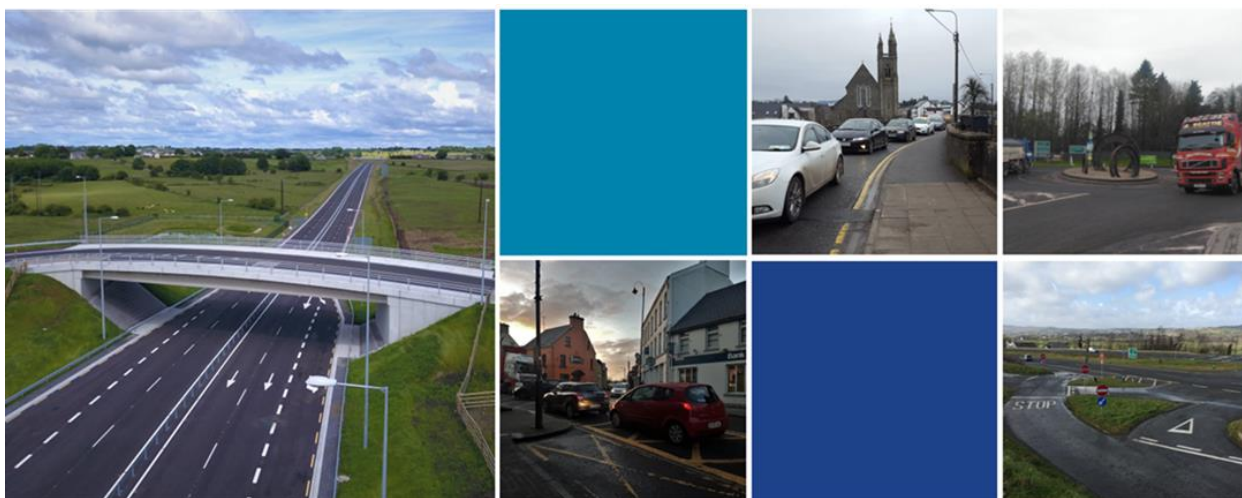


TEN-T Priority Route Improvement Project, Donegal

Phase 2, Option Selection Report Volume D2- Section 2 Environmental Appendices



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TEN-T Priority Route Improvement Project, Donegal

Section 2: N56 / N13 Letterkenny to Manorcunningham

Option Selection Report

Appendix D2.1 – Air and Climate

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1 INTRODUCTION

This report outlines the comparative assessment of options in relation to air quality and climate for the seven options for Section 2: N56/N13 Letterkenny to Manorcunningham of the TEN-T Priority Route Improvement Project in Donegal. This assessment forms 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 selection 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*” (May 2011) provides guidance on the assessment procedures utilised for air and climate of the option selection. 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 (TII, 2016, p.3) 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 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 Envision Map at <https://gis.epa.ie/EPAMaps/>.

Air quality is classified using a four band scale of; Good, Fair, Poor, and Very Poor. In terms of existing air quality, the study area is within both EPA Zone C (large towns, including Letterkenny) and Zone D which covers rural Ireland. Air quality in Zone C and 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 sensitive receptors, in this case primarily residential properties located within 50m of the centreline for each of the proposed N56 / N13 Letterkenny to Manorcunningham options 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

Options	Receptors (50m)	Length (km)	AADT	%HGVs	Average Speed (kph)
2A (Orange)	44	11	16,635	2.3	98
2B (Pink)	56	10.4	15,640	1.9	98
2C (Purple)	35	11.7	17,993	1.7	98
2D (Red)	30	13.3	17,990	1.7	98
2E (Green)	17	12.4	17,757	1.7	98
2F1 (Blue)	9	10	15,065	1.6	98
2F2 (Blue)	12	9.6	15,065	1.6	98

3 OPTIONS ASSESSMENT

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 (NO₂) and particulate matter (PM₁₀). 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 change in exposure for design year 2028 is 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.

The tables indicate that 2B (Pink) has the potential to impact on the greatest number of properties (56) relative to each of the other proposed options. Of the other options, 2F1 (Blue) (9) and 2F2 (Blue) (12) will impact the least number of properties relative to 2E (Green) (17), 2D (Red) (35), 2C (Purple) (35), and 2A (Orange) (44). The predicted emissions between the various options show low variation as expected given the similarities in the traffic patterns and option lengths.

As a consequence, the air quality scores are largely dominated by the trend in receptor numbers with the link length also having a minor impact on ranking. Therefore, 2A (Orange), 2B (Pink), 2C (Purple) and 2D (Red) are moderately negative for air quality given the higher number of properties potentially impacted. While 2F1 (Blue), 2F2 (Blue) and 2E (Green) will impact the least number of properties and hence are minor or slightly negative for air quality.

Table 3-1: 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
2A (Orange)	44	11	23,319	2,120	93,276	Moderately negative	2	Least Preferred
2B (Pink)	56	10.4	20,065	1,929	108,041	Moderately negative	2	Least Preferred
2C (Purple)	35	11.7	25,539	2,183	76,400	Moderately negative	2	Intermediate
2D (Red)	30	13.3	29,027	2,182	65,475	Moderately negative	2	Intermediate
2E (Green)	17	12.4	26,712	2,154	36,622	Minor or slightly negative	3	Preferred
2F1 (Blue)	9	10	18,123	1,812	16,310	Minor or slightly negative	3	Preferred
2F2 (Blue)	12	9.6	17,398	1,812	21,747	Minor or slightly negative	3	Preferred

Table 3-2: Overall Change in Exposure to PM₁₀ for Design Year 2028

Options	Receptors within 50m	Link Length (km)	Predicted Emission PM ₁₀ kg/year	Rate (kg/km/yr)	PM ₁₀ Score	Impact Level	Impact Score	Preference
2A (Orange)	44	11	1,040	85	3,751	Moderately negative	2	Least Preferred
2B (Pink)	56	10.4	918	57	3,206	Moderately negative	2	Least Preferred
2C (Purple)	35	11.7	1,184	95	3,316	Moderately negative	2	Least Preferred
2D (Red)	30	13.3	1,346	96	2,883	Moderately negative	2	Intermediate
2E (Green)	17	12.4	1,239	103	1,755	Minor or slightly negative	3	Intermediate
2F1 (Blue)	9	10	846	54	485	Not significant/neutral	4	Preferred
2F2 (Blue)	12	9.6	812	56	672	Not significant/neutral	4	Preferred

Climate impacts during the operation stage are based on total greenhouse gas (GHG) emissions associated with traffic on the road network as calculated by the DMRB regional model. These results are presented in **Table 3-3**. Each of the options shows little significant variation given the similarity in traffic patterns. Hence all options are classed as moderately negative for climate and intermediate.

Table 3-3: Climate Impacts Associated with Options

Options	Carbon (tonnes/year)	GHG (CO _{2eq}) (tonnes/year)	Impact Level	Impact Score	Preference
2A (Orange)	3,371	37,081	Moderately negative	2	Intermediate
2B (Pink)	2,947	30,652	Moderately negative	2	Intermediate
2C (Purple)	3,780	44,226	Moderately negative	2	Intermediate
2D (Red)	4,297	57,155	Moderately negative	2	Least Preferred
2E (Green)	3,956	49,057	Moderately negative	2	Intermediate
2F1 (Blue)	2,694	26,944	Moderately negative	2	Intermediate
2F2 (Blue)	2,587	24,832	Moderately negative	2	Intermediate

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 a result, there is the potential of a climate impact for the one-off construction stage event.

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 Option 2F1 (Blue) and 2F2 (Blue) indicate the highest preference score as these options are the shortest and potentially impact on the lowest number of properties. These two options are the preferred options for air quality and climate.

Option 2E (Green) ranks high for air quality as a consequence of the low number of properties potentially impacted but ranks at the low end for climate given the length and hence is classed as intermediate. Similarly, Option 2D (Red) ranks intermediate in terms of air quality and climate impacts.

Options 2A (Orange), 2B (Pink), and 2C (Purple) impact on the greatest number of properties and are longer than the preferred options and as such, these are the least preferred in terms of both air quality and climate.

Table 3-4: Option Scoring Matrix

Options	Quantitative Assessment			Qualitative Assessment	Impact Score	Ranking	Overall Preference
	NO _x	PM ₁₀	CO ₂				
2A (Orange)	93,276	3,751	37,081	Moderately negative	2	7	Least Preferred
2B (Pink)	108,041	3,206	30,652	Moderately negative	2	6	Least Preferred
2C (Purple)	76,400	3,316	44,226	Moderately negative	2	5	Intermediate
2D (Red)	65,475	2,883	57,155	Moderately negative	2	4	Intermediate
2E (Green)	36,622	1,755	49,057	Moderately negative	2	3	Intermediate
2F1 (Blue)	16,310	485	26,944	Minor or slightly negative	3	1	Preferred
2F2 (Blue)	21,747	672	24,832	Minor or slightly negative	3	2	Preferred



TEN-T Priority Route Improvement Project, Donegal

Section 2: N56 / N13 Letterkenny to Manorcunningham

Option Selection Report

Appendix D2.2 – Noise

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1 INTRODUCTION

This report 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 of 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 utilised to identify the noise sensitivity and impacts of each proposed option in Section 2: N56/N13 Letterkenny to Manorcunningham.

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 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 option centrelines. 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 the TII's project appraisal matrix as described in **Section 1.1.3**. See **Figure 1-1** for an example of buffer zone assessments.

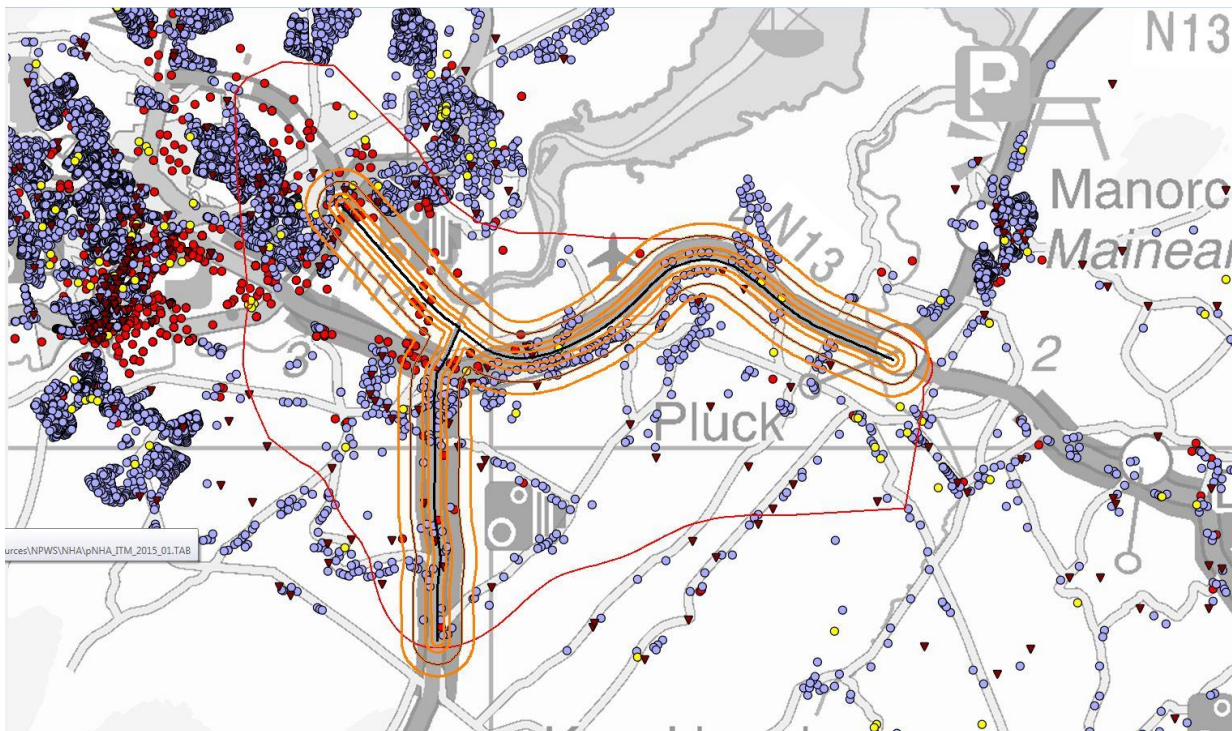


Figure 1-1: Sample buffer zones for proposed Option 2A (Orange) in Section 2 Letterkenny to Manorcunningham

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 Potential Impact Rating (PIR). The PIR values are used to assess the potential impact of each option; the larger the PIR the greater the potential impact. This calculation is summarised in **Section 3**.

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: Impact Scoring Key** (TII, 2016) taken from the *Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis* (TII, 2016). An overall assessment was 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 score assigned according to the impact level.

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

Section 2 Letterkenny to Manorcunningham of the TEN-T Priority Route Improvement Project, Donegal is located in an urban region. The existing N15 is included as an action planning area in the Donegal Local Authorities Noise Action Plan 2013 -2018.

The existing route is populated with housing development facing the national roads. Saint Patrick's national school is located close to the existing carriageway at the southern end of Section 2. The Clanree Hotel (over 100 bedrooms) is located immediately west of the Dry Arch Roundabout. The existing traffic levels on the N13 and N14 give rise to significant road traffic noise levels at these locations.

2.2 Description of Options

The 2E (Green) and 2F1/2F2 (Blue) options are located in open country to the east of the current N13 alignment, with the 2F1/2F2 (Blue) options taking the most southerly layout furthest from Saint Patrick's national school and the more densely populated areas. The 2B (Pink) option follows the existing N13 with the 2A (Orange) option being very similar. The 2C (Purple) option diverts west and the 1D (Red) option diverts east of Saint Patrick's school, respectively, and both rejoin the N13 approximately half way along their length.

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**. Ambient noise was checked at selected locations. Topography of the options and proximity to noise sensitive locations was noted.

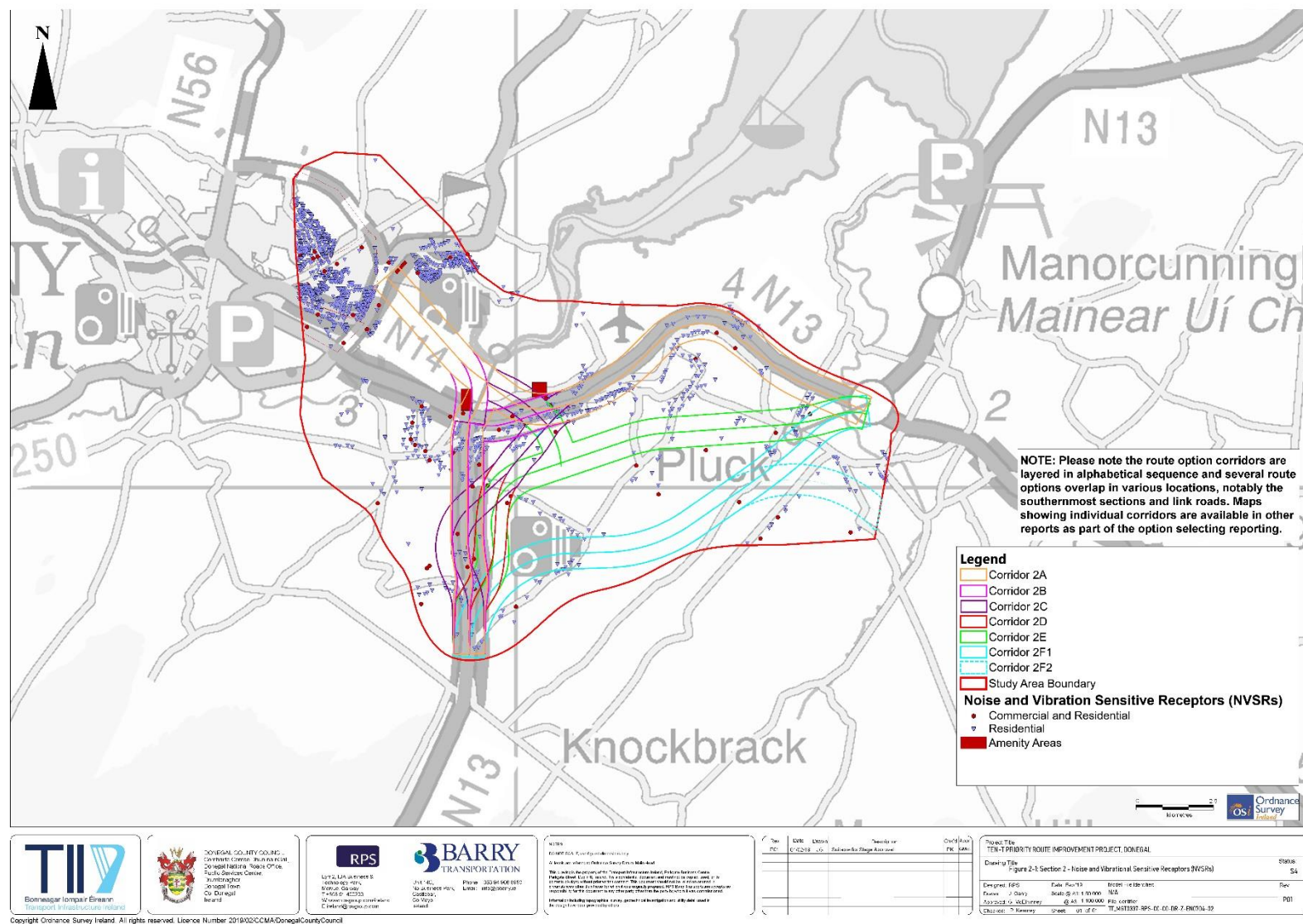


Figure 2-1 Noise and Vibration Sensitive Receptors (NVSRs) – Section 2 Options

3 OPTIONS ASSESSMENT

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 2 the critical traffic changes are in the area of Node 1 (the Dry Arch Roundabout). There are residential properties to the south and east of the roundabout with a commercial zone including an hotel to the east. The existing traffic on the N13 south of Node 1 is 16,800 AADT and will decrease to 16,500 AADT in the design year. The corresponding figures for the N13 east of the Dry Arch Roundabout are 25,700 and 26,600 AADT. For the link to the N14 West from the Dry Arch Roundabout the figures are 33,000 and 35,300 AADT.

The 2C (Purple), 2D (Red) and 2E (Green) options will see a significant decrease in traffic on the N13 south of node 1. All options other than 2C (Purple) will see a significant decrease in traffic on the N13 east of the Dry Arch Roundabout. All options will see a significant decrease in traffic on the N14 west of the Dry Arch Roundabout. The 2F (Blue) option will lead to some reduction in traffic along the N13, whereas the 1E (Green) option offers a greater reduction in traffic on the existing N13 at the acoustic cost of being closer to existing dwellings.

3.2.2 Assessment of the Likely Need for Mitigation Measures

The existing N13 and N14 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 for each option in Section 2.

3.2.3 Summary of Qualitative Assessment

There are no significant barriers to providing mitigation that would distinguish between the options in Section 2. While the area is not densely populated there is a concentration of housing at the N13 close to the Dry Arch roundabout and along the L1114. St. Patricks National School is also located on the N13. The options that are furthest away from the housing and the school are the 2F1/2F2 (Blue) options which are both given a subjective score of 100. The next best option on a subjective basis is the 2E (Green) option which is somewhat closer to the school but also given a score of 100. The 2D (Red) option is routed closer to housing east of the Dry Arch Roundabout and is awarded 200. The 2C (Purple) option is routed on three sides of the school and closer to houses on the N13 and given a score of 300. The least favoured options subjectively are the 2B (Pink) and 2A (Orange) options which are awarded a score of 500 because they are not significantly different from the existing alignment and do not improve the situation for the school.

3.3 Comparison of Options

Table 3-3 summarises the impact score matrix for all options in Section 2. This overall impact has been determined based on the quantitative and qualitative assessments of each option and the receptors likely to be affected.

The overall rating shows that the 2F1/2F2 (Blue) options have the lowest noise impact, followed closely by the 2E (Green) option. The 2F1/2F2 (Blue) options relocate the corridor furthest from St. Patricks School and properties along the existing N13/N14 corridor. All options are given an impact score based on the overall impact level.

Table 3-1: Section 2 Property Counts and Banding

Banding	2A (Orange)	2B (Pink)	2C (Purple)	2D (Red)	2E (Green)	2F1 (Blue)	2F2 (Blue)
0-50m	44	56	35	30	17	9	12
<i>Residential</i>	30	37	25	21	9	4	6
<i>Commercial</i>	7	10	5	5	6	5	5
<i>Both</i>	4	6	2	1	2	0	0
<i>Unknown</i>	3	3	3	3	0	0	1
50-100m	94	101	79	79	46	31	31
<i>Residential</i>	70	73	54	54	21	19	19
<i>Commercial</i>	21	24	21	21	21	11	10
<i>Both</i>	3	3	4	4	4	1	1
<i>Unknown</i>	0	1	0	0	0	0	1
100-200m	146	139	154	145	119	96	89
<i>Residential</i>	96	99	105	99	73	55	49
<i>Commercial</i>	42	34	40	38	38	35	35
<i>Both</i>	6	5	7	6	6	5	4
<i>Unknown</i>	2	1	2	2	2	1	1
200-300m	153	156	178	178	177	160	168
<i>Residential</i>	123	118	136	135	135	117	122
<i>Commercial</i>	22	31	32	33	32	34	35
<i>Both</i>	5	4	7	7	6	3	6
<i>Unknown</i>	3	3	3	3	4	6	5

Table 3-2: Section 2 Potential Impact Rating

Option	Band	Multiplier	Receptors	Sub-Total	PIR (Quantitative Score)
2A	0-50	4	44	176	903
	50-100	3	94	282	
	100-200	2	146	292	
	200-300	1	153	153	
2B	0-50	4	56	224	961
	50-100	3	101	303	
	100-200	2	139	278	
	200-300	1	156	156	
2C	0-50	4	35	140	863
	50-100	3	79	237	
	100-200	2	154	308	
	200-300	1	178	178	
2D	0-50	4	30	120	825
	50-100	3	79	237	
	100-200	2	145	290	
	200-300	1	178	178	
2E	0-50	4	17	68	621
	50-100	3	46	138	
	100-200	2	119	238	
	200-300	1	177	177	
2F1	0-50	4	9	36	481
	50-100	3	31	93	
	100-200	2	96	192	
	200-300	1	160	160	
2F2	0-50	4	12	48	487
	50-100	3	31	93	
	100-200	2	89	178	
	200-300	1	168	168	

Table 3-3: Section 2 Noise Impact Score Matrix

Option	PIR (Quantitative Score)	Qualitative Score	Total Score	Impact level	Impact Score	Preference Ranking	Preference
2A (Orange)	903	500	1403	Minor or slightly negative	3	6	Least Preferred
2B (Pink)	961	500	1461	Minor or slightly negative	3	7	Least Preferred
2C (Purple)	863	300	1163	Minor or slightly negative	4	5	Intermediate
2D (Red)	825	200	1025	Minor or slightly negative	4	4	Intermediate
2E (Green)	621	100	721	Minor or slightly positive	5	3	Preferred
2F1 (Blue)	481	100	581	Minor or slightly positive	5	1	Preferred
2F2 (Blue)	487	100	587	Minor or slightly positive	5	2	Preferred



TEN-T Priority Route Improvement Project, Donegal

Section 2: N56 / N13 Letterkenny to Manorcunningham

Option Selection Report

Appendix D2.3 - Landscape

Document Control Sheet

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Project Title:	TEN-T Priority Route Improvement Project, Donegal – Section 2: N56 / N13 Letterkenny to Manorcunningham
Document Title:	Option Selection Report –Appendix D2.3 – Landscape and Visual
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1 INTRODUCTION

This appendix of the Option Selection Report relates to the landscape and visual assessment of the options considered for Section 2: N56 / N13 Letterkenny to Manorcunningham of the TEN-T Priority Route Improvement Project, Donegal. Please refer to the Option Selection Report for a full description of the project options.

The project is being progressed in accordance with the phased approach to developing a major road scheme identified in the TII 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,
- On Line 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 2 is largely restricted to a single Landscape Character Area (LCA): *Letterkenny Estuary and Farmland LCA 15* (refer to **Figure 2-1** below). Section 2 also includes western portions of the LCA identified as *Laggan Valley LCA 12*.

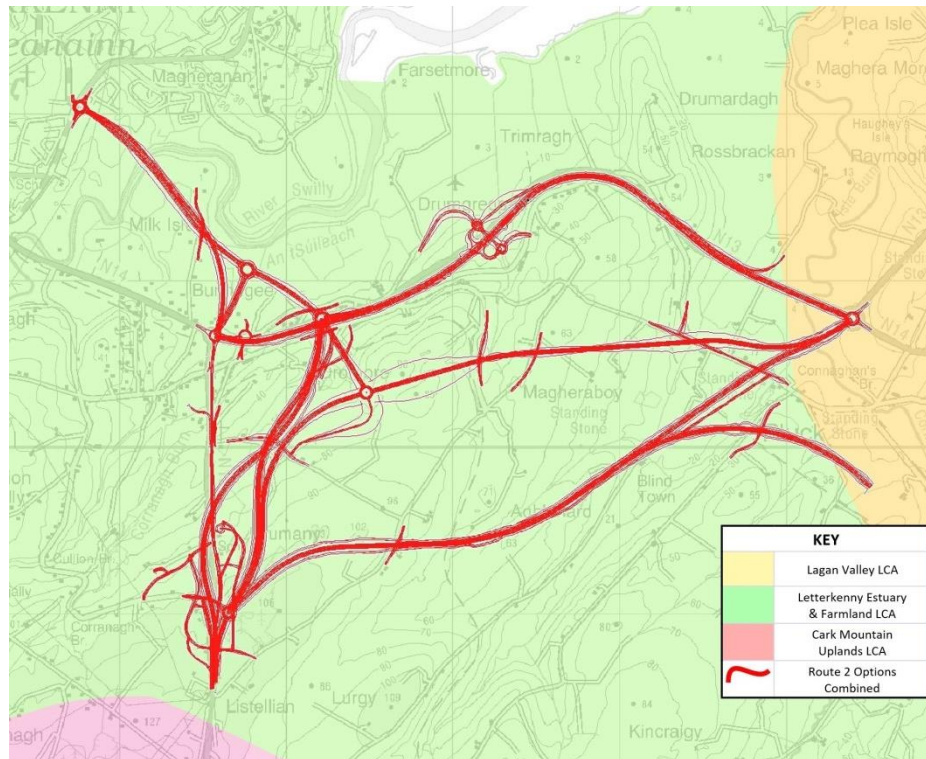


Figure 2-1: Landscape Character Area Map (Source – County Donegal Development Plan 2018 – 2024)

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

- Large primarily agricultural floodplains extend inland along the river Swilly through Letterkenny town and beyond into Newmills. Some of the floodplains within the town area have been developed for commercial and retail use.
- The agricultural lands within this LCA are of varying quality ranging from good quality arable land along the shores of Lough Swilly, river valleys and arable land to the east, to upland grazing and pasture on peripheral uplands.
- There is a substantial amount of residential sprawl radiating from Letterkenny and a considerable amount of one-off rural dwellings and linear development along the local road networks.
- Letterkenny is the largest town in the county with a population of 19,588 (Letterkenny urban boundary; CSO 2011) and part of the linked Letterkenny Derry Gateway as identified in the National Spatial Strategy, 2020. The town is located west of the Swilly estuary on the banks of the Swilly River; in recent times the town has expanded south across the river whereas the historic town fabric is located on higher lands just north of the river.
- Hedge and deciduous tree bound fields are a predominant feature in this landscape providing biodiversity corridors throughout.

- 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, infrastructure development and development and consolidation of Letterkenny urban area.

2.2 Landscape Value

KEY

- Medium Scenic Amenity
- High Scenic Amenity
- Route 2 Options Combined

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

- **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.

The study area associated with Section 2 is either classed as being of HSA or MSA, with the majority of the land at lower elevation within the study area considered to be of HSA designation. Higher elevation land to the south is generally classified as being of MSA designation, interspersed with HSA designation along the abandoned railway link.

2.2.1 Land Cover

Land cover within the study area associated with Section 2 is predominantly comprised of pastoral and arable agricultural land use to the south and east, whilst the urban fringe of Letterkenny dominates north and north-western portions. Further urban influence is experienced along the existing N13 corridor that bisects the study area in a generally east west orientation with linear residential development primarily located along more elevated land to the south of the N13. Industrial expansion on land between the River Swilly and the N13 corridor is apparent, particularly in the vicinity of the existing N13/ N14 junction, with low rise industrial units of varying quality and design evident.

Fields are generally well defined by mixed species hedgerows of varying quality. In many places these hedgerows have become degraded, have developed gaps, become overgrown or over-mature, so that only lines of trees remain without hedgerow species to connect them. In other instances, gorse has become a more dominant species, changing the appearance of the generally well managed hedgerows on the more elevated agricultural land. Tree cover, particularly adjacent to the existing N13 corridor, often limits views north across Lough Swilly. Coniferous plantations are scattered and largely restricted to poorer quality, higher elevation land within the study area.

2.2.2 Visually Significant Trees

There is limited vegetation cover within the study area with potential to be affected by the proposed options. This shortage of potentially visually significant vegetation results in increasing the value of such vegetation where it does occur in the study area. In summary the key areas of visually significant vegetation are as follows:

- Mixed species planting adjacent to N13 corridor between N13/ N14 junction and Dry Arch Junction to east of Letterkenny
- Mixed species planting south-west of N13/N14 roundabout junction;
- Mixed species planting along former railway link west of Magheraboy; and
- Plantation woodland adjacent to N13 south of Drumany

2.2.3 Existing Networks

The study area is well served by national, regional and local road networks which generally occupy higher elevation land around the periphery of the River Swilly estuary, with instances of local roads extending into the adjacent floodplain.

2.2.4 Urban Form

Whilst the urban form of Letterkenny dominates the landscape character in the north-western portion of the study area, views north-west from within the estuarine landscape are often filtered or obscured by roadside vegetation and close built form, such that the urban fabric associated with eastern fringes of Letterkenny is obscured.

Mature vegetation cover within the urban fringe of Letterkenny further restricts clear views of the urban form at lower elevation; however more elevated development is visually apparent, though seen against and generally below the existing horizon formed by ridge lines of hills to the west.

Residential development has expanded eastwards adjacent to the N13 corridor, with further residential development extending along local access roads further south and east from the N13 corridor.

Other visual detractors include; the overhead electricity power line and pylons which crosses north to south across the study area, south of the major road junction at Port Bridge.

2.3 Overall Landscape Sensitivity

The existing environment of the study area associated with Section 2 includes land between Connaghan's Bridge to the east, Trimragh to the north, Listellian to the south and the urban form of Letterkenny to the north-west. The landscape associated with the Section 2 study area and wider environs is dominated by the wide valley system associated with the River Swilly estuary and its adjacent floodplains. More elevated land to the south of the existing N13 road corridor and to the north and west of Letterkenny provides a sense of enclosure to the flat, estuarine landscape.

Overall it is considered that the landscape within the study area is of a medium sensitivity. Whilst much of the study area may be designated as HSA, the landscape is heavily influenced by existing road networks, industrial built form and residential development such that the landscape has 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 the following two Protected View are located within the study area associated with the Section 2 Options:

- Designated view on N13, Listellian looking north (identified as view 01 on **Figure 2-3** below); and a further Protected View is located to the immediate north of the study area;
- Designated view on N13, Manorcunningham looking north-west (identified as view 02 on **Figure 2-3** below)

Both of these identified Protected Views have been assessed in **Section 3** of this report with regard to potential visual impacts resulting from options.

With regards to views from within the study area, it is considered that due to the lack of extensive tree cover generally, panoramic expansive views are available from properties and road networks at higher elevation particularly within the south-eastern portion of the study area.

Views from the existing N13 corridor, set at lower elevation, are restricted by mixed species screen planting adjacent, though where gaps in vegetation permit, views north are expansive and panoramic in nature and generally focused towards Letterkenny and the elevated land beyond. Residential properties

directly adjacent to the N13 are generally well screened by garden hedgerows, though more expansive views north over Lough Swilly are available from upper floors.

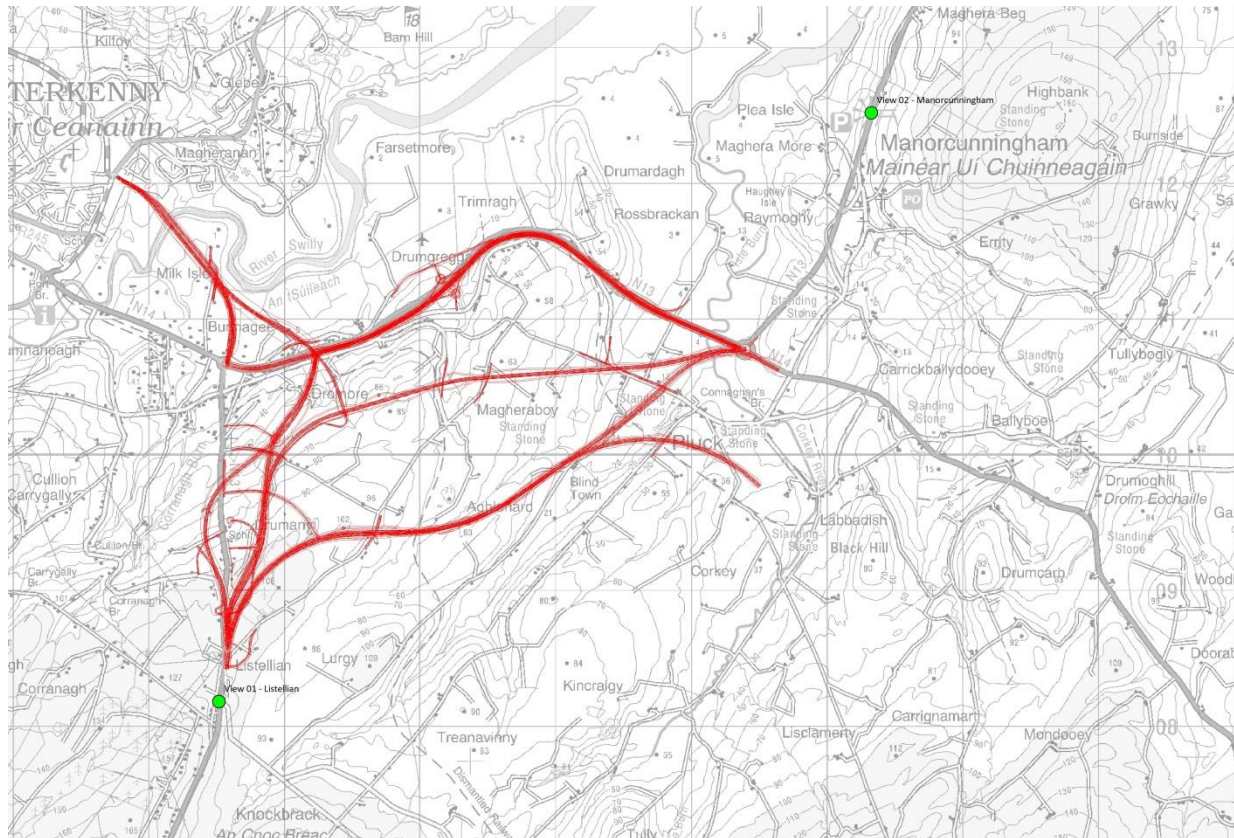


Figure 2-3: Protected Views and Prospects (Source - County Donegal Map Portal¹)

¹ <http://donegal.maps.arcgis.com/home/webmap/viewer.html?useExisting=1>

3 OPTIONS ASSESSMENT

3.1 Landscape Impact

The landscape impacts are described for each option in the following sections and summarised in **Table 3-1**. 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 of each of the proposed options in combination with the proposed River Swilly bridge crossing. The assessment assumes a worst-case scenario and does not include landscape mitigation.

3.1.1 Option 2A (Orange)

The orange option begins at the existing N56 / R245 junction on the western fringe of Letterkenny immediately west of Magheranan with alteration and widening of the existing roundabout junction which will be constructed at grade. The option progresses across an adjacent area of unbuilt land between industrial units before heading south-east across open agricultural land adjacent to the northern bank of the River Swilly, with this portion of the option constructed on new embankments prior to the proposed new bridge crossing point.

To the south-east of the proposed bridge crossing at the River Swilly, the option traverses open agricultural fields and the existing Tinneys Business Park with new link roads connecting to the existing roundabout forming the N13 / N14 junction (Dry Arch Junction) and a new roundabout junction further east on the N13 at Dromore. All sections of this option will be constructed on new embankments, with a proposed underbridge facility for link roads within Tinneys Business Park and new culvert / bridge crossing for the ditch system on Milk Isle.

The option then follows the existing N13 dual carriageway east, with a new junction proposed at Drumreggan, with associated link roads connecting with the existing local road network. This new junction facility is likely to comprise new over bridge facility with left in and left out connections to the N13. All new road elements will be constructed on new embankments which have the potential to impact on vegetation adjacent to the N13 corridor, existing field boundary vegetation and vegetation on northern facing slopes to the north of the local road network.

The option continues east along the existing N13 corridor, with minor adjustments and extension to the local road network immediately north of the N13 at Rossbrackan, which has the potential to impact on visually significant roadside vegetation, currently forming a visual screen to the N13. The eastern portion of this option then terminates at the existing roundabout forming the junction between the N13 and N14 (Pluck Roundabout).

The proposed option also includes network upgrades to the existing N13 corridor between the Dry Arch roundabout and Listellian, to the south of the N13/ N14 junction. This option includes for a new roundabout junction to the immediate north of Listellian and new link roads connecting with the existing local road networks. The majority of the proposed link roads are to be within new cuttings which have the potential to impact on locally significant areas of vegetation, which includes coniferous plantation, field boundary vegetation and garden boundary vegetation.

With regard to Landscape Character Areas: this option traverses through approximately 10.5km of the Letterkenny Estuary and Farmland LCA and the Laggan Valley LCA. With regards to Scenic Amenity the option traverses through approximately 9.8km of the HSA designation and 1.2km of MSA designation. It is noted that large portions of this option occur on existing road networks and as such the LCA and Scenic Amenity Areas are already influenced by these.

3.1.2 Option 2B (Pink)

This option follows a similar alignment to the previously assessed Option 2A option, commencing at the existing N56 / R245 junction on the western fringe of Letterkenny immediately west of Magheranan with alteration and widening of the existing roundabout junction which will be constructed at grade. The option then progresses across an adjacent area of unbuilt land between industrial units before heading south-east across open agricultural land adjacent to the northern bank of the River Swilly, with this portion of the option constructed on new embankments prior to the proposed new bridge crossing point.

To the south-east of the proposed bridge crossing, the option traverses open agricultural fields and the existing Tinneys Business Park connecting to the existing roundabout forming the N13 / N14 junction (Dry Arch Junction). All portions of this option will be constructed on new embankments, with a proposed underbridge facility for link roads within Tinneys Business Park and new culvert / bridge crossing for the ditch system on Milk Isle.

From the Dry Arch junction, the option then follows the existing dual carriageway N13 east, with a new junction proposed at Drumgreggan, with associated link roads connecting with the existing local road network. This new junction facility is likely to comprise new over bridge facility with left in and left out connections to the N13. All new road elements will be constructed on new embankments which have the potential to impact on vegetation adjacent to the N13 corridor, existing field boundary vegetation and vegetation on northern facing slopes to the north of the local road network.

The option continues east along the existing N13 corridor, with minor adjustments and extension to local road network immediately north of the N13 at Rossbrackan, which has the potential to impact on visually significant roadside vegetation, currently forming a visual screen to the N13. The eastern portion of this option then terminates at the existing roundabout forming the junction between the N13 and N14.

The proposed option also includes network upgrades to the existing N13 corridor between the Dry Arch roundabout and Listellian, to the south of the N13/ N14 junction. This option includes for a new roundabout junction to the immediate north of Listellian and new link roads connecting with the existing local road networks. The majority of the proposed link roads are to be within new cuttings which have the potential to impact on locally significant areas of vegetation, which includes coniferous plantation, field boundary vegetation and garden boundary vegetation.

With regard to Landscape Character Areas: this option traverses through approximately 9.9km of the Letterkenny Estuary and Farmland LCA and 0.5km of the Laggan Valley LCA. With regards to Scenic Amenity the option traverses through approximately 9.2km of the HSA designation and 1.2km of MSA designation. It is noted that large portions of this option occur on existing road networks and as such the LCA and Scenic Amenity Areas are already influenced by these.

3.1.3 Option 2C (Purple)

This option begins at the existing N56 / R245 junction on the western fringe of Letterkenny immediately west of Magheranan with alteration and widening of the existing roundabout junction which will be constructed at grade. The option progresses across an adjacent area of unbuilt land between industrial units before heading south-east across open agricultural land adjacent to the northern bank of the River Swilly, with this portion of the option constructed on new embankments prior to the proposed new bridge crossing point.

To the south-east of the proposed crossing of the River Swilly, the purple option traverses open agricultural fields and the existing Tinneys Business Park with new link road connecting to the existing roundabout forming the N13 / N14 junction (Dry Arch Junction) with a new roundabout junction immediately east, providing connection with existing industrial units and local roads. A further roundabout junction is proposed further east on the N13 at Dromore. All of these proposed sections of this option will be constructed on new embankments, with a proposed underbridge facility for link roads within Tinneys Business Park and new culvert / bridge crossing for the ditch system on Milk Isle.

The option then follows the existing dual carriageway N13 east, with a new junction proposed at Drumgreggan, with associated link roads connecting with the existing local road network. This new junction facility is likely to comprise of new over bridge facility with left in and left out connections to the N13 corridor. All new road elements will be constructed on new embankments which have the potential to impact on vegetation adjacent to the N13 corridor, existing field boundary vegetation and vegetation on northern facing slopes to the north of the local road network. All elements are similar to that proposed under Option 2A and Option 2B assessed previously.

The option continues east along the existing N13 corridor, with minor adjustments and extension to local road network immediately north of the N13 at Rossbrackan, which has the potential to impact on visually significant roadside vegetation, currently forming a visual screen to the N13. The eastern portion of this option then terminates at the existing roundabout forming the junction between the N13 and N14.

From the proposed new roundabout junction at Dromore, the option provides a new southern link across more elevated land to the south of the N13 corridor to a proposed roundabout junction to the immediate north of Listellian. This southern link option will be constructed within a combination of embankments and cuttings which has the potential to impact on visually significant roadside vegetation, groups of trees, field boundary hedgerows and garden boundary vegetation which currently aid visual screening of the existing N13 corridors.

The proposed new local road accesses and alterations to existing local access roads in the vicinity of the new roundabout junction to the north of Listellian will be constructed within new cuttings which have the potential to impact upon visually significant roadside vegetation, coniferous plantation, field boundary vegetation and garden boundary vegetation in proximity to the re-aligned Roads.

With regard to Landscape Character Areas: this option traverses through approximately 11.2km of the Letterkenny Estuary and Farmland LCA and 0.5km of the Laggan Valley LCA. With regards to Scenic Amenity the option traverses through approximately 10.5km of the HSA designation and 1.2km of MSA designation. It is noted that large portions of this option occur on existing road networks and as such the LCA and Scenic Amenity Areas are already influenced by these.

3.1.4 Option 2D (Red)

This option begins at the existing N56 / R245 junction on the western fringe of Letterkenny immediately west of Magheranan with alteration and widening of the existing roundabout junction which will be constructed at grade. The option progresses across an adjacent area of unbuilt land between industrial units before heading south-east across open agricultural land adjacent to the northern bank of the River Swilly, with this portion of the option constructed on new embankments prior to the proposed new bridge crossing point.

To the south-east of the proposed bridge crossing, the option traverses open agricultural fields and the existing Tinneys Business Park with new link road connecting to the existing roundabout forming the N13 / N14 junction (Dry Arch Junction) and a new roundabout junction further east on the N13 at Dromore. All sections of this option will be constructed on new embankments, with a proposed underbridge facility for link roads within Tinneys Business Park and new culvert / bridge crossing for the ditch system on Milk Isle.

This option then follows the existing dual carriageway N13 east, with a new junction proposed at Drumgreggan, with associated link roads connecting with the existing local road network. This new junction facility is likely to comprise of new over bridge facility with left in and left out connections to the N13. All new road elements will be constructed on new embankments which have the potential to impact on vegetation adjacent to the N13 corridor, existing field boundary vegetation and vegetation on northern facing slopes to the north of the local road network.

The option continues east along the existing N13 corridor, with minor adjustments and extension to local road network immediately north of the N13 at Rossbrackan, which has the potential to impact on visually significant roadside vegetation, currently forming a visual screen to the N13. The eastern portion of this option then terminates at the existing roundabout forming the junction between the N13 and N14.

From the proposed new roundabout junction at Dromore, the option provides a new southern link across more elevated land to the south of the N13 corridor to a proposed roundabout junction to the immediate north of Listellian. This southern link will be constructed primarily within cuttings, with the option located south of the proposed Option 2C. Impacts on the northern section of this option are similar in nature to the Option 2C with potential for visually significant roadside vegetation, groups of trees and field boundary vegetation to be impacted upon. The southern section of this option, including the proposed roundabout junction and alterations to local access roads, all have the potential to impact upon field boundary hedgerows, coniferous plantation and roadside vegetation which currently aid visual screening of the existing N13 corridor.

The proposed new local road accesses and alterations to existing N13 corridor in the vicinity of the new roundabout junction to the north of Listellian will be constructed within new cuttings and embankments which have the potential to impact upon visually significant roadside vegetation, coniferous plantation, field boundary vegetation and garden boundary vegetation in proximity to the re-aligned roads.

With regard to Landscape Character Areas, this option traverses through approximately 12.8km of the Letterkenny Estuary and Farmland LCA and 0.5km of the Laggan Valley LCA. With regards to Scenic Amenity the option traverses through approximately 11.2km of the HSA designation and 2.1km of MSA designation. It is noted that large portions of this option occur on existing road networks and as such the LCA and Scenic Amenity Areas are already influenced by these.

3.1.5 Option 2E (Green)

This option begins at the existing N56 / R245 junction on the western fringe of Letterkenny immediately west of Magheranan with alteration and widening of the existing roundabout junction which will be constructed at grade. The option progresses across an adjacent area of unbuilt land between industrial units before heading south-east across open agricultural land adjacent to the northern bank of the River Swilly, with this portion of the option constructed on new embankments prior to the proposed new bridge crossing point.

To the south-east of the proposed bridge crossing, the option traverses open agricultural fields and the existing Tinneys Business Park with new link road connecting to the existing roundabout forming the N13 / N14 junction (Dry Arch Junction) and a new roundabout junction further east on the N13. All sections of this option will be constructed on new embankments, with a proposed underbridge facility for link roads within Tinneys Business Park and new culvert / bridge crossing for the ditch system on Milk Isle.

The proposed new roundabout junction to the east of the Dry Arch Junction and associated N13 alignment alterations have the potential to impact on vegetation adjacent to the existing N13 corridor, with alterations to local road access also impacting on areas of vegetation, including roadside vegetation and garden boundary vegetation.

From the proposed roundabout junction to the east of the Dry Arch Junction the option continues south, across more elevated land. As a result of proposed cuttings associated with the road alignment of this option, there is the potential for it to impact on garden boundary vegetation, field boundary vegetation and woodland areas associated with the former rail line to the south of the existing N13 corridor.

A new roundabout junction is proposed to the south of Dromore, which will link with a proposed new road option that runs generally east to west from the existing N13/ N14 roundabout junction north of Connaghan's Bridge to a proposed roundabout junction north of Listellian. This section of the proposed option will primarily be constructed within cuttings, with significant earthworks provided as the option crosses a localised high spot to the east of the new roundabout. This option also includes for new bridge crossing over the Corkey River to the west of the N13/ N14 junction. Further crossings are to be provided as the proposed option crosses local streams and water crossings. Further alignment works will be carried out to provide links between proposed option and local roads where these are bisected by the option. This section has the potential to impact on significant areas of vegetation, including field boundary vegetation, riverside vegetation, garden boundary vegetation associated with scattered residential properties, woodland areas associated with the former railway connection and roadside vegetation and hedgerows associated with the local roads.

To the west of the proposed roundabout junction north of Dromore, the proposed option closely follows alignment of the proposed Option 2D, with impacts on field boundary vegetation, roadside vegetation, garden boundary vegetation and coniferous plantation, particularly to the north of Listellian as a consequence of the proposed alignment being located within cuttings.

Proposed alignment works to the N13 and adjacent local road access in the vicinity of the proposed roundabout junction north of Listellian have the potential to impact upon areas of vegetation which includes, roadside vegetation, field boundary vegetation and garden boundary vegetation.

With regard to Landscape Character Areas, this option traverses through approximately 11.9km of the Letterkenny Estuary and Farmland LCA and 0.5km of the Laggan Valley LCA. With regards to Scenic Amenity the option traverses through approximately 8.5km of the HSA designation and 3.9km of MSA designation.

3.1.6 Option 2F1 (Blue)

This first blue option, 2F1, begins at the existing N56 / R245 junction on the western fringe of Letterkenny immediately west of Magheranan with alteration and widening of the existing roundabout junction which will be constructed at grade. The option progresses across an adjacent area of unbuilt land between industrial units before heading south-east across open agricultural land adjacent to the northern bank of the River Swilly, with this portion of the option constructed on new embankments prior to the proposed new bridge crossing point.

To the south-east of the proposed bridge crossing, the option traverses open agricultural fields and the existing Tinneys Business Park with new link road connecting to the existing roundabout forming the N13 / N14 junction (Dry Arch Junction) and a new roundabout junction further east on the N13. All sections of this option will be constructed on new embankments, with a proposed underbridge facility for link roads within Tinneys Business Park and new culvert / bridge crossing for the ditch system on Milk Isle. The proposed new roundabout junction to the east of the Dry Arch Junction and associated N13 alignment alterations have the potential to impact on vegetation adjacent to the existing N13 corridor, with alterations to local road access also impacting on areas of vegetation, including roadside vegetation and garden boundary vegetation.

This option proposes a new link road from the existing N13/ N14 roundabout junction north of Connaghan's Bridge to proposed roundabout junction north of Listellian, with the alignment crossing the agricultural landscape in the southern portion of the study area. A new bridge crossing is to be provided

across the Corkey River with further structures (over bridges) provided where the option crosses local roads. The majority of this proposed option alignment is to be constructed within cuttings, though new embankments will be formed in localised areas as required. Between the existing N13/ N14 junction and the proposed roundabout junction to the north of Listellian the proposed option has the potential to impact upon areas of visually significant vegetation, including riverside vegetation, field boundary vegetation, hedgerows adjacent to access roads and coniferous plantation.

The proposed roundabout junction to the north of Listellian and associated N13 alignment works and modifications to local access roads have the potential to impact upon areas of vegetation that includes roadside vegetation, field boundary vegetation and garden boundary vegetation as a consequence of the works being constructed mainly within cuttings.

With regard to Landscape Character Areas, this option traverses through approximately 9.6km of the Letterkenny Estuary and Farmland LCA and 0.4km of the Laggan Valley LCA. With regards to Scenic Amenity the option traverses through approximately 5.8km of the HSA designation and 4.2km of MSA designation.

3.1.7 Option 2F2 (Blue)

The second blue option, 2F2, begins at the existing N56 / R245 junction on the western fringe of Letterkenny immediately west of Magheranan with alteration and widening of the existing roundabout junction which will be constructed at grade. The option progresses across an adjacent area of unbuilt land between industrial units before heading south-east across open agricultural land adjacent to the northern bank of the River Swilly, with this portion of the option constructed on new embankments prior to the proposed new bridge crossing point.

To the south-east of the proposed bridge crossing, the option traverses open agricultural fields and the existing Tinneys Business Park with new link road connecting to the existing roundabout forming the N13 / N14 junction (Dry Arch Junction) and a new roundabout junction further east on the N13. All sections of this option will be constructed on new embankments, with a proposed underbridge facility for link roads within Tinneys Business Park and new culvert / bridge crossing for the ditch system on Milk Isle. The proposed new roundabout junction to the east of the Dry Arch Junction and associated N13 alignment alterations have the potential to impact on vegetation adjacent to the existing N13 corridor, with alterations to local road access also impacting on areas of vegetation, including roadside vegetation and garden boundary vegetation.

This option proposes a new link road from south of Pluck, south-east of Section 2 Study area, west to a new roundabout junction to the north of Listellian. Option 2F2 which is proposed to link with Section 3; Option 3E (Cyan) will cross more elevated agricultural land within the southern portion of the Section 2 study area and will be constructed in a combination of embankments and within cuttings, dependent upon localised level differences. The eastern portion of this option, along with local road access alterations has the potential to impact on visually significant copses of woodland, field boundary vegetation, roadside hedgerows and tree and vegetation associated with the former railway line. It is likely that new overbridge facilities will be constructed where the option crosses local roads and access options, with the potential to impact on mature hedgerows and trees. Further west, the proposed option has the potential to impact on coniferous plantation as it approaches the new roundabout junction north of Listellian.

The proposed roundabout junction to the north of Listellian and associated N13 alignment works and modifications to local access roads have the potential to impact upon areas of vegetation that includes roadside vegetation, field boundary vegetation and garden boundary vegetation as a consequence of the works being constructed mainly within cuttings.

With regard to Landscape Character Areas, this option traverses through approximately 9.3km of the Letterkenny Estuary and Farmland LCA and 0.3km of the Laggan Valley LCA. With regards to Scenic

Amenity the option traverses through approximately 5.8km of the HSA designation and 3.8km of MSA designation.

3.1.8 Summary of Landscape Impact

Table 3-1 summarises the predicted significance of landscape impact for each of the previously described 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
Do Minimum	Letterkenny Estuary and Farmland	Medium	Medium	Moderately Negative	2	Preferred
	Laggan Valley	Medium	Small			
Option 2A (Orange) Total Length: 11.0km	Letterkenny Estuary and Farmland	Medium	Medium	Moderately Negative	2	Preferred
	Laggan Valley	Medium	Small			
Option 2B (Pink) Total Length: 10.4km	Letterkenny Estuary and Farmland	Medium	Medium	Moderately Negative	2	Preferred
	Laggan Valley	Medium	Small			
Option 2C (Purple) Total Length: 11.7km	Letterkenny Estuary and Farmland	Medium	Medium	Moderately Negative	2	Intermediate
	Laggan Valley	Medium	Small			
Option 2D (Red) Total Length: 13.3km	Letterkenny Estuary and Farmland	Medium	Medium	Moderately Negative	2	Intermediate
	Laggan Valley	Medium	Small			
Option 2E (Green) Total Length: 12.4	Letterkenny Estuary and Farmland	Medium	Large	Major or Highly negative	1	Least Preferred
	Laggan Valley	Medium	Small			
Option 2F1 (Blue) Total Length: 10km	Letterkenny Estuary and Farmland	Medium	Large	Major or Highly negative	1	Least Preferred
	Laggan Valley	Medium	Small			
Option 2F2 (Blue) Total Length: 9.6km	Letterkenny Estuary and Farmland	Medium	Large	Major or Highly negative	1	Least Preferred
	Laggan Valley	Medium	Small			

* 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 effects are considered there is a preference for Option 2B as it reduces the number of new features within the estuarine landscape when compared with the Option 2A.

All options introduce new features into the estuarine landscape with new link road, River Swilly crossing and junctions on the existing N13 corridor. The proposed Option 2A and Option 2B are broadly similar,

proposing new link road, junction facility on the N13 to the east of Letterkenny and limited improvement works to the N14 to the south of Letterkenny, though Option 2B is considered to have a lesser landscape impact due to the reduced number of features introduced into the estuarine landscape.

Option 2C and Option 2D are also considered to have broadly similar landscape effects, with a new section of road proposed as a link across more elevated land to the south of Letterkenny.

The proposed Option 2E and both Options 2F1/2F2 are considered to have more of an impact as new portions of these options impact upon areas of the landscape that are not currently affected by main road corridors and consequently impact more on areas of significant vegetation.

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. In addition, predicted visual impacts have been assessed against each of the protected views identified within the Section 2 study area (refer to **Figure 2-3**).

As indicated in **Figure 2-3**, two protected views have been identified that lie within or in close proximity to the study area associated with Section 2:

- Designated view on N13, Listellian looking north (identified as view 01 on **Figure 2-3**); and
- Designated view on N13, Manorcunningham looking north-west (identified as view 02 on **Figure 2-3**)

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
Option 2A (Orange)	30	70	96	123	319
Option 2B (Pink)	37	73	99	118	327
Option 2C (Purple)	25	54	105	136	320
Option 2D (Red)	21	54	99	135	309
Option 2E (Green)	9	21	73	135	238
Option 2F1 (Blue)	4	19	55	117	195
Option 2F2 (Blue)	6	19	49	122	196

Additional assessment of visual intrusion and obstruction on an individual property basis is not required at this Phase 2 Option Selection process and more detailed assessments are to be carried out at the full EIAR stage to be carried out during Phase 3 of the project.

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 50 m, 50-100 m, 100-200 m and 200-300 m 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
Option 2A (Orange)	90	140	96	61.5	319	387.5
Option 2B (Pink)	111	146	99	59	327	415.0
Option 2C (Purple)	75	108	105	68	320	356.0
Option 2D (Red)	63	108	99	67.5	309	337.5
Option 2E (Green)	27	42	73	67.5	238	209.5
Option 2F1 (Blue)	12	38	55	58.5	195	163.5
Option 2F2 (Blue)	18	38	49	61	196	166.0

3.2.1 Option 2A (Orange)

This option has the third highest overall potential for visual impacts on properties due to high numbers of residential properties within the 0-50m distance band. However, it is noted that the majority of these properties lie directly adjacent to the existing N13 corridors and would be less susceptible to change. This option also has high potential for visual impacts on residential properties within the 50-100m and 100 – 200m distance bands. This option also has the highest number of properties within the 200-300m distance band.

With regards to visibility from protected views and prospects and with reference to **Figure 2-3** above, it is considered that the proposed roundabout junction and alterations to local road access to the N13 are potentially visible in northern views; however intervening vegetation has the potential to screen visual impacts. Remaining portions of the option are not predicted to be visible in northern and north-eastern portions of the view due to intervening landform and vegetation.

Overall, Option 2A is considered to have a minor to slightly negative impact.

3.2.2 Option 2B (Pink)

This option has the second highest overall potential for visual impacts on properties due to high numbers of properties within 0-50m and 50-100m distance bands. It is noted however that properties within the 0-50m distance band are already impacted upon by the existing N13 corridors. This option also has the second highest number of properties within the 100-200m distance band.

With regards to visibility from protected views and prospects and with reference to **Figure 2-3** above, it is considered that the proposed roundabout junction and alterations to local road access to the N13 are potentially visible in northern views; however intervening vegetation has the potential to screen visual

impacts. Remaining portions of the option are not predicted to be visible in northern and north-eastern portions of the view due to intervening landform and vegetation.

Overall, Option 2B is considered to have a minor to slightly negative impact.

3.2.3 Option2C (Purple)

This option has the greatest potential for visual impacts on properties within the 100-200m distance band and second highest potential for visual impacts on properties within the 200-300m distance band overall and has a higher potential for visual impacts on properties between 0-50m than the 2D option, Option 2E or either of the 2F Options. It is noted that potential impacts on residential properties to the east of the proposed round about junction, east of the dry arch junction, are already impacted upon by the existing N13 corridor.

With regards to visibility from protected views and prospects and with reference to **Figure 2-3** above, it is considered that the proposed roundabout junction and alterations to local road access to the N13 will be partially visible in northern views as a consequence of vegetation removal associated with the alterations to the N13 alignment south of the proposed roundabout junction. Remaining portions of the option are not predicted to be visible in northern and north-eastern portions of the view due to intervening landform and vegetation.

Overall, Option 2C is considered to have a minor to slightly negative impact.

3.2.4 Option 2D (Red)

This option has a lower potential for visual impacts on properties within the 0-50m distance band than Option 2C, Option 2A or Option 2B, has a similar potential for visual impacts on properties within the 50-100m distance band as Option 2C, though has a lower potential for visual impacts on properties than Option 2C and Option 2A in the 200 – 300m distance band. It is noted that potential impacts on residential properties to the east of the proposed round about junction, east of the dry arch junction, are already impacted upon by the existing N13 corridor.

With regards to visibility from protected views and prospects and with reference to **Figure 2-3** above, it is considered that the proposed roundabout junction and alterations to local road access to the N13 will be visible in northern views as a consequence of vegetation removal associated with the alterations to the N13 alignment south of the proposed roundabout junction. Remaining portions of the option are not predicted to be visible in northern and north-eastern portions of the view due to intervening landform and vegetation.

Overall, Option 2D is considered to have a minor to slightly negative impact

3.2.5 Option 2E (Green)

This option has a lower potential for visual impacts on properties within the 0-50m, 50-100m and 100-200m distance bands than the Option 2D, Option 2C, Option 2A or Option 2B though has a similar potential for visual impacts on properties within the 200-300m distance band as the Option 2D and Option 2E.

With regards to visibility from protected views and prospects and with reference to **Figure 2-3** above, it is considered that the proposed roundabout junction and alterations to local road access to the N13 will be visible in northern views as a consequence of vegetation removal associated with the alterations to the N13 alignment south of the proposed roundabout junction. Remaining portions of the option are not predicted to be visible in northern and north-eastern portions of the view due to intervening landform and vegetation.

Overall, Option 2E is considered to have a major or highly negative impact.

3.2.6 Option2F1 (Blue)

This option has the lowest potential for visual impacts on properties within the 0-50m distance band and lower potential for visual impact on properties in the 100-200m and 200-300m distance bands than the Option2A, Option 2B, Option 2C, Option 2D or Option 2E. Though it has a similar potential for visual impacts on properties within the 100-200m distance band as the Option 2F1.

With regards to visibility from protected views and prospects and with reference to **Figure 2-3** above, it is considered that the proposed roundabout junction and alterations to local road access to the N13 will be visible in northern views as a consequence of vegetation removal associated with the alterations to the N13 alignment south of the proposed roundabout junction.

It is also considered that proposed alignment works between the new roundabout junction north of Listellian and Pluck, to the east, will be visible in more open portions of the view to the north-east.

Overall, Option 2F1 is considered to have a major or highly negative impact.

3.2.7 Option 2F2 (Blue)

This option has a lower potential for visual impacts on properties within the 100-200m distance band than all other options. Though it has a higher potential for visual impacts on properties in the 50-100m and 200-300m distance bands than Option 2F1 resulting in an overall ranking of second.

With regards to visibility from protected views and prospects and with reference to **Figure 2-3** above, it is considered that the proposed roundabout junction and alterations to local road access to the N13 will be visible in northern views as a consequence of vegetation removal associated with the alterations to the N13 alignment south of the proposed roundabout junction.

It is also considered that proposed alignment works between the new roundabout junction north of Listellian and Pluck, to the east, will be visible in more open portions of the view to the north-east.

Overall, Option 2F2 is considered to have a major or highly negative impact.

3.2.8 Summary of Visual Impact

Table 3-4 summarises the predicted significance of visual impact for each of the previously described options.

Table 3-4: Visual Impact Matrix

Option	Impact	Impact Score	Preference
Option 2A (Orange)	Minor or slightly negative	3	Preferred
Option2B (Pink)	Minor or slightly negative	3	Preferred
Option2C (Purple)	Minor or slightly negative	3	Intermediate
Option2D (Red)	Minor or slightly negative	3	Intermediate
Option2E (Green)	Major or highly negative	1	Least Preferred
Option2F1 (Blue)	Major or highly negative	1	Least Preferred
Option 2F2 (Blue)	Major or highly negative	1	Least Preferred

3.3 Summary and Preference

In summary as shown in **Table 3-5** below, when landscape impacts are considered overall for the proposed options there is a slight preference for Option 2B as it is considered to introduce fewer new features into the low lying flood plain than Option 2A. Both Option 2A and Option 2B are of a similar length; however Option 2A creates a new roundabout within the flood plain.

Option 2C and Option 2D are considered to have a similar landscape effect; however, both of these options create new link roads through more elevated land to the south of the N13 corridor, which has a greater landscape effect than either Option 2A or Option 2B.

The remaining Option 2E, Option 2F1 and Option 2F2 are least preferred as they create the greatest length of new road infrastructure in areas currently unaffected by such features.

When visual impacts are considered overall Option 2A and Option 2B are preferred. Whilst having the greatest potential for impacts on residential properties in the 0-50m distance band, they are preferred as such impacts are already experienced by residential properties adjacent to the N13 corridor. Options 2C and 2D are ranked as intermediate. Option 2E, 2F1 and Option 2F2 are the least preferred options. In particular, Options 2F1 and 2F2 have a greater potential for impact on the Protected View and Prospect in the south-west of the study area.

When both landscape and visual impacts are combined there is a slight preference for Option 2B, as it introduces fewer new features into the lower elevation landscape to the south of Lough Swilly.

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.

The overall summary combining both the landscape and visual impact assessments is presented in summary in **Table 3-6**.

Table 3-5: Predicted Landscape and Visual Impacts Summary

Option	Summary of Impacts
Option 2A (Orange)	<ul style="list-style-type: none"> Overall option length of 11.0km Traverses 9.8km of HSA Designation Visual impact: 349 dwellings within 300m of Option, majority of which are adjacent to existing N13 corridor Potential impact on visually significant vegetation adjacent to N13 and plantation woodland adjacent to N13 south of Drumany Limited impacts on Protected View due to screening provided by intervening vegetation
Option 2B (Pink)	<ul style="list-style-type: none"> Overall option length of 10.4km Traverses 9.2km of HSA Designation Visual impact: 327 dwellings within 300m of Option, majority of which are adjacent to existing N13 corridor Potential impact on visually significant vegetation adjacent to N13 and plantation woodland adjacent to N13 south of Drumany Limited impacts on Protected View due to screening provided by intervening vegetation
Option 2C (Purple)	<ul style="list-style-type: none"> Overall option length of 11.7km Traverses 10.5km of HSA Designation Visual impact: 320 dwellings within 300m of Option, majority of which are adjacent to existing N13 corridor Potential impact on visually significant vegetation adjacent to N13, woodland associated with former railway link and plantation woodland adjacent to N13 south of Drumany Minor impacts on Protected View
Option 2D (Red)	<ul style="list-style-type: none"> Overall option length of 13.3km Traverses 11.2km of HSA Designation Visual impact: 309 dwellings within 300m of Option, majority of which are adjacent to existing N13 corridor Potential impact on visually significant vegetation adjacent to N13, woodland associated with former railway link and plantation woodland adjacent to N13 south of Drumany Impacts on Protected View
Option 2E (Green)	<ul style="list-style-type: none"> Overall option length of 12.4km Traverses 8.5km of HSA Designation Visual impact: 238 dwellings within 300m of Option, Potential impact on visually significant vegetation adjacent to N13, woodland associated with former railway link and plantation woodland adjacent to N13 south of Drumany Impacts on Protected View
Option 2F1 (Blue)	<ul style="list-style-type: none"> Overall option length of 10km Traverses 5.8km of HSA Designation Visual impact: 195 dwellings within 300m of Option, Potential impact on visually significant vegetation adjacent to N13, woodland associated with former railway link and plantation woodland adjacent to N13 south of Drumany Impacts on Protected View
Option 2F2 (Blue)	<ul style="list-style-type: none"> Overall option length of 9.6km Traverses 5.8km of HSA Designation Visual impact: 207 dwellings within 300m of Option, Potential impact on visually significant vegetation adjacent to N13, woodland associated with former railway link and plantation woodland adjacent to N13 south of Drumany Impacts on Protected View

Table 3-6: Summary of assessment for Section 2: N56/ N13 Letterkenny to Manorcunningham

Option	Quantitative Assessment	Qualitative Assessment	Impact Score	Preference Ranking	Preference
Option 2A (Orange)	12	Moderately negative	2	2	Intermediate
Option 2B (Pink)	11	Moderately negative	2	1	Preferred
Option 2C (Purple)	14	Moderately negative	2	3	Intermediate
Option 2D (Red)	15	Moderately negative	2	4	Intermediate
Option 2E (Green)	12	Major or highly negative	1	5	Least Preferred
Option 2F1 (Blue)	12	Major or highly negative	1	6	Least Preferred
Option 2F2 (Blue)	12	Major or highly negative	1	6	Least Preferred



TEN-T Priority Route Improvement Project, Donegal

Section 2: N56 / N13 Letterkenny to Manorcunningham

Option Selection Report

Appendix D2.4 - Biodiversity (Terrestrial)

Document Control Sheet

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1 INTRODUCTION

This report examines the terrestrial biodiversity aspects of the environment of the seven options for Section 2: N56/N13 Letterkenny to Manorcunningham 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 all available and 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 project 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) *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (2009) hereafter NRA Guidelines 2006), taking into account interactions with other environmental disciplines;
- To assess each option in accordance with the TII¹ *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 D2.4 to the Options Selection Report, provides the details of the biodiversity related constraints associated with Section 2 that require consideration during the project lifetime.

1.1 Methodology

The methodology for the option selection comprised of a desk study and field surveys undertaken throughout 2018 and FROM January to May 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 by 10km squares (hectads), accessed online September 2019 (<https://www.npws.ie/>)

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

- 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 square, accessed online September 2019 (<http://www.biodiversityireland.ie/>);
- GeoHive online mapping (<http://map.geohive.ie/mapviewer.html>);
- Environmental Protection Agency – water bodies and water quality (<https://www.epa.ie/>);
- Environmental Protection Agency Catchments resource (<https://www.catchments.ie/maps/>);
- Geological Survey of Ireland – geology, soils and hydrogeology (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
- County Donegal Development Plan 2018-2024.

1.2 Study Area and Zone of Influence

The western extremity of the study area for Section 2 commences in the centre of Letterkenny and extends east to the N13/N14 Manorcunningham junction, to the townlands Trimnagh in the north and Scribly and Corkey in the south. The N56 from Pole Star Roundabout crosses the River Swilly Estuary and continues eastward to the Dry Arch Roundabout. The N13 continues from the Dry Arch roundabout towards the east, crossing the River Corkey prior to a roundabout which forms a junction with the N14.

The study area incorporates significant residential clusters and housing estates located within Letterkenny to the north and south of the existing N13/N14 road network. The River Swilly meanders through the study area, flowing from the west to enter Lough Swilly Estuary in the northeast. The Corky River flows through the eastern boundary of the study area and also flows into Lough Swilly.

The study area includes seven options (denoted 2A, 2B, 2C, 2D, 2E, 2F1 and 2F2) which form the basis of this report (see **Figure 1-1**).

The Zone of Influence (Zol) 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 Zol 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 Zol further afield depending on the pathway of potential impacts.

To this end, the Zol 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 Zol, the 15km buffer zone from the study area boundary and the Lough Foyle catchment boundary were combined to form the Zol. The Zol 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.

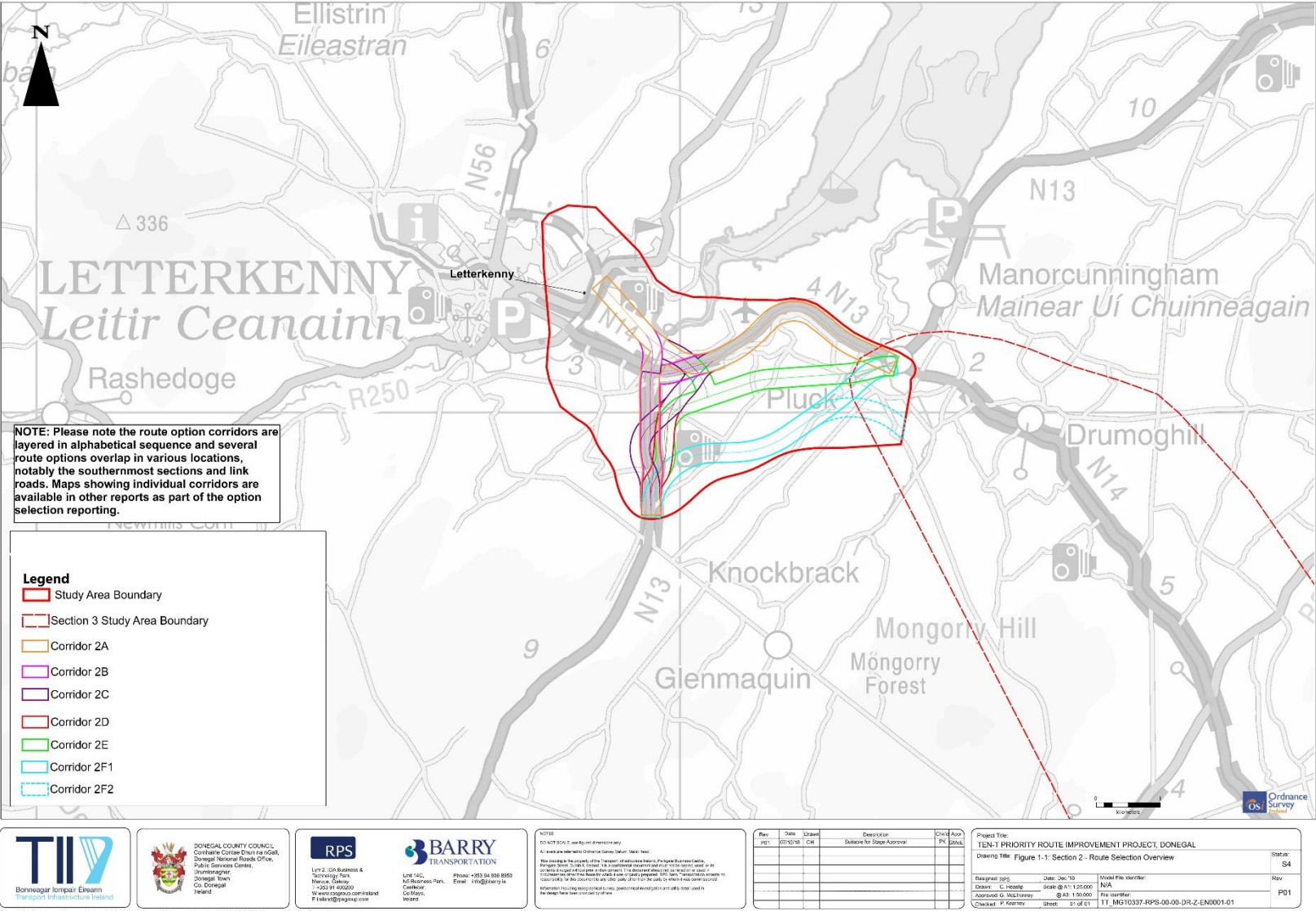


Figure 1-1: Option Selection Overview

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 on their level of importance on a geographical scale as set out within the guidance document, as presented in **Table 1.1**. All ecological receptors within the project's ZoI are assessed according to these criteria 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
<p>International Importance:</p> <ul style="list-style-type: none"> ▪ '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: <ul style="list-style-type: none"> ▪ 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).
<p>National Importance:</p> <ul style="list-style-type: none"> ▪ 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: <ul style="list-style-type: none"> ▪ 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.
<p>County Importance:</p> <ul style="list-style-type: none"> ▪ 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: <ul style="list-style-type: none"> – 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.
<p>Local Importance (higher value):</p> <ul style="list-style-type: none"> ▪ 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: <ul style="list-style-type: none"> – 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;

Ecological Valuation
<ul style="list-style-type: none"> - 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):
<ul style="list-style-type: none"> ▪ 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** below. Impacts were quantified by using a combination of these criteria, 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/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.

2.2 Field Surveys

Field surveys were undertaken by RPS along each of the seven proposed options during the 9th July – 11th July 2018. Weather conditions were overcast yet humid, following drought conditions. Additional multi-disciplinary ecological surveys were conducted on the following dates; 23rd July 2018, 14th August 2018 and 22nd August 2018, bat surveys were also undertaken at potential bat roost locations within the footprint of proposed options on the 26th July 2018 and 3rd October 2018. The surveys were undertaken in accordance with Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition (BCT, 2016)⁶ and the Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (2006). Overwintering bird surveys were undertaken on 20th December 2017, 30th January, 27th February, 15th March, 23rd October, 19th November, 10th December 2018, 29th January, 27th February and 26th March 2019. The bird surveys were undertaken in accordance with the *NPWS Low Tide Waterbird Surveys: Survey*

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 Collins. J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). The Bat Conservation Trust, London

Methods and Guidance Notes (NPWS, 2004)⁷. Over-wintering birds surveys involved targeting two survey areas within the Section 2 study area and associated lands outside of the study area, as follows:

- Within the study area: Survey of Lough Swilly tidal estuary area and suitable adjoining habitats at low tide; and,
- Important areas outside of study area hosting SCI species from the SPA included surveys of the agricultural and polderland areas from Farsetmore and Big Isle (North & North-east of Section 2 boundary) between tidal cycles. This determined feeding patterns and activity to establish any interactions between these birds and the Section 2 study area.

A crossing of the Rivery Swilly will be required as part of the road project. The crossing location is the same for all options. The crossing spans the River Swilly estuary and is located in the Milk Isle and Ballyraine townlands. The proposed crossing point of the River Swilly Estuary intersects 0.0002287 square kilometres of Lough Swilly SPA. However, most of the crossing is not located within lands designated as part of Lough Swilly SPA.

Immediately north of the N13 and N56 intersection, the lands comprise enclosed pastoral fields, industrial units, buildings and associated storage yards before turning north-west towards the estuary. The estuary's southern bank is fringed by two large, flat and tightly grazed pastoral fields that adjoin Tinney's coal and oil facility. The findings of the over-wintering bird surveys completed to date have identified small flocks of Curlew (peak count of 54), Black-headed Gull (peak count of 83), Common Gull (peak count 83) and Oystercatcher (peak count 9) using these fields south of the crossing location. The greatest use of these fields occurred during the peak over-wintering period between December and February. Activity in these areas are typically opportunistic feeding. Gull species, in particular Black-headed Gulls were noted to move between the field systems on both sides of the estuary, in addition to those field systems further downstream along the estuary. The footprint of the road will result in the removal of these fields which prove to be viable feeding areas for gulls and some wading species during the peak over-wintering period. However, there is an abundance of feeding habitat of similar quality in the adjoining and adjacent sections of the tidal area.

The estuarine / tidal section of the River Swilly spanned by the proposed crossing (and within the locality upstream and downstream of the crossing) supports a sandy / muddy substrate that is partially exposed at low tide. The overwintering bird surveys noted the presence of small numbers of wading and wildfowl species including Redshank, Teal and Wigeon as well as individual recordings of Greenshank. These were noted using the margins of the estuary exposed at low tide for feeding purposes. The most frequently occurring species included Teal and Redshank, which occurred in small localised flocks (typically between 10 and 20 birds) along this section of the estuary. The greatest number of birds identified in this section of the River Swilly estuarine / tidal channel was again noted during peak winter months between December and February. Flight patterns and activity of waders and wildfowl observed during the over-wintering bird surveys noted movements typically confined to the tidal channel. Waders and wildfowl typically flew at a low trajectory moving between areas of exposed tidal channel substrate along either side of the channel.

North of the River Swilly crossing, there is an area of rough grassland situated on comparatively hilly and undulating grassland which is unsuitable feeding and roosting habitat for over-wintering bird species, associated with the Lough Swilly SPA. Over-wintering birds were not identified here during the over-wintering surveys. The amenity grassland / playing pitches, WwTP and pastoral lands located to the north-east of the crossing support ongoing opportunistic usage by over-wintering birds, predominantly Black-

⁷ Lewis, L. J. & Tierney, T. D. (2014) Low tide waterbird surveys: survey methods and guidance notes. Irish Wildlife Manuals, No. 80. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.. <https://www.npws.ie/sites/default/files/publications/pdf/IWM80.pdf>

headed Gull and occasional Curlew which utilised pastoral fields on both sides of the estuary as a feeding habitat. There will be no direct impact to these areas as a result of the River Swilly crossing.

2.2.1 Habitats

The habitats found within the Section 2 study area highlight Letterkenny as a built urban environment with intermittent amenity grasslands (GA2) and areas of scattered trees and parkland (WD5). From the Pole Star Roundabout, the N14/N56 crosses the River Swilly Estuary and continues east – southeast to the Dry Arch Roundabout (serving the N13 and N56). The lower reaches and estuarine element of the River Swilly and surrounding flood plains are designated under the Lough Swilly SAC which is designated for the following Annex I habitats; Estuaries [1130], Coastal lagoons [1150], Atlantic salt meadows [1330], Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] and the Annex II species Otter (1355).

Otter is a qualifying interest of the Lough Swilly 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 Lough Swilly within the study area are considered to provide potential habitat for otter.

The N13 continues east / north-east of the Dry Arch roundabout, towards a roundabout junction prior to merging onto the N14. The study area terminates at this location. The road is bordered to the north and south by residential housing, agricultural grassland, wet grassland, reedbeds and treelines which occasionally develop into wider areas of woodland. The agricultural grasslands and pastoral fields support hedgerow 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**.

2.2.2 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 include the following:

- Special Area of Conservation (SAC)⁸;
- 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

⁸ Some SAC sites present within a 15km buffer zone of the study area 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.

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.

The Zol 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 receptors⁹ 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 Zol extending beyond the reach of the footprint of the project area, as per guidance (DoEHLG, 2010). There may be scientifically appropriate reasons for extending this Zol further afield depending on the pathway of potential impacts.

To this end, the Zol extends outside of the proposed road project footprint to include ecological receptors connected to the project through overlap / intersection, proximity and connectivity through features such as watercourses, waterbodies in addition to potential connectivity via groundwater sources and features.

Section 2 is located within the Swilly Water Framework Directive (WFD) Catchment area, therefore designated sites (SACs/SPAs) within this catchment area are also included in the Zol assessment. 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 2.5 Aquatic Biodiversity**.

European Sites within the Zol area are displayed in Figure 2-1. While sites of National Importance within the Zol are displayed in Figure 2-2.

There are 13 European sites within the Zol of the proposed Section 2 study area. These European Sites are as follows:

- 1) North Inishowen Coast SAC (Site Code: 002012);
- 2) Lough Swilly SAC (Site Code: 002287);
- 3) Meentygrannagh Bog SAC (Site Code:000173);
- 4) Clogernagore Bog and Glenveagh SAC (Site Code: 002047);
- 5) Leannan River SAC (Site Code: 002176);
- 6) Ballyar Wood SAC (Site Code: 000116);
- 7) Ballyhorrisky Point to Fanad Head SAC (Site Code: 001975);
- 8) Lough Swilly SPA (Site Code: 004075);
- 9) Horn Head to Fanad Head SPA (Site Code:004194);
- 10) Lough Fern SPA (Site Code: 004060);
- 11) Derryveagh and Glendowan Mountains SPA (Site Code: 004039); and
- 12) Fanad Head SPA (Site Code: 004148); and
- 13) Mulroy Bay SAC (Site Code: 002159).

⁹ The term ecological receptors refers to sites, habitats, features, assemblages, species or individuals that occur in the vicinity of a project and are judged to be of ecological value at a particular scale (NRA, 2009)

There are 13 pNHAs sites within the Swilly WFD Catchment area and Zol of the proposed Section 2. They are as follows:

- 1) Ballyar wood pNHA (Site Code: 000116);
- 2) Bulbin Mountain pNHA (Site Code: 000120);
- 3) Old Rectory Fahan pNHA (Site Code:002056);
- 4) Lough Fern pNHA (Site Code:001162);
- 5) Ramelton Mill pNHA (Site Code:002057);
- 6) Lough Swilly Incl. Big Isle, Blanket Nook and Inch Lake pNHA (Site Code: 000166);
- 7) River Swilly Valley Woods pNHA (Site Code: 002011);
- 8) Leannan Valleys Woods pNHA (Site Code: 001155);
- 9) Lough Akibbon and Gartan Lough pNHA (Site Code: 000158);
- 10) Cloghernagore Bog and Glenvaeagh pNHA (Site Code: 002047);
- 11) Meentygrannagh Bog pNHA (Site Code: 000173);
- 12) North Inishowen Coast pNHA (Site Code: 002012); and
- 13) Ballymastocker Dunes pNHA (Site Code: 001089).

Descriptions of the key features of conservation importance of these sites are outlined in the **OSR Volume B, Constraints Study, Appendix A.**

Each of the proposed 7 no. options intersect the Lough Swilly SAC and Lough Swilly SPA at the proposed Lough Swilly road crossing the river estuary (See **Figure 2-1**). The Lough Swilly SAC is designated for the following five qualifying features:

- Estuaries [1130]
- *Coastal lagoons [1150] (*priority habitat)
- Atlantic salt meadows (*Glauco-Puccinellietalia maritima*) [1330]
- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]
- *Lutra lutra* (Otter) [1355]

The Lough Swilly SPA is designated for the following species:

- Great Crested Grebe (*Podiceps cristatus*) [A005]
- Grey Heron (*Ardea cinerea*) [A028]
- Whooper Swan (*Cygnus cygnus*) [A038]
- Greylag Goose (*Anser anser*) [A043]
- Shelduck (*Tadorna tadorna*) [A048]
- Wigeon (*Anas penelope*) [A050]
- Teal (*Anas crecca*) [A052]
- Mallard (*Anas platyrhynchos*) [A053]
- Shoveler (*Anas clypeata*) [A056]
- Scaup (*Aythya marila*) [A062]
- Goldeneye (*Bucephala clangula*) [A067]
- Red-breasted Merganser (*Mergus serrator*) [A069]
- Coot (*Fulica atra*) [A125]
- Oystercatcher (*Haematopus ostralegus*) [A130]
- Knot (*Calidris canutus*) [A143]
- Dunlin (*Calidris alpina*) [A149]
- Curlew (*Numenius arquata*) [A160]
- Redshank (*Tringa totanus*) [A162]
- Greenshank (*Tringa nebularia*) [A164]
- Black-headed Gull (*Larus (Chroicocephalus) ridibundus*) [A179]
- Common Gull (*Larus canus*) [A182]

- Sandwich Tern (*Sterna sandvicensis*) [A191]
- Common Tern (*Sterna hirundo*) [A193]
- Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395], and
- Wetland and Waterbirds [A999]

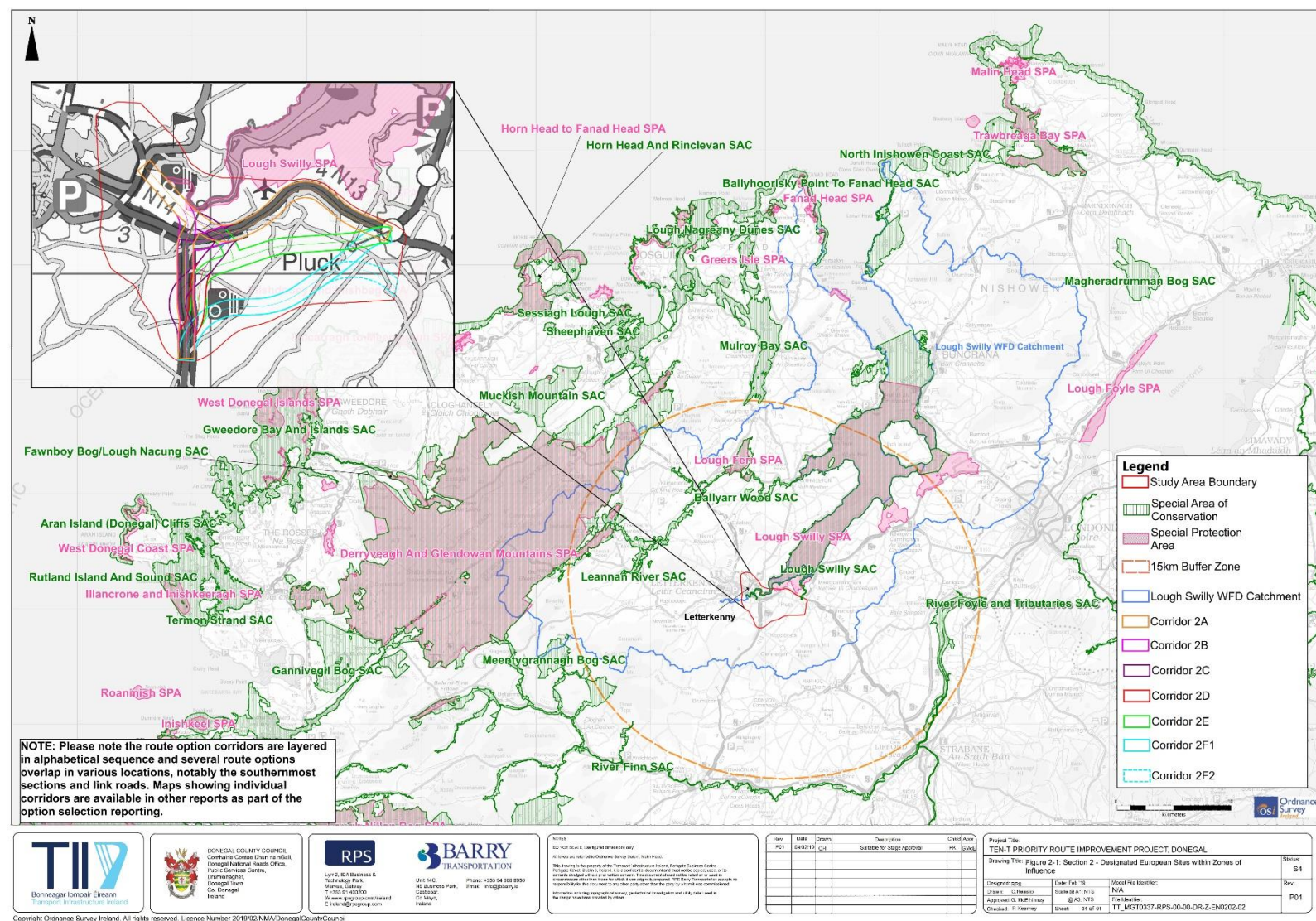


Figure 2-1: European Designated Sites within Zone of Influence

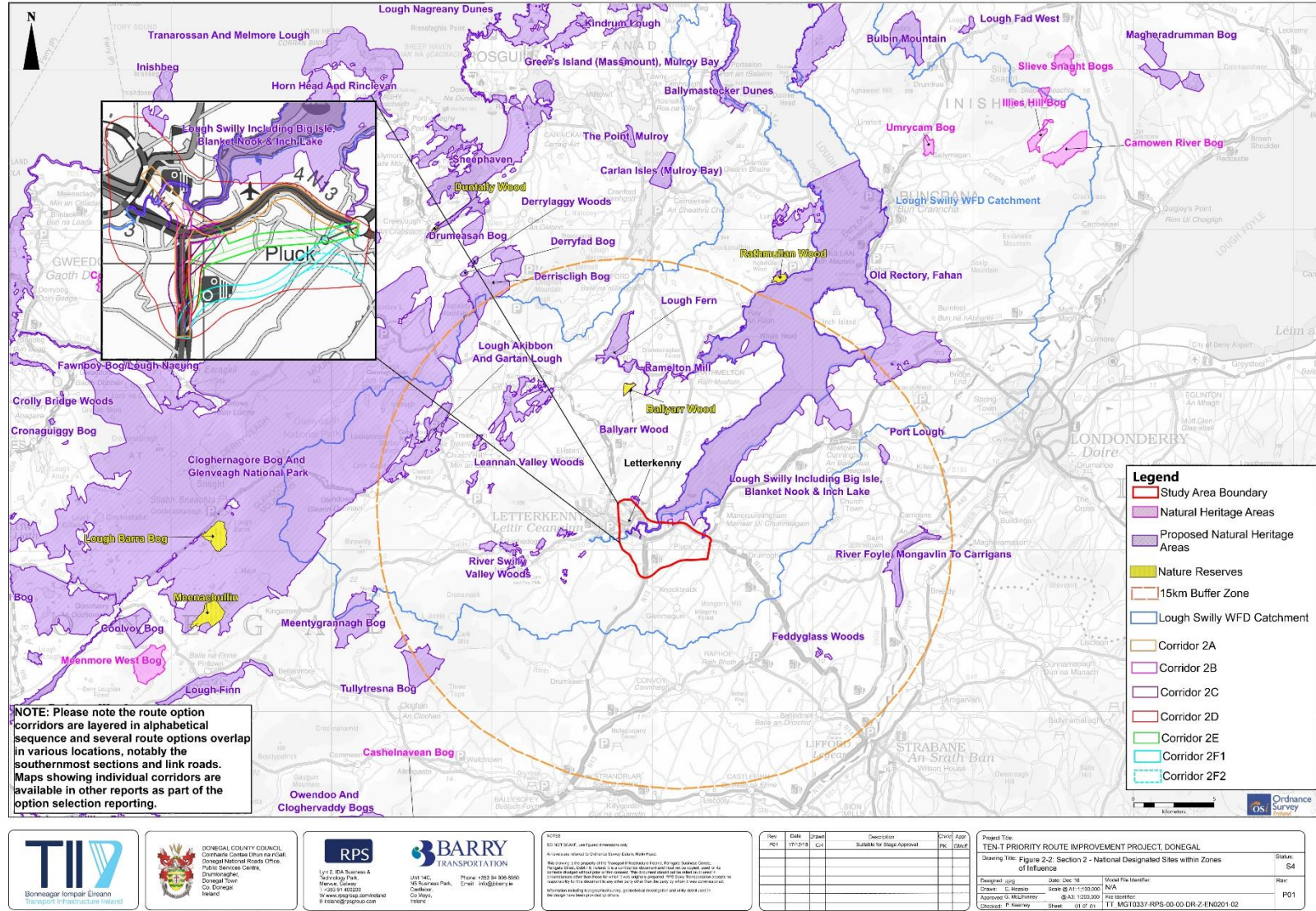


Figure 2-2: National Designated Sites within Zone of Influence

2.2.3 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. Section 2 is located in hectads (10km x10km square) C10, C11, C20 and C21. 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 searches also included The BSBI Distribution Database¹⁰, and the National Biodiversity Data Centre (NBDC) database¹¹. The lists of species yielded for these hectads were cross referenced for the occurrence of vascular plants listed and protected under Annex II of the EU Habitats Directive, Flora Protection Order (FPO) of 2015 and the Irish Red Data Book (IRDB) (Wyse Jackson *et al.*, 2016)¹². The results of the data search are detailed in the **OSR Volume B, Constraints Study, in Appendix 2, Table A2.2**. The protected species recorded within the boundaries of Section 2 study area include reindeer moss (*Cladonia portentosa*), bird cherry (*Prunus padus*), Irish whitebeam (*Sorbus hibernica*), globe flower (*Trollis europaeus*), large flowered hemp nettle (*Galeopsis speciosa*), heath cudweed (*Gnaphalium sylvaticum*), small white orchid (*Pseudorchis albida*), frog orchid (*Coeloglossum viride*), meadow crane's bill (*Geranium pratense*), good King Henry (*Blitum bonus-henricus*) and yellow bartsia (*Parentucellia viscosa*).

2.2.4 Rare and Protected Species Database

The NPWS rare and protected species database was consulted for all records of rare and protected species within the Constraints Study Area. In addition, as the NPWS rare and protected species records are known to be incomplete, the NBDC online species database was also consulted. A species list was generated for each hectad for which the study area is located 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 A2.5 and Table A2.8**. 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*), two species of deer, 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 six bat species, all 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 area include Kingfisher (*Alcedo atthis*), Corncrake (*Crex crex*), Whooper Swan (*Cygnus cygnus*), Dunlin (*Calidris alpina schinzii*), Hen Harrier (*Circus cyaneus*), Peregrine Falcon (*Falco peregrinus*), Golden Plover (*Pluvialis apricaria*), Little Egret (*Egretta garzetta*), and Merlin (*Falco columbarius*). In addition, barn owl (*Tyto alba*), a Red-listed Bird of Conservation Concern in Ireland¹³, 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)¹⁴. The Ecological Receptor (ER) recorded within the study area and its attributes and geographical category rating within the context of the proposed project are provided in **Table 2-1**.

¹⁰ <https://database.bsbi.org/>

¹¹ <https://maps.biodiversityireland.ie/Map>

¹² Wyse Jackson, M., Fitzpatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. & Wright, M. (2016) *Ireland Red List No. 10: Vascular Plants*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

¹³ 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

¹⁴ Barn Owl Surveying Standards for National Road Projects, RE-ENV-07005 (TII, 2017)

Table 2-1: Ecological Receptor Description and Category Evaluation

ER Site No.	Habitat Description	Category	Rating Rationale
1	A mosaic of habitats consisting of scrub (WS1), wet grassland (GS4), wet alder woodland (WN6), mixed broadleaved woodland (WD1), treelines (WL2) and hedgerows (WL1). Increased development of dense scrub and woodland. Deer activity in the form of prints and grazing impacts are recorded in this area.	D	This habitat provides an area of high biodiversity in a local context, supporting a mosaic of habitats, and ecological connectivity in a landscape primarily dominated by improved agricultural grassland. It is considered to be of Local Importance (higher value) , Category D.
2	A conifer plantation (WD4), which is felled in areas and supporting scrub (WS1) vegetation on the margins.	E	Although bordering a broadleaved woodland and supporting elements of connectivity, this habitat is supporting non-native species for production, therefore considered to be of Local Importance (lower value) , Category E.
3	Improved agricultural grassland (GA1), arable land (BC), and wet grassland (GS4) supporting significant mature treelines of sycamore (<i>Acer pseudoplatanus</i>) and Horse Chestnut (<i>Aesculus hippocastanum</i>) and high hedgerow connectivity throughout.	D	The field boundaries support well developed semi-mature/mature treelines and hedgerows, providing connectivity in the landscape in particular for bat foraging and commuting activity. This habitat is regarded as having Local Importance (higher value) , Category D.
4	A stand of mixed scrub (WS1) supporting Himalayan Balsam (<i>Impatiens glandulifera</i>). Also supporting an old disused house (BL3) with bat roost potential.	E	This habitat is regarded as have Local Importance (lower value) , although a scrub habitat, it supports invasive species therefore warranting its placement in Category E.
5	Farmyard sheds surrounded by patchy scrub (WS1), large mature Beech (<i>Fagus sylvatica</i>) treelines (WL2) and wet grassland (GS4). High bat foraging potential with bats previously sighted at this location.	D	This ER provides an ecological corridor and is of Local Importance (higher value) due to the present of significant mature beech treeline which has potential to support foraging and commuting bat species. Due to these characteristics it is assigned to Category D.
6	Flood defence embankment (earth banks) (BL2) supporting scrub (WS1) patches and improved grassland (GA1).	E	This habitat supports connectivity along Lough Swilly, however the habitat is of low biodiversity value, therefore valued as having Local Importance (lower value) . Due to its low biodiversity in a local context this habitat is placed in Category E.
7	An area of wet grassland (GS4) with encroaching willow (<i>Salix</i> sp.) scrub (WS1) bordered by low hawthorn (<i>Crataegus monogyna</i>) hedgerows (WL1). Old building with bat roost potential adjacent to the roadside.	E	The site supports a small area of semi-natural habitat, which is of local importance however it does not support links to areas of high ecological importance. It is therefore regarded as Local Importance (lower value) and is assigned to Category E.

ER Site No.	Habitat Description	Category	Rating Rationale
8	An area of improved agricultural grassland (GA1), bordered throughout by hedgerows (WL1) and treelines (WL2). Woodland strips (WD1/WN6) are present bordering streams running through the fields. Badgers potentially traversing the fields. There is high connectivity between hedgerow/treeline present throughout the area. The disused railway crosses the land supporting scrub (WS1). The old railway line supports numerous habitat types (scrub, treelines, and embankments). A large stone arch bridge is located along the railway line with high bat roost potential. An old house present on site with high bat roost potential.	D	The combination of these habitats within a landscape dominated by improved agricultural grassland and in particular with the presence of the old railway line with its ability to act as an important wildlife corridor, this ER is regarded as having Local Importance (higher value) and placed in Category D.
9	Improved agricultural grassland (GA1) and wet grassland (GS4) fields bordered by a network of well-established hedgerows and treelines (WL1/WL2), many of which are also bordering streams (FW2) and ditches (FW4) with water flow. The hedgerows support a diverse mix of species, with woodland strip/scrub development along the dis-used railway. An old bridge from the railway adjacent to sheds supports high bat roost potential.	D	The linear boundaries of these fields support vital wildlife corridors in the form of hedgerows, treelines, streams and ditches. These networks provide shelter and foraging areas for commuting mammals, important features in a predominantly pastoral dominated landscape. It is classified as an ER with Local Importance (higher value) , Category D.
10	Narrow strip of mixed broadleaved woodland WD1) with scrub (WS1), with hedgerows (WL1) and treelines (WL2) along the N13/N14 dual-carriage way. Other habitats present include wet grassland (GS4). Invasive alien species are also supported along the dual-carriage way corridor. Old house with bat potential to the north of N13.	E	These areas although providing semi-natural habitat do not provide connectivity to areas of high biodiversity. They also support invasive species. This ER is of Local Importance (lower value) , Category E.
11	Agricultural (GA1) fields supporting treelines (WL2) and hedgerows (WL1) with a patch of wet scrub and semi-mature trees, wet grassland towards the north-west field boundary.	E	The agricultural grassland is improved and the hedgerows are not of high species richness. Although supporting elements of connectivity via hedgerows and treelines, due to the lack of diversity within these features this habitat is valued as having Local Importance (lower value) , Category E.
12	This location supports a network of mature treelines (WL2), hawthorn (<i>Crataegus monogyna</i>) and ash (<i>Fraxinus excelsior</i>) dominated hedgerows and scrub (WS1) development bordering agricultural fields (GA1). Two abandoned farm tracks are located in this area supporting mature treelines. The established mature treelines have bat foraging and commuting potential. There is dense scrub (WS1) mosaic development along the disused railway embankments (BL2). These embankments potentially support a badger sett along railway embankment. An active badger sett is located in the earth embankment/treeline to the north-east. There is mixed broadleaved woodland (WD1) and wet willow-alder-ash woodland (WN6) strip development along a stream to the east. Wet grassland (GS4) is present in areas in-particular bordering drains and streams in the area. This ER also encompasses a network of hedgerows (WL1) and treelines (WL2), bordering improved agricultural (GA1) grassland with wet grassland influence (GS4).	D	Due to the high connectivity and mosaic of habitats within this area and potential to support species designated under the Wildlife Act, it is valued as Local Importance (higher value) and therefore placed in Category D.

ER Site No.	Habitat Description	Category	Rating Rationale
	Other features include old farm tracks, ditches (FW4), and inactive badger setts, along with large mature trees (ash and wild cherry) with bat roost potential.		
13	An area of mixed broadleaved woodland (WD1). Old house (BL3) with a slate roof located in the scrub with high bat roost potential.	D	This ER provides a habitat of high biodiversity in a local context while also supporting connectivity to a network of hedgerows and treelines. This connectivity is an importance resource for local mammal populations. It is therefore considered of Local Importance (higher value) , Category D.
14	A network of hawthorn dominated hedgerows (WL1) bordering improved agricultural grassland (GA1), with elements of wet grassland (GS4) adjacent to farmyard buildings (BL3) surrounded by scrub (WS1). The scrub located at the farmyard supports an extensive stand of invasive species; Japanese knotweed (<i>Fallopia japonica</i>) & Himalayan knotweed (<i>Impatiens glandulifera</i>). An active badger sett and rabbit burrows present are present within the field hedgerow network. Old sheds (BL3) in the farmyard support slate roofs, providing high bat roost potential.	E	Although providing connectivity in the landscape, the hedgerows are of low species richness with extensive coverage of invasive species around farm buildings and scrub. It is therefore considered of Local Importance (lower value) , Category E.
15	A series of gorse (<i>Ulex europaea</i>) and hawthorn (<i>Crataegus monogyna</i>) dominated hedgerows (WL1), and ash (<i>Fraxinus excelsior</i>) treelines (WL2), bordering semi-improved agriculture grassland (GA1) with encroaching <i>Juncus spp.</i> An old abandoned farm track is present supporting a hedgerow on either side; this has potential to act as a wildlife corridor. Mature Sycamore (<i>Acer pseudoplatanus</i>) and ash trees with bat roost potential are also present.	E	The hedgerows and treelines are not botanically diverse but provide some connectivity for some faunal species in the locality. Rabbits are present with burrows evident. This ER does not support the features required to classify as high local importance and is therefore regarded as Local Importance (lower value) , Category E.
16	This ER includes willow (<i>Salix sp.</i>) dominated scrub (WS1) to the north-west of Lurgybrack River. There is a wet willow-alder-ash woodland (WN6) strip, with encroaching wet grassland (GS4), bordering the Lurgybrack River (FW2). An old railway bridge with bat roost potential is also intersected. There are old sheds in the farmyard which have high bat roost potential, with bats previously sighted in the area.	D	This area supports wet willow-alder-ash woodland and scrub, semi-natural habitats which provide connectivity for terrestrial species along the Lurgybrack River. This ER is of Local Importance (higher value) , Category D.
17	The railway embankment supports a mixed broadleaved strip (WD1) and scrub (WS1), the disused railway provides a wildlife corridor across the landscape primarily dominated by improved agricultural grassland (GA1)	D	The presence of good habitat connectivity and the potential to support an ecological corridor for Wildlife Act species justifies the classification of this habitat as Local Importance (higher value) , Category D.
18	Scrub (WS1) with wet influence. Scrub (WS1) area and tree clump bordering brackish water (CW2) supporting a heronry.	D	This is a transitional habitat supporting brackish influenced species and scrub; it is regarded as having Local Importance (higher value) , Category D.

ER Site No.	Habitat Description	Category	Rating Rationale
			value), Category D due to the presence of a heronry and potential to support commuting otters.
19	Mature treelines (WL1) of ash (<i>Fraxinus excelsior</i>), alder (<i>Alnus glutinosa</i>), rowan (<i>Sorbus aucuparia</i>) and narrow woodland strip development (WD1) supporting invasive species along the N13 dual carriageway. An old disused building with bat roost potential located to the west of the ER, south of the N13.	E	Providing limited connectivity of habitats and supporting invasive species this ER should be regarded as Local Importance (lower value) and therefore placed in Category E.
20	Wet grassland (GS4) bordered by scrub (WS1) and treelines (WL1),	E	This habitat combination supports low species diversity; however, it supports a certain amount of habitat connectivity therefore regarded as having Local Importance (lower value) as a result of these habitat links. It is therefore placed in Category E.
21	<p>Faunal species protected under the Irish Wildlife Act evidence of which was recorded include; deer activity, potential locations to support bat roosts (buildings, mature trees, stone bridges), badger (<i>Meles meles</i>) activity including snuffle holes, active setts, disused setts and information of badger traversing areas.</p> <p>21A: Deer Species – Red deer (<i>Cervus elaphus</i>), Sika deer (<i>Cervus Nippon</i>) and Fallow deer (<i>Dama dama</i>) are all Irish Wildlife Act species.</p> <p>21B: Bat Species – All nine Irish bat species are designated as Annex IV species under the EU Habitats Directive, with the exception of the Lesser Horseshoe bat (<i>Rhinolophus hipposideros</i>) with designated as both an Annex II and Annex IV species. All species are designated under the Wildlife Act.</p> <p>21C: Badger - An Irish Wildlife Act species</p>	B	As these species are protected under the Wildlife Act 1976 (as amended), they are regarded as being of National Importance .
22	Kingfisher has been identified at Lough Swilly. Kingfisher is listed on Annex I of the EU Birds Directive.	A	Kingfisher is an Annex II species under the EU Habitats Directive and is of International Importance .
23	Peregrine (<i>Falco peregrinus</i>) has been identified nesting in a wooded area within the townland of Lurgy, this is an Annex I species of the EU birds Directive. It is of International Importance.	A	As this species is an Annex I species of the EU birds Directive, it is regarded as having National Importance as per NRA Guidelines 2009 and is classified in Category A.
24	Otter is listed and protected under Annex II and Annex IV EU Habitats Directive.	A	These species are a qualifying interest of the Lough Swilly SAC, a European site of International importance, therefore are regarded as having International Importance as per NRA Guidelines 2009.
25	Species of Conservation Interest (SCI) species for Lough Swilly SPA are bird species designated under the Lough Swilly SPA which may occur or frequent areas adjacent to the SPA but outside its designated boundaries.	A	These species are qualifying features of Lough Swilly SPA, a European site of International importance, therefore are regarded as having International Importance as per NRA Guidelines 2009.

ER Site No.	Habitat Description	Category	Rating Rationale
26	Lough Swilly SAC, a European site of International Importance	A	Lough Swilly SAC is a designated European site under the EU Habitats Directive. It is an ER of International Importance . It is intersected by all options, and is classified as Category A.
27	Lough Swilly SPA, a European site of International Importance	A	Lough Swilly SPA is a designated European site under the EU Habitats Directive. It is an ER of International Importance and is therefore placed in Category A.
28	<p>Invasive species were identified in locations throughout the study area, species identified include; Japanese knotweed (<i>Fallopia japonica</i>), Himalayan balsam (<i>Impatiens glandulifera</i>), Himalayan Knotweed (<i>Persicaria wallichii</i>), Rhododendron (<i>Rhododendron ponticum</i>) and Snowberry (<i>Symphoricarpos albus</i>).</p> <p>Invasive species are not considered as Ecological Receptors, they are however regarded as an ecological constraint which should be taken into consideration when choosing the preferred option with avoidance recommended where possible.</p>	-	Invasive species, particularly plant species, are not considered as Ecological Receptors 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.

Table 2-2: Section 2 Preliminary Bat Survey Results

Survey No.	Date	Grid Reference ¹⁵		Townland	Habitat	Species	Scientific Name
1	26.09.2018	C2269	10086	Pluck	Disused railway bridge (BL3)	Common pipistrelle	<i>Pipistrellus pipistrellus</i>
						Leisler's Bat	<i>Nyctalus leisleri</i>
						Unidentified Spp.	-
2	26.09.2018	C22927	10387	Pluck	Old farmyard sheds (BL3)	Unidentified Spp.	-
						Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
3	26.09.2018	C22433	10611	Pluck	Significant mature Ash	Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
						Common pipistrelle	<i>Pipistrellus pipistrellus</i>
4	26.09.2018	C21812	11580	Trimragh	Old abandoned old house (BL3)	Common pipistrelle	<i>Pipistrellus pipistrellus</i>
5	26.09.2018	C20707	11152	Drumgreggan	Old house (BL3)	Absent	Absent
6	26.09.2018	C20045	10834	Dromore Lower	Old building (BL3)	Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
7	26.09.2018	C19513	92247	Lurgybrack	Old house (BL3)	Leisler's Bat	<i>Nyctalus leisleri</i>
8	26.09.2018	C20904	09333	Aghlehard	Old railway line supporting numerous habitat types (BL3/WS1)	Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
						Common pipistrelle	<i>Pipistrellus pipistrellus</i>
9	03.10.2018	C21524	09771	Aghlehard	Large mature cherry tree and Ash tree	Common pipistrelle	<i>Pipistrellus pipistrellus</i>
						Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
						Leisler's Bat	<i>Nyctalus leisleri</i>
10	03.10.2018	C21067	09529	Aghlehard	Old house with slate roof (BL3)	Common pipistrelle	<i>Pipistrellus pipistrellus</i>
						Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
						Leisler's Bat	<i>Nyctalus leisleri</i>

¹⁵ Grid References recorded are presented in Irish Grid.

Survey No.	Date	Grid Reference ¹⁵		Townland	Habitat	Species	Scientific Name
11	03.10.2018	C21024	10700	Magheraboy	Large multi-arch stone railway bridge (BL3)	Common pipistrelle	<i>Pipistrellus pipistrellus</i>
						Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
						Leisler's Bat	<i>Nyctalus leisleri</i>
12	03.10.2018	C21757	09615	Aghlehard	Mature Ash Tree	Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
						Common pipistrelle	<i>Pipistrellus pipistrellus</i>
13	03.10.2018	C22445	10731	Pluck	Mature Sycamore	Common pipistrelle	<i>Pipistrellus pipistrellus</i>
14	03.10.2018	C21986	10439	Magheraboy	Old sheds with slate roof (BL3)	Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
						Common pipistrelle	<i>Pipistrellus pipistrellus</i>
15	03.10.2018	C20154	10357	Dromore	Old house with slate roof (BL3)	Common pipistrelle	<i>Pipistrellus pipistrellus</i>

3 OPTIONS ASSESSMENT

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. The impact assessment investigates the impacts of the proposed options on the identified ecological features. The number of ERs and their category classification (as per **Table 2.1.**), traversed by each option is provided in **Table 3-1**. The significance of the impacts upon these ERs is detailed in **Table 3-2**.

Table 3-3 summaries the impacts to ecological receptors intersected by each option, outlining the number of impacts and their severity as per the TII Impact Scoring Key (**Table 1.3**).

Table 3-1: Ecological Receptors Intersected by the Proposed Options and Assigned Ecological Evaluation

Ecological Evaluation Category	Orange	Pink	Purple	Red	Green	Blue	
	2A	2B	2C	2D	2E	2F1	2F2
A	13	12	14	14	12	12	12
B	3	3	4	4	9	9	10
C	0	0	0	0	0	0	0
D	3	3	4	3	5	6	7
E	5	5	5	5	5	6	5
Number of ERs¹⁶	24	23	27	26	31	33	34

¹⁶ A total of 27 Ecological Receptors (ERs) have been recorded in the study area. Intersections by options with watercourses which have potential to support Otter (ER No.24) were counted individually i.e. five watercourses intersected = five A category ERs counted in overall total. Similarly, intersections with Wildlife Act Species (ER No. 21) such as badger setts and deer tracks were counted as individual intersections and included in overall total.

Table 3-2: Impact Significance on the Ecological Receptors Intersected by the Proposed Options¹⁷

ER No.	Category	Orange	Pink	Purple	Red	Green	Blue	
		2A	2B	2C	2D	2E	2F1	2F2
1	D	Minor-ve	Minor-ve	Mod-ve	Major-ve	Major-ve	Major-ve	Major-ve
2	E	Minor-ve	Minor-ve	Minor-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve
3	D	Mod-ve	Mod-ve	Major-ve	Neutral	Neutral	Minor-ve	Minor-ve
4	E	Mod-ve	Mod-ve	Mod-ve	Minor-ve	Minor-ve	Neutral	Neutral
5	D	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
6	E	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve
7	E	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Minor-ve	Minor-ve
8	D	Neutral	Neutral	Mod-ve	Mod-ve	Major-ve	Neutral	Neutral
9	D	Neutral	Neutral	Neutral	Neutral	Major-ve	Neutral	Neutral
10	E	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Neutral	Neutral	Neutral
11	E	Neutral	Neutral	Neutral	Neutral	Neutral	Mod-ve	Mod-ve
12	D	Neutral	Neutral	Neutral	Neutral	Neutral	Major-ve	Major-ve
13	D	Neutral	Neutral	Neutral	Neutral	Neutral	Major-ve	Major-ve
14	E	Neutral	Neutral	Neutral	Neutral	Mod-ve	Mod-ve	Minor-ve
15	E	Neutral	Neutral	Neutral	Neutral	Mod-ve	Mod-ve	Minor-ve
16	E	Neutral	Neutral	Neutral	Neutral	Neutral	Mod-ve	Major-ve

¹⁷ Impact Significance as per Table 1-2: Criteria for Assessing Impact Significance. The suffix (-ve) denotes a *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	
		2A	2B	2C	2D	2E	2F1	2F2
17	D	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Mod-ve
18	D	Neutral	Neutral	Neutral	Neutral	Minor-ve	Mod-ve	Neutral
19	E	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Neutral	Neutral	Neutral
20	E	Neutral	Neutral	Neutral	Neutral	Neutral	Mod-ve	Mod-ve
21	B	Major-ve	Major-ve	Major-ve	Major-ve	Major-ve	Major-ve	Major-ve
22	A	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve
23	A	Neutral	Neutral	Neutral	Neutral	Neutral	Major-ve	Major-ve
24	A	Major-ve	Major-ve	Major-ve	Major-ve	Major-ve	Major-ve	Major-ve
25	A	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve	Minor-ve
26	A	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve
27	A	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve	Mod-ve

Table 3-3: Summary of Impact Scores Assigned to Ecological Receptors

Impact Key		Orange	Pink	Purple	Red	Green	Blue	
		2A	2B	2C	2D	2E	2F1	2F2
1	Major or Highly Negative	2	2	3	3	5	6	7
2	Moderately Negative	8	8	9	8	8	11	8
3	Minor or slightly negative	4	4	3	3	3	3	5
4	Not Significant/ Neutral	13	13	12	13	11	8	8
5	Minor or Slightly Positive	0	0	0	0	0	0	0
6	Moderately Positive	0	0	0	0	0	0	0
7	Major or Highly Positive	0	0	0	0	0	0	0
Total No. of ERs Impacted ¹⁸		14	14	15	14	16	20	20
Summary of Options in Order of Preference		2 nd	1 st	3 rd	3 rd	4 th	6 th	5 th

¹⁸ Not Significant/ Neutral Impacts are not counted in Total No. ERs Impacted.

3.2 Ecological Impact Assessment

Table 3-4 at the end of this section summarises the impact 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.

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.

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

3.2.1 Option 2A (Orange)

Option 2A primarily follows the existing N13. Habitats of ecological importance intersected by the option include rough wet grassland dominated by *Juncus* species, areas of scrub development, established broadleaved woodland, and a significant network of hedgerows and treelines. The Option 2A intersects lands bordering the N13 from Listellian to the Dry Arch roundabout, encompassing the townland of Lurgybrack. The locations supporting the highest ecological constraints intersected by the option are within the townlands of Lurgybrack and Dromore (Upper). Established broadleaved woodland is partially intersected by the option east of the N13 at Lurgybrack, this is bordered to the south by a conifer plantation and associated scrub. The removal of these habitats has potential to impact upon wildlife corridors and local wildlife populations. Some of the habitats along Option 2A have the potential to support foraging and commuting areas for bats, in particular at Lurgybrack, west of the N13. Farmland at this location supports a mature network of hedgerows and treelines, providing high value wildlife corridors for species such as badgers, which are known to traverse the agricultural land in this area. Mature horse chestnut trees were also identified at this location with potential to support bat roosts. A stand of the invasive species, Himalayan balsam (*Impatiens glandulifera*) and Japanese knotweed (*Fallopia japonica*) occur on this option, a significant negative ecological constraint.

Scrub areas are present at other locations throughout the option, however not of high local ecological importance, examples of these areas are located at Dromore (upper) adjacent to the Dry Arch Business Park or within the townland of Trimragh, south of the N13 dual carriage way.

The Lough Swilly SAC/SPA will be intersected at the proposed link road crossing of the Lough Swilly estuary. The Lough Swilly SAC also borders the N13 at the existing Isle Burn road crossing.

The crossing footprint intersects 0.0002287 sq. km of the Lough Swilly SPA. The proposed link road will lead to the loss of suitable foraging habitat for Lough Swilly SPA SCI species on the southern banks of the River Swilly crossing. These include Black-headed Gull, Common Gull, Curlew and Oystercatcher. The occurrences of these species are mainly concentrated to the peak wintering period; i.e. December to February inclusive. The use of these pastoral lands on the southern bank of the river appears to be opportunistic and intermittent, coinciding when probing conditions and prey availability are most suitable. In the immediate and wider localities of the river crossing, there are other pastoral habitats that are equally suitable for field feeding / foraging activities displayed in those areas to the south of the Swilly crossing.

The construction of the road spanning the tidal channel will result in temporary disturbance of SCI species and other over-wintering species using this area during low tide. The over-wintering surveys completed to date indicate that the movement and flight patterns of over-wintering species remain within the channel footprint. The use of a clear spanning structure at the proposed crossing point will continue to allow for unimpeded movement and usage of the tidal channel by over-wintering species during the operational phase of the proposed link road. Fields spanned by the proposed link road on the northern bank of the Swilly Estuary do not support suitable feeding or roosting habitat for over-wintering avifauna. The adjoining WwTP

and amenity / playing pitches support suitable habitat for over-wintering avifauna. These areas may experience indirect disturbance during the project's construction phase but are likely to habituate to conditions during the projects operational phase.

Option 2A (Orange) is given an impact rating of 3 – *Minor or Slightly Negative* due to the option primarily being comprised of the existing road infrastructure and lower number of ERs intersected of which the majority are rated moderately negative. 2A (Orange) is the 2nd preferred option.

3.2.2 Option 2B (Pink)

Option 2B is located along the existing N13 and supports the same ecological receptors as Option 2A. The ecological features which will be negatively impacted by the proposed option are those located immediately east and west of the N13, between the townland of Listellian and the Dry Arch roundabout. Other habitats which will be negatively impacted are those bordering the N13 dual carriageway. These primarily consist of hedgerows and treelines both planted and naturally occurring, along with areas of scrub development and wet grassland located immediately north and south of the N13, as previously highlighted. The most significant ecological constraint on the option is the presence of invasive species in particular Japanese knotweed (*Fallopia japonica*) found at Dromore and Trimnagh, south of the N13 dual carriageway.

The Lough Swilly SAC/SPA will be intersected at the proposed link road crossing of the Lough Swilly estuary as part of this proposed option. The Lough Swilly SAC also borders the N13 at the existing Isle Burn road crossing.

The crossing footprint intersects 0.0002287 sq. km of the Lough Swilly SPA. The proposed link road will lead to the loss of suitable foraging habitat for Lough Swilly SPA SCI species on the southern banks of the River Swilly crossing. These include Black-headed Gull, Common Gull, Curlew and Oystercatcher. The occurrences of these species are mainly concentrated to the peak wintering period; i.e. December to February inclusive. The use of these pastoral lands on the southern bank of the river appears to be opportunistic and intermittent, coinciding when probing conditions and prey availability are most suitable. In the immediate and wider localities of the river crossing, there are other pastoral habitats that are equally suitable for field feeding / foraging activities displayed in those areas to the south of the Swilly crossing.

The construction of the road spanning the tidal channel will result in temporary disturbance of SCI species and other over-wintering species using this area during low tide. The over-wintering surveys completed to date indicate that the movement and flight patterns of over-wintering species remain within the channel footprint. The use of a clear spanning structure at the proposed crossing point will continue to allow for unimpeded movement and usage of the tidal channel by over-wintering species during the operational phase of the proposed link road. Fields spanned by the proposed link road on the northern bank of the Swilly Estuary do not support suitable feeding or roosting habitat for over-wintering avifauna. The adjoining WwTP and amenity / playing pitches support suitable habitat for over-wintering avifauna. These areas may experience indirect disturbance during the project's construction phase but are likely to habituate to conditions during the projects operational phase.

Similar to Option 2A, Option 2B (Pink) is given an impact rating of 3 – *Minor or Slightly Negative* due to the option primarily being comprised of the existing road infrastructure and with a lower number of ERs intersected of which the majority of potential impacts are considered to be moderately negative. This option is the preferred option, due to its location along the existing N13 and the limited intersection (when compared with all other options) with habitats or features of high ecological significance.

3.2.3 Option 2C (Purple)

Similar to Option 2A (Orange) and 2B (Pink), Option 2C (Purple) intersects the townland of Lurgybrack to the west of the N13 but to a greater extent. In doing so, it intersects numerous ecological receptors of Local Importance (high value) and Local Importance (low value). The most significant of these habitats are

hedgerows and treelines of high connectivity, dominated by gorse (*Ulex europaea*), hawthorn (*Crataegus monogyna*), horse chestnut (*Aesculus hippocastanum*) and sycamore (*Acer pseudoplatanus*). Option 2C supports further intersection of hedgerows and treelines in the townlands of Drumany, Drumany Lower and Dromore.

As common to Options 2A and 2B, mature trees were identified with high potential to support bat roosts at Lurgybrack, however additional mature trees were identified on Option 2C in the townland of Drumany. Other features with the potential ability to support bats identified on the option include old buildings with slate roofs located in Drumany Lower and Dromore. Option 2C intersects the old railway line and associated habitats at Drumany Lower. The disused railway line is a significant ecological feature in a local context supporting scrub, clay embankments, hedgerows and treelines. Due to its linear nature and habitat features, it is acting as an important wildlife corridor within the region, providing a shelter and foraging areas for commuting mammals. North of Drumany, Option 2C merges with the existing N13 dual carriageway of which the ecological constraints are previously discussed.

The Lough Swilly SAC/SPA will be intersected at the proposed crossing of the Lough Swilly estuary as part of this proposed option. The Lough Swilly SAC also borders the N13 at the existing Isle Burn road crossing.

The crossing footprint intersects 0.0002287 sq. km of the Lough Swilly SPA. The proposed link road will lead to the loss of suitable foraging habitat for Lough Swilly SPA SCI species on the southern banks of the River Swilly crossing. These include Black-headed Gull, Common Gull, Curlew and Oystercatcher. The occurrences of these species are mainly concentrated to the peak wintering period; i.e. December to February inclusive. The use of these pastoral lands on the southern bank of the river appears to be opportunistic and intermittent, coinciding when probing conditions and prey availability are most suitable. In the immediate and wider localities of the river crossing, there are other pastoral habitats that are equally suitable for field feeding / foraging activities displayed in those areas to the south of the Swilly crossing.

The construction of the road spanning the tidal channel will result in temporary disturbance of SCI species and other over-wintering species using this area during low tide. The over-wintering surveys completed to date indicate that the movement and flight patterns of over-wintering species remain within the channel footprint. The use of a clear spanning structure at the proposed crossing point will continue to allow for unimpeded movement and usage of the tidal channel by over-wintering species during the operational phase of the proposed link road. Fields spanned by the proposed link road on the northern bank of the Swilly Estuary do not support suitable feeding or roosting habitat for over-wintering avifauna. The adjoining WwTP and amenity / playing pitches support suitable habitat for over-wintering avifauna. These areas may experience indirect disturbance during the project's construction phase but are likely to habituate to conditions during the project's operational phase.

This option is assigned an impact rating of 3 – *Minor – Slightly Negative*, it has a slightly higher number of ERs intersected, with a total of 15 in comparison to 14 on the 2A (Orange) and 2B (Pink) options. It is the 3rd preferred option.

3.2.4 Option 2D (Red)

Option 2D is most similar to 2C (Purple) in both option direction and ecological receptors. This option traverses the townland of Lurgybrack to the east of the N13. It intersects an area of Local Importance (high value) which supports improved agricultural grassland reverting into wet grassland dominated by *Juncus spp*, well established dense scrub, wet willow-alder-ash woodland, and existing and developing broadleaved woodland. This area of high ecological diversity is partially the result of land abandonment and subsequent progression of improved habitats to semi-natural habitats. Mammal activity was noted in this area including the evidence of deer. Other ecological features at this location of note included the presence of old buildings with potential to support bat roosts and significant stands of Himalayan knotweed (*Persicaria wallichii*) and Rhododendron (*Rhododendron ponticum*).

As discussed in Option 2C, this option intersects the townland of Drumany and Dromore prior to merging onto the existing N13. As a result, it intersects the same ecological constraints for the remainder of the option.

The Lough Swilly SAC/SPA will be intersected at the proposed crossing of the Lough Swilly estuary as part of this proposed option. The Lough Swilly SAC borders the N13 at the existing Isle Burn road crossing.

The crossing footprint intersects 0.0002287 sq. km of the Lough Swilly SPA. The proposed link road will lead to the loss of suitable foraging habitat for Lough Swilly SPA SCI species on the southern banks of the River Swilly crossing. These include Black-headed Gull, Common Gull, Curlew and Oystercatcher. The occurrences of these species are mainly concentrated to the peak wintering period; i.e. December to February inclusive. The use of these pastoral lands on the southern bank of the river appears to be opportunistic and intermittent, coinciding when probing conditions and prey availability are most suitable. In the immediate and wider localities of the river crossing, there are other pastoral habitats that are equally suitable for field feeding / foraging activities displayed in those areas to the south of the Swilly crossing.

The construction of the road spanning the tidal channel will result in temporary disturbance of SCI species and other over-wintering species using this area during low tide. The over-wintering surveys completed to date indicate that the movement and flight patterns of over-wintering species remain within the channel footprint. The use of a clear spanning structure at the proposed crossing point will continue to allow for unimpeded movement and usage of the tidal channel by over-wintering species during the operational phase of the proposed link road. Fields spanned by the proposed link road on the northern bank of the Swilly Estuary do not support suitable feeding or roosting habitat for over-wintering avifauna. The adjoining WwTP and amenity / playing pitches support suitable habitat for over-wintering avifauna. These areas may experience indirect disturbance during the project's construction phase but are likely to habituate to conditions during the projects operational phase.

This option is assigned an impact rating of 3 – *Minor – Slightly Negative*. It is a joint 3rd preferred option with 2C (Purple). Both options have potential Major or Highly Negative impacts to three Ecological Receptors as per the Impact Scoring Key (See **Table 3-3**).

3.2.5 Option 2E (Green)

Option 2E (Green) does not follow any existing road, primarily traversing eastwards from Lurgybrack, across the landscape prior to tying into the N13/N14 roundabout junction. It follows a similar trajectory as the Option 2D (Red) through the townland of Lurgybrack east of the N13, encountering the same ecological receptors in the form of well-established scrub (WS1), rough wet grassland, broadleaved woodland, wet alder woodland and a stand of invasive species; Himalayan knotweed (*Persicaria wallichii*) and Rhododendron (*Rhododendron ponticum*).

The townlands of Drumany, Dromore and Magheraboy are intersected by the proposed option, all areas supporting habitats of high local ecological value. Habitats which would require removal at Drumany include dense broadleaved woodland, scrub and riparian woodland, all of which are commonly found bordering the numerous streams throughout the option. The option crossing at Dromore and Magheraboy primarily intersects pastoral agricultural land with elements of wet grassland, however the field boundaries support a noteworthy network of mature, dense hedgerows and treelines providing high habitat connectivity and a significant wildlife corridor. These well-established field boundaries are an ecological constraint for the option crossing. These habitats are known to support foxes, rabbits and badgers, all having been noted to commute, forage and reside on the intersected lands, with rabbit warrens and badger setts noted and recorded.

An extensive active badger sett is located in the railway embankment at Dromore, situated within the option alignment. A second significant badger sett has also been recorded Magheraboy in the hedgerow/treeline embankment. This is also located within the option alignment. Further north of the Dromore badger sett is a

large, stone, multi-arch railway bridge with high bat roost potential. Although located approximately 40m outside the option, it is noteworthy due to its ecological potential and habitat connectivity via treelines and scrub associated with the disused railway line. Other areas with bat roost potential were noted at old buildings in Drumany and Magherboy, along with two mature sycamore (*Acer pseudoplatanus*) trees in Pluck.

A stand of invasive species, Japanese knotweed (*Fallopia japonica*) and Himalayan balsam (*Impatiens glandulifera*) were recorded at a farmyard in Magherboy. Due to the extensive nature of the stand, it is regarded as a high ecological constraint.

Option 2E (Green) crosses the disused old railway line at Dromore. The railway line as previously discussed is noted as an ecological receptor due to the numerous diverse habitats it supports, and the provision of an established, continuous wildlife corridor. This option traverses northwards through the townlands of Drumany and Dromore prior to joining the N13. In doing so it intersects developing broadleaved and wet woodland development. Other ecological receptors encountered by the option include scrub, drains and hedgerow and treeline networks.

The Lough Swilly SAC/SPA will be intersected at the proposed crossing of the Lough Swilly estuary as part of this proposed option. The Lough Swilly SAC borders the N13 at the existing Isle Burn road crossing.

The crossing footprint intersects 0.0002287 sq. km of the Lough Swilly SPA. The proposed link road will lead to the loss of suitable foraging habitat for Lough Swilly SPA SCI species on the southern banks of the River Swilly crossing. These include Black-headed Gull, Common Gull, Curlew and Oystercatcher. The occurrences of these species are mainly concentrated to the peak wintering period; i.e. December to February inclusive. The use of these pastoral lands on the southern bank of the river appears to be opportunistic and intermittent, coinciding when probing conditions and prey availability are most suitable. In the immediate and wider localities of the river crossing, there are other pastoral habitats that are equally suitable for field feeding / foraging activities displayed in those areas to the south of the Swilly crossing.

The construction of the road spanning the tidal channel will result in temporary disturbance of SCI species and other over-wintering species using this area during low tide. The over-wintering surveys completed to date indicate that the movement and flight patterns of over-wintering species remain within the channel footprint. The use of a clear spanning structure at the proposed crossing point will continue to allow for unimpeded movement and usage of the tidal channel by over-wintering species during the operational phase of the proposed link road. Fields spanned by the proposed link road on the northern bank of the Swilly Estuary do not support suitable feeding or roosting habitat for over-wintering avifauna. The adjoining WwTP and amenity / playing pitches support suitable habitat for over-wintering avifauna. These areas may experience indirect disturbance during the project's construction phase but are likely to habituate to conditions during the projects operational phase.

Option 2E (Green) is assigned a rating of 2- *Moderately Negative*. It intersects five ERs which impacts are classed as Major or Highly Negative. It is the 4th preferred option.

3.2.6 Option 2F1 (Blue)

Similar to the Option 2E (Green), the 2F1 (Blue) option does not follow any existing road infrastructure. It primarily traverses agricultural and wet grassland across the southern half of the study area. The proposed option would require the removal of a conifer plantation and associated scrub, east of the N13 at Listellian. As common to Option 2E (Green), this option intersects a large area of rough wet grassland, encroaching scrub, wet willow-alder-ash woodland and established broadleaved woodland within the townland of Lurgybrack, east of the N13. This area is regarded as having Local Ecological Importance (higher value) due to extensive mosaic of habitats and mammals presents.

The option crosses the railway line at Lurgy/Aghlehard, again as previously noted this is a significant ecological feature, in the local context. The railway line supports a badger sett approximately 80m to the south of the option at Lurgy and badgers are noted to use the surrounding area. An extensive active badger sett was also noted in a treeline embankment at Aghlehard.

The proposed option crosses the townlands of Listellian, Lurgy, Aghlehard and Pluck. In doing so, it intersects numerous habitat types including; mature hedgerows and treelines, rough wet grassland, dense scrub and mature copse of trees. As found in Option 2E (Green), the agricultural lands support significant well-established hedgerows and treelines throughout, providing important wildlife corridors. A noteworthy area of scrub/broadleaved woodland is established at Lurgy, this is of Local Ecological Importance (high value), with previous historic sightings of Barn Owl in this area. Locations were noted with potential to support bat roosts within the option, these included significant mature trees located in Listellian, Aghlehard and Pluck such as ash (*Fraxinus excelsior*) and wild cherry (*Prunus avium*).

A feature common throughout Option 2F1 are abandoned farm tracks, these are typically bordered either side by clay embankments, dense hedgerows and treelines beginning to develop into woodland strips. These tracks have been noted in the townlands of Lurgy, Aghlehard and Pluck. These are important ecological features as they provide secure and sheltered commuting routes for wildlife.

Option 2F1 (Blue) intersects an area of scrub in Pluck south of the River Corkey. A heronry is supported at this location, and previous evidence of otter at this location has been noted.

Option 2F1 transects numerous ecological receptors of Local Ecological Importance (high value), in the form of habitats and protected mammal species. There is high connectivity of habitats throughout the landscape, the presence of numerous badger setts and wildlife commuting areas, and high potential for bat roosts and activity.

The Lough Swilly SAC/SPA will be intersected at the proposed crossing of the Lough Swilly estuary as part of this proposed option. The Lough Swilly SAC borders the N13 at the existing Isle Burn road crossing.

The crossing footprint intersects 0.0002287 sq. km of the Lough Swilly SPA. The proposed link road will lead to the loss of suitable foraging habitat for Lough Swilly SPA SCI species on the southern banks of the River Swilly crossing. These include Black-headed Gull, Common Gull, Curlew and Oystercatcher. The occurrences of these species are mainly concentrated to the peak wintering period; i.e. December to February inclusive. The use of these pastoral lands on the southern bank of the river appears to be opportunistic and intermittent, coinciding when probing conditions and prey availability are most suitable. In the immediate and wider localities of the river crossing, there are other pastoral habitats that are equally suitable for field feeding / foraging activities displayed in those areas to the south of the Swilly crossing.

The construction of the road spanning the tidal channel will result in temporary disturbance of SCI species and other over-wintering species using this area during low tide. The over-wintering surveys completed to date indicate that the movement and flight patterns of over-wintering species remain within the channel footprint. The use of a clear spanning structure at the proposed crossing point will continue to allow for unimpeded movement and usage of the tidal channel by over-wintering species during the operational phase of the proposed link road. Fields spanned by the proposed link road on the northern bank of the Swilly Estuary do not support suitable feeding or roosting habitat for over-wintering avifauna. The adjoining WwTP and amenity / playing pitches support suitable habitat for over-wintering avifauna. These areas may experience indirect disturbance during the project's construction phase but are likely to habituate to conditions during the project's operational phase.

Option 2F1 (Blue) is assigned a rating of 1 – *Major or Highly Negative Impact*. A total of 20 ERs are intersected as part of this option, six of which may experience Major or Highly Negative impacts and 11 of which may be Moderately Negatively impacted. This option is the least favourite and therefore the 6th preferred option.

3.2.7 Option 2F2 (Blue)

The alternative blue Option 2F2 intersects a large area of the disused railway, which at this location in Pluck supports dense scrub and woodland strip, along with badger activity. Woodland influenced by waterlogging and wet ground conditions are also a common feature in the townlands of Aghlehard and Pluck, these provide greater ecological diversity, particularly in areas which have developed wet willow-alder-ash woodland strips along the Lurgybrack River.

A significant area of wet willow-ash-alder woodland and scrub is noted at Pluck, this encompasses an old mill run and as a result an old stone bridge with potential to support bat roosts. Badger activity was also evident at this location and bat activity has been previously noted at adjacent farmyard buildings. Buzzards are also noted to be nesting in this area. This location is of Local Ecological Importance (higher value).

The Lough Swilly SAC/SPA will be intersected at the proposed crossing of the Lough Swilly estuary as part of this proposed option.

The crossing footprint intersects 0.0002287 sq. km of the Lough Swilly SPA. The proposed link road will lead to the loss of suitable foraging habitat for Lough Swilly SPA SCI species on the southern banks of the River Swilly crossing. These include Black-headed Gull, Common Gull, Curlew and Oystercatcher. The occurrences of these species are mainly concentrated to the peak wintering period; i.e. December to February inclusive. The use of these pastoral lands on the southern bank of the river appears to be opportunistic and intermittent, coinciding when probing conditions and prey availability are most suitable. In the immediate and wider localities of the river crossing, there are other pastoral habitats that are equally suitable for field feeding / foraging activities displayed in those areas to the south of the Swilly crossing.

The construction of the road spanning the tidal channel will result in temporary disturbance of SCI species and other over-wintering species using this area during low tide. The over-wintering surveys completed to date indicate that the movement and flight patterns of over-wintering species remain within the channel footprint. The use of a clear spanning structure at the proposed crossing point will continue to allow for unimpeded movement and usage of the tidal channel by over-wintering species during the operational phase of the proposed link road. Fields spanned by the proposed link road on the northern bank of the Swilly Estuary do not support suitable feeding or roosting habitat for over-wintering avifauna. The adjoining WwTP and amenity / playing pitches support suitable habitat for over-wintering avifauna. These areas may experience indirect disturbance during the project's construction phase but are likely to habituate to conditions during the projects operational phase.

Option 2F2 (Blue) is assigned a rating of *1 – Major or Highly Negative Impact*. A total of 20 ERs are intersected as part of this option, seven of which may experience Major or Highly Negative impacts and eight of which may contribute towards Moderately Negatively impacts. This option is the 5th preferred option.

3.2.8 River Swilly Crossing

The River Swilly Crossing Link Road crosses the River Swilly Estuary north-east from the Dry Arch roundabout to the Ramelton Road area north of the River Swilly. In doing so, the link road will cross the Bonagee and Milk Isle areas, encompassing the River Swilly flood plains and existing flood defence embankments. The proposed options; 2A (Orange), 2B (Pink), 2C (Purple), 2D (Red) and 2E (Green) intersects the townland of Dromore Upper/Lower, north of the existing N13. This area supports wet grassland and scrub mosaic. It is at this location that all options propose to tie into the Swilly crossing. The Swilly Crossing will intersect European Sites; Lough Swilly SAC and Lough Swilly SPA as it crosses the River Swilly Estuary. The features of Qualifying Interest for Lough Swilly SAC and the Special Conservation Interests (SCI) for Lough Swilly SPA are listed in **Section 2.1.2** of this report.

The crossing footprint intersects 0.0002287 sq km of the Lough Swilly SPA. The proposed link road will lead to the loss of suitable foraging habitat for Lough Swilly SPA SCI species on the southern banks of the River

Swilly crossing. These include Black-headed Gull, Common Gull, Curlew and Oystercatcher. The occurrences of these species are mainly concentrated to the peak wintering period; i.e. December to February inclusive. The use of these pastoral lands on the southern bank of the river appears to be opportunistic and intermittent, coinciding when probing conditions and prey availability are most suitable. In the immediate and wider localities of the river crossing, there are other pastoral habitats that are equally suitable for field feeding / foraging activities displayed in those areas to the south of the Swilly crossing.

The construction of the road spanning the tidal channel will result in temporary disturbance of SCI species and other over-wintering species using this area during low tide. The over-wintering surveys completed to date indicate that the movement and flight patterns of over-wintering species remain within the channel footprint. The use of a clear spanning structure at the proposed crossing point will continue to allow for unimpeded movement and usage of the tidal channel by over-wintering species during the operational phase of the proposed link road. Fields spanned by the proposed link road on the northern bank of the Swilly Estuary do not support suitable feeding or roosting habitat for over-wintering avifauna. The adjoining WwTP and amenity / playing pitches support suitable habitat for over-wintering avifauna. These areas may experience indirect disturbance during the project's construction phase but are likely to habituate to conditions during the projects operational phase.

Table 3-4: Impact Scoring Matrix

Option	Quantitative Assessment	Qualitative Assessment ¹⁹	Impact	Impact Score	Preference Ranking	Preference
2A (Orange)	2 Major or Highly Negative Impact 8 Moderately Negative Impacts 4 Minor or slightly negative Impacts 13 Neutral Impacts	Ecological Receptors intersected by the proposed option; <ul style="list-style-type: none"> Lough Swilly SAC boundary is located adjacent to N13 crossing of Isle Burn River at existing dual carriageway; Wet grassland (GS4) (Lurgybrack & Dromore); Scrub areas (WS1) (Lurgybrack, Drumany, Dromore Lower & Trimnagh); Broadleaved Woodland (WD1) at Lurgybrack; Established hedgerow (WL1) and tree line networks (WL2); Planted treelines and woodland strip development²⁰; Invasive Species²¹; and, Old building (BL3)²² with bat roost potential. 	Minor or Slightly Negative	3	2	Preferred
2B (Pink)	2 Major or Highly Negative Impact 8 Moderately Negative Impacts 4 Minor or slightly negative Impacts	Ecological Receptors intersected by the proposed option; <ul style="list-style-type: none"> Lough Swilly SAC boundary is located adjacent to N13 crossing of Isle Burn River at existing dual carriageway; Semi-natural wet grassland (GS4) (Lurgybrack, Dromore); Scrub areas (WS1) (Lurgybrack, Drumany, Dromore Lower & Trimnagh); Broadleaved Woodland (WD1) at Lurgybrack; Established hedgerow (WL1) and tree line networks (WL2) throughout; Planted treelines and woodland strip development²³; Invasive Species²⁴; and, Old building (BL3)²⁵ with bat roost potential. 	Minor or Slightly Negative	3	1	Preferred

¹⁹ Habitat classification code is assigned as per Fossitt, J. A, (2000) "A Guide to Habitats in Ireland"²⁰ Bordering the existing N13 dual carriageway²¹ Himalayan Balsam (*Impatiens glandulifera*) in scrub at Lurgybrack adjacent to N13, Grid Reference: C19496 09260. Snowberry north of N13 at Dromore, Grid Reference: C20617 10915. Regenerating Japanese knotweed stands at Trimagh, Grid Reference: C21687 11576 & C11537. Japanese Knotweed in WS1 at Dromore south of N13, Grid references; C20821 10955 & C20705 10874²² Old building with bat roost potential, Grid Reference: C20761 11158.²³ Bordering the existing N13 dual carriageway²⁴ Himalayan Balsam (*Impatiens glandulifera*) in scrub at Lurgybrack adjacent to N13, Grid Reference: C19496 09260. Snowberry north of N13 at Dromore, Grid Reference: C20617 10915. Regenerating Japanese knotweed stands at Trimagh, Grid Reference: C21687 11576 & C11537. Japanese Knotweed in WS1 at Dromore south of N13, Grid references; C20821 10955 & C20705 10874²⁵ Old building with bat roost potential, Grid Reference: C20761 11158.

Option	Quantitative Assessment	Qualitative Assessment ¹⁹	Impact	Impact Score	Preference Ranking	Preference
2C (Purple)	3 Major or Highly Negative Impacts 9 Moderately Negative Impacts 3 Minor or Slightly Negative Impacts 12 Neutral Impacts	Ecological Receptors intersected by the proposed option; <ul style="list-style-type: none"> Lough Swilly SAC boundary is located adjacent to N13 crossing of Isle Burn River at existing dual carriageway; Wet grassland (GS4) (Lurgybrack, Drumany & Dromore); Scrub areas (WS1) (Lurgybrack, Drumany, Dromore & Trimnagh); Broadleaved Woodland (WD1) at Lurgybrack; Established hedgerows (WL1) and tree line network of high connectivity (WL2) (Lurgybrack, Drumany, Drumany Lower and Dromore); Planted treelines (WL2) and woodland (WD2) strip development; Invasive Species²⁶ Mature Trees with bat roost supporting potential (Lurgybrack & Drumany); Old building (BL3) with bat roost potential;²⁷ and Old railway line and embankments (BL2)²⁸ (Drumany Lower). 	Minor or Slightly Negative	3	3	Intermediate
2D (Red)	3 Major or Highly Negative Impacts 8 Moderately Negative Impacts 3 Minor or Slightly Negative Impacts 13 Neutral Impacts	Ecological Receptors intersected by the proposed option; <ul style="list-style-type: none"> Lough Swilly SAC boundary is located adjacent to N13 crossing of Isle Burn River at existing dual carriageway; Conifer Plantation ((WD4) and felled area (WS5); Semi-natural wet grassland (GS4) (Lurgybrack & Drumany); Scrub areas (WS1) (Lurgybrack, Drumany & Trimnagh); Broadleaved Woodland (WD1) at Lurgybrack; Alder woodland (WN6) (Lurgybrack); Deer population (Lurgybrack); Established hedgerow (WL1) and tree line networks (WL2); Mature Trees with bat roost supporting potential (Lurgybrack & Drumany); Old building (BL3) with bat roost potential²⁹ Old railway line and embankments (BL2)³⁰ (Dromore); and Planted treelines and woodland strip development 	Minor or Slightly Negative	3	3	Intermediate

²⁶ Himalayan Balsam (*Impatiens glandulifera*) in scrub at Lurgybrack adjacent to N13, Grid Reference: C19496 09260. Snowberry north of N13 at Dromore, Grid Reference: C20617 10915. Regenerating Japanese knotweed stands at Trimnagh, Grid Reference: C21687 11576 & C11537. Japanese Knotweed in WS1 at Dromore south of N13, Grid references; C20821 10955 & C20705 10874

²⁷ An old building with a slate roof supporting bat roost potential at Drumany & Dromore, Grid Reference: C20159 10349 & C20761 11158.

²⁸ An old railway line traverses the study area, supporting a variety of habitats and providing a significant wildlife corridor.

²⁹ An old building with a slate roof supporting bat roost potential at Lurgybrack, Drumany & Dromore, Grid Reference: C19705 09836, C20159 10349 & C20761 11158.

³⁰ An old railway line traverses the study area, supporting a variety of habitats and providing a significant wildlife corridor. This section is located in the Dromore area.

Option	Quantitative Assessment	Qualitative Assessment ¹⁹	Impact	Impact Score	Preference Ranking	Preference
		<ul style="list-style-type: none"> Invasive Species³¹ 				
2E (Green)	5 Major or Highly Negative Impacts 8 Moderately Negative Impacts 3 Minor or Slightly Negative Impacts 11 Neutral Impacts	Ecological Receptors intersected by the proposed option; <ul style="list-style-type: none"> Lough Swilly SAC boundary is located adjacent to N13 crossing of Isle Burn River at existing dual carriageway; Conifer Plantation (WD4) and felled area (WS5); Semi-natural wet grassland (GS4) (Lurgybrack & Drumany); Scrub areas (WS1) (Lurgybrack, Drumany, Trimnagh & Dromore); Broadleaved Woodland (WD1) (Lurgybrack, Dromore Upper, Maherboy); Alder woodland (WN6) (Lurgybrack); Deer population (Lurgybrack); Established hedgerow (WL1) and tree line (WL2) networks of high biodiversity value in particularly at Dromore Upper; Mature Trees with bat roost supporting potential (Lurgybrack, Drumany & Maherboy); Invasive Species;³² Old buildings (BL3) with bat roost potential³³ Badger Setts³⁴ Old railway line and embankments (BL2)³⁵ (Dromore); Broadleaved (WD1) and Alder (WN6) Woodland (Dromore) Scrub areas (WS1) (Drumany/Dromore) Established hedgerow (WL1) and tree line networks (WL2) Badger activity 	Moderately Negative	2	4	Intermediate

³¹ Himalayan Balsam (*Impatiens glandulifera*) in scrub at Lurgybrack adjacent to N13, Grid Reference: C19496 09260. Snowberry north of N13 at Dromore, Grid Reference: C20617 10915. Regenerating Japanese knotweed stands at Trimnagh, Grid Reference: C21687 11576 & C11537. Japanese Knotweed in WS1 at Dromore south of N13, Grid references: C20821 10955 & C20705 10874

³² Himalayan Balsam (*Impatiens glandulifera*) in scrub at Lurgybrack adjacent to N13, Grid Reference: C19496 09260 (Irish National Grid). Extensive Himalayan Knotweed (*Persicaria wallichii*) and Rhododendron (*Rhododendron ponticum*) in scrub/woodland development at Drumany, Grid Reference: C19854 09903. Rhododendron (*Rhododendron ponticum*) located in a scrub/treeline at Lurgybrack Grid Reference: C19826 09564 Extensive stand of Japanese Knotweed (*Fallopia japonica*) at Maherboy, Grid Reference: C21981 10466.

³³ An old building with a slate roof supporting bat roost potential at Drumany, Grid Reference: C20159 10349, a second potential building is located at Maherboy, Grid Reference: C21939 10433.

³⁴ Badger Sett located at Dromore (Grid Reference: C24071 09625) & Magherboy (Grid Reference: C22090 10635)

³⁵ An old railway line traverses the study area, supporting a variety of habitats and providing a significant wildlife corridor. This section is located in the Dromore area.

Option	Quantitative Assessment	Qualitative Assessment ¹⁹	Impact	Impact Score	Preference Ranking	Preference
2F1 (Blue)	6 Major or Highly Negative Impacts 11 Moderately Negative Impacts 3 Minor or Slightly Negative Impacts 7 Neutral Impacts	Ecological Receptors intersected by the proposed option; <ul style="list-style-type: none"> Lough Swilly SAC boundary is located adjacent to N13 crossing of Isle Burn River at existing dual carriageway; Conifer Plantation (WD4) and felled area (WS5); Broadleaved Woodland (WD1) at Lurgybrack, Listellian and Lurgy; Alder Woodland (WN6) adjoining streams Semi-natural wet grassland (GS4) (Lurgybrack, Pluck); Alder woodland (WN6) (Lurgybrack); Deer population (Lurgybrack); Established hedgerow (WL1) and tree line networks (WL2) Mature Trees with bat roost supporting potential (Lurgybrack, Listellian, Aghlehard & Pluck); Scrub areas (WS1) (Lurgybrack, Listellian, Lurgy, Pluck); Alder Woodland (WN6) (Aghlehard, Magheraboy, Pluck) Invasive Species;³⁶ Old railway line and embankments (BL2)³⁷; Badger Setts (Lurgy, Aghlehard & Pluck) 	Major or Highly Negative	1	6	Least Preferred
2F2 (Blue)	7 Major or Highly Negative Impacts 8 Moderately Negative Impacts 5 Minor or Slightly Negative Impacts 7 Neutral Impacts	<ul style="list-style-type: none"> Wet willow-alder-ash woodland (WN6) (Pluck) bordering Lurgybrack River; Old buildings (BL3) with bat roost potential³⁸ Old railway line and embankments (BL2)³⁹; Wet grassland (GS4) bordering wet woodland (WN6); Treelines (WL2) and hedgerows (WL1); Willow dominated scrub (WS1) 	Major or Highly Negative	1	5	Least Preferred
Swilly Crossing Link Road	The Quantitative Assessment of impacts of the Lough Swilly Crossing has been assessed in conjunction with each proposed	Ecological Receptors intersected by the link road; <ul style="list-style-type: none"> Lough Swilly SAC/SPA (River Swilly estuary crossing at Bonagee); Flood defence embankments (BL2) and flood plains at Bonagee & Milk Isle; Semi-natural wet grassland (GS4) (Dromore Upper); and, 		The Swilly Crossing Link Road has been assessed as part of each option with impact scores reflecting potential impact consider when assigned.		

³⁶ Himalayan Balsam (*Impatiens glandulifera*) in scrub at Lurgybrack adjacent to N13, Grid Reference: C19496 09260. Rhododendron (*Rhododendron ponticum*) located in a scrub/treeline at Lurgybrack Grid Reference: C19826 09564 Extensive stand of Japanese Knotweed (*Fallopia japonica*) at Maherboy, Grid Reference: C21981 10466.

³⁷ An old railway line traverses the study area, supporting a variety of habitats and providing a significant wildlife corridor. This section is located in the Lurgy, Pluck & Corkey area.

³⁸ Located at Lurgy (Grid Reference: C21074 09529) and farm buildings at Pluck (Grid Reference: C 22955 103400)

³⁹ An old railway line traverses the study area, supporting a variety of habitats and providing a significant wildlife corridor. This section is located in the Pluck & Corkey area.

Option	Quantitative Assessment	Qualitative Assessment ¹⁹	Impact	Impact Score	Preference Ranking	Preference
	option. The listed ecological receptors as part of the qualitative assessment are common to all proposed options.	<ul style="list-style-type: none">▪ Scrub areas (WS1) (Dromore Upper)				

3.3 Conclusion

In relation to proposed options located in or adjacent to potential Annex I priority habitats or sites of International Importance, the primary mitigation measure is avoidance in that no option should be located through these areas.

The overall emerging preferred option is the Option 2B (Pink) due to the location of the option along the existing N13 and the limited intersection with habitats or features of high ecological significance. The option is assigned an impact score of *Neutral to 3 – Minor or Slightly Negative*.

Options 2F1 (Blue) and 2F2 (Blue) are the least preferred options due to the greater number of Ecological Receptors intersected by these routes. Option 2F1 (Blue) and 2F2 (Blue) encounter numerous ecological receptors in the form of habitats of Local Importance (higher value) and protected mammal species. Both options have an assigned impact score of *1 - Major or Highly Negative Impacts*.

In conclusion, the emerging preferred option in relation to Biodiversity (Terrestrial) is Option 2B (Pink) given its limited land take and impacts to Ecological Receptors when compared with other options.

Appendix 1: European Sites Risk Assessment

Introduction

All options considered for Section 2 require crossing of the River Swilly, which is designated under the Lough Swilly Special Area of Conservation (SAC) and Special Protection Area (SPA). SACs and 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 Lough Swilly 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 negative 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: Lough Swilly SAC Qualifying Interests

Site Code	Site Name	Qualifying Interests Habitats and Species (*Priority Habitats)
002287	Lough Swilly	Habitats Estuaries [1130] Coastal lagoons [1150] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] Species <i>Lutra lutra</i> (Otter) [1355]

Table 2: Lough Swilly SPA Qualifying Interests

Site Code	Site Name	Qualifying Interests Habitats and Species
004075	Lough Swilly SPA	Habitats Wetland and Waterbirds [A999] Species <i>Podiceps cristatus</i> (Great Crested Grebe) [A005] <i>Ardea cinerea</i> (Grey Heron) [A028] <i>Cygnus cygnus</i> (Whooper Swan) [A038] <i>Anser anser</i> (Greylag Goose) [A043] <i>Tadorna tadorna</i> (Shelduck) [A048] <i>Anas penelope</i> (Wigeon) [A050] <i>Anas crecca</i> (Teal) [A052] <i>Anas platyrhynchos</i> (Mallard) [A053] <i>Anas clypeata</i> (Shoveler) [A056] <i>Aythya marila</i> (Scaup) [A062] <i>Bucephala clangula</i> (Goldeneye) [A067] <i>Mergus serrator</i> (Red-breasted Merganser) [A069] <i>Fulica atra</i> (Coot) [A125] <i>Haematopus ostralegus</i> (Oystercatcher) [A130] <i>Calidris canutus</i> (Knot) [A143] <i>Calidris alpina</i> (Dunlin) [A149] <i>Numenius arquata</i> (Curlew) [A160] <i>Tringa totanus</i> (Redshank) [A162] <i>Tringa nebularia</i> (Greenshank) [A164] <i>Chroicocephalus ridibundus</i> (Black-headed Gull) [A179] <i>Larus canus</i> (Common Gull) [A182] <i>Sterna sandvicensis</i> (Sandwich Tern) [A191] <i>Sterna hirundo</i> (Common Tern) [A193] <i>Anser albifrons flavirostris</i> (Greenland White-fronted Goose) [A395]

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 a comprehensive understanding of the ecological features to which the risk assessment pertained to. These included a number of dedicated visits to potential bat roost locations to confirm earlier records and confirm, as far as was practical, activity and habitat usage. Surveys were carried out to determine numbers of over-wintering bird species and the assemblage locations of SCIs of the Lough Swilly SPA in relation to the proposed options

Table 3: Lough Swilly SAC Qualifying Interest Targeted Survey Details

Survey Date	European site QI/SCI	Comment
9 th – 13 th July 2018 23 rd July 2018 14 th August 2018 22 nd August 2018	Habitats Estuaries [1130] Coastal lagoons [1150] Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>) [1330] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]	Windshield and multidisciplinary walkover surveys conducted for each option in July 2018 confirmed the terrestrial QI habitats for which the SAC is designated are not present within the study area.
9 th – 13 th July 2018 16 th July 2018 29 th August 2018	<i>Lutra lutra</i> (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 options footprints of any river crossing option. Cognisance is required during the design and AA assessment phase on severance impacts to commuting corridors of otter resulting from the construction and operational phases of the proposed project
11 th July 2018 14 th July 2018 16 th July 2018 29 th August 2018	n/a	Aquatic Surveys were conducted of the watercourses that were accessible, associated with the options within the study area.
26 th September 2018 3 rd October 2018	n/a	Bat surveys were conducted at locations which were noted as having high potential to support bat roosts, at locations intersected by the options within the study area. Bat species were identified within the study area; however, they are not a qualifying interest of the Lough Swilly SAC.

Table 4: Lough Swilly SPA Qualifying Interest Targeted Survey Details

Date	European site QI/SCI	Comment
	Habitats Wetlands [A999]	Habitat usage by SCI features was noted during each survey and cognisance of sensitive habitats providing ecosystem services to the SCI's are required within the design process.
	<u>Species</u> <i>Podiceps cristatus</i> (Great Crested Grebe) [A005] <i>Ardea cinerea</i> (Grey Heron) [A028] <i>Cygnus cygnus</i> (Whooper Swan) [A038] <i>Anser anser</i> (Greylag Goose) [A043] <i>Tadorna tadorna</i> (Shelduck) [A048] <i>Anas penelope</i> (Wigeon) [A050] <i>Anas crecca</i> (Teal) [A052] <i>Anas platyrhynchos</i> (Mallard) [A053] <i>Anas clypeata</i> (Shoveler) [A056] <i>Aythya marila</i> (Scaup) [A062] <i>Bucephala clangula</i> (Goldeneye) [A067] <i>Mergus serrator</i> (Red-breasted Merganser) [A069] <i>Fulica atra</i> (Coot) [A125] <i>Haematopus ostralegus</i> (Oystercatcher) [A130] <i>Calidris canutus</i> (Knot) [A143] <i>Calidris alpina</i> (Dunlin) [A149] <i>Numenius arquata</i> (Curlew) [A160] <i>Tringa totanus</i> (Redshank) [A162] <i>Tringa nebularia</i> (Greenshank) [A164] <i>Chroicocephalus ridibundus</i> (Black-headed Gull) [A179] <i>Larus canus</i> (Common Gull) [A182] <i>Sterna sandvicensis</i> (Sandwich Tern) [A191] <i>Sterna hirundo</i> (Common Tern) [A193] <i>Anser albifrons flavirostris</i> (Greenland White-fronted Goose) [A395]	Surveys were carried out to determine numbers of over-wintering bird species and the assemblage locations of SCIs of the SPA in relation to the proposed options. Many of the SCI species, notably ducks and waders, were present along the estuarine zone of the SPA. Swan and Goose species were present in agricultural fields and polderland extending east of Farsetmore townland, which is part of the Lough Swilly SPA boundary.
20 th December 2017, 30 th January 2018, 27 th February 2018, 15 th March 2018, 23 rd October 2018, 19 th November 2018, 10 th December 2018, 29 th January 2019 27 th February 2019 26 th March 2019		

The risk assessment matrix below is based on an evaluation of the targets of the COs for each of the six qualifying features as listed on the NPWS website⁴⁰. It is recommended that site-specific COs be used when evaluating likely significant impacts on qualifying interest (QI) of European sites. Where no site-specific COs exist, it is further recommended that another site which hosts a similar QI, but for which site-specific targets are in place is used.

⁴⁰ <https://www.npws.ie/protected-sites>

Option 2A

The Lough Swilly SAC/SPA will be intersected at the proposed crossing of the River Swilly estuary. This proposed crossing point of the Lough Swilly SAC/SPA occurs at Bonagee/Milk Isle north of the N56/N14 and ties in with the N56 north of the Lough Swilly estuary. The SAC and SPA territory spanned by the option is 0.052 km² and 0.018km², respectively. The total area of the Lough Swilly SAC is 92.577km². The total area of the Lough Swilly SPA is 85.597km².

The Lough Swilly Estuary is characterised by existing berm embankments along the estuary banks with a combination of improved agricultural and rough wet grassland in the immediate area. 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.

Table 5: Ecological Risk Associated with Lough Swilly SAC – Option 2A

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Estuaries [1130]	<p>The Lough Swilly Crossing is within the Annex I Habitat, Estuaries [1130] habitat. The community complex present is typical of the Mud Community Complex identified in the Lough Swilly SAC Conservation Objectives supporting document (NPWS, 2011)</p> <p>Potential impact pathways are associated with surface water run-off and overland flow as a result of construction phase impacts.</p>	<p>The River Swilly will be crossed by a single span structure and it is envisaged that there will be no in-stream works. Impacts on the River Swilly, if any, are most likely to occur during the construction phase.</p>	<p>It is anticipated that the greatest ecological risks will occur during the construction phase, however if works are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.</p> <p>No habitat loss.</p>
Coastal Lagoons [1150]	<p>Potential indirect connectivity to Annex habitat via the River Swilly and Estuary.</p>	<p>The qualifying feature is located 13.4km north east of the River Swilly crossing, due to the distance from the proposed works impacts are not likely to be of high significant risk</p>	<p>It is anticipated that the greatest ecological risks will occur during the construction phase, however if work are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.</p>

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]	Potential direct connectivity to Annex habitat via the River Swilly and Estuary.	The qualifying feature is intersected by the proposed River Swilly crossing. Potential for significant impacts.	It is anticipated that the greatest ecological risks will occur during the construction phase, however if work are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]	This Annex I habitat is located on the outer margins of the Swilly estuary. Therefore, there is potential for remote, indirect connectivity to this Annex I habitat via the River Swilly and Estuary.	The qualifying interest is located approximately 16km north of the proposed works. Due to distance from proposed crossing and remainder of the proposed works, this risk is deemed to be insignificant.	None
Otter (<i>Lutra lutra</i>) [1355]	Evidence of Otter activity along River Swilly tributaries. Otter holts were not identified within the estuarine habitats, the SAC or those watercourses within the study area. Further surveys to be completed as part of the EIS and NIS.	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter along the River Swilly and Estuary, 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 Swilly River and Estuary river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting routes during construction work cannot be ruled out.	Until ongoing otter surveys are completed, and a final Route Option selected, adverse effects to this qualifying interest cannot be discounted.

Table 6: Ecological Risk Associated with Lough Swilly SPA – Option 2A

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
<ul style="list-style-type: none"> ▪ <i>Podiceps cristatus</i> (Great Crested Grebe) [A005] ▪ <i>Ardea cinerea</i> (Grey Heron) [A028] ▪ <i>Cygnus cygnus</i> (Whooper Swan) [A038] ▪ <i>Anser anser</i> (Greylag Goose) [A043] ▪ <i>Tadorna tadorna</i> (Shelduck) [A048] ▪ <i>Anas penelope</i> (Wigeon) [A050] ▪ <i>Anas crecca</i> (Teal) [A052] ▪ <i>Anas platyrhynchos</i> (Mallard) [A053] ▪ <i>Anas clypeata</i> (Shoveler) [A056] ▪ <i>Aythya marila</i> (Scaup) [A062] ▪ <i>Bucephala clangula</i> (Goldeneye) [A067] ▪ <i>Mergus serrator</i> (Red-breasted Merganser) [A069] ▪ <i>Fulica atra</i> (Coot) [A125] ▪ <i>Haematopus ostralegus</i> (Oystercatcher) [A130] ▪ <i>Calidris canutus</i> (Knot) [A143] 	<p>Impact pathways identified -</p> <p>Run-off of potential pollutants to the SPA resulting in indirect impacts to the SCI species.</p> <p>Potential displacement of Species of Special Conservation Interest (SCI) features for the SPA at both construction and operational phase at the location of the proposed bridge crossing.</p> <p>Commuting corridors for birds moving along the estuary could be also be impacted as a result of a bridge crossing the Swilly estuary.</p> <p>SCI species such as Redshank, Greenshank, Teal and Black-headed Gull actively utilise the exposed estuarine muds at low-tide in the areas proximal to the potential bridge crossing location of the option.</p>	<p>Whilst robust and effective construction measures can be developed in the design phase for the avoidance of long-term disturbance to the roosting and feeding territory along the Lough Swilly estuary, proposed works could interfere with foraging and commuting activities of some species during the construction and operational phase. Therefore, there is potential for significant negative effects.</p>	<p>Until ongoing surveys are completed, cannot rule out adverse effects to the SCI of the SPA for this option.</p> <p>The Site-Specific Conservation Objectives for Lough Swilly SPA requires that favourable conservation condition be maintained for each species. Detailed assessment of data gathered from the ongoing surveys is required to establish any likely effects the proposed project may have on the SCI features of the SPA. On the basis of the precautionary principle, ecological risk cannot be excluded at this stage for the option, specifically the bridge crossing element adjacent to the Lough Swilly SPA.</p>

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
<ul style="list-style-type: none"> ▪ <i>Calidris alpina</i> (Dunlin) [A149] ▪ <i>Numenius arquata</i> (Curlew) [A160] ▪ <i>Tringa totanus</i> (Redshank) [A162] ▪ <i>Tringa nebularia</i> (Greenshank) [A164] ▪ <i>Chroicocephalus ridibundus</i> (Black-headed Gull) [A179] ▪ <i>Larus canus</i> (Common Gull) [A182] ▪ <i>Sterna sandvicensis</i> (Sandwich Tern) [A191] ▪ <i>Sterna hirundo</i> (Common Tern) [A193] ▪ <i>Anser albifrons flavirostris</i> (Greenland White-fronted Goose) [A395] ▪ Wetlands [A999] 			

Option 2B

The Lough Swilly SAC/SPA will be intersected at the proposed crossing of the River Swilly estuary. This proposed crossing point of the Lough Swilly SAC/SPA occurs at Bonagee/Milk Isle north of the N56/N14 and ties in with the N56 north of the Lough Swilly estuary. The SAC and SPA territory spanned by the option is 0.044km² and 0.012km², respectively. The total area of the Lough Swilly SAC is 92.577km². The total area of the Lough Swilly SPA is 85.597km².

The Lough Swilly Estuary is characterised by existing berm embankments along the estuary banks with a combination of improved agricultural and rough wet grassland in the immediate area. 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.

Table 7: Ecological Risk Associated with Lough Swilly SAC – Option 2B

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Estuaries [1130]	<p>The Lough Swilly Crossing is within the Annex I Habitat, Estuaries [1130] habitat. The community complex present is typical of the Mud Community Complex identified in the Lough Swilly SAC Conservation Objectives supporting document (NPWS, 2011)</p> <p>Potential impact pathways associated with surface water run-off and overland flow via the River Swilly and Estuary along with its tributaries, as a result of construction phase impacts.</p>	The River Swilly will be crossed by a single span structure and it is envisaged that there will be no in-stream works. Impacts on the River Swilly, if any, are most likely to occur during the construction phase.	It is anticipated that the greatest ecological risks will occur during the construction phase, however if works are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.
Coastal Lagoons [1150]	Potential indirect connectivity to Annex habitat via the River Swilly and Estuary.	The Annex Habitat is located 13.4km north east of the River Swilly crossing, due to the distance from the proposed works impacts are not likely to be of high significant risk	It is anticipated that the greatest ecological risks will occur during the construction phase, however if work are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330]	Potential direct connectivity to Annex habitat via the River Swilly and Estuary.	The qualifying feature is intersected by the proposed River Swilly crossing. Potential for significant impacts.	It is anticipated that the greatest ecological risks will occur during the construction phase, however if work are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]	This Annex I habitat is located on the outer margins of the Swilly estuary. Therefore, there is potential for remote, indirect connectivity to this Annex I habitat via the River Swilly and Estuary.	The qualifying interest is located approximately 16km north of the proposed works. Due to distance from proposed crossing and remainder of the proposed works, this risk is deemed to be insignificant.	None
Otter (<i>Lutra lutra</i>) [1355]	Evidence of Otter activity along River Swilly tributaries. Otter holts were not identified within the estuarine habitats, the SAC or those watercourses within the study area. Further surveys to be completed as part of the EIS and NIS.	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter along the River Swilly and Estuary, 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 Swilly River and Estuary river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting routes during construction work cannot be ruled out.	Until ongoing otter surveys are completed, and a final Route Option selected, t adverse effects to this qualifying interest cannot be discounted.

Table 8: Ecological Risk Associated with Lough Swilly SPA – Option 2B

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
<ul style="list-style-type: none"> ▪ <i>Podiceps cristatus</i> (Great Crested Grebe) [A005] ▪ <i>Ardea cinerea</i> (Grey Heron) [A028] ▪ <i>Cygnus cygnus</i> (Whooper Swan) [A038] ▪ <i>Anser anser</i> (Greylag Goose) [A043] ▪ <i>Tadorna tadorna</i> (Shelduck) [A048] ▪ <i>Anas penelope</i> (Wigeon) [A050] ▪ <i>Anas crecca</i> (Teal) [A052] ▪ <i>Anas platyrhynchos</i> (Mallard) [A053] ▪ <i>Anas clypeata</i> (Shoveler) [A056] ▪ <i>Aythya marila</i> (Scaup) [A062] ▪ <i>Bucephala clangula</i> (Goldeneye) [A067] ▪ <i>Mergus serrator</i> (Red-breasted Merganser) [A069] ▪ <i>Fulica atra</i> (Coot) [A125] ▪ <i>Haematopus ostralegus</i> (Oystercatcher) [A130] ▪ <i>Calidris canutus</i> (Knot) [A143] 	<p>Impact pathways identified -</p> <p>Run-off of potential pollutants to the SPA resulting in indirect impacts to the SCI species.</p> <p>Potential displacement of Species of Special Conservation Interest (SCI) features for the SPA at both construction and operational phase at the location of the proposed bridge crossing.</p> <p>Commuting corridors for birds moving along the estuary could be also be impacted as a result of a bridge crossing the Swilly estuary.</p> <p>SCI species such as Redshank, Greenshank, Teal and Black-headed Gull actively utilise the exposed estuarine muds at low-tide in the areas proximal to the potential bridge crossing location of the option.</p>	<p>Whilst robust and effective construction measures can be developed in the design phase for the avoidance of long-term disturbance to the roosting and feeding territory along the Lough Swilly estuary, proposed works could interfere with foraging and commuting activities of some species during the construction and operational phase. Therefore, there is potential for significant negative effects.</p>	<p>Until ongoing surveys are completed, cannot rule out adverse effects to the SCI of the SPA for this option.</p> <p>The Site-Specific Conservation Objectives for Lough Swilly SPA requires that favourable conservation condition be maintained for each species. Detailed assessment of data gathered from the on-going surveys is required to establish any likely effects the proposed project may have on the SCI features of the SPA. On the basis of the precautionary principle, ecological risk cannot be excluded at this stage for the option, specifically the bridge crossing element adjacent to the Lough Swilly SPA.</p>

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
<ul style="list-style-type: none"> ▪ <i>Calidris alpina</i> (Dunlin) [A149] ▪ <i>Numenius arquata</i> (Curlew) [A160] ▪ <i>Tringa totanus</i> (Redshank) [A162] ▪ <i>Tringa nebularia</i> (Greenshank) [A164] ▪ <i>Chroicocephalus ridibundus</i> (Black-headed Gull) [A179] ▪ <i>Larus canus</i> (Common Gull) [A182] ▪ <i>Sterna sandvicensis</i> (Sandwich Tern) [A191] ▪ <i>Sterna hirundo</i> (Common Tern) [A193] ▪ <i>Anser albifrons flavirostris</i> (Greenland White-fronted Goose) [A395] ▪ Wetlands [A999] 			

Option 2C

The Lough Swilly SAC/SPA will be intersected at the proposed crossing of the River Swilly estuary. This proposed crossing point of the Lough Swilly SAC/SPA occurs at Bonage/Milk Isle north of the N56/N14 and ties in with the N56 north of the Lough Swilly estuary. The SAC and SPA territory spanned by the option is 0.052km² and 0.018km², respectively. The total area of the Lough Swilly SAC is 92.577km². The total area of the Lough Swilly SPA is 85.597km².

The Lough Swilly Estuary is characterised by existing berm embankments along the estuary banks with a combination of improved agricultural and rough wet grassland in the immediate area. 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.

Table 9: Ecological Risk Associated with Lough Swilly SAC – Option 2C

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Estuaries [1130]	<p>The Lough Swilly Crossing is within the Annex I Habitat, Estuaries [1130] habitat. The community complex present is typical of the Mud Community Complex identified in the Lough Swilly SAC Conservation Objectives supporting document (NPWS, 2011)</p> <p>Potential impact pathways associated with surface water run-off and overland flow via the River Swilly and Estuary along with its tributaries, as a result of construction phase impacts.</p>	<p>The River Swilly will be crossed by a single span structure and it is envisaged that there will be no in-stream works. Impacts on the River Swilly, if any, are most likely to occur during the construction phase.</p>	<p>It is anticipated that the greatest ecological risks will occur during the construction phase, however if works are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.</p>
Coastal Lagoons [1150]	<p>Potential indirect connectivity to Annex habitat via the River Swilly and Estuary.</p>	<p>The Annex Habitat is located 13.4km north east of the River Swilly crossing, due to the distance from the proposed works impacts are not likely to be of high significant risk</p>	<p>It is anticipated that the greatest ecological risks will occur during the construction phase, however if work are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.</p>

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	Potential direct connectivity to Annex habitat via the River Swilly and Estuary.	The qualifying feature is intersected by the proposed River Swilly crossing. Potential for significant impacts.	It is anticipated that the greatest ecological risks will occur during the construction phase, however if work are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]	This Annex I habitat is located on the outer margins of the Swilly estuary. Therefore, there is potential for remote, indirect connectivity to this Annex I habitat via the River Swilly and Estuary.	The qualifying interest is located approximately 16km north of the proposed works. Due to distance from proposed crossing and remainder of the proposed works, this risk is deemed to be insignificant.	None
Otter (<i>Lutra lutra</i>) [1355]	Evidence of Otter activity along River Swilly tributaries. Otter holts were not identified within the estuarine habitats, the SAC or those watercourses within the study area. Further surveys to be completed as part of the EIS and NIS.	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter territory along the River Swilly and Estuary, 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 Swilly River and Estuary river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting routes during construction work cannot be ruled out.	Until ongoing otter surveys are completed, and a final Route Option selected, adverse effects to this qualifying interest cannot be discounted.

Table 10: Ecological Risk Associated with Lough Swilly SPA – Option 2C

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
<ul style="list-style-type: none"> ▪ <i>Podiceps cristatus</i> (Great Crested Grebe) [A005] ▪ <i>Ardea cinerea</i> (Grey Heron) [A028] ▪ <i>Cygnus cygnus</i> (Whooper Swan) [A038] ▪ <i>Anser anser</i> (Greylag Goose) [A043] ▪ <i>Tadorna tadorna</i> (Shelduck) [A048] ▪ <i>Anas penelope</i> (Wigeon) [A050] ▪ <i>Anas crecca</i> (Teal) [A052] ▪ <i>Anas platyrhynchos</i> (Mallard) [A053] ▪ <i>Anas clypeata</i> (Shoveler) [A056] ▪ <i>Aythya marila</i> (Scaup) [A062] ▪ <i>Bucephala clangula</i> (Goldeneye) [A067] ▪ <i>Mergus serrator</i> (Red-breasted Merganser) [A069] ▪ <i>Fulica atra</i> (Coot) [A125] ▪ <i>Haematopus ostralegus</i> (Oystercatcher) [A130] ▪ <i>Calidris canutus</i> (Knot) [A143] 	<p>Impact pathways identified -</p> <p>Potential displacement of Species of Special Conservation Interest (SCI) features for the SPA at both construction and operational phase at the location of the proposed bridge crossing.</p> <p>Commuting corridors for birds moving along the estuary could be also be impacted as a result of a bridge crossing the Swilly estuary.</p> <p>SCI species such as Redshank, Greenshank, Teal and Black-headed Gull actively utilise the exposed estuarine muds at low-tide in the areas proximal to the potential bridge crossing location of the option.</p>	<p>Whilst robust and effective construction measures can be developed in the design phase for the avoidance of long-term disturbance to the roosting and feeding territory along the Lough Swilly estuary, proposed works could interfere with foraging and commuting activities of some species during the construction and operational phase. Potential for significant negative effects.</p>	<p>Until ongoing surveys are completed, cannot rule out adverse effects to the SCI of the SPA for this option.</p> <p>The Site-Specific Conservation Objectives for Lough Swilly SPA requires that favourable conservation condition be maintained for each species. Detailed assessment of data gathered from the on-going surveys is required to establish any likely effects the proposed project may have on the SCI features of the SPA. On the basis of the precautionary principle, ecological risk cannot be excluded at this stage for the option, specifically the bridge crossing element adjacent to the Lough Swilly SPA.</p>

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
<ul style="list-style-type: none"> ▪ <i>Calidris alpina</i> (Dunlin) [A149] ▪ <i>Numenius arquata</i> (Curlew) [A160] ▪ <i>Tringa totanus</i> (Redshank) [A162] ▪ <i>Tringa nebularia</i> (Greenshank) [A164] ▪ <i>Chroicocephalus ridibundus</i> (Black-headed Gull) [A179] ▪ <i>Larus canus</i> (Common Gull) [A182] ▪ <i>Sterna sandvicensis</i> (Sandwich Tern) [A191] ▪ <i>Sterna hirundo</i> (Common Tern) [A193] ▪ <i>Anser albifrons flavirostris</i> (Greenland White-fronted Goose) [A395] ▪ Wetlands [A999] 			

Option 2D

The Lough Swilly SAC/SPA will be intersected at the proposed crossing of the River Swilly estuary. This proposed crossing point of the Lough Swilly SAC/SPA occurs at Bonagee/Milk Isle north of the N56/N14 and ties in with the N56 north of the Lough Swilly estuary. The SAC and SPA territory spanned by the option is 0.052km² and 0.018km², respectively. The total area of the Lough Swilly SAC is 92.577km². The total area of the Lough Swilly SPA is 85.597km².

The Lough Swilly Estuary is characterised by existing berm embankments along the estuary banks with a combination of improved agricultural and rough wet grassland in the immediate area. 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.

Table 11: Ecological Risk Associated with Lough Swilly SAC – Option 2D

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Estuaries [1130]	<p>The Lough Swilly Crossing is within the Annex I Habitat, Estuaries [1130] habitat. The community complex present is typical of the Mud Community Complex identified in the Lough Swilly SAC Conservation Objectives supporting document (NPWS, 2011)</p> <p>Potential impact pathways associated with surface water run-off and overland flow via the River Swilly and Estuary along with its tributaries, as a result of construction phase impacts.</p>	The River Swilly will be crossed by a single span structure and it is envisaged that there will be no in-stream works. Impacts on the River Swilly, if any, are most likely to occur during the construction phase.	It is anticipated that the greatest ecological risks will occur during the construction phase, however if works are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.
Coastal Lagoons [1150]	Potential indirect connectivity to Annex habitat via the River Swilly and Estuary.	The Annex Habitat is located 13.4km north east of the River Swilly crossing, due to the distance from the proposed works impacts are not likely to be of high significant risk	It is anticipated that the greatest ecological risks will occur during the construction phase, however if work are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330]	Potential direct connectivity to Annex habitat via the River Swilly and Estuary.	The qualifying feature is intersected by the proposed River Swilly crossing. Potential for significant impacts.	It is anticipated that the greatest ecological risks will occur during the construction phase, however if work are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]	This Annex I habitat is located on the outer margins of the Swilly estuary. Therefore, there is potential for remote, indirect connectivity to this Annex I habitat via the River Swilly and Estuary.	The qualifying interest is located approximately 16km north of the proposed works. Due to distance from proposed crossing and remainder of the proposed works, this risk is deemed to be insignificant.	None
Otter (<i>Lutra lutra</i>) [1355]	Evidence of Otter activity along River Swilly tributaries. Otter holts were not identified within the estuarine habitats, the SAC or those watercourses within the study area. Further surveys to be completed as part of the EIS and NIS.	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter territory along the River Swilly and Estuary, 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 Swilly River and Estuary river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting routes during construction work cannot be ruled out.	Until ongoing otter surveys are completed, and a final Route Option selected, adverse effects to this qualifying interest cannot be discounted.

Table 12: Ecological Risk Associated with Lough Swilly SPA – Option 2D

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
<ul style="list-style-type: none"> ▪ <i>Podiceps cristatus</i> (Great Crested Grebe) [A005] ▪ <i>Ardea cinerea</i> (Grey Heron) [A028] ▪ <i>Cygnus cygnus</i> (Whooper Swan) [A038] ▪ <i>Anser anser</i> (Greylag Goose) [A043] ▪ <i>Tadorna tadorna</i> (Shelduck) [A048] ▪ <i>Anas penelope</i> (Wigeon) [A050] ▪ <i>Anas crecca</i> (Teal) [A052] ▪ <i>Anas platyrhynchos</i> (Mallard) [A053] ▪ <i>Anas clypeata</i> (Shoveler) [A056] ▪ <i>Aythya marila</i> (Scaup) [A062] ▪ <i>Bucephala clangula</i> (Goldeneye) [A067] ▪ <i>Mergus serrator</i> (Red-breasted Merganser) [A069] ▪ <i>Fulica atra</i> (Coot) [A125] ▪ <i>Haematopus ostralegus</i> (Oystercatcher) [A130] ▪ <i>Calidris canutus</i> (Knot) [A143] 	<p>Impact pathways identified -</p> <p>Run-off of potential pollutants to the SPA resulting in indirect impacts to the SCI species.</p> <p>Potential displacement of Species of Special Conservation Interest (SCI) features for the SPA at both construction and operational phase at the location of the proposed bridge crossing.</p> <p>Commuting corridors for birds moving along the estuary could be also be impacted as a result of a bridge crossing the Swilly estuary.</p> <p>SCI species such as Redshank, Greenshank, Teal and Black-headed Gull actively utilise the exposed estuarine muds at low-tide in the areas proximal to the potential bridge crossing location of the option.</p>	<p>Whilst robust and effective construction measures can be developed in the design phase for the avoidance of long-term disturbance to the roosting and feeding territory along the Lough Swilly estuary, proposed works could interfere with foraging and commuting activities of some species during the construction and operational phase. Therefore, there is potential for significant negative effects.</p>	<p>Until ongoing surveys are completed, cannot rule out adverse effects to the SCI of the SPA for this option.</p> <p>The Site-Specific Conservation Objectives for Lough Swilly SPA requires that favourable conservation condition be maintained for each species. Detailed assessment of data gathered from the on-going surveys is required to establish any likely effects the proposed project may have on the SCI features of the SPA. On the basis of the precautionary principle, ecological risk cannot be excluded at this stage for the option, specifically the bridge crossing element adjacent to the Lough Swilly SPA.</p>

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
<ul style="list-style-type: none"> ▪ <i>Calidris alpina</i> (Dunlin) [A149] ▪ <i>Numenius arquata</i> (Curlew) [A160] ▪ <i>Tringa totanus</i> (Redshank) [A162] ▪ <i>Tringa nebularia</i> (Greenshank) [A164] ▪ <i>Chroicocephalus ridibundus</i> (Black-headed Gull) [A179] ▪ <i>Larus canus</i> (Common Gull) [A182] ▪ <i>Sterna sandvicensis</i> (Sandwich Tern) [A191] ▪ <i>Sterna hirundo</i> (Common Tern) [A193] ▪ <i>Anser albifrons flavirostris</i> (Greenland White-fronted Goose) [A395] ▪ Wetlands [A999] 			

Option 2E

The Lough Swilly SAC/SPA will be intersected at the proposed crossing of the River Swilly estuary. This proposed crossing point of the Lough Swilly SAC/SPA occurs at Bonagee/Milk Isle north of the N56/N14 and ties in with the N56 north of the Lough Swilly estuary. The SAC and SPA territory spanned by the option is 0.052km² and 0.018km², respectively. The total area of the Lough Swilly SAC is 92.577km². The total area of the Lough Swilly SPA is 85.597km².

The Lough Swilly Estuary is characterised by existing berm embankments along the estuary banks with a combination of improved agricultural and rough wet grassland in the immediate area. 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.

Table 11: Ecological Risk Associated with Lough Swilly SAC – Option 2E

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Estuaries [1130]	<p>The Lough Swilly Crossing is within the Annex I Habitat, Estuaries [1130] habitat. The community complex present is typical of the Mud Community Complex identified in the Lough Swilly SAC Conservation Objectives supporting document (NPWS, 2011)</p> <p>Potential impact pathways associated with surface water run-off and overland flow via the River Swilly and Estuary along with its tributaries, as a result of construction phase impacts.</p>	The River Swilly will be crossed by a single span structure and it is envisaged that there will be no in-stream works. Impacts on the River Swilly, if any, are most likely to occur during the construction phase.	It is anticipated that the greatest ecological risks will occur during the construction phase, however if works are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.
Coastal Lagoons [1150]	Potential indirect connectivity to Annex habitat via the River Swilly and Estuary.	The Annex Habitat is located 13.4km north east of the River Swilly crossing, due to the distance from the proposed works impacts are not likely to be of high significant risk	It is anticipated that the greatest ecological risks will occur during the construction phase, however if work are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]	Potential direct connectivity to Annex habitat via the River Swilly and Estuary.	The qualifying feature is intersected by the proposed River Swilly crossing. Potential for significant impacts.	It is anticipated that the greatest ecological risks will occur during the construction phase, however if work are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]	This Annex I habitat is located on the outer margins of the Swilly estuary. Therefore, there is potential for remote, indirect connectivity to this Annex I habitat via the River Swilly and Estuary.	The qualifying interest is located approximately 16km north of the proposed works. Due to distance from proposed crossing and remainder of the proposed works, this risk is deemed to be insignificant.	None
Otter (<i>Lutra lutra</i>) [1355]	Evidence of Otter activity along River Swilly tributaries. Otter holts were not identified within the estuarine habitats, the SAC or those watercourses within the study area. Further surveys to be completed as part of the EIS and NIS.	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter along the River Swilly and Estuary, 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 Swilly River and Estuary river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting routes during construction work cannot be ruled out.	Until ongoing otter surveys are completed, and a final Route Option selected, adverse effects to this qualifying interest cannot be discounted.

Table 12: Ecological Risk Associated with Lough Swilly SPA – Option 2E

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
<ul style="list-style-type: none"> ▪ <i>Podiceps cristatus</i> (Great Crested Grebe) [A005] ▪ <i>Ardea cinerea</i> (Grey Heron) [A028] ▪ <i>Cygnus cygnus</i> (Whooper Swan) [A038] ▪ <i>Anser anser</i> (Greylag Goose) [A043] ▪ <i>Tadorna tadorna</i> (Shelduck) [A048] ▪ <i>Anas penelope</i> (Wigeon) [A050] ▪ <i>Anas crecca</i> (Teal) [A052] ▪ <i>Anas platyrhynchos</i> (Mallard) [A053] ▪ <i>Anas clypeata</i> (Shoveler) [A056] ▪ <i>Aythya marila</i> (Scaup) [A062] ▪ <i>Bucephala clangula</i> (Goldeneye) [A067] ▪ <i>Mergus serrator</i> (Red-breasted Merganser) [A069] ▪ <i>Fulica atra</i> (Coot) [A125] ▪ <i>Haematopus ostralegus</i> (Oystercatcher) [A130] ▪ <i>Calidris canutus</i> (Knot) [A143] 	<p>Impact pathways identified -</p> <p>Run-off of potential pollutants to the SPA resulting in indirect impacts to the SCI species.</p> <p>Potential displacement of Species of Special Conservation Interest (SCI) features for the SPA at both construction and operational phase at the location of the proposed bridge crossing.</p> <p>Commuting corridors for birds moving along the estuary could be also be impacted as a result of a bridge crossing the Swilly estuary.</p> <p>SCI species such as Redshank, Greenshank, Teal and Black-headed Gull actively utilise the exposed estuarine muds at low-tide in the areas proximal to the potential bridge crossing location of the option.</p>	<p>Whilst robust and effective construction measures can be developed in the design phase for the avoidance of long-term disturbance to the roosting and feeding territory along the Lough Swilly estuary, proposed works could interfere with foraging and commuting activities of some species during the construction and operational phase. Therefore, there is potential for significant negative effects.</p>	<p>Until ongoing surveys are completed, cannot rule out adverse effects to the SCI of the SPA for this option.</p> <p>The Site-Specific Conservation Objectives for Lough Swilly SPA requires that favourable conservation condition be maintained for each species. Detailed assessment of data gathered from the on-going surveys is required to establish any likely effects the proposed project may have on the SCI features of the SPA. On the basis of the precautionary principle, ecological risk cannot be excluded at this stage for the option, specifically the bridge crossing element adjacent to the Lough Swilly SPA.</p>

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
<ul style="list-style-type: none"> ▪ <i>Calidris alpina</i> (Dunlin) [A149] ▪ <i>Numenius arquata</i> (Curlew) [A160] ▪ <i>Tringa totanus</i> (Redshank) [A162] ▪ <i>Tringa nebularia</i> (Greenshank) [A164] ▪ <i>Chroicocephalus ridibundus</i> (Black-headed Gull) [A179] ▪ <i>Larus canus</i> (Common Gull) [A182] ▪ <i>Sterna sandvicensis</i> (Sandwich Tern) [A191] ▪ <i>Sterna hirundo</i> (Common Tern) [A193] ▪ <i>Anser albifrons flavirostris</i> (Greenland White-fronted Goose) [A395] ▪ Wetlands [A999] 			

Option 2F1

The Lough Swilly SAC/SPA will be intersected at the proposed crossing of the River Swilly estuary. This proposed crossing point of the Lough Swilly SAC/SPA occurs at Bunnagee/Milk Isle north of the N56/N14 and ties in with the N56 north of the Lough Swilly estuary. The SAC and SPA territory spanned by the option is 0.052km² and 0.0012km², respectively. The total area of the Lough Swilly SAC is 92.577km². The total area of the Lough Swilly SPA is 85.597km².

The Lough Swilly Estuary is characterised by existing berm embankments along the estuary banks with a combination of improved agricultural and rough wet grassland in the immediate area. 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.

Table 15: Ecological Risk Associated with Lough Swilly SAC – Option 2F1

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Estuaries [1130]	<p>The Lough Swilly Crossing is within the Annex I Habitat, Estuaries [1130] habitat. The community complex present is typical of the Mud Community Complex identified in the Lough Swilly SAC Conservation Objectives supporting document (NPWS, 2011)</p> <p>Potential impact pathways associated with surface water run-off and overland flow via the River Swilly and Estuary along with its tributaries, as a result of construction phase impacts.</p>	The River Swilly will be crossed by a single span structure and it is envisaged that there will be no in-stream works. Impacts on the River Swilly, if any, are most likely to occur during the construction phase.	It is anticipated that the greatest ecological risks will occur during the construction phase, however if works are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.
Coastal Lagoons [1150]	Potential indirect connectivity to Annex habitat via the River Swilly and Estuary.	The Annex Habitat is located 13.4km north east of the River Swilly crossing, due to the distance from the proposed works impacts are not likely to be of high significant risk	It is anticipated that the greatest ecological risks will occur during the construction phase, however if work are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330]	Potential direct connectivity to Annex habitat via the River Swilly and Estuary.	The qualifying feature is intersected by the proposed River Swilly crossing. Potential for significant impacts.	It is anticipated that the greatest ecological risks will occur during the construction phase, however if work are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]	This Annex I habitat is located on the outer margins of the Swilly estuary. Therefore there is potential for remote, indirect connectivity to this Annex I habitat via the River Swilly and Estuary.	The qualifying interest is located approximately 16km north of the proposed works. Due to distance from proposed crossing and remainder of the proposed works, this risk is deemed to be insignificant.	None
Otter (<i>Lutra lutra</i>) [1355]	Evidence of Otter activity along River Swilly tributaries. Otter holts were not identified within the estuarine habitats, the SAC or those watercourses within the study area. Further surveys to be completed as part of the EIS and NIS.	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter along the River Swilly and Estuary, 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 Swilly River and Estuary river bank and bridge pillars/abutments. Permanent disturbance to territory and/or commuting routes during construction work cannot be ruled out.	Until ongoing otter surveys are completed and a final Route Option selected, adverse effects to this qualifying interest cannot be discounted

Table 16: Ecological Risk Associated with Lough Swilly SPA – Option 2F1

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
<ul style="list-style-type: none"> ▪ <i>Podiceps cristatus</i> (Great Crested Grebe) [A005] ▪ <i>Ardea cinerea</i> (Grey Heron) [A028] ▪ <i>Cygnus cygnus</i> (Whooper Swan) [A038] ▪ <i>Anser anser</i> (Greylag Goose) [A043] ▪ <i>Tadorna tadorna</i> (Shelduck) [A048] ▪ <i>Anas penelope</i> (Wigeon) [A050] ▪ <i>Anas crecca</i> (Teal) [A052] ▪ <i>Anas platyrhynchos</i> (Mallard) [A053] ▪ <i>Anas clypeata</i> (Shoveler) [A056] ▪ <i>Aythya marila</i> (Scaup) [A062] ▪ <i>Bucephala clangula</i> (Goldeneye) [A067] ▪ <i>Mergus serrator</i> (Red-breasted Merganser) [A069] ▪ <i>Fulica atra</i> (Coot) [A125] ▪ <i>Haematopus ostralegus</i> (Oystercatcher) [A130] ▪ <i>Calidris canutus</i> (Knot) [A143] ▪ <i>Calidris alpina</i> (Dunlin) [A149] ▪ <i>Numenius arquata</i> (Curlew) [A160] ▪ <i>Tringa totanus</i> (Redshank) [A162] 	<p>Impact pathways identified –</p> <p>Run-off of potential pollutants to the SPA resulting in indirect impacts to the SCI species.</p> <p>Potential displacement of Species of Special Conservation Interest (SCI) features for the SPA at both construction and operational phase at the location of the proposed bridge crossing.</p> <p>Commuting corridors for birds moving along the estuary could be also be impacted as a result of a bridge crossing the Swilly estuary.</p> <p>SCI species such as Redshank, Greenshank, Teal and Black-headed Gull actively utilise the exposed estuarine muds at low-tide in the areas proximal to the potential bridge crossing location of the option.</p>	<p>Whilst robust and effective construction measures can be developed in the design phase for the avoidance of long-term disturbance to the roosting and feeding territory along the Lough Swilly estuary, proposed works could interfere with foraging and commuting activities of some species during the construction and operational phase. Therefore, there is potential for significant negative effects.</p>	<p>Until ongoing surveys are completed, cannot rule out adverse effects to the SCI of the SPA for this option.</p> <p>The Site-Specific Conservation Objectives for Lough Swilly SPA requires that favourable conservation condition be maintained for each species. Detailed assessment of data gathered from the on-going surveys is required to establish any likely effects the proposed project may have on the SCI features of the SPA. On the basis of the precautionary principle, ecological risk cannot be excluded at this stage for the option, specifically the bridge crossing element adjacent to the Lough Swilly SPA.</p>

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
<ul style="list-style-type: none"> ▪ <i>Tringa nebularia</i> (Greenshank) [A164] ▪ <i>Chroicocephalus ridibundus</i> (Black-headed Gull) [A179] ▪ <i>Larus canus</i> (Common Gull) [A182] ▪ <i>Sterna sandvicensis</i> (Sandwich Tern) [A191] ▪ <i>Sterna hirundo</i> (Common Tern) [A193] ▪ <i>Anser albifrons flavirostris</i> (Greenland White-fronted Goose) [A395] ▪ Wetlands [A999] 			

Option 2F2

The Lough Swilly SAC/SPA will be intersected at the proposed crossing of the River Swilly estuary. This proposed crossing point of the Lough Swilly SAC/SPA occurs at Bunagee/Milk Isle north of the N56/N14 and ties in with the N56 north of the Lough Swilly estuary. The SAC and SPA territory spanned by the option is 0.052km² and 0.0012km², respectively. The total area of the Lough Swilly SAC is 92.577km². The total area of the Lough Swilly SPA is 85.597km².

The Lough Swilly Estuary is characterised by existing berm embankments along the estuary banks with a combination of improved agricultural and rough wet grassland in the immediate area. 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.

Table 17: Ecological Risk Associated with Lough Swilly SAC – Option 2F2

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Estuaries [1130]	<p>The Lough Swilly Crossing is within the Annex I Habitat, Estuaries [1130] habitat. The community complex present is typical of the Mud Community Complex identified in the Lough Swilly SAC Conservation Objectives supporting document (NPWS, 2011)</p> <p>Potential impact pathways associated with surface water run-off and overland flow via the River Swilly and Estuary along with its tributaries, as a result of construction phase impacts.</p>	The River Swilly will be crossed by a single span structure and it is envisaged that there will be no in-stream works. Impacts on the River Swilly, if any, are most likely to occur during the construction phase.	It is anticipated that the greatest ecological risks will occur during the construction phase, however if works are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.
Coastal Lagoons [1150]	Potential indirect connectivity to Annex habitat via the River Swilly and Estuary.	The Annex Habitat is located 13.4km north east of the River Swilly crossing, due to the distance from the proposed works impacts are not likely to be of high significant risk	It is anticipated that the greatest ecological risks will occur during the construction phase, however if work are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330]	Potential direct connectivity to Annex habitat via the River Swilly and Estuary.	The qualifying feature is intersected by the proposed River Swilly crossing. Potential for significant impacts.	It is anticipated that the greatest ecological risks will occur during the construction phase, however if work are carried out in adherence to best practice construction guidelines and operational standards, no long-term significant impacts are envisaged.
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]	This Annex I habitat is located on the outer margins of the Swilly estuary. Therefore there is potential for remote, indirect connectivity to this Annex I habitat via the River Swilly and Estuary.	The qualifying interest is located approximately 16km north of the proposed works. Due to distance from proposed crossing and remainder of the proposed works, this risk is deemed to be insignificant.	None
Otter (<i>Lutra lutra</i>) [1355]	Evidence of Otter activity along River Swilly tributaries. Otter holts were not identified within the estuarine habitats, the SAC or those watercourses within the study area. Further surveys to be completed as part of the EIS and NIS.	Whilst robust and effective construction measures can be developed for the avoidance of long-term disturbance to otter along the River Swilly and Estuary, 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 Swilly River and Estuary river bank and bridge pillars/abutments. Potential for significant negative effects.	Until ongoing otter surveys are completed and a final Route Option selected, adverse effects to this qualifying interest cannot be discounted.

Table 18: Ecological Risk Associated with Lough Swilly SPA – Option 2F2

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
<ul style="list-style-type: none"> ▪ <i>Podiceps cristatus</i> (Great Crested Grebe) [A005] ▪ <i>Ardea cinerea</i> (Grey Heron) [A028] ▪ <i>Cygnus cygnus</i> (Whooper Swan) [A038] ▪ <i>Anser anser</i> (Greylag Goose) [A043] ▪ <i>Tadorna tadorna</i> (Shelduck) [A048] ▪ <i>Anas penelope</i> (Wigeon) [A050] ▪ <i>Anas crecca</i> (Teal) [A052] ▪ <i>Anas platyrhynchos</i> (Mallard) [A053] ▪ <i>Anas clypeata</i> (Shoveler) [A056] ▪ <i>Aythya marila</i> (Scaup) [A062] ▪ <i>Bucephala clangula</i> (Goldeneye) [A067] ▪ <i>Mergus serrator</i> (Red-breasted Merganser) [A069] ▪ <i>Fulica atra</i> (Coot) [A125] ▪ <i>Haematopus ostralegus</i> (Oystercatcher) [A130] ▪ <i>Calidris canutus</i> (Knot) [A143] 	<p>Impact pathways identified -</p> <p>Run-off of potential pollutants to the SPA resulting in indirect impacts to the SCI species.</p> <p>Potential displacement of Species of Special Conservation Interest (SCI) features for the SPA at both construction and operational phase at the location of the proposed bridge crossing.</p> <p>Commuting corridors for birds moving along the estuary could be also be impacted as a result of a bridge crossing the Swilly estuary.</p> <p>SCI species such as Redshank, Greenshank, Teal and Black-headed Gull actively utilise the exposed estuarine muds at low-tide in the areas proximal to the potential bridge crossing location of the option.</p>	<p>Whilst robust and effective construction measures can be developed in the design phase for the avoidance of long-term disturbance to the roosting and feeding territory along the Lough Swilly estuary, proposed works could interfere with foraging and commuting activities of some species during the construction and operational phase. Therefore, there is potential for significant negative effects.</p>	<p>Until ongoing surveys are completed, cannot rule out adverse effects to the SCI of the SPA for this option.</p> <p>The Site-Specific Conservation Objectives for Lough Swilly SPA requires that favourable conservation condition be maintained for each species. Detailed assessment of data gathered from the on-going surveys is required to establish any likely effects the proposed project may have on the SCI features of the SPA. On the basis of the precautionary principle, ecological risk cannot be excluded at this stage for the option, specifically the bridge crossing element adjacent to the Lough Swilly SPA.</p>

Qualifying Feature	Impact Pathways Identified	Likely Significant Risk	Ecological Risk (in terms of Site designation)
<ul style="list-style-type: none"> ▪ <i>Calidris alpina</i> (Dunlin) [A149] ▪ <i>Numenius arquata</i> (Curlew) [A160] ▪ <i>Tringa totanus</i> (Redshank) [A162] ▪ <i>Tringa nebularia</i> (Greenshank) [A164] ▪ <i>Chroicocephalus ridibundus</i> (Black-headed Gull) [A179] ▪ <i>Larus canus</i> (Common Gull) [A182] ▪ <i>Sterna sandvicensis</i> (Sandwich Tern) [A191] ▪ <i>Sterna hirundo</i> (Common Tern) [A193] ▪ <i>Anser albifrons flavirostris</i> (Greenland White-fronted Goose) [A395] ▪ Wetlands [A999] 			

Appendix 2:

Ecological Impact Risk Matrix

Criteria for impact magnitude (derived from TII, Unit 12, PAG, 2011)⁴¹ 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		

⁴¹ 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)⁴¹. 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).



TEN-T Priority Route Improvement Project, Donegal

Section 2: N56 / N13 Letterkenny to Manorcunningham

Option Selection Report

Appendix D2.5 – Biodiversity (Aquatic)

Document Control Sheet

Client:	Donegal County Council
Project Title:	TEN-T Priority Route Improvement Project, Donegal – Section 2: N56 / N13 Letterkenny to Manorcunningham
Document Title:	Option Selection Report –Appendix D2.5 – Biodiversity (Aquatic)
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1 INTRODUCTION

This report contains the aquatic biodiversity assessment of the 7 no. options for Section 2: N56 / N13 Letterkenny to Manorcunningham 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 the seven options (2A, 2B, 2C, 2D, 2E, 2F1 and 2F2), and their associated link options, were comprehensively investigated. This involved desk and field studies in order to characterise and identify aquatic ecological value of all waterbodies (rivers, streams and estuary) 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 the quality of aquatic habitats including; fisheries value, presence/absence of protected aquatic species and habitats, hydromorphology and biological indicators of water quality. Site designations and any 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 impact as part of the overall option selection process.

Watercourses intersected by the proposed options lie within the Lough Swilly catchment, Co Donegal, specifically the River Swilly and Isle Burn / Corkey River tributary sub-catchments. A proposed new crossing of the Swilly main channel downstream of Letterkenny, is located within the Lough Swilly Special Area of Conservation (SAC Code – 002287) and Lough Swilly including Big Isle, Blanket Nook and Inch Lake proposed National Heritage Area (pNHA Code 000166).

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 (EclA) relating to major engineering projects, including transport and energy infrastructure developments.

1.1 Methodology

The assessment of options (Aquatic Biodiversity) involved investigation of all the main inland surface waters (rivers, streams) that are intersected by each of the seven options. This was in order to identify details and descriptions of ecological value, including fisheries habitats and importance, presence/absence of protected habitats and species, and any relevant site 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 Lough Swilly SAC, a thorough desk-based search of available information was undertaken including the following:

- 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.
- National Biodiversity Centre Livemaps (<http://www.biodiversityireland.ie/biodiversity-data/access-biodiversity-data/>)
- EPA Envision Mapping (<http://maps.epa.ie/InternetMapView/mapviewer.aspx>)
- NPWS Maps and Data (<http://www.npws.ie/mapsanddata/>)
- WFD and River Basin Management site (<http://www.wfdireland.ie/>)
- WFD watermaps (<http://www.wfdireland.ie/maps.html>)

1.1.2 Field Studies

Study Approach

Fieldwork was conducted in good weather conditions on July 13th and 14th, 2018. In as much as possible with regards to access, all intersections between surface waters and proposed option were subject to a walkover survey. 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 the 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 the habitat types 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. Specialist sampling and habitat characterisation was carried out in the Lough Swilly Estuary, at the proposed option crossing location.

Fisheries Habitat Assessment

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

General Habitat Descriptions

Sites were visually assessed with regard 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).

Biological Water Quality Assessment

Macroinvertebrate samples were collected according to EPA standard biological river monitoring procedure adhering to ISO Standard for kick sampling and utilising the EPA's Quality Rating System (Q-Value). Under this system, a standard 2-minute, travelling, kick-sample is 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 received 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 were used to assign Q-values. The macroinvertebrate EQR calculated for water quality / ecological status interpretation is set out in **Table 1-1**, below.

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

Biotic Index	EQR ¹	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

Swilly Estuary Habitat Characterisation

A walkover of the River Swilly crossing area near Milk Isle was undertaken on 11th July 2018. In addition, a set of five replicate samples and a 0.25m² dig through were collected and checked for infauna at two locations within the river crossing area. Samples were also collected for granulometric and loss on ignition analyses at these stations. Sample site locations are shown in **Table 1-2**. Sampling methodology followed the methods outlined in the *Marine Monitoring Handbook* (Davies *et al.*, 2001).

Table 1-2: Location of River Swilly Estuarine Sites (ITM)

Site	Easting	Northing
Swilly - S1	619086	911690
Swilly - S2	619014	911558

1.1.3 Assessment Criteria

Ecological Valuation of Watercourses

The criteria used for assessment of ecological value of watercourses are adapted from NRA² *Guidelines for Assessment of Ecological Impacts of National Roads Schemes* (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.

¹ EQR = Environmental Quality Ratio (Observed/Reference);

² The National Roads Authority (NRA) and the Railway Procurement Agency were merged to become Transport Infrastructure Ireland (TII) in 2015.

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 EclA, including:

- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine CIEEM (2018);
- Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EIAR), (EPA (2017);
- NRA³ Guidelines for Assessment of Ecological Impacts of National Roads Schemes (NRA, 2009).

The magnitude, extent, timing and duration of potential impacts have been considered as well as their likelihood of occurring (CIEEM, 2018; EPA, 2017). 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 the Lough Swilly 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 Category Key as set out in **Table 1-3**. This exercise was conducted with reference to relevant NRA *Ecological Impact Assessment* and *Project Appraisal Guidelines* (NRA, 2009; NRA 2011).

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

- 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.

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

³ The National Roads Authority (NRA) and the Railway Procurement Agency were merged to become Transport Infrastructure Ireland (TII) in 2015.

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 (See **Appendix 1**). The quantitative evaluation was conducted by a broad calculation of the linear length (extent) of watercourses directly affected by each option. 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 1-4**. The Impact Risk Score rates each watercourse intersection on a scale from 1 (Major Negative) to 7 (Major Positive).

Table 1-4: Glossary of Impact Duration (EPA, 2017)

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 Practice (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 Lough Swilly and tributaries catchment, specifically the River Swilly and Isle Burn/Corkey River sub-catchments. The Lough Swilly catchment is largely located within County Donegal with a very small portion of the upper Corkey sub-catchment located in Northern Ireland. In total the catchment area covers some 1,130 km² (DCC, 2015).

2.1.1 Swilly Estuary

The Swilly Estuary (Lough Swilly) covers an area of 59km², starting at the tidal limit of the River Swilly in Letterkenny town and extending seaward approximately 20km north-easterly to the village of Rathmullan (CRFB, 2010). The estuary is within Lough Swilly SAC (002287) and Lough Swilly including Big Isle, Blanket Nook and Inch Lake pNHA (000166). Qualifying Interests of the SAC (NPWS, 2011) are:

- Estuaries [1130]
- Coastal lagoons [1150]
- Atlantic salt meadows (*Glaucopuccinellietalia maritima*) [1330]
- Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]
- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]
- *Lutra lutra* (Otter)

In addition, the Lough Swilly Special Protection Area (SPA 004075) for birds commences at the downstream end of the proposed option for the new River Swilly crossing.

Lough Swilly is an important fisheries resource. The Central Fisheries and Regional Fisheries Board (CRFB, now IFI) carried out WFD fish sampling in the Swilly Estuary in 2009, recording 32 fish species, which was the highest fish species richness for any transitional water body surveyed nationwide that year. Juveniles of commercially important fish species were present (cod, plaice and whiting), plus species of angling importance (sea trout, flounder and lesser spotted dogfish) (CRFB, 2010). Lough Swilly estuary was assigned draft ecological status classifications of “Good” based on fish populations present in 2009.

The Swilly Estuary is monitored by the EPA and is currently classified as a Transitional Waterbody with *Intermediate* water quality based on general physio-chemical elements, phytoplankton and macroalgal growths (EPA Envision Maps).

2.1.2 Swilly River

The River Swilly rises in the mountains of Glendore, flowing easterly through Letterkenny into the estuary at Lough Swilly before flowing into the Atlantic Ocean. The river is tidal to a point upstream of Letterkenny town, near the Oldtown Bridge. Inland Fisheries Ireland (IFI) carry out Water Framework Directive (WFD) freshwater fish stock monitoring at a site on the River Swilly, c.12km upstream of Letterkenny, where brown trout (*Salmo trutta*), salmon (*Salmo salar*), lamprey and eel were recorded (Kelly *et al.*, 2012). This is relevant in so far as the anadromous fish species - salmon, sea trout, eel, river lamprey and sea lamprey are species that would be migrating into the freshwater reaches of the River Swilly to spawn. They would, therefore, pass through Lough Swilly Estuary and past the location of the new bridge proposed under the current scheme.

Biological water quality is monitored by the EPA on the River Swilly in freshwater reaches upstream of Letterkenny. Recent data is displayed in

Table 2-1, showing the river is currently ‘unpolluted’ (Q4-5), equating to High Status. Note that the freshwater reaches of the River Swilly are not affected by the currently proposed project, but it is of some relevance that waters flowing into the estuary are currently at high status.

Corravaddy Burn and Corranagh Burn join to form one channel just upstream of the existing N56 crossing location, forming a tributary of the River Swilly. The stream discharges to the tidal zone of the Swilly downstream of Letterkenny. The EPA monitor this tributary, with recent records (see

Table 2-1) showing consistently Poor Status (Q3). This is relevant in so far as a tributary of the Corranagh Burn is intercepted by the proposed options under the current scheme.

2.1.3 Isle Burn / Corkey River

At Manorcunningham, a number of small streams potentially affected by the scheme drain to the Isle Burn River, which forms the lower, tidal reaches of the “Corkey” River. The Isle Burn flows into the Swilly Estuary, connected to Lough Swilly. The Isle Burn, immediately downstream of the existing N13 crossing, forms part of the Lough Swilly SAC / pNHA, with Lough Swilly SPA located a further 1km downstream. There was no available background fisheries data for the Isle Burn / Corkey River.

EPA monitoring data for freshwaters of the Isle Burn / Corkey River is available through records for “Leslie Hill (Stream)”, which currently reported Poor Status (Q2-3), “moderately polluted”, in 2016. This is a significant decline from Good Status in 2010 and 2013, as shown in

Table 2-1.. Note that freshwater reaches of the Corkey River are not affected by the currently proposed scheme, but it is of some relevance that freshwaters flowing into the estuary are currently somewhat impaired.

The Dooballagh Burn is the main stream affected by Options 2F1 and 2F2. It runs from Lurgybrack to Pluck, discharging to the Isle Burn within tidal reaches about 250m upstream of the Lough Swilly SAC boundary. EPA monitoring data show consistently Good Status (Q4) in this tributary (see **Table 2.1**).

Table 2-1: EPA Water Quality Monitoring Data

EPA Code	Station Name	2010	2013	2016
39S020190	River Swilly – Br. at Newmills	3	4	4-5
39D020200	Dooballagh Burn – Br. at Pluck Mill	4	4	4
39C030250	Corravaddy Burn – Br. near Bunnagee	3	3	3
39L050600	Leslie Hill Stream – Br.at Leslie Hill	4	4	2-3

2.2 Field Survey

2.2.1 Options

Dooballagh Burn at Pluck [2F1]

- 2F1 – c.370m intersection across option.



Image 2-1

ITM: 622675 910126 Dooballagh Burn at Pluck, disused rail bridge, typical habitat on crossing point – 2F2 Option (13th July 2018).



Image 2-2

ITM: 622838 910340 Dooballagh Burn – site of benthic macroinvertebrate sample, typical stream habitat (14th July 2018).

Habitat / Fisheries Assessment: The Dooballagh Burn is a moderate sized (bank-width 3-4m, wet-width 1-2m; 15cm depth), moderate-to fast flowing, meandering stream (**Image 2-1** & **Image 2-2**) that discharges directly to the Isle Burn in tidal reaches (**Image 2-3**). There were signs of historical drainage, but good recovery with quite natural instream morphology, forming a series of mainly riffle/run and glide/run sequences over substrates of gravel, cobble and coarse sand with some exposed bedrock and small boulders. Instream vegetation comprised mainly aquatic mosses and liverworts (*Amblystegium* spp., *Chiloscyphus* spp.). The affected reach has a riparian corridor of broadleaf trees and shrubs, mainly ash (*Fraxinus excelsior*), holly (*Ilex aquifolium*), alder (*Alnus glutinosa*), hawthorn (*Crataegus monogyna*), with generally rough and improved grazing pasture beyond. Dooballagh Burn has excellent salmonid nursery habitat and good potential for salmonid spawning, though holding pools were scarce. Numerous parr (1+ fish) were observed in pools and glides near riffles, potentially salmon and trout. The stream 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 high degree of naturalness and fisheries value. This watercourse is considered Category C (County Importance).

Biological Water Quality: A standard macroinvertebrate sample was taken and analysed on the bankside. The community had a reasonable representation of more sensitive species, including the good quality indicator mayfly *Ecdyonurus* plus numerous moderately sensitive stoneflies (*Leuctra* spp.). Other more tolerant groups included; midges (*Chironomidae*), uncased caddisflies (Hydropsychidae), Baetid and *Serratella ignita* mayflies. The sample merited a Q4 (3-4) rating, equating to unpolluted-to-slightly polluted and Good/Moderate Ecological Status.

Lower Dooballagh Burn (confluence with Isle Burn) [2E; 2F1]

- 2F1– c.200m intersection at confluence and upstream of Corkey River.
- 2E – c.150m intersection at confluence and upstream of Corkey River.

Habitat / Fisheries Assessment: The lower Dooballagh Burn is under considerable tidal influence at the Isle Burn confluence. It is an important migration option for migrating fish species in and out of the Dooballagh Burn catchment, e.g., salmon, lampreys, eel, but has little in the way of salmonid spawning or nursery habitat. It is, however, very near the Lough Swilly SAC boundary and would be a foraging area for many types of estuarine fish. This was classed as Category C (County Importance with high local fisheries value).

Dooballagh Burn Tributary - Aghlehard to Blindtown [2F1; 2F2]

- 2F1 and 2F2 – long reach of c.1500m intersects with centre line/north side of option.

**Image 2-3**

ITM: 623104 910625 Dooballagh Burn / Isle Burn confluence – sluggish tidal reach – 2F1, 2E Options (14th July 2018)

**Image 2-4**

ITM: 621222 909488 Upper reaches of the Dooballagh Burn - typical drained habitat but with reasonable fisheries potential (14th July 2018)

Habitat / Fisheries Assessment: The Dooballagh Burn Tributary. – Aghlehard to Blind Town is a small (bank-width 2m, wet-width 0.5-1.0m) stream that has been extensively drained in the upper reaches (see **Image 2-4**). There was a combination of riffle/run and step/pool type flow with substrates of cobble, pebble and gravel in lower reaches near Blind Town and more gravel and pebble substrates in drained reaches near Aghlehard. Riparian hedgerow shading the stream was comprised of Holly, Hawthorn, Sycamore, Ash and Willow. There was reasonable flow even in drought. Considered to have some reasonable potential for trout and brook lamprey spawning and nursery. This watercourse was assigned as Category D rating (Local Importance (higher value) with moderate local fisheries value).

Isle Burn Tributary A [2F2]

- 2F2 – option has a 300m intersection with this small channel.

Habitat / Fisheries Assessment: Isle Burn Tributary A had extremely low flows during July 2018. It was a small (bank-width 1.2m, wet-width 30cm; 3cm depth) historically drained channel (**Image 2-5**). Substrates were mainly pebble and gravel with some cobble and patches of silt. Quite embedded, meaning it is

unlikely to be salmonid spawning habitat, although with greater flows in winter trout cannot be ruled out. No instream vegetation, banks steep and stable with dense riparian hedgerow of fern, ivy, bramble and cover from sycamore and conifers. This watercourse was classed as Category E (Local Importance – lower value).



	
Image 2-5	Image 2-6
ITM: 623170 910013 Isle Burn Trib. A - Blue Option – minor, low value channel (13 th July 2018)	ITM: 622394 910628 Isle Burn Trib. B1, upper end – Blue, Green Options - minor channel (dry) with no fisheries value (13 th July 2018)

Isle Burn Tributary B1 (2A, 2B, 2C, 2D, 2E, 2F1, 2F2)

- 2A, 2B, 2C, 2D and 2E options - intersects for about 300m;
- 2F1 and 2F2 options –intersect for c.250m in the upper reach.

Isle Burn Tributary B2 (2A, 2B, 2C, 2D)

- 2A, 2B, 2C, 2D options - intersect for about 540m.

	
Image 2-7	Image 2-8
ITM: 622803 911252 Isle Burn Trib. B1, downstream end, d/s N13 — minor channel, stagnant overgrown, no fisheries value (13 th July 2018)	ITM:622324 911210 Isle Burn Trib. B2, minor channel with no fisheries value (13 th July 2018)

Habitat / Fisheries Assessment: Isle Burn Tributary B2 joins Isle Burn Tributary B1 to form a single channel that discharges to the tidal reaches of the Isle Burn within Lough Swilly SAC. The B1 channel is a minor field drain in the upper reaches where 2F1, 2F2 and 2E options intersect (see **Image 2-6** and **Image 2-7**). At the downstream end, B1 channel is located on very flat open ground where it is contained in a deep drain, with stagnant standing water. Grasses, willow herb, bramble, nettle and rushes have overgrown the channel entirely (See **Image 2-7**). The B2 channel has been historically realigned (N13 road) and is a minor drain with substrates of mud and silt and just a trickle of flow (See **Image 2-8**). Both channels are of E Category E (Local Importance (lower value) with no fisheries value).

Isle Burn Crossing (2F1; 2E)

- 2E and 2F1 options – 300m intersect.



Image 2-9

ITM: 623066 910858 View upstream of Isle Burn from existing N13 crossing towards 2F1 / 2E crossing option locations. Low tide (tidal) (13th July 2018)



Image 2-10

ITM: 623104 910625 Isle Burn, view d/s within 2E / 2F1 option crossing location, high tide (14th July 2018)

Habitat / Fisheries Assessment: This reach of the Isle Burn is entirely tidal (see **Image 2-9** and **Image 2-10**). It is an important option for migrating fish species in and out of the Corkey River catchment, e.g., salmon, lampreys, eel, but has little in the way of freshwater spawning or nursery habitat. The centre line of the option is 100m upstream of the Lough Swilly SAC boundary. The area is also potentially a foraging area for a number of types of estuarine fish. This watercourse is classed as Category C (County Importance).

Lough Swilly Tributary A (Trimragh) (2A, 2B, 2C, 2D)

- 2A, 2B, 2C and 2D- options intersect for about 200m.

Habitat / Fisheries Assessment: Lough Swilly Tributary A (Trimragh) was an insignificant (dry) drain in July 2018. It is piped upstream and downstream of a short visible section (see **Image 2-11**). No aquatic or fisheries value. This tributary is assigned Category E (Local Importance (lower value) with no fisheries value).

Lough Swilly Tributary B (Drumgreggan) (2A, 2B, 2C, 2D, 2E)

- 2A, 2B, 2C, 2D -- options intersect for about 370m near N13.

- 2E – option intersects in headwater for 350m.

Habitat / Fisheries Assessment: Lough Swilly Tributary B (Drumgreggan) had very low flow during July 2018, it was a small (bank-width 1.5-2m, wet-width 40cm; 4cm depth) gully stream (see **Image 2-12**). Substrates were mainly pebble and gravel with some cobble and patches of silt. The substrate was quite embedded, meaning it is unlikely to be valuable salmonid spawning habitat, although with greater flows in winter trout cannot be ruled out. It is culverted under existing N13 road. Dense riparian cover is present consisting of ferns, ivy (*Hedera helix*), bramble (*Rubus fruticosus*), ash (*Fraxinus excelsior*), willow (*Salix* sp), hawthorn (*Crataegus monogyna*), alder (*Alnus glutinosa*). The upstream end (2E option) was a dry channel with no fisheries value. This tributary is attributed as Category E (Local Importance (lower value) with little or no fisheries value).



Image 2-11



Image 2-12

ITM: 621789 911643 Lough Swilly Tributary A (Trimragh) (13th July 2018)

- ITM: 621243 911910 Lough Swilly Tributary B (Drumgreggan) (13th July 2018)

River Swilly Tributary C (2A, 2B, 2C, 2D)

- 2A, 2B, 2C, 2D- options intersect by total of 200m.

Habitat / Fisheries Assessment: River Swilly Tributary C has two branches that intersect minimally with the options. They are both already highly modified by urban development and are both piped past rows of houses (see **Image 2-13** and **Image 2-14**). The stream may have some minor fisheries value where it flows into a gully stream, but overall it was considered an insignificant watercourse. This is classed as Category E (Local Importance (lower value) with little or no fisheries value).



Image 2-13

ITM: 620374 910924 Lough Swilly Tributary C. Minor stream. (13th July 2018)



Image 2-14

ITM: 620694 911130 River Swilly Tributary C – piped under road. Insignificant (13th July 2018)

River Swilly Tributary D (Dromore) (All Options)

- 2F1 and 2F2 – 75m intersection in headwater (dry field drain);
- 2E – 450m + 290m intersection with option (270m dry field drain)
- 2D and 2C – 1050m intersection with option (270m dry field drain);
- 2A - 690m intersection with option;
- 2B – 370m intersection with option.
- 2E link option - 940m intersection with link option;
- 2D and 2C link options – 620m intersection with link option.



Image 2-15

ITM: 619932 910024 River Swilly Tributary D (Dromore) upper reach - dry (13th July 2018)



Image 2-16

ITM: 620064 910450 River Swilly Tributary D (Dromore) middle reach, polluted (14th July 2018)



Image 2-17

ITM: 620218 910496 River Swilly Tributary D (Dromore) middle reach, minor field drain (14th July 2018)



Image 2-18

ITM: 620020 910027 River Swilly Tributary D (Dromore) lower reach, d/s N13 (14th July 2018)

Habitat / Fisheries Assessment: River Swilly Tributary D (Dromore) is a low value field drain in the very upper reaches; completely dry during July 2018. The middle reaches are small, low value field drains with either mud silt and clay substrates or stony clay substrates (see **Image 2-16** - **Image 2-17**). There was evidence of pollution in the middle reaches (see **Image 2-16**) where the water was turbid, smelling strongly of slurry or sewage leakage. The stream has a high degree of hydromorphological modification in its current state, with very low levels of naturalness. It is culverted under the existing N13, emerging in a trickle flow into a highly uniform, realigned channel that flows straight downhill eventually forming a deep drain (see **Image 2-18**) with stagnant or sluggish flow of no significance for fish. Overall the entire tributary is considered of low value and was in poor biological condition. This watercourse has been classed as Category E (Local Importance (lower value) with little or no fisheries value).

Corranagh Burn Tributary (All Options)

- 2E, 2D – 430m intersection in upper reach;
- 2C – 340m intersection in middle reach;
- 2A, 2B – c.650m intersection in middle-lower reach;
- 2F1, 2F2 link options – 340m intersection in upper reach.



Image 2-19

ITM: 619507 909995 Corranagh Burn Trib. (Drumany), piped under N13, trickle flow (13th July



Image 2-20

ITM: 619507 909995 Corranagh Burn Trib. (Drumany), clay, cobble, trickle flow (13th July 2018)

2018)	
	
Image 2-21	Image 2-22
ITM: 619650 909507 Corranagh Burn Trib. (Drumany) – upper reach (14 th July 2018)	ITM: 619581 909902 View down Corranagh Burn Trib. (Drumany) – upper reach (14 th July 2018)

Habitat / Fisheries Assessment: Corranagh Burn Tributary (Drumany) is a fairly low value field drain along most of the affected reach. It had barely trickle flow in July 2018. The channel is small (1.5m bank width; 10-30cm wet-width, 2cm depth) and steeper sections form step/pool habitat with clay and cobble (see **Image 2-20**). The upper reach is a low value field drain with mud, silt and detritus substrates and trickle flows (see **Image 2-21**). The channel is enclosed in a dense riparian hedgerow of gorse and tall rushes in the middle reach (see **Image 2-22**). It passes under the N13 in a small volume pipe (see **Image 2-19**) where it emerges in a trickle and flows downhill towards the main channel of the Corranagh Burn. The stream is minor with no significance for fish. Category E (Local Importance (lower value) with little or no fisheries value).

Corranagh Burn [Existing crossing on N56]

- Not intercepted by new options, but close to 2B and 2A option boundaries and downstream of all interceptions of Corranagh Burn Tributary.

Habitat / Fisheries Assessment: Small (2m wet width, 10cm depth), stony bottomed stream with reasonable flow, even in drought. This is a wooded gully stream (Plate 23) not far downstream of the relevant tributary confluence. Substrates were mainly pebble and gravel with some cobble and areas of exposed bedrock forming riffle/runs and cascades. Juvenile salmonids (likely trout) were observed in the stream. It is unlikely to be valuable salmonid spawning habitat within the potentially affected reach but was considered reasonable nursery habitat. This watercourse is Category D Local Importance (higher value) with moderate local fisheries value).

Biological Water Quality: A standard macroinvertebrate sample was taken and analysed on the bankside. The community had a few moderately sensitive stoneflies (*Leuctra* spp.), but the majority of the community was comprised of more tolerant groups: black-fly larvae (*Simulium*); midges (*Chironomidae*); uncased caddisflies (*Philopotimidae*, *Hydropsychidae*); Baetid and *Serratella ignita* mayflies. The sample merited a Q3 rating, equating to “moderately polluted” and Poor Ecological Status.

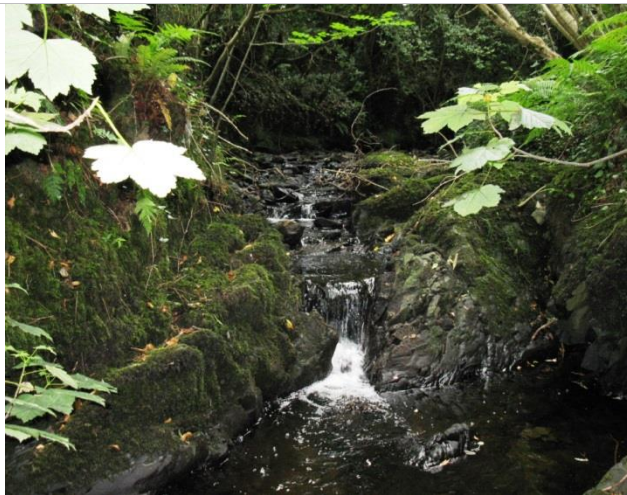


Image 2-23

ITM: 619258 910332 Corranagh Burn main channel
(14th July 2018)



Image 2-24

ITM: View downstream from existing N56 Corranagh
Burn Crossing (culvert) (29th August 2018)

River Swilly (Existing N56 crossing)

- Not intercepted by new options; upstream of proposed new River Swilly crossing.

The existing N56 crossing of the River Swilly is known as the “Port Bridge”, just before the Polestar Roundabout. It consists of five parallel culverts (see **Image 2-25**) and is within the tidal reach of the river downstream of Letterkenny (see **Image 2-26**). Habitats were not assessed at this location at this stage, but the bridge was recorded as part of the consideration of the existing option.



Image 2-25

ITM: Existing N56 River Swilly Crossing – ‘Port
Bridge’ (29th August 2018)



Image 2-26

ITM: View downstream from Existing N56 River Swilly
Crossing – ‘Port Bridge’ (29th August 2018)

2.2.2 Link Options

Milk Isle Drain (All Options)

- Intersection of c.350m on all options

Habitat / Fisheries Assessment: Milk Isle Drain discharges to the tidal reaches of the River Swilly within Lough Swilly SAC. It is located on very flat open ground where it is contained in a deep drain, with patches of stagnant standing water and some dry reaches. The channel is overgrown with grasses, willow herb, nettle, reed canary grass (*Phalaris arundinacea*), bulrush (*Typha latifolia*), with duckweed (*Lemna minor*) (Plates 27 & 28). Sticky substrates of mud and silt were present. Classified as Category E (Local Importance (lower value) with no significant fisheries value).

	
Image 2-27	Image 2-28
ITM: 619209 911463 Milk Isle Drain, view south (14 th July 2018)	ITM: 619209 911463 Milk Isle Drain, view north (14 th July 2018)



River Swilly Crossing (All Options)

- Intersection of c.350m applying to all options.

	
Image 2-29	Image 2-30
River Swilly - Overview of the intertidal area within the study area (11 th July 2018)	River Swilly – Intertidal bank habitat at crossing location (11 th July 2018)

Habitat Assessment: The intertidal area within the option of the proposed crossing is uniform and typical of upper estuarine systems. The intertidal soft sediment consists primarily of soft, liquid muds (see **Image 2-29**), sloping into the river from dry, compact mud located at the top of the shore adjacent to the terrestrial area of the crossing (see **Image 2-30**). Diatoms are common across this soft, intertidal muddy area. The anoxic layer across the site is located just beneath the sediment surface. No large fauna were returned in either dig, and results from the infaunal replicate cores indicated the area to be species poor, with very low faunal abundances across the survey area. The fauna present in the area consist primarily of Oligochaetes within the sloping mud, and the polychaete *Hediste diversicolor*, which is present in the firmer, compacted mud near the top of the shore. The brown algae, *Fucus* sp. was present across the shore line. The site has been classified as typical of the Polychaete/Oligochaete-dominated upper estuarine mud shores habitat – LS.LMu.UEst (JNCC, 2015) which has been described as ‘Upper estuarine sandy mud and mud shores, in areas with significant freshwater influence. Littoral mud typically forms mudflats, though dry compacted mud can form steep and even vertical structures, particularly at the top of the shore adjacent to saltmarshes. Little oxygen penetrates these cohesive sediments, and an anoxic layer is often present within millimetres of the sediment surface. The upper estuarine mud communities support few infaunal species and are principally characterised by a restricted range of polychaetes and oligochaetes.’ This description corresponds well with the results from the present survey of the study area.

The crossing area is within the Annex I Habitat, Estuaries [3110] habitat, and the community complex present is typical of the Mud Community Complex identified in the Lough Swilly SAC Conservation Objectives supporting document (NPWS, 2011) although the faunal diversity and abundances are low.

	
<p align="center">Image 2-31</p>	<p align="center">Image 2-32</p>
<p>ITM: 618993 911454 River Swilly, view downstream over crossing location (14th July 2018)</p>	<p>ITM: 618993 911454 River Swilly, view from embankment back towards crossing approach across Milk Isle (14th July 2018)</p>

The riparian corridor at the proposed crossing location is characterised by broad, open, uniformly sloping banks with set-back raised embankments (see **Image 2-31**). Banks were grassed, with very little tree or shrub growth, and no fringing reed beds.

In summary, the area examined at the River Swilly crossing point was uniform in nature, with only a single marine biotope identified - Mud Community Complex of Habitat 3110 – Estuaries. There was no evidence at the site of other annexed habitats for the Lough Swilly SAC.

2.3 Ecological Valuation of Watercourses

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

Table 2-2: Ecological Evaluation of Watercourses

Option	Watercourse	Ecological Category	No.
2A (Orange)	Corranagh Burn Trib.	E	10
	River Swilly Trib. D (Dromore)	E	
	River Swilly Trib. C	E	
	Lough Swilly Trib. B (Drumgreggan)	E	
	Lough Swilly Trib. A (Trimragh)	E	
	Isle Burn Tributary B2	E	
	Isle Burn Tributary B1	E	
	Isle Burn Crossing (Existing)	A/C	
Lough Swilly Link	River Swilly Crossing	A	10
	Milk Isle Drain	E	
2B (Pink)	Corranagh Burn Trib.	E	
	River Swilly Trib. D (Dromore)	E	
	River Swilly Trib. C	E	
	Lough Swilly Trib. B (Drumgreggan)	E	
	Lough Swilly Trib. A (Trimragh)	E	
	Isle Burn Tributary B2	E	
	Isle Burn Tributary B1	E	
	Isle Burn Crossing (Existing)	A/C	
Lough Swilly Link Corridor	River Swilly Crossing	A	11
	Milk Isle Drain	E	
2C (Purple)	Corranagh Burn Trib.	E	
	River Swilly Trib. D (Dromore)	E	
	River Swilly Trib. C	E	
	Lough Swilly Trib. B (Drumgreggan)	E	
	Lough Swilly Trib. A (Trimragh)	E	
	Isle Burn Tributary B2	E	
	Isle Burn Tributary B1	E	
	Isle Burn Crossing (Existing)	A/C	
Lough Swilly Link	River Swilly Trib. D (Dromore)	E	11
	River Swilly Crossing	A	
	Milk Isle Drain	E	
2D Option (Red)	Corranagh Burn Trib.	E	
	River Swilly Trib. D (Dromore)	E	
	River Swilly Trib. C	E	
	Lough Swilly Trib. B (Drumgreggan)	E	
	Lough Swilly Trib. A (Trimragh)	E	
	Isle Burn Tributary B2	E	

Option	Watercourse	Ecological Category	No.
Lough Swilly Link	Isle Burn Tributary B1	E	
	Isle Burn Crossing (Existing)	A/C	
	River Swilly Trib. D (Dromore)	E	
	River Swilly Crossing	A	
	Milk Isle Drain	E	
2E (Green)	Corranagh Burn Trib.	E	9
	River Swilly Trib. D (Dromore)	E	
	Lough Swilly Trib. B (Drumgreggan)	E	
	Isle Burn Trib. B1	E	
	Lower Dooballagh Burn	C	
	Isle Burn Crossing (New)	C	
Lough Swilly Link	River Swilly Trib. D (Dromore)	E	
	River Swilly Crossing	A	
	Milk Isle Drain	E	
2F1 (Blue)	River Swilly Trib. D (Dromore)	E	9
	Dooballagh Burn Trib. - Aghlehard	D	
	Isle Burn Tributary B1	E	
	Lower Dooballagh Burn	C	
	Isle Burn Tributary A	E	
	Isle Burn Crossing (New)	C	
Lough Swilly Link	River Swilly Crossing	A	
	Milk Isle Drain	E	
	Corranagh Burn Trib.	E	
2F2 (Blue)	River Swilly Trib. D (Dromore)	E	9
	Dooballagh Burn Trib. - Aghlehard	D	
	Isle Burn Tributary B1	E	
	Dooballagh Burn at Pluck	C	
	Isle Burn Tributary A	E	
	Isle Burn Crossing (New)	C	
Lough Swilly Link	River Swilly Crossing	A	
	Milk Isle Drain	E	
	Corranagh Burn Trib.	E	

3 ASSESSMENT OF POTENTIAL IMPACTS

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), broad types of impacts are described below.

3.1 Construction Phase Impacts

3.1.1 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.

3.1.2 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, estuary and Lough Swilly. 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.

3.1.3 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 Dooballagh Burn and Tributary intersections (2F1 and 2F2 options).

Physical impacts arising from sediment wash out is less critical in the estuarine environment, where depositional habitats are the norm. However, timing of works in terms of migration of anadromous fish, e.g., salmon, sea trout, lampreys and eel, is critical and the timing of any instream or significant out-of-channel works must take this into account. Fish will be moving up- and down-stream in tidal reaches of River Swilly and Isle Burn, which are immediately upstream of Lough Swilly SAC.

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, Loughs Agency). OPW should also be consulted regarding regular channel maintenance schedules.

3.1.4 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.

3.1.5 Nutrient Loss to Watercourses

There is some risk of increased nutrient loss to watercourses during the construction phase, though limited mainly to nutrients 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, but this does not appear to be a major issue on any of the options for this scheme.

3.2 Operation Phase Impacts

3.2.1 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.

3.2.2 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 Swilly or Isle Burn main channels assuming large, clear-span crossing structures are used. Careful design of any proposed crossing structure / culvert at streams such as the Dooballagh Burn and its tributary (at Aghlehard) would be required as these streams must be treated as fish bearing.

3.2.3 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.

3.2.4 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 Practise Standards, including such measures as discussed in Drainage Design for National Road Schemes - Sustainable Drainage Options (TII, 2014).

3.3 Potential Impacts by Watercourse

3.3.1 River Swilly Crossing

The River Swilly will be crossed by a single span structure and it is envisaged that there will be no in-stream works. Impacts on the River Swilly, if any, are most likely to occur during the construction phase. All options include the River Swilly Crossing, which is within the Lough Swilly SAC.

The nature of the proposed crossing (consisting of a single span bridge with no marine footprint) will result in no direct impact on the marine communities present in the area. Any potential impact associated with the proposed crossing will be indirect and associated with construction or maintenance phase of the development. Depending on the final design and approaches used, any potential construction phase impacts can likely be mitigated to minimised or remove any residual impact on the intertidal/marine habitats.

The international importance and designation of the channel (SAC, pNHA) 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' Category), affecting all options, however, the single span structure means that long term impacts are likely negligible.

3.3.2 Dooballagh Burn

Apart from the River Swilly Crossing (SAC), the Dooballagh Burn ('C' Category), is the second most sensitive channel within the study area, likely supporting salmon and certainly a good population of trout. The 2F2 option intersects directly with this river and also intersects a considerable distance of Dooballagh Burn Tributary –Aghlehard to Blind Town ('D' Category). Direct impacts on the tributary stream would represent potentially moderate to major indirect (downstream) impacts in the main channel. Any impacts would depend on specific option alignment, design and measures proposed and whether the channel is physically altered or impacted permanently / long-term. For this reason, the 2F2 and 2F1 options, respectively, carry the most risk of all options.

3.3.3 Isle Burn Crossing

The 2F1 and 2E Option crossing of the Isle Burn would be in the tidal reaches a short distance upstream of the existing N13 crossing, very near the Lough Swilly SAC boundary. The downstream option boundary is at the interface of the SAC boundary. Owing to close proximity to a site of international significance (SAC, pNHA), construction phase impacts would be classed as potentially 'Major', even

though long term impacts would likely be negligible, depending on crossing design (e.g., culvert, single span, etc.).

3.3.4 River Swilly Tributary D (Dromore)

This tributary of the River Swilly is highly modified, physically and in terms of hydromorphology. Considerable linear lengths of the various branches of this tributary are potentially directly impacted by all options, except 2F1 and 2F2. These impacts, however, would be of low or no significance given that biological water quality is quite impaired and there is no valuable fisheries habitat. In addition, the stream runs along deep drains on flat land before discharging to Lough Swilly, meaning there is some natural attenuation in the system for any sediment potentially mobilised during the construction phase.

3.3.5 Corranagh Burn Tributary

Highly modified in its current state owing to existing N13 road infrastructure, but potentially a trout stream ('D' Category), this stream is intercepted least by 2D and 2E options, although to a greater extent by 2F1, 2F2 and 2B (Pink) Options. Potential impacts would relate to indirect impact on the main channel of the Corranagh Burn just downstream; mainly the potential export of sediment / pollutants during construction phase. The Corranagh Burn is considered to be Local Importance (lower value) ('D') with moderate local fisheries value.

3.3.6 Minor Streams

Remaining streams are largely minor ('E' Category) with little or no fisheries value or potential where potential direct impacts are considered Minor or Neutral and Not Significant. Note that more significant indirect impacts can arise through downstream mobilisation of pollutants via minor streams to better quality habitats downstream. In this scheme, such potential impacts can likely be mitigated or avoided.

4 OPTIONS ASSESSMENT

4.1 Comparison of Options

Option comparison calculations are contained in Appendix 3, presenting the combined qualitative and quantitative assessment for aquatic ecological impacts, pertaining to each potential watercourse intersection, per option.

Total linear length (m) of watercourse intersected by each Option is shown in Appendix 3 and illustrated in **Figure 4-1**, below. **Table 4-1**, below, further separates the linear intersection length (m) into main options and links.

Each option has similar levels of intersection with higher valuation waters (category 'A'), relating to the River Swilly Crossing and the Isle Burn Crossing. Note, however, at the River Swilly a single span crossing is proposed which virtually eliminates residual impacts following the construction phase. At the Isle Burn, the crossing is already in place for 2A, 2B, 2C and 2D, but any upgrades would occur directly at the Lough Swilly SAC boundary. A new crossing of the Isle Burn on options 2E and 2F1, would also be a single span structure, but this is also in close proximity to the Lough Swilly SAC boundary (c.100m downstream).

Apart from the River Swilly Crossing, the majority of watercourse intersections, for the greatest channel lengths, are with waters of low local ecological value ('E' Category), on all except 2F1 and 2F2 options.

The 2F2 option clearly has the greatest level of intersection with waters of higher ecological value, making this the least preferable option from the aquatic biodiversity perspective. The sensitivity on the 2F2 option is associated with potential impacts on the Dooballagh Burn and its main tributary (Aghlehard to Blind Town). The Dooballagh Burn is a good quality water resource with high local fisheries value.

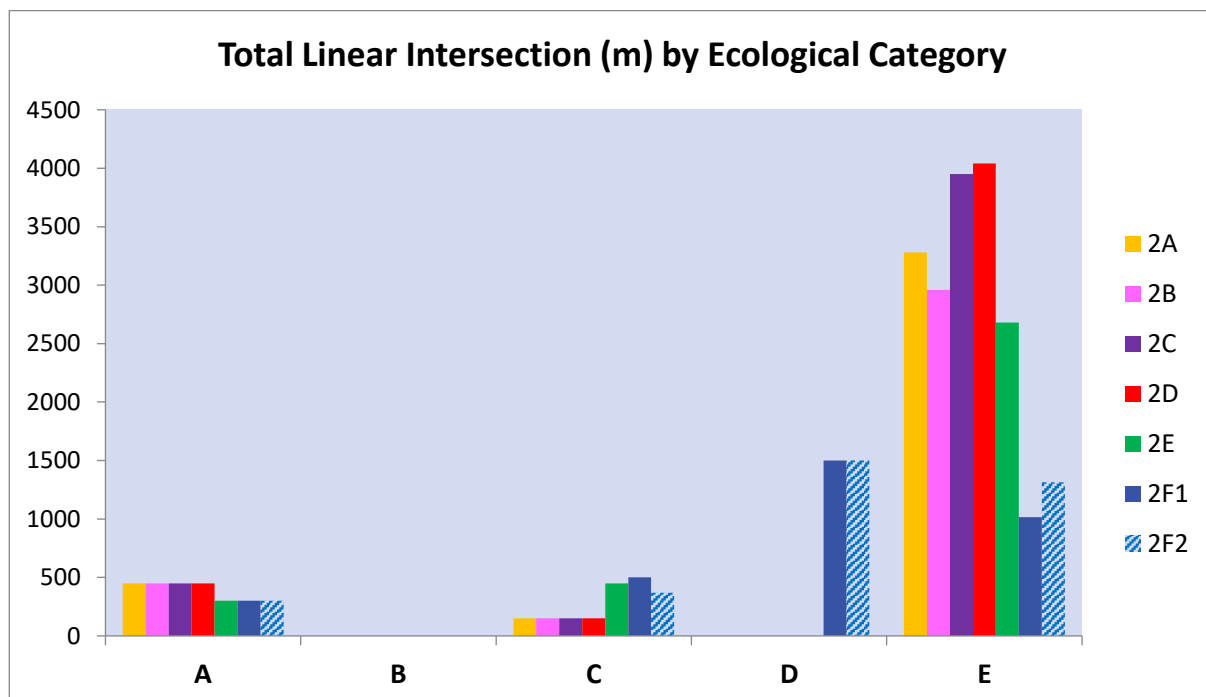


Figure 4-1: Total watercourse intersection (m) per option by Ecological Category

Table 4-1: Watercourse intersection length (m) main / link options by Ecological Category

	A	B	C	D	E	Total (m)	Grand Total (m)
2A Main	150	0	150	0	2930	3230	3880
2A Link	300	0	0	0	350	650	
2B Main	150	0	150	0	2610	2910	3560
2B Link	300	0	0	0	350	650	
2C Main	150	0	150	0	2980	3280	4550
2C Link	300	0	0	0	970	1270	
2D Main	150	0	150	0	3070	3370	4640
2D Link	300	0	0	0	970	1270	
2E Main	0	0	450	0	1820	2270	3860
2E Link	300	0	0	0	1290	1590	
2F1 Main	0	0	500	1500	325	2325	3315
2F1 Link	300	0	0	0	690	990	
2F1 Main	0	0	370	1500	625	2495	3485
2F2 Link	300	0	0	0	690	990	

The 2E option has the next greatest sensitivity, although that sensitivity is entirely based on the proposed new crossing of the Isle Burn which is not far upstream of the Lough Swilly SAC boundary.

Magnitude of watercourse intersection for 2A, 2B, 2C and 2D options appear very high, but much of this is already culverted under the existing N13. These are all intersections with waters of low ecological value ('E' Category) and the level of potential direct impact is considerably lessened, given that culverts and crossing structures are *in-situ*. The level to which existing structures would require alteration for the upgraded / new option is unknown at the stage this report was prepared.

Table 4-2 shows occurrences of watercourse impact categories along each option (including associated link options). Options 2F1 and 2F2 show the highest level of more serious impact potential overall. 2B and 2A options tend to have the lowest level of potential impact significance, with most of the watercourse intersections in the Neutral impact category. The 2E Option has slightly greater impact potential compared to 2C and 2D options.

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

Option	Major (-)	Moderate (-)	Minor (-)	Neutral
2A	1	1	3	5
2B	1	1	3	5
2C	1	1	4	5
2D	1	1	4	5
2E	1	1	6	1
2F1	1	2	2	3
2F2	1	2	2	3

In addition, a Mean Impact Score (MIS) per option was calculated (Appendix 3) to provide an indication of the weighting of qualitative impact per option. **Table 4-2** shows that 2F1, 2F2 (Blue) and 2E (Green) Options indicate an "average" impact of between Moderate and Minor (Score 2-3, closer to 2). Remaining

options indicate an “average” impact of between Minor and Neutral (Score 3-4). The 2A (Orange) and 2B (Pink) Options have an ‘average’ impact score marginally closer to Neutral than the others.

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

Option	Mean Impact Score	Total Intersection (m)
2A	3.20	3880
2B	3.20	3560
2C	3.18	4550
2D	3.18	4640
2E	2.44	3860
2F1	2.38	3315
2F2	2.38	3485

Taking all of the above into account, and with expert judgement applied, the 2B (Pink) option emerges as the slightly more preferable option over 2A (Orange). 2C (Purple) and 2D (Red) are similar in terms of impact potential and are equally preferable after 2B and 2A. 2F2 (Blue) is marginally less preferable than 2F1 (Blue), both of which are the least preferable compared to all other options. 2E (Green) is next least preferable to 2F1/2F2, although aside from the River Swilly crossing, the 2E option really does not impact on any particularly sensitive waters apart from the new crossing location at Isle Burn. Both new crossings at the River Swilly and Isle Burn would mainly have potential for construction phase impacts, however, as single span structures, both crossings would likely have imperceptible post-construction (operational) phase impacts on aquatic biodiversity.

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	⁴ Quantitative Assessment	Qualitative Assessment	MIS	Impact	Impact Score	Preference Ranking	Preference
2A (Orange)	Total linear length of watercourses intersected by option = 3880m. Total watercourse interceptions = 10	<p>Major Negative (x1): Lough Swilly (Designated SAC, pNHA) 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.</p> <p>Moderate Negative (x1): Isle Burn Crossing. There is an existing crossing (N13 culvert) at this location, and the extent to which it would be altered or modified is unknown. Lough Swilly SAC boundary is immediately downstream of the existing culvert. If the existing structure required instream works, the potential impact significance may increase to 'Major'. These impacts are likely to be adequately mitigated with specific measures.</p> <p>Minor Negative (x3): Corranagh Burn Trib., River Swilly Trib. C (Dromore) and Lough Swilly Trib. B (Drumgreggan). These interceptions are quite extensive, but the streams are of low value. These impacts are likely to be adequately mitigated with general and specific measures.</p> <p>Neutral (x5) Low valuation watercourses and/or low magnitude of direct impact. See Appendix 3.</p>	3.20	Minor or Slightly Negative	3	2	Preferred
2B (Pink)	Total linear length of watercourses intersected by	<p>Major Negative (x1): Lough Swilly (Designated SAC, pNHA) 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 (x1): There is an</p>	3.20	Minor or Slightly Negative	3	1	Preferred

⁴ See Appendix 3 for full table of calculations

Option	⁴ Quantitative Assessment	Qualitative Assessment	MIS	Impact	Impact Score	Preference Ranking	Preference
	option = 3560m. Total watercourse interceptions = 10	existing crossing (N13 culvert) at this location, and the extent to which it would be altered or modified is unknown. Lough Swilly SAC boundary is immediately downstream of the existing culvert. If the existing structure required instream works, the potential impact significance may increase to 'Major'. These impacts are likely to be adequately mitigated with specific measures. Minor Negative (x3): Corranagh Burn Trib., River Swilly Trib. C (Dromore) and Lough Swilly Trib. B (Drumgreggan). These interceptions are quite extensive, but the streams are of low value. The impacts are likely to be adequately mitigated with general and specific measures. Neutral (x5): Low valuation watercourses and/or low magnitude of direct impact. See Appendix 3.					
2C (Purple)	Total linear length of watercourses intersected by option = 4550m. Total watercourse interceptions = 11	Major Negative (x1): Lough Swilly (Designated SAC, pNHA) 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 (x1): Isle Burn Crossing. There is an existing crossing (N13 culvert) at this location, and the extent to which it would be altered or modified is unknown. Lough Swilly SAC boundary is immediately downstream of the existing culvert. If the existing structure required instream works, the potential impact significance may increase to 'Major'. These impacts are likely to be adequately mitigated with specific measures. Minor Negative (x4): Corranagh Burn Trib., River Swilly Trib. C (Dromore) x 2; and Lough Swilly Trib. B (Drumgreggan). Interceptions are quite extensive, but the streams are of low value. These impacts are likely to be adequately mitigated with general and specific measures. Neutral (x5): Low valuation watercourses and/or low magnitude of direct impact. See Appendix 3.	3.18	Minor or Slightly Negative	3	3	Intermediate
2D (Red)	Total linear length of watercourses intersected by option = 4640m. Total watercourse interceptions = 11	Major Negative (x1): Lough Swilly (Designated SAC, pNHA) 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 (x1): Isle Burn Crossing. There is an existing crossing (N13 culvert) at this location and the extent to which it would be altered or modified is unknown. Lough Swilly SAC boundary is immediately downstream of the existing culvert and if the existing structure required instream works the potential impact significance may increase to 'Major'. These impacts are likely to be adequately mitigated with specific measures. Minor Negative (x4): Corranagh Burn Trib., River Swilly Trib. C (Dromore) x 2; and	3.18	Minor or Slightly Negative ³	3	3	Intermediate

Option	⁴ Quantitative Assessment	Qualitative Assessment	MIS	Impact	Impact Score	Preference Ranking	Preference
		Lough Swilly Trib. B (Drumgreggan). These interceptions are quite extensive, but the streams are of low value. The impacts are likely to be adequately mitigated with general and specific measures. Neutral (x5): Low valuation watercourses and/or low magnitude of direct impact. See Appendix 3.					
2E (Green)	Total linear length of watercourses intersected by option = 3430m. Total watercourse interceptions = 9	Major Negative (x1): Lough Swilly (Designated SAC, pNHA) 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 (x1): New Isle Burn Crossing. A new crossing is indicated for this option, but there are no details of the design, other than the structure will likely be single span. Lough Swilly SAC boundary is c.100m downstream of the new crossing option centreline. If the new structure required instream works, the potential impact significance may increase to 'Major' given the possibility of indirect impacts on the SAC downstream. Minor Negative (x6): Corranagh Burn Trib., River Swilly Trib. C (Dromore) x 2; Lough Swilly Trib. B (Drumgreggan), Lower Dooballagh Burn & Isle Burn Trib. B1. Interceptions are quite extensive in parts, but the streams are of low value. These impacts are likely to be adequately mitigated with general and specific measures. Neutral (x1): Low valuation watercourses and/or low magnitude of direct impact. See Appendix 3.	2.44	Moderately Negative	2	4	Intermediate
2F1 (Blue)	Total linear length of watercourses intersected by option = 3315m. Total watercourse interceptions = 8	Major Negative (x1): Lough Swilly (Designated SAC, pNHA) 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 (x3): New Isle Burn Crossing; Dooballagh Burn (Pluck and Lower) and its tributary from Aghlehard to Blind Town. A new crossing is indicated for Isle Burn, but there are no details of the design other than it is likely to be a single span structure. Lough Swilly SAC boundary is c.100m downstream of the new crossing option centreline. If this structure required instream works, the potential impact significance may increase to 'Major' given the possibility of indirect impacts on the SAC downstream. Dooballagh Burn (Lower) and its tributary (Aghlehard) is of high local value with good -to-excellent salmonid spawning and nursery habitat and good water quality, mainly in the main channel. In an area where so many watercourses are at Poor Status, this stream has high local ecological value. Minor Negative (x2): Corranagh Burn Trib. and Lower Dooballagh Burn. These interceptions are either not overly extensive or they occur at a low value stream. Neutral (x3): Low valuation watercourses and/or low magnitude of direct impact. See	2.38	Moderately Negative	2	5	Least Preferred

Option	Quantitative Assessment	Qualitative Assessment	MIS	Impact	Impact Score	Preference Ranking	Preference
		Appendix 3.					
2F2 (Blue)	<p>Total linear length of watercourses intersected by option = 3485m.</p> <p>Total watercourse interceptions = 8</p>	<p>Major Negative (x1): Lough Swilly (Designated SAC, pNHA) 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.</p> <p>Moderate Negative (x2): Dooballagh Burn (Pluck) and its tributary from Aghlehard to Blind Town. Dooballagh Burn is of high local value with good -to-excellent salmonid spawning and nursery habitat and good water quality. In an area where many watercourses are at Poor Status, this stream has high local ecological value.</p> <p>Minor Negative (x2): Corranagh Burn Trib. and Isle Burn Trib. A. The interceptions are not overly extensive at these low value streams.</p> <p>Neutral (x3): Low valuation watercourses and/or low magnitude of direct impact. See Appendix 3.</p>	2.38	Moderately Negative	2	6	Least Preferred

5 CONCLUSION

Watercourses intersected by the proposed options lie within the Lough Swilly catchment, Co Donegal, specifically the River Swilly and Isle Burn / Corkey River tributary sub-catchments. The proposed new crossing of the Swilly main channel downstream of Letterkenny, is located within the Lough Swilly SAC and Lough Swilly including Big Isle, Blanket Nook and Inch Lake pNHA. A proposed new crossing of the Isle Burn (2F1 and 2E options) is about 100m upstream of the Lough Swilly SAC / pNHA boundary. Qualifying interests include the marine habitats: Estuaries [3110], Coastal lagoons [1150] and Atlantic salt meadows [1330]. Lough Swilly is an important fisheries resource with evidence that it is nursery to a number of commercially important fish species. The River Swilly at the crossing location is also an important migration option for anadromous fish species (salmon, sea trout, eel, lampreys) in and out of the upstream catchment.

The two potential crossings within, or just upstream of the Lough Swilly SAC, are potentially the most sensitive aspects of the scheme on account of their international designation (River Swilly and Isle Burn). It is noted, however, that estuarine habitat at the River Swilly crossing, for example, was a typical Mud Community Complex with low faunal diversity and abundance. There was no evidence of designated SAC qualifying interests other than this widespread element of Estuarine Habitat 3110. Furthermore, at the River Swilly, the nature of the proposed crossing (single span, no in-channel footprint) will result in no direct impact on the marine communities present in the area. Any impact associated with the proposed crossing will be indirect and associated with the construction and/or maintenance phase of the development. Such impacts will be temporary and can very likely be adequately mitigated to minimise or remove any potential impact on the marine habitats.

There were no specific details for the potential new crossing on the Isle Burn (2E and 2F1 options). It would seem prudent to avoid the need for a new crossing of the Isle, given the downstream proximity to Lough Swilly SAC. It would be considered that, unless the new crossing was a single-span design, that a new crossing may carry greater impact significance than upgrading the existing N13 crossing (which is only 100m downstream).

The main channel Dooballagh Burn, potentially affected mainly on the 2F2 option, is considered the second most sensitive watercourse associated with the scheme options. Dooballagh Burn is of high local value with good -to-excellent salmonid spawning and nursery habitat, good water quality and a fairly high degree of naturalness. It likely has brook lamprey spawning and nursery value and the wooded riparian corridor would be a valuable ecological link in the vicinity. In an area where many small streams are at Poor Status (moderately polluted) or are highly modified by drainage and/or infrastructure, this stream has high local ecological value. For this reason, the 2F2 option is by far the least preferable from an aquatic ecology perspective.

Apart from those described above, most of the watercourses potentially affected in this scheme are of low ecological value with little or no fisheries significance. ('E' Category). Many have been subject to extensive hydromorphology alterations as a consequence of urban development, existing major road infrastructure and agriculture.

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' Category) or high local fisheries importance ('C' Category), but also with waters with some level of fish bearing capacity and/or a high degree of naturalness ('D'), e.g., Dooballagh Burn.

The above option comparison, with expert opinion applied, tends to show Options 2A, 2B, 2C and 2D as the preferred options. Option 2E is intermediate and Option 2F1/ 2F2 as the least preferred.

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Appendix 1:

Ecological Valuation Criteria

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

Relevant Criteria	Category
International Importance: <ul style="list-style-type: none"> • '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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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): <ul style="list-style-type: none"> • 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): <ul style="list-style-type: none"> • 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. • Waterbody with no fisheries value and/or poor fisheries habitat. 	E

Appendix 2: Ecological Impact Risk Matrix

Criteria for impact magnitude (derived from NRA, 2011)

Impact Magnitude	Internationally important (A sites)	Nationally important (B sites)	County Importance (C sites)	Locally important, higher value (D sites)	Locally important, lower value, (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/Highly 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

Appendix 3:

Option Comparison Calculations

Table 3.1: Option Comparison Calculations

Option	Watercourse	Ecological Classification Categories					Total (m)	Score	No.
		A	B	C	D	E			
2A (Orange)	Corranagh Burn Trib.					650		3	10
	River Swilly Trib. D (Dromore)					690		3	
	River Swilly Trib. C					200		4	
	Lough Swilly Trib. B (Drumgreggan)					350		3	
	Lough Swilly Trib. A (Trimragh)					200		4	
	Isle Burn Tributary B2					540		4	
	Isle Burn Tributary B1					300		4	
	Isle Burn Crossing (Existing)	150		150				2	
2A Link	River Swilly Crossing	300						1	
	Milk Isle Drain					350		4	
TOTAL		450	0	150	0	3280	3880	32	
(Main)		150	0	150	0	2930	3230		
(Link)		300	0	0	0	350	650		
2B (Pink)	Corranagh Burn Trib.					650		3	10
	River Swilly Trib. D (Dromore)					370		3	
	River Swilly Trib. C					200		4	
	Lough Swilly Trib. B (Drumgreggan)					350		3	
	Lough Swilly Trib. A (Trimragh)					200		4	
	Isle Burn Tributary B2					540		4	
	Isle Burn Tributary B1					300		4	
	Isle Burn Crossing (Existing)	150		150				2	
2B Link	River Swilly Crossing	300						1	
	Milk Isle Drain					350		4	
TOTAL		450	0	150	0	2960	3560	32	

Option	Watercourse	Ecological Classification Categories					Total (m)	Score	No.
		A	B	C	D	E			
(Main)		150	0	150	0	2610	2910		
(Link)		300	0	0	0	350	650		
2C (Purple)	Corranagh Burn Trib.					340		3	11
	River Swilly Trib. D (Dromore)					1050		3	
	River Swilly Trib. C					200		4	
	Lough Swilly Trib. B (Drumgreggan)					350		3	
	Lough Swilly Trib. A (Trimragh)					200		4	
	Isle Burn Tributary B2					540		4	
	Isle Burn Tributary B1					300		4	
	Isle Burn Crossing (Existing)	150		150				2	
2C Link	River Swilly Trib. D (Dromore)					620		3	
	River Swilly Crossing	300						1	
	Milk Isle Drain					350		4	
TOTAL		450	0	150	0	3950	4550	35	
(Main)		150	0	150	0	2980	3280		
(Link)		300	0	0	0	970	1270		
2D (Red)	Corranagh Burn Trib.					430		3	11
	River Swilly Trib. D (Dromore)					1050		3	
	River Swilly Trib. C					200		4	
	Lough Swilly Trib. B (Drumgreggan)					350		3	
	Lough Swilly Trib. A (Trimragh)					200		4	
	Isle Burn Trib. B2					540		4	
	Isle Burn Trib. B1					300		4	
	Isle Burn Crossing (Existing)	150		150				2	
2D Link	River Swilly Trib. D (Dromore)					620		3	
	River Swilly Crossing	300						1	

Option	Watercourse	Ecological Classification Categories					Total (m)	Score	No.
		A	B	C	D	E			
	Milk Isle Drain					350		4	
TOTAL		450	0	150	0	4040	4640	35	
(Main)		150	0	150	0	3070	3370		
(Link)		300	0	0	0	970	1270		
2E (Green)	Corranagh Burn Trib.					430		3	9
	River Swilly Trib. D (Dromore)					740		3	
	Lough Swilly Trib. B (Drumgreggan)					350		3	
	Isle Burn Trib. B1					300		3	
	Lower Dooballagh Burn			150				3	
	Isle Burn Crossing (New)			300				2	
2E Link	River Swilly Trib. D (Dromore)					940		3	
	River Swilly Crossing	300						1	
	Milk Isle Drain					350		4	
TOTAL		300	0	450	0	2680	3430	22	
(Main)		0	0	450	0	1820	2270		
(Link)		300	0	0	0	1290	1590		
2F1 (Blue)	River Swilly Trib. D (Dromore)					75		4	8
	Dooballagh Burn Trib. - Aghlehard				1500			2	
	Isle Burn Tributary B1					250		4	
	Lower Dooballagh Burn			200				3	
	Isle Burn Crossing (New)			300				2	
2F1 Link	River Swilly Crossing	300						1	
	Milk Isle Drain					350		4	
	Corranagh Burn Trib.					340		3	
TOTAL		300	0	500	1500	1015	3315	19	
(Main)		0	0	500	1500	325	2325		

Option	Watercourse	Ecological Classification Categories					Total (m)	Score	No.
		A	B	C	D	E			
(Link)		300	0	0	0	690	990		
2F2 (Blue)	River Swilly Trib. D (Dromore)					75		4	8
	Dooballagh Burn Trib. - Aghlehard				1500			2	
	Isle Burn Tributary B1					250		4	
	Dooballagh Burn at Pluck			370				2	
	Isle Burn Tributary A					300		3	
2F2 Link	River Swilly Crossing	300						1	
	Milk Isle Drain					350		4	
	Corranagh Burn Trib.					340		3	
TOTAL		300	0	370	1500	1315	3485	19	
(Main)		0	0	370	1500	625	2495		
(Link)		300	0	0	0	690	990		



TEN-T Priority Route Improvement Project, Donegal

Section 2: N56 / N13 Letterkenny to Manorcunningham

Option Selection Report

Appendix D2.6 – Soils, Geology and Hydrogeology

Document Control Sheet

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1 INTRODUCTION

This report examines the soils, geology and hydrogeology attributes of the seven options for Section 2: N56/N13 Letterkenny to Manorcunningham 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 Description.

This assessment examines each option in terms of their importance and the possible impacts resulting from the construction of 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 western extremity of the study area for Section 2 commences in the centre of Letterkenny and extends east to the N13/N14 Manorcunningham junction, to the townlands Trimnagh in the north and Scribly and Corkey in the south. The N56 from Pole Star Roundabout crosses the River Swilly Estuary and continues eastward to the Dry Arch Roundabout. The N13 continues from the Dry Arch roundabout towards the east, crossing the River Corkey prior to a roundabout which forms a junction with the N14.

The study area incorporates significant residential clusters and housing estates located within Letterkenny to the north and south of the existing N13/N14 road network. The River Swilly meanders through the study area, flowing from the west to enter Lough Swilly Estuary in the northeast. The Corky River flows through the eastern boundary of the study area and also flows into Lough Swilly.

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 Projects¹ (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 hydrogeological 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 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. 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 2015, Priority Geotechnical completed a ground investigation in the area of proposed works on the Letterkenny relief road. The investigation involved excavation of 15 trial pits and five slit trenches. 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)
Trial Pits	16	3.8
Slit trenches	5	1.5

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 Zol. The key soils, geology and hydrogeology features are illustrated in **Figure 2-1** to **Figure 2-5**.

2.2 Soils and Subsoils

Metamorphic till is the predominant subsoil type across the south-west, south, south-east and east. The River Swilly flows from west to east across the centre of the study area and, therefore, alluvium deposits are present from west to east across the centre of the study area. The north-west of the study area, around Letterkenny town, the subsoil and soil types are classed as made ground. Across the northern tip of the study area, there are portions of metamorphic till with areas of rock outcrop.

The soils in the south and south-east of the study are predominantly acid brown earths with pockets of surface water gleys. The south-east and northern-western tip of the study area is predominantly surface water gleys.

The Letterkenny Estuary and Farmland Landscape Character Area (LCA) 15⁴ describe some of the floodplains within the town area as being developed for commercial and retail use, with a substantial amount of residential sprawl radiating from Letterkenny and a considerable amount of one-off rural dwellings and linear development along the local road networks.

The CORINE 2012⁵ landcover for Section 2 shows the dominated landcover type in the area to be *Pastures* (231), *Discontinuous urban fabric* (112), and *Industrial or commercial units* (121). *Estuaries* (522), *Non-Irrigated Arable Land* (211), *Land principally occupied by agriculture with wet areas of natural vegetation* (243), *Complex cultivation patterns* (242) and *Intertidal flats* (423) are also heavily featured within the study area boundary.

2.2.1 Geology

The existing route is predominantly underlain by three metamorphic rock types which were originally sedimentary rocks that subsequently metamorphosed.

The north-western, south-western and southern part of the Section 2 study area is underlain by the Termon Formation, which consists of banded semi-pelitic and psammitic schist. The centre of the study area is comprised of a band of Killeter Quartzite Limestone Formation; this formation consists of slightly impure quartzite. The north and east of the study area are made up of Aghyaran and Killgordon Limestone Formation, this bedrock is comprised of marble, quartzite, psammite and graphite.

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 Zol. There are no landfills, historically contaminated sites, active quarries or mineral locations within the Zol of each option.

⁴<http://www.donegalcoco.ie/media/donegalcountyc/planning/pdfs/viewdevelopmentplans/draftlandscapecharacterassessmentofdonegal/draftlandscapecharacterassessment/LCA15%20Letterkenny%20Estuary%20%20Farmland.pdf>

⁵ Spatial Mapping of landcover (<http://www.epa.ie/soilandbiodiversity/soils/land/corine/>)

There are no records of landslides held by the GSI within the study area or the surrounding environment. According to the GSI's Landslide Susceptibility⁶ 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 the south-west and north-west.

2.2.2 Hydrogeology

2.2.2.1 Groundwater Body and Aquifer Characteristics

The bedrock aquifer classification that occurs in the study area applies to the bedrock types discussed in **Section 2.2.1**. The Termon Formation and the Killeter Quartzite Limestone Formation form a *Poor Aquifer (PI) – Bedrock which is Generally Unproductive except for Local Zones*. The Aghyaran and Killygordon Limestone formation, located in the north and east of the study area, forms a *Locally Important (LI) Aquifer - Bedrock which is Moderately Productive only in Local Zones*. The alluvium associated with the River Swilly forms a Locally Important sand and gravel aquifer (Lg).

The study area is underlain by the Lough Swilly Groundwater Body (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 GSI's summary of characterisation of the Lough Swilly GWB indicates that transmissivity and storability of the two aquifers are likely to be low although higher values may be achieved in faulted zones, especially in the coarser-grained rocks. With low permeability, the majority of groundwater flow is likely to occur in the upper 5m of the bedrock.

With the exception of the area of alluvium, the groundwater recharge is low and ranges from 51 to 100mm. The portion of the study area that is underlain by alluvium recharge ranges from 201 to 250 mm. 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
Lough Swilly	Water Quality Status	Good	<ul style="list-style-type: none"> - Restore 2021 - Prevent Deterioration - Restore Good Status - Reduce Chemical Pollution - Achieve Protected Areas Objectives 	Basic Measures <ul style="list-style-type: none"> - 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)

⁶ GSI Geohazards Mapping (<https://www.gsi.ie/en-ie/data-and-maps/Pages/Geohazards.aspx>)

Groundwater Body	Element	Rating for Groundwater Body (WFD Status 2010-2015)	Objectives	Measures to Achieve Objectives
	Risk Category	Not at risk		<ul style="list-style-type: none"> - The Integrated Pollution Prevention Control Directive (96/61/EEC). <p>Specific Measures</p> <ul style="list-style-type: none"> - 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; and - Prevention or reduction of the impact of accidental pollution incidents.

2.2.2.2 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 for the study area indicates areas of 'Extreme' (E) vulnerability in the north-west, south and south-east and corresponds with areas of high elevation where subsoil thickness of less than three metres. Groundwater vulnerability in the west, south and east centre and south of the study area is 'High' (H). Vulnerability is generally 'Moderate' in areas where alluvium is mapped. Where the vulnerability is rated as 'High', cut greater than 3m could push the vulnerability into the 'Extreme' category. This would 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

2.2.2.3 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 Zol of each option, with a high level of location uncertainty. The GSI well database indicates the wells are 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 Letterkenny area is sourced from Lough Salt and Lough Greenan Mourne located to the northwest of the study area.

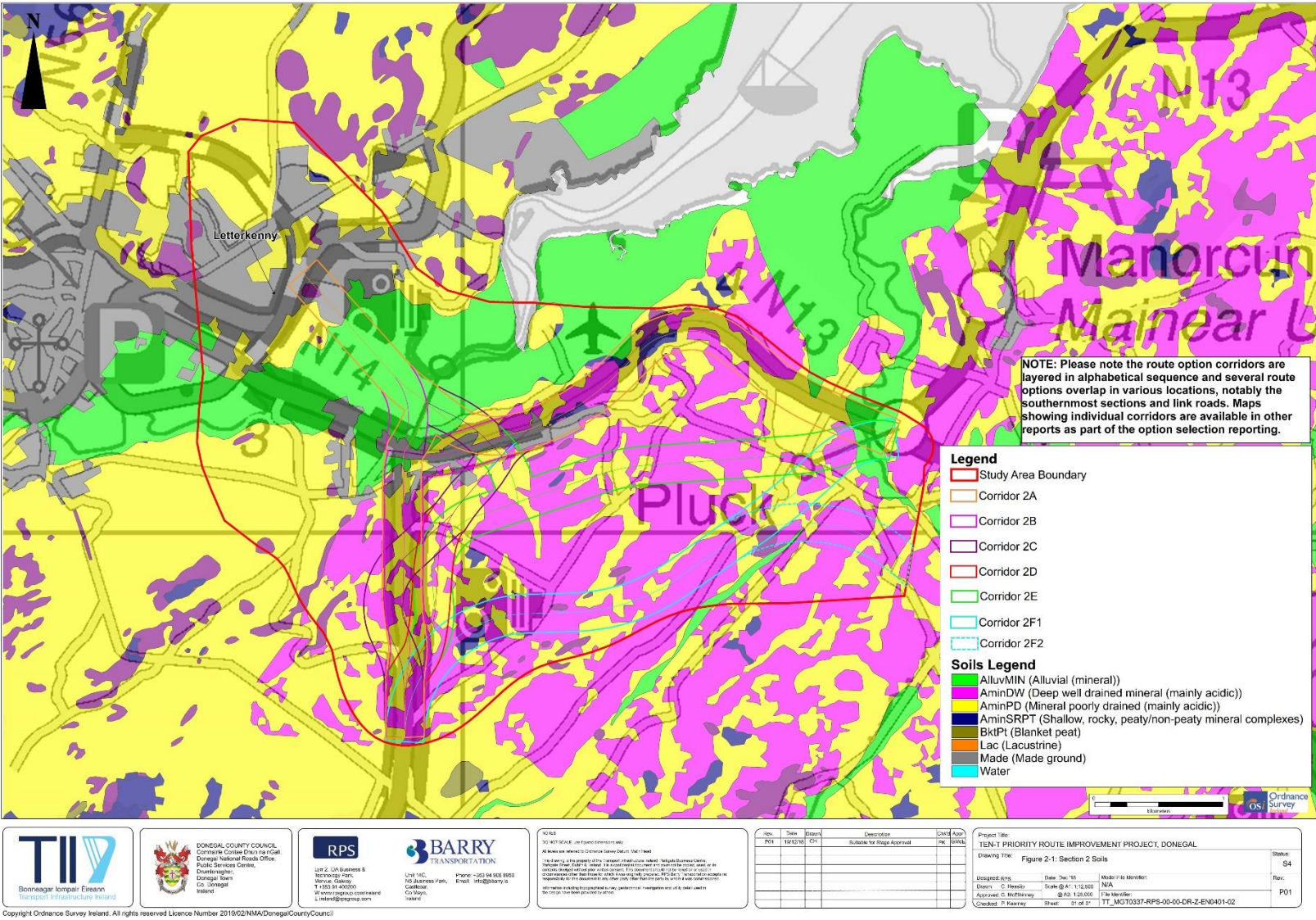


Figure 2-1: Soils

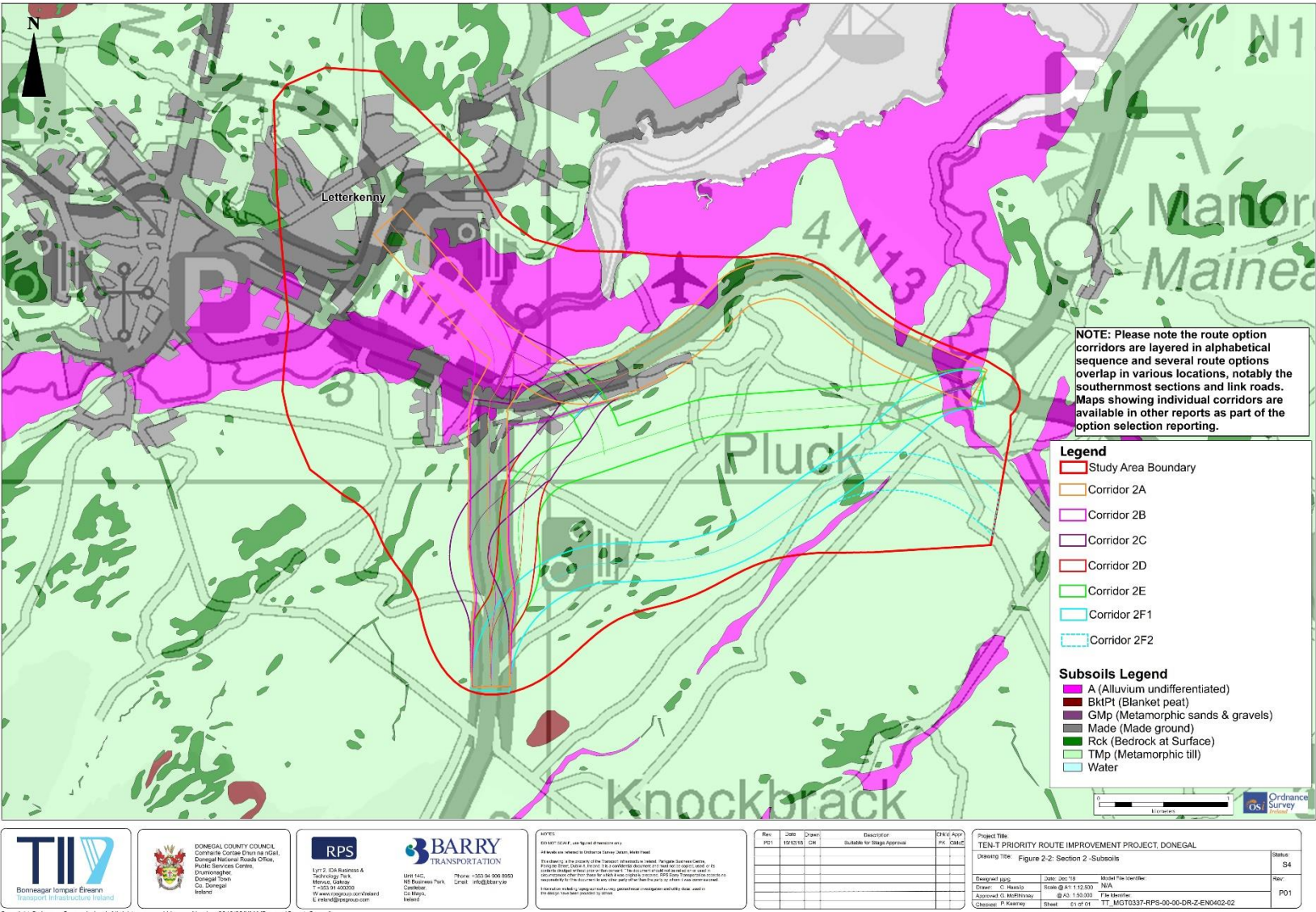


Figure 2-2: Subsoils

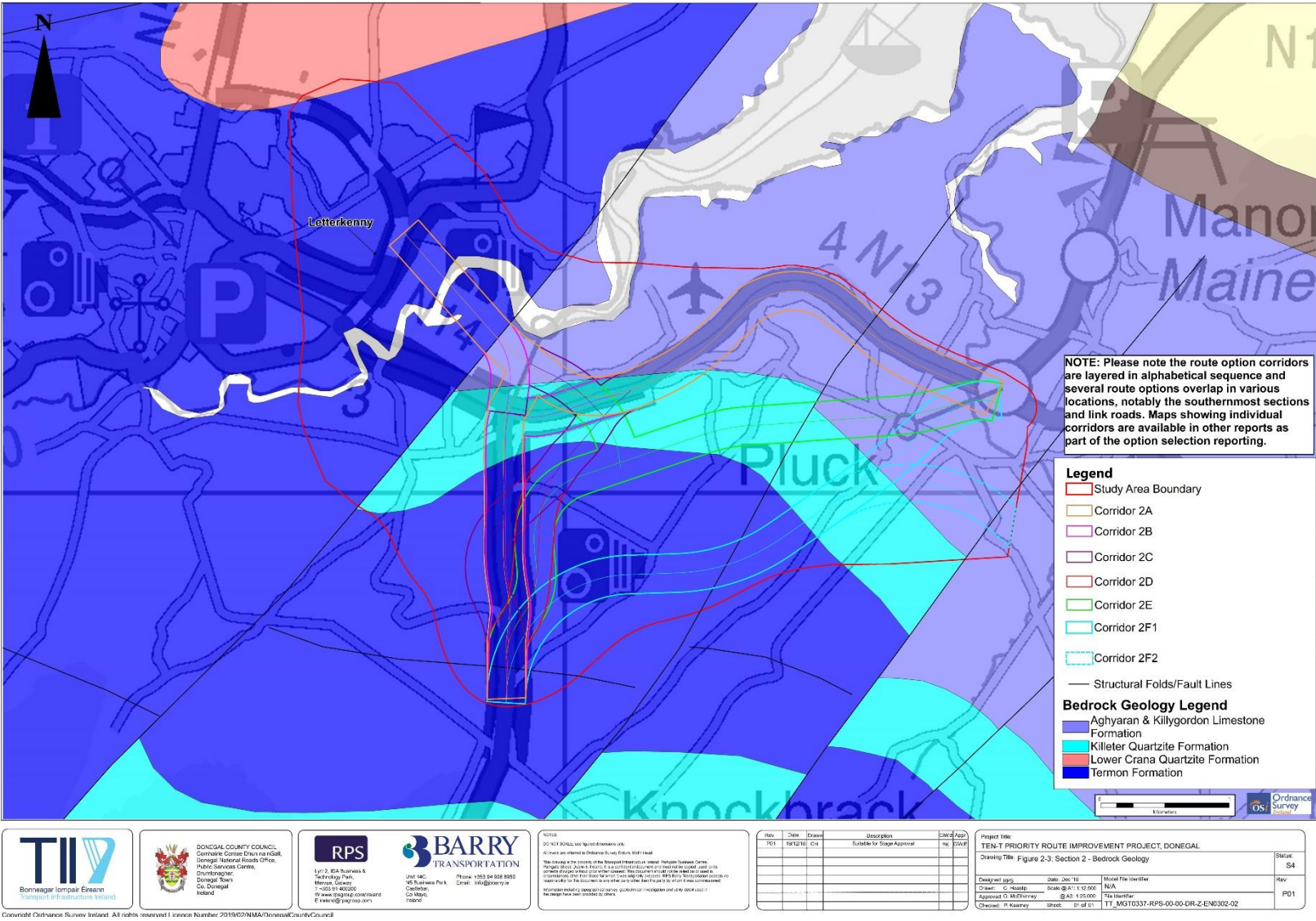


Figure 2-3: Bedrock Geology





3 OPTIONS ASSESSMENT

There are no recorded karst features, geological heritage areas, active quarries, mineral sites, landfills or contaminated land in the Zol 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 are described below under the relevant headings.

3.1 Soils and Geology

All seven options cross the Swilly Estuary. The proportion of the options that cross alluvial soils associated with the Swilly Estuary ranges from 21% of the total length (Option 2B) to 27% of the total length (Blue 2F1). The estimated volumes of soils to be removed ranges from 138,374m³ along Option 2B to 175,354m³ along Option 2A. There is a Low attribute importance associated with soft soils (NRA Guidelines⁷). In a regional context, the proportion of the attribute that will be removed is generally considered small. The impact associated with removal of soft soils is considered Neutral for five of the seven options. Along two of the options, where more than 25% of the options will cross a section of soft soils, the level of impact is deemed to be Minor Negative.

Due to the limited number of impacts associated with each option a summary of key impacts is presented on one table; **Table 3-1**.

Table 3-1: Assessment of Land and Soils impacts for seven options

Option	Attribute	Attribute Importance	Impact	Level of Impact
2A (Orange)	Poor/ soft ground* (entire option)	Low	The options length is 7,804m. The proportion of the options that will cross soft ground comprises 26% (2,039m) of total length. It is estimated that 175,354m³ of soft soils will need to be excavated along this option.	Minor Negative
2B (Pink)			The option length is 7,845 m. The length of the option that will cross soft ground comprises 21% (1,609m) of total length. It is estimated that 138,374m³ of soft soils will need to be excavated along this option.	Neutral
2C (Purple)			The option length is 8,837m. The length of the option that will cross soft ground comprises 22% (1,956m) of total length. It is estimated that 168,216m³ of soft soils will need to be excavated along this option.	Neutral

⁷ 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>)

Option	Attribute	Attribute Importance	Impact	Level of Impact
2D (Red)			The option length is 8,808m. The length of the option that will cross soft ground comprises 22% (1,956m) of total length. It is estimated that 168,216m³ of soft soils will need to be excavated along this option.	Neutral
2E (Green)			The option length is 7,946m. The length of the option that will cross soft ground comprises 24% (1,882m) of total length. It is estimated that 161,852m³ of soft soils will need to be excavated along this option.	Neutral
2F1 (Blue)			The option length is 7,043 m. The length of the option that will cross soft ground comprises 27% (1,903m) of total length. It is estimated that 163,658m³ of soft soils will need to be excavated along this option.	Minor Negative
2F2 (Blue)			The option length is 7,036m. The proportion of the option that will cross soft ground comprises 23% (1,642m) of total length. It is estimated that 141,212m³ 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 have one not significant/neutral impact or one minor or slightly negative impact.

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

TII Rating Key	2A	2B	2C	2D	2E	2F1	2F2
Major or Highly negative	-	-	-	-	-	-	-
Moderately Negative	-	-	-	-	-	-	-
Minor or Slightly negative	1					1	
Not significant/neutral		1	1	1	1	-	1
Minor or Slightly positive	-	-	-	-	-	-	-
Moderately Positive	-	-	-	-	-	-	-
Major or Highly Positive	-	-	-	-	-	-	-

3.2 Hydrogeology

The aquifers in the area are poorly productive aquifers, which are generally unproductive except for local zones; a locally important bedrock aquifer, that is moderately productive only in local zones; and a locally important sand and gravel aquifer. 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 of the overlying surficial deposits of soil and subsoil are thinner or not present.

The amount of cut (removal of soil and/or rock to design elevation of road) 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 seven 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 3-9** below.

3.2.1 Option 2A (Orange)

Option 2A (Orange) is 7,804 metres long and 2,873 metres (37% of total length) crosses a Poor Aquifer (PI), 3,806 metres (49%) crosses a Locally Important Bedrock Aquifer (LI) and 1,125 metres (14%) crosses a Locally Important Sand and Gravel Aquifer (Lg). All seven options cross a similar proportion of PI, LI and Lg aquifers. 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, minor negative impacts and moderate negative impacts, in areas underlain by PI, LI and Lg aquifers, respectively. The Moderate Negative impact score associated with the Lg aquifer is due to its smaller size, on a regional scale when compared to the LI and PI aquifers. Therefore, the impacts affect a larger proportion of the aquifer.

Approximately 29% (2,282m) 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). 21 % (479m) of this is underlain by a locally important aquifer. This is the highest proportion of all seven options. Owing to the importance of the underlying aquifer, the impact associated with this is Minor Negative. The remaining 79% (1,803m) is underlain by a Poor Aquifer (PI). The impact associated with the proportion of the option that crosses the PI is neutral.

None of the option crosses areas of High vulnerability where more than three metres of fill are due to be removed during construction.

Table 3-3: Assessment of Hydrogeology Impacts for Option 2A (Orange)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (PI)	Low	37% (2,873m) traverses Poor Aquifer (PI)	Neutral
Proportion of option that crosses locally important bedrock aquifer (LI)	Medium	49% (3,806m) traverses Locally important bedrock aquifer (LI)	Minor Negative
Proportion of option that crosses locally important sand and gravel aquifer (Lg)	Medium	14% (1,125m) traverses Locally important sand and gravel aquifer (Lg)	Moderate Negative

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	Approximately 29% (2,282m) of the option is cut through X/Extreme groundwater vulnerability. 79% (1,803m) of this traverse a Poor Aquifer (PI).	Neutral
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Medium	Approximately 29% of the option is cut through X/Extreme groundwater vulnerability. 21% (479m) crosses a Locally Important (LI or Lg) Aquifer.	Minor Negative

3.2.2 Option 2B (Pink)

Option 2B (Pink) is 7,845 metres long and 3,180 metres (41% of total length) crosses a Poor Aquifer (PI), 3,390 metres (43%) crosses a Locally Important Bedrock Aquifer (LI) and 1,275 metres (16%) crosses a Locally Important Sand and Gravel Aquifer (Lg). This is similar to Options 2C and 2D. 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, minor negative impacts and moderate negative impacts, in areas underlain by PI, LI and Lg aquifers, respectively. The Moderate Negative impact score associated with the Lg aquifer is due to its smaller size, on a regional scale, when compared to the LI and PI aquifers. Therefore, the impacts affect a larger proportion of the aquifer.

Approximately 33% (2,601m) 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). 18 % (479m) of this is underlain by a locally important aquifer. Owing to the importance of the underlying aquifer, the impact associated with this is Minor Negative. The remaining 82% (2,122m) is underlain by a Poor Aquifer (PI). The impact associated with the proportion of the option that crosses the PI is neutral

None of the option crosses areas of High vulnerability where more than three metres of fill are due to be removed during construction.

Table 3-4: Assessment of Hydrogeology Impact for Option 2B (Pink)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (PI)	Low	41% (3,180m) traverses Poor Aquifer (PI)	Neutral
Proportion of option that crosses locally important bedrock aquifer (LI)	Medium	43% (3,390m) traverses Locally important bedrock aquifer (LI)	Minor Negative
Proportion of option that crosses locally important sand and gravel aquifer (Lg)	Medium	16% (1,275m) traverses Locally important sand and gravel aquifer (Lg)	Moderate Negative

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	Approximately 33% (2,601m) of the option is cut through X/Extreme groundwater vulnerability. 82% (2,122m) of this traverses a Poor Aquifer (PI).	Neutral
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Medium	Approximately 33% (2,601m) of the option is cut through X/Extreme groundwater vulnerability. 18% (479m) crosses a Locally Important (LI or Lg) Aquifer.	Minor Negative

3.2.3 Option 2C (Purple)

Option 2C (Purple) is 8,837 metres long and 3,906 metres (44% of total length) crosses a Poor Aquifer (PI), 3,806 metres (43%) crosses a Locally Important Bedrock Aquifer (LI) and 1,125 metres (13%) crosses a Locally Important Sand and Gravel Aquifer (Lg). This is similar to Options 2B and 2D. 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, minor negative impacts and moderate negative impacts, in areas underlain by PI, LI and Lg aquifers, respectively. The Moderate Negative impact score associated with the Lg aquifer is due to its smaller size, on a regional scale, when compared to the LI and PI aquifers. Therefore, the impacts affect a larger proportion of the aquifer.

Approximately 33% (2,926m) 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). 16 % (479m) of this is underlain by a locally important aquifer. Owing to the importance of the underlying aquifer, the impact associated with this is Minor Negative. The remaining 84% (2,447m) is underlain by a Poor Aquifer (PI). The impact associated with the proportion of the option that crosses the PI is neutral.

Approximately 13% (1,185m) of the option is cut by more than >3m in areas of High vulnerability. 100% traverses Poor Aquifer (PI). This is similar to Options 2D and 2E. The impact associated with the proportion of the option that crosses the PI is neutral.

Table 3-5: Assessment of Hydrogeology Impacts for Option 2C (Purple)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (PI)	Low	44% (3,906m) traverses Poor Aquifer (PI)	Neutral
Proportion of option that crosses locally important bedrock aquifer (LI)	Medium	43% (3,806m) traverses Locally important bedrock aquifer (LI)	Minor Negative
Proportion of option that crosses locally important sand and gravel	Medium	13% (1,125m) traverses Locally important sand and gravel aquifer (Lg)	Moderate Negative

Attribute	Attribute Importance	Impact	Level of Impact
aquifer (Lg)			
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	Approximately 33% (2,926m) of the option is cut through X/Extreme groundwater vulnerability. 84% (2,447m) of this traverses a Poor Aquifer (PI).	Neutral
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Medium	Approximately 33% (2,926m) of the option is cut through X/Extreme groundwater vulnerability. 16% (479m) crosses a Locally Important (LI or Lg) Aquifer.	Minor Negative
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Low	13% (1,185m) of the option is cut >3m in areas of High vulnerability. 100% traverses Poor Aquifer (PI).	Neutral

3.2.4 Option 2D (Red)

Option 2D (Red) is 7,845 metres long and 3,180 metres (41% of total length) crosses a Poor Aquifer (PI), 3,390 metres (43%) crosses a Locally Important Bedrock Aquifer (LI) and 1,275 metres (16%) crosses a Locally Important Sand and Gravel Aquifer (Lg). This is similar to Options 2B and 2C. 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, minor negative impacts and moderate negative impacts, in areas underlain by PI, LI and Lg aquifers, respectively. The Moderate Negative impact score associated with the Lg aquifer is due to its smaller size, on a regional scale, when compared to the LI and PI aquifers, therefore the impacts affect a larger proportion of the aquifer.

Approximately 33% (2,601m) 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). 18 % (479m) of this is underlain by a locally important aquifer. Owing to the importance of the underlying aquifer, the impact associated with this is Minor Negative. The remaining 82% (2,122m) is underlain by a Poor Aquifer (PI). The impact associated with the proportion of the option that crosses the PI is neutral

Approximately 12% (1,043m) of the option is cut by more than >3m in areas of High vulnerability. 100% traverses Poor Aquifer (PI). This is similar to Options 2C and 2E. The impact associated with the proportion of the option that crosses the PI is neutral.

Table 3-6: Assessment of Hydrogeology Impacts for Option 2D (Red)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (PI)	Low	44% (3,877m) traverses Poor Aquifer (PI)	Neutral

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses locally important bedrock aquifer (LI)	Medium	43% (3,806m) traverses Locally important bedrock aquifer (LI)	Minor Negative
Proportion of option that crosses locally important sand and gravel aquifer (Lg)	Medium	13% (1,125m) traverses Locally important sand and gravel aquifer (Lg)	Moderate Negative
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	Approximately 38% (3,388m) of the option is cut through X/Extreme groundwater vulnerability. 86% (2,909m) of this traverses a Poor Aquifer (PI).	Neutral
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Medium	Approximately 38% (3,388m) of the option is cut through X/Extreme groundwater vulnerability. 14% (479m) crosses a Locally Important (LI or Lg) Aquifer.	Minor Negative
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Low	12% (1,043m) of the option is cut >3m in areas of High vulnerability. 100% traverses Poor Aquifer (PI).	Neutral

3.2.5 Option 2E (Green)

Option 2E (Green) is 7,946 metres long and 4,588 metres (58% of total length) crosses a Poor Aquifer (PI), 2,233 metres (28%) crosses a Locally Important Bedrock Aquifer (LI) and 1,125 metres (14%) crosses a Locally Important Sand and Gravel Aquifer (Pg). This is similar to Option 2F1. 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, minor negative impacts and moderate negative impacts, in areas underlain by PI, LI and Lg aquifers, respectively. The Moderate Negative impact score associated with the Lg aquifer is due to its smaller size, on a regional scale, when compared to the LI and PI aquifers. Therefore, the impacts affect a larger proportion of the aquifer.

Approximately 55% (4,353m) 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). 7 % (308m) of this is underlain by a locally important aquifer. Owing to the importance of the underlying aquifer, the impact associated with this is Minor Negative. The remaining 93% (4,045m) is underlain by a Poor Aquifer (PI). The impact associated with the proportion of the option that crosses the PI is neutral.

Approximately 11% (900m) of the option is cut by more than >3m in areas of High vulnerability. 100% traverses Poor Aquifer (PI). The impact associated with the proportion of the option that crosses the PI is neutral.

Table 3-7: Assessment of Hydrogeology Impacts for Option 2E (Green)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (PI)	Low	58% (4,588m) traverses Poor Aquifer (PI)	Neutral
Proportion of option that crosses locally important bedrock aquifer (LI)	Medium	28% (2,233m) traverses Locally important bedrock aquifer (LI)	Minor Negative
Proportion of option that crosses locally important sand and gravel aquifer (Lg)	Medium	14% (1,125m) traverses Locally important sand and gravel aquifer (Lg)	Moderate Negative
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	Approximately 55% (4,353m) of the option is cut through X/Extreme groundwater vulnerability. 93% (4,045m) of this traverse a Poor Aquifer (PI).	Neutral
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Medium	Approximately 55% (4,353m) of the option is cut through X/Extreme groundwater vulnerability. 7% (308m) crosses a Locally Important (LI or Lg) Aquifer.	Minor Negative
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Low	11% (900m) of the option is cut >3m in areas of High vulnerability. 100% traverses Poor Aquifer (PI).	Neutral

3.2.6 Option 2F1 (Blue)

Option 2F1 (Blue) is 7,043 metres long and 4,026 metres (57% of total length) crosses a Poor Aquifer (PI), 1,892 metres (27%) crosses a Locally Important Bedrock Aquifer (LI) and 1,125 metres (16%) crosses a Locally Important Sand and Gravel Aquifer (Pg). This is similar to Option 2E and 2F2. 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, minor negative impacts and moderate negative impacts, in areas underlain by PI, LI and Lg aquifers, respectively. The Moderate Negative impact score associated with the Lg aquifer is due to its smaller size, on a regional scale, when compared to the LI and PI aquifers. Therefore, the impacts affect a larger proportion of the aquifer.

Approximately 53% (3,711m) 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). 6% (210m) of this is underlain by a locally important aquifer. Owing to the importance of the underlying aquifer, the impact associated with this is Minor Negative. The remaining 94% (3,501m) is underlain by a Poor Aquifer (PI). The impact associated with the proportion of the option that crosses the PI is neutral.

Approximately 18% (1,286m) of the option is cut by more than >3m in areas of High vulnerability. 24 % (314m) of this is underlain by a locally important aquifer. This is similar to Option 2F2 and the

associated impact is Minor Negative. The remaining 76% (972m) is underlain by a Poor Aquifer and the impact associated with the proportion of the option that crosses the PI is neutral.

Table 3-8: Assessment of Hydrogeology Impacts for Option 2F1 (Blue)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (PI)	Low	57% (4,026m) traverses Poor Aquifer (PI)	Neutral
Proportion of option that crosses locally important bedrock aquifer (LI)	Medium	27% (1,892m) traverses Locally important bedrock aquifer (LI)	Minor Negative
Proportion of option that crosses locally important sand and gravel aquifer (Lg)	Medium	16% (1,125m) traverses Locally important sand and gravel aquifer (Lg)	Moderate Negative
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	Approximately 53% (3,711m) of the option is cut through X/Extreme groundwater vulnerability. 94% (3,501m) of this traverses a Poor Aquifer (PI).	Neutral
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Medium	Approximately 53% (3,711m) of the option is cut through X/Extreme groundwater vulnerability. 6% (210m) crosses a Locally Important (LI or Lg) Aquifer.	Minor Negative
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Low	18% (1,286m) of the option is cut >3m in areas of High vulnerability. 76% (972m) traverses Poor Aquifer (PI).	Neutral
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Medium	18% (1,286m) of the option is cut >3m in areas of High vulnerability. 24% (314m) traverses a Locally Important Aquifer.	Minor Negative

3.2.7 Option 2F2 (Blue)

Option 2F2 (Blue) is 7,036 metres long and 4,064 metres (58% of total length) crosses a Poor Aquifer (PI), 1,847 metres (26%) crosses a Locally Important Bedrock Aquifer (LI) and 1,125 metres (16%) crosses a Locally Important Sand and Gravel Aquifer (Pg). This is similar to Option 2E and 2F1. 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, minor negative impacts and moderate negative impacts, in areas underlain by PI, LI and Lg aquifers, respectively. The Moderate Negative impact score associated with the Lg aquifer is due to its smaller size, on a regional scale, when compared to the LI and PI aquifers. Therefore, the impacts affect a larger proportion of the aquifer.

Approximately 56% (3,968m) 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). 6% (249m) of this is

underlain by a locally important aquifer. The remaining 94% (3,719m) is underlain by a Poor Aquifer. This is also similar to Option 2E and 2FI. The impact to the Locally Important and Poor Aquifers is Minor Negative and Neutral, respectively.

Approximately 18% (1,274m) of the option is cut by more than >3m in areas of High vulnerability. 16% (209m) of this is underlain by a locally important aquifer. The remaining 84% (1065m) is underlain by a Poor Aquifer. This is similar to Option 2F1 and the associated impact is Minor Negative. The remaining 84% (1065m) is underlain by a Poor Aquifer and the impact associated with the proportion of the option that crosses the PI is neutral.

Table 3-9: Assessment of Hydrogeology Impacts Option 2F2 (Blue)

Attribute	Attribute Importance	Impact	Level of Impact
Proportion of option that crosses poor aquifer (PI)	Low	58% (4,064m) traverses Poor Aquifer (PI)	Neutral
Proportion of option that crosses locally important bedrock aquifer (LI)	Medium	26% (1,847m) traverses Locally important bedrock aquifer (LI)	Minor Negative
Proportion of option that crosses locally important sand and gravel aquifer (Lg)	Medium	16% (1,125m) traverses Locally important sand and gravel aquifer (Lg)	Moderate Negative
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Low	Approximately 56% (3,968m) of the option is cut through X/Extreme groundwater vulnerability. 94% (3,719m) of this traverses a Poor Aquifer (PI).	Neutral
Proportion of option that crosses X or Extreme Groundwater Vulnerability	Medium	Approximately 56% (3,968m) of the option is cut through X/Extreme groundwater vulnerability. 6% (249m) crosses a Locally Important (LI or Lg) Aquifer.	Minor Negative
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Low	18% (1,274m) of the option is cut >3m in areas of High vulnerability. 84% (1,065m) traverses Poor Aquifer (PI).	Neutral
Proportion of option that crosses High Groundwater Vulnerability and cut >3m	Medium	18% (1,274m) of the option is cut >3m in areas of High vulnerability. 16% (209m) traverses a Locally Important Aquifer.	Minor Negative

3.2.8 Summary and Preference

The summary of the impact assessment for each impact level is outlined in **Table 3-1**. Options 2A and 2B have the lowest number of impacts. Options 2C, 2D and 2E have the next highest numbers of impacts. Options 2F1 and 2F2 have the highest numbers of impacts.

Table 3-10: Summary of Hydrogeology Impacts for each Option

Impact Level	2A (Orange)	2B (Pink)	2C (Purple)	2D (Red)	2E (Green)	2F1 (Blue)	2F2 (Blue)
Major or Highly negative	-	-	-	-	-	-	-
Moderately Negative	1	1	1	1	1	1	1
Minor or Slightly negative	2	2	2	2	2	3	3
Not significant/neutral	2	2	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 3-11**. **Table 3-12** outlines the Quantitative and Qualitative elements of the assessment along with the TII impact score and the order of preference for each option.

Table 3-11: Summary of Land and Soils and Hydrogeology Impacts for each Option

TII Rating Key	2A (Orange)	2B (Pink)	2C (Purple)	2D (Red)	2E (Green)	2F1 (Blue)	2F2 (Blue)
Major or Highly negative	-	-	-	-	-	-	-
Moderately Negative	1	1	1	1	1	1	1
Minor or Slightly negative	3	2	2	2	2	4	3
Not significant/neutral	2	3	4	4	4	3	4
Minor or Slightly positive	-	-	-	-	-	-	-
Moderately Positive	-	-	-	-	-	-	-
Major or Highly Positive	-	-	-	-	-	-	-

Table 3-12: Predicted TII Impact Score and Option Preferences

Option	Quantitative Assessment	Qualitative Assessment	Impact	Preference Ranking	Impact Score	Preference Score
2A (Orange)	× 1 Moderate negative ×3 Minor Negative ×2 Neutral	Poor/ soft ground requires excavation (<u>Mod. Neg</u>) Traverses Locally important aquifer (LI & Lg) Traverses X/extreme vulnerability. (LI & Lg)	Moderate Negative	2	2	Intermediate
2B (Pink)	× 1 Moderate negative ×2 Minor Negative ×3 Neutral	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI & Lg) Traverses X/extreme vulnerability. (LI & Lg)	Moderate Negative	1	2	Preferred
2C (Purple)	× 1 Moderate negative ×2 Minor Negative ×4 Neutral	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI & Lg) Traverses X/extreme vulnerability. (LI & Lg)	Moderate Negative	1	2	Preferred
2D (Red)	1 Moderate negative ×2 Minor Negative ×4 Neutral	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI & Lg) Traverses X/extreme vulnerability. (LI & Lg)	Moderate Negative	1	2	Preferred
2E (Green)	1 Moderate negative ×2 Minor Negative ×4 Neutral	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI & Lg) Traverses X/extreme vulnerability. (LI & Lg)	Moderate Negative	1	2	Preferred
2F1 (Blue)	1 Moderate negative ×4 Minor Negative ×3 Neutral	Poor/ soft ground requires excavation (<u>Mod. Neg</u>) Traverses Locally important aquifer (LI & Lg) Traverses X/extreme vulnerability. (LI & Lg) Traverses high vulnerability. (<u>LI & Lg</u>)	Moderate Negative	4	2	Least Preferred
2F2 (Blue)	1 Moderate negative ×3 Minor Negative ×4 Neutral	Poor/ soft ground requires excavation Traverses Locally important aquifer (LI & Lg) Traverses X/extreme vulnerability. (LI & Lg) Traverses high vulnerability. (<u>LI & Lg</u>)	Moderate Negative	3	2	Least Preferred

3.4 Conclusion

From the review of the impacts of each proposed option on the soil, geology and hydrogeology in the Zone of Influence, Options 2A, 2B, 2C, 2D and 2E are the preferable options with the same number of moderate and minor negative, and neutral impacts. All four of these options traverse poor or soft ground that requires excavation, and all four options traverse areas of Locally important aquifer (LI & Lg) and areas of extreme groundwater vulnerability. Options 2F1 and 2F2 are the least preferred with respect to their impact on the land and soils in the Zone of Influence, since these options traverse and cut through longer areas of high groundwater vulnerability.

All options have an overall impact score of 'moderate negative' on the land and soil in the TEN-T Section 2 Zone of Influence.



TEN-T Priority Route Improvement Project, Donegal

Section 2: N56 / N13 Letterkenny to Manorcunningham

Option Selection Report

Appendix D2.7 – Hydrology

Document Control Sheet

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Document Title:	Option Selection Report –Appendix D2.7 – Hydrology
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1 INTRODUCTION

This report examines the hydrological environment associated with seven options for Section 2 N56/N13 Letterkenny to Manorcunningham road project 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 **Figure 1-1** for an overview of the options.

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 TII¹ 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 possible options is to 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(s). The data required to inform the hydrological section of the Option 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 options, including the examination of any locally relevant information or data;

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)

- Use of stereoscopic aerial photographs to identify previously unmapped soft or disturbed ground, potential geohazards or hydrogeological features in the vicinity of the options;
- A targeted drive-by (windshield) survey, if appropriate, along options 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

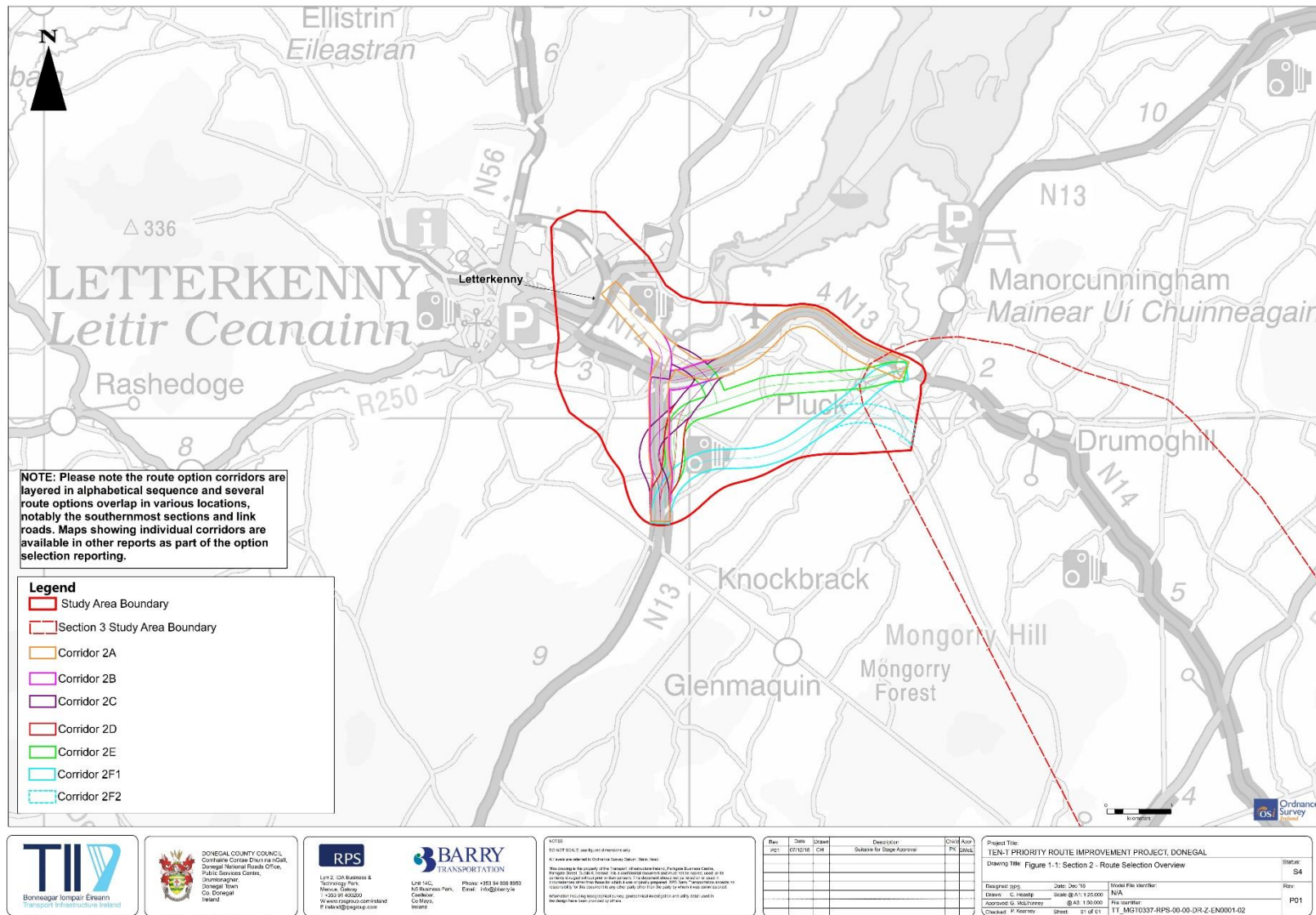


Figure 1-1: Section 2 Options Overview

1.2 Assessment Criteria

Most of the potential environmental impacts for watercourses occur close to the points where the proposed options 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.

2 EXISTING ENVIRONMENT

2.1 Desk Study

The entire study area lies within the Lough Swilly Catchment and forms part of the National Hydrometric Area – 39. The main surface water features potentially impacted by the option extents include the River Swilly, River Pluck (Leslie Hill Stream) and their tributaries, and also the Swilly Estuary.

The River Swilly is the major river of the greater Lough Swilly catchment (HA 39) and receives flows from a number of tributaries including the Sprack, Corravaddy Burns and the Knocknamona watercourse. The Swilly River catchment is fairly mixed in land coverage with forested land, pasture, peat bog and urban area due to Letterkenny. The modelled tributaries which enter the Swilly emanate from the hills surrounding Letterkenny to the north and south. Some of these tributaries pick up a significant amount of urban drainage along the way to their discharge points into the Swilly. The River Swilly Sub Catchment (Swilly_SC_010) is a medium sized catchment with an area of 112km².

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 is also illustrated in **Figure 2-2**. The impacts of each of these instances will be assessed individually later in **Section 3**.

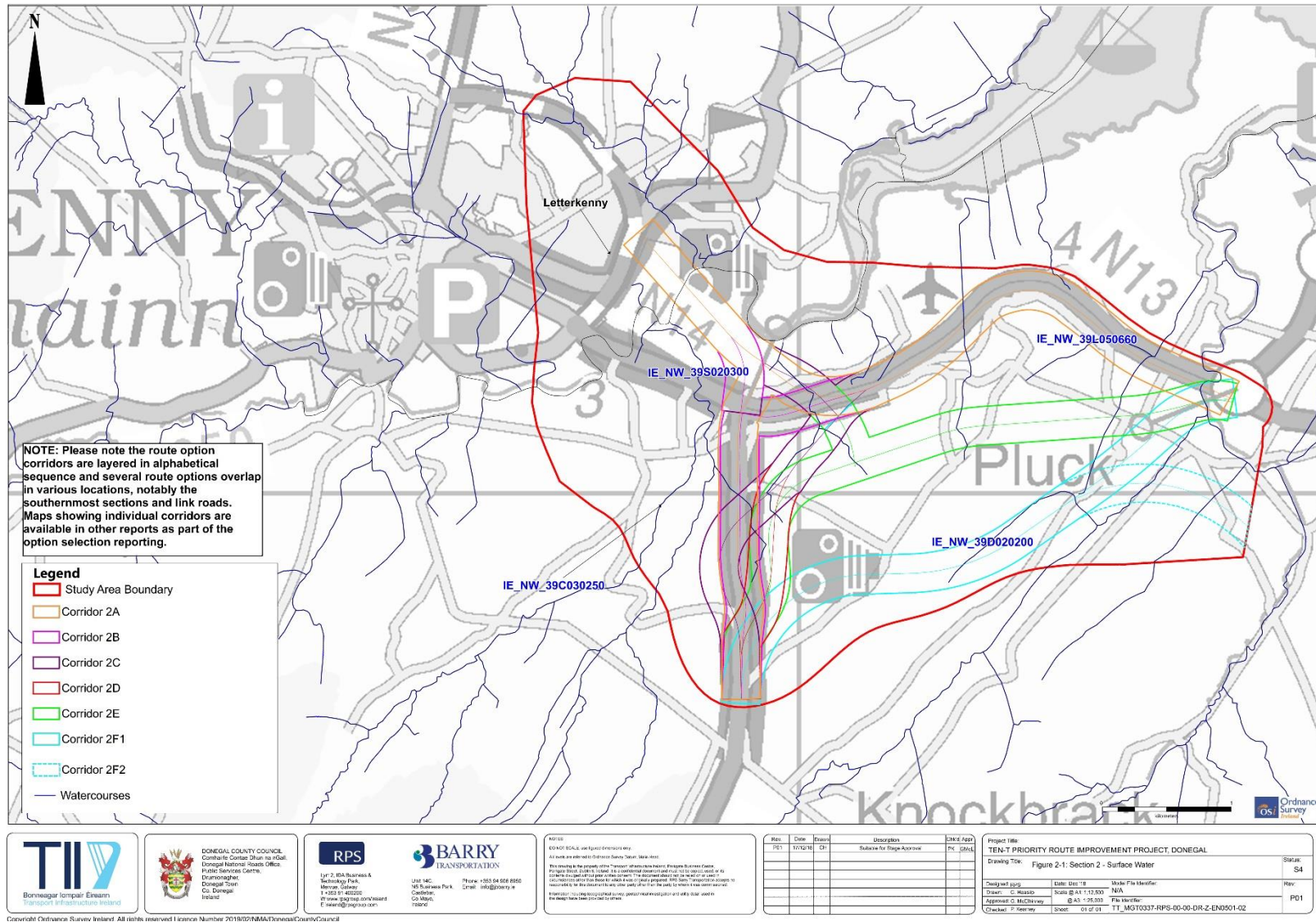


Figure 2-1: Surface Water - Section 2

Table 2-1: Overview of Potentially Impacted Watercourses and their Catchments

ID	EPA Name	River Waterbody Code	Watercourse Segment Code	WFD Catchment	WFD Sub Catchment	WFD River Sub Basin
1	Rossbrackan	IE_NW_39L050660	39_367	Lough Swilly	LeslieHill[Stream]_SC_010	Leslie Hill Stream_020
2	Dooballagh (Burn)	IE_NW_39D020200	39_954	Lough Swilly	LeslieHill[Stream]_SC_010	Dooballagh Burn_010
3	Magheraboy 39	IE_NW_39D020200	39_471	Lough Swilly	LeslieHill[Stream]_SC_010	Dooballagh Burn_010
4	Maghera_More 39	IE_NW_39L050660	39_413	Lough Swilly	LeslieHill[Stream]_SC_010	Leslie Hill Stream_020
5	Trimragh	IE_NW_39L050660	39_412	Lough Swilly	LeslieHill[Stream]_SC_010	Leslie Hill Stream_020
6	Maghera_More 39	IE_NW_39L050660	39_576	Lough Swilly	LeslieHill[Stream]_SC_010	Leslie Hill Stream_020
7	Leslie Hill (Stream)	IE_NW_39L050660	39_741	Lough Swilly	LeslieHill[Stream]_SC_010	Leslie Hill Stream_020
8	Leslie Hill (Stream)	IE_NW_39L050660	39_740	Lough Swilly	LeslieHill[Stream]_SC_010	Leslie Hill Stream_020
9	Farsetmore	IE_NW_39S020300	39_2476	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
10	Churchland_Isle	IE_NW_39S020300	39_2481	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
11	Drumardagh	IE_NW_39S020300	39_2474	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
12	N/A	IE_NW_39S020300	39_2344	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
13	N/A	IE_NW_39S020300	39_225	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
14	Drumgreggan	IE_NW_39S020300	39_1268	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
15	Dromore 39	IE_NW_39S020300	39_2954	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
16	Bunnagee	IE_NW_39S020300	39_1288	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
17	N/A	IE_NW_39S020300	39_1544	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
18	N/A	IE_NW_39S020300	39_2934	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
19	Coaghmill	IE_NW_39S020300	39_2151	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
20	Lurgybrack	IE_NW_39S020300	39L34	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
21	Corravaddy (Burn)	IE_NW_39C030250	39_2973	Lough Swilly	Swilly_SC_010	Corravaddy Burn_010
22	Corravaddy (Burn)	IE_NW_39S020300	39_2468	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
23	Drumnaoagh	IE_NW_39S	39_2486	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010

ID	EPA Name	River Waterbody Code	Watercourse Segment Code	WFD Catchment	WFD Sub Catchment	WFD River Sub Basin
		020300				
24	Corravaddy (Burn)	IE_NW_39S 020300	39_2547	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
25	Milk_Isle	IE_NW_39S 020300	39_2960	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
26	Ballyraine	IE_NW_39S 020300	39_2959	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
27	Swilly 39	IE_NW_220_0100	39_2709	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
28	Swilly 39	IE_NW_220_0100	39_2718	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
29	Swilly 39	IE_NW_220_0100	39_2724	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
30	Port Bridge Stream	IE_NW_39S 020300	39_2963	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
31	Magheranan	IE_NW_39S 020300	39_1399	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
32	N/A	IE_NW_39S 020300	39_2487	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
33	Knocknamona	IE_NW_39S 020300	39_2961	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
34	N/A	IE_NW_39S 020300	39_2140	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
35	Knocknamona	IE_NW_39S 020300	39_2141	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
36	Ballyboe_Lisne nan	IE_NW_39S 020300	39_1494	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
37	Knocknamona	IE_NW_39S 020300	39_1495	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
38	Kilttoy	IE_NW_39S 020300	39_2296	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
39	Knocknamona	IE_NW_39S 020300	39_2318	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
40	Lisnenan 39	IE_NW_39S 020300	39_2193	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
41	Knocknamona	IE_NW_39S 020300	39_2192	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
42	Knocknamona	IE_NW_39S 020300	39_858	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010
43	Carnamogagh_Lower	IE_NW_39S 020300	39_733	Lough Swilly	Swilly_SC_010	Swilly (Donegal)_010

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. Letterkenny 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 Swilly 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 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 option extents.

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)
Swilly	39_1293	39_2323_5	3.59	6.15	9.34	15.18	24.75
Swilly	39_2709	39061_RPS	96.66	71.86	102.26	134.53	220.34
Swilly	39_2542	39_1004_D_RPS	120.83	88.58	126.04	183.79	263.33
Corravaddy (Burn)	39_800	39_800_2	7.44	5.56	8.14	13.72	22.35
Lurgybrack	39_2152	39_2152_2	3.76	3.22	4.89	7.95	12.96
Lurgybrack	39_2153	39_2153_2	5.06	4.20	6.38	10.37	16.90
Corravaddy (Burn)	39_2468	39_2468_3	13.81	13.75	20.74	32.98	52.03
Knocknamona	39_2961	39_2551_2_RPS	4.59	2.90	4.41	7.17	11.68
Drumany	39_1545	39_1507_U	0.03	0.02	0.03	0.050	0.08
Bunnagee	39_2934	39_1507_2	1.05	0.71	1.07	1.74	2.84
Maghera_More 39	39-576	Upstream of crossing		N/A	N/A	N/A	N/A
Leslie Hill Stream	39_741	Upstream of crossing		N/A	N/A	N/A	N/A
Dooballagh (Burn)	39_2970	Upstream of crossing		N/A	N/A	N/A	N/A
FARSETMORE	39_2476	Upstream of crossing		N/A	N/A	N/A	N/A

⁴ North Western – Neagh Bann CFRAM Study – UoM 01 Hydrology Report, RPS 2015 (http://www.cfram.ie/otherprojects/IBE0700Rp0006_UoM01%20Hydrology%20Report_F02.pdf)

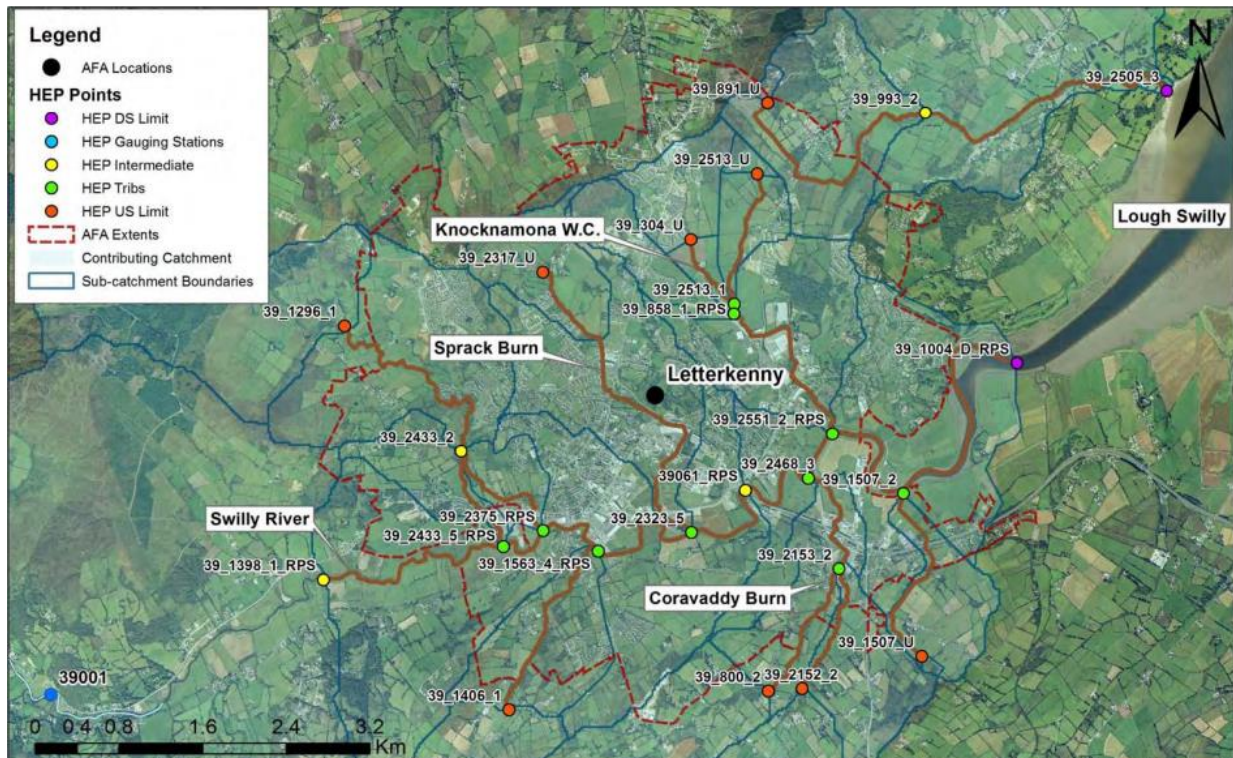


Figure 2-2: Catchment Boundaries and HEPs

2.1.3 Overview of Drainage Issues

Historical 6-inch mapping has revealed very little change in drainage regimes in the study area.



Figure 2-3: Location of Historical Water Features at Letterkenny

The OPW Arterial drainage mapping was also consulted and there is evidence that the River Swilly and surrounding lands benefit from arterial drainage (see **Figure 2-4**). The surrounding lands also seem to be protected by flood defence embankments.

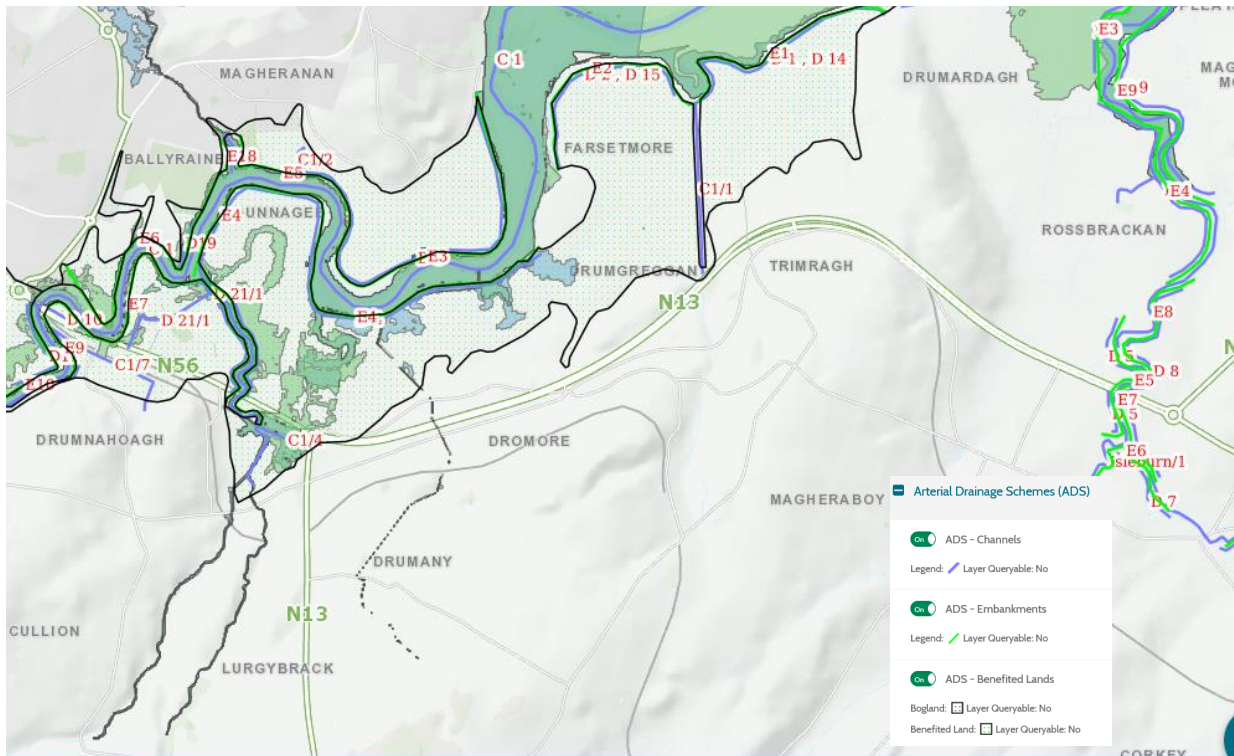


Figure 2-4: OPW Arterial Drainage Scheme with Benefited Lands (Source: www.floodinfo.ie)

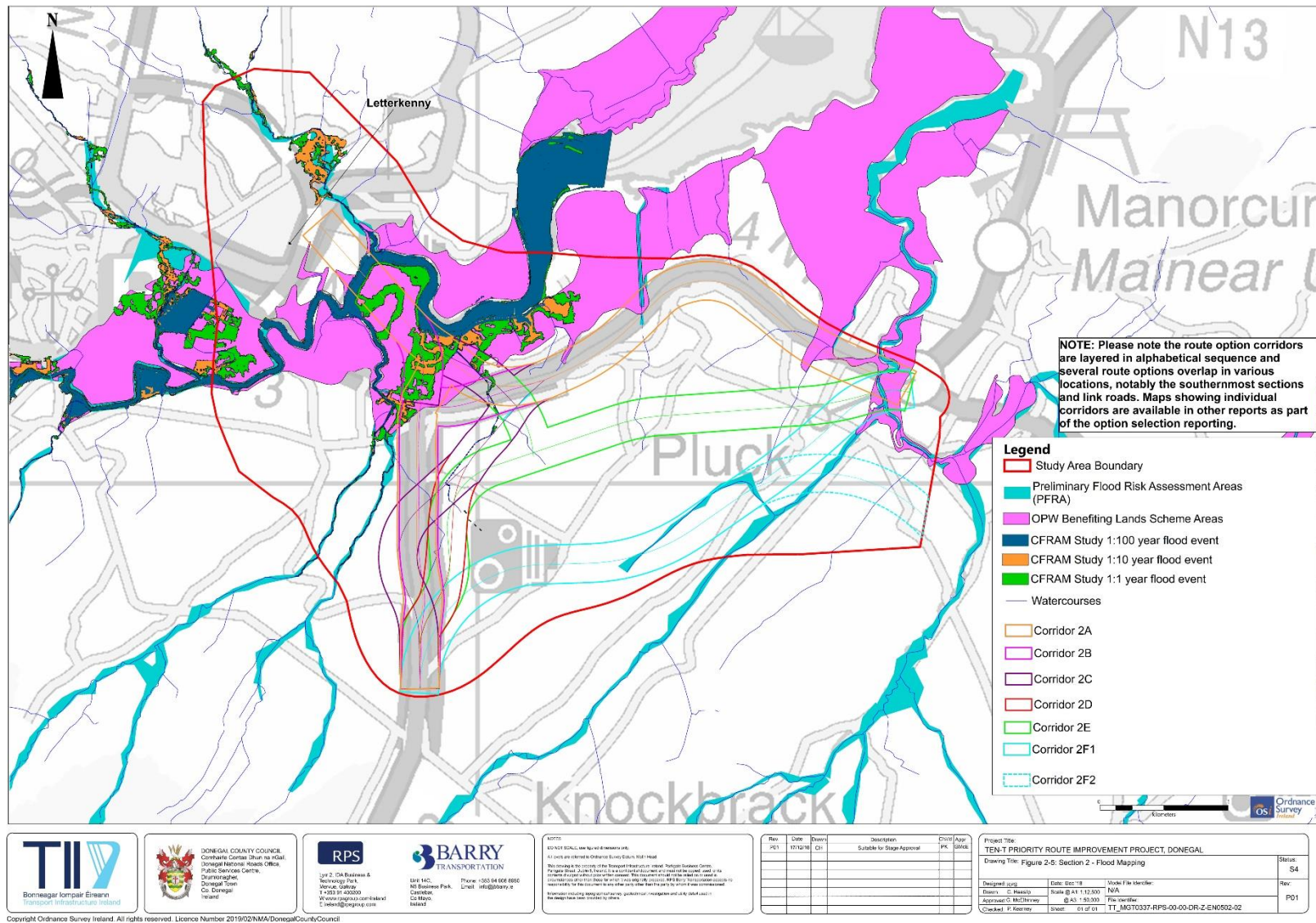


Figure 2-5: Flood Mapping - Section 2

2.1.4 Overview of Flooding Aspects and Floodplains

The OPW maintained Floodmaps.ie database has been consulted and a report generated for all recorded flood events within the vicinity of the study area. There were six instances of flooding reported in the Letterkenny that coincide with the proposed option extents (see **Figure 2-6**).



Figure 2-6: Locations of Historical Floods (Source: Floodinfo.ie⁵)

These six instances of recurring floods and the respective reports from Floodmap.ie are outlined in **Table 2-3** below. The reports can be read on www.floodinfo.ie.

Table 2-3: Historical Flooding Data

Location	Flood Description
Drumnaoagh	Flooding in Donegal by DCC (26/11/2006) Letterkenny Electoral Engineer – Minutes (11/01/2006)
Coravaddy (Burn) 1	Letterkenny Electoral Engineer – Minutes (11/01/2006)
UNIFY Factory	Letterkenny Localised Flood Study (00/10/2002)
Coravaddy (Burn) 2	Letterkenny Electoral Engineer – Minutes (11/01/2006)
Bonagee	Flooding at Letterkenny (No date) Flooding in Donegal (21/12/1999) Flooding of November 1999 - West Region (01/12/1999)
Holiday Inn	Letterkenny Localised Flood Study (00/10/2002)

⁵ Floodinfo.ie website: <https://www.floodinfo.ie/map/floodmaps/>

As mentioned in **Section 2.1.2** above, Letterkenny 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**. CFRAM mapping with the proposed option extents overlaid can also be seen in this drawing.

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 options 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. Flood relief culverts through road embankments may also be an option to allow flood waters to reach their natural flood extents.

2.1.5 Overview of Surface Water Quality

Water Quality records for watercourses in the study area were sourced from the Environmental Protection Agency (EPA) online datasets (www.epa.ie). These results (2010-2015) show that the majority of the watercourses have not been assigned a WFD (Water Framework Directive) status while the Swilly Estuary is of *Moderate* (yellow) status. Some tributaries to the River Pluck (Leslie Hill Stream) have been assigned a *Good* (green) status.

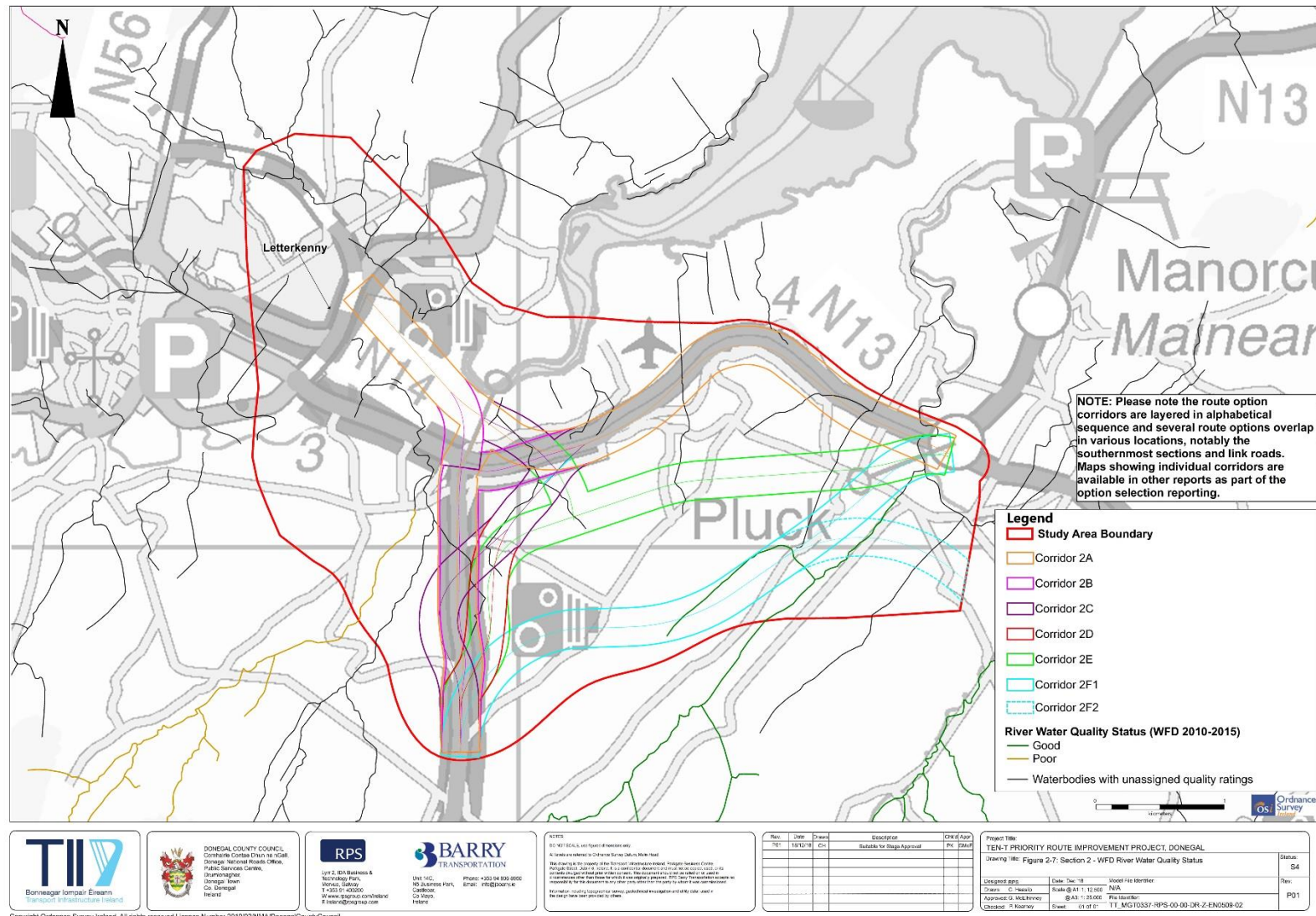


Figure 2-7: River Quality Status – Section 2

Figure 2-8 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 many of the watercourses in the study area are highlighted for review (orange) as the degree of confidence in the waterbody's characterisation is weak. The Swilly Estuary and the Corravaddy Burn are At Risk (red) to not meet their WFD status while Dooballagh Burn is 'Not At Risk' (green).

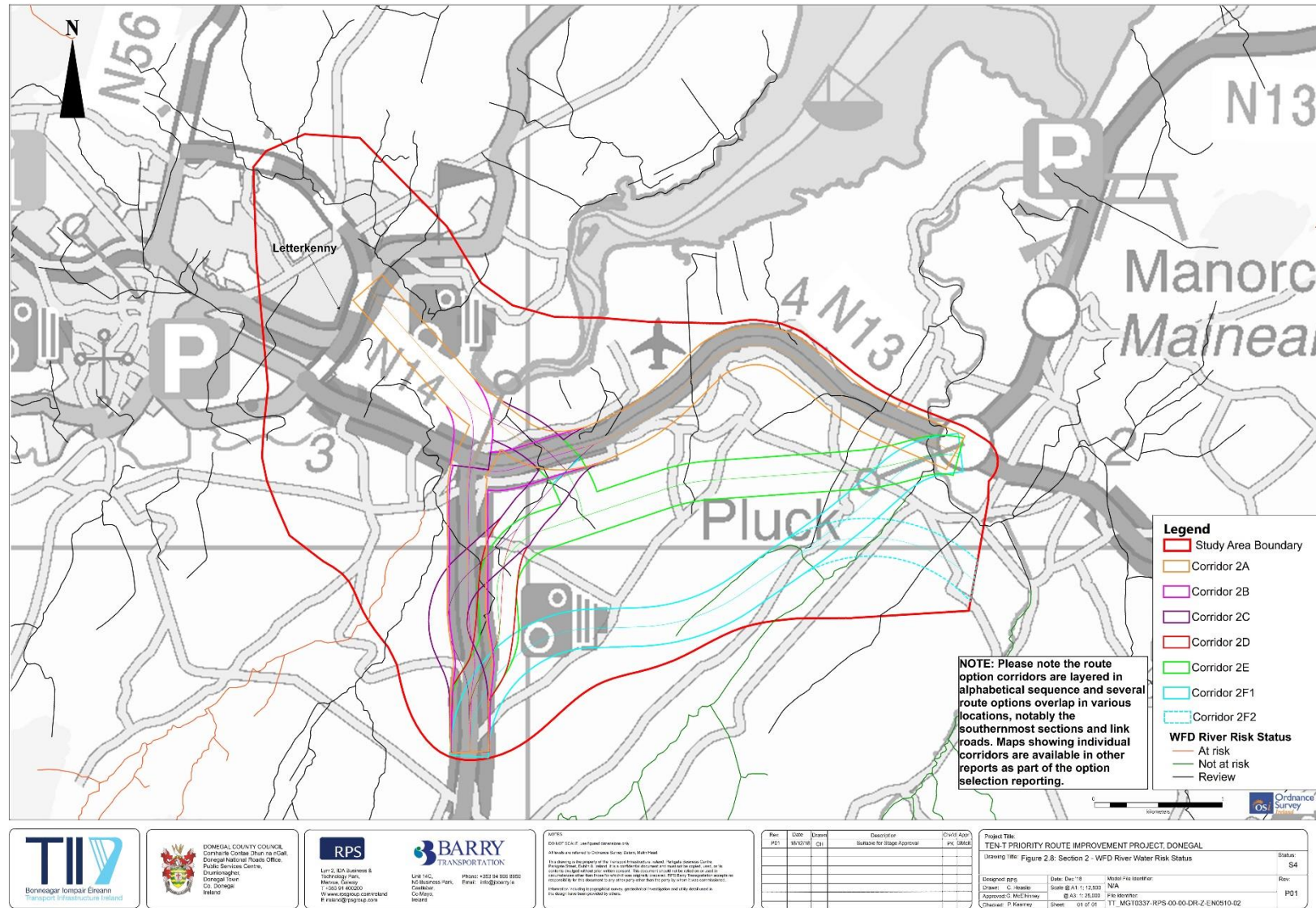


Figure 2-8: WFD River Risk Status – Section 2

2.1.6 Overview of Water Supply Sources

There are no drinking water abstraction points within the study area.

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 2-9 below illustrates the locations of discharge points from industrial and municipal sewage effluent discharges. There can be seen to be two industrial discharges (blue), and two storm water overflows (green) in the study area.

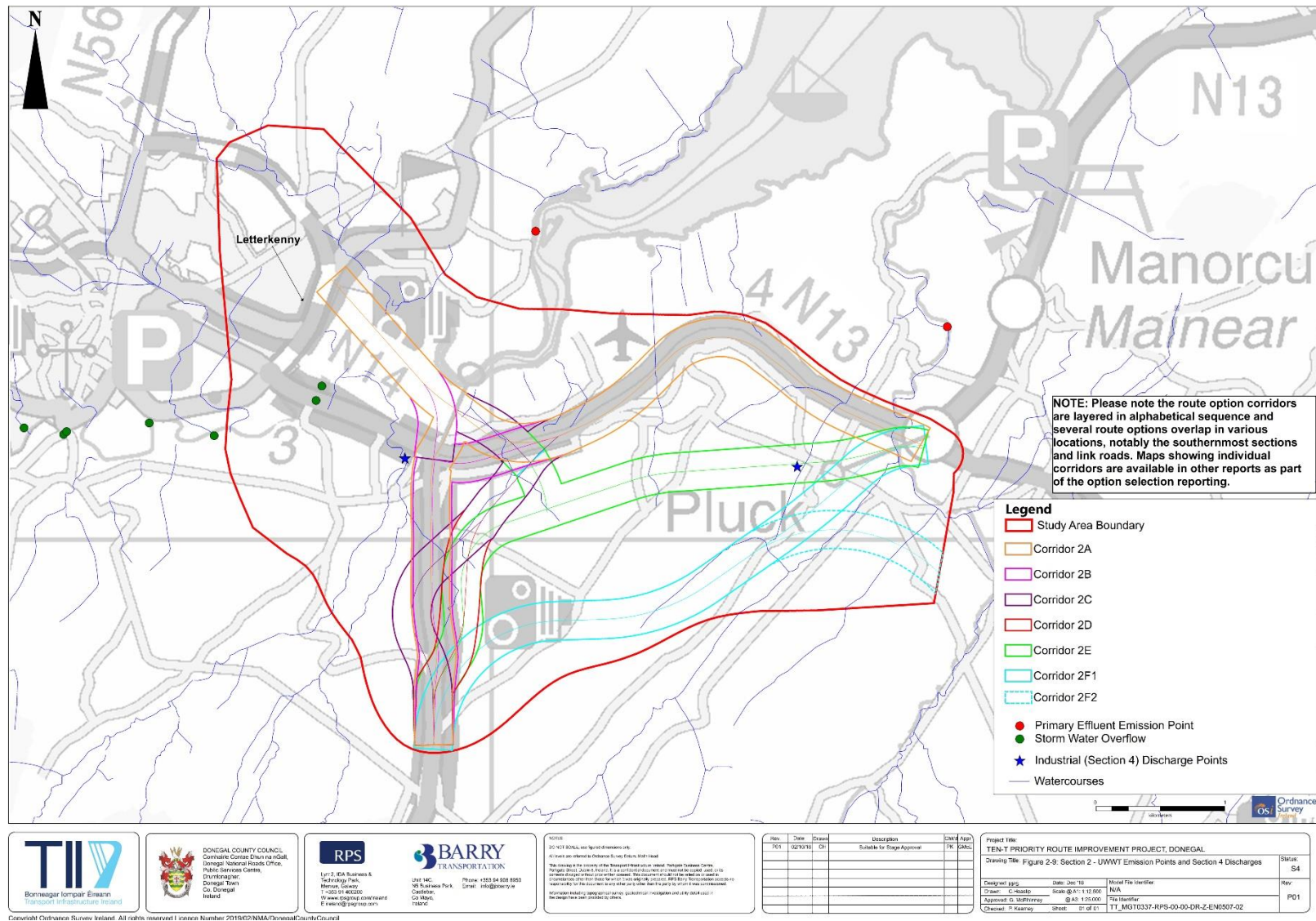


Figure 2-9: UWWT Emission Points and Section 4 Discharges - Section 2

2.1.9 Overview of Ecological Issues

The Lough Swilly Special Area of Conservation (SAC) and Lough Swilly Special Protection Area (SPA) are both intersecting the study area and in some case interacting with certain options. The Lough Swilly SAC's Qualifying Interests for which it is designated are; Estuaries [1130], Coastal lagoons [1150], Atlantic salt meadows (*Glauco-Puccinellietalia maritima*) [1330], Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410], Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0], and *Lutra lutra* (Otter) [1355]. The Lough Swilly SPA is designated for a variety of wildfowl and waterbirds. See Figure 2-10 below for designated sites and surface water interaction. See Appendices B4.3 Biodiversity (Terrestrial) and B4.4 Biodiversity (Aquatic) respectively for greater in-depth description of identified ecological issues within Section 2 study area.

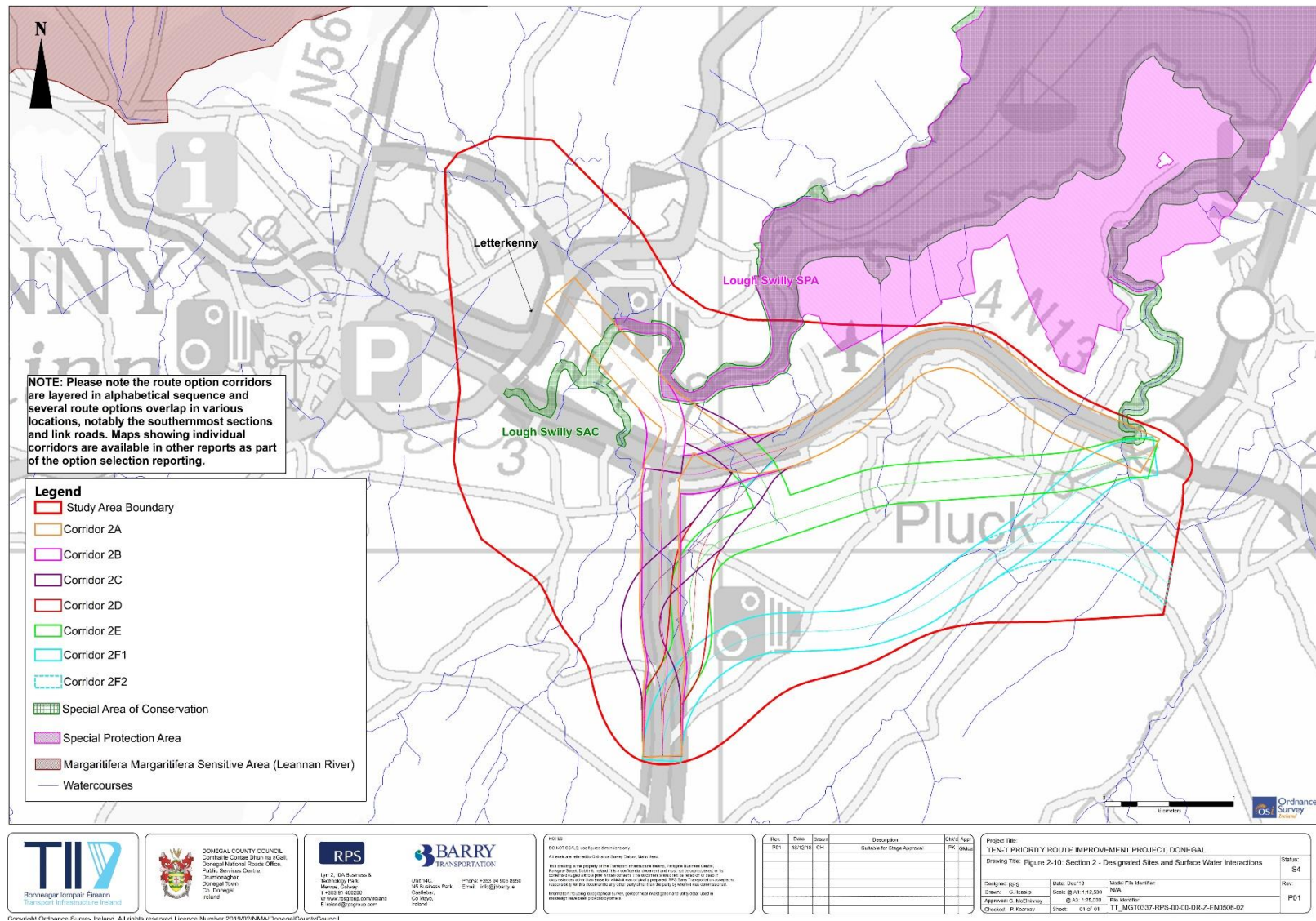


Figure 2-10: Designated Sites and Surface Water Interactions - Section 2

3 OPTIONS ASSESSMENT

This section details the assessment of the options with respect to the hydrology constraints identified in **Section 2.1** of this report. The seven options are illustrated in **Figure 1-1**.

Table 3-1 and **Table 3-2** have been extracted from the NRA guidelines and provide the basis for the options 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	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of		

Impact Level	Attribute Importance				
	Extremely High**	Very High	High	Medium	Low
	proportion of attribute		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			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 Option

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 2A (Orange)

The impact of 2A (Orange) on the flood risk of local watercourses from south to north is outlined in the table below:

Table 3-3: Flood Impact Assessments for Option 2A (Orange)

Option 2A (Orange)			
Watercourse EPA name	Segment Code	Crossing / Encroachment	Details
Coaghmill	39_2151	Crossing & Encroachment	The proposed option crosses the Coaghmill Stream. It is a minor crossing. However, a culvert crossing will be required at this location and for this an OPW Section 50 application will be required. The expected impacts on the flooding scenario due to the construction of the road could be considered as minimal (slight).
Swilly	39_2718& 39-2724	Crossing & Encroachment	The proposed Bunnagee link road for Letterkenny town crosses the River Swilly Channel. The Swilly river channel is approximately 55m wide at this location. Furthermore, much of this link road passes through the floodplains of the Swilly River. Construction of this link road could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be required for the subject river crossing.

Option 2A (Orange)			
Watercourse EPA name	Segment Code	Crossing / Encroachment	Details
Bunnagee & Dromore Upper	39_1288; 39_1544	Crossing & Encroachment	The proposed Bunnagee link road for Letterkenny town crosses the Bunnagee stream channel and also Dromore Upper Stream Channel (5-6 m wide). Lands adjacent to these crossings are liable to flooding (Refer to CFRAM flood maps). Construction of this link road could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated stream channels and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for these streams' crossings.
Dromore Lower & Drumgreggan	39_225	Encroachment	The proposed option slightly encroaches the Drumgreggan & Dromore Lower Stream channel floodplains. Any impacts on the flooding scenarios, in the vicinity of the encroachments, are expected to be minimal. However, an appropriate mitigation measure should be implemented to minimise this impact.
Farsetmore	39_2476	Crossing & Encroachment	The proposed option crosses the Farsetmore Stream channel (approximately 2-3m wide). Furthermore, it also encroaches slightly the adjacent Swilly river floodplain (refer to CFRAM floodmaps). Any impacts on the flooding scenarios expected to be minimal. A section 50 application will be required for this stream crossing.
Churchland Isle	39_2481	Encroachment	The proposed option slightly encroaches the Churchland Isle Stream Channel floodplain, in the vicinity. Any impacts on the flooding scenarios expected to be minimal. An appropriate mitigation measure should be implemented to minimise this impact.
Trimragh	39_412	Crossing	The proposed option crosses the Trimragh Stream channel (a minor stream). Any impacts on the flooding scenarios expected to be minimal. A section 50 application will be required for this stream crossing.
Maghera_More 39	39_413 &39_576	Crossing	The proposed option crosses the Mahera More Stream channel (approximately 2-3m wide). Furthermore, it also encroaches the adjacent Swilly river floodplain (refer to CFRAM floodmaps). Any impacts on the flooding scenarios expected to be moderate. A section 50 application will be required for this stream crossing.
Leslie Hill Stream	39_740	Crossing	The proposed option crosses the Leslie Hill Stream Channel and its associated floodplain. This river channel is approximately 20m wide at this location. The proposed road construction works could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for the subject river crossing.

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. The river Swilly is characterised as *At Risk* under the Water Framework Directive. However, the remaining watercourses encountered along the option are currently at review stage. The River Swilly 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 2A (Orange) Option.

Table 3-4: Water Quality Impact Assessments for Option 2A (Orange)

Option 2A (Orange)				
Watercourse EPA name	Segment Code	Biotic Index	River Waterbodies Risk	Importance of Hydrological Attribute
Coaghmill	39_2151	Unknown	Review	Low
Swilly	39_2718& 39-2724	Unknown	At Risk	Very High
Bunnagee & Dromore Upper	39_1288; 39_2934 & 39_1021	Unknown	Review	High
Dromore Lower	39_225	Unknown	Review	Low
Drumgreggan	39_1268	Unknown	Review	Low
Farsetmore	39_2476	Unknown	Review	Low
Churchland Isle	39_2481	Unknown	Review	Low
Trimragh	39_412	Unknown	Review	Low
Maghera_More 39	39_413 &39_576	Unknown	Review	Medium
Leslie Hill Stream	39_740	Unknown	Review	Very High

3.1.2 Option 2B (Pink)

The impact of Option 2B (Pink) on the flood risk of local watercourses from south to north is outlined in the table below:

Table 3-5: Flood Impact Assessments for Option 2B (Pink)

Option 2B (Pink)			
Watercourse EPA name	Segment Code	Crossing / Encroachment	Details
Coaghmill	39_2151	Crossing & Encroachment	The proposed option crosses the Coaghmill Stream. It is a minor crossing. However, a culvert crossing will be required at this location and for this an OPW Section 50 application will be required. The expected impacts on the flooding scenario due to the construction of the road could be considered as minimal (slight).
Swilly	39_2718& 39-2724	Crossing & Encroachment	The proposed Bunnagee link road for Letterkenny town crosses the River Swilly Channel. The Swilly river channel is approximately 55m wide at this location. Furthermore, much of this link road passes through the floodplains of the Swilly River. Construction of this link road could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be required for the subject river

			crossing.
Dromore Upper	39_1544	Crossing	The proposed option crosses the Dromore Upper Stream Channel (5-6 m wide) at the existing N13 crossing. Lands adjacent to this crossing is liable to flooding (Refer to CFRAM flood maps). Construction of this link road could pose medium level of flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated stream channels and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for these streams' crossings.
Dromore Lower & Drumreggan	39_225 & 39_1268	Encroachment	The proposed p option slightly encroaches the Drumreggan & Dromore Lower Stream channel floodplains. Any impacts on the flooding scenarios, in the vicinity of the encroachments, are expected to be minimal. However, an appropriate mitigation measure should be implemented to minimise this impact.
Farsetmore	39_2476	Crossing & Encroachment	The proposed option crosses the Farsetmore Stream channel (approximately 2-3m wide). Furthermore, it also encroaches slightly the adjacent Swilly river floodplain (refer to CFRAM floodmaps). Any impacts on the flooding scenarios expected to be minimal. A section 50 application will be required for this stream crossing.
Churchland Isle	39_2481	Encroachment	The proposed option slightly encroaches the Churchland Isle Stream Channel floodplain. Any impacts on the flooding scenarios expected to be minimal. An appropriate mitigation measure should be implemented to minimise this impact.
Trimragh	39_412	Crossing	The proposed option crosses the Trimragh Stream channel (a minor stream). Any impacts on the flooding scenarios expected to be minimal. A section 50 application will be required for this stream crossing.
Maghera_More 39	39_413 & 39_576	Crossing	The proposed option crosses the Mahera More Stream channel (approximately 2-3m wide). Furthermore, it also encroaches the adjacent Swilly river floodplain (refer to CFRAM floodmaps). Any impacts on the flooding scenarios expected to be moderate. A section 50 application will be required for this stream crossing.
Leslie Hill Stream	39_740	Crossing	The proposed option crosses the Leslie Hill Stream Channel and its associated floodplain. This river channel is approximately 20m wide at this location. The proposed road construction works could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for the subject river crossing.

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. The River Swilly is characterised as *At Risk* under the Water Framework Directive. However, the remaining watercourses encountered the option are currently at review stage. The River Swilly 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 2B (Pink).

Table 3-6: Water Quality Impact Assessments for Option 2B (Pink)

Option 2B (Pink)				
Watercourse EPA name	Segment Code	Biotic Index	River Waterbodies Risk	Importance of Hydrological Attribute
Coaghmill	39_2151	Unknown	Review	Low
Swilly	39_2718& 39-2724	Unknown	At Risk	Very High
Dromore Upper	39_1544	Unknown	Review	Medium
Dromore Lower	39_225	Unknown	Review	Low
Drumgreggan	39_1268	Unknown	Review	Low
Farsetmore	39_2476	Unknown	Review	Low
Churchland Isle	39_2481	Unknown	Review	Low
Trimragh	39_412	Unknown	Review	Low
Maghera_More 39	39_413 & 39_576	Unknown	Review	Medium
Leslie Hill Stream	39_740	Unknown	Review	Very high

3.1.3 Option 2C (Purple)

The impact of Option 2C (Purple) 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 2C (Purple)

Option 2C (Purple)			
Watercourse EPA name	Segment Code	Crossing / Encroachment	Details
Coaghmill	39_2151	Crossing & Encroachment	The proposed option crosses the Coaghmill Stream. It is a minor crossing. However, a culvert crossing will be required at this location and for this a OPW Section 50 application will be required. The expected impacts on the flooding scenario due to the construction of the road could be considered as minimal (slight).
Drumany	39_1545	Crossing & Encroachment	The proposed option crosses the Drumany Stream channel. Furthermore, it encroaches the floodplains of this stream channel. The proposed road construction works could pose moderate level of flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for the subject river crossing.
Dromore Upper	39_1021	Crossing & Encroachment	The proposed option crosses the Dromore Stream channel at its floodplain. The proposed road construction works could pose moderate level of flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure

Option 2C (Purple)			
Watercourse EPA name	Segment Code	Crossing / Encroachment	Details
			should be implemented. A Section 50 application will also be also required for the subject river crossing.
Bunnagee & Dromore Upper	39_1288; 39_1544	Crossing & Encroachment	The proposed Bunnagee link road for Letterkenny town crosses the Bunnagee stream channel and also Dromore Upper Stream Channel (5-6 m wide). Lands adjacent to these crossings are liable to flooding (Refer to CFRAM flood maps). Construction of this link road could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated stream channels and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for these streams' crossings.
Swilly	39_2718& 39-2724	Crossing & Encroachment	The proposed Bunnagee link road for Letterkenny town crosses the River Swilly Channel. The Swilly river channel is approximately 55m wide at this location. Furthermore, much of this link road passes through the floodplains of the Swilly River. Construction of this link road could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be required for the subject river crossing.
Dromore Lower & Drumreggan	39_225 & 39_1268	Encroachment	The proposed option slightly encroaches the Drumreggan & Dromore Lower Stream channel floodplains. Any impacts on the flooding scenarios, in the vicinity of the encroachments, are expected to be minimal. However, an appropriate mitigation measure should be implemented to minimise this impact.
Farsetmore	39_2476	Crossing	The proposed option crosses the Farsetmore Stream channel (approximately 2-3m wide). Furthermore, it also encroaches slightly the adjacent Swilly river floodplain (refer to CFRAM floodmaps). Any impacts on the flooding scenarios expected to be minimal. A section 50 application will be required for this stream crossing.
Churchland Isle	39_2481	Encroachment	The proposed option slightly encroaches the Churchland Isle Stream Channel floodplain. Any impacts on the flooding scenarios expected to be minimal. An appropriate mitigation measure should be implemented to minimise this impact.
Trimragh	39_412	Crossing	The proposed option crosses the Trimragh Stream channel (a minor stream). Any impacts on the flooding scenarios expected to be minimal. A section 50 application will be required for this stream crossing.
Maghera_More 39	39_413 &39_576	Crossing	The proposed option crosses the Mahera More Stream channel (approximately 2-3m wide). Furthermore, it also encroaches the adjacent Swilly river floodplain (refer to CFRAM floodmaps). Any impacts on the flooding scenarios expected to be moderate. A section 50 application will be required for this stream crossing.
Leslie Hill Stream	39_740	Crossing	The proposed option crosses the Leslie Hill Stream Channel and its associated floodplain. This river channel is approximately 20m wide at this location. The proposed road construction works could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction

Option 2C (Purple)			
Watercourse EPA name	Segment Code	Crossing / Encroachment	Details
			stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for the subject river crossing.

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. The River Swilly is characterised as *At Risk* under the Water Framework Directive. However, the remaining watercourses encountered along the option are currently at review stage. The River Swilly 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 2C (Purple).

Table 3-8: Water Quality Impact Assessments for Option 2C (Purple)

Option 2C (Purple)				
Watercourse EPA name	Segment Code	Biotic Index	River Waterbodies Risk	Importance of Hydrological Attribute
Coaghmill	39_2151	Unknown	Review	Low
Swilly	39_2718& 39-2724	Unknown	At Risk	Very High
Drumany	39_1545	Unknown	Review	Medium
Bunnagee & Dromore Upper	39_1288; 39_2934 & 39_1021	Unknown	Review	High
Dromore Lower	39_225	Unknown	Review	Low
Drumgreggan	39_1268	Unknown	Review	Low
Farsetmore	39_2476	Unknown	Review	Low
Churchland Isle	39_2481	Unknown	Review	Low
Trimragh	39_412	Unknown	Review	Low
Maghera_More 39	39_413 & 39_576	Unknown	Review	Medium
Leslie Hill Stream	39_740	Unknown	Review	Very High

3.1.4 Option 2D (Red)

The impact of the 2D (Red) Option on the flood risk of local watercourses from south to north is outlined in the table below.

Table 3-9: Flood Impact Assessments for Option 2D (Red)

Option 2D (Red)			
Watercourse EPA name	Segment Code	Crossing / Encroachment	Details
Coaghmill	39_2151	Encroachment	The proposed option encroaches the Coaghmill Stream channel floodplain. The proposed road construction works could pose some moderate level of flooding risk to the adjacent lands. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented.
Drumany	39_1545	Crossing & Encroachment	The proposed option crosses the Drumany Stream channel. Furthermore, it encroaches the floodplains of this stream channel. The proposed road construction works could pose moderate level of flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for the subject river crossing.
Dromore Upper	39_1021	Crossing & Encroachment	The proposed option crosses the Dromore Stream channel at its floodplain. The proposed road construction works could pose moderate level of flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for the subject river crossing.
Bunnagee & Dromore Upper	39_1288; 39_1544	Crossing & Encroachment	The proposed Bunnagee link road for Letterkenny town crosses the Bunnagee stream channel and also Dromore Upper Stream Channel (5-6 m wide). Lands adjacent to these crossings are liable to flooding (Refer to CFRAM flood maps). Construction of this link road could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated stream channels and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for these streams' crossings.
Swilly	39_2718& 39-2724	Crossing & Encroachment	The proposed Bunnagee link road for Letterkenny town crosses the River Swilly Channel. The Swilly River channel is approximately 55m wide at this location. Furthermore, much of this link road passes through the floodplains of the Swilly River. Construction of this link road could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be required for the subject river crossing.
Dromore Lower & Drumreggan	39_225 & 39_1268	Encroachment	The proposed option slightly encroaches the Drumreggan & Dromore Lower Stream channel floodplains. Any impacts on the flooding scenarios, in the vicinity of the encroachments, are expected to be minimal. However, an appropriate mitigation measure should be implemented to minimise this impact.

Option 2D (Red)			
Watercourse EPA name	Segment Code	Crossing / Encroachment	Details
Farsetmore	39_2476	Crossing	The proposed option crosses the Farsetmore Stream channel (approximately 2-3m wide). Furthermore, it also encroaches slightly the adjacent Swilly river floodplain (refer to CFRAM floodmaps). Any impacts on the flooding scenarios expected to be minimal. A section 50 application will be required for this stream crossing.
Churchland Isle	39_2481	Encroachment	The proposed option slightly encroaches the Churchland Isle Stream Channel floodplain. Any impacts on the flooding scenarios expected to be minimal. An appropriate mitigation measure should be implemented to minimise this impact.
Trimragh	39_412	Crossing	The proposed option crosses the Trimragh Stream channel (a minor stream). Any impacts on the flooding scenarios expected to be minimal. A section 50 application will be required for this stream crossing.
Maghera_More 39	39_413 & 39_576	Crossing	The proposed option crosses the Mahera More Stream channel (approximately 2-3m wide). Furthermore, it also encroaches the adjacent Swilly River floodplain (refer to CFRAM floodmaps). Any impacts on the flooding scenarios expected to be moderate. A section 50 application will be required for this stream crossing.
Leslie Hill Stream	39_740	Crossing	The proposed option crosses the Leslie Hill Stream Channel and its associated floodplain. This river channel is approximately 20m wide at this location. The proposed road construction works could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for the subject river crossing.

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. The River Swilly is characterised as *At Risk* under the Water Framework Directive. However, the remaining watercourses encountered along the option are currently at review stage. The River Swilly 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 Red Option.

Table 3-10: Water Quality Impact Assessments for Option 2D (Red)

Option 2D (Red)				
Watercourse EPA name	Segment Code	Biotic Index	River Waterbodies Risk	Importance of Hydrological Attribute
Coaghmill	39_2151	Unknown	Review	Low
Swilly	39_2718 & 39-2724	Unknown	At Risk	Very High
Bunnagee & Dromore Upper	39_1288; 39_2934 & 39_1021	Unknown	Review	High

Option 2D (Red)				
Watercourse EPA name	Segment Code	Biotic Index	River Waterbodies Risk	Importance of Hydrological Attribute
Dromore Lower	39_225	Unknown	Review	Low
Drumany	39_1545	Unknown	Review	Medium
Drumgreggan	39_1268	Unknown	Review	Low
Farsetmore	39_2476	Unknown	Review	Low
Churchland Isle	39_2481	Unknown	Review	Low
Trimragh	39_412	Unknown	Review	Low
Maghera_More 39	39_413 &39_576	Unknown	Review	Medium
Leslie Hill Stream	39_740	Unknown	Review	Very High

3.1.5 Option 2E (Green)

The impact of Option 2E (Green) 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 2E (Green)

Option 2E (Green)			
Watercourse EPA name	Segment Code	Crossing / Encroachment	Details
Coaghmill	39_2151	Encroachment	The proposed option encroaches the Coaghmill Stream channel floodplain. The proposed road construction works could pose some moderate level of flooding risk to the adjacent lands. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented.
Drumany	39_1545	Crossing & Encroachment	The proposed option crosses the Drumany Stream channel and its floodplain. The proposed road construction works could pose moderate level of flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be required for the subject river crossing.
Dromore Upper	39_1021	Crossing & Encroachment	The proposed option crosses the Dromore Stream channel at its floodplain. The proposed road construction works could pose moderate level of flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be required for the subject river crossing.
Bunnagee & Dromore Upper	39_1288; 39_1544	Crossing & Encroachment	The proposed Bunnagee link road for Letterkenny town crosses the Bunnagee stream channel and also Dromore Upper Stream Channel (5-6 m wide). Lands adjacent to these crossings are liable to flooding (Refer to CFRAM flood maps). Construction of this link road could pose significant flooding risk to the adjacent lands and properties, both during the

Option 2E (Green)			
Watercourse EPA name	Segment Code	Crossing / Encroachment	Details
			construction and post construction stages of the works. A detailed hydraulic modelling for the associated stream channels and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for these stream crossings.
Swilly	39_2718& 39-2724	Crossing & Encroachment	The proposed Bunnagee link road for Letterkenny town crosses the River Swilly Channel. The Swilly river channel is approximately 55m wide at this location. Furthermore, much of this link road passes through the floodplains of the Swilly River. Construction of this link road could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be required for the subject river crossing.
Farsetmore	39_2476	Crossing	The proposed option crosses the Farsetmore Stream channel (approximately 2-3m wide). Furthermore, it also encroaches slightly the adjacent Swilly river floodplain (refer to CFRAM floodmaps). Any impacts on the flooding scenarios expected to be minimal. A section 50 application will be required for this stream crossing.
Maghera_More 39	39_413	Crossing	The proposed option crosses the Mahera More Stream channel (approximately 2-3m wide). Furthermore, it also encroaches the adjacent Swilly river floodplain (refer to CFRAM floodmaps). Any impacts on the flooding scenarios expected to be moderate. A section 50 application will be required for this stream crossing.
Leslie Hill Stream	39_740	Crossing	The proposed mainline road alignment crosses the Leslie Hill Stream Channel and its associated floodplain. This river channel is approximately 20m wide at this location. The proposed road construction works could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for the subject river crossing.

In terms of water quality impact, considerable levels of storm water attenuation and treatment will be required before outfalling to any of the watercourses traversed by the option. The River Swilly is characterised as *At Risk* under the Water Framework Directive. However, the remaining watercourses encountered along the option are currently at review stage. The River Swilly 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 2E (Green).

Table 3-12: Water Quality Impact Assessments for Option 2E (Green)

Option 2E (Green)				
Watercourse EPA name	Segment Code	Biotic Index	River Waterbodies Risk	Importance of Hydrological Attribute
Coaghmill	39_2151	Unknown	Review	Low
Swilly	39_2718& 39-2724	Unknown	At Risk	Very High
Bunnagee & Dromore Upper	39_1288; 39_2934 & 39_1021	Unknown	Review	High
Drumany	39_1545	Unknown	Review	Medium
Drumgreggan	39_1268	Unknown	Review	Low
Farsetmore	39_2476	Unknown	Review	Low
Maghera_More 39	39_413 &39_576	Unknown	Review	Medium
Leslie Hill Stream	39_740	Unknown	Review	Very High

3.1.6 Option 2F1 (Blue)

The impact of Option 2F1 (Blue) 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 2F1 (Blue)

Option 2F1 (Blue)			
Watercourse EPA name	Segment Code	Crossing / Encroachment	Details
Magheraboy 39	39_413 &39_471	Crossing & Encroachment	The proposed option crosses the Magheraboy Stream Channel at two locations and also encroaches its floodplain. Lands adjacent to these crossings are liable to flooding (Refer to PFRA flood maps). The proposed road construction works could pose some flooding risks to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for the subject stream crossings.
Bunnagee & Dromore Upper	39_1288; 39_1544	Crossing & Encroachment	The proposed Bunnagee link road for Letterkenny town crosses the Bunnagee stream channel and also Dromore Upper Stream Channel (5-6 m wide)... Lands adjacent to these crossings are liable to flooding (Refer to CFRAM flood maps). Construction of this link road could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated stream channels and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for these stream crossings.
Swilly	39_2718& 39-2724	Crossing & Encroachment	The proposed Bunnagee link road for Letterkenny town crosses the River Swilly Channel. The Swilly river channel is

Option 2F1 (Blue)			
Watercourse EPA name	Segment Code	Crossing / Encroachment	Details
			approximately 55m wide at this location. Furthermore, much of this link road passes through the floodplains of the Swilly River. Construction of this link road could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be required for the subject river crossing.
Leslie Hill Stream	39_740	Crossing	The proposed mainline road alignment crosses the Leslie Hill Stream Channel and its associated floodplain. This river channel is approximately 20m wide at this location. The proposed road construction works could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be also required for the subject river crossing.

In terms of water quality impact, considerable levels of storm water attenuation and treatment will be required before outfalling to any of the watercourses traversed by the option. The River Swilly is characterised as *At Risk*, while the Magheraboy stream has been assessed as *Not at Risk* under the Water Framework Directive. However, the remaining watercourses encountered along the option are currently at review stage. The River Swilly 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 2F1 (Blue) Option.

Table 3-14: Water Quality Impact Assessments for Option 2F1 (Blue)

Option 2F1 (Blue)				
Watercourse EPA name	Segment Code	Biotic Index	River Waterbodies Risk	Importance of Hydrological Attribute
Swilly	39_2718& 39-2724	Unknown	At Risk	Very High
Magheraboy 39	39_413 &39_576	Unknown	Not at Risk	Low
Leslie Hill Stream	39_740	Unknown	Review	Very High
Bunnagee & Dromore Upper	39_1288; 39_2934 & 39_1021	Unknown	Review	High

3.1.7 Option 2F2 (Blue)

The impact of Option 2F2 (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 2F2 (Blue)

Option 2F2 (Blue)			
Watercourse EPA name	Segment Code	Crossing / Encroachment	Details
Magheraboy 39	39_413 & 39_471	Crossing & Encroachment	The proposed option crosses the Magheraboy Stream Channel at two locations and also encroaches its floodplain. Lands adjacent to these crossings are liable to flooding (Refer to PFRA flood maps). The proposed road construction works could pose some risks to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be required for the subject stream crossings.
Bunnagee & Dromore Upper	39_1288; 39_1544	Crossing & Encroachment	The proposed Bunnagee link road for Letterkenny town crosses the Bunnagee stream channel and also Dromore Upper Stream Channel (5-6 m wide). Lands adjacent to these crossings are liable to flooding (Refer to CFRAM flood maps). Construction of this link road could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated stream channels and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be required for these stream crossings.
Dooballagh (Burn)	39_2970	Crossing	The proposed option crosses the Dooballagh Stream channel and its floodplain (approximately 5-6 m wide). Any impacts on the flooding scenarios expected to be moderate. A section 50 application will be required for this stream crossing.
Rossbrackan	39_367	Crossing	The proposed option crosses the Rossbrackan Stream channel and its floodplain. Any impacts on the flooding scenarios expected to be minimal. A section 50 application will be required for this stream crossing.
Swilly	39_2718 & 39-2724	Crossing & Encroachment	The proposed Bunnagee link road for Letterkenny town crosses the River Swilly Channel. The Swilly river channel is approximately 55m wide at this location. Furthermore, much of this link road passes through the floodplains of the Swilly River. Construction of this link road could pose significant flooding risk to the adjacent lands and properties, both during the construction and post construction stages of the works. A detailed hydraulic modelling for the associated river channel and floodplains should be carried out to assess this impact and an appropriate mitigation measure should be implemented. A Section 50 application will also be required for the subject river crossing.

In terms of water quality impact, considerable levels of storm water attenuation and treatment will be required before outfalling to any of the watercourses traversed by the option. The River Swilly is characterised as *At Risk*, while the Magheraboy & Dooballagh (Burn) streams have been assessed as *Not at Risk* under the Water Framework Directive. However, the remaining watercourses encountered along the mainline are currently at review stage. The River Swilly 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 2F2 (Blue).

Table 3-16: Water Quality Impact Assessments for Option 2F2 (Blue)

Option 2F2 (Blue)				
Watercourse EPA name	Segment Code	Biotic Index	River Waterbodies Risk	Importance of Hydrological Attribute
Swilly	39_2718& 39-2724	Unknown	At Risk	Very High
Dromore Upper	39_1544	Unknown	Review	High
Magheraboy 39	39_413 & 39_576	Unknown	Not at Risk	Low
Bunnagee	39_1288	Q4	Review	High
Dooballagh (Burn)	39_2970	Unknown	Not at Risk	Medium
Rossbrackan	39_367	Unknown	Review	Low

3.2 Summary of Option Comparison

The impact of the options on hydrology has been assessed based on flood risk, water quality and hydro-ecology.

The comparative evaluation of options was assisted by scoring of impacts to sensitive receptors using the Impact Scoring Key in **Table 3-17** taken from the *Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis* (TII, 2016). An overall assessment was 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 score assigned according to the impact level. **Table 3-18** below outlines the option scoring matrix based on the quantitative and qualitative assessment of each option.

Table 3-17: 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

Table 3-18: Option Scoring Matrix

Option	Quantitative Assessment	Qualitative Assessment	Impact	Impact Score	Preference Ranking	Preference
2A (Orange)	2 Major, 3 Moderate, 4 Minor, 2 Neutral	5 th least interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	2	Intermediate
2B (Pink)	2 Major, 2 Moderate, 4 Minor, 2 Neutral	3 rd least interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	2	Intermediate
2C (Purple)	2 Major, 4 Moderate, 5 Minor, 1 Neutral	7 th least (or the most) interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	2	Intermediate
2D (Red)	2 Major, 4 Moderate, 4 Minor, 2 Neutral	6 th least interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	2	Intermediate
2E (Green)	2 Major, 4 Moderate, 3 Minor	4 th least interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	2	Intermediate
2F1 (Blue)	2 Major, 4 Moderate, 1 Minor	2 nd least interaction with water course & associated flood risk and water quality concerns.	Moderately negative	2	2	Intermediate
2F2 (Blue)	1 Major, 3 Moderate, 2 Minor	Least interaction with water course & associated flood risk and water quality concerns.	Minor or Slightly Negative	3	1	Preferred

4 CONCLUSIONS & RECOMMENDATIONS

This preliminary hydrological assessment has highlighted the environs of the 2F2 (Blue) option 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. The 2F2 (Blue) option would be considered the preferred option as it encounters the least number of watercourses along its extent.

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.



TEN-T Priority Route Improvement Project, Donegal

Section 2: N56 / N13 Letterkenny to Manorcunningham

Option Selection Report

Appendix D2.8 – Cultural Heritage

Document Control Sheet

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Document Title:	Option Selection Report –Appendix D2.8 – Cultural Heritage
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1 INTRODUCTION

This report examines the cultural heritage aspects of the study area for seven options for Section 2: N56/N13 Letterkenny to Manorcunningham 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 Appendix 3: Cultural Heritage Option Corridor Mapping**). See Section 1.2 of the Option Selection Report for Project Description.

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 contains a number of predominantly prehistoric sites however a large majority of the recorded archaeological sites have been noted by the Archaeological Survey of Ireland as having no visible trace, which may attest to the impact of more intensive agricultural practices and land improvement works during the 20th century. Despite this, there is still potential for the survival of sub-surface archaeological features, deposits and artefacts at such locations as well as within the wider greenfield environs.

The study area contains a significant natural crossing of the River Swilly, which has been documented as an important fording point since earliest times. The lands at Ballyraine, and at Lisnenan to towards the north, were home to the O'Donnell's with recorded ‘forts’ strategically overlooking the Swilly below, still evident from the archaeological records. This location and general area was scene to several skirmishes and attacks over the medieval period. There is a battle site (DG053-056---) recorded in the area as the Battle of Farsetmore, 1567, a significant battle fought between the O'Neill's and the O'Donnell's prior to their unification during the Nine Years' War against Crown forces (1594-1603). Following the latter, the construction of the town of Letterkenny came, along with the Plantation of the wider area by planter Scotsman Patrick Crawford. Sir Ralph Bingley also established a residence and associated settlement within the study area at this time with a residence in Farestmore townland and the associated village possibly in Dromore Lower (Hunter 1995).

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 7 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) has been utilised as a 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 options 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 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.

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 County Donegal (2016)

The Landscape Character Assessment of County 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 Co. Donegal describes the study area as being located within LCA 15 Letterkenny Estuary and Farmland. Within this LCA the study area for the options is described as ‘a wide, fertile valley of the River Swilly flowing through heath and bog covered uplands east towards Lough Swilly, a large intertidal estuary encircled by higher hills and mountains to the north and south and rolling arable lands in the east.’

2 EXISTING ENVIRONMENT

2.1 Desk Study

The proposed options for Section 2: N56 / N13 Letterkenny to Manorcunningham scheme comprises seven corridors: 2A (Orange), 2B (Pink), 2C (Purple), 2D (Red), 2E (Green), 2F1(Blue) and 2F2 (Blue) (see **Appendix 3: Cultural Heritage Option Corridor Mapping**). Section 2 involves the creation of a relief road serving Letterkenny of c. 3km, along the Swilly estuary flatlands and with a river crossing; and a combination of an online upgrade of the existing N56 of c. 1.4km and/or seven options from the N13 southerly approach to Letterkenny and the Dry Arch roundabout (N13) to Pluck roundabout (N14) (c. 2 – 4kms).

The principal source reviewed for the assessment of the known archaeological resource is the online form of the *Archaeological Survey of Ireland* (ASI)¹. 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”² (www.archaeology.ie) 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).

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 database³. 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

¹ <https://www.archaeology.ie/archaeological-survey-ireland>

² <https://www.archaeology.ie/>

³ <https://excavations.ie/>

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.

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 2 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 extends southeast of the urban environs of Letterkenny town and crossing the River Swilly estuary and associated flatlands, across the existing N13 and rising ground to the south and including undulating good quality agricultural farmland towards the east at Pluck (Manorcunningham) N13/N14 roundabout.

The area has a long history of human settlement, as demonstrated by the archaeological and historical record. The River Swilly and its estuarine flatlands would have provided an important crossing point which resulted in human settlement within the area since earliest times. Indeed, this fertile river valley, coupled with the fact that the River is navigable north-westwards, ultimately out to sea; indicates that it was an important natural resource in terms of social, economic and political terms since earliest times. This has resulted in the convergence of a number of transport networks at this river crossing up to the present time. There are a number of examples of built heritage of vernacular importance scattered throughout the area, in particular within the urban environs of Letterkenny town and associations with the previous railway line that facilitated the area up to its closure in the 1960s.

The Historic Landscape Characterisation (HLC) of the Letterkenny Estuary & Farmland LCA (*Draft Historic Landscape Characterisation of County Donegal, Feb 2014*) identifies that it is characterised by coastal lowland and soft rock and a series of fields identified as ‘*straight-sided and surveyed rectilinear 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 (2005a & 2005b). The topography within the study area consists of a combination of fertile estuarine river floor and gently rising hillslopes of improved undulating agricultural lands with pockets of lowland wetter ground towards the east.

The offline options extend from Listellian at the southerly terminus, crossing an area of commercial forestry, east of the existing N13 at high ground 106m OD traversing in a north/north-easterly fashion along the northern slopes of higher ground that falls towards the Swilly below (100m – 40m OD) before extending eastwards across the dis-used railway line towards Magheraboy and Aghlehard, through good

quality undulating terrain before terminating at Pluck and the banks of the Corkey River which empties into the Swilly to the north, via the Isle Burn.

The proposed link road option extends from the existing N56/N13 at the Port Road along the flat low-lying estuarine lands associated with the River Swilly, with a crossing point at the River, and beyond into the urban fringe of Letterkenny town.

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 3 no. locations and have been abbreviated as Section 2 Area of Archaeological Potential_01 to 03 (S2-AAP01 to S2-AAP03) and presented in **Figure 2-1** (see also **Appendix 3: Cultural Heritage Option Corridor Mapping** for more detail).

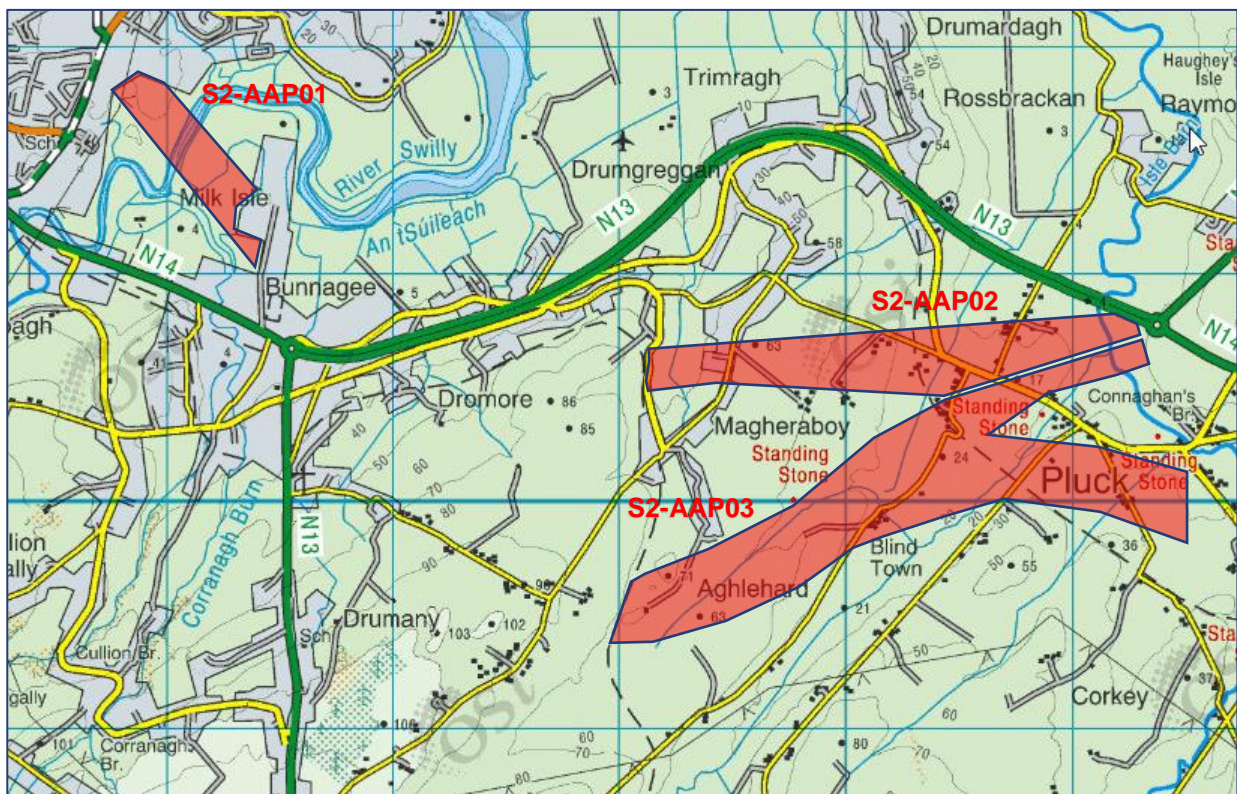


Figure 2-1: Areas of high archaeological potential

S2-AAP01

This area comprises the location for the offline relief road option proposed to service Letterkenny town at Ballyrairie linked to the Port Road (N56) and N13 and is common to all 7 no. corridor options. It consists of the estuarine lands associated with the River Swilly, the river itself, and associated banks. There is a site of a recorded ringfort DG53-026--- 'White Fort' on the northern banks of the river, as the ground begins to rise, as well as the location of a Battle site in the general northerly environs at this point (DG053-056---). Given the recorded archaeological resource as well as the attractive nature of the riverine environment for past human use and the potential for the presence of underwater archaeology, this area is deemed to be of high archaeological potential.

S2-AAP02

This area comprises a portion of the proposed 2E (Green) option extending east from the disused railway line at Magheraboy, crossing another disused railway line, crossing the Corkey River and its banks at Pluck and the roundabout terminus at the N13/N14. The lands consist of undulating improved agriculture on a NW/SE extending ridge of well drained ground c. 50m OD. The area has a high concentration of recorded prehistoric sites, in particular a high density of recorded standing stones (DG054-036---, DG053-037---, DG053-038---, DG054-037---, DG062-002--- and DG053-038---), as well as a cairn site (DG053-039---). Given the good quality terrain, and the high density of standing stones with clear indications of early Bronze age settlement, this area is deemed to be of high archaeological potential.

S2-AAP03

This area comprises a portion of the both the proposed 2F1 (Blue) and 2F2 (Blue) options extending east from the disused railway line at Aghlehard eastwards towards lower ground and a minor NW/SE tributary of the Corkey river, crossing another disused railway line and terminating at Pluck, west of the banks of the Corkey river itself. Similar to S2-AAP02, there is a high density of prehistoric standing stone sites (DG054-036---, DG053-037---, DG053-038---, DG054-037---, DG062-002--- and DG053-038---), as well as a cairn site (DG053-039---). In addition, there is also an interesting grouping of an enclosure (DG061-006002-), a ringfort (DG061-006---) and a medieval house (DG061-006001-) at Aglehard townland. Given the excellent terrain, and the high density of prehistoric sites offering clear indication of a Bronze Age community within the area in the past, progressing later with evidence of early medieval settlement up to the present day, this area 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 2. 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 2A Corridor (Orange): 500m Cultural Heritage Constraints

The 2A (Orange) option has a total of 13 no. Cultural Heritage assets located within the 500m wide assessment corridor (see **Table 2.1**). These consist of a ringfort site at Ballyraine, a bullaun stone, four 'sites of' rock art at Trimragh, and the 'site of' a church and graveyard (also at Trimragh). There is a NIAH

recorded mill and pair of detached houses at Dromore as well as Leck former COI church (Drumany) and a disused railway bridge at Bunnagee on the southern environs of Letterkenny town.

In addition, the 2A (Orange) option traverses through one area of archaeological potential at Ballyraine: S2-AAP01.

Table 2.1: Cultural Heritage Items located within 500m wide Option 2A Corridor (Orange)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG053-026----	BALLYRAINE	Ringfort - unclassified	78m
DG053-035---	BUNNAGEE	Bullaun Stone	247m
DG053-027001-	TRIMRAGH	Rock art	195m
DG053-027002-	TRIMRAGH	Rock art	204m
DG053-028----	TRIMRAGH	Church	0m
DG053-028001-	TRIMRAGH	Graveyard	0m
DG053-027003-	TRIMRAGH	Rock art	207m
DG053-027004-	TRIMRAGH	Rock art	189m
DG053-052----	TRIMRAGH	Redundant record	n/a
40905390	DROMORE	Mill	82m
40905339	DROMORE (MAGHERABOY)	Pair of Semi-detached Houses	43m
40905301	DRUMANY (MAGHERABOY)	Church	20m
40905326	BUNNAGEE	Railway Bridge	253m
S2-AAP01	Swilly estuary at Milk Isle extending north towards Ballyraine	Area of High Archaeological Potential, including possible battle site associations (DG053-056---)	0m

2.3.2 Option 2B Corridor (Pink): 500m Cultural Heritage Constraints

The 2B (Pink) option has a total of 14 no. Cultural Heritage assets located within the 500m wide assessment corridor (see **Table 2.2**). These consist of a ringfort site at Ballyraine, a bullaun stone, four 'sites of' rock art at Trimragh, and the 'site of' a church and graveyard (also at Trimragh). There is a NIAH recorded mill and pair of detached houses at Dromore as well as Leck former COI church (Drumany) and a disused railway bridge at Bunnagee on the southern environs of Letterkenny town and at Dromore (Magheraboy).

In addition, the 2B (Pink) option traverses through one area of archaeological potential at Ballyraine: S2-AAP01.

Table 2.2: Cultural Heritage Items located within 500m wide Option 2B Corridor (Pink)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG053-026----	BALLYRAINE	Ringfort - unclassified	78m
DG053-035---	BUNNAGEE	Bullaun Stone	247m

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG053-027001-	TRIMRAGH	Rock art	195m
DG053-027002-	TRIMRAGH	Rock art	204m
DG053-028----	TRIMRAGH	Church	0m
DG053-028001-	TRIMRAGH	Graveyard	0m
DG053-027003-	TRIMRAGH	Rock art	207m
DG053-027004-	TRIMRAGH	Rock art	189m
DG053-052----	TRIMRAGH	Redundant record	n/a
40905390	DROMORE	Mill	82m
40905339	DROMORE (MAGHERABOY)	Pair of Semi-detached Houses	43m
40905301	DRUMANY (MAGHERABOY)	Church	20m
40905326	BUNNAGEE	Railway Bridge	253m
40905394	DROMORE (MAGHERABOY)	Railway bridge	177m
S2-AAP01	Swilly estuary at Milk Isle extending north towards Ballyraine	Area of High Archaeological Potential, including possible battle site associations (DG053-056---)	0m

2.3.3 Option 2C Corridor (Purple): 500m Cultural Heritage Constraints

The 2C (Purple) option has a total of 15 no. Cultural Heritage assets located within the 500m wide assessment corridor (see **Table 2.3**). These consist of a ringfort site at Ballyraine, four 'sites of' rock art at Trimragh, and the 'site of' a church and graveyard (also at Trimragh) as well as a souterrain site at Lurgybrack. There is a NIAH recorded glebe house at Lurgybrack, a mill and pair of detached houses at Dromore as well as Leck former COI church (Drumany) and a disused railway bridge at Bunnagee on the southern environs of Letterkenny town and at Dromore (Magheraboy).

In addition, the 2C (Purple) option traverses through one area of archaeological potential at Ballyraine: S2-AAP01.

Table 2.3: Cultural Heritage Items located within 500m wide Option 2C Corridor (Purple)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG053-026----	BALLYRAINE	Ringfort - unclassified	78m
DG053-027001-	TRIMRAGH	Rock art	195m
DG053-027002-	TRIMRAGH	Rock art	204m
DG053-028----	TRIMRAGH	Church	0m
DG061-005----	LURGYBRACK	Souterrain	241m
DG053-028001-	TRIMRAGH	Graveyard	0m
DG053-027003-	TRIMRAGH	Rock art	207m
DG053-027004-	TRIMRAGH	Rock art	189m
DG053-052----	TRIMRAGH	Redundant record	n/a

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
40906101	LURGYBRACK	Rectory/Glebe House	228m
40905390	DROMORE	Mill	82m
40905339	DROMORE (MAGHERABOY)	Pair of semi-detached houses	43m
40905301	DRUMANY (MAGHERABOY)	Church	170m
40905326	BUNNAGEE	Railway bridge	227m
40905394	DROMORE (MAGHERABOY)	Railway bridge	90m
S2-AAP01	Swilly estuary at Milk Isle extending north towards Ballyraine	Area of High Archaeological Potential, including possible battle site associations (DG053-056---)	0m

2.3.4 Option 2D Corridor (Red): 500m Cultural Heritage Constraints

The 2D (Red) option has a total of 12 no. Cultural Heritage assets located within the 500m wide assessment corridor (see Table 2-4). These consist of a ringfort site at Ballyraine, four 'sites of' rock art at Trimragh, and the 'site of' a church and graveyard (also at Trimragh). There is a NIAH recorded mill and pair of detached houses at Dromore and a disused railway bridge at Bunnagee on the southern environs of Letterkenny town, and at Dromore (Magheraboy).

In addition, the 2D (Red) option traverses through one area of archaeological potential at Ballyraine: S2-AAP01.

Table 2.4: Cultural Heritage Items located within 500m wide Option 2D Corridor (Red)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG053-026----	BALLYRAINE	Ringfort - unclassified	78m
DG053-027001-	TRIMRAGH	Rock art	195m
DG053-027002-	TRIMRAGH	Rock art	204m
DG053-028----	TRIMRAGH	Church	0m
DG053-028001-	TRIMRAGH	Graveyard	0m
DG053-027003-	TRIMRAGH	Rock art	207m
DG053-027004-	TRIMRAGH	Rock art	189m
DG053-052----	TRIMRAGH	Redundant record	n/a
40905390	DROMORE	Mill	82m
40905339	DROMORE (MAGHERABOY)	Pair of semi-detached houses	43m
40905394	DROMORE (MAGHERABOY)	Railway bridge	94m
40905326	BUNNAGEE	Railway bridge	227m
S2-AAP01	Swilly estuary at Milk Isle extending north towards Ballyraine	Area of High Archaeological Potential, including possible battle site associations (DG053-056---)	0m

2.3.5 Option 2E Corridor (Green): 500m Cultural Heritage Constraints

The 2E (Green) option has a total of 8 no. Cultural Heritage assets located within the 500m wide assessment corridor (see **Table 2.5**). These consist of a ringfort site at Ballyraine and three standing stones (within an overall area of a high density of this site type). The 2E (Green) option crosses two separate sections of disused railway line at Dromore.

In addition, the 2E (Green) option traverses through two areas of archaeological potential: S2-AAP01 and S2-AAP02.

Table 2.5: Cultural Heritage Items located within 500m wide Option 2E Corridor (Green)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG053-026----	BALLYRAINE	Ringfort - unclassified	78m
DG053-037----	MAGHERABOY (Magheraboy ED)	Standing stone	152m
DG054-036----	ROSSBRACKAN	Standing stone	37m
DG054-037----	ROSSBRACKAN	Standing stone	187m
S2BH03	Dromore	Disused Railway Line	0m
S2BH04	Dromore	Disused Railway Line	0m
S2-AAP01	Swilly estuary at Milk Isle extending north towards Ballyraine	Area of High Archaeological Potential, including possible battle site associations (DG053-056---)	0m
S2-AAP02	Area from disused railway line at Magheraboy and extending east towards Pluck, including Corkey River crossing	Area of High Archaeological Potential	0m

2.3.6 Option 2F1 Corridor (Blue): 500m Cultural Heritage Constraints

The 2F1 (Blue) option has a total of 12 no. Cultural Heritage assets located within the 500m wide assessment corridor (see **Table 2-6**). These consist of a ringfort site at Ballyraine, three standing stones (within an overall area of a high density of this site type), and a cairn. There is a NIAH recorded house and cornmill at Pluck as well as a disused railway bridge; and the 2F1 (Blue) option crosses two separate sections of disused railway line at Magheraboy and Aghlehard.

The 2F1 (Blue) option also traverses through two areas of archaeological potential: S2-AAP01 and S2-AAP03.

Table 2.6: Cultural Heritage Items located within 500m wide 2F1 (Blue) Corridor Option

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG053-026----	BALLYRAINE	Ringfort - unclassified	78m
DG053-038----	MAGHERABOY (Magheraboy ED)	Standing stone	226m
DG053-039----	MAGHERABOY (Magheraboy ED)	Cairn - unclassified	151m
DG054-036----	ROSSBRACKAN	Standing stone	174m

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG054-037----	ROSSBRACKAN	Standing stone	32m
40905454	PLUCK	House	232m
40905337	AGHLEHARD	Single-arch rail bridge	6m
40905455	PLUCK	Cornmill	200m
S2BH01	Mageraboy/Listellan	Disused Railway Line	0m
S2BH02	Aghlehard	Disused Railway Line	0m
S2-AAP01	Swilly estuary at Milk Isle north towards Ballyraine	Area of High Archaeological Potential, including possible battle site associations (DG053-056---)	0m
S2-AAP03	Area from disused railway line west of Aghlehard east towards Pluck	Area of High Archaeological Potential	0m

2.3.7 Option 2F2 Corridor (Blue): 500m Cultural Heritage Constraints

The 2F2 (Blue) option has a total of 14 no. Cultural Heritage assets located within the 500m wide assessment corridor (see **Table 2.7**). These consist of a ringfort site at Ballyraine, three standing stones (within an overall area of a high density of this site type, and including the National Monument No. 453 at Pluck), a cairn and a souterrain. There is a NIAH recorded house at Corkey (which is also a protected structure) as well as three disused railway bridges. The 2F2 (Blue) option also crosses two separate sections of disused railway line at Magheraboy and Aghlehard.

In addition, the 2F2 (Blue) option traverses through two areas of archaeological potential: S2-AAP01 and S2-AAP03.

Table 2.7: Cultural Heritage Items located within 500m wide Option 2F2 Corridor (Blue)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
DG053-026----	BALLYRAINE	Ringfort - unclassified	78m
DG053-038----	MAGHERABOY (Magheraboy ED)	Standing stone	226m
DG053-039----	MAGHERABOY (Magheraboy ED)	Cairn - unclassified	157m
DG062-001----	CORKEY	Souterrain	217m
DG062-002----	CORKEY	Standing stone	143m
DG04-038--- (Nat Mon. 453)	PLUCK	Setting: Standing Stone	337m
40905337	AGHLEHARD	Single-arch rail bridge	172m
40906228	CORKEY	Single-arch rail bridge	181m
40905425	PLUCK	Single-arch rail bridge	29m
40906204 (incl. RPS)	CORKEY	House	237m
S2BH01	Mageraboy/Listellan	Disused Railway Line	0m
S2BH02	Aghlehard	Disused Railway Line	0m

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line
S2-AAP01	Swilly estuary at Milk Isle north towards Ballyraine	Area of High Archaeological Potential, including possible battle site associations (DG053-056---)	0m
S2-AAP03	Area from disused railway line west of Aghlehard east towards Pluck, incl. Corkey River crossing	Area of High Archaeological Potential	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 option in **Table 3.1** to **Table 3.7**.

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 3-7** 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 2: N56/N13 Letterkenny to Manorcunningham*.

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 2A Corridor (Orange)

Table 3.1 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 2A (Orange) option.

Table 3.1: Impact Assessment on Cultural Heritage, Option 2A Corridor (Orange)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG053-026----	BALLYRAINE	Ringfort - unclassified	78m	Direct	Moderate
DG053-035---	BUNNAGEE	Bullaun Stone	247m	Indirect (online)	Imperceptible
DG053-027001-	TRIMRAGH	Rock art	195m	Indirect	Slight
DG053-027002-	TRIMRAGH	Rock art	204m	Indirect	Slight
DG053-028----	TRIMRAGH	Church (site of)	0m	Direct	Moderate
DG053-028001-	TRIMRAGH	Graveyard (site of)	0m	Direct	Moderate
DG053-027003-	TRIMRAGH	Rock art	207m	Indirect	Slight
DG053-027004-	TRIMRAGH	Rock art	189m	Indirect	Slight
40905390	DROMORE	Mill	82m	Direct (online)	Slight
40905339	DROMORE (MAGHERABOY)	Pair of Semi-detached Houses	43m	Direct (online)	Slight
40905301	DRUMANY (MAGHERABOY)	Church	20m	Direct (online)	Slight
40905326	BUNNAGEE	Railway Bridge	253m	Indirect (online)	Imperceptible
S2-AAP01	Swilly estuary at Milk Isle extending north towards Ballyraine	Area of High Archaeological Potential, including possible battle site associations (DG053-056---)	0m	Potential Direct	Potential Profound

3.1.2 Option 2B Corridor (Pink)

Table 3.2 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 2B (Pink) option.

Table 3.2: Impact Assessment on Cultural Heritage, Option 2B Corridor (Pink)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG053-026----	BALLYRAINE	Ringfort - unclassified	78m	Direct	Moderate
DG053-035---	BUNNAGEE	Bullaun Stone	247m	Indirect (online)	Imperceptible

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG053-027001-	TRIMRAGH	Rock art	195m	Indirect	Slight
DG053-027002-	TRIMRAGH	Rock art	204m	Indirect	Slight
DG053-028----	TRIMRAGH	Church (site of)	0m	Direct	Moderate
DG053-028001-	TRIMRAGH	Graveyard (site of)	0m	Direct	Moderate
DG053-027003-	TRIMRAGH	Rock art	207m	Indirect	Slight
DG053-027004-	TRIMRAGH	Rock art	189m	Indirect	Slight
40905390	DROMORE	Mill	82m	Direct (online)	Slight
40905339	DROMORE (MAGHERABOY)	Pair of Semi-detached Houses	43m	Direct (online)	Slight
40905301	DRUMANY (MAGHERABOY)	Church	20m	Direct (online)	Slight
40905326	BUNNAGEE	Railway Bridge	253m	Indirect (online)	Imperceptible
40905394	DROMORE (MAGHERABOY)	Railway bridge	177m	Indirect (online)	Imperceptible
S2-AAP01	Swilly estuary at Milk Isle extending north towards Ballyraine	Area of High Archaeological Potential, including possible battle site associations (DG053-056---)	0m	Potential Direct	Potential Profound

3.1.3 Option 2C Corridor (Purple)

Table 3.3 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 2C (Purple) option.

Table 3.3: Impact Assessment on Cultural Heritage, Option 2C Corridor (Purple)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG053-026----	BALLYRAINE	Ringfort - unclassified	78m	Direct	Moderate
DG053-027001-	TRIMRAGH	Rock art	195m	Indirect	Slight
DG053-027002-	TRIMRAGH	Rock art	204m	Indirect	Slight
DG053-028----	TRIMRAGH	Church (site of)	0m	Direct	Moderate
DG053-028001-	TRIMRAGH	Graveyard (site of)	0m	Direct	Moderate
DG061-005----	LURGYBRACK	Souterrain (site of)	241m	Indirect	Imperceptible
DG053-027003-	TRIMRAGH	Rock art	207m	Indirect	Slight
DG053-027004-	TRIMRAGH	Rock art	189m	Indirect	Slight
40906101	LURGYBRACK	Glebe House	228m	Indirect	Slight

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
40905390	DROMORE	Mill	82m	Direct (online)	Slight
40905339	DROMORE (MAGHERABOY)	Pair of semi-detached houses	43m	Direct (online)	Slight
40905301	DRUMANY (MAGHERABOY)	Church	170m	Indirect	Slight
40905326	BUNNAGEE	Railway bridge	227m	Indirect	Imperceptible
40905394	DROMORE (MAGHERABOY)	Railway bridge	90m	Direct	Moderate
S2-AAP01	Swilly estuary at Milk Isle extending north towards Ballyraine	Area of High Archaeological Potential, including possible battle site associations (DG053-056---)	0m	Potential Direct	Potential Profound

3.1.4 Option 2D Corridor (Red)

Table 3.4 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 2D (Red) Option.

Table 3.4: Impact Assessment on Cultural Heritage, Option 2D Corridor (Red)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG053-026----	BALLYRAINE	Ringfort - unclassified	78m	Direct	Moderate
DG053-027001-	TRIMRAGH	Rock art	195m	Indirect	Slight
DG053-027002-	TRIMRAGH	Rock art	204m	Indirect	Slight
DG053-028----	TRIMRAGH	Church (site of)	0m	Direct	Moderate
DG053-028001-	TRIMRAGH	Graveyard (site of)	0m	Direct	Moderate
DG053-027003-	TRIMRAGH	Rock art	207m	Indirect	Slight
DG053-027004-	TRIMRAGH	Rock art	189m	Indirect	Slight
40905390	DROMORE	Mill	82m	Direct (online)	Slight
40905339	DROMORE (MAGHERABOY)	Pair of semi-detached houses	43m	Direct (online)	Slight
40905394	DROMORE (MAGHERABOY)	Railway bridge	94m	Direct	Moderate
40905326	BUNNAGEE	Railway bridge	227m	Indirect	Imperceptible
S2-AAP01	Swilly estuary at Milk Isle extending north towards Ballyraine	Area of High Archaeological Potential, including possible battle site	0m	Potential Direct	Potential Profound

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
		associations (DG053-056---)			

3.1.5 Option 2E Corridor (Green)

Table 3.5 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 2E (Green) option.

Table 3.5: Impact Assessment on Cultural Heritage, Option 2E Corridor (Green)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG053-026----	BALLYRAINE	Ringfort - unclassified	78m	Direct	Moderate
DG053-037----	MAGHERABOY (Magheraboy ED)	Standing stone	152m	Indirect	Slight
DG054-036----	ROSSBRACKAN	Standing stone (site of)	37m	Direct	Moderate
DG054-037---	ROSSBRACKEN	Standing Stone	186m	Indirect	Slight
S2BH03	Dromore	Disused Railway Line	0m	Direct	Slight
S2BH04	Dromore	Disused Railway Line	0m	Direct	Slight
S2-AAP01	Swilly estuary at Milk Isle extending north towards Ballyraine	Area of High Archaeological Potential, including possible battle site associations (DG053-056---)	0m	Potential Direct	Potential Profound
S2-AAP02	Area from disused railway line at Magheraboy and extending east towards Pluck, including Corkey River crossing	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

3.1.6 Option 2F1 Corridor (Blue)

Table 3.6 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 2F1 (Blue) option.

Table 3.6: Impact Assessment on Cultural Heritage, Option 2F1 Corridor (Blue)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG053-026----	BALLYRAINE	Ringfort - unclassified	78m	Direct	Moderate

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG053-038----	MAGHERABOY (Magheraboy ED)	Standing stone	226m	Indirect	Slight
DG053-039----	MAGHERABOY (Magheraboy ED)	Cairn - unclassified	151m	Indirect	Slight
DG054-036----	ROSSBRACKAN	Standing stone (site of)	174m	Indirect	Imperceptible
DG054-037----	ROSSBRACKAN	Standing stone	32m	Direct	Significant
40905454	PLUCK	House	232m	Indirect	Imperceptible
40905337	AGHLEHARD	Single-arch rail bridge	6m	Direct	Moderate
40905455	PLUCK	Cornmill	200m	Indirect	Imperceptible
S2BH01	Mageraboy/Listellan	Disused Railway Line	0m	Direct	Slight
S2BH02	Aghlehard	Disused Railway Line	0m	Direct	Slight
S2-AAP01	Swilly estuary at Milk Isle north towards Ballyraine	Area of High Archaeological Potential, including possible battle site associations (DG053-056---)	0m	Potential Direct	Potential Profound
S2-AAP03	Area from disused railway line west of Aghlehard east towards Pluck	Area of High Archaeological Potential	0m	Potential Direct	Potential Profound

3.1.7 Option 2F2 Corridor (Blue)

Table 3.7 sets out both the quantitative and qualitative impacts identified on the Cultural Heritage resource for the 2F2 (Blue) option.

Table 3.7: Impact Assessment on Cultural Heritage, Option 2F2 Corridor (Blue)

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
DG053-026----	BALLYRAINE	Ringfort - unclassified	78m	Direct	Moderate
DG053-038----	MAGHERABOY (Magheraboy ED)	Standing stone	226m	Indirect	Slight
DG053-039----	MAGHERABOY (Magheraboy ED)	Cairn - unclassified	157m	Indirect	Slight
DG062-001----	CORKEY	Souterrain (site of)	217m	Indirect	Imperceptible
DG062-002----	CORKEY	Standing stone (site of)	143m	Direct	Moderate
DG054-038--- (Nat Mon. 453)	PLUCK	<u>Setting:</u> Standing Stone	344m	Indirect	Slight
40905337	AGHLEHARD	Single-arch rail bridge	172m	Indirect	Slight
40906228	CORKEY	Single-arch rail bridge	181m	Indirect	Slight

Monument Reference Number	Townland	Type	Approx. Distance (m) from centre-line	Type of Impact	Impact Level (Significance)
40905425	PLUCK	Single-arch rail bridge	29m	Direct	Moderate
40906204 (incl. RPS)	CORKEY	House	237m	Indirect	Slight
S2BH01	Mageraboy/Listellán	Disused Railway Line	0m	Direct	Slight
S2BH02	Aghlehard	Disused Railway Line	0m	Direct	Slight
S2-AAP01	Swilly estuary at Milk Isle north towards Ballyraine	Area of High Archaeological Potential, including possible battle site associations (DG053-056---)	0m	Potential Direct	Potential Profound
S2-AAP03	Area from disused railway line west of Aghlehard east towards Pluck, incl. Corkey River crossing	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** Error! Reference source not found. 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 Corridor 2B (Pink)

The option 2B (Pink) corridor consists of the most online upgrade option of all the options available. The 2B (Pink) option, encompassing the existing N13/N14 road network, with consideration of proposed junction upgrades, particularly at Trimragh (along the existing dual carriageway), has 14 identified impacts. Although some of these measurable impacts are relative to the existing road network (a bullaun stone site DG053-035---, Leck COI church NIAH 40905301 and two railway bridges: NIAH 40905326 and NIAH 40905394); the remaining impacts relate to the proposed junction upgrade at Trimragh and the proposed Link Road at Ballyraine (an area of high archaeological potential).

The 2B (Pink) corridor, (and, also common to all seven corridors), has a direct (moderate) on ringfort site DG053-026--- at Ballyraine, at the proposed relief road, crossing the Swilly river. In addition, there is the site of a church and graveyard at Trimragh (DG053-028--- and DG053-028001-) which is not indicated on the 1st edition OS mapping (1830s) but marked on the 25-inch 2nd OS maps (c.1890) as a 'site of'. Records indicate that the site was probably destroyed during building of the railway line (Letterkenny Railway

Company) c. 1860. The present dual carriageway is aligned on the former railway line and proposed online options 2A (Orange), 2B (Pink), 2C (Purple) and 2D (Red) at this 'site of' church and graveyard location will not involve any ground works, but rather online re-surfacing and safety upgrades. However, a proposed junction along the proposed upgrade of the N13 dual carriageway, is located c. 200m south-west of this church and graveyard site and as such there is still potential to reveal associated sub-surface features. Given the site type, this is considered a direct (moderate) impact (applicable to the 2A (Orange), 2B (Pink), 2C (Purple) and 2D (Red) options). (It should be noted that a testing excavation at Trimragh was carried out adjacent to the site for purposes of a house-build in 2003, (2003:437) which only exposed bedrock directly below the topsoil.) The option 2B (Pink) corridor also traverses an area of archaeological potential at Ballyrairie, S2-AAP01, (which is common to all of the seven options).

Given that the 2B (Pink) option shall have the least amount of offline ground disturbance when compared with all other options, it is considered the most preferred option from a cultural heritage perspective.

Option 2A Corridor (Orange)

The 2A (Orange) Option is considered the second preferred option from a cultural heritage perspective and has 13 no. identified impacts. The 2A (Orange) option has an increased offline footprint at the Bonagee junction location (northeast of the existing Dry Arch Roundabout) when compared to the 2B (Pink) option and therefore has marginally greater potential to reveal hitherto unknown archaeological finds/features. The 2A (Orange) option, similar to the 2B (Pink) option also has indirect (slight) impact on the 'site of' a grouping of Rock Art sites, as well as on a cornmill (NIAH 40905390), pair of houses (NIAH 40905390) and church (NIAH 40905301). The option also traverses an area of archaeological potential at Ballyrairie, S2-AAP01, (which is common to all the seven options).

Option 2D Corridor (Red)

The 2D (Red) Option is considered the third preferred option, (12 no. identified impacts) where, similar to the 2A (Orange) option it has the same RMP and built heritage impacts but in addition, it also has a direct (moderate) impact on a railway bridge (NIAH 40905394) in Dromore townland. Furthermore, the 2D (Red) option has additional offline alignment at Dromore, thereby increasing the risk of revealing sub-surface archaeological material, when compared to the 2B (Pink) or 2A (Orange) options. The option also traverses an area of archaeological potential at Ballyrairie, S2-AAP01, (which is common to all the seven options).

Option 2C Corridor (Purple)

The 2C (Purple) Option is considered the fourth preferred option, (15 no. identified impacts) having more impacts than the 2D (Red) option including direct impact (slight) on both a COI church structure at Leck (NIAH 40905301), and on a former glebe house/rectory at Lurgybrack (NIAH 40906101), as well as closer proximity to the 'site of' a souterrain DG061-005--- at Lurgybrack. This marginally heightened potential for associated sub-surface archaeological remains at Lurgybrack as well as offline alignments at Dromore (broadly comparable to the 2D (Red) option), ranks this option 4th from a Cultural Heritage perspective.

Option 2E Corridor (Green)

The 2E (Green) Option is considered the fifth preferred option, despite having the least amount of identified impacts (total 8 no. impacts). This option, similar to 2F1 and 2F2 (Blue) corridors, traverses a large portion of offline (greenfield) alignment, thereby increasing the risk of encountering sub-surface archaeological remains. This option has a direct (moderate) impact on standing stone site DG054-036--- which is removed and is now a 'site only' location. Nonetheless, it is possible that associated sub-surface features may exist at this location. This option also has direct (moderate) impact on ringfort site DG053-

026--- (common to all options) and has direct (slight) impact on at two locations along a (disused) railway line; and indirect (slight) impact on standing stones DG053-037--- and DG054-037---.

In addition, the 2E (Green) option traverses two areas of archaeological potential. Area S2-AAP01 is common to all options (at Ballyraine and the Swilly river crossing) whilst S2-AAP02 is particular only to the 2E (Green) option. This area of good quality land winds through the environs of a high density of recorded prehistoric monuments and is considered to be of high archaeological potential. Due to the additional high potential risk of S2-AAP02, option 2E corridor (Green) is considered 5th preferred option when compared with option corridors 2B (Pink) 2A (Orange), 2D (Red) and 2C (Purple).

Option 2F2 Corridor (Blue)

The 2F2 (Blue) Option is considered the sixth preferred option (14 no. identified impacts). This option, similar to the 2F1 (Blue) and 2E (Green) options, traverses a large (easterly) portion of offline alignment. This option has direct (moderate) impact on ringfort site DG053-026--- (common to all seven options) and direct (moderate) impact on railway bridge NIAH 40905425. In addition it has an indirect (slight - visual) impact on National Monument DG054-038--- standing stone at Pluck and a RPS house 40906204, Direct (slight) impact on a disused railway line at 2 no. locations (S2BH01 and S2BH02), as well as an indirect (imperceptible) impact the site of a souterrain (DG062-001---).

Similar to 2F1 (Blue) Option, and in addition to area S2-AAP01 (common to all options), the option traverses through area S2-AAP03 which is within an area of high density prehistoric monuments and as such there is a high potential risk to have profound impact on any remains that may exist. Given the magnitude of impact identified for the 2F2 (Blue) option, when compared with the other options save for 2F1 (Blue), it is considered the 6th preferred option from a Cultural Heritage perspective.

Option 2F1 Corridor (Blue)

The 2F1 (Blue) Option is considered the seventh preferred option (12 no. identified impacts). This option has a direct (significant) impact on an extant standing stone DG054-037--- in Rossbracken. The actual location of this extant standing stone is at a location 168m further northwest to the recorded ITM, per the National Monuments of Ireland database. As well as the direct (moderate) impact on ringfort site DG053-026---, which is common to all the options, it also has direct (moderate) impact on a railway bridge (NIAH 40905454) and direct (slight) impact at two locations of disused railway lines. There is also indirect (slight) impact on a standing stone (DG053-038---) and a cairn site (DG053-039---).

The 2F1 (Blue) option also traverses two areas of archaeological potential (S2_AAP01 and S2_AAP03). This option is largely an offline option and with that comes added risk to encounter sub-surface archaeological remains. In addition to area S2-AAP01 (common to all options), the area S2-AAP03 is within an area of high-density prehistoric monuments and as such there is a high potential risk to have profound impact on any remains that may exist. Given the increased overall archaeological potential along the corridor as well as the direct (significant) impact on an extant standing stone at Rossbracken the 2F1 (Blue) option is the least preferred option, when compared to all the other options available.

A summary of the cultural heritage impacts is provided in **Table 3.8**.

The above assessments have been combined to give an overall quantitative and qualitative assessment of the cultural heritage on Section 2. These are presented in **Table 3.9**.

Table 3.8: Option Corridor Appraisal: Cultural Heritage

Impact	2A (Orange)	2B (Pink)	2C(Purple)	2D (Red)	2E (Green)	2F1 (Blue)	2F2 (Blue)
Negative Profound	-	-	-	-	-	-	-
Negative Significant	-	-	-	-	-	Standing stone DG054-037---	-
Negative Moderate	Ringfort site DG053-026--- Area of a 'site of' Church and Graveyard DG053-028--- and DG053-028001-	Ringfort site DG053-026--- Area of a 'site of' Church and Graveyard DG053-028--- and DG053-028001-	Ringfort site DG053-026--- Area of a 'site of' Church and Graveyard DG053-028--- and DG053-028001- Railway bridge NIAH 40905394	Ringfort site DG053-026--- Area of a 'site of' Church and Graveyard DG053-028--- and DG053-028001- Railway bridge NIAH 40905394	Ringfort site DG053-026--- Site of Standing Stone site DG054-036---	Ringfort site DG053-026--- Railway Bridge NIAH 40905337	Ringfort site DG053-026--- Site of Standing Stone DG062-002--- Rail bridge NIAH 40905425
Negative Slight	Site of Rock Art DG053-027001-, DG053-027002-, DG053-027003-, and DG053-027004- Church NIAH 40905301 NIAH Mill 40905390 Pair of houses NIAH 40905339	Site of Rock Art DG053-027001-, DG053-027002-, DG053-027003-, and DG053-027004- Church NIAH 40905301 NIAH Mill 40905390 Pair of houses NIAH 40905339	Site of Rock Art DG053-027001-, DG053-027002-, DG053-027003-, and DG053-027004- Church NIAH 40905301 NIAH Mill 40905390 Pair of houses NIAH 40905339 Former Glebe House 40906101	Site of of Rock Art DG053-027001-, DG053-027002-, DG053-027003-, and DG053-027004- NIAH Mill 40905390 Pair of houses NIAH 40905339	Standing Stone DG053-037--- Standing Stone DG054-037--- Disused railway line at 2 no. locations (S2BH03 and S2BH04)	Standing Stone DG053-038--- Cairn DG053-039--- Disused railway line at 2 no. locations (S2BH01 and S2BH02)	Standing Stone DG053-038--- Cairn DG053-039--- Standing Stone Nat Mon DG054-038--- House RPS 40906204 Railway Bridges NIAH 40905337 and 40906228 Disused railway line at 2 no. locations (S2BH01 and S2BH02)
Negative Imperceptible	Bullaun Stone site DG053-035--- Railway bridge NIAH 40905326	Railway bridge NIAH 40905394 Bullaun Stone site DG053-035--- Railway bridge NIAH 40905326	Railway bridge NIAH 40905326 Site of souterrain DG061-005---	Railway bridge NIAH 40905326		Standing Stone DG054-036--- Mill NIAH 40905455 House NIAH 40905454	Site of souterrain DG062-001---

Impact	2A (Orange)	2B (Pink)	2C(Purple)	2D (Red)	2E (Green)	2F1 (Blue)	2F2 (Blue)
Potential Negative Profound	Area of Archaeological Potential: S2-AAP01	Area of Archaeological Potential: S2-AAP01	Area of Archaeological Potential: S2-AAP01	Area of Archaeological Potential: S2-AAP01	Areas of Archaeological Potential: S2-AAP01 and S2-AAP02	Areas of Archaeological Potential: S2-AAP01 and S2-AAP03	Areas of Archaeological Potential: S2-AAP01 and S2-AAP03
Potential Negative Significant	-	-	-	-	-	-	-
Potential Negative Moderate	-	-	-	-	-	-	-
Potential Negative Slight	-	-	-	-	-	-	-
Potential Negative Imperceptible	-	-	-	-	-	-	-
Preference Level	<u>13 Sites:</u> 2nd Preference	<u>14 Sites:</u> 1st Preference	<u>14 Sites:</u> 4th Preference	<u>12 Sites:</u> 3rd Preference	<u>8 Sites:</u> 5th Preference	<u>12 Sites:</u> 7th Preference	<u>14 Sites:</u> 6th Preference

Table 3.9 Option Scoring Matrix

Options	Quantitative Assessment	Qualitative Assessment	Impact	Impact Score	Preference
2A (Orange)	13 no. identified impacts	1 no. Major/Highly Negative 3 no. Moderately Negative 7 no. Slightly Negative 2 no. Not Significant No direct (significant) impacts on the <i>known recorded</i> cultural heritage resource. 3 direct (moderate) impacts on the <i>known recorded</i> cultural heritage resource. This option is marginally more offline than the 2B (Pink) option. This, coupled with the 13 identified impacts and the level and significance of same, is deemed the 2 nd preferred option when assessed against the other largely online options of 2B (Pink), 2D (Red) and 2C (Purple)	Moderately Negative	2	Preferred
2B (Pink)	14 no. identified impacts	1 no. Major/Highly Negative 3 no. Moderately Negative 7 no. Slightly Negative 3 no. Not Significant No direct (significant) impacts on the <i>known recorded</i> cultural heritage resource. 3 direct (moderate) impacts on the <i>known recorded</i> cultural heritage resource. This option is largely online, with the least amount of offline alignment overall, and this, coupled with the 14 identified impacts and the level and significance of same is deemed the 1 st preferred option when assessed against the other largely online options 2A (Orange), 2C (Purple) and 2D (Red)	Moderately Negative	2	Preferred
2C (Purple)	15 no. identified impacts	1 no. Major/Highly Negative 4 no. Moderately Negative 8 no. Slightly Negative 2 no. Not Significant No direct (significant) impacts on the <i>known recorded</i> cultural heritage resource. 3 direct (moderate) impacts on the <i>known recorded</i> cultural heritage resource. This option is additionally offline at Lurgybrack when compared particularly to the 2D (Red) option. Coupled with the 15 identified impacts and the level and significance of same is deemed the 4 th preferred option when assessed against the other options 2A (Orange), 2B (Pink) and 2D (Red)	Moderately Negative	2	Intermediate
2D (Red)	12 no. identified impacts	1 no. Major/Highly Negative 4 no. Moderately Negative	Moderately Negative	2	Intermediate

Options	Quantitative Assessment	Qualitative Assessment	Impact	Impact Score	Preference
		<p>6 no. Slightly Negative 1 no. Not Significant</p> <p>No direct (significant) impacts on the <i>known recorded</i> cultural heritage resource. 4 direct (moderate) impacts on the <i>known recorded</i> cultural heritage resource. This option is largely online, save for an area at Dromore. This, coupled with the 12 identified impacts and the level and significance of same deems this option the 3rd preferred option when assessed against the other options 2A (Orange), 2B (Pink) and 2C (Purple)</p>			
2E (Green)	8 no. identified impacts	<p>2 no. Major/Highly Negative 2 no. Moderately Negative 4 no. Slightly Negative</p> <p>No direct (significant) impacts on the <i>known recorded</i> cultural heritage resource. 2 direct (moderate) impacts on the <i>known recorded</i> cultural heritage resource. This option is largely offline (with high archaeological potential) is 5th preferred, to the 2F2 (Blue) option</p>	Highly Negative	1	Least Preferred
2F1 (Blue)	12 no identified impacts	<p>3 no. Major/Highly Negative 2 no. Moderately Negative 4 no. Slightly Negative 3 no. Not Significant</p> <p>1 direct (significant) impact on an extant standing stone site, and 2 direct (moderate) impacts on the known cultural heritage resource. The option is largely offline (with high archaeological potential). This coupled with the 12 identified impacts and significance therein is more than that for the 2E (Green) Option or 2F2 (Blue) Option and is therefore least preferred.</p>	Highly Negative	1	Least Preferred
2F2 (Blue)	14 no identified impacts	<p>2 no. Major/Highly Negative 3 no. Moderately Negative 8 no. Slightly Negative 1 no. Not Significant</p> <p>No direct (significant) impacts on the <i>known recorded</i> cultural heritage resource. 3 direct (moderate) impacts on the <i>known recorded</i> resource. The option is largely offline (with high potential); this coupled with the 14 identified impacts and significance (incl. slight impact on a Nat. Mon and an RPS structure) is more than that for the 2E (Green) option</p>	Highly Negative	1	Least Preferred

4 CONCLUSIONS

The impacts of 2A (Orange), 2B (Pink), 2C (Purple), 2D (Red), 2E (Green), 2F1 (Blue) and 2F2 (Blue) options are detailed above in **Section 3.1**. From a cultural heritage perspective and based on a quantitative and qualitative assessment; the 2B (Pink) Option is the preferred option, followed closely by, in order of preference: 2A (Orange), 2D (Red), 2C (Purple), 2E (Green), 2F2 (Blue) and 2F1 (Blue).

The 2B (Pink) option would involve retention of the existing road network with junction rationalisation, particularly on the existing dual carriageway at Trimragh, with closure of several existing at grade junctions including the central median cross-over; and replace with a single grade separated junction. The 2B (Pink) option has 14 identified constraints, the majority of which are focused at the proposed junction area at Trimragh (Rock Art sites, Church and Graveyard site, and built heritage items) as well as the relief road at Ballyraine (area of archaeological potential and site of a ringfort).

5 REFERENCES

Department of Arts, Heritage, Gaeltacht and the Islands (1999) *Framework and Principles for the protection of the Archaeological Heritage*

Donegal County 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 Archaeological Artefacts within study area for Section 2

Townland	NMI ref.	Artefact types	Notes
Scribly	1937:2490	Stone axehead	Purchased from Mr. William Scott, Scribly, who found it by farmstead.

Townland names with potential archaeological associations within Section 2 study area

Townland	Irish	Translation	Notes on SMR entries
Lisnenan	Lios Naíonán	'Nenan's ringfort'	There are no entries for a ringfort within this townland, although it does contain two souterrains (located outside the study area)
Listellian	Lios Teileáin	'Tellion's fort'	There are no entries for a ringfort within this townland
Ballyboe Lisnenan	Baile Bó Lios Naíonán	Baile Bó 'cow-land' 'Nenan's ringfort'	There are no entries for a ringfort within this townland
Trimragh	Tromra	'Ringfort of the elder'	There are no entries for a ringfort within this townland

Cultural Heritage Constraint sites within 500m corridor of Section 2 study area

Unique Identification No.	
Legal Status	RMP
Reference No.	DG053-026---
Address/Townland	Ballyraine
Site Type	Ringfort - unclassified
ITM	618900, 911715
Description	This site now consists of a steep-sided natural mound overgrown with trees and bushes. It was marked 'White Fort' on the 1st edition of the OS 6-inch map so there may have been a monument here then but no trace of this is visible now.
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(s) Centre-line	78m (2F1 Blue) 78m (2F2 Blue) 78m (2E Green) 78m (2A Orange) 78m (2B Pink) 78m (2C Purple) 78m (2D Red)
Type of Impact	Direct & Moderate (2F1 Blue) Direct & Moderate (2F2 Blue) Direct & Moderate (2E Green) Direct & Moderate (2A Orange) Direct & Moderate (2B Pink)

	Direct & Moderate (2C Purple) Direct & Moderate (2D Red)
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Unique Identification No.	
Legal Status	RMP
Reference No.	DG053-027001-
Address/Townland	Trimagh
Site Type	Rock Art
ITM	621418, 911764
Description	Kinahan (1879-88, 272) recorded that the Giants rock which was marked on the 1st edition of the OS 6-inch map had seven cupmarks i.e. two sets in triangular arrangements with an outlier. One hundred yards due E was another large flat stone (DG053-027002-) called the 'Giants Grave' which had two cupmarks. Nearby on a rock surface (DG053-027003-) were two or more cupmarks and on a smaller stone (DG053-027004-) about fifty yards S a smaller stone with one cupmark. None of these were discovered on this occasion. The stones were located in low-lying scrub-land close to the old Lough Swilly shoreline but land reclamation has totally altered the area.
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(s) Centre-line	195m (2A Orange) 195m (2B Pink) 195m (2C Purple) 195m (2D Red)
Type of Impact	Indirect & Slight (2A Orange) Indirect & Slight (2B Pink) Indirect & Slight (2C Purple) Indirect & Slight (2D Red)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG053-027002-
Address/Townland	Trimagh
Site Type	Rock Art
ITM	621504, 911811
Description	Kinahan (1879-88, 272) recorded that the Giants rock (DG053-027001-) which was marked on the 1st edition of the OS 6-inch map had seven cupmarks i.e. two sets in triangular arrangements with an outlier. One hundred yards due E was another large flat stone called the 'Giants Grave' which had two cupmarks. Nearby on a rock surface (DG053-027003-) were two or more cupmarks and on a smaller stone (DG053-027004-) about fifty yards S a smaller stone with one cupmark. None of these were discovered on this occasion. The stones were located in low-lying scrub-land close to the old Lough Swilly shoreline but land reclamation has totally altered the area.

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(s) Centre-line	204m (2A Orange) 204m (2B Pink) 204m (2C Purple) 204m (2D Red)
Type of Impact	Indirect & Slight (2A Orange) Indirect & Slight (2B Pink) Indirect & Slight (2C Purple) Indirect & Slight (2D Red)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG053-027003-
Address/Townland	Trimagh
Site Type	Rock Art
ITM	621522, 911825
Description	Kinahan (1879-88, 272) recorded that the Giants rock (DG053-027001-) which was marked on the 1st edition of the OS 6-inch map had seven cupmarks i.e. two sets in triangular arrangements with an outlier. One hundred yards due E was another large flat stone called the 'Giants Grave' which had two cupmarks. Nearby on a rock surface were two or more cupmarks and on a smaller stone (DG053-027004-) about fifty yards S a smaller stone with one cupmark. None of these were discovered on this occasion. The stones were located in low-lying scrub-land close to the old Lough Swilly shoreline but land reclamation has totally altered the area.
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(s) Centre-line	207m (2A Orange) 207m (2B Pink) 207m (2C Purple) 207m (2D Red)
Type of Impact	Indirect & Slight (2A Orange) Indirect & Slight (2B Pink) Indirect & Slight (2C Purple) Indirect & Slight (2D Red)

Unique Identification No.	
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Legal Status	RMP
Reference No.	DG053-027004-
Address/Townland	Trimagh
Site Type	Rock Art
ITM	621548, 911808
Description	Kinahan (1879-88, 272) recorded that the Giants rock (DG053-027001-) which was marked on the 1st edition of the OS 6-inch map had seven cupmarks i.e. two sets in triangular arrangements with an outlier. One hundred yards due E was another large flat stone (DG053-027002-) called the 'Giants Grave' which had two cupmarks. Nearby on a rock surface (DG053-027003-) were two or more cupmarks and on a smaller stone about fifty yards S a smaller stone with one cupmark. None of these were discovered on this occasion. The stones were located in low-lying scrub-land close to the old Lough Swilly shoreline but land reclamation has totally altered the area.
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(s) Centre-line	189m (2A Orange) 189m (2B Pink) 189m (2C Purple) 189m (2D Red)
Type of Impact	Indirect & Slight (2A Orange) Indirect & Slight (2B Pink) Indirect & Slight (2C Purple) Indirect & Slight (2D Red)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG053-028---
Address/Townland	Trimagh
Site Type	Church (site of)
ITM	621387, 911469
Description	Although not marked on the 1st edition of the OS 6-inch map the 2nd and 3rd editions show this as the site of a church and burial ground (DG053-028001-). No trace of it now survives and it was probably destroyed by the building of the railway line (Kinahan 1885-86, 426). Situated on the lower marshy slopes of a hill rising from the River Swilly.
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(s) Centre-line	0m (2A Orange) 0m (2B Pink)

	0m (2C Purple) 0m (2D Red)
Type of Impact	Direct & Moderate (2A Orange) Direct & Moderate (2B Pink) Direct & Moderate (2C Purple) Direct & Moderate (2D Red)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG053-028001-
Address/Townland	Trimagh
Site Type	Graveyard (site of)
ITM	621387, 911469
Description	Although not marked on the 1st edition of the OS 6-inch map the 2nd and 3rd editions show this as the site of a church (DG053-028) and burial ground (DG053-028001-). No trace of it now survives and it was probably destroyed by the building of the railway line (Kinahan 1885-86, 426). Situated on the lower marshy slopes of a hill rising from the River Swilly.
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(s) Centre-line	0m (2A Orange) 0m (2B Pink) 0m (2C Purple) 0m (2D Red)
Type of Impact	Direct & Moderate (2A Orange) Direct & Moderate (2B Pink) Direct & Moderate (2C Purple) Direct & Moderate (2D Red)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG053-035---
Address/Townland	Bunnagee
Site Type	Bullaun Stone
ITM	619215, 910372
Description	None Available
Sources	http://webgis.archaeology.ie/historicenvironment/

Approx. Distance from Corridor(s) Centre-line	247m (2A Orange) 247m (2B Pink)
Type of Impact	Indirect & Imperceptible (2A Orange) Indirect & Imperceptible (2B Pink)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG053-037---
Address/Townland	Rossbrackan
Site Type	Standing Stone
ITM	622143, 910455
Description	There is no trace of the 'Standing Stone' marked on the 1st edition of the OS 6-inch map. Situated on good land on the E slope of a ridge.
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(s) Centre-line	152m (2E Green)
Type of Impact	Indirect & Slight (2E Green)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG053-038---
Address/Townland	Magheraboy
Site Type	Standing Stone
ITM	621697, 910009
Description	A standing stone 1.06m high x 0.8m wide at base x 0.44m thick at base; NNE-SSW. Situated on the gentle SE slope of a ridge of good 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(s) Centre-line	226m (2F1 Blue) 226m (2F2 Blue)
Type of Impact	Indirect & Slight (2F1 Blue) Indirect & Slight (2F2 Blue)

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Unique Identification No.	
Legal Status	RMP
Reference No.	DG053-039---
Address/Townland	Magheraboy
Site Type	Cairn – unclassified (Magheraboy ED)
ITM	622004, 910121
Description	Marked 'Carn' on the 1st edition of the OS 6-inch map this site does not seem to survive. However at about the point indicated there is a section of rock outcrop c. 2m x 1m. The site is on the E slope of a ridge of good 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(s) Centre-line	151m (2F1 Blue) 157m (2F2 Blue)
Type of Impact	Indirect & Slight (2F1 Blue) Indirect & Slight (2F2 Blue)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG054-036---
Address/Townland	Rossbrackan
Site Type	Standing Stone
ITM	622561, 910598
Description	None Available
Sources	http://webgis.archaeology.ie/historicenvironment/
Approx. Distance from Corridor(s) Centre-line	174m (2F1 Blue) 37m (2E Green)
Type of Impact	Indirect & Imperceptible (2F1 Blue) Direct & Moderate (2E Green)

Unique Identification No.	
Legal Status	RMP

Reference No.	DG054-037---
Address/Townland	Rossbrackan
Site Type	Standing Stone
ITM	622773, 910376
Description	A standing stone 1.36m high x 0.67m wide x 0.17m thick; NW-SE. It is set in a small mound of earth and stones, on a small hillock in generally low-lying, good 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(s) Centre-line	32m (2F1 Blue) 186m (2E Green)
Type of Impact	Direct & Significant (2F1 Blue) Indirect & Slight (2E Green)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG054-038---(Nat Mon. 453)
Address/Townland	Pluck
Site Type	Standing Stone
ITM	619215, 910372
Description	This standing stone (National Monument No. 453) is 1.75m high x 1.7m wide x 0.95m thick; NNE-SSW. Situated on low-lying level ground close to the Isle Burn river.
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(s) Centre-line	344m (2F2 Blue)
Type of Impact	Indirect & Slight (2F2 Blue)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG061-005---
Address/Townland	Lurgybrack
Site Type	Souterrain
ITM	619103, 909575
Description	There is no trace of the 'Cave' marked on the 1st and 2nd editions of the OS 6-inch map. It was situated in good 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(s) Centre-line	241m (2C Purple)
Type of Impact	Indirect & Imperceptible (2C Purple)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG062-001---
Address/Townland	Corkey
Site Type	Souterrain
ITM	623081, 909766
Description	There is no trace of the 'cave' marked on the 1st and 2nd editions of the OS 6-inch maps. It was situated on good land sloping to NW.
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(s) Centre-line	217m (2F2 Blue)
Type of Impact	Indirect & Imperceptible (2F2 Blue)

Unique Identification No.	
Legal Status	RMP
Reference No.	DG062-002---
Address/Townland	Corkey
Site Type	Standing Stone
ITM	623129, 909824
Description	Kinahan (1885-6, 428) records that 'somewhere to N or NE' of the souterrain (1462) 'there is said to be a stone, having a number of flint chips buried by its side; the exact place, however, could not be ascertained.' No trace of this could be found.
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(s) Centre-line	143m (2F2 Blue)

Type of Impact	Direct & Moderate (2F2 Blue)
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Unique Identification No.	
Legal Status	N/A
Reference No.	S2-AAP01
Address/Townland	Swilly Estuary at Milk Isle north towards Ballyraine
Site Type	Area of high Archaeological potential including possible battle site associations (DG053-056---)
ITM	
Description	This area comprises the location for the offline relief road option proposed to service Letterkenny town at Ballyraine linked to the Port Road (N56) and N13. It consists of the estuarine lands associated with the River Swilly, the river itself, and associated banks. There is a site of a recorded ringfort DG53-026--- 'White Fort' on the northern banks of the river, as the ground begins to rise, as well as the location of a Battle site in the general northerly environs at this point (DG053-056---). Given the recorded archaeological resource as well as the attractive nature of the riverine environment for past human use and the potential for the presence of underwater archaeology, this area is deemed to be of high archaeological potential.
Sources	N/A
Approx. Distance from Corridor(s) Centre-line	0m (2F1 Blue) 0m (2F2 Blue) 0m (2E Green) 0m (2A Orange) 0m (2B Pink) 0m (2C Purple) 0m (2D Red)
Type of Impact	Potential Direct & Potential Profound (2F1 Blue) Potential Direct & Potential Profound (2F2 Blue) Potential Direct & Potential Profound (2E Green) Potential Direct & Potential Profound (2A Orange) Potential Direct & Potential Profound (2B Pink) Potential Direct & Potential Profound (2C Purple) Potential Direct & Potential Profound (2D Red)

Unique Identification No.	
Legal Status	N/A
Reference No.	S2-AAP02
Address/Townland	Area from disused railway line at Magheraboy and extending East towards Pluck, including Corkey River crossing
Site Type	Area of High Archaeological Potential
ITM	
Description	This area comprises a portion of the proposed Green option extending east from the disused railway line at Magheraboy, crossing another disused railway line, crossing the Corkey River and its banks at Pluck and the roundabout terminus at the N13/N14. The lands consist of undulating improved agriculture on a NW/SE extending ridge of well drained ground c. 50m OD. The area has a high concentration of recorded prehistoric

	sites, in particular a high density of recorded standing stones (DG054-036---, DG053-037---, DG053-038---, DG054-037---, DG062-002--- and DG053-038---), as well as a cairn site (DG053-039---). Given the good quality terrain, and the high density of standing stones with clear indications of early Bronze age settlement, this area is deemed to be of high archaeological potential.
Sources	N/A
Approx. Distance from Corridor(s) Centre-line	0m (2E Green)
Type of Impact	Potential Direct & Potential Profound (2E Green)

Unique Identification No.	
Legal Status	N/A
Reference No.	S2-AAP03
Address/Townland	Area from disused railway line west of Aghlehard east towards Pluck
Site Type	Area of High Archaeological Potential
ITM	
Description	This area comprises a portion of the proposed Blue option extending east from the disused railway line at Aghlehard eastwards towards lower ground and a minor NW/SE tributary of the Corkey river, crossing another disused railway line and terminating at Pluck, west of the banks of the Corkey river itself. Similar to S2-AAP02, there is a high density of prehistoric standing stone sites (DG054-036---, DG053-037---, DG053-038---, DG054-037---, DG062-002--- and DG053-038---), as well as a cairn site (DG053-039---). In addition, there is also an interesting grouping of an enclosure (DG061-006002-), a ringfort (DG061-006---) and a medieval house (DG061-006001-) at Aglehard townland. Given the excellent terrain, and the high density of prehistoric sites offering clear indication of a Bronze Age community within the area in the past, progressing later with evidence of early medieval settlement up to the present day, this area is deemed to be of high archaeological potential.
Sources	N/A
Approx. Distance from Corridor(s) Centre-line	0m (2F1 Blue) 0m (2F2 Blue)
Type of Impact	Direct Potential & Direct Profound (2F1 Blue) Direct Potential & Direct Profound (2F2 Blue)

Unique Identification No.	
Legal Status	N/A
Reference No.	S2BH01
Address/Townland	Magheraboy/Listellan
Site Type	Disused Railway Line
ITM	620927, 909421
Description	Disused railway line. Not on 1 st or 2 nd ed mapping.
Sources	N/A
Approx. Distance from Corridor(s) Centre-line	0m (2F1 Blue) 0m (2F2 Blue)
Type of Impact	Direct & Slight (2F1 Blue)

	Direct & Slight (2F2 Blue)
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Unique Identification No.	
Legal Status	N/A
Reference No.	S2BH02
Address/Townland	Aghlehard
Site Type	Disused Railway Line
ITM	622455, 910267 (Blue Option A) 622662, 910107 (Blue Option B)
Description	Disused railway line. Not on 1 st or 2 nd ed mapping.
Sources	N/A
Approx. Distance from Corridor(s) Centre-line	0m (2F1 Blue) 0m (2F2 Blue)
Type of Impact	Direct & Slight (2F1 Blue) Direct & Slight (2F2 Blue)

Unique Identification No.	
Legal Status	N/A
Reference No.	S2BH03
Address/Townland	Dromore
Site Type	Disused railway line
ITM	621058, 910501 (Green Option)
Description	Disused railway line. Not on 1 st or 2 nd ed mapping.
Sources	N/A
Approx. Distance from Corridor(s) Centre-line	0m (2E Green)
Type of Impact	Direct & Slight (2E Green)

Unique Identification No.	
Legal Status	N/A
Reference No.	S2BH04
Address/Townland	Dromore
Site Type	Disused railway line
ITM	620307, 910532 (Green Option)
Description	Disused railway line. Not on 1 st or 2 nd ed mapping.
Sources	N/A
Approx. Distance from Corridor(s) Centre-line	0m (2E Green)
Type of Impact	Direct & Slight (2E Green)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40906101
Address/Townland	Lurgybrack
Site Type	Former Rectory/Glebe House
ITM	619120, 909289
Description	Detached three-bay two-storey former Church of Ireland rectory, built c. 1820, having modern single-storey addition to the south-east side of entrance front. Extensively altered c. 1980 and now in use as a private house. Hipped artificial slate roof with slightly overhanging eaves with projecting ashlar eaves course, and with a central pair of rendered chimneystacks having clayware pots over. Roughcast walls over smooth rendered plinth course. Square-headed windows with replacement fittings. Central square-headed doorway with timber panelled door and plain overlight. Flight of cut stone steps up to entrance. Set well back from road in mature grounds in the rural countryside to the south-east of Letterkenny. Detached four-bay two-storey outbuilding to the rear (south-west) with external flight of rubble stone steps to front giving access to doorway at first floor level, and having pitched purple natural slate and corrugated iron roof, roughcast rendered rubble stone walls, and square-headed openings. Gateway to site with rubble stone gate piers and wrought-iron flat bar gate.
Sources	www.buildingsofireland.ie
Approx. Distance from Corridor(s) Centre-line	228m (2C Purple)
Type of Impact	Indirect & Slight (2C Purple)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40905301
Address/Townland	Drumany (Magheraboy)
Site Type	Church
ITM	619518, 910104
Description	Freestanding gable-fronted single-cell former Church of Ireland church, built c. 1840, comprising three-bay hall. Now in use as offices. Pitched artificial slate roof with projecting cut stone eaves course, raised ashlar granite coping to gables having carved kneeler stones to eaves, and with tripartite carved sandstone chimneystack to the gable apex to the rear (north-east). Coursed and squared rubble stone walls over ashlar granite plinth to front (south-east), rubble stone walls to side elevation (north-west and south-east), and smooth and roughcast rendered wall to rear (north-east). Pointed-arched window opening to the front elevation (south-west) having splayed\chamfered ashlar granite surround, and with cast-iron multi-paned windows. Pointed-arched window opening to the rear elevation (north-east) having splayed\chamfered ashlar granite surround, timber Y-tracery and with cast-iron multi-paned windows; main window flanked by narrow pointed-arched windows having splayed\chamfered ashlar granite surround, and with cast-iron multi-paned windows. Pointed-arched window opening to the side elevations (north-west and south-east) having splayed\chamfered ashlar granite surround, and replacement windows. Round-headed door opening to centre of main façade (south-west) with cut granite staged surround, granite plinth blocks, granite hoodmoulding over, and with replacement door. Pointed-arched door opening to west of north elevation with replacement timber battened door. Set back from road in elevated site in the rural countryside to the south-west of Letterkenny.

Sources	www.buildingsofireland.ie
Approx. Distance from Corridor(s) Centre-line	20m (2A Orange) 20m (2B Pink) 170m (2C Purple)
Type of Impact	Direct & Slight (2A Orange) Direct & Slight (2B Pink) Indirect & Slight (2C Purple)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40905326
Address/Townland	Bunnagee
Site Type	Railway bridge
ITM	619252, 910695
Description	Single-arch bridge carrying the former Burt Junction to Letterkenny narrow gauge railway line over former tributary of the River Swilly (river diverted), built c. 1883. Railway out of use and tracks removed (since 1953). Segmental-headed arch with brick voussoirs and with brick construction to arch barrel; coursed and squared rubble stone construction to piers to arch below springing point. Squared rubble stone construction to spandrels and to parapets. Rubble stone coping to parapets. Modern rubble stone infill across former back to either end of bridge. Located within grounds of modern hotel to the east of the centre of Letterkenny.
Sources	www.buildingsofireland.ie
Approx. Distance from Corridor(s) Centre-line	253m (2A Orange) 253m (2B Pink) 227m (2C Purple) 227m (2D Red)
Type of Impact	Indirect & Imperceptible (2A Orange) Indirect & Imperceptible (2B Pink) Indirect & Imperceptible (2C Purple) Indirect & Imperceptible (2D Red)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40905337
Address/Townland	Aghlehard
Site Type	Single – arch rail bridge
ITM	622451, 910281
Description	Single-arch rail bridge, c. 1883, carrying road over the former Burt Junction to Letterkenny narrow gauge railway line. Railway out of use and tracks removed (since 1953). Segmental-headed arch with brick voussoirs and with brick construction to arch barrel; coursed and squared mildly rock-faced rubble stone construction to piers and to arch below springing point. Squared rubble stone construction to spandrels and to parapets. Rubble stone coping to parapets. Tarmac deck with grass verges. Squared and coursed rubble stone retaining walls to either side having cut stone coping over. Located in the rural countryside to the east/south-east of Letterkenny and adjacent to the south-east of the site of Pluck Station (heavily altered or demolished).

Sources	www.buildingsofireland.ie
Approx. Distance from Corridor(s) Centre-line	6m (2F1 Blue) 172M (2F2 Blue)
Type of Impact	Direct & Moderate (2F1 Blue) Indirect & Slight (2F2 Blue)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40905339
Address/Townland	Dromore (Magheraboy)
Site Type	Pair of semi-detached houses
ITM	620524, 910935
Description	Pair of semi-detached three-bay two-storey houses, built c. 1860, each having two-storey return to rear (east). Possibly originally associated with a ruinous mill to the north-west (see 40905390). Modern dwelling attached to return to house to south, single-bay single-storey lean-to addition to north gable end of house to the north. Pitched natural slate roof to house to the south having rendered chimneystacks to the gable ends with clay pots over; pitched natural slate roof to house to the north having yellow brick chimneystack to the north gable end with clay pots over. Smooth rendered walls to house to north and smooth rendered ruled-and-lined rendered walls to house to south. Square-headed window openings with mainly stone sills, and with mainly one-over-one pane timber sliding sash windows with margin glazing bars and some replacement windows at ground floor level. Square-headed window openings to the south gable end at first floor level having two-over-two pane timber sliding sash windows. Square-headed doorways with replacement fitting. Road-fronted along laneway in the rural countryside to the east of Letterkenny. Ruinous mill to the north-west (see 40905390) and various ruinous buildings to site. Section of rubble stone boundary wall to the south.
Sources	www.buildingsofireland.ie
Approx. Distance from Corridor(s) Centre-line	43m (2A Orange) 43m (2B Pink) 43m (2C Purple) 43m (2D Red)
Type of Impact	Direct & Slight (2A Orange) Direct & Slight (2B Pink) Direct & Slight (2C Purple) Direct & Slight (2D Red)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40905390
Address/Townland	Dromore
Site Type	Mill
ITM	620477, 910955
Description	Detached three-bay two-storey former corn mill, built c. 1860, having remains of porch to the east elevation and with remains of metal waterwheel to the west elevation. Now out of use and derelict. Pitched corrugated-metal roof with raised cement coping to gable ends. Rubble stone walls with roughly squared quoins to the corners.

	Segmental-headed window openings with red brick block-and-start reveals and voussoirs, and remains of timber fittings. Square-headed door openings with red brick block-and-start-reveals and voussoirs, and with remains of timber framed matchboard doors. Square-headed carriage-arch to the south gable end having paired corrugated metal clad gates. Remains of metal waterwheel to the west elevation having timber spokes and metal cogs. Former millrace to site; River Swilly located a short distance to the north. Set back from road in the rural countryside to the east of Letterkenny. Pair of vernacular houses to the south (see 40905339).
Sources	www.buildingsofireland.ie
Approx. Distance from Corridor(s) Centre-line	82m (2A Orange) 82m (2B Pink) 82m (2C Purple) 82m (2D Red)
Type of Impact	Direct & Slight (2A Orange) Direct & Slight (2B Pink) Direct & Slight (2C Purple) Direct & Slight (2D Red)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40905394
Address/Townland	Dromore (Magheraboy)
Site Type	Railway bridge
ITM	619984, 910481
Description	Single-arch former railway bridge, built c. 1909, carrying road over the former Strabane to Letterkenny narrow gauge railway line. Railway line now out of use with tracks removed (c. 1960). Squared and mildly rock-faced construction to spandrels, parapets, and piers; chamfered cut stone coping over parapets. Cut stone block-and-start quoins to piers below arch springing point. Segmental-headed arch with cut stone voussoirs or ruled-and-lined render detailing to arch ring, and with cement rendered finish to arch barrel. Tarmacadam deck with grass verges. Located in the rural countryside to the east/south-east of Letterkenny.
Sources	www.buildingsofireland.ie
Approx. Distance from Corridor(s) Centre-line	177m (2B Pink) 90m (2C Purple) 94m (2D Red)
Type of Impact	Indirect & Imperceptible (2B Pink) Direct & Moderate (2C Purple) Direct & Moderate (2D Red)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40905425
Address/Townland	Pluck
Site Type	Single arch railway bridge
ITM	622701, 910069

Description	Single-arch rail bridge, c. 1883, carrying former Burt Junction to Letterkenny narrow gauge railway line over road. Railway out of use and tracks removed (since 1953). Segmental-headed arch with brick voussoirs and with brick construction to arch barrel; coursed and squared mildly rock-faced rubble stone construction to piers and to arch below springing point. Drafted margins to piers. Squared rubble stone construction to spandrels and to parapets. Rubble stone coping to parapets. Rubble stone retaining walls to either side bridge. Tarmacadam deck with grass verges to road; former track bed overgrown. Located in the rural countryside to the south-west of Manorcunningham and to the south-east of Letterkenny.
Sources	www.buildingsofireland.ie
Approx. Distance from Corridor(s) Centre-line	29m (2F2 Blue)
Type of Impact	Direct & Moderate (2F2 Blue)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40905454
Address/Townland	Pluck
Site Type	House
ITM	622929, 910356
Description	Detached five-bay single-storey house, built c. 1820, having single-bay two-storey addition to the west end (west), c. 1870. Now out of use and derelict. Pitched natural slate roof with projecting eaves course, cast-iron rainwater goods, and with four rendered chimneystacks (one to either gable end of original building and two to centre). Pitched natural slate roof to addition to the west. Roughcast rendered and limewashed rubble stone walls. Square-headed window openings having stone sills and six-over-six pane timber sliding sash windows. Square-headed window openings to the block to the west having timber sliding sash windows. Central square-headed doorway to main block having remains of timber door. Set slightly back from road in own grounds in the rural countryside to the south-west of Manorcunningham. Small enclosed garden to the front, now overgrown, having low plinth wall with modern metal railings over. Detached seven-bay two-storey outbuilding to the south-west, built c. 1860, having pitched natural slate roof and projecting eaves course, roughcast rendered rubble stone walls, square-headed window openings with timber windows, and square-headed doorways and loading bays with timber lintels and battened timber doors. Gateway to the west of house having a pair of rubble stone gate piers (on circular-plan) with modern metal gates. Ruinous former corn mill (see 40905455) to the south-west of site.
Sources	www.buildingsofireland.ie
Approx. Distance from Corridor(s) Centre-line	232m (2F1 Blue)
Type of Impact	Indirect & Imperceptible (2F1 Blue)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40905455
Address/Townland	Pluck
Site Type	Cornmill
ITM	622878, 910347

Description	Detached multiple-bay three-storey former corn mill, built c. 1860 and possibly containing the fabric of an earlier mill to site, c. 1800. Not out of use and derelict. Pitched roof, now collapsed, having remains of cut stone eaves course. Rubble stone walls. Segmental-headed window openings having stone sills, red brick voussoirs, and remains of multiple-pane metal windows with timber frames. Square-headed doorways and loading bays having red brick voussoirs and remains of battened timber doors. Remains of metal machinery and millstones to site. Located to the east bank of the Isle Burn in the rural countryside to the south-west of Manorcunningham.
Sources	www.buildingsofireland.ie
Approx. Distance from Corridor(s) Centre-line	200m (2F1 Blue)
Type of Impact	Indirect & Imperceptible (2F1 Blue)

Unique Identification No.	
Legal Status	RPS/NIAH
Reference No.	40906204
Address/Townland	Corkey
Site Type	House
ITM	623669.4, 909730.9
Description	Detached three-bay two-storey house built, c. 1820 and extended c. 1860, having two-storey split-level extension to rear and with projecting single-bay single-storey flat-roofed entrance porch to north-east built c. 1860. Possibly originally a mill manager's or mill owner's house. Now out of use. Hipped natural slate roof with central leaded valley to south-west having projecting cut stone eaves course, smooth rendered chimneystacks with ashlar copings over, and with remains of cast-iron rainwater goods. Clipped gablet over stairs to south-west (rear elevation). Flat roof to entrance porch (now overgrown). Remains of roughcast lime render over rubble stone construction with smooth rendered ruled-and-lined walls to porch. Square-headed window openings with stone sills, red brick reveals and voussoirs, and having six-over-six pane hornless timber sliding sash windows to ground floor openings and six-over-three pane timber sliding sash windows to first floor openings; timber louvered shutters to first floor openings. Square-headed doorway to the front face (north-east) of porch having timber panelled entrance door with bolection mouldings, overlight, and sidelights. Round-headed opening to interior of porch having square-headed half-glazed timber panelled door flanking with half-glazed sidelights with decorative geometric glazing bars, moulded timber lintel, and with spider's web fanlight over. Timber panelled doors and architraves, cornices and ceilings roses with cast-iron and stone fireplaces to interior. Set back from road in own grounds in the rural countryside to the south of Manorcunningham. Complex of outbuildings arranged around a courtyard to the rear (south-west); now ruinous having pitched natural slate and corrugated-metal roofs, rubble stone walls, and square-headed openings. Set in overgrown gardens with mature hedgerows and trees surrounding. Modern field gateway to the north-west at site of original entrance.
Sources	www.buildingsofireland.ie
Approx. Distance from Corridor(s) Centre-line	237m (2F2 Blue)
Type of Impact	Indirect & Slight (2F2 Blue)

Unique Identification No.	
Legal Status	NIAH
Reference No.	40906228

Address/Townland	Corkey
Site Type	Single arch railway bridge
ITM	623252, 909686
Description	Single-arch rail bridge, c. 1883, carrying the former Burt Junction to Letterkenny narrow gauge railway line over road. Railway out of use and tracks removed (since 1953). Segmental-headed arch with brick voussoirs and with brick construction to arch barrel; coursed and squared mildly rock-faced rubble stone construction to piers and to arch below springing point. Squared rubble stone construction to spandrels and to parapets. Deck overgrown. Squared and coursed mildly rock-faced rubble stone retaining walls to either side having cut stone coping over. Located in the rural countryside to the south of Manorcunningham.
Sources	www.buildingsofireland.ie
Approx. Distance from Corridor(s) Centre-line	181m (2F2 Blue)
Type of Impact	Indirect & Slight (2F2 Blue)

Appendix 2: Photographic Record



Plate 1: Pluck National Monument No. 453



Plate 2: View of remains of Railway Line S2-BH02



Plate 3: Pluck Railway (road) Bridge NIAH 40905337



Plate 4: Remains of Railway Bridge S2-BH03



Plate 5: View towards S at DG054-037--- Standing Stone in Rossbracken



Plate 6: View towards 2E (Green) Option alignment S2-AAP02



Plate 7: Trimragh Church & Graveyard 'site of' DG053-028---



Plate 8: View towards site of Trimragh Rock Art DG053-027---



Plate 9: View to north and ringfort site DG053-028---



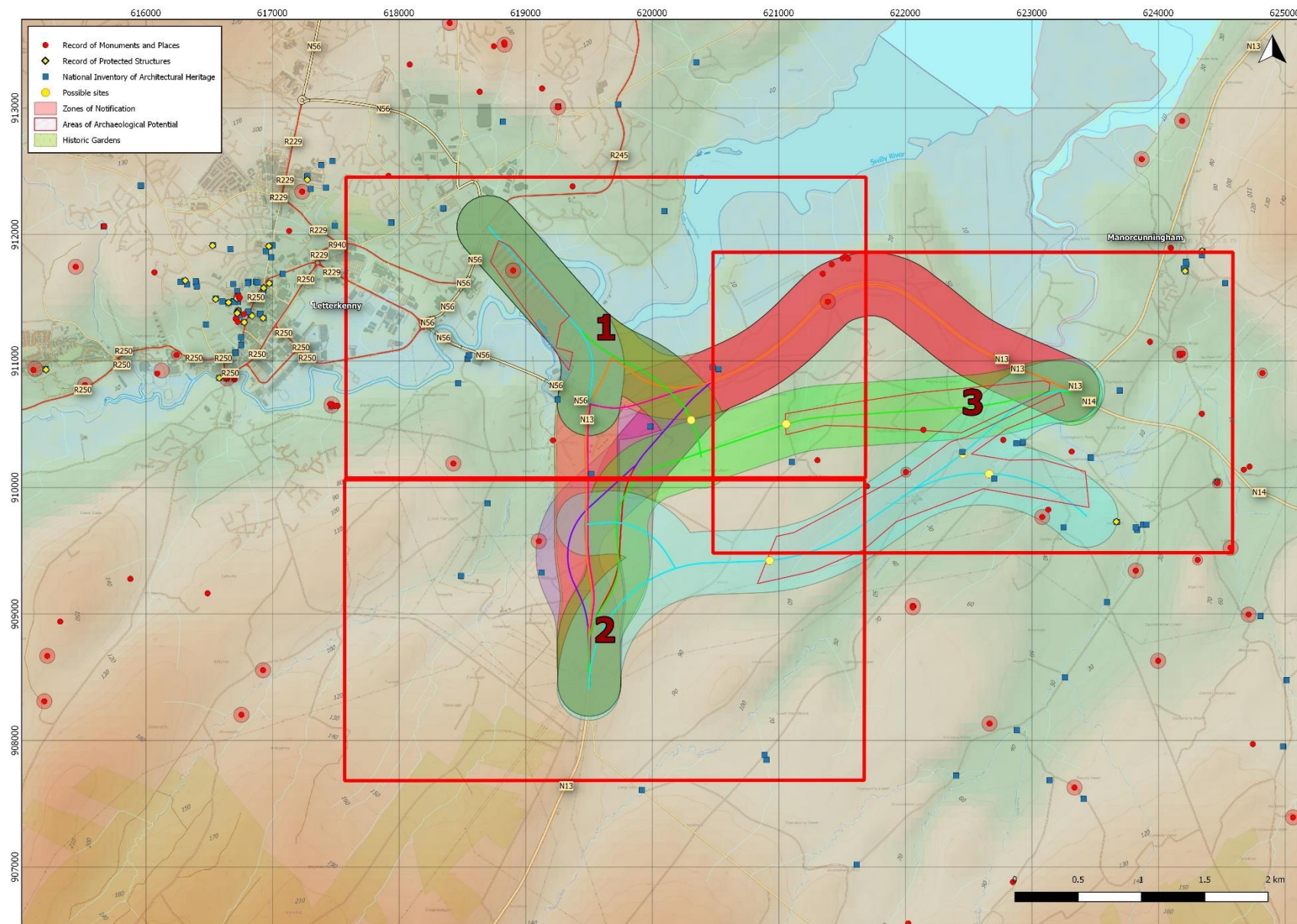
Plate 10: View to River Swilly and Milk Isle and area of Link Road (S2-AAP01)

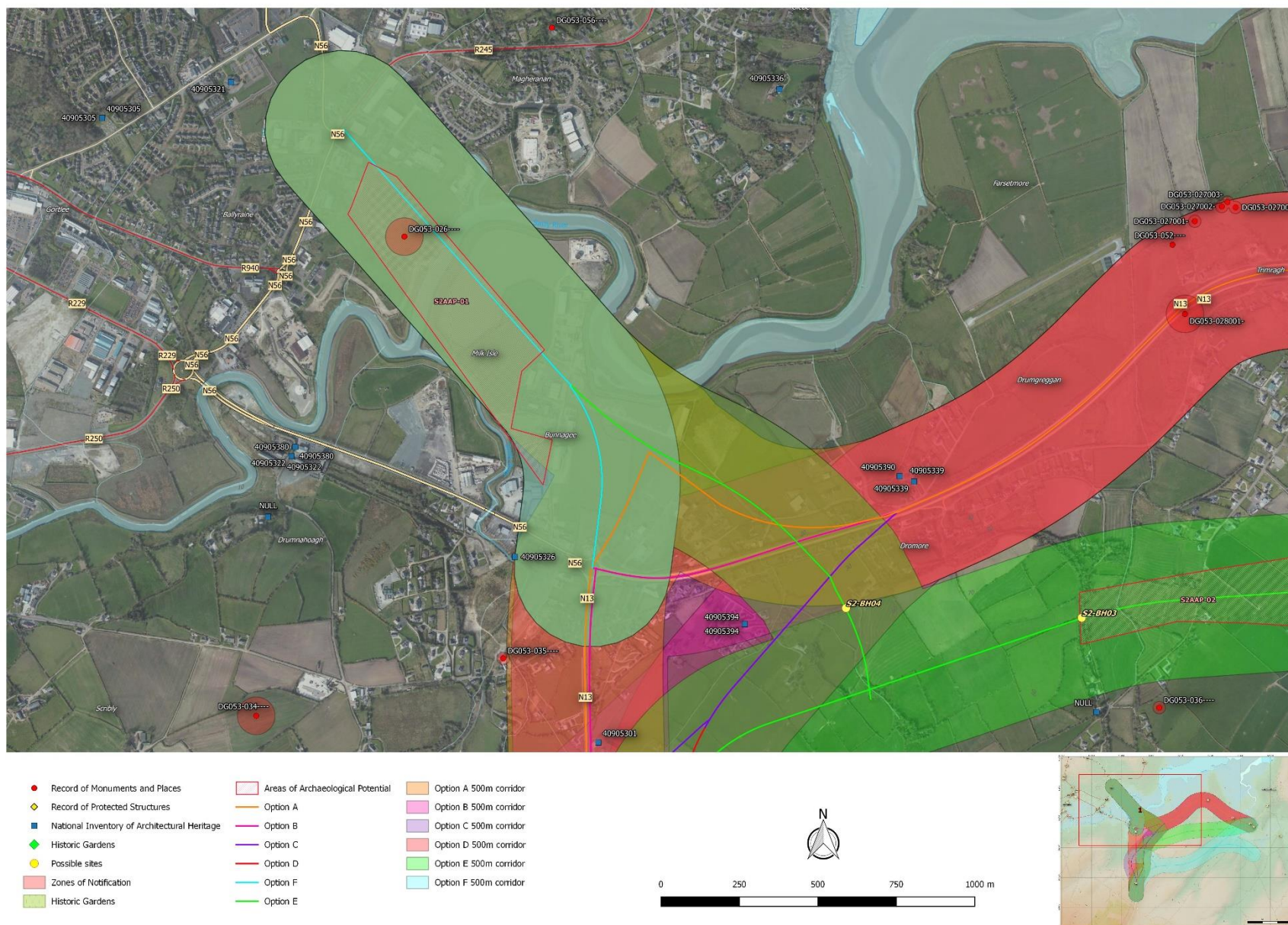


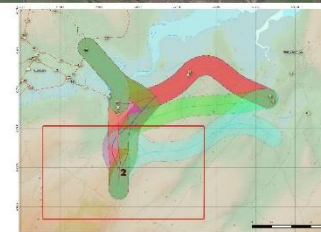
Plate 11: View towards termination point, all options, at Listellian

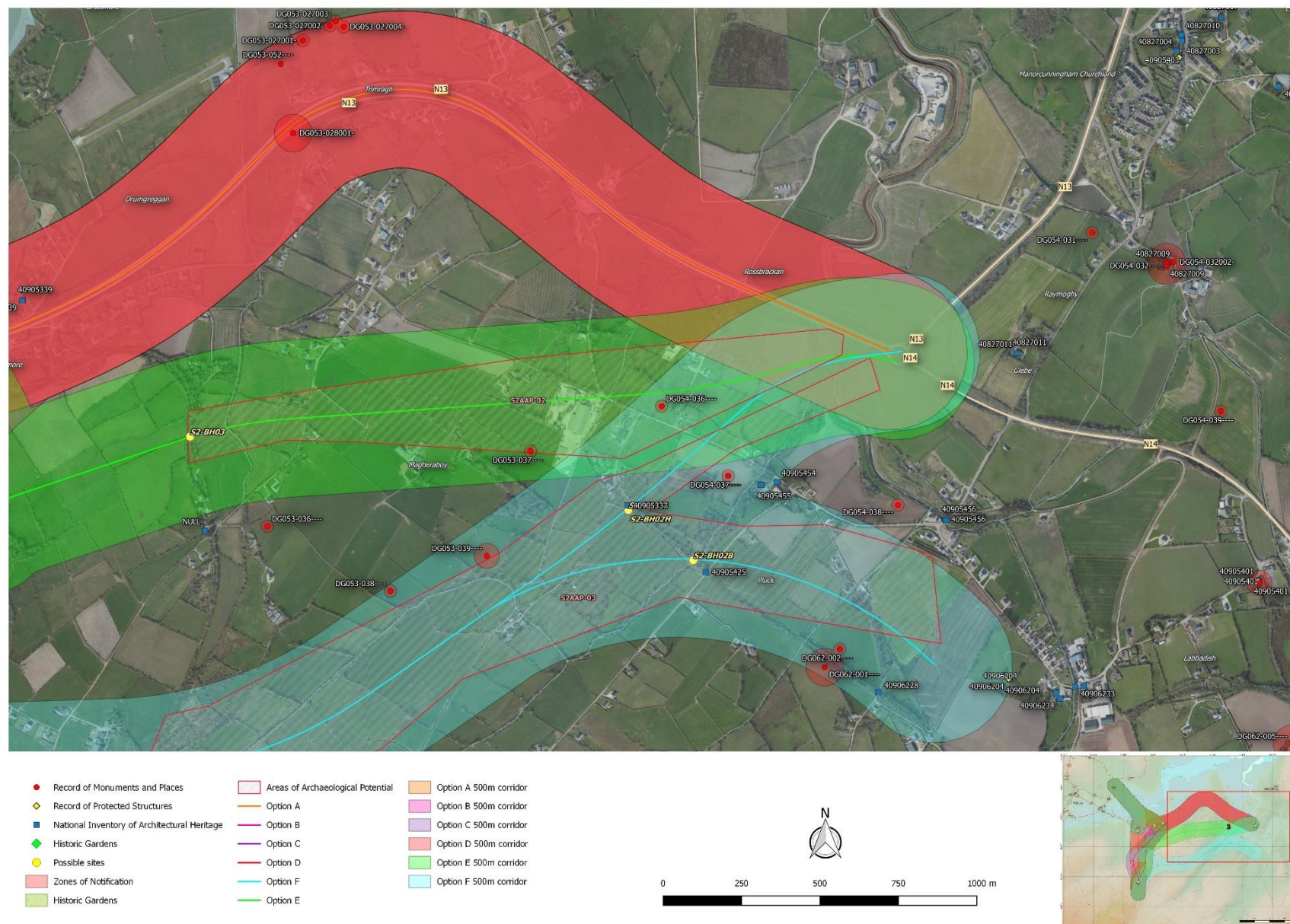
Appendix 3:

Cultural Heritage Option Corridor Mapping











TEN-T Priority Route Improvement Project, Donegal

Section 2: N56 / N13 Letterkenny to Manorcunningham

Option Selection Report

Appendix D2.9 – Material Assets (Agricultural)

Document Control Sheet

Client:	Donegal County Council
Project Title:	TEN-T Priority Route Improvement Project, Donegal – Section 2: N56 / N13 Letterkenny to Manorcunningham
Document Title:	Option Selection Report – D2.9 – Material Assets (Agricultural)
Document No.:	TT-MGT0337-RPS-00-01-RP-E-EN-1022

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1 INTRODUCTION

This review undertakes multi criteria assessment of each of the proposed options associated with 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, and the likely significant impacts that these proposed options may have on agriculture. This report 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 2 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

1.1.1 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, 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, October 2016.

1.1.2 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 land-parcel 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 proposed 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 options¹, 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.

¹ Stud farm as listed in the "Directory of the Turf"

http://www.directoryoftheturf.com/search_results.cfm/searchcategory/Stud%20Farms/searchcounty/Co%20Dublin

- **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 areas for the actual facilities but may require substantial spreadlands 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.

1.1.3 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*, 2016.

Table 1-1: Assessment of Environmental Value - Agriculture

Value (sensitivity)	Descriptions
Very high	<ul style="list-style-type: none"> ▪ Stud farms; ▪ Equine therapy facilities; and ▪ Deer farms.
High	<ul style="list-style-type: none"> ▪ Riding stables; ▪ Horse training facilities; and ▪ Poultry units;
Medium	<ul style="list-style-type: none"> ▪ Dairy; ▪ Horticultural units; ▪ Pig units; and ▪ Forestry;
Low	<ul style="list-style-type: none"> ▪ Sheep farms; ▪ Beef farms; ▪ Tillage farms; and ▪ Fodder conservation areas.
Negligible	<ul style="list-style-type: none"> ▪ 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

1.1.4 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.

1.1.5 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.

² The National Roads Authority (NRA) and the Railway Procurement Agency were merged to become Transport Infrastructure Ireland (TII) in 2015.

1.1.6 Assumptions

The following assumptions were used for the comparative analysis between proposed options.

- 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.

1.1.7 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 2010³ 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 2 are described in **Table 2-1**, below.

Table 2-1: Summary of Agricultural Constraints within Section 2: N56 / N13 Letterkenny to Manorcunningham

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 is the most northerly and is within the environs of the town of Letterkenny, which is situated to the north west of the study area. The lands to the south and east of Letterkenny are influenced by the River Swilly and Lough Swilly. The lands rise to the west of the study area with some scrub and bog land apparent. The lands further south of this study area are of better quality with larger field patterns and are more intensively farmed.	1,365	50	56	44	None

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 OPTIONS ASSESSMENT

3.1 Option 2A (Orange)

- Landtake: This option is ranked 2nd for length of option affecting agricultural land and is 22% longer than the shortest option. This option will affect 12 agricultural folios.
- Severance: The centreline of this option will significantly sever 7 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 shortest options from an agricultural perspective and is ranked 2nd for overall preference.

3.2 Option 2B (Pink)

- Landtake: This option is ranked 1st for length of option affecting agricultural land and is the shortest option. This option will affect 9 agricultural folios.
- Severance: The centreline of this option will significantly sever 4 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 the shortest options from an agricultural perspective and is ranked 1st for overall preference.

3.3 Option 2C (Purple)

- Landtake: This option is ranked 3rd for length of option affecting agricultural land and is 57% longer than the shortest option. This option will affect 21 agricultural folios.
- Severance: The centreline of this option will significantly sever 16 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 shortest options from an agricultural perspective and is ranked 3rd for overall preference.

3.4 Option 2D (Red)

- Landtake: This option is ranked 4th for length of option affecting agricultural land and is 63% longer than the shortest option. This option will affect 25 agricultural folios.
- Severance: The centreline of this option will significantly sever 20 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 longer options from an agricultural perspective and is ranked 4th for overall preference.

3.5 Option 2E (Green)

- Landtake: This option is ranked 6th for length of option affecting agricultural land and is 78% longer than the shortest option. This option will affect agricultural 41 folios.
- Severance: The centreline of this option will significantly sever 34 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 from an agricultural perspective and is ranked 6th for overall preference.

3.6 Option 2F1 and 2F2 (Blue)

- Landtake: This option is ranked 5th for length of option affecting agricultural land and is 73% longer than the shortest option. This option will affect 34 agricultural folios.
- Severance: The centreline of this option will significantly sever 28 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 shortest options from an agricultural perspective and is ranked 5th for overall preference.

3.7 Comparison of Options

A comparison of each option is presented in **Table 3.1**.

Table 3.1: Summary of Assessment for Section 2: N56 / N13 Letterkenny to Manorcunningham

Option	Quantitative Assessment ⁵	Qualitative Assessment	Score	Preference Ranking	Preference
2A	7	Moderately Negative	2	2	Intermediate
2B	4	Minor to Slightly Negative	3	1	Preferred
2C	10	Moderately Negative	2	3	Intermediate
2D	13	Moderately Negative	2	4	Intermediate
2E	19	Moderately Negative	2	7	Least Preferred
2F1	16	Moderately Negative	2	6	Least Preferred
2F2	16	Moderately Negative	2	5	Least Preferred

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.



TEN-T Priority Route Improvement Project, Donegal

Section 2: N56 / N13 Letterkenny to Manorcunningham

Option Selection Report

Appendix D2.10 – Material Assets (Non-Agricultural)

Document Control Sheet

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Project Title:	TEN-T Priority Route Improvement Project, Donegal – Section 2: N56 / N13 Letterkenny to Manorcunningham
Document Title:	Option Selection Report – D2.10 – Material Assets (Non-Agricultural)
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1 INTRODUCTION

This report examines the Material Assets (Non-agricultural) for Section 2: N56 / N13 Letterkenny-Manorcunningham 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.

Seven proposed options are assessed in this report, namely: Options 2A (Orange), 2B (Pink), 2C (Purple), 2D (Red), 2E (Green), 2F1 (Blue), and 2F2 (Blue).

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 for 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 NRA¹ 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 2. 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 7no. 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: <ul style="list-style-type: none"> Electricity Renewable energy Telecommunications Water and wastewater
	Transport Infrastructure covering: <ul style="list-style-type: none"> Roads Rail
	Waste Management covering <ul style="list-style-type: none"> Waste facilities Waste⁴
	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

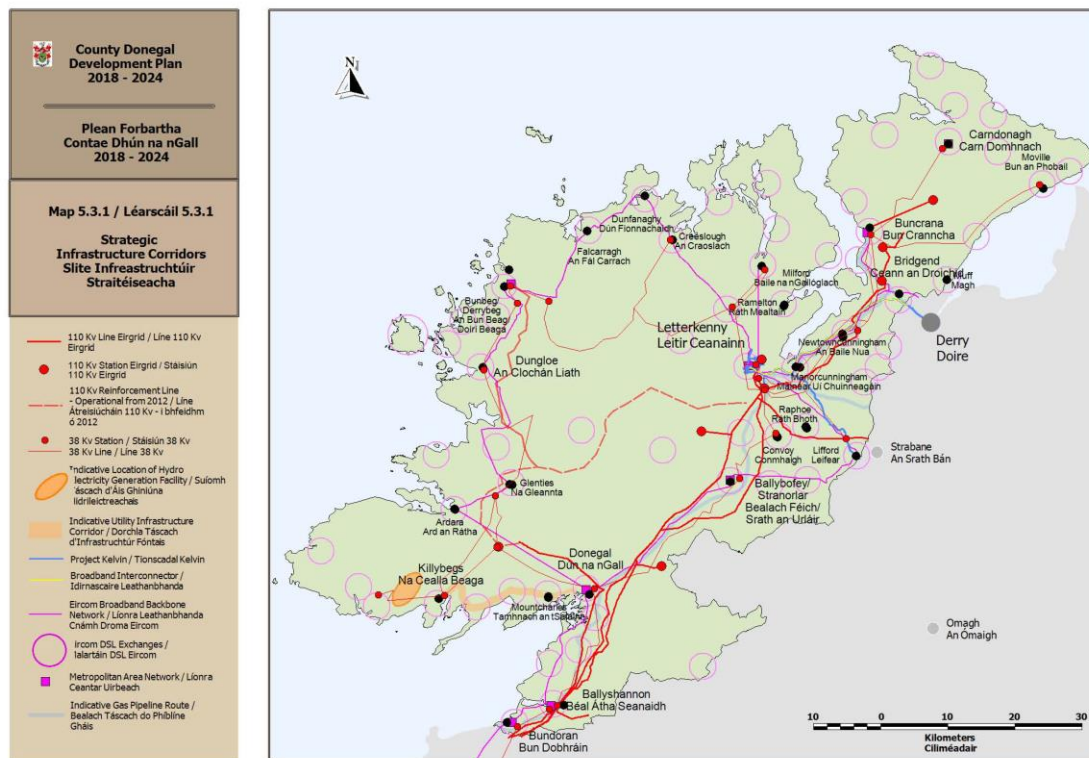
2.1 Introduction

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).



Source - Donegal County Council
Foinse - Comhairle Contae Dhún na nGall

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This data is for reference only and should not be used for any other purpose. It is not a guarantee of accuracy and should not be used for any other purpose. It is not a guarantee of accuracy and should not be used for any other purpose.

Figure 2-1: Telecommunications and Electrical Networks in Donegal County⁵

⁵ <http://www.donegalcoco.ie/media/donegalcountyc/planning/pdfs/viewdevelopmentplans/countydongaldevelopmentplan2018-2024/partaandb/Map%205.3.1%20Strategic%20Infrastructure%20Corridor.pdf>

2.2.1 Electricity

The Section 2 study area contains a 110kV substation with 110kV transmission and 38kV distribution overhead electricity cables. The Letterkenny 110kV substation is located south of Lurgybrack in the townland of Listellian. Two 38kV lines run through Lurgybrack and transect the study area boundary in several places. A 110kV transmission line transects the N56/N13 in south-north direction close to the Polestar Roundabout. None of the options impact existing substations. All options will have some impacts on local electricity supplies.

Table 2.1: Electricity Transmission Line Impacts

Electricity	Orange	Pink	Purple	Red	Green	Blue	Blue
	2A	2B	2C	2D	2E	2F1	2F2
Supplies crossed	Local 2 x 110kv	Local 2 x 110kv	Local 2 x 38kv 2 x 110kv	Local 2 x 38kv 2 x 110kv	Local 2 x 38kv 2 x 110kv	Local 2 x 38kv 2 x 110kv	Local 2 x 38kv 2 x 110kv
Impact description	Slight-ve	Slight-ve	Moderate-ve	Moderate-ve	Moderate-ve	Moderate-ve	Moderate-ve
Score	3	3	2	2	2	2	2

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	Blue
	2A	2B	2C	2D	2E	2F1	2F2
Impact on Sites	None	None	None	None	None	None	None
Impact description	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Score	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 Letterkenny.

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

Telecommunications	Orange	Pink	Purple	Red	Green	Blue	
	2A	2B	2C	2D	2E	2F1	2F2
Supplies crossed	BB b'bone & local	BB b'bone & local	BB b'bone & local	BB b'bone & local	BB b'bone & local	BB b'bone & local	BB b'bone & local
Impact description	Slight -ve	Slight -ve	Slight -ve	Slight -ve	Slight -ve	Slight -ve	Slight -ve
Score	3	3	3	3	3	3	3

2.2.4 Water and Wastewater

There are three public water supply sources for Letterkenny and its environs – Lough Greenan, Lough Salt and Lough Keel. The Goldrum Water treatment plant treats water sourced from Lough Keel and makes up almost 50% of the total water supply. Lough Keel is located approximately 15.3km north of Letterkenny town, immediately east of the N56. The primary waste water treatment (WWT) plant located with the study area is Letterkenny WWT. The WWT was assigned a “Pass” grade by the EPA’s Urban WWT 2015 assessment⁶.

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 Wastewater	Orange	Pink	Purple	Red	Green	Blue	
	2A	2B	2C	2D	2E	2F1	2F2
Supplies crossed	Local	Local	Local	Local	Local	Local	Local
Impact description	Slight-ve	Slight-ve	Slight-ve	Slight-ve	Slight-ve	Slight-ve	Slight-ve
Score	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
2A (Orange)	3	4	3	3	Minor to slightly negative	3	Intermediate
2B (Pink)	3	4	3	3	Minor to slightly negative	3	Intermediate
2C (Purple)	2	4	3	3	Minor to slightly negative	3	Intermediate
2D (Red)	2	4	3	3	Minor to slightly negative	3	Intermediate
2E (Green)	2	4	3	3	Minor to slightly negative	3	Intermediate
2F1 (Blue)	2	4	3	3	Minor to slightly negative	3	Intermediate
2F2 (Blue)	2	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 N13 runs south from the Dry Arch Roundabout toward Stranorlar.

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 during construction. At the southern end of Section 2, all options tie in with the N13 while at the western end of Section 2 they tie in with the N56. The new crossing of the River Swilly will also result in the creation of a new junction on the N56, north of the river. All options, except for the Blue and Green options will result in significant online works on the N13 between Lurgybrack and the Pluck Roundabout. However, the temporary to short-term impacts associated with the construction phase will be greatly outweighed by the permanent operation of new sections of national road, particularly linking the new crossing of the River Swilly. This introduces a second “lifeline” crossing point on the Swilly linking the western and eastern areas of Letterkenny.

For Section 2, in addition to the existing TEN-T national primary routes, there are two regional roads within and associated with the study area, namely:

- R250 which runs from the city centre in a south westerly direction towards Glenties.
- R245 which runs on the eastern edge of the city in a northerly direction towards Ramelton.

These regional roads are supplemented by local roads connecting communities along and across the N56/ N13 and N14. This network of regional and local roads provides many direct one-off residential and agricultural accesses.

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 highly positive impacts associated with the transport infrastructure in Section 2 taking into consideration the impacts on the national, regional and local road networks. In particular, the construction of a new crossing of the River Swilly, introducing a second lifeline route is seen as a major positive for both the locality and the region. **Table 2.6** summarises the road network impacts at each proposed option.

Table 2.6: Road Network Impacts

Transport	Orange	Pink	Purple	Red	Green	Blue	
	2A	2B	2C	2D	2E	2F1	2F2
Impact description	Maj +ve	Maj +ve	Maj +ve	Maj +ve	Maj +ve	Maj +ve	Maj +ve
Score	7	7	7	7	7	7	7

2.3.2 Rail

There is no live railway networking in Donegal. There are two dismantled rail lines within the study area, located to the south of the existing N13 dual carriageway between Dry Arch and Manorcunningham Roundabouts.

The 2A (Orange) and 2B (Pink) options do not impact the dismantled railway line, but all other options do impact on them. The 2D (Red) and 2C (Purple) options each impact the dismantled railway line once at Dromore, the 2E (Green) and 2F1/ 2F2Blue options each impact the dismantled railway lines twice at Magheraboy (2E option) and at Aghlenard and Pluck (both 2F1 and 2F2 options).

The 2A (Orange) and 2B (Pink) options have a neutral impact, the 2D (Red), 2C (Purple), 2E (Green) and 2F1/2F2 (Blue) options have a slightly negative impact, as summarised in **Table 2.7**.

Table 2.7: Rail Network Impacts

Rail Network	Orange	Pink	Purple	Red	Green	Blue	
	2A	2B	2C	2D	2E	2F1	2F2
Rail Network Impacted	n/a	n/a	1	1	2	2	2
Impact description	Neutral	Neutral	Slight -ve	Slight -ve	Slight -ve	Slight -ve	Slight -ve
Score	4	4	3	3	3	3	3

2.3.3 Summary of Transport

A summary of the transport impacts and preferences is provided in **Table 2.8**. As the rail impacts are neutral for Options 2A and 2B they are given an overall major positive impact in line with the overarching road impacts. The remaining options are all slightly more impactful due to the crossing of the disused railway line. As discussed in that section, the overall impacts will be moderately positive for each option.

Table 2.8: Transport Impacts

Option	Road	Rail	Impact	Impact Score	Preference
2A (Orange)	7	4	Major positive	7	Preferred
2B (Pink)	7	4	Major positive	7	Preferred
2C (Purple)	7	3	Moderately positive	6	Intermediate
2D (Red)	7	3	Moderately positive	6	Intermediate
2E (Green)	7	3	Moderately positive	6	Intermediate
2F1 (Blue)	7	3	Moderately positive	6	Intermediate
2F2 (Blue)	7	3	Moderately positive	6	Intermediate

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 Letterkenny which is operated by Bryson recycling which accept a range of recyclable materials free of charge, while charges are applied to other household waste. This facility is located in Carnamuggagh, north of Kiltroy. None of the proposed options impact this centre, as summarised in **Table 2.9**.

Table 2.9: Waste Facility Impacts

Waste Facilities	Orange	Pink	Purple	Red	Green	Blue	
	2A	2B	2C	2D	2E	2F1	2F2
Impact description	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Score	4	4	4	4	4	4	4
Preference	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred

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 4** 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.

The 2B (Pink) option will have a slight negative impact. The 2A (Orange), 2C (Purple), 2D (Red), 2F (Blue) and 2F1 (Blue) options will have moderate negative impacts and the 2E (Green) option which will have a major negative impact.

Table 2.10: Waste Impacts

Waste	Orange	Pink	Purple	Red	Green	Blue	
	2A	2B	2C	2D	2E	2F1	2F2
Cut/Fill difference ('000 m ³)	441.7	254.7	499.8	517.1	1,135.5	580.0	557.1
Impact description	Mod-ve	Slight -ve	Mod-ve	Mod-ve	Maj-ve	Mod-ve	Mod-ve
Score	2	3	2	2	1	2	2
Preference	Intermediate	Preferred.	Intermediate.	Intermediate	Least Preferred	Intermediate	Intermediate

2.5 Forestry

Drumany is the only area of commercial forestry impacted by the 2F1 (Blue), 2F2 (Blue), 2D (Red) and 2E (Green) options and comprises a coniferous forest over a total area of approximately 14 hectares.

Drumany forest is directly impacted by the 2F1/2 (Blue), 2D (Red) and 2E (Green) options to varying degrees ranging from minor to slightly negative to major negative. Based on preliminary alignments for the options it is anticipated that Option 2D (Red) will impact the smallest footprint of approximately 0.3ha. Option 2E (Green) interacts with a similarly small area of approximately 0.4ha. Option 2F1/2 follow the same path through the forestry and would impact approximately 2.6ha. 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

Impact on Forestry	2A (Orange)	2B (Pink)	2C (Purple)	2D (Red)	2E (Green)	2F1 (Blue)	2F2 (Blue)
Area of commercial forestry impacted (Hectares)	0	0	0	0.3	0.4	2.6	2.6
Impact description	Neutral	Neutral	Neutral	Slight -ve	Slight -ve	Slight -ve	Slight -ve
Score	4	4	4	3	3	3	3
Preference	Preferred	Preferred	Preferred	Intermediate	Intermediate	Least Preferred	Least Preferred

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 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 options (i.e. completed width of road and associated infrastructure / land take) and given the potential for movement of the road alignment within the selected option, 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 is 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 options. With respect to commercial properties, the numbers of properties within 0-50m are 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. 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 option 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 significantly 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 and existing options are located in and close to the town of Letterkenny and all options end close to the village of Manorcunningham.

Outside of the settlement boundary for Letterkenny, there are no other identified towns or villages intersected by the proposed options. The settlement pattern outside of Letterkenny largely comprises of linear or scattered one off properties.

The County Donegal Development Plan 2018-2024 (hereafter referred to as the CDP) is the primary planning policy document for the county, and for the town of Letterkenny. This plan provides a zoning map for Letterkenny, identified as a 'Layer 1' town due to its strategic importance within the county. The town is a key location for population growth as discussed later within this report.

3.2.1.2 Rural Area Types

There are three separate rural area types identified in the County Plan: 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 traverse an area referred to as an 'Area Under Strong Rural Influence' while those options which follow the alignment of the existing road also traverse an area referred to as 'urban' which does not fall under the rural area typology.

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.

The 2A (Orange) and 2B (Pink) options are located within areas of high scenic amenity, however depending on the extent of land take and exact alignment of those options within their assessment corridors, they may also intersect an area of moderate scenic amenity. The 2F1/2F2 (Blue), 2E (Green), 2C (Purple) and 2D (Red) options all intersect both the high and moderate scenic amenity areas.

3.2.1.4 Development Zoning

The majority of the main sections of the 2A (Orange), 2B (Pink), 2D (Red) and 2C (Purple) options follow the same route on the N14 between the junction with the L1154 and the Pluck roundabout south of Manorcunningham. These sections of these options lie outside the development boundary of Letterkenny. The westerly sections of these options interact with the land use zoning objectives as set out in **Table 3.1** below.

Table 3.1 Option Interactions with Letterkenny Zoning Objectives

Zoning	Options	Objective
Established Development	2A (Orange) 2B (Pink) 2C (Purple) 2D (Red)	<i>To conserve and enhance the quality and character of the area, to protect residential amenity and allow for development appropriate to the sustainable growth of the settlement subject to all relevant material planning considerations, all the policies of this Plan, relevant National / regional policy / guidance including environmental designations and subject to the proper planning and sustainable development of the area.</i>
Strategic Residential Reserve	2A (Orange) 2B (Pink) 2C (Purple) 2D (Red)	<i>To reserve land for residential development as a long term strategic landbank.</i>
Open Space	2A (Orange)	<i>To conserve and enhance land for formal and informal open space and amenity purposes, and to make provision for new recreation, leisure and community facilities.</i>
General Employment	2A (Orange) 2B (Pink)	<i>To reserve land for commercial, industrial and non-retail purposes.</i>
Long Established Residential Area	2C (Purple) 2D (Red)	<i>No specific Objective, however Policy LK-H-P-3 states: It is the policy of the Council to protect the architectural, cultural and historic value of residential communities within and on the edge of the town centre that are identified as 'Long Established Residential Areas' on Map 12.1B: Letterkenny Land Use Zoning, that accompanies this part of the Plan.</i>

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

Existing traffic is routed through a built-up area of Letterkenny which currently experiences congestion. The 2A (Orange) and 2B (Pink) options, along with parts of the 2C (Purple) and 2D (Red) options are online

through the same area or part of and are located within the settlement boundary of the town as set out within the County Donegal Development Plan. The main section of the 2E (Green) option is slightly outside of the settlement boundary; the main section of the 2F1 (Blue) option avoids the built-up area. All options have links within the settlement boundary. For settlement impacts, the 2A (Orange), 2B (Pink), 2C (Purple) and 2D (Red) options are scored moderately negative, the 2E (Green) option is moderately positive and the 2F1/2F2 (Blue) options as majorly positive.

All options will contribute to the Core Strategy Objectives of the current County Donegal Development Plan by improving connectivity and will therefore be positive. The options are not scored on same however as this is a broad policy function.

The TEN-T corridor identified on zoning and transport objective mapping in the County Donegal Development Plan is broadly similar to the potential link corridor identified in the option mapping and the concept of the link corridor is therefore considered to be consistent with the zoning objective.

Along with the new link for the River Swilly crossing to the N56, those sections of the 1D (Red), 1B (Pink), 1C (Purple) and 1A (Orange) options that follow the existing road from the Dry Arch Roundabout to the east are considered compatible with the zoning objective; the 1B (Pink) option is the most closely aligned followed by the 2A (Orange), and then the 1D (Red) and 1C (Purple) options. The main sections of the 2E (Green) and 2F1/2F2 (Blue) options are not aligned with the mapped strategic road corridors. Therefore, the 2E (Green) and 2F1/2F2 (Blue) options score negatively to a moderate level, whereas the others score positively, the 2B (Pink) scoring highest (major), with the 2A (Orange) rating moderately and the 1D (Red), and 1C (Purple) rating minor to slight in accordance with the degree of overlap arising.

With respect to rural area types, these zonings are largely provided for the management of proposals for the development of single dwellings. While it is noted that new entrances to future development proposals are unlikely to be permitted along the options (as per TII policy for national roads), access will still be achievable from the local road network. Therefore, the implementation of these zoning objectives will not be impeded by the proposed options. The 2F1/2F2 (Blue) options particularly, and the 2E (Green) option to a lesser extent have a greater interaction with the rural area zonings with reduced areas within the urban footprint. Regardless, impact is considered neutral. While the 2F1/2F2 (Blue) and 2E (Green) options could reduce the potential for development of single dwellings in the rural areas through which they traverse, these areas are not priority development areas.

Landscape policies have been reviewed. Because all options traverse an area of high scenic amenity, this will result in a negative scoring. The 2A (Orange) and 2B (Pink) options score moderately negative with a greater proportion of these options in a high scenic amenity area. As there is greater proportion of the other options within a moderate scenic amenity area, these are given a minor to slight rating.

There is a current shortfall of residentially zoned lands. The 2A (Orange), 2B (Pink), 1C (Purple), and 2D (Red) options all intersect with or are located adjacent to lands zoned for strategic residential land reserves. In particular, the 2D (Red) and 1C (Purple) centre lines run through the centre of this parcel of zoned land. These options all also intersect lands zoned for established uses, for which the protection of the residential amenity is an objective. This will result in negative scoring, major for the 2D (Red) and 1C (Purple). The 2A (Orange) and 2B (Pink) may be balanced by the possibility of improving access directly to the strategic land reserve. The 2A (Orange) option then runs through lands zoned for open space and general employment and intersects with a flood risk area. The 2B (Pink) option also intersects a flood risk area as identified on the CDP mapping. Cumulatively, a moderate negative rating is attached to those options. The 2E (Green) option, apart from link roads, is located outside the development boundary (some minor potential overlaps with established development) and will therefore have little impact or interaction with land use zoning. The 2E (Green) option will score neutrally as while it does interact with some zoned lands, it could provide an option to access a strategic land reserve, which could be seen as a positive outcome. Neither of the blue options impact on zoned development lands and would score positively in this respect.

A summary of the settlements and zoning assessment is provided in **Table 3.2**.

Table 3.2 Settlements and Zoning Matrix

Option	Qualitative Assessment	Impact	Impact Score	Preference
2A Orange	Option is largely online through built-up part of existing settlement. Partly aligned with mapped roads objectives but impacts on land zoned for open space and employment uses. Immediately adjacent to strategic residential reserve and established uses. Located in area of high scenic amenity. Intersects flood risk area.	Moderately Negative	2	Preferred
2B Pink	Option is largely online through built-up part of existing settlement. Most aligned with mapped road objectives but Immediately adjacent to strategic residential reserve and established areas. Located in area of high scenic amenity. Intersects flood risk area.	Moderately Negative	2	Preferred
2C Purple	Option is partially online through built-up part of existing settlement. Partly aligned with mapped roads objectives. Intersects areas of strategic residential reserve and long-established residential areas. Partially in high scenic amenity area.	Major Negative	1	Least Preferred
2D Red	Option is partially online through built-up part of existing settlement. Partly aligned with mapped roads objectives. Intersects areas of strategic residential reserve and long-established residential areas. Partially in high scenic amenity area.	Major Negative	1	Least Preferred
2E Green	Option is just outside of existing settlement. Main section not aligned with mapped roads objectives. Option intersects with minor areas of established development only but is partially in high scenic amenity area	Moderately Negative	2	Intermediate
2F1 Blue	Located outside of settlement. Main section not aligned with mapped roads objectives. Option has no interaction with land use zoning but is partially in high scenic amenity area.	Moderately Negative	2	Intermediate
2F2 Blue	Located outside of settlement. Main section not aligned with mapped road objectives. Option has no interaction with land use zoning but is partially in high scenic amenity area.	Moderately Negative	2	Intermediate

3.3.1.2 Potential to Impact on Residential Properties

The 2D (Red), 2C (Purple), 2B (Pink) and 2A (Orange) options all have the most residential properties within 50m of the centreline, the pink having the highest numbers at 43 no. dwellings in this band. These options also have the highest numbers within 300m of the assessment corridor; this is influenced by the fact that much of these options are online along the existing N13/N14 road and adjacent to a linear pattern of development from the Dry Arch Roundabout east as far as the Pluck roundabout. A moderate negative is assigned where more than 25 houses are located within 0-50m in line with the methodology outlined earlier, with this escalated to major for the 2D (Red) and 2C (Purple) options as explained below.

The main part of Letterkenny town is located to the north west of the study area. Most of the main residential areas of the town are located in that area and will not be physically impacted by the proposed options. The Dromore area, located to the south and east of the Dry Arch Roundabout and south of the N14 is characterised by linear development, primarily residential in character. While there are residences located within all options, the 2D (Red) and 2C (Purple) options in particular, have the potential to impact on a concentration of dwellings which is characterised in the County Donegal Development Plan a 'Long Established Residential Area', as well as a large proportion of residential development along the L114 and in the area of the junction of the L114 and the N13. The 2D (Red) and 2C (Purple) options come close to these properties and there is potential for major negative impact on many properties in this area.

The 2E (Green) option has only 11 no. residential properties within 50m. The 2F1/2F2 (Blue) options have the lowest number of residential properties within 50m (2F1 - 4 and 2F2 - 6 no. respectively).

A review of extant planning permissions indicates that there are 10 no. or less potential new residential developments along any of the option. The numbers are not considered to be of such an extent as to modify the scoring assigned given the urban setting.

Table 3.3 Residential Properties Matrix

Option	Quantitative Assessment	Impact	Impact Score	Preference
2A Orange	34 residential properties within 50m band. 73 no. within 50-100m band. 230 no. within 100-300m band.	Moderately negative	2	Intermediate
2B Pink	43 residential properties within 50m band. 76 no. within 50-100m band. 226 no. within 100-300m band.	Moderately negative	2	Intermediate
2C Purple	27 residential properties within 50m band. 58 no. within 50m band. 255 no. within 100-300m band. Intersects and comes close to established residential properties.	Major negative	1	Least Preferred
2D Red	22 residential properties within 50m band. 58 no. within 50-100m band. 247 within 100-300m band. Intersects and comes close to established residential properties.	Major negative	1	Least Preferred
2E Green	11 residential properties within 50m band. 25 no. within 50-100m band. 220 no. within 100-300m band.	Minor or slightly negative	3	Preferred
2F1 Blue	4 residential properties within 50m band. 20 no. within 50-100m band. 180 no. within 100-300m band.	Minor or slightly negative	3	Preferred
2F2 Blue	6 residential properties within 50m band. 20 no. within 50-100m band. 181 no. within 100-300m band.	Minor or slightly negative	3	Preferred

3.3.1.3 Existing Commercial Properties

The area to the north of the Dry Arch roundabout, both east and west is characterised by commercial properties, many of an industrial type and as is to be expected within an urban area, the majority of such properties are located closest to the existing route. These businesses benefit from passing trade however they also experience traffic congestion and noise associated with the road usage.

When looking at commercial properties within 50m of the centreline, the 2B (Pink) and 2A (Orange) options have the highest numbers with 16 and 11 no. while the remainder have relatively low numbers of commercial properties within the 50m band (5 – 8 no.).

In terms of the total numbers of commercial properties located within 300m of the centreline the 2C (Purple), 2B (Pink), 2E (Green) 2A (Orange) and 2D (Red) options have relatively comparable numbers. The 2F1/2F2 (Blue) options have the least amount but not significantly so. No alterations to scoring are considered appropriate.

There are a number of industrial type commercial properties located in the vicinity of the Dry Arch roundabout, both to the east (Dromore) and west (Bonagee) as well as retail and hospitality properties including the Dry Arch Inn filling station and diner, Applegreen, Clanree Hotel, NCT Centre, Coach Hire and Letterkenny Glass amongst others, some of which are located wholly or partially within the 2A (Orange) and 2B (Pink) options.

There is a concrete product manufacturing facility located partially in the 2E (Green) option, to the southwest of the Pluck roundabout. Pending the final alignment, there is currently potential for a major negative impact on the operation of the facility if land take is required.

There are a number of other commercial properties located along the existing route such as B&Bs, an Animal Hospital, Open Farm, autofactors, AstroTurf pitches and a caravan retail business amongst others which are also located within the assessment corridors of the 2B (Pink) and 2A (Orange) options. The area where the proposed Bonagee Link Road is to connect the Dry Arch Roundabout northwest across the River Swilly is also characterised by industrial commercial properties which may be significantly impacted depending on the exact alignment of the proposed link road or which may benefit from improved accessibility.

All options intersection with a permitted wind farm grid connection route. This will require consideration at design stage. There are low numbers of commercial planning permissions intersecting the options.

Table 3.4 Commercial Properties Matrix

Option	Quantitative Assessment	Impact	Impact Score	Preference
2A Orange	11 no. properties within 50m band. 24 no. within 50-100m band. 75 no. within 100-300m band. Properties to north of Dry Arch roundabout have potential for major impacts. Potential impact to Animal Hospital.	Moderately negative	2	Intermediate
2B Pink	16 no. properties within 50m band. 27 no. within 50-100m band. 74 no. within 100-300m band. Potential impact to Animal Hospital,	Moderately negative	2	Intermediate
2C Purple	7 no. properties within 50m band. 25 no. within 50-100m band. 86 no. within 100-300m band. Potential impact to Animal Hospital and Lurgybrack Open Farm	Minor or slightly negative	3	Preferred
2D Red	6 no. properties within 50m band. 25 no. within 50-100m band. 84 no. within 100-300m band.	Minor or slightly negative	3	Preferred
2E Green	8 no. properties within 50m band. 25 no. within 50-100m band. 82 no. within 100-300m band. Potential major impact on concrete facility.	Moderately negative	2	Intermediate
2F1 Blue	5 no. properties within 50m band. 12 no. within 50-100m band. 77 no. within 100-300m band.	Minor or slightly negative	3	Preferred
2F2 Blue	5 no. properties within 50m band. 11 no. within 50-100m band. 80 no. within 100-300m band.	Minor or slightly negative	3	Preferred

3.3.1.4 Existing Community Facilities

This section focusses on community facilities such as schools, churches, amenity grounds such as playing pitches and walkways, medical facilities and childcare service providers.

Following a site visit and identification of property types using GeoDirectory data, the following community facilities were identified:

- Bonagee Football Club, together with some community benefit arising from filling stations, hotel and diner.
- Archview Nursing Home in Drumany south of the N13 / N14.
- St. Patrick's National School, Lurgybrack.
- Astro turf playing pitches in Dromore north of the N13 / N14.

The retail and hospitality premises in Bonagee comprise the Clanree Hotel, a number of filling stations and associated retail units and diners. While these premises are considered to comprise commercial facilities, it is acknowledged that they play a role in the community also. Some of these facilities are wholly or partially located within the assessment corridor for the 2A (Orange) and 2B(Pink) options, including the Bonagee Football Club playing grounds which is located to the northwest of the Dry Arch roundabout. Therefore, the 2B (Pink) and 2A (Orange) options have the potential to have a significant negative impact on these premises.

Archview Nursing Home is located wholly within the 2B (Pink) and 2A (Orange) options. The 2B (Pink) and 2A (Orange) options may require a land take which would have a substantial negative impact to same considering its proximity to the existing N13 / N14.

St. Patrick's National School will benefit from the 2F1/2F2 (Blue) and 2C (Purple) options in terms of moving traffic and noise away from the premises. To a lesser extent, this is also the case for the 2D(Red) and 2E (Green) options. Depending on the exact route alignment, the 2B (Pink) and 2A (Orange) options may require landtake from (and at worst case relocation of) the school as they both intersect with the school grounds.

Goals astro turf playing pitches are located in Dromore north of the N13 / N14 and east of the Dry Arch roundabout and are located just outside of the 2B (Pink), 2A (Orange) options, 2C (Purple) and 2D (Red) options. No direct impacts are expected to arise though there is potential for indirect impact

Table 3.5: Community Facilities Matrix

Option	Qualitative Assessment	Impact	Impact Score	Preference
2A Orange	Impact to Bonagee Football Club and St. Patricks NS.	Moderate negative	2	Least Preferred
2B Pink	Impact to Bonagee Football Club, funeral directors, nursing home and St. Patricks NS.	Moderate negative	2	Least Preferred
2C Purple	Moving traffic away from school.	Moderately positive	6	Preferred
2D Red	Moving traffic away from school.	Minor to Slight Positive	5	Intermediate
2E Green	Moving traffic away from school.	Minor to Slight Positive	5	Intermediate
2F1 Blue	Moving traffic away from school.	Moderately positive	6	Preferred
2F2 Blue	Moving traffic away from school.	Moderately positive	6	Preferred

3.3.1.5 Community Severance

The local community have raised concerns regarding potential community severance in the vicinity of the Dry Arch roundabout during consultation events for the TEN-T project. In the absence of under and

overpasses providing access to the other side of a major traffic artery, there is potential for community severance for residents to access community facilities. There are potential severance issues in all cases bar the 2F1/2F2 (Blue) and 2E (Green) options given the location of most new options close to a concentration of linear residential development that will lie on the opposite side of an improved road / new road to many of the facilities it seeks to access. However, in most cases, there is existing traffic congestion and the new scenario is therefore not considered to be more than minor or slightly negative, particularly when the position of existing major roads is factored into the assessment and mitigation is taken into account. The 2F1/2F2 (Blue) and 2E (Green) options are scored as neutral.

While some of the options interact with a primary school as discussed above, given the location of the school on a national it is reasonable to assume that access will be maintained.

Table 3.6: Community Severance Matrix

Option	Qualitative Assessment	Impact	Impact Score	Preference
2A Orange	Potential severance of residential properties from facilities.	Minor or slightly negative	3	Intermediate
2B Pink	Potential severance of residential properties from facilities.	Minor or slightly negative	3	Intermediate
2C Purple	Potential severance of residential properties from facilities.	Minor or slightly negative	3	Intermediate
2D Red	Potential severance of residential properties from facilities.	Minor or slightly negative	3	Intermediate
2E Green	Limited severance issues identified; outside of main built up area	Not Significant / Neutral	4	Preferred
2F1 Blue	Limited severance issues identified; outside of main built up area.	Not Significant / Neutral	4	Preferred
2F2 Blue	Limited severance issues identified; outside of main built up area.	Not Significant / Neutral	4	Preferred

3.3.1.6 Tourism

The N13 and N14 to the east and west of the Dry Arch Roundabout form part of the Wild Atlantic Way tourist route. While no works are proposed to the N13 to the west, the 2B (Pink), 2A (Orange), 2D (Red) and 2C (Purple) options on the N13 / N14 to the east will all follow the alignment of the current road at least in part. Therefore, road works and traffic delays are likely to occur on this important tourist route which would be considered a temporary negative impact during construction, however the overall improved road surface, connectivity and journey times will result in an overall benefit to the tourists following this well-marketed route.

Letterkenny Airfield, north of the N13 / N14, is outside of any option and therefore is not expected to be impacted.

There is a potential impact to Lurgybrack Open Farm, a visitor attraction that could be located closer to a major route which may detract from the amenity of the facility for visitors.

In terms of hospitality, there are a number of Bed and Breakfast and hotels located along the current N13 and N14 and close by on local roads. While these businesses will benefit from passing trade, conversely, they will be impacted by factors such as congestion and noise.

Tourism in general can benefit from improved road networks in the context of regional and local accessibility and safety of journeys, which would result in a positive impact of all options, but which has no specific spatial implication for differentiating between the options and scoring options.

Table 3.7: Tourism Matrix

Option	Qualitative Assessment	Impact	Impact Score	Preference
2A Orange	Temporary impact to Wild Atlantic Way and hospitality trade during construction but positive for the WAW route in terms of long-term road improvements.	Minor to Slight Positive	5	Preferred
2B Pink	Temporary impact to Wild Atlantic Way and hospitality trade during construction but positive for the WAW route in terms of long-term road improvements.	Minor to Slight Positive	5	Preferred
2C Purple	Temporary impact to Wild Atlantic Way and hospitality trade during construction but positive for the WAW route in terms of long-term road improvements. Potential impact to Lurgybrack Open Farm.	Minor or Minor or slightly negative	3	Least Preferred
2D Red	Temporary impact to Wild Atlantic Way and hospitality trade during construction but positive for the WAW route in terms of long-term road improvements.	Minor to Slight Positive	5	Preferred
2E Green	Option has no identified spatial interaction with tourism or land take from tourism facilities.	Not Significant/Neutral	4	Intermediate
2F1 Blue	Option has no identified spatial interaction with tourism or land take from tourism facilities.	Not Significant/Neutral	4	Intermediate
2F2 Blue	Option has no identified spatial interaction with tourism or land take from tourism facilities.	Not Significant/Neutral	4	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**.

Options 2E is the preferred option as it has the least number of negative impacts when compared with the other options. The overall impact score for Option 2E is slightly less than that of Options 2F1 and 2F2, but because Option 2E has a lesser impact on forestry it has been preferred over those two options. There is very little between Options 2A and 2B. Options 2C and 2D have the same overall impact score as Options 2A and 2B but in terms of preference they are ranked lower, and least preferred, as they impact on residential properties is considered greater.

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	Transport	Waste Management	Forestry	Settlements & Zoning	Residential	Commercial	Community Facilities	Community Severance	Tourism		
2A	Intermediate	Preferred	Preferred	Preferred	Preferred	Intermediate	Intermediate	Least Preferred	Intermediate	Preferred	Intermediate	4
2B	Intermediate	Preferred	Preferred	Preferred	Preferred	Intermediate	Intermediate	Least Preferred	Intermediate	Preferred	Intermediate	5
2C	Intermediate	Intermediate	Preferred	Preferred	Least Preferred	Least Preferred	Preferred	Preferred	Intermediate	Least Preferred	Least Preferred	7
2D	Intermediate	Intermediate	Preferred	Intermediate	Least Preferred	Least Preferred	Preferred	Intermediate	Intermediate	Preferred	Least Preferred	6
2E	Intermediate	Intermediate	Preferred	Intermediate	Intermediate	Preferred	Intermediate	Intermediate	Preferred	Intermediate	Preferred	1
2F1	Intermediate	Intermediate	Preferred	Least Preferred	Intermediate	Preferred	Preferred	Preferred	Preferred	Intermediate	Intermediate	2
2F2	Intermediate	Intermediate	Preferred	Least Preferred	Intermediate	Preferred	Preferred	Preferred	Preferred	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			
2A	3	7	4	4	2	2	2	2	3	5	34	3	Minor or slightly negative
2B	3	7	4	4	2	2	2	2	3	5	34	3	Minor or slightly negative
2C	3	6	4	4	1	1	3	6	3	3	34	2	Moderately Negative
2D	3	6	4	3	1	1	3	5	3	5	34	2	Moderately Negative
2E	3	6	4	3	2	3	2	5	4	4	36	3	Minor or slightly negative
2F1	3	6	4	3	2	3	3	6	4	4	38	3	Minor or slightly negative
2F2	3	6	4	3	2	3	3	6	4	4	38	3	Minor or slightly negative