

Environmental Impact Assessment Report

TEN-T Priority Route Improvement Project, Donegal Chapter 5: Assessment of Reasonable Alternatives



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List of Acronyms

The following is a list of abbreviations used within this chapter of the Environmental Impact Assessment Report (EIAR).

List of Abbreviations used within this Chapter

List of Abbreviations	
A5 WTC	A5 Western Transport Corridor
AA	Appropriate Assessment
AISRR	All-Island Strategic Rail Review
ANPR	Automatic Number Plate Recognition
ATC	Automatic Traffic Counts
BCR	Benefit Cost Ratio
CAF	Common Appraisal Framework
CDDP	County Donegal Development Plan
CFRAM	Catchment-based Flood Risk Assessment and Management
CPO	Compulsory Purchase Order
CSO	Central Statistics Office
DCC	Donegal County Council
DHLGH	Department of Housing, Local Government House and Heritage
DMRB	Design Manual for Roads and Bridges
EHSA	Especially High Scenic Amenity
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ETSC	European Transport Safety Council
GHG	Greenhouse Gas
GIS	Geographical Information System
GSI	Geological Survey Ireland
HGV	Heavy Goods Vehicle
IFI	Inland Fisheries Ireland
JTC	Junction Turning Counts
LAP	Local Area Plan
LCA	Landscape Character Area
LGV	Light Goods Vehicle
LLO	Land Liaison Officer
MCA	Multi-Criteria Analysis
MCO	Moving Car Observer
MED	Material Extraction/ Deposition (area)
NDP	National Development Plan
NIAH	National Inventory of Architectural Heritage
NIFTI	National Investment Framework for Transport in Ireland
NIS	Natura Impact Statement
NMU	Non-Motorised User
NPF	National Planning Framework
NPWS	National Parks and Wildlife Service
NRA	National Roads Authority
NSO	National Strategic Outcomes

List of Abbreviations

NWRA	Northern and Western Regional Assembly
OPW	Office of Public Works
OSI	Ordnance Survey Ireland
OSR	Option Selection Report
PAG	Project Appraisal Guidelines
PIR	Property Impact Rating
PMG	Project Management Guidelines
pNHA	proposed National Heritage Area
QI	Qualifying Interest
RSA	Road Safety Authority
RSES	Regional Spatial and Economic Strategy
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SOR	Structures Outline Report
SPA	Special Protection Area
TAF	Transport Appraisal Framework
TEN- T PRIPD	Trans-European Network - Transport Priority Route Improvement Project, Donegal
TII	Transport Infrastructure Ireland
VRU	Vulnerable Road Users
WFD	Water Framework Directive

5 ASSESSMENT OF REASONABLE ALTERNATIVES

5.1 Introduction

5.1.1 Project Phases

The TEN-T Priority Route Improvement Project, Donegal (TEN-T PRIPD), hereafter the 'Proposed Development' or 'Project' is being delivered in accordance with the Transport Infrastructure Ireland (TII) Project Management Guidelines (PMG) and Project Appraisal Guidelines (PAG). The PMG document PE-PMG-02041 (TII, May 2025, and first published in September 2017) summarises the phases for project delivery as set out in Figure 5.1.



Figure 5.1: TII Project Management Guideline Phases

The Proposed Development has progressed through the TII project phases applicable at the time. At the end of Phase 3 Design and Environmental Evaluation, and following TII approval, the project will be submitted to An Coimisiún Pleanála as part of Phase 4 Statutory Processes.

The assessment of reasonable alternatives has been undertaken through each phase of the project as summarised below and more fully described in the following sections.

5.1.2 Competent Experts

The primary authors of this chapter are set out below.

Sections 1 and 2 contained within this chapter have been prepared by Eamon Cox, a qualified Civil Engineer with over 30 years of experience, working within RPS (a Tetratech Company). Eamon holds a Bachelor of Civil & Environmental Engineering (Hons) BE and a Diploma in Project Management. Eamon is a Chartered Engineer, CEng and a longstanding member of Engineers Ireland. Eamon is also a Registered Professional Consulting Engineer within the Association of Consulting Engineers of Ireland (ACEI) and a licensed Professional Engineer in the US (Massachusetts). Eamon has extensive experience in the design and construction of road related projects and is a qualified Road Safety Audit, team leader. Eamon's experience includes the feasibility and development of major transportation projects through options selection, preliminary and detailed design and the associated management of the EIAR / Environmental Reports and CPO process and in the construction of road schemes. This has included planning and design and management of utility infrastructure.

Section 3 contained within this chapter have been prepared by Eamon Daly, a qualified Civil Engineer with over 30 years of experience, working with Egis Engineering Ireland. Eamon holds a Bachelor of Civil Engineering (Hons) BE, a Master of Engineering Science in Transportation Engineering MEngSc. Eamon is a Chartered Engineer, CEng and a Fellow of Engineers Ireland, FIEI. He is also a Fellow Professional Consulting Engineer, FConsEI ACEI. Eamon has extensive experience in the design and construction of

road related projects. He has worked for on feasibility studies, preliminary and detailed designs including the management of the EIAR/Environmental Reports and CPO processes and in the construction of road schemes. This has included planning and design and management of utility infrastructure.

Gareth McElhinney is the Environmental Coordinator for the Proposed Development. He is a Technical Director in RPS with over 22 years' experience. He holds a BE in Civil Engineering, a Postgraduate Diploma in Environmental Sustainability, and a Masters in Business Studies. He is a Chartered Engineer and Fellow with Engineers Ireland, a Registered Consulting Engineer with ACEI and a Project Management Professional with PMI. Gareth is experienced in the delivery of infrastructure projects across the environment and transport sectors and as part of multi-disciplinary teams. These projects include offshore wind, roads and greenways, water and healthcare infrastructure, oil & gas exploration, and environmental engineering.

5.1.3 Summary of Process

This Chapter 5: Assessment of Reasonable Alternatives provides information on the design development process and how environmental information was taken into consideration in the design of the Proposed Development.

The identification and assessment of alternatives was a phased and iterative process over an extended period, starting in 2014 and continuing through to the end of Phase 3 Design and Environmental Evaluation and publication of the Environmental Impact Assessment Report (EIAR).

The stages in assessment of reasonable alternatives were:

- **Identify feasible alternatives to deliver on established needs and objectives, circa 2014 to 2017 (Phase 0/1):**

After determining the core needs, aims and objectives (see Section 5.1.4), feasible and reasonable options to deliver on these objectives were considered. This included non-transport and transport options as well as other modes and combined solutions. Further information is provided in Section 5.3. This assessment concludes that a transport road-based solution is the only reasonable way to achieve the Project objectives, in particular improving connectivity from the North-West Region to the rest of the island of Ireland, including Northern Ireland and meeting the requirements of Regulation (EU) 2024/1679 of the European Parliament and of the Council of 13 June 2024 on Union guidelines for the development of the trans-European transport network amending Regulations (EU) 2021/1153 and (EU) No 913/2010 and repealing Regulation (EU) No 1315/2013 (the "TEN-T Regulation"). Subsequently, a targeted road-based solution was identified as the only feasible and reasonable solution / alternative that can deliver on the needs and objectives of the Project. This stage also identified the priority targeted locations for intervention on the TEN-T network as discussed in Section 5.4.

- **Assessment of Constraints and Feasible Route Options Assessments, circa 2017 to 2019 (Phase 2):**

This was a phased process first identifying the Constraints Area for each location and then assessing feasible route corridor options within that area. These route corridors are basic 200m wide corridors centred on a basic horizontal and vertical road design alignment. Assessment of these corridor options was carried out in two stages, in accordance with the TII PMG and PAG, and was fully consistent with EIA requirements. Each reasonable alternative studied/considered was compared against each other in accordance with the provisions of Article 5(1)(d) and Annex IV of Directive 2011/92EU (as amended by Directive 2014/52EU) (the "EIA Directive"), and the Commission's 2017 Guidance on the Preparation of the Environmental Impact Assessment Report. Tables and/or matrices have been included in this chapter with summary textual explanations of the comparison of environmental effects of the reasonable alternatives studied/considered. This has led to the preferred route option chosen for the Proposed Development.

Multi Criteria Analysis (MCA) was used throughout the Project in accordance with TII and Department of Transport (DoT) guidance. In particular, the DoT Common Appraisal Framework (CAF) was used during Phase 2 as it was the appraisal process current at that time (2019).

The output from this stage was the identification of the Preferred Corridor from the route options considered. This stage included more detailed surveys and assessments and determined overall road cross section type(s), preliminary alignment designs and further consideration of environmental mitigation and impact avoidance. The assessment of the route corridor alternatives is provided in Section 5.5 and the route corridor option selection process is provided in Section 5.6.

This Chapter 5: Assessment of Reasonable Alternatives summarises the information published in the TEN-T PRIPD Options Selection Report (December 2019) which details the Phase 2 assessments. The full report including all supporting drawings and appendices is available at the following link: <https://www.donegal-ten-t.ie/pages/documentsdownloads/phase-2.php>.

▪ **Assessment of Proposed Development Design Alternatives, circa 2019 to 2025 (Phase 3):**

As the design of the Proposed Development progressed in Phase 3, design decisions on elements including particularly climate action enhancements and green options were considered and introduced across design and construction alternatives. These included but are not restricted to multimodal provision, enabling and linking infrastructure, active travel, park and share, drainage, structure options, compounds, waste and material management. All involved individual assessment of alternative design and construction options. Environmental assessment of such options was carried out in accordance with the EIA Directive. Section 5.7 presents information in relation to the Phase 3 design development while Section 5.8 provides information on Project construction alternatives.

5.1.4 Project Objectives

The overarching Project objectives are:

- Enhance regional accessibility and geographic integration to and within the North-West;
- Facilitate sustainable compact growth in Letterkenny (Regional Centre) and Key Towns;
- Enhance all-island connectivity within the North-West city region (Letterkenny-Derry-Strabane);
- Contribute to Climate Action goals through improved sustainable travel;
- Provide a safe and efficient transport network in the north-west for all users.

A set of criteria-specific objectives have been developed to ensure that the Proposed Development addresses the challenges facing the North-West, and to align with Government policy. The objectives have been established across the core Common Appraisal Framework (CAF) headings of Economy, Safety, Environment, Accessibility and Social Inclusion, Integration and Physical Activity. They have been reviewed alongside national policy objectives, in particular the Project Ireland 2040 NSOs, the Climate Action Plan and the NIFTI Investment Priorities and are summarised in Table 5.1.

Table 5.1: TEN-T PRIPD Project Objectives

Criterion	Project Objectives
Economy	<ul style="list-style-type: none"> ▪ To improve the efficiency of the transport network by improving journey time and journey time reliability. ▪ To provide opportunities to grow the regional economy and improve economic interaction by creating better transport linkage including Public Transport and Active Travel connectivity for people, goods and services, between Donegal, the rest of Ireland and Europe. ▪ To facilitate population growth within Donegal as envisaged in the National Planning Framework and the key town of Letterkenny. ▪ To accord with the National Planning Framework objective of enhancing regional connectivity to achieve average journey speeds of 90 km/h and a competitive inter-urban journey time from Letterkenny to other regional centres. ▪ Provide a scheme at an investment cost that offers good value for money.

Criterion	Project Objectives
Safety	<ul style="list-style-type: none"> ▪ To improve road safety by reducing the rate and severity of collisions on the road network in Donegal and to support the RSA Road Safety Strategy to reduce road deaths and serious injuries by 50% by 2030. ▪ To improve safety for vulnerable road users: <ul style="list-style-type: none"> – by separating strategic traffic from local traffic through towns, villages and rural communities. – by providing Active Travel facilities as part of the scheme which are segregated from traffic. – by enabling Active Travel facilities (i.e., by reducing traffic) which will provide a safer environment for VRUs within the study area particularly Ballybofey, Stranorlar, Letterkenny and Lifford.
Environment	<ul style="list-style-type: none"> ▪ To improve the environment in the vicinity of the scheme including reducing overall air pollution levels caused by platooning, reducing traffic noise levels and reducing pollutants and heavy metals from road surface water drainage from entering watercourses, to support sustainable development principles and measures to minimise effects on the environment including potential climate change effects. ▪ To support sustainable and equitable mobility to encourage modal shift to help meet Ireland's climate change goals.
Accessibility and Social Inclusion	<ul style="list-style-type: none"> ▪ Improve accessibility and connectivity to/from the North-West region, both by planned improvements to the Atlantic Economic Corridor and improved linkage to the east of Ireland via the N14, helping to reduce deprivation caused by the geographic location of Donegal. ▪ Remove strategic and commercial traffic from local towns and communities, thereby making these communities more inviting and encourage more travel independence and safety for non-motorised users and vulnerable groups. ▪ Improve accessibility to employment in regional and national centres including Donegal, Letterkenny, Derry, Belfast, Dublin, Sligo and Galway. ▪ Improve accessibility to regional health services including hospitals in Letterkenny and Sligo. ▪ Improve network resilience such as access to Letterkenny where the N56 four lane road is a "Lifeline Route" being the only access into Letterkenny and northwest Donegal. ▪ To enable more effective traffic management within and around Letterkenny, Ballybofey/Stranorlar and Lifford by providing bypass routes and convenient Park and Share facilities for seamless modal change. ▪ To provide an improved road transport system to facilitate the delivery an improved bus-based public transport system (in the absence of rail services).
Integration	<ul style="list-style-type: none"> ▪ Meet the objectives of the TEN-T Regulations to enhance geographic integration. ▪ To support the transport objectives contained in national, regional and local planning policies and strategies. ▪ To meet the objectives of the National Planning Framework National Strategic Outcomes. ▪ To be compatible with land use objectives as set out in regional and local land use plans. ▪ To improve connectivity to/from other transport modes, such as ports at Killybegs, Foyle (Derry), Belfast, Larne, Foynes, Shannon, Rosslare and Dublin, and airports at Derry, Ireland West Airport Knock, Belfast (City and International), Dublin and Shannon.
Physical Activity	<ul style="list-style-type: none"> ▪ To encourage active travel in towns/villages (by reducing strategic traffic in town centres, thus potentially freeing up space for non-motorised travellers) and longer distance non-motorised travel on strategic routes (provision of inter-urban segregated active travel network). ▪ To enable local opportunities for walking and cycling (active travel) activity in and between communities. ▪ To facilitate the improvement of town and village public realm. ▪ To facilitate positive health benefits and improve wellbeing ▪ To have a positive environmental impact through reduced private car use, congestion, reduction in carbon and improvements in air quality and noise. ▪ To facilitate tourism and recreational activities by active travel modes and improve accessibility to key tourism destinations across Donegal.

5.2 Environmental Legislation in the Alternatives and Options Assessment Process

The Article 5(1) of the EIA Directive requires that an EIAR includes:

- d. *“a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment.”*

and

- f. *“any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.”*

Section 50 of the Roads Act, 1993, as amended has transposed the requirements of Article 5(1) of the EIA Directive, into Irish Law.

Section 50(2)(b) of the Roads Act 1993 includes the following matters that should be contained within an EIAR:

“... (iv). a description of the reasonable alternatives studied by the road authority or the Authority, as the case may be, which are relevant to the proposed road development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed road development on the environment.

and

... (vi) any additional information specified in Annex IV that is relevant to the specific characteristics of the particular proposed road development or type of proposed road development and to the environmental features likely to be affected, ...”

Annex IV of the EIA Directive (being the Annex IV referred to in Section 50(2)(b)(vi) of the Roads Act, 1993 as amended) includes the following:

“2. A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.”

The following sections outline how the requirements of the EIA Directive and the Roads Act 1993 (as amended) have been complied with in the development of this Project.

5.3 Non-road and Demand-Management Alternatives

Alternative non-road based and demand-management options to achieve the Project objectives are described below.

5.3.1 Improved Broadband

Improved broadband to accommodate more uptake of remote working with the aim of reducing reliance of workers on the transport network daily. The need to improve the broadband networks within the northern and western regions has been identified as one of several infrastructure developments that will need to take place in order to enable the objectives of the National Planning Framework (NPF) to be implemented. The Northern & Western Regional Assembly (NWRA) Regional Spatial and Economic Strategy (RSES) 2020-2032 recognises the need to improve the broadband network in the northern and western region. However, the opportunity for increased homeworking is limited suitable roles within industries, services and professions (for example: on-line services, consultancy services, IT support services) and is less of an option for many, particularly in relation to retail, education, healthcare, caring, accommodation, agriculture, manufacturing,

construction, deliveries and other services and industries where people must be present in the workplace. Therefore, improvement in broadband alone is unlikely to result in increased working from home or have any notable impact on the transport network. Therefore, improved broadband is not considered a reasonable alternative for the Project.

In the 2022 Census figures published by the CSO for County Donegal¹, 67,977 people were at work in the county. Of these, 15,350 (23%) worked from home at least one day a week. This was well below the national average from the 2022 Census which stood at 32% of employees working from home. The need to improve the broadband networks within the northern and western region has been identified and is subject to a separate program under the national Broadband Strategy.

Improvement in broadband would not comprise a suitable alternative to meet the Project objectives particularly under the TEN-T Regulations as it does not address the regional and cross-border connectivity and need for sustainable travel alternatives in the northwest. Improved broadband will not address the safety and legacy road issues of the existing transport network in Donegal. The existing transport infrastructure to and within the Northwest requires all goods must be transported to/from the county by road. Improved broadband cannot address this issue and is not a reasonable alternative. It can only be seen as a complementary intervention and the continued substantive use of the road network is required.

5.3.2 Staggering Worktimes and Localised Improvements

Staggering worktimes/ school times is a useful demand management measure to spread peak hour traffic flows across longer periods of the day thereby reducing peak hour traffic flows on the existing road network. This has the potential to alleviate the delays experienced, particularly on Sections 1 and 2 of the Proposed Development, during these hours. Such measures are applied to localised capacity problems such as junctions in the vicinity of school and factories, for example. However, control of worktimes/ school times is not within the powers of Donegal County Council. In addition, the need to implement the Proposed Development is not aimed at solving localised traffic problems (although in some cases, that may be a positive benefit of the Project) but to provide a high-quality transport network that will open up areas of the county and region that have been deprived of this type of infrastructure in the past. The objectives of the TEN-T Regulations and the need to deliver on connectivity and regional development as set out in National Regional and Local policy could not be addressed by such localised measures. Therefore, staggering worktimes and implementing localised improvements do not meet the objectives of the Project and is not a reasonable alternative.

5.3.3 Alternative Forms of Transport – Air and Sea

There are no alternative adequate or accessible air or sea infrastructure of scale available within Donegal and access to existing international transport hubs in the Republic of Ireland such as in Dublin Airport, Ireland West Airport or Tier 1 ports such as Galway, Foynes, or Rosslare is reliant on a legacy, unsafe and inefficient road network. Similarly, notwithstanding Brexit, access to Northern Ireland airports and ports such as in Derry, Belfast and Larne are equally restricted by a lack of adequate connecting road or rail infrastructure.

5.3.4 Alternative Forms of Transport - Rail

Transport infrastructure in Donegal is solely based on its road network. This is due to the lack of any remaining rail network in the County. The disused and abandoned rail corridors within the county are at best partially intact sections of residual embankment only. The width, alignment and structural integrity of these remaining remnants of corridors would not be suitable for any modern railway. For it to be a reasonable alternative over 200 km of new rail line, many new stations and ancillary upgrades beyond Donegal would be required.

At the time of the alternatives options assessment for this project, re-opening former rail routes was considered in a previous independent report; 'Future Railway Investment' published by Northern Ireland's Department for Regional Development in 2013. This included an option to reopen cross-border rail links from

¹ CSO (30/05/2023): [Press Statement Census of Population 2022 - Summary Results Donegal - CSO - Central Statistics Office](#)

Derry to Letterkenny and Donegal Town. An initial appraisal concluded that the benefit/cost ratio was insufficient to warrant further detailed investigation.

Neither the Iarnród Éireann Strategy 2027, published in January 2021, nor the Rail Freight Strategy 2040 launched in December 2021, include for the provision of rail services in Donegal.

The All-Island Strategic Rail Review (AISRR) published by the Department of Transport (Ireland) and Department for Infrastructure (Northern Ireland) in July 2024 recommended only one rail option be considered in Donegal, namely a new single-track passenger only line between Derry-Londonderry and Letterkenny. The AISRR also identifies the Derry/Dublin and Derry/Belfast lines for new line and upgrades respectively. The report includes a long list of improvement and upgrades to the rail network across the island. It states that maintaining the existing rail network takes priority over future new extension plans. As such any rail strategy for Donegal or the Northwest is well beyond 2050, the period required for intervention on the transport network in Donegal under the TEN-T Regulations.

Currently there are no rail freight operations in Northern Ireland or to the closest rail head in Ireland at Sligo. All future rail considerations in the report do not include freight on any new and improved lines to Derry or Letterkenny.

A future rail connection between Letterkenny and Sligo was considered but not brought forward in the AISRR as a feasible option. The reasons given include 'Lack of Population Density' and 'Challenging terrain' and the report concludes that 'rail is not the appropriate solution to improve connectivity.' It also goes on to note that some options for new rail brought forward 'are unlikely to be viable within the horizon of this Review' i.e. 2050 including a new rail link from Derry to Letterkenny.

The AISRR recognises that not all parts of Ireland were to be served by rail by 2050. In these circumstances, the AISRR recommends a 'high frequency integrated public bus service' between the nearest station on the new network be provided to address connectivity gaps over the lifetime of the AISRR (up to 2050). In the case of Donegal, this would mean improved bus services to Letterkenny and Derry in the north of the county and to Sligo to the south. It is therefore imperative that the AISRR recommendation is supported by a fit for purpose, uncongested/ upgraded road based public transport network. As such, the improvements to the existing road network provided by the Proposed Development supports the AISRR recommendation in order to mitigate the continued rail connectivity gaps to and within Co. Donegal.

It is evident that a rail alternative is a long-term aspiration only and will not resolve the immediate, short or even medium-term core aims and objectives of this Project including but not restricted to road safety, TEN-T Regulations, climate action, regional connectivity, and balanced regional development. The rail alternative was therefore ruled out as a reasonable alternative and access from Donegal to all existing and proposed transport hubs across the island of Ireland will continue to be through the existing primary road network.

5.3.5 Improved Public Transport and Alternative Modes (excluding Rail)

Road-based public transport (i.e. buses and taxis) is the only available form of public transport to and within Donegal. Donegal County Council supports the transition to more efficient transport. However, the effective function and operation of any bus network in Donegal is reliant on a safe and efficient road network. This is currently not available with journey times and safety on interurban routes particularly poor. The 2022 census highlights that 65.6% of the population of Donegal commute to work by driving. In urban areas such as Letterkenny and Ballybofey/Stranorlar, chronic congestion through a mix of essential strategic and local traffic, Heavy Goods Vehicles (HGV) and Light Goods Vehicles (LGV), cars, pedestrians and cyclists on TEN-T routes render such services unreliable and often an unreasonable option.

Given the poor safety, congestion and journey time reliability on the existing road network on which public transport depends, the provision of improved public transport services and facilities alone will not address the objectives of this Project including enhanced regional and cross-border connectivity. Public transport definitively cannot achieve the improved freight capacity which is also a goal of this project.

A road-based solution to the Project objectives will improve journey times, safety and reliability for local, regional and national public transport services, and thus improve the attractiveness and demand for those services. In addition, improvements in public transport services can form part of the solution to achieve the

Project's objectives, including climate related objectives and increasing modal shift, e.g. including park and share facilities, active travel facilities, etc.

Similarly, active travel facilities alone cannot address the Project objectives. They will not address the movement of freight or the movement of strategic traffic within the county. They will also not improve safety on the existing road network, and it would be difficult to construct them within the existing road network footprint available. If constructed, they will provide opportunities for modal shift, reducing emissions and climate impacts.

To address climate action and improve the carbon balance of the Proposed Development, opportunities to improve existing public transport facilities and services were considered and have been included within the design of the Proposed Development. The removal of a significant volume of strategic traffic and associated congestion from the local road network, particularly in urban areas, provides the opportunity for improved reliability of existing urban bus services, which in turn will make them more attractive to users and will encourage modal shift. With increased demand, there will be an opportunity to provide more services, which in turn will further increase their attraction to users and thereby demand for services. The iterative progression of increased public transport demand and improved services will ultimately contribute towards the modal shift away from the private car, towards public transport.

Furthermore, the Park and Share / Active Travel facilities that are included within the design of the Proposed Development include bus facilities, providing the opportunity for bus service operators to incorporate additional stops along existing and future routes to enhance services. Bus services that could benefit from these stops include scheduled services and school bus services, as well as ad hoc organised groups wishing to use the active travel facilities for leisure purposes.

5.3.6 Assessment of Alternatives - Transport

Appendix C5.01 in Volume C: Technical Appendices, presents an assessment of alternatives - transport report prepared in accordance with TII's Project Appraisal Guidelines (PAG) Unit 4.0: Consideration of Alternatives and Options and the National Investment Framework for Transport in Ireland (NIFTI) Intervention Hierarchy which broadly dictates that sustainable mode enhancements should be prioritised where possible over road based solutions to benefit private mode users. The report examines road-based solutions and considers the range of transport management and modal alternatives that may address the project objectives.

A Multi-Criteria Analysis (MCA) was undertaken for each Common Appraisal Framework (CAF) criterion in relation to the interventions considered the most appropriate for the Proposed Development, namely: demand management, active modes, bus, rail, road, and a hybrid solution of road/ bus/ active travel.

The results of the MCA are presented in Appendix C5.01 with a summary of the environmental considerations presented below.

Demand Management: Demand management measures such as increased parking charges or banning HGVs through Mid-Donegal border region could reduce traffic and local emissions. It should be noted that a HGV ban would only be suitable if there was an alternative, suitable, route available for HGVs. Otherwise a ban could result in HGVs using unsuitable, more local and regional roads with an associated negative environmental impact elsewhere. Overall, a Low Preference under the environmental criterion.

Active Modes: Improving segregated facilities for active modes would make walking/cycling safer and more attractive, promoting mode transfer from private cars and public transport over short distances. Active modes do not produce emissions and any mode transfer from cars to walking and cycling would reduce air/noise pollution and produce a modest environmental benefit. However, this is only likely to occur for short distance trips, or within urban areas, rather than throughout the whole study area. This means that the overall positive impact on the environment will be geographically constrained, resulting in a medium rather than high preference benefit. Overall, a Medium Preference under the environmental criterion.

Bus: Providing bus priority in combination with increased frequency makes trips reliable and quicker, which will increase the attractiveness of travel by bus. This would encourage people to change mode from car to bus for some trips. Even a small amount of mode transfer would reduce the number of cars on the road,

which would lower air and noise pollution in the area and in local towns. To be environmentally efficient, large buses need to be relatively full and this could be challenging to achieve due to the established car dependency observed in the study area. Overall, while the bus will result in a moderate positive impact for the environment, extremely high levels of mode transfer would be required for a high preference benefit to occur. Overall, a Medium Preference under the environmental criterion.

Rail: The introduction of a rail line through the area could increase the attractiveness of rail travel, which would encourage people to change mode from car to train for some of their trips. Even a small amount of mode transfer would reduce the number of cars on the road, which would lower air and noise pollution in the area and in local towns. However, due to factors such as a lack of population density and dispersed trip patterns, a rail option is unlikely to attract significant use. Overall, a Low Preference under the environmental criterion.

Road: Improving roads or capacity could increase the attractiveness of travel by car and potentially result in increased vehicle kilometres. However, a bypass of the existing urban centres would reduce noise/air pollution in the study area. Localised targeted route improvement will have less impact than a full new inter-urban corridor. However, there will be impacts on the environment as a result of new road infrastructure. Overall, a Low Preference under the environmental criterion.

Hybrid (Road/ Bus PT/ Active Travel): Improving roads or capacity could increase the attractiveness of travel by car and potentially result in increased vehicle kilometres. However, a bypass of the existing urban centres would reduce noise/air pollution in the study area. Providing bus priority in combination with increased frequency makes trips reliable and quicker, which will increase the attractiveness of travel by bus. This would encourage people to change mode from car to bus for some trips. Even a small amount of mode transfer would reduce the number of cars on the road, which would lower air and noise pollution in the area and in local towns. The provision of a type 2 dual carriageway road could facilitate a future dedicated bus corridor. Transfer of car users to active travel due to the provision of park and share sites will have a positive impact on the environment. However, there will be other impacts on the environment as a result of new infrastructure. Overall, a Medium Preference under the environmental criterion.

Under the other CAF criteria, the Road and Hybrid solutions provided the highest preference under Economy and Safety. The Hybrid solution provided the highest preference under accessibility and social inclusion, integration, and physical activity. The results of the MCA are presented in Table 5.2.

From these results, a Hybrid-based solution is deemed the most appropriate road-based intervention to meet the Project objectives.

Table 5.2: Results of MCA of Transport Options to meet Project Objectives

Criteria	Demand Management	Active Modes	Bus	Rail	Road	Hybrid (Road / Bus PT/ Active Travel)
Economy	Low Preference	Low Preference	Low Preference	Low Preference	High Preference	High Preference
Safety	Low Preference	Medium Preference	Medium Preference	Low Preference	High Preference	High Preference
Environment	Low Preference	Medium Preference	Medium Preference	Low Preference	Low Preference	Medium Preference
Accessibility & Social Inclusion	Low Preference	Low Preference	Low Preference	Low Preference	Medium Preference	High Preference
Integration	Low Preference	Low Preference	Medium Preference	Low Preference	Medium Preference	High Preference
Physical Activity	Low Preference	High Preference	Low Preference	Medium Preference	Medium Preference	High Preference
Preferred Option	No	No	No	No	No	Yes

5.3.7 Conclusion

Improved broadband, staggered worktimes and localised improvements, rail, and improvements in public transport and active travel will not alone achieve the Project objectives. Elements of each, when considered individually or collectively will only provide minor improvements to the current situation. They do not address in any meaningful way, the overarching objectives of meeting the requirements of the TEN-T Regulations contributing to economic growth and development in the Northwest Region, improving safety, accessibility, protecting the environment, etc.

As described in Section 2.3.1 of EIAR Chapter 2: Background and Need for the Proposed Development, the TEN-T Regulation requires that TEN-T routes such as parts of the N13, N14 and N15 in Donegal must be of high quality as key strategic connecting transport corridors. The Project objectives align with key National Strategic Outcomes (NSO) in the NPF and the NPF First Revision (2025). This includes balanced regional development, connectivity to the Northwest, and connectivity and support for the development of a strong Northwest City Region. This Proposed Development is specifically listed in the National Development Plan (NDP) 2021 to 2030, in the business as usual modelling that was carried out to inform Ireland's Climate Action Plan namely CAP23, CAP24 and CAP25s. The RSES and the County Donegal Development Plan (CDDP) 2024-2030 also identify critical road infrastructure intervention to address connectivity, safety and regional social and economic deficits and disparity.

Taking all of the above into consideration, a road-based transport solution is deemed to be the most appropriate solution to achieve the Project objectives, particularly in relation to meeting the requirements of the TEN-T Regulations.

5.4 Road-based Alternative Options for the Proposed Development

5.4.1 Sections of the TEN-T Network Prioritised for Improvement

The prioritised sections constituting this TEN-T Priority Route Improvement Project, Donegal (TEN-T PRIPD), i.e. the Proposed Development, are:

- Section 1 - N15/N13 Ballybofey/Stranorlar Urban Region
- Section 2 - N56/N13 Letterkenny to Manorcunningham
- Section 3 - N14 Manorcunningham to Lifford / Strabane / A5 Link

5.4.2 Identification of Road-Based Solutions

During Phase 2, and subsequent Phase 3, the road-based transport solutions for the Project were examined as the design developed to consider different scenarios including the Do-Nothing, Do-Minimum and Do-Something alternatives. Within the Phase 2 Options Selection process, alternative road improvement routes for the Proposed Development were identified and assessed against the objectives of the Project, the environmental constraints and through consultation with stakeholders and the public. During Phase 2 and Phase 3, extensive landowner engagement and consultations have also been undertaken.

Three road-based solutions have been considered in the development of alternatives for the Project as detailed in the Phase 2 Option Selection Report, available at the following link: <https://www.donegal-ten-t.ie/pages/documentsdownloads/phase-2.php>. The alternative solutions considered follow the TII guidance relating to the selection of options. These three scenarios considered were:

1. Do Nothing Alternatives: the existing environment with no improvements.
2. Do Minimum Alternatives: interventions on the existing network and adjacent committed schemes.
3. Do Something Alternatives: road-based interventions.

5.4.3 Do Nothing Alternatives

At the strategic plan level, consideration for a Do Nothing alternative (business as usual) has been examined in the Strategic Environmental Assessment (SEA) completed as part of County Donegal Development Plan,

2024-2030 (DCC, 2024). The Environmental Report for the Draft County Donegal Development Plan 2024-2030 (DCC, 2024) quotes the Strategic Environmental Assessment Guidelines for Regional Assemblies and Planning Authorities (DHLGH, 2022), which state (p.39):

‘the “do-nothing” scenario represents a continuation of present trends - as if the current plan were to continue - without any policy changes, environmental interventions or infrastructural improvements which may be proposed in the draft plan.

[...]

The “Do Nothing” Scenario should describe: [...]

- Any projects or plans that are expected to take place regardless of the plan in question, for example, expected new roads or flood protection works, projects with planning approval.

The Proposed Development was identified in the previous CDDP and corridors for each of Section 1, 2 and 3 of the Proposed Development were identified. Therefore, at the strategic plan level under the current CDDP 2024-2030, the “do-nothing” approach includes for the delivery of the Proposed Development.

At the project level, the Do-Nothing alternatives regarding the Proposed Development were assessed against the aims and objectives of the Project particularly the TEN-T Regulation, Road Safety and delivery on National Strategic Outcomes as set out in the NPF (including the NPF First Revision) and the NDP 2021-2030. The background and need for the Project is set out in detail in Chapter 2 while the planning and policy context is set out in detail in Chapter 3 of this EIAR.

The following sections discuss a Do-Nothing scenario for the entire Proposed Development as well as each individual section of it.

5.4.3.1 Do-Nothing – Entire Proposed Development

Consecutive TEN-T Regulations commit to building a sustainable and resilient transportation network that will bring Europe closer together that meets certain agreed standards as set out in the Regulations. The Regulations state that the network should aim at strengthening economic, social and territorial cohesion by ensuring accessibility and connectivity for all regions of the Union, including a better connectivity of the outermost regions and other remote, rural, insular, peripheral and mountainous regions as well as sparsely populated areas. Furthermore National, Regional and Local policy and plans have identified the disparity in the national road network in Donegal compared to the rest of the country. This disparity and legacy underinvestment has led to a recognised disconnect with the county both from its hinterland in Northern Ireland, with the rest of Ireland and to Europe. There is a documented comparative poverty and underdevelopment in Donegal compared with the rest of the country and across Europe. In addition, the health and safety of the public continues to be compromised through inadequate primary road network, lack of resilience in lifeline routes through insufficient capacity and the continued mix of strategic and local traffic in urban zones. Communities are stymied by congestion and suffer chronic air quality and noise issues along the remaining existing substandard and inefficient network sections.

Do-Nothing will not offer the transition to a lower carbon transport network through new or improved climate action initiatives and sustainable transport alternatives. Do-Nothing does not deliver on the needs and objectives of the Project, including but not restricted to, TEN-T Comprehensive network standards, National Road Safety Strategy for divided roads and Government targets for improved average speeds on national roads. For all these reasons a Do-Nothing option is not a reasonable alternative for the TEN-T network in Donegal. Specific sectional assessment of Do-Nothing options are considered below adding to the general determination that it fails to meet fundamental project objectives.

5.4.3.2 Do-Nothing – Section 1

For Section 1, the existing N15 is a key strategic route through the twin towns of Ballybofey and Stranorlar that is currently operating beyond its capacity and is performing poorly with respect to safety and travel times. This congestion is expected to continue and worsen in at least the short to medium term. With regards to the environment, human health and climate this congestion is unsustainable and grossly detrimental.

Chronic traffic congestion increases air, noise and water quality issues in these urban populated zones. Congestion increases vehicle emissions increasing overall carbon emissions. In addition, ongoing road traffic congestion goes against the town first policy, inhibiting compact development and stifling urban regeneration. Under the Do-Nothing scenario, no active travel elements will be provided and therefore no alternatives to motorised vehicle travel will be available. The retention of this existing road network without any improvement fails to address these and other local issues that also form part of the core aims and objectives of the Project.

5.4.3.3 Do-Nothing – Section 2

For Section 2, the existing N13 and N56 routes are key strategic routes operating beyond capacity and performing poorly with respect to safety and function. The legacy N13 National Primary and dual carriageway has a significant accident history with substandard alignments, frequent direct access and at-grade junctions. The existing N56 four lane road is a recognised Lifeline Route into the regional centre of Letterkenny. It is essential for all passenger and freight movement as the only major road and the sole transport option into the town. It is over capacity and has no resilience to any incident that may occur resulting in a closing off of all reasonable access. The retention of the existing N13/N14 and N56 routes, without any improvement, fails to meet the core aims and objectives of the Project.

5.4.3.4 Do-Nothing – Section 3

In Section 3, the existing N14 is currently operating beyond its capacity and performing poorly with respect to safety due to both poor alignment and at-grade junctions and accesses. The current road serves as both a strategic TEN-T route and as a local connector to local communities and major farming activities. The N14 crosses the River Finn/ River Foyle at Lifford to become the A38 in Strabane before joining the A5 Derry/ Dublin road (N2). In the Do-Nothing scenario the bridge at Lifford/ Strabane remains the only connection across the border forcing all traffic to travel through the urban areas in Lifford and Strabane, increasing congestion on the main Dublin-Letterkenny route, especially as population levels increase.

5.4.3.5 Do-Nothing - Summary

Table 5.3 summarises the assessment of the Do-Nothing scenario against the Project Objectives. Based on this assessment, the Do-Nothing option has been ruled out from further consideration.

Table 5.3: Assessment of Do-Nothing Alternatives against Project Objectives

Criterion	Do-Nothing Scenario
Economy	The Economy objectives will not be met in the Do-Nothing scenario for the following reasons: <ul style="list-style-type: none"> No improvement in travel times. Traffic will continue to use urban centres, increasing congestion and delays. Traffic levels will increase with population growth. No improvements in active travel. Public transport reliability will decrease due to increased congestion. Fails to contribute to achieving NSOs from NPF.
Safety	The Safety objectives will not be met in the Do-Nothing scenario for the following reasons: <ul style="list-style-type: none"> No improvements to the existing road network means safety issues, particularly with increased traffic levels, will not be addressed. Direct accesses on to the national road network will not be closed-off. Vehicles and Non-Motorised Users (NMU)/ Vulnerable Road Users (VRU) will continue to interact, especially in urban centres. No active travel facilities will be created to separate vehicles and NMU/ VRUs.
Environment	The Environment objectives will not be met in the Do-Nothing scenario for the following reasons: <ul style="list-style-type: none"> No reductions in emissions to air, water and soil. Increased congestion will not improve and is likely to decrease air quality. Traffic noise levels in urban areas will not decrease. Run-off from existing network to watercourses will not be treated. Climate emissions are likely to increase due to increase in traffic volumes and congestion. No improvements to the local population (access to facilities).

Criterion	Do-Nothing Scenario
	<ul style="list-style-type: none"> ▪ No active travel facilities will be created to encourage modal shift and decrease carbon emissions and vehicle kilometres travelled. ▪ The achievement of climate targets and carbon emissions will be impacted at the local level as there will be no alternatives to personal vehicle use for short journeys and no Park & Share facilities to encourage car-pooling and reduce congestion.
Accessibility and Social Inclusion	<p>The Accessibility and Social Inclusion objectives will not be met in the Do-Nothing scenario for the following reasons:</p> <ul style="list-style-type: none"> ▪ No improvements to accessibility and connectivity to/from the North-West Region. ▪ Strategic and commercial traffic will still have to use urban centres during transit, especially in Ballybofey/ Stranorlar and Lifford. ▪ No improvements to access for employment locally and regionally. ▪ No improvements to access for healthcare facilities, especially in Letterkenny where the existing N56 Lifeline route will become more congested with population growth. ▪ No active travel facilities or Park & Share facilities will be created to encourage modal shift and accessibility and social inclusion. ▪ No network improvements to encourage and facilitate a better, more reliable public transport system.
Integration	<p>The Integration objectives will not be met in the Do-Nothing scenario for the following reasons:</p> <ul style="list-style-type: none"> ▪ The TEN-T Regulations will not be met. ▪ Certain objectives of the NPF, NDP, RSES and CDDP will not be met. ▪ Better connectivity to other transport hubs will not be realised.
Physical Activity	<p>The Physical Activity objectives will not be met in the Do-Nothing scenario for the following reasons:</p> <ul style="list-style-type: none"> ▪ No active travel facilities or Park & Share facilities will be created to encourage modal shift and increase opportunities for physical activity. ▪ No incentives to reduce private car-use. ▪ Urban realm improvements cannot be fully realised due to increased vehicular traffic and congestion.

5.4.4 Do-Minimum Alternatives

The Do-Minimum alternatives for the Proposed Development as well as for each section of the Proposed Development are outlined below.

5.4.4.1 Do-Minimum – Entire Proposed Development

Do-Minimum alternatives considered localised and online improvements coupled with demand management initiatives. Restricting classes of vehicles and/or reallocation of road space is not feasible where the road is fundamentally substandard and where alternate routes are unavailable. Without full alternate modes or alternate routes, the objective of the TEN-T Regulation to ‘*establish a single multimodal Union wide transport network of high quality*’ is also not achievable. The Project is a targeted minimal intervention focusing on the most deficient sections of the TEN-T network in Donegal. It focuses on the poorest standard sections as well as on urban bypass and high collision locations and includes some online improvements. However, more general online improvements are not reasonable due to the very poor quality of the existing network in places as well as a legacy proliferation of accesses on to the existing national road network. Alternate modes and other demand management tools cannot resolve the core capacity, regional connectivity and safety issues on the existing TEN-T network as set out in TEN-T Regulations and in national, regional and local policies and objectives.

5.4.4.2 Do-Minimum - Section 1

The Do-Minimum option for Section 1 consists of retaining the existing road with minimum online improvements and demand management initiatives. The existing road goes through the centres of Ballybofey and Stranorlar using the existing bridge over the River Finn, a designated Special Area of Conservation (SAC). The Do Minimum approach would continue to see all traffic use the existing N15 through the town centres. This is the only national road crossing of the River Finn from the south of the county. With projected population growth and increases in traffic, this Do-Minimum scenario will negatively impact on the safety, environment and economy of Ballybofey/ Stranorlar as Heavy and Light Goods Vehicles (HGV, LGV), personal vehicles, and NMU/VRU will continue to interact in the urban areas. An

online improvement scheme does not provide the appropriate cross-section and junctions required to achieve the level of service, journey time reliability, safety, sustainable alternatives and economic benefit required in the project objectives.

5.4.4.3 Do-Minimum - Section 2

The Do Minimum option considered for Section 2 includes retaining the existing N13 and N56 routes, as well as other committed schemes with traffic management and demand management considerations. However, the N13 and N56 routes include multiple public and private direct accesses that fall outside design standards. In addition, existing sections of the N13 include vertical gradients that far exceed national road design standards. The existing N56 section carries significant (>32,000) daily traffic volumes, has numerous commercial premises with direct access onto the adjacent existing carriageway, and runs alongside watercourses that form part of or flow into a designated SAC. The existing cross section on the N56 is already a divided two-lane road and still suffers from chronic congestion and resilience as the sole transport connection from the south and east of County Donegal into Letterkenny. Further online improvements of the N56 are not feasible, practical or functional. A Do-Minimum online improvement option on the N13 section south of the Dry Arch Roundabout does not provide the appropriate cross-section and junction arrangements required to achieve the level of service, journey time reliability and safety required in the project objectives. The existing N13 dual carriageway must be improved and online options are feasible but this alone will not address the other adjacent issues. The Do-Minimum approach also means that there will remain only one bridge crossing over the River Swilly on the national road network. The existing N56 is the sole "lifeline route" from the south and east of Donegal into Letterkenny including to the Letterkenny University Hospital and other key services. There is a national objective to increase the average speed on the national primary road network as well as journey time reliability and resilience. The NPF NSOs under connectivity, balanced regional development and the Northwest City region cannot be delivered without addressing the substandard access to Letterkenny, the identified Regional Centre for Donegal and the Northwest.

5.4.4.4 Do-Minimum - Section 3

The Do Minimum option for Section 3 consists of a combination of online and offline improvements including traffic management and demand management options. In order to meet TEN-T Regulations and national policy requirements in respect to quality, safety and efficiency, an online Type 2 Divided Road is required. The existing section of road is a single carriageway road, without hard shoulders, and is very narrow (as low as 5.5m) and poorly aligned. Roadside development is extensive and in some instances this development is located very close to the road edge. Junctions and accesses are frequent, and include public roads, commercial access, residential accesses and field accesses. Introducing a Type 2 Divided Road to current TII Design Standards within the footprint of the existing road is not feasible and would result in a disproportionately high impact to adjoining properties while also incurring extensive diversion routes for local residential, commercial and agricultural properties which straddle the existing road as direct to the improved network. As such, the Do-Minimum option can only provide localised online improvements, and to a significantly reduced standard. In addition, enhanced cross-border and regional connectivity will not be achieved as all cross-border traffic between Lifford/ Strabane on the N14/A38/A5 will continue to use the existing bridge over the River Finn/ River Foyle.

5.4.4.5 Do-Minimum - Summary

Table 5.4 summarises the assessment of the Do-Minimum scenario against the Project Objectives. Based on this assessment, the Do-Minimum option has been ruled out from further consideration.

Table 5.4: Assessment of Do-Nothing Alternatives against Project Objectives

Criterion	Do-Nothing Scenario
Economy	<p>The Economy objectives will not be met in the Do-Minimum scenario for the following reasons:</p> <ul style="list-style-type: none"> ▪ No improvement in travel times. ▪ Traffic will continue to use urban centres, increasing congestion and delays. ▪ Traffic levels will increase with population growth. ▪ Difficult to make room for active travel improvements within the existing limited road footprint available.

Criterion	Do-Nothing Scenario
	<ul style="list-style-type: none"> ▪ Public transport reliability will decrease due to increased congestion. ▪ Fails to contribute to achieving NSOs from NPF.
Safety	<p>The Safety objectives will not be met in the Do-Minimum scenario for the following reasons:</p> <ul style="list-style-type: none"> ▪ Minor improvements to the existing road network will not greatly improve safety issues, particularly with increased traffic levels. ▪ Direct accesses on to the national road network will not be closed-off. ▪ Vehicles and Non-Motorised Users (NMU)/ Vulnerable Road Users (VRU) will continue to interact, especially in urban centres. ▪ Difficult to make room for active travel improvements within the existing limited road footprint to safely separate vehicles and NMU/ VRUs.
Environment	<p>The Environment objectives will not be met in the Do-Minimum scenario for the following reasons:</p> <ul style="list-style-type: none"> ▪ No reductions in emissions to air, water and soil. ▪ Increased congestion will not improve and is likely to decrease air quality. ▪ Traffic noise levels in urban areas will not decrease. ▪ Run-off from existing network to watercourses will not be treated. ▪ Climate emissions are likely to increase due to increase in traffic volumes and congestion. ▪ Minor to no improvements to the local population (access to facilities). ▪ Minimal active travel facilities could be created but likely to be disjointed/ incomplete given available space and so will have limited appeal to encourage modal shift and decrease carbon emissions and vehicle kilometres travelled. ▪ The achievement of climate targets and carbon emissions will be impacted at the local level as there will be limited alternatives to personal vehicle use for short journeys and no Park & Share facilities to encourage car-pooling and reduce congestion.
Accessibility and Social Inclusion	<p>The Accessibility and Social Inclusion objectives will not be met in the Do-Minimum scenario for the following reasons:</p> <ul style="list-style-type: none"> ▪ Minor improvements to accessibility and connectivity to/from the North-West Region. ▪ Strategic and commercial traffic will still have to use urban centres during transit, especially in Ballybofey/ Stranorlar and Lifford. ▪ No improvements to access for employment locally and regionally as traffic levels are expected to increase. ▪ No improvements to access for healthcare facilities, especially in Letterkenny where the existing N56 Lifeline route will become more congested with population growth. ▪ Minimal active travel facilities could be created but likely to be disjointed/ incomplete given available space and so will have limited appeal to encourage accessibility and social inclusion. ▪ Limited network improvements will not encourage or facilitate a better, more reliable public transport system.
Integration	<p>The Integration objectives will not be met in the Do-Minimum scenario for the following reasons:</p> <ul style="list-style-type: none"> ▪ The TEN-T Regulations will not be met. ▪ Certain objectives of the NPF, NDP, RSES and CDDP will not be met. ▪ Better connectivity to other transport hubs will not be realised.
Physical Activity	<p>The Physical Activity objectives will not be met in the Do-Minimum scenario for the following reasons:</p> <ul style="list-style-type: none"> ▪ Minimal active travel facilities could be created but likely to be disjointed/ incomplete given available space and so unlikely to encourage modal shift and increase opportunities for physical activity. ▪ Minimal to no incentives to reduce private car-use. ▪ Urban realm improvements cannot be fully realised due to increased vehicular traffic and congestion.

5.4.5 Do-Something Alternatives

5.4.5.1 National Investment Framework for Transport in Ireland 2021

Following on from the determination that a road-based solution was required, further assessment of modal and intervention alternatives were considered, with the need to deliver a whole new transport network for the entire TEN-T network in Donegal rejected at an early phase with the completion of the TEN-T Donegal Roads Needs Study (2015) which established targeted priority sections.

The National Investment Framework for Transport in Ireland (NIFTI) 2021 required that an assessment was undertaken to further consider modal and intervention Hierarchy of road-based alternatives. The analysis assessed potential modes of travel such as road-based transport, bus based public transport, rail based public transport, as well as demand management measures and active mode enhancements, including combinations of these, and a hybrid solution of active travel infrastructure, bus and road-based transport. The study also assessed the NIFTI intervention hierarchy of Maintain, Optimise, Improve and New. The NIFTI modal and intervention hierarchies are set out in Figure 5.2.



Figure 5.2: NIFTI Hierarchy

Figure 5.3 below details the alternatives considered to determine the Preferred Transport Solution and address the established Project need and objectives. A MCA assessment of each mode was carried out to identify the preferred mode of transport to achieve the Project objectives. This MCA was carried out according to the six DoT CAF parameters (Economy, Safety, Environment, Accessibility and Social Inclusion, Integration and Physical Activity) as it predated TAF. In the MCA, each of the alternative modes are rated according to a three-point scale of preference, from low preference to high preference.

Active Travel	Public Transport		Private Vehicle	TEN-T PRIP Donegal Multi-Modal Transport Solution
	Bus	Rail	Road	
Positive benefits, however does not fulfil all Project /Policy Needs to deliver identified outcomes, in particular regional connectivity, safety and sustainable compact growth. Combine with other Alternatives(s)	Positive benefits, however congested town centres and legacy network must be addressed for full and efficient service. Does not fulfill all Project /Policy Needs to deliver identified outcomes. Combine with other Alternative(s)	Positive benefits, however no functioning rail service within Co. Donegal. Opportunity to improve connectivity to closest Rail Hubs in Derry and Sligo. Combine with other Alternative(s)	Targeted interventions to maximise positive benefits to regional connectivity, safety and relieving traffic congestion in town centres to support sustainable compact growth. Does not fulfill all Project / Policy Needs. Combine with other Alternatives(s)	Targeted blended modes with positive benefits to address all Policy and Project goals including Enhanced Regional Connectivity, Decarbonisation, Sustainable Compact Growth, Safety and Shared Island connectivity
				Preferred Solution

Figure 5.3: TEN-T PRIPD – Alternatives, Modes Considered and NIFTI Alignment

Options consideration also focused on delivering the best possible climate resilient solution and resolving current transport deficiencies in line with national climate policy, urban development and future transport strategies and intervention priorities, as shown in Figure 5.4 below.

Maintain	Optimise	Improve	New	TEN-T PRIP Donegal Multi-Modal Transport Solution
Positive benefits, however minimal limited scope across the project due to congested town centres and legacy substandard network beyond urban centres. Climate resilience measures must be incorporated within larger scale works for tangible benefits. Does not fulfill all Project /Policy Needs to deliver identified outcomes. Combine with other Intervention(s)	Positive benefits such as Modal Hubs and EV charging, however further works required to develop and expand sustainable network and improve access for modal transition, alleviate congestion in town centres and improve legacy substandard network for full and efficient service. Does not fulfill all Project /Policy Needs to deliver identified outcomes. Combine with other Intervention(s)	Positive but limited benefits achieved through targeted improvements to existing network of sufficient scale to address safety and operation. Provision of new segregated Active Travel only viable by increasing the safety, connectivity and capability of existing residual legacy infrastructure. Does not fulfill all Project /Policy Needs to deliver identified outcomes. Combine with other Intervention(s)	Targeted interventions to maximise positive benefits to regional connectivity, safety and relieving traffic congestion in town centres to support sustainable compact growth. Cross-section to optimise safety, public transport needs and provide route consistency. Does not fulfill all Project /Policy Needs to deliver identified outcomes. Combine with other Intervention(s)	Targeted blended interventions with positive benefits to address all Policy and Project goals including Enhanced Regional Connectivity, Decarbonisation, Sustainable Compact Growth, Safety and Shared Island connectivity
Combine with Intervention(s)	Combine with Intervention(s)	Combine with Intervention(s)	Combine with Intervention(s)	Preferred Solution

Figure 5.4: Intervention Hierarchy Consideration

The conclusion of this analysis was that a multi-modal hybrid solution comprising road, bus and active travel intervention was the most appropriate to achieve the project objectives including supporting modal shift and reducing pressures on the local road network in the long term. All could be delivered around a road-based solution. Furthermore, the project adheres to NIFTI Modal and Intervention hierarchies, as outlined below in Figure 5.5.

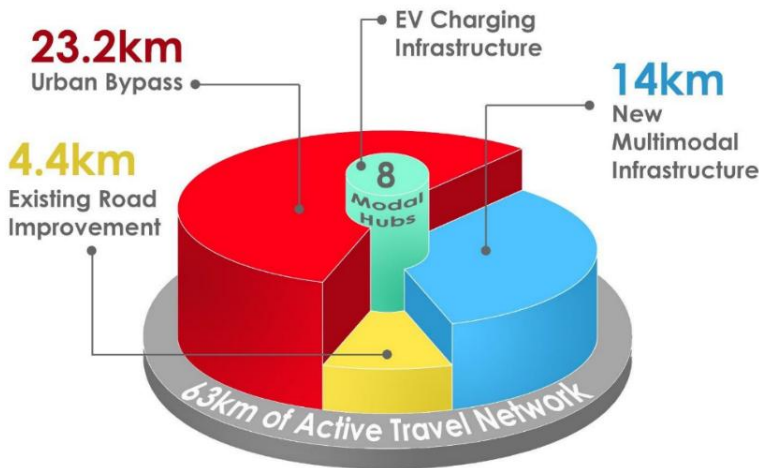


Figure 5.5: Key Interventions and Modal Hierarches of the Project

5.4.6 Summary

Following on from the establishment that a road-based solution for the Project is necessary in respect of achieving the Project objectives and, in particular, the requirements of the TEN-T Regulations, the NPF, as well as other national, regional and county policies and objectives, the road-based alternatives that were considered included Do-Nothing, Do-Minimum, and Do-Something scenarios.

The Do-Nothing alternatives are not considered reasonable as they do not achieve the requirements for the TEN-T Regulations and do not achieve national, regional or local policies or objectives.

Similarly, the Do-Minimum alternatives are not considered reasonable as they do not achieve the requirements for the TEN-T Regulations and do not achieve national, regional or local policies or objectives.

As the Project has progressed, the design process has taken cognisance of evolving and developing policies including appraisal guidance, environmental information, TEN-T Regulations and climate action plans and policies. As such appropriate and beneficial elements of alternatives have been incorporated into the final design of the Proposed Development to best address these new changes and requirements without diminishing the Project’s core aims and objectives.

The Proposed Development is therefore a multimodal solution with significant NIFTI hierarchy consideration and intervention element enhancing its overall climate action credentials, as depicted in Figure 5.5 above.

The following sections detail the assessment of reasonable alternatives that formed part of the development of the Project through Phase 2 Options Selection and Phase 3 Design and Environmental Evaluation.

5.5 Route Corridor Alternatives: General Process

5.5.1 Study Area

The three sections of the TEN-T network prioritised for improvement are within an area encompassing the national primary road network in Ballybofey/ Stranorlar, and from Letterkenny to Lifford. At the commencement of Phase 2, a study area for all three sections of the Proposed Development was identified, as shown in Figure 5.6. Individual study areas for each of the three sections of the TEN-T network were also identified as shown in Figure 5.7.

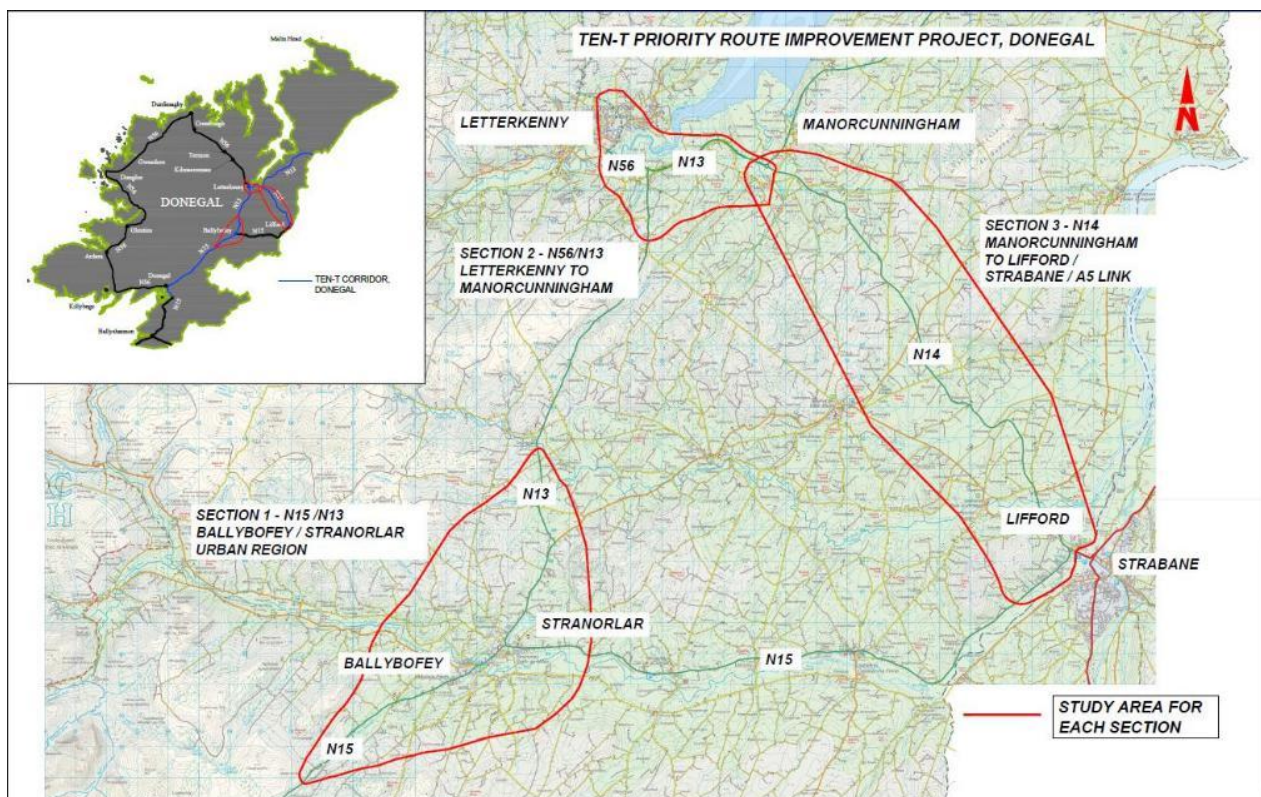


Figure 5.6: Proposed Development Study Area

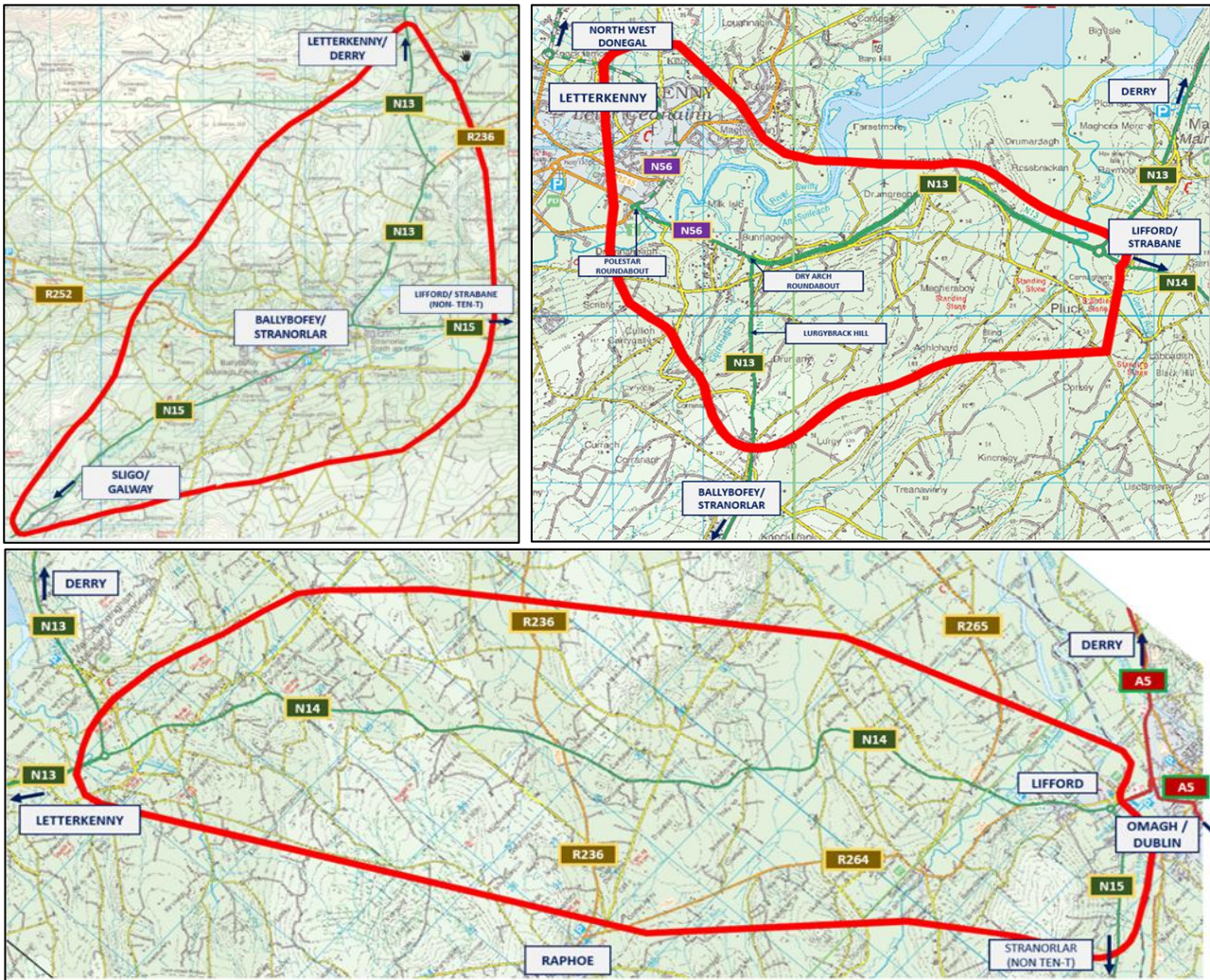


Figure 5.7: Study Areas for Section 1 (top left), Section 2 (top right) and Section 3 (bottom)

The Proposed Development study area was selected through consideration of a targeted road-based solution meeting the aims and objectives of the Project along three district sections of the existing TEN-T road network. This considered the physical constraints such as environmental designations, coastlines, watercourses and areas of high / steep topography, as well as the existing road network, road type and possible alignments.

Following the identification of the Project study area, a constraints study was undertaken, as described in the following section.

5.5.2 Constraints Study

At the commencement of Phase 2 and following identification of the three study areas, a Constraints Study was undertaken. The scope of the constraints study was to identify and map the nature and extent of potential environmental constraints that exist within the identified study areas of the Project. The purpose of completing this exercise was to identify where such constraints may impact upon the development of the Project and in so doing inform both the stakeholder consultation and Phase 2 Option Selection processes. The constraints study was compiled with reference to the TII guidance applicable at the time of the study and concentrated on the environmental factors provided in Article 3 of the EIA Directive. The full constraints report is available on the Project website at the following link: https://www.donegal-ten-t.ie/media/download_gallery/Volume%20B%20Constraints%20Report_Dec%2019.pdf. A summary of the main constraints is provided in Table 5.5.

Table 5.5: Main Constraints Identified within the Study Area

Category	Source	Constraints
Legislative, Planning and Policy	EU and National Legislation. National, Regional and Local Planning Policy.	Compliance with the Water Framework Directive, Habitats Directive, Birds Directive and fishery related legislation will create constraints on the proposed measures to varying degrees depending on the final project route. National and regional policies aim to contribute to mitigating the effects of floods and are also required to enhance the protection for the aquatic environment through complying with the requirements of the Habitats Directive and Birds Directive. Archaeological and Cultural Heritage legislation pertaining to protected structures may constrain proposed structural works at river crossings.
Population and Human Health	Central Statistics Office, County Donegal Development Plan, Various County and Local Level strategies and Local Area Plans.	Socio-economic constraints in the region, such as the population, employment and health provisions, will for the most part, not be adversely affected by the project. Overall, the project aims to improve conditions within the town by reducing traffic congestion and improving the safety conditions of the road.
Cultural Heritage	Record of Monuments and Places for County Donegal. Sites and Monuments Records for County Donegal. Monuments in State Care Database County Donegal.	The combined study area around the three sections contains a total of 137 recorded archaeological sites that range in date from the Neolithic onwards, indicating that the lands in the area have been continuously settled during the past six thousand years. The combined study area around the three sections contains a total of 172 buildings and structures that are listed in the NIAH and 17 of these have been designated as Protected Structures in the County Development Plan. Sites identified within Archaeological and Cultural Heritage legislation pertaining to protected structures may constrain proposed structural works at river crossings. Option Selection processes will require cognisance to be taken regarding any identified sites present along any proposed footprint and efforts made to avoid impacting them.
Landscape	County Donegal Development Plan 2018-2024.	As classified by the County Donegal Development Plan 2018-2024: The proposed study area is located within the following Landscape Character Assessment Area; Finn Valley (LCA 14), Letterkenny Estuary and Farmland (LCA 15), Lagan Valley (LCA 12) and Foyle Valley (LCA 13). The study area encompasses areas of Especially High Scenic Amenity (EHSA), in particular Section 1 and Section 2, with Manorcunningham, supporting views and prospects towards Lough Swilly.
Ecology	NPWS natural heritage database for designated areas. NPWS Rare and Threatened Species Database. National Biodiversity Data Centre. New Atlas of the British and Irish Flora CD-ROM. Bat Conservation Ireland Irish Butterflies website. Water Framework Directive website. Ordnance Survey maps and aerial images of the survey area.	Section 1 The project within the constraints study area will cross the River Finn and consequently the River Finn SAC (Site Code: 002301) between Ballybofey and Stranorlar. The following are the qualifying interests of the River Finn SAC: Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110], Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010], Blanket bogs (* if active bog) [7130], Transition mires and quaking bogs [7140], <i>Salmo salar</i> (Salmon) [1106] and <i>Lutra lutra</i> (Otter) [1355]. Section 2 Any crossing of the River Swilly has the potential to impact on the Lough Swilly SAC and SPA.

Category	Source	Constraints
		<p>The following are the qualifying interests of the SAC: 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] and Otter (<i>Lutra lutra</i>) [1355].</p> <p>Section 3</p> <p>Proposed corridor options may intersect with Feddyglass Woods pNHA (Site Code: 001129).</p> <p>Proposed corridor options crossing the Corkey River, the Swilly Burn and Deelee River must consider that these watercourses subsequently flow into Lough Swilly and River Finn, which are both protected sites.</p> <p>In the absence of suitably defined mitigation these sites that form part of the Natura 2000 network, may be impacted by the project either directly, indirectly or there may be cumulative impacts either alone or in combination with other plans or projects.</p>
Water	<p>OS Survey vector. Six inch and "Discovery" Series mapping.</p> <p>Aerial Photography.</p> <p>The Office of Public Works.</p> <p>Western River Basin Management Plan (2009 -2015).</p> <p>EPA Maps website.</p>	<p>The main hydrology and water quality constraints are in relation to the objectives set under the WFD and the fisheries status of the rivers present along the route. The WFD requires that rivers of Good status within the study area are protected. Avoidance and prevention of deterioration of water quality status as a result of any works being carried out during the project is also of importance. This would apply particularly where any works are being carried out over or adjacent to watercourses and waterbodies which could potentially result in silt releases or other negative impacts on the receiving water quality and by extension aquatic flora and fauna present.</p>
Land and Soils	<p>A Geological Description to accompany the Bedrock Geology 1:100,000 Map.</p> <p>Geological Survey of Ireland (GSI) online mapping database.</p> <p>Aerial Photography (OSI, flown 2000 and 2005).</p> <p>Ordnance Survey 1:50,000 Discovery Series.</p>	<p>The removal of material during the construction of the project may give rise to an increase in aquifer vulnerability.</p> <p>The project will not impact on any areas of national geological importance or areas currently recorded by the GSI as having mining, quarrying or water resource development.</p> <p>The proposed study area is predominantly low to moderate risk in terms of landslide susceptibility. Two areas of high risk (A) were identified, one to the south west of Ballybofey in Section1 and one to the west of the staggered N14/R236 junction in Section3.</p>
Air and Climate		<p>The majority of air, noise and climate effects associated with the project will be experienced during the operational phase of the project.</p> <p>There will be minor air, noise and climate impacts during the construction phase. Such emissions will be temporary and localised.</p>
Material Assets (non-agricultural)		<p>The primary constraints within the study area are the utilities and existing transport infrastructure. Early consideration of how options can integrate with the existing material assets in the area is essential and will require engagement with service providers to ensure that utilities can be avoided and/ or modified to mitigate impacts.</p>
Material Assets (Agricultural)	<p>EPA/ Teagasc/ GSI GIS Map of National Soil Types, 2006.</p> <p>Census of Agriculture 2010, final results.</p> <p>Aerial Photography (Google Earth 2011 – 2016).</p>	<p>Dairy farms, intensive pig/poultry facilities and horse facilities all represent and present a potential constraint to the development of a new road scheme.</p> <p>At this stage it would appear that study area No. 2 does not have any agricultural or forestry constraints, but this will</p>

Category	Source	Constraints
		<p>need to be confirmed at the Stage 2 of Phase 2 Option Selection.</p> <p>Observations would indicate that there are a number of agricultural enterprises within Section 3 that may represent a constraint and as such will need further consideration at the Stage 2 of Phase 2 Option Selection. Furthermore, forestry blocks in both Section 2 Section 3 may represent a constraining factor and will require greater consideration during the option selection process.</p>

5.5.3 Consultations

During Phase 2, non-statutory consultations were held including three public consultations on the Proposed Development and one targeted public consultation on the proposed Ballybofey Link Road in Section 1, as summarised below.

- Non-statutory consultations were undertaken with a range of public bodies and organisations who were invited to submit comments and information relevant to the Proposed Development.
- Public consultation 1 took place in December 2017 and displayed the Project study area.
- Public consultation 2 took place in April and May 2018 and displayed the preliminary options considered and the shortlisted options to be taken forward for further assessment.
- Public consultation 3 took place in February 2019 and presented the preliminary conclusions of the Phase 2 Options Assessment and the proposed alignment of the Emerging Preferred Option and an outline draft design of the Emerging Preferred Option for each of the three sections of the Proposed Development. Private consultations were also held with individuals impacted by the emerging options consultations including individual, families and businesses. The Project's Land Liaison Officers (LLO) made every effort to inform those affected within the Emerging Preferred Options.
- Section 1 Ballybofey Link Road public consultation was held in March 2019 on four short-listed options linking the emerging preferred corridor for Section 1 with the town of Ballybofey.

Options and their progression have also been presented to members of the public via an updated project website (www.donegal-ten-t.ie).

Information collected as part of the non-statutory consultations has helped inform the decision-making in terms of options.

Consultations continued during Phase 3, particularly with landowners, and information was provided to the design team and environmental specialists as the design and environmental evaluation of the project progressed.

A summary of consultations undertaken on the Project are provided in Appendix C5.08 in Volume C: Technical Appendices.

5.5.4 Traffic Modelling

Modelling was undertaken for the study area to forecast the traffic growth and network demands within the region and to ensure that the Proposed Development meets the requirements of these future traffic demands. The modelling included real-world data from traffic surveys that included Junction Turning Counts (JTC), Automatic Traffic Counts (ATC), Automatic Number Plate Recognition (ANPR) and Moving Car Observer (MCO) journey time data.

A summary of the traffic assessment in Phase 2 is provided in Section 4 of the published Option Selection Report available at the following link: https://www.donegal-ten-t.ie/media/Option_Selection_Report/Volume%20A%20-%20Main%20Report.pdf

The Phase 2 Transport Modelling Report is available in Volume F of the published Option Selection Report available at the following link: https://www.donegal-ten-t.ie/media/download_gallery/Volume%20F%20Transport%20Modelling%20Report.pdf

The cross-sections for the Proposed Development and alignments were subsequently chosen to meet the projected traffic demand and the requirements of the TEN-T regulations.

It should be noted that the traffic modelling has been updated during the lifetime of the Project and the most up-to-date traffic modelling is included in Chapter 6 of this EIAR. The findings of the traffic modelling remain valid and fully support the decisions made with regard to the design of the Proposed Development that has evolved through Phase 2 and Phase 3.

5.5.5 Methodology for Option Selection and Identifying the Preferred Option

Following determination of feasible alternatives for the Proposed Development and the targeted priority locations on the existing road network, corridors for road-based options were identified through a stepped assessment process. The stages in the Phase 2 Options Selection process are as per the TII guidelines applicable at that time and followed a three-stage process:

1. Stage 1: Preliminary options assessment.
2. Stage 2: Appraisal of options.
3. Stage 3: Preferred option.

5.5.5.1 Stage 1 Preliminary Options Assessment

At Stage 1, a long-list of 300 m wide corridor options were identified within the Project study area. These take account of the constraints identified in the Constraints Study, particularly the environmental constraints. A high number of feasible route corridor options for the Proposed Development were developed based on the study area and the constraints study. These corridors were all based on feasible offline and/or online horizontal and vertical alignments. This provided opportunities to meet the Project objectives while minimising the potential for likely significant environmental effects.

The long-list of options were then assessed in accordance with TII guidelines under the three criteria: Engineering, Environment and Economy, and a preference was provided for each. The environmental criteria were of particular importance in the decision-making process, and the appraisal was carried out on the basic preference for avoidance of environmental impacts followed by consideration on whether reasonable mitigation could be applied. The potential for positive benefits were also considered. The presence of European sites was a particular focus in this stage and it was identified at an early stage that it was not possible to address the Project objectives and avoid an interaction with the European sites for the following reasons:

- In Section 1, the River Finn SAC passes east to west through the study area and any option will have to cross the River Finn SAC to link the N15 south of Ballybofey with the N13 and/or N15 north of Stranorlar.
- In Section 2, the Lough Swilly SAC extends from Lough Swilly up to the existing N56 at Polestar Roundabout and also up to the existing N13 dual carriageway just east of the existing Pluck Roundabout. The Lough Swilly SPA is also within the northern part of the study area for Section 2. Any crossing of the River Swilly to the north of the existing N56 will cross the Lough Swilly SAC.
- In Section 3, the River Finn SAC passes south to north through the study area. The River Finn marks the border between Ireland and Northern Ireland. The inclusion of a link road from the N14 to the proposed A5 Western Transport Corridor (WTC) in Northern Ireland will involve a crossing of the River Finn and the SAC. The River Foyle and Tributaries SAC (Northern Ireland) is contiguous with the River Finn SAC on this stretch of the River Finn and therefore the link would also cross this SAC.

A short-list of the preliminary options was then identified and brought forward to Stage 2. All shortlisted options have been identified as being reasonable and having greater benefit / lower impact than the eliminated options.

The environmental assessments throughout all stages and phases were carried out by competent experts cooperating and collaborating across all three sections of the Proposed Development and under a single environmental lead.

5.5.5.2 Stage 2 Appraisal of Options

At the beginning of Stage 2, the shortlisted options were further developed to include preliminary designs for link roads, junctions' strategy, tie-in and transitions, etc. Further refinement and improvements were made as the preliminary design progressed to reduce the potential for environmental impacts where feasible. Following this further refinement, a more detailed assessment, using objective impact assessment methodologies, of each of the shortlisted options was undertaken. The Stage 2 appraisal also includes the Road Safety Audit and Road Safety Impact Assessments.

The short-list of options were appraised in line with TII guidelines under the six CAF criteria: Economy, Safety, Environment, Accessibility & Social Inclusion, Integration and Physical Activity, with the following sub-criteria:

- **Economy**
 - Transport efficiency and effectiveness.
 - Wider economic impacts.
 - Funding impacts.
- **Safety**
 - Collision Reduction.
 - Security.
 - Road Safety Audit.
 - Road Safety Impact Assessment.
- **Environment**
 - Air Quality & Climate.
 - Noise.
 - Landscape & visual.
 - Biodiversity (Terrestrial and Aquatic).
 - Waste.
 - Soils, Geology and Hydrogeology.
 - Hydrology.
 - Architectural heritage, Archaeology and Cultural Heritage.
 - Material Assets (Agricultural).
 - Material Assets (Non-agricultural).
- **Accessibility & Social Inclusion**
 - Deprived geographical areas.
 - Vulnerable groups.
- **Integration**
 - Transport integration.
 - Land use integration.
 - Geographical integration.
 - Other government policy integration.
- **Physical Activity**

The impact score rating follows the procedure set out in the TII PAG Unit 7, scoring from 1 – Major or Highly Negative to 7 – Major or Highly Positive, as shown in Table 5.6.

Table 5.6: MCA Impact Scoring Applied to Assessment Criteria

Score	Impact Level
1	Major or Highly Negative
2	Moderately Negative
3	Minor or Slightly Negative
4	Neutral
5	Minor or Slightly Positive
6	Moderately Positive
7	Major or Highly Positive

The project appraisal of options followed the relevant TII guidance documents current at the time of assessment for the different elements of consideration, namely: TII PMGs (2019) and the PAG for National Roads Unit 7.0 – Multi-Criteria Analysis, PE PAG 02031 (2016). This appraisal, completed in 2019, conforms with the six CAF criteria and the relevant sub-criteria (Department of Transport, March 2016). As such these assessments predated the introduction of TAF in June 2023. However it should be noted that all environmental factors listed in the EIA Directive, namely (i) Population and Human Health, (ii) Biodiversity, (iii) Land, (iv) Soil, (v) Water, (vi) Air, (vii) Climate, (viii) Material Assets, (ix) Cultural Heritage, and (x) Landscape were considered in the environmental assessments carried out for the MCA within Stage 2 Appraisal of Options as summarised in Table 5.7. As such these assessments also fully comply with TAF.

Table 5.7: Correlation of MCA Criteria under CAF and Environmental Factors from the EIA Directive

MCA topics under the six CAF Criteria	Environmental Factors from the EIA Directive									
	Population & Human Health*	Biodiversity	Land*	Soils	Water	Air	Climate	Landscape & Visual	Material Assets	Cultural Heritage
1. Environment										
Air Quality & Climate	✓					✓	✓			
Noise	✓									
Landscape & Visual								✓		
Biodiversity		✓								
Waste									✓	
Soils, Geology and Hydrogeology			✓	✓						
Hydrology					✓					
Cultural Heritage										✓
Material Assets - Agricultural			✓						✓	
Material Assets - Non-agricultural	✓		✓						✓	
2. Safety	✓									
3. Physical Activity	✓									
4. Economy										
5. Accessibility and Social Inclusion	✓									
6. Integration	✓									

Note * Population & Human Health, and Land topics: As set out in Table 5.7 above and Table 1.2 of Chapter 1, the Population and Human Health impacts and the Land impacts are separately considered and assessed within a number of the MCA criteria in the various Tables that follow throughout this Chapter in the assessment of the various reasonable alternatives, notwithstanding that Population and Human Health is not specifically listed in those Tables.

Project Appraisal Matrix

Following the completion of the appraisals, the individual impact scores for each shortlisted option derived in accordance with Unit 7.0 of the PAG, were compiled into a Project Appraisal Matrix. This includes scores for environmental impact arising out of assessment in accordance with the EIA directive and presented in accordance with the required project appraisal criteria and sub criteria.

Determining Preferences

Subsequently, each option was ranked and a preference determined. Preferences were grouped into one of three types:

- **Preferred** – the option(s) which has the most positive impact, considering the project objectives and across all criteria including environmental. These are shown Green in the assessment matrices.
- **Intermediate** – the option(s) where negative and positive impacts are considered reasonable in terms of the anticipated impacts and overall project objectives. Impacts are greater than those of the preferred option(s) but considerably better than those of the least preferred option(s). These are shown Orange in the assessment matrices.
- **Least Preferred** - the option(s) which have the potential for the greatest negative impact taking into consideration the project objectives and across all criteria including environmental. These are shown Red in the assessment matrices.

The outcome of each appraisal was both an impact score and a preference ranking for each option. Again, this further specialist assessment had regard to all of the environmental factors listed in the EIA Directive in considering and ranking environmental criteria.

The highest ranking options in terms of the Project Appraisal Matrix (sum of the impact scores) and relevant specialist preference, was used to determine the best performing option. This became the emerging preferred option for the Proposed Development.

At the end of Stage 2, following the appraisal, a preferred option was identified and brought forward to Stage 3.

Pairwise Appraisal

Where there was very little between two or more options based on the matrices and preferences, then a further pairwise appraisal was undertaken to determine the emerging preferred option. The pairwise appraisal examined the two or more top scoring options in order to determine their relative advantages and disadvantages including for environmental criteria based on the environmental factors set out in the EIA Directive. From this process, an emerging preferred option was chosen based on the option that performed best against the appraisal criteria.

Additional Appraisals

Further to the above option selection process and design development, additional MCA were carried out for discrete engineering elements as required. These followed a similar assessment process as for the mainline option. These are also set out in the following sections.

Further Information

Specifics on the environmental assessments carried out for this Options Selection process for each section are set out in Section 5.6 of this report with full details available in Volumes D1 (Section 1), D2 (Section 2) and D3 (Section 3) of the Options Selection report Environmental Appendices which were published (2019) on the Project website and can be found at the following links:

- Section 1 Environmental Appendices: https://www.donegal-ten-t.ie/media/download_gallery/Volume%20D1%20Section%201%20Environmental%20Appendices.pdf

- Section 2 Environmental Appendices: https://www.donegal-ten-t.ie/media/download_gallery/Volume%20D2%20Section%202%20Environmental%20Appendices.pdf
- Section 3 Environmental Appendices: https://www.donegal-ten-t.ie/media/download_gallery/Volume%20D3%20Section%203%20Environmental%20Appendices.pdf

5.5.5.3 Stage 3 Preferred Option

At Stage 3, the preferred option is recommended to be taken forward to Phase 3 Design and Environmental Evaluation. The preferred option is still a 300m wide corridor within which the Proposed Development is to be designed. The preferred option can be modified as required based on design requirements and environmental information that becomes available as the Project progresses through Phase 3.

5.6 Route Corridor Option Selection Process

5.6.1 Section 1: N15/N13 Ballybofey-Stranorlar Urban Region

5.6.1.1 Stage 1 Corridor Options Assessment: Section 1

A total of 36 options were identified at Stage 1 for Section 1: N15/N13 Ballybofey-Stranorlar Urban Region. All options are road-based solutions based on consideration of reasonable and feasible alternatives to deliver on the objectives of the proposed Development. All options were considered as Type 2 Divided Road cross section in keeping with traffic figures and minimal design standards. This cross-section type has been reaffirmed through Ireland's Government Road Safety Strategy 2021 - 2030 which directs that going forward only divided national primary roads can be posted 100 kph. The Proposed Development mainline is a divided cross section. This also supports the National Planning Framework First Revision National Strategic Outcome 2 objective of 'improving average journey times targeting an average inter-urban speed of 90 kph'.

All corridor options are shown as blue lines in Figure 5.8. These lines represent 300 m wide corridors centred on preliminary 50 m wide horizontal and vertical alignments.

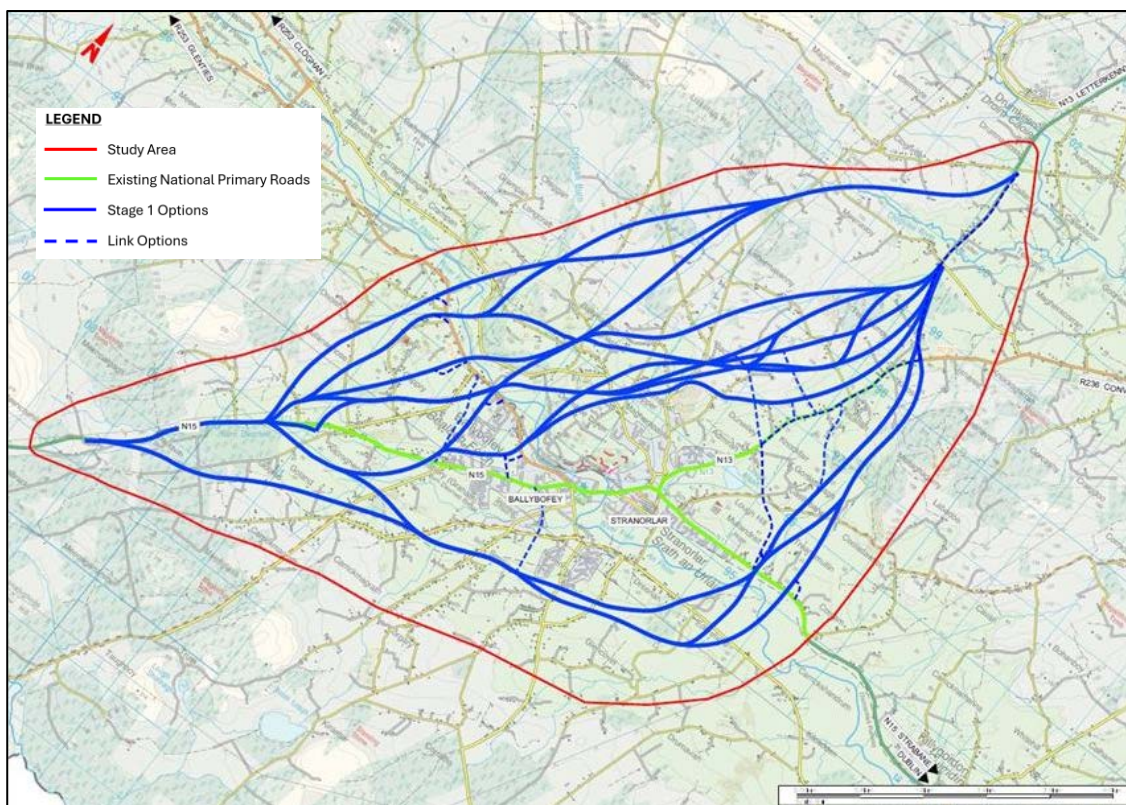


Figure 5.8: Section 1, Stage 1 Preliminary Options

Feasible options were considered bypassing to both the northwest and southeast of Ballybofey and Stranorlar. Each of the 36 options identified can be broadly described as falling into one of three categories, as described below:

Northwestern Extremity Options – these are options that are located remotely from Ballybofey and Stranorlar and would provide the most direct link between the N15 south west of Ballybofey and the N13 north of Stranorlar and have one intermediate junction. Traffic travelling from Donegal directly to Letterkenny, along the TEN-T Route, would benefit the most from this new road as it would shorten the journey both in distance and time, avoiding the need to travel through the Twin Towns. These options would, however, have less connectivity between the proposed road and the residual road network, so local traffic making journeys within the Twin Towns and to / from the N15 Lifford road, would get less benefit from these options. This traffic would be more likely to use the existing road network but would benefit indirectly from having less traffic using the local roads. These options would provide the shortest options in terms of distance between N15 and N13.

Northwestern Bypass Options – these are options that are located closer to the northwestern side of the Twin Towns and would provide an improved link between the N15 south west of Ballybofey / Stranorlar and the N13 north of the towns. They would also facilitate local traffic travelling between the two sides of the towns since they have two or more intermediate junctions. Traffic travelling between Donegal and Letterkenny, along the TEN-T Route will benefit from shortened journeys both in distance and time by avoiding the need to travel through the Twin Towns. Traffic travelling between the N15 south west of the Twin Towns and N15 east of the Twin Towns (to Lifford) would likely also benefit from the scheme options as they would negotiate a less congested residual road network.

Southeastern Bypass Options – these are options that follow an alignment southeast of the Twin Towns and intersect the N15 between the Twin Towns and Lifford. These options would provide benefit to traffic travelling between Donegal and Letterkenny on the TEN-T Route in the form of a faster, safer road than the existing road network, but the distances travelled would be similar or more than the distance taken on the existing roads or those associated with all of the northwestern options. These southeastern options would provide benefits for local traffic bypassing the town centres and traffic travelling between Donegal and Lifford.

All options considered the established environmental constraints including but not restricted to the River Finn SAC. All Stage 1 options for Section 1 intersect the River Finn SAC (Site Code 002301) at various points between Ballybofey and Stranorlar. Total avoidance of this SAC is not possible in consideration of feasible options however avoidance of direct impact with SAC was a major consideration in the selection of shortlisted options. No other designated European sites are intersected. The environmental assessment of options at Stage 1 looked at this and other factors.

A description of the stage 1 preliminary options is provided in Table 5.8.

Table 5.8: Stage 1 Preliminary Options

Option	Description
1.1 and 1.2	Two variants of similar Northern Extremity Options being close to the northern boundary of the study area. Passing through least densely populated part of the study area. These options start east of the recently improved N15 Blackburn Bridge (Phase 1). The proposed road crosses the River Finn east of Crampan on a bridge elevated above the R252. The northern termination point on the N13 is approximately 2.5km north of the R236 junction. Only 1 intermediate junction at Capry makes it is less beneficial to local traffic.
1.3, 1.4 and 1.5	Three variants of similar Northern Extremity Options – Located closer to Ballybofey and Stranorlar, they pass through more populated areas than Options 1.1 and 1.2. These options are shorter than Options 1.1 and 1.2 although Options 1.3 and 1.4 converge with the Options 1.1 and 1.2 approximately mid-way along their lengths. These options start east of the recently improved N15 Blackburn Bridge (Phase 1) and cross the River Finn north of Trooper's Hill on a bridge elevated above the R252. The northern termination point is on the N13 approximately 2.5km north of the junction with the R236. Only 1 intermediate junction at Capry means it is less beneficial to local traffic.

Option	Description
1.6	A shorter variant of Options 1.3, 1.4 and 1.5. Another Northern Extremity Option – Located closer to the Twin Towns, it is shorter than Options 1.3, 1.4, and 1.5 because it terminates east of the recently improved N15 Blackburn Bridge (Phase 1) to the south of Ballybofey and, north of the Twin Towns, connects to the N13 at a point approximately 1km north of the junction with the R236. The proposed road crosses the River Finn north of Troopers Hill on a bridge elevated above the R252. Only 1 intermediate junction at Cappry means it is less beneficial to local traffic.
1.7	Like Option 1.6, this option passes through more populated areas closer to the Twin Towns than the northern extremity options. Its length is like Option 1.6, as it has the same termination points, but it has two intermediate junctions on the crossing of the R252 (same as Option 1.6) and at a new junction north of the Twin Towns, with a link back to the existing N13 at Tircallan. This second junction will make this option more attractive to local traffic and it will operate as a local bypass, as well as a strategic TEN-T Route. The proposed option crosses the River Finn north of Trooper's Hill on a bridge elevated above the R252.
1.8	A variant of Option 1.5, it is one of the northern extremity options. The southwestern half of this route is located in close proximity to the Twin Towns and connects to the N15 east of the recently improved N15 Blackburn Bridge (Phase 1). Approximately half-way along its length, the option moves away from the towns in a northerly direction and connects to the N13, north of the Twin Towns, at a point approximately 2.5km north of the R236 junction. The proposed road crosses the River Finn west of Trooper's Hill on a bridge elevated above the R252. Only 1 intermediate junction at the crossing point of the R252 still means it is less beneficial to local traffic.
1.9	Option 1.9 is a northern extremity option located closer to the Twin Towns within a more populated area than previous northern extremity options. The shortest of all the northern extremity options, it connects to the N15 east of the recently improved N15 Blackburn Bridge (Phase 1) and connects to the N13 at a point approximately 1km north of the junction with the R236. The proposed road crosses the River Finn west of Trooper's Hill on a bridge elevated above the R252. Only 1 intermediate junction at the crossing point of the R252 still means it is less beneficial to local traffic.
1.10	This northern bypass option has two intermediate junctions and terminations points, at the crossing point of the R252 and north of Stranorlar with a link back to the existing N13 at Tircallan, and onto the existing N15 west of St Joseph's Hospital. The proposed road crosses the River Finn west of Trooper's Hill on a bridge elevated above the R252.
1.11	This northern extremity option has one intermediate junction south of the River Finn on the R252. The proposed road crosses the River Finn between Drumboe Lower and Cappry on a bridge elevated above the R252. North of the Finn, the option moves north-westwards, from the towns towards higher ground and less populated areas of Lettermakenny and Meenavoy.
1.12 and 1.13	Like Options 1.8 and 1.11 to the south of the River Finn but whose northern sections stay closer to Stranorlar. These routes are located close to the Twin Towns, both Options have an intermediate junction at the crossing of the R252, while Option 1.13 has a second intermediate junction north of Stranorlar with a link back to the existing N13 at Tircallan, and onto the existing N15 west of St Joseph's Hospital. Both options have the same termination points and cross the River Finn at the same point between Drumboe Lower and Cappry on a bridge at a point elevated above the R252.
1.14	This option operates as a northern bypass with two intermediate junctions located at the crossing points of the N15 west of the Twin Towns and the R252. The proposed road crosses the River Finn between Drumboe Lower and Cappry on a bridge elevated above the R252. It is one of the longer bypass routes with its termination points located east of the recently improved N15 Blackburn Bridge (Phase 1) and on the N13 approximately 2.5km north of the junction with the R236.
1.15	A variant of Option 1.14 with the difference being a shorter distance with its northern termination point on the N13 approximately 1km north of the junction with the R236. The proposed road crosses the River Finn between Drumboe Lower and Cappry on a bridge elevated above the R252.

Option	Description
1.16	A northern bypass option with three intermediate junctions located at the crossing points of the N15 west of the Twin Towns, the R252 and the N13 north of the Twin Towns where a new link road would tie it back to the existing network. The proposed road crosses the River Finn between Drumboe Lower and Cappry on a bridge elevated above the R252. This option would operate effectively as a local bypass. Located fairly close to the towns, it is located in areas with a higher population density than the northern extremity options. It meets the N15 east of the recently improved N15 Blackburn Bridge (Phase 1) and the N13 at a point approximately 1km north of the junction with the R236.
1.17 and 1.18	Similar northern bypass options that have the advantage of accessing both the N15 and the R252 close to the town centres, with just one junction and a link road providing access to both the N15 and R252. These options are located closest to the town centres and located in the areas of highest population compared to other options. The proposed road crosses the River Finn immediately north of Drumboe Woods on a bridge at a point where the river floods to a width of approximately 200m. Both options terminate east of the recently improved N15 Blackburn Bridge (Phase 1) and at a point on the N13 approximately 1km north of the junction with the R236.
1.19 and 1.20	Variants of similar southern bypass options with two intermediate junctions, the first located at Navenny south of Ballybofey, and the second located adjacent to the crossing point of the N15 east of the Twin Towns on the road to Lifford east of St. Joseph's Hospital. The proposed road crosses the River Finn at Edenmore on a bridge at a point where the river floods to a width of 800m. Both options terminate east of the recently improved N15 Blackburn Bridge (Phase 1) and at a point on the N13 approximately 1km north of the junction with the R236.
1.21	Option 1.21 represents the Preferred Option for the previous bypass project undertaken between 2000 and 2009. It has two intermediate junctions, the first located at Navenny south of Ballybofey, and the second located adjacent to the crossing point of the N15 east of the Twin Towns on the road to Lifford east of St. Joseph's Hospital. The option crosses the River Finn at Edenmore on a bridge at a point where the river floods to a width of 800m. Its termination points are located west of the recently improved N15 Blackburn Bridge (Phase 1) and at a point on the N13 approximately 1km north of the junction with the R236. This option is located in areas with higher population density than the northern extremity routes.
1.22, 1.23 and 1.24	These are all variations of similar options, all of which are located further away from the Twin Towns than Option 1.21. They all have two intermediate junctions, the first located at Navenny south of Ballybofey, and the second located adjacent to the crossing point of the N15 east of the Twin Towns on the road to Lifford east of St Joseph's Hospital. Termination points are located west of the recently improved N15 Blackburn Bridge (Phase 1) and at a point on the N13 approximately 1km north of the junction with the R236. Option 1.22 is the longest of all options considered and is the most southerly located of the southern bypass options. Like Option 1.21, all these options are located in areas with higher population density than the northern extremity routes. The proposed road crosses the River Finn at Edenmore on a bridge where the river floods to a width of between 800m and 900m.
1.25, 1.26, 1.27 and 1.28	These are versions of similar options, starting east of the Blackburn Bridge Improvement on the N15 and all having two junctions in similar (but not identical) locations, the first located west of Ballybofey south of the Finn with a link road to the R252, the second located north of Stranorlar with a link road to the N13. Their crossing points of the Finn are located where the Finn is in deep channel, without excessive flood plain so the bridge crossings are shorter than the options that run south of the towns.
1.29	This option starts east of the Blackburn Bridge Improvement on the N15 and initially follows an alignment south of the existing N15, but unlike Option 1.28, it passes south of the towns similar to Option 1.22, with similar junction provision and locations.
1.30, 1.31, 1.32, 1.33, 1.34, 1.35, 1.36	These are variations of similar options. Unlike all other options, these start at the western end with a continuation of the Blackburn Bridge Improvement that follows an alignment (with single carriageway cross section) south of the existing N15 until reaching a proposed roundabout at Dooish. Here the options head northwards, crossing the existing N15, before continuing a combination of alignments similar to Options 1.25, 1.26 and 1.27. These have two junctions, the first located south of the proposed Finn crossing with the R252 and the second located north of Stranorlar with a link road back to the N13. The difference between the options is due to a different alignment for each through Troopers Hill, Backlees and

Option	Description
	Teevickmoy. All options cross the river where it is deep channel and the river is less than 100m wide.

All preliminary options were appraised against the three criteria of Environment, Engineering and Economy. The Stage 1 appraisal is presented in Volume G1 of the Option Selection report and is available on the project website at this link: https://www.donegal-ten-t.ie/media/download_gallery/Volume%20G1%20Section%201%20Stage%201%20Option%20Selection%20Matrices.pdf.

The Stage 1 assessment resulted in six shortlisted option corridors that were brought forward to Stage 2 of the option assessment process. All shortlisted options were to the northwest of the Ballybofey and Stranorlar Urban Area reflective of the considerations to minimise potential impacts on the River Finn SAC.

The eliminated options and the reasons for elimination are summarised in Table 5.9.

A summary of the shortlisted options and why they were chosen is provided in Table 5.10.

Table 5.9: Eliminated Options from the Stage 1 Preliminary Options Assessment

Option	Reasons for Elimination
1.1	<ul style="list-style-type: none"> ▪ Low connectivity with the towns.
1.2	<ul style="list-style-type: none"> ▪ High landscape impact.
1.3	<ul style="list-style-type: none"> ▪ High property impact. ▪ High biodiversity impact.
1.4	<ul style="list-style-type: none"> ▪ Low connectivity with the towns. ▪ High landscape impact. ▪ High property impact.
1.5	<ul style="list-style-type: none"> ▪ Low connectivity with the towns. ▪ High landscape impact.
1.7	<ul style="list-style-type: none"> ▪ High direct impact on properties.
1.8	<ul style="list-style-type: none"> ▪ Low connectivity with the towns. ▪ High landscape impact.
1.11	<ul style="list-style-type: none"> ▪ Low connectivity with the towns. ▪ High landscape impact. ▪ High property impact.
1.12	<ul style="list-style-type: none"> ▪ High community impact.
1.13	<ul style="list-style-type: none"> ▪ Marginally lower scores than similar shortlisted options.
1.14	<ul style="list-style-type: none"> ▪ Poor ground. ▪ High landscape impact. ▪ High archaeology impact.
1.15 to 1.18	<ul style="list-style-type: none"> ▪ Poor ground. ▪ High property impact. ▪ High archaeology impact.
1.19 and 1.20	<ul style="list-style-type: none"> ▪ High cost. ▪ High impact on area prone to flooding. ▪ High landscape impact. ▪ High property impact.

Option	Reasons for Elimination
1.21 to 1.24	<ul style="list-style-type: none"> ▪ High cost. ▪ High impact on area prone to flooding. ▪ High ecology impact. ▪ High community impact.
1.25 to 1.28	<ul style="list-style-type: none"> ▪ Marginally lower scores than similar shortlisted options.
1.29	<ul style="list-style-type: none"> ▪ High cost. ▪ High impact on area prone to flooding.
1.32 to 1.35	<ul style="list-style-type: none"> ▪ Marginally lower scores than similar shortlisted options.

Table 5.10: Shortlisted Options from the Stage 1 Preliminary Options Assessment

Option	Corridor Description and Reasons for Short-listing
1.6	<p>Northwestern Extremity Option – Located closer to the Twin Towns than Options 1.1 to 1.5, it is shorter than Options 1.3, 1.4, and 1.5 because it terminates east of the recently improved N15 Blackburn Bridge (Phase 1) to the south of Ballybofey and, north of the Twin Towns, connects to the N13 at a point approximately 1km north of the junction with the R236. The proposed road crosses the River Finn north of Troopers Hill on a bridge elevated above the R252. Only 1 intermediate junction at Cappry means it is less beneficial to local traffic.</p> <p>Option 1.6 is the longest (cumulative length of mainline and link roads – 14.1 km) and fourth lowest cost of the shortlisted options, with relatively low environmental impact compared to the other options. It crosses the River Finn at a point where the river channel is well defined, so it can be crossed without the need to place piers in the river, and thereby has low indirect impact on the SAC. It has just one junction located adjacent to the crossing of the R252, resulting in lower benefit to local traffic within the Twin Towns, than the other options with more junctions.</p>
1.9	<p>Option 1.9 is a northwestern extremity option located closer to the Twin Towns within a more populated area than the other northwestern extremity options. The shortest of all the northwestern extremity options, it connects to the N15 east of the recently improved N15 Blackburn Bridge (Phase 1) and connects to the N13 at a point approximately 1km north of the junction with the R236. The proposed road crosses the River Finn west of Trooper's Hill on a bridge elevated above the R252. Only 1 intermediate junction at the crossing point of the R252 still means it is less beneficial to local traffic.</p> <p>Option 1.9 is the second longest (13.8km) of the shortlisted options and is the second lowest cost option with higher environmental impact compared to Option 1.6. Option 1.9 also crosses the River Finn at a point where the river channel is well defined, so it can be crossed without the need to place piers in the river, and thereby has medium indirect impact on the SAC. Being one of the northern options, but closer to the Twin Towns, it also has just one junction located adjacent to the crossing of the R252, resulting in limited benefit to local traffic within the Twin Towns but better than Option 1.6.</p>
1.10	<p>This northwestern bypass option has two intermediate junctions and terminations points, at the crossing point of the R252 and north of Stranorlar with a link back to the existing N13 at Tircallan, and onto the existing N15 west of St Joseph's Hospital.</p> <p>The proposed road crosses the River Finn west of Trooper's Hill on a bridge elevated above the R252.</p> <p>Option 1.10 is the third shortest of the shortlisted options (12.0 km) with a similar environmental impact to Option 1.6. It also crosses the River Finn at a point where the river channel is well defined, so it can be crossed without the need to place piers in the river, and thereby has medium indirect impact on the SAC. Having two junctions with the local road network at the R252 and N13 North, it provides greater benefit to local traffic within the Twin Towns than Options 1.6 and 1.9.</p>
1.30 1.31 1.36	<p>These are variations of similar options. Unlike all other options, these start at the western end with a continuation of the Blackburn Bridge Improvement that follows an alignment (with single carriageway cross section) south of the existing N15 until reaching a proposed roundabout at Dooish. Here the options head northwestwards, crossing the existing N15, before continuing a combination of alignments similar to Options 1.25, 1.26 and 1.27. These have two junctions, the first located south of the proposed Finn crossing with the R252 and the second located north of Stranorlar with a link road back to the N13. The difference between the options is due to a different alignment for each through Troopers Hill, Backlees</p>

Option	Corridor Description and Reasons for Short-listing
	<p>and Teevickmoy. All options cross the River Finn where it is deep channel and the river is less than 100m wide.</p> <p>Options 1.30, 1.31 and 1.36 are all similar in terms of direction but differing in alignment on the northern side of the river crossing with lengths of 11.9 km (second shortest), 11.1 km (shortest) and 12.1 km (3rd longest) respectively. Each option crosses the River Finn at the same point where the river channel is well defined, so it can be crossed without the need to place piers in the river and has low indirect impact on the SAC. All options have two junctions with the local road network at the R252 and N13 North, providing similar benefit to local traffic, as Option 1.10.</p> <p>Option 1.31 is the lowest cost of all options considered. Each of these three options are located closer to the towns that Options 1.6, 1.9 and 1.10 which mean they impact a higher number of houses and have a higher impact on zoned land.</p>

5.6.1.2 Stage 2 Options Assessment

The six shortlisted options that were taken forward from Stage 1 to Stage 2 were renamed and colour coded to make referencing easier and provide a better visual aid for public consultation, as per Table 5.11.

After some further design development in terms of layout, junction arrangements and possible alignments, a number of other variations and combinations were established within these six short-listed options. A number of composite options were also assessed as a sub-group within the main options. These included options for the N15 link to the eastern Stranorlar end of the scheme. A single option for the proposed Ballybofey Link was also included for applicable mainline options in this assessment. These variants to the main options are denoted 1A1, 1B1, etc. in Table 5.11.

Following the initial assessment of Options 1A to 1F and 1A1 to 1F1, a further Option 1G (Yellow) was identified. This is a composite option formed by combining the best sections of other options. It includes a link road north of the River Finn, near Teevickmoy, linking the proposed mainline with the existing N15 to the north of Stranorlar.

Table 5.11: Shortlisted Options from Stage 1 to Stage 2

Stage 1 Option Name	Stage 2 Option Colour and Name	Variants
Option 1.6	Orange 1A	1A1
Option 1.9	Purple 1B	1B1
Option 1.10	Pink 1C	1C1
Option 1.30	Red 1D	1D1
Option 1.31	Green 1E	1E1
Option 1.36	Blue 1F	1F1
Composite Route	Yellow 1G	-

These six shortlisted options plus the composite option 1G are illustrated in Figure 5.9 with colour-coding as per Table 5.11.

The Stage 2 appraisal of options was carried out in accordance with process as set out in Section 5.5.5. All options were appraised under the six main CAF criteria. This included environmental appraisal in accordance with the EIA Directive requirements.

All assessments are detailed in the Stage 2 appraisal presented in Volume D1 of the Option Selection report and is available on the project website at this link: https://www.donegal-ten-t.ie/media/download_gallery/Volume%20D1%20Section%201%20Environmental%20Appendices.pdf.

A summary of the Stage 2 appraisal is presented in Section 9 of the Phase 2 Options Selection Report available on the project website at this link: https://www.donegal-ten-t.ie/media/Option_Selection_Report/Volume%20A%20-%20Main%20Report.pdf

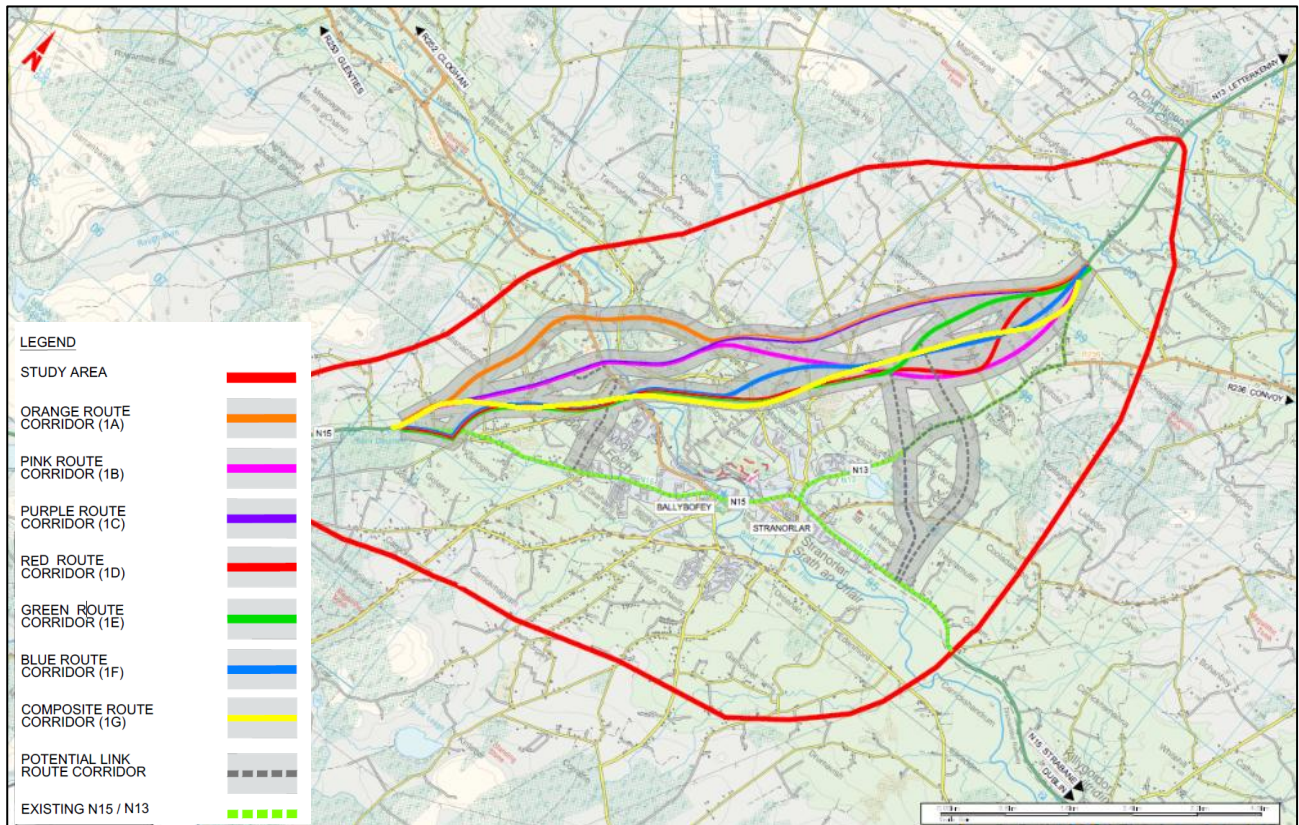


Figure 5.9: Section 1, Stage 2 Options

The environmental appraisal of the options is summarised in the following sections.

5.6.1.2.1 Population and Human Health

Both population and human health were considered as part of both the environmental and engineering criteria. The air quality is expected to improve for some receptors on the existing roads due to traffic moving to the Proposed Development but this will also introduce new receptors along the new alignment that will be exposed to higher levels of emissions. Both will have a direct impact on human health. Similarly, there will be a reduction in traffic noise at some locations on the existing road network as a result of the Proposed Development while there will be new receptors that will experience an increase in noise given their proximity to the new alignment. The impacts on population were also considered within the Material Assets Non-agricultural MCA topic in relation to settlements, community facilities, severance, properties etc. Refer to each of the individual MCA environmental criteria below for the results.

Within the engineering criterion, considerations to do with safety, physical activity, integration, accessibility & social inclusion all impact on population and human health. Using these criteria, Option 1G is preferred as it provides greater safety performance, a greater degree of accessibility to services and facilities, integration with land-use plans and the existing transport network, and will contribute to a positive impact to noise sensitive receptors.

5.6.1.2.2 Biodiversity

The biodiversity study compared the potential impacts of the options for Section 1 on the terrestrial and aquatic natural environment. Each of the options was assessed as a 300m wide corridor to determine potential impacts on the principal ecological receptors within or adjacent to each option, and also in relation to potential impacts arising from fragmentation or interference with species' movement across the options. The assessment was undertaken in accordance with the NRA Guidelines for the Assessment of Ecological Impacts of National Road Schemes (Revision 2, June 2009).

The appraisal of biodiversity, both aquatic and terrestrial ecology, involved desk and field studies in order to characterise habitats and identify flora and fauna of ecological value of all potentially affected habitats intercepted by, or within the Zone of Influence of, each of the options.

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

In conclusion, the emerging preferred options in relation to Biodiversity are Options 1B and 1B1, given the limited number of risks to the identified ERs when compared to other options assessed.

5.6.1.2.3 Land

Land was considered as part of the Soils, Geology and Hydrogeology, Material Assets Agricultural, and Material Assets Non-agricultural environmental criteria. Refer to each of those three sections for the results.

5.6.1.2.4 Soils

The soils, geology and hydrogeology assessment examine each option in terms of their importance and the possible impacts resulting from the construction of a proposed option. The options are compared, and impacts assessed from a land, soil, and hydrogeological perspective

Options 1A, 1A1, 1C, 1C1, 1D, 1D1, 1E and 1E1 are the most favourable options with the same number of minor negative and neutral impacts. All eight of these options traverse poor or soft ground that requires excavation, and all eight option traverse areas of Locally important aquifer (LI & Lg) and areas of extreme groundwater vulnerability. Option 1B and 1B1 are the least preferred with respect to their impact on the soil, geology and hydrogeology in the Zone of Influence, since these options traverse and cut through longer areas of high groundwater vulnerability and locally important aquifer than the other option.

Option 1A, 1A1, 1C, 1C1, 1D, 1D1, 1E and 1E1 have an overall impact score of 'not significant or neutral' on the soil, geology and hydrogeology in the TEN-T Section 1 Zone of Influence with an impact score of 'minor negative' applied to all other option in Section 1.

5.6.1.2.5 Water

The hydrology assessment was prepared having regard to the TII Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes as recommended by the TII Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis. A comparative evaluation of the options was undertaken, having regard to the specific hydrological impacts associated with each option in order to identify a preferred option(s).

The hydrological assessment has determined that Option 1B/1B1 (Pink) is the preferred option. This is primarily on the basis of the avoidance of areas with a potential for flooding and reduction in required river crossing lengths.

In terms of drainage of road runoff and water quality issues, each option would have similar effects both during and after construction. Again, the 1B/1B2 (Pink) option would be considered the preferred option as it encounters the least number of watercourses along its length.

It is recommended that the ultimate preferred option be aligned as necessary to avoid encroaching upon watercourses and their potential flood extents. Any required crossings will require detailed hydrological and hydraulic analysis so as to eliminate any risk of flooding to adjacent lands. Adequate storm water attenuation and treatment will be required before out-falling to any watercourse along the option due to every watercourse being At Risk to not meet its WFD objectives.

5.6.1.2.6 Air & Climate

The air quality and climate analysis was undertaken by means of a desktop assessment. The assessment focussed on NO_x exposure, PM₁₀ exposure and the anticipated climate impacts through a calculation on greenhouse gas emissions (GHG).

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

Climate impacts are largely the same for each option and they all were determined to be moderately negative in impact.

5.6.1.2.7 Noise & Vibration

A comparative assessment of each of the seven options in Section 2 was carried out in relation to noise with reference to key sensitive receptors in proximity to the proposed options. The noise impacts for each of the options are identified so that those impacted by unacceptably high levels of noise can be avoided where feasible as part of the overall option selection process.

A qualitative assessment was carried out where the property impact rating (PIR) was calculated. The PIR is based on the anticipated traffic flows using each option and the number of properties likely to be impacted, banded into distances from the centreline of each option and within a 300m wide corridor. A qualitative assessment was then carried out which considered factors such as noise sensitive receptors and populated areas. The results of the quantitative and qualitative assessments were then combined to provide an overall impact level for each option.

Option 1E1 is the most preferred option from a noise and vibration perspective as it leads to a noticeable reduction in noise levels in the urban centre of Ballybofey/ Stranorlar. There is only a marginal difference between Option 1E1 and Options 1B, 1D, 1D1, 1E and 1G which would see similar reductions in noise levels through the urban centre.

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

5.6.1.2.8 Landscape & Visual

The landscape and visual impact assessment was undertaken to identify the receptors associated with each option and the likely effects upon them which are then taken into consideration in developing and refining the options. A desktop study was undertaken, as well as site visits to establish an understanding of the landscape and visual context of the proposed options.

When landscape impacts are considered overall for the proposed options there is a slight preference for Option 1G as this option avoids impacts on larger areas of mixed species woodland on the southern slopes of Trooper's Hill associated with other options. However, there will still be an impact on the woodland to the west of Drumboe Lower. Also, Option 1G is closer in proximity to Ballybofey and therefore is likely to have a

lesser impact on the landscape in terms of the River Finn crossing than the other options. There is little difference between all of the other options considered with all options having a major or highly negative impact level.

When visual impacts are considered all options have the potential to directly affect existing residential properties to some degree. Out of all the options considered, there would be a slight preference, in visual impact terms, for either of Option 1F or Option 1G. In a comparative assessment between the two, Option 1G would be the preferred option, as it has a lower number of residential properties within the 0-50m and 50-100m distance banding when compared against Option 1F.

5.6.1.2.9 Material Assets

The assessment was informed by the Transport Infrastructure Ireland (TII) Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis (PE-PAG-02031). The assessment focussed on both agricultural and non-agricultural material assets.

In relation to the agricultural assessment, Option 1E was determined to be the preferred option as it interacts the least with agricultural activities and land. This is closely followed by Option 1D. Option 1B and 1C follow, being the third most preferred route, as they do not significantly affect sensitive farms or landholdings. Option 1A1 is the least preferred option since it interacts with the greatest number of landholdings.

In relation to the non-agricultural assessment, all options scored the same at slightly negative with an impact score of 3.

5.6.1.2.10 Waste

At this stage in the project, it is difficult to predict estimates of the likely quantities of waste that will be generated. The cut/fill balance for each option, based on preliminary alignments, was estimated to consider how much of a deficit or surplus in excavated material there may be with each option. Where there is a potential surplus in material from the earthworks, then it is possible that some of it may become a waste. This surplus was used as the basis for evaluating the potential impact of each option and ranking preferences.

Options 1F1 and 1G have the lowest cut/fill differences and therefore score a neutral impact, Options 1D1 and 1E1 require an import of material and therefore have a neutral impact for waste. Options 1D and 1E is the option with the largest difference and is therefore considered to have a major negative impact. All other options range between minor to slightly negative and moderately negative.

5.6.1.2.11 Cultural Heritage

The architectural heritage and archaeology assessments (together known as cultural heritage) was undertaken in accordance with 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).

From a Cultural Heritage perspective and based on a quantitative and qualitative assessment; the Purple 1C Route is the preferred option, followed by, in order of preference: 1C1 (Purple), 1A (Orange), 1A1 (Orange), 1B1 (Pink), 1B (Pink), 1F1 (Blue), 1F (Blue), 1G (Yellow), 1E1 (Green), 1D1 (Red), 1E (Green), and 1D (Red).

None of the proposed options have a direct negative profound impact on the recorded Cultural Heritage resource.

5.6.1.2.12 Summary of Environmental Appraisal

A summary of the results of the MCA of the Stage 2 options is presented in Table 5.12. This table presents the impact score using the ratings from TII PAG Unit 7, scoring from 1 – Major or Highly Negative to 7 – Major or Highly Positive, as shown previously in Table 5.6 in Section 5.5.5.

The matrix in Table 5.12 shows that Option 1G achieved the top overall score of 110, followed by Options 1B1, 1D1 and Option 1E1 with a score of 107, with all other options scoring lower. It must be emphasised that summing of impact scores does not account for the relative importance of each sub criteria or the individual impacts or preferences, but provides an initial comparison between the overall, non-weighted performance of each option. As such, Option 1G emerges to the front as an option performing well, on balance, considering all impacts.

A secondary appraisal matrix showing the preferences of each option across the sub-criterion was also prepared to ensure consideration of other factors that may inform a decision on the emerging preferred option. This matrix is based on expert opinion and was used as the primary tool for the choice of option. For each topic, the specialists, including the EIAR specialists, also provided a preference for the options which were grouped and colour coded Green (Preferred), Orange (Intermediate), and Red (Least Preferred). A summary of this is provided in Table 5.13. The table demonstrates that Option 1G also has the highest number of preferences with no 'least preferred' across all the criteria. This supports further the choice of Option 1G as the Emerging Preferred Option.

Section 1 options were assessed under each Project Appraisal criteria, and upon review of the Project Appraisal matrices prepared, it is evident that Option 1G is preferred in terms of impact score and preferences. As such, Option 1G was identified as the emerging preferred option. This option includes the link road from the townland of Teevickmoy to the existing N15 to the north of Stranorlar.

Table 5.12: Stage 2 Project Appraisal Matrix for Section 1

Option Colour Option Name	Orange		Pink		Purple		Red		Green		Blue		Yellow
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Environment													
Air Quality & Climate	2	2	2	3	2	2	3	3	3	3	3	3	3
Noise	4	3	5	4	4	3	5	5	5	5	4	4	5
Landscape & Visual	1	1	1	1	1	1	1	1	1	1	1	1	1
Biodiversity	1	1	2	2	1	1	1	1	1	1	1	1	1
Waste	2	2	2	2	2	2	1	4	1	4	2	3	4
Soils, Geology and Hydrogeology	4	4	3	3	4	4	4	4	4	4	3	3	3
Hydrology	2	2	3	3	3	2	2	2	2	2	2	2	2
Cultural Heritage	2	2	2	2	2	2	1	1	1	1	2	2	2
Material Assets - Agricultural	2	2	2	2	2	2	2	2	2	2	2	2	2
Material Assets - Non-agricultural	3	3	3	3	3	3	3	3	3	3	3	3	3
Environment Sub-Total	23	22	25	25	24	22	23	26	23	26	23	24	26
Safety													
Safety and Security of Road Users	6	6	6	6	6	6	6	6	6	6	6	6	6
Collision Reduction	6	6	6	6	6	6	5	5	5	5	5	5	6
Road Safety Audit (Stage F)	6	5	6	6	6	5	6	6	6	6	5	5	7
Road Safety Impact Assessment	6	6	6	7	6	7	6	6	6	6	6	6	7
Safety Sub-Total	24	23	24	25	24	24	23	23	23	23	22	22	26
Physical Activity													
Physical Activity	6	6	6	6	6	6	6	6	6	6	6	6	6
Physical Activity Sub-Total	6	6	6	6	6	6	6	6	6	6	6	6	6

Option Colour Option Name	Orange		Pink		Purple		Red		Green		Blue		Yellow
	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Economy													
Transport Efficiency and Effectiveness	7	7	7	7	7	7	7	7	7	7	7	7	7
Wider Economic Impacts	5	5	5	5	5	5	5	5	5	5	5	5	5
Funding Impacts	5	5	5	5	5	5	5	5	5	5	5	5	5
Economy Sub-Total	17	17	17	17	17	17	17	17	17	17	17	17	17
Accessibility and Social Inclusion													
Deprived Geographical Areas	4	4	4	4	4	4	4	4	4	4	4	4	4
Vulnerable Groups	4	4	5	5	4	4	5	5	5	5	5	5	5
Accessibility and Social Inclusion Sub-Total	8	8	9	9	8	8	9	9	9	9	9	9	9
Integration													
Transport Integration	6	6	6	6	6	6	6	6	6	6	6	6	6
Land use Integration	5	5	5	5	5	5	6	6	6	6	6	6	6
Geographical Integration	7	7	7	7	7	7	7	7	7	7	7	7	7
Other Government Policy Integration	7	7	7	7	7	7	7	7	7	7	7	7	7
Integration Sub-Total	25	25	25	25	25	25	26	26	26	26	26	26	26
Total Impact Scores	103	101	106	107	104	102	104	107	104	107	103	104	110

Table 5.13: Stage 2 Preference Summary Section 1

Option Colour	Orange		Pink		Purple		Red		Green		Blue		Yellow
Option Name	1A	1A1	1B	1B1	1C	1C1	1D	1D1	1E	1E1	1F	1F1	1G
Environment													
Air Quality & Climate	Least Preferred	Intermediate	Intermediate	Preferred	Intermediate	Intermediate	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
Noise	Intermediate	Least Preferred	Preferred	Intermediate	Intermediate	Least Preferred	Preferred	Preferred	Preferred	Preferred	Intermediate	Intermediate	Preferred
Landscape & Visual	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Preferred
Biodiversity	Least Preferred	Intermediate	Intermediate	Preferred	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Waste	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Least Preferred	Preferred	Least Preferred	Preferred	Intermediate	Intermediate	Preferred
Soils, Geology and Hydrogeology	Preferred	Preferred	Least Preferred	Least Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Intermediate	Intermediate	Intermediate
Hydrology	Intermediate	Intermediate	Preferred	Preferred	Preferred	Intermediate	Intermediate	Least Preferred	Intermediate	Least Preferred	Intermediate	Intermediate	Intermediate
Cultural Heritage	Intermediate	Intermediate	Intermediate	Intermediate	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Intermediate	Intermediate	Intermediate
Material Assets - Agricultural	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Preferred	Intermediate	Intermediate	Intermediate	Intermediate
Material Assets - Non-agricultural	Preferred	Preferred	Least Preferred	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Safety													
Safety and Security of Road Users	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Collision Reduction	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Preferred
Road Safety Audit (Stage F)	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Preferred
Road Safety Impact Assessment	Intermediate	Intermediate	Intermediate	Preferred	Intermediate	Preferred	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Preferred
Physical Activity													
Physical Activity	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Preferred
Economy													
Transport Efficiency and Effectiveness	Least Preferred	Least Preferred	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Preferred	Preferred	Intermediate	Intermediate	Intermediate
Wider Economic Impacts	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Funding Impacts	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Accessibility and Social Inclusion													
Deprived Geographical Areas	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Vulnerable Groups	Least Preferred	Least Preferred	Intermediate	Intermediate	Least Preferred	Least Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
Integration													
Transport Integration	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
Land use Integration	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
Geographical Integration	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
Other Government Policy Integration	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred

5.6.1.3 Ballybofey Link Options

5.6.1.3.1 Summary of process and options considered

During the Stage 2 appraisal of options, a local link for Ballybofey was included equally for each option that provided connectivity from the proposed junction with the mainline of the Proposed Development at Cappry to the existing road network.

The preferred Option 1G included this local connection that took the form of a link from the proposed junction, connecting with the R252 in the vicinity of Logues Bridge and connecting to the existing N15 in the vicinity of Woodland Road / Aishling Court. Both the proposed mainline and associated Ballybofey Link Road were subject to a Stage 2 appraisal in accordance the TII PAG Unit 7.0.

Following the identification of Option 1G as the preferred option, further detailed consideration was given to the optimisation of the Ballybofey Link to explore if there were alternative, better alignments and junction arrangements for this link. In doing so, 19 preliminary options for the Ballybofey Link road (LR1 through LR19) were identified and underwent a Stage 1 appraisal. The 19 options considered at Stage 1 for the link are shown in Figure 5.10.



Figure 5.10: Ballybofey Link Road Stage 1 Options

Following the Stage 1 assessment 14 options were eliminated and 5 options were shortlisted for Stage 2 appraisal.

From an environmental perspective, the main reasons for the elimination of options were:

- Significant area within flood zone.
- Significant earthworks deficits/ surpluses with horizontal and vertical alignments within the existing topography that may negatively impact on landscape and visual.

- Poor ground conditions.
- Limited compatibility with the local area plan.
- Proximity to and areas within the River Finn SAC.
- Impacts to existing forestry/ woodland and associated amenities.
- Proximity to residential areas.
- Cultural heritage features within 300m of the centreline.
- Large number of receptors within 300m of centreline.
- Community severance.
- New bridge crossing.

Full details on the assessment of the options at Stage 1 are available in Appendix C1.5 of Volume C1 of the Options Selection Report available on the project website at this link: [https://www.donegal-ten-t.ie/media/download_gallery/Volume%20C1%20-%20Section%201%20Non%20Environmental%20Appendices\(1\).pdf](https://www.donegal-ten-t.ie/media/download_gallery/Volume%20C1%20-%20Section%201%20Non%20Environmental%20Appendices(1).pdf).

The eliminated options and the main reasons for elimination are summarised in Table 5.14.

Table 5.14: Eliminated Options from the Stage 1 Preliminary Options Assessment

Option	Reasons for Elimination
LR2	New river crossing, blocks the flood plains, potential impact to SAC and hence rejected.
LR3	Proposed roundabout needs to be raised at least 5m to achieve gradients and hence rejected.
LR4	vertical alignment not within the standard guidelines, large amount of earthworks required, proposed roundabout needs to be raised 10m to achieve gradients and hence rejected.
LR6	Poor option across multiple criteria, hence rejected.
LR7	While this option is feasible, it is less safe than other options. Not taken forward
LR8	Poor option across multiple criteria, hence rejected.
LR9	Poor option across multiple criteria, hence rejected.
LR10	Poor option across multiple criteria, hence rejected.
LR11	Poor option across multiple criteria, hence rejected.
LR12	Vertical alignment requires large amount of earthworks, direct impacts to Archaeology and hence rejected.
LR13	Vertical alignment requires large amount of earthworks, direct impacts to Archaeology and hence rejected.
LR16	While this option is feasible, it is less safe than other options and is not in compliance with Local Area Plan. Not taken forward.
LR17	While this option is feasible, it is less safe than other options and is not in compliance with Local Area Plan. Not taken forward.
LR18	Low score across multiple criteria and hence rejected.

The five short-listed options for the proposed Ballybofey Link Road Options are as shown in Table 5.15. These five options are described as follows and are depicted in the individual mapping below from the OSR.

Table 5.15: Ballybofey Link Road Shortlisted Options for Stage 2

Stage 1 Option Name	Stage 2 Name and Description of Option	Map
LR1	<p>Option A</p> <p>This Link Road Option A commences at the junction of the R252 and a local road to the west of Ballybofey, to the south of the River Finn and traverses in a generally north-south alignment to the N15. The properties in the area are largely residential with ribbon development along existing road infrastructure and housing estates in Blue Cedars and Aishling Court. There are 16 properties within the 50m zone from the corridor centreline.</p>	


Stage 1 Option Name	Stage 2 Name and Description of Option	Map
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LR5 Option B

Link Road Option B at the proposed junction with preferred Option 1G Option, to the south of the proposed River Finn bridge crossing and traverses in a generally south-east alignment, with a link to the N15 between two houses and a new link back to the R252, north of Cois na Finn housing estate. This corridor intersects the Blue Cedars and Cois na Finn housing estates and skirts the back of Hawthorn Close. There are 12 properties within the 50m zone from the corridor centreline.



Stage 1 Option Name	Stage 2 Name and Description of Option	Map
LR14	<p>Option C</p> <p>Similar to Link Road Option B, Link Road Option C commences at the proposed junction with preferred Option 1G Option, to the south of the proposed River Finn bridge crossing and traverses in a generally south-east alignment and ties in with the N15 to the east of Hawthorn Close. A new link between the existing R252 and the N15 between the Bramble Hill industrial estate and Glenview housing estate is also provided. This corridor also intersects the Hawthorn Close, Blue Cedars and Cois na Finn housing estates. There are 31 properties within the 50m zone from the corridor centreline.</p>	

Stage 1 Option Name	Stage 2 Name and Description of Option	Map
LR15	<p>Option D</p> <p>Similar to Link Road Options B and C, Link Road Option D commences at the proposed junction with preferred Option 1G Option, to the south of the proposed River Finn bridge crossing and traverses in a generally south-east alignment and provides a new link with the N15 to the immediate west of Ballybofey. This link lies between the Bramble Hill industrial estate and Glenview housing estate. This corridor also intersects the Blue Cedars and Cois na Finn housing estates and skirts the back of Hawthorn Close. There are 28 properties within the 50m zone from the corridor centreline.</p>	

Stage 1 Option Name	Stage 2 Name and Description of Option	Map
LR19	<p>Option E</p> <p>Similar to Link Road Options B, C, and D, Link Road Option E commences at the proposed junction with preferred Option 1G Route, to the south of the proposed River Finn bridge crossing and traverses in a generally south-east alignment and provides a new link with the N15 to the immediate west of Ballybofey. This link lies between the Bramble Hill industrial estate and Glenview housing estate. This corridor also intersects the Blue Cedars and Cois na Finn housing estates and skirts the back of Hawthorn Close. There are 16 properties within the 50m zone from the corridor centreline.</p>	

The Stage 2 appraisal of link road options was carried out in accordance with process as set out in Section 5.5.5. All options were appraised under the six main CAF criteria. This included environmental appraisal in accordance with the EIA Directive requirements.

All assessments are detailed in the Stage 2 appraisal presented in Volume D, Appendix D1.11 of the Option Selection report and is available on the project website at this link: https://www.donegal-ten-t.ie/media/download_gallery/Volume%20D1%20Section%201%20Environmental%20Appendices.pdf.

A summary of the Stage 2 appraisal is presented in Section 9.10 of the Phase 2 Options Selection Report available on the project website at this link: https://www.donegal-ten-t.ie/media/Option_Selection_Report/Volume%20A%20-%20Main%20Report.pdf.

The environmental appraisal of the options is summarised in the following sections.

5.6.1.3.2 Population and Human Health

Both population and human health were considered as part of both the environmental and engineering assessments. Of most relevance to the population and human health assessment, accessibility and social inclusion and integration, Option E is the preferred option. From a population perspective, Options B, C, D and E provide the closer links to the town centre, so are favourable over Option A. Options A, B and E provide a direct link between the R252 and the existing N15 so are favourable to Options C and D. On balance, all options provide a moderately positive impact, but Option E is preferred over the other options since it has both direct access to the R252 and a tie in with the N15 close to the town centre. From a safety perspective, Option E provides the option with the least number of potential conflict points with existing junctions and accesses, and is therefore the preferred option. In terms of human health Option E is also the preferred option as it has fewer receptors within close proximity to it.

5.6.1.3.3 Biodiversity

All of the link road options assessed are situated within or adjoining the area spanned by Option 1G between the townland of Cappry and rural area immediately west of Ballybofey town. It is to be noted that Option 1G intersects the River Finn (SAC) which is identified under two Ecological Receptors (ER) including the River Finn SAC (ER1) and otter (*Lutra lutra*) (ER2) which is a Qualifying Interest (QI) for the SAC.

Option A has the potential to impact three individual ERs, two of which are considered to be of International Importance (ER1 and ER2) and one considered to be of Local Importance (Higher Value) (ER6). Option A is the least impactful of the link road options from aquatic ecology perspective, both quantitatively and qualitatively.

The Option B corridor interacts with two ERs of International Importance at two locations, and one ER of Local Importance (Higher Value), ER25. This option corridor has a significantly larger intersection with ER1 and ER2 in comparison to Option A and includes the full surface area of ER25. Therefore, the link option has a potential for significant negative impacts on ecological receptors.

The Option C corridor interacts with two ERs of International Importance, ER1 and ER2, and one ER of Local Importance (Higher Value), ER25. The option has the same number of interactions with ER1 and ER2 as Option B. However, Option C has a larger corridor footprint that covers a larger surface area of the River Finn watercourse and consequently has a greater risk of negative impacts occurring to ER1 and ER2. The option also has a significant impact of ER25, however, link option C impacts 0.0003481 sq.km less surface area of ER25 than Option B. The cumulative impact of Option C in association with the River Finn main channel crossing is elevated (potentially Moderate - temporary, negative, localised), especially compared to Option A.

Similar to Link Road Option A, Link Road Option D has two direct interactions with ER1 and ER2 compared to Option B and Option C which have four interactions on ER1 and ER2. The overall corridor footprint still poses a risk of potential significant negative impacts to ER1 and ER2 due to hydrological connectivity to the River Finn and the direct overlap with ER2. In addition, this option corridor covers the full surface area of ER25, however it does not intersect ER6 in comparison to Link Road Option A.

Option E intersects ecological receptor ER25, which comprises a habitat mosaic PF2/GS4/GM1 which is being fed by a water source from the sloped land present at the southern boundary of this field system. There are 2no. dug well features are located in the field boundaries adjacent to this habitat. This wetland habitat is to be considered an ecological receptor with a ranking of Local Importance (higher value). It does not directly interact with any other ER identified within the study area. The overall corridor area has a high potential for commuting and foraging activity of volant and non-volant mammals protected under the Wildlife Act (1976 as amended). The cumulative impact of Option E in association with the Finn main channel crossing is slightly elevated (potentially Slight - temporary, negative, localised) compared to Option A.

Overall, Option E is preferred, Option C is Least Preferred, and the other three options are Intermediate.

5.6.1.3.4 Land

Land was considered as part of the Soils, Geology and Hydrogeology, Material Assets Agricultural, and Material Assets Non-agricultural environmental criteria. Refer to each of those three sections for the result.

5.6.1.3.5 Soils

From the review of the impacts of each proposed option on the soils, geology and hydrogeology each of the options have a similar degree of impacts. None of the five options traverse poor or soft ground that requires excavation or traverse areas of Locally important aquifer (LI & Lg). Areas of extreme groundwater vulnerability were not identified in the areas of Ballybofey Link Roads. The underlying aquifer is a Poor Aquifer. In assessing a preferred route option from a geological and hydrogeological perspective, the impacts are all similar and as such, each route option has equal ranking.

5.6.1.3.6 Water

Option A is 2.1 km. This is the second shortest route comparing against all other options. The 300m buffer zone encroaches upon approximately 100m length of minor tributary Aghasheil (01_553). Option A ranks Intermediate.

Option B is 2.4 km. This is the third longest route comparing against all other options. The preliminary eastern R252 link road corridors and roundabout are located approximately 30m from CFRAM predictive flood extents for the River Finn (01_591). The 300m buffer zone encroaches upon approximately 320m length of minor tributary Aghasheil (01_553). Option B ranks Intermediate.

Option C may have a moderately negative impact on the hydrology of the area and ranks 5th with regards to preferred options. This is mainly due to the proximity of the eastern link roads to the predictive CFRAM flood extents of the River Finn, the length of the route option and the extent of buffer zone encroaching on the CFRAM extents. Option C is Least Preferred.

Option D is 1.9km. This is the shortest route comparing against all other options and so it is assumed that this option will transform the least greenfield area to impermeable surfaces. However, the 300m buffer zone encroaches upon approximately 320m length of minor tributary Aghasheil (01_553). Option D ranks Intermediate.

Option E is 3.2 km. This is the longest route when compared against all other link road options and so will result in the most greenfield area transformed to impermeable surfaces. The 300m buffer zone also does not encroach upon any EPA identified watercourses. Option E is Preferred.

Overall, Option E should not have a significant impact on the hydrology of the area and is the preferred link road option.

5.6.1.3.7 Air & Climate

Option C has the potential to impact on the greatest number of properties (31) relative to each of the other proposed options and along with Option D is intermediate in ranking. Options C and D are classed as moderately negative for air quality given the higher number of properties potentially impacted. Of the other options, Options B (12) and A (16) and E (16) will impact on the least number of properties and are

considered to pose a minor or slightly negative impact to air quality and these are considered the preferred route for air quality for this route.

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

For the Ballybofey Link Road Options both parameters combined result in routes Option A, B and E indicate the highest preference score and as a result these options are the preferred options for air quality and climate.

5.6.1.3.8 Noise & Vibration

A comparative assessment of each of the seven options in Section 2 was carried out in relation to noise with reference to key sensitive receptors in proximity to the proposed options. The noise impacts for each of the options are identified so that those impacted by unacceptably high levels of noise can be avoided where feasible as part of the overall option selection process.

A qualitative assessment was carried out where the property impact rating (PIR) was calculated. The PIR is based on the anticipated traffic flows using each option and the number of properties likely to be impacted, banded into distances from the centreline of each option and within a 300m wide corridor. A qualitative assessment was then carried out which considered factors such as noise sensitive receptors and populated areas. The results of the quantitative and qualitative assessments were then combined to provide an overall impact level for each option.

Link road Option A provides a short route through open country requiring the least mitigation. The other four link road options are routed significantly closer to residential areas, have higher PIR scores and would require significant mitigation. The increase in traffic noise above baseline if Option A is not selected will be noticeable at some properties.

Based on the noise assessment for Link Roads for Section 1, it was deemed that Link Road Option A was the most preferred option from a noise and vibration perspective. The least preferred option is Link Road D.

5.6.1.3.9 Landscape & Visual

When landscape impacts are considered overall for the proposed Link Road Options there is a slight preference for Option A as it is considered to introduce fewer newer features into the landscape than the other Link Road Options being assessed and is the second shortest in overall length. Options B, C, D and E introduce significant new features into the landscape as a consequence of junction connection with the Option 1G Route corridor, with Link Road Options B, C and D introducing newer features (embankments) immediately west of Ballybofey.

When visual impacts are considered overall Option A; whilst having the second highest potential for impacts on residential properties in the 0-50m distance band is preferred as such impacts are already experienced by residential properties adjacent to the local road utilised as the link to the R252 and the Link Road Option has the lowest potential for visual impacts on residential properties within 300m of the Option.

When both landscape and visual impacts are combined there is a preference for Link Road Option A, as it introduces fewer new features into the landscape to the south of the River Finn and has the lowest overall potential for visual impacts on residential properties.

5.6.1.3.10 Material Assets

In terms of agricultural impacts, the corridors were assessed against the number of folios interacting with them and the overall length of corridor. Overall Option D is Preferred because it is the shortest and potentially affects the least number of agricultural folios.

In terms of non-agricultural impacts, Options A, B and E are placed higher on scoring than Options C and D. The distinction between Options A, B and E would be influenced by the potential ability to deliver a road

within Option B and E that meets LAP objectives for lands zoned for SRR and Opportunity Site and facilitates development there without introducing an unacceptable level of traffic through the proposed future residential and commercial areas. Option A has potential to impact on a smaller number of existing sensitive residential receptors. Therefore, Option A is the preferred option.

5.6.1.3.11 Cultural Heritage

Option A measures 2.1 km and has a total of 2 no. cultural heritage assets located within the 500m wide assessment corridor.

Option B measures 2.4 km has a total of 3 no. cultural heritage assets located within the 500m wide assessment corridor.

Option C measures 2.6 km and has a total of 3 no. cultural heritage assets located within the 500m wide assessment corridor.

Option D measures 1.9 km and has a total of 3 no. cultural heritage assets located within the 500m wide assessment corridor.

Option E measures 3.2 km and has a total of 2 no. cultural heritage assets located within the 500m wide assessment corridor.

Ballybofey Link Road Option D is considered the preferred option from a cultural heritage perspective. It is the shortest option, having the least amount of greenfield ground disturbance (and therefore least likelihood to encounter sub-surface archaeological remains). In addition, there is 1 no. identified impact (slight) on the former railway line (S1-BH04) when compared with Options B and C (2 no. locations).

5.6.1.3.12 Summary of Environmental Appraisal

A summary of the results of the MCA of the Stage 2 options is presented in Table 5.16. This table presents the impact score using the ratings from TII PAG Unit 7, scoring from 1 – Major or Highly Negative to 7 – Major or Highly Positive, as shown previously in Table 5.6 in Section 5.5.5.

For each topic, the specialists, including the EIAR specialists, also provided a preference for the options which were grouped and colour coded Green (Preferred), Orange (Intermediate), and Red (Least Preferred). A summary of this is provided in Table 5.17.

From Environmental assessments, Option A scores the highest amongst all the Ballybofey link road options. Options E, B and D equally score slightly lower and Option C scores the lowest. In terms of preferences, Option A is preferred, with Option E having slightly lower preference, Options B and D having lower preference and Option C being the lowest preferred.

From Non-Environmental assessments, Option E is the highest scoring option with Options B, C and D being equally slightly lower scoring options. Option A is the lowest scoring option. Similarly, Option E has the highest preferences, with Options B, C and D having slightly lower preference and Option A having the lowest preference.

Taking into consideration the combined impacts and preference matrices for the Ballybofey Link Roads, **Option E** is identified as the preferred option with the highest cumulative score and the highest number of preferences.

The final selection of Link Option E for the Ballybofey Link Road did not change the conclusion that Option 1G is the preferred option for the mainline of the Proposed Development.

Table 5.16: Ballybofey Link Project Appraisal Matrix

Environment	Link A	Link B	Link C	Link D	Link E
Air Quality & Climate	3	3	2	2	3
Noise	4	3	3	3	3
Landscape & Visual	2	1	1	1	1
Terrestrial Biodiversity	2	1	1	2	2
Aquatic Biodiversity	3	2	2	2	2
Soils, Geology and Hydrogeology	4	4	4	4	4
Hydrology	3	3	2	2	3
Cultural Heritage	3	3	3	3	3
Material Assets - Agricultural	2	2	2	3	2
Material Assets - Non-agricultural	3	3	2	2	3
Environment Sub-Total	29	25	22	24	26
Safety	A	B	C	D	E
Safety and Security of Road Users	6	6	6	6	6
Collision Reduction	4	5	5	5	6
Road Safety Audit (Stage F)	5	6	6	6	6
Road Safety Impact Assessment	5	6	5	5	6
Safety Sub-Total	20	23	22	22	25
Physical Activity	A	B	C	D	E
Physical Activity	5	5	5	5	5
Physical Activity Sub-Total	5	5	5	5	5
Economy	A	B	C	D	E
Transport Efficiency and Effectiveness	7	7	7	7	7
Wider Economic Impacts	5	6	6	6	7
Funding Impacts	5	5	5	5	5
Economy Sub-Total	17	18	18	18	19
Accessibility and Social Inclusion	A	B	C	D	E
Deprived Geographical Areas	4	4	4	4	4
Vulnerable Groups	5	5	5	5	5
Accessibility and Social Inclusion Sub-Total	9	9	9	9	9
Integration	A	B	C	D	E
Transport Integration	5	5	5	5	5
Land use Integration	4	6	6	6	6
Geographical Integration	6	6	6	6	6
Other Government Policy Integration	6	6	6	6	6
Integration Sub-Total	21	23	23	23	23
Total Impact Scores	101	103	99	101	107

Table 5.17: Stage 2 Ballybofey Link Road Preference Summary

Environment	Link A	Link B	Link C	Link D	Link E
Air Quality & Climate	Preferred	Preferred	Intermediate	Intermediate	Preferred
Noise	Preferred	Intermediate	Intermediate	Least Preferred	Intermediate
Landscape & Visual	Preferred	Intermediate	Least Preferred	Intermediate	Least Preferred
Terrestrial Biodiversity	Intermediate	Intermediate	Least Preferred	Intermediate	Preferred
Aquatic Biodiversity	Preferred	Intermediate	Least Preferred	Intermediate	Intermediate
Soils, Geology and Hydrogeology	Preferred	Preferred	Preferred	Preferred	Preferred
Hydrology	Intermediate	Intermediate	Least Preferred	Intermediate	Preferred
Cultural Heritage	Intermediate	Intermediate	Intermediate	Preferred	Intermediate
Material Assets - Agricultural	Intermediate	Intermediate	Intermediate	Preferred	Intermediate
Material Assets - Non-agricultural	Preferred	Intermediate	Least Preferred	Least Preferred	Intermediate
Safety	Link A	Link B	Link C	Link D	Link E
Safety and Security of Road Users	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Collision Reduction	Least Preferred	Intermediate	Intermediate	Intermediate	Preferred
Road Safety Audit (Stage F)	Least Preferred	Intermediate	Intermediate	Intermediate	Preferred
Road Safety Impact Assessment	Intermediate	Preferred	Intermediate	Intermediate	Preferred
Physical Activity	Link A	Link B	Link C	Link D	Link E
Physical Activity	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Economy	Link A	Link B	Link C	Link D	Link E
Transport Efficiency and Effectiveness	Intermediate	Intermediate	Intermediate	Intermediate	Preferred
Wider Economic Impacts	Least Preferred	Intermediate	Intermediate	Intermediate	Preferred
Funding Impacts	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Accessibility & Social Inclusion	Link A	Link B	Link C	Link D	Link E
Deprived Geographical Areas	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Vulnerable Groups	Intermediate	Intermediate	Intermediate	Intermediate	Preferred
Integration	Link A	Link B	Link C	Link D	Link E
Transport Integration	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Land use Integration	Least Preferred	Preferred	Preferred	Preferred	Preferred
Geographical Integration	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Other Government Policy Integration	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate

5.6.1.4 Stage 3: Preferred Option for Section 1

The selected Preferred Option for Section 1 of the Proposed Development is Option 1G and Link Road Option E. The combined options are illustrated in Figure 5.11, where Option 1G is shown as the solid black line, the Teevickmoy to N15 link is the dashed black line to the north of Stranorlar, and the Ballybofey Link Road Option E is shown as the dashed black line south of the River Finn.

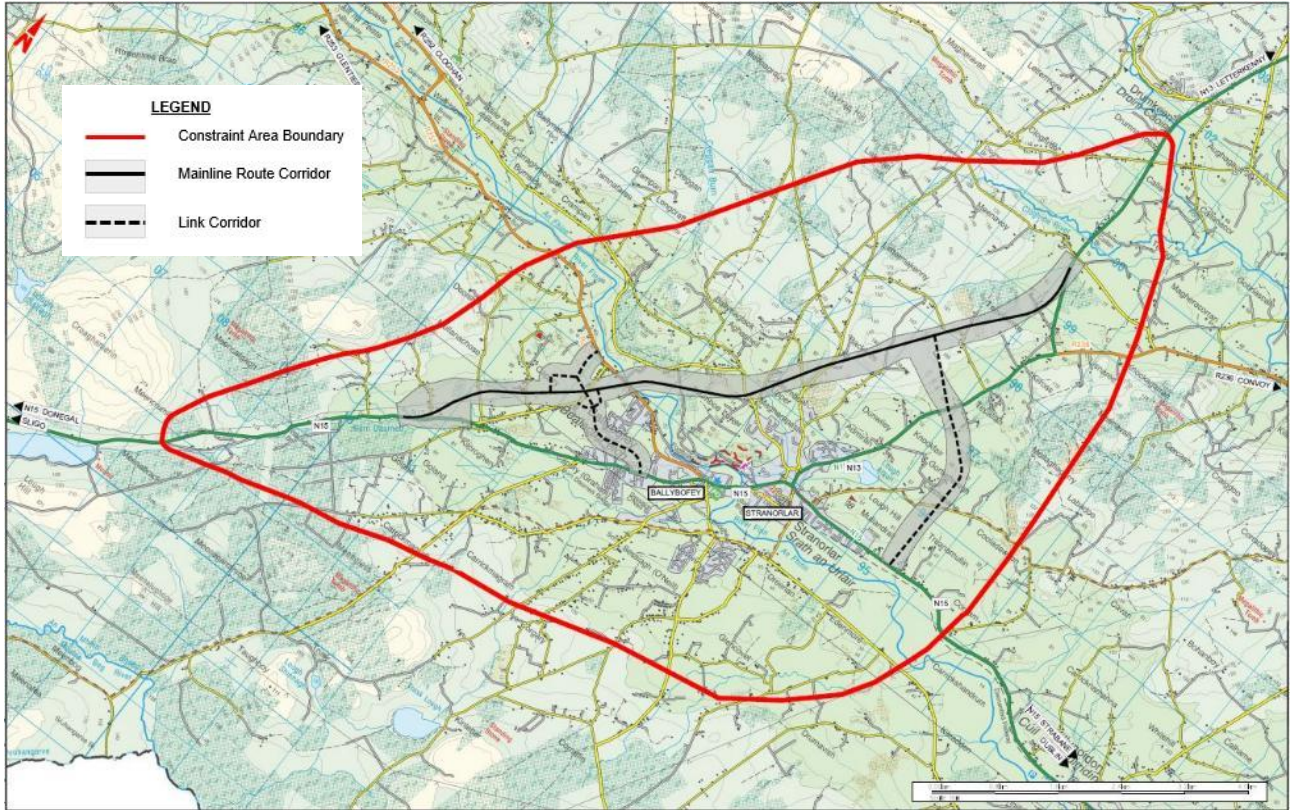


Figure 5.11: Section 1, Preferred Option 1G and Link Option E

5.6.2 Section 2: N56/N13 Letterkenny to Manorcunningham

5.6.2.1 Stage 1 Corridor Options Assessment: Section 2

A total of 28 preliminary options including nine mainline options, seven link options and varying and in-combination options have been identified. All options were considered as Type 2 Divided Road cross section in keeping with traffic figures and minimal design standards. This cross-section type has been reaffirmed through Ireland’s Government Road Safety Strategy 2021 - 2030 which directs that, in future, only divided national primary roads can be posted 100 kph. The Proposed Development mainline is a divided cross section. This also supports the National Planning Framework First Revision National Strategic Outcome 2 objective of ‘improving average journey times targeting an average inter-urban speed of 90 kph’. All preliminary corridor options are shown as blue or dashed blue lines in Figure 5.12. These lines represent a 300m wide corridors centred on preliminary 50m wide horizontal and vertical alignments. The interface between Section 2 and Section 3 of the Proposed Development was selected as the existing Pluck Roundabout where the N13 Letterkenny to Derry road meets the N14 from Lifford. All of the Section 2 preliminary options except for one terminated at this interface point. The one that does not is the option furthest south that meets with one of the options proposed as part of Section 3.

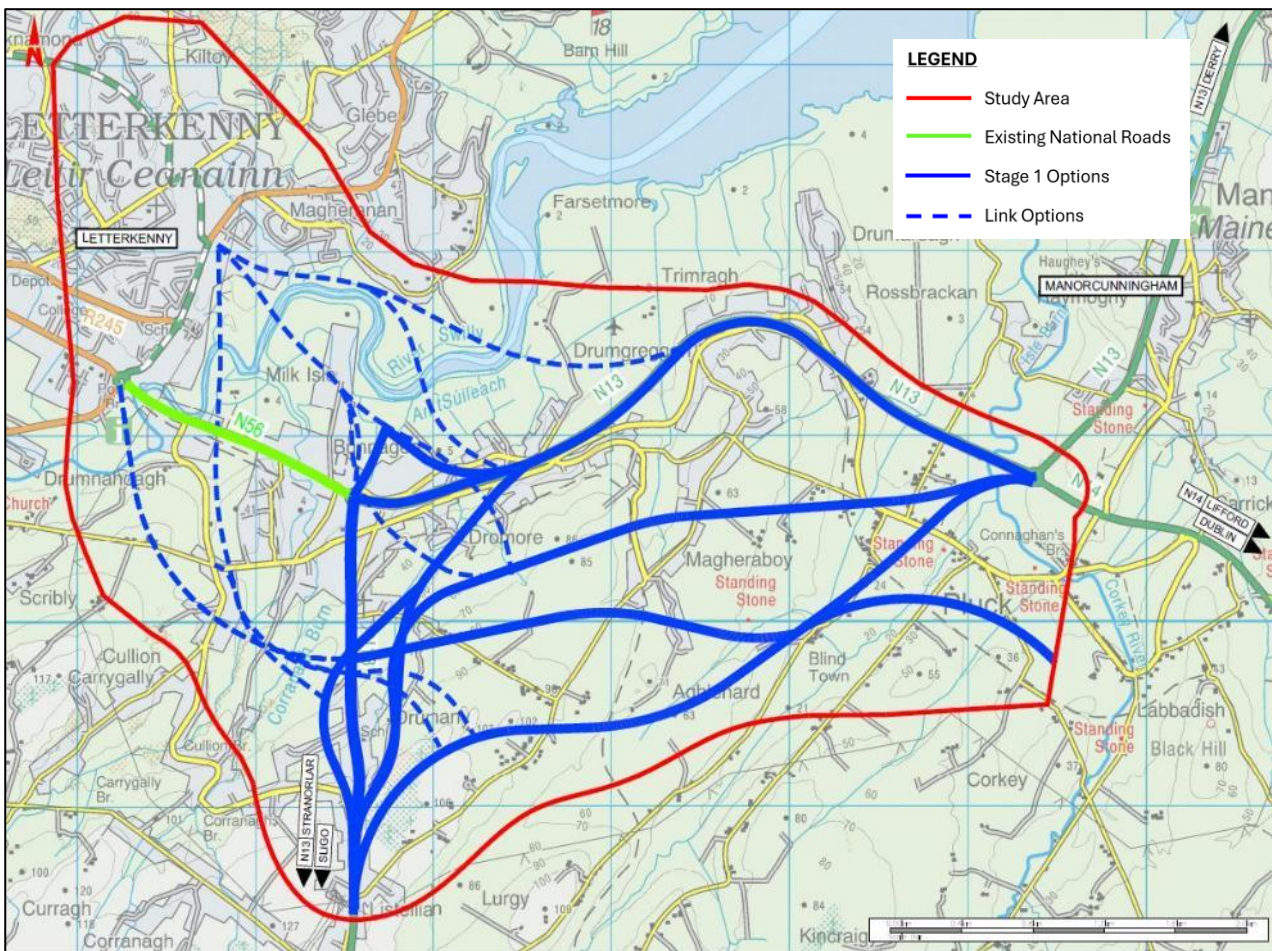


Figure 5.12: Section 2, Stage 1 Preliminary Options

A description of the stage 1 preliminary options is provided in Table 5.18.

Table 5.18: Stage 1 Preliminary Options

Option	Description
2.1	<p>Option 2.1 is predominantly an online option.</p> <p>This option uses the existing N13 commencing approximately 2km south of Dry Arch Roundabout near the townland of Listellian. A new junction is proposed online to allow for a change in road type and the closure of multiple direct accesses in the vicinity. The route continues northbound and online to the existing Dry Arch Roundabout where a junction facilitates traffic splitting:</p> <ul style="list-style-type: none"> (i) West along the existing N56 to the existing Polestar roundabout, (ii) North on a new link to the N56/R245 junction providing access to north Letterkenny and northwest Donegal, and (iii) East along the existing N13 dual carriageway. <p>The new link to the N56/R245 junction starts at the Dry Arch roundabout and passes through commercial lands heading north to a new junction. From this junction the new link turns north west heading towards the existing N56/R245 junction; a new bridge crossing of the River Swilly (approximately 100m wide) is proposed. The link terminates at the existing N56/R245.</p> <p>Travelling east along the existing N13 dual carriageway from the Dry Arch roundabout the route remains online to where it meets the N13/N14 routes at the existing Pluck roundabout, near Manorcunningham. Approximately 0.5km east of Dry Arch Roundabout a new junction allows westbound traffic to divert to the new link serving the existing N56/R245 junction. Midway along this route section between the Dry Arch and Pluck roundabouts a new grade separated junction is proposed near Trimragh which will facilitate local access onto the N13, crossing of the N13 and existing N13 access closures.</p> <p>This proposed route is online, which means existing sub-standard carriageway sections must be improved for this to be a viable option. Existing accesses along the N13 will be closed with alternate access options provided.</p>
2.2 - 2.7	<p>Options 2.2 – 2.7 have an identical realignment of the N13 from approximately 2km south of Dry Arch Roundabout, near the townland of Listellian to the eastern tie-in at the existing N13/N14 Pluck roundabout, near Manorcunningham. A new junction is proposed approximately 2km south of Dry Arch Roundabout to allow for a change in road type and the closure of multiple direct accesses in the vicinity. The N13 is realigned initially to the northwest however the option quickly sweeps back to the northeast crossing over the existing N13 (skewed), south of the existing St Patrick’s School travelling downhill, through Dromore, where it connects back to the N13 approximately 600m east of Dry Arch roundabout. From this point the option travels east along the existing dual carriageway to the N13/N14 junction.</p> <p>All options differ in their proposed link option to Letterkenny. Option 2.2 has no link provision and therefore fails to meet project objectives and must be eliminated. Options 2.3 - 2.7 include alternate link options connecting to Letterkenny. Each alternate requires a new crossing of the River Swilly connecting to the existing N56/R245 junction servicing north Letterkenny and northwest Donegal.</p>
2.8	<p>This reference is to the ‘Do Nothing’ option eliminated.</p>
2.9 – 2.12	<p>Options 2.9 – 2.12 are N13 online improvement options. These options propose to use the existing N13 corridor from approximately 2km south of Dry Arch Roundabout, near the townland of Listellian, north to the Dry Arch roundabout, at Bonagee, and then east to the tie-in termination point at the existing N13/N14 junction, near Manorcunningham. Existing and new proposed junctions will require assessed to facilitate change in road type, the closure of multiple direct accesses in the vicinity and the link connections across the River Swilly connecting to the existing N56/R245 junction, servicing north Letterkenny and points in northwest Donegal. The existing carriageway has sub-standard sections that must be improved for this to be a viable option. It is considered that direct local accesses onto the existing network will be closed for safety and alternate access points provided.</p> <p>All options differ in their proposed link option to Letterkenny. Option 2.9 has no link provision and therefore fails to meet project objectives and is eliminated. Options 2.10 - 2.12 include alternate link options connecting to Letterkenny. Each alternate requires a new crossing of the River Swilly connecting to the existing N56/R245 junction servicing north Letterkenny and northwest Donegal.</p>
2.13 – 2.17	<p>Options 2.13 – 2.17 have an identical realignment of the N13 from approximately 2km south of Dry Arch Roundabout, near the townland of Listellian to the eastern tie-in at the existing N13/N14 Pluck roundabout, near Manorcunningham. A new junction is proposed approximately 2km south of Dry Arch Roundabout to allow for a change in road type and the closure of multiple direct accesses in the vicinity. The N13 is realigned to the northeast behind the existing St Patrick’s school travelling downhill, through</p>

Option	Description
	<p>Dromore, where it connects back to the N13 approximately 600m east of Dry Arch roundabout. From this point the option travels east along the existing dual carriageway to the N13/N14 junction.</p> <p>All options differ in their proposed link option to Letterkenny. Option 2.13 has no link provision and therefore fails to meet project objectives and is eliminated. Options 2.14 - 2.17 include alternate link options connecting to Letterkenny. Each alternate requires a new crossing of the River Swilly connecting to the existing N56/R245 junction servicing north Letterkenny and northwest Donegal.</p>
2.18 – 2.21	<p>Options 2.18 – 2.21 have an identical realignment of the N13 from approximately 2km south of Dry Arch Roundabout, near the townland of Listellian to the eastern tie-in at the existing N13/N14 Pluck roundabout, near Manorcunningham. A new junction is proposed approximately 2km south of Dry Arch Roundabout to allow for a change in road type and the closure of multiple direct accesses in the vicinity. The N13 is realigned to the northeast behind the existing St Patrick’s school travelling downhill, turning due east in Dromore travelling through Magheraboy and Rossbrackan terminating with a new connection at the existing N13/N14 junction.</p> <p>All options differ in their proposed link option to Letterkenny. Option 2.18 has no link provision and therefore fails to meet project objectives and is eliminated. Options 2.19 - 2.21 include alternate link options connecting to Letterkenny. Each alternate requires a new crossing of the River Swilly connecting to the existing N56/R245 junction servicing north Letterkenny and northwest Donegal.</p>
2.22 – 2.26	<p>Options 2.22 – 2.26 have an identical realignment of the N13 from approximately 2km south of Dry Arch Roundabout, near the townland of Listellian to the eastern tie-in at the existing N13/N14 Pluck roundabout, near Manorcunningham. A new junction is proposed approximately 2km south of Dry Arch Roundabout to allow for a change in road type and the closure of multiple direct accesses in the vicinity. The N13 is realigned travelling easterly through Lurgy and Aughlihard terminating with a new connection at the existing N13/N14 junction.</p> <p>All options differ in their proposed link option to Letterkenny. Option 2.22 has no link provision and therefore fails to meet project objectives and is eliminated. Options 2.23 – 2.25 include link provisions that offer an alternative to/from Letterkenny to the existing N56 Four lane Road. Each provides a new crossing of the River Swilly and connects to the existing N56/R245 junction servicing north Letterkenny and northwest Donegal. Option 2.26 has a link provision that connects from the realigned N13 option back to the existing N13 north of St. Patrick’s school however this option has no link provision across the River Swilly and therefore fails to meet project objectives and is eliminated.</p>
2.27 – 2.31	<p>Options 2.27 – 2.31 have an identical realignment of the N13 from approximately 2km south of Dry Arch Roundabout at Lurgybrack to a new proposed N14 connection at Corkey with the N14 Manorcunningham to Lifford/Strabane/A5 Link scheme (Section 3 of this project). The options commence with a realignment of the N13 northeast behind the existing St Patrick’s school where the option turns east travelling through Lurgy and Aughlihard and terminating in Corkey where a new connection is proposed with the adjacent scheme and the existing N13/N14 junction.</p> <p>All options differ in their proposed link option to Letterkenny. Option 2.27 has no link provision and therefore fails to meet project objectives and is eliminated. Options 2.28 – 2.30 include link provisions that offer an alternative to/from Letterkenny to the existing N56 Four lane Road. Each provides a new crossing of the River Swilly and connects to the existing N56/R245 junction servicing north Letterkenny and all points in north Donegal. Option 2.31 has a link that connects from the realigned N13 option back to the existing N13 north of St. Patrick’s school however this option has no link provision across the River Swilly and therefore fails to meet project objectives and is eliminated.</p>
2.32 – 2.35	<p>Options 2.32 – 2.35 have an identical realignment of the N13 from approximately 1km south of Dry Arch Roundabout at Lurgybrack east to the eastern tie-in connection at the N13/N14 junction, near Manorcunningham. The options commence with a realignment of the N13 easterly towards Aghlehard terminating with a new connection at the existing N13/N14 junction.</p> <p>All options differ in their proposed link option to Letterkenny. Option 2.32 has no link provision and therefore fails to meet project objectives and is eliminated. Options 2.33 and 2.34 include link provisions that offer an alternative to/from Letterkenny to the existing N56 Four lane Road. Each of these link options provides a new crossing of the River Swilly connecting to the existing N56/R245 junction servicing north Letterkenny and northwest Donegal. Option 2.35 crosses over the existing local road L1114 and the river Swilly connecting to the existing Polestar roundabout.</p>
2.36 – 2.39	<p>Options 2.36 – 2.39 have an identical realignment of the N13 from approximately 1km south of Dry Arch Roundabout at Lurgybrack east to a new proposed N14 connection at Corkey with the N14 Manorcunningham to Lifford/Strabane/A5 Link scheme (Section 3 of this project). The options</p>

Option	Description
	commence with a realignment of the N13 easterly towards Aghlehard terminating in Corkey where a new connection is proposed with the adjacent scheme and the existing N13/N14 junction.
	All options differ in their proposed link option to Letterkenny. Option 2.36 has no link provision and therefore fails to meet project objectives and is eliminated. Options 2.37 and 2.38 include link provisions that offer an alternative to/from Letterkenny to the existing N56 Four lane Road. Each of these link options provides a new crossing of the River Swilly connecting to the existing N56/R245 junction servicing north Letterkenny and northwest Donegal. Option 2.39 crosses over the existing local road L1114 and the river Swilly connecting to the existing Polestar roundabout.

All preliminary options were appraised against the three criteria of Environment, Engineering and Economy. The Stage 1 appraisal is presented in Volume G2 of the Option Selection report and is available on the project website at this link: https://www.donegal-ten-t.ie/media/download_gallery/Volume%20G2%20Section%20%20Stage%20%20Option%20Selection%20Matrices.pdf.

Following the appraisal of the preliminary options, ten options remained. Within this group, there were three pairs of options that have similar alignments with only slight variation. Each pair is identified as one option with a variation. Therefore, there are seven shortlisted options, with three of the options having a similar variation of the option, being brought forward to Stage 2 of the option selection process.

The eliminated options and the reasons for elimination are summarised in Table 5.19.

A summary of the shortlisted options and why they were chosen is provided in Table 5.20.

Table 5.19: Eliminated Options from the Stage 1 Preliminary Options Assessment

Option	Reasons for Elimination
2.2, 2.3, 2.4 and 2.7	<ul style="list-style-type: none"> ▪ Option 2.2 is eliminated as it does not provide a new link option to Letterkenny. ▪ Options 2.3 and 2.4 had longer link lengths, longer crossings of the SAC/SPA/NHA/pNHA and peat/soft lands, greater impacts to the floodplain, more community impacts and higher construction costs. ▪ Option 2.7 had a long link length, higher agricultural impacts and construction cost.
2.8	<ul style="list-style-type: none"> ▪ The Do Nothing option was eliminated as retention of the existing road network fails to meet project objectives
2.9, 2.10 and 2.11	<ul style="list-style-type: none"> ▪ Option 2.9 is eliminated as it does not provide a new link option to Letterkenny. ▪ Options 2.10 and 2.11 had longer link lengths, longer crossings of the SAC/SPA/NHA/pNHA and peat/soft lands, greater impacts to the floodplain, more community impacts and higher construction costs.
2.13, 2.14 and 2.15	<ul style="list-style-type: none"> ▪ Option 2.13 is eliminated as it does not provide a new link option to Letterkenny. ▪ Options 2.14 and 2.15 had longer link lengths, longer crossings of the SAC/SPA/NHA/pNHA and peat/soft lands, greater impacts to the floodplain, more community impacts and higher construction costs.
2.18 and 2.21	<ul style="list-style-type: none"> ▪ Option 2.18 is eliminated as it does not provide a new link option to Letterkenny. ▪ Option 2.21 had greater impacts on air quality, noise and visibility near properties, greater impacts on communities and higher construction costs.
2.22, 2.24, 2.25 and 2.26	<ul style="list-style-type: none"> ▪ Options 2.22 and 2.26 were eliminated as they do not provide a new link option to Letterkenny. ▪ Options 2.24 and 2.25 performed poorly due to length of links, number of road crossings, earthworks, landscape and visual, agriculture, length of links in zoned lands and higher costs.
2.27, 2.29, 2.30 and 2.31	<ul style="list-style-type: none"> ▪ Option 2.27 and 2.31 were eliminated as they do not provide a new link option to Letterkenny. ▪ Options 2.29 and 2.30 performed poorly due to length of links, number of road crossings, earthworks, greater impacts on residential properties, air quality/noise and agriculture, length of links in zoned lands and higher costs.

Option	Reasons for Elimination
2.32, 2.33, 2.34 and 2.35	<ul style="list-style-type: none"> ▪ Option 2.32 is eliminated as it does not provide a new link option to Letterkenny. ▪ Options 2.33, 2.34 and 2.35 were eliminated as these options resulted in more significant river crossings, greater earthworks, geometry constraints and higher costs than other options.
2.36, 2.37, 2.38 and 2.39	<ul style="list-style-type: none"> ▪ Option 2.36 is eliminated as it does not provide a new link option to Letterkenny. ▪ Options 2.37, 2.38 and 2.39 were eliminated as these options resulted in more minor road crossings, greater earthworks, geometry constraints and higher costs than other options.

Table 5.20: Shortlisted Options from the Stage 1 Preliminary Options Assessment

Option	Corridor Description and Reasons for Short-listing
2.1	This online option proposes significant re-use of the existing road network. Stage 2 will require further traffic, geometry and safety assessments to facilitate design improvements that enable this option to be viable for continued re-use. This option requires minimal land-take compared to other options and results in lower overall environmental impacts and construction cost. To facilitate splitting the existing traffic and providing relief at the Dry Arch Roundabout this route provides a link option for traffic approaching Letterkenny from the east to divert towards a new crossing of the River Swilly SAC (approximately 100m) connecting to the existing N56/R245 junction heading to north Donegal. Various junction options are to be considered along the route.
2.5 and 2.6	Options 2.5 and 2.6 are essentially the same however each option proposed a slight variation in the proposed link crossing the River Swilly. A combination of online and offline these routes use the existing Type 1 dual carriageway and their offline route section provides an alternative option to the existing 8% gradient along the N13 at Lurgybrack. Both link options include a new crossing of the River Swilly SAC (approximately 100m) connecting to the existing N56/R245 junction heading to north Donegal however the links commence at different locations. Various junction options will be considered along the route.
2.12	Like option 2.1 this online option also proposes significant re-use of the existing road network. Stage 2 will require further traffic, geometry and safety assessments to facilitate design improvements that enable this option to be viable for continued re-use. This option requires minimal land-take compared to other options and results in lower overall environmental impacts and construction cost. To facilitate splitting the existing traffic and providing relief along the N56 Four Lane Road this route provides a new link crossing over the River Swilly SAC (approximately 100m) connecting to the existing N56/R245 junction heading to north Donegal is proposed from the Dry Arch Roundabout. The link utilises a reserved corridor identified in the Letterkenny Development Plan. Various junction options are to be considered along the route.
2.16 and 2.17	Like options 2.5 and 2.6 these options are essentially the same however each option proposed a slight variation in the proposed link crossing the River Swilly. A combination of online and offline these routes use the existing Type 1 dual carriageway and their offline route section provides an alternative option to the existing 8% gradient along the N13 at Lurgybrack. Both link options include a new crossing of the River Swilly SAC (approximately 100m) connecting to the existing N56/R245 junction heading to north Donegal however the links commence at different locations. Various junction options will be considered along the route.
2.19 and 2.20	Options 2.19 and 2.20 are essentially the same however each option proposed a slight variation in the proposed link crossing the River Swilly. This offline option runs to the southeast of the existing N13. Because this option is new offline it requires significant lands however it is more direct for strategic traffic travelling between Sligo and Derry. Two link options have been taken forward for Stage 2 appraisal; both link options include a new crossing of the River Swilly SAC (approximately 100m) connecting to the existing N56/R245 junction heading to north Donegal however the links commence at different locations. Various junction options will be considered along the route.
2.23 and 2.28	Option 2.23 and 2.28 are offline options that run to the southeast of the existing N13 and further south of options 2.19 and 2.20 above. The difference between option 2.23 and 2.28 is the tie-in on the eastern Manorcunningham end. Option 2.23 ties into the existing N13/N14 junction whereas option 2.28 offers an alternative to tie-into an option on the Section 3 – N14 Manorcunningham to Lifford scheme. Because each option is new offline each requires significant lands however each is more direct for strategic traffic travelling between Sligo and Derry. Link options taken forward for Stage 2 appraisal on these options include: <ul style="list-style-type: none"> (i) a link option connecting back to the existing N13 north of the existing St. Patrick's school. (ii) a new link crossing over the River Swilly SAC (approximately 100m) connecting to the existing N56/R245 junction heading to north Donegal is proposed from the Dry Arch Roundabout. The link utilises a reserved corridor identified in the Letterkenny Development Plan. Various junction options are to be considered along the route

5.6.2.2 Stage 2 Options Assessment

The seven shortlisted options that were taken forward from Stage 1 to Stage 2 were renamed and colour coded to make referencing easier and provide a better visual aid for public consultation, as per Table 5.21.

Table 5.21: Shortlisted Options from Stage 1 to Stage 2

Stage 1 Option Name	Stage 2 Option Colour and Name
Option 2.1	Orange 2A
Option 2.12	Pink 2B
Option 2.5 and 2.6	Purple 2C
Option 2.16 and 2.17	Red 2D
Option 2.19 and 2.20	Green 2E
Option 2.23	Blue 2F1
Option 2.28	Blue 2F2

The options brought forward to Stage 2 are illustrated in Figure 5.13.

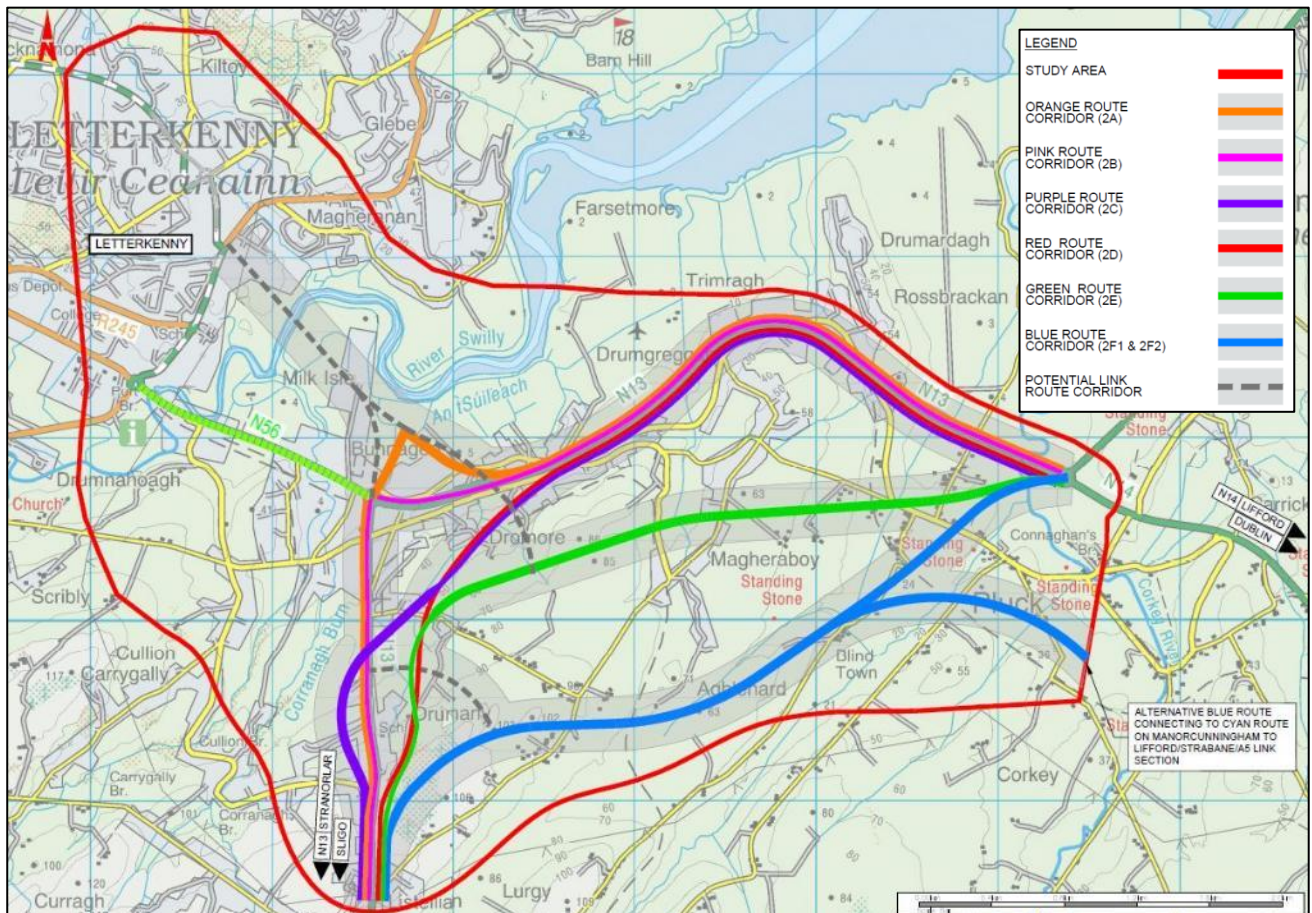


Figure 5.13: Section 2, Stage 2 Options

There were a number of significant environmental considerations for this route option assessment. All options are within close proximity to the Lough Swilly Special Area of Conservation (SAC), Lough Swilly Special Protection Area (SPA) and the Lough Swilly Including Big Isle, Blanket Nook & Inch Lake proposed Natural Heritage Area (pNHA). The options also include a proposed new link between the existing N13 at or near the existing N56/N13 Dry Arch Roundabout and the N56 at Ballyrairie. This link crosses the River Swilly which is within the Lough Swilly SAC north of the existing N56 between Polestar Roundabout and Dry Arch Roundabout. The Lough Swilly SAC also extends to the northern boundary of the existing N13 dual carriageway at Rossbracken, just west of the existing Pluck Roundabout.

The Stage 2 appraisal of options was carried out in accordance with process as set out in Section 5.5.5. All options were appraised under the six main CAF criteria. This included environmental appraisal in accordance with the EIA Directive requirements.

All assessments are detailed in the Stage 2 appraisal presented in Volume D2 of the Option Selection report and is available on the project website at this link: https://www.donegal-ten-t.ie/media/download_gallery/Volume%20D2%20Section%202%20Environmental%20Appendices.pdf.

A summary of the Stage 2 appraisal is presented in Section 12 of the Phase 2 Options Selection Report available on the project website at this link: https://www.donegal-ten-t.ie/media/Option_Selection_Report/Volume%20A%20-%20Main%20Report.pdf.

The environmental appraisal of the options is summarised in the following sections.

5.6.2.2.1 Population and Human Health

Both population and human health were considered as part of both the environmental and engineering assessments. The air quality is expected to improve for some receptors on the existing roads due to traffic moving to the Proposed Development but this will also introduce new receptors along the new alignment that will be exposed to higher levels of emissions. Both will have a direct impact on human health. Similarly, there will be a reduction in traffic noise at some locations on the existing road network as a result of the Proposed Development while there will be new receptors that will experience an increase in noise given their proximity to the new alignment. The impacts on population were also considered within the Material Assets Non-agricultural MCA topic in relation to settlements, community facilities, severance, properties etc. Refer to each of the individual MCA environmental criteria below for the results.

Within the engineering criterion, considerations to do with safety, physical activity, integration, accessibility & social inclusion all impact on population and human health. Using these criteria, Option 2C and 2D are preferred as they provide greater safety performance, a greater degree of integration with land-use plans and the existing transport network, and an overall neutral impact to noise sensitive receptors.

5.6.2.2.2 Biodiversity

The biodiversity study compared the potential impacts of the options for Section 1 on the terrestrial and aquatic natural environment. Each of the options was assessed as a 300m wide corridor to determine potential impacts on the principal ecological receptors within or adjacent to each option, and also in relation to potential impacts arising from fragmentation or interference with species' movement across the options. The assessment was undertaken in accordance with the NRA Guidelines for the Assessment of Ecological Impacts of National Road Schemes (Revision 2, June 2009).

The appraisal of biodiversity, both aquatic and terrestrial ecology, involved desk and field studies in order to characterise habitats and identify flora and fauna of ecological value of all potentially affected habitats intercepted by, or within the Zone of Influence of, each of the options.

Option 2B (Pink) is the preferred option due to the location of the option along the existing N13 and the limited intersection with habitats or features of high ecological significance.

Options 2F1 (Blue) and 2F2 (Blue) are the least preferred options due to the greater number of Ecological Receptors (ER) 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. 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.

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

5.6.2.2.3 Land

Land was considered as part of the Soils, Geology and Hydrogeology, Material Assets Agricultural, and Material Assets Non-agricultural environmental criteria. Refer to each of those three sections for the results.

5.6.2.2.4 Soils

The soils, geology and hydrogeology assessment examine each option in terms of their importance and the possible impacts resulting from the construction of a proposed option. The options are compared, and impacts assessed from a land, soil, and hydrogeological perspective.

From the review of the impacts of each proposed option on the soil, geology and hydrogeology in the Zone of Influence, Options 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 routes 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 routes traverse and cut through longer areas of high groundwater vulnerability.

5.6.2.2.5 Water

The hydrology assessment was prepared having regard to the TII Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes as recommended by the TII Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis. A comparative evaluation of the options was undertaken, having regard to the specific hydrological impacts associated with each option in order to identify a preferred option(s).

The hydrological assessment has determined that the 2F2 (Blue) option is 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 option corridor.

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 corridor due to every watercourse being At Risk to not meet its WFD objectives.

5.6.2.2.6 Air & Climate

The air quality and climate analysis was undertaken by means of a desktop assessment. The assessment focussed on NO_x exposure, PM₁₀ exposure and the anticipated climate impacts through a calculation on greenhouse gas emissions (GHG).

For the three assessment sub-criteria both 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) scores high for air quality as a consequence of the low number of properties potentially impacted but scores low for climate given the length. Option 2D (Red) scores similarly 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.

5.6.2.2.7 Noise & Vibration

A comparative assessment of each of the seven options in Section 2 was carried out in relation to noise with reference to key sensitive receptors in proximity to the proposed options. The noise impacts for each of the options are identified so that those impacted by unacceptably high levels of noise can be avoided where feasible as part of the overall option selection process.

A qualitative assessment was carried out where the property impact rating (PIR) was calculated. The PIR is based on the anticipated traffic flows using each option and the number of properties likely to be impacted, banded into distances from the centreline of each option and within a 300m wide corridor. A qualitative assessment was then carried out which considered factors such as noise sensitive receptors and populated areas. The results of the quantitative and qualitative assessments were then combined to provide an overall impact level for each option.

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. The 2C (Purple) and 2D (Red) options have received an intermediate preference due to the fact that they remove traffic from the existing N13 and divert around the national school. The 2A (Orange) and 2B (Pink) options are largely online. They do not divert traffic from the national school or other receptors currently located along the existing road network.

5.6.2.2.8 Landscape & Visual

The landscape and visual impact assessment was undertaken to identify the receptors associated with each option and the likely effects upon them which are then taken into consideration in developing and refining the options. A desktop study was undertaken, as well as site visits to establish an understanding of the landscape and visual context of the proposed options.

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 newer features into the low lying floodplain than Option 2A. Both the Option 2A and Option 2B are of a similar length; however, Option 2A creates a new roundabout within the floodplain.

Option 2C and Option 2D are considered to have a similar landscape effect; however, both 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 corridor 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. Remaining options are least preferred as whilst these option options may have a lower potential impact on properties in the 0-50m distance banding, such properties are in locations where main road corridors do not impact on visual amenity, and it is considered that these receptors would be of a higher sensitivity than those impacted upon by either the Option 2A or Option 2B. It is also considered that Option 2F1 and Option 2F2 options 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. It should be noted that 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.

5.6.2.2.9 Material Assets

The assessment was informed by the Transport Infrastructure Ireland (TII) Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis (PE-PAG-02031). The assessment focussed on both agricultural and non-agricultural material assets.

In relation to the agricultural assessment, Option 2B (Pink) was determined to be the preferred option as it interacts the least with agricultural activities and land. This was closely followed by Option 2A (Orange). Both of these options are largely online and as such would be expected to perform better than the other options. Options 2C (Purple) and 2D (Red) are similar in length and agricultural impacts, with 2C marginally less impacting than 2D. Options 2E, and 2F1/2 are the least preferable options due to their impacts on agricultural lands from their largely offline routes.

In relation to the non-agricultural assessment, Option 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 are less preferred, as their impact on residential properties is considered greater.

5.6.2.2.10 Waste

At this stage in the project, it is difficult to predict estimates of the likely quantities of waste that will be generated. The cut/fill balance for each option, based on preliminary alignments, was estimated to consider how much of a deficit or surplus in excavated material there may be with each option. Where there is a potential surplus in material from the earthworks, then it is possible that some of it may become a waste. This surplus was used as the basis for evaluating the potential impact of each option and ranking preferences.

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.

Option 2B (Pink) will have a slight negative impact as it has the lowest surplus of material generated by the earthworks. Option 2A (Orange), 2C (Purple), 2D (Red), 2F (Blue) and 2F1 (Blue) will have moderate negative impacts as they all have similar quantities of surplus material. Option 2E (Green) has the greatest surplus of material and is therefore the Least Preferred option.

5.6.2.2.11 Cultural Heritage

The architectural heritage and archaeology assessments (together known as cultural heritage) was undertaken in accordance with 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).

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), 2F2 (Blue), 2E (Green) 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).

5.6.2.2.12 Summary of Environmental Appraisal

A summary of the results of the MCA of the Stage 2 options is presented in Table 5.22. This table presents the impact score using the ratings from TII PAG Unit 7, scoring from 1 – Major or Highly Negative to 7 – Major or Highly Positive, as shown previously in Table 5.6 in Section 5.5.5.

In reviewing total impact scores in Table 5.22, Options 2C, 2D achieve an overall top score of 106. Option 2E achieved an overall score of 105 with other options scoring less. It must be emphasised that summing up of impact scores does not take account of the relative importance of each sub-criterion or the individual impacts or preferences, but provides an initial comparison between the overall, non-weighted performance of each option. As such, Options 2C and 2D emerge to the front as options performing well, on balance, considering all impacts.

A secondary appraisal showing specialist preferences of each option across each sub-criterion was prepared to ensure consideration of other factors that may inform a decision on the preferred option. For each topic, the specialists, including the EIAR specialists, also provided a preference for the options which were grouped and colour coded Green (Preferred), Orange (Intermediate), and Red (Least Preferred). A summary of this is provided in Table 5.23.

A review of the two appraisal summary tables clarifies:

- Options 2C and 2D have identical impact scores and preferences for each sub-criterion resulting in the same overall impact score of 106.
- Options 2C and 2D are the lowest scoring options, over all other options, in only one criterion; Material Assets – non-agricultural. The impact score for this criterion is categorised as moderately negative due to impacts on residential properties. However, the highest impact score for this criterion is only one impact level higher and therefore the better performing options were categorised as minor to slightly negative impact.
- Options 2C and 2D are least preferred in only one criterion; Material Assets – non-agricultural. For all other criteria, Options 2C and 2D specialist preferences are either Preferred or Intermediate.
- Option 2E impact score of 105 while close to Options 2C and 2D includes considerable variance in preferences. This option is least preferred by four of the environmental specialists; Landscape & Visual, Waste, Cultural Heritage and Material Assets - Agriculture. This option is preferred by three environmental specialists: Noise, Soils-Geology-Hydrogeology and Material Assets, non-Agriculture.

The appraisal process clarifies that Options 2A, 2B, 2F1 and 2F2 are the worst performing options. As Option E is considered by several category specialists to be the 'least preferred' this option is a poorer performing option than Options 2C and 2D.

Option 2C and Option 2D have identical impact scores and identical preferences for each of the sub-criterion. A pairwise competition is necessary to differentiate which of these two options is the preferred option.

Table 5.22: Section 2 Project Appraisal Matrix

	Option Colour Option Name	Orange 2A	Pink 2B	Purple 2C	Red 2D	Green 2E	Blue 2F1	Blue 2F2
Environment								
Air Quality & Climate		2	2	2	2	2	3	3
Noise		3	3	4	4	5	5	5
Landscape & Visual		2	2	2	2	1	1	1
Biodiversity		3	3	3	3	2	1	1
Waste		2	3	2	2	1	2	2
Soils, Geology and Hydrogeology		2	2	2	2	2	2	2
Hydrology		2	2	2	2	2	2	3
Cultural Heritage		2	2	2	2	1	1	1
Material Assets - Agricultural		2	3	2	2	2	2	2
Material Assets - Non-agricultural		3	3	2	2	3	3	3
Environment Sub-Total		23	25	23	23	21	22	23
Safety								
Safety and Security of Road Users		4	4	6	6	6	5	5
Collision Reduction		5	6	6	6	7	5	5
Road Safety Audit (Stage F)		6	6	7	7	7	5	5
Road Safety Impact Assessment		6	6	7	7	7	6	6
Safety Sub-Total		21	22	26	26	27	21	21
Physical Activity								
Physical Activity		5	5	7	7	7	6	6
Physical Activity Sub-Total		5	5	7	7	7	6	6

Option Colour Option Name	Orange 2A	Pink 2B	Purple 2C	Red 2D	Green 2E	Blue 2F1	Blue 2F2
Economy							
Transport Efficiency and Effectiveness	7	7	7	7	7	7	7
Wider Economic Impacts	5	5	5	5	5	5	5
Funding Impacts	5	5	5	5	5	5	5
Economy Sub-Total	17	17	17	17	17	17	17
Accessibility and Social Inclusion							
Deprived Geographical Areas	4	4	4	4	4	4	4
Vulnerable Groups	5	5	5	5	5	5	5
Accessibility and Social Inclusion Sub-Total	9	9	9	9	9	9	9
Integration							
Transport Integration	5	5	5	5	5	5	5
Land use Integration	5	5	5	5	5	5	5
Geographical Integration	7	7	7	7	7	7	7
Other Government Policy Integration	7	7	7	7	7	7	7
Integration Sub-Total	24	24	24	24	24	24	24
Total Impact Scores	99	102	106	106	105	99	100

Table 5.23: Section 2 Secondary Appraisal Matrix

Option Colour Option Name	Orange 2A	Pink 2B	Purple 2C	Red 2D	Green 2E	Blue 2F1	Blue 2F2
Environment							
Air Quality & Climate	Least Preferred	Least Preferred	Intermediate	Intermediate	Intermediate	Preferred	Preferred
Noise	Least Preferred	Least Preferred	Intermediate	Intermediate	Preferred	Preferred	Preferred
Landscape & Visual	Intermediate	Preferred	Intermediate	Intermediate	Least Preferred	Least Preferred	Least Preferred
Biodiversity	Preferred	Preferred	Intermediate	Intermediate	Intermediate	Least Preferred	Least Preferred
Waste	Intermediate	Preferred	Intermediate	Intermediate	Least Preferred	Intermediate	Intermediate
Soils, Geology and Hydrogeology	Intermediate	Preferred	Preferred	Preferred	Preferred	Least Preferred	Least Preferred
Hydrology	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Preferred
Cultural Heritage	Preferred	Preferred	Intermediate	Intermediate	Least Preferred	Least Preferred	Least Preferred
Material Assets - Agricultural	Intermediate	Preferred	Intermediate	Intermediate	Least Preferred	Least Preferred	Least Preferred
Material Assets - Non-agricultural	Intermediate	Intermediate	Least Preferred	Least Preferred	Preferred	Intermediate	Intermediate
Safety							
Safety and Security of Road Users	Least Preferred	Least Preferred	Preferred	Preferred	Preferred	Intermediate	Intermediate
Collision Reduction	Least Preferred	Intermediate	Intermediate	Intermediate	Preferred	Least Preferred	Least Preferred
Road Safety Audit (Stage F)	Intermediate	Intermediate	Preferred	Preferred	Preferred	Least Preferred	Least Preferred
Road Safety Impact Assessment	Intermediate	Intermediate	Preferred	Preferred	Preferred	Intermediate	Intermediate
Physical Activity							
Physical Activity	Least Preferred	Least Preferred	Preferred	Preferred	Preferred	Intermediate	Intermediate
Economy							
Transport Efficiency and Effectiveness	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
Wider Economic Impacts	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Funding Impacts	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Accessibility and Social Inclusion							
Deprived Geographical Areas	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Vulnerable Groups	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Integration							
Transport Integration	Intermediate	Intermediate	Preferred	Preferred	Preferred	Intermediate	Intermediate
Land use Integration	Intermediate	Intermediate	Preferred	Preferred	Preferred	Intermediate	Intermediate
Geographical Integration	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
Other Government Policy Integration	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred

5.6.2.3 Stage 2 Pairwise Comparison

Two options (2C and 2D) came out with identical impact scores and identical preferences and so a pairwise comparison has been required to decide the preferred option.

The pairwise appraisal found the impacts of both Options 2C and 2D in relation to Physical Activity, Accessibility and Social Inclusion and Integration are similar. Therefore, the Emerging Preferred Option has been determined based on the Environment, Safety and Economy impacts.

Under the environmental criteria, the summary of the pairwise comparison is provided in Table 5.24.

Table 5.24: Environmental Pairwise Comparison between Option 2C and 2D Stage 2

Environment Criteria	Comments
Air Quality & Climate	No significant differences with both options having the same impact score and preference. Option 2D is ranked higher as Option 2C is closer to more residential houses.
Noise	No significant differences with both options having the same impact score and preference. Option 2D is ranked higher as Option 2C is routed on three sides of St Patrick's school and is closer to more residential houses.
Landscape & Visual	No significant differences with both options having the same impact score and preference. No clear differences however Option 2C is ranked higher than Option 2D due to Option 2D having a greater impact on view.
Biodiversity	No significant differences with both options having the same impact score and preference.
Waste	No significant differences with both options having the same impact score and preference.
Soils, Geology and Hydrogeology	No significant differences with both options having the same impact score and preference.
Water	No significant differences with both options having the same impact score and preference. Option 2C had a slightly greater interaction with water course.
Cultural Heritage	No significant differences with both options having the same impact score and preference. Option 2D is ranked higher as Option 2C due to its higher number of impacts.
Material Assets - Agricultural	No significant differences with both options having the same impact score and preference. Option 2C is ranked higher than Option 2D due to Option 2D having a slightly greater impact on agricultural lands.
Material Assets – Non-agricultural	No significant differences with both options having the same impact score and preference. Option 2D is ranked higher as Option 2C due to Option 2C having a greater impact on residential properties.
Overall Summary	<p>For some of the Environmental sub-criteria there remains no clear difference between Options 2C and 2D.</p> <p>However, Option 2D is ranked higher than Option 2C by the relevant specialists on Air Quality & Climate, Noise, Cultural Heritage and Non-Agricultural Material Assets.</p> <p>Whereas Option 2C is ranked higher than Option 2D by the relevant specialists on Landscape & Visual and Agricultural Material Assets.</p>

Option 2D is preferred in four sub-criteria (air quality & climate, noise, cultural heritage and non-agricultural material assets). This is due to the additional receptors (residential properties) that would be directly impacted by Option 2C. Whereas Option 2C is preferred in two sub-criteria (landscape & visual and agricultural material assets), the result of Option 2D impacts on agricultural lands.

Overall, in terms of the Environment, Option 2D is preferred.

Under the other CAF criteria, the summary of the pairwise comparison is provided in Table 5.25.

Table 5.25: Other Criteria Pairwise Comparison between Option 2C and 2D Stage 2

Criteria	Comments
Safety	For the Safety sub-criteria there is little difference between Options 2C and 2D. However, Option 2D is ranked higher than Option 2C by the Road Safety Auditor.
Physical Activity	Options 2C and 2D provide similar proposals and therefore have similar preferences and impact scores.
Economy	Overall in terms of Economy Options 2C and 2D have a similar impact however Option 2D is preferable due to it having a marginally better BCR and a lower Capital cost.
Accessibility and Social Inclusion	Both options are unlikely to alter the Pobal HP Deprivation index and will have a slight positive impact on Vulnerable Groups therefore both Options have a similar preference.
Integration	Both options have a positive impact score and preference; there was no difference between the options under Integration.

Under the Safety criteria Option 2D is marginally preferred over Option 2C. Although little between the options, Option 2D has been given a slightly higher preference by the Road Safety Auditor. Option 2C had a slightly higher preference in the Road Safety Impact Assessment, however, this determination has been because the preliminary road geometry design for Option 2D approached limiting design standards (although still within design standards). Given that the design is preliminary at this stage, it was not considered as an appropriate reason to give Option 2C more preference.

Under the Economics criteria both options performed well, however, Option 2D is preferable due to it having a marginally better benefit cost ratio (BCR) and a lower capital cost.

In reviewing the full spectrum of appraisals, evaluating the number and significance of impacts that each option has and comparing the preferences of the options, Option 2D is identified as the Preferred Option. This is supported qualitatively, by reviewing balance of preferences across each criterion, and quantitatively by considering the cumulative impact of each option and the significance of those impacts.

Therefore, Option 2D is a better performing option than 2C.

5.6.2.4 Stage 3: Preferred Option for Section 2

The selected Preferred Option for Section 2 of the Proposed Development is Option 2D and includes a Link Road between Dromore and Ballyraine, as illustrated in Figure 5.14 where Option 2D is shown as the solid black and the link is shown as the dashed black line.

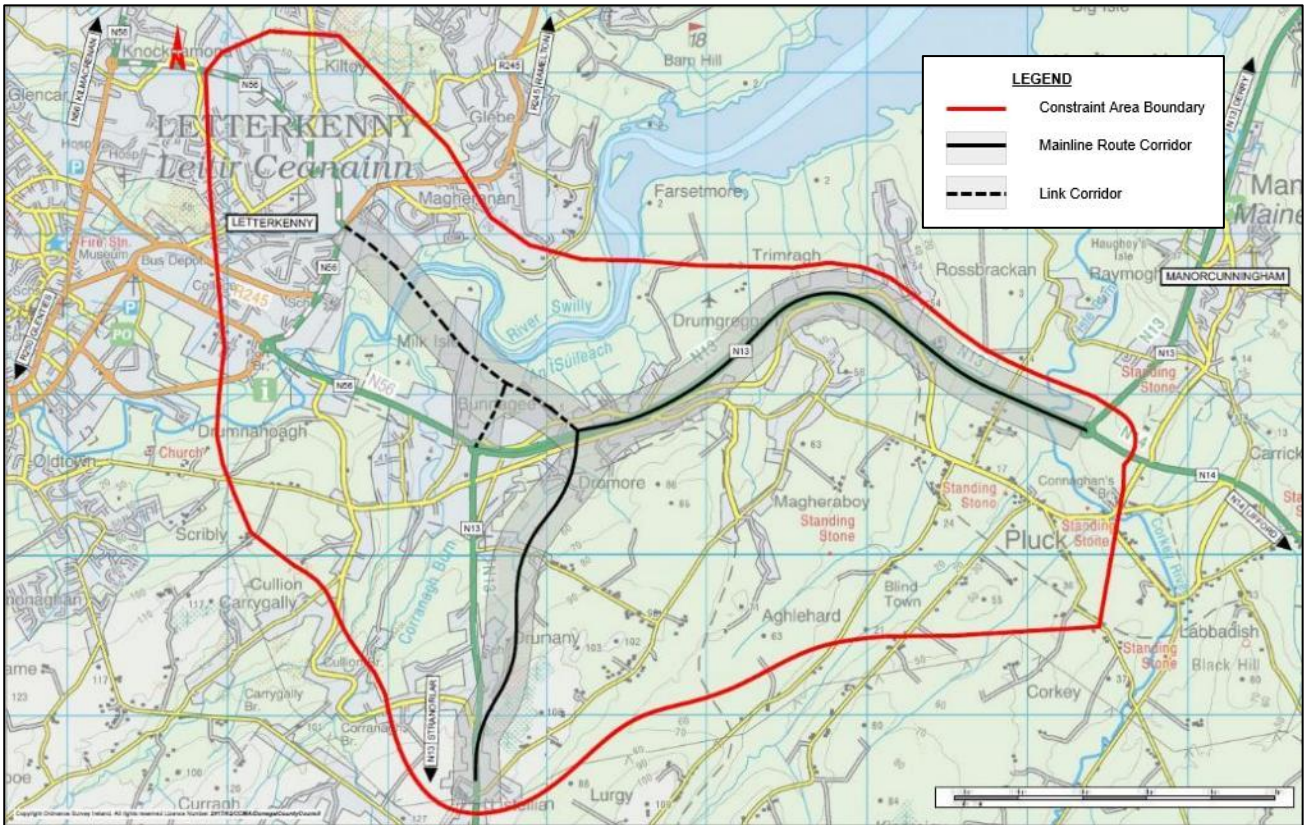


Figure 5.14: Section 2, Preferred Option 2D

5.6.3 Section 3: N14 Manorcunningham to Lifford / Strabane / A5 Link

5.6.3.1 Stage 1 Corridor Options Assessment: Section 3

A total of 42 preliminary options were considered for Section 3 of the Proposed Development. These are indicated as combinations of the blue lines shown on Figure 5.15. All options end at Lifford in Ireland and all include a link road across the River Finn to tie in with the proposed A5 Western Transport Corridor (WTC) to the south of Strabane in Northern Ireland. All options are contiguous with the eastern extent of Section 2 of the Proposed Development at or in close proximity to the existing N13/N14 Pluck Roundabout near Manorcunningham. Options 3.30/3.31 is continuous with a Section 2 route option 2.28.

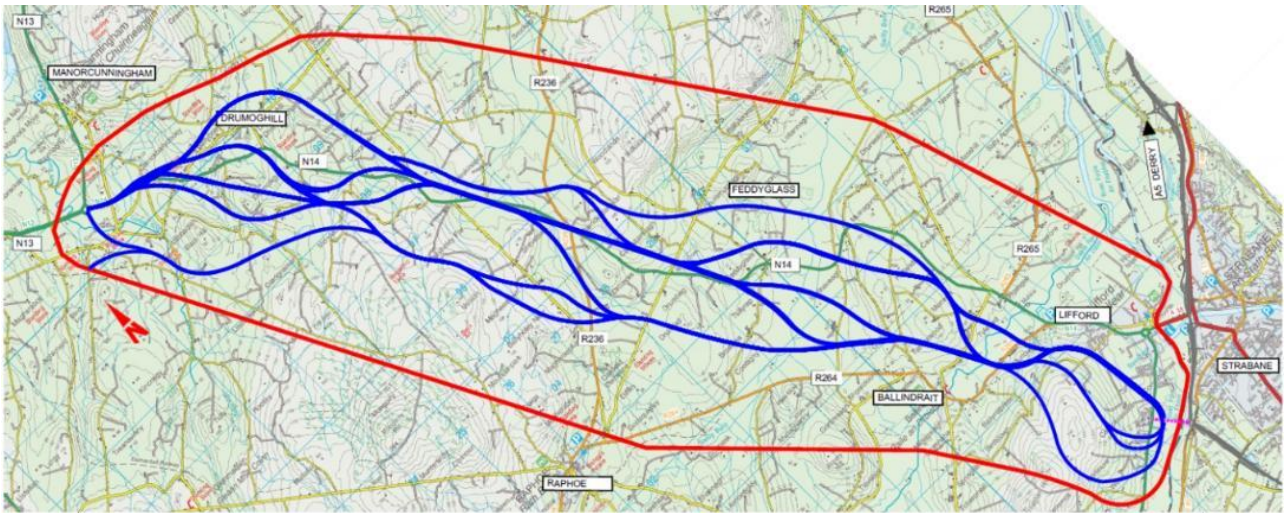


Figure 5.15: Section 3, Stage 1 Preliminary Options

The study area includes the River Finn Special Area of Conservation (SAC) and River Foyle and Tributaries SAC (Northern Ireland) at southeastern end of the section at Lifford/ Strabane. Both of the SACs are contiguous in the River Finn at the bord between Ireland and Northern Ireland.

The northwestern end of Section 3, at the interface with Section 2, is in close proximity to the Lough Swilly SAC and the Lough Swilly Including Big Isle, Blanket Nook & Inch Lake proposed Natural Heritage Area (pNHA). The Feddyglass Woods pNHA is also within the study area, located north of the existing N14 approximately 10 km southeast of Pluck Roundabout and 6 km northwest of Lifford.

A description of the stage 1 preliminary options is provided in Table 5.26.

Table 5.26: Stage 1 Preliminary Options

Option	Description
3.1, 3.2, 3.3, and 3.4	<p>All these options begin near to/online the existing N14 for approximately 1km before continuing off in an easterly direction and curving around the eastern side of Drumoghill. They then turn southward toward the existing N14 at Sheskinapoll. The corridor continues in a south easterly direction close to the existing N14 to Drumbeg.</p> <p>At this point the options differ with Options 3.1 and 3.2 taking a south-west direction and aligning through Hollands and Moneen. These then curve back toward the other options. Option 3.1 crosses the Deelee to the East of Murlough and Option 3.2 crosses the Deelee to the west. Options 3.3 and 3.4 curve in a northerly direction to the townland of Tamnawood. At this point the options take the same alignment over the Deelee to the west of Murlough.</p> <p>All the options finish with the same segment at the Lifford end.</p>
3.5, 3.6, 3.7, and 3.8	<p>These options begin with the same alignment as Options 3.1 to 3.4 around the eastern side of Drumoghill. They then deviate to the east of Options 3.1 to 3.4 in a south easterly direction from Doorable, parallel to the existing N14 for approximately 3km just beyond the R236. At this point all</p>

Option	Description
	<p>options then curve back in a southerly direction toward the existing N14 to Carnshannagh. At this point, the options vary with Options 3.5 and 3.6 curving eastward again, taking the same alignments as Options 3.1 and 3.2, while Options 3.7 and 3.8 continue the alignment in a south easterly direction in the same way as Options 3.3 and 3.4.</p> <p>All the options finish with the same segment at the Lifford end.</p>
3.9 and 3.10	<p>These options begin with the same alignment as Options 3.1 to 3.8 around the eastern side of Drumoghill. They then continue on the same alignment as Options 3.5 to 3.8, aligning to the east of the existing N14 from Doorable to the east of the R236. At this point the options take a new alignment to the east of all other options, through the townlands of Drummucklagh and Mulnagung before returning to Moneen. At this point, the options go in two opposite directions as previously described (to the east or west of Murlough) across the River Deele to tie into a segment to Lifford.</p>
3.11, 3.12, 3.13, and 3.14	<p>All these options begin near to/online the existing N14 for approximately 1km. They then align to the south of Drumoghill before curving near the townland of Drumcairn back toward the existing N14 at Sheskinapoll. The options then align in a south easterly direction for approximately 4km to Feddyglass where Options 3.11 to 3.14 differ. Option 3.11 takes the most easterly direction through Hollands and Moneen and Option 3.14 being the most westerly option via the southern curve from Feddyglass to Tamnawood.</p>
3.15	<p>This option begins near to/online the existing N14 for approximately 1km. It then aligns to the south of Drumoghill before curving past Drumcairn and continuing in a southerly direction away from the existing N14 through the townland of Ballyholey Far. At this point, the option continues on the western extremity through the townlands of Drumfad and Broadlea parallel to other options and the existing N14 before returning toward at Tamnawood. The option then continues across the River Deele to the west of Murlough and ties into a segment to Lifford.</p>
3.16, 3.17, 3.18, and 3.19	<p>These options follow a similar alignment to Option 3.15 aligning to the south of Drumoghill before curving past Drumcairn. At this point, these options return the curvature back toward the existing N14 at Sheskinapoll. All options then align south eastward for approximately 3 to 4km. Options to the east include Options 3.16 and 3.17 which go through Hollands and Moneen. Options 3.18 and 3.19 continue in the same direction, with a curve to the north or south to Tamnawood and subsequently cross the Deele to the west of Murlough.</p>
3.20, 3.21, 3.22, and 3.23	<p>These options commence as per the previous options near the existing N14 at Manorcunningham but change to a direct south eastern alignment from Labbadish, through Drumcairn and subsequently curve back toward the existing N14 near Sheskinapoll.</p> <p>The options then take various forms as per Options 3.16 to 3.19 above.</p>
3.24	<p>This option commences as per the previous options near the existing N14 at Manorcunningham but changes to a direct south eastern alignment from Labbadish through Drumcairn and then curves in a southerly direction to the western extremity of the study area. The option aligns through the townlands of Drumfad and Broadlea parallel to other options and the existing N14 before returning toward at Tamnawood. The option then continues across the River Deele to the west of Murlough and ties into a segment to Lifford.</p>
3.25	<p>This option commences on/near the existing N14 at Manorcunningham for approximately 800m before coming offline at Labbadish. The option then curves around the south of the townland of Drumcairn. Option 3.25 then continues on the same alignment as Option 3.24 through Ballyholey Far, Drumfad, Broadlea and crosses the River Deele to the west of Murlough before tying into a segment to Lifford.</p>
3.26, 3.27, 3.28, and 3.29	<p>These options commence on/near the existing N14 at Manorcunningham for approximately 800m before coming offline at Labbadish. The options then curve around the south of the townland of Drumcairn and continue toward the existing N14 at Sheskinapoll. The options then take various forms as per Options 3.16 to 3.19 above.</p>
3.30 and 3.31	<p>These are the most westerly options. The options follow an off-line alignment in a south westerly direction from the N13/N14 junction around south of the townland of Pluck. After crossing the Corkey river, the options curve back to an easterly direction through Mondooy following the same alignment as Option 3.25.</p>
3.32	<p>This option commences on/near the existing N14 at Manorcunningham for approximately 800m before coming offline at Labbadish. The option then curves around the south of the townland of Drumcairn southerly direction to the western extremity with the remaining alignment the same as Option 3.24.</p>

Option	Description
3.33	This option is the same as Option 3.24 but with one variation for approximately 3km from Ballyholey Far to Dromore Little. This alternative segment is to the east of Option 3.24.
3.34	This option is the same as Option 3.15 but with one variation for approximately 3km from Ballyholey Far to Dromore Little. This alternative segment is to the east of Option 3.15.
3.35	This option begins the same as Option 3.26 with a new alignment in a due south direction from Carrickdawson to Dromore Little. From this point, the option has the same alignment as Options 3.24, 3.25, 3.31, 3.32 and 3.33.
3.36	This option commences as per the previous options near the existing N14 at Manorcunningham, but abruptly change to a direct south eastern alignment from Labbadish through Drumcairn and subsequently curve back toward the existing N14 near Sheskinapoll. The option aligns south easterly for <2km and then takes a direction due south from Carrickdawson to Dromore Little. From this point, the option has the same alignment as Options 3.24, 3.25, 3.31, 3.32 and 3.33.
3.37	This option is the same as Options 3.16 to 3.19 until Sheskinapoll. At this point, the option continues to align south eastward for 1-2km and then changes direction due south from Carrickdawson to Dromore Little. From this point, the option has the same alignment as Options 3.24, 3.25, 3.31, 3.32 and 3.33.
3.38	This option is the same as Options 3.11 to 3.14 until Sheskinapoll. At this point, the option continues to align south eastward for 1-2km and then changes direction due south from Carrickdawson to Dromore Little. From this point, the option has the same alignment as Options 3.24, 3.25, 3.31, 3.32 and 3.33.
3.38a	This option is the same as Option 3.38 with an alternative segment at the Lifford end of the scheme.
3.38b	This option is the same as Option 3.38 with an alternative segment at the Lifford end of the scheme.
3.38c	This option is the same as Option 3.38 with an alternative segment at the Lifford end of the scheme.
3.39	This option is the same as Option 3.1 until Sheskinapoll. At this point, the option continues to align south eastward for 1-2km and then changes direction due south from Carrickdawson to Dromore Little. From this point, the option has the same alignment as Options 3.24, 3.25, 3.31, 3.32 and 3.33.

All preliminary options were appraised against the three criteria of Environment, Engineering and Economy. The Stage 1 appraisal is presented in Volume G3 of the Option Selection report and is available on the project website at this link: https://www.donegal-ten-t.ie/media/download_gallery/Volume%20G3%20Section%203%20Stage%201%20Option%20Selection%20Matrices.pdf.

Following the appraisal of the preliminary options, nine options remained.

The eliminated options and the reasons for elimination are summarised in Table 5.27.

A summary of the shortlisted options and why they were chosen is provided in Table 5.28.

Table 5.27: Eliminated Options from the Stage 1 Preliminary Options Assessment

Option	Reasons for Elimination
3.1	Eliminated due High impact on archaeology and poor performance across other criteria including: <ul style="list-style-type: none"> ▪ The length of side roads required ▪ Number of communities severed ▪ Length of the mainline within the floodplain ▪ Cost
3.2	Eliminated due to poor performance across the following criteria: <ul style="list-style-type: none"> ▪ Length of the mainline road ▪ The length of side roads required ▪ Significant earthworks ▪ Cost
3.5	Eliminated due to impact on archaeology and poor performance across other criteria including: <ul style="list-style-type: none"> ▪ Length of the mainline road ▪ The length of side roads required ▪ Number of interfaces with the existing road network

Option	Reasons for Elimination
3.6	<ul style="list-style-type: none"> ▪ Alignment <p>Eliminated due to poor performance across the following criteria:</p> <ul style="list-style-type: none"> ▪ Length of the mainline road ▪ The length of side roads required ▪ Significant earthworks ▪ Cost ▪ Alignment
3.7 and 3.8	<p>Options 3.7 and 3.8 follow a similar alignment to Options 3.3 and 3.4. A comparison between these four options resulted in Options 3.7 and 3.8 being eliminated due to poorer performance on the following criteria:</p> <ul style="list-style-type: none"> ▪ Length of the mainline road ▪ Alignment
3.9	<p>Eliminated due to impact on archaeology and ecology, as well as poor performance across other criteria including:</p> <ul style="list-style-type: none"> ▪ Length of the mainline within the floodplain ▪ Number of interfaces with the existing road network
3.10	<p>Eliminated due to impact on ecology and poor performance across other criteria including:</p> <ul style="list-style-type: none"> ▪ Length of the mainline road ▪ Number of interfaces with the existing road network ▪ Significant earthworks
3.11	<p>Eliminated due to impact on archaeology and poor performance across other criteria including:</p> <ul style="list-style-type: none"> ▪ Air quality ▪ The length of side roads required ▪ Length of the mainline within the floodplain ▪ Significant earthworks
3.12	<p>This option follows a similar alignment to Option 3.13. A comparison between the options resulted in Option 3.12 being eliminated due to poorer performance on the following criteria:</p> <ul style="list-style-type: none"> ▪ Length of the mainline road ▪ The length of side roads required ▪ Significant earthworks ▪ Residential Impact ▪ Cost
3.16	<p>Eliminated due to impact on archaeology and poor performance across other criteria including:</p> <ul style="list-style-type: none"> ▪ The length of side roads required ▪ Significant earthworks ▪ Length of the mainline within the flood plain ▪ Air quality
3.17	<p>Eliminated due poor performance across the following criteria:</p> <ul style="list-style-type: none"> ▪ The length of side roads required ▪ Significant earthworks ▪ Air quality
3.20	<p>Eliminated due to impact on archaeology and poor performance across other criteria including:</p> <ul style="list-style-type: none"> ▪ Length of the mainline within the floodplain ▪ The length of side roads required ▪ Number of interfaces with the existing road network
3.21	<p>Eliminated due to poor performance across the following criteria:</p> <ul style="list-style-type: none"> ▪ Number of interfaces with the existing road network ▪ The length of side roads required ▪ Significant earthworks ▪ Cost
3.22 and 3.23	<p>Options 3.22 and 3.23 follow a similar alignment to Options 3.13 and 3.18. A comparison between the four options resulted in Options 3.22 and 3.23 being eliminated due to poorer performance on the following criteria:</p> <ul style="list-style-type: none"> ▪ Significant earthworks ▪ Residential impact ▪ Cost
3.24	<p>This option follows a similar alignment to Option 3.15. A comparison between the two options resulted in Option 3.24 being eliminated due to poorer performance on the following criteria:</p> <ul style="list-style-type: none"> ▪ Residential Impact

Option	Reasons for Elimination
3.25	Eliminated due to impact on archaeology and poor performance across other criteria including: <ul style="list-style-type: none"> ▪ Community impact ▪ Community severance ▪ Residential impact ▪ Significant earthworks ▪ Alignment
3.26	Eliminated due to impact on archaeology and poor performance across other criteria including: <ul style="list-style-type: none"> ▪ Community impact ▪ Residential impact ▪ The length of side roads required ▪ Number of interfaces with the existing road network ▪ Length of the mainline within the flood plain ▪ Significant earthworks
3.27	Eliminated due to impact on archaeology and poor performance across other criteria including: <ul style="list-style-type: none"> ▪ Community impact ▪ Residential impact ▪ The length of side roads required ▪ Number of interfaces with the existing road network ▪ Length of the mainline within the floodplain ▪ Significant earthworks ▪ Cost
3.28	Eliminated due to impact on archaeology and poor performance across other criteria including: <ul style="list-style-type: none"> ▪ Community impact ▪ Residential impact ▪ Significant earthworks
3.29	Eliminated due to impact on archaeology and poor performance across other criteria including: <ul style="list-style-type: none"> ▪ Community impact ▪ Residential impact ▪ Significant earthworks ▪ Number of interfaces with the existing road network ▪ Alignment
3.31	Eliminated due to poor performance across the following criteria: <ul style="list-style-type: none"> ▪ Community severance ▪ Major river crossings ▪ Alignment ▪ Cost
3.32	Eliminated due to impact on archaeology and poor performance across other criteria including: <ul style="list-style-type: none"> ▪ Community impact ▪ Community severance ▪ Residential impact ▪ Alignment
3.33	This option follows a similar alignment to Option 3.24. A comparison between the two options resulted in Option 3.33 being eliminated due to poorer performance on the following criteria: <ul style="list-style-type: none"> ▪ Residential impact
3.34	Eliminated due to poor performance across the following criteria: <ul style="list-style-type: none"> ▪ Significant earthworks ▪ Community severance ▪ Alignment
3.35	Eliminated due to impact on archaeology and poor performance across other criteria including: <ul style="list-style-type: none"> ▪ Community impact ▪ Community severance ▪ Residential impact ▪ Earthworks
3.36	This option follows a similar alignment to Option 3.39. A comparison between the two options resulted in Option 3.36 being eliminated due to poorer performance on the following criteria: <ul style="list-style-type: none"> ▪ Community impact ▪ Residential impact
3.37	This option follows a similar alignment to Option 3.38. A comparison between the two options resulted in Option 3.37 being eliminated due to poorer performance on the following criteria: <ul style="list-style-type: none"> ▪ Length of the mainline within the flood plain ▪ The length of side roads required

Option	Reasons for Elimination
	<ul style="list-style-type: none"> ▪ Significant earthworks ▪ Cost
3.38	<p>This option follows a similar alignment to Option 3.39. A comparison between the two options resulted in Option 3.38 being eliminated due to poorer performance on the following criteria:</p> <ul style="list-style-type: none"> ▪ Impact on archaeology ▪ Significant earthworks
3.38	<p>Eliminated due to poor performance across the following criteria:</p> <ul style="list-style-type: none"> ▪ Length of the mainline road ▪ Significant earthworks (greater than 3.5 million m3 surplus material) ▪ Cost
3.38	<p>Eliminated due to poor performance across the following criteria:</p> <ul style="list-style-type: none"> ▪ Significant earthworks (greater than 3 million m3 surplus material) ▪ Cost
3.38	<p>Eliminated due to poor performance across the following criteria:</p> <ul style="list-style-type: none"> ▪ Length of the mainline road ▪ Significant earthworks (greater than 7.4 million m3 surplus material) ▪ Cost

Table 5.28: Shortlisted Options from the Stage 1 Preliminary Options Assessment

Option	Corridor Description and Reasons for Short-listing
3.3 and 3.4	<p>This option is approximately 18km long. It at the N13/N14 junction and runs along a similar/same alignment as the existing N14 for approximately 800m. The option then changes to a westerly direction before curving around the townland of Drumoghill and aligning southward for approximately 3km close to the existing N14 at Sheskinapoll. The option continues in a south easterly direction for approximately 4km to Feddyglass. At this point, the option can go one of two ways for approximately 2km: in a northerly curve or a southerly curve to the townland of Tamnawood. At this point the option, along with all other options, continues in a south easterly direction to Murlough. All the options then curve around to the east side of Croaghan hill and subsequently in a southerly direction between Coneyburrow and Beechwood park. Here the termination point occurs next to the existing N15 on greenfield land.</p>
3.13 and 3.14	<p>This option is approximately 17.4km long. It runs along a similar alignment to the Orange corridor (Options 3.18 and 3.19). It begins at the N13/N14 junction and runs along a similar/same alignment as the existing N14 for approximately 800m. The option then continues in a similar westerly direction offline towards Drumoghill before a large curve bring the corridor south through Drumcairn. At this point, the Red option differs to the Orange option, with a wider curve bringing the option towards the existing N14 at Sheskinapoll. The option then aligns in a south easterly direction for approximately 4km to Feddyglass. At this point, the option can go one of two ways for approximately 2km: in a northerly curve or a southerly curve to the townland of Tamnawood. At this point the option, along with all other options, continues in a south easterly direction to Murlough. All the options then curve around to the east side of Croaghan hill and subsequently in a southerly direction between Coneyburrow and Beechwood park. Here the termination point occurs next to the existing N15 on greenfield land.</p>
3.18 and 3.19	<p>This option is approximately 17.7km long. It begins at the N13/N14 junction and runs along a similar/same alignment as the existing N14 for approximately 800m. The option then continues in a similar westerly direction offline towards Drumoghill direction before two large curves bring the option close to the existing N14 at Sheskinapoll. The option then aligns in a south easterly direction for approximately 4km to Feddyglass. At this point, the option can go one of two ways for approximately 2km: in a northerly curve or a southerly curve to the townland of Tamnawood. At this point the option, along with all other options, continue in a south easterly direction to Murlough. All the options then curve around to the east side of Croaghan hill and subsequently in a southerly direction between Coneyburrow and Beechwood park. Here the termination point occurs next to the existing N15 on greenfield land.</p>
3.15	<p>This option is approximately 17.5km long. It begins at the N13/N14 junction and runs along a similar/same alignment as the existing N14 for approximately 800m. The option then continues in a similar westerly direction offline towards Drumoghill before a large curve southward to Drumcairn. Subsequently, the option aligns in a generally south easterly direction north of Mondooney and through Ballyholey Far, Ballyholey Near and Drumfad to Broadlea. At this point, the option turns to a more easterly direction to the townland of Tamnawood. At this point the option, along with all other options, continues in a south easterly direction to Murlough. All the options then curve around to the east side of Croaghan hill and subsequently in a</p>

Option	Corridor Description and Reasons for Short-listing
	southerly direction between Coneyburrow and Beechwood park. Here the termination point occurs next to the existing N15 on greenfield land.
3.30	This option is approximately 17.4km long. It begins at the N13/N14 junction and continues in a southerly direction, curving around the village of Pluck and the townland of Labbadish before changing to a more easterly direction through Mondooney. The option then follows the alignment of the Purple option through Ballyholey Far, Ballyholey Near and Drumfad to Broadlea. At this point, the option turns to a more easterly direction to the townland of Tamnawood. At this point the option, along with all other options, continues in a south easterly direction to Murlough. All the options then curve around to the east side of Croaghan hill and subsequently in a southerly direction between Coneyburrow and Beechwood park. Here the termination point occurs next to the existing N15 on greenfield land. This option also provides for an alternative connection to Section 2 Option 2F2.
3.39	This option is approximately 18.4km long. It begins at the N13/N14 junction and runs along a similar/same alignment as the existing N14 for approximately 800m. The option then changes to a westerly direction before curving around the townland of Drumoghill and aligning southward for approximately 3km close to the existing N14 at Sheskinapoll. The option continues in a south easterly direction for approximately 4km to Feddyglass. At this point, the option can go one of two ways for approximately 2km: in a northerly curve or a southerly curve to the townland of Tamnawood. At this point the option, along with all other options, continues in a south easterly direction to Murlough. All the options then curve around to the east side of Croaghan hill and subsequently in a southerly direction between Coneyburrow and Beechwood park. Here the termination point occurs next to the existing N15 on greenfield land.

5.6.3.2 Stage 2 Options Assessment

There are nine shortlisted options that were taken forward from Stage 1 to Stage 2. Within this group, there have been three pairs of options that have similar alignments with only slight variation. Each pair is identified as one option with a variation, denoted 3A1 and 3A2, 3B1 and 3B2, and 3C1 and 3C2 (see Table 5.29 below). Therefore, there are six shortlisted options, with three of the options having a similar variation of the option, being brought forward to Stage 2 of the option selection process. The shortlisted options were renamed and colour coded to make referencing easier and provide a better visual aid for public consultation, as per Table 5.29.

Table 5.29: Shortlisted Options from Stage 1 to Stage 2

Stage 1 Option Name	Stage 2 Option Colour and Name
3.3	Blue 3A1
3.4	Blue 3A2
3.13	Red 3B1
3.14	Red 3B2
3.18	Orange 3C1
3.19	Orange 3C2
3.15	Purple3D
3.30	Cyan 3E
3.39	Pink 3F

The options brought forward to Stage 2 are illustrated in Figure 5.16.

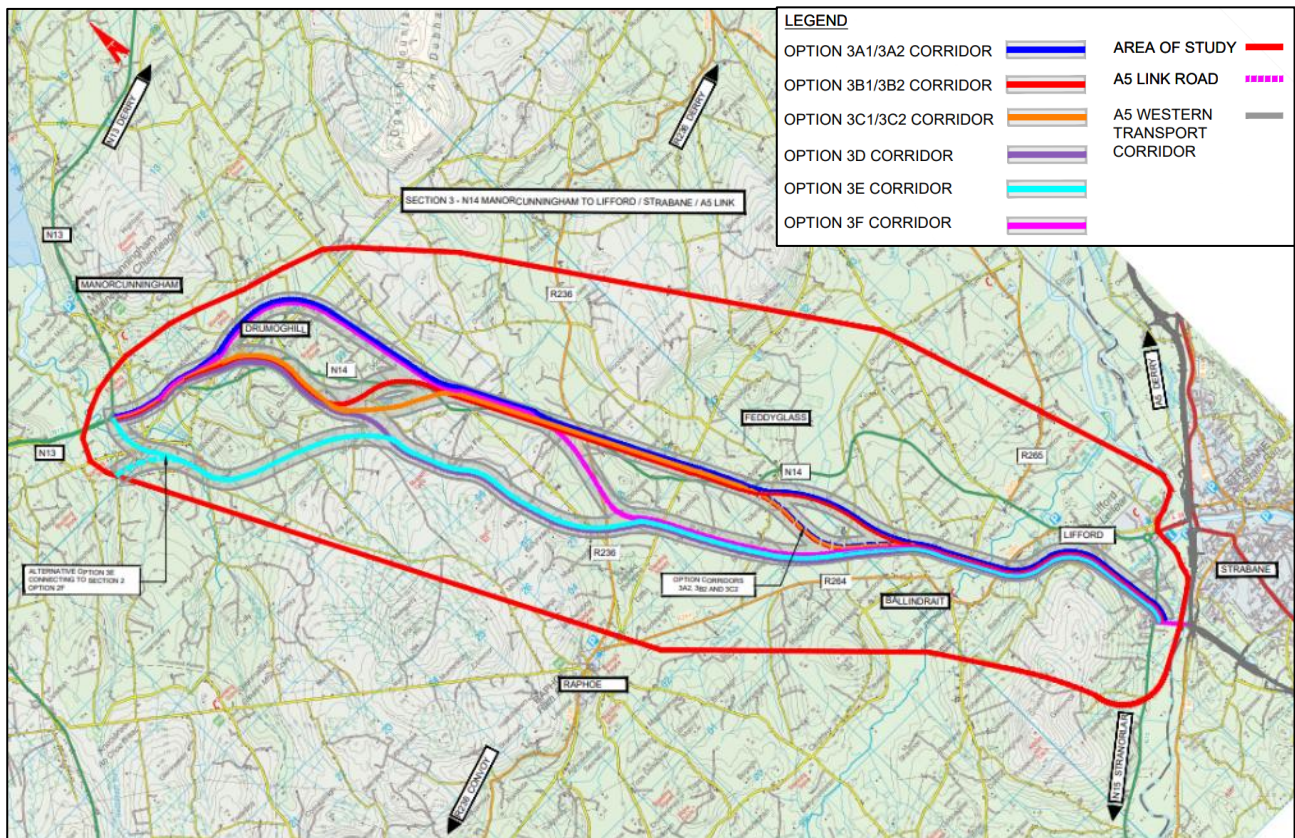


Figure 5.16: Section 3, Stage 2 Options

The Stage 2 appraisal of options was carried out in accordance with process as set out in Section 5.5.5. All options were appraised under the six main CAF criteria. This included environmental appraisal in accordance with the EIA Directive requirements.

All assessments are detailed in the Stage 2 appraisal presented in Volume D3 of the Option Selection report and is available on the project website at this link: https://www.donegal-ten-t.ie/media/download_gallery/Volume%20D3%20Section%203%20Environmental%20Appendices.pdf

A summary of the Stage 2 appraisal is presented in Section 15 of the Phase 2 Options Selection Report available on the project website at this link: https://www.donegal-ten-t.ie/media/Option_Selection_Report/Volume%20A%20-%20Main%20Report.pdf.

The environmental appraisal of the options is summarised in the following sections.

5.6.3.2.1 Population and Human Health

Both population and human health were considered as part of both the environmental and engineering criteria. The air quality is expected to improve for some receptors on the existing roads due to traffic moving to the Proposed Development but this will also introduce new receptors along the new alignment that will be exposed to higher levels of emissions. Both will have a direct impact on human health. Similarly, there will be a reduction in traffic noise at some locations on the existing road network as a result of the Proposed Development while there will be new receptors that will experience an increase in noise given their proximity to the new alignment. The impacts on population were also considered within the Material Assets Non-agricultural MCA topic in relation to settlements, community facilities, severance, properties etc. Refer to each of the individual MCA environmental criteria below for the results.

Within the engineering criterion, considerations to do with safety, physical activity, integration, accessibility & social inclusion all impact on population and human health. Using these criteria, Options 3B1 and 3B2 are marginally preferred, closely followed by Options 3C1 and 3C2, as they all provide greater safety

performance, a greater degree of accessibility to services and facilities and integration with land-use plans and the existing transport network. They will all also contribute to a neutral impact to noise sensitive receptors.

5.6.3.2.2 Biodiversity

The biodiversity study compared the potential impacts of the options for the proposed Section 3 on the terrestrial and aquatic natural environment. Each of the options was assessed as a 300m wide corridor to determine potential impacts on the principal ecological receptors within or adjacent to each option, and in relation to potential impacts arising from fragmentation or interference with species' movement across the options. The assessment was undertaken in accordance with the NRA Guidelines for the Assessment of Ecological Impacts of National Road Schemes (Revision 2, June 2009).

The appraisal of biodiversity, both aquatic and terrestrial ecology, involved desk and field studies in order to characterise habitats and identify flora and fauna of ecological value of all potentially affected habitats intercepted by, or within the Zone of Influence of, each of the options.

All Options entail a crossing of the River Deele at Cavanacor where flood embankments on the river provide a high local importance. Similarly, all options cross the Swilly Burn flood embankments and wet grassland and scrub embankments which are also high local importance. The historic floodplain of the river here has low-lying open agricultural grassland on both sides of the river and is used frequently by wintering Whooper swan as a foraging ground.

Considering the relative importance of each site and the impact of each option it was concluded that Options 3A2 and 3F are joint preferred options from the biodiversity perspective as neither option impacts on any sites greater than Local Importance (higher value).

Options 3B2, 3C2 and 3E are all equal as second preferences, while Option 3D emerges as the sole third preference.

Options 3A1, 3B1 and 3C1 are all the least preferred options, as they all impact on the Whooper Swan foraging grounds at Mulnaveagh near the Swilly Burn.

5.6.3.2.3 Land

Land was considered as part of the Soils, Geology and Hydrogeology, Material Assets Agricultural, and Material Assets Non-agricultural environmental criteria. Refer to each of those three sections for the results.

5.6.3.2.4 Soils

The soils, geology and hydrogeology assessment examine each option in terms of their importance and the possible impacts resulting from the construction of a proposed option. The options are compared, and impacts assessed from a land, soil, and hydrogeological perspective.

There are no significant receptors such as public supply wells, working quarries, karst features or groundwater dependent terrestrial ecosystems within the study area. The only receptor that has the potential to be impacted is the groundwater within the aquifer (rather than public supplies). The magnitude of impact on the water quality is estimated to be Small Adverse (results in minor impact on integrity of attribute or loss of small part of attribute). Considering the importance of the aquifer attributes (medium) and the magnitude of the impact (small), the overall significance of the impact is assessed to be Slight Adverse for all options. There is no significant difference in the options in terms of impact.

In terms of ranking, there is a slight preference for Options 3C1, 3C2 and 3F. Options 3B1, 3B2, 3D and 3E are ranked intermediate. Options 3A1 and 3A2 are Least Preferred, primarily because they have the least potential for aggregate generation during construction but also due to the potential for unsuitable/ soft soils and aquifer vulnerability.

5.6.3.2.5 Water

The hydrology assessment was prepared having regard to the TII Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes as recommended by the TII Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis. A comparative evaluation of the options was undertaken, having regard to the specific hydrological impacts associated with each option in order to identify a preferred option(s).

Most of the impacts on surface water are at locations where the options cross existing watercourses. The impact scores assigned to the crossing points are based on the overall impact each option will have throughout the construction and maintenance phase. A bridge/culvert crossing of an existing watercourse has the potential to impact both the existing flow/flood regime along with the water quality, therefore the impact scores on watercourses consider both aspects. Where an option impacted on a significant flood plain this was included as a separate impact.

Due to it traversing more elevated ground and the fact that it avoids floodplains, Option 3D is the preferred option in terms of water. Options 3B2 and 3C2 are second and third preference respectively.

5.6.3.2.6 Air & Climate

The air quality and climate analysis was undertaken by means of a desktop assessment. The assessment focussed on NO_x exposure, PM₁₀ exposure and the anticipated climate impacts through a calculation on greenhouse gas emissions (GHG).

Options 3C2 (Orange) and 3B2 (Red) have the potential to impact on the greatest number of properties (9) relative to each of the other proposed options. Of these other options, 3D (Purple) (3), 3E (Cyan) (3) and 3F (Pink) (4) will impact the least number of properties relative to Options 3A1 (Blue) (7), 3A2 (Blue) (8), 3B1 (Red) (8) and C1 (Orange) (8). The predicted emissions between the various options show lower variation as expected given the similarities in the traffic patterns and option lengths.

The air quality scores are largely dominated by the trend in receptor numbers. However, for Section 3, the variance in the number of properties affected is minimal and hence all options are considered to have a minor or slightly negative impact on air quality. As such, there is no clear preference for air quality amongst the options presented.

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 illustrate no significant variation between the options which is unsurprising given the similarity in traffic patterns. Hence all options are classed as moderately negative for climate.

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

For both air quality and climate, the relative similarity in the number of receptors affected and option length has resulted in no material difference in the options presented for air and climate. Consequently, all options presented are considered to pose a similar minor or slightly negative impact and all are ranked as intermediate.

5.6.3.2.7 Noise & Vibration

A comparative assessment of each of the nine options in Section 3 was carried out in relation to noise with reference to key sensitive receptors in proximity to the proposed options. The noise impacts for each of the options are identified so that those impacted by unacceptably high levels of noise can be avoided where feasible as part of the overall option selection process.

A qualitative assessment was carried out where the Property Impact Rating (PIR) was calculated. The PIR is based on the anticipated traffic flows using each option and the number of properties likely to be impacted, banded into distances from the centreline of each option and within a 300m wide corridor. A qualitative assessment was then carried out which considered factors such as noise sensitive receptors and populated

areas. The results of the quantitative and qualitative assessments were then combined to provide an overall impact level for each option.

The options are not significantly different from a subjective point of view other than the Cyan (3E) Option which routes traffic away from the concentration of receptors in the Drumoghill area. This results in the ranking being predominantly on the PIR scores in a situation where there is little else to differentiate between them subjectively.

The quantitative assessment for the PIR was calculated from the Geodirectory counts. The qualitative assessment is based on a site visit, analysis of changes in traffic flows, the construction requirements and the location of proximal noise sensitive locations.

Option 3E (Cyan) is the overall preferred option from a noise and vibration perspective primarily due to the fact that it redirects traffic from the Drumoghill area.

5.6.3.2.8 Landscape & Visual

The landscape and visual impact assessment was undertaken to identify the receptors associated with each option and the likely effects upon them which are then taken into consideration in developing and refining the options. A desktop study was undertaken, as well as site visits to establish an understanding of the landscape and visual context of the proposed options.

When landscape impacts are considered overall for the proposed options there is a slight preference for Option 3B1 and Option 3C1 as these options utilise the existing N14 corridor for a greater proportion of their length when compared with other options. Proposed Options 3D, 3E and 3F are considered to have a greater potential impact on the landscape as these are further removed from the existing N14 corridor and would introduce new features into portions of the landscape where such features are not apparent.

There is little difference between Options 3A1, 3A2, 3C2 and 3B2 with regard to potential landscape effects, however Options 3A1, 3A2 introduce new features into the landscape to the east of Ballyboe, whilst proposed southern options associated with Option 3C2 and 3B2 are further west where embankments would be required.

When visual impacts are considered, proposed Options 3D, 3E and 3F have the least number of residential properties within the 0m-50m distance band. However, Option 3E has the highest number of residential properties in the 50m-100m distance band. All three options are considered to introduce embankments and cuttings into a portion of the landscape not currently impacted by such features.

When considering potential visual impacts in regard to Options 3A1 and 3A2, it is considered that whilst these options share similarities in the number of properties potentially being affected within 300m of the option, there is a larger degree of visual impact associated with new embankments and cuttings being formed to the north and east of Ballyboe in areas not already affected by such features.

When considering Options 3B1 and 3B2 it is considered that whilst these options have the potential to impact on larger property numbers within 300m of the options, such affected properties are already impacted by the existing N14 road corridor. There is a slight preference for Option 3B1 as this is considered to have a slightly less visual impact in lower elevated land adjacent to the Deele River.

For Options 3C1 and 3C2 it is considered that whilst these options have the potential to impact on larger property numbers within 300m of the proposed options, such affected properties are already impacted by the existing N14 road corridor. There is a slight preference for Option 3C1 as this is considered to have a slightly less visual impact in lower elevated land adjacent to the Deele River.

Overall, Option 3B1 and 3C1 are preferred with Options 3B2 and 3C2 ranked intermediate. Options 3A1, 3A2, 3D, 3E and 3F are all ranked Least Preferred.

5.6.3.2.9 Material Assets

The assessment was informed by the Transport Infrastructure Ireland (TII) Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis (PE-PAG-02031). The assessment focussed on both agricultural and non-agricultural material assets.

In relation to the agricultural assessment, Option 3C2 is most preferred, being one of the shorter options with an impact on less folios. This is followed by Option 3E being the shortest of all options, but with higher impact on folios than 3C2. Ranked third is Options 3C1 and 3B2, followed by Option 3D which has greater potential to impact sensitive farms. Options 3A2 and 3B1 are joint fifth preference with Options 3A1 and 3F the least preferred of all options. All options have varying impact on the number of folios and severance and are deemed to all have a moderately negative impact at this stage

In relation to the non-agricultural assessment, all options have a similar impact on non-agricultural material assets. Some differentiating factors include potential impacts on forestry, telecommunications/ fibre optic cables, and properties. Taking these into consideration, Options 3D and 3E are least preferred due the quantity of property impacts and their associated sensitivity and significance. All other options have a lesser impact on non-agricultural material assets.

5.6.3.2.10 Waste

At this stage in the project, it is difficult to predict estimates of the likely quantities of waste that will be generated. The cut/fill balance for each option, based on preliminary alignments, was estimated to consider how much of a deficit or surplus in excavated material there may be with each option. Where there is a potential surplus in material from the earthworks, then it is possible that some of it may become a waste. This surplus was used as the basis for evaluating the potential impact of each option and ranking preferences.

Although there is variance in the volume of material that will need to be disposed of, or imported, for each option, all options have high earthwork operations as the study area has a drumlin topography and a combination of low-lying alluvial areas and high elevation alignments. While considering typical anticipated quaternary characteristics for the area and applying common assumptions in terms of depth, each option can be compared in terms of anticipated material disposal.

Overall, there is relatively little difference between all options under consideration with a similar level of impact expected. Therefore, all options were ranked as Intermediate.

5.6.3.2.11 Cultural Heritage

The architectural heritage and archaeology assessments (together known as cultural heritage) was undertaken in accordance with 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).

There are many different types of cultural heritage within the study area. For example, there is a presence of several 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. The study area contains several important river networks, landscapes of rolling well-drained drumlin terrain (which would have been very conducive to past human settlement), standing stones, and historic buildings such as various churches, Lifford Castle and Cavanacor House.

The study area for all option alignments traverses through an environment considered to be of high archaeological potential. A total of five extensive areas have been identified within the study area which are common to all nine proposed options. As such, when assessed on a comparative basis, the hitherto unknown archaeological potential of the proposed options carry equal level and weighting of potential profound impact throughout. In addition, it should be noted that there are two cultural heritage constraints which are common to all nine options as they all follow the same alignment and termination at the Lifford extent of the proposed scheme. These sites consist of: the site of a Standing Stone at Murlough (DG070-048) and the attendant grounds of Croaghan House (NIAH 40835028).

Overall, from a Cultural Heritage perspective and based on a quantitative and qualitative assessment; the F (Pink) Option is the preferred option, followed by, in order of preference: D (Purple), C2 (Orange), C1 (Orange), B2 (Red), B1 (Red), A2 (Blue), A1 (Blue) and E (Cyan).

5.6.3.2.12 Summary of Environmental Appraisal

A summary of the results of the MCA of the Stage 2 options is presented in Table 5.30. This table presents the impact score using the ratings from TII PAG Unit 7, scoring from 1 – Major or Highly Negative to 7 – Major or Highly Positive, as shown previously in Table 5.6 in Section 5.5.5.

In reviewing total impact scores in Table 5.30, Options 3B2 and 3C2 achieve an overall top score of 107. with other options scoring less. It must be emphasised that summing up of impact scores does not take account of the relative importance of each sub-criterion or the individual impacts or preferences, but provides an initial comparison between the overall, non-weighted performance of each option. As such, Options 3B2 and 3C2 emerge to the front as options performing well, on balance, considering all impacts.

A secondary appraisal showing specialist preferences of each option across each sub-criterion was prepared to ensure consideration of other factors that may inform a decision on the preferred option. For each topic, the specialists, including the EIAR specialists, also provided a preference for the options which were grouped and colour coded Green (Preferred), Orange (Intermediate), and Red (Least Preferred). A summary of this is provided in Table 5.31. From a review of the preference, Options 3B2 and 3C2 are the preferred options, followed by Options 3A2 and 3D. Options 3A1, 3B1 and 3C1 are not preferred options due to the significance of the Biodiversity preferences as a result of the Whooper Swans.

Option 3F performs worse than all other options across a number of criteria due to poor performance across Economy and Safety, partly due to it being the longest option. Therefore, this is the least preferred option.

Options 3A1, 3B1 and 3C1 all have a significant impact on an ecological site of County / National importance at the Feddyglass/Swilly Burn Whooper Swan foraging area. For this reason, these options are also not preferred.

Options 3D and 3E are less preferred than option 3B2 in terms of Economy, Environment, Safety and Integration. A significant factor in the low preferences is the Highly Negative effect on Non-Agricultural Material Assets. Both options impact upon five properties, while all other options impact on two.

Options 3A2 is less preferred than Option 3B2 in terms of Economy and Integration.

Overall Options 3B2 and 3C2 score best taking all multi criteria analysis into account. As there is not a clear preferred option between Options 3B2 and 3C2, a pairwise comparison was conducted to further compare these two options against each other to identify the preferred option. This pairwise comparison is described in the following section.

Table 5.30: Section 3 Project Appraisal Matrix

Option Colour Option Name	Blue		Red		Orange		Purple	Cyan	Pink	
	3A1	3A2	3B1	3B2	3C1	3C2	3D	3E	3F	
Environment										
Air Quality & Climate	3	3	3	3	3	3	3	3	3	
Noise	4	4	4	4	4	4	4	5	4	
Landscape & Visual	1	1	2	2	2	2	1	1	1	
Biodiversity	1	3	1	2	1	2	1	2	3	
Waste	3	3	3	3	3	3	3	3	3	
Soils, Geology and Hydrogeology	3	3	3	3	3	3	3	3	3	
Hydrology	2	2	3	3	3	3	3	2	2	
Cultural Heritage	1	1	1	1	1	1	2	1	2	
Material Assets - Agricultural	2	2	2	2	2	2	2	2	2	
Material Assets - Non-agricultural	3	3	3	3	3	3	2	2	3	
Environment Sub-Total	23	25	25	26	25	26	24	24	26	
Safety										
Safety and Security of Road Users	6	6	6	6	6	6	6	6	6	
Collision Reduction	7	7	7	7	7	7	7	7	6	
Road Safety Audit (Stage F)	7	7	7	7	7	7	6	6	6	
Road Safety Impact Assessment	7	7	7	7	7	7	7	6	6	
Safety Sub-Total	27	27	27	27	27	27	26	25	24	
Physical Activity										
Physical Activity	6	6	6	6	6	6	6	6	6	
Physical Activity Sub-Total	6	6	6	6	6	6	6	6	6	

Option Colour Option Name	Blue		Red		Orange		Purple	Cyan	Pink	
	3A1	3A2	3B1	3B2	3C1	3C2	3D	3E	3F	
Economy										
Transport Efficiency and Effectiveness	4	4	4	4	4	4	4	4	4	3
Wider Economic Impacts	5	5	5	5	5	5	5	5	5	5
Funding Impacts	5	5	5	5	5	5	5	5	5	5
Economy Sub-Total	14	14	14	14	14	14	14	14	14	13
Accessibility and Social Inclusion										
Deprived Geographical Areas	4	4	4	4	4	4	4	4	4	4
Vulnerable Groups	4	4	4	4	4	4	4	4	4	4
Accessibility and Social Inclusion Sub-Total	8	8	8	8	8	8	8	8	8	8
Integration										
Transport Integration	6	6	6	6	6	6	6	6	6	6
Land use Integration	6	6	6	6	6	6	6	6	6	6
Geographical Integration	7	7	7	7	7	7	7	7	7	7
Other Government Policy Integration	7	7	7	7	7	7	7	7	7	7
Integration Sub-Total	26	26	26	26	26	26	26	26	26	26
Total Impact Scores	104	106	106	107	106	107	104	103	103	103

Table 5.31: Section 3 Secondary Appraisal Matrix

Option Colour Option Name	Blue		Red		Orange		Purple	Cyan	Pink	
	3A1	3A2	3B1	3B2	3C1	3C2	3D	3E	3F	
Environment										
Air Quality & Climate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Noise	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Preferred	Intermediate	Intermediate
Landscape & Visual	Least Preferred	Least Preferred	Preferred	Intermediate	Preferred	Intermediate	Least Preferred	Least Preferred	Least Preferred	Least Preferred
Biodiversity	Least Preferred	Preferred	Least Preferred	Intermediate	Least Preferred	Intermediate	Intermediate	Intermediate	Intermediate	Preferred
Waste	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Soils, Geology and Hydrogeology	Least Preferred	Least Preferred	Intermediate	Intermediate	Preferred	Preferred	Intermediate	Intermediate	Intermediate	Preferred
Hydrology	Least Preferred	Least Preferred	Intermediate	Preferred	Intermediate	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred
Cultural Heritage	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Preferred	Least Preferred	Preferred	Preferred
Material Assets - Agricultural	Least Preferred	Least Preferred	Intermediate	Intermediate	Intermediate	Preferred	Intermediate	Preferred	Least Preferred	Least Preferred
Material Assets - Non-agricultural	Preferred	Preferred	Preferred	Preferred	Intermediate	Intermediate	Least Preferred	Least Preferred	Preferred	Preferred
Safety										
Safety and Security of Road Users	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
Collision Reduction	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Intermediate
Road Safety Audit (Stage F)	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Intermediate	Intermediate	Intermediate	Intermediate
Road Safety Impact Assessment	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Intermediate	Intermediate	Intermediate
Physical Activity										
Physical Activity	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Intermediate	Intermediate	Intermediate	Intermediate
Economy										
Transport Efficiency and Effectiveness	Intermediate	Intermediate	Preferred	Preferred	Preferred	Preferred	Intermediate	Intermediate	Least Preferred	Least Preferred
Wider Economic Impacts	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
Funding Impacts	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
Accessibility and Social Inclusion										
Deprived Geographical Areas	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
Vulnerable Groups	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
Integration										
Transport Integration	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
Land use Integration	Intermediate	Intermediate	Preferred	Preferred	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Geographical Integration	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
Other Government Policy Integration	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred

5.6.3.3 Stage 2 Pairwise Comparison

Two options (3B2 and 3C2) came out with identical impact scores and identical preferences and so a pairwise comparison has been required to decide the preferred option.

Options 3B2 and 3C2 have similar alignments over approximately 90% of their length. They differ over approximately 2.5 km between the townlands of Drumcain and Sheskinapoll. Both options also perform best in terms of impact and have the same score. A pairwise competition was conducted on these options to establish the better of the two options based on the impact score and preference of each option under each criterion.

Under the environmental criteria, the summary of the pairwise comparison is provided in Table 5.32.

Table 5.32: Environmental Pairwise Comparison between Option 3B2 and 3C2 Stage 2

Environment Criteria	Comments
Air Quality & Climate	No material difference between options, with both having slightly negative impact score.
Noise	No material difference between options with both having a neutral / not significant impact score and have the same preference.
Landscape & Visual	Options 3B2 and 3C2 both have moderately negative impacts and no discernible difference in preference.
Biodiversity	Both options have a moderately negative impact and have a similar preference.
Waste	Both options have slightly negative impacts as both options require disposal of earthworks material. Option 3C2 is slightly preferred over 3B2 due to less potential generation of earthworks waste.
Soils, Geology and Hydrogeology	Both options have minor negative impacts and are very similar. Option 3C2 is slightly preferred due to less deep cuttings which has the potential to increase vulnerability of groundwater.
Hydrology	Options 3B2 and 3C2 have slightly negative impacts and have similar preferences.
Cultural Heritage	Both route corridors have highly negative impacts, however 3C2 is slightly preferred as it has one less moderately negative impact within the assessment corridor.
Material Assets - Agricultural	Option 3B2 impacts on 72 folios and severs approx. 80 fields while Option 3C2 affects the least number of folios (69) and approx. 72 fields. Therefore, Option 3C2 is marginally preferred over Option 3B2.
Material Assets – Non-Agricultural	Both options have a minor negative impact score, but Option 3B2 is slightly preferred over option 3C2 with respect to the existing road network, telecommunications and properties/community severance. Option 3C2 separates clusters of residences and isolates properties between the proposed and existing N14.
Overall Summary	Over the majority of the Environmental sub-criteria there is no significant differences between Options 3B2 and 3C2. Option 3C2 is slightly preferred over Option 3B2 in terms of Noise, Cultural Heritage and Land and Soils. Option 3B2 is slightly preferred over Option 3C2 in terms of Non-Agricultural Material Assets. Overall in terms of the Environment, Options 3B2 and 3C2 have a similar impact, with Option 3C2 having a marginal preference.

Under the Environmental criteria, Option 3C2 is slightly preferred in terms of Cultural Heritage, Waste, Noise and Land and Soils whereas Option 3B2 is slightly preferred in terms of Non-Agricultural Material Assets. Overall in terms of the Environment Option 3C2 is slightly preferred over Option 3B2.

Under the other CAF criteria, the summary of the pairwise comparison is provided in Table 5.33.

Table 5.33: Other Criteria Pairwise Comparison between Option 3B2 and 3C2 Stage 2

Criteria	Comments
Safety	Both options perform similarly as they are very similar along their length, however Option 3C2 is marginally preferred over option 3B2 due to slightly favourable engineering design.
Physical Activity	Options 3B2 and 3C2 provide similar proposals and as such all have similar preferences and impact scores.
Economy	Overall in terms of Economy Options 3B2 and 3C2 have a similar impact with Option 3B2 being slightly preferred due to it having a marginally better BCR and a lower Capital cost.
Accessibility and Social Inclusion	Options are unlikely to alter the Pobal HP Deprivation score or have measurable impact on Vulnerable Groups therefore both Options have a similar preference.
Integration	All options score the same with Option 3B2 marginally preferred over option 3C2 due to closer alignment with the reserved corridor in the County Development Plan.

In terms of Safety Option 3C2 is marginally preferred over Option 3B2 but it is noted that there is no discernible difference in terms of Safety. Under the Economics criteria, Option 3B2 is slightly preferred over Option 3C2, with both options scored as minor positive. Under Integration Option 3B2 is slightly preferred over Option 3C2. Both options are rated equally under the Physical Activity and the Accessibility and Social Inclusion criteria.

In reviewing the full spectrum of appraisals, evaluating the number and significance of impacts that each option has and comparing the preferences of the options, Option 3B2 is identified as the Preferred Option. This is supported qualitatively, by reviewing balance of preferences across each criterion, and quantitatively by considering the cumulative impact of each option and the significance of those impacts.

Therefore, Option 3B2 is a better performing option than 3C2.

5.6.3.4 Stage 3 Selection of Preferred Route

The selected Preferred Option for Section 2 of the Proposed Development is Option 3B2, as illustrated in Figure 5.17 where Option 3B2 is shown as the solid black.

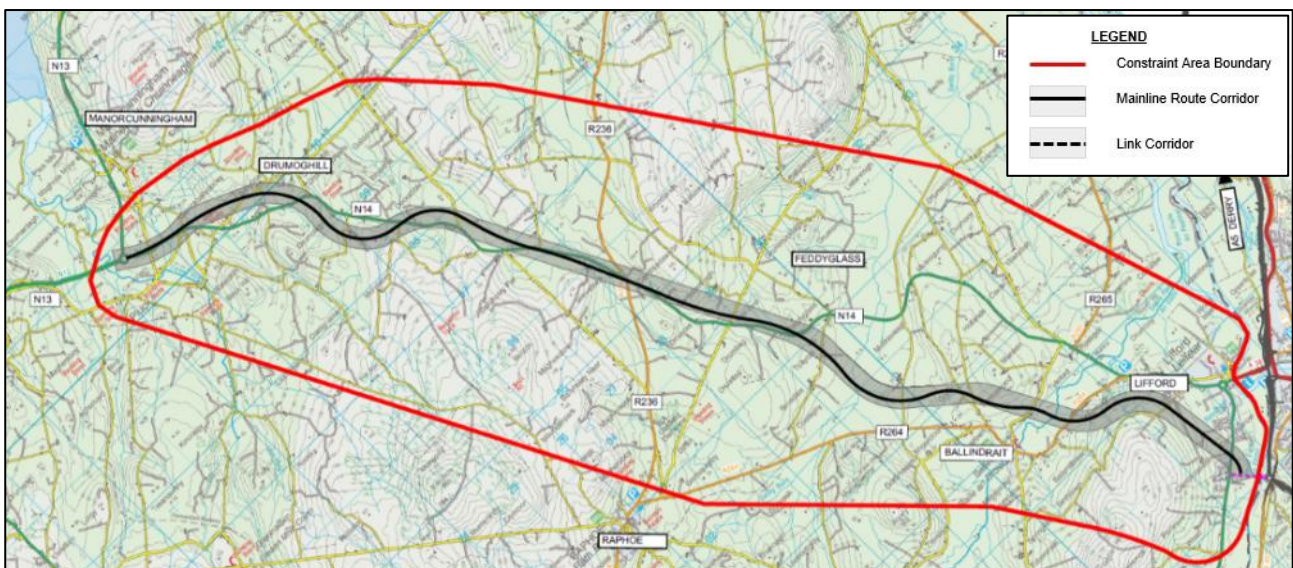


Figure 5.17: Section 3, Preferred Option 3B2

5.6.4 Overall Conclusion of the Phase 2 Options Selection Process for the Proposed Development

The preceding Sections 5.6.1 through 5.6.3 have provided an assessment of the options considered for each of the three sections of the Proposed Development. This has fully considered the environmental aspects of the Project against the EIA factors from the EIA Directive.

Having carefully considered and assessed the reasonable route options for the sections of the Proposed Development against the environmental, engineering and economic criteria, the relevant specialists are satisfied that the preferred option for the overall Proposed Development is the best reasonable alternative to deliver on the Project's objectives.

5.7 Phase 3 Design Development: All Sections of the Proposed Development

5.7.1 Route Layout Alternatives

The route corridors alternatives were all environmentally assessed in accordance with the EIA Directive as transposed into Irish law at Phase 2. As part of the Phase 2 works, preliminary alignments (horizontal and vertical) were developed. At the commencement of Phase 3, these alignments were further developed and refined in an iterative design process to derive the optimum solution for the Proposed Development.

Further information was collected during Phase 3 that resulted in amendments to the design as it progressed. The environmental evaluation of the project progressed in tandem with the design evolution. Some of the further information that was collected that resulted in design modifications included: ground investigation data, proximity to houses, buildings, communities, roads, farms, accesses, watercourses, soft ground, woodland, amenities, identification of cultural heritage features, archaeological investigations and confirmation of presence/ absence of important features, ecologically sensitive areas, SAC and SPA areas, flood zones and areas prone to flooding, etc. These alternatives represented a normal refinement of aspects of the design and part of the iterative design process, in order to avoid sensitive features and, for example, to further reduce environmental impacts and/or optimise design and to address new standards and policy requirements.

A number of design freezes have been completed throughout this design phase to allow environmental experts and relevant consultees to examine the design options and provide feedback to be incorporated back into the decision-making process.

In addition, the design process sought to optimise the Phase 2 selected preferred route option in accordance with proper and efficient design practice but also to accommodate for developing policy and guidance, including but not restricted to, NIFTI, the National Road Safety Strategy as well as climate action goals. To this end public transport (bus) and active travel facilities as well as enabling infrastructure for e-charging and other green initiatives were integrated at Phase 3. Improved local connectivity was also considered throughout and particularly at junctions to ensure that the necessary provision of a high quality TEN-T strategic road upgrade did not unduly sever existing communities but rather provided greater multimodal connectivity to communities, community hubs and to local services.

Table 5.34 (Section 1), Table 5.35 (Section 2), and Table 5.36 (Section 3) present a summary of key locations where alternative designs have been considered for each section of the Proposed Development during Stage 3. The chosen solution for each option is presented in the general arrangement drawings in EIAR Drawing 4.1 (Section 1), 4.2 (Section 2) and 4.3 (Section 3) in Volume D: Book of Drawings. For each relevant location, environmental impacts such as community severance, proximity to existing properties (noise and air impact) and proximity to sensitive sites (biodiversity and archaeological) have been considered during the development of the further minor refinements that have been made as part of the design development. Appendix C5.02 presents details of key alternatives for road layout considered during the design process. The Proposed Development as set out in Chapter 4: Project Description and in the drawings contained in Volume D: Book of Drawings represent the design as assessed within this EIAR as required under the EIA Directive and the Roads Act, 1993 as amended, and is sufficient for a robust environmental impact assessment to be carried out.

Table 5.34: Key Alternatives Examined During Design Development of Section 1

Location	Number of Alternatives Developed	Comments
Dooish Junction	9	Alternative arrangements for the southern tie-in to the existing N15 at Dooish have been examined to: <ul style="list-style-type: none"> ▪ Improve local connectivity and reduce community severance between Dooish and Cappry ▪ Improve road safety by reducing the number of direct accesses onto the National Primary Road Network ▪ Improve safety by increasing segregation between local traffic (including vulnerable road users) and strategic traffic
Mainline 1.2 at Drumboe	2	Two alternative alignments for the mainline at Drumboe to avoid potential archaeological features at the Drumboe Abbey site. Both alternatives are located to the north of the proposed mainline to avoid the Drumboe Abbey Site and had significant impacts on Holywell Woods. Archaeological site investigations have been completed and concluded that there are no archaeological remains impacted by the proposed mainline alignment, and the alternatives have been therefore not taken forward.
L-2784 Connector and L-2734 Connector at Dunwiley	2	Alternative arrangements for the L-2784 and L-2734 connector crossing of the mainline examined to optimise the number of road bridges while maintaining satisfactory connectivity of the local road network to reduce impact and costs.
L-2724 Connector at Dunwiley	6	Alternative arrangements for the L-2724 side road crossing of the mainline examined to: <ul style="list-style-type: none"> ▪ Achieve feasible access to dwelling to the east of the side road, while minimising land take ▪ Reduce visual impact of side road structure and impact on adjacent private land and properties
L – 7094 Connector	2	Initial proposals included the provision of an overbridge on the existing side road (unnamed) at Ch 5+700 to retain local road connectivity and access. The existing road is narrow with very little traffic, and alternatives have been examined to explore opportunities for cost reduction.
L-7084 Connector at Teevickmoy	5	Alternative alignment for the L-7084 side road to: <ul style="list-style-type: none"> ▪ Provide satisfactory alignment to maintain road safety and maintain access to land holdings, at location where existing road has very poor alignment ▪ Minimise direct impacts on adjacent properties and land holdings
Teevickmoy Junction	3	The proposed junction of the N15 Primary Road Connector with mainline at Teevickmoy is located on a steep hillside. The variable topography of this location significantly influences the visual impact of the junction, the extent of earthworks required to construct it, and the impact on land holdings. Options have been examined to explore ways to reduce earthworks, visual impact and impact on landholdings.

Location	Number of Alternatives Developed	Comments
Tircallan Junction	2	<p>Alternative arrangements for arrangement at N15 Primary Road Connector junction with existing N13 (to be downgraded) at Tircallan to:</p> <ul style="list-style-type: none"> ▪ Reduce direct impact on nearby properties ▪ Improve traffic flow on proposed new N15 Primary Road Connector.
Meenavoy Junction	5	<p>Alternative arrangements for the northern tie-in to the existing N13 have been examined to:</p> <ul style="list-style-type: none"> ▪ Improve local connectivity and reduce community severance between Meenavoy, Stranorlar and Raphoe ▪ Improve road safety by reducing the number of direct accesses onto the National Primary Road Network ▪ Improve safety by increasing segregation between local traffic (including vulnerable road users) and strategic traffic

Table 5.35: Key Alternatives Examined During Design Development of Section 2

Location	Number of alternatives developed	Comments
L-1064 Connector	4	<p>Alternative arrangements for the existing N13 junction with existing L-1064 (Raphoe road) have been examined to:</p> <ul style="list-style-type: none"> ▪ Improve local connectivity and reduce community severance between Listillian and Lurgybrack ▪ Improve road safety by reducing the number of direct accesses onto the National Primary Road Network ▪ Improve safety by increasing segregation between local traffic (including vulnerable road users) and strategic traffic
Connections at Listellian junction	7	<p>Seven alternative arrangements considered for connections to existing local roads from National Road N13 at Listellian. L-1094 Connector considered to provide connection between the existing L-1094 (Cullion Road), new proposed roundabout on N13, Lurgybrack school and surrounding property accesses.</p> <ul style="list-style-type: none"> ▪ These alternative arrangements for the southern junction and L-1094 Connector to the existing N13 have been examined to: ▪ Improve local connectivity and reduce community severance between Local Road, school access and property access roads. ▪ Improve road safety by removing the number of direct accesses onto the National Primary Road Network.
L-5784 Connector at Drumany	5	<p>Five alternative arrangements for L-5784 Connector considered to provide connection between the existing L-5784 and downgraded existing N13 to retain the local road connectivity and accesses. These alternatives have been examined to improve road safety and existing local road poor alignment.</p>
L-58141 Connector at Dromore	5	<p>Five alternative arrangements for the access road considered to maintain the local connectivity and property accesses.</p> <p>Option F has been selected in the final phase of the design. The decision based on the geometrics for corresponding design speed and overall least impact on existing properties.</p>
Connections at Bonagee Junction	8	<p>Eight alternative arrangements for surrounding side, local roads at Bonagee have been developed so as to provide connection between proposed mainline and properties/developments within the Bonagee parcels.</p> <p>These alternatives have been examined to improve connectivity, road safety and existing local road poor alignment considering impact on properties, SAC constraints, active travel facility and surface water drainage.</p>

Location	Number of alternatives developed	Comments
Ballyraine Junction	3	Three alternative arrangements for Ballyraine roundabout and approach roads have been examined to improve road safety, local connectivity, property access provisions and geometrics.
Trimragh Junction	7	<p>Alternative arrangements for the Trimragh junction connecting the mainline examined based on existing topography, geometric standards, impact on properties, local road connections and dwelling accesses.</p> <ul style="list-style-type: none"> ▪ The initial alternatives developed with two different scenarios. ▪ Trimragh link road with Underbridge ▪ Trimragh link road with Overbridge
Existing N13 section at St. Patricks National School (Lurgybrack section)	5	<p>Alternative arrangements for arrangement at St Patricks National School with existing N13 (to be downgraded) at Lurgybrack have been examined to:</p> <ul style="list-style-type: none"> ▪ Provide connection to St. Patricks National school from Proposed Development ▪ Improve local connectivity and reduce community severance between Listellian and Lurgybrack ▪ Improve road safety by reducing the number of direct accesses ▪ Improve safety by increasing segregation between local traffic (including vulnerable road users) and strategic traffic
Existing N13 Section – south of Dry Arch junction	2	<p>Alternative arrangements for existing N13 (to be downgraded) at Lurgybrack have been examined to:</p> <ul style="list-style-type: none"> ▪ Provide connection to St. Patricks National school from Proposed Development ▪ Improve local connectivity and reduce community severance between Listellian and Lurgybrack ▪ Improve Non-Motorised Users (NMU) network and provide for connections with Proposed Development ▪ Improve safety by increasing segregation between local traffic (including vulnerable road users) and strategic traffic

Table 5.36: Key Alternatives Examined During Design Development of Section 3

Location	Number of alternatives developed	Comments
Ch.0+600	3	Alternative arrangements for the access road AR3.03 connecting from L1294 Manorcunningham to L-6004-2 have been examined in order to: <ul style="list-style-type: none"> ▪ Reduce land take requirements ▪ Remove headwalls ▪ Remove significant culvert
Ch.3+500	5	Alternative arrangements for the sideroad L5574 Mondooy Lower have been examined in order to: <ul style="list-style-type: none"> ▪ Reduce land take requirements ▪ Minimise impact on historical buildings ▪ Minimise the difficulties for gaining access to properties ▪ Take into account difficult local topography
Ch.4+100	5	Alternative arrangements for the sideroad Drumoghill Junction South Link have been examined to: <ul style="list-style-type: none"> ▪ Reduce impacts on adjacent watercourse ▪ Reduce land take requirements and number of impacted holdings ▪ Reduce complexity of grades and earthworks requirements ▪ Minimise landholding severances
Ch.5+200	3	Alternative arrangements for the sideroad L1214 Galdonagh have been examined to: <ul style="list-style-type: none"> ▪ Minimise land take requirements ▪ Reduce local severances ▪ Reduce earthworks volumes
Ch.6+400	4	Alternative arrangements for the sideroad LX3014 Sheshkinpoll have been examined to: <ul style="list-style-type: none"> ▪ Reduce impact on adjacent watercourse ▪ Minimise land take requirements ▪ Reduce impact on property access ▪ Reduce bridge skew and central span
Ch.10+300	4	Alternative arrangements for the sideroad LX3014 Tullyrap have been examined to: <ul style="list-style-type: none"> ▪ Minimise impact on historical buildings ▪ Minimise impacts on adjacent watercourse

Location	Number of alternatives developed	Comments
Ch.10+800	2	<ul style="list-style-type: none"> ▪ Reduce impact on dwelling from overbridge ▪ Minimise environmental impact on adjacent wooded area ▪ Improve safety by removal of existing cross road junction
Ch.12+200	4	<p>Alternative arrangements for the sideroad L6104 Broadlea have been examined to:</p> <ul style="list-style-type: none"> ▪ Minimise impacts on adjacent watercourse ▪ Improve traffic flow in the area ▪ Reduce earthworks embankment height and side road length ▪ Reduce impact on adjacent dwellings from noise and visual impact perspective ▪ Reduce impact on land take requirements
Ch. 13+300	3	<p>Alternative arrangements for the sideroad L2424 Mullinavegh have been examined to:</p> <ul style="list-style-type: none"> ▪ Reduce impact on land take requirements ▪ Minimise impacts on nearby watercourse ▪ Minimise variation from the existing local road ▪ Improve road drainage ▪ Increase earthworks fill for mainline improve scheme cut fill balance <p>Alternative arrangements for sideroad L2414 Tamnawood have been examined to:</p> <ul style="list-style-type: none"> ▪ Reduce impact on land take requirements ▪ Minimise impacts on archeology ▪ Minimise variation from the existing local road ▪ Minimise number of bridges

5.7.2 Alternative Design Elements

The previous section dealt with design development to ensure that the delivery of all aims and objectives of the Project were consistent with evolving policy and at EU, National and Local level. This was particularly focused on geometric design, cut, fill and earthworks optimisation.

Other project elements evolved through the Phase 3 design process also. These design evolutions were focused in a significant way on minimising the whole life carbon footprint of the Project from construction through operation and maintenance.

Three areas where element designs have evolved with detailed environmental assessment are:

- Structures and Bridges
- Drainage
- Active travel

The above design elements as further detailed below have been chosen to best represent the level of alternative consideration applied across the design process. Assessment of such design alternatives including economic, social and environmental impacts have been carried out through the design development process.

5.7.2.1 Structures Design Options:

5.7.2.1.1 Bridge Design General

The Proposed Development requires 52 bridges in total, which are categorised as follows:

- **Major River Bridges** (carry the proposed mainline carriageway over the River Finn and River Swilly)
- **Underbridges** (carry the proposed mainline carriageway over side roads (e.g. local & link roads))
- **Overbridges** (carry side roads over the proposed mainline carriageway)
- **Riverbridges** (carry the proposed mainline carriageway over rivers)
- **Footbridges** (carry pedestrians and NMU over the proposed mainline carriageway)
- **Underpasses** (buried box / frame structures which enable private roads and paths to pass under the proposed mainline carriageway)

The Structure Options Reports (SOR) have been prepared for each of the above structure groupings, with the exception of the underpasses, which use a standard TII configuration. These SORs presented different options for the structure type in terms of configuration and materials, each concluded with a recommendation for the preferred option following liaison with TII Structures. Refer to Appendix C5.04 to C5.07 for individual SOR for each of the three main bridge structures, namely: Appx. C5.04 River Finn Crossing SOR (Section 1); Appx. C5.05 River Swilly Crossing SOR (Section 2); Appx. C5.06 River Finn Crossing SOR (Section 3) along with Appx. C5.07 River Finn Crossing SOR Addendum (Section 3). Further detail is provided in Section 5.8.2.2 below.

All options considered for the Major River Bridges included set-backs from the river banks, and clear spans across the rivers, to avoid any direct impact on the SACs and riparian habitat. The only exception being the N14/ N15 to A5 Link in Section 3 which has piers within the River Finn SAC boundary as a clear span over this distance was not feasible given the span involved. However, there is no adverse impact on the integrity of the River Finn SAC as per the Natura Impact Statement that accompanies the application to the Commission for the Proposed Development.

The proposed bridges have been selected based on the physical, geotechnical, hydrological and environmental constraints at each location. The structural designs considered the technical, aesthetic, construction and maintenance requirements and value of each option.

Due to the expansive land coverage of the works area for all three sections of the Proposed Development, there has been significant degree of interaction with various landscape constraints. Each section of the Proposed Development contains both Moderate and High Scenic Amenity Areas. With input from stakeholders, impacted landowners and environmental assessments, bridge profiles have been designed to be simple and understated. Loss of property and impact on residents and landowners has been minimised in the design of each of the structures.

Further details regarding bridge structures are provided in Chapter 4: Project Description. The consideration of bridge structures in relation to flooding are provided in Chapter 11: Water and the potential impacts to aquatic and plant life are outlined in Chapter 9: Biodiversity.

5.7.2.1.2 Section 1 Bridge Design

Section 1 River Finn Bridge is a significant part of the Project, comprising a seven span structure length 360 m over the River Finn SAC. In order to minimise the potential for impact on the River Finn SAC due to the construction and operation of the Proposed Development at this location, the proposed bridge includes an 85 m span that clears the river and banks, including the SAC. In relation to otter, a QI species of the River Finn SAC, the bridge structure meets the Site-Specific Conservation Objectives, in relation to 'Extent of terrestrial habitat'. The set-back distance between the face of the first pier and the SAC boundary on the southern and northern bank are between 10.3 m to 10.9 m and 6.7 m to 6.9 m respectively, providing sufficient river bank passage for mammals. The SOR considered different options for this major river bridge, taking into account potential risk of impact on the river during construction, as well as the criteria mentioned above. Further details of construction methodologies are provided below in Section 5.8.2.

Section 1 Riverbridge N15R042 has been designed to accommodate the existing Backlees River along its natural path and facilitate access to severed lands with the inclusion of an accommodation road. In doing so, the natural flow path of the river has been retained in order to allow fish passage.

Section 1 Underbridge N15U047 has been designed so that the revised alignment for the L2724 side road followed the natural contours of the existing topography within a steeply graded part of the Proposed Development. In doing so, the visual impact of the road crossing has been limited, and significant visual impact to adjacent properties limited.

5.7.2.1.3 Section 2 Bridge Design

Section 2 River Swilly Bridge is a significant part of the Project, comprising a three-span structure length 290 m over the Swilly Estuary SAC. In order to minimise the potential for impact on the Lough Swilly SAC due to the construction and operation of the Proposed Development at this location, the proposed bridge includes a 104 m span that clears the river and banks. The SOR considers different options for this major river bridge, taking into account potential risk of impact on the river during construction and its proximity to the coast, as well as the criteria mentioned above.

An active travel bridge (N13F031 at CH3150) crosses over the existing N13 mainline carriageway, and the approach embankment/ ramp is located on agricultural grassland fields and/ or hedgerows. There are no significant environmental constraints on the proposed works.

An active travel bridge crosses over the Isle Burn on the south side of the existing dual carriageway just before Pluck Junction at the interface of Section 2 and Section 3 of the Proposed Development. The Isle Burn is connected to the Lough Swilly SAC. The SAC boundary is on the northern side of the existing N13 dual carriageway. The Isle Burn is an important fisheries migration channel and the riverbanks are otter habitat. The proposed bridge will ensure passage of fish and will avoid in-stream works. Substructures and construction works are proposed to be set back 10 m from the edge of the river channel. Modification of existing ground in connection with substructures is to be minimised, with surface water run-off and sediment control measures in place during construction.

5.7.2.1.4 Section 3 Bridge Design

Section 3 River Finn Bridge is a significant structure, comprising of eight spans and a structure length of 287 m over the River Finn SAC. In order to minimise the potential for impact on the River Finn SAC and the River Foyle and Tributaries SAC (Northern Ireland) due to the construction and operation of the Proposed Development at this location, the proposed bridge includes a 63 m main span that clears the river and banks. The SOR considered six different options for this major river bridge, considering potential risk of impact on the river during construction. The bridge will be partly in Donegal and partly in Northern Ireland as it crosses the border which is the mid-point of the River Finn. Approval is being sought from An Coimisiún Pleanála for the aspects of this bridge structure that are located in Ireland while the SOR and environmental assessment of the bridge has considered transboundary impacts given that this proposed bridge straddles the border.

There is one active travel bridge on Section 3, near the Lifford junction. The structure crosses over the mainline carriageway and is located on agricultural grassland fields. The option selected for the structure is the Bow string arch truss on bankseat abutments, which provides the best aesthetic option.

Further details of environmental considerations for construction methodologies in respect to the bridges on this Proposed Development are provided below in Section 5.8.2.

5.7.2.2 Drainage Design

Project specific meetings with various stakeholders took place to inform the design and environmental assessment of drainage and flooding elements including with the Office of Public Works (OPW), Inland Fisheries Ireland (IFI) and the Loughs Agency.

Input from environmental experts have been incorporated in the design, with consideration for the following:

- Allowance for fish passage.
- Account for 100-year flood events in design.
- Constructed wetlands as part of attenuation pond design.
- Flood compensation areas.

Further details regarding drainage are provided in Chapter 4: Project Description, and Chapter 11: Water.

5.7.2.2.1 Drainage Ponds

The positioning and configuration of the proposed drainage ponds within the Proposed Development involved careful consideration of several factors including:

- Requirement to achieve drainage inlet and outfall levels and pond capacity.
- Optimum positioning to minimise the land-take requirements and configuration of the drainage pond to fit available land plots.
- Positioning of ponds to avoid or minimise adverse impacts on existing properties.
- Avoidance of environmentally sensitive locations and outside of flood plains.
- Integration of the pond with the rest of the design.

5.7.2.2.2 Section 2 Drainage Attenuation within Urban Area

The need to provide drainage attenuation capacity near Dry Arch Roundabout in Section 2 had to be balanced against the need to accommodate a Park and Share / Cycle site at the same location.

A conventional surface drainage pond left no room to accommodate the Park and Share / Cycle site. To address this issue an underground storage tank is proposed for drainage attenuation, with the Park and Share / Cycle facility provided on the surface.

5.7.2.2.3 Watercourse Diversion

For all three sections of the Project, there have been requirements to divert existing watercourses. In doing so, it has been necessary to design the diversion in such a way as to avoid adverse impacts to the aquatic ecology, and to ensure allowance has been maintained for fish passage.

For Section 3 of the Project a particularly long watercourse diversion of 950 m in length has been proposed. This diversion will go on lands off the mainline between Chainages 9+250 and 10+200. A number of options have been considered before finally deciding to proceed with the long watercourse diversion. The alternative options consisted of culverting long lengths of the existing streams. When deciding to proceed, a watercourse diversion provided more ecological benefit to the subject watercourses and is preferable to extensive culverting as culverting shades the entire stretch of water blocking sunlight and making passage unattractive for fish, animals, etc. The proposed watercourse diversion has been designed in consultation with ecologists and takes into account the recommendations of the IFI. The diversion has meanders and will incorporate riffles which will assist in aerating the water and serve as habitats for macroinvertebrates. In addition, the proposed diversion will be wider than the existing watercourse it is replacing, meaning new additional fisheries habitat will be created.

5.7.3 Active Travel Network

5.7.3.1 Climate Action through Modal Shift

The inclusion and promotion of active travel forms a key component of the Proposed Development. This responds to the policy requirements to promote physical and mental health benefits, and to encourage a modal shift towards low or zero carbon modes such as cycling and walking and away from vehicular modes. The Project aims also to encourage and enable both improved public transport and low carbon alternate fuels through route improvement modal hubs and e-charging facilities.

The current road network in the study area has minimal provision for pedestrians and cyclists due to poor alignment characteristics and insufficient cross-section to safely accommodate Non-Motorised Users (NMU).

The proposed active travel network consists of approximately 66 km of pedestrian/cycling facilities as well as eight Park and Share/ Cycle facilities. Emphasis has been placed on connectivity between the new network and existing local network and facilities, such as amenity sites, schools, workplaces.

Each of the potential options considered the design principles identified in DN-GEO-03047 Rural Cycleway Design which includes Coherence, Convenience, Directness, Safety, Comfort, Attractiveness and Access. The design standard DN-GEO-03036 Cross sections and Headroom states that Cycle/Pedestrian Facilities shall be provided as part of all Type 2 and Type 3 Dual Carriageway national road schemes. As such, continuous Cycle/Pedestrian Facilities have been provided within the proposed design in all three sections of the project for these road types.

The Active Travel network for each section of the Proposed Development has been developed to encourage modal shift by introducing a high frequency of interfaces between any existing local road, pedestrian and cycle networks network and the Active Travel infrastructure proposed for the Project. This will provide a more expansive, coherent and connected active travel facility within the Northwest, including a new cross-border active travel connection. The Project will provide access to local points of interest and to places of local or community significance such as community centres, sports facilities, amenity areas and schools.

Eight Park and Share / Cycle facilities have been included within the active travel proposals to encourage modal shift and car sharing. These sites have been selected to be at key locations within each section (for example close to strategic junctions or on the edge of key towns), or at locations that would encourage use for amenity purposes (for example at the extremities of a section to encourage recreational cycle use). Locations have been also selected to reduce potential impact (for example light pollution) on nearby residential properties, and on land that has been already included within the Proposed Development boundary for the Project. Thereby reusing, repurposing and optimising the use of lands already identified within the CPO for the Project.

5.7.3.2 Section 1 Active Travel

Section 1 delivers a segregated active travel network (shared use cycleways/ and pedestrian walkways) on N13 and N15 corridor through Ballybofey and Stranorlar. Furthermore, the design team included active mode connectivity to Letterkenny in the north by linking into existing infrastructure and proposed improvements around Section 2. The proposed infrastructure also aims to bring about step change in active mode connectivity across education, health and other community facilities such as Robertson National School, Saint Joseph's Hospital, Finn Valley College, St Marys Church, Finn Valley Centre and Stranorlar Presbyterian Church. The proposals will also deliver significant improvement in active mode accessibility for key leisure and tourist destinations such as to Balor Art Centre, Troopers Hill, Gortlettaragh Waterfalls, Dunwiley Fort, Drumboe Woods and other forest walks.

Three Park and Share / Cycle sites have been included within Section 1 at the northern and southern tie-ins for the section, and at a mid-point at the proposed junction with the Ballybofey Link Road and R252 Glenfinn Road. The locations at either end of the Project have been chosen to encourage recreational use to promote physical exercise. Cyclists can start off from these locations and cycle the whole, or part of the Section 1 route which offers seven intermediate access points to Ballybofey/Stranorlar, before returning. The centrally located Park and Share / Cycle facility has been located to provide easy access between the proposed Active Travel network for the mainline, and the Active Travel network along Ballybofey Link Road and onwards to the town centre, and associated amenities. Proposed access arrangements to the Park and Share / Cycle sites have been designed to avoid impact on local residential properties and that lighting from the proposed sites does not spill into the curtilage of existing residential properties.

The centrally located Park and Share / Cycle site on Section 1, near Ballybofey Junction, has been relocated from a position close to the junction of the R252 Glenfinn Road / Proposed Ballybofey Link Road to its current position close to the junction, in order to increase the distance between the site and the closest residential property, and to make it more readily accessible from the proposed Active Travel network on the Mainline.

The locations of the proposed Park and Cycle / Share sites have been identified in the latter stages of the design process, so that consideration could be given to their location in the context of the entire design, and to make best use, where feasible, of pockets of severed land within project boundary that are otherwise not used. All sites as such were already environmentally assessed under the general scheme with further assessment carried out as and if necessary.

Accessibility to amenity sites is an important component of Section 1. Options to provide accessibility between the Active Travel Network adjacent to the Mainline 1.2 and Cappry Rovers Football Club have also been explored, in order to successfully achieve the connection while minimising impact on local constraints. The preferred option includes provision for the Active Travel connection and also facilitates access from the L-6584 Connector. Also, alternatives to provide enhanced access to the existing Holywell Woods have been considered, with the preferred option including access from both north and south of the woods.

5.7.3.3 Section 2 Active Travel

5.7.3.3.1 General

Active travel networks have been considered throughout the entire length of Section 2 of the Proposed Development. These cycle/pedestrian facilities also provide further link connections to key local facilities such as St Patrick's National School and to other existing active travel networks like the N56 Four Lane Road, N56 Creamery Roundabout and the Donegal Cycle Route². These new active travel routes and connections are an important element in the overall Letterkenny Plan and Local Transport Plan 2023-2029 which sets out a major program of improved active travel and public transport for Donegal's largest town and key regional centre. Both active travel and improved road connection will enable sustainable growth through improved land accessibility arising out of the Project particularly to the south of the town.

² The Donegal Cycle Route can be visualised here:

<https://donegal.maps.arcgis.com/apps/Viewer/index.html?appid=15543ecc8ed04c07a65c690e00b8f607>

5.7.3.3.2 Active Travel Network between Letterkenny and Manorcunningham

As part of Section 2, the existing N13 dual carriageway between Letterkenny and Manorcunningham will be retained for a good part. This legacy Type 1 dual carriageway does not allow for independent cycle/pedestrian facilities. Segregated active travel facilities have therefore been incorporated into this section enabling connection to existing facilities in Letterkenny and to Section 3. This active travel section will connect significant rural and semiurban communities around Letterkenny to safely access the town by these carbon friendly modes.

5.7.3.3.3 Active Travel Network Along Link Roads

Options for the Active Travel Network for the proposed network including the Bonagee Link, Mainline 2.3, 2.5 and 2.6 and associated roads including LX-2005, LX-2009, LX-2010 and LX-2011 have been developed, with particular focus on the access to the proposed Park and Share / Cycle Facility 2.01. Consideration has been given to the achievement of access to and from the local and strategic road network, while ensuring the safety of NMU's.

Further options for the Active Travel Network have been developed for LX-2002, the section of the existing N13 south of Dry Arch to be downgraded. This includes the provision of a pedestrian facility providing access to the St. Patrick's National School. These elements in addition to being significant active travel improvements are also critical to retaining and improving community connectivity.

5.7.3.4 Section 3 Active Travel

Online (active travel located adjacent to the mainline) and offline (active travel removed from the mainline – between the road embankments and the fenceline or further from same) have been assessed as part of the design development for Section 3 of the Proposed Development. As a Type 2 divided road standard this section includes separate segregated active travel elements as standard. Location of active travel elements has been carried out to minimise the road cross section / earthworks / landtake and associated environmental impact. Active travel connections to amenities / local road network have been also considered and incorporated into the design.

Other alternatives considered for the active travel facility included

- Alternative active travel alignments considered for the crossing of the N13/N14 Pluck Roundabout and connection to Section 2.
- Alternatives considered for the active travel facility crossing the compact grade separated junctions.
- Connection to the existing active travel facility near Murlogh – active travel facility relocated away from watercourse to reduce environmental impact.

As with the other sections Park and Share / Cycle sites have been included within Section 3. These are at the northern and southern tie-ins for the section, and in the vicinity of two intermediate junctions at R236 Ballinalecky Junction and Ballindrait Junction. The locations have been chosen to encourage modal shift and recreational use to promote physical exercise.

Two alternative locations were assessed for the Park and Share located near Pluck roundabout, one located close to the roundabout and one located between approximate chainage 1+000 between the existing N14 and the proposed N14. The option chosen is the location adjacent to the Pluck roundabout. This option provides for superior access to the strategic road network, is in an area that will be lit due to the proposed roundabout and is the best on environmental ground avoiding impact with an existing watercourse connecting to the Swilly Burn and R Swilly SAC.

The Park and Share / Cycle site located adjacent to the R236 Ballinalecky junction has been relocated from an originally proposed location between the existing and proposed N14 at approximate chainage 8+700. The current location provides for superior access to the road network. The original location had a significant impact on existing dwellings located nearby.

5.7.3.5 Active Travel Design Conclusion

All of the above active travel elements developed during Phase 3 represent a focussed strategy to maximise the alternative mode aspects of this development in parallel with the essential road-based improvement of the strategic TEN-T Network. These significant active travel facilities, park and share sites and enabling of e-charging are also consistent with the latest TEN-T Regulation as well as climate action policy.

5.8 Project Construction Alternatives

As part of considering how the Proposed Development would be constructed all key alternatives associated with the process have been assessed. Compound locations and construction methodologies have been chosen to best represent the level of environmental assessment applied to alternative design of such elements within the Phase 3 design process.

5.8.1 Compound Location Options

Within each section of the Proposed Development construction compound locations have been identified. The locations have been strategically placed across the Proposed Development after being assessed to minimise environmental impact and engineering impacts associated with construction. Construction compounds are located within the permanent Proposed Development boundary or on adjacent land already required for the works. Where construction compound locations are within specific works areas it is envisaged that the works would be phased to minimise impacts.

Assessments of the construction compound options were carried out in accordance with the requirements of the EIA Directive and the Roads Act, 1993, as amended. This assessment was undertaken using the EIA factors as well as engineering considerations. A red, amber and green system has been used in the assessment. Green indicated the most preferred option and Red the least preferred one under each respective assessment criterion. Each colour was then scored 1, 2, 3 as shown in Table 5.37, with least preferred (red) receiving a score of 1, intermediate (orange) a score of 2, and preferred (green) a score of 3. The total scores are then added up across the environmental and engineering criteria to select the best performing options. The most favourable options have been then incorporated into the Project.

Table 5.37: Construction Compounds Scoring Matrix

Assessment	Colour	Score
Least Preferred	Red	1
Intermediate	Orange	2
Preferred	Green	3

Further details regarding the proposed compound locations are provided in Chapter 4: Project Description. The location of the selected compounds are illustrated in the general arrangement drawings in EIAR Drawing 4.1 (Section 1), 4.2 (Section 2) and 4.3 (Section 3) in Volume D: Book of Drawings. The assessment of the compound options is provided in Appendix C5.03 in Volume C: Technical Appendices.

5.8.1.1 Section 1 Compound Locations

Three compound locations were considered for Section 1 of the Proposed Development, one south of the River Finn and two north of the River Finn. The locations and reasons for their selection are set out below:

- C1.1** Mainline 1.2, Ch. 1+450 – 1+930 m: Area around the intersection of the Mainline and the Ballybofey Link Road Grade Separated Junction. This area includes the Material Extraction / Deposition (MED) Areas MED01 and MED04, and the proposed Park & Share Facility 1.02 (EIAR Drawing 4.1, sheet 2 of 8). C1.1 is within the CPO boundary and provides a large construction area associated with the Mainline and the Ballybofey Link Road Grade Separated Junction. This offers access opportunities to the compound location and takes into consideration the permanent hard-standing area required for the

proposed Park & Share Facility 1.02. It is also suitably distant from nearby sensitive receptors including the River Finn, its tributaries and areas prone to flooding at the southern end of Section 1 (Mainline 1.1).

- **C1.2** Mainline 1.3, Ch. 0+050 - Ch. 0+300m: area contained the proposed Park & Share Facility 1.03 (EIAR Drawing 4.1, sheet 7 of 8). C1.2 is located within the CPO boundary and at the location of the proposed Park & Share Facility 1.03. It has ready access from the existing N13 Letterkenny/ Stranorlar road.
- **C1.3** N15 Primary Road Connector Ch. 2+500 – 2+850 m: area close to Treanamullin Junction, just north of the tie-in between the N15 Primary Road Connector and the existing N15 at (EIAR Drawing 4.1, sheet 8 of 8). C1.3 is located within the CPO boundary and provides a large enough area to accommodate the construction compound. It has ready access from the existing N15 Lifford/ Stranorlar road.

The detailed assessment is provided in Appendix C5.03 in Volume C: Technical Appendices. The environmental assessment was undertaken for each of the EIA factors.

Each option was ranked, colour coded and scored as follows: Preferred-Green-3, Intermediate-Orange-2, Least Preferred-Red-1. The summary table for the compound location assessment for Section 1 is outlined in Table 5.38. On this basis, C1.1 and C1.3 scored the highest and have been chosen as the compound locations.

Table 5.38: Section 1 Compound Location Assessment of Alternatives

Environment	C1.1	C1.2	C1.3
Population	3	1	2
Human Health	3	1	2
Biodiversity Aquatic	3	1	2
Biodiversity Terrestrial	3	2	3
Land & Soil	3	2	2
Water	3	1	2
Climate	3	3	3
Air	3	1	2
Noise	3	2	3
Material Assets - Ag	3	3	3
Material Assets - Non-Ag	3	3	2
Cultural Heritage	2	3	3
Landscape	3	1	2
Sub-Total	39	24	31
Engineering			
Access to Main Construction Works	2	3	3
Site Area* (in acres)	3	1	2
Landowner Impact	3	3	3
Post scheme benefits such a potential for landscape, park & share, etc.	3	3	3
Sub-Total	11	10	11
Total	50	34	42
Ranking	1	3	2

Of the three locations assessed, C1.1 and C1.3 were preferred under the environmental criteria in a comparative assessment and so were selected as the compound locations for Section 1 of the Proposed Development. The reasons C1.1 and C1.3 were selected can be summarised as follows:

- Fewer sensitive receptors in close proximity to the compound boundary.
- Further from watercourse and rivers.
- Existing area of construction.
- Within the CPO boundary.

C1.2 performed the worst environmentally in a comparative assessment and so was eliminated from consideration. The reasons option C1.2 was eliminated can be summarised as follows:

- Proximity to residential properties and human receptors.
- Proximity to the Cloghroe river and Magheracorran stream.
- Temporary visual impact on local residential properties.

From an engineering perspective, Option C1.2 was also the least preferred as it is the smallest area at 1.6 ha offering less room for the contractor's construction requirements.

5.8.1.2 Section 2 Compound Locations

Seven compound locations were considered for Section 2 of the Proposed Development. The locations and reasons for their selection are set out below:

- **C2.1** Ch.0+100 – 0+200: Area between the proposed Listellian Junction and the proposed L-1064/ L-5794 Junction either side of the proposed realigned L-1064 connector (EIAR Drawing 4.2, sheet 1 of 5). C2.1 is within the CPO boundary and provides a large construction area with access opportunities to the existing N13, and the proposed mainline.
- **C2.2** Ch.0+300 – 0+350 South of proposed Bonagee Junction: Area located between the LX-2011 and LX-2009 and between Mainline 2.5 and the Bonagee Link (EIAR Drawing 4.2, sheet 2 of 5). C2.2 is within the CPO boundary and is located in an industrial area to the north of the existing Dry Arch Roundabout. It provides access to/from the existing N56, N13 and the proposed mainline.
- **C2.3** Ch.0+000 – 0+150 Trimragh Junction: Area located to the east of the proposed Trimragh Grade Separated Junction and the L-1554 Connector WB and L-1154 Connector EB (EIAR Drawing 4.2, sheet 4 of 5). Area is outside of the CPO boundary but contiguous with it. Temporary lands would be required for this compound location.
- **C2.4** Ch.0+050 – 0+300 North of Dry Arch Roundabout: Area located to the north of the existing Dry Arch Roundabout encompassing the proposed Park & Share Facility 2.1 and the Bonagee Link (EIAR Drawing 4.2, sheet 2 of 5). The area is within the CPO Boundary and is located in an industrial area to the north of the existing Dry Arch Roundabout. It provides access to/from the existing N56, N13 and the proposed mainline.
- **C2.5** Ch.0+300 – 0+500, North of proposed Dromore Junction. Area is just east of the proposed Mainline 2.5 (EIAR Drawing 4.2, sheet 4 of 5). Area is outside of the CPO boundary but contiguous with it. Temporary lands would be required for this compound location. This location provides access to the mainline via the realigned access roads.
- **C2.6** Ch.0+400 – 0+700 on LX-2005 just north of L-11141 tie-in: Area is immediately to the east of the proposed LX-2005, just north of the proposed L-11141 tie-in with the LX-2005 (EIAR Drawing 4.2, sheet 4 of 5). Area is outside of the CPO boundary but contiguous with it. Temporary lands would be required for this compound location. This location provides access to the mainline via the realigned access roads.

- **C2.7** Ch.0+250 – 0+675 on L-1064 (Raphoe Road): Area is to the east of the existing N13 on the realigned L-1064 (EIAR Drawing 4.2, sheet 1 of 5). Area is within the CPO boundary. This location provides access to/from the existing N13 south of Letterkenny and to the mainline 2.1 and 2.2

The detailed assessment is provided in Appendix C5.03 in Volume C: Technical Appendices. The environmental assessment was undertaken for each of the EIA factors.

Each option was ranked, colour coded and scored as follows: Preferred-Green-3, Intermediate-Orange-2, Least Preferred-Red-1. The summary table for the compound location assessment for Section 1 is outlined in Table 5.39. On this basis, C2.2 and C2.7 scored the highest and have been chosen as the compound locations.

Table 5.39: Section 2 Compound Location Assessment of Alternatives

Environment	C2.1	C2.2	C2.3	C2.4	C2.5	C2.6	C2.7
Population	1	3	2	1	2	2	2
Human Health	2	3	2	2	2	2	3
Biodiversity Aquatic	3	1	2	1	2	1	3
Biodiversity Terrestrial	3	3	2	3	2	2	3
Land & Soil	3	1	2	1	2	2	2
Water	3	1	2	1	2	1	3
Climate	3	3	3	3	3	3	3
Air	2	3	2	2	2	2	3
Noise	3	3	3	3	3	2	3
Material Assets - Ag	2	3	2	3	2	2	2
Material Assets - Non-Ag	2	2	2	1	2	2	3
Cultural Heritage	3	3	2	3	2	2	3
Landscape	1	3	1	2	2	2	2
Sub-Total	31	32	27	26	28	25	35
Engineering							
Access to Main Construction Works	2	3	3	3	3	3	2
Site Area* (in acres)	2	1	2	2	2	3	3
Landowner Impact	3	3	3	3	1	2	2
Post scheme benefits such a potential for landscape, park & share, etc.	3	3	3	3	3	3	3
Sub-Total	9	9	5	11	9	11	10
Total	40	41	32	37	37	36	45
Ranking	3	2	6	4	4	5	1

Of the seven locations assessed, C2.2 and C2.7 were preferred under the environmental criteria in a comparative assessment and so were selected as the compound locations for Section 2 of the Proposed Development. The reasons C2.2 and C2.7 were selected can be summarised as follows:

- Fewer sensitive receptors in close proximity to the compound boundary, particularly residences.
- Further from watercourse and rivers.
- Existing area of construction.
- Located within urban fabric landscape.
- Within the CPO boundary.

The other five options, C2.1, C2.3, C2.4, C2.5 and C2.6 were all eliminated from consideration. The reasons they were eliminated can be summarised as follows:

- Proximity to residential properties and human receptors.
- Proximity to the floodplain for River Swilly.
- Temporary visual impact on local residential properties.
- Close to cultural heritage features.

From an engineering perspective, Option C2.2 and C2.7 were not the preferred options, mainly as C2.2 is limited in area (approx. 1.4 ha) and C2.7 is slightly away from the mainline on the local road network. However, when combined with the environmental assessment, both of these two options out-performed all other options.

5.8.1.3 Section 3 Compound Locations

Five compound locations were considered for Section 3 of the Proposed Development. The locations and reasons for their selection are set out below:

- **C3.1** Ch.0+000 – 0+300: Area between the proposed new N13/N14 Pluck Roundabout and the proposed LX-3014 Link North and within the proposed Park & Share Facility 3.01 (EIAR Drawing 4.3, sheet 1 of 10). C3.1 is within the CPO boundary and provides a large construction area with access opportunities to the existing N14, and the proposed mainline.
- **C3.2** Ch.0+900 – 1+100: Area between the proposed N14 and the existing N14 (EIAR Drawing 4.3, sheet 1 of 10). The C3.2 area is outside of the CPO boundary but contiguous with it. Temporary lands would be required for this compound location.
- **C3.3** Ch.2+600: Area adjacent to the existing N14 that will be east of the proposed N14 and the realigned LX-3014 Drumoghill East road (EIAR Drawing 4.3, sheet 2 of 10). The C3.3 area is within the CPO boundary and has close proximity to the existing national road network (N14).
- **C3.4** Ch.6+600 – 6+800: Area between the existing N14 (the proposed realigned LX-3014 Sheshkinpoll road) and the proposed N14 (EIAR Drawing 4.3, sheet 4 of 10). The C3.4 area is within the CPO boundary and has close proximity to the existing national road network (N14).
- **C3.5** Ch.7+900: Area west of the proposed N14 at the R236 Ballinalecky Grade Separated Junction, and the R236 LX-3014 Link South and Ballinalecky Junction Link South (EIAR Drawing 4.3, sheet 5 of 10). The C3.5 area is within the CPO boundary and has close proximity to the existing national road network (N14).

The detailed assessment is provided in Appendix C5.03 in Volume C: Technical Appendices. The environmental assessment was undertaken for each of the EIA factors.

Each option was ranked, colour coded and scored as follows: Preferred-Green-3, Intermediate-Orange-2, Least Preferred-Red-1. The summary table for the compound location assessment for Section 3 is outlined

in Table 5.40. On this basis, C3.1, and C3.5 scored the highest and have been chosen as the compound locations.

Table 5.40: Section 3 Compound Location Assessment of Alternatives

Environment	C3.1	C3.2	C3.3	C3.4	C3.5
Population	3	3	2	3	3
Human Health	2	2	2	3	3
Biodiversity Aquatic	3	1	1	1	3
Biodiversity Terrestrial	3	3	3	2	3
Land & Soil	3	3	3	2	2
Water	3	1	1	1	3
Climate	3	3	3	3	3
Air	2	2	2	3	3
Noise	3	3	3	3	3
Material Assets - Ag	3	2	3	3	3
Material Assets - Non-Ag	3	3	3	3	3
Cultural Heritage	2	2	3	2	3
Landscape	2	2	1	3	3
Sub-Total	35	30	30	32	38
Engineering					
Access to Main Construction Works	2	3	3	3	2
Site Area* (in acres)	3	2	1	1	1
Landowner Impact	3	3	3	3	3
Post scheme benefits such a potential for landscape, park & share, etc.	3	2	2	2	2
Sub-Total	11	10	7	9	8
Total	46	40	37	41	46
Ranking	1	4	5	3	2

Of the five locations assessed, C3.1 and C3.5 were preferred under the environmental criteria in a comparative assessment and so were selected as the compound locations for Section 3 of the Proposed Development. The reasons C3.1 and C3.5 were selected can be summarised as follows:

- Fewer sensitive receptors in close proximity to the compound boundary.
- Sites of low ecological value.
- Further from watercourse and rivers.

- Existing area of construction.
- Within the CPO boundary.

The other three options, C3.2, C3.3 and C3.4 were all eliminated from consideration. The reasons they were eliminated can be summarised as follows:

- Proximity to residential properties and human receptors.
- Proximity to the watercourses.
- Temporary visual impact on local residential properties.

From an engineering perspective, Option C3.1 was also the preferred option as it has good access, is of a suitable size and will become the proposed Park & Share facility after construction. Option C3.7 was the second lowest preference from an engineering perspective given its location close to the existing N14 and R236 at Ballinalecky. However, when combined with the environmental assessment, both of these two options out-performed all other options.

5.8.1.4 Compound Options Assessment Summary

For each section of the Proposed Development possible site compound areas were identified. Each of these options were assessed using a MCA analysis. Environmental assessment within this MCA followed the requirement of the EIA Directive. Three locations were assessed on Section 1, seven on Section 2 and five on Section 3. Two compound locations were chosen on each section (six locations in total) and are included in the land requirement for the Project. The chosen compound locations are all shown on the EIAR Drawing 4.1 (Section 1), 4.2 (Section 2) and 4.3 (Section 3) in Volume D: Book of Drawings.

5.8.2 Construction Options and Environmental Management

5.8.2.1 Introduction

This section looks at the measures taken at this design and planning stage to consider the Proposed Development construction and environmental assessment of options for construction including materials, constructability and construction methodology and timing.

5.8.2.2 Major River Structures: Construction Option and Assessment

The assessment of structural design options (see Section 5.7.2.1 above) and construction options in this section are in the context of determining the best structural form and construction method to avoid and/or mitigate environmental impacts arising out of these sensitive crossings of SAC. The design and construction analysis has looked at the following key alternates.

- Form including but not restricted to bridge type, span, function, operation and maintenance
- Construction including methodology, temporary works, materials, sustainable construction, circular economy and whole life cost efficiency,

The proposed three major river bridge crossings across the River Finn (two locations) and River Swilly are presented in the EIAR Drawings 4.13 (River Finn Bridge in Section 1), 4.19 (River Swilly Bridge in Section 2), and 4.35 (River Finn Bridge in Section 3) all in Volume D: Book of Drawings. During the development of the major river structures options, consideration has been given to different forms of construction for the various components of the bridges, including:

- In-situ concrete construction
- Pre-cast concrete construction
- Steel construction
- Composite construction of the different forms above

The requirement to avoid construction within the SAC sites for the three crossings has been a key consideration in the decision of the forms of structures. Both the Section 1 River Finn Bridge and the Section 2 River Swilly Bridge avoid any works within the SAC boundary. Due to the width of the SAC at the point of the Section 3 River Finn Bridge it has not been possible to avoid construction works within the SAC boundary. However, these works have been minimised to the greatest extent possible. Similarly, the landscape and visual impact was of high importance in the assessments. The Project team has worked with the environmental specialists, and the ecologists in particular, to avoid and/or minimise impacts where they occur. A summary of the environmental considerations is provided in Appendix C5.04 (River Finn Bridge in Section 1), Appendix C5.05 (River Swilly Bridge in Section 2), and Appendices C5.06 and 5.07 (River Finn Bridge in Section 3), all contained in Volume C: Technical Appendices, as discussed further below.

5.8.2.2.1 Section 1 – River Finn Crossing

The project environmental team have considered the bridge location in detail. The primary environmental constraint for the bridge is the River Finn which is an SAC with six Qualifying Interests (QI):

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

The River Finn is also designated a Salmonid Water (S.I. No. 293 of 1988). Within this reach of the River Finn SAC where the Proposed Development will cross the River Finn, the QI recorded are the species salmon and otter. None of the habitats above that are QI are within this part of the SAC.

The River Finn flows west and then north to Lough Foyle. From the south of Lifford the River Finn SAC is contiguous with the River Foyle and Tributaries SAC (Northern Ireland). The River Finn is noted for being one of the most prolific salmon and grilse rivers in Donegal and the Foyle catchment.

These environmental constraints and conditions were central to the development of an appropriate design considering the structural requirements particularly span and foundation.

The Section 1 River Finn Crossing: Structures Options Report (SOR) is included at Appendix C5.04 in Volume C: Technical Appendices. Five options for the bridge construction were considered within the design stage SOR. These are:

- Option 1: 7-span constant depth steel box girders. This is a 7-span steel box girder bridge with three constant depth boxes made composite with a reinforced concrete deck slab. The span arrangement is 43m, 55m, 85m, 55m, 43m, 39.5m, 39.5m giving a total length of 360m. The composite boxes have a constant overall depth of 3.4m. This represents a feasible option with an uncomplicated structure. This option could be incrementally launched across the valley from the north to the pier intermediate pier on the southern side of the river, southern sections would be lifted into position by crane. The substructure consists of cast in-situ reinforced concrete piers and abutments supported by bored pile foundations.
- Option 2: 7-span varying depth steel plate girders. This has the same span arrangement, length and substructure as Option 1. The superstructure comprises steel plate girders made composite with a reinforced concrete deck slab. The girder depth varies from 4.25m at the intermediate supports to 2.25m away from the supports thus achieving good clearance and aesthetics. The varying depth multi-girder deck would be erected by crane from outside of the SAC. Access for a very large crane on both sides of the river would be required.
- Option 3: 7-span varying depth post-tensioned concrete box girder. This is a 7-span concrete box girder option with 3 spans of varying depths and 4 approach spans of constant depth. The girder depth varies

from 4.5m at the intermediate supports to 2m away from the supports. This option achieves good aesthetics, an open aspect and it would be similar in appearance to the Harry Blaney Bridge spanning Mulroy Bay in Co. Donegal. The span arrangement is again 43m, 55m, 85m, 55m, 43m, 39.5m, 39.5m giving a total length of 360m. The bridge consists of an in-situ, post tensioned concrete box girder structure, constructed via balanced cantilever method. The substructure consists of cast in-situ reinforced concrete piers and abutments supported by bored pile foundations. A significant construction site will be required to cater for the specialist balanced cantilever construction methodology of the varying depth spans and the traditional construction of the approach spans.

- Option 4: 4-span varying depth post-tensioned concrete box girder. Option 4 is a similar structure to Option 3. There are 4-spans of varying depth in-situ, post tensioned concrete box girder structure, constructed via balanced cantilever method. The span arrangement is again 75m, 105m, 105m, 75m giving a total length of 360m. The girder depth varies from 5.3m at the intermediate supports to 2.3m away from the supports. This option achieves good symmetry and an open aspect. The increase in cross-section depth would give this option a heavier appearance. This option would significantly increase the scale of the balanced cantilever construction compared to Option 3.
- Option 5: 5-span cable stayed steel plate girder. This option comprises a single pylon cable stayed structure. The main span is 145m long and the overall length is 360m. The deck comprises two 2.5m longitudinal steel plate girders with intermediate transverse girders supporting an insitu reinforced concrete slab. This option is based on the current vertical alignment being considered for the overall scheme with one pylon positioned to the south of the River Finn. This option would require the vertical alignment on the approach to be amended to move the sag transition curve off the bridge. The pylon foundation would require a significant piled foundation. This option would be highly visual and visible with a pylon which stands over 80m high above the adjacent landscape. Landmark structures of this scale are not commonplace in Ireland.

Following an environmental evaluation of the options (reference Section 9 in Appendix C5.04), Option 4 was preferred as it has a clear-span of the River Finn, with abutments set back from the SAC. It also has a lesser visual impact. Options 2 and 3 were jointly the second preference.

From an economic and engineering perspective, Options 2 and 3 were more preferred whereas Option 4 was less preferred.

When the assessments were combined (reference Section 15 in Appendix C5.04), Option 2 and 3 came out joint top. Following further assessment, Option 2 was deemed the preferred option as Option 2 was more preferred in terms of Capital Cost and Construction & Buildability.

Option 2 is therefore considered as the most adequate options to address the constraints for the Finn Crossing which can be simplified to the following points:

- The structure is considered safe and useable for all users,
- The structure is cost effective,
- The option is buildable,
- The structure provides sufficient headroom and clearance to the River Finn channel, the R252 and the proposed greenway.
- It has aesthetic merit with minimal negative visual impact on the local landscape,
- The development has minimal impact on the local environment and the SAC.

The Option 2 structure comprises a seven-span arrangement of 43 m, 55 m, 85 m, 55 m, 43 m, 39.5 m and 39.5 m giving a total bridge length, including the piers, of 360m. The 85 m main span will cross the River Finn and the existing R252 regional road, and avoids any construction works within the SAC boundary, i.e. the piers either side of the River Finn are 85m apart at their centrelines and are not within the SAC.

The bridge is a varying depth weathering steel multi-girder composite deck bridge. It will have a structural depth of approximately 4.5 m at the main span intermediate supports and 2 m away from the supports. The substructure consists of cast in-situ reinforced concrete piers and abutments supported by bored pile foundations. Following construction of the reinforced concrete sub-structure, the superstructure of the steel girder option would be lifted into position in braced pairs by a large crane prior to casting the concrete deck. The crane, loading areas and all temporary works have been considered and can be located outside of the SAC and within the land made available for the works.

Construction activities within the River Finn are not permitted as part of the construction works and the design of the bridge, including the 85 m central clear span of the river ensures that this is the case. The 360 m long bridge spans the entire flood plain which reduces the risks of flooding, potential impact on the SAC and the permanent land take required compared to a shorter bridge with longer approach embankments.

5.8.2.2.2 Section 2 – River Swilly Crossing

The project environmental team identified the key constraints which are summarised as follows. The river is prone to flooding and there is a flood berm located on the southern bank at the proposed crossing location. The primary environmental constraint at this location is the River Swilly which is designated part of the Lough Swilly SAC and the Lough Swilly Including Big Isle, Blanket Nook & Inch Lake pNHA. The Lough Swilly SPA is located a short distance downstream of the bridge crossing point. The Lough Swilly SAC has seven QI:

- 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]
- *Phocoena phocoena* (Harbour Porpoise) [1351]
- *Lutra lutra* (Otter) [1355]

At the crossing point of the Proposed Development and the Lough Swilly SAC, the only QI habitat present is estuaries and the only species QI present is otter. The bridge has been designed in consultation with the biodiversity expert to ensure it can be constructed to avoid impacting the habitat (clean span) and otter (set-back from river banks).

The SPA is designated for multiple special conservation interests. The Lough Swilly SPA is downstream of the proposed bridge crossing however it is within the flight path of commuting birds such as black headed gull and curlew upstream in the estuary outside of the SPA. There has been therefore a preference for a low-level bridge which did not interfere with the commuting birds' flightpath.

These environmental constraints and conditions were central to the development of an appropriate design considering the structural requirements particularly span and foundation.

The Section 2 River Swilly Crossing: Structures Options Report (SOR) is included at Appendix C5.05 in Volume C: Technical Appendices. Six options for the bridge construction were considered within the design stage SOR. These are:

- Option 1: 3-span varying depth post-tensioned concrete box girder. Option 1 is a 3-span concrete box girder. The girder depth varies from 5.3m at the intermediate supports to 2.3m away from the supports. This option achieves good symmetry and aesthetics and it would be similar in appearance to the Harry Blaney Bridge spanning Mulroy Bay in Co. Donegal. The span arrangement is 65m, 104m, 65m, giving a total length of 234m. The bridge consists of an in-situ, post tensioned concrete box girder structure, constructed via balanced cantilever method. The substructure consists of cast in-situ reinforced concrete piers and abutments supported by bored pile foundations. A significant construction site will be required

to cater for the specialist balanced cantilever construction methodology of the varying depth spans and the traditional construction of the approach spans.

- Option 2: 3-span varying depth steel box girders with steel orthotropic deck. Option 2 has a similar span arrangement and substructure to Option 1. The superstructure is comprised of twin steel box girders with a steel orthotropic deck. This option is a similar structure to the Foyle Bridge in Co. Derry. The steel section would be lifted into position by a large crane. The girder depth varies from 4.5m at the supports to 2m away from the supports.
- Option 3: 5-span varying depth post-tensioned concrete box girder. Option 3 is similar to Option 1 with additional constant depth spans to the south over the floodplain. The 5-span arrangement is 65m, 104m, 65m, 65m, 65m giving a total length of 364m. The mains spans would again be constructed vis balanced cantilever method with the additional backspans being constructed by conventional methods. The viability and potential benefits of extending the structure is to reduce the potential flood risk of constructing approach embankments across the flood plain and also to make up for a fill material deficit in Section 2 of the project.
- Option 4: 9-span varying depth post-tensioned concrete box girder. Option 4 is an extension of option 3 with a 9-span arrangement of 65m, 104m, 65m, 65m, 65m, 55m, 55m, 55m, 55 giving a total length of 584m. Again the viability and potential benefits of extending the structure is to reduce the potential flood risk of constructing approach embankments across the flood plain and also to make up for the fill material deficit in Section 2 of the project.
- Option 5: 2-span cable stayed steel plate girder. This option comprises a single pylon cable stayed structure. The main span is 176m long and the overall length is 228.5m. The deck comprises two 2.5m longitudinal steel plate girders with intermediate transverse girders supporting an insitu reinforced concrete slab. The pylon foundation would require a significant piled foundation. This option would be highly visual and visible with a pylon which stands 90m high above the adjacent landscape. Landmark structures of this scale are not commonplace in Ireland.
- Option 6: Single-span varying depth post-tensioned concrete box girder. Option 6 is effectively a single span bridge with a total length of 174m. The main length of this is a 104m main span with a varying depth multi cell post-tensioned concrete box. At either end of this main span is an extended sub structure which includes both pier and abutment. This substructure acts as a short end span with two foundations, a primary piled foundation under the pier and a shallow foundation with rock anchors under the abutment. The rock anchors would counteract the potential effect of abutment uplift associated with very short end spans on multi-span bridges.

Following an environmental evaluation of the options (reference Section 9 in Appendix C5.05), Option 3 and Option 4 came out joint first in terms of preference. They both provide a clear-span of the River Swilly, with abutments set back from the SAC. They also has a lesser visual impact. Option 2 was the second preference followed by Option 1.

From an economic and engineering perspective, Option 1 was the preferred option followed by Option 6 and Option 2.

When the assessments were combined (reference Section 15 in Appendix C5.05), Option 1 was clearly the best performing option. Option 1 most adequately addresses the constraints which can be simplified to the following points:

- The structure is considered safe and useable for all users,
- The structure is cost effective,
- The option is buildable,
- The structure provides sufficient headroom and clearance to the River Swilly channel.
- It has aesthetic merit with minimal negative visual impact on the local landscape,
- The development has minimal impact on the local environment and the SAC

The preferred option for the structure comprises of a three-span varying depth post-tensioned concrete box girder bridge. The span arrangement of 65 m, 104 m, and 65 m gives a total bridge length of 234 m. The 104 m central span avoids any construction works within the SAC boundary, i.e. the piers either side of the River Swilly are 104 m apart at their centrelines and are not within the SAC. The 104 m main span crosses both the river and the flood berm as well as providing setback zones to the SAC boundaries and construction activities within the watercourse will be prohibited.

The depth of the box girder varies from 5.3 m at the intermediate supports to 2.3 m away from the supports. The substructure consists of cast in-situ reinforced concrete piers and abutments supported by bored pile foundations. Following construction of the reinforced concrete sub-structure, the superstructure will be constructed via balanced cantilever method. The exposed concrete faces of this option will require nominal maintenance over its entire lifespan minimising whole life costs. Concrete is recognised as being a durable material with little maintenance required even in coastal areas such as the proposed crossing location.

Construction activities within the River Swilly are not permitted as part of the construction works and the design of the bridge, including the 104 m central clear span of the river ensures that this is the case.

5.8.2.2.3 Section 3 – River Finn Crossing (N14/N15 to A5 Link)

The project environmental team have considered the bridge location in detail. The primary environmental constraint for the bridge is the River Finn which is an SAC with six Qualifying Interests (QI):

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

The River Finn is also designated a Salmonid Water (S.I. No. 293 of 1988). Within this reach of the River Finn SAC where the Proposed Development will cross the River Finn, the only QI recorded are the species salmon and otter. None of the habitats above that are QI are within this part of the SAC.

In Northern Ireland, the former Natura 2000 network site at this location of the bridge is the River Foyle and Tributaries SAC. The three QI of this SAC are:

- *Lutra lutra* (Otter)
- *Salmo salar* (Salmon)
- Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation.

Within this reach of the River Foyle and Tributaries SAC where the Proposed Development will cross the River Finn, the only QI recorded are the species salmon and otter. None of the habitats above that are QI are within this part of the SAC.

These environmental constraints and conditions were central to the development of an appropriate design considering the structural requirements particularly span and foundation.

The Section 3 River Finn Crossing: Structures Options Report (SOR) prepared for the 2011 design of this bridge is included at Appendix C5.06 in Volume C: Technical Appendices. An addendum to this report completed in 2021 is included in Appendix C5.07 in Volume C: Technical Appendices.

As a base for the analysis the design team followed the Bridges Options Report River Finn Crossing, 2011 (Roughan and O Donovan). This bridge option and associated EIS was included in the N14/ N15 to A5 Link scheme approved by An Bord Pleanála in 2011. The project was not pursued at that time as it was dependant on the confirmation of the A5 Western Transport Project for its eastern tie-in. Five options for the bridge construction were considered within the design stage SOR as previously referenced:

- Option 1 – Four Span Steel Composite. The proposed structural arrangement comprises of 3 pairs of haunched plate girders made composite with reinforced concrete deck slab, monolithic with reinforced concrete piers at the intermediate supports and supported on reinforced concrete piled bankseats with reinforced earth abutment on the north abutment and secant piled wall at the south abutment. The overall length of the bridge is approximately 160m.
- Option 2 – Eight Span Steel Composite. The proposed structural arrangement consists of 3 pairs of plate girders made composite with reinforced concrete deck slab and haunched over the river mainspan. At this stage the proposed structure is supported on bearings at intermediate supports with reinforced concrete piers and piled foundations. The overall length of the bridge is approximately 287m.
- Option 3 – Five Span Steel composite with Tied Arch Span. The superstructure comprises a steel box girder with propped cantilevers made composite with reinforced concrete deck and single central vertical steel/concrete composite arch supporting the main span with inclined intermediate supports connected to the superstructure. Provision of the supporting arch along the centreline of the proposed road requires a marginal widening of the central reserve to allow provision of a median safety barrier to protect the main arch and supporting cables. Longitudinally, the arch crosses the deck with a monolithic joint and continues to ground level, the horizontal thrust of the arch is supported by an inclined prop-column that is connected to the deck providing a span with a portal frame/triangular cell shape. This structural layout avoids horizontal forces being transferred to the ground as the arch is tied by the two triangular frames on each side. The overall length of the bridge is approximately 170m.
- Option 4 – Five Span Concrete Box with Steel Composite Drop in Span. The proposed superstructure provides two approach spans on either side of the river with cantilever sections formed in reinforced concrete and made monolithic with inclined intermediate supports. The deck cross section comprises twin cell concrete box with propped cantilevers for the backspan and steel box girder, with propped cantilevers, drop in span made composite with a reinforced concrete deck. The overall length of the bridge is approximately 155m.
- Option 5 – Span Asymmetric Cable Stayed Bridge. This option proposes the construction of a three span asymmetric cable stayed bridge with a single central tower and a single plane of cables located in the middle of the deck. The spans are approximately 40, 45.0 and 97.0m. The total depth of the deck will be 2.2m giving a span depth ratio of 1/44. In general, single plane cable stayed bridges require a deeper section since the torsional resistance is provided by the deck for the full span and not by two different planes of cables. Given the total width of the deck at 22.0m the span depth ratio is well proportioned. A cross section consisting in a single box with long cantilevers supported by props at a certain spacing is proposed. This cross section enhances the visual impact due to the large relationship between the deck depth and the cantilever, which is more than 1:2. Additionally, it allows the construction of the transversal cantilevers independently from the central box with light temporary works, which reduces the auxiliary works during construction. The pylon will be approximately 2m wide and will be accommodated in the central reserve integrated with the concrete barrier. This requires a total width of structure of 22.2m. The overall length of the bridge is approximately 182m.

The bridge options were assessed under technical evaluation, economic evaluation, aesthetic evaluation & visual impact, maintenance requirements, hydraulic considerations health & safety, construction & buildability and environmental considerations. Following a review of constraints and impacts Option 2 – Eight Span Multi Girder Bridge was considered to be the preferred design as it had the least impact on the River Finn SAC / River Foyle and Tributaries SAC (clear spanning the river) and floodplain and the least landscape and visual impact. It was also a preferred option in terms of maintenance, hydraulic considerations, constructability and Health & Safety.

The proposed structural arrangement consists of four pairs of braced plate girders made composite with a Reinforced Concrete (RC) deck slab. The proposed bridge deck is supported on bearings at intermediate RC piers with piled foundations.

RC abutments are proposed with piled foundations. Abutment galleries are being incorporated to enable access for inspection and maintenance of bearings.

The overall length of the bridge is approximately 287 m with the following span arrangement:

- West Approach Spans: One 26 m span and five 33 m spans,
- Main Span: 63 m
- East Approach Span: 33 m.

Weathering steel is proposed which has an aesthetically pleasing reddish-brown colour and avoids the need for paint maintenance.

The proposed N14/N15 to A5 Link, including the bridge, has a clear span over the River Finn and no works are permitted within the River Finn. There are no QI habitats from either the River Finn SAC or the River Foyle and Tributaries SAC at this location and therefore no impacts to those QI can occur. The bridge is a clear span of the river itself with no works in the river. Any discharges to the River Finn will be via attenuated flows and via existing land drains. Silt fencing will be used as dictated by the mitigation measures in Chapter 9A Terrestrial Biodiversity and Chapter 9B Aquatic Biodiversity of this EIAR as well as those dictated by the NIS. With the implementation of these mitigation measures, the Proposed Development will not result in direct, indirect or in-combination impacts which would have the potential to adversely affect the QI of the River Finn SAC or the River Royle and Tributaries SAC having regard to the range, population densities and conservation status of the habitats and species for which these sites are designated.

Construction activities within the River Finn are not permitted as part of the construction works and the design of the bridge, including the 63 m central clear span of the river ensures that this is the case. The 287 m long 8 span bridge reduces the risks of flooding, potential impact on the SAC compared to a shorter bridge with longer approach embankments.

5.8.2.3 Overbridges, Skewed Overbridges and Underbridges: Construction Alternatives

5.8.2.3.1 Overbridges

Three overbridge options were considered

- Option 1 – Integral three span steel composite
- Option 2 – Integral three span prestressed concrete
- Option 3 – Semi integral three span prestressed concrete.

Option 2 – the three span integral bridge was chosen as the preferred option. It was preferred in terms of structural efficiency, maintenance requirements, capital cost, risk and ease of fabrication and transport. The bridge options are all similar footprint and therefore the difference between the options from an environmental perspective is negligible. Considering that concrete may be sourced locally (as opposed to structural steel which is imported from overseas), there is a general preference in Ireland to build concrete structures.

Each of the standard overbridge structures are three span integral bridges, which provides the most efficient structural configuration for bridges of this length, to minimise the amount of concrete use, and therefore minimise carbon footprint of materials used for the bridge and their transportation to site. The integral structure will require minimal maintenance which also reduces transportation and therefore carbon footprint associated with maintenance works.

5.8.2.3.2 Underbridges

'Underbridges' are defined as bridges which carry the mainline carriageway over various regional, local and link roads. There are 16 no. underbridges proposed on the Project.

Three underbridge options were considered

- Option 1 – Buried Box / Portal
- Option 2 – Prestressed Beam Deck on Integral Abutment
- Option 3 – Prestressed Beam Deck on Integral Abutment at 30 degrees skew

Option 1 is the preferred choice for spans up to 6m and a maximum of 12m. Option 2 is for skew spans less than 30 degrees and ranging from 9 to 31m. Option 3 for skew spans greater than 30 degrees. The required square clear spans are 9 m to 20 m. Roughly half the sites have roads crossing at skew greater than 30 degrees. All the underbridges are single span which provides the most efficient structural configuration for these shorter bridges, to minimise the amount of concrete use, and therefore minimise carbon footprint of materials used for the bridge and their transportation to site. The integral structure will require minimal maintenance which also reduces transportation and therefore carbon footprint associated.

5.9 Summary of Assessment of Reasonable Alternatives

Identification and assessment of alternatives was a phased and iterative process over an extended period of time, starting in 2014 and continuing through to detailed design and publication of this Proposed Development EIAR.

The assessment of reasonable alternatives has followed a process throughout the TII project phases (0-3) up to the point of the completion of Phase 3 Design and Environmental Evaluation. This process has followed the requirements of the TII PMGs and PAGs and has included environmental assessment against the EIA factors contained in the EIA Directive.

After the development of the Project objectives, various alternative solutions were examined including do-nothing and do-minimum. Non-road and demand management alternatives were also assessed, including rail and public transport. The results of the assessment confirmed that a Hybrid (Road/ Bus / Active Travel) solution is the most appropriate to meet the Project objectives taking into account environmental considerations.

Thereafter, road-based alternatives were examined to derive corridors within which the Proposed Development could be constructed. This was undertaken in Phase 2 Options Selection. A total of 106 options were appraised in Phase 2, Stage 1, across all three sections of the Proposed Development.

After the appraisal of the preliminary options, a total of 22 options were taken forward to Phase 2, Stage 2: six in Section 1, seven in Section 2, and nine in Section 3. After an initial review, an additional one option, a composite option, was also added to Section 1 bringing that total to seven. All of these options were assessed against the CAF criteria including the environmental considerations under the EIA factors from the EIA Directive. From this assessment a single preferred option for each of the three sections of the Proposed Development were selected and brought forward to Phase 3 Design and Environmental Evaluation.

As the design of the Proposed Development progressed in Phase 3, environmental assessment of alternatives for the various design elements was undertaken. This included the active travel network, park and share facilities, drainage system (including attenuation ponds and flood compensation areas), structures (and in particular river bridges), and the location of construction compounds.

Through the iterative design process and the assessment of reasonable alternatives, which included significant environmental inputs from the various environmental specialists, environmental impacts from the Proposed Development, both during construction and operation, have been avoided, mitigated and/or offset.

5.10 References

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- NWRA. (2020) Regional Spatial and Economic Strategy 2020-2032, Roscommon, Project Ireland 2040.
- TII (2025) PE-PMG-02041 Project Management Guidelines
- TII (2021) National Roads – Active Travel Planning
- TII (2019) Cross Sections and Headroom
- TII (2017) Design standard DN-GEO-03060
- TII (2017) Geometric Design of Junctions
- TII (2017) Rural Cycleway Design
- TII (2017) Rural Road Link Design
- TII (2016) Unit 4.0 - Consideration of Alternatives and Options, October 2016 (PE-PAG-02013).
- TII (2016) Unit 7.0 – Multi Criteria Analysis, Section 4.3 (PE-PAG-02031).