

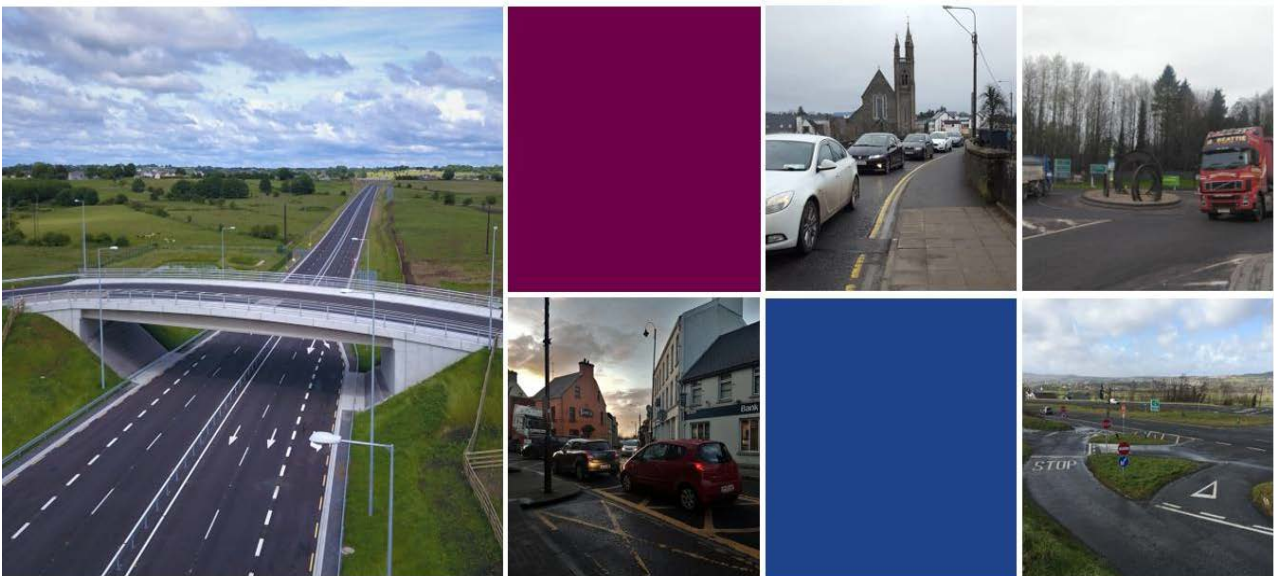
Appendix C5.01

Assessment of Alternatives - Transport

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Assessment of Alternatives - Transport Report

TEN-T Priority Route Improvement Project, Donegal



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ASSESSMENT OF ALTERNATIVES REPORT



SYSTRA

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1. INTRODUCTION

1.1 Overview

- 1.1.1 Transport Infrastructure Ireland’s (TII) Project Appraisal Guidelines (PAG) Unit 4.0: Consideration of Alternatives and Options, recognises that a transport strategy may dictate that the preferred alternative to address the need for a specific intervention should be a road based solution. It is necessary that alternatives to a road based solution are considered and discussed, including all modes and demand management alternatives.
- 1.1.2 This document presents the results of an Assessment of Alternatives to a road based solution centred on the Trans-European Transport Network (TEN-T) Priority Route Improvement Project in Donegal. The objective of this report is to identify and consider the range of transport management and modal alternatives that may address the project objectives. It will inform the selection of the most appropriate options to bring forward for further consideration.
- 1.1.3 Using the TII’s definitions, the difference between alternatives and options from a project appraisal perspective are that:
- **Alternatives** – “An alternative refers to a specific transport mode (road, rail, bus, air, etc.) or demand management proposal (fiscal, control, ITS measures etc.) which could address the need for an intervention”.
 - **Options** – “Options refer to the specific road-based options that fall under the remit of TII. At Phase 2: Option Selection stage a number of options are considered and brought through a structured appraisal process in order to identify a single preferred option”.
- 1.1.4 The objective of this report is to present the baseline evidence to inform the decision-making process in the Assessment of Alternatives. This has been done with reference to 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.
- 1.1.5 It will assess potential modes of travel such as road, bus and rail, as well as demand management measures and active mode enhancements. This assessment will conclude with reference to the project objectives.

1.2 TEN-T Summary

- 1.2.1 The Trans-European Transport Network (TEN-T) is a planned network of roads, railways, airports and water infrastructure stretching across the European Union. One of the main goals is to improve primary roads, railways, inland waterways, airports, seaports, inland ports and traffic management systems to provide **integrated** and **intermodal long-distance, high-speed** routes. The TEN-T programme consists of hundreds of projects – defined as studies or works – whose ultimate purpose is to ensure the **cohesion, interconnection** and **interoperability** of the trans-European transport network, as well as access to it. As a whole, TEN-T projects, such as the scheme in Donegal, aim to:

- Establish and develop the key links and interconnections needed to eliminate existing bottlenecks to mobility;
- Fill in missing sections and complete the main routes - especially cross-border;
- Cross natural barriers, and
- Improve interoperability on major routes.

1.3 Project Summary

1.3.1 In order to satisfy the objectives of the TEN-T, the following objectives need to be assessed. Some of the key issues for the sections of the National road corridors forming the TEN-T Priority Route for which this project is being developed to rectify, include:

- The lack of **connectivity** to this peripheral region of the country and the EU, has resulted in significant regional disparities and associated imbalance of the internal market and wider European market.
- lack of **proper transport infrastructure** impacts negatively on economic growth, social and territorial cohesion within the northwest region and as a result, Donegal suffers from a declining population and has the second highest unemployment rate in Ireland.
- limited options for **modal shift** in Donegal. There are no formal facilities for carpooling or Park & Ride/Share facilities to facilitate modal shift from private car to public transport and only limited Active Travel provision.
- Due to the UK (and Northern Ireland) leaving the EU (known as Brexit), Donegal's **peripheral location** is further exacerbated, with extra reliance on ports and infrastructure in the Republic of Ireland being more likely, in addition to the use of infrastructure in Northern Ireland. This further increases the need to improve strategic connectivity and accessibility to Donegal from regional centres and hubs, including Dublin to the south-east and Sligo/Galway to the south. This will subsequently improve connectivity to the rest of the country and prominent EU import/export infrastructure, including ports (in Dublin, Rosslare, Foynes/Shannon and Cork/Ringaskiddy) and international airports (in Dublin and Shannon).
- **Poor network resilience** to and from Letterkenny due to an over reliance on the existing N56 (four lane road) between the Polestar and the Dry Arch roundabouts. **Heavy traffic volumes** and **frequent delays** result for traffic from Derry, Strabane and Dublin to the east and/or Ballybofey/Stranorlar, Donegal, Sligo and Galway to the south.
- Conflicts between strategic and non-strategic users resulting in **traffic congestion**, **higher collision rates** and **unreliable journey times** along the national road network.
- **Poor collision history**; higher than national average rates for similar roads along much of the three sections.
- **Poor journey time reliability** for public transport operators from Letterkenny to Dublin via the N14 and to Sligo and Galway via the N13 and N15 through Ballybofey and Stranorlar.
- **Poor cross-sectional characteristics** of the N15 through Ballybofey/Stranorlar and the N14 from Manorcunningham to Lifford which do not correlate with those of national primary routes.
- The N56 between Polestar and Dry Arch roundabouts and the N15 through Ballybofey/Stranorlar are currently **operating beyond capacity**.
- **Excessive gradients** on the N13 southern approach to Letterkenny (locally known as Lurgybrack).
- Numerous at-grade junctions and **access conflict points** on the existing N13 dual carriageway east of Letterkenny and on the N14 Manorcunningham to Lifford section that do not align with the characteristics of a TEN-T strategic corridor and do not meet current national road design standards.
- **Unsustainable** number of direct accesses onto the existing N56 between the Polestar and Dry Arch roundabout, and the N13 south of Dry Arch Roundabout (including St Patrick's School).

- **Poor provision for pedestrians and cyclists** in all three priority sections. This is aggravated by poor alignment characteristics on the road network and insufficient cross-section to safely accommodate non-motorised users.

1.4 Project Objectives

1.4.1 The overarching scheme objectives are:

- Enhance regional accessibility and geographic integration to and within the Northwest
- 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

1.4.2 A set of criteria-specific objectives have been developed to ensure that the proposed scheme addresses the challenges facing the north west, and to align with Government policy. The objectives have been established across the core 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 1. As part of the Assessment of Alternatives, the project objectives will be used to inform the selection of any preferred alternatives to road based options to bring forward for further assessment.

Table 1. Project Objectives

Appraisal Heading	Objective
Economy	<p>To improve the efficiency of the transport network by improving journey time and journey time reliability.</p> <p>To accord with the National Planning Framework objective of enhancing regional connectivity between Cork and Limerick to achieve average journey speeds of 90 km/h and a competitive inter-urban journey time.</p> <p>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 and the rest of Ireland.</p> <p>To facilitate population growth within Donegal as envisaged in the National Planning Framework and the key town of Letterkenny.</p> <p>To provide a scheme at an investment cost that offers good value for money.</p>
Safety	<p>To reduce the frequency and severity of collisions on the road network to improve the overall safety of the national road network in Donegal and to support the RSA Road Safety Strategy to reduce road deaths and serious injuries by 50% by 2030.</p> <p>To improve safety for vulnerable users.</p>
Environment	<p>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.</p> <p>To support sustainable development principles and measures to minimise effects on the environment including potential climate change effects.</p> <p>To support sustainable and equitable mobility to encourage modal shift to help meet Irelands Climate change goals.</p>
Accessibility and Social Inclusion	<p>To 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.</p> <p>To remove strategic and commercial traffic from local towns and communities, thereby making these communities more inviting and encourage more travel independence for non-motorised users and vulnerable groups.</p> <p>To improve accessibility to employment in regional and national centres including Donegal, Letterkenny, Derry, Belfast, Dublin, Sligo and Galway.</p> <p>To improve accessibility to regional health services including hospitals in Letterkenny and Sligo.</p> <p>To 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 NW Donegal.</p>

	<p>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</p> <p>To provide an improved road transport system to facilitate the delivery an improved bus-based public transport system (in the absence of rail services)</p>
<p>Integration</p>	<p>Meet the objectives of the TEN-T Regulations 1315/2013 to enhance geographic integration.</p> <p>To support the transport objectives contained in national, regional and local planning policies and strategies.</p> <p>To meet objectives of the National Planning Framework National Strategic Outcomes (NSO)</p> <p>To be compatible with land use objectives as set out in regional and local land use plans.</p> <p>To improve connectivity to/from other transport modes, such as ports at Killybegs, Foyle (Derry), Belfast, Shannon and Dublin, and airports at Derry, Knock, Belfast, Dublin and Shannon.</p>
<p>Physical Activity</p>	<p>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)</p> <p>To enable local opportunities for walking and cycling (active travel) activity in and between communities.</p> <p>To facilitate the improvement of town and village public realm.</p> <p>To facilitate positive health benefits and improve wellbeing</p> <p>To have a positive environmental impact through reduced private car use, congestion, reduction in carbon and improvements in air quality and noise</p> <p>To facilitate tourism and recreational activities by active travel modes and improve accessibility to key tourism destinations across Donegal.</p>

2. PROBLEM ANALYSIS: BASELINE AND FORECAST REVIEW

2.1.1 The first step in this assessment is identify the baseline situation that has led to the formation of the project objectives to address the identified issues in the study area.

2.2 Data Sources and Analysis Tools

2.2.1 The baseline review draws upon numerous data sources to present the existing situation in and around the Project area in respect to modal choice, origin-destination of travel, road safety issues and public transport. The main data sources used in this analysis are:

- Census 2016 commuting data;
- Census 2016 POWSCAR data;
- General Transit Feed Specification (GTFS) Data base;
- Preliminary Business Case Transport Modelling Report, and
- NTA’s West Regional Model.

2.3 Origin-Destination Analysis

Census Commuting Data O-D Analysis

2.3.1 Using POWSCAR information from the 2016 Census, the CSO has developed a set of data on aggregate populations. This data is presented at Electoral Division (ED) and county level and provides the total number of commuting trips (including commutes to work and education) which take place between each ED during the morning period. The data is based on the origin and destinations of workers and students who are usually resident in Ireland. The data includes persons who work from home and persons who have no fixed place of work.

2.3.2 It should be noted that these figures only represent usual home and work or education addresses (i.e. cumulative total of all modes) and usual modes of travel. These are indicative of home to work or school trips but are not actual trip observations. For example, the frequency of the trip, any typical stop-offs on the way, and detail of the return trip are not recorded. However, the data is nonetheless useful in inferring overall travel patterns within the study area.

2.3.3 This 2016 POWSCAR data has been processed to deduce the quantity and direction of strategic commuting trips taking place within the study area, during the AM period. The results of this analysis are shown in Table 2 alongside the corresponding data in Figure 1.

Table 2. Study Area Commuting Patterns*

FROM\TO	BALLYBOFEY	LETTERKENNY	LIFFORD	SLIGO
Ballybofey	3225	774	97	30
Letterkenny	191	10871	147	47
Lifford	98	175	474	6
Sligo	3	30	1	11702

*This table shows home address (trip origin) and work address (trip destination). Trip origins are shown on the vertical axis and destinations are shown on the horizontal axis. For example, 10871 trips start and end in the Letterkenny area during the AM period. Similarly, 191 trips take place from Letterkenny to the Ballybofey area.

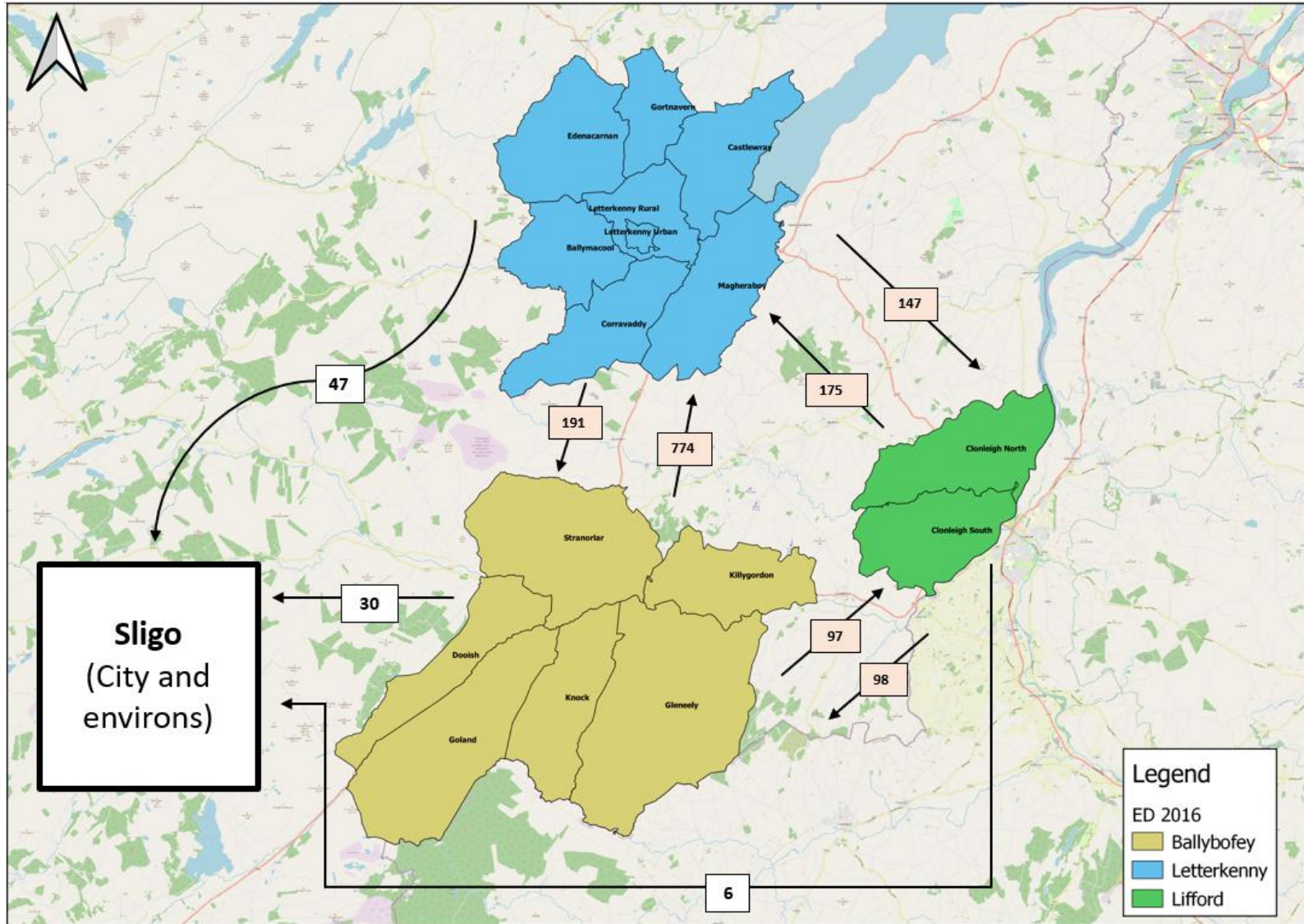


Figure 1. Study Area Commuting Patterns

- 2.3.4 The logical proposition that most trips in the area are destined for bigger urban centres such as Strabane and Londonderry/Derry could not be investigated due to the fact they are under administrative borders of United Kingdom. However, Lifford area is a major indicator of international commute because it is a relatively unpopulated area located right on the border so the trips coming to and from the area are in fact trips destined for Strabane/Northern Ireland.
- 2.3.5 The majority of commuting demand in the area is destined for Letterkenny. Notably, Ballybofey/Stranorlar and Lifford contribute 774 and 175 trips, respectively. These movements already align with existing bus routes along the N13/N14/N15 which are already available.
- 2.3.6 Although not illustrated in Figure 1, there are many “internal” trips within each of the specified settlements i.e. 10,871 commuting trips begin and end inside Letterkenny. Given the relative short distances involved in these trips, public transport and active mode alternatives are already available for these trips. These are not strategic movements and such strategic traffic would not be broadly affected by improvements to the TEN-T priority route.

Trip Productions and Attractions

- 2.3.7 An analysis of Census 2016 data has been undertaken to establish trip production and attraction rates in the study area, as illustrated in Figure 2 and Figure 3.

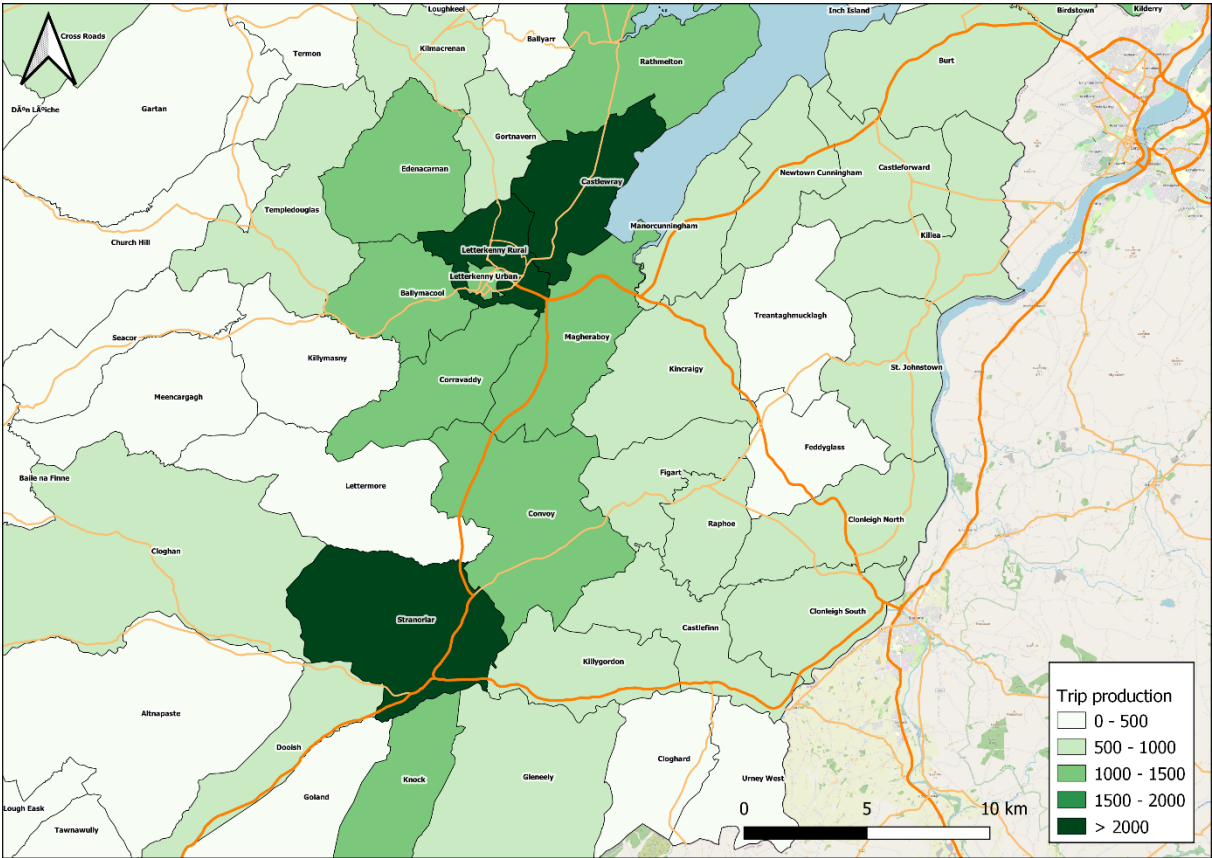


Figure 2. Study Area Trip Productions

- 2.3.8 Figure 2 shows that trip production, which largely relates to population distribution, is mostly concentrated between Letterkenny and Ballybofey/Stranorlar, and some of the smaller surrounding urban settlements.

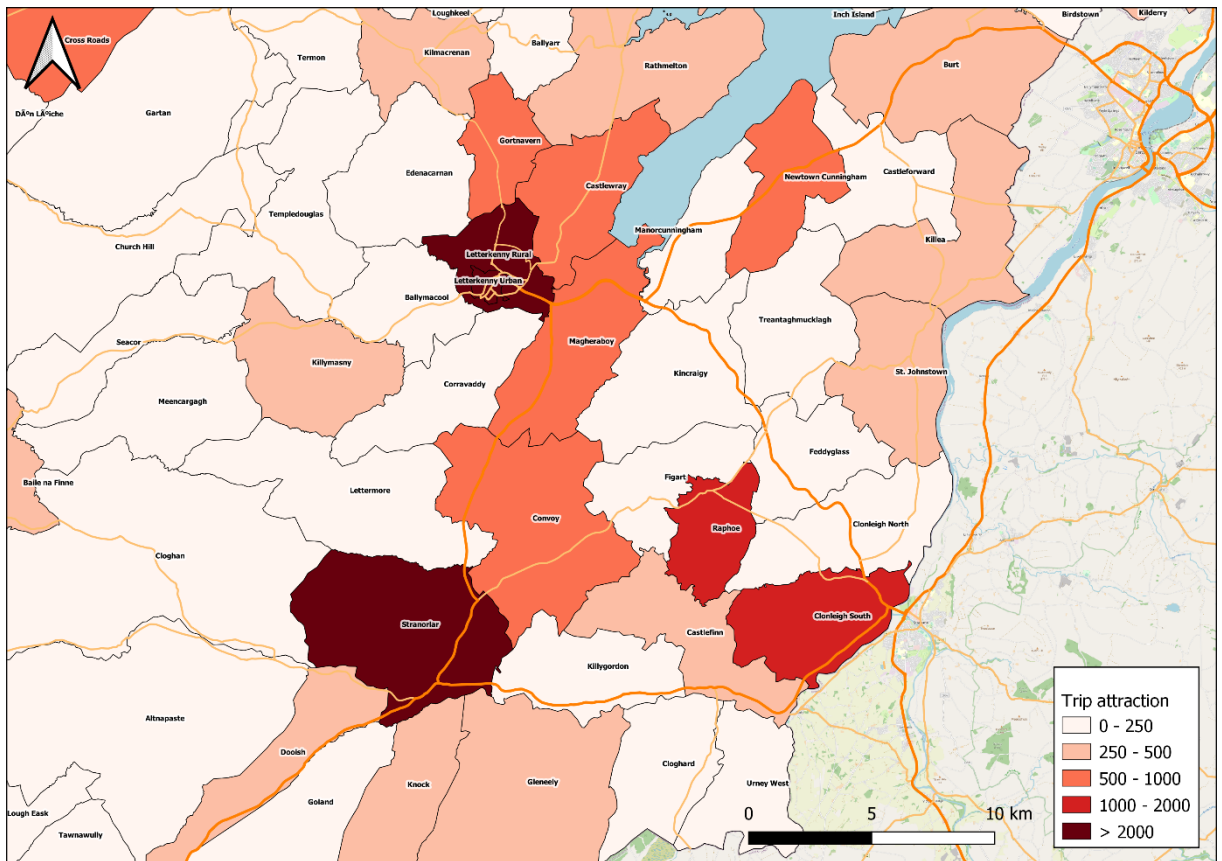


Figure 3. Study Area Trip Attractions

2.3.9 Similarly, Figure 3 shows that trip attraction in the study area is mostly concentrated in the larger economic centres in places like Letterkenny and Ballybofey/Stranorlar.

2.4 Modal Split

2.4.1 A mode split analysis has been undertaken for the study area using Census 2016 data. The mode share for each of the main modes of travel are presented below for work trips and education trips separately.

2.4.2 Table 3 shows the modal splits for Letterkenny, Ballybofey/Stranorlar, Lifford, Donegal County and the National Average for commuters.

Table 3. Modal Split for Work Trips (Census 2016)

Location	Walking	Cycling	PT	Motor Vehicle
Letterkenny	10.4%	0.7%	0.9%	88.1%
Ballybofey/Stranorlar	7.2%	0.4%	1.2%	91.2%
Lifford	7.8%	1.4%	2.4%	88.4%
Donegal County	7.3%	0.6%	1.5%	90.6%
National average	9.9%	3.2%	9.9%	77.0%

2.4.3 Figure 4 provides a graphical comparison of the figures and highlights that the private motor vehicle is the dominant mode in Letterkenny, Ballybofey/Stranorlar and across Donegal County as well as nationally. All towns in Donegal County have similar splits and have low active and public transport levels which reflects their rural locations and relative car-dependency.

2.4.4 Figure 4 shows a high level of car use for those living within the study area and thus the importance of the TEN-T road network in the area. While the level of travel by walking in the area is relatively low, it is almost comparable to the national average (which includes the main cities). Given the rural location of central Donegal, these levels are likely higher than most rural towns. This is likely due to the number of people living and working within urban areas and the relatively compact nature of the towns. Similarly, the level of public transport use is low in comparison to the national average, but similar to that of the county as a whole.

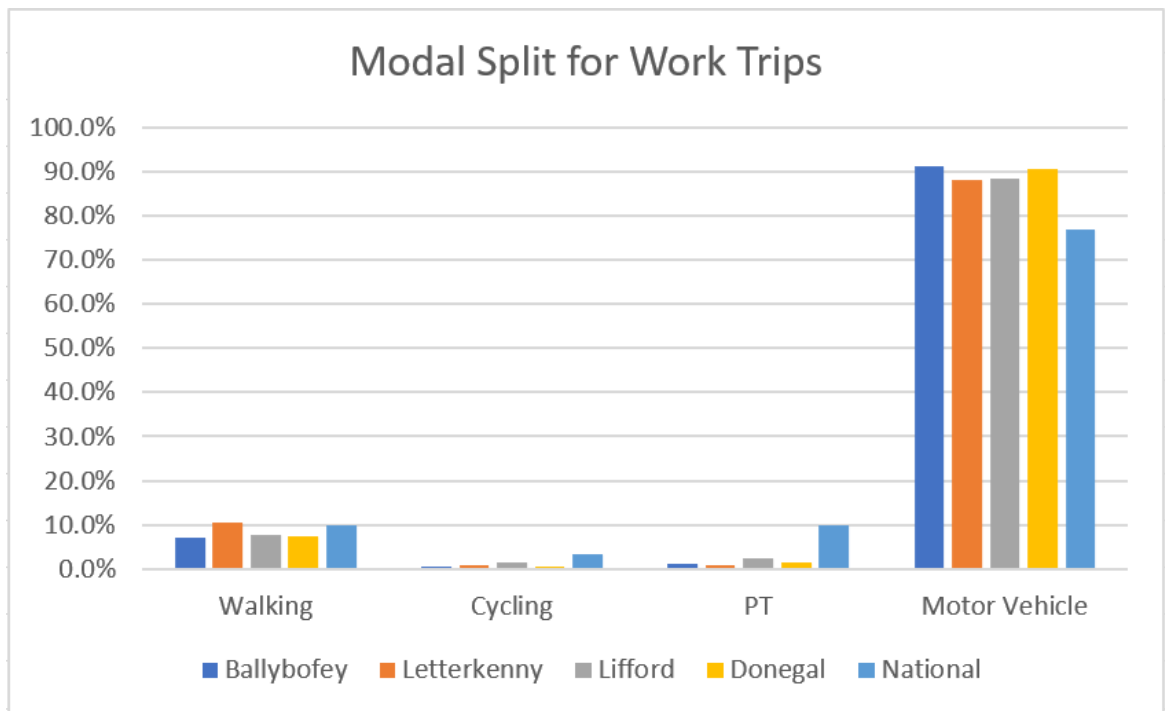


Figure 4. Modal Split Comparison for Work Trips (Census 2016)

2.4.5 Table 4 shows the modal splits for Letterkenny, Ballybofey/Stranorlar, Lifford, Donegal County and the National Average for Education trips.

Table 4. Modal Split for Education Trips (Census 2016)

Location	Walking	Cycling	PT	Motor Vehicle
Letterkenny	17.5%	0.5%	24.2%	57.8%
Ballybofey/Stranorlar	11.3%	0.5%	29.2%	59.1%
Lifford	4.5%	0.3%	36.2%	59.1%
Donegal County	11.0%	0.5%	23.4%	65.2%
National average	24.1%	2.4%	21.2%	52.3%

2.4.6 Figure 5 highlights that the private motor vehicle is also the dominant mode for Education trips across Donegal County as well as nationally. However, in Letterkenny itself, there is a notably higher mode share for sustainable modes than the county averages, which is still much lower than national averages. Most of this sustainable travel is taken by walking (approx. 18% which is lower than the national average) which again reflects the compact nature of the towns and suggests that a lot of students live near their schools. The graph also shows that public transport use is higher than both the county and national average (36% in Lifford, 29% in Ballybofey and 24% in Letterkenny respectively) which would suggest that the existing bus services in Donegal are a viable alternative to car travel for education trips where the services are available.

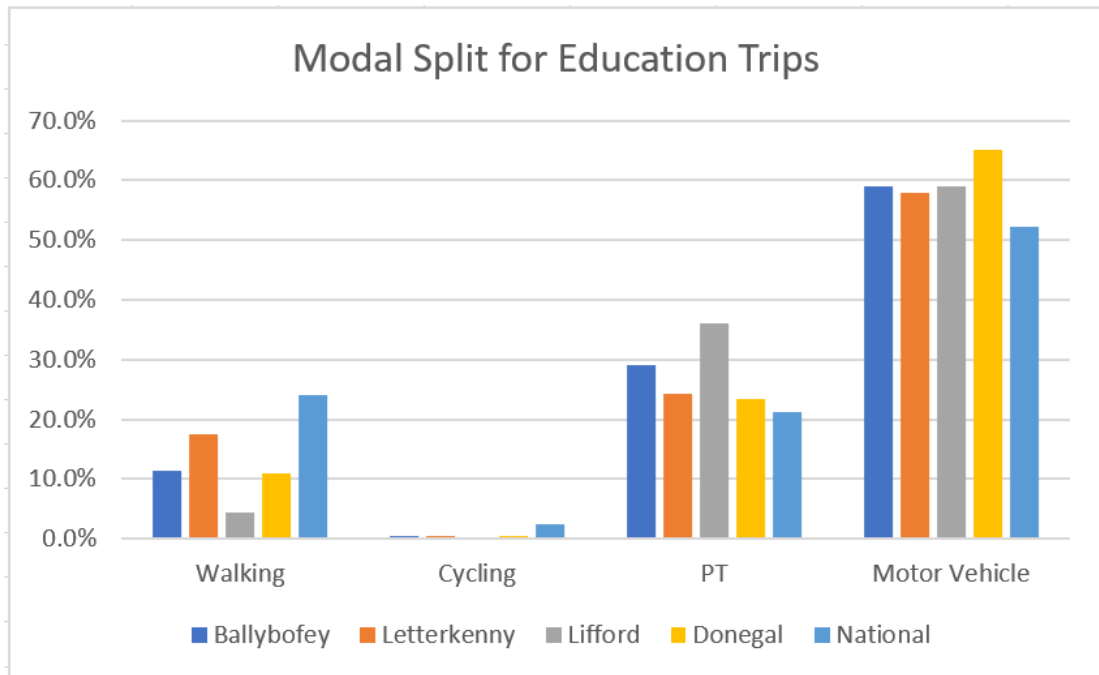


Figure 5. Modal Split Comparison for Education Trips (Census 2016)

2.5 Walking and Cycling Activity

2.5.1 The following heat maps show walking and cycling activity in Donegal County between Letterkenny, Ballybofey/Stranorlar and Lifford, with the areas of greatest activity represented by bright colours and areas of least activity being represented by dark colours. Previous data indicated that walking is mostly preferred for education trips. Cycling trips are equally low for education and work trips, which indicates that cycling is mostly used for recreation purposes.

2.5.2 This data was taken from the STRAVA website which collates information uploaded by users of the Strava application. For a user’s activity to be shown, they would have to have the STRAVA application installed and active on their phone. Therefore, the following maps only show a sample of the walking and cycling activity in the aforementioned area. Additionally, STRAVA is very popular among exercise enthusiasts, so the majority of activity shown in the maps below is likely to be for exercise purposes rather than commuting purposes. Notwithstanding this, these maps can provide a useful insight into preferred routes.

2.5.3 Figure 6 shows the areas in study area where the greatest level of walking activity takes place. As expected, the areas with the highest levels (the bright colours) are focused in and around the urban areas of Letterkenny, Ballybofey/Stranorlar, Raphoe and Lifford/Strabane. This level of activity suggests that there are already a lot of walking trips across Donegal for either exercise, commuting, shopping or leisure purposes.



Figure 6. Walking Heat Map for Letterkenny, Ballybofey and Lifford (STRAVA 2022)

- 2.5.4 Figure 7 shows the areas between Letterkenny, Ballybofey/Stranorlar and Lifford where the greatest level of cycling activity takes place. The areas with the highest levels of cycling (the bright colours) are more dispersed compared to the walking map with the majority of all radial routes leading into urban areas showing a reasonable level of activity. Given the fact that there is minimal cycle lane provision throughout the area, this suggests that cyclists regularly mix with general traffic on the roads into and around the study area.



Figure 7. Cycling Heat Map for Letterkenny, Ballybofey and Lifford (STRAVA 2022)

2.5.5 As roads comprising the existing TEN-T network are vital connections between towns in the study area, they are also heavily used by active modes. Strategic traffic makes these connections less attractive and more dangerous to users of active modes, which could significantly benefit from rerouting of strategic traffic away from these routes.

2.6 Existing Public Transport Access

2.6.1 In order to provide an indicative summary of areas which are accessible to public transport or car dependent, a GIS assessment was completed which plotted National Transport Authority (NTA) General-Transit-Feed-Specification (GTFS) stop locations and categorised CSO Small Areas according to access. The analysis categorised CSO Small Area boundaries as being accessible or inaccessible to public transport on the basis of whether they intersect with a public transport catchment buffer (1km for rail or 500m for bus).

2.6.2 A map of study area between Letterkenny, Ballybofey/Stranorlar and Lifford which has public transport access is shown in Figure 8. This shows that Letterkenny, Ballybofey/Stranorlar and Lifford as well as the areas along the N13/N15 have a good level of Public Transport access, with the exception of the area along N14 which is not well covered. This generally reflects the dispersed settlements with low population levels along the N14. As there is no train line within the study area below, public transport access is provided solely by buses.

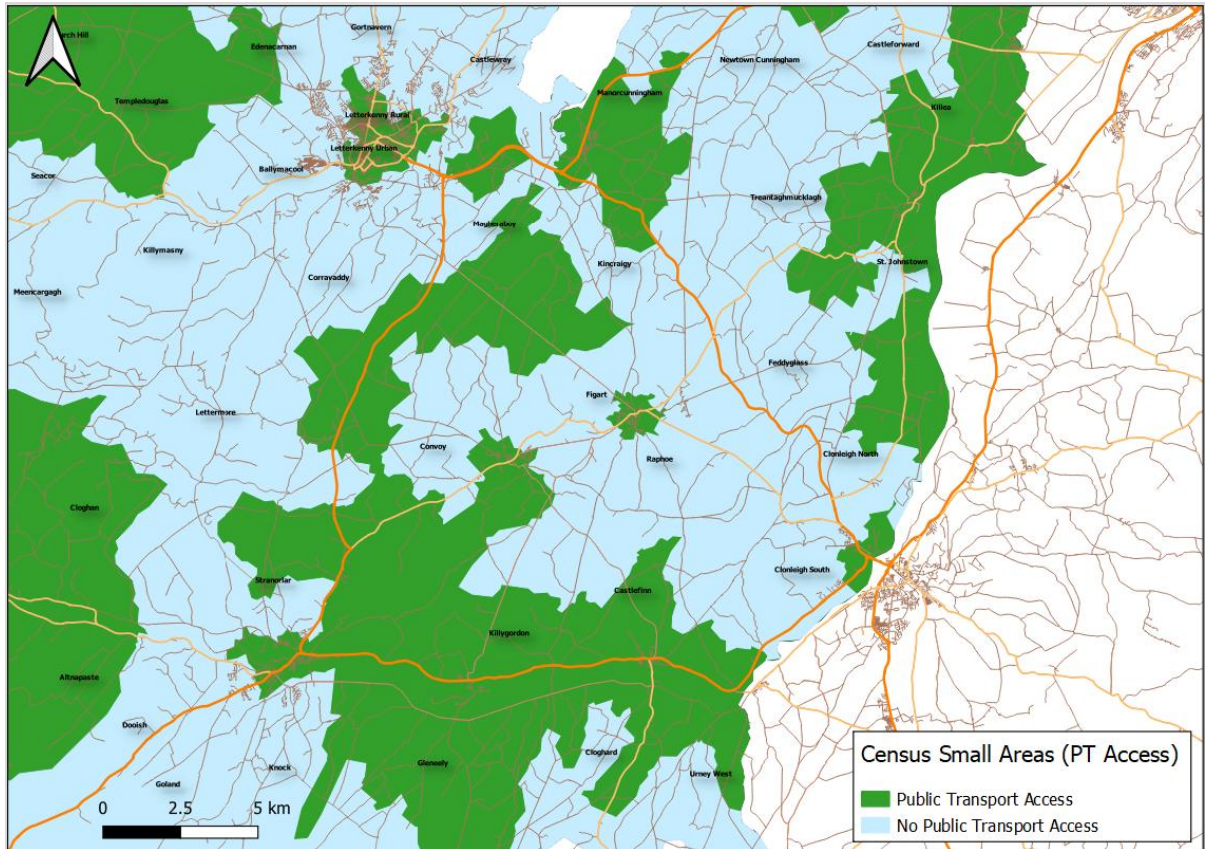


Figure 8. Census Small Areas with Public Transport Access

2.7 Forecast Public Transport Demand

2.7.1 This section will provide an overview of the forecast public transport demand analysis in the study area (same public transport provision as of February 2022).

2.7.2 Bus provision in this area is predominantly provided between Ballybofey, Letterkenny and Lifford along the N13, N14 and N15. The national roads are used by some short and long distance bus services operators, including the following:

- Bus Eireann
- Expressway
- Local Link
- Bus Feda Teoranta
- John McGinley
- McGeehan Coaches

2.7.3 In order to estimate the future Public Transport demand in the study area, the NTA's West Regional Model (WRM) was used to compare Base Year (2016) with a 2043 reference case scenario. This reference case only had committed schemes in Donegal and Sligo. Non-committed schemes included in this reference case were focused around Galway and deemed to have negligible impact on the study area for this project.

2.7.4 The WRM covers the west and northwest part of the country and includes a public transport model which can be used to assess any Public Transport provision. The 2043 reference case scenario includes all existing public transport services for the specified Future Year (including the services mentioned above). The following tables and figures detail the forecast year mode share and Public Transport usage for the study area.

2.7.5 As indicated in Table 5, highest number of boardings in the AM period takes place in Letterkenny, while the highest number of alightings in the PM period takes place in Ballybofey.

Table 5. Base Year and Future Year (2043) Scenarios Total Bus Boardings & Alightings in Donegal

AREA	BOARDINGS (AM)	ALIGHTINGS (PM)	BOARDINGS (AM)	ALIGHTINGS (PM)
SCENARIO	Base Year	Base year	Future Year (2043)	Future Year (2043)
Letterkenny	93	42	123	49
Lifford	26	3	35	4
Ballybofey	86	48	122	63

2.7.6 As indicated in Figure 9, by looking at all Trip Ends in the study area the AM Origin Mode Share in the Study area shows car as the most frequently used mode of transportation (67%), followed by walking (24%), PT (6%) and cycling at only 3%.

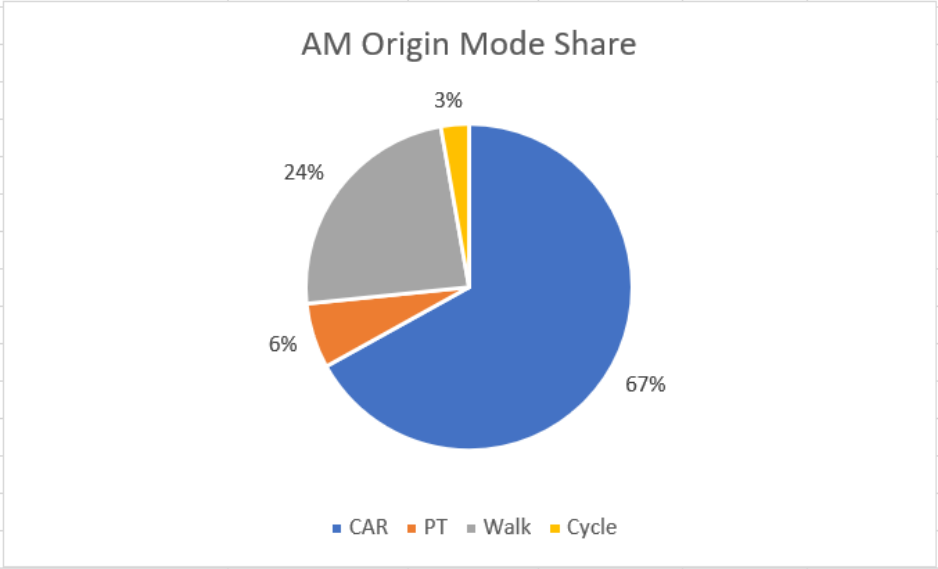


Figure 9. AM Origin Mode Share in Study Area

2.7.7 As indicated in Figure 10, by looking at all Trip Ends in the study area the PM Destination Mode Share in the Study area shows car as the most frequently used mode of transportation (69%), followed by walking (24%), PT (4%) and cycling at only 3%.

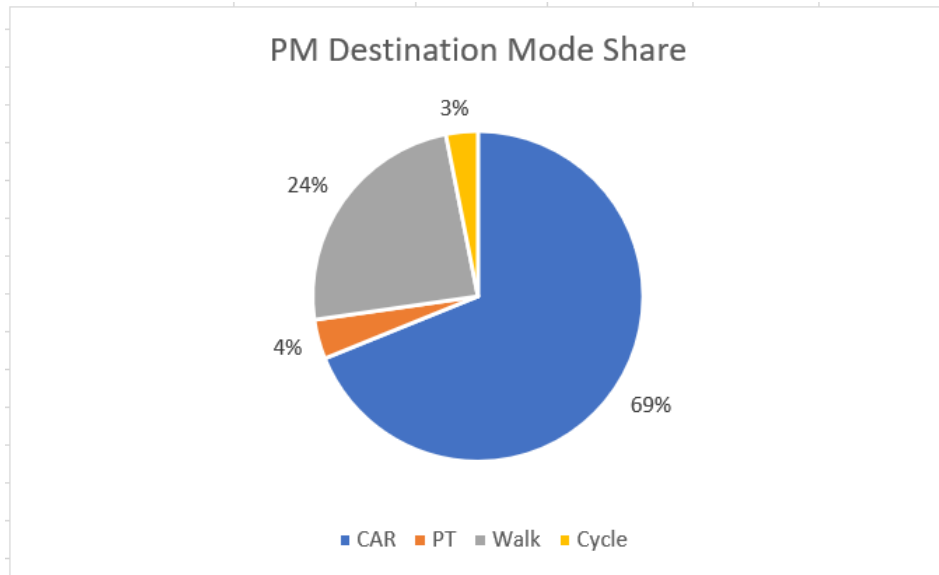


Figure 10. PM Origin Mode Share in Study Area

2.8 Assessment of Strategic Road Network

- 2.8.1 As illustrated in Figure 11, the study area is located along the N13, N14 and N15 national primary roads between Ballybofey/Stranorlar, Letterkenny and Lifford.
- 2.8.2 The **N13** road is a national primary road in Ireland, running in County Donegal from Stranorlar to just outside Derry. The **N14** road is a national primary road entirely located in County Donegal, connecting Manorcunningham to Lifford in the east. Here it connects to the N15 near the border with Northern Ireland and along the A38 to Strabane in County Tyrone. Finally, running to the north of Donegal County the national primary road **N15** connects Sligo, Donegal, Ballybofey and Lifford where it crosses the Northern Irish border becoming the A5.
- 2.8.3 As stated in the Chapter 1.3 Project Summary, these roads are characterized by heavy traffic volumes and frequent delays due to resulting congestion, mixing of strategic and non-strategic traffic, high collision rates, excessive gradients, numerous at-grade junctions and access points, and a poor provision for pedestrians and cyclists due to poor alignment characteristics and insufficient cross-section to safely accommodate non-motorised users.



Figure 11. Study Area Road Network

2.9 Summary

2.9.1 The key findings identified in the baseline review are outlined in Table 6.

Table 6. Summary of the Key Points in the Baseline Review

ISSUE	KEY POINT
Origin Destination Analysis	There is a significant volume of local trips (Origin & Destination in central Donegal) generated within the urban areas. These tend to be shorter distance trips which could be carried out by sustainable modes. There are also relatively high volumes of commuting trips in the area which are destined for Strabane (Northern Ireland), Derry and Dublin which use parts of the current TEN-T Priority Route.
Mode Split	The modal split Census results show that private motor vehicle is the most used mode of transport, accounting for 90% of work trips and 65% of education trips within Donegal County. Public transport usage for work is low, but a substantial number of children travel to school by public transport (23%) and walking (17.5% in Letterkenny). This suggests that a lot of students live close to their schools.
Public Transport	As there is no train line within the study area below, public transport access is provided solely by buses. The majority of bus services are ones which pass through the N13/N15 corridors on route to Strabane and/or Derry. Consequently, the residential area close to the N13/N15 have a good level of Public Transport access, with the surrounding areas having sparse, or no, coverage, reflective of low demand for public transport services.

3. POTENTIAL SOLUTIONS

3.1 Introduction

3.1.1 The objective of this chapter is to present potential solutions to inform the decision-making process in the Assessment of Alternatives. The TII Project Appraisal Guidelines specify the requirements for the appraisal process for National Road projects. The overall aim of the appraisal process is to provide an assessment of whether a proposal is worthwhile and to clearly communicate conclusions and recommendations. The first step in this process is to identify whether there is need for intervention and this is followed by establishing appropriate objectives for the project. The next step involves considering possible alternatives to a road-based intervention such as public transport or active mode solutions.

3.1.2 The TII's preferred approach is in line with 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.

3.2 Investment Hierarchy

3.2.1 To support the delivery of the National Planning Framework, and to make best use of existing assets, a hierarchy of following intervention types will be applied. **Maintaining** the existing transport network will be given first priority. Maximising the value of the network through **optimising** its use will be second in priority. Infrastructural investments will only be considered after these two categories have been assessed as inappropriate for the identified problem. Thus, **upgrades** to **existing** infrastructure are to be considered before **new** infrastructure.

3.2.2 Note that the Assessment of Alternatives is focused on a high-level selection of an appropriate mode of transport to meet the project objectives, rather than assessing specific options.

3.2.3 The remainder of this chapter is aligned with the NIFTI Intervention Hierarchy, as follows:

- Maintain
- Optimise
- Improve
- New

3.3 Maintain

3.3.1 Maintain refers specifically to measures which protect the existing transport network, and keep it at the standard or capability at which it was designed. This includes all protection and renewal investment, and investments targeted at climate resilience.

3.3.2 This can include the following:

- All protection and renewal investment for road, rail and active travel;
- Targeted maintenance and renewal measures where asset quality has reduced safety levels;
- Targeted maintenance and renewal measures to ensure asset accessibility, and
- Climate resilience measures

Table 7. 'Maintain' Measures Assessment

Measure for Detailed Appraisal	Application	Acceptability
Protection and renewal investment for roads	Maintaining the existing road network in the Donegal study area to ensure asset quality is brought to a high level which improves safety	There is little scope for widening existing roads to improve safety and reduce potential accidents. It is unlikely to achieve the project objectives
Protection and renewal investment for public transport	Maintaining the existing public transport network to promote sustainable travel	This measure could help to improve the attractiveness of public transport, but given the lack of public transport access generally across the study area, it is unlikely to achieve significant mode shift to alleviate congestion levels and achieve the project objectives
Protection and renewal investment for active modes	Maintaining the existing walking and cycling network to promote active travel	This measure could help to improve the attractiveness of walking for short distance trips, but given the lack of existing cycling infrastructure, it is unlikely to achieve significant mode shift to alleviate congestion and achieve the project objectives

3.4 Optimise

3.4.1 'Optimise' refers to measures which are targeted at increasing levels of service of transport infrastructure through enabling and encouraging more efficient behaviour and sustainable use of the network. Several Demand Management measures and Active Mode Enhancements have been examined.

Demand Management Measures

3.4.2 Transport Demand Management programmes are primarily demand oriented rather than supply oriented i.e. they attempt to manage people's travel rather than seeking to provide more physical capacity for travel (such as more roads, bus and train services etc). Transport Demand Management programmes can, however, complement supply oriented programmes which, for example, either reduce the capacity for private vehicles or provide priority in traffic for new or existing public transport services. An example would be where on-street parking availability is reduced as a demand management measure and the space is reallocated to provide for cycle facilities or improved pedestrian environment or public transport priority.

3.4.3 **Land use measures** seek to provide for development which reduces car dependency and encourages the use of alternative modes. Land use policies which support the provision of new development in locations, and at densities, which support walking and cycling and enable the efficient provision of public transport services are to be encouraged. Some examples include:

- Transit oriented development / Increased densities in areas served by public transport;
- Providing for a mix of land uses in close proximity to each other;
- Providing for permeability.

3.4.4 **Fiscal measures** can introduce financial incentives towards sustainable transport modes or financial disincentives to travel by car, particularly at peak periods. The cost of transport has a significant influence on people's travel choices and fiscal demand management measures can be targeted to support public transport use or to influence desire to travel, the choice of route or the time of travel. Some examples include:

- Road Tolling / Pricing;
- Congestion Charging;
- Fuel Duty;
- Public Transport Fare Subsidy;
- Parking Charges / Levies;
- Cycle to Work Scheme;
- Tax Saver Scheme.

3.4.5 **Corridor based demand management strategies** can be very effective in ensuring the efficient operation of the strategic road network. The strategies can combine different demand management approaches and generally aim to make best use of Intelligent Transport Systems such as:

- Variable Speed Limits;
- Incident Detection Systems;
- Variable Message Signs; and
- Ramp Metering on National Routes.

3.4.6 The availability and price of parking are major determinants of the relative attractiveness of the private car versus sustainable transport options. **Parking management measures** include pricing and supply controls that make car use more expensive and less convenient, thereby increasing the relative attractiveness of non-car modes. Parking has a significant influence on people's travel behaviour. Transport demand management through parking restraint can be targeted to locations where accessibility by alternative modes is high thereby encouraging mode shift to public transport, walking and cycling. Parking restraint can also be applied as a fiscal measure or alongside land use planning measures.

3.4.7 Some examples of parking management include:

- On-Street parking controls;
- Restrictive parking standards for new developments;
- Reduction in availability of parking;
- Workplace / private parking levies.

3.4.8 **Behavioural change programmes** are aimed at encouraging people to choose more sustainable transport options. Existing behavioural change programmes include the Smarter Travel Workplaces and Campuses programme directly managed by the NTA and the Green Schools Travel Module administered by the NTA and run by An Taisce on behalf of the Department of Transport. Requirements for Travel Plans are set out in local authority development plans. As such, the local authorities also play a significant role in the review and monitoring of Travel Plans.

3.4.9 The behavioural change programmes supporting measures comprise:

- Workplace Travel Plans;
- Smarter Travel Campus; and
- Green Schools Programme

- 3.4.10 **Information, education, promotion and outreach measures** that are aimed at raising awareness, improving understanding of the options available to help people to recognise the travel choices available to them can play an important role in overcoming barriers to switching from private car use to sustainable modes.
- 3.4.11 The use of technology in the communication of information has developed considerably over recent years and opportunities to take advantage of effective and efficient new methods of communication could be explored as part of the implementation of CMATS.
- 3.4.12 The information and awareness supporting measures comprise:
- Journey Planner;
 - Real Time Passenger Information; and
 - Marketing/information campaigns.
- 3.4.13 One of the features of a successful transport network is how effectively and attractively the opportunities for **interchange between various transport services and modes** are presented. Effective interchange can significantly enhance the opportunity to use sustainable transport to access a range of destinations. Key measures which can play a role in increasing the efficiency of integration and interchange of modes include:
- Interchange facilities for transport hubs/ points where various modes (bus, rail, road, intersect);
 - Integrated ticketing and fares structures;
 - Bicycle hire / sharing scheme;
 - Car pooling; and
 - Car sharing.
- 3.4.14 **Urban design** that creates a visually appealing urban environment is often very conducive to encouraging walking, cycling and public transport. A mobility friendly built environment includes a safe pedestrian environment, safe street crossings, easy to access public destinations, a mix of housing choices, nearby health centres and recreational facilities, within high quality public realm and urban design. Some of the built environment demand management measures which could be considered include:
- Public realm and urban design; and
 - Community Gains Programmes.

Assessment of Demand Management Measures

- 3.4.15 As outlined above, there are numerous transport demand management measures available which could be applied within the study area. In order to determine those most suitable, an initial assessment was carried out on a “long-list” of demand management measure, as shown in Table 8.
- 3.4.16 In order to determine their suitability for implementation in the study area, each option has been appraised against their project **objectives**, their alignment with **national policy** as well as their **deliverability**. Each option has also been assessed regarding their deliverability in terms of feasibility, affordability and public acceptability. These criteria have been defined as follows:
- **Feasibility:** Is the proposal technically and physically feasible?;
 - **Affordability:** Is the proposal economically viable and affordable?;
 - **Public Acceptability:** Is the proposal likely to be acceptable to the general public?

Table 8. Shortlisted Demand Management Measures

DM Measure for Detailed Appraisal	Application	Acceptability
Providing for a mix of land uses in close proximity to each other	A long term strategic development plan, introduced in towns across the study area, designed to minimise the distance between residential, commercial and employment zones. This would act to reduce the overall use of non-active modes	This measure would be beneficial to some extent but would take significant amount of time to put in place and would not resolve the main issues which the project objectives are seeking to address.
Counter commuting strategy	Strategy and list of measures developed to encourage people to work locally (e.g. In remote working Hubs, etc) or work from Home	This measure would improve conditions for local trips in urban areas, but would not impact long-distance strategic traffic.
Increased Parking Charges / Levies	Increase parking charges in town centres in an effort to limit trips into towns by car.	Analysis indicated that many internal work and educational trips are taken by active modes. Car is used mostly for strategic trips.
Signals / Traffic Management which penalises short trips over strategic trips	Alterations and introduction of signals aimed at penalising more local trips and improving journey times for strategic movements	Introducing signals on the main roads in the study area would increase the current congestion, and would not alleviate the level of strategic traffic.
On-Street Parking Controls and Reallocating space for active modes	Restriction on parking along certain roads throughout towns and reallocating space where possible to dedicated active mode infrastructure	This measure could be beneficial for some if that space was reallocated for use by active modes. But it is only likely to impact local trips and restricting parking on certain roads could lead to increased parking in uncontrolled areas i.e. residential areas
Flexible Working (Post Covid Behaviours)	The encouragement of flexible working patterns and the surrounding area to avoid peak hour trips	This measure would be beneficial to some people who can work from home but wouldn't impact those who don't have the option to work from home. This measure also would not impact on HGV traffic.
Work Place / Area wide Mobility Management Plans	Work Place MMP is an on-going strategy that facilitates, promotes, and encourages sustainable, active, and healthy modes of travel and helps reduce single-occupancy car use for journeys to and from a workplace. Area based MMPs cover a particular set of sites in an area that can be linked in order to increase the effectiveness of individual Mobility Management Plans	This measure could be useful to certain businesses within the local area but is only likely to be effective to those who work locally and is unlikely to affect the high levels of strategic traffic which travels through the area.

3.4.17 Following this high-level appraisal, those options deemed as being in-line with existing policy and feasible to deliver were brought forward and included in a Multi-Criteria assessment against other alternatives to establish the most appropriate, as detailed in Chapter 4.

3.5 Improve

3.5.1 Improve' refers to measures which increase the capability of existing infrastructure, through increasing the standards of that infrastructure, or measures which shift existing capacity to more

sustainable modes. These measures can include amongst others, public transport enhancements.

Potential Public Transport Enhancements

- 3.5.2 Previous analysis showed that Letterkenny, Ballybofey/Stranorlar and Lifford as well as the areas along the N13/N15 have a good level of public transport access, with the exception of the area along N14 which is not well covered. This generally reflects the dispersed settlements with low population levels along the N14.
- 3.5.3 According to the Future Year (2043) scenario results, in the AM peak hour we see an increase of 30 people boarding buses in Letterkenny, 9 people boarding buses in Lifford, and 36 people boarding buses in Ballybofey/Stranorlar area compared to the Base Year scenario. Meanwhile in the PM, we see small increase of 7 people alighting the buses in Letterkenny, 1 in Lifford and 15 in Ballybofey/Stranorlar area compared to the Base Year scenario. Possible reasons for this are that expected population growth will be low which leads to a conclusion that public transport demand won't increase significantly.
- 3.5.4 Potential enhancements of Public Transport in the study area would include increased frequency and extended hours of operation for existing local/inter-city lines, as well as introducing dedicated bus corridors/lanes. Since evidence points out that there won't be any significant increase in demand due to the expected population growth, increasing the frequency of existing bus lines would be questionably feasible. Also, as congestion is one of the main problems within the study area it would in fact negatively impact the existing situation. Providing dedicated bus corridors/lanes would therefore also negatively impact the existing situation.
- 3.5.5 Regarding rail, given there is no existing rail line within or near the study area with closest train stations in Sligo and Derry, a rail based solution is unlikely to be feasible in the short to medium term. It would require significant costs in terms of the infrastructure and planning required. Given the low density and dispersed nature of population and job centres within the surrounding area, a rail based option is unlikely to have sufficient demand to make it viable.

3.6 New

- 3.6.1 'New' encompasses all measures which entail significant increases to transport infrastructure capacity. These measures can include dedicated walking and cycling infrastructure, new rail and bus services, or new road infrastructure.
- 3.6.2 As mentioned under some of the previous NIFTI Intervention Hierarchy headings, new walking and cycling infrastructure could be beneficial to some VRUs but is unlikely to help solve some of the other key objectives of the project, similarly to the effect of providing new public transport, which is also unlikely to solve the key objectives of the project.
- 3.6.3 In order to assess the potential impacts of a road based option, the three sections of the TEN-T Priority Route Improvement Project were modelled with the aim of addressing existing safety and operational issues on each section as illustrated in Figure 12.

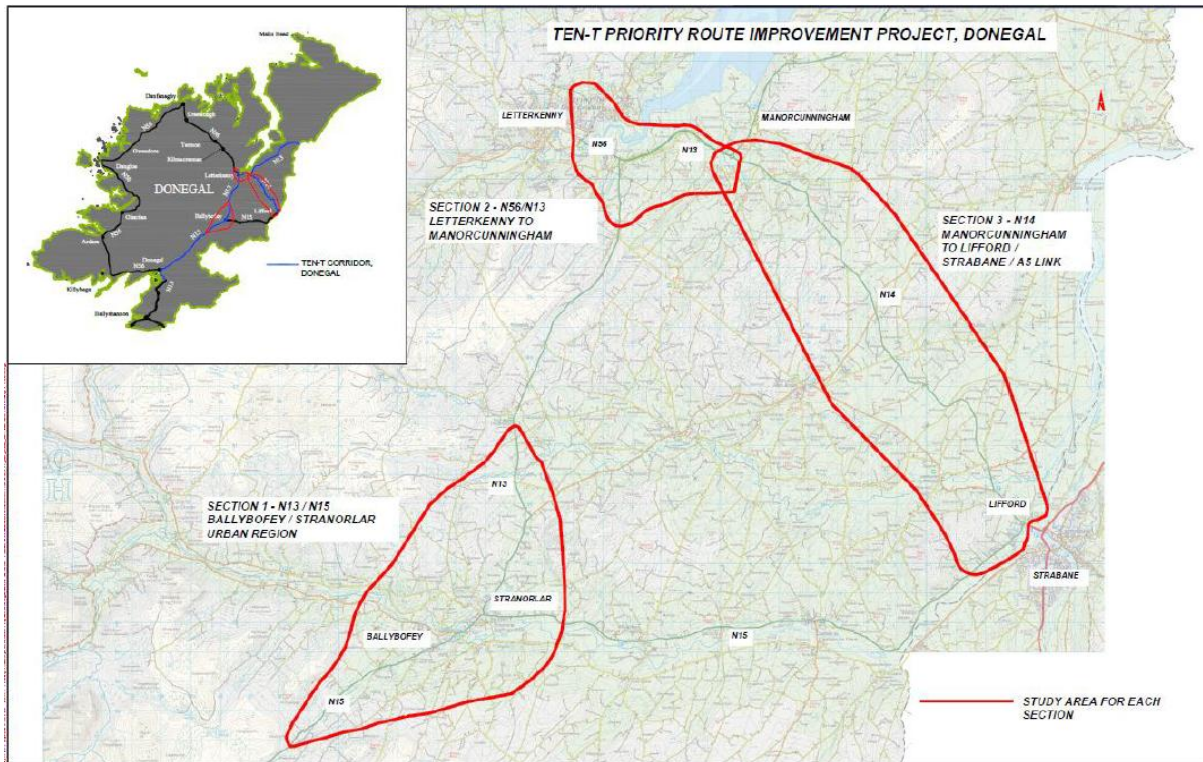


Figure 12. TEN-T Priority Route Improvement project, Donegal. Source: Preliminary Business Case (RPS Barry Transportation, 2017)

3.6.4 The three modelled sections 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.

3.6.5 The analysis of the modelled outputs outlined in Transport Modelling Report (TMR) show that the TEN-T Priority Route Improvement Project scheme helps in relieving congestion in the study area whilst also saving travel time along various routes of travel in the modelled area.

3.6.6 The Do-Something scenario provides a small drop in total travel time when compared against the Do-Nothing scenario. It also achieves higher average speed on a longer total distance travelled (due to the fact the project consists of building bypasses of towns) in the AM period.

3.6.7 The PM results show a similar trend and indicate that the Do-Something scenario provides a bigger drop in overall travel time when compared against the Do-Nothing scenario. It also achieves the higher average speed on a longer total distance travelled (due to the fact the project consists of building bypasses of towns).

3.7 Multi-Modal/Hybrid Options

3.7.1 Several multi modal/hybrid options were also assessed using the NIFTI process and the flow chart below shows a summary of the options and process followed. Each point is also expanded upon below too.

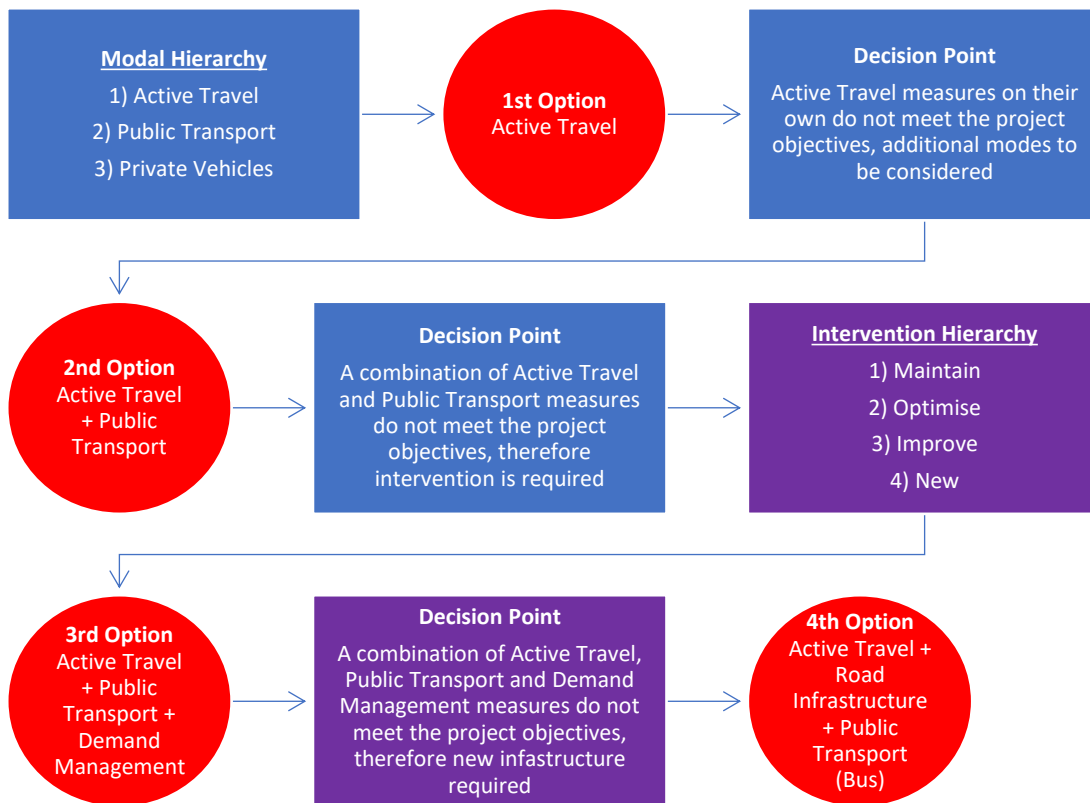


Figure 13. Multi-Modal options assessed using NIFTI

1st Option/Decision Point

3.7.2 In the case of Donegal TEN-T active travel infrastructure could result in some local car travel from urban areas but would have no effect on trips using the national road network for long distance movement. Active travel measures would also have no effect on goods vehicle movement and therefore do not achieve any of the desired elimination of goods traffic from the urban areas. Active travel alone, will not improve accessibility to/from the northwest or reduce the number of accidents.

2nd Option/Decision Point

3.7.3 A combined set of public transport and active travel measures was then considered. Enhanced public transport measures could alleviate some traffic from the national road network each day but given the dispersed nature of travel movements along the national road network in Donegal and the high modal split of cars in the area, it is unlikely to achieve the mode transfer required. It would also have no effect on goods vehicle movements. Rail options were discounted as there isn't an existing rail line in Donegal.

3.7.4 Therefore, a combination of public transport (bus) and active travel measures would be unable to achieve the mode transfer required and will not improve accessibility to/from the northwest or reduce the number of accidents.

NIFTI Intervention Hierarchy

3.7.5 After being unsuccessful in finding a solution to meet the project objectives using NIFTI's Modal Hierarchy, the process then moved towards using NIFTI's Intervention Hierarchy. The hierarchy sets out a framework to follow when an intervention is deemed necessary and uses four headings -

- **Maintain** - refers to measures which protect the existing transport network.
- **Optimise** - refers to measures to encouraging more sustainable use of the network.
- **Improve** - refers to measures which increase the capability of existing infrastructure.
- **New** - encompasses all measures which entail significant increases to transport infrastructure capacity.

Maintain

3.7.6 In the context of Donegal TEN-T, “Maintain” measures were deemed a non-viable option as protecting the existing network and keeping it at the standard or capability at which it was designed, would not meet the project objectives.

3rd Option/Decision Point – “Optimise”

3.7.7 Under “Optimise”, several Demand Management measures were examined in the study area –

- **Land Use measures** i.e. providing for a mix of land uses in close proximity and thus reducing the need for car travel.
- **Fiscal measures** i.e. Tolls, congestion charging, parking charges.
- **Traffic Management measures** i.e. speed limit reductions, banning HGVs, signals which penalise short trips.
- **Behavioural change programmes** i.e. Workplace travel plans, flexible home working.

3.7.8 The above-mentioned demand management measures were all deemed unviable solutions for various reasons including the lack of an alternative route for most of the national road traffic to use, only affecting certain businesses within the study area including those who can work from home and not dealing with the key objective of reducing traffic levels through the urban areas, improved connectivity to / from the northwest and reducing accidents.

3.7.9 Therefore, building upon the previous options, a combination of active travel, public transport (bus) and demand management measures would be unable to achieve the extremely high levels of mode transfer and/or traffic rerouting required, improve connectivity and reduce accident rates

Improve

3.7.10 Solutions under the “Improve” heading were also discounted as bus enhancements were addressed above and not deemed viable. Also increasing the capacity of the existing national routes was ruled out given the existing built environment.

4th Option/Decision Point – “New”

3.7.11 Under the last heading in the Intervention Hierarchy, a combination of new infrastructure and traffic management measures was examined. This included new road based infrastructure to allow the large volume of strategic traffic to bypass the towns of Ballybofey, Letterkenny and Lifford, active travel infrastructure to promote sustainable travel and park and share sites to promote modal shift to active travel and public transport. These ‘combination of measures’ were found to meet the project objectives of promoting sustainable travel, making the transport network a safer environment for motorists / VRUs, enhancing connectivity and

reducing the high level of strategic traffic from Ballybofey/Stranorlar, Letterkenny and Lifford.

3.8 Summary and conclusions

- 3.8.1 Table 9 contains a list of potential alternatives modes which have been considered according to National Investment Framework for Transport in Ireland (NIFTI) Intervention Hierarchy, including do-nothing, maintenance, optimisation, improvement and new infrastructure. It provides a non-exhaustive list of examples of the types of options/measures which could be considered to meet the project objectives.

Table 9. Examples of potential alternatives to address the objectives for each mode of transport

NIFTI Hierarchy for Intervention	Potential Options	Description of option as per PE-PAG-02013 – Unit 4.0 – Consideration of Alternatives and Options
Do-Nothing	Do-Nothing	No other investment in the transport network (other than regular maintenance) during the appraisal period
MAINTAIN	Do-Minimum (Base Case)	Road protection and renewal investment – new asphalt coverage, accessibility and safety issues addressed
		Drainage works on the existing corridors
OPTIMISE	Demand/Traffic Management	On-Street Parking Controls and increased Parking Charges
		Counter commuting strategy
		Flexible Working (Post Covid Behaviours)
		Workplace / Area wide Mobility Management Plans
	Safety Improvements	Re-arrange existing vertical and horizontal signalization within and outside urban areas to address congestion
	Information Technology System (ITS)	ITS signal optimization within study area, especially in urban centres (Letterkenny, Ballybofey/Stranorlar, Lifford)
Road Based Management Option	Providing for a mix of land uses in close proximity to each other	
IMPROVE	Active Travel	Add vertical and horizontal signalization for cyclists to existing roads and widen existing footpaths
	Bus	Enhanced Inter-urban services along the N13/N14/N15
		Increased frequency and extended hours of operation
		Dedicated Bus corridors
	Rail	N/A
	Road Based Transport	Potential road improvement schemes include: Junction capacity upgrades; removing dangerous bends
Hybrid Options	Combine Active Travel, Bus PT and Road Based measures	

NIFTI Hierarchy for Intervention	Potential Options	Description of option as per PE-PAG-02013 – Unit 4.0 – Consideration of Alternatives and Options
NEW	Active Travel	Segregated pedestrian/cycle network with continuous cycle track through settlements
		Off road pedestrian/cycle tracks following similar routes as N13/N14/N15
	Bus Based Public Transport	Introduction of new, local and inter-city bus services
	Rail Based Public Transport	Introduction of a new Rail Line connecting Sligo and Derry, stopping at Letterkenny with associated services.
	Road Based Transport	Introduction of new bypass roads in the study area
	Hybrid Options	Combine new Active Travel infrastructure enhanced Public Transport (Bus) and Bypass Road schemes

4. COMMON APPRAISAL FRAMEWORK

- 4.1.1 A Multi-Criteria Analysis (MCA) assessment was carried out to identify the preferred mode of transport to achieve the project objectives. In the MCA, each of the alternative modes are rated according to a three point scale of preference, from low preference to high preference, as shown in Table 10.
- 4.1.2 The MCA assessment uses the six Department of Transport (DoT) Common Appraisal Framework (CAF) headings (Economy, Safety, Environment, Accessibility and Social Inclusion, Integration, Physical Activity) to assess the suitability of each mode against the project objectives.
- 4.1.3 Table 11 presents the results of the MCA process. The scoring for each category is based on the potential for each mode of transport to achieve, or contribute to achieving, the project objectives as outlined in Chapter 1 of this Report. This process assesses each transport mode individually in respect to its sole ability to respond to the objectives.
- 4.1.4 In the MCA, a low ranking in one CAF category does not exclude the transport mode from playing an important role as a complementary measure to support the preferred mode. The mode of transport with the greatest number of medium and high preference responses overall is selected as the preferred mode of transport.

Table 10. MCA Ranking

Ranking	Colour
Low Preference	Orange
Medium Preference	Yellow
High Preference	Green

		Demand/Traffic Management	Active Modes	Bus	Rail	Road	Hybrid (Road / Bus PT/ Active Travel)
Economy	Statement	<p>Demand management measures such as increased parking charges in the town centres would potentially raise revenue, however, this could result in vehicles rerouting and parking in less suitable locations (e.g. nearby residential roads).</p> <p>Other types of traffic management such as banning general traffic could result in longer journey times and additional vehicles travelling on less safe roads.</p> <p>Other suitable Demand Management measures are likely to only result in marginal impacts in terms of economic benefit.</p>	<p>An infrastructure solution focused on active modes alone would only improve access to nearby destinations over short distances and as such are unlikely to remove any long-distance strategic traffic from the N13/N14/N15 in the area.</p> <p>As a result, the benefits are likely to be negligible in respect to supporting the economy of the region when compared to other modes.</p> <p>Furthermore, an active mode solution does not support longer distance regional connectivity between e.g. the North West City Regions and Belfast, Galway, and Dublin.</p>	<p>Public transport use in the area is low for work trips but is relatively high for education trips.</p> <p>Analysis suggests that ridership figures would stay on approximately same level since expected population growth is not significantly high. Increasing frequency of buses would contribute to existing congestion, thus the new road infrastructure would divert strategic traffic out of urban areas directly improving bus journey time reliability and enhanced connectivity (e.g. overall quality of the journey experience). This cannot be improved without intervention on the existing legacy network and removal of strategic traffic from town centres.</p>	<p>There is no existing rail line within the study area or near study area (north from Sligo) nor are there plans for the introduction of a Rail line in this area.</p> <p>A rail-based solution is thus unlikely to be feasible in the short to medium term. It would require significant costs in terms of the infrastructure required.</p> <p>However, given the low and dispersed nature of population and job centres within the surrounding area, a rail-based option is unlikely to have sufficient demand to make it viable.</p>	<p>Most travel to/from the Donegal study area is conducted by car and so the magnitude of the positive impacts achieved by a road intervention will be greater than for other modes.</p> <p>Improved road infrastructure would support the economy of the area by facilitating the efficient movement of workers, students, tourists and freight as it will benefit long distance, strategic traffic, as well as more local trips.</p>	<p>Most travel to/from the Donegal study area is conducted by car and so the magnitude of the positive impacts achieved by a road intervention will be greater than for other modes.</p> <p>Improved road infrastructure would support the economy of the area by facilitating the efficient movement of workers, students, tourists and freight as it will benefit long distance, strategic traffic, as well as more local trips. The new road infrastructure will improve journey time reliability and quality of journey experience. Park and Share sites will allow for transfer from car to public transport, transfer from car to cycling and also for car pooling.</p>
	Ranking	Low Preference	Low Preference	Low Preference	Low Preference	High Preference	High Preference
Safety	Statement	<p>Variable speed limits or introduction of more signalized junctions could potentially result in a small reduction in collisions.</p> <p>Banning HGVs from the towns would improve safety and could result in a small reduction in collisions.</p> <p>However, in practice, a HGV ban would only be suitable if there was a suitable alternative route available for HGVs. Otherwise a ban could result in HGVs using unsuitable, more local and regional roads.</p>	<p>There would be a significant safety benefit from improving infrastructure for pedestrians/cyclists as it would provide a segregated route which would remove them from interaction with road traffic. But any active mode measure is also unlikely to reduce the level of strategic long-distance traffic on the N13/N14/N15 and thus have a negligible impact on safety through the town areas.</p>	<p>Mode transfer from car to bus would reduce the number of vehicles on the road and associated collisions. Due to the current number of car trips, this would only have a very modest impact on safety, unless extremely high levels of mode transfer took place.</p>	<p>Mode transfer from car to rail would reduce the number of vehicles on the road and associated collisions. Due to the current number of car trips, this would only have a modest impact on safety, unless extremely high levels of mode transfer took place.</p> <p>A rail-based option wasn't considered given the lack of an existing rail line or policy context for rail in the area.</p>	<p>A road solution would potentially bypass towns (Ballybofey/Stranorlar, Letterkenny, Lifford) which would improve safety in the urban areas by removing traffic, and in particular HGVs, from areas with a lot of VRUs.</p>	<p>A hybrid solution would potentially bypass towns (Ballybofey/Stranorlar, Letterkenny, Lifford) which would improve safety in the urban areas by removing traffic, and in particular HGVs, from areas with a lot of VRUs. The provision of park and share areas will facilitate more transfer from car to bus and cycling. There would be a significant safety benefit from improving infrastructure for pedestrians/cyclists as it would provide a segregated route which would remove</p>

		Demand/Traffic Management	Active Modes	Bus	Rail	Road	Hybrid (Road / Bus PT/ Active Travel)
							them from interaction with road traffic.
	Ranking	Low Preference	Medium Preference	Medium Preference	Low Preference	High Preference	High Preference
Environment	Statement	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.	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.	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.	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.	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.	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.
	Ranking	Low Preference	Medium Preference	Medium Preference	Low Preference	Low Preference	Medium Preference
Access and Social Inclusion	Statement	Demand management measures would do little to improve accessibility and the introduction of fiscal measures	Walking requires no expenditure and cycling only requires a modest one-off investment for a bicycle, so	Buses are affordable to all users which would enhance social inclusion. As a bus solution could be integrated	As rail can in theory be used by everyone, social inclusion would be enhanced. However, the dispersed	Accessibility would be enhanced by provision of additional road capacity and associated reduction in	Accessibility would be enhanced by provision of additional road capacity and associated reduction in

		Demand/Traffic Management	Active Modes	Bus	Rail	Road	Hybrid (Road / Bus PT/ Active Travel)
		would increase the cost of travel and negatively affect social inclusion.	improvements to active modes would benefit all social groups. However, active mode infrastructure would do little to improve accessibility for those residing outside of the towns as the long distances involved would be too far for most users. Therefore, the impact would be small as it would be focused on the towns alone rather than the entire study area.	with existing bus services in the study area, this would improve accessibility across a large area. Without an intervention on the existing legacy road network, there will be no tangible improvement in reliability and efficiency of regional and inter-urban public transport journeys.	nature of the population in the area means that only those located close to potential rail route (e.g. bigger towns) would have access to the train stations.	congestion. However, the expense related to car ownership would exclude the lowest income groups, and this would reduce the benefit to social inclusion. All income groups would benefit indirectly through bus/coach services which would benefit from reduced congestion and have an opportunity to operate on the new road.	congestion. The provision of enhanced bus routes, park and share sites will improve accessibility. A dedicated active travel network with park and share sites will benefit all social groups
	Ranking	Low Preference	Low Preference	Low Preference	Low Preference	Medium Preference	High Preference
Integration	Statement	Demand management measures could reduce congestion around study area which would improve transport links between other major towns in the north-west. However, the implementation of fiscal demand management measures would increase the cost of travel which would negatively affect integration overall.	Active mode users would not be able to travel far enough to improve links between major towns in the area.	Improved bus services in the area could integrate with local bus services to improve transport links between other major towns in the west and south of the country, while also supporting land-use development.	A rail solution would support integration in respect to land-use plans and densification in the town centres. However, the dispersed nature of the population in the area means that only those located close to potential rail route (e.g. bigger towns) would have access to the train stations.	A road project would enhance connectivity within the north-west of the country and support policy objectives. At a regional level, the TEN-T network upgrade in Donegal is an objective set out in the Project Ireland 2040 and National Investment Framework for Transport in Ireland.	A hybrid project would enhance connectivity within the north-west of the country and support policy objectives. At a regional level, the TEN-T network upgrade in Donegal is an objective set out in the Project Ireland 2040 and National Investment Framework for Transport in Ireland. Improved bus services in the area could integrate with local bus services to improve transport links between other major towns in the west and south of the country, while also supporting land-use development. Park and share sites will also contribute to improvements in modal shift.
	Ranking	Low Preference	Low Preference	Medium Preference	Low Preference	Medium Preference	High Preference
Physical Activity	Statement	Demand management measures would have limited impact on physical activity.	The greatest benefit from improving infrastructure for walking and cycling would be in respect to encouraging a	Improving bus infrastructure would have an impact on physical activity. Mode transfer from car to bus would	Adding rail infrastructure would have a slight impact on physical activity. Mode transfer from car to rail	A road option could incorporate improvements to pedestrian and cycling infrastructure. Improvements	The provision of a road based hybrid solution, along with a separated active travel network and facilities

		Demand/Traffic Management	Active Modes	Bus	Rail	Road	Hybrid (Road / Bus PT/ Active Travel)
			greater amount of physical activity. Again, the impact would be focused within the towns alone given the long distances that some outside of study area would have to travel.	result in more people walking to bus stops to access services. However, modelling indicates that the introduction of local bus services will also lead to a reduction in those walking or cycling over short distances and instead using bus.	would result in more people walking to train stations to access services.	could be made in the area to enhance walking and cycling facilities between settlements. Additionally, if a bypass is brought forward it would remove significant amounts of traffic from town centres therefore improving the environment for walking and cycling.	to park and cycle will encouraging a greater amount of physical activity.
	Ranking	Low Preference	High Preference	Low Preference	Low Preference	Medium Preference	High Preference

Table 11. MCA Analysis

4.2 Preferred Option

4.2.1 The results of the MCA are summarised in Table 12 and shows that the greatest number of high and medium preference ratings are achieved through a hybrid solution, which is the preferred option in summary.

Table 12. MCA Summary

	Demand Management	Active Mode	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
Access and 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

4.2.2 Therefore, the conclusion of this analysis is that a hybrid based intervention comprising road, bus and active travel facilities with park and share hubs (mobility hubs) to allow for modal shift is the most appropriate mode to achieve the project objectives.

5. CONCLUSIONS

5.1 Summary

- 5.1.1 This report has drawn upon a wide range of spatial and statistical data and traffic modelling tools to analyse the demand for travel in the study area. The baseline review process used several analytical tools to quantify the existing number of trips by each transport mode and identify the key desire lines of travel from origin to destination.
- 5.1.2 The Assessment of Alternatives was focused on the selection of an appropriate intervention which would fulfil the project objectives. An assessment which follows the NIFTI Intervention Hierarchy and a Multi-Criteria Analysis assessment was conducted, which drew upon the evidence presented in the baseline review and, initial modelling analysis, to assess the suitability of a different solutions in achieving the project objectives on its own.
- 5.1.3 The Potential Solutions assessment which aligns which NIFTI, assessed different options and combinations of options by improving the existing network and prioritising sustainable mode enhancements where possible over road based solutions to benefit private mode users.
- 5.1.4 While the MCA looked at the suitability of each mode according to the six DoT Common Appraisal Framework themes (Economy, Safety, Environment, Accessibility and Social inclusion, Integration and Physical Activity) against the project objectives.

5.2 Recommendation

- 5.2.1 This report recommends that the project should proceed with a hybrid based intervention comprising road, bus, active travel facilities and park and share hubs to allow for modal shift on the basis of the assessment presented in this report. The analysis has made it clear that a hybrid multi-modal transport solution is the best placed as the primary mode to achieve the project objectives.