embankments do not intersect any EPA identified watercourses. The 300m buffer zone encroaches upon approximately 100m length of minor tributary Aghasheil (01_553).

The 300m buffer zone of the northern link road to the R252 encroaches upon the predictive CFRAM extents but there is no discernible difference in predictive flood extent encroachment between all reviewed link road options. The buffer zone for the N15 southern link road also abuts the predictive CFRAM flood extents of the Burn Daurnett (01_1828) but ties in on the northern side of the N15 and so there are no foreseeable potential impacts on the flood extents.

The proposed length of the Link Road Option A is 2.057km. This is the second shortest route comparing against all other options. It is assumed that adequately designed drainage and attenuation will be provided to remove any potential impact stormwater runoff may have on local hydrology.

The N15 southern link road also crosses one land drain approximately 100m north of the N15. Adequately designed drainage solutions (culverts) will be required at this location.

Ballybofey Link Road Option A will have a minor or slightly negative impact on the hydrology of the area and ranks 2nd with regards to preferred options.

2.7.2 Option 1G - Ballybofey Link Road Option B

Ballybofey Link Road Option B preliminary road corridor and associated embankments do not intersect any EPA identified watercourses. However, the preliminary eastern R252 link road corridors and roundabout are located approximately 30m from CFRAM predictive flood extents for the River Finn (01_591). The 300m buffer zone encroaches upon approximately 320m length of minor tributary Aghasheil (01_553).

Again, the 300m buffer zone of the northern link road to the R252 encroaches upon the predictive CFRAM extents but there is no discernible difference in predictive flood extent encroachment at the northern link road between all reviewed link road options. The 300m buffer zone for the eastern link for the R252 encroaches upon approximately 12,500m^2 of predictive CFRAM flood extents of the River Finn (01_591).

The proposed length of the Link Road Option B is 2.425km. This is the third longest route comparing against all other options. It is assumed that adequately designed drainage and attenuation will be provided to remove any potential impact stormwater runoff may have on local hydrology.

No drain crossings were identified through examination of OS mapping.

Ballybofey Link Road Option B may have a minor or slightly negative impact on the hydrology of the area and ranks 4th with regards to preferred options. This is mainly due to the proximity of the eastern link roads to the predictive CFRAM flood extents of the River Finn.

2.7.3 Option 1G - Ballybofey Link Road Option C

Ballybofey Link Road Option C preliminary road corridor and associated embankments do not intersect any EPA identified watercourses. However, the preliminary eastern R252 link road corridors are located approximately 20m from CFRAM predictive flood extents for the River Finn (01_591). The 300m buffer zone encroaches upon approximately 320m length of minor tributary Aghasheil (01_553).

Again, the 300m buffer zone of the northern link road to the R252 encroaches upon the predictive CFRAM extents but there is no discernible difference in predictive flood extent encroachment at the northern link road between all reviewed link road options. The 300m buffer zone for the eastern link for the R252 encroaches upon approximately 18,500m^2 of predictive CFRAM flood extents of the River Finn (01_591).

The proposed length of the Link Road Option C is 2.564km. This is the second longest route comparing against all other options and so we may assume that this option will transform the most greenfield area to impermeable surfaces. It is assumed that adequately designed drainage and attenuation will be provided to remove any potential impact stormwater runoff may have on local hydrology.

No drain crossings were identified through examination of OS mapping.

Ballybofey Link Road Option C may have a moderately negative impact on the hydrology of the area and ranks 5th with regards to preferred options. This is mainly due to the proximity of the eastern link roads to the predictive CFRAM flood extents of the River Finn, the length of the route option and the extent of buffer zone encroaching on the CFRAM extents.

2.7.4 Option 1G - Ballybofey Link Road Option D

Ballybofey Link Road Option D preliminary road corridor and associated embankments do not intersect any EPA identified watercourses. The 300m buffer zone encroaches upon approximately 320m length of minor tributary Aghasheil (01_553).

Again, the 300m buffer zone of the northern link road to the R252 encroaches upon the predictive CFRAM extents but there is no discernible difference in predictive flood extent encroachment at the northern link road between all reviewed link road options.

The proposed length of the Link Road Option D is 1.874km. This is the shortest route comparing against all other options and so we may assume that this option will transform the least greenfield area to impermeable surfaces. It is assumed that adequately designed drainage and attenuation will be provided to remove any potential impact stormwater runoff may have on local hydrology.

No drain crossings were identified through examination of OS mapping.

Ballybofey Link Road Option D will have a minor or slightly negative impact on the hydrology of the area and ranks 3rd with regards to preferred options.

2.7.5 Option 1G - Ballybofey Link Road Option E

Review of Ballybofey Link Road Option E reveals that the preliminary road corridor and associated embankments do not intersect any EPA identified watercourses. The 300m buffer zone also does not encroach upon any EPA identified watercourses.

Neither the preliminary road corridor and associated earthworks nor the 300m buffer zone encroach upon the predictive CFRAM flood extents.

The Eastern section of the N15 link road crosses 1 nr land drain approximately 500m west of the proposed N15 junction. Culvert design and associated section 50 approval may be required from OPW for this crossing.

The length of this link road option is 3.17km. This is the longest route when compared against all other link road options and so will result in the most greenfield area transformed to impermeable surfaces. Any flood risk generated from the creation of these impermeable surfaces may be resolved through adequate drainage design and attenuation.

From desk studies it is apparent that this option would have a minor or slightly negative impact on the local hydrology and is the preferred option.

2.7.6 Conclusion

Ballybofey Link Road Option A should not have a significant impact on the hydrology of the area and is the preferred link road option.

Table 2-23 provides details of the summary findings of the assessment for link road options for Section regarding Hydrology.

Table 2-23: Hydrology Option Scoring Matrix

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
1G (Ballybofey Link Road Option A)	No intersection/encroachment of preliminary road corridor & associated embankments with EPA identified local watercourses. 300m buffer zone encroaches upon c.100m length of minor trib. Aghasheil (01_553). Slight encroachment of R252 northern link road 300m buffer zone with R. Finn (01_7147) predictive CFRAM flood extents but no discernible increase in impact when compared to other options. N15 southern link road buffer zone abuts predictive CFRAM flood extents of Burn Daurnett (01_1828) but no observable impact on the flood extents. 2.057km corridor length – assumed adequately designed drainage attenuation before discharging to watercourses. 1nr drain crossing identified at N15 southern link road on OSI vector mapping – culvert design required	Minor or slightly negative. Any impacts identified through quantitative assessment related to 300m buffer zone, therefore any potential impacts on local hydrology will only arise through temporary construction related activities – adequate surface water management plans during construction shall eliminate any risk to hydrology during construction. Adequately designed drainage attenuation required for new 2.057km link road corridor. Any identified drain crossings will require adequate culvert design to eradicate any risk of flooding at lands surrounding link road corridor	3	2	Intermediate
1G (Ballybofey Link Road Option B)	No intersection/encroachment of preliminary road corridor & associated embankments with EPA identified local watercourses. However, preliminary roundabout at eastern link road to R252 approaches predictive CFRAM flood extents of R. Finn (01_591).	Minor or slightly negative Proposed corridor for eastern R252 link road is within 30m of predictive CFRAM flood extents of R. Finn (01_591) which may pose problems during construction. Earthworks and embankments should not reduce floodplain storage volumes at this location. Remaining impacts identified through quantitative assessment	3	4	Intermediate

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
	300m buffer zone encroaches upon c.320m length of minor trib. Aghasheil (01_553). Slight encroachment of northern link road 300m buffer zone with R. Finn (01_7147) predictive CFRAM flood extents but no discernible increase in impact when compared to other options. Eastern R252 link road buffer zone encroaches upon approx. 12500m^2 of predictive CFRAM flood extents of R. Finn (01_591). 2.425km corridor length – assumed adequately designed drainage attenuation before discharging to watercourses. No drain crossings identified on OS vector mapping.	are associated with 300m buffer zone and so will be predominantly temporary in nature (construction phase). Adequately designed drainage attenuation required for new 2.425km link road corridor. No drain crossings identified from OS vector mapping, any drains identified at planning/detailed design phase will require adequate culvert design.			
1G (Ballybofey Link Road Option C)	No intersection/encroachment of preliminary road corridor & associated embankments with EPA identified local watercourses. However, preliminary eastern link road to R252 within 20m of predictive CFRAM flood extents of R. Finn (01_591). 300m buffer zone encroaches upon c.320m length of minor trib. Aghasheil (01_553). Slight encroachment of northern link road 300m buffer zone with R. Finn (01_7147) predictive CFRAM flood extents but no discernible increase in impact when compared to other options. Eastern R252 link road buffer zone encroaches upon approx. 18500m^2 of predictive CFRAM flood extents of R. Finn (01_591). 2.564km corridor length – assumed adequate drainage attenuation before discharging to watercourses. No drain crossings identified on OS vector mapping.	Moderately negative. Proposed corridor for eastern R252 link road is within 20m of predictive CFRAM flood extents of R. Finn (01_591) which may pose problems during construction. Earthworks and embankments should not reduce floodplain storage volumes at this location. Remaining impacts identified through quantitative assessment are associated with 300m buffer zone and so will be predominantly temporary in nature (construction phase). Adequately designed drainage attenuation required for new 2.564km link road corridor. No drain crossings identified from OS vector mapping, any drains identified at planning/detailed design phase will require adequate culvert design.	2	5	Least preferred

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
1G (Ballybofey Link Road Option D)	No intersection/encroachment of preliminary road corridor & associated embankments with EPA identified local watercourses. 300m buffer zone encroaches upon c.320m length of minor trib. Aghasheil (01_553). Slight encroachment of northern link road 300m buffer zone with R. Finn (01_7147) predictive CFRAM flood extents but no discernible increase in impact when compared to other options. No drain crossings identified on OS vector mapping. 1.874km corridor length – assumed adequately designed drainage attenuation before discharging to watercourses.	Minor or slightly negative Any impacts identified through quantitative assessment related to 300m buffer zone, therefore any potential impacts on local hydrology will only arise through temporary construction related activities – adequate surface water management plans during construction shall eliminate any risk to hydrology during construction. Adequately designed drainage attenuation required for new 1.874km link road corridor. No drain crossings identified from OS vector mapping, any drains identified at planning/detailed design phase will require adequate culvert design.	2	3	Intermediate
1G (Ballybofey Link Road Option E)	No intersection/encroachment of preliminary road corridor & associated embankments with EPA identified local watercourses. No encroachment of 300m buffer zone with EPA identified local watercourses. No encroachment or 300m buffer zone with predictive CFRAM flood extents. 1 nr drain crossing identified at N15 link road – culvert design required. 3.17km corridor length – assumed increase in impermeable surfaces will be adequately drained and attenuated	Minor or slightly negative. No impacts on large watercourses identified through quantitative assessment, therefore it is not anticipated that this link road option will have any negative effects on local hydrology. Adequately designed drainage attenuation required for new 3.17km link road corridor. Any identified drain crossings will require adequate culvert design to eradicate any risk of flooding at lands surrounding link road corridor	3	1	Preferred

2.8 Cultural Heritage

2.8.1 Introduction

The proposed Option 1G - Ballybofey Link Road Options A to E are located at the western portion of the study area pertaining to Section 1: N15 Ballybofey-Stranorlar Urban Region (see **Figure 2-1** to **Figure 2.5**).

The overall study area has a long history of past human settlement, which is further enhanced by the presence of the navigable River Finn and its excellent fishing resources. The proposed Ballybofey Link

Road Options are sited south of the River Finn, connecting with the western side of the urban environs and extents of Ballybofey town centre, at the existing N15 road alignment.

The criteria for the comparative evaluation of each overall Option 1G - Ballybofey Link Road option corridor is per the methodology set out in **Section 1.1.1** and **Table 1.1** in **Technical Appendix D1.8** and should be read in conjunction with this report.

A 500m wide corridor for each Option 1G - Ballybofey Link Road Options A - E (250m either side of centre-line) contains the study area for which assessment is based. Due cognisance has also been taken of site types and potential groupings/complexes and inter-associations therein, across a given landscape.

Methodological principles applied in this assessment have been both desk and field based.

- **Desk Study**: further expansion of information gathered during the constraints study, including the examination of historical cartographic sources, NMI files, aerial mapping/photography and relevant published information.
- **Field Study**: primarily a windshield survey of the environs, topography and landscape and observations therein with a view to identifying significant cultural heritage impacts and/or areas of archaeological potential. This has been coupled with site specific visits, as required, in order to determine level of impact and extent and condition of the heritage asset.

The compilation of a cultural heritage constraints inventory has been undertaken to include core locational and descriptive data, as well as identification of the distance to the option and the type of impact (direct/indirect).

The compilation of impact assessment tables (**Table 2-24 to Table 2-28**) for each option includes assessment of the level of impact for each constraint per EPA Guidelines (2003) *Appendix 4, Glossary of Terms* as well as having due regard for the assessment of impacts contained within the *Draft EPA Guidelines on the Information to be contained in EIARs* (2017). A set of detailed mapping of cultural heritage constraints, accompanies each option (see **Figure 2-1** to **Figure 2.5**).

The compilation of the Cultural Heritage comparison assessment of the options is presented in the **Option Scoring Matrix** in **Section 3 Option Selection Report**. This outlines the results of each option and provides both a quantitative and qualitative assessment in order to determine an emerging preferred corridor from a Cultural Heritage perspective. This includes a review of the nature and magnitude of the impact to include assessment of the quality, duration and type of impact per EPA Guidelines provided in *Advice Notes on Current Practice in the preparation of Environmental Impact Statements* (2003) and *Draft EPA Guidelines on the Information to be contained in EIARs* (2017).

2.8.2 Desk Study

Please refer to **Technical Appendix D1.8** for the principle sources of data referred to during the desktop assessment. A full inventory of Cultural Heritage Items (RMPs/SMRs, NIAH/RPS structures, excavations, NMI finds, historic cartographic items, place names and literary references as appropriate) located within the 500m wide corridor of each of the Option 1G - Ballybofey Link Road is included in **Appendix A.** Summarised data of the Cultural Heritage items located within a 500m wide corridor for each of the proposed options is presented in the tables below.

2.8.3 Field Survey

Field survey was undertaken within the study area during June 2019 and consisted of a windshield survey and site visits by a suitably qualified archaeologist per TII Guidelines (2005a and 2005b). The topography within the study area consists of a combination of fertile river valley floors and gently rising hillslopes of

improved undulating agricultural lands with pockets of commercial forestry plantation and boggy terrain (see **Appendix B Photographic Record**).

There are 3 no. recorded archaeological sites located in Goland townland (just outside the western extents of the study area) of prehistoric and early medieval origins; and a recorded souterrain (DG077-033---) 'Duggan's Cellar' at Cappry townland, within the study area, adjacent the Burn Daurnett river at S1-AAP07. There is also a recorded (site of) a ringfort at the northerly extents of the study area (DG078-013---) adjacent the River Finn and north of the R252. Overall, the presence of evidence-based recorded sites as well as the important presence of the river networks therein, indicates that the study area can be considered of fair/good archaeological potential for the presence and retention of sub-surface archaeological remains.

The Option 1G - Ballybofey Link Road options extend from various points along the existing N15, west of the urban centre of Ballybofey, traversing in a northerly direction where they reach the southern banks of the River Finn at the R252. There is partial remains of the railway embankments (S1-BH04) associated with the former narrow-gauge line of the Donegal Light Railway (Stranorlar & Glenties Branch) (1895-1947) in this area.

Areas of high archaeological potential were identified following a review of the local topography, recorded archaeological records and locational data, historic cartographic sources and aerial mapping which was supplemented by observations in the field. There is one area of high archaeological potential identified as S1AAP-01. This area is located at the south-westerly extents of the study area, at the Burn Daurnett river lowlands and south-west of the urban environs of Ballybofey. This riverine environment would have been attractive to early settlers since prehistoric times, providing good food and transport resources, and although marshy and wet in places, this type of natural environment is also conducive to Bronze Age cooking sites such as *fulachta fiadh*. There is also an additional area of potential, (S1AAP-07), on lowlands immediately adjacent the Burn Daurnett river network, at the location south of the existing N15.

2.8.4 Option Impact Assessment

TII Guidelines, for the *Assessment of Archaeological Heritage Impacts on National Road Schemes* (2005a) note that as the archaeological component of the option corridor selection process largely involves a desk-survey, it can be difficult to assess the exact level of potential of an archaeological site and therefore impact, due to (a) possible associated below ground remains with a recorded monument, (b) unknown extent of a recorded monument, (c) potential to reveal archaeological sites given the type of terrain or (d) possible recorded and newly identified sites may prove natural when tested or excavated.

An extensive desktop and windshield survey of the proposed option corridors have identified (a) known and recorded Cultural Heritage sites (b) potential Cultural Heritage sites (from aerial photography and historic cartographic sources) and (c) areas of high archaeological potential (based on a number of factors including terrain, proximity to recorded sites and topography).

The quality, significance, extent, duration and type of effect on all likely impacts on the Cultural Heritage resource has been considered per EPA EIA Guidelines and Advice Notes (2002 and 2003) as well as more recent EPA draft EIAR Guidelines and Advice Notes (2015 and 2017).

The project design corridors are 300m wide (as opposed to the 500m wide corridor assessed for this Cultural Heritage study, per TII Guidelines, 2005a & 2005b). Likely impacts have been defined as Negative, and either Direct, Indirect, or Potential Direct.

Direct/potential direct impacts have been categorised as any asset falling <150m of the centre-line (i.e. within the designed 300m corridor). Indirect impacts have been categorised as any asset falling >150m

and <250m of the centre-line (i.e. beyond the designed 300m corridor but within an overall 500m assessment corridor).

In addition, the Zone of Notification for each RMP site can average between *c.* 20m - 60m or more in overall diameter, depending on the site type (e.g. a 'site of' a recorded burial ground could be much more extensive), and as such, due cognisance has been taken of the zone and the impact therein when considering the Level of Impact on the recorded archaeological site.

It is important to note that the centre-line is an arbitrary line for design purposes at option assessment stage, and may be subject to change, in order to avoid unacceptably high-level negative magnitude impact(s) on the known cultural heritage resource. Furthermore, any impacts identified as 'direct' in **Table 2-24** to **Table 2-28** below are classified as such by virtue of the site(s) being located within the 300m wide designed option corridor. These identified direct impacts may be avoided and/or reduced, as the design process refines from option corridor analyses to designed preferred option alignment, for purposes of the overall *TEN-T Priority Route Improvement Project, Donegal, Section 1: Ballybofey-Stranorlar Urban Region: Option 1G Link Road.*

The level of impact is determined based on the significance (value) of the asset having due regard to an overall assessment of the condition/preservation/quality of the asset; and the duration and extent of the quality of impact on that asset.

2.8.5 Option 1G - Ballybofey Link Road Option A

Option 1G – Ballybofey Link Road Option A measures 2.057km and has a total of 2 no. cultural heritage assets located within the 500m wide assessment corridor (see **Figure 2-1** and **Table 2-24**). These consist of a recorded NIAH outbuilding 40907720 at Cappry and a railway line embankment (S1-BH04) associated with the Donegal Light Railway (Stranorlar & Glenties Branch) at Cappry (one location).

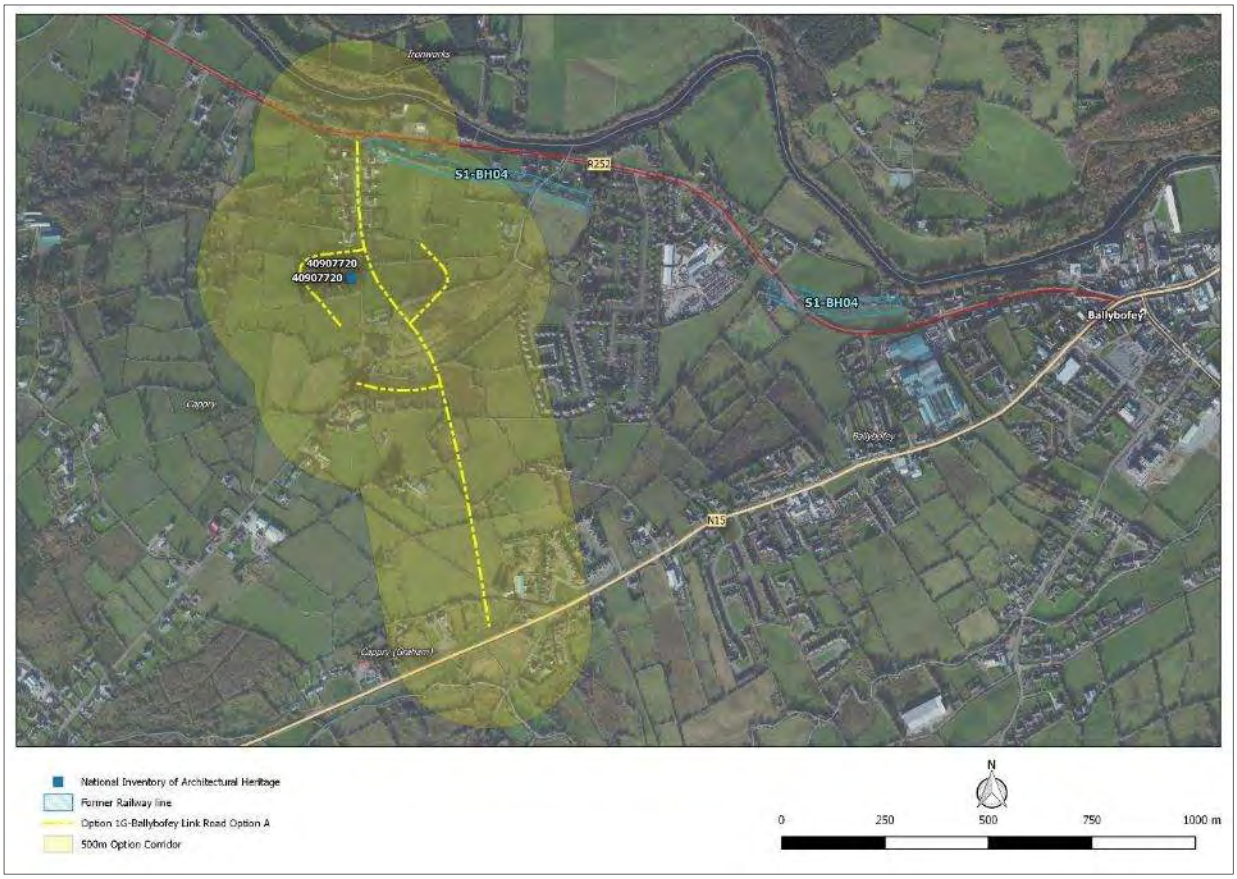


Figure 2-1: Cultural Heritage Items within 500m Corridor: Option 1G – Ballybofey Link Road Option A

Table 2-24: Cultural Heritage Items located within 500m Corridor: Option 1G - Ballybofey Link Road Option A

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
40907720	CAPPRY	Outbuilding	54m	Direct	Moderate
S1-BH04	CAPPRY	Former Railway Line	52m	Direct	Imperceptible

NIAH outbuilding 40907720 located at a farmstead in Cappry, is considered of regional importance. The building is located within Option 1G – Ballybofey Link Road Option A corridor and is considered a direct impact of moderate significance.

A section of the former Donegal Light Railway embankment (S1-BH04) is located east of roadside residential development/at the northern terminus of Cappry Road, where Option 1G – Ballybofey Link Road Option A links with same. The location of the embankment is such that although within the corridor for Option 1G - Ballybofey Link Road Option A, potential upgrade to the existing Cappry Road carriageway would have an imperceptible impact on same.

2.8.6 Option 1G - Ballybofey Link Road Option B

Option 1G – Ballybofey Link Road Option B measures 2.425km has a total of 3 no. cultural heritage assets located within the 500m wide assessment corridor (see **Figure 2-2** and **Table 2-25**). These consist of a recorded NIAH outbuilding 40907720 at Cappry; a railway line embankment (S1-BH04) associated with the Donegal Light Railway (Stranorlar & Glenties Branch) at Cappry (two locations); and the 'site of' a ringfort at the southern banks of the River Finn (DG078-013---).

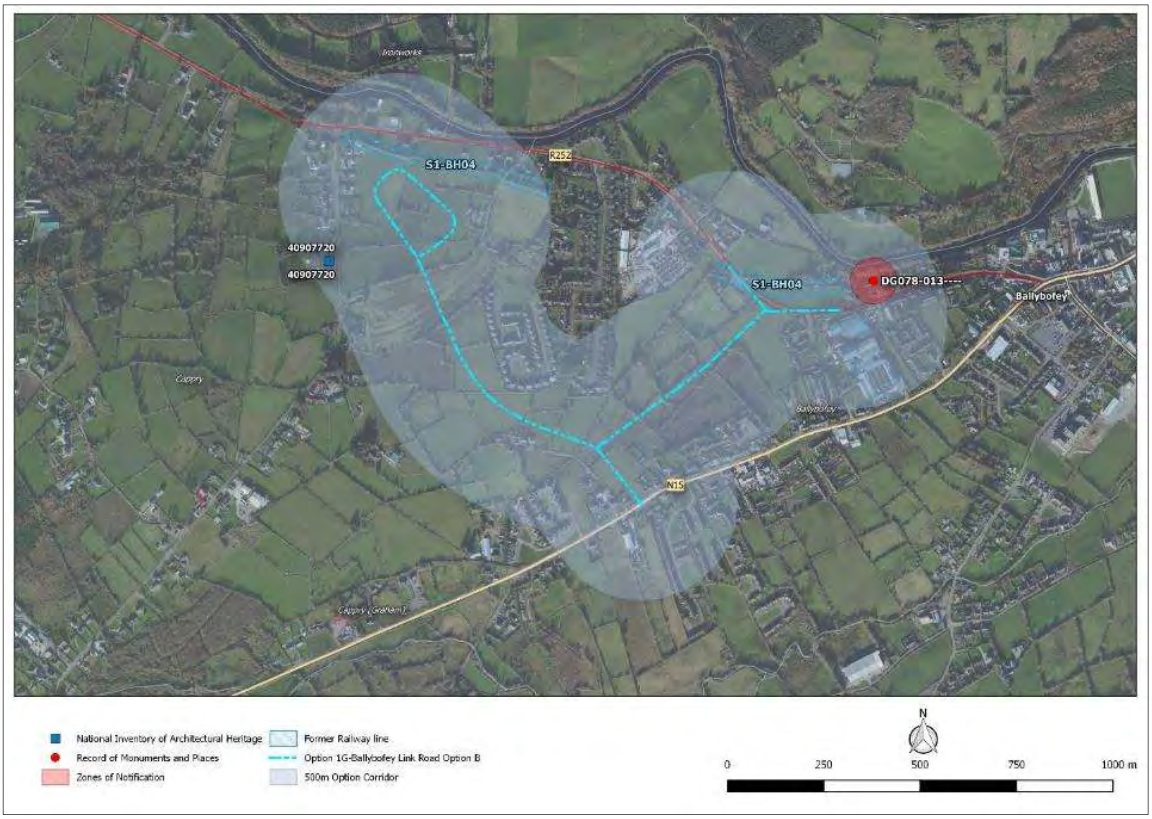


Figure 2-2: Cultural Heritage Items within 500m Corridor: Option 1G - Ballybofey Link Road Option B

Table 2-25: Cultural Heritage Items located within 500m Corridor: Option 1G - Ballybofey Link Road Option B

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
40907720	CAPPRY	Outbuilding	193m	Indirect	Imperceptible
DG078-013---	BALLYBOFEY	Ringfort – unclassified (site of)	109m	Direct	Imperceptible
S1-BH04	CAPPRY	Former Railway Line x 2 locations	0m & 29m	Direct	Slight

NIAH outbuilding 40907720 located at a farmstead in Cappry, is considered of regional importance. The building is located within Option 1G – Ballybofey Link Route Option B corridor, however it is on the opposite side of the existing Cappry Road and is considered to be of sufficient distance to be measured as an indirect impact of imperceptible significance.

The ringfort (site of) DG078-013---, at Ballybofey on the southern banks of the River Finn, is sited between roadside ribbon residential development north of the existing R252, and the pedestrian footpath/walkway accessing the footbridge over the River Finn and Drumboe Woods. The site appears to have been affected by previous building of the railway line at this location. The proposed Option 1G – Ballybofey Road Option B linkage terminates at the R252 itself, and as such, although the site is in proximity to this

linkage location, the existing urban streetscape and potential upgrade measures confined to the R252 itself is such, that any measurable likely impact on the site is considered imperceptible.

A section of the former Donegal Light Railway embankment (S1-BH04) is located north of Option 1G – Ballybofey Link Road Option B (east of Cappry Road), and at a crossing point on the existing R252 where upgrade to same is proposed for the linkage option. The location of the embankment is such that it would have a slight impact of significance on same at both locations.

2.8.7 Option 1G - Ballybofey Link Road Option C

Option 1G – Ballybofey Link Road Option C measures 2.564km and has a total of 3 no. cultural heritage assets located within the 500m wide assessment corridor (see **Figure 2-3** and **Table 2-26**). These consist of a recorded NIAH outbuilding 40907720 at Cappry; a railway line embankment (S1-BH04) associated with the Donegal Light Railway (Stranorlar & Glenties Branch) at Cappry (two locations); and the 'site of' a ringfort at the southern banks of the River Finn (DG078-013---). With reference to Option 1G – Ballybofey Road Option C, these assets are measured as for Option 1G – Ballybofey Link Road Option B above, save for a closer measurable distance to DG078-013---, due to an additional proposed link road along Mulrines industrial estate (between N15 and R252).

Figure 2-3: Cultural Heritage Items within 500m Corridor: Option 1G - Ballybofey Link Road Option C

Table 2-26: Cultural Heritage Items located within 500m Corridor: Option 1G - Ballybofey Link Road Option C

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
40907720	CAPPRY	Outbuilding	193m	Indirect	Imperceptible
DG078-013---	BALLYBOFEY	Ringfort – unclassified (site of)	70m	Direct	Imperceptible
S1-BH04	CAPPRY	Former Railway Line x 2 locations	0m & 29m	Direct	Slight

2.8.8 Option 1G - Ballybofey Link Road Option D

Option 1G – Ballybofey Link Road Option D measures 1.874km and has a total of 3 no. cultural heritage assets located within the 500m wide assessment corridor (see **Figure 2-4** and **Table 2-27**). These consist of a recorded NIAH outbuilding 40907720 at Cappry; a railway line embankment (S1-BH04) associated with the Donegal Light Railway (Stranorlar & Glenties Branch) at Cappry (one location); and the 'site of' a ringfort at the southern banks of the River Finn (DG078-013---). With reference to Option 1G – Ballybofey Road Option D, these assets are measured as for Option 1G – Ballybofey Link Road Option C above save that there is only one crossing point along the former railway line S1-BH04.

Figure 2-4: Cultural Heritage Items within 500m Corridor: Option 1G - Ballybofey Link Road Option D

Table 2-27: Cultural Heritage Items located within 500m Corridor: Option 1G - Ballybofey Link Road Option D

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
40907720	CAPPRY	Outbuilding	193m	Indirect	Imperceptible
DG078-013---	BALLYBOFEY	Ringfort – unclassified (site of)	70m	Direct	Imperceptible
S1-BH04	CAPPRY	Former Railway Line	29m	Direct	Slight

2.8.9 Option 1G - Ballybofey Link Road Option E

Option 1G – Ballybofey Link Road Option A measures 3.17km and has a total of 2 no. cultural heritage assets located within the 500m wide assessment corridor (see **Table 2-28** and **Figure 2.5)**. These consist of a recorded NIAH outbuilding 40907720 at Cappry and a section of railway line embankment (S1-BH04) associated with the Donegal Light Railway (Stranorlar & Glenties Branch) at Cappry (one location).

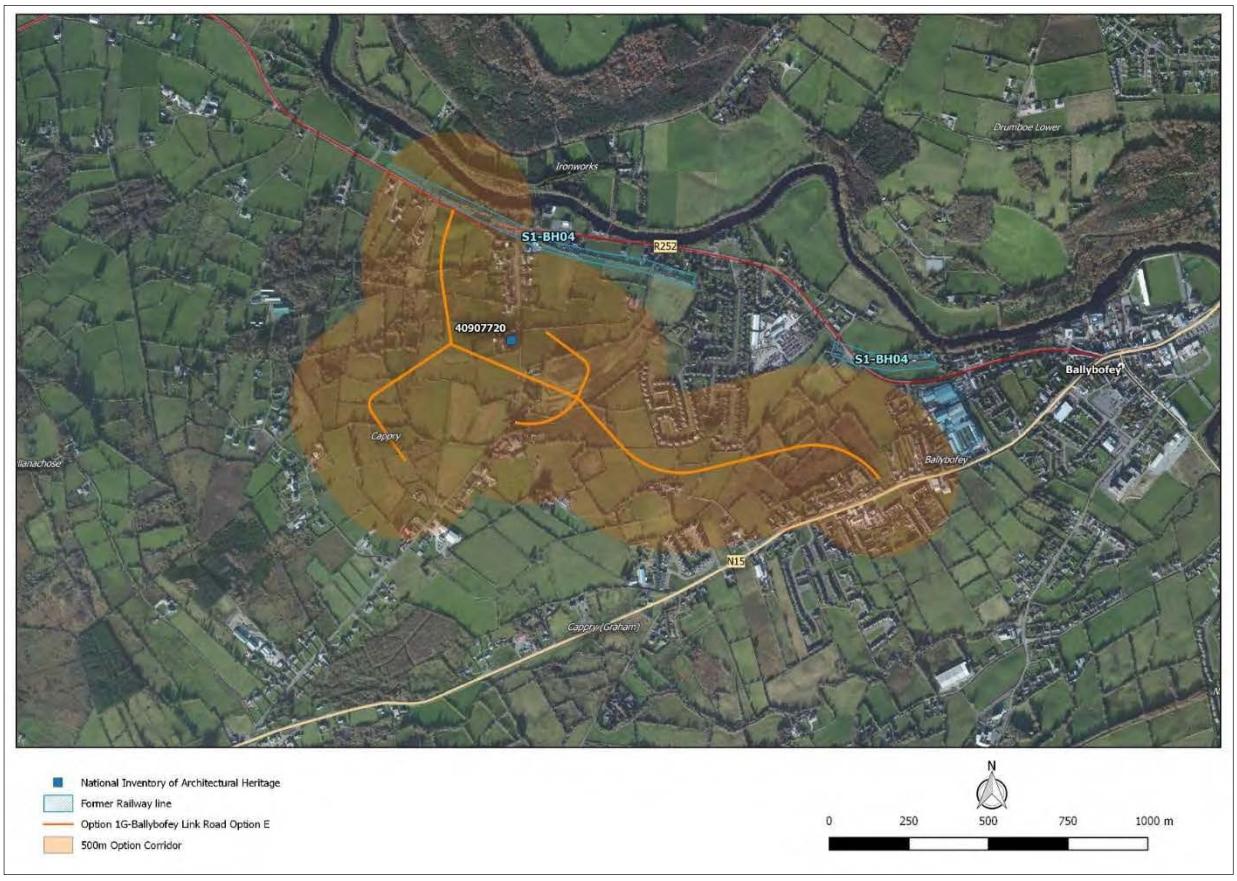


Figure 2.5: Cultural Heritage Items within 500m Corridor: Option 1G - Ballybofey Link Road Option E

Table 2-28: Cultural Heritage Items located within 500m Corridor: Option 1G - Ballybofey Link Road Option E

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
40907720	CAPPRY	Outbuilding	80m	Direct	Moderate
S1-BH04	CAPPRY	Former Railway Line	15m	Direct	Slight

NIAH outbuilding 40907720 located at a farmstead in Cappry, is considered of regional importance. The building is located within Option 1G – Ballybofey Link Route Option E corridor and is considered a direct impact of moderate significance.

A section of the former Donegal Light Railway embankment (S1-BH04) is located immediately north of the R252 carriageway and the tie-in location for the Option 1G – Ballybofey Link Road Option E with same. The location of the embankment is such that although immediately north of the corridor for Option 1G - Ballybofey Link Road Option E, the alignment is confined to the opposite side of the R252 carriageway and as such, is deemed to have a slight impact on same.

2.8.10 Summary and Preference - Cultural Heritage Option Appraisal

Table 2-29 below sets out a comparison of the cultural heritage assets across all 5 no. Option 1G – Ballybofey Link Road options A - E. All Option 1G – Ballybofey Link Road options A – E have the same fair/good archaeological potential throughout to reveal hitherto unknown archaeological sub-surface finds and/or features.

Option 1G – Ballybofey Link Road Option D is considered the preferred option from a cultural heritage perspective. It is the shortest option, having the least amount of greenfield ground disturbance (and therefore least likelihood to encounter sub-surface archaeological remains). In addition, there is 1 no. identified impact (slight) on the former railway line (S1-BH04) when compared with Option 1G - Ballybofey Link Road Options B & C (2 no. locations).

Option 1G – Ballybofey Link Road Option A is considered 2nd preferred from a cultural heritage perspective. This option has a measurable moderate impact on NIAH outbuilding 40907720 and on 1 no. location along the former railway line (S1-BH04). However, despite the moderate impact on NIAH outbuilding 40907720, this option is *c.* 0.5km less in length to Option 1G – Ballybofey Link Road Options B and C and therefore is deemed to have less risk of encountering sub-surface archaeological remains within its overall footprint corridor.

Option 1G – Ballybofey Link Road Option C is considered marginally 3rd preferred from a cultural heritage perspective to that of Option 1G - Ballybofey Link Road Option B (4th preferred). Both options retain slight impact significance on the former railway line at 2 no. locations and imperceptible impact on the NIAH outbuilding 40907720 at Cappry; and at 'site of' ringfort DG078-013---. However, Option 1G – Ballybofey Link Road Option C is less in terms of overall greenfield footprint disturbance to Option 1G – Ballybofey Link Road Option B. Despite marginally greater overall lengths for the former, Option 1G – Ballybofey Link Road Option B also includes an additional (greenfield) linkage to the existing N15; whilst Option 1G – Ballybofey Link Road Option C includes a brownfield linkage at Mulrines industrial estate – this area is not considered to be of archaeological potential.

Option 1G – Ballybofey Link Road Option E is considered 5th preferred to all other available options, from a cultural heritage perspective. This option has a slight impact on the former railway line (1 no. location)

and a moderate impact on NIAH outbuilding 40907720 at Cappry. Despite having 2 no. cultural heritage constraints located within the assessed 500m corridor for Option E, which is less than that for Option 1G – Ballybofey Link Road Options B, C and D; this option is greatest in overall length of all available options and, traversing entirely through greenfield areas, it carries a higher potential risk of encountering sub-surface archaeological remains, within its overall footprint corridor.

Table 2-29 Option 1G - Ballybofey Link Road Option Appraisal

Options/	Option 1G - Ballybofey Link Rd – A Length 2.057km	Option 1G - Ballybofey Link Rd – B Length 2.425km	Option 1G - Ballybofey Link Rd – C Length 2.564km	Option 1G - Ballybofey Link Rd – D Length 1.874km	Option 1G - Ballybofey Link Rd – E Length 3.17km
Negative Profound	-	-	-	-	-
Negative Significant	-	-	-	-	-
Negative Moderate	**1 Site:** NIAH 40907720 Outbuilding	-	-	-	**1 Site:** NIAH 40907720 Outbuilding
Negative Slight	-	**1 Site:** S1-BH04 Former Railway Line x 2 locations	**1 Site:** S1-BH04 Former Railway Line x 2 locations	**1 Site:** S1-BH04 Former Railway Line x 1 location	**1 Site:** S1-BH04 Former Railway Line x 1 location
Negative Imperceptible	**1 Site:** S1-BH04 Former Railway Line x 1 location	**2 Sites:** NIAH 40907720 Outbuilding DG078-013 'site of' ringfort	**2 Sites:** NIAH 40907720 Outbuilding DG078-013 'site of' ringfort	**2 Sites:** NIAH 40907720 Outbuilding DG078-013 'site of' ringfort	-
Preference Level	**2nd Preference**	**4th Preference**	**3rd Preference**	**1st Preference**	**5th Preference**

Table 2-30: Options Scoring Matrix – Cultural Heritage Section 1**Table 2-30** showcases the scoring summary for all 1G Ballybofey Link road options with reference to Cultural Heritage.

Table 2-30: Options Scoring Matrix – Cultural Heritage Section 1

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
1G (Ballybofey Link Road Option A)	2 no. identified impacts	1 no. Moderately Negative: NIAH 40907720 Outbuilding 1 no. Not Significant: S1-BH04 Former Railway Line x 1 location	3	2nd	Intermediate
1G (Ballybofey Link Road Option B)	3 no. identified impacts	1 no. Slightly Negative: S1-BH04 Former Railway Line x 2 locations 2 no. Not Significant: NIAH 40907720 Outbuilding DG078-013 'site of' ringfort	3	4th	Intermediate
1G	3 no. identified impacts	1 no. Slightly Negative: S1-BH04 Former Railway Line x 2 locations	3	3rd	Intermediate

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
(Ballybofey Link Road Option C)		2 no. Not Significant: NIAH 40907720 Outbuilding DG078-013 'site of' ringfort			
1G (Ballybofey Link Road Option D)	3 no. identified impacts	1 no. Slightly Negative: S1-BH04 Former Railway Line x 1 location 2 no. Not Significant: NIAH 40907720 Outbuilding DG078-013 'site of' ringfort	3	1st	Preferred
1G (Ballybofey Link Road Option E)	2 no. identified impacts	1 no. Moderately Negative: NIAH 40907720 Outbuilding 1 no. Slightly Negative: S1-BH04 Former Railway Line x 1 location	3	5th	Intermediate

2.9 Material Assets (Agricultural)

2.9.1 Option 1G - Ballybofey Link Road Option A

There is no evidence of dairying or other intensive/sensitive farming practices in the corridor associated with this option. The centreline of this option is 2.05 km and will affect 12 agricultural folios.

2.9.2 Option 1G - Ballybofey Link Road Option B

There is no evidence of dairying or other intensive/sensitive farming practices in the corridor associated with this option. The centreline of this option is 2.42 km and will affect 13 agricultural folios.

2.9.3 Option 1G - Ballybofey Link Road Option C

There is no evidence of dairying or other intensive/sensitive farming practices in the corridor associated with this option. The centreline of this option is 2.57 km will affect 14 agricultural folios.

2.9.4 Option 1G - Ballybofey Link Road Option D

There is no evidence of dairying or other intensive/sensitive farming practices in the corridor associated with this option. The centreline of this option is 1.87 km and will affect 11 agricultural folios.

2.9.5 Option 1G - Ballybofey Link Road Option E

There is no evidence of dairying or other intensive/sensitive farming practices in the corridor associated with this option. The centreline of this option is 3.17 km and will affect 14 agricultural folios.

2.9.6 Conclusion

Table 2-31 provides a detailed summary of the findings for the Link Road Options Assessment regarding Material Assets (Agriculture).

Table 2-31: Material Assets (Agriculture) Option Scoring Matrix

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
1G	There is no evidence of dairying or other	Moderate	2	2	Intermediate

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
(Ballybofey Link Road Option A)	intensive/sensitive farming practices in the corridor associated with this option. The centreline of this option is 2.05 km and will affect 12 agricultural folios.	▪ No evidence of dairying or other intensive/sensitive farming practices in the corridor associated with this option. ▪ The centreline of this option is 2.05 km and as such is ranked 2nd in preference from an agricultural perspective. ▪ The centreline will affect 12 agricultural folios and as such is ranked 2nd in preference. Overall this option is ranked 2nd from an agricultural perspective.			
1G (Ballybofey Link Road Option B)	There is no evidence of dairying or other intensive/sensitive farming practices in the corridor associated with this option. The centreline of this option is 2.42 km and will affect 13 agricultural folios.	Moderate ▪ No evidence of dairying or other intensive/sensitive farming practices in the corridor associated with this option. ▪ The centreline of this option is 2.42 km and as such is ranked 3rd in preference from an agricultural perspective. ▪ The centreline will affect 13 agricultural folios and as such is ranked 3rd in preference. Overall this option is ranked 3rd from an agricultural perspective.	2	3	Intermediate
1G (Ballybofey Link Road Option C)	There is no evidence of dairying or other intensive/sensitive farming practices in the corridor associated with this option. The centreline of this option is 2.57 km will affect 14 agricultural folios	Moderate ▪ No evidence of dairying or other intensive/sensitive farming practices in the corridor associated with this option. ▪ The centreline of this option is 2.57 km and as such is ranked 4th in preference from an agricultural perspective. ▪ The centreline will affect 14 agricultural folios and as such is ranked 4th in preference. Overall this option is ranked 4th from an agricultural perspective.	2	4	Intermediate
1G (Ballybofey Link Road Option D)	There is no evidence of dairying or other intensive/sensitive farming practices in the corridor associated with this option. The centreline of this option is 1.87 km and will affect 11 agricultural folios.	Minor ▪ No evidence of dairying or other intensive/sensitive farming practices in the corridor associated with this option. ▪ The centreline of this option is 1.87 km and as such is ranked 1st in preference from an agricultural perspective.	3	1	Preferred

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
		▪ The centreline will affect 11 agricultural folios and as such is ranked 1st in preference. Overall this option is ranked 1st from an agricultural perspective because it is the shortest and potentially affects the least number of agricultural folios.			
1G (Ballybofey Link Road Option E)	There is no evidence of dairying or other intensive/sensitive farming practices in the corridor associated with this option. The centreline of this option is 3.17 km and will affect 12 agricultural folios.	Moderate ▪ No evidence of dairying or other intensive/sensitive farming practices in the corridor associated with this option. ▪ The centreline of this option is 3.17 km and as such is ranked 5th in preference from an agricultural perspective. ▪ The centreline will affect 12 agricultural folios and as such is ranked joint 5th in preference.	2	5	Intermediate

2.10 Material Assets (Non-Agricultural)

2.10.1 Infrastructure

2.10.2 Link Road Option A

Infrastructure

The area in which the Ballybofey Junction and associated Link Roads (irrespective of option) is traversed by a 110kV Eirgrid transmission line. This transmission line will be diverted as a result of the construction of the mainline Option 1G and can be accommodated within the proposed alignment of Link Road Option A. Accordingly, given the diversion will be taking place with the mainline construction, Link Road Option A is considered to have a neutral impact on the transmission line.

Link Road Option A will require limited diversion of local electricity lines on the Cappry Road.

The impact on the electricity network is slight negative for Link Road Option A.

There is no impact on renewable energy facilities, accordingly the impact caused by Option A is neutral.

Link Road Option A will require limited diversion of local communications lines and water / wastewater supplies on the Cappry Road.

Link Road A will contribute towards providing significantly better road infrastructure than exists at present, which will remove traffic from the existing local road network, while impacting local roads negatively at discreet crossing points. Accordingly Link Option A will have a moderately positive impact on the road network.

There is no rail network in Donegal so Link Road Option A will have a neutral impact on the rail network.

There are no waste facilities in the vicinity of Link Road Option A so will result in a neutral impact on waste management infrastructure.

Link Road Option A has no impact on areas of forestry so has a neutral impact on forestry infrastructure.

Settlements and Zoning

With respect to settlements, Link Road Option A is located substantially inside of the Ballybofey-Stranorlar settlement boundary and therefore traverses zoned lands as identified within the Seven Strategic Town Local Area Plan 2018-2024 (the LAP).

From the north, the Option A traverses an area of 'Established Development' where it is located online within an area characterised by linear residential development at each side. South and east of same, the option intersects with areas zoned for 'Local Environment' purposes.

The option will not intersect with land zoned for residential, commercial, recreation and amenity or from an area zoned for a Masterplan for future development by the LAP. There are no intersections with identified pedestrian linkages as identified within the LAP.

The main potential for impact on zoning objective compliance in this case is considered to be the routing of the proposed link road through the area zoned to conserve and enhance the quality and character of an established residential area and protect the amenities of that residential area. In this case the residential properties are located on a through-route at present which effectively serves as a main link road between the R252 and the existing N15 to the south at the west of Ballybofey-Stranorlar. Further, the residential area concerned is small. A slight or minor negative impact score is assigned.

Under the zoning maps for the County Donegal Development Plan 2018-2024 (the CDP), the length of road being considered as part of this assessment will be predominantly located within an 'Urban Area'. A small area at the north west of the proposed link option in the vicinity of an existing farmyard and surrounding land is zoned as an 'Area under Strong Urban Influence' under the County Donegal Development Plan 2018-2024. Rural area type zonings, such as *Areas under Strong Urban Influence* are largely provided for the management of proposals for single dwellings. Given the extent of the area outside of the 'Urban Area', the fact that this area already contains a farm complex which limits the area of land remaining, and the fact that access to this land can be maintained, it is considered that the implementation of these zoning objectives will not be significantly impeded by the proposed options. The impact is considered neutral.

The CDP has three landscape designation categories – 'moderate', 'high' and 'especially high'. These are illustrated in Map No. 7.1.1 'Scenic Amenity' of the CDP. Option A is predominantly located in an area of Moderate Scenic Amenity, however the area immediately north of the existing N15 and a circle of land incorporating the existing farmyard will be located in areas of High Scenic Amenity, noting this property also has a built heritage designation. The area where the proposed option meets the R252 at the north also intersects a small area of High Scenic Amenity, however this area already accommodates an existing road and junction.

As the option intersects areas of high scenic amenity, this will result in a negative scoring. Such areas can absorb some sensitive development according to the CDP objectives. The significance is therefore considered slight to minor negative at this stage of assessment given that the longer section of the proposed Link Road Option is located within an area of Moderate Scenic Amenity. The potential impact on the area containing the farm complex are considered within the landscape and visual and cultural heritage assessments.

Existing Properties

Option A has 15 residential properties in the 0-50m band, 7 no. further properties within the 50-100m band, 27 no. properties in the 100-200m band and 97 no. properties in the 200-300m band.

A single farmhouse will be surrounded by roads as part of the proposal where the link road connects at the north of the mainline of 1G. The design team advises this can be mitigated by the provision of an access point. Also, an existing road that travels through an established residential area at the north of the link option will be used. The number of properties located along this road is small and the design team advises that landtake is unlikely to be necessary. From discussions with the design team, the traffic volumes using this section of road are unlikely to increase significantly.

The impact on residential receptors is considered minor to slight negative.

Option A has 1 no. commercial property in the 0-50m band, 2 no. further properties within the 50-100m band, 3 no. properties in the 100-200m band and 2 no. properties in the 200-300m band. As advised above a farmyard will be encircled by roads with the proposed link road and mainline option in place. Access is to be maintained from the road, but mitigation will also be required to ensure access to lands within the curtilage of the yard. The potential for impact is considered minor or slight negative.

There is no potential for community facilities to be significantly impacted by this link option. With respect to community severance, the existing Cappry Road will be maintained as a through-route by a proposed short link road and no potential for community severance of a significant scale is identified. There is no potential for tourist facilities or amenities to be significantly impacted by this proposed link option. Impacts are considered neutral with respect to these three categories of the Existing Population assessment.

2.10.3 Link Road Option B

Infrastructure

The area in which the Ballybofey Junction and associated Link Roads (irrespective of option) is traversed by a 110kV Eirgrid transmission line. This transmission line will be diverted as a result of the construction of the mainline Option 1G and can be accommodated within the proposed alignment of Link Road Option B. Accordingly, given the diversion will be taking place with the mainline construction, Link Road Option B is considered to have a neutral impact on the transmission line.

Link Road Option B will require limited diversion of local electricity lines on the R252 Glenfinn Road, and on the existing N15.

The impact on the electricity network is slight negative for Link Road Option B.

There is no impact on renewable energy facilities, accordingly the impact caused by Option B is neutral.

Link Road Option B will require limited diversion of local communications lines and water / wastewater supplies on the R252 Glenfinn Road and the existing N15. There is a potential impact on 2 private wells.

Link Road B will contribute towards providing significantly better road infrastructure than exists at present, which will remove traffic from the existing local road network, while impacting local roads negatively at discreet crossing points. Accordingly Link Option B will have a moderately positive impact on the road network.

There is no rail network in Donegal so Link Road Option B will have a neutral impact on the rail network.

There are no waste facilities in the vicinity of Link Road Option B so will result in a neutral impact on waste management infrastructure.

Link Road Option B has no impact on areas of forestry so has a neutral impact on forestry infrastructure.

Settlements and Zoning

The length of road being considered as part of this assessment is entirely within the settlement boundary for Ballybofey-Stranorlar and will be located within an area zoned as an 'Urban Area' as per the CDP. Under the LAP then, the route, from the north, traverses an area zoned for 'Local Environment' and there is a small area of 'Established Development' within the corridor just east of the intersection with the mainline option of 1G, however this relates to a single property only. Impacts here are considered slight to minor negative.

The southern part of the main north-south alignment intersects an area zoned as a 'Strategic Residential Reserve (SRR)', as does the western part of the east-west spur connecting to the R252. The eastern part of the spur then runs through a land parcel zoned as Opportunity Site 4, by the LAP. Both of the points of connection to the existing N15 and R252 are further identified as 'Potential Access Points' within the LAP zoning map, and the east-west spur generally is in line with an indicative proposed through route.

Lands zoned as SRR are *"To reserve land for residential development as a long term strategic landbank."* While the proposed route intersects same, a link road was envisaged to be provided (see below) through the lands and there will still be sufficient land available for housing development.

Opportunity Site 4 is earmarked within the LAP as suitable for a retail park with mixed bulky goods retail or other commercial uses and residential / community development with disaggregated neighbourhood centre uses.

Policy BS-TC-4 refers and provides a detailed breakdown of the objective for the Opportunity Site which includes for a link road, with development of a tight urban grain and with strong active frontage. The policy specifies the importance of key access points, of pedestrian and cycle facilities which should be incorporated into the link road and that the link road is integrated into the link road required for the SRR lands to the west.

The CDP has three landscape designation categories – 'moderate', 'high' and 'especially high'. These are illustrated in Map No. 7.1.1 'Scenic Amenity' of the CDP. Option B is predominantly located in an area of Moderate Scenic Amenity, however the area immediately north of the existing N15 where a roundabout is proposed, the area immediately west of the R252 where a further roundabout is proposed and much of the area where the proposed access from the mainline of the 1G option is proposed to be accommodated will be located in areas of High Scenic Amenity. It should be noted though two of these locations are broadly consistent with potential access points to zoned lands which are identified in the LAP.

As the option intersects areas of high scenic amenity, this will result in a negative scoring. Such areas can absorb some sensitive development according to the CDP objectives. The significance is therefore considered slight to minor negative at this stage of assessment given that the longer section of the proposed option is located within an area of Moderate Scenic Amenity and further, two of the areas of high scenic amenity are located where the policy objectives discussed above identify potential road access to zoned lands.

On balance, the proposed Link Road Option B is considered to be slight or minor negative with respect to Settlements and Zoning though may be considerably influenced by a more detailed assessment of the interaction with the lands zoned for SRR and Opportunity Site.

Existing Properties

Option B has 12 residential properties in the 0-50m band, 55 no. further properties within the 50-100m band, 217 no. properties in the 100-200m band and 223 no. properties in the 200-300m band. There is potential for indirect negative impact due to the proposed position of the interconnecting loop where the proposed link road option meets the mainline 1G option and the proposed road is in fill in relatively close proximity to the rear gardens of a number of residential properties to the west of same. It is noted that the volume of traffic passing in front of those same properties would then be lower in this scenario than with Option A in place. There are significant numbers of residential properties in the outer bands of the GeoDirectory analysis, particularly when the length of the link road is considered. The potential for impact is considered to be moderate negative when both quantitative and qualitative factors are considered.

There are no commercial properties within the 0-50m band for Option B. There are 2 no. commercial properties within the 50-100m band, 11 no. properties in the 100-200m band and 24 no. properties in the 200-300m band. The impact score assigned is neutral as no direct impacts will arise and indirect impacts of any substantive nature on commercial properties in the outer bands are not readily identifiable at this level of assessment.

There is no potential for community facilities to be significantly impacted by this proposed link road option. With respect to community severance, the existing Cappry Road will be maintained as a through route by an underpass and no potential for community severance of a significant scale is identified. Impacts are considered neutral with respect to these categories of the Existing Population assessment.

There is a bed and breakfast located to the west of the proposed access and roundabout where the proposed option is to connect to the existing N15. However, this premises is currently operating adjacent to a national road and there are other properties buffering the accommodation facility from the proposed new road. A neutral scoring is assigned.

2.10.4 Link Road Option C

Infrastructure

The area in which the Ballybofey Junction and associated Link Roads (irrespective of option) is traversed by a 110kV Eirgrid transmission line. This transmission line will be diverted as a result of the construction of the mainline Option 1G and can be accommodated within the proposed alignment of Link Road Option C. Accordingly, given the diversion will be taking place with the mainline construction, Link Road Option C is considered to have a neutral impact on the transmission line.

Link Road Option C will require limited diversion of local electricity and telecommunication line on the R252 Glenfinn Road.

The impact on the electricity network is slight negative for Link Road Option C.

There is no impact on renewable energy facilities, accordingly the impact caused by Option C is neutral.

Link Road Option C will require limited diversion of local communications lines and water / wastewater supplies on the Glenfinn Road. There is a potential impact on 2 private wells.

Link Road C will contribute towards providing significantly better road infrastructure than exists at present, which will remove traffic from the existing local road network, while impacting local roads negatively at discreet crossing points. Accordingly Link Option C will have a moderately positive impact on the road network.

There is no rail network in Donegal so Link Road Option C will have a neutral impact on the rail network.

There are no waste facilities in the vicinity of Link Road Option C so will result in a neutral impact on waste management infrastructure.

Link Road Option C has no impact on areas of forestry so has a neutral impact on forestry infrastructure.

Settlements and Zoning

The length of road being considered as part of this assessment is entirely within the settlement boundary for Ballybofey-Stranorlar and will be located within an area zoned as an 'Urban Area' under the County Donegal Development Plan 2018-2024.

Under the LAP, the route from the north traverses an area zoned for 'Local Environment'. There is a small area of 'Established Development' within the corridor just east of the intersection with the mainline option of 1G, (single property only) and a further 'Established Development' area is impacted by Mulrine's Link. The Mulrine's Link element of the proposal is shown as a potential link in the LAP. Impacts here are considered neutral to slight or minor negative on balance.

The southern part of the alignment intersects the area zoned SRR where it re-orientates to the east. The eastern part of the east-west orientated section also intersects Opportunity Site 4. The connection to the existing R252 is identified as one of the 'Potential Access Points' within the LAP zoning map, as is the east-west spur generally. However, by comparison with Option B the cut and fill required appears more intrusive in this case and there are no proposed linkages to the N15 at the points identified in the LAP.

The impact is considered moderate negative as although these lands are intersected, and the road could open up the lands for development partly in line with LAP objectives, this looks less likely to be achievable based on the proposed cut-fill arrangement and the lack of spurs to the existing N15. The option also introduces through-traffic from the north to a proposed residential and commercial area which was not envisaged by the LAP.

The CDP has three landscape designation categories – 'moderate', 'high' and 'especially high'. These are illustrated in Map No. 7.1.1 'Scenic Amenity' of the CDP. Option C is predominantly located in an area of Moderate Scenic Amenity, however the area immediately west of the existing R252 where a new junction is proposed and much of the area where the proposed access from the mainline of the 1G option is proposed to be accommodated will be located in areas of High Scenic Amenity. The former is noted however as being identified as a potential access point to zoned lands in the LAP.

As the option intersects areas of high scenic amenity, this will result in a negative scoring. Such areas can absorb some sensitive development according to the CDP objectives. The significance is therefore considered slight to minor negative at this stage of assessment given that the longer section of the proposed option is located within an area of Moderate Scenic Amenity and further, one of the areas of high scenic amenity is located where the policy objectives discussed above identify potential road access to zoned lands.

On balance, the proposed Link Road Option C is considered to be moderate negative with respect to Settlements and Zoning.

Existing Properties

Option C has 30 residential properties in the 0-50m band, 81 no. further properties within the 50-100m band, 180 no. properties in the 100-200m band and 210 no. properties in the 200-300m band. It should be noted however that a slight movement in the alignment and changes to levels of the proposed option introduces additional residential properties to the 0-50m band that would have been marginally outside it under Option B and further, a housing estate (Glenview Park) located immediately east of the proposed Mulrine's link at the eastern end of the option is also partially located within the 0-50m band.

There is potential for indirect negative impact due to the proposed position of the interconnecting loop where the proposed link road option meets the mainline 1G option and the proposed road is in fill in relatively close proximity to the rear gardens of a small number of residential properties to the west of same, noting that the volume of traffic passing in front of those same properties would be lower in this scenario than with Link Road Option A in place. The housing development to the east of Mulrine's link is buffered from the proposed road by tall coniferous planting. There are significant numbers of residential properties in the outer bands, particularly when the length of the overall option is considered. On the whole, the potential for impact is considered to be moderate negative.

Option C has 2 no. commercial properties in the 0-50m band, 9 no. further properties within the 50-100m band, 19 no. properties in the 100-200m band and 18 no. properties in the 200-300m band. While the number of commercial properties where there is most potential for direct, or significant indirect impacts are low, at Mulrine's Link, the option takes in part of the existing storage / parking areas of an industrial facility. Given the limited space available it is unclear as to whether impacts could be successfully mitigated. A moderate negative impact is assigned at this stage of assessment.

With respect to community facilities, there is a creche located in Glenview Business Park, immediately east of the proposed Mulrine's Link. However, this is located within an existing commercial area with a road and landscaped area between it and the proposed option. There is no potential for community facilities to be significantly impacted by this proposed link road option.

With respect to community severance, the existing Cappry Road will be maintained as a through route by an underpass and no potential for community severance of a significant scale is identified. There is no potential for tourist facilities or amenities to be significantly impacted by this proposed link road option. Impacts are considered neutral with respect to these categories of the Existing Population assessment.

2.10.5 Link Road Option D

Infrastructure

The area in which the Ballybofey Junction and associated Link Roads (irrespective of option) is traversed by a 110kV Eirgrid transmission line. This transmission line will be diverted as a result of the construction of the mainline Option 1G and can be accommodated within the proposed alignment of Link Road Option D. Accordingly, given the diversion will be taking place with the mainline construction, Link Road Option D is considered to have a neutral impact on the transmission line.

Link Road Option D will require limited diversion of local electricity and telecommunication line on the existing N15.

The impact on the electricity network is slight negative for Link Road Option D.

There is no impact on renewable energy facilities, accordingly the impact caused by Option D is neutral.

Link Road Option D will require limited diversion of local communications lines and water / wastewater supplies on the existing N15. There is a potential impact on 2 private wells.

Link Road D will contribute towards providing significantly better road infrastructure than exists at present, which will remove traffic from the existing local road network, while impacting local roads negatively at discreet crossing points. Accordingly Link Option D will have a moderately positive impact on the road network.

There is no rail network in Donegal so Link Road Option D will have a neutral impact on the rail network.

There are no waste facilities in the vicinity of Link Road Option D so will result in a neutral impact on waste management infrastructure.

Link Road Option D has no impact on areas of forestry so has a neutral impact on forestry infrastructure.

Settlements and Zoning

The proposed option is located within the settlement boundary of Ballybofey-Stranorlar and the length of road being considered as part of this assessment will be located within an area zoned as an 'Urban Area' under the County Donegal Development Plan 2018-2024.

Under the LAP the route from the north traverses an area zoned for 'Local Environment'. There is a small area of 'Established Development' within the corridor just east of the intersection with the mainline option of 1G, (single property only) and a further 'Established Development' area is impacted by Mulrine's Link. The Mulrine's Link element of the proposal is shown as a potential link in the LAP. Impacts here are considered neutral to slight or minor negative.

The southern part of the alignment intersects the SRR zoned site, where it re-orientates to the east. The eastern part of the east-west orientated section intersects Opportunity Site 4. As identified above in discussing Option B, there is no provision within the LAP for the link to the north. The connection to the existing N15 is identified as one of the 'Potential Access Points' within the LAP zoning map, as is an east-west spur generally. However, by comparison with Option B, the fill required for this option appears more intrusive than for Option B and there are no proposed linkages to the R252 at the point identified in the LAP. It is likely to be more difficult to integrate with any future development access points.

The impact is considered moderate negative as though the road could open up the lands for development partly in line with LAP objectives, this looks less likely to be achievable based on the proposed cut-fill arrangement and the lack of a spur to the existing R252. The link to the north would further introduce through-traffic from the north to a proposed residential and commercial area not envisaged by the LAP.

The CDP has three landscape designation categories – 'moderate', 'high' and 'especially high'. These are illustrated in Map No. 7.1.1 'Scenic Amenity' of the CDP. Option D is predominantly located in an area of Moderate Scenic Amenity, however the area immediately north of the existing N15 where a new roundabout is proposed and much of the area where the proposed access from the mainline of the 1G corridor is proposed to be accommodated will be located in areas of High Scenic Amenity. The former is identified as a potential access point to zoned lands in the LAP however.

As the option intersects areas of high scenic amenity, this will result in a negative scoring. Such areas can absorb some sensitive development according to the CDP objectives. The significance is therefore considered slight to minor negative at this stage of assessment given that the longer section of the proposed option is located within an area of Moderate Scenic Amenity and further, one of the areas of high scenic amenity is located where the policy objectives discussed above identify potential road access to zoned lands.

On balance, the proposed Link Road Option D is considered to be moderate negative with respect to Settlements and Zoning.

Existing Properties

Option D has 26 residential properties in the 0-50m band, 96 no. further properties within the 50-100m band, 238 no. properties in the 100-200m band and 175 no. properties in the 200-300m band. It should be noted however that a slight movement in the alignment and changes to levels of the proposed road introduces additional residential properties to the 0-50m band that would have been marginally outside it under Option B and further, a housing estate (Glenview Park) located immediately east of the proposed

Mulrine's link is also partially located within the 0-50m band. There is potential for indirect negative impact due to the proposed position of the interconnecting loop where the proposed link road option meets the mainline 1G option and the proposed road is in fill in relatively close proximity to the rear gardens of a number of residential properties to the west of same. It is noted though that the volume of traffic passing in front of those same properties would be lower in this scenario than with Link Road Option A in place. There is further potential for indirect negative impact on dwelling houses at the eastern side of Hawthorn Close where the proposed link road runs adjacent (in fill) before meeting the existing N15. The housing development to the east of Mulrine's link is buffered from the proposed road by tall coniferous planting. There are significant numbers of residential properties in the outer bands, particularly when the length of the overall route is considered. On the whole, the potential for impact is considered to be moderate negative.

Option D has 3 no. commercial properties in the 0-50m band, 8 no. further properties within the 50-100m band, 25 no. properties in the 100-200m band and 9 no. properties in the 200-300m band. While the number of commercial properties where there is most potential for direct, or significant indirect impacts are low, at Mulrine's Link, the option takes in part of the existing storage / parking areas of an industrial facility. Given the limited space available it is unclear as to whether impacts could be successfully mitigated. A moderate negative impact is assigned.

With respect to community facilities, there is a creche located in Glenview Business Park, immediately east of the proposed Mulrine's Link. However, this is located within an existing commercial area with a road and landscaped area between it and the proposed new link road. There is no potential for community facilities to be significantly impacted by this option.

With respect to community severance, the existing Cappry Road will be maintained as a through route by an underpass and no potential for community severance of a significant scale is identified. There is no potential for tourist facilities or amenities to be significantly impacted by this proposed link road option. Impacts are considered neutral with respect to these categories of the Existing Population assessment.

2.10.6 Link Road Option E

The area in which the Ballybofey Junction and associated Link Roads (irrespective of option) is traversed by a 110kV Eirgrid transmission line. This transmission line will be diverted as a result of the construction of the mainline Option 1G and can be accommodated within the proposed alignment of Link Road Option E. Accordingly, given the diversion will be taking place with the mainline construction, Link Road Option E is considered to have a neutral impact on the transmission line.

Link Road Option E will require limited diversion of local electricity and telecommunication line on the existing N15 and R252.

The impact on the electricity network is slight negative for Link Road Option E.

There is no impact on renewable energy facilities, accordingly the impact caused by Option E is neutral.

Link Road Option E will require limited diversion of local communications lines and water / wastewater supplies on the existing N15 and R252. There is a potential impact on 2 private wells.

Link Road E will contribute towards providing significantly better road infrastructure than exists at present, which will remove traffic from the existing local road network, while impacting local roads negatively at discreet crossing points. Accordingly Link Option E will have a moderately positive impact on the road network.

There is no rail network in Donegal so Link Road Option E will have a neutral impact on the rail network.

There are no waste facilities in the vicinity of Link Road Option E so will result in a neutral impact on waste management infrastructure.

Link Road Option E has no impact on areas of forestry so has a neutral impact on forestry infrastructure.

Settlements and Zoning

The proposed option is located predominantly within the settlement boundary of Ballybofey-Stranorlar with most of the road being considered as part of this assessment therefore to be located within an area zoned as an 'Urban Area' under the County Donegal Development Plan 2018-2024. The links to the existing R252 to the north, and to 1G, at the western end of the link road option are located however outside of the settlement boundary. The area at the north west of this option is zoned as an 'Area under Strong Urban Influence' under the County Donegal Development Plan 2018-2024. Rural area type zonings, such as *Areas under Strong Urban Influence* are largely provided for the management of proposals for single dwellings. Given the extent of the area outside of the 'Urban Area' and noting that access via the local road network can still facilitate limited development, it is considered that the implementation of these zoning objectives will not be significantly impeded by the proposed options. The impact is considered neutral.

Within the settlement boundary, under the LAP zoning, the route from the north traverses an area zoned for 'Local Environment' along with small areas of 'Established Development' within the corridor just east of the intersection with the mainline option of 1G. The number of existing properties in the established development areas is low and impacts are considered neutral to slight or minor negative.

The eastern part of the alignment intersects the SRR zoned site, where it re-orientates to the east. The eastern part of the east-west orientated section also intersects Opportunity Site 4. As identified above in discussing Option B, there is no provision within the LAP for the link to the north west and a new national road as will be generated by the use of a new road for both purposes. The connection to the existing N15 is identified as one of the 'Potential Access Points' within the LAP zoning map. There are no proposed linkages to the R252 at the point identified in the LAP.

The impact is considered slight to minor negative as though the road could open up the lands for development partly in line with LAP objectives the link to the north would further introduce through-traffic to a proposed residential and commercial area to an extent not envisaged by the LAP.

The CDP has three landscape designation categories – 'moderate', 'high' and 'especially high'. These are illustrated in Map No. 7.1.1 'Scenic Amenity' of the CDP. Option E is predominantly located in an area of Moderate Scenic Amenity, however the area just south of the proposed junction with the existing R252, the area where a new junction is proposed with the existing N15 will be located in areas of High Scenic Amenity, though the latter has been identified in the LAP as a potential future access point to zoned lands. Part of the road will be located just south west of a pocket of High Scenic Amenity Area around an existing farmhouse, which is also a heritage structure, though it is noted the road will be in cut in this location.

As the option intersects areas of high scenic amenity, this will result in a negative scoring. Such areas can absorb some sensitive development according to the CDP objectives. The significance is therefore considered slight to minor negative at this stage of assessment given that the longer section of the proposed option is located within an area of Moderate Scenic Amenity and further, one of the areas of high scenic amenity is located where the policy objectives discussed above identify potential road access to zoned lands.

On balance, the proposed Link Road Option E is considered to be slight or minor negative with respect to Settlements and Zoning though may be considerably influenced by a more detailed assessment of the interaction with the lands zoned for SRR and Opportunity Site.

Existing Properties

Option E has 15 residential properties in the 0-50m band, 43 no. further properties within the 50-100m band, 175 no. properties in the 100-200m band and 177 no. properties in the 200-300m band. Those properties mainly affected lie within Hawthorn Close just west of the proposed access road before it meets the existing N15. These properties are already located close to a national road, however additional traffic would be introduced by way of the new road just to the east of the houses, which will be in fill. There is potential for direct and indirect negative impact on a small number of residential properties due to the alignment of the corridor where it turns east from the initial north-south running section that links to the existing R252. There are significant numbers of receptors in the outer bands. Potential for impact is on the whole considered moderate negative to residential receptors.

Option E has 1 no. commercial property in the 0-50m band, 2 no. further properties within the 50-100m band, 14 no. properties in the 100-200m band and 13 no. properties in the 200-300m band. The number of commercial properties where there is most potential for direct, or significant indirect impacts is low and a slight to minor negative impact is assigned.

There is no potential for community facilities to be significantly impacted by this proposed link road option. With respect to community severance, the proposed route includes for a number of interconnecting roads and no potential for community severance of a significant scale is identified. There is no potential for tourist facilities or amenities to be significantly impacted by this proposed link road option. Impacts are considered neutral with respect to these categories of the Existing Population assessment.

2.10.7 Summary for Impact Assessment of Link Road Options

A summary of the impact scores for each link road and the relative preferences is provided in **Table 2-32**.

Table 2-32: Impact Scores and Preferences for Link Roads

Option		A	B	C	D	E
Infrastructure	Electricity	3	3	3	3	3
	Renewables	4	4	4	4	4
	Telecommunications	3	3	3	3	3
	Water & Wastewater	3	3	3	3	3
	Road	6	6	6	6	6
	Rail	4	4	4	4	4
	Waste Facilities	4	4	4	4	4
	Forestry	4	4	4	4	4
Properties	Settlements and Zoning	3	3	2	2	3
	Residential	3	2	2	2	2
	Commercial	3	4	2	2	3
	Community Facilities	4	4	4	4	4
	Community Severance	4	4	4	4	4
	Tourism	4	4	4	4	4

Option	A	B	C	D	E
Overall Impact Score	3	3	2	2	3
Impact	Slight -ve	Slight -ve	Mod -ve	Mod -ve	Slight -ve
Overall Preferences	Preferred	Intermediate	Least Preferred	Least Preferred	Intermediate

With regard to infrastructure, all options score very similarly and overall can be expected to have a neutral impact.

In terms of properties, Options A, B and E are placed higher on scoring than Options C and D. The distinction between Options A, B and E would be influenced by the potential ability to deliver a road within Option B and E that meets LAP objectives for lands zoned for SRR and Opportunity Site and facilitates development there without introducing an unacceptable level of traffic through the proposed future residential and commercial areas. Option A has potential to impact on a smaller number of existing sensitive residential receptors. Therefore, Option A is the preferred option.

2.10.8 Conclusion

Table 2-33 provides a detailed summary of the findings of the assessment of Link Road Options for Section 1 regarding Materials Assets (Non-agricultural).

Table 2-33: Material Assets (Non-agricultural) Option Scoring Matrix

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
Material Assets (Non-Agriculture)					
1G (Ballybofey Link Road Option A)	▪ 15 no. residential properties in 0-50m band. ▪ 7 no. residential properties in 50-100m band. ▪ 124 no. residential properties in 100-300m band. ▪ 1 no. commercial property in the 0-50m band. ▪ 2 no. commercial properties in 50-100 band. ▪ 5 no. commercial properties in 100-300m band. ▪ 0 community facilities directly affected. ▪ 0 significant incidents of community severance. No tourist facilities or amenities impacted significantly.	▪ Predominantly within settlement boundary. Interaction with zoned lands limited to 'Established Development' and 'Local Environment'. ▪ Predominantly located in moderate scenic amenity area with short sections in high scenic amenity area. Travels through established residential area; 1 no. farm residence to be surrounded by road network.	3	1	Preferred

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
1G (Ballybofey Link Road Option B)	▪ 12 no. residential properties in 0-50m band. ▪ 55 no. residential properties in 50-100m band. ▪ 440 no. residential properties in 100-300m band. ▪ 0 no. commercial properties in the 0-50m band. ▪ 2 no. commercial properties in 50-100m band. ▪ 35 no. commercial properties in 100-300m band. ▪ 0 community facilities directly affected. ▪ 0 significant incidents of community severance. ▪ No tourist facilities or amenities impacted significantly.	▪ Entirely within settlement boundary. Small area of land zoned for 'Established Development' impacted. Intersects lands zoned for SRR and Opportunity Site. Could open up these lands for development by providing new link partially in line with LAP objectives. ▪ Predominantly located in moderate scenic amenity area with short sections in high scenic amenity area. ▪ Option is in fill in relatively close proximity to rear gardens of residential properties. Significant numbers of receptors in outer bands.	3	2	Intermediate
1G (Ballybofey Link Road Option C)	▪ 30 no. residential properties in 0-50m band. ▪ 81 no. residential properties in 50-100m band. ▪ 390 no. residential properties in 100-300m band. ▪ 2 no. commercial properties in 0-50m band. ▪ 8 no. commercial properties in 50-100 band. ▪ 37 no. commercial properties in 100-300m band. ▪ 0 community facilities directly affected. ▪ 0 significant incidents of community severance. ▪ No tourist facilities or amenities impacted significantly.	▪ Entirely within settlement boundary. Two areas of land zoned for 'Established Development' impacted. Intersects lands zoned for SRR and Opportunity Site. Could provide access for development but one new link as per LAP objectives only and option provides for increased cut and fill in this area. ▪ Predominantly located in moderate scenic amenity area with short sections in high scenic amenity area. ▪ Option is in fill in relatively close proximity to rear gardens of residential properties. Significant numbers of receptors in outer bands. Land-take from large industrial property with potential implications for site operations.	2	5	Least Preferred
1G (Ballybofey Link Road Option D)	▪ 26 no. residential properties in 0-50m band. ▪ 96 no. residential properties in 50-100m band. ▪ 413 no. residential properties in 100-300m band.	▪ Entirely within settlement boundary. Two areas of land zoned for 'Established Development' impacted. Intersects lands zoned for SRR and Opportunity Site. Could provide access for development but with one new link as per LAP objectives only	2	4	Least Preferred

Option	Quantitative Assessment	Qualitative Assessment and Analysis	Impact Score	Preference Ranking	Overall Preference
	▪ 3 no. commercial properties in 0-50m band. ▪ 8 no. commercial properties in 50-100 band. ▪ 34 no. commercial properties in 100-300m band. ▪ 0 community facilities directly affected. ▪ 0 significant incidents of community severance. ▪ No tourist facilities or amenities impacted significantly.	and option provides for increased fill in this area. ▪ Predominantly located in moderate scenic amenity area with short sections in high scenic amenity area. ▪ Option is in fill in relatively close proximity to rear gardens of residential properties. Significant numbers of receptors in outer bands. ▪ Land-take from large industrial property with potential implications for site operations.			
1G (Ballybofey Link Road Option E)	▪ 15 no. residential properties in 0-50m band. ▪ 43 no. residential properties in 50-100m band. ▪ 352 no. residential properties in 100-300m band. ▪ 1 no. commercial property in 0-50m band. ▪ 1 no. commercial property in 50-100 band. ▪ 27 no. commercial properties in 100-300m band. ▪ 0 community facilities directly affected. ▪ 1 significant incidents of community severance. ▪ 0 tourist facilities or amenities impacted significantly.	▪ Predominantly within settlement boundary. Interaction with zoned lands limited to 'Established Development' and 'Local Environment'. Intersect land zoned for SRR and Opportunity Site. Could provide access for development but with one new link only as per LAP objectives. ▪ Predominantly located in moderate scenic amenity area with short sections in high scenic amenity area. ▪ Option is in fill close to rear gardens of residential properties. ▪ Significant numbers of receptors in outer bands. ▪	3	3	Intermediate

3 OPTION SELECTION

Having completed the assessment of Stage 3 Project Appraisal for Section 1 – 1G Link Road Options for the TEN T Priority Route Improvement Project, Donegal, the Preferred Link Road Option in terms of environment, has been identified as the Option 1G Ballybofey Link Road Option A. The Multi-Criteria Project Appraisal Matrix of the options is provided in **Table 3-1** and the Preference Summary is provided in **Table 3-2.**

Table 3-1 Multi-Criteria Project Appraisal Matrix Section 1 - 1G Ballybofey Link Road Options

Option	1G (Ballybofey Link Road Option A)	1G (Ballybofey Link Road Option B)	1G (Ballybofey Link Road Option C)	1G (Ballybofey Link Road Option D)	1G (Ballybofey Link Road Option E)
Air Quality & Climate	3	3	2	2	3
Noise	4	3	3	3	3
Landscape & Visual	2	1	1	1	1
Terrestrial Biodiversity	2	1	1	2	2
Aquatic Biodiversity	3	2	2	2	2
Soils, Geology and Hydrogeology	4	4	4	4	4
Hydrology	3	3	2	2	3
Cultural Heritage	3	3	3	3	3
Material Assets - Agriculture	2	2	2	3	2
Material Assets - Non-agricultural	3	3	2	2	3
Total Impact Scores	**29**	**25**	**22**	**24**	**26**

Table 3-2: Section 1 - 1G Ballybofey Link Road Options Preference Summary

Option	1G (Ballybofey Link Road Option A)	1G (Ballybofey Link Road Option B)	1G (Ballybofey Link Road Option C)	1G (Ballybofey Link Road Option D)	1G (Ballybofey Link Road Option E)
Air Quality & Climate	Preferred	Preferred	Intermediate	Intermediate	Preferred
Noise	Preferred	Intermediate	Intermediate	Least Preferred	Intermediate
Landscape & Visual	Preferred	Intermediate	Least Preferred	Intermediate	Least Preferred
Terrestrial Biodiversity	Intermediate	Intermediate	Least Preferred	Intermediate	Preferred
Aquatic Biodiversity	Preferred	Intermediate	Least Preferred	Intermediate	Intermediate
Soils, Geology and Hydrogeology	Preferred	Preferred	Preferred	Preferred	Preferred
Hydrology	Intermediate	Intermediate	Least Preferred	Intermediate	Preferred
Cultural Heritage	Intermediate	Intermediate	Intermediate	Preferred	Intermediate
Material Assets - Agriculture	Intermediate	Intermediate	Intermediate	Preferred	Intermediate
Material Assets - Non-agricultural	Preferred	Intermediate	Least Preferred	Least Preferred	Intermediate

Appendix A Cultural Heritage Inventory

Recorded finds from National Museum of Ireland (NMI) from Study Area

Townland	NMI ref.	Artefact types	Notes
Dooish	SA1899:64	Stone axe	Polished
Ballybofey	1930:544	Polished stone axe	-

Cultural Heritage Constraints within 500m Option Corridors for Study Area

Unique Identification No.	
Legal Status	RMP
Reference No.	DG078-013---
Address/Townland	BALLYBOFEY
Site Type	Ringfort – unclassified
ITM	613520, 894621
Description	A single-ringed 'Fort' is marked on the 1st and 2nd editions of the OS 6-inch maps. The site would appear to have been destroyed by the railway line. It was situated on low, rough pasture rising from the S bank of the River Finn.
Sources	http://webgis.archaeology.ie/historicenvironment/
Approx. Distance from Centre-Line	**Option 1G - Ballybofey Link Road Options B: 109m C & D:** 70m
Type of Impact	**Option 1G - Ballybofey Link Road Options B C & D:** Direct & Imperceptible

Unique Identification No.	
Legal Status	NIAH
Reference No.	40907720
Address/Townland	Cappry
Site Type	Outbuilding
ITM	612106, 894673
Description	Detached five-bay two-storey outbuilding associated with altered two-storey house, built c. 1820, having external flight of cut stone steps giving access to doorway at first floor entrance to west gable end. Pitched natural slate roof with cast-iron rainwater goods. Uncoursed limewashed rubble stone walls, smooth cement rendered walls to the west gable end. Square-headed window openings at ground floor level to both main elevations (north and south) having cast-iron fixed-framed diamond and squared paned windows. Square-headed door openings having battened timber and replacement doors, square-headed loading bay to centre of north elevation at first floor level. Set in yard to rear (west) of three-bay two-storey house (altered) to the west of Ballybofey. Modern outbuildings to site.
Sources	http://www.buildingsofireland.ie/niah/search.jsp?county=DG&regno=40907720&type=record
Approx. Distance from Centre-Line	**Option 1G - Ballybofey Link Road Options A:** 54m **Option 1G: Ballybofey Link Road Options B, C & D:** 193m
Type of Impact	**Option 1G - Ballybofey Link Road Options A:** Direct & Moderate **Option 1G – Ballybofey Link Road Options B, C & D:** Indirect & Imperceptible

Unique Identification No.	

Legal Status	-
Reference No.	-
Address/Townland	CAPPRY
Site Type	Railway line
ITM	612289, 894945 & 613180, 894624
Description	Portion of railway line built as part of the Donegal Light Railway (Stranorlar & Glenties Branch). Narrow gauge line - opened 1895, closed 1947.
Sources	http://www.buildingsofireland.ie/Surveys/Gardens/gardensapp/ViewSite.jsp?gardenId=DG0047
Approx. Distance from Centre-Line	**Option 1G - Ballybofey Link Road Options A:** 52m **Option 1G: Ballybofey Link Road Options B & C:** 0m & 29m **Option 1G: Ballybofey Link Road Option D:** 29m
Type of Impact	**Option 1G - Ballybofey Link Road Options A:** Direct & Imperceptible **Option 1G – Ballybofey Link Road Options B, C & D:** Direct & Slight

References

Donegal County Development Plan 2018-2024

EPA (2002) *Guidelines on the Information to be contained in Environmental Impact Statements*

EPA (2003) *Advice Notes on Current Practice on the preparation of Environmental Impact Statements*

EPA (2015) *Draft Advice Notes for preparing Environmental Impact Statements*

EPA (2017) *Draft Guidelines on the Information to be contained in EIARs*

TII (2005a) *Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes*

TII (2005b) *Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes*

TII (2010) *Project Management Guidelines*

TII (2016) *Project Appraisal Guidelines for National Roads Unit 7.0 – Multi-Criteria Analysis*

Online Sources

Irish Heritage Council Map: www.heritagemaps.ie

National Excavations Database: www.excavations.ie

National Monuments Service: www.archaeology.ie

Ordnance Survey of Ireland: www.osi.ie/mapviewer

Appendix B Cultural Heritage Photographic Record

Plate 1: View of N elevation of NIAH outbuilding 40907720

Plate 2: View N towards Option 1G – Ballybofey Link Road Option A corridor (area east of Cappry Rd)

Plate 3: View of former railway embankment (S1-BH04) adjacent existing R252 at Ballybofey

Plate 4: View SW of Option 1G - Ballybofey Link Road Options B & C linkage point to R252

Plate 5: View N of Option 1G – Ballybofey Link Road Option A linkage point to N15

Plate 6: View NW of Option 1G – Ballybofey Link Road Option B linkage point to N15

Plate 7: View NW of Option 1G – Ballybofey Link Road Option D linkage point to N15

Plate 8: View of area to rear of Blue Cedars and The Park housing estates of Option 1G – Ballybofey Link Road option corridors B, C & D