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Project Ireland 2040

N19 SHANNON AIRPORT ACCESS ROAD IMPROVEMENT SCHEME

Option Selection Report

Comhairle Contae an Chláir
Clare County Council

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Rev 6

An Roinn Iompair
Department of Transport

Bonneagar Iompair Éireann
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National Road Design Office

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EXECUTIVE SUMMARY

Clare County Council in partnership with Transport Infrastructure Ireland (TII) proposes to carry out the planning and design for the N19 Shannon Airport Access Road Improvement Scheme. This Option Selection Report has been prepared on behalf of Clare County Council in accordance with the Transport Infrastructure Ireland (TII) Project Management Guidelines (PMG) and TII Project Appraisal Guidelines (PAG).

The purpose of this Report is to present the finding of the Phase 2 Option Section process, to present the Preferred Option for the scheme that is recommended to be taken forward to Phase 3 Design and Environmental Evaluation.

The N19 National Primary Road extends from M18 Junction 9 to Knockbeagh Point Roundabout, a distance of approximately 5km. The route provides access to Shannon International Airport and the Shannon Free Zone (SFZ) industrial area, and a northern access to Shannon Town. The N19 has five intermediate junctions and is good-quality dual carriageway between the M18 and the Drumgeely roundabout. From Drumgeely Roundabout to Knockbeagh Point Roundabout the N19 is single-carriageway of mixed quality.

The Project is the proposed on-line upgrade of the 2.2km substandard section of the N19 between Drumgeely Roundabout and Knockbeagh Point Roundabout on approach to Shannon International Airport.

Figure 0-1: N19 Corridor

A detailed transport study, including the development of a strategic transport model, has been undertaken to forecast future travel demand on the N19 transport corridor and to inform the economic and environmental appraisal of the scheme options. A Study Area was established and existing constraints within this area were identified and mapped prior to the development of route options.

A list of potential feasible route corridor alternatives and options were established that might meet the objectives of the scheme. Following the Options Assessment and Project Appraisal process, a Preferred Option was identified.

The Preferred Option consists of:

- A shared footpath and cycle route of 4m width from Knockbeagh Point Roundabout travelling along the right-hand (east) side of the existing N19 until it turns into Drumgeely Road where it continues and terminates at Drumgeely junction and provides access to the estate, the Shannon Town Road footpath and cycling network and to the existing pedestrian bridge over the N19 which links into Shannon Free Zone. Traffic control crossings are proposed to be provided crossing the N19 at Knockbeagh Point Roundabout, the SFZ Gateway West Access and at Drumgeely Roundabout. Additional crossings are to be provided on the minor roads.
- Four new bus bays with bus shelters together with additional footpath links to the proposed cycleway and pedestrian facility and existing paths.
- The upgrade of both the Drumgeely Roundabout and the SFZ Gateway West junction. The Knockbeagh Point Roundabout would not be altered.
- The existing N19 would be upgraded to a DMURS standard route consisting of two bus lanes and two traffic lanes in each direction for the full length of the proposed scheme on the section from Knockbeagh Point Roundabout to Drumgeely Roundabout.

There is strong policy support for the scheme, which plays a key network role in connecting up the comprehensive TEN-T network. The scheme is an integral part of LSMATS, local and regional plans. The Preferred Option provides a transport solution which has been developed in consideration of the National Investment Framework for Transport in Ireland (NIFTI) and provides a multi modal option that caters for active travel, public transport and car usage.

The economic benefits are high. Although the level of benefit is sensitive to details of the traffic modelling, sensitivity testing has shown that the economic case is robust. There are likely to be wider economic benefits in attracting foreign direct investment to Ireland, attracting and retaining international employers in Shannon Free Zone, having a positive impact on local and regional employment and economic activity, support the growth of freight and passenger numbers and tourism.

There are safety benefits for the scheme include improved access to Shannon International Airport by emergency response vehicles in the event of an incident

The physical activity benefits are high as the proposed scheme will provide a 2.2km shared pedestrian cyclist facility with traffic-controlled crossings geared to providing priority to vulnerable road users. The shared pedestrian cyclist facility will provide the spine of the proposed cycling and walking network and by linking to the existing facilities provides active travel corridors between residential areas and employment and educational zones.

The provision of bus lanes will assist in modal transfer and provide significant non-car use benefits.

1 INTRODUCTION AND DESCRIPTION

1.1 Introduction

Clare County Council in partnership with Transport Infrastructure Ireland (TII) proposes to carry out the planning and design for the N19 Shannon Airport Access Road Improvement Scheme. The Project's objective is to provide a high quality road improvement scheme on the N19 National Primary Road between Drumgeely Roundabout and Knockbeagh Point Roundabout on approach to Shannon International Airport.

The purpose of the Option Selection Report is to document TII's Phase 2 (Option Selection) process for the N19 Shannon Airport Access Road Improvement Scheme, which has been undertaken in accordance with Project Management Guidelines (PMGs) PE-PMG-02041 (December 2020), TII's Project Manager's Manual for Major National Road Projects PE-PMG-02042 (February 2019), TII's Project Appraisal Guidelines (PAG) for National Roads and other applicable guidelines /regulations.

The Phase 2 process comprises of the identification of a Study Area, the identification of constraints within that Study Area, consideration and assessment of various alternatives/options such that an Emerging Preferred Option can be identified, and ultimately a Preferred Option selected before the project progresses to its subsequent design and planning phases. A further description of the purpose of the Option Selection Report and TII's Phase 2 - Option Selection process is provided in *Section 1.4 - Purpose of the Option Selection* Report below in this Report.

TII's PMGs provide a framework for a phased process for the management, development and delivery of National Road and Public Transport Capital Projects in Ireland and is outlined in **Figure 1-1** below. This Option Selection Report describes the planning and design work undertaken to the end of Phase 2 - Option Selection of the N19 Shannon Airport Access Road Improvement Scheme.

Figure 1-1: TII's Project Management Guidelines Project Phases

1.2 Description of the Project

The N19 National Primary Road extends from M18 Junction 9 to Knockbeagh Point Roundabout, a distance of approximately 5km. The route provides access to Shannon International Airport and the Shannon Free Zone industrial area, and a northern access to Shannon Town.

As illustrated in **Figure 1-2**, the N19 has five intermediate junctions:

- A left-in left-out junction for southbound traffic, providing access to Shannon Free Zone (East);
- A 5-arm junction "Shannon Town roundabout" where the N19 is crossed by the R472;
- Two roundabouts giving access to Shannon Free Zone (West), at Drumgeely and Gateway West; and
- A priority junction giving access to the Drumgeely Hill area at the south-western end of Shannon Town.

The route is good-quality dual carriageway between the M18 and the Drumgeely Roundabout, and single-carriageway of mixed quality between Drumgeely Roundabout and Knockbeagh Point Roundabout.

The section of the N19 National Primary Road under consideration in this project extends from Drumgeely Roundabout to Knockbeagh Point Roundabout as illustrated by the dashed line in **Figure 1-2**.

The proposed scheme is approximately 2.2km in length and comprises primarily of single carriageway cross section. There are a high number of direct accesses, particularly on the approach to the Knockbeagh Point Roundabout with sub-standard junction layouts and pedestrian crossing facilities.

The existing N19 does not have formal dedicated facilities for cyclists and facilities for pedestrians require significant improvement to meet current design standards. Gaps in street lighting are evident on approach to the Airport, presenting significant safety and security concerns for vulnerable road users.

The role of Shannon Airport as an emergency diversion airport within the Air Traffic control system means that there is a potentially life-critical need for reliable journeys along the N19 during an emergency. In the event of an airside incident, priority access by emergency vehicles to the airport (and by ambulance from the airport to University Hospital Limerick) is vital. Although emergency vehicle access has not been an issue in the past, in the event of a potential future airside emergency coinciding with a traffic accident or traffic congestion on the single lane section of the N19, emergency vehicles may encounter delays when accessing the airport.

Figure 1-2: N19 Corridor

1.3 Scheme Development to Date

The current extent of the N19 was established by S.I. No. 131/2016, under the Roads Act 1993. Previously, the section between Knockbeagh Point Roundabout and Gateway West Roundabout was a local road.

Shannon International Airport have raised concerns that the current N19 route leaving the airport provides a poor appearance from the perspective of an inbound traveller's first impression of Ireland. It is an objective of Clare County Council to promote further expansion at Shannon International Airport and Shannon Free Zone (SFZ) from an economic development and tourism perspective. The SFZ is a key location for foreign direct investment.

Clare County Council appointed Fehily Timoney and Company Ltd. / Clandillon Civil Consulting Ltd. (FTC) on the 14th October 2019 to provide Technical Consultancy Services which will provide the Engineering, Environmental, Economic and Appraisal services required to successfully deliver the project through the planning and design phases (TII PMG Phases 1 to 4 inclusive). Phase 1 Concept and Feasibility was successfully completed in July 2020, with the scheme then progressing to Phase 2 Option Selection.

1.4 Purpose of the Option Selection Report

The purpose of the Option Selection Report is to document the Phase 2 Option Selection process for the proposed scheme. The Option Selection Report is the main deliverable for Phase 2. As stated in *Section 1.1 Introduction* above, the Phase 2 process essentially comprises of the identification of a Study Area, the identification of constraints within that Study Area, consideration and assessment of various alternatives/options, such that an Emerging Preferred Option can be identified, and ultimately a Preferred Option selected before the project progresses to its subsequent design and planning phases.

The purpose of Phase 2 Options Selection is to examine alternatives/options against prescribed criteria, and the Scheme Objectives as outlined in Section 1.5 Project Operational Goals of this Report, through a structured and systematic appraisal process.

As per the TII's PMGs, PMM, and PAG Unit 4.0 – Consideration of Alternatives and Options (October 2016), the options selection process is split into three distinct stages, as shown in **Figure 1-3** below each requiring a more detailed level of assessment and appraisal.

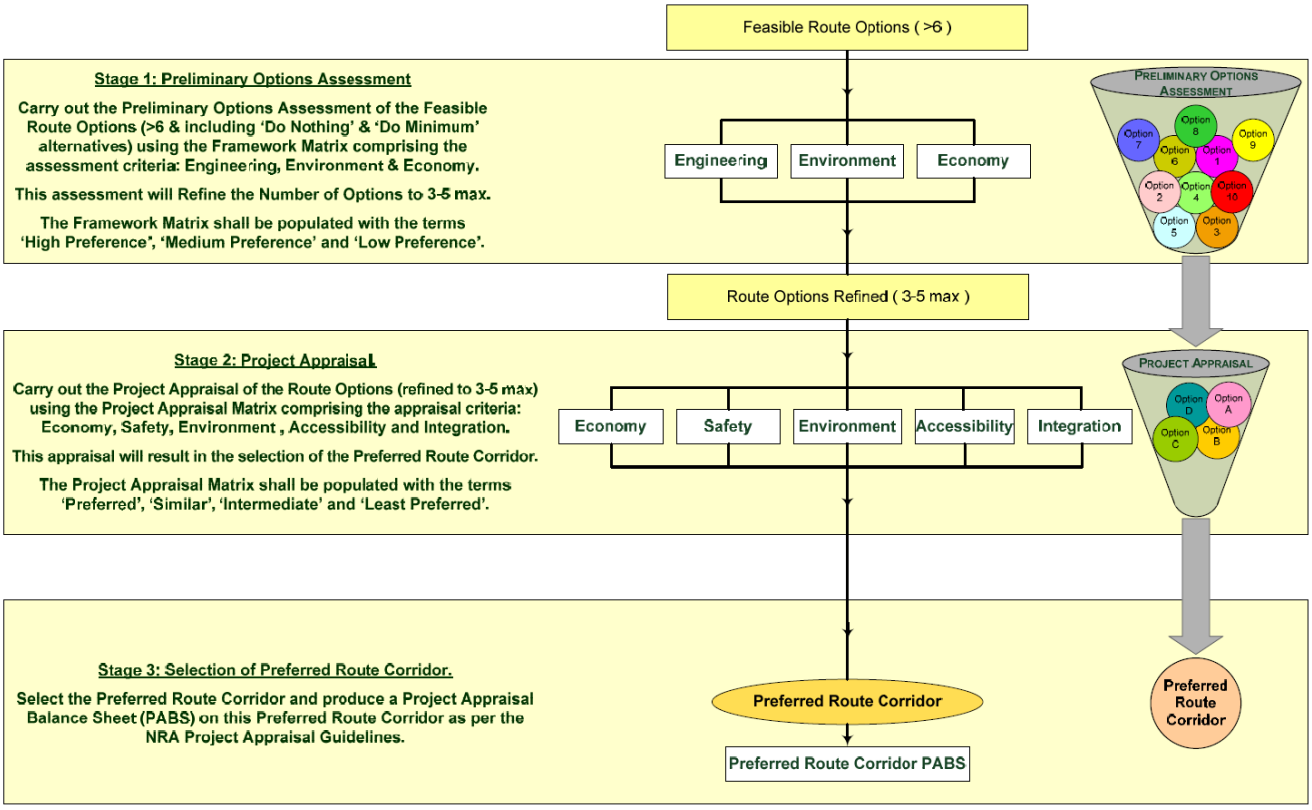


Figure 1-3: TII's Three Stage Option Selection Process

1.4.1 Option Selection Process

In advance of undertaking the three-stage process, the Study Area was defined, and the existing constraints were identified within this Study Area as part of the Constraints Study. This is described in more detail in *Chapter 4 -Constraints Study* of this Report, with a copy of the associated Report provided in Appendix A.

As part of the Phase 2 Option Selection process, all reasonable / feasible options, which include the Do-Nothing Option, Do-Minimum Option, Do-Something Alternative – Public Transport, and the Traffic Management Option, were considered and assessed. This activity is described in *Chapter 6 - Consideration of Options* of this Report.

In order to inform Stage 2 and 3 assessments, facilitate a Cost Benefit Analysis (CBA) of Stage 2 Options, and identify the Preferred Option, a traffic assessment was undertaken. This assessment is described in *Chapter 3 - Traffic Assessment and Option Cross-Section* of this Report, with a copy of the Traffic Modelling Report provided in Appendix D.

1.4.2 Stage 1: Preliminary Options Assessment

A preliminary assessment of feasible options was undertaken comprising of a comparative assessment of the potential impacts of the options against the following assessment criteria: -

- Engineering
- Environment
- Economy

This assessment resulted in a reduced number of options to be taken forward to the next stage of the appraisal process (Stage 2 – Project Appraisal).

1.4.3 Stage 2: Project Appraisal

A more detailed assessment of the options advanced from Stage 1 was undertaken using a Project Appraisal Matrix comprising of the following appraisal criteria: -

- Economy
- Safety
- Environment
- Accessibility and Social Inclusion
- Integration
- Physical Activity

This assessment resulted in the identification of an Emerging Preferred Option to be taken forward to the next stage of appraisal process (Stage 3 – Selection of Preferred Route Corridor).

1.4.4 Stage 3: Selection of Preferred Route Corridor

Following the identification of an Emerging Preferred Option, an assessment of this option using a Project Appraisal Balance Sheet (PABS) was undertaken to summarise the benefits and impacts associated with this option.

1.4.5 Public Consultation

Non-Statutory Public Consultation forms a key part of the Phase 2 Option Selection process, where consultations are undertaken to generate awareness and initiate engagement with the public and stakeholders, and to obtain feedback for consideration by the Project Team. In the case of the N19 Shannon Airport Access Road Improvement Scheme, a Non-Statutory Public Consultation was undertaken in November / December 2020 to present the Constraints & Preliminary Route Options. The Public Display of the Preferred Option took place in November / December 2021.

Further details are provided in *Section 7.7 – Stage 1 - Preliminary Options Assessment* and in *Section 9.3 – Public Display of Preferred Option* of this Report, with copies of the Reports prepared on the Non-Statutory Public Consultation and Public Display of the Preferred Option provided in Appendix B.

1.5 Project Operational Goals

The proposed scheme project operational goals are outlined below. The objectives are assessed based on the multiple criteria headings outlined by the Department of Transport in the Common Appraisal Framework for Transport Projects and Programmes. The multi-criteria headings are as follows:

- Economy
- Safety
- Environment
- Accessibility & Social Inclusion
- Integration
- Physical Activity

The Scheme Objectives were developed based on the identified deficiencies of the existing road infrastructure and in response to the aims of European, national, regional, and local strategic policy. Further detail is provided in *Chapter 2 – Project Need, Strategic Fit and Priority*.

The Scheme Objectives for the proposed scheme are provided below:

1.5.1 Economy

1) To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West;

2) To support the growth of freight and passenger throughput at Shannon International Airport – a key driver of the regional economy – by improving the quality, efficiency and reliability of ground transport to and from the airport; and
3) To achieve value for money from investment in the project.

1.5.2 Safety

4) To improve access to Shannon International Airport by emergency response vehicles in the event of an incident; and
5) To reduce the frequency of transport collisions within the N19 corridor.

1.5.3 Physical Activity

6) To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone.

1.5.4 Environment

7) To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment.

1.5.5 Accessibility & Social Inclusion

8) To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey.

1.5.6 Integration

9) To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network; and
10) To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS).

1.6 Design Strategies

In order to inform the appraisal process, the Design Strategy for Phase 2 followed the following general steps:

- Step 1 – Identification of Scheme Objectives: As per *Section 1.5 – Project Operational Goals* above, the Phase 1 Scheme Objectives were reviewed and confirmed.

- Step 2 – Identification of Study Area: As outlined in *Chapter 4 - Constraints Study* of this Report, the Study Area was identified, and its extents defined.
- Step 3 – Identification of Constraints: Following identification of the Study Area, the existing constraints, natural, artificial and external, were identified within this area, with completion of a Constraints Study.
- Step 4 – Consideration of Options/Alternatives: Taking the identified constraints into account, all reasonable / feasible options (Including the Do-Nothing Option, Do-Minimum Option, Do-Something Alternative - Public Transport and the Traffic Management Option), were considered and assessed.
- Step 5 – Identification and Development of Feasible Options: Following assessment of all options /alternatives, feasible options were identified, and developed taking cognisance of the Scheme Objectives, existing constraints and TII's Design Standards.
- Step 6 – Appraisal of Options: The options were appraised in accordance with TII's three stage systematic appraisal process, where Stages 1 and 2 assessments were undertaken. Throughout this process, the development of the options was refined. A Non-Statutory Public Consultation was undertaken on the Constraints and the Route Corridor Options selected for progression to the Stage 2 assessment - Project Appraisal.
- Step 7 – Identification of Emerging / Preferred Option: As part of Stage 3 of the Option Selection Process, and following the identification of an Emerging Preferred Option, an assessment of this option using a Project Appraisal Balance Sheet (PABS) was undertaken to summarise the benefits and impacts associated with this option.

As stated in *Section 1.4 - Purpose of Option Selection Report* of this Report, Non-Statutory Public Consultation forms a key part of TII's Phase 2 (Option Selection) process. Feedback from the consultation helped inform the Option Selection Process and Design Strategy, including the identification / confirmation of existing constraints.

2 STRATEGIC FIT AND PROJECT NEED

2.1 Strategic Fit and Priority of the Project

The N19 Shannon Airport Access Road Improvement Scheme and its objectives are consistent and compatible with the following European, National, Regional and Local policy:

2.1.1 European Policy Context

Ireland's transport infrastructure contributes to one Trans-European Transport Network (TEN-T) Corridor. The North Sea - Mediterranean Corridor includes infrastructure on the island of Ireland, with particular focus on port and airports and the road and rail connections to them, in support of the EU policy aim of improved transport connectivity across Europe.

There are two levels of TEN-T network – Core and Comprehensive. As shown in **Figure 2-1**, Shannon International Airport is designated as part of the Comprehensive network, as are the road and rail links between Limerick and Galway.

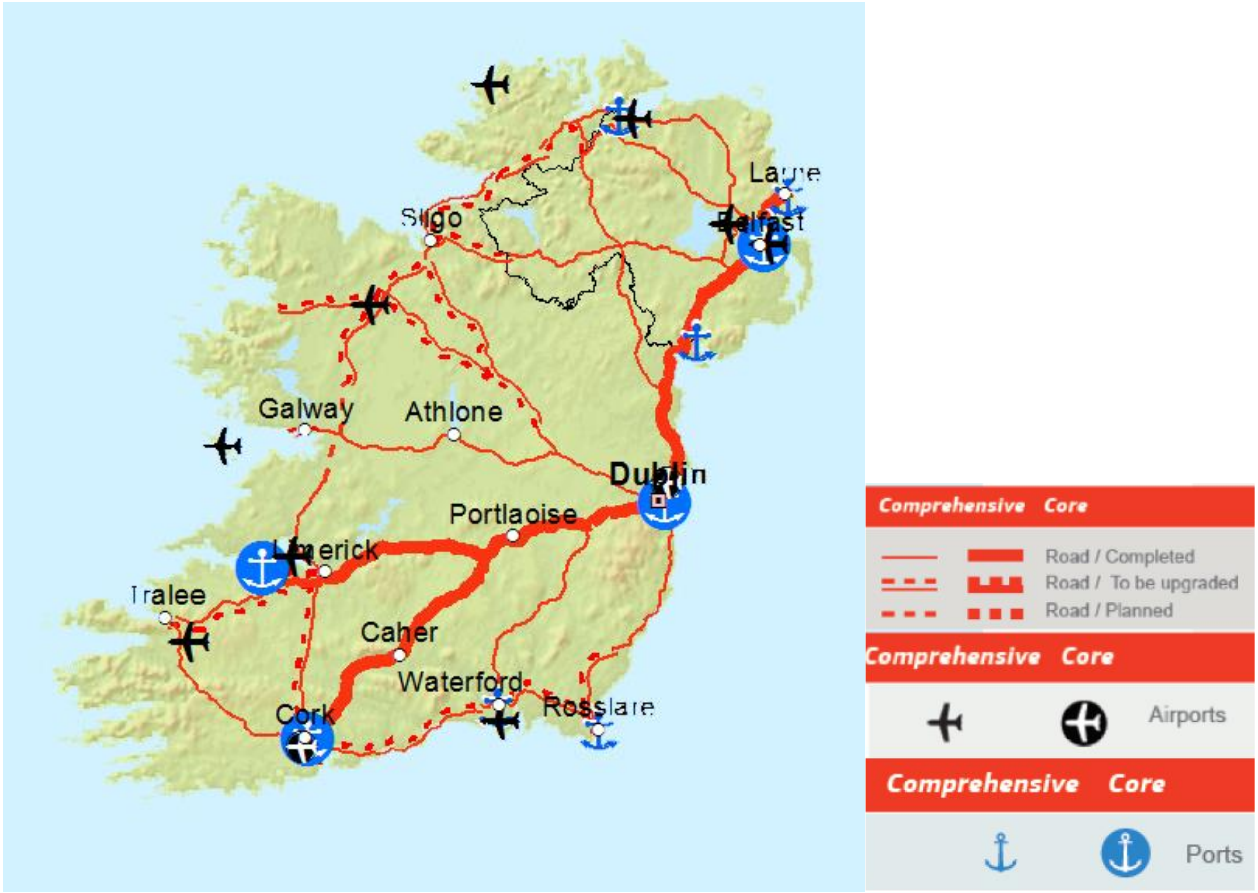


Figure 2-1: TEN-T Network Ireland – Ports, Airports, Roads (source: European Commission)

Extract from DECISION No. 1692/96/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 July 1996 on Community guidelines for the development of the trans-European transport network:

2. The network must:

(a) ensure the sustainable mobility of persons and goods within an area without internal frontiers under the best possible social and safety conditions, while helping to achieve the Community's objectives, particularly in regard to the environment and competition, and contribute to strengthening economic and social cohesion;
(b) offer users high-quality infrastructure on acceptable economic terms;
(c) include all modes of transport, taking account of their comparative advantages;
(d) allow the optimal use of existing capacities;
(e) be, insofar as possible, interoperable within modes of transport and encourage intramodality between the different modes of transport;
(f) be, insofar as possible, economically viable;
(g) cover the whole territory of the Member States of the Community so as to facilitate access in general, link island, landlocked and peripheral regions to the central regions and interlink without bottlenecks the major conurbations and regions of the Community.

Article 9 Characteristics

1. The trans-European road network shall comprise motorways and high-quality roads, whether existing, new or to be adapted, which:
   - play an important role in long-distance traffic, or
   - bypass the main urban centres on the routes identified by the network, or
   - provide interconnection with other modes of transport.

Extract from Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on Union guidelines for the development of the trans-European transport network, Article 10

1. In the development of the comprehensive network, general priority shall be given to measures that are necessary for:

a) ensuring enhanced accessibility and connectivity for all regions of the Union while taking into consideration the specific case of islands, isolated networks and sparsely populated, remote and outermost regions;

b) ensuring optimal integration of the transport modes and interoperability within transport modes;

c) bridging missing links and removing bottlenecks, particularly in cross-border sections;

d) promoting the efficient and sustainable use of the infrastructure and, where necessary, increasing capacity;

e) improving or maintaining the quality of infrastructure in terms of safety, security, efficiency, climate and, where appropriate, disaster resilience, environmental performance, social conditions, accessibility for all users, including elderly people, persons with reduced mobility and disabled passengers, and the quality of services and continuity of traffic flows.

The interpretation of the above is that:

- the whole of the N19, as the short connection between Shannon International Airport that is part of the Comprehensive network and the N18/M18 which is part of the Comprehensive network, should be considered part of the Comprehensive network
- it is therefore EU policy that the N19 should be high-quality infrastructure
- in developing the Comprehensive network within Ireland, the Irish government has a duty under EU law to consider a range of issues including disaster resilience, safety, accessibility for all users and quality of service.

2.1.2 National Policy Context

2.1.2.1 National Planning Framework – Project Ireland 2040

The National Planning Framework is an overarching blueprint, intended to give a clear strategy for where and how the country is to be developed, built and connected over the next decade. The National Planning Framework was published in February 2018.

Although not specifically mentioning the N19 the Plan refers to Shannon Airport as a key element of the Southern Region stating:

> *"Shannon Airport has an established role as a key travel and enterprise hub for the region, with potential for further growth"*

> *"Provision of a Citywide public transport network, with enhanced accessibility from the City Centre to the National Technology Park, UL and Shannon Airport"*

The Plan outlines Key Future Growth enablers for Limerick including:

The *'National Strategic Outcome 4'* of the Plan refers to Shannon as one of the main Airports, which it describes as *"key infrastructure for national and regional development".*

2.1.2.2 National Development Plan 2021 – 2030

The National Development Plan will drive Ireland's long term economic, environmental and social progress across all parts of the country over the next decade. The plan is fully integrated with the new approach to spatial planning in Ireland in the National Planning Framework. The Plan refers to supporting investment at Shannon Airport stating:

> *"Cork and Shannon Airports will continue to be supported in their roles as key tourism and business gateways for their regions, particularly with regard to the development of niche markets"*

The Plan also refers to the development of Shannon Group's commercial property portfolio in a selection of investments for the Southern Region.

2.1.2.3 National Investment Framework for Transportation in Ireland (NIFTI), 2021

The Department of Transport published its new high-level strategic framework for prioritising future investment in the land transport network in December 2021. The framework establishes high-level investment priorities to efficiently and effectively address key transport challenges to ensure that transport investment is aligned with and supports Government's overarching spatial and climate change objectives, as articulated in the National Planning Framework and Climate Action Plan. The National Investment Framework for Transport in Ireland (NIFTI) sets out a modal hierarchy as follows:-

1) Active Travel;

2) Public Transport; and

3) Private Vehicles.

The proposed improvement on the N19 has been developed in consideration of the modal hierarchy set out above.

NIFTO also identifies a number of key transport challenges, some of which are referred to below, which are relevant to the development of the N19 scheme: -

- Increasing sustainable mode share to reduce emissions and address urban congestion;
- Safeguarding accessibility for rural Ireland by protecting and renewing existing infrastructure;
- Ensuring the future capacity of key strategic links to Ireland's international gateways;

2.1.2.4 National Aviation Policy for Ireland, 2015

This policy framework for Irish aviation states that:

> *The Government recognizes the importance of aviation to Ireland and is committed to creating an environment in which the industry can maximise its potential for the benefit of the wider economy.*

It notes that Shannon Airport handles around one-sixth of all Irish air cargo and air mail. It references the International Aviation Services Centre (IASC), a business unit of the Shannon Group, and states a policy aim.

> *It is intended that IASC will build on the aviation related activities already located at the airport and the Shannon Free Zone area to become an aerospace industry cluster.*

The policy makes a commitment that:

> *Access to the airports will be taken into account during the development of surface transport programmes, in line with the Department's Strategic Framework for Investment in Land Transport which proposed the prioritization of improved connections to key seaports and airports.*

2.1.2.5 Smarter Travel, 'A New Transport Policy for Ireland' 2009 – 2020

Smarter Travel, A Sustainable Transport Future sets out Ireland's transport policy for the period 2009-2020. Although the policy horizon envisaged at the time of publication ended in 2020 the targets outlined in the report remain applicable and valid. The document contains 5 Key Goals/Targets:

- to reduce overall travel demand
- to maximise the efficiency of the transport network
- to reduce reliance on fossil fuels
- to reduce transport emissions and
- to improve accessibility to transport.

and 49 Key Actions, including:

Action 4
The delivery of public transport, cycling and promotion of more sustainable travel patterns generally in many existing urban centres can only be achieved through retrofitting. We will require local authorities to prepare plans to retrofit areas towards creating sustainable neighbourhoods so that walking and cycling can be the best options for local trips, for example to reach local facilities such as shops and schools.

The Government is committed to creating a culture of walking in Ireland. In that context, there is strong convergence between walking as a tourism asset and walking as recreational activity for local residents. This in turn complements a culture of walking as a mode of everyday transport, by encouraging people to walk as a matter of routine.

We will ensure that urban walking networks are strengthened by increasing opportunities for walking and removing constraints as part of planning for more attractive public realms, including … … Providing safe pedestrian routes.
Action 23
We will ensure improved road priority for walking and cycling access to key public transport interchanges and ports and in the case of airports for cycling.

The path to sustainability is thus seen in terms of balance between the use of different modes. Motorised modes are to have reduced environmental impact, and be more accessible, whilst having lower demand because local walking journeys will be a greater share of the total.

Within this context, the policy affirms the importance of aviation to Ireland:

As an island nation with an open economy, aviation provides a key transport link for us. Connectivity and access through international and regional airports are vital for our tourism industry, which generated €4.9 billion revenue in 2007 from foreign visitors and employs some 322,000 people in the tourism and hospitality sector. Only 1% of our goods are exported by air but the value of these represents 17% of the national total of exports. Furthermore, the Government has supported the development of a network of regional airports to assist balanced regional development. We have also made significant investment to improve accessibility to our offshore islands…
We will ensure good connectivity between airports and public transport services.

2.1.2.6 Road Safety Authority Road Safety Strategy 2021-2030

The current policy framework for road safety is set out in the Road Safety Authority (RSA) Road Safety Strategy 2021 – 2030. This document sets outs targets to be achieved in terms of road safety in Ireland as well as policy to achieve these targets.

The primary target of this strategy is:

> *By 2030 reduce deaths on Ireland's roads by 50% from 144 to 72 or lower.*
> *By 2030 reduce serious injuries on Ireland's roads by 50% from 1,259 to 630 or lower*

The Strategy includes three phases of action plans: -

- Phase 1 2021-2024
- Phase 2 2025-2027
- Phase 3 2028-2030

Phase 1 2021-2024 targets of this strategy are:

> *By 2024 reduce deaths on Ireland's roads by 15% from 144 to 122 or lower.*
> *By 2024 reduce serious injuries on Ireland's roads by 10% from 1,259 to 1,133 or lower*

2.1.2.7 Climate Action Plan 2021

The Climate Action Plan 2021 sets out a plan to achieve a 51% reduction in overall greenhouse gas emissions by 2030 with the aim of reaching net-zero emissions by no later than 2050. The Plan notes that "*Without significant changes in travel patterns, modal share, and technology, a growth in current transport activity and demand will further diminish our national competitiveness, quality of life, and decarbonisation goals*."

The Plan further notes that "*Transport accounts for approximately 20% of Ireland's greenhouse gas (GHG) emissions. Road transport is responsible for 96% of those GHG emissions and is also directly responsible for a range of air pollutants that negatively impact both human health and the environment*."

To meet the required level of emissions reduction, by 2030 the Climate Action Plan sets out the following transport related targets: -

- Provide for an additional 500,000 daily public transport and active travel journeys
- Develop the required infrastructural, regulatory, engagement, planning, innovation and financial supports for improved system, travel, vehicle and demand efficiencies
- Increase the fleet of EVs and low emitting vehicles (LEVs) on the road to 945,000, comprising of:
    - 845,000 electric passenger cars
    - 95,000 electric vans
    - 3,500 low emitting trucks
    - 1,500 electric buses
    - an expanded electrified rail network
- Raise the blend proportion of biofuels to B20 in diesel and E10 in petrol
- Reduce ICE (Internal Combustion Engine) kilometres by c. 10% compared to present day levels
- Undertake a programme of work which will review progress and further refine measures that will seek to deliver the additional c. 0.9 MtCO2 reduction by 2030 in a fair and equitable manner

2.1.3 Regional Policy Context

2.1.3.1 Regional Spatial & Economic Strategy for the Southern Region 2021 – 2030

Under the National Planning Framework, the South-West, South-East and Mid-West regions of Ireland are combined into a Southern region covering broadly one-third of the State. The RSES provides the framework through which the NPF vision will be implemented in this region. The RSES identifies four levels of settlement in the region, of which the highest level is Metropolitan Areas. The geographically-specific content of the RSES within these Metropolitan Areas is set out in Metropolitan Area Strategic Plans (MASPs) which from Volume 2 of the RSES.

The Limerick-Shannon MASP addresses the infrastructure need of the Shannon area as follows:

The infrastructural requirements for Shannon include:

- Public transport improvements to Shannon International Airport and Shannon Town. Shannon Airport benefits from regular Bus Éireann services to Galway, however currently only five of these services per day are direct expressway services and do not coincide with flight times, creating a disincentive to use public transport to and from the Airport. Moreover, there are currently no direct public bus services providing connectivity between Cork and Shannon. Enhanced public transport connectivity from cities such as Galway, Cork and Limerick is particularly important to assist the continued growth of the Airport and the sustainable development of Shannon town.
- Rail link – an infrastructural safeguard has been incorporated into the existing Clare County Development Plan and Local Area Plan for a rail line to be provided to Shannon town and International Airport.
- Road Access - Investment is required in improving and upgrading the existing road access from the motorway to Shannon International Airport.

2.1.3.2 Draft Limerick Shannon Metropolitan Area Transport Strategy (LSMATS)

The National Transport Authority (NTA) published a draft Limerick-Shannon Metropolitan Area Transport Strategy (LSMATS) in September 2020 and the Public Consultation Process ran from 02/09/2020 to 16/10/20. The Strategy is currently under review and update prior to formal publication.

LSMATS Outline

LSMATS is a regional-level (Tier 2) plan and is directly informed by National Level Tier-1 policies. The most important and recent of these are the National Planning Framework 2040 (NPF) and the National Development Plan 2018-2027 (NDP).

The National Planning Framework 2040 (NPF) envisages that the Limerick-Shannon Metropolitan Area (LSMA) will become the growth engine of the Mid-West Region with projected growth of at least 50% during the period up to 2040. This projected population, employment and education growth brings with it opportunities for the development of the LSMA.

This projected population and associated economic growth will also result in a significant increase in the demand for travel. This demand needs to be managed and planned for carefully in order to safeguard and enhance the LSMA's attractiveness to live, work, visit and invest in.

In common with the other regional metropolitan areas of Cork, Galway and Waterford, there is a legacy of car dependency in the LSMA. This has contributed to a wide range of economic, environmental and social issues including longer commutes, declining urban centres, poor public health, reduced air quality and noise pollution.

To mitigate this, land use and transport planning will be far more closely aligned. This will discourage the use of the private car, particularly for short trips, in order to fundamentally change how people, move around the LSMA. This requires a more efficient use of valuable street and road space and a prioritisation of walking, cycling and public transport.

LSMATS will deliver an integrated transport network that addresses the needs of all modes of transport to support planned growth up to 2040 in a compact and sustainable manner.

The Strategy represents a coherent transport planning policy framework and implementation plan around which other agencies involved in land use planning, environmental protection and the delivery of other infrastructure and services such as housing, utilities and community facilities can align their plans and investment priorities.

The Strategy has been developed to be scalable and flexible enough to meet changes in population and employment growth and is subject to periodic review, every 6 years.

N19 Shannon Airport Access Road Improvement Scheme

Within the documentation the N19 Shannon Airport Access Road Improvement Scheme is not reviewed but the delivery of the N19 is included in the 'Implementation Plan' tables in the Roads and Streets Section as part of the Short-Term deliverables (up to 2026).

Shannon Airport and Shannon Free Zone

Within the documentation Shannon Airport and Shannon Free Zone are considered strategic and major employers and key strategies and outcomes of the plan are as follows:

- Maximise the potential of the existing transport infrastructure including the InterCity rail network, Shannon Airport, the Port of Foynes and Ennis as a connecting hub;
- Provision of a Citywide public transport network, with enhanced accessibility from the City Centre to the National Technology Park, UL and Shannon Airport;
- Develop a primary pedestrian network throughout Limerick City, Shannon and other Metropolitan towns; included is the route from Shannon town centre to Shannon Free Zone;
- Part of the envisaged cycling network is the Inter-Urban Cycle Network which includes Limerick City Centre to Shannon;
- Connectivity to Shannon will be significantly improved over the lifetime of the Strategy. Existing bus services will be enhanced with some new additional services, including:
    - Limerick City Centre – Shannon Town Centre –Shannon Free Zone – Shannon Airport (Express service);

- Limerick City Centre – Cratloe – Bunratty –Shannon Town Centre – Shannon Free Zone – Shannon Airport;
- Sixmilebridge railway station – Shannon (Shuttle service);
- Shannon – Ennis; and
- The potential for enhanced direct services from Shannon to Cork and Galway will be examined.

- In relation to Nation Roads the objectives are
  - Retain and protect the strategic function of the National Road network;
  - Reduce peak time congestion on the N18/N19 network at Shannon;

2.1.4 Local Policy Context

2.1.4.1 Clare County Development Plan 2017 – 2023

The Clare County Development Plan 2017-2023 includes specific objectives:

- Objective CDP6.4 - to *"facilitate the improvement/upgrade (as necessary) of key infrastructural resources within the airport, the airport lands and the N19 providing access to the area".*
- Objective CDP8.15) - to *"safeguard the route of the proposed Shannon Rail Link and permit development where it is demonstrated it will not inhibit the future development of the selected route as a rail link".*

Clare County Council are currently new Clare County Development Plan 2022-2028 which went on Public Display in December 2021.

2.1.4.2 Shannon Town and Environs Local Area Plan (As Amended) 2012 – 2018

Key objectives from this plan are as follows:

1. Local Area Plan Objective 2.2:

"To increase interaction between the N19, the town, the free zone, the airport and the estuary"

2. Local Area Plan Objective 3.7:

"To promote the continuous sustainable improvement of the competitiveness of Shannon Free Zone in the short, medium and long term through cost effective improvement in infrastructure and in the design and quality of existing and new buildings and of infrastructure.

3. Local Area Plan Objective 4.4:

"To reserve a corridor that will facilitate the future provision of a rail link to serve Shannon Airport"

4. Local Area Plan Objective 11.3:

"To connect the component elements of the town through the delivery of an integrated Green Infrastructure network, i.e., the town centre with the residential areas, the Industrial Zone, the Airport and the Estuary".

5. Local Area Plan Objective 11.9:

"To outline and implement a cycling strategy for the Plan area, which builds on and connects the existing cycle network, providing high amenity, accessible corridors linking the town centre with the Industrial Zone, Airport and residential neighbourhoods, and offering an alternative and efficient modal choice other than the private car".

2.1.5 Policy Conclusion

European policy recognises the international significance of Shannon International Airport, and aims that, subject to economic and environmental considerations, the N19 – the interconnection between the airport and the M18 (the nearest connection point on the Comprehensive route carrying long-distance traffic) – should be a high-quality road.

As stated in *Section 1.5 – Project Operational Goals* above, a key objective of the proposed scheme is to provide high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network, along with improving the quality, efficiency and reliability of ground transport to and from the airport. Shannon Airport is identified as part the National Development Plan (NDP) 2021 – 2030, which refers to support for investment at the airport. The National Planning Framework (NPF) recognises Shannon Airport as a key travel and enterprise hub and supports the provision of enhanced accessibility from the City Centre to Shannon Airport.

In the context of European Policy, and the TEN-T Regulations, the existing section of N19 forms part of the TEN-T Comprehensive Network. It is considered that the proposed Scheme aligns with the TEN-T objectives of cohesion, efficiency, sustainability, and benefit increase for its users.

The proposed scheme seeks to improve the existing infrastructure (providing a high-quality road), contribute to the enhancement of international connections, improve accessibility to the Western region and the main urban and economic centres in the area, whilst supporting other sustainable transport modes and minimising environmental impact as per the Scheme Objectives.

National planning policy recognises the national and regional economic significance of Shannon International Airport and supports investment to facilitate the airport fulfilling its role as a business gateway and encouraging foreign direct investment in the SFZ.

National sustainability policy envisages a continuing role for aviation, with improved access to airports by cycle and by public transport, with many local commuting journeys switching to cycling and walking.

The National Investment Framework for Transport in Ireland (NIFTI) sets outs a The modal hierarchy of 1) Active Travel; 2) Public Transport; and 3) Private Vehicles.

Improved surface access to Shannon International Airport and encouraging foreign direct investment in the SFZ are seen as priority issues in regional plans.

The development of an improvement/upgrade of the N19 providing access to Shannon International Airport is an objective of the Clare County Development Plan. The promotion of walking and cycling in the vicinity of Shannon Airport and Shannon Free Zone plays an intrinsic part of the overall Green Infrastructure Strategy contained in the Shannon Town and Environs Local Area Plan.

Within the draft LSMATS documentation the N19 Shannon Airport Access Road Improvement Scheme is included in the 'Implementation Plan' tables in the Roads and Streets Section as part of the Short-Term deliverables (up to 2026).

2.2 Project Specific Need

The 'Need for the Scheme' is defined by the identified deficiencies, and operational and safety issues of the existing road infrastructure in combination with the aims of European, National, Regional and Local strategic policy. These identified deficiencies and relevant strategic policy then inform the Scheme Objectives.

As outlined in *Section 2.1 - Development Policy* above, the N19 Shannon Airport Access Road Improvement Scheme aligns with current European (in the form of current TEN-T regulations), National, Regional and Local policy.

In terms of identified deficiencies, when compared with current design standards, the existing section of N19 between Drumgeely Roundabout and Knockbeagh Point Roundabout presents significant infrastructural, operational and safety deficiencies, and are summarised below;

1. Existing Road Layout – There are a high number of direct accesses, particularly on the approach to the Knockbeagh Point Roundabout. Junction layouts, including pedestrian crossing facilities, are poor and the existing road does not comply with current design standards in terms of geometric parameters.
2. Existing Road Condition – The road pavement surface consists of three different material types over five distinct sections comprising hot rolled asphalt, stone mastic asphalt and concrete. There are clear indications of surface failure/distress on several sections of the existing route. Poor ground conditions have contributed to sever cracking of both concrete and bituminous surfaces. Signing & line marking, public lighting and drainage are also considered to be of poor quality. The section of the existing N19 from SFZ Gateway to Knockbeagh Point Roundabout was the subject of an intervention by the Motorway Maintenance and Renewals Contract (MMaRC) Contractor in October 2020 where the existing concrete road, which showed signs of uplifting and joint distress was overlaid with a steel mesh reinforced bitumen overlay. This intervention was designed as a short-term solution until permanent N19 scheme is developed.
3. Traffic Capacity – This section of the N19 serves two major trip destinations – Shannon Airport and the Shannon Free Zone (West) business park. Future traffic modelling indicates that there is a significant problem with forecast peak hour congestion at junctions, caused by "tidal" flow of commuter traffic to and from the Shannon Free Zone. There is some tidality in flows to and from the Airport, but Airport-related employment tends to have a wider range of start and finish times.
4. Journey Reliability – The role of Shannon Airport as an emergency diversion airport within the Air Traffic control system means that there is a potentially life-critical need for reliable journeys along the N19 during an emergency. In the event of an airside incident, priority access by emergency vehicles to the airport (and by ambulance from the airport to University Hospital Limerick) is vital. Although emergency vehicle access has not been an issue in the past, in the event of a potential future airside emergency

coinciding with a traffic accident or traffic congestion on the single lane section of the N19, emergency vehicles may encounter delays when accessing the airport.

5. Vulnerable Road Users – The existing N19 does not have formal dedicated facilities for cyclists and facilities for pedestrians require significant improvement to meet current design standards. Gaps in street lighting are evident on approach to the Airport, presenting significant safety and security concerns for vulnerable road users.
6. Collision Occurrence/Safety –Two different safety concerns have been considered as drivers for the scheme -
    a. VRUs and the absence of cycling facilities and the below standard pedestrian facilities.
    b. The concerns raised by the Gardaí, Emergency Services and Clare County Council on behalf of the Major Emergency Management Committee regarding the existing road being considered a safety issue in the event of a Major Emergency Incident - main issue was width of road and concerns regarding access being blocked.

In addition to the infrastructural, operational and safety deficiencies identified above the following factor which contribute to the 'Need for the Scheme' have been identified during the development of the scheme to date: -

7. Active Travel Route Connections – The existing network of active travel routes requires additional pathways and connections to create a more comprehensive network to encourage modal shift. In addition it is noted that Clare County Council are developing proposals (currently at TII Phase 0 - Scope Pre-Appraisal) for greenway projects in the wider Shannon to Bunratty / Sixmilebridge region.
8. Bus Infrastructure – The expansion plans of Shannon Airport and Shannon Free Zone West will result in a significant increase in employee numbers using the N19 to access their place of work. LSMATS states that additional public transport demand to these areas will require an increase in the frequency of bus services.
9. Autonomous Vehicle Testing – Future Modal Campus Ireland (FMCI) plans to implement autonomous vehicle testing on the section of the N19 under consideration. This section of road will need to provide a safe testing ground during the initial testing phase.
10. Supporting Prosperity of the Mid-West Region - Shannon Commercial Properties have extensive future development plans laid out in their masterplan to be delivered in three phases
    - The scheme addresses the only remaining sub-standard section of the N19 serving Shannon International Airport. Shannon International Airport is one of the most important pieces of public infrastructure in the region and plays a significant role in international connectivity and increasing prosperity to the region, including tourism and exports.
    - Shannon Airport maintains U.S. Custom and Border Protection (CBP), which offers huge potential for future growth at this airport. Improved connectivity and access to the Airport are critical to supporting rapid, timely and cost-effective transport connectivity.
    - Shannon Free Zone hosts the largest concentration of US companies outside of Dublin and is rapidly growing year on year. A three phase multi-million-euro Shannon Commercial Properties investment in state-of-the-art property solutions at the Shannon Free Zone (SFZ) is to currently in its second phase. A €40 Million Phase 1 is completed, and Phase 2 is in progress with funding committed for over 850,000 sq.ft. development planned to be delivered through 2019 to 2024. Phase 3 of the master plan is planned to follow and be delivered through 2025 to 2028. Improved connectivity to SFZ is essential to assist this planned economic growth.
    - The growing economy in this region and major expansion of both Shannon International Airport and SFZ is likely to result in significant traffic growth in future years.

- This section of the N19 is not consistent with the adjacent National Road Network in terms of quality and layout and provides a poor national and international perception on arrival to one of the prime areas in the Mid-West region for indigenous and international investment.

Analysis of Census data (Project Brief, Section 2.4.1) has shown that only 1.9% of airport workers and 4.5% of SFZW workers have a usual mode of travel as a pedestrian or cyclist. Whereas 20% and 22.5% respectively of usual journeys to work take less than 15 minutes, implying a short enough distance that use of Active Travel is a realistic possibility. Suggesting that there is considerable scope for mode shift to more sustainable modes.

With the existing infrastructural, operational and safety deficiencies outlined above, the need for an improvement to this section of the N19 has been identified in order to meet the future demands on the route in a safe and efficient manner.

3 TRAFFIC ASSESSMENT AND OPTION CROSS SECTION

3.1 Introduction

As part of TII's PMG Phase 2 - Option Selection process, a traffic assessment was undertaken in order to inform the comparative assessment of the identified feasible and refined Route Corridor Options, and the identification of the Emerging Preferred Route Corridor Option, and ultimately the Preferred Route Corridor Option. In particular, the traffic assessment informs the Economy, Safety, and Environment Appraisals of the Phase 2 Stage 2 Project Appraisal Matrix, the Cost Benefit Analysis (CBA) of the Stage 2 Options, and the Stage 3 Project Appraisal Balance Sheet (PABS). In addition, through the traffic modelling process, estimated future year traffic flows were calculated for the Do-Minimum Option/Scenario and Do-Something Option/Scenario (i.e., the Route Corridor Options), which informed the initial identification of the road type and the indicative junction design approach for the proposed Scheme.

This Chapter provides a summary of the traffic modelling undertaken as part of the Phase 2 - Option Selection process, a summary of the traffic assessment of the Stage 2 Route Corridor Options, and an overview of the initial identification of the road type and indicative junction design approach for the proposed Scheme.

A full description of the traffic modelling and associated assessment, including supporting information, is outlined in the Traffic Modelling Report in Appendix D.

3.2 Summary of Traffic Modelling

As stated above, the purpose of the traffic modelling in TII's PMG Phase 2 is to estimate future year traffic flows for the Do-Minimum Option/Scenario and Do-Something Option/Scenario (i.e., the Route Corridor Options), which will allow a traffic assessment to be undertaken where the Stage 2 Route Corridor Options are compared against the Do-Minimum Option. This informs the Stage 2 Appraisal process. As part of the Economy and Safety Appraisal, and the CBA, the outputs from the Traffic Model are used by TII's software packages; Transport Users Benefit Appraisal (TUBA) and Cost and Benefits to Accidents - Light Touch (COBALT), to estimate the economic and safety benefits for each Stage 2 Route Corridor Option when compared against the Do-Minimum Option/Scenario.

In relation to the traffic model for this proposed scheme, the sections below outline the key activities and outputs which were undertaken in the scoping and collecting of data for the model, constructing, calibrating and validating the base model, and finally the estimating of the future year traffic flows for the Do-Minimum Option/Scenario and the Stage 2 Route Corridor Options.

3.2.1 Traffic Modelling and Agreed Scope

In order to define the extents of the traffic modelling and agree the scope of the traffic modelling exercise, a Traffic Modelling Report (TMR) was prepared in accordance with TII's PAGs, and in consultation with TII. The TMR set out the proposed traffic modelling extents, the traffic survey data collection, matrix and network development, model calibration and validation and future year traffic projections.

3.2.2 Traffic Survey Data Collection

In TII's PMG Phase 1, the proposed traffic modelling methodology was set out in an Annex to the Project Appraisal Plan, which was submitted to TII Strategic Planning Unit. This Annex proposed collection of project-specific traffic survey data in March/April/May 2020. Due to the Covid-19 pandemic, this was not possible. The Phase 2 Traffic Model was instead developed using existing available data.

The availability of the Permanent TII Counter, together with the (Nov 2019) Traffic Data received from SCP and the earlier journey time surveys undertaken by MWNRDO, was deemed sufficient to inform the Phase 2 Traffic Model. Although it would have been preferable if existing data included the original video footage and also extended to Knockbeagh Point Roundabout.

3.2.2.1 Junction Turning Counts

Classified video turning counts were undertaken on Tuesday 26-Nov-2019 at 10 road junctions as shown in **Figure 3-1** below. These counts were undertaken for Shannon Commercial Properties, for their own planning purposes, and they have kindly made the data available to the project. High-mast telescopic video camera systems were used to record the operation of each junction between 00:00 and 24:00. 15-minute survey intervals were used, and vehicles were classified as:

- Motorcycles
- Cars
- Light Goods Vehicles (LGV)
- Medium Goods Vehicles (OGV1)
- Heavy Goods Vehicles (OGV2)
- Buses & Coaches (PSV).

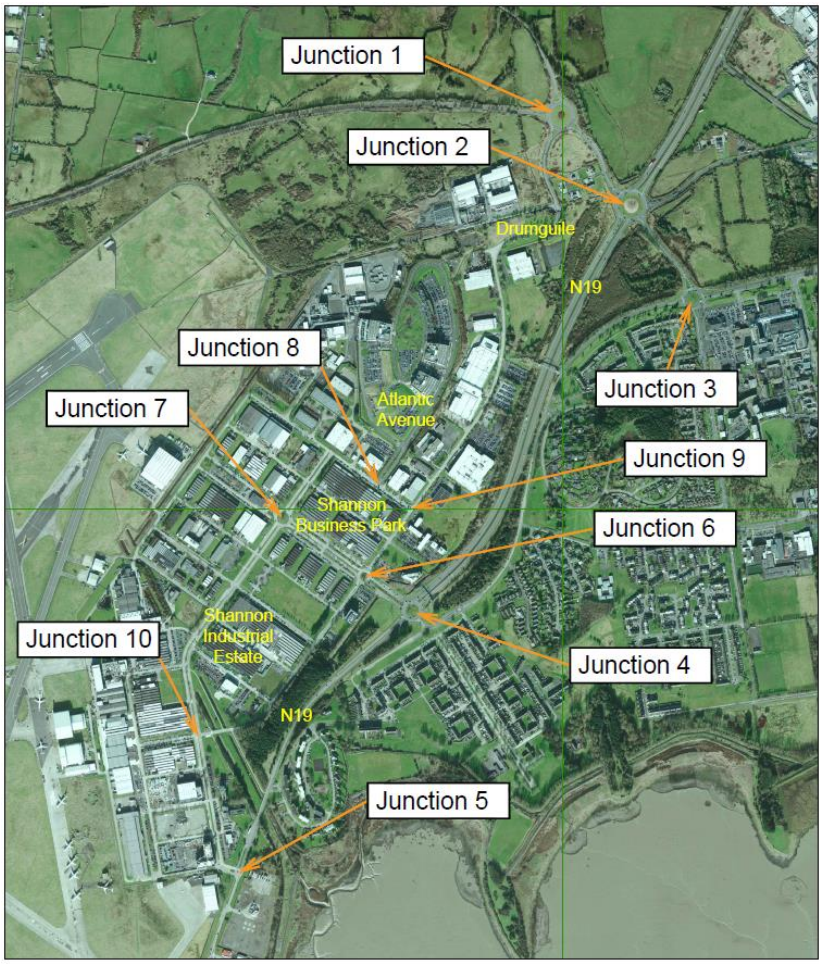


Figure 3-1: November 2019 JTC Survey Locations

Junctions 1 to 6 from this survey were used for traffic model development.

The vehicle mix recorded at Drumgeely roundabout is shown in **Table 3-1**:

Table 3-1: Vehicle Mix from 24-hour Classified Video Count

Car (& MC)	LGV	OGV1	OGV2	PSV	Total
18119	1532	305	279	185	20420
88.7%	7.5%	1.5%	1.4%	0.9%	100.0%
96.2%		3.8%			
Light		Heavy			
92.2%	7.8%	39.7%	36.3%	24.1%	

3.2.2.2 Permanent Traffic Counter

TII Traffic Monitoring Unit (TMU) has permanent induction loop counters on the stretch of the N19 northeast of the Drumgeely roundabout. This counter came on-stream in late February 2019.

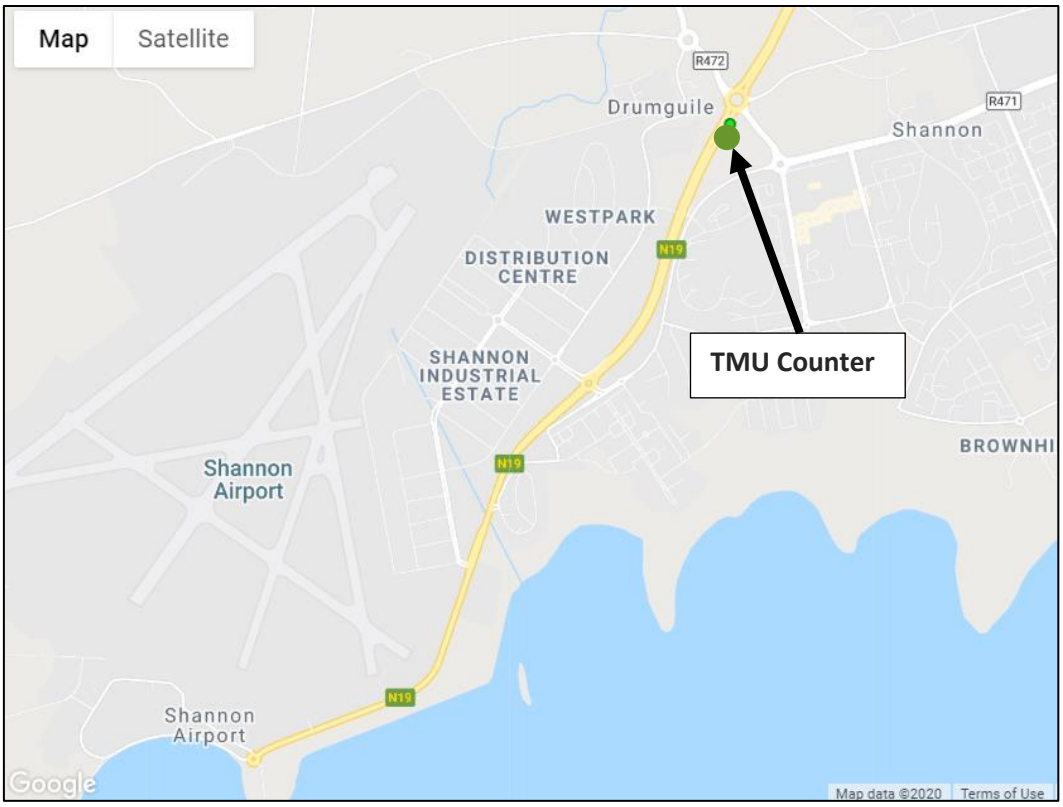


Figure 3-2: Location of TMU Counter

There is a permanent traffic counter on the N19 is presented in **Table 3-2**:

Table 3-2: TII Traffic Monitoring Unit on N19

Year	ADT	% HGV
2022	9,406	3.5%
2021	8,230	3.5%
2020	7,772	4.0%
2019	13,460	3.1%

3.2.2.3 Analysis of Traffic Data

An analysis of the traffic data found that there is relatively little summer/winter variation in flow over the year. The busiest week is at the end of August / start of September which corresponds with Shannon International Airport data which states that airport passenger throughput is highest in this period.

The analysis also indicated that weekend flows are very much lower than those during the week and that Friday is little different from any other weekday in terms of traffic volumes.

Over an average weekday variation in traffic flow is dominated by tidal commuter peaks. These are most apparent in the traffic flows to and from Shannon Free Zone West, which is highly peaked. The busiest hour for arrivals at the business park is 07:30-08:30, with a spike between 07:45 and 08:00, presumably for commuters starting work at 8am.

The busiest hour for departures from the business park is 16:30-17:30, with a spike between 16:30 and 16:45.

There is some tidality in flows to and from the airport, but airport-related employment tends to have a wider range of start and finish times. Traffic to the airport is busiest in the hour 08:30-09:30, possibly involving a combination of commuters starting work around 9am and passengers arriving for morning flights.

Traffic from the airport does have a PM peak in the hour 16:30-17:30 but flows are not particularly high. A number of spikes occur throughout the day, with flows of around 90 vehicles in particular 15-minute periods, reflecting flight arrivals.

Accordingly, in order to fully represent the range of travel conditions on the N19, five time periods have been modelled, as shown in **Table 3-3** below:

Table 3-3: Selection of Modelled Time Periods

Name	Period	Notes
Early AM peak	07:30-08:30	Dominated by traffic to SFZW
Late AM peak	08:30-09:30	Main flow is traffic to airport
Interpeak	Average of 10:00-11:00, 11:00-12:00, 14:00-15:00	Inflows and outflows broadly balanced. More traffic to/from airport than SFZW
PM peak	16:30-17:30	Tidal flow from airport and SFZW; more from SFZW
PM shoulder	16:00-16:30 and 17:30-18:00	Tidal flow from airport and SFZW; similar flows from each

A full analysis of the traffic data is provided in the Traffic Modelling Report in Appendix D.

3.2.3 Base Year Model Development

The N19 Traffic Model has been developed using SATURN software. The Base Year for the model is 2020. The following sections provide a summary of the Network Development, Zoning System, and Base Year Matrix Development. A full description of the model development is provided in the Traffic Modelling Report in Appendix D.

3.2.3.1 Network Development

A road network was developed in SATURN, coding all node positions against an OSI-referenced map background. **Figure 3-3** shows the extent of the network.

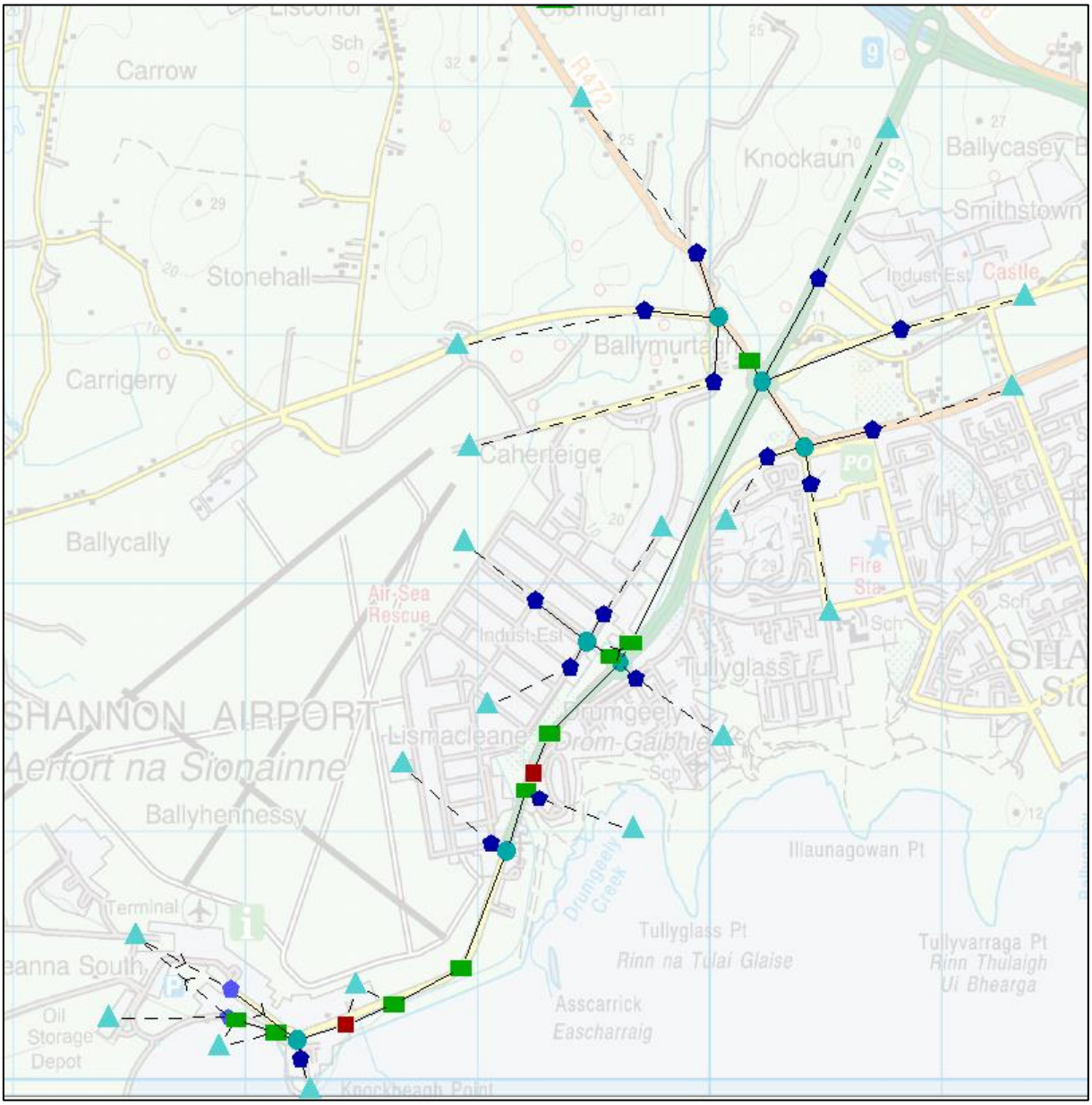


Figure 3-3: Model network

The initial speed-flow curves used in the network and the saturation flows at junctions were based on data from the NTA regional model. These were subsequently modified as part of the calibration process.

Observed traffic turning counts for each of the five modelled time periods were coded into the model, for light and heavy vehicles separately Flows were coded in units of pcus, with each heavy vehicle given a weight of 2.5 pcus.

3.2.3.2 Zoning System

Zones represent geographic areas between which traffic travels. The model was initially set up with 19 zones representing entry/exit points to the model network. 5 zones represent different areas of the airport, 5 zones represent the different access points to the Shannon Free Zone (West) business park, 6 zones represent routes for traffic to/from/via parts of Shannon Town, one zone represents the M18/N18/N19 junction, and 2 zones represent routes for traffic arriving/departing to/from areas to the rural areas northwest of the airport.

Subsequently a twentieth zone was added to represent a significant development site immediately to the southeast of the Gateway West roundabout.

3.2.3.3 Base Year Matrix Development

There are two key stages in the development of the base year matrix. The first is the creation of a prior matrix, which is then adjusted using a process known as matrix estimation to allow the base model to better reflect observed volumetric traffic data. This adjustment to the prior matrix is part of the model calibration and validation stage, which is discussed further in Section 3.2.4 below.

The initial prior matrix was developed using a process of combining turning count data, assuming that turning proportions at each junction apply equally to flows from each origin.

A matrix estimation procedure was then applied to fit these matrices more closely to the count data, and the fitted matrices assigned back to the network. The classified video turning counts were used for this fitting process at the level of light and heavy vehicles.

Additional data on the effect of this two stage procedure in bringing the modelled flows closer to the count data is provided in the Traffic Modelling Report in Appendix D.

3.2.4 Model Calibration and Validation

The initial base year development, as discussed in Sections 3.2.3.3 above, was followed by model calibration. The purpose of model calibration is to ensure that the model adequately reflects existing traffic conditions. It is an iterative process, whereby the base model is subject to continual revisions and the results compared against observed data at each iteration to improve how well the base year traffic model replicates these observed conditions.

Validation is very similar to calibration, but the comparison is made against an independent dataset that was not used in the matrix estimation process, which was used to adjust the prior matrices.

The standard method used to compare modelled values against observed values on a link involves the calculation of the GEH statistic.

The GEH statistic is a measure of comparability that takes account of not only the difference between the observed and model flows, but also the significance of this difference with respect to the size of the observed flow. The target is for this statistic to be less than five for at least 85% of comparisons.

3.2.4.1 Model Calibration

Due to Covid 19, there has been no opportunity to collect new traffic data, so the level of congestion has not been observed to the level that we would normally do so. "Moving observer" journey time surveys were undertaken by the Mid-West NRDO on 29th November 2017 between the Knockbeagh Point Roundabout and the Drumgeely Roundabout. A total of six runs were undertaken in each direction, covering AM peak, interpeak and PM peak conditions.

The model was calibrated to reproduce these journey times, by small adjustments to the speed-flow curves and saturation flows used. **Table 3-4** shows the level of fit achieved:

Table 3-4: Model fit to surveyed journey times

	AM-late	*dif*	AM-early	*dif*	PM peak	*dif*	PM-shoulder	*dif*	IP	*dif*
Survey	00:03:07	*5.1%*	00:03:07	*0.8%*	00:03:15	*-1.5%*	00:03:15	*-1.5%*	00:03:13	*-6.2%*
Model	00:03:16		00:03:08		00:03:12		00:03:12		00:03:01	
Average	-0.7%									

The traffic model shows the principal congestion to be at Drumgeely Roundabout, with "tidal flow" movements from M18 and Shannon Town into SFZW in the AM peak. The journey time surveys used for model calibration start downstream at Drumgeely Roundabout and therefore show little present-day congestion. In the PM peak, the N19 through traffic northbound has priority over traffic emerging from SFZ West, so again the queuing that is present is largely uncaptured by the surveys.

3.2.4.2 Validation

The model was fitted to count data from Tuesday 26th November 2019. Data from the permanent counter on the N19 has been used in interpreting the data, but not in model-building, and is therefore available as an independent check on the levels of traffic flow in the base year model. **Table 3-5** presents this comparison.

Table 3-5: Model comparison

Modelled time period	Observed flow		Modelled flow		*% difference*		GEH statistic	
	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
AM early	1842	24	1781	19	-3%	-21%	1.43	1.08
AM late	1651	51	1647	46	0%	-10%	0.10	0.72
Interpeak	584	55	579	48	-1%	-13%	0.21	0.98
PM peak	1589	83	1655	71	4%	-14%	1.64	1.37
PM shoulder	1353	43	1426	30	5%	-30%	1.96	2.15

Journey time and distance were subsequently sense-checked against those from a leading internet journey planner.

3.2.5 Base Year Model Results

Figure 3-4 shows the resulting modelled AADT flows for the base year 2020.

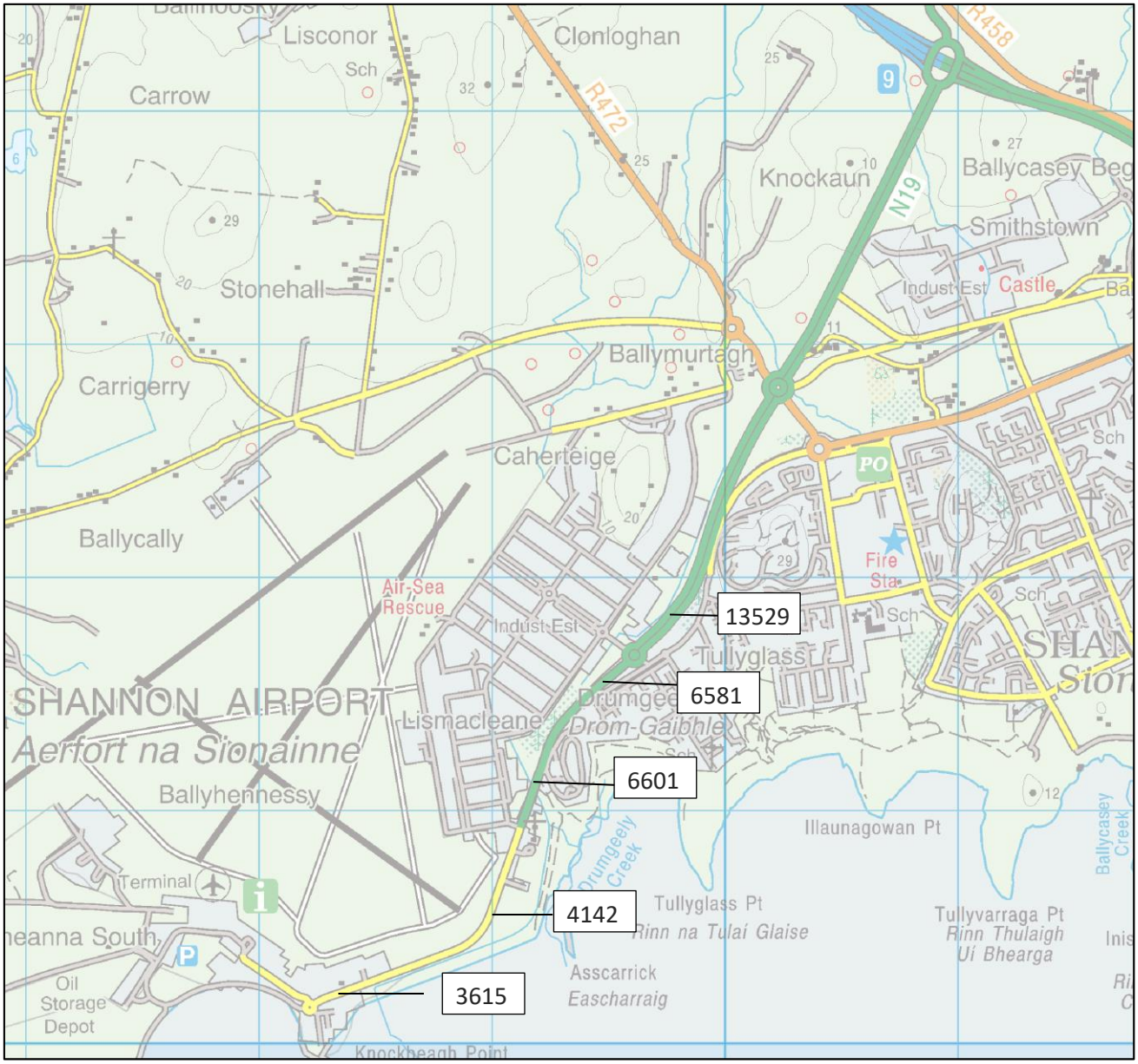


Figure 3-4: Modelled AADT flows in base year

3.2.6 Future Year Traffic Projections

The base year traffic model represents traffic conditions in 2020. However, for the purposes of appraisal, it is necessary to present traffic flow projections in several future years in accordance with TII's PAG Unit 5.3– Travel Demand Projections (October 2021). The future year traffic models for the N19 represent the following years:

- 2025 – Scheme Opening Year[1]

  2040 – Scheme Design Year (15 Years after Opening); and
- 2050 – Horizon Year

The level of development in the Masterplan does not yet have planning permission, and is therefore "uncommitted" in terms of PAG guidance.

Accordingly, at this stage, two demand growth scenarios were developed:

In the 'with-Masterplan' growth scenario:

- the 2025 opening year demand matrices assume the 2019-2023 Masterplan fully implemented.
- the 2040 design year scenario additionally assumes the 2024-2028 Masterplan fully implemented, but no additional growth beyond that.
- the 2050 horizon year scenario assumes no growth in SFZW beyond that in the 2040 scenario.

In the 'without-Masterplan' growth scenario, representing only "committed" land use change, SFZW was given the same PAG 5.3 zone-based growth rates as Shannon Town. This may be thought of as representing organic growth – modest increase in economic activity without major land use development.

Table 3-6: Forecast Future Year Flows (Committed/with Masterplan)

N19 Sections	Base Year 2019	Opening Year 2025	Design Year 2040	Horizon Year 2050
NE of Drumgeely Roundabout	13,529	15,731 / 17,849	17,118 / 23,929	17,502 / 24,243
Drumgeely Hill to Drumgeely Roundabout	6,581	8,108 / 8,165	8,891 / 11,177	9,289 / 11,443
Gateway West Roundabout to Drumgeely Hill	6,601	8,155 / 8,257	8,947 / 11,361	9,330 / 11,626
Development Site to Gateway West Roundabout	4,142	5,470 / 4,574	6,095 / 6,174	6,558 / 6,464
Aer Lingus Cargo Buildings to Development Site	4,142	5,470 / 4,574	6,095 / 5,143	6,558 / 5,467
Knockbeagh Point Roundabout to Aer Lingus Cargo Buildings	3,615	4,799 / 3,985	5,370 / 4,482	5,787 / 4,774

[1] The opening year of 2025 is what has been modelled at Phase 2 – Option Selection. This will be reviewed at Phase 3 – Design and Environmental Evaluation. Assuming earlier than now likely implementation of the scheme at this stage is generally a conservative assumption as delaying both the costs and benefits will tend to discount both equally. Underlying traffic growth and increase in the value of time over time will tend to increase the benefits relative to the costs.

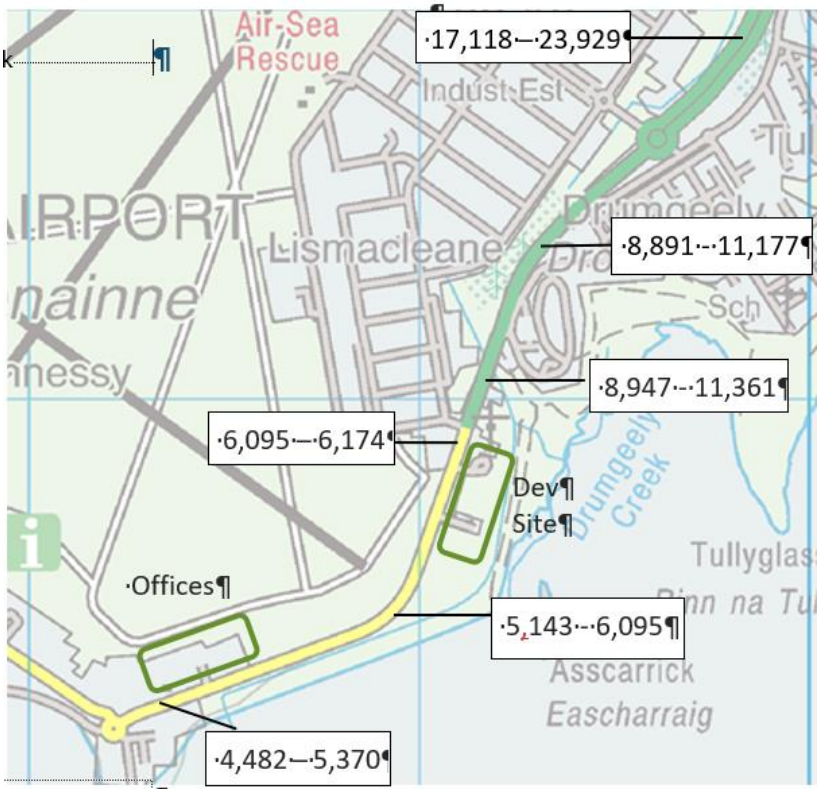


Figure 3-5: Modelled AADT Flows in Design Year

Further details of the future year projections of the traffic model are provided in Appendix D.

3.3 Initial Selection of Road Type

During the initial development of the scheme various road types and cross-section where considered. Traffic modelling shows that a single carriageway is sufficient to address future traffic growth – TII Type 1 Single Carriageway from Drumgeely Roundabout to Gateway West Junction and TII Type 2 Single Carriageway from Gateway West Junction to Knockbeagh Point Roundabout. However, during consultations with stakeholders' concerns were raised with respect to airport safety in a major emergency scenario should only a narrow single carriageway be provided. Following these consultations, a TII Type 1 Single Carriageway was proposed for the full length of the scheme.

At Stage 2 of the option selection process it was determined that the section of the scheme between Gateway West and Knockbeagh Point would, following proposed development, be classified as urban and with a current speed limit of 60km/hr be required to be designed to DMURS. With regard to active travel, safety and taking into consideration individuals who do not own their own vehicle and users of public transport the approach taken to provide route consistency was to propose that the full scheme be designed to DMURS with a 60km/hr speed limit.

The proposal to use DMURS for the full length of the scheme was based on the following:

a) One of the key safety consideration of road design is the provision of as consistent a design as possible so that the road user is comfortable and not presented with an ongoing change in cross-section. This scheme is only 2.2km long and the provision of multiple cross-sections over this length of road is not recommended.

b) Shannon International Airport is a Gateway to Ireland and the South West Region and will be used by overseas visitors who will not be familiar with Ireland's various road types. To avoid confusion, it would be preferrable not to present multiple cross-sections over short lengths but instead provide a road cross-section that is as consistent as possible over the scheme.

c) Sustainable Transport and Active Travel are fundamental design principles and the importance of prioritising the safety and comfort of vulnerable road users over motor vehicle throughput at junctions is important. This suggests a consistent lower speed limit, a cross-section with bus lanes and compact junction design is critical for all road user safety and to provide drivers with the correct visual layout to enforce this approach.

d) The 13m cross-section was chosen to provide bus lanes which assist in modal transfer and to allow for the development of an enhanced bus service as development takes place – particularly based on feedback from the NTA and Stakeholders regarding the students attending the catering college and the young age of employees in the growing high-tech businesses in the surrounding employment areas.

e) LSMATS proposes to cater for increasing public transport demand for Shannon Airport, Shannon Free Zone and the surrounding areas by increasing the frequency of existing bus services. Existing bus services use a number of routes, including along the N19, through Shannon Town, Drumgeely Village and Shannon Free Zone. The provision of the bus lanes over the full length of the scheme will maintain the same cross-section and lane distribution and will facilitate the provision of an enhanced bus service as development, including that proposed in LSMATS, continues to occur.

f) The provision of dedicated bus lanes allows for greater flexibility during an emergency incident at the airport whereby the emergency services will have the use of four lanes for traffic management and the exclusive use of two bus lanes for emergency vehicles responding to a major incident at the airport.

g) As part of Future Mobility Campus Ireland (FMCI) plans to implement autonomous vehicle testing on the section of the N19 under consideration, it is felt a four-lane carriageway incorporating bus lanes may allow for greater flexibility and safer operation during the initial testing phase.

An application for approval to use DMURS as the adopted standard for the design of the road cross section, the junction design and the geometric/alignment design has been accepted by TII. All other road elements, including drainage, VRS, structures etc. shall be designed in accordance with TII Publications standards.

3.4 Consideration of Indicative Junction Design Approach

Preliminary junction and access strategies were developed in accordance with PE-PMG-02042 Section 2.12.7.1 Development of Options. These will be further developed as the scheme progresses and will form the basis of the Junction Strategy Report to be addressed at Stage 3 (Design and Environmental Evaluation) of the TII Project Management process.

The feasibility stage work ruled out any route corridors other than the existing N19 corridor and also identified that in terms of the levels of travel demand relative to the scale of the existing infrastructure, peak hour conditions at the junctions are in general more of an issue for traffic than the lengths of N19 between the junctions. Accordingly, a major input to the development of the scheme was the upgrade the existing junctions at: -

- Drumgeely Roundabout
- Gateway West (SFZ) Junction
- Drumgeely Hill Junction

It was necessary therefore to consider the relative merits of different junction types. This was done in three stages: -

1. Stakeholder consultations were held with: -
    - Clare County Councils Planning Department;
    - Shannon Airport and Shannon Commercial Properties;
    - The National Transport Authority;
    - Emergency Services; and
    - Transport Infrastructure Ireland.
2. The SATURN traffic model developed early in Phase 2 was used to test the performance of a number of such junction types, under a range of traffic growth scenarios; and
3. A multi criteria analysis was applied to determine the junction types to be taken forward for further development and analysis.

The following feedback on the junction design was received as part of the stakeholder consultations

- Active travel to be guiding principle.
- Junctions to be designed for vulnerable road users and to allow for all movements.
- Cyclist crossings to be separate to pedestrian – can be adjoining.
- Signalised crossroad preferred with single phase crossing and crossing distance minimised.
- Vulnerable road users to be prioritised over vehicles;
- Traffic signal controlled junctions preferable to roundabouts;
- Preferrable for vulnerable road users crossings to be accommodated in one movements, avoid staggered crossing and median islands where possible;
- Grade separated vulnerable road users crossings are not preferred, need to be given priority at-grade;
- Right turning traffic not to be given dedicated lanes at accesses to increase vehicle throughput; and
- Keep carriageway narrow.

The SATURN traffic modelling and subsequent multi criteria assessment were undertaken on the two main junctions – Drumgeely Roundabout and Gateway West (SFZ).

In identifying the types of junctions, the multi criteria analysis gave consideration to the following:

- Traffic Delay
- Active Travel
- Air Quality
- Constructability
- Cost
- Impacts on Land / Property

The purpose of the analysis was to review the various options and based both on their ability to manage the forecast traffic flows and the multi-criteria assessment, make recommendations on which junction layouts should be taken forward for further assessment in Phase 3 and which at this stage should be discarded. The recommended junction options to be taken forward to Phase 3 are set out in **Table 3-7**.

Table 3-7: Recommended Junction Options To Be Taken Forward to Phase 3

Junction	Options To Be Taken Forward to Phase 3
Drumgeely Roundabout	Do Minimum (Existing Roundabout)
	Signalised Crossroad
	Signalised Roundabout
Gateway West Junction	Do Minimum (Existing Roundabout)
	Signalised Crossroad
	Roundabout

4 CONSTRAINTS STUDY

4.1 Introduction

The first key activities of the Option Selection Process were the definition of the Study Area and the identification of existing constraints within the Study Area. The existing constraints were documented and mapped as part of Constraints Study such that the options/alternatives under consideration, could be assessed and developed taking cognisance of such constraints, and where feasible and practical, avoid these constraints.

A detailed description of the definition of the Study Area and the identification of the existing constraints, along with the associated constraints drawings, are outlined in the Constraints Report, which is provided in Appendix A.

A summary of the definition of the Study Area and the identification of the existing constraints is provided in the sections below.

4.2 Definition of the Study Area

As per the TII's PMM, the Study Area is to 'cover an area which will enable appropriate options to be developed and examined.' Furthermore, the PMM states, 'the term "study area" relates to the area under consideration for the physical location of options and may be different to the macroscopic and microscopic study areas identified in the Project Appraisal Plan for use in transport modelling.' As is the case for the traffic modelling plan study area, the environmental study area may be different / larger in order to capture and consider the zones of influence of particular sensitive areas/ecosystems/species, which may be considerable distances from the physical location of options but could be potentially impacted by the options.

In defining the Study Area for the N19 Shannon Airport Access Road Improvement Scheme, the initial Study Area as identified in during TII PMG Phases 0 and 1 was reviewed and further refined.

At the start of Phase 2, a Study Area review was undertaken to include sufficient land so that all potential options recommended to be taken forward could be assessed. The Study Area Review report was submitted to Clare County Council with a recommendation for a revised study area. This was approved at the Sponsoring Agency Management Group Meeting on the 18th March 2020.

The updated Phase 2 Study Area is shown in **Figure 4.1** below.

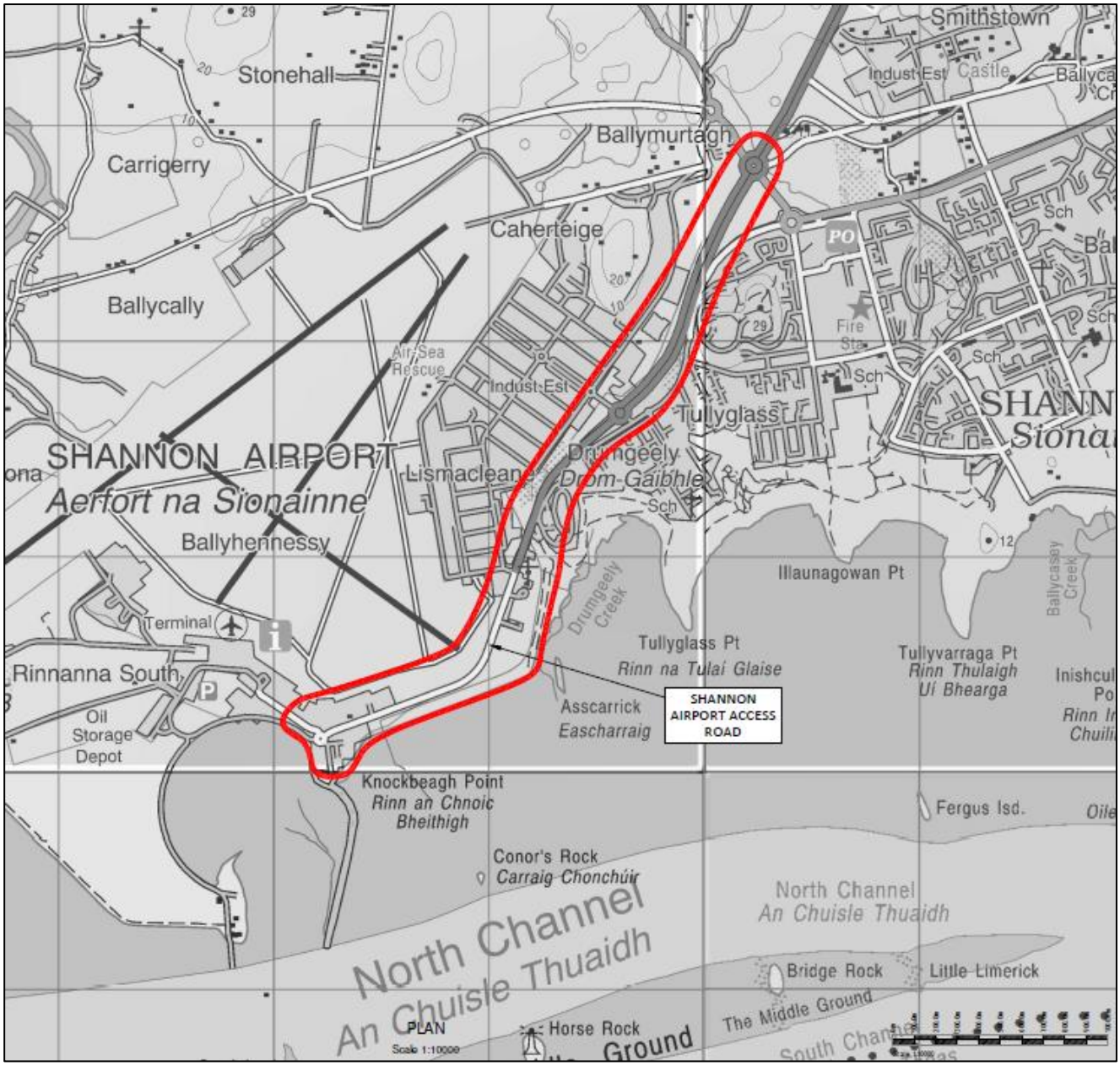


Figure 4-1: Phase 2 Study Area - Constraints Area

4.3 Existing Constraints

A summary of the identified constraints is provided in the sections below.

As per TII's PMM, the constraints were divided into three principal categories:

- **Natural Constraints** (naturally occurring landscapes and features, including underground features);
- **Artificial Constraints** (forming part of the built environment including underground features, e.g. disused landfills); and
- **External Parameters** (design standards, policy, procedural, financial, and legal issues).

In line with the PMM requirements, the Constraints Study was primarily a desktop study, supplemented by windshield or walkover surveys where deemed necessary and appropriate, along with feedback from the public and stakeholders as part of the non-statutory public consultation process (see *Section 6 – Stage 1 - Preliminary Options Assessment* and Appendix B).

4.3.1 Summary of Natural Constraints

The following is a summary of the key Natural Constraints that were identified during the Constraints Study). Data sources for the constraints are described in detail in the Constraints Report.

4.3.1.1 Soils, Geology and Hydrogeology

Key constraints within the Study Area in relation to Geology and Soils include:

- The Study Area largely consists of soft ground including alluvium and estuarine deposits;
- Potential interaction with made ground and contaminated land;
- Boreholes and springs close to the Study Area;
- Potential for unidentified karstic features in the bedrock;
- The presence of the SAC/SPA/pNHA to the south of the Study Area.

4.3.1.2 Biodiversity

There are 25 designated areas for nature conservation located within 15km of the Study Area

- 12 Special Areas of Conservation (SACs) – the nearest is Lower River Shannon cSAC, 0km from the Study Area;
- One Special Protection Areas (SPAs) – the nearest is River Shannon and River Fergus SPA, 0km from the Study Area;
- 12 proposed Natural Heritage Areas (pNHAs); and
- There are no Natural Heritage Areas (NHAs) within 15km of the Study Area.

Shannon Airport Lagoon represents a key constraint, owing to the proximity of this site to the constraints area and that it may represent important habitat for special conservation interest (SCI) bird species from River Shannon and River Fergus Estuaries SPA.

Two existing culvert water crossings hydrologically link the N19 to the Shannon Estuary (designated as River Shannon and River Fergus SPA, Lower River Shannon cSAC and Fergus Estuary and Inner Shannon, North Shore pNHA). This hydrological link coupled with the proximity (0km) to the Shannon Estuary, may result in the requirement for a Natura Impact Statement.

The ecological sites identified are likely to support populations of a range of flora and fauna.

The following are a list of the flora and fauna constraints associated with the constraints area:

- Flora:
    - Meadow Barley (*Hordeum secalinum*) which is protected under the Flora (Protection) Order, 2015 and rated as Vulnerable as been recorded within 10km of the constraints area.
    - Bee Orchid (*Ophrys apifera*) which is rated as Near Threatened has been recorded within 2km of the constraints area.
    - Opposite-leaved Pondweed (*Groenlandia densa)* (Flora Protection Order species) has been recorded in a canal connected to Shannon Airport Lagoon.

- Invasive Flora:
    - Himalayan Knotweed (*Persicaria wallichii*), a Medium Impact invasive species regulated under Regulation S.I. 477; Reg 49 and 50, recorded within 10km of the constraints area.
    - Japanese Knotweed (*Fallopia japonica)*, a High Impact invasive species regulated under Regulation S.I. 477; Reg 49 and 50, recorded within 10km of the constraints area.
    - Red-osier Dogwood (*Cornus sericea*), Amber List/Uncertain Risk species, recorded within 10km of the constraints area.

- Birds:
    - Four Annex I (Birds Directive) species and protected under the Wildlife Acts have been recorded within 2km of the constraints area; Common Tern, European Golden Plover, Little Egret and Sandwich Tern.
    - Six red listed species (and protected under the Wildlife Acts) were recorded within 2km of the constraints area; Black-headed Gull, Dunlin, Eurasian Curlew, Herring Gull, Meadow Pipit, Northern Lapwing.
    - Fourteen amber listed species (and protected under the Wildlife Acts) recorded within 2km of the constraints area; Barn Swallow, Common Redshank, Common Sandpiper, Common Shelduck, Common Snipe, Common Starling, Common Swift, Eurasian Oystercatcher, European Robin, House Sparrow, Lesser Black-backed Gull, Mew Gull, Red Knot and Sky Lark.
    - Noise, vibration and overall disturbance will need to be fully considered in relation to any mobile bird species that might use habitats within or nearby to the constraints area (especially Shannon Airport Lagoon).
    - Some SCI bird species are winter migrants and thus, a strong constraint is that works take place outside of the winter season (October to March) to avoid disturbance.

- Terrestrial Mammals:
    - European Otter (*Lutra lutra*), protected under the Wildlife Acts and Annex II and IV listed of the Habitats Directive, has been recorded within 10km of the constraints area and is a qualifying interest of the Lower River Shannon cSAC (site code: 002165).

- Irish Hare (*Lepus timidus subsp. Hibernicus*), protected under the Wildlife Acts and Annex IV listed (Habitats Directive), has been recorded within 2km of the constraints area.
- Pine Marten (*Martes martes*), protected under the Wildlife Acts and Annex V listed (Habitats Directive) has been recorded within 10km of the constraints area.
- Three mammals solely protected under the wildlife act and of Least Concern have been recorded within 10km of the constraints area; Eurasian Badger (*Meles meles*), Irish Stoat (*Mustela erminea subsp. Hibernica*) and Red Deer (*Erinaceus europaeus*).
- Hedgehog (*Erinaceus europaeus*) solely protected under the Wildlife Acts and of Least Concern has been recorded within 2km of the constraints area.

- Bats:
  - Six species of bat protected under Annex IV of the Habitats Directive and Wildlife Acts and of Least Concern have been recorded within 10km of the constraints area; Brown Long-eared Bat (*Plecotus auritus*), Daubenton's Bat (*Myotis daubentonii*), Lesser Noctule (*Nyctalus leisleri*), Pipistrelle (*Pipistrellus sensu lato*), Soprano Pipistrelle (*Pipistrellus pygmaeus*) and Lesser Horseshoe Bat (*Rhinolophus hipposideros*). The Lesser Horseshoe Bat is also protected under Annex II of the Habitats Directive.

- Other Taxa:
  - Common Frog (*Rana temporaria*), protected under Annex V of the Habitats Directive and the Wildlife Acts, is of Least Concern and was recorded within 10km of the constraints area
  - Smooth Newt (*Lissotriton vulgaris*) protected under the Wildlife Acts, is of Least Concern and was recorded within 2km of the constraints area
  - Common Lizard (*Zootoca vivipara*) protected under the Wildlife Acts, is of Least Concern and was recorded within 10km of the constraints area

4.3.1.3 Hydrology and Water Quality

Key constraints within the Study Area in relation to Hydrology and Water Quality include:

- Two existing culvert water crossings (The Urlan Beg Stream and Clonloghan Stream) cross beneath the existing N19 and discharge into the Upper Shannon Estuary;
- Potential interactions with receiving water in terms of the conservation importance and current water quality of the river;
- The study area is within Shannon Area of Further Assessment (AFA) and Shannon Airport Individual Risk Receptor (IRR) as defined in the CFRAM Programme. Wall and embankments are proposed as potentially viable flood relief measures for these zones;
- Clare County Council Climate Change Adoption Strategy 2019-2024 requires proposed developments to ensure that areas at risk of flooding are clearly identified and that inappropriate development does

not take place within areas that are at risk of flooding. Proposed developments shall mitigate the risk and impact of flooding;

- Reconstruction works are due on the East and West Coastal Embankments, which are essential to the protection of Shannon Airport. The timing may overlap with the proposed N19 Shannon Airport Access Road Improvement Scheme.

4.3.1.4 Landscape and Visual

The Landscape and Seascape Character Areas in the study area include:

- Landscape Character Area – (LCA10) Sixmilebridge Farmland;
- Landscape Character Area – (LCA14) Fergus Estuary;
- Heritage Landscape – Heritage Landscape;
- Working Landscape – Shannon Estuary Working Landscape; and
- Seascape Character Area – (12) Fergus Estuary.

There are a number of significant landscape and visual receptors within the Study Area ranging of regional and local importance:

- Heritage Landscape
  - County level designation applied along shoreline of River Shannon;
- Seascape Character Area 12 - Fergus Estuary
  - Identified in the Clare Seascape Character Assessment;
- Important Green / Amenity Area OS6 – Drumgeely Hill
  - Amenity green area identified in the Local Area Plan set amongst residential dwellings on Drumgeely Hill;
- Recreational Route
  - Free Zone / Estuary Walkway identified in the Local Area Plan;
- Shannon Loop Yellow Route
  - Route for cycling or walking likely to be formalised.

4.3.2 Summary of Artificial Constraints

The following is a summary of the key Artificial Constraints that were identified during the Constraints Study.

4.3.2.1 Topography & Landscape

The key constraints in relation to Topography and Landscape are:

- Generally, the landform is flat and gently falling towards the River Shannon. The landscape is generally managed grassland and some ornamental planting at Shannon Free Zone and the Drumgeely apartment blocks;
- The eastern and southern perimeter of the Study Area is dominated by the River Shannon Estuary with a pronounced hill to the southeast of Drumgeely Roundabout; and
- The western perimeter consists predominately of built environment including Shannon Airport and the Shannon Free Zone.

4.3.2.2 Rivers and the Coastal Domain

The key constraints in relation to Rivers and the Coastal Domain are:

- The study area is reclaimed swamp land circa 1940-50s and is enclosed by an embankment.
- Drainage is collected in two channels with culverts under the existing road;
    - The northern channel discharges directly to the River Shannon through a sluice gate non-return valve;
    - The southern channel discharges through a pump station maintained by Shannon Airport into the Lagoon.

4.3.2.3 Roads, Railways, Public Transport, Ports, Airports, etc.

The key constraints in relation to Roads, Railways, Public Transport, Ports, Airports are:

4.3.2.3.1 Roads

- The existing N19 bisects the Study Area and connects the M18 at the Shannon Interchange to Shannon Airport. The proposed improvement scheme is 2.2km long and extends from the Drumgeely Roundabout to the Knockbeagh Point Roundabout;
- The cross section is predominantly single carriageway with inconsistent speed limits varying from 40kph to 50kph to 60kph;
- Overtaking opportunities in both directions are infrequent and short in length;
- Within the Study Area the N19 has three roundabout junctions (Drumgeely, Shannon Free Zone West and Knockbeagh Point) and a T-intersection at the Drumgeely Hill Apartments; and
- The existing operational and safety issues, are described in Section 2.2.

4.3.2.3.2 Railways

- There are no existing railways within the study area;
- The Draft Clare County Development Plan 2023–2029 includes reference to a Shannon Rail Link. The draft Pan notes that "*The N19 National Road and the undefined infrastructural safeguard of the proposed Shannon Rail Link are located in close proximity. The delivery of the N19 National Road upgrade is a priority of Clare County Council and should take precedence over other infrastructural projects along its route delivering on the significant exchequer investment already made in scheme planning and design.*"
- Objective CDP11.7 (b) of the draft Plan sets to "*To facilitate a proposed Shannon Rail Link which does not inhibit the N19 National Road Upgrade*."

4.3.2.3.3 Public Transport

- Three scheduled bus services operate to and from Shannon Airport;
- Two of these bus services are Expressway services, and only stop at one point in the vicinity of the Study Area, Shannon Airport itself. Both services travel along the N19;
- The remaining bus services is a local route which serves the Airport but also serves stops in the adjacent Shannon Business Parks and Shannon Town. There is one bus stop for this route on the N19 just east of Knockbeagh Point Roundabout;
- There is a taxi rank at the airport and the operators of same must use the existing N19 National Primary Route as the only public access serving the airport;
- The airport is heavily reliant on private coach operators for the collection and return of passengers serving European and Transatlantic flight operators.

4.3.2.3.4 Airports

- The existing N19 National Primary Route is the only public access serving Shannon International Airport;
- The airports operations and infrastructure consisting of terminal buildings, runways, hangers, parking facilities and services are within or adjacent to the Study Area.

4.3.2.4 Waste

Any large infrastructure project has the potential to generate waste of different types. There will be a requirement to remove, dispose, process, and store waste material as part of the proposed scheme. Management of waste will need to be undertaken in accordance with the relevant European, national, regional and local legislation and guidelines.

Waste material will be primarily generated from two main sources:

- Surplus excavated materials resulting from earthwork excavations and general site clearance (including potential demolition works). Where excavated material is deemed unacceptable for re-use, it will be necessary to remove off-site for disposal or for processing, where a waste permit / certificate of registration from the applicable authority will be required.
- Wastes generated from general construction activities including waste oils from plant and machinery, general waste from site office accommodation, etc.

There are no licensed waste management facilities in the environs of the study area. As the project progresses through route selection and EIAR, waste management will be assessed. TII have published 'Management of Waste from National Road Construction Projects', which sets out the legal framework in relation to the management of waste and sets out good practice to ensure that effective waste management is a priority through the design and construction stages of national roads projects.

4.3.2.5 Traffic

The key constraints in relation to Traffic are:

- Traffic counts have been conducted between Drumgeely and SFZ Gateway West roundabouts and show an average daily flow of ca. 8,279 vehicles per day AADT with 6% heavy vehicles;
- Traffic counts were also conducted between Knockbeagh Point Roundabout and the Gateway West roundabout and show a flow of 4,243 vehicles per day AADT;
- Traffic flows to and from the airport tend to be concentrated into short periods of the day, before and after the arrival and departure of large passenger aircraft and before and after changes of shift; and
- Passenger-related trips are also seasonal, with later August being the busiest period.

4.3.2.6 Planning and Landuse

The key constraints in relation to Planning and Landuse are:

- The upgrade/extension of the N19 to Shannon Airport is identified as a project priority in the Clare County Development Plan 2017 – 2023, as varied, and its inclusion in the Southern Regional Spatial and Economic Strategy and the LSMATS reinforces this local policy priority;
- The Shannon Airport Rail Link Corridor, as contained in the Clare County Development Plan 2021-2030, is identified as a route to be safeguarded from development or other activities that would compromise its future development;
- Any alteration to the rail line infrastructure safeguard route will be subject to an amendment to the Shannon Town and Environs LAP 2012- 2018 and a variation to the Clare County Development Plan 2021- 2030, or any future version of either of these documents;
- A large section to the west of the study area is zoned as 'Airport' with no specific land use definition detailed in the Shannon Town and Environs Local Area Plan;
- The lands of the study area located outside of the 'Airport' designation and road corridor area include zonings for Enterprise (E1 & E4), Community (C1 & C17), Light Industry, Open Space (OS6) and Existing Residential;

- Potential conflict may arise to the various land uses due to access constraints during the construction of the N19 upgrades;
- The core land uses which rely on the N19 route for access are the airport and ancillary uses located in and around the airport terminal area, and the Shannon Free Zone Business Park where two of the primary access points are located on the N19;
- Access to residential areas will be impacted however, an alternative route is available; and
- Airport Enterprise Site E4 and Community Site C17, both located between the N19 and the Shannon Estuary, may become segregated if appropriate access is not provided during the design phase of the project.

4.3.2.7 Air and Climate

The key constraints in relation to Air and Climate are:

- The major source of air pollution within the study area is road and airport traffic;
- There are eight IPPC/IED licences issued by the EPA for facilities with emissions to the atmosphere within 1km of the scheme;
- The Clare County Council Climate Change Adaption Strategy 2019 recommends that infrastructure plans should support sustainable modes of transport, such as walking and cycling, through promotional strategies and the provision of infrastructure where required; and
- Currently there are no dedicated off-road cycle facilities while facilities for pedestrians require significant improvement to meet current design standards.

4.3.2.8 Noise and Vibration

The key constraints identified in relation to Noise and Vibration are:

- The baseline noise environment is comprised of ground operation and aircraft noise from Shannon Airport, noise from traffic on the existing N19 and local road traffic noise within the housing and industrial estates;
- Most of the noise sensitive locations within the study area are located in the housing estates south of the existing N19 and the residential properties adjacent to the Shannon Town Roundabout; and
- The area north of the existing N19 is largely industrial and some manufacturing processes may have vibration sensitive equipment that may result in issues during construction.

4.3.2.9 Archaeological, Architectural and Cultural Heritage

The key constraints in relation to Archaeological, Architectural and Cultural Heritage are:

- The overall Study Area contains a total of 22 archaeological, architectural or cultural heritage sites of significance;

- None of these sites are National Monuments or Sites Subject to a Preservation Order, Recorded Monuments (RMPs), Protected Structures (PS) or sites included in the NIAH;
- The identified sites comprise 10 townland boundaries and 12 unregistered cultural heritage sites; and
- The unregistered cultural heritage sites include five vernacular buildings or building clusters, four embankments related to historic coastal defences, two wells and the site of a former navigation beacon for the Shannon Estuary.

4.3.2.10 Population and Human Health

The key constraints in relation to Population and Human Health are:

- The population of Shannon Town is wholly located to the east of the N19. Lands zoned for future residential development are not located in proximity to the N19 study area;
- Shannon Town has a range of community, social, cultural and recreational facilities supporting residential amenity throughout the town. The Drumgeely neighbourhood centre is located in proximity to the N19 scheme;
- Economic activity in the study area is focused on Shannon Airport and Shannon Free Zone West. This area is considered a significant employment centre for the region;
- Upgrade of the N19 has the potential to impact on economic activity at the Shannon Free Zone and Shannon Airport as a result of potentially restricted access during the construction phase of the project;
- The population of Shannon Town has generally good or very good health as indicated by CSO statistics, and therefore is therefore not considered an 'at risk community'; and
- There are 3 no. Seveso sites within 2km of the study area.

4.3.2.11 Material Assets – Non-Agricultural

The key constraints in relation to Material Assets – Non-Agricultural are:

- Shannon International Airport is located to the south and west of the N19. The airport infrastructure includes Terminal Buildings, hangers, parking facilities, runways, fuel farm, internal services and utility connections;
- There is a requirement to ensure a 3m clearance from the existing boundary fence line to driven or stationary vehicles;
- Shannon Free Zone is a Business Park located to the west of the N19. Located on 600 acres, over 200 buildings house more than 150 companies;
- Phase 2 of Shannon Commercial Properties phased development plan will see 650,000 sq. ft. of commercial and industrial building completed by 2023;
- Phase 3 of the development plan will see 700,000 sq. ft. of commercial and industrial building completed from 2024 to 2028;
- There are a series of apartment blocks located to the east of the N19 at Drumgeely Hill at a higher elevation to the existing road and with a steep local access from the N19. These apartments have an alternative access through Shannon Town to the N19;

- There are various individual businesses with direct access off the existing N19, particularly along the later section of the scheme immediately east of Knockbeagh Point Roundabout. All of these accesses contribute to reduced safety and reduced service level along the route; and
- There is a security hut located on the N19 in the centre of the existing road. This is used by the Gardai when required and will need relocating in agreement with them.

In addition to the above Material Assets there are a number of utility services that may affect the scheme. The key constraints in relation to utilities are:

- In relation to the ESB network, there is a significant underground service that feeds Shannon Airport including the control tower as well as Shannon Free Zone. The service is a 185mm copper cable with approx. 600mm cover running predominantly along the southern side of the existing N19. Other major infrastructure includes 2 number 38kv and one number 110kv stations as well as a number of sub-stations of which two are of particular concern – Shell and East Hanger. ESB also noted that the distances between sub-stations is critical.
- The ESB currently have no plans for major works or alterations and all future changes will be driven by connections/development.
- In relation to Gas Networks Ireland (GNI), there is a significant underground service that feeds Shannon Airport and Shannon Free Zone. The service is a 180mm diameter main with approx. 600mm cover running in the grass verge predominantly on the northern side of the existing N19 parallel to the existing fence.
- GNI currently have no plans for major works or alterations and all future changes will be driven by connections/development.
- In relation to the telecommunication network, there is a significant underground Eir service that feeds Shannon Airport including the control tower as well as Shannon Free Zone. The service varies depending on location and is comprised of:
    - 4 no. concrete ducts and 4 no 100mm waving from Flats to Roundabout;
    - In grass verge on LHS up to roundabout then crosses road and on RHS up to airport;
    - Note 3 or 4 Fibreoptic services – copper cable with nominal 2ft 6inch cover.
- Other major Eir infrastructure in the study Area includes a number of cabinets;
- Eir currently have no plans for major works or alterations.
- Irish Water services within the Study Area include a number of N19 road crossings, a pump station and a foul rising main. The foul rising main is asbestos concrete and its location has not been provided on drawings received from Irish Water;
- Irish Water currently have no plans for major works or alterations however existing services are old (circa 1970) and a DAP has been commenced which will eventually determine necessary future upgrade works; and
- Shannon International Airport noted that it has its own treatment plant and water supply contained within the airport lands. Also noted is that the runway runoff is collected in various drainage pipes which cross the existing N19 and connect to the open drainage channel.

4.3.3 Summary of External Parameters

The following is a summary of the key External Parameters Constraints that were identified during the Constraints Study. Further information on these constraints are contained in Appendix A (Constraints Report).

4.3.3.1 Funding and Scope

- In terms of funding, it has been assumed at this initial stage that the N19 Shannon Airport Access Road Improvement Scheme will be 100% Irish Exchequer funded. EU grants or developer contributions have not been identified at this stage;
- TII PAG guidance, reflecting the Public Spending Code requirements, sets out the required level of appraisal based on the expected level of capital expenditure. At this Options Selection Stage, the Option Cost Estimates (OCE) have been signed off by TII. The scheme has been appraised in line with the procedures as set out in TII PAG suite of Documents relating to Major Schemes; and
- The proposed scheme is not dependent on the delivery of any other scheme. It is intended that the delivery of the scheme will be such that its implementation can be carried out without dependency on any other scheme.

4.3.3.2 European Requirements/Standards

The European, national, regional and local policy documents relevant to the N19 Shannon Airport Access Road Improvement Scheme have been identified and outlined in Section 2.1 – Strategic Fit and Priority of the Project of this Report. The scheme has been identified as being compatible with the identified documents.

4.3.3.3 Design Standards

An application for approval to use DMURS as the adopted standard for the design of the road cross section, the junction design and the geometric/alignment design has been accepted by TII. All other road elements, including drainage, VRS, structures etc. shall be designed in accordance with TII Publications standards.

The proposed road has the following characteristics:

- The design speed is 60km/hr.
- The cross- section consists of two bus lanes of 3.25m width and two traffic lanes of 3.25m width.
- The existing junctions are designed to DMURS with priority given to Active Travel.
- A 4m wide cyclist/pedestrian shared facility is provided on the estuary side of the road designed to the NTA National Cycling Manual.
- The number of accesses is to be minimised as much as possible in consultation with the relevant landowners

4.3.3.4 Construction Phasing

Access to Shannon International Airport, the Shannon Free Zone and other businesses and premises must be maintained at all times during the construction of the project. This will necessitate extensive traffic management and phased construction.

There are critical utilities whose service cannot be disrupted, particularly the fibre-optic cable to the Control Tower, and this may necessitate an early works contract for diversion of affected services.

4.3.3.5 Procedural & Legal Requirements

The scheme will have to be developed within the constraints of the existing roads, procurement and environmental legislation and of the documents produced in conformity with this body of legislation. The Roads Act 1993 and the Roads Regulations 1994 indicate that a formal Environmental Impact Assessment Report for the scheme is necessary. The road authority is required to advise the Minister in accordance with the Roads Act 1993. The Environmental Impact Assessment Report and the Compulsory Purchase Orders (if deemed necessary) will require assessment by An Bord Pleanála.

4.3.3.6 Airport Operation Constraints

Options and alternatives that impinge on the safe operation of the airport in line with aviation industry good practice are considered out of scope.

5 CONSIDERATION OF OPTIONS

5.1 Introduction

As part of TII Phases 0 (Scope and Pre-Appraisal) and 1 (Concept and Feasibility) consideration of alternatives and options was undertaken. These alternatives and options were further identified, developed and assessed as part of TII Phase 2 (Option Selection), which is documented in the sections below.

The consideration of alternatives and options was undertaken in accordance with the TII's PAG Unit 4.0– Consideration of Alternatives and Options (October 2016) and TII's PMM. The following alternatives and options were identified, developed and assessed:

1) Do-Nothing Option
2) Do-Minimum Option ('The Base Case' as per the PAG)
3) Do-Something Option – Feasible Route Corridor Options

The alternatives and options were assessed against how they would meet and respond to the defined Scheme Objectives, which as per Section 2.2 - Project Specific Need above were informed by the identified existing deficiencies and strategic policy. With reference to Section 1.5 – Project Operational Goals of this Report, the Scheme Objectives Headings are as follows:

- Economy
- Safety
- Physical Activity
- Environment
- Accessibility & Social Inclusion
- Integration

It is noted that as part of the initial stage of the Option Selection Process, Stage 1 - Preliminary Options Assessment, the alternatives and options listed above were assessed as documented in the sections below.

5.2 Do-Nothing Option

In accordance with the Project Appraisal Guidelines for National Roads Unit 4.0 - Consideration of Alternatives and Options - PE-PAG-02013 Table 4.2 - The Do-Minimum is the Base Case unless there are no other schemes that will be delivered during the appraisal period that are considered as part of the Do-Minimum, in which case the Do-Minimum will effectively be a Do-Nothing Scenario.

At this stage there appear to be no committed transport projects within the N19 corridor thus for this scheme the Do-Minimum is effectively a Do-Nothing Scenario.

5.3 Do-Minimum Option

The Do-Minimum is the option which provides the baseline against which the merits of various proposed improvements are measured and for establishing the economic, integration, safety, environmental and accessibility impacts of all scheme options.

Being the baseline against which all impacts are measured, the Do-Minimum by definition has zero impact, and thus does not itself appear in the results table showing the impacts of each option.

In the Do-Minimum option there is assumed to be no change made to the base year network. The option therefore includes the costs of maintaining the road network in line with TII standards for maintenance of a national route. Trips to and from any land use developments are assumed to access the road network at existing access points.

5.4 Do-Nothing / Do-Minimum Option – Conclusion

Further to identifying and assessing the operational and safety issues of the existing N19 Shannon Airport Access Road under the headings of Existing Road Layout, Existing Road Condition, Traffic Capacity, Journey Reliability, Vulnerable Road Users, Collision Occurrence, and Overtaking Opportunities on the Existing Road Infrastructure, it was considered that this existing section of the N19 presents significant infrastructural deficiencies, and significant operational and safety issues. As traffic volumes increase into the future, it is likely that these deficiencies and issues will be further exacerbated, and the safety and operational performance of the existing road would further deteriorate.

In terms of comparing the Do-Nothing / Do-Minimum Option against the Project Operational Goals (See Section 1.5 of this Report), it is assessed that the Do-Nothing Option, with the exception of Environment, does not meet the Scheme Objectives. In the case of Environment, for the purposes of this assessment, it is considered that Do-Nothing / Do-Minimum Option could potentially meet the environmental scheme objectives, as no significant works would be undertaken, other than regular maintenance, and hence no significant impacts to the environment would be generated. The Do-Nothing Option does not meet the remaining five Scheme Objective Headings as described below:

Economy:

- The Do-Nothing / Do-Minimum Option would use the existing N19 road infrastructure. Therefore, journey times, and consequently travel costs would not reduce and would likely increase into the future, as traffic flows are expected to increase.

Safety:

- The Do-Nothing / Do-Minimum Option and the existing road infrastructure will not provide any new safe overtaking opportunities, a reduction in the existing number of junctions or new opportunities/facilities for vulnerable road users. Consequently, without these improvements and the provision of an overall safer road to current design standards, the Do-Nothing / Do-Minimum Option would not contribute to an increase in safety.

Physical Activity:

- As identified previously, the existing section of the N19 between Drumgeely Roundabout and Knockbeagh Point Roundabout does not provide any formal dedicated facilities for cyclists and facilities for pedestrians require significant improvement to meet current design standards. The Do-Nothing / Do-Minimum Option will not provide for any new opportunities for vulnerable road users, and/or any new or improved safe and accessible pedestrian and cycle routes.

Accessibility & Social Inclusion:

- The Do-Nothing / Do-Minimum Option will not improve journey times and journey reliability on the existing section of the N19, and it is likely that journey times will increase as traffic flows increase on the existing infrastructure. Consequently, there is no opportunity to improve and support existing bus transportation in the Study Area. Also, as there will be no improvement to the existing infrastructure, under the Do-Nothing / Do-Minimum Option, there will be no opportunity to enhance accessibility to essential services.

Integration:

- With existing N19 road infrastructure staying the same, and its identified existing operational and safety issues, the Do-Nothing / Do-Minimum Option will not provide improvements to the strategic connectivity and transport links between Shannon Airport and the Mid-West region. In terms of strategic capacity, the existing infrastructure will not be able to maintain and enhance traffic capacity at the major junction locations on this section of N19 corridor, as the existing junction layouts are currently experiencing capacity issues and are likely to exceed capacity in the future.
- In relation to land use objectives and European policy, the N19 is considered part of the Comprehensive network within Ireland and it is therefore EU policy that the N19 should be high-quality infrastructure. National transport policy recognises Shannon International Airport as a key airport and aims to prioritise “improved connections to key seaports and airports”. National policy also supports investment to facilitate the airport fulfilling its role as a business gateway and encouraging foreign direct investment in the SFZ. National sustainability policy envisages a continuing role for aviation, with improved access to airports by bike and by public transport, with many local commuting journeys switching to cycling and walking. Improved surface access to Shannon International Airport and encouraging foreign direct investment in the SFZ are seen as priority issues in regional plans. The development of an improvement/upgrade of the N19 providing access to Shannon International Airport is an objective of the Clare County Development Plan. The promotion of walking and cycling in the vicinity of Shannon Airport and Shannon Free Zone plays an intrinsic part of the overall Green Infrastructure Strategy contained in the Shannon Town and Environs Local Area Plan. Therefore, with all levels of policy supporting a proposed N19 Shannon Airport Access Road Scheme, a Do-Nothing / Do-Minimum Option was not considered to be compatible with EU, national, regional and local land use objectives.

In conclusion, with the exception of potentially meeting the environmental objectives, it was been determined that the Do-Nothing / Do-Minimum Option failed to meet all of the Scheme Objectives for the remaining five objectives (Economy, Safety, Physical Activity, Accessibility & Social Inclusion, and Integration). Therefore, overall, it was assessed that the Do-Nothing / Do-Minimum Option fails to meet all of the Scheme Objectives and were discounted as a viable solution to meet the Scheme Objectives.

5.5 Do-Something Option – Feasible Route Corridor Options

TII's PAG Unit 4.0 defines a Feasible Route Corridor as 'a corridor improvement (which) can be delivered through a major investment to widen an existing road, or to develop a new alignment'.

As per the TII's PMM, Route Corridor Options are to be 'developed to an appropriate level of detail to facilitate a systematic assessment of the potential impacts upon the findings of the constraints study'.

Section 6 of this Report details the Phase 1 Preliminary Options Assessment initial sifting process to decide which options were to be taken froward to appraisal in Phase 2.

The Phase 2 appraisal namely being Stages 1 to 3 of the Option Selection Process (TII's PMG Phase 2) is described in detail in Section 7 to 9 of this Report.

5.6 Consideration of Alternatives and Options – Conclusion

The Do-Nothing / Do-Minimum Option was determined to not meet the Scheme Objectives and was discounted, however in line with the PAG Unit: 4.0 Consideration of Alternatives and Options the Do-Nothing / Do-Minimum option shall be brought forward from the Stage 1 - Preliminary Options Assessment process.

6 PHASE 1 – PRELIMINARY OPTIONS ASSESSMENT

6.1 Introduction

A list of potential feasible route corridor alternatives and options were drawn up at the Phase 1 Workshop 1 that might meet the objectives of the scheme. The study area was expanded for to cover the area encompassed by the list of alternatives and options identified. These options were outlined, assessed and an initial sifting undertaken to determine which options should be taken forward to Phase 2.

6.2 Description and Development of the Stage 1 Options

6.2.1 Phase 1 Workshop 1

TII - PAG *Unit 4.0: Consideration of Alternatives and Options* provides guidance on the process for identifying alternatives and options once the need for intervention has been established.

To facilitate the assessment of alternatives and options the Phase 0 Study Area was reviewed at the Phase 1 Workshop 1 (for reviewing and challenging the Project Brief, Project Execution Plan and the consultants proposed approach to transport modelling, ground investigation, service diversions and traffic management arrangements to avoid disruptions to airport services) in the light of a list of potential alternatives and options that were drawn up at the Workshop that might meet the objectives of the scheme. The study area was expanded for Phase 1 to cover the area encompassed by the list of alternatives and options identified. **Table 6-1** lists the possible measures identified.

Table 6-1: Wide Range of Measures Considered

No.	Infrastructure Options in Alternative Corridors:	
1	New public road for access to Shannon International Airport from the West	
2	Emergency vehicle access onto Airport property at the north side of the airport	
3	New route running broadly along the line of the existing boundary fence east of the airport and west of the Free Zone	
4	Tunnel under the airport	
5	Upgraded access to the Free Zone from the north, so as to reduce traffic using the existing Drumgeely and West Gateway roundabouts	
	Alternative Modes:	
6	Heavy rail route to airport	
7a	Park-and-ride site near M18/N19 junction, with onward service to the airport by:	Light Rail
7b		Bus
7c		A pool of autonomous vehicles
	Alternative Modes:	
8	Improve footpath and cycleway to airport	
9	Package of bus, cycleway & footpath improvements to Shannon Free Zone West to reduce demand for car travel	
	Demand Management Alternatives:	
10	Package of improved bus service to the airport & increased parking charges at the airport, so as to reduce car traffic on N19	
10a	Package of mobility management measures at Shannon Free Zone West, so as to reduce car traffic on N19	
11	Tolling of airport access road to encourage mode-switching	
	Road Options to Improve Existing Corridor:	
12	Upgrade road to design standards broadly along the line of the existing N19.	
13a	Improvements to junctions along the existing N19	Including grade separation
13b		At-grade junctions only

Each measure is illustrated and discussed in more detail in Section 6.3 below.

For clarity, each type of measure was considered initially as an independent proposal. Possible combinations of these measures are discussed in Section 6.5 below.

TII PAG Unit 4.0 makes a distinction between options (possible measures that are within the existing remit of TII) and alternatives (measures that are for other agencies to implement or that would require new legislation). However, for convenience, in this Report each of the measures in the above table is considered to be an option.

6.2.2 Do-Minimum

TII PAG Unit 4.0 notes that the Do-Minimum is an option which provides the baseline for establishing the economic, integration, safety, environmental and accessibility impacts of all scheme options.

Being the baseline against which all impacts are measured, the Do-Minimum by definition has zero impact, and thus does not itself appear in the results table showing the impacts of each option.

The Do-Minimum includes the following features:

- The maintenance of existing facilities and services in the study corridor and region;
- The completion of committed projects in the study corridor; and
- The continuation of existing transportation policies.

6.3 Preliminary Appraisal of Options

The Common Appraisal Framework recommends a two-stage appraisal process: *"A preliminary assessment of the costs and benefits should be undertaken of the options. The options are then sifted for the better performing options to be taken on to the detailed appraisal stage".*

This section presents the preliminary high-level appraisal of each of the options listed above, that was carried out at feasibility stage, with the aim of identifying a better-performing set of options to take forward to detailed appraisal (including traffic modelling and cost-benefit analysis) at Option Selection stage.

Each measure was appraised against each of the scheme objectives, using a standard 7-point scale.

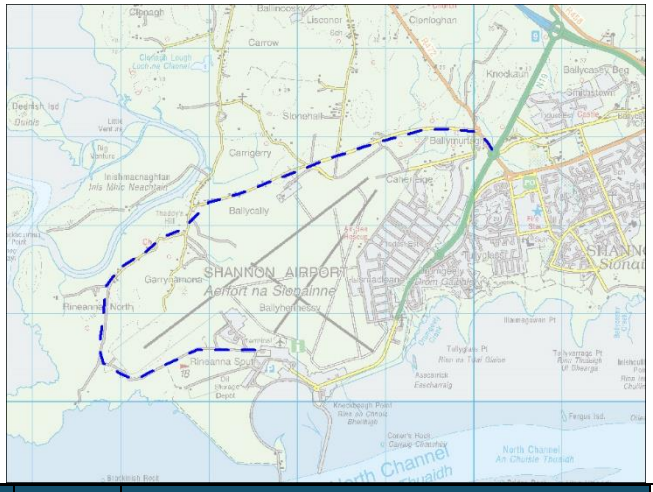
Table 6-2: Scale Used for Preliminary Appraisal

Rating	Impact on objective
✓✓✓	Highly or strongly positive
✓✓	Moderately positive
✓	Slightly positive
-	Minimal or negligible
X	Slightly negative
XX	Moderately negative
XXX	Highly or strongly negative

6.3.1 Option 1 – New Western Access to Airport

This option would upgrade the existing "back road" to the airport to modern highway standards, so as to provide a second access route between the airport and the M18.

Such an option would be around 3km longer than the existing route. The scheme might perhaps include Variable Message Signs to direct traffic to use the longer access route in busy periods and the existing more direct route in quieter periods.



Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓	Limited time savings to SFZ West through reduced congestion on existing route
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓✓✓	Having two independent routes to the airport gives a high level of resilience in the face of incidents or congestion.
3	To achieve value for money from investment in the project	XX	New route is approx. 3km longer, so unlikely to be major time saving benefits
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	✓✓	In an emergency one route could be closed to traffic to give max access for emergency vehicles.
5	To reduce the frequency of transport collisions within the N19 corridor	X	Likely increase in collisions – resulting from the need to maintain access to local roads north of the airport plus the net effect of an increase in vehicle-kilometres (which will increase collision numbers) and need to maintain access to properties north/west of airport verses an improvement in route quality (which will decrease collision numbers).
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	-	Cyclists unlikely to choose to use a route that is 3km longer
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	XXX	Significant construction impacts and land-take, removal of hedgerows etc., with probable increase in resulting emissions

8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	✓	Buses benefit from limited time savings through removal of congestion on existing route. Minimal benefit for walkers and cyclists.
9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	✓	Single-carriageway road with multiple property accesses would be little improvement over existing N19.
10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	✓	New route improves perceived attractiveness of the airport, consistent with the Strategy

Summarised conclusion – option 1 would result in an overly long and circuitous route at significant cost.

6.3.2 Option 2 – New Emergency Vehicle Access

This option was conceived as providing a new secure gateway in the airport perimeter fence at the northern end of the airport, allowing emergency vehicles access from a lightly used public road onto the airport property, in order to respond rapidly to an incident in the terminal or onboard an aircraft on the taxiway, thereby avoiding the need for emergency vehicles to use the N19.

Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	-	Measure does not address this
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓	Small impact on reliability in the event of incidents
3	To achieve value for money from investment in the project	✓✓	Relatively low-cost with the potential to save lives
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	✓✓✓	More direct route, avoiding entrances to SFZ West
5	To reduce the frequency of transport collisions within the N19 corridor	-	Measure does not address this
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	-	Measure does not address this
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	-	Measure does not address this
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	-	Measure does not address this
9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	-	Measure does not address this

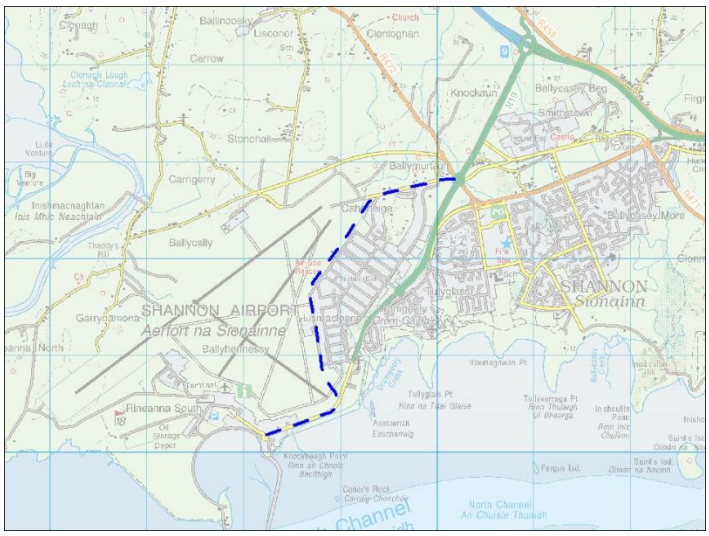
10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	-	Measure does not address this

Summarised conclusion – this is a specialised measure outside the usual range of transport planning solutions. It addresses only one issue, i.e. providing emergency access, and therefore does not address the full range of objectives of the proposed scheme.

Following consultation, it is understood that such a gateway exists, and that the Emergency Planning team at Shannon Airport are keeping under review the ease of access through the gate for emergency vehicles. This is therefore not a measure that the study needs to consider further, and it has been sifted out.

6.3.3 Option 3 – New Route between Airport and SFZ

This option would divert the N19 to run along the western edge of the SFZ (West), leaving the existing route for access to Shannon Town and the SFZ only. At least one intermediate junction would be required on order to give access to those aviation-related businesses within the perimeter fence.



Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓✓	Moderate time savings to SFZ West through removal of airport traffic from existing route
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓✓	Higher-quality route with greater separation from nonairport traffic, but still a single point of access in the event of incidents
3	To achieve value for money from investment in the project	XX	Significant costs – 4.1km route, & need to relocate Westair, with longer route to airport so limited benefits
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	✓	Higher-quality route improves access for emergency vehicles
5	To reduce the frequency of transport collisions within the N19 corridor	X	Likely increase in collisions - the net effect of an increase in vehicle-kilometres (which will increase collision numbers) verses an improvement in route quality (which will decrease collision numbers).
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	✓	Existing N19 more suitable for cyclists by removal of traffic
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	XX	Construction impacts and loss of existing trees, but most of the route is on the line of an existing road
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	✓	Bus gate on existing route? Easier to cross existing N19?

9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	✓✓	Higher-quality single-carriageway road
10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	✓	New route improves perceived attractiveness of the airport, consistent with the Strategy

Summarised conclusion – a traditional off-line road-building solution to bypass problem locations, but limited space to fit this into the landscape.

6.3.4 Option 4 – Tunnel under Airport

Of several possible tunnel alignments, the one considered most likely to be viable was this short tunnel under the runway to shorten a western access route to roughly the length of Option 3.

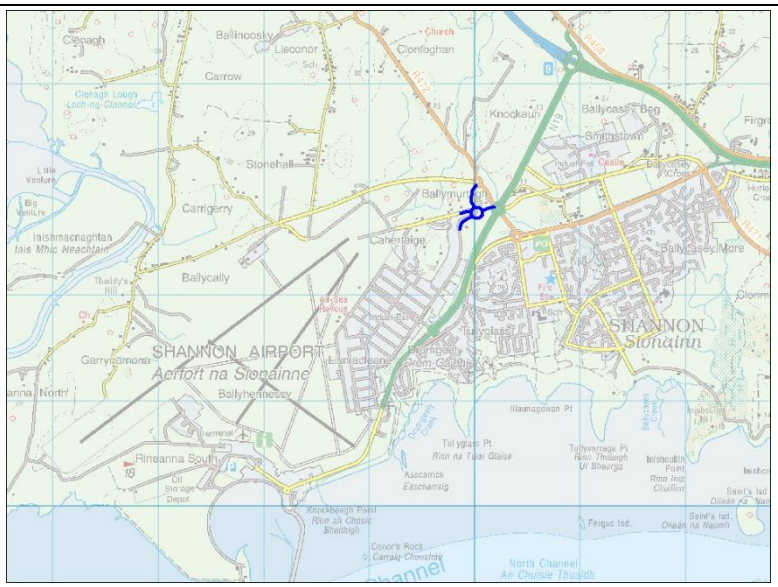
Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓	Limited time savings to SFZ West through reduced congestion on existing route.
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓✓✓	Having two independent routes to the airport gives a high level of resilience in the face of incidents or congestion
3	To achieve value for money from investment in the project	XXX	Time saving benefits are small and cost is very high; runway would need to remain in use during construction.
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	✓✓	In an emergency one route could be closed to traffic to give max access for emergency vehicles.
5	To reduce the frequency of transport collisions within the N19 corridor	X	Likely increase in collisions – resulting from the need to maintain access to local roads north of the airport plus the net effect of an increase in vehicle-kilometres (which will increase collision numbers) verses an improvement in route quality (which will decrease collision numbers).
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	-	Cyclists unlikely to choose to use a route that is longer and includes a tunnel
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	XXX	Significant land-take and severe construction impacts with earthworks
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	✓	Buses benefit from limited time savings through removal of congestion on existing route. Minimal benefit for walkers and cyclists

9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	✓	Single-carriageway road with limited junctions would be little improvement over existing N19, but would comply with standards
10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	✓	New entrance improves perceived attractiveness of the airport, consistent with the Strategy

Summarised conclusion – having ruled out the money-no-object versions, what remains is merely very poor value for money.

6.3.5 Option 5 – Improved Northern SFZ access

This option would improve the operation of the SFZ (West) access junctions at Drumgeely and Gateway West by providing an upgraded northern access to the industrial area for traffic from M18/N18. Replacing the existing gated entrance.



Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓✓	Easier access
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓	Slight reductions in congestion
3	To achieve value for money from investment in the project	✓✓	Relatively low-cost measure
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	✓	Slight reductions in congestion
5	To reduce the frequency of transport collisions within the N19 corridor	-	Reduced conflicts but overall scale of impact likely to be negligible
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	-	Measure does not address this objective
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	-	Slight land-take and construction impact balanced by slight reduction in emissions
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	-	Measure does not address this objective

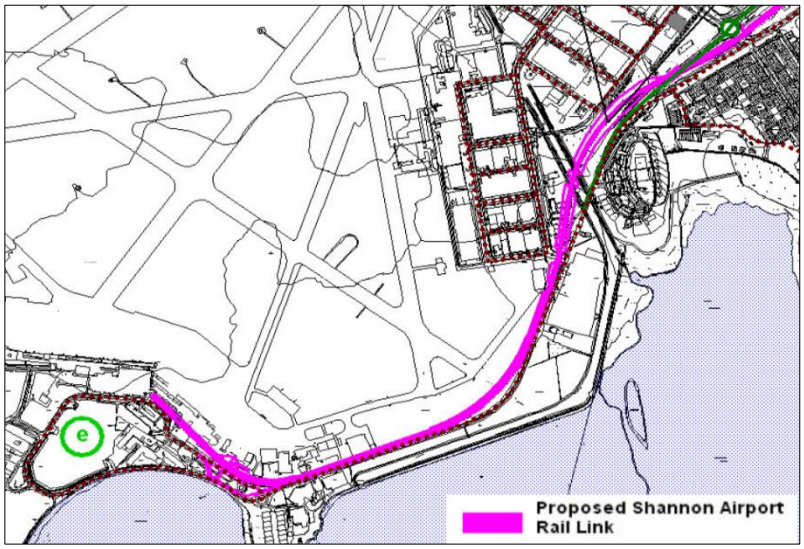
9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	-	Route quality unchanged
10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	✓	Increased attractiveness to foreign direct investment is consistent with the Strategy

Summarised conclusion – such an entrance would need to be taken forward primarily by Shannon Commercial Properties (acting in conjunction with the local highway authority insofar as the scheme affected the R472). It is understood that SCP do not wish to pursue this. This is therefore not a measure that the study needs to consider further, and it has been sifted out.

6.3.6 Option 6 – New Rail Link

This option was the subject of a 2007 study by Irish Rail.

The link is envisaged as a single-track spur from the Limerick to Galway rail line, with a 30-minute interval service calling at new stations at SFZ West and adjacent to the passenger terminal.



Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓✓	Substantial improvement in peak hour access times from the catchment area of stations on the line.
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓✓✓	Rail link would be a separate mode unaffected by road congestion or road accidents.
3	To achieve value for money from investment in the project	XX	Very high cost, not justified by scale of benefits at current levels of airport passenger throughput
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	✓	Reduces traffic levels to airport & thus lowers congestion
5	To reduce the frequency of transport collisions within the N19 corridor	✓✓	Rail is a very safe mode of travel
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	-	Measure does not address this objective
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	XX	Major construction project but reduced emissions in operation
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	✓✓	Substantial improvement in peak hour access times from the catchment area of stations on the line.
9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	✓✓	Rail link qualifies as a high-quality route in EU terms

10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	✓	Mode-switching to a less-polluting mode is consistent with the Strategy

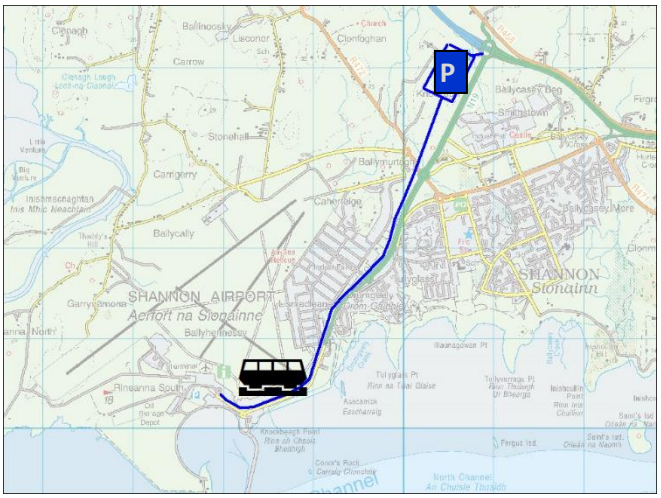
The 2007 study has been reviewed as part of this high-level appraisal. That report concluded that if and when Shannon International Airport has expanded significantly, so that this measure offers much better value for money than at present, this is likely to be the preferred long-term solution for the airport. But that existing demand is too low to justify this level of expenditure.

The Draft Clare County Development Plan 2023–2029 includes reference to a Shannon Rail Link. The draft Pan notes that "*The N19 National Road and the undefined infrastructural safeguard of the proposed Shannon Rail Link are located in close proximity. The delivery of the N19 National Road upgrade is a priority of Clare County Council and should take precedence over other infrastructural projects along its route delivering on the significant exchequer investment already made in scheme planning and design.*"

Objective CDP11.7 (b) of the draft Plan sets to "*To facilitate a proposed Shannon Rail Link which does not inhibit the N19 National Road Upgrade*."

6.3.7 Option 7a – P&R served by Light-rail Shuttle

This option would provide a Park-and-Ride site adjacent to the M18/N19 roundabout which would become the main car park for Shannon International Airport. A dedicated light rail service would run alongside the N19 from this car park to the airport terminal, thereby removing a significant portion of the travel demand from the N19.



Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓	Reduces traffic levels to airport & thus lowers congestion; but possible issues if access roads cross light rail route at-grade
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓	Light rail access bypasses congestion and any road traffic accidents or roadworks
3	To achieve value for money from investment in the project	xx	High cost
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	✓	Reduces traffic levels to airport & thus lowers congestion
5	To reduce the frequency of transport collisions within the N19 corridor	✓✓	Potentially large reduction in car-km
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	-	Measure does not address this objective
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	x	Reduced car-km and thus lower emissions, but significant land take for P&R site & light rail route
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	-	Dedicated service to P&R site of little benefit to non-car-owners
9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	-	Route quality unchanged

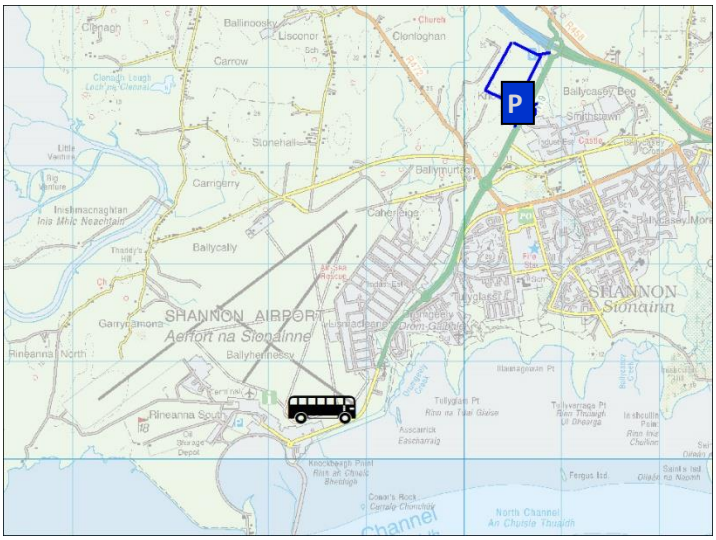
10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	✓	Mode-switching to a less-polluting mode is consistent with the Strategy

Summarised conclusion - The scale of benefits to justify the high cost isn't there.

6.3.8 Option 7b – P&R served by bus

This option would provide a Park-and-Ride site adjacent to the M18/N19 roundabout which would become the main car park for Shannon International Airport.

A high-frequency bus service would run along the N19 from this car park to the airport terminal, thereby removing a portion of the private vehicle traffic from the N19. Buses would use an additional junction onto the N19, which could be bus-only.



Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓	Reduces traffic levels to airport & thus lowers congestion
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	X	More to go wrong when journey includes an interchange
3	To achieve value for money from investment in the project	X	Significant cost for minimal journey time or cost savings
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	✓	Reduces traffic levels to airport & thus lowers congestion
5	To reduce the frequency of transport collisions within the N19 corridor	✓	Reduced car-km
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	-	Measure does not address this objective; buses & cyclists don't necessarily mix well
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	X	Reduced car-km and thus lower emissions, but significant land-take & construction for P&R site
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	-	Dedicated P&R bus of little benefit to non-car-owners
9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	-	Route quality unchanged

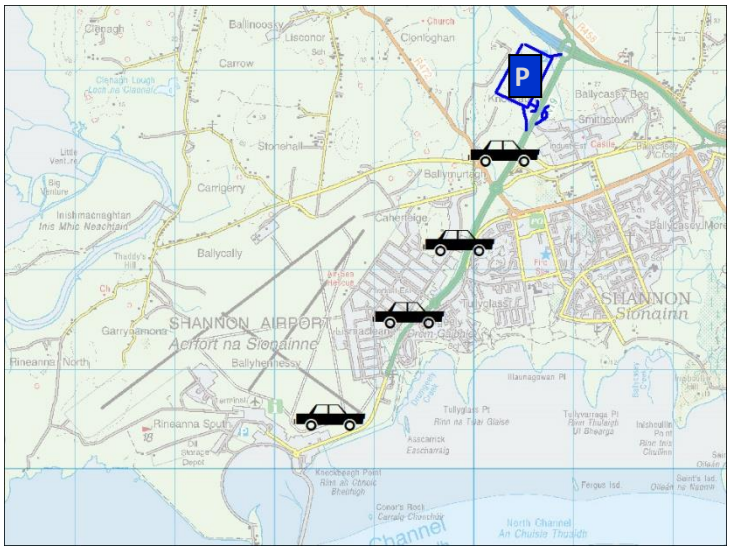
10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	✓	Mode-switching to a less-polluting mode is consistent with the Strategy

Summarised conclusion - does relatively little to meet the objectives of the project.

6.3.9 Option 7c – P&R served by pool of autonomous vehicles

This option would provide a Park-and-Ride site adjacent to the M18/N19 roundabout which would become the main car park for Shannon International Airport.

Journeys from this car park to the airport terminal would use a fleet of autonomous vehicles, serving as an international showcase for the technology. These vehicles would be fully electric, charged outside periods of peak demand. They would use an additional junction onto the N19.



Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	-	Volume of traffic on N19 is unchanged, negligible gain from some of those vehicles being autonomous.
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	X	More to go wrong when journey includes an interchange
3	To achieve value for money from investment in the project	XX	High cost for minimal journey time or cost savings
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	-	Minimal impact
5	To reduce the frequency of transport collisions within the N19 corridor	✓✓	Most collisions are caused by human error; autonomous vehicles are likely to be significantly safer once the technology matures
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	-	Measure does not address this objective; how autonomous vehicles react to cyclists is a source of additional uncertainty
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	X	Electric vehicles will reduce emissions and energy use, but volume of traffic on N19 is unchanged, and significant land-take & construction for P&R site
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	-	Measure does not address this objective

9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	-	Measure does not address this objective
10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	✓	Flagship project that would contribute to the high-level aims of the Strategy by promoting the region

Summarised conclusion - an outside-the-box idea which on reflection does little to meet the objectives of the project.

6.3.10 Option 8 – Improve footpath and cycleway to airport

This option would provide a dedicated cycle route and adjacent footpath between Shannon Town and the Airport, within the N19 corridor but separated from the road.

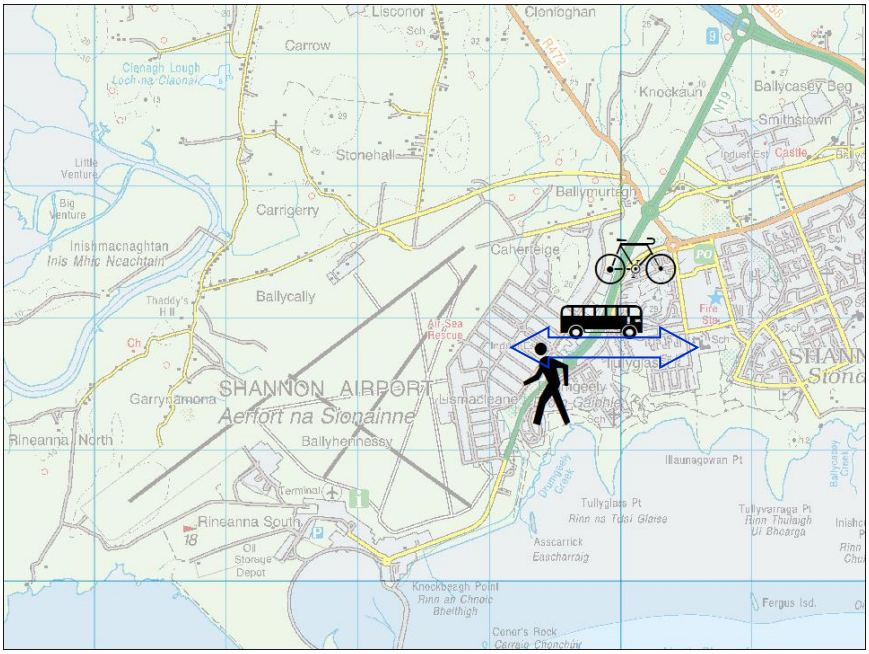
Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	-	Minimal impact on other modes
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	-	Minimal impact on other modes
3	To achieve value for money from investment in the project	-	Limited cost and limited benefit
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	-	Minimal impact on other modes
5	To reduce the frequency of transport collisions within the N19 corridor	-	Minimal impact on other modes
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	✓✓✓	High quality of provision for cyclists
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	-	Little land-take, localized construction work along the length of the route, encourages mode shift.
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	✓	A good option for those willing and able to get on a bike
9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	-	Minimal impact

10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	✓	Support for active travel

Summarised conclusion - *"Build it and they will come"*? Addresses some but not all of the scheme objectives; may be part of the solution.

6.3.11 Option 9 – Better Bus/Walking/Cycling Access to SFZ West

This option would comprise a package of measures including footpath upgrades, bus shelters, and cycle routes in road margins to improve non-car journeys to SFZ West.



Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓	Reduced congestion from mode switching
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓	Reduced congestion from mode switching
3	To achieve value for money from investment in the project	-	Costs are low but so are numbers of people gaining a direct benefit
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	✓	Reduced congestion from mode switching
5	To reduce the frequency of transport collisions within the N19 corridor	-	Negligible change
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	✓✓	Quality of cycle journeys to SFZ West improves
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	✓	Land-take limited to existing road corridor, minimal construction work, some reduction in emissions
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	✓✓✓	Step-change in attractiveness of travel to SFZ West for non-car owners

9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	-	Negligible change
10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	✓	Mode-switching is consistent with the Strategy

Summarised conclusion - a package with significant benefits to those who do not own their own vehicle but with limited impact in meeting the other objectives of the scheme.

6.3.12 Option 10 – Bus Improvements & Increased Parking Costs

This option would increase parking charges at Shannon International Airport and use the revenue to part-fund a high-quality low-emission bus service from the airport to Shannon Town and Limerick City. Thereby taking a "carrot and stick" approach to encourage mode-switching.

Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	-	Uptake of the bus service is likely to be limited, as airport passengers are travelling from a wide catchment area
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	-	Incidents and delays affect buses as well as cars
3	To achieve value for money from investment in the project	-	Partly self-financing
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	-	Measure does not address this objective
5	To reduce the frequency of transport collisions within the N19 corridor	-	Negligible impact
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	-	Measure does not address this objective
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	✓	No land-take or construction and reduces emissions to the extent that trips switch to bus but may increase car trips.
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	✓	Some improvement in bus quality and frequency

9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	-	Quality of this infrastructure is unchanged
10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	XX	LSMATS strategy is to encourage growth of Shannon Airport; this measure would tend to discourage car-owning passengers from choosing to fly from Shannon

Summarised conclusion - Not a realistic solution to meeting the objectives of the scheme, given the choice sets involved. There are rural-dwelling car drivers who park at the airport for whom the next-best alternative is to travel as a car passenger being ferried to the airport by a friend or family member, doubling the car-km associated with the journey. This measure could thus conceivably increase traffic on N19.

6.3.13 Option 10a – Mobility Management Planning at SFZ West

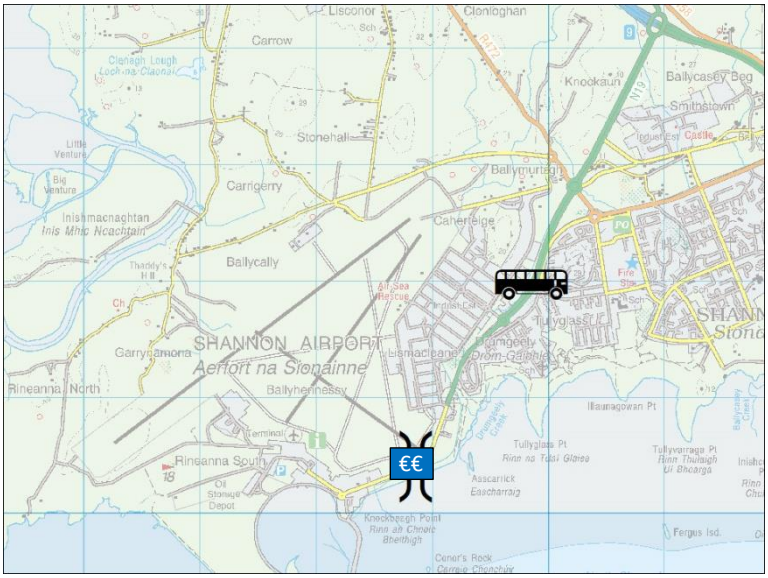
This option would comprise a package of measures including footpath upgrades, bus shelters, and cycle routes in road margins to improve non-car journeys to SFZ West

Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓	Reduced congestion from mode switching & car-sharing
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓	Reduced congestion from mode switching & car-sharing
3	To achieve value for money from investment in the project	-	Capital costs low but ongoing running cost
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	✓	Reduced congestion from mode switching & car-sharing
5	To reduce the frequency of transport collisions within the N19 corridor	-	Negligible change
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	✓	cycle parking
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	✓	Minimal construction
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	✓	Car-share option for non-car owners to SFZW
9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	-	Negligible change
10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	✓	Mode-switching is consistent with the Strategy

Summarised conclusion – scale of impact uncertain but no significant downside

6.3.14 Option 11 – Toll Existing N19

This option would impose a barrier-free toll on all private vehicles entering the airport with the money spent on provision of improved bus services, so as to encourage mode-switching.



Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓	Reduced traffic flows to airport lessen congestion on journeys to SFZ
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓	More frequent public transport service with less congestion offers more reliable journeys by either mode
3	To achieve value for money from investment in the project	-	The gains from this measure are reduced externalities rather than user benefits
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	✓	Fewer vehicles on the road
5	To reduce the frequency of transport collisions within the N19 corridor	✓	Fewer vehicles on the road
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	-	Cyclist experience is similar to Do-Nothing
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	✓	Fewer vehicles on the road reduces emissions. Minimal construction work to install gantries for barrier-free tolling.
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	✓✓	Better public transport service for non-car owners

9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	-	Route quality is similar to Do-Nothing
10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	XX	LSMATS strategy is to encourage growth of Shannon Airport; this measure would discourage passengers from choosing to fly from Shannon

Summarised conclusion - unpopular and contrary to current policy despite its green appeal.

6.3.15 Option 12 – Online upgrade of existing N19

This option would upgrade the N19 between Drumgeely roundabout and Knockbeagh roundabout, to meet design standards. The appropriate cross-section would be determined at the Preliminary Design stage of the project.

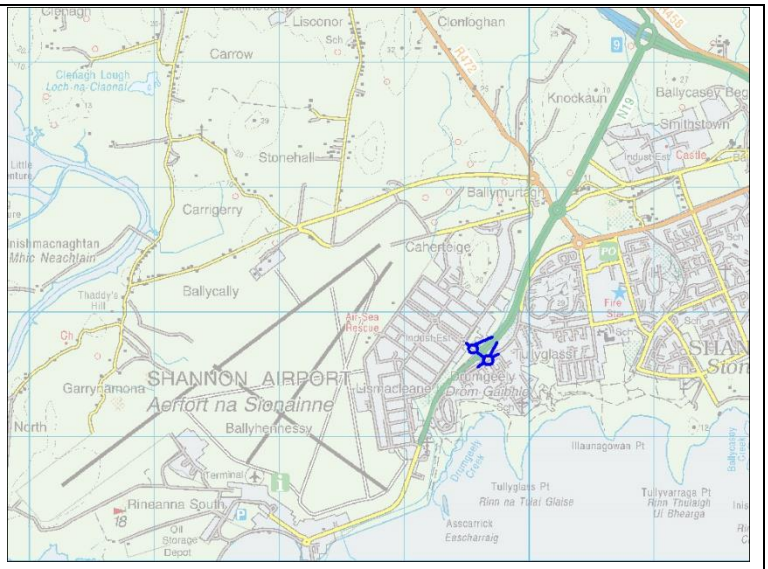
Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓	Improved link and junction to southern part of SFZ West increases accessibility
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓✓	Improves speed and road surface and resilience to incidents.
3	To achieve value for money from investment in the project	✓	Likely to offer long-term benefit as airport-related traffic grows
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	✓✓	Physical separation of inbound and outbound flows would increase resilience
5	To reduce the frequency of transport collisions within the N19 corridor	✓	Roads built to modern standards are considered significantly safer than older designs.
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	✓	Cycleway is considered as a separate option; on-road cycling would be better with an improved surface and wider running lane and shoulder
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	X	Land-take limited to existing road corridor, but significant construction work would be involved
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	-	Better ride and improved speeds for buses

9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	✓✓	Significant increase in route quality
10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	✓	Improved traffic flow is consistent with the Strategy

Summarised conclusion - improves vehicular access and network resilience without the financial and environmental costs of a new route.

6.3.16 Option 13a – Grade Separated Junction

This option would provide a high-standard grade-separated entrance to Shannon Free Zone West at one of the junctions on the N19.



Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓✓✓	Removes junction delay, allowing traffic to get directly onto high-quality route
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓✓	Significant reduction in congestion
3	To achieve value for money from investment in the project	-	Probably not justified in cost-benefit terms
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	✓	Addresses one source of delay
5	To reduce the frequency of transport collisions within the N19 corridor	✓	Reduction in conflicting vehicle movements increases safety
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	-	Grade separated junctions generally unsafe for cycling
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	x	Significant construction work but low level of land-take compared with new route
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	✓	Pedestrian, cycle and bus traffic between SFZ and Shannon Town is separated from airport traffic flow
9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	✓	Route quality improvement

10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	✓	Improved traffic flow is consistent with the Strategy

Summarised conclusion – this might be a good solution to high levels of congestion that is localised in time and space. But that may not be the major problem on the N19. Financial and environmental cost may be high for the levels of benefit but need traffic modelling to confirm this.

6.3.17 Option 13b– At-Grade Junction Improvements

This option would signalise some or all of the junctions along the N19 so as to maintain access to the airport at times of peak traffic flow to or from the SFZ and vice versa.

Objective		Rating	Justification
1	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	X	The effect of traffic signals is to increase delay at periods of low flow but manage queuing during the peaks. Net average journey time is likely to increase slightly.
2	To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West	✓	Signals will guarantee a quantum of capacity for airport traffic in commuter peaks
3	To achieve value for money from investment in the project	✓✓	Signal control systems are a low-cost measure
4	To improve access to Shannon International Airport by emergency response vehicles in the event of an incident	✓	Scope for emergency vehicles to carry a transponder to override normal signal cycle for emergency access
5	To reduce the frequency of transport collisions within the N19 corridor	-	Scale of safety benefit probably negligible
6	To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone	✓	Roundabouts are perceived as particularly dangerous for cyclists; signals allow a measure of priority to pedestrians and cyclists crossing the carriageway.
7	To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment	-	Construction limited to installation of signals. Signals can reduce emissions by managing queues at periods of high demand but tend to increase queuing & emissions at other times.
8	To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey	✓	Small improvement at the point of crossing conflicting traffic flows

9	To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network	-	No increase in route quality
10	To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)	✓	Improved traffic flow is consistent with the Strategy

Summarised conclusion - a measure to make best use of existing road space by changes to the management of the transport system. Costs and benefits are both likely to be modest.

6.4 Results of Preliminary Appraisal

Table 6-3 summarizes the high-level appraisal scores presented above. Based on the performance of each option against the full range of scheme objectives, those measures with the most potential were sifted in and carried forward to a more detailed appraisal at Phase 2 Option Selection.

Table 6-3: Option Appraisal Matrix

Measures	Objectives	Objective No. 1	Objective No. 2	Objective No. 3	Objective No. 4	Objective No. 5	Objective No. 6	Objective No. 7	Objective No. 8	Objective No. 9	Objective No. 10	Conclusion
1	West Access to Airport	✓✓	✓✓✓	xxx	✓✓	x	-	xxx	-	✓✓	✓	Sifted out
2	Emergency Vehicle	-	✓	✓✓	✓✓✓	-	-	-	-	-	✓	See below
3	Route Between	✓✓	✓✓	x	✓✓	-	-	xx	-	✓✓	✓	Sifted out
4	Tunnel	✓✓	✓✓✓	xxx	✓✓	x	-	xxx	-	✓✓	✓	Sifted out
5	New Free Zone Access	✓✓	✓	✓✓	✓	-	-	-	-	-	✓	See below
6	Rail Link	✓✓	✓✓✓	xx	✓	✓✓	-	xx	✓✓	✓✓	✓	Sifted out
7a	P&R - Light Rail	✓	✓	xx	✓	✓✓	-	x	-	✓	✓	Sifted out
7b	P&R - Bus	✓	x	x	✓	✓	-	x	-	-	✓	Sifted out
7c	P&R - CAVs	-	x	xx	-	✓✓	-	x	-	-	✓	Sifted out
8	Airport Cycleway and Footpath	-	-	-	-	-	✓✓✓	-	✓	-	✓	Sifted in
9	Other Modes to Free Zone	✓	✓	-	✓	-	✓✓	✓	✓✓✓	-	✓	Sifted in
10	Airport Bus & Parking	-	-	-	-	-	-	✓	✓	-	xx	Sifted out
10a	SFZ mobility management	✓	✓	-	✓	-	✓	✓	✓	-	✓	See below
11	Toll Existing N19	✓	✓	-	✓	✓	-	✓	✓✓	-	xx	Sifted out
12	Online Upgrade	✓	✓✓	✓	✓✓	✓	-	x	-	✓✓	✓	Sifted in
13a	Grade Separated Jn(s)	✓✓✓	✓✓	-	✓	✓	✓	x	✓	✓	✓	Sifted in
13b	Signalise Roundabouts	-	✓	✓✓	✓	-	✓	-	✓	-	✓	Sifted in

The following paragraphs discuss the scores for each objective:

Objective No. 1 - To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West

The objective of improving journey times to SFZ (West) would be served best by a new/improved access or by a grade-separated junction. Options that remove a substantial part of the traffic from the existing N19 would meet this objective moderately well. Options that remove only a small volume of the traffic from the existing N19 would meet this objective slightly.

Options that remove a negligible proportion of traffic would have minimal effect on this objective. Signalising access junctions gives a way of balancing delays; this could be to the detriment of traffic to and from SFZ (West), depending on the signal regime, and was therefore provisionally scored as Neutral pending more detailed assessment.

Objective No. 2 - To support the growth of freight and passenger throughput at Shannon International Airport – a key driver of the regional economy – by improving the quality, efficiency and reliability of ground transport to and from the airport

The objective of improved reliability for journeys to the airport encompasses both resilience to incidents and reduction of peak congestion. Options which provide a second access route serve this objective best by fully addressing both aspects. Options which have a substantial impact on both resilience and congestion would meet this objective moderately well. Options which address one aspect or the other would meet this objective slightly. Options which involve waiting for public transport that is itself subject to delay are likely to increase journey time variability and were therefore scored as Slight Negative.

Objective No 3 - To achieve value for money from investment in the project

The objective of obtaining value for money can be assessed only approximately at this stage. Options that provide a high benefit (large savings in time or reliability for large numbers of people) for low cost serve this objective best. At this stage none of the options fall into this category. Options that offer medium or low-to-medium benefits at low cost would meet this objective moderately well or slightly. Conversely, options that have medium or high cost and low benefits offer poor or poorest value for money.

Objective No 4 - To improve access to Shannon International Airport by emergency response vehicles in the event of an incident

The objective of better or more reliable access to the airport for emergency vehicles in the event of an incident is best served by a dedicated access into the airport. Options which provide a second access route to the terminal complex would meet this objective moderately well. Options which both reduce peak congestion and provide greater road width (hard shoulder or second lane) along the existing route also meet this objective moderately well. Options which reduce peak congestion would meet this objective slightly.

Objective No 5 - To reduce the frequency of transport collisions within the N19 corridor

The objective of reducing road collisions is best served by measures which move substantial numbers of people off the roads onto rail modes. Connected Autonomous Vehicles also have the potential to offer substantial safety benefits, although these vehicles are still at risk of collision with human-driven vehicles. Other options

which tackle substantial elements of safety risk would meet this objective slightly. Options which substantially increase vehicle-kilometres and therefore increase risk exposure were scored as Slight Negative.

Objective No 6 - To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone

The objective of improving levels of service for cycling and walking would be best served by measures which look at the entire journey. Measures which provide well-designed infrastructure within the N19 corridor would meet this objective moderately well. Measures which make the junctions easier to negotiate for pedestrians and cyclists would meet this objective slightly.

Objective No 7 - To take all reasonably practical measures to avoid, minimize and mitigate impact on the natural and human environment

The particular aspects of environmental impact that are likely to be particularly salient for this project relate to:

- the scale of construction work involved
- the level of land-take required
- the extent of reduction in vehicular emissions of pollutants.

The environmentally worst options are those which have the largest land-take and construction impacts and which increase emissions. These have been scored as highly negative. The environmentally best options are those with zero or minimal land-take and construction impacts and which reduce emissions. These have been scored as slightly positive.

Objective No 8 - To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey

The objective of reducing social exclusion by improving access for non-car owners is best met by a package of measures which focuses on this aim. Options that provide a rail service or cycleway from places where people live would meet this objective moderately well. Options that improve the ability of pedestrians and cyclists to cross the N19, or improve existing bus services, would meet this objective slightly. Options that only provide public transport from a P&R site that is remote from any settlement were scored as having negligible impact (Neutral).

Objective No 9 - To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network

The objective of providing a high-quality connection in accordance with TEN-T policy would best be served by an upgrade of the N19 to motorway standard. This is not a viable option. Options that provide a rail connection or a substantial improvement on the quality of the existing route would meet this objective moderately well.

Objective No 10 - To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)

The draft LSMATS recognises the extent to which Shannon International Airport competes with other Irish airports and intends that Shannon should increase its share of the market in order to build critical mass. Therefore at this stage, any measure which actively supports the development of the Airport and SFZ by improving access was been scored as Slightly Positive. Measures which aim to reduce demand (the "stick" instead of the "carrot") were scored negatively.

6.5 Combinations of Options

The principal conclusion emerging from the high-level appraisal is that none of the measures considered individually performed well against all the objectives of the scheme. There was no dominant stand-alone measure that emerged as an obvious preferred option at this stage.

It was concluded that it would be necessary to consider combinations of options.

As an example, two possible combinations are presented in **Table 6-4** below.

Table 6-4: Option Appraisal Matrix – Combinations

Measures	Objectives:	Objective No. 1	Objective No. 2	Objective No. 3	Objective No. 4	Objective No. 5	Objective No. 6	Objective No. 7	Objective No. 8	Objective No. 9	Objective No. 10
8 + 9 + 12	Online widening with airport cycleway and footpath/cycleway routes to SFZ using footbridges over N19	✓	✓✓	✓	✓✓	✓	✓✓ ✓	-	✓✓	✓✓	✓
9 + 13b	Signalise junctions and bus priority with footpath/cycleway routes to SFZ that cross N19 at signals	✓✓	✓	✓✓	✓	-	✓✓	✓	✓✓ ✓	-	✓

Such combinations offer significant contributions to multiple project objectives with minimal disbenefit to any of the other objectives.

6.6 Options Outside TII Remit

Option 2 (separate emergency vehicle access to airport) was raised in consultation with Shannon Airport. A form of this facility already exists. It was considered that any further development of this to streamline access was not a matter for the TII scheme, and the option was dropped.

Option 5 (improve northern access to SFZW to reduce demand on the N19 in the study area) was raised in consultation with Shannon Commercial Properties. It was considered that any further development of this to streamline access was not a matter for the TII scheme, and the option was dropped.

Option 10a (mobility management planning in SFZW to reduce demand on the N19 in the study area) was raised in consultation with Shannon Commercial Properties. It was considered that this is not an option within TII's remit and the option was dropped. On the understanding that the issue would be re-opened in the context of realistic forecasting scenarios at a later stage of the project management process

6.7 Conclusion from Preliminary Appraisal

The principal conclusion emerging from the high-level appraisal was that none of the measures considered individually performs well against all the objectives of the scheme and that there was no dominant stand-alone measure that emerged as an obvious preferred option at Stage 1.

The recommendation was that at Phase 2 (Option Selection) it would be necessary to consider combinations of options and that set of options recommended to be taken forward to detailed appraisal comprised combinations of:

- a road improvement within the existing corridor (a package involving one or more of option 12, 13a and 13b);
- a set of measures to improve non-car journeys (a package of footway/cycleway measures and bus infrastructure that draws on options 8 and 9 plus mobility management as in option 10a).

The ideal outcome was to contribute positively to all the project objectives with no negative impacts. These shortlisted options each contributed positively to some of the project objectives without having a major negative impact on any of the other project objectives, when considered in isolation. The best performing option were therefore likely to be a combination of these.

7 PHASE 2 STAGE 1 – PRELIMINARY OPTIONS ASSESSMENT

7.1 Introduction

The purpose of the Phase 2 Stage 1 Preliminary Options Assessment was to outline the rationale and summarise the findings of the first assessment stage of the Option Selection process and provide a short-list of options to be progressed to the next assessment stage.

The Preliminary Options Assessment is a comparative assessment of the potential impacts of the options, and their relative success in achieving the project objectives, under the headings of engineering, environment, and economy.

7.2 Phase 2 Stage 1 Options for Assessment

As part of the Phase 2 Stage 1 Preliminary Options Assessment, the options identified as reasonable and feasible were considered, developed and assessed. To allow the various options brought forward to Phase 2 Stage 1 to be properly assessed and evaluated against the agreed project objectives, the various options were developed to a sufficient preliminary level. The following paragraphs provide a description of the various developed do-something options.

7.2.1 Renaming of Options

To avoid confusion at Public Consultation events the options brought forward from Phase 1 were re-named. This was done as many of the numbered options reviewed in the Phase 1 Project Brief were sifted out and the numbering of the options recommended to be brought forward were no longer sequential.

The renamed options are as follows: -

- Previous (Phase 1) Option 8 (shared pedestrian/cycleway) becomes **Option A**. Two sub-options have been developed (A0 and A1).
- Previous (Phase 1) Option 9 (shared pedestrian/cycleway with improved bus service frequency and bus stops) becomes **Option B**.
- Previous (Phase 1) Option 12 (on-line improvement) becomes **Option C**. Three sub-options have been developed (C0, C1, C2) with slight variations to the alignment.
- Previous (Phase 1) Option 13a (grade-separated junction) becomes **Option D**. Due to the constraints of the site, a single feasible design has been identified.
- Previous (Phase 1) Option 13B (signalised junctions) becomes **Option E**. Two sub-options have been developed (E1, E2)

As per PE-PAG-02013 Unit 4.0 (Section 4.1) - All elements of the Do-Minimum Option have been included as part of each Do-Something Option.

7.2.2 Renaming of Options

7.2.2.1 Option A

For this option, a shared footpath and cycle route of 3.0m width was proposed between Knockbeagh Point Roundabout and Drumgeely Roundabout within the N19 study corridor but separated from the road. There would be no improvement or upgrade works to this length of the existing road. The proposed shared footpath and cycleway would link with the Shannon Town cycleway and footpath proposals and form part of the Shannon Free Zone – Proposed Walking and Cycling Routes. Two alternatives were developed A0 and A1.

Option A0 started at Knockbeagh Point Roundabout and included an initial pedestrian/cyclist crossing of the existing N19 before travelling along the right-hand (east) side of the existing N19 for its full length and terminated by connecting to the existing footpath and road at Drumgeely Road which provides access to the estate, the Shannon Town road footpath and cycling network and to the existing pedestrian bridge over the N19 which links into Shannon Free Zone. This option would be of all new construction.

Option A1 started at Knockbeagh Point Roundabout, and initially travelled on the left-hand (west) side of the existing N19, mainly along the route of the existing below-standard footpath. Works would involve removal of the existing path and construction of a new facility. The combined footpath and cycle route crossed the N19 south of the Gateway West access road to Shannon Free Zone and then followed the east side of the N19 to the proposed endpoint where it joined the Shannon Town local road & footpath network.

These shared footpath and cycleways options were approximately 2.5km in length constructed generally parallel to the existing road and as located in fairly open areas were proposed to be designed to DN-GEO-03047 Rural Cycleway Design (Offline) and DN-GEO-03036 Cross Sections and Headroom.

Figure 7-1: Option A

7.2.2.2 Option B

Option B incorporated Option A (the shared footpath and cycle route) plus the provision of new bus bays, the upgrading of the existing bus shelter and additional footpath links from the bus stops to the proposed cycleway and pedestrian facility.

In discussions with the National Transport Authority (NTA) they outlined that the projected increase in demand for public transport in the short and medium term would be provided for by increasing the frequency of existing bus services. This would be done in steps as demand grows.

Figure 7-2: Option B

7.2.2.3 Option C

Option C consisted of an online upgrade of the existing N19 between Knockbeagh Point Roundabout and Drumgeely Roundabout with potential variations of being centred or to the right or left of the existing road including a shared two-way cyclist and pedestrian path.

At this option selection stage, the cross-section had not been finalised and the working assumption was to progress the scenario of a dual carriageway road north of Gateway West roundabout and a single-carriageway road south of Gateway West roundabout.

Within Option C three alternatives were considered: -

- Option C0 - Centre the proposed upgrades as closely as possible to the centre line of the existing road. This option would require construction in several discrete sections in sequence requiring construction of temporary road diversions and numerous phases of temporary traffic management.
- Option C1 - Develop the proposed upgrade to the left (the west side) of the outside edge of the existing road. For the proposed single carriageway section and the northbound lanes of the dual carriageway, this would involve initially building to the left of the existing carriageway and when complete, diverting traffic to the newly built carriageway. The old carriageway would then be upgraded to provide the combined footpath and cycleway and the southbound carriageway of the dual carriageway section.
- Option C2 - Develop the proposed upgrade to the right (the east side) of the outside edge of the existing road. For the proposed single carriageway section, this would involve building to the right of the existing road, and when complete diverting traffic to use the new road while transforming the old carriageway into a combined footpath and cycleway. For the proposed dual carriageway section, this would involve building one carriageway on the right (east) of the existing road, then diverting traffic onto the new construction when complete and then excavating out and upgrading the existing road to provide the second carriageway.

The design and construction for all options would match the existing ground levels as close as is possible while still meeting required standards. Due of the presence of soft ground, it is expected that there will be significant piling, possibly for between 50-60% of the proposed line. This would not differ significantly between Options C0, C1 and C2. The rest of the design and construction would be to TII standards and would not significantly differ between Options C0, C1 and C2.

Figures 7-3 to 7-5 below illustrated the above for a segment of the dual-carriageway section of the various options.

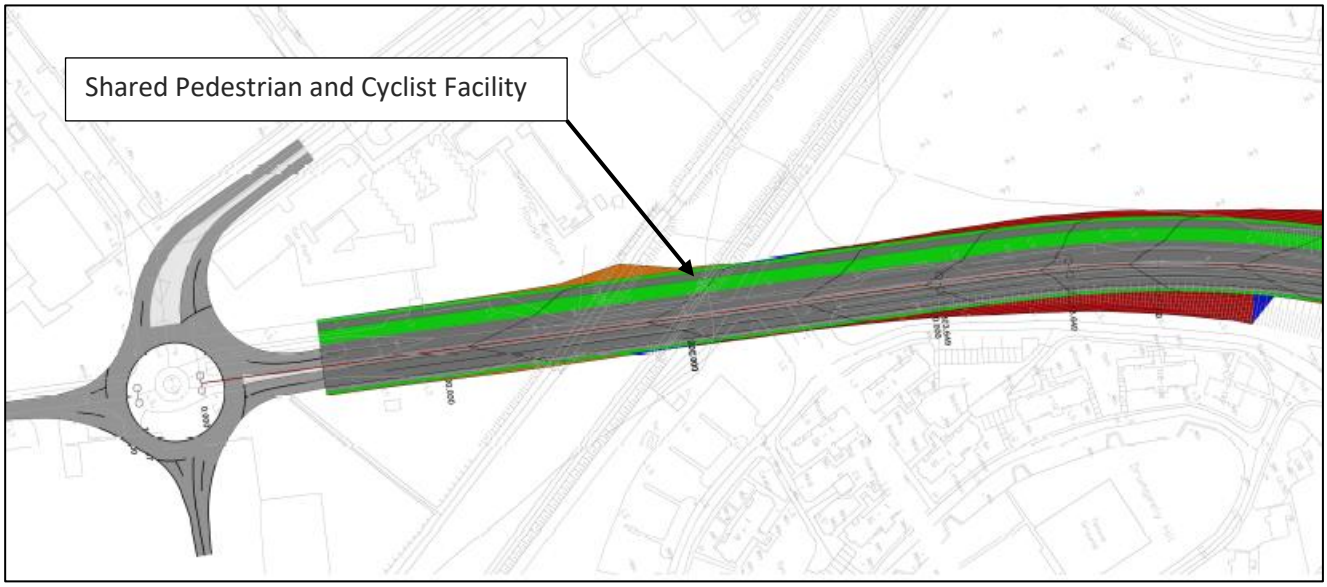


Figure 7-3: Segment of Option C0 – Centred on Existing N19

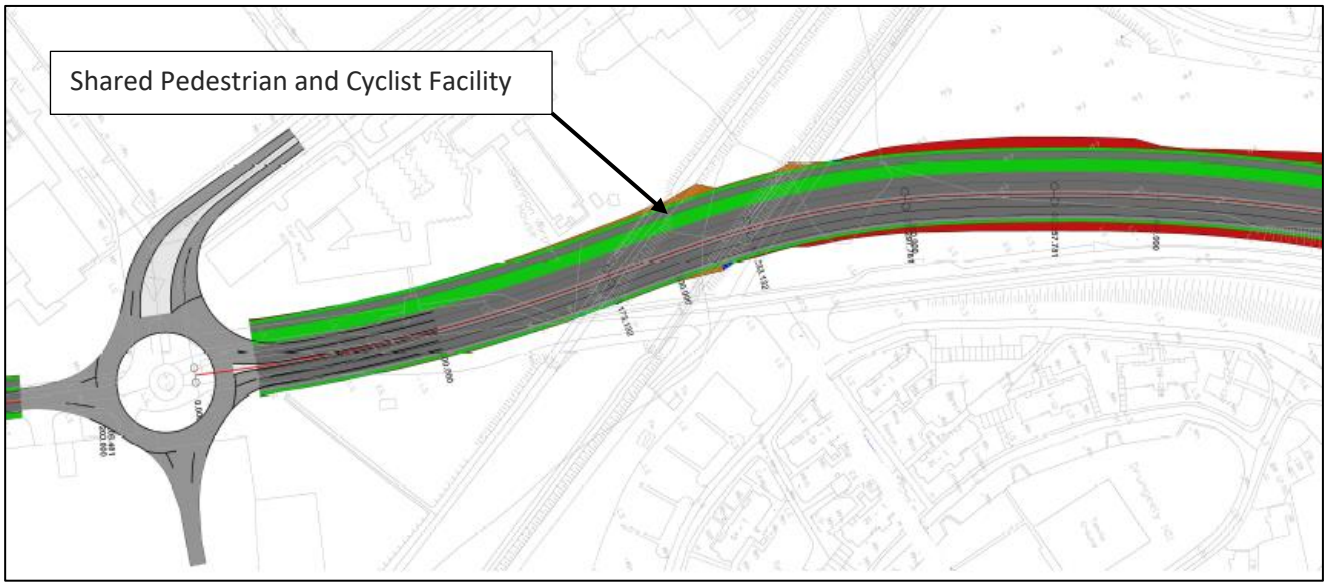


Figure 7-4: Segment of Option C1 – Left of Existing N19

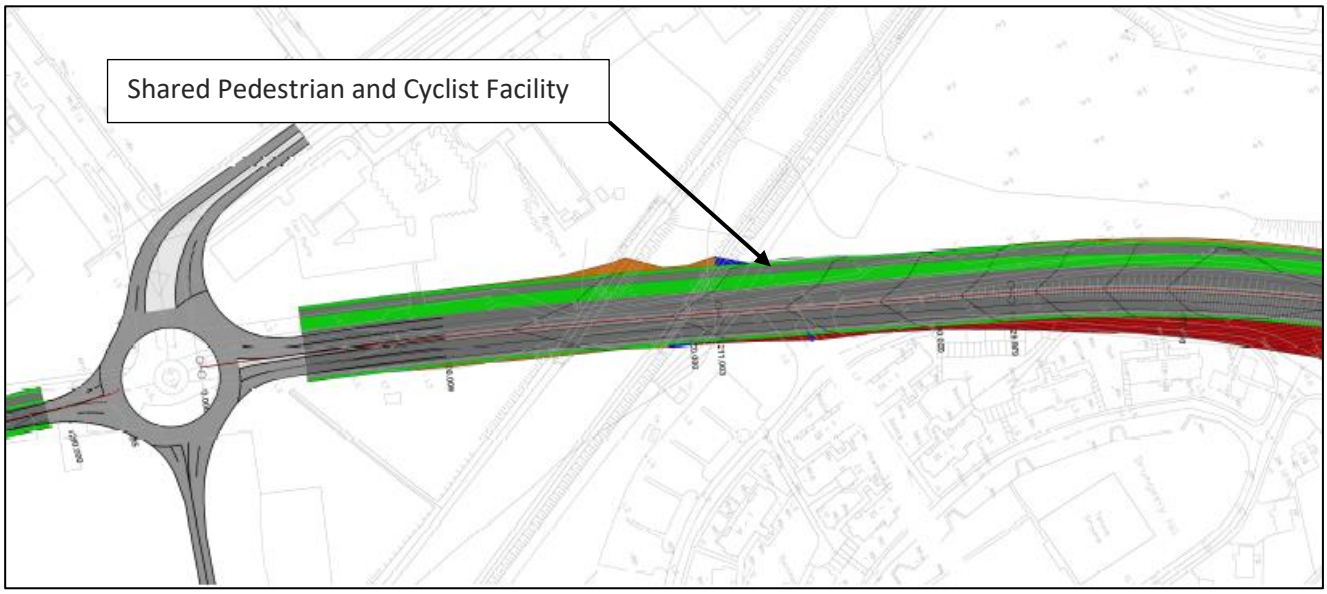


Figure 7-5: Segment of Option C2 – Right of Existing N19

7.2.2.4 Option D

This option consists of the provision of a compact grade-separated entrance to Shannon Free Zone at Drumgeely Roundabout on the N19. No other improvements are included to the remainder of the existing road.

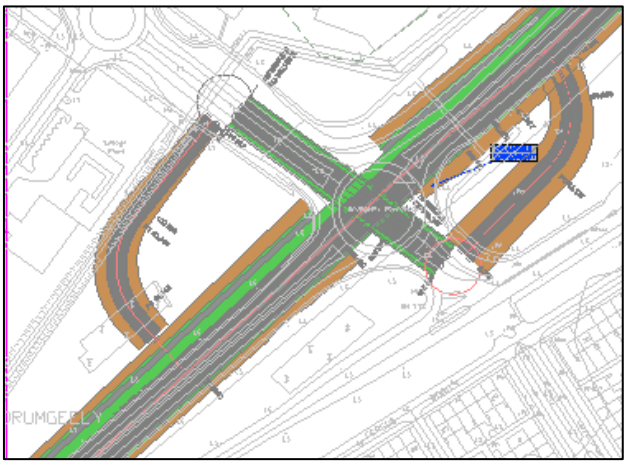


Figure 7-6: Preliminary layout of a compact grade separated junction

It was determined that the available space and levels do not allow for a full high-quality grade-separated interchange to TII standards. A preliminary design of a compact grade separated junction was developed. In this design the mainline of the N19 passed over the road from Shannon Town into the Shannon Free Zone (West). Two new small roundabouts on that road – one on the east side and one on the west side – connect low-speed slip roads from the N19 to the local road network.

7.2.2.5 Option E

Option E consisted of signalising two of the existing junctions within the scheme to maintain access to the airport at times of peak traffic flow to or from the SFZ and vice versa. In this option Gateway West roundabout became a 4-arm signalised junction instead of a 4-arm roundabout.

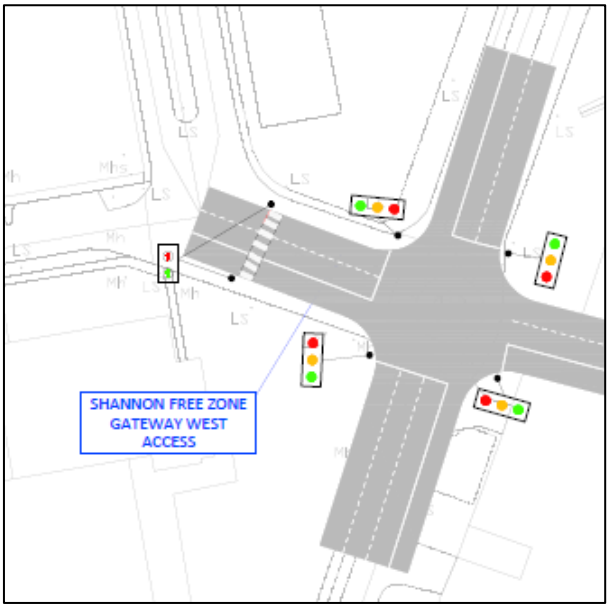


Figure 7-7: Signalised Junction SFZ Gateway West

Two options were identified for Drumgeely roundabout, signalised roundabout and a signalised crossroads.

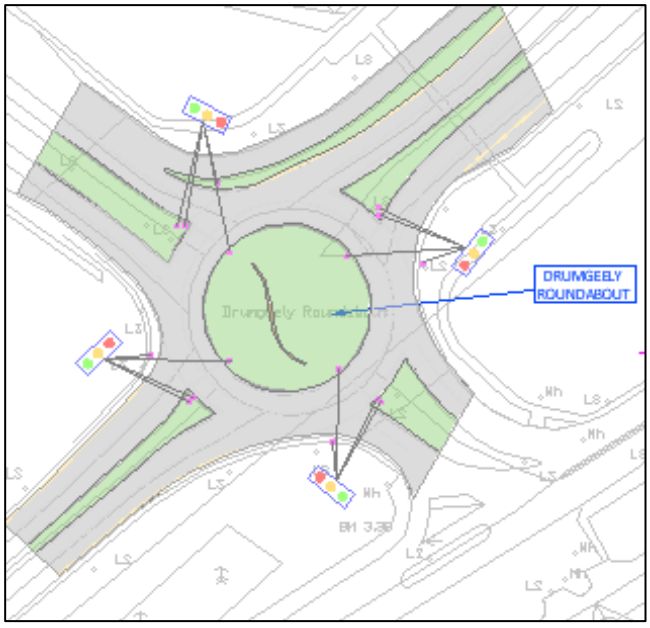


Figure 7-8A: Signalised Drumgeely Roundabout

Figure 7-8B- Signalised Drumgeely Crossroads

7.3 Stage 1 Methodology & Criteria

An assessment was undertaken on each option to include both quantitative and qualitative assessment.

In line with the TII PAG document 'Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis', Section 2.3 for Stage 1 of the Phase 2 Option Selection process, the headline criteria against which options should be assessed are:-

- Engineering
- Environment
- Economy

Under the Economy heading, no Cost-Benefit Analysis (CBA) was undertaken at Stage 1 because: -

- the competing options include cycleways and bus stops for which the economic benefits are not easy to quantify; and
- part of the economic case for the scheme involves wider economic benefits, which are also not easy to quantify.

Accordingly, at Stage 1, the economic consideration was limited to the financial cost of each option. CBA was undertaken at Stage 2.

7.3.1 Engineering Assessment Methodology

7.3.1.1 Engineering Assessment Headings

For Stage 1 – Preliminary Options Assessment (Engineering) the outline of items considered, including as a minimum those indicated in Appendix A2.4 Outline for Stage 1 – Preliminary Options Assessment (Engineering and Environmental) of the Project Manager's Manual for Major National Road Projects, PE-PMG-20042, is as follows:

- Traffic Assessment;
- Compliance with Technical Standards;
- Examination of Junction Strategy, Access Control and Interaction with Existing Transportation Networks;
- Examination of Structures;
- Geology and its Potential Impacts on Construction;
- Groundwater;
- Earthworks;
- Stage F (Part 1) Road Safety Audit;
- Drainage;

- Construction;
- Comparative Service Conflicts;
- Comparisons on Land and Property;
- Comparative Conflict with Proposed Rail Corridor;
- Comparative Conflict with Proposed Flood Relief Scheme.

7.3.1.2 Engineering Assessment Scoring

For each of the Engineering Assessment Headings the overall likely effect of each Option is scored based on the seven-point scale as shown in **Table 7-1** and a number was assigned according to the level of likely significance of the effect in line with TII PAG document 'Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis', Section 2.4.

Table 7-1: Likely Impact Scoring Key

Score	Likely significance level
7	Major or highly positive
6	Moderately positive
5	Minor or slightly positive
4	Not significant or neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or highly negative

The scores achieved under each sub-heading were taken to a heading summary table to determine each engineering heading's 'Assessment Performance Matrix'.

7.3.1.3 Engineering Assessment Performance Matrix Summary

Each engineering heading's 'Assessment Performance Matrix' rating was then taken to an overall Engineering Assessment Performance Matrix Summary where an average score calculated. Based on this score each option was ranked in preference. **Table 7-2** below shows the Summary of Engineering Criteria Assessment Performance Matrix.

Table 7-2: Summary of Engineering Criteria Assessment Performance Matrix

Engineering Sub-Criteria	A0	A1	B	C0	C1	C2	D	E
Traffic Assessment	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Most Preferred	Preferred
Compliance with Technical Standards	Least Preferred	Least Preferred	Least Preferred	Preferred	Most Preferred	Most Preferred	Preferred	Preferred
Junction Strategy, Access Control & Interaction with Existing Transportation Networks	Least Preferred	Least Preferred	Preferred	Most Preferred	Most Preferred	Most Preferred	Preferred	Preferred
Examination of Structures	Most Preferred	Most Preferred	Most Preferred	Preferred	Preferred	Preferred	Least Preferred	Most Preferred
Geology and its Potential Impacts on Construction	Preferred	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Preferred
Groundwater	Preferred	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Preferred
Earthworks	Preferred	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Most Preferred
RSA – Stage F (Part 1)	Most Preferred	Most Preferred	Most Preferred	Preferred	Preferred	Preferred	Least Preferred	Preferred
Drainage	Preferred	Preferred	Preferred	Preferred	Least Preferred	Preferred	Least Preferred	Most Preferred
Construction	Most Preferred	Most Preferred	Most Preferred	Least Preferred	Preferred	Preferred	Least Preferred	Preferred
Comparative Service Conflicts	Preferred	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Most Preferred	Most Preferred
Comparisons on Land and Property	Preferred	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Most Preferred
Comparative Conflict with Proposed Rail Corridor	Preferred	Least Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Most Preferred
Comparative Conflict with Proposed Flood Relief	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
Overall Engineering Performance Preference	Preferred	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Most Preferred

7.3.2 Environmental Assessment Methodology

7.3.2.1 Environmental Assessment Headings

The Stage 1 – Preliminary Options Assessment (Environmental) was carried out in accordance with *PAG Unit: 7.0 Multi Criteria Analysis* which sets out Environmental Assessment Sub-Criteria against which each option is considered. These criteria are as follows:

Table 7-3: Environmental Assessment Criteria

Criteria	Sub-Criteria	Description
Environment	Biodiversity	Assessment of impacts on designated sites/species and other areas of national, regional or local ecological value
	Air Quality & Climate	Assessment of impact on air quality in the context of the number of potentially affected sensitive receptors
	Noise & Vibration	Assessment of impact in the context of the location of noise sensitive receptors
	Soils and Geology	Assessment of effects on: • Geological heritage sites; • Landfills and historic waste sites; • Quarries; • Karst features; • Agricultural soils; • Extent of peat and soft ground
	Hydrogeology	Assessment of effects on: • Aquifer Type and Classification; • Aquifer Vulnerability; • Karst; • Groundwater Resources. • Groundwater Dependent Ecosystems
	Hydrology	Assessment of impacts on water dependent receptors, surface watercourses, flooding and flood risk and water quality
	Landscape and visual	Comparative impact assessment of effects on landscape character and visual amenity (views and obstructions)
	Archaeological, architectural, and cultural heritage	Assessment of Archaeological Heritage Impacts
	Material assets – Non-Agricultural	Comparative assessment of effects on utilities, properties and infrastructure, etc.)
	Human Beings	The human environment is considered under the following criteria: • Population; • Socioeconomics; • Community Facilities, Amenities & Healthcare; • Human Health & Safety

7.3.2.2 Environmental Assessment Scoring

Each Environmental Sub-Criteria was addressed including a comparative assessment of the performance of each option in terms of environmental impact for each criteria. The assessment of performance was made both qualitatively and quantitively as feasible. The impacts are scored relative to TII's defined scoring procedure as defined in **Table 7-3** above.

These scores were subsequently used to document the performance of each option under the Environment Criteria, whereby the scores for each of the sub-criterion were summed to indicate the options with the greatest environmental effect (least preferred option) and the least environmental effect (most preferred option).

The *Multi Criteria Analysis Guidelines* required that in completing the environmental assessment of options, reference should be made to the TII (NRA) Planning Guidelines which include topic-specific guidance on how environmental pressures should be assessed when planning the development of a road scheme.

7.3.2.3 Environmental Assessment Performance Matrix Summary

It should be noted that the TII PAG stipulate that "*it is not intended that the sum of each of the individual scores will be used in selecting a preferred option…*" and that "*…it is up to the assessor to weigh up the individual impacts and form a view as to the likely overall impact of the options*".

The scores achieved under each sub-heading were taken to a heading summary table to determine each environmental heading's 'Assessment Performance Matrix'.

7.3.2.4 Environmental Assessment Performance Matrix Summary

Each environmental heading's 'Assessment Performance Matrix' rating was then taken to an overall Environmental Assessment Performance Matrix Summary where an average score calculated. Based on this score each option was ranked in preference. **Table 7-4** below shows the Summary of Environmental Criteria Assessment Performance Matrix.

Table 7-4: Summary of Environmental Criteria Assessment Performance Matrix

Environmental Sub-Criteria	A0	A1	B	C0	C1	C2	D	E
Biodiversity	Preferred	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Preferred	Most Preferred
Air Quality & Climate	Preferred	Preferred	Preferred	Preferred	Most Preferred	Least Preferred	Preferred	Preferred
Noise & Vibration	Preferred	Preferred	Preferred	Preferred	Most Preferred	Least Preferred	Least Preferred	Preferred
Soils & Geology	Preferred	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Most Preferred
Hydrogeology	Preferred	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Preferred
Hydrology	Preferred	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Most Preferred
Landscape & Visual	Most Preferred	Most Preferred	Most Preferred	Least Preferred	Least Preferred	Least Preferred	Preferred	Most Preferred
Archaeological, Architectural & Cultural Heritage	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Most Preferred	Most Preferred
Material Assets – Non-Agricultural	Preferred	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Preferred	Preferred
Human Beings	Preferred	Preferred	Preferred	Most Preferred	Most Preferred	Least Preferred	Preferred	Preferred
Overall Environmental Performance Preference	Preferred	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Most Preferred

7.4 Financial Assessment

The purpose of the Financial Assessment section is to provide comparative costs of the various options being assessed in accordance with TII's PMG (PE-PMG-02041) and TII Cost Management Manual.

7.4.1 Financial Assessment Headings

In line with the TII Cost Management Manual a comparative assessment of the options was undertaken under the following headings: -

- Main Construction Contract;
- Project Specific Risk Contingency;

- Main Contract Supervision;
- Archaeology all phases;
- Advance Works;
- Residual Network;
- Land and Property;
- Planning and Design.

The result of this assessment is the Option Comparison Estimate (OCE). It should be noted that the calculation of the OCE is for the sole purpose of comparative purposes, is reflective of the level of design work undertaken at the time of the estimation, based on rates at the time, and is subject to refinement, change and further accuracy throughout TII's project delivery phases.

7.4.2 Financial Assessment Performance Matrix Summary

A ranking of the OCE provides the comparative financial assessment as set out in **Table 7-5** below..

Table 7-5: Options Comparison Estimate Ranking

Item	A0	A1	B	C0	C1	C2	D	E
Option Comparison Estimate	Most Preferred	Most Preferred	Most Preferred	Least Preferred	Least Preferred	Least Preferred	Preferred	Most Preferred

7.5 Summary of Combined Stage 1 Assessment of Options

Upon completion of the assessment for each of the three Main Criteria of Engineering, Environment and Economy, the associated ranking for each of these main criteria were combined to provide a summary of the combined Stage 1 assessments. **Table 7-6** below contains the summary of the Stage 1 assessments.

Table 7-6: Summary of Combined Stage 1 Assessments Performance Matrices

Item	A0	A1	B	C0	C1	C2	D	E
Engineering	Preferred	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Most Preferred
Environmental	Preferred	Preferred	Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred	Most Preferred
Financial	Most Preferred	Most Preferred	Most Preferred	Least Preferred	Least Preferred	Least Preferred	Preferred	Most Preferred

It should be noted that all options in the Engineering and Environmental assessments are grouped around slightly negative, neutral and slightly positive marks. A review of the scoring ranges showed that no option achieves positive or negative scoring across a majority of the assessment headings. Therefore, no scheme in these assessments was showing as a clear preference or one to be discarded. The Financial assessment as such just highlights a ranking based on included elements in that option.

7.6 Road Safety Assessment

7.6.1 Road Safety Impact Assessment

Further to reviewing the initial Road Safety Impact Assessment (RSIA), TII's Safety Section noted the following: -

'*The RSIA fails to demonstrate, on a strategic level, the implications on road safety of different planning alternatives of a road scheme, possibly because the scheme is too small. It has previously been relayed that a RSIA is only required on major schemes*.'

The suggestion then was that the RSIA could be reconfigured and amended to be included in a Stage F Road Safety Audit, which would negate the need for a RSIA. A separate Stage F (Part 2) RSA would be required in the future when the preferred option is selected.

Following a review by the Design Team a request was made to recall the RSIA and to include a Stage F (Part 1) and Stage F (Part 2) Road Safety Audits. This was approved by TII's Safety Section.

7.6.2 Summary of Stage F (Part 1) Road Safety Audit

A Stage F (Part 1) Road Safety Audit was undertaken by independent auditors Roadplan. The team consisted of Ray Butler, Team Leader and Dermot Donovan, Team Member. The Report is contained in Appendix C.

Potential problems were identified for each of the options with the principal differences relating to the provision for vulnerable road users. The options were ranked relative to each other by the audit team. Based on the problems identified, the options were assessed as Most Preferred, Preferred and Least Preferred, as shown in Table 7-7 (this is an extract from the Table 7-2 Summary of Engineering Criteria Assessment Performance Matrix)

Table 7-7: Stage F (Part 1) Road Safety Audit Options Ranking

Engineering Sub-Criteria	A0	A1	B	C0	C1	C2	D	E
RSA – Stage F (Part 1)	Most Preferred	Most Preferred	Most Preferred	Preferred	Preferred	Preferred	Least Preferred	Preferred

7.7 Non-Statutory Public Consultation

Non-Statutory Public Consultation forms a key part of TII's Phase 2 - Option Selection process, where consultations are undertaken to generate awareness and initiate participation of the public and key stakeholders, and to obtain feedback for consideration by the Project Team.

The first non-statutory Public Consultation on the scheme took place between Thursday 12th of November 2020 and Wednesday 2nd of December 2020 seeking public feedback to the Constraints and Route Corridor Options.

A brief summary of this public consultation is provided in the sections below, whilst a detailed description of the process and feedback received is provided in Appendix B - Summary of Public Consultations Feedback.

In response to COVID-19 restrictions at the time of the consultation, an online consultation platform was made available on the dedicated project website (www.shannonaccess.ie), to allow stakeholders and the general public to view maps and project information, and to submit their feedback in a safe and accessible environment. In addition, unmanned displays were set up in Ennis, Shannon, Limerick and Shannon Airport.

In the dedicated public consultation section, the following documents were available to view:

- Brochure & Questionnaire
- Online Questionnaire
- Interactive Mapping
- Study Area and Preliminary Route Options Drawings
- Constraints Drawings

The Consultation Brochure was available at the unmanned display locations.

7.7.1 Public Notification

Public notification was undertaken through the following methods: -

- By advanced notice through the dedicated project website monthly updates;
- By newspaper advertisements in both Clare Champion and Clare Echo;
- By radio advertisement on Clare FM; and
- By use of Clare County Councils Social Media channels.

7.7.2 Public Bodies Notification

The following Public Bodies were notified of the Public Consultation on the 12th of November 2020:

- An Taisce
- Bat Conservation Ireland
- Birdwatch Ireland
- Bus Eireann
- Commission for Regulation of Utilities, Water and Energy

- Department of Communications, Climate Action and Environment
- Department of Culture, Heritage and the Gaeltacht
- Department of Defence
- Department of Housing, Local Government and Heritage
- Department of Transport
- Failte Ireland
- Geological Survey of Ireland
- Health Service Executive
- Inland Fisheries Ireland
- Irish Aviation Authority
- Irish Rail
- National Transport Authority
- Office Public Works
- Shannon Commercial Properties
- Shannon International Airport
- Southern Regional Assembly
- Teagasc
- The Arts Council
- The Heritage Council

7.7.3 Submissions Received

7.7.3.1 Public Bodies Submissions

Six responses were received directly from Public Bodies within the consultation period. Details are contained in 'Public Consultation No. 1 Report on Submissions Received'.

7.7.3.2 Public Consultation Forum Submissions

In total eleven submissions were received during the public consultation period.

Seven submissions were made from members of the public. Six agreed that a scheme was required while one indicated it was not.

One Public Body, the Waste Policy and Resource Efficiency Division (a division of the Department of Environment, Climate and Communications Department of Environment, Climate and Communications) made an online submission.

Three group submissions were received on behalf of Clare Public Participation Network with NCPD, Shannon Chamber and Shannon Group.

The full details of the submissions are contained in Appendix B - Summary of Public Consultations Feedback.

7.7.4 Submissions Review

Of the 11 submissions received one questioned the need for any scheme, two expressed a preference for a specific option and the rest did not express any particular preference.

Table 7-8: Option Preferences

Option	Number of Preferences
B	1
C	1
E	0
Against	1
No preference	8

Seven of the submissions filled in the questionnaire which asked how important provided statements were in relation to the scheme (ranking 1 to 9 with 9 being least important).

Table 7-9 outlines the results of the subsequent ranking of these statements:

Table 7-9: Ranking of Questionnaire Statements

Submission no. / Item	1	2	3	4	5	6	7	Overall Score	Ranking
Safety improvements	1	1	-	2	6	8	2	20	2
Improvements in cycling & pedestrian facilities	4	5	1	5	9	1	5	30	4
Improvements in traffic conditions & capacity	2	2	-	3	2	9	1	19	1
Effect on flora & fauna	5	9	-	4	8	2	8	36	6
Impact on air quality & noise	6	8	-	7	4	6	9	40	8
Access to Airport and Shannon Free Zone	3	3	2	1	1	7	3	20	2
Visual and landscape impact	8	7	3	8	5	3	6	40	8
Scheme costs / value for money	9	6	-	9	3	5	4	36	6
Impact on communities with the study area	7	4	-	6	7	4	7	35	5

Based on the results above the four most important are:

1. Improvements in traffic conditions & capacity;
2. Safety Improvements;
3. Access to Airport and Shannon Free Zone; and
4. Improvements in cycling & pedestrian facilities.

The feedback received from this public consultation process was considered by the Project Team in advance of finalising the Stage 1 assessment of options.

7.8 Recommendation of Options to be taken forward to Stage 2 (Project Appraisal Matrix)

Consideration was given to combinations of the various options to address the scheme objectives. It was determined that by combining options that better address vulnerable road user needs with those that address the existing road condition and/or long-term traffic growth, a better scheme outcome would result.

In line with the PAG Unit: 4.0 Consideration of Alternatives and Options the Do-Nothing and/or Do-Minimum options as well as at least three Do-Something options shall be brought forward from the Stage 1 (Preliminary Options Assessment) process.

The options recommended to be taken forward were

- Do-Minimum.
- Option 1 (Option B and E combined) - Active Travel Measures and Junction Improvements
- Option 2 (Option C1a combined with Option E) - Option 1 plus carriageway realignment/widening to Type 2/Type 1 design standard
- Option 3 (Option C1b combined with Option E) - Option 1 plus carriageway realignment/widening to Type 1 design

8 PHASE 2 STAGE 2 – PROJECT APPRAISAL MATRIX

8.1 Introduction

The sections below provide a full description of the options selected for progression to Stage 2 Project Appraisal Matrix, and outline the development, assessment methodology, criteria, results and recommendations/conclusion of the TII Phase 2 Stage 2 process.

With reference to Section 7.8, the Do-Minimum and the following three short-listed options, which were identified as having the lowest overall impact and greatest benefit from the Stage 1 assessment, were initially selected for progression to Stage 2 of the Option Selection Process:

- Do-Minimum (maintain existing road)
- Option 1 - (junction improvements and active travel measures – equivalent to preliminary Option's B and E combined)
- Option 2 - (Option 1 plus carriageway realignment/widening to Type 2/Type 1 design standard – equivalent to preliminary Option's C1a and Option E combined)
- Option 3 - (Option 1 plus carriageway realignment/widening to Type 1 design standard – equivalent to preliminary Options C1b and E combined)

In parallel with developing options to take forward to the Stage 2 appraisal, the Project Team undertook a significant amount of consultation with key project stakeholders, including: -

- Transport Infrastructure Ireland
- Shannon Airport
- Shannon Commercial Properties
- National Transport Authority
- Emergency Services
    - CCC Chief Fire Officer
    - An Garda Siochana
    - Shannon Airport
- Future Mobility Campus Ireland & TII ITS
- Clare County Council Roads, Environmental & Planning Depts
- Service Providers and MMaRC Contractor
- Project Team for Shannon Town & Environs Flood Relief Scheme

The key issues raised during this stakeholder engagement process included: -

- Reliability of emergency access to the Airport in event of incident on the N19 or at the Airport.
- Consistency of road layout between the N19 north and south of Drumgeely Roundabout.
- N19 upgrade required to support future economic growth.
- Importance of provision of active travel routes.
- Preference to locate the main active travel route along estuary side of N19.
- Importance of connections to existing active travel routes to form part of wider network of active travel infrastructure.

- Junctions to prioritise vulnerable road users; and
- Facilities to support enhanced bus provision.

As a result of this stakeholder engagement, an Option 4 was developed and then appraised: -

- Option 4 - (Option 1 plus carriageway realignment/widening with Bus Lanes designed to DMURS with 60kph speed limit throughout)

A full description of the four Options and the Do-Minimum is provided in Section 8.2 below.

8.2 Description and Development of the Stage 2 Options

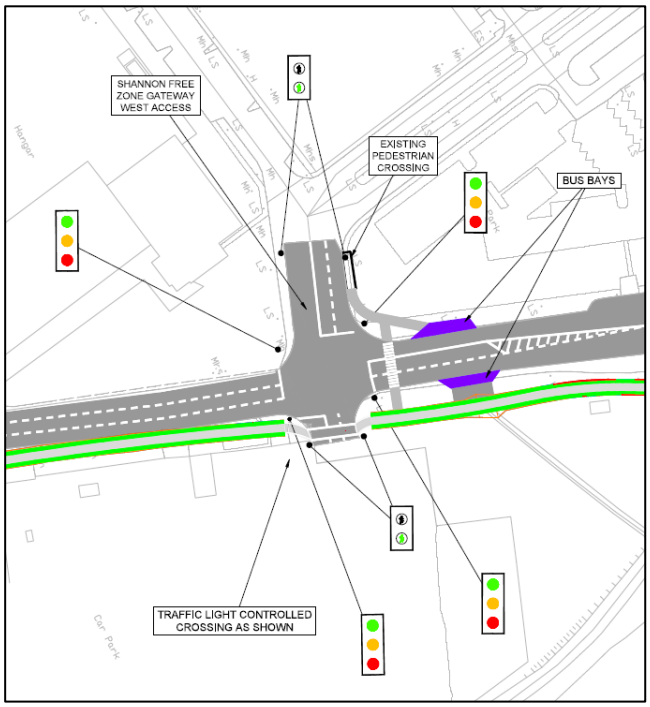
8.2.1 Baseline: Do-Minimum

This option consists of the existing MMaRC contract which includes for general maintenance and occasional minor road constructions interventions as agreed with TII.

8.2.2 Option 1

Option 1 (presented on drawing numbers N19 SAARS-DR-CW-01-0001 to 0004) consisted of:

- A shared footpath and cycle route of 3.0m width starting at Knockbeagh Point Roundabout including an initial pedestrian/cyclist crossing of the existing N19 before travelling along the right-hand (east) side of the existing N19 until it terminated by connecting to the existing footpath and road at Drumgeely Road which provides access to the estate, the Shannon Town road footpath and cycling network and to the existing pedestrian bridge over the N19 which links into SFZ. This shared footpath and cycleway option was approximately 2.5km in length constructed generally parallel to the existing road designed to DN-GEO-03047 Rural Cycleway Design (Offline) and DN-GEO-03036 Cross Sections and Headroom.
- Four new bus bays with bus shelters together with additional footpath links to the proposed cycleway and pedestrian facility and existing paths.
- The upgrade of both the Drumgeely Roundabout and the SFZ Gateway West Access junction. The Knockbeagh Point Roundabout would not be altered.



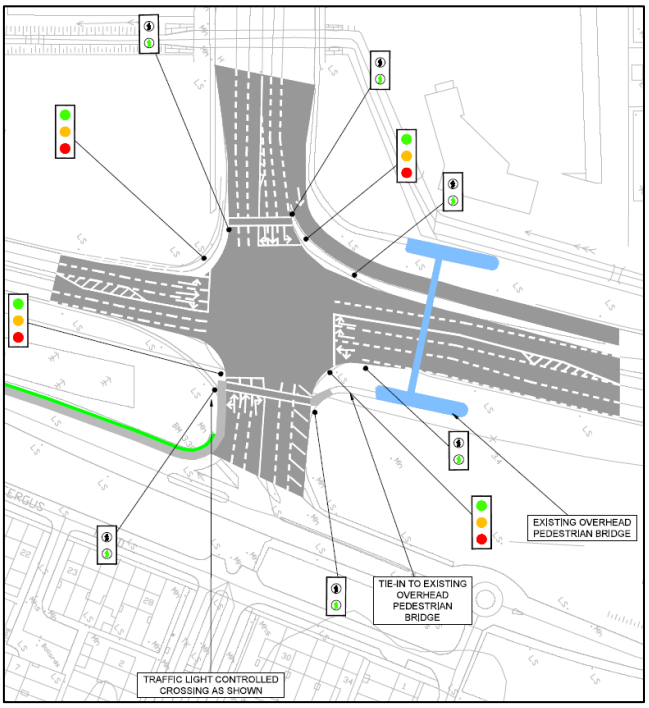


Figure 8-1A: SFZ Gateway West Junction Upgrade **Figure 8-1B- Drumgeely Roundabout Upgrade**

8.2.3 Option 2

Option 2 (as presented on drawing numbers N19 SAARS-DR-CW-02-0001 to 0004) consisted of:

- A shared footpath and cycle route of 3.0m width starting at Knockbeagh Point Roundabout including an initial pedestrian/cyclist crossing of the existing N19 before travelling along the right-hand (east) side of the existing N19 until it terminated by connecting to the existing footpath and road at Drumgeely Road which provides access to the estate, the Shannon Town road footpath and cycling network and to the existing pedestrian bridge over the N19 which links into SFZ. This shared footpath and cycleway option was approximately 2.5km in length constructed generally parallel to the existing road designed to DN-GEO-03047 Rural Cycleway Design (Offline) and DN-GEO-03036 Cross Sections and Headroom.
- Four new bus bays with bus shelters together with additional footpath links to the proposed cycleway and pedestrian facility and existing paths.
- The upgrade of both the Drumgeely Roundabout and the SFZ Gateway West junction. The Knockbeagh Point Roundabout would not be altered.
- The existing N19 would be upgraded as a Type 2 Single Carriageway to TII Standards on the section from Knockbeagh Point Roundabout to SFZ Gateway West Access junction to the right-hand side of the existing N19 and as a Type 1 Single Carriageway to TII Standards on the section from SFZ Gateway West Access junction to Drumgeely junction the left-hand side of the existing N19.

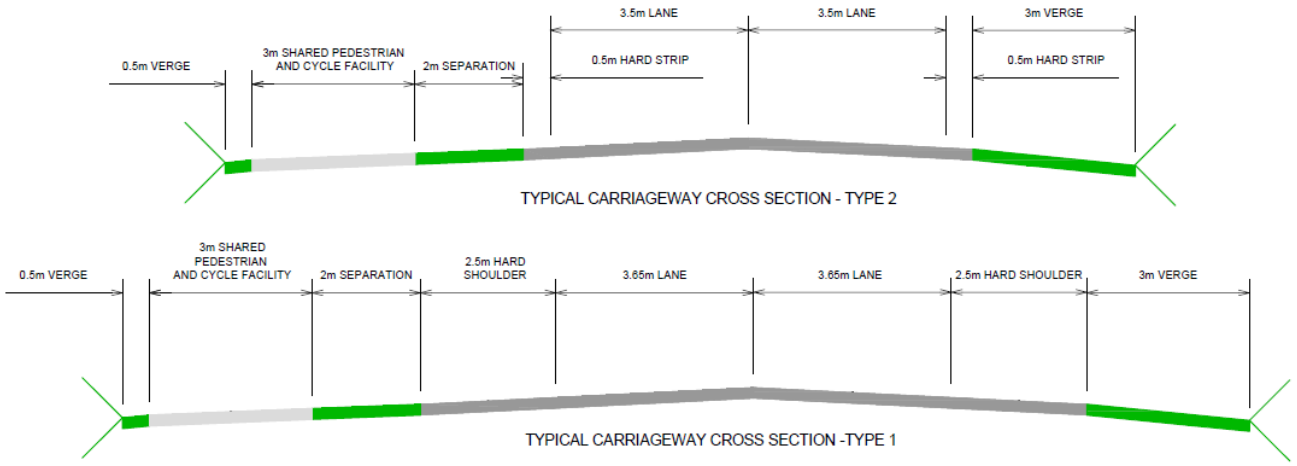


Figure 8-2: Combination of Type 1 and Type 2 Single Carriageway Options

8.2.4 Option 3

Option 3 (as presented on drawing numbers N19 SAARS-DR-CW-03-0001 to 0004) consisted of:

- A shared footpath and cycle route of 3.0m width starting at Knockbeagh Point Roundabout including an initial pedestrian/cyclist crossing of the existing N19 before travelling along the right-hand (east) side of the existing N19 until it terminated by connecting to the existing footpath and road at Drumgeely Road which provides access to the estate, the Shannon Town road footpath and cycling network and to the existing pedestrian bridge over the N19 which links into SFZ. This shared footpath and cycleway option was approximately 2.5km in length constructed generally parallel to the existing road designed to DN-GEO-03047 Rural Cycleway Design (Offline) and DN-GEO-03036 Cross Sections and Headroom
- Four new bus bays with bus shelters together with additional footpath links to the proposed cycleway and pedestrian facility and existing paths.
- The upgrade of both the Drumgeely Roundabout and the SFZ Gateway West junction. The Knockbeagh Point Roundabout would not be altered.
- The existing N19 would be upgraded as a Type 1 Single Carriageway to TII Standards – on the section from Knockbeagh Point Roundabout to SFZ Gateway West Access junction to the right-hand side of the existing N19 and from SFZ Gateway West Access junction to Drumgeely junction the left-hand side of the existing N19.

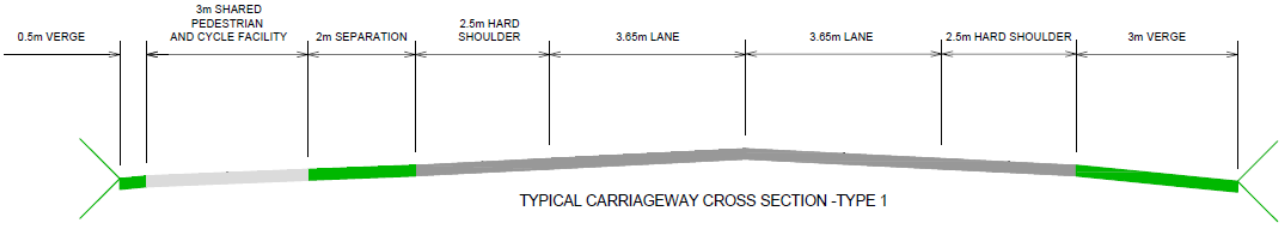


Figure 8-3: Type 1 Single Carriageway Option

8.2.5 Option 4

Option (as presented Drawing Numbers N19 SAARS-DR-CW-04-0001 to 0004) consisted of:

- A shared footpath and cycle route of 4m width from Knockbeagh Point Roundabout travelling along the right-hand (east) side of the existing N19 until it turns into Drumgeely Road where it continues and terminates at Drumgeely junction and provides access to the estate, the Shannon Town Road footpath and cycling network and to the existing pedestrian bridge over the N19 which links into Shannon Free Zone. Traffic control crossings would be provided crossing the N19 at Knockbeagh Point Roundabout, the SFZ Gateway West Access and at Drumgeely Roundabout. Additional crossings would be provided on the minor roads. This shared footpath and cycleways option would be approximately 2.5km in length constructed generally parallel to the existing road designed to the National Cycling Manual.
- Four new bus bays with bus shelters together with additional footpath links to the proposed cycleway and pedestrian facility and existing paths.
- The upgrade of both the Drumgeely Roundabout and the SFZ Gateway West junction. The Knockbeagh Point Roundabout would not be altered.
- The existing N19 would be upgraded as a 13m single carriageway to DMURS standard consisting of two 3.25m bus lanes and two 3.25m traffic lanes for the full length of the proposed scheme on the section from Knockbeagh Point Roundabout to SFZ Gateway West Access junction to the right-hand side of the existing N19 and from SFZ Gateway West Access junction to Drumgeely junction the left-hand side of the existing N19.

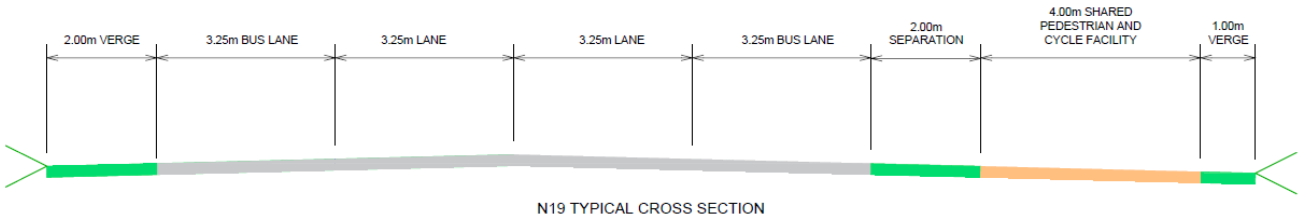


Figure 8-4: Option 4 Cross Sections

8.3 Stage 2 Appraisal Methodology & Criteria

The Stage 2 Appraisal is a more detailed evaluation than the Stage 1 assessment, where the impacts of the short-listed options were examined against a different set of defined Main Criteria and Sub-Criteria.

As outlined in Chapter 5, in advance of undertaking the Stage 2 Appraisal, the viability of the Do-Nothing Option and Do-Minimum Option were considered and assessed. As documented in Section 5.6 it was determined that these options/alternatives did not meet the scheme objectives and were discounted as solutions. However the assessment undertaken was of the impacts of each option against the Do-Minimum (the baseline) using, as per PAG guidance, the standard 1-7 scale (but intermediate values such as 5½ for slight-to-moderate positive impact are allowed). A baseline automatically has neutral impact against itself.

Table 8-1: Likely Impact Scoring Key

Score	Likely Impact Level
7	Major or highly positive
6	Moderately positive
5	Minor or slightly positive
4	Not significant or neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or highly negative

As per the Stage 1 assessment, the short-listed options were comparatively assessed in accordance with the Multi-Criteria Analysis (MCA) approach as per TII's PAG Unit 7.0. Using the defined TII MCA approach, the impacts of the short-listed options were qualitatively and/or quantitively assessed against a set of the six Main Criteria (Economy, Safety, Environment, Accessibility & Social Inclusion, Integration, and Physical Activity) and associated Sub-Criteria. Each scored sub-criteria within each criterion is supported by text and tables justifying the scoring.

PAG Unit 7.0 states

> "*The high level ranking of options is given by the sum of all the preference scores based on the scoring for each of the main criterion. The preference scores for each of the main criterion is equal to the sum of the scores for each sub criterion which are assessed individually based on the seven point scale outlined above. The high level ranking of options is intended only to provide a guide to the impact of options and as a record for future reference. It is not intended that the sum of each of the individual scores will be used in selecting a preferred option. The overall impact will obviously depend on the strength of individual impacts and it is up to the assessor to weigh up the individual impacts and form a view as to the likely overall impact of the options.*"

Accordingly, the analysis below presents for each criterion the sum of individual scores (normalised to the 7-point scale in the form of an average, as this is more meaningful).

These summary statistics were not used directly to determine the preferred option. Instead the findings under each criterion were reviewed, balancing the scale of the differences, to identify the option which best meets the objectives of the scheme.

For the Stage 2 Project Appraisal of the routes, the options were ranked as being either 'Most Preferred', 'Intermediate', or 'Least Preferred'. These assessments were then compiled for each of the above criteria in a Project Appraisal Matrix. . Note that these labels are for clarity, and do to not determine the overall ranking of the Stage 2 options, which is based on consideration of the differences in impact under each heading, as portrayed in the appraisal scores.

Table 8-2: Overall Preference Colour Code

Overall Preference Colour Code
Most Preferred
Intermediate
Least Preferred

8.4 Summary of Economy Appraisal (Options Comparison Estimate and Cost Benefit Analysis)

The economic assessment was carried out under criteria in accordance with the PAG Unit 6.1 in accordance with the recommendations of the Common Appraisal Framework.

The purpose of this appraisal is to comparatively assess the impact of each option against the Do-Minimum option in terms of how each option performs against the scheme objectives that fall under the Economy heading.

Three of the scheme objectives fall under the Economy heading:

- Peak hour accessibility of SFZ West
- Reliability of end-to-end journey
- Value for Money

As part of the Economy Appraisal, an Options Comparison Estimate (OCE) was prepared for each option.

8.4.1 Options Comparison Estimate

An updated OCE was undertaken on the refined Stage 2 options. The OCE for all Stage 2 options was prepared in accordance with TII's Cost Management Manual, using the Level 2 Cost Estimate Template and OCE Budget Template.

The OCE comprised of the following items as per TII's CMM:

1. Main Contract Construction
2. Main Contract Supervision
3. Archaeology
4. Advance Works and Other Contracts
5. Walking/Cycling/Asset Renewal (Residual Network Allowances)
6. Land and Property
7. Planning and Design

A ranking of the OCE is set out in **Table 8-3** below.

Table 8-3: Summary of Options Comparison Estimate Ranking

Item	Option 1	Option 2	Option 3	Option 4
Option Comparison Estimate	Most Preferred	Intermediate	Intermediate	Intermediate

8.4.2 Economy Scheme Objectives

Objective No. 1 - To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in Shannon Free Zone West

Accessibility is considered to be a key factor in the attractiveness of the SFZ West to foreign direct investment, affecting both business-to-business connectivity and the availability of a skilled labour force within the commuting catchment area.

The performance indicators used for each option are the modelled design year journey times from the zone representing the M18 to the zones representing SFZ West in the early AM peak, and the reverse journey in the PM peak.

Table 8-4: Accessibility Impacts (Minutes)

Time in Minutes		Do-Min	Option 1	Option 2	Option 3	Option 4
AM Peak	Via Drumgeely Roundabout	14.8	3.8	3.8	3.8	3.8
	Via Gateway West Roundabout	15.3	4.2	3.8	3.8	3.9
PM Peak	Via Drumgeely Roundabout	3.3	3.4	3.4	3.4	3.4
	Via Gateway West Roundabout	4.1	4.2	3.8	3.8	3.9
	Saving Over Do-Minimum	**Minutes**	**Option 1**	**Option 2**	**Option 3**	**Option 4**
		AM	11.1	11.3	11.3	11.2
		PM	-0.1	0.2	0.2	0.1
		Average	5.51	5.72	5.72	5.66
	Score		**6.5**	**7**	**7**	**6.75**

It can be seen from **Table 8-4** that:

- in the absence of the scheme, there is significant AM peak congestion, which if not addressed would lead to a substantial reduction in the accessibility of the SFZ West business park, and this effect dominates the cost-benefit analysis, with the majority of benefits in the AM peak hours.

- the differences between scheme options, which relate to the carriageway between the junctions, have minimal impact on the accessibility to SFZ West via the main entrance at Drumgeely roundabout. Therefore, the averaging of impacts over both entrances tends to minimise the differences between the scheme options.

All options are considered to have a strong positive impact, with averaged accessibility improvements of better than 5 minutes. Options 2 and 3 perform best on this measure and Option 1 least well. A score of 7 is allocated to Options 2 and 3 as best performing, 6.75 to Option 4 as next and 6.5 to Option 1 as least performing.

Objective No. 2 - To support the growth of freight and passenger throughput at Shannon International Airport – a key driver of the regional economy – by improving the quality, efficiency and reliability of ground transport to and from the airport

Reliability is to do with day-to-day variation in journey times. Some of the variation in journey times relates to congestion. If a road user happens to arrive at the N19 at about the same time as a large number of other road users, their journey will be delayed.

Some of the variation in journey times is to do with factors such as weather. Improved road markings may mitigate delays due to poor visibility but arguably such measures could be incorporated into the Do-Minimum.

Another aspect is resilience - the robustness of journey times to incidents such as road collisions (typically a very low probability of high delays) or roadworks.

Congestion-related variation can be modelled using microsimulation; this has not been done at Option Selection stage, so the assessment is entirely qualitative.

Most congestion is to do with junctions. The sensitivity of delay to flow typically increases with flow, so the higher the congestion delay, the higher the unreliability of delay. The scheme will thus improve reliability to the extent that additional capacity is provided, to reduce congestion-related delays is generally to make those delays more predictable.

Some congestion relates to links, provision of overtaking opportunities, for example, can improve reliability in general, although this is not a particular issue for this scheme.

Note that the introduction of traffic lights tends to reduce reliability at low traffic flows by introducing additional variation in journey times depending on when within the cycle a road user arrives, and also introduces another element that can go wrong, for a small reduction in resilience.

A structured assessment is presented in the **Table 8-5** below:

- Junction effects are the same for all options because junction improvements are common to each option, to ensure like-for-like comparisons. With the junction options that have been modelled, the results are a net positive.
- Improved alignment and overtaking opportunities apply more or less equally to Options 2, 3, 4, but not to Option 1.

- Scheme impacts on weather-related effects are assessed as negligible (allowing for the Do-Minimum including maintenance to TII standards).
- The resilience benefits of a hard shoulder relate primarily to the ability to maintain traffic flow past an incident and apply equally to a bus lane. These apply to the full length of the scheme in Option 3 and 4, and to part of the scheme length in Option 2.

Table 8-5: Reliability Assessment

Source of Unreliability	Option 1	Option 2	Option 3	Option 4
Junction Delays	5	5	5	5
Link Congestion / Overtaking	4	6	6	6
Weather etc.	4	4	4	4
Resilience	4	5	7	7
Overall	**4.25**	**5**	**5.5**	**5.5**

Options 3 and 4 therefore perform best. Assessing the relative importance of the different aspects is a matter of judgment, but it is clear that Option 1 performs least well.

Objective No 3 - To achieve value for money from investment in the project

Two standard measures of value for money are in common use:

- Net present value is the difference between the value of the benefits and the value of the costs,
- Benefit-cost ratio is the ratio of the value of the benefits to the value of the costs.

For the purpose of option selection – choosing the best solution to a given transport problem – net present value is the better measure to use.

The reason for this is as follows. In many complex systems there will be a part-solution which has the highest BCR – the "low-hanging fruit" which offers good benefits at low cost. The existence of such an option is not an argument against implementing a more complete solution.

In such situations, the decision choice is between spending the money that comprises the difference in cost on a more complete solution or spending the same money elsewhere in the economy on another project, so the relevant economic test is to look at the incremental BCR – the ratio of the extra benefits to the extra costs – against some target BCR.

If options are ranked according to BCR, the part-solution always comes out better, even when the complete solution is the right answer - better value for money than spending the difference elsewhere.

If options are ranked according to NPV, the part solution comes out better when the incremental BCR is below 1 and the complete solution comes out better when the incremental BCR is above 1, which is economically optimal in the absence of capital constraint (Capital constraint can be represented by a shadow price of capital; this method is used in the PAG cost spreadsheet).

Table 8-6 shows the results from the Option Selection stage cost-benefit analysis:

Table 8-6: Cost Benefit Analysis (€Million)

	Masterplan Scenario				Committed Scenario			
Item	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 1**	**Option 2**	**Option 3**	**Option 4**
Benefits								
Net Present Value of Benefits (PVB) (Including residual value)	158.7	173.4	173.5	170.2	-6.39	16.13	16.34	11.97
Costs								
Net Present Value Costs (PVC)	7.65	12.78	13.1	13.9	7.65	12.78	13.10	13.90
Comparison								
Net Present Value (NPV = PVB – PVC)	151.07	160.64	160.41	156.30	-14.04	3.35	3.24	-1.93
Benefit to Cost Ratio (BCR = PVB / PVC)	**20.74**	**13.57**	**13.24**	**12.24**	**-0.84**	**1.26**	**1.25**	**0.86**

Why are the high values so high?

In the Masterplan scenario, the estimated benefits of all options are surprisingly high, leading to very high forecast BCR values (even before consideration of residual value).

On inspection, these high benefits come from the AM peak modelling. Within this time period, demand at the Drumgeely Roundabout exceeds capacity in the Do-Minimum case, leading to high levels of queuing and delay. The junction improvement that has been modelled – a signalised roundabout - has been chosen to provide sufficient capacity to meet demand, and thus leads to a very high level of time savings in this period.

Table 8-7 illustrates this, tabulating the benefits by the three time periods distinguished by TUBA.

Table 8-7: TUBA benefits per time period

	Benefits (€K) across time periods			
	Option 1	Option 2	Option 3	Option 4
AM	165,919	170,005	170,042	169,444
Inter	4,373	1,888	1,920	108
PM	2,884	1,439	1,471	781

These very high values thus do represent the economic value of the proposed scheme. They merely warn against high levels of land-use development that are unsupported by transport infrastructure or mobility management planning.

Why are the low values so low ?

In the conservative scenario, Option 1 (junction improvements and Active Travel) has negative benefits. Introducing traffic signals increases delay to traffic at low flow levels. The benefits to users of other modes are not included in the TUBA results.

Options 2, 3 and 4 offer additional benefits beyond the junction improvements in Option 1. It can be seen that these are large enough to more than offset the junction disbenefit.

8.4.3 Incremental Analysis

Looking at the case for each of the other options as incremental spending in addition to Option 1, the extra cost is justified by the extra benefit in all three cases, with incremental BCRs significantly above 1. **Table 8-8** shows the results.

Table 8-8: Incremental Analysis Relative to Option 1

	Option 2	Option 3	Option 4
Incremental Cost	5.13	5.45	6.25
Incremental Benefit (Masterplan Scenario excluding residual value)	14.7	14.8	11.48
Incremental Benefit (Committed Scenario)	22.5	22.7	18.4
Incremental BCR (Masterplan scenario excluding residual value)	2.9	2.7	1.8
Incremental BCR (Committed Scenario)	4.4	4.2	2.9

There is thus a clear economic case for improving the links as well as the adapting the junctions for whatever level of development traffic occurs.

8.4.4 Economy Summary Assessment

The overall Economy score was derived by combining the above assessments under three sub-criteria – one qualitative and two quantified. The qualitative score for reliability was been crudely mapped to a quantitative scale.

PAG unit 7.0 recommends a procedure which involves adding up individual scores without any weighting of criteria or sub-criteria, but then notes that *"It is not intended that the sum of each of the individual scores will be used in selecting a preferred option. The overall impact will obviously depend on the strength of individual impacts, and it is up to the assessor to weigh up the individual impacts and form a view as to the likely overall impact of the options".*

Table 8-9: Economy Summary

Objective-Led Sub-Criteria	Option 1	Option 2	Option 3	Option 4
Objective No. 1	6.5	7	7	6.75
Objective No. 2	4.25	5	5.5	5.5
Objective No. 3	6	7	6.75	6.5
Average Score	**5.6**	**6.3**	**6.4**	**6.3**
Overall Preference	Least Preferred	Intermediate	Most Preferred	Intermediate

Weighing up the individual impacts, it was clear that Options 2, 3 and 4 perform the strongest. The choice between these was a trade-off between the additional reliability offered by Options 3 and 4, and the slightly higher value for money of Option 2. On balance, it was considered that Option 3 best meets the economy objectives of the scheme.

Option 1 clearly performed least well on economy grounds, with the additional costs for Options 2, 3 and 4 justified by the additional accessibility, reliability and value-for-money benefits.

8.5 Summary of Safety Appraisal

Two of the scheme objectives fall under the Safety heading and are considered through the appraisal process, these are emergency vehicle journey times and collision reduction.

Objective No 4 - To improve access to Shannon International Airport by emergency response vehicles in the event of an incident

Achievable journey times for emergency vehicles depend on two aspects of the scheme.

One is the avoidance of major queuing at junctions and the other aspect is the provision of sufficient carriageway width so that traffic can pull over to let emergency vehicles pass.

In terms of avoidance of major queuing at junctions, the traffic modelling suggested that in the Do-Minimum (core forecast design year AM peak) there were long queues back from Drumgeely Roundabout to Shannon Town Roundabout, which would impede emergency access in the event of an incident at this time of day. An increase in junction capacity will result in a reduction in queuing and therefore enable better access for emergency vehicles. Each of the modelled options addresses this issue through an increase in junction capacity.

With regards to the use of additional carriageway width so that traffic can pull over to let emergency vehicles pass. Option 2 has a hard shoulder north of Gateway West roundabout; Option 3 has a hard shoulder for the full length of the scheme and Option 4 has bus lanes for the full length of the scheme, which emergency vehicles could use.

Table 8-10: Emergency Vehicle Journey Times Assessment

Emergency Vehicle Journey Times	Option 1	Option 2	Option 3	Option 4
Queuing at Junctions	5	5	5	5
Hard Shoulder	4	5	6	6
Overall	**4.5**	**5**	**5.5**	**5.5**

Objective No 5 - To reduce the frequency of transport collisions within the N19 corridor

The Road Safety Authority database of reported personal injury collisions includes a total of 9 collisions along the relevant length of the N19 over a 12-year period 2005-2016. None involved casualties considered to be serious.

Observed collision rates are low. This section of the N19 already has relatively low speeds south of Gateway West roundabout, good visibility and “forgiving” roadsides.

The standard method of assessing likely collision reductions from each option is to use the PAG default collision rates with the COBALT software.

These default rates are not sensitive to junction type, or standards of horizontal alignment, but only to single/dual and urban/rural differences. Accordingly, such an analysis would estimate a negligible safety impact from the proposed scheme under any of the scheme options.

COBALT software allows use of locally-observed collision rates.

However, Do-Scheme rates are not observable. Such analysis typically assumes that building a road to current design standards will reduce some element of safety risk from observed above-average to average (default) levels. In the case of the N19, observed rates are lower than default rates, so there is limited evidence that could be used to underpin a statistical analysis.

Analysis undertaken for the National Secondary Road Needs Study (NSRNS) showed collision rates reducing as road quality improves, where road quality is primarily a function of the straightness and cross-section of the road.

Using NSRNS data, a broad-brush estimate of the scale of this effect gives a reduction of 0.03 collisions per Million Vehicle-Kilometres (MVK), equal to a 12% reduction, where a 6m single carriageway is widened to Type 1 standard with minimal straightening of the route.

A high-level estimate of the likely collision savings from the scheme, when applied to the 9 collisions along the relevant length of the N19, is therefore as follows. For each type of collision, a broad-brush estimate has been made of the potential for the scheme to reduce that type of collision:

- Collisions involving pedestrians and cyclists are considered likely to be roughly halved by taking cyclists off the road onto purpose-built cycle tracks and by improving pedestrian crossing facilities;
- Collisions at Drumgeely Hill are considered likely to be reduced substantially by removal of right-turning movements from this junction;
- No reduction is claimed for other junctions; and
- Non-junction collisions are estimated to reduce by 12% where a poor-quality route is upgraded to include hard shoulders (based on NSRNS analysis quoted above) and by half of that where the improvement in quality is lower.

Applying these broad-brush estimates to the observed collision numbers, we get the following relative performance of each option:

Table 8-11: Estimated Likely Collision Savings

Type of Collision	Number Reported	High-Level Estimate of Impact			
		Option 1	Option 2	Option 3	Option 4
Vulnerable Road Users	2	50%			
Drumgeely Hill Turn	1	75%			
Other Major Junction	3	0%			
Non-Junction North	2	0%	6%	6%	6%
Non-Junction South	1	0%	6%	12%	12%
Comparative Reduction		1.75	1.93	1.99	1.99
Score		**5.5**	**6.0**	**6.25**	**6.25**

The road collisions assessment scaling statement assesses the safety impact of Option 1 as slight-to-moderate, and scores the other options in proportion.

8.5.1 Safety Summary Assessment

The overall Safety score is derived by combining the above two assessments.

Table 8-12: Safety Summary

Objective-Led Sub-Criteria	Option 1	Option 2	Option 3	Option 4
Objective No. 4	4.5	5	5.5	5.5
Objective No. 5	5.5	6	6	6
Average Score	5	5.5	5.75	5.75
Overall Preference	Least Preferred	Intermediate	Most Preferred	Most Preferred

Options 3 and 4 performed best on both sub-criteria, and were considered to have a moderate positive impact, being likely to address the causes of roughly 2 out of 9 observed collisions and make a significant but unspectacular improvement to access times for emergency vehicles. Whilst it was difficult to assess the weight of the various factors involved, it was clear that Option 2 has a stronger impact than Option 1.

8.6 Summary of Physical Activity Appraisal

Objective No 6 - To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone

The Physical Activity appraisal focused on physical activity impacts such as impacts on vulnerable road users including pedestrians and cyclists. The purpose of this appraisal was to comparatively assess the impact of each option against the Do-Minimum option.

The existing facilities for vulnerable road users of the Do-Minimum option do not meet current design standards as they are narrow (approximately one meter in width) and do not have public lighting. There is a pedestrian bridge near Drumgeely Roundabout and a signal-controlled pedestrian crossing between the Drumgeely Apartments and the Shannon Free Zone Gateway West junction. The Do-Minimum option contains no dedicated off-road cycle facilities.

Options 1, 2 and 3 propose a 3.0m-wide shared pedestrian/cycleway facility with public lighting from Knockbeagh Point Roundabout to Drumgeely Roundabout. The existing pedestrian bridge near Drumgeely Roundabout will be maintained. It was proposed to remove the existing signal-controlled pedestrian crossing between the Drumgeely Apartments and the Shannon Free Zone Gateway West junction and replace it with pedestrian/cycleway crossing facilities at the proposed new signal-controlled junction at Shannon Free Zone Gateway West.

The following additional new signalised pedestrian/cycleway crossing facilities would be provided as follows:

- Crossing the N19 near the Knockbeagh Point Roundabout;
- Crossing the side road at the Drumgeely Apartments junction;

- Crossing the N19 at the SFZ Gateway West junction; and
- Crossing the Drumgeely Road at the Drumgeely Roundabout.

Option 4 is similar to Options 1, 2 and 3 in terms of the proposed pedestrian/cycleway network however the width of the path was proposed to be 4m wide and public lighting would be included from Knockbeagh Point Roundabout to Drumgeely Roundabout.

Table 8-13 shows the assessment of each option against the Do-Minimum Option. It was determined that all four options are equal and determined as Major or Highly Positive. Each option scored 7.

Table 8-13: Physical Activity Summary

Objective-Led Sub-Criteria	Option 1	Option 2	Option 3	Option 4
Walking	7	7	7	7
Cycling	7	7	7	7
Average Score	7	7	7	7
Overall Preference	Most Preferred	Most Preferred	Most Preferred	Most Preferred

8.7 Summary of Environmental Appraisal

The purpose of the Environment Appraisal was to comparatively assess the impact of each option against the existing baseline conditions in terms of how each option performed against the following subheadings:

- Air Quality & Climate;
- Noise;
- Landscape & Visual;
- Biodiversity (Flora and Fauna);
- Archaeological & Cultural Heritage;
- Population & Human Health;
- Material Assets;
- Hydrogeology;
- Hydrology;
- Soils and Geology.

Objective No 6 - To improve opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone

Each heading was detailed below including an assessment matrix of each scheme option under the corresponding heading. The matrix showed how each option performed within each of the assessment criteria. Where possible, the performance matrix for each option included both quantitative and qualitative assessments on each the criteria impacts.

8.7.1 Air Quality & Climate

The specific objectives of the air quality assessment assess the various options from their points of deviation with the existing route and presents the most favourable options in terms of air quality and climate impacts.

TII's document entitled "Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes" (TII 2011) provides guidance on the route selection assessment procedures in "Chapter 2 - Route Selection".

The primary aspects of the assessment relate to existing ambient air quality, proximity of sensitive locations and a review of the overall significance of potential changes in air quality.

The objective at this stage of the route selection process is to indicate whether there are likely to be significant air quality impacts associated with the proposed options. In the current assessment, the number of residential properties within 50m of the carriageway of each route were identified. Traffic data obtained for the design year of 2040 was used in the model as per the TII guidelines (2011). A comparison of the proposed options was carried out based on a calculation of the Index of the Overall Change in Exposure to Nitrogen Oxides (NOx) and Particulate Matter (PM10) resulting from each option.

The calculation of the Index of Overall Change in Exposure allowed a comparison of the overall air quality impact on people from each option to be carried out. The Index is based on identifying the number of sensitive receptor locations (e.g., residential properties) within 50m of the carriageway of all road links that would experience a significant change in traffic for each option The change in emissions is influenced by changes in traffic flow, composition and speed. The analysis was carried out using the methodology of TII (2011) using the UK DMRB air dispersion model (UK Highways Agency, 2007).

The comparison calculated as per the "Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes" was then used to inform the Stage 2 project appraisal matrix.

In addition to assessing the impact to people as a result of air quality, the impact to sensitive ecosystems must also be assessed as per the TII guidelines (2011). The EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the "Habitats Directive") requires an Appropriate Assessment to be carried out where there is likely to be a significant impact upon a European protected site. TII requires the Air Quality Specialist to liaise with an ecologist on schemes where there is a European protected site within 2km of the route. However, as the potential impact of a scheme is limited to local level, detailed consideration need only be given to roads where there is a significant change to traffic flows (>5%) and the designated site lies within 200m of the road centre line. Where these two requirements are fulfilled, the assessment at the route selection stage involves a calculation of nitrogen oxides (NOx) concentrations and NO2 dry deposition rates using the UK DMRB screening method as recommended by TII (2011).

Regarding climate impacts, longer routes will require greater amounts of material for construction and will have higher GHG emissions. The route length must also be considered for the operational phase, longer journeys will also produce higher GHG emissions.

The results and preference ranking of the air quality assessment are presented in **Table 8-14**.

There is not a significant difference in the NOX and PM10 scores for Options 2, 3 or 4, all of which result in a minor or slightly beneficial impact due to a lower number of impacted receptors (residential properties) along the proposed alignments compared to the Do-Minimum. Option 1 has a slightly negative impact compared to the Do-Minimum. This is due to the increase in AADT compared to the Do-Minimum.

Option 1 is the least preferred option in terms of air quality as it resulted in the highest NOX and PM10 scores of the four options. This is due to the higher number of receptors within 50m of the carriageway. Option 4 performed best insofar as it results in the lowest NOX an PM10 scores. Options 2 and 3 are also performed well in this regard due to their improvement of score compared to the Do Minimum scenario, and therefore lesser impact to receptors. However, as mentioned there was not a significant difference between the scores for Options 2, 3 or 4 and all three routes were predicted to have a minor or slightly beneficial impact to air quality, as such all options are preferable.

Regarding climate change construction stage impacts, all schemes will have similar lengths and construction methods. In addition, all route options provide improvements in infrastructure for cycling and bus services. For the high-level qualitative assessment, all schemes are given equal preference.

Table 8-14: Air Quality and Climate Assessment

	Option 1	Option 2	Option 3	Option 4
Impact Significance Level	Imperceptible (35 Receptors within 50m)	Imperceptible (0 Receptors within 50m)	Imperceptible (0 Receptors within 50m)	Imperceptible (0 Receptors within 50m)
Score	**3**	**4**	**4**	**4**
Preference	Intermediate	Most Preferred	Most Preferred	Most Preferred

8.7.2 Noise

This assessment was completed in accordance with TII's Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2004) and a Good Practice Guidelines for the Treatment of Noise during the Planning of National Road Schemes (2014).

TII's Guidelines for the treatment of Noise and Vibration in National Road Schemes state…

> *The work undertaken as part of the Constraints Study is used by the project engineers responsible to refine the broad corridor into a small number of route corridor options.*
>
> *The NRPMG state that the purpose of Route Corridor Selection is to "carry out a detailed technical evaluation of the scheme corridor. The route selection process involves…. [the] identification and investigation of Route Options, assessment of Environmental Impacts for each option…". This evaluation in turn leads to the production of a Route Corridor Selection Report.*

The TII guidelines outline three parts to the noise assessment as follows:

- Assessment of potential impacts based upon property counts.
- Consideration of likely changes in traffic flow.
- A review of the need for, and difficulties associated with, noise mitigation measures. This also involves undertaking preliminary noise predictions for each option to identify the number of noise sensitive locations (NSLs) with noise levels greater than the TII design goal of L_{den} 60 dB(A).

The four options were compared with reference to their Potential Impact Ratings (PIR) based on property counts between 0 and 300m from the road centreline. The PIR assessment takes account of all properties within 300m of the road centreline of the proposed route alignment placed into one of four bands (0 to 50m, 50 to 100m, 100 to 200m and 200 to 300m). Based on a count of properties within 300m of each option and the location of those properties within the four designated bands, the assessment determined that Options 2, 3 and 4 are ranked joint highest and Option 1 is ranked lowest.

With regards to likely changes in traffic flow, there is little or no change in flows between the existing road alignment and the proposed options. However, there will be an increase in traffic speeds for Options 2, 3 and 4 due to the improvement of the corridor. There will also be a change in traffic speed for Option 1 at the north section to Drumgeely Roundabout.

In terms of noise sensitive locations (NSLs) with noise levels greater than the TII design goal of L_{den} 60 dB(A), Option 1 had 21 no. of NSLs above the 60 dB L_{den} design goal whilst Options 2 and 3 each had 63 NSL's above this threshold. Options 2, 3 and 4 had marginally higher traffic flows, but significantly higher traffic speeds than the Do-Minimum scenario, and so the noise impact was greater for these route options. Option 4 had a slightly lower speed than Options 2 and 3.

The noise mitigation options normally considered would include use of topography (i.e., cuttings), low noise roads surfaces, traffic management and noise barriers/bunds. The proposed options are on a relatively flat ground. Options 2, 3 and 4 require upgrade works and so there is potential to include a low noise road surface as part of the improvement scheme.

With the installation of a low noise road surface the number of noise sensitive locations with noise levels above the 60 dB L_{den} design goal drop significantly with zero for options 2, 3 and 4. Options 2 and 3 with a low noise road surface had a similar number of properties above the design goal, but less than the Do Minimum option.

There would be an increase in traffic speeds for Options 2, 3 and 4 due to the improvement of the corridor. The average traffic speed from the Drumgeely Roundabout to Airport Avenue was expected to increase by 19 km/hr up to 74 km/hr. The noise levels at nearby receptors could be mitigated by reducing the speed limit along this section of road.

The last potential for mitigation involves the installation of noise barriers/bunds. Noise barrier/bunds are most effective when they are located close to either the source and/or the receiver, and when they block direct line of sight between the source and the receiver. Noise barriers/bund will perform reasonably well for single and two-story dwellings but are unlikely have the same impact for higher rise buildings at Drumgeely Hill.

Overall, the highest ranked options were Options 2, 3 and 4 as they had the lowest PIR as well as having the best opportunity for mitigation. The overall ranking of the route options is presented in **Table 8-15**.

Table 8-15: Noise Assessment

Noise	Option 1	Option 2	Option 3	Option 4
Noise Sensitive Locations (Potential Impact Rating)	2	3	3	3
Traffic Flow & Noise Sensitive Locations	4	3	3	3
Mitigation Performance	4	7	7	7
Average Score	**3.33**	**4.33**	**4.33**	**4.33**
Overall preference	Intermediate	Most Preferred	Most Preferred	Most Preferred

8.7.3 Landscape & Visual

Landscape and visual aspects were examined as two discrete topics:

- Landscape - is concerned with alteration to the physical landscape and features which contribute to its character; and
- Visual - is concerned with changes that may arise in the overall visual amenity enjoyed by people.

In accordance with the UK Guidelines for Landscape and Visual Impact Assessment (LVIA) the likely significance of effects is based on a balance between the likely sensitivity of the landscape or visual receptor and the likely magnitude of landscape or visual effect.

For the purposes of this assessment, it was assumed that general landscape mitigation measures would be implemented for all options.

For Option 1 a degree of vegetation would likely need to be removed between Drumgeely Hill and the adjacent section on the N19 during the construction near Ch1600. This may result in a slightly reduction to the level of visual screening between the existing N19 and some residents in the apartment blocks however only a limited degree of visual change was predicted and is unlikely to be significant.

Traffic signals provided as part of Option 1 would be in keeping with the existing character within the road corridor and would not alter the character of the landscape or of the views from nearby visual receptors. Physical impact on the landscape of this option is likely to be inconsequential. If instances occur where the new infrastructure is visible it is likely to be a case of visual intrusion rather than visual obstruction.

For these reasons, it was anticipated that Option 1 impacts on the landscape and visual receptors identified are unlikely to be significant.

- Significant landscape effect unlikely;
- Significant visual effect unlikely;
- Likely PAG Unit 7.0 Impact significance level: Not significant or neutral;

Options 2, 3 and 4 involved a new section of road passing within an area zoned as Open Space in the LAP which is located to the northwest of the existing N19 on the opposite side to Drumgeely Hill. This Open Space contains a conifer woodland, and this option would likely require the removal of some trees within the woodland, resulting in a notable change to the character and consequently represents a potential significant impact on this landscape component.

Traffic signals provided as part of Options 2, 3 and 4 would be in keeping with the existing character within the road corridor and would not alter the character of the landscape or of the views from nearby visual receptors. Physical impact on the landscape of this option is likely to be inconsequential. If instances occur where the new infrastructure is visible it is likely to be a case of visual intrusion rather than visual obstruction.

There was the potential for significant visual impacts from Options 2, 3 and 4 on residents on Drumgeely Hill.

- Potential likely significant effect on landscape component 'Open Space zoning'
- Potential likely significant visual effect on residents
- Likely PAG Unit 7.0 Impact significance level: Moderate Negative

Overall, Option 1 was ranked as Most Preferred and Options 2, 3 and 4 were ranked equally as Least Preferred. The overall ranking of the route options is presented in **Table 8-16**.

Table 8-16: Landscape & Visual Assessment

Landscape & Visual	Option 1	Option 2	Option 3	Option 4
Likely Potential Significant Landscape Effects	4	2	2	2
Likely Potential Significant Visual Effects	4	2	2	2
Average Score	**4**	**2**	**2**	**2**
Overall Preference	Most Preferred	Least Preferred	Least Preferred	Least Preferred

8.7.4 Biodiversity

The Stage 2 Options Assessment examined each option in relation to both the ecological constraints identified in the Stage 1 Preliminary Options Assessment report and those identified following site surveys. Ecological constraints examined include designated nature conservation sites (both national and European), additional nature conservation sites, watercourses, protected flora and fauna, and invasive species that are legally regulated.

The assessment was undertaken in line with National Roads Authority (NRA) guidelines: 'Guidelines for Assessment of Ecological Impacts of National Road Schemes' (2009), 'Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes' (2008) and 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes' (2008).

Documentation and guidance available from Clare County Council such as the County Development Plan (CDP) and the Clare Biodiversity Action Plan were also reviewed.

Option 1 would likely require some vegetation removal.

Options 2, 3 and 4 are similar and the impact on key ecological receptors would be the same. Options 2, 3 and 4 would likely require the removal of some trees. A small amount of trimming of hedgerows north of the Urlan Beg crossing is anticipated. North of the Urlan Beg crossing there may be some felling of (mixed) broadleaved woodland and a small amount of conifer plantation. Also, a potential bat roost (birch tree) and tree lines are likely to be affected.

Similar invasive plant species to Option 1 are in proximity to Options 2, 3 and 4. Impacts similar in type to those from Option 1 on the Urlan Beg stream, Shannon Airport drainage ditch, otter and frog are likely to occur.

Watercourse crossings associated with these options would be similar in nature. The watercourses are heavily modified and are of sub-optimal habitat quality to be of any significant importance in supporting protected species. It was assumed that temporary flow diversion (likely over-pumping) will be employed and as such works will be carried out under dry conditions, limiting the potential for downstream pollution to European sites. There is opportunity for fishery and riparian habitat enhancement as part of watercourse crossings.

Overall, Option 1 was ranked as Most Preferred and Options 2, 3 and 4 were ranked equally as Least Preferred. The overall ranking of the route options is presented in **Table 8-17.**

Table 8-17: Biodiversity Assessment

Biodiversity	Option 1	Option 2	Option 3	Option 4
Potential to Impact Sites of International or National Importance	3	3	3	3
Potential to Impact Protected Flora or Fauna	3	2	2	2
Potential For Habitat Loss / Degradation	3	2	2	2
Potential to Cause the Spread of Invasive Species	2	2	2	2
Average Score	**2.75**	**2.25**	**2.25**	**2.25**
Overall Preference in Relation to Biodiversity	Most Preferred	Least Preferred	Least Preferred	Least Preferred

8.7.5 Archaeological & Cultural Heritage

An archaeological and cultural heritage study was undertaken for the four options at Stage 2 in order to inform the selection of the preferred option.

Option 1 was unlikely to have any impact on Architectural Heritage receptors. There were no Protected Structures, Architectural Conservation Areas (ACAs), sites listed in the National Inventory of Architectural Heritage (NIAH) or unregistered cultural heritage sites comprising extant remains that could be classified as built heritage within the study area criteria for Option 1.

There are also no National Monuments, sites subject to a preservation order or designated RMPs within the study area for Option 1.

The sites that will be impacted by Option 1 are unregistered sites—a townland boundary with a baseline value of Medium/High and two areas of archaeological potential with baseline values of Medium/Low.

The existing N19 road cuts through the extant townland boundary between Drumgeely and Rineanna South (CH009). As part of Option 1, Insertion of the proposed combined footpath and cycleway to the south of the current road at this location could require further removal of the townland boundary.

The route of the proposed Option 1 shared path would extend through two areas of archaeological potential CH023 and CH024. These are two of the few remaining areas of unimproved and undeveloped greenfield along this section of the N19 road, so would have a higher potential to preserve sub-surface archaeological features. Ground reduction for the proposed shared path could impact on such features if present.

Options 2, 3 and 4 are similar and the impact on archaeological and cultural heritage receptors would be the same. There are no Protected Structures, Architectural Conservation Areas (ACAs), sites listed in the National Inventory of Architectural Heritage (NIAH) or unregistered cultural heritage sites comprising extant remains that could be classified as built heritage within the study area and therefore Options 2, 3 and 4 were unlikely to have any impact on Architectural Heritage receptors.

There are no National Monuments, sites subject to a preservation order or designated RMPs within the study area for these Options. The sites that will be impacted by Options 2, 3 and 4 are unregistered sites—two townland boundaries with baseline values of Medium/High, the site of a well with a baseline value of Medium/Low and two areas of archaeological potential with baseline values of Medium/Low. This option should not impact on this townland boundary.

The existing N19 road cuts through the extant townland boundary between Drumgeely and Rineanna South (CH009). Insertion of the proposed online upgrade at this location could require further removal of the townland boundary.

The site of a well (CH016) is located adjacent to the carriageway of the current N19. Options 2, 3 and 4 should not directly impact on this site.

Options 2, 3 and 4 would extend through two areas of archaeological potential CH023 and CH024. These are two of the few remaining areas of unimproved and undeveloped greenfield along this section of the N19 road, so would have a higher potential to preserve sub-surface archaeological features. Ground reduction for the options could impact on such features, if present.

Overall, each of the four options are ranked equally as Intermediate. The overall ranking of the route options is presented in **Table 8-18**.

Table 8-18: Architectural & Cultural Heritage Assessment

Impact Significance Level	Option 1	Option 2	Option 3	Option 4
Very Significant	None	None	None	None
Significant	None	None	None	None
Moderate	None	None	None	None
Slight	CH009 - Townland Bdy CH023 - AAP CH024 - AAP	CH008 - Townland Bdy CH009 - Townland Bdy CH016 - Site of Well CH023 - AAP CH024 - AAP	CH008 - Townland Bdy CH009 - Townland Bdy CH016 - Site of Well CH023 - AAP CH024 - AAP	CH008 - Townland Bdy CH009 - Townland Bdy CH016 - Site of Well CH023 - AAP CH024 - AAP
Negligible	None	None	None	None
No Impact	None	None	None	None
Average Score	**4**	**4**	**4**	**4**
Preference	Intermediate	Intermediate	Intermediate	Intermediate

8.7.6 Population & Human Health

The population and human environment is considered under the following criteria:

- Population
- Socio-Economics
- Community Facilities, Amenities & Healthcare
- Human Health & Safety

In terms of population there are 1,350 dwellings within 1km of the project. These are entirely located to the east of the study area. The most proximate dwellings are located at Drumgeely Hill and are located ca. 25m from the existing N19 corridor. There are no lands zoned for future residential development in proximity to the project.

The main economic activities located in the N19 study area includes enterprise, business and light industry associated with the Shannon Free Zone, located north of the study area, and airport related activity located west of the study area. Furthermore, Shannon Airport is considered significant for tourism in the region.

With regards to community facilities, amenities and healthcare, the settlement of Shannon has a range of community, social, cultural and recreational facilities supporting residential amenity throughout the town. Existing community facilities and amenity areas are located in proximity to the east of the N19 corridor at Drumgeely Hill.

Furthermore, there is a site zoned for community use (C17) in the Shannon Town and Environs LAP 2012-2018 located to the south of the N19 study area. There are no healthcare facilities located in proximity to the N19 study area and are therefore not considered below.

From analysis of health statistics, Shannon Town's population is generally in good health and is not considered to be 'at risk'. With respect to health and safety, there are 3 no. Seveso sites within 2km of the study area, Shannon Airport Authority's aviation fuel farm, 1.2km west of the study area, Avara Shannon Pharmaceutical Services, located within the Shannon Free Zone, ca. 600m north west of the study area and Enva Ireland, located ca. 2km north east of the study area.

The potential impacts on human beings as a result of each of the N19 route options has been assessed. **Table 8-18** outlines the order of preference for each of the options regarding the population & human environment. The options have been ranked using the EPA magnitude of impacts. Ranking was assigned under each respective topic including Population, Socio-Economics, Community Facilities, Amenities & Healthcare and Human Health & Safety with an overall summary indicating the level of preference of the options. It should be noted that the assessment did not take account of mitigation measures which could potentially alleviate impacts to the human environment.

No profound impacts to the human environment were predicted as a result of each of the options. The route options identified as having the least negative impact and a slight to moderate positive impact on the human environment was Option 1. Options 2, 3 and 4 were considered to have the greatest positive impact (moderate positive), however temporary moderate or slight negative impacts are associated with the construction phase.

Overall, each of the four options are ranked equally as Most Preferred. The overall ranking of the route options is presented in **Table 8-19.**

Table 8-19: Population and Human Health Assessment

Population & Human Health	Option 1	Option 2	Option 3	Option 4
Population	Imperceptible (4)	Imperceptible (4)	Imperceptible (4)	Imperceptible (4)
Socio-economics	Slight Positive (5)	Moderate Positive (6)	Moderate Positive (6)	Moderate Positive (6)
Community Facilities, Amenities & Healthcare	Moderate Positive (6)	Moderate Positive (6)	Moderate Positive (6)	Moderate Positive (6)
Human Health & Safety	Not Significant Neutral (4)	Temporary Slight Negative (3)	Temporary Slight Negative (3)	Temporary Slight Negative (3)
Average Score	**4.75**	**4.75**	**4.75**	**4.75**
Overall Preference	Most Preferred	Most Preferred	Most Preferred	Most Preferred

8.7.7 Material Assets

There are no agricultural material assets impacted by the proposed scheme and therefore this appraisal relates to the potential impacts to non-agricultural properties.

There are four non-agricultural properties affected by the options. Shannon International Airport, Shannon Free Zone, the apartment blocks at Drumgeely Hill and a Garda security hut.

Shannon International Airport includes Terminal Buildings, hangers, parking facilities, runways, fuel farm, internal services, and utility connections.

There was no impact by any of the options on the Terminal Buildings, hangers, main parking facilities, runways, fuel farm, and internal services and utility connections. Some options impact on the old disused overflow car park but this is under the control of Shannon Commercial Properties and is earmarked for future development. Therefore, all options considered were neutral.

Shannon Free Zone is a Business Park located to the west of the N19. Shannon Free Zone is a world-renowned business park at the edge of Shannon Airport. Located on 600 acres, over 200 buildings house more than 150 companies, making it one of Ireland's largest multi-sectoral business parks and home to the largest concentration of American companies in Ireland outside of Dublin.

There was no impact by any of the options on existing buildings. All options would impact on the existing roundabouts and landscaping at SFZ West and Drumgeely Roundabout.

Shannon Commercial Properties have significant phased development plans in Shannon Free Zone (SFZ) West. The Phase 1 Development (2014 – 2018) = 650,000 sq. ft. commercial / industrial buildings is completed and thus included in the assessment above.

The proposed Phase 2 Development (2019 – 2023) = 650,000 sq. ft. commercial / industrial buildings (Commenced) and Phase 3 Development (2024 – 2028) = 700,000 sq. ft. commercial / industrial buildings will be impacted by all options where the land take required for these would impact on the land available for development.

The apartments at Drumgeely Hill are a series of apartment blocks located to the east of the N19 at a higher elevation to the existing road and with a steep local access out on to the N19. An alternative access is available through Shannon Town. Options 2, 3 and 4 would have a minor impact in revisions to the junction layout while Option 1 is neutral.

The Garda security hut is located on the N19 in the centre of the existing road. This is used by the Gardai when required and Options 2, 3 and 4 may require its relocation in agreement with them. Therefore the impact is highly negative. Option 1 will have no impact and so is neutral.

Overall, Option 1 was ranked as Most Preferred and Options 2, 3 and 4 were ranked equally as Least Preferred. The overall ranking of the route options is presented in **Table 8-20**.

Table 8-20: Material Assets Assessment

Material Assets	Option 1	Option 2	Option 3	Option 4
Shannon International Airport	4	4	4	4
Shannon Free Zone	4	4	4	4
Apartment Blocks	4	2	2	2
Garda Security Hut	4	1	1	1
Average Score Value	**4**	**2.75**	**2.75**	**2.75**
Overall preference	Most Preferred	Least Preferred	Least Preferred	Least Preferred

8.7.8 Hydrogeology

The effects on hydrogeology of the four options were assessed in accordance with TII Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. In order to compare the options, the assessment has considered and appraised the following attributes:

- Aquifer Type and Classification;
- Aquifer Vulnerability;
- Karst;
- Groundwater Resources;
- Ecology.

The Zone of Influence (ZoI) for hydrogeology attributes is a 250m buffer either side of the options being assessed and this zone also takes junctions into consideration. This ZoI may increase, as necessary, to consider attributes which extend beyond the 250m limit.

There are no recorded karst features in the ZoI of each of the four options.

The potential for hydrogeological impacts during the construction phase is related to the excavation of soil and resultant risk to the underlying aquifer and groundwater resource:

- The vulnerability of the aquifer to groundwater pollution particularly during the construction stage will be increased as overburden is removed thus reducing the level of protection for groundwater pollution.
- Potential for silt infiltration to groundwater as a result of increased surface runoff and reduced protection of the aquifer. Soil erosion as a result of exposure of soils in open excavations and temporary storage of excavated materials represents a potential impact to the underlying groundwater aquifer.

- Potential for contamination to groundwater from spills/leakages during construction phase earthworks. The use of construction plant and associated refuelling and storage of fuels and hydrocarbons could result in contamination of the underlying aquifer.
- Potential for ground water pollution from the use of cement-based compounds during the construction of some options will be required. Cement leachate has the potential to percolate into the underlying aquifer and impact groundwater quality.
- Reduction in groundwater levels from dewatering of excavations if high groundwater is encountered. This impact is most likely during the excavation of deeper foundations or earthworks. However, it is considered these groundwater levels will revert to the pre-construction situation when there is no longer a requirement to control groundwater levels.

There is a low attribute importance associated with the underlying aquifer and groundwater resource. The level of impact associated with Option 1 was imperceptible. Options 2, 3 and 4 were the least preferred options as relatively deeper excavations will be required during the construction phase when compared to the other option. The level of impact was assessed as slightly negative. It was not envisaged that there will be any significant cuts or embankments. The potential for water quality impacts during construction can be mitigated using adequate water quality controls and best practice techniques.

A summary of the impacts in terms of hydrogeology appraisal is provided in **Table 8-21** below.

Table 8-21: Hydrogeological Assessment

Hydrogeology	Option 1	Option 2	Option 3	Option 4
Aquifer Vulnerability	4	3	3	3
Karst (No Recorded Karst Features)	4	4	4	4
Groundwater Resources	4	3	3	3
Average Score Value	**4**	**3.33**	**3.33**	**3.33**
Overall Preference	Most Preferred	Least Preferred	Least Preferred	Least Preferred

8.7.9 Hydrology

The hydrological impact of each option was assessed by considering the impact of each route on the watercourses and floodplains in the study area. The assessment was undertaken in line with TII (NRA, 2009) guidelines on procedures for assessment and treatment of geology, hydrology and hydrogeology for national road schemes. The assessment highlighted those water depended receptors considered to be at risk from the options and provides qualitative assessments of potential impacts on them.

The principal criteria used to assess against each corridor option were:

- Number of watercourse crossings;
- Flood risk area;
- Water Quality.

In terms of watercourse crossings and flood risk, Option 1 crosses the Urlan Beg Stream and Shannon Airport drainage ditch which runs adjacent to the Urlan Beg Stream. The crossing structure over these streams will be a culvert.

At the southern section of Option 1 a combined footpath and cycle path runs separate to the existing road, and along Flood Zone A for a length of approximately 450m. Approximately 1.2km of the combined footpath and cycle path are within Flood Zone B. All options cross Flood Zone A at the crossing of the Urlan Beg Stream and Shannon Airport drainage ditch.

Culverting the Urlan Beg Stream and Shannon Airport drainage ditch as part of the drainage works for the road scheme is unlikely to give rise to any significant impacts on flood risk both locally and downstream. Construction of the footpath / cycle path may increase the flood risk if additional flows due to change of surface area are not addressed.

The impact on the stream hydrology and flood risk of Option 1 can be reduced from "Moderate Permanent Negative" to "Imperceptible" by implementing SuDS system attenuation.

In terms of water quality, during the construction stage the release of suspended solids, hydrocarbons and other pollutants to watercourses may occur. Option 1, through normal drainage mitigation measures, can reduce the potential impact on water quality and impact on the Upper Shannon Estuary SAC. The impact on water quality from Option 1 is 'Slight Temporary Negative'.

Options 2, 3 and 4 are similar and the impact on hydrology will be the same.

Options 2, 3 and 4 cross the Urlan Beg Stream and Shannon Airport drainage ditch. The existing culvert structures will most likely need to be resized. This will ensure that crossing structures have sufficient flow capacity to convey flows generated from extreme storm events.

The road drainage from Options 2, 3 and 4 can be discharged into the Clonloghan Steam, the Urlan Beg Stream and Shannon Airport drainage ditch. Culverting the Urlan Beg Stream and Shannon Airport drainage ditch as part of the drainage works for the road scheme is unlikely to give rise to any significant impacts on flood risk both locally and downstream. Construction of an additional carriageway can significantly increase the flood risk if attenuation of additional flows and controlled discharging to the streams is not in place.

The impact of Options 2, 3 and 4 on stream hydrology and flood risk can be reduced from "Significant Permanent Negative" to "Imperceptible" by implementing SuDS system attenuation and controlled discharging to receiving waters.

In terms of water quality, the road surface water will be discharged into the streams as mentioned above. During the construction stage the release of suspended solids, hydrocarbons and other pollutants to watercourses may occur. Options 2, 3 and 4, through normal drainage mitigation measures, can reduce the potential impact on water quality and the impact on the Upper Shannon Estuary SAC. The impact on water quality is 'Moderate Temporary Negative' impact**.**

Table 8-22 outlines the order of preference for the hydrological aspects with respect to each of the options.

Table 8-22: Hydrology Assessment

Hydrology	Option 1	Option 2	Option 3	Option 4
Watercourse and Flood Risk	2	1	1	1
Water quality	3	2	2	2
Average Score Value	**2.5**	**1.5**	**1.5**	**1.5**
Overall preference	Most Preferred	Least preferred	Least preferred	Least Preferred

8.7.10 Soils and Geology

The soils and geology effects of the four options have been assessed in accordance with the TII Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. The assessment has considered and appraised the following attributes:

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

The Zone of Influence (ZoI) for the soils, geology and hydrogeology assessment is a 250m buffer either side of the options being assessed and also takes into consideration junctions. This ZoI may increase as necessary to consider attributes which extend beyond 250m.

There are no recorded karst features, geological heritage areas, active quarries, mineral sites, landfills or known contaminated land in the ZoI of each Scheme option. The main impact associated with each option was the potential excavation of soft soil deposits.

There is a Low attribute importance associated with soft soils. In a regional context, the proportion of the attribute that will be removed was considered small. Option 1 was unlikely to require the excavation of soft ground, and as such the impact associated with this option was considered to have a Neutral impact on soils and geology. Options 2, 3 and 4 were, for the purposes of this assessment, assumed to involve the removal of soft soils, and as such the level of impact on soils and geology was assessed to be Slight Negative.

A summary of the soils and geology appraisal is provided in **Table 8-23**.

Table 8-23: Soils & Geology Assessment

Soils and Geology	Option 1	Option 2	Option 3	Option 4
Karst Features, Geological Heritage Areas, Active Quarries, Mineral Sites, Landfills or Known Contaminated Land (Note: None Located within the ZoI)	4	4	4	4
Peat or Soft Ground (Low Attribute Importance)	4	3	3	3
Average Score Value	**4**	**3.5**	**3.5**	**3.5**
Overall Preference	Most Preferred	Least Preferred	Least Preferred	Least Preferred

8.7.11 Environmental Assessment Summary

The environmental assessment indicates that all of the route options are acceptable with no profound impact predicted and, where moderate impacts were identified, mitigation measure were also identified that could reduce or eliminate such impact to slight or imperceptible.

The results of the impact assessment process are presented in **Table 8-24**.

Table 8-24: Environmental Assessment Summary

Objective-Led Sub-Criteria	Option 1	Option 2	Option 3	Option 4
Air Quality & Climate	Intermediate	Most Preferred	Most Preferred	Most Preferred
Noise	Intermediate	Most Preferred	Most Preferred	Most Preferred
Landscape & Visual	Most Preferred	Least Preferred	Least Preferred	Least Preferred
Biodiversity	Most Preferred	Least Preferred	Least Preferred	Least Preferred
Architectural & Cultural Heritage	Intermediate	Intermediate	Intermediate	Intermediate
Population & Human Health	Most Preferred	Most Preferred	Most Preferred	Most Preferred
Material Assets	Most Preferred	Least Preferred	Least Preferred	Least Preferred
Hydrogeology	Most Preferred	Least Preferred	Least Preferred	Least Preferred
Hydrology	Most Preferred	Least Preferred	Least Preferred	Least Preferred
Soils & Geology	Most Preferred	Least Preferred	Least Preferred	Least Preferred
Overall Preference	Most Preferred	Least Preferred	Least Preferred	Least Preferred

8.8 Summary of Accessibility and Social Inclusion Appraisal

The accessibility and social inclusion appraisal was carried out in accordance with the PAG and has considered the impact of each route corridor option on vulnerable groups and the impact on deprived geographic areas.

Objective No 8 - To improve access to social, employment and education opportunities in the N19 corridor for those without a car available for the journey

The Do-Minimum situation includes an existing pedestrian bridge and controlled pedestrian crossing, no cyclist facilities or crossings and one bus stop currently in use but with no bus bay. Therefore, the Do-minimum situation is seen as providing poor non-car access to employment.

All four options provide:

- Cyclist and pedestrian at-grade crossings of the N19 at Drumgeely Roundabout, Gateway West Junction and at Knockbeagh Point Roundabout which will provide continuity of the proposed cyclist/pedestrian shared facility linking the adjoining housing areas of Shannon Town, Drumgeely Village and Drumgeely Apartments to the Shannon Free Zone Business Park and employment; and
- Four new bus stops with footpath connections to the new crossing facilities, the shared cyclist/pedestrian facility and existing footpaths into the Shannon Free Zone Business Park and employment area.

In addition to the above, Option 4 provides dedicated bus lanes.

Therefore, all four options provide major or highly positive improvements to non-car access to employment, however Option 4 is ranked highest due to the provision of bus lanes. Options 1 to 3 each score a total of 6 while Option 4 scores 7.

Table 8-25: Accessibility and Social Inclusion Assessment Preference

Soils and Geology	Option 1	Option 2	Option 3	Option 4
Average Score	6	6	6	7
Overall Preference	Intermediate	Intermediate	Intermediate	Most Preferred

8.9 Summary of Integration Appraisal

The appraisal of integration has assessed the impact of each option in terms of achieving the objectives of national, regional, and local planning policy, together with EU Regulation and integration with previous infrastructure investments. This assessment was carried out in accordance with the TII PAG

Objective No 9 - To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network

Ireland's transport infrastructure contributes to one Trans-European Transport Network (TEN-T) Corridor. The North Sea - Mediterranean Corridor includes infrastructure on the island of Ireland, with particular focus on port and airports and the road and rail connections to them, in support of the EU policy aim of improved transport connectivity across Europe.

There are two levels of TEN-T network – Core and Comprehensive. Shannon International Airport is designated as part of the Comprehensive network, as are the road and rail links between Limerick and Galway. The whole of the N19 can be considered part of the Comprehensive network:

- it is therefore EU policy that the N19 should be high-quality infrastructure.
- in developing the Comprehensive network within Ireland, the Irish government has a duty under EU law to consider a range of issues including disaster resilience, safety, accessibility for all users and quality of service.

In the context of TEN-T Option 1 only addresses the existing junctions and the lack of pedestrian/cyclist facilities and provides minor improvements to bus infrastructure facilities with additional bus bays. Therefore Option 1 does not provide high-quality infrastructure over the full scheme and can seem to provide minor improvements to disaster resilience and quality of service and moderate improvements to safety and accessibility for all users. Therefore Option 1 was viewed overall as between minor and moderately positive – scoring 5.5.

Option 2 includes the improvements provided in Option 1 and in addition addresses the deficiencies of compliance with current design standards, poor quality pavement, poor signing & lining, sub-standard public lighting, poor drainage and the high volume of accesses. Therefore Option 2 provides high-quality infrastructure over the full scheme and can seem to provide major or highly positive improvements to quality of service, safety and accessibility for all users and moderate improvements to disaster resilience. Therefore Option 2 was viewed overall as majorly positive – scoring 6.5.

Options 3 and 4 also includes the improvements provided in Option 1 and addresses the deficiencies of compliance in a similar manner to Option 2. Therefore Options 3 and 4 provide high-quality infrastructure over the full scheme and can seem to provide major or highly positive improvements to quality of service, disaster resilience, safety and accessibility for all users. Therefore Options 3 and 4 were viewed overall as majorly positive – scoring 7.

Objective No 10 - To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS)

At a local and regional level the Limerick-Shannon Metropolitan Area Transport Strategy 2040 (LSMATS) views Shannon as a significant employment centre with assets such as Shannon International Airport and Shannon Free-Zone. LSMATS sees Limerick City and Shannon as interdependent upon each other, with their complementary functions contributing to a combined strength which is a key economic driver for the Mid-West Region. LSMATS sets out a number of key strategies and outcomes in relation to public and private transport connectivity, accessibility, pedestrian & cyclist networks and the reduction in peak time congestion.

In terms of meeting the requirements of LSMATS, Options 2 and 3 were rated between moderately to majorly positive and score 6.5. Option 1 was rated as moderately positive – scoring 6.0. Option 4, due to the provision of high-quality infrastructure over the full scheme can be seen to further assist in the improvement to the public transport network and further contributing to the retaining and protection of the strategic function of the National Road network, the movement of freight traffic and maximising the potential of Shannon International Airport. Therefore Option 4 was viewed overall as majorly positive – scoring 7.0.

Overall, Option 4 was ranked as Most Preferred, Options 2 and 3 were Intermediate and Option 1 was ranked as Least Preferred.

The overall ranking of the route options is presented in **Table 8-26**.

Table 8-26: Integration Assessment Preference

Integration	Option 1	Option 2	Option 3	Option 4
Objective No. 9	5.5	6.5	7	7
Objective No. 10	6	6.5	6.5	7
Average Score	**5.75**	**6.5**	**6.75**	**7**
Overall Preference	Least Preferred	Intermediate	Intermediate	Most Preferred

8.10 Stage 2 Project Appraisal Matrix Assessment Summary

The above assessments are drawn together in the Project Assessment Matrix, as presented in **Table 8-27** below. Each option was given an overall score based on the seven point scale ranging from Highly Positive to Major Negative as described in **Table 8-28** below.

Table 8-27: Project Appraisal Matrix Assessment

Criteria	Option 1		Option 2		Option 3		Option 4	
Economy								
Peak Hour Accessibility		6.5		7		7		6.75
Reliability Assessment		4.25		5		5.5		5.5
NPV/BCR Increment		6		7		6.75		6.5
Sub Total/Average		5.6		6.3		6.4		6.3
Safety								
Emergency Vehicle Journey Times		4.5		5		5.5		5.5
Road Collisions		5.5		6		6.		6
Sub Total/Average		5		5.5		5.75		5.75

Criteria	Option 1		Option 2		Option 3		Option 4	
Physical Activity (Active Travel)								
Walking		7		7		7		7
Cycling		7		7		7		7
Sub Total/Average		7		7		7		7
Environment								
Air Quality		3		4		4		4
Noise		3.33		4.33		4.33		4.33
Landscape & Visual		4		2		2		2
Biodiversity		2.75		2.25		2.25		2.25
Architectural & Cultural Heritage		4		4		4		4
Population &Human Health		4.75		4.75		4.75		4.75
Material Assets		4		2.75		2.75		2.75
Hydrogeology		4		3.33		3.33		3.33
Hydrology		2.5		1.5		1.5		1.5
Soils & Geology		4		3.5		3.5		3.5
Sub Total/Average		3.63		3.24		3.24		3.24
Accessibility and Social Inclusion								
Non-car access to employment		6		6		6		7
Sub Total/Average		6		6		6		7
Integration								
TEN-T Policy		5.5		6.5		7		7
LSMATS		6.0		6.5		6.5		7
Sub Total/Average		5.75		6.5		6.75		7

Table 8-28: Project Appraisal Matrix Assessment

Major or Highly Positive	6.5 - 7
Moderately Positive	5.5 > 6 < 6.5
Minor or Slightly Positive	4.5 > 5 < 5.5
Not Significant or Neutral	3.5 > 4 < 4.5
Minor or Slightly Negative	2.5 > 3 < 3.5
Moderate Negative	1.5 > 2 < 2.5
Major or Highly Negative	1 - 1.5

The final preference ranking, under each heading, for each of the four routes upon completion of the Phase 2-Stage 2 Project Appraisal are presented in the Stage 2 Project Appraisal Matrix Assessment Summary in **Table 8-29.**

Table 8-29: Stage 2 Project Appraisal Matrix Assessment Summary

Options → Criteria ↓	Option 1	Option 2	Option 3	Option 4
Economy	5.6	6.3	6.4	6.3
Safety	5	5.5	6	6
Physical Activity	7	7	7	7
Environment	3.63	3.24	3.24	3.24
Accessibility and Social Inclusion	6	6	6	7
Integration	5.75	6.5	6.75	7
Average Score	**5.5**	**5.76**	**5.90**	**6.09**
Overall Preference	4	3	2	1

Table 8-29 is interpreted as follows:

Option 2, 3 and 4 were all on-line upgrades of the existing road, and were similar in nature but with a different cross-section. The differences between them were relatively slight. On balance, Option 4 is preferred, as it is considered that the greater public transport accessibility and better policy "fit" under the Integration heading outweigh the poorer economic performance.

Option 1 scores better under the Environment heading, but much of the impact can be mitigated, and this is outweighed by the greater economic, safety, accessibility and integration benefits of Option 4.

8.11 Identification and Recommendation of an Emerging Preferred Option

Based on the Project Appraisal Matrix, the analysis undertaken above indicates that Option 4 is the emerging preferred option. This option consists of:

- A shared footpath and cycle route from Knockbeagh Point Roundabout travelling along the right-hand (east) side of the existing N19 until it turns into Drumgeely Road where it continues and terminates at Drumgeely junction and provides access to the estate, the Shannon Town Road footpath and cycling network and to the existing pedestrian bridge over the N19 which links into Shannon Free Zone. Traffic control crossings would be provided crossing the N19 at Knockbeagh Point Roundabout, the SFZ Gateway West Access and at Drumgeely Roundabout. Additional crossings would be provided on the minor roads. This shared footpath and cycleways option would be approximately 2.5km in length constructed generally parallel to the existing road designed to the National Cycling Manual.
- Four new bus bays with bus shelters together with additional footpath links to the proposed cycleway and pedestrian facility and existing paths.
- The upgrade of both the Drumgeely Roundabout and the SFZ Gateway West junction. The Knockbeagh Point Roundabout would not be altered.
- The existing N19 would be upgraded as a 13m single carriageway to DMURS standard consisting of two 3.25m bus lanes and two 3.25m traffic lanes for the full length of the proposed scheme on the section from Knockbeagh Point Roundabout to SFZ Gateway West Access junction to the right-hand side of the existing N19 and from SFZ Gateway West Access junction to Drumgeely junction the left-hand side of the existing N19.

The recommendation based on the conclusion of the Project Appraisal Matrix was that Option 4 should be taken forward into Stage 3 and to Public Display.

9 STAGE 3 – PREFERRED OPTION AND PREPARATION OF PABS

9.1 Structure of Scheme Appraisal

The Project Appraisal Balance Sheet (PABS) provides a short summary of the total impacts for the N19 Shannon Airport Access Road Improvement Scheme based on the appraisal work carried out at option selection stage.

In accordance with TII PAG, the appraisal considered 6 main aspects:

- Economy – the direct economic benefits to road users and transport providers, and the wider boost to businesses from lower transport costs.
- Safety – the road safety impacts of the scheme, including the increase or decrease in numbers of personal injury accidents, and any impact on the personal security of road users.
- Physical Activity - To improve opportunities for active travel - walking and cycling
- Environment – including the operational and construction impacts of the scheme on the natural environment (air quality, water quality, habitat of other species), the impact of changes in traffic noise on the living environment for human beings, and any impact on irreplaceable resources (land and cultural heritage)
- Accessibility and Social Inclusion – the extent to which the project reduces social exclusion by enhancing the accessibility of disadvantaged groups such as people in low-income rural areas.
- Integration – the extent to which the project supports government policy more generally.

Each impact has been assessed at an appropriate level of detail for option selection purposes. A more detailed Business Case for the scheme will be presented at Preliminary Design stage.

9.1.1 Economy

Transport Economic Efficiency

Cost Benefit Analysis (CBA) has been undertaken, using the TUBA software. The results are presented in full for each scheme option in **Table 8-6** above.

Wider Economic Impacts

PAG recognises that road projects may have economic impacts that are not fully represented by the transport efficiency and effectiveness benefits included in the CBA. These include impacts on competition in the economy, agglomeration or clustering of economic activity, foreign direct investment into Ireland, improved labour supply, and urban regeneration.

Because of its' relationship to Shannon International Airport and the Shannon Free Zone the scheme has: -

- The potential to attract multi-national firms to the Shannon Free Zone and is considered likely to have a positive impact on inward investment.
- The potential to assist in the development plans for both the Airport and Shannon Free Zone and is considered likely to have a positive impact on employment and on economic activity.
- The potential to support the growth of freight and passenger numbers by linking the Airport designated as an International Gateway to the National Roads Network and is considered likely to have a positive impact on tourism and employment.

Such impacts are difficult to estimate with any level of accuracy and have been omitted in this initial PABS table.

Overall, the scheme is considered to have a slightly positive impact on economy.

9.1.2 Safety

An estimate of the safety impacts of the scheme has been derived and is set out in Section 7.6, based on improved access to Shannon International Airport by emergency response vehicles in the event of an incident; and potential reduction of the frequency of transport collisions within the N19 corridor.

Overall, the scheme is considered to have a slightly positive impact on safety.

9.1.3 Physical Activity

The scheme includes a shared pedestrian cycleway for the full length of the scheme (2.2km) with traffic signal controlled crossings at Drumgeely Roundabout, Shannon Free Zone Gateway West junction and Knockbeagh Point Roundabout providing connectivity to the existing footpath network and compatible with the proposed cycling network. As such the scheme improves opportunities for walking and cycling between Shannon town, Shannon International Airport and Shannon Free Zone.

Overall, the scheme is considered to have a positive impact on physical activity.

9.1.4 Environment

The potential environmental impacts have been set out in some detail in Section 8.7 above. The PABS table contains a top-level summary of these impacts for the Preferred Option.

The impact rating of minimal to slightly negative is in the absence of mitigation and does not take into account the fact that some of the potential negative impacts are temporary or short term.

Overall, the scheme is considered to have a slightly negative impact on environment.

9.1.5 Accessibility and Social Inclusion

Vulnerable Groups

PAG Unit 7.0 notes that the accessibility appraisal should consider the project impacts on:

- Access to employment for lower income groups; and
- Access to vital infrastructure such as schools and hospitals.

The proposed scheme improves access for people without a car to social, employment and education opportunities in the N19 corridor with the provision of a shared footpath and cyclist facility with improved road crossing and the provision of bus lanes.

Improved non-car access to the National Catering College counts as a significant accessibility gain for vulnerable groups.

Improved non-car access from adjoining housing areas to the employment areas in Shannon Airport and the Shannon Free Zone counts as a significant accessibility gain for vulnerable groups.

The scheme is considered to have a moderately positive impact on vulnerable groups.

Overall, the scheme is considered to have a slightly positive impact on accessibility and social inclusion.

9.1.6 Integration

The integration criterion is about how well the proposed investment fits with other elements of Government transport and non-transport policy. There are two relevant aspects: -

1. To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network; and
2. To improve wider integration between transport and land-use planning by being consistent with the Limerick & Shannon Metropolitan Area Transport Strategy (LSMATS).

The scheme is compatible with these objectives as:

1. The proposed scheme is an online upgrade to the existing 2.2km substandard section of the N19 which connects Shannon Airport to the M18/N18 both part of the Comprehensive TEN-T network, and
2. The Vision for LSMATS is:

   'The Strategy will deliver a high-quality, accessible, integrated and more sustainable transport network that supports the role of the Limerick- Shannon Metropolitan Area as the major growth engine of the Mid-West Region, an internationally competitive European city region and main international entry to the Atlantic Corridor'.

   Within this context the scheme is included in the LSMATS 'Implementation Plan' as part of the Short-Term deliverables (up to 2026).

Overall, the scheme is considered to have a highly positive impact on integration.

9.2 Summary of Stage F (Part 2) Road Safety Audit

A Stage F2 Road Safety Audit was undertaken by independent auditors Roadplan. The team consisted of Ray Butler, Team Leader and Dermot Donovan, Team Member. The Report is contained in Appendix C.

Seven problems and four observations were identified in the Stage F (Part 2) Road Safety Audit.

Of the seven problems identified, five recommended measures were accepted by the Design Team and two alternatives proposed were accepted by the Road Safety Audit Team.

The four observations will be considered during the design at Phase 3.

None of the problems or observations cause any concern for the scheme and can be dealt with in the design of the scheme in Phase 3.

9.3 Public Display of Preferred Option

A Public Display of the Preferred Option took place between Monday 22nd November 2021 and Monday 6th December 2021 informing the public and stakeholders of the Preferred Option developed for the project, the work undertaken to date and the programme for advancement of the project.

Due to Covid-19 restrictions Clare County Council (CCC) were unable to hold a public consultation event in-person. Instead, an online consultation platform was developed and made live on the project's dedicated website www.shannonaccess.ie.

In the dedicated public consultation section of the project website, the following documents were available to view: -

- Information Boards;
- Maps of the Preferred Option;
- Interactive Webmap;
- Project Brochure; and
- An online feedback facility.

Appendix B of this Report provides a detailed report on the Public Display of the Preferred Option.

9.3.1 Public Notification

Public notification was undertaken through the following methods: -

- Newsletter updates published on the project website www.shannonaccess.ie on the 16th and 22nd November 2021;

- Newsletter updates published on the Clare County Council website on the 16th and 22nd November 2021;
- Clare County Council twitter notifications posted on the 22nd, 25th and 29th November 2021, and on the 2nd and 6th December 2021
- Shannon Airport twitter notification posted on the 30th November 2021;
- Shannon Commercial Properties twitter notification posted on the 30th November 2021;
- Internal notifications issued by Shannon Airport and Shannon Commercial Properties;
- Newspaper advertisements in the Clare Champion on the 19th and 26th November 2021;
- Newspaper advertisements in the Clare Echo on the 18th and 25th November 2021; and
- Radio advertisements on Clare FM on the 23rd, 24th, 25th and 29th November and on the 3rd December 2021 – 3 times daily (am / lunch / pm).

9.3.2 Public Bodies Notification

Notifications were issued to the following stakeholders advising of the public display: -

- An Garda Siochána;
- An Taisce;
- Bat Conservation Ireland;
- Birdwatch Ireland;
- Bus Eireann;
- Clare County Council;
- Commission for Regulation of Utilities, Water and Energy;
- Department of Communications, Climate Action and Environment;
- Department of Culture, Heritage and the Gaeltacht - Development Applications Unit;
- Department of Defence;
- Department of Enterprise, Trade and Employment;
- Department of Housing, Local Government and Heritage;
- Department of Tourism Culture, Arts, Gaeltacht, Sport and Media;
- Department of Transport;
- EIR;
- Electricity Supply Board;
- Environmental Protection Agency - Office of Evidence and Assessment;
- Failte Ireland;
- Future Mobility Campus Ireland;
- Gas Networks Ireland;
- Geological Survey of Ireland;
- Health & Safety Authority;
- Health Service Executive;
- Inland Fisheries Ireland;
- Irish Aviation Authority;
- Irish Rail;
- Irish Water;
- Motorway Maintenance and Renewals Contract (MMaRC) Consulting Engineers;
- National Parks and Wildlife Services;
- National Transport Authority;
- Office of Public Works;
- RPS team working on the Shannon Town & Environs Flood Relief Scheme;
- Shannon Chamber;
- Shannon Commercial Properties;
- Shannon International Airport;
- Southern Regional Assembly;
- Teagasc;
- The Arts Council;
- The Heritage Council; and
- Transport Infrastructure Ireland

9.3.3 Feedback Received

Feedback on the Public Display of the Preferred Option was received from 12 respondents, including: -

- Elected Representatives,
- General Public,
- Public Bodies
    - Chief Fire Officer Clare County Council;
    - Inland Fisheries Ireland;
    - Geological Survey Ireland;
    - National Transport Authority; and
    - Department of Housing, Local Government and Heritage
- Group Submissions: -
    - Shannon Chamber; and
    - Shannon Group

The feedback received can be summarised as relating to the following issues:-

- Access to Drumgeely Hill;
- Form of upgraded junctions at Drumgeely Roundabout and Shannon Free Zone West;
- Detailed design considerations for bus and active travel measures;
- N19 route alignment;
- The role of existing accesses along the N19, and the potential for additional access provision, within the upgraded N19.

All feedback has been acknowledged by the Project Team.

9.3.4 Actions to be Taken Forward

The following actions will be addressed as a result of the feedback received:-

1. The Project Team will arrange a consultation with IFI in Phase 3 to discuss the watercourse crossings;

2. The Project Team will continue liaison with Department of Housing, Local Government and Heritage and Geological Survey Ireland in Phase 3;

3. The Project Team will prepare responses to the feedback received from the following: -
    - Shannon Chamber;
    - National Transport Authority; and
    - Shannon Group.

All feedback will be considered as far as practical in the further development of the scheme.

9.4 Summary

There is strong policy support for the scheme, which plays a key network role in connecting up the comprehensive TEN-T network. The scheme is an integral part of LSMATS, local and regional plans. The Preferred Option provides a transport solution which has been developed in consideration of the National Investment Framework for Transport in Ireland (NIFTI) and provides a multi modal option that caters for active travel, public transport and car usage.

The economic benefits are high. Although the level of benefit is sensitive to details of the traffic modelling, sensitivity testing has shown that the economic case is robust. There are likely to be wider economic benefits in attracting foreign direct investment to Ireland, attracting and retaining international employers in Shannon Free Zone, having a positive impact on local and regional employment and economic activity, support the growth of freight and passenger numbers and tourism.

There are safety benefits for the scheme include improved access to Shannon International Airport by emergency response vehicles in the event of an incident

The physical activity benefits are high as the proposed scheme will provide a 2.2km shared pedestrian cyclist facility with traffic-controlled crossings geared to providing priority to vulnerable road users. The shared pedestrian cyclist facility will provide the spine of the proposed cycling and walking network and by linking to the existing facilities provides active travel corridors between residential areas and employment and educational zones.

The provision of bus lanes will assist in modal transfer and provide significant non-car use benefits.

10 RECOMMENDATION

The recommendation of Phase 2 Options Selection is that the Preferred Option (Option 4) be taken forward to Phase 3 Design and Environmental Evaluation.

Tionscadal Éireann
Project Ireland
2040

N19 SHANNON AIRPORT ACCESS ROAD IMPROVEMENT SCHEME

Phase 2 Option Selection Report - Addendum February 2024

Dílis dár nOidhreacht

Comhairle Contae an Chláir
Clare County Council

February 2024
Rev 2

An Roinn Iompair
Department of Transport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

FEHILY TIMONEY

CLANDILLON
CIVIL CONSULTING

Mid West
National Road Design Office

REVISION CONTROL SHEET

Client:	Clare County Council
Project Name:	N19 Shannon Airport Access Road Improvement Scheme
Report Title:	Phase 2 – Option Selection Report – Addendum February 2024
Report No.:	N19SAAR-MP-AL-0021A-P01
TII Project Ref:	CL/17/16362
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Revision:	02

Rev. No.	Description of Changes	Prepared by:	Checked by:	Approved by:	Date:
01	DRAFT - Issue for Client Review	Tom Meagher	Senan Clandillon	Beren de Hora	11.12.2023
02	Draft – Issue for TII Review	Tom Meagher	Senan Clandillion / Tanya Ruddy	Beren de Hora	28.02.2024

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0 EXECUTIVE SUMMARY

Clare County Council (the "Client") in partnership with Transport Infrastructure Ireland (TII) proposes to carry out the planning and design for the N19 Shannon Airport Access Road Improvement Scheme (the "Project").

Clare County Council appointed Fehily Timoney and Company Ltd. and Clandillon Civil Consulting Ltd on the 14th of October 2019 to provide Technical Consultancy Services which will provide the Engineering, Environmental, Economic and Appraisal services required to successfully deliver the project through the planning and design phases (TII Project Management Guidelines Phases 1 to 4 inclusive).

The Scheme is currently at Phase 3 – Design and Environmental Evaluation.

This Addendum to the Phase 2 Option Selection Report Rev 6 (August 2022) provides an update on relevant policies that have been published since undertaking the Preliminary Options Selection and Appraisal in December 2021, which took account of all relevant plans and policies in place at that time.

It is noted that drafting, auditing, and approval of the Options Selection Report takes a considerable period of time and as such it is acknowledged that policies and plans have changed in the intervening period.

This Addendum outlines policies that have been updated or published since the Phase 2 option selection process was undertaken and which were not, therefore, referred to in the contents of the Options Selection Report nor formed part of the appraisal process at that time. In acknowledging the status of these documents at the time of undertaking the Phase 2 Options Selection it is confirmed that the updated policies and design standards will be taken into consideration during Phase 3 – Design and Environmental Evaluation.

Notwithstanding the publication of these updated policies and plans, the conclusions of the Options Selection Report remain valid and it is recommended that the preferred Scheme identified be brought forward to Phase 3 – Design and Environmental Evaluation.

1 UPDATES TO POLICY SECTION SINCE COMPLETION OF THE OPTION SELCTION REPORT

1.1 Introduction

Table 1-1 below outlines a range of new policies, policy changes or updates since the Option Selection Report was completed following Phase 2 Peer Review. The policies are broken down by National, Regional and Local Policy.

Table 1-1: Relevant National, Regional and Local Policy Changes/Updates since December 2021

Policy Level	Relevant Policy
National Policy	Climate Action Plan 2024 (Government of Ireland, 2023) National Sustainable Mobility Policy, 2022 (Department of Transport, 2022) and National Sustainability Mobility Action Plan (2022-2025) Department of Transport, 2022)
Other national strategies in response to national policy	Transport Infrastructure Ireland Climate Adaptation Strategy (TII, 2022) National Roads 2040 (TII, 2023)
Regional	Limerick-Shannon Metropolitan Area Transport Strategy 2040 (NTA 2022)
Local	Clare County Development Plan 2023-2029 (Clare County Council, 2023) Shannon Town Masterplan 2022-2037 (Clare County Council, 2022)

1.2 National Policy Changes/Updates

1.2.1 Climate Action Plan 2024

The Climate Action Plan 2024 (Government of Ireland, 2023) (Government of Ireland, 2021 updated 2022) prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021 is the third update to Irelands Climate Action Plan 2019, sets out a plan to achieve a 51% reduction in overall greenhouse gas emissions by 2030 (relative to 2018 levels) with the aim of reaching net-zero emissions by no later than 2050. The Plan takes account of sectoral emissions ceilings and carbon budgets for various sectors including 'Transport'. The carbon budget for the transport sector is 54 $MtCO_2eq$ (2021-2025) and 37 $MtCO_2eq$ (2026-2030) and the target is for a reduction to 50% of 2018 emissions (12.2 $MtCO_2eq$) to 6.1 $MtCO_2eq$ by 2030. The emissions from the transport sector in the period 2021 to 2022 were 22.6 $MtCO_2eq$ (11.6 $MtCO_2eq$ in 2022) showing a 5% reduction on 2018 levels to date.

The Plan states "Decoupling the direct correlation between transport emissions and wider social and economic activity thus forms the fundamental challenge for the sector. For this reason, the focus is on pursuing measures to address travel demand - in the first instance by pursuing policy measures that promote greater efficiency in our transport system, allied with significant investment in sustainable alternatives and incentives and regulatory measures to promote the accelerated take-up of low carbon technologies". It recognises that "achieving a shift to transport modes with zero- or low-carbon emissions, such as active travel (walking and cycling) and public transport, will require unprecedented levels of public buy-in and engagement".

The Plan notes that "not only can road-space reallocation redirect valuable space from on-street car-parking and public urban roadways to public transport and active travel infrastructure (such as efficient bus lanes, and more spacious footpaths and segregated cycle-lanes), it also leads to significant and wide-scale improvements in our urban environments".

The Plan is framed around Avoid-Shift-Improve, i.e. avoid the need for travel, shift to more environmentally friendly transport modes and improve the efficiency of vehicle technology. To deliver the required emissions abatement by 2025 and 2030 the Climate Action Plan sets out the following transport related targets which are relevant to the proposed development:

- Expand the number of safe, accessible, walking and cycling routes, including the provision of 500 Safe Routes to School schemes and the rollout of over 1,000 kilometres in active travel infrastructure.
- Enhance the integration of sustainable transport considerations into the spatial planning system.
- Support a shift to active travel and public transport, including by the reallocation of road space.
- Communicate the benefits of a shift away from private car usage and facilitate the provision of the required infrastructure and services to bring about a very significant modal shift to public transport and active travel, and away from car journeys (internal combustion engine and electric vehicle (EV)) by 2030.

The Plan identifies key metrics to deliver abatement in the transport sector by 2030 under the themes of Avoid-Shift-Improve:

- Avoid
  - 20% reduction in total vehicle kms relative to 2030 BAU scenario
  - 50% reduction in fuel usage
- Shift
  - 50% increase in daily active travel (AT) journeys
  - 130% increase in daily public transport (PT) journeys
  - 25% reduction in daily car journeys
  - 53% car, 19% PT, 28% AT
  - shift in daily mode share
- Improve
  - Biofuel blend rate E10:B20
  - EV share of total passenger car fleet (30%)
  - EV share of total commercial LGV fleet (20%)
  - EV share of new commercial HGV fleet (30%)
  - EV share of buses in PSO (1,500 no.)
  - All new private car registrations 2030 to be EV
  - Expansion of electric rail services

- Sub Targets
  - 30% reduction in share of current escort-to-education car journeys to sustainable modes via Safe Routes to School programmes and enhancement of School Transport Servies

CAP24 emphasises the importance of local authority delivery of active travel infrastructure and points to the National Cycle Network (inter-urban) and CycleConnects (intra-urban network) as the two strategies that will inform future investment. It states that priority will be given to Safe Routes to School, CycleConnects, the National Cycle Network and scenic greenways.

Relevance to the Proposed Development

The proposed development will contribute to transport-related targets to achieve a 50% reduction in emissions.

- The provision of 2 no. new lanes for use by public and private buses on the N19 SAAR, a new bus lane on Drumgeely Road toward the proposed Drumgeely Signalised Junction, along with 7. no. new bus stops and 3 no. upgrades to existing bus stops will encourage airport users and employees of both Shannon Group and other commercial businesses to take public transport to work. The active travel elements of the scheme will provide for pedestrians and cyclists commuting to work from Shannon Town or from the wider region.
- It is proposed to sequence the signalling at junctions to favour active travel users whilst bus drivers can use on board technology to change lights to avoid queuing of public transport.
- New segregated cycleways and new footpaths will be provided along with upgrade of existing footpaths. The new active travel infrastructure includes crossing points at several locations to significantly increase the permeability of the N19 SAAR and to increase safety for VRUs and to encourage a modal shift.
- The proposed active travel route will tie into and overlap routes identified in CycleConnects and LSMATS demonstrating joined up spatial planning.

Under the 'do nothing' scenario, the users of the N19 have a very limited public transport offering with no dedicated cycleways or bus lanes. In addition to enabling N19 users to make the modal shift, the Scheme is designed to improve safety of all road users, but particularly vulnerable and active travel users.

The scheme has been designed in accordance with the Design Manual for Urban Roads and Streets (2019) (Government of Ireland, 2019) and Cycle Design Manual (2023) (National Transport Authority) and the junction assessments were carried out using modal shift assumptions in the Limerick Shannon Metropolitan Area Transport Strategy (LSMATS). The proposed development will contribute to the national delivery of key metrics under the Shift-Avoid-Improve framework.

1.2.2 National Sustainable Mobility Policy (2022)

The National Sustainable Mobility Policy published in 2022 (NSMP) (Department of Transport, 2022) sets out a strategic framework to 2030 for active travel and public transport to support Ireland's overall requirement to achieve a 51% reduction in carbon emission by 2030.

The primary, overarching targets that underpin the goals of the policy are:

- to deliver at least 500,000 additional daily active travel and public transport journeys
- a 10% reduction in kilometres driven by fossil fuelled cars by 2030 in line with metric for transport set out in the Climate Action Plan 2021 (this has subsequently been increased to 20% by CAP 23, refer to Section 1.2.2 below).

This policy builds on and replaces existing active travel and public transport policy as set out in the 2009 policy documents – Smarter Travel (Department of Transport, 2009), see Section 5.3.5.

The policy defines sustainable mobility as "connecting people and places in a sustainable way by supporting: safe, accessible, comfortable and affordable journeys to and from home, work education, shops and leisure, travel by cleaner and greener public transport, a shift away from the private car to greater use of active travel and public transport".

It highlights the benefits of sustainable mobility under four categories as follows:

Environmental
- reduces greenhouse gas emissions
- improves air quality
- reduces noise pollution

Social:
- reduces levels of social isolation
- supports connected and liveable communities
- enables equitable access to services and amenities

Economic:
- allows more efficient movement of people
- provides access to employment
- reduces traffic congestion

Health and Well-Being:
- increases physical activity levels through active travel
- creates safer roads and streets

The guiding principles and goals of the policy are presented in the table below:

Table 1-2: NSMP Principles and Goals

Principles	Goals
Safe and Green Mobility	1. Improve mobility safety. 2. Decarbonise public transport. 3. Expand availability of sustainable mobility in metropolitan areas. 4. Expand availability of sustainable mobility in regional and rural areas. 5. Encourage people to choose sustainable mobility over the private car.
People Focused Mobility	6. Take a whole of journey approach to mobility, promoting inclusive access for all. 7. Design infrastructure according to Universal Design Principles and the Hierarchy of Road Users model. 8. Promote sustainable mobility through research and citizen engagement.
Better Integrated Mobility	9. Better integrate land use and transport planning at all levels. 10. Promote smart and integrated mobility through innovative technologies and development of appropriate regulation.

National Sustainability Mobility Policy Action Plan (2022 - 2025)

This Action Plan was devised to support the achievement of the goals outlined in the National Sustainable Mobility Policy. The plan sets out core actions against each goal, of which the following are of relevance to the proposed development:

- Continue to protect and renew road infrastructure for all road users including sustainable mobility users.
- Promote the principle of 'Access for All' across sustainable mobility services.
- Fund local authorities to upgrade existing active travel infrastructure to meet safety, permeability and design standards.

Relevance to the Proposed Development

The proposed development supports the implementation of this policy and facilitates modal shift towards active travel through supporting the achievement of a number of the goals outlined i.e. improving mobility safety, expanding the availability of sustainable mobility and encouraging people to choose sustainable mobility over the private car, promoting inclusive access for all by incorporating cycling lanes, improved pedestrian footpaths and improving public transport infrastructure.

The design of the proposed development facilitates permeability across the N19 for active travel users and the operation of the proposed development will aim to rebalance transport movements by giving priority to active travel users and public transport at junctions through traffic light signalling and on board technology.

The proposed road improvement has also been designed according to a set of Universal Design Principles i.e. DMURS thus supporting Goal 7 and reducing the speed limit on the road, therefore improving safety for vulnerable road users.

1.2.3 National Strategies

Whilst not national policy documents, the following strategies from TII are of relevance of the proposed scheme as each were prepared in response to national policy. They are National Roads 2040 (TII, 2023), and the Transport Infrastructure Ireland Climate Adaptation Strategy (TII, 2022). The following sections include a brief description of the strategy documents and relevance to the proposed scheme.

National Roads 2040

National Roads 2040 (TII, 2023) is TII's strategy to enable the NPF, responding to evolving national policy and aligning to the Department of Transport's National Investment Framework for Transport in Ireland (NIFTI). TIIs vision is that national roads support an evolving transport system with safety, innovation and accessibility at its core. The strategy document states that national roads are essential to the delivery of Project Ireland 2040 NSOs of enhanced regional accessibility, strengthened rural economies and communities and sustainable mobility.

Relevance to the Proposed Development

The provision of improved pedestrian, cycling and public transport infrastructure, along with public realm enhancements, in the proposed development directly supports the implementation of NSO 4 and NSO 8 and indirectly supports the implementation of NSO 1, 2, 5, 6 and 7 of the National Planning Framework. In line with National Roads 2040, the proposed development will deliver an evolving transport system along the N19 SAAR with safety, innovation and accessibility at its core and improving regional accessibility, strengthened community and sustainable mobility.

Shannon Airport is a key element of the southern region; therefore the proposed development will maintain the existing access to the airport and the enterprise hub and enable further growth via sustainable mobility in line with the NSOs of the NPF. It will support and sustain economic progress as per the scheme objectives.

Transport Infrastructure Ireland Climate Adaptation Strategy

This Strategy was published (TII, 2022) in response to Climate Action Plan 2019. In order to address the impacts of climate change, the strategy identified seven strategic climate adaptation objectives, of which the following is of relevance to the proposed scheme:

- Adopt a low-carbon approach in TII's designs, standards, and processes when considering climate adaptation, while also considering wider social and environmental benefits.

The other 6 objectives are aimed at a higher level than the proposed scheme but the overall message is absolutely relevant to the proposed development, which is climate adaption. The design and operation of the proposed development will consider the potential impact of climate change, specifically climate events on the proposed development and include mitigation measures as required.

Relevance to the Proposed Development

The proposed development has been the subject of a rigorous design and environmental appraisal process which has identified the most suitable road improvement measures for the N19, taking into account climate adaptation.

1.3 Regional Policy Changes/Updates

1.3.1 Limerick Shannon Metropolitan Area Transport Strategy (LSMATS), 2022

At time of writing, this strategy was in draft format. The National Transport Authority (NTA) published the Limerick-Shannon Metropolitan Area Transport Strategy 2040 (LSMATS) in 2022 (NTA, 2022). It is the framework within which the transport system for the Limerick Shannon Metropolitan area will be delivered. It was prepared in collaboration with Limerick City and County Council, Clare County Council and TII, with cooperation from Irish Rail.

LSMATS is a regional-level (Tier 2) plan and is directly informed by National Level Tier-1 policies. The most important and recent of these are the National Planning Framework 2040 (NPF) (Department of Housing, 2018) and the National Development Plan 2021-2030 (NDP) (Departnment of Public Expenditure and Reform, 2021). The NPF 2040 (Department of Housing, 2018) envisages that the Limerick-Shannon Metropolitan Area (LSMA) will become the growth engine of the Mid-West Region with projected growth of at least 50% during the period up to 2040. This projected population, employment and education growth brings with it opportunities for the development of the LSMA.

This projected population and associated economic growth will also result in a significant increase in the demand for travel. This demand needs to be managed and planned for carefully to safeguard and enhance the LSMA's attractiveness to live, work, visit and invest in.

In common with the other regional metropolitan areas of Cork, Galway and Waterford, there is a legacy of car dependency in the LSMA. This has contributed to a wide range of economic, environmental and social issues including longer commutes, declining urban centres, poor public health, reduced air quality and noise pollution.

To mitigate this, land use and transport planning will be far more closely aligned. This will discourage the use of the private car, particularly for short trips, in order to fundamentally change how people move around the LSMA. This requires a more efficient use of valuable street and road space and a prioritisation of walking, cycling and public transport.

LSMATS will deliver an integrated transport network that addresses the needs of all modes of transport to support planned growth up to 2040 in a compact and sustainable manner. The Strategy represents a coherent transport planning policy framework and implementation plan around which other agencies involved in land use planning, environmental protection and the delivery of other infrastructure and services such as housing, utilities and community facilities can align their plans and investment priorities.

The Strategy has been developed to be scalable and flexible enough to meet changes in population and employment growth and is subject to periodic review, every 6 years.

LSMATS has eight pillars upon which objectives were identified and the following are of relevance to the proposed N19 SAAR development:

The climate change and reducing emissions pillar has an objective to increase use of public transport, walking and cycling. This is identified as the core function of the LSMATS.

A unified Limerick/Shannon Metropolitan Area pillar aims to focus investment in Limerick City where the need is greatest but also acknowledges the importance of Shannon to the economic well-bring of the region, and aims to significantly improve the quality of public transport connections between Shannon and Limerick as well as facilitating car travel between them. The commitment to investing in transport links between Limerick and Shannon is also an objective of the reducing social disadvantage pillar, whereby the LSMATS seeks to rebalance transport disadvantage and connect physically isolated areas resulting in better access to services and employment and reducing the need for the car.

The transformation of the urban environment pillar seeks to reduce the dominance of the car in urban environments in order to improve the environment in which people move and mitigating the adverse impact on those with mobility impairments, the elderly and the socially disadvantaged. The universal access pillar of LSMATS aims to make public transport accessible to all sectors of society.

The economic, social and cultural development pillar includes objectives for job growth through improved public transport and active transport links. The strategy seeks to provide for a much closer link between the City and Shannon Airport and Free Zone.

Strategic transport objectives will facilitate the achievement of the strategic pillars of the strategy. These objectives have been further clarified as measures under a range of topics. The proposed development is compliant with and supportive of the following measures:

Table 1-3: Compliance with LSMATS Measures

LSMATS Measures	Design and Operation of the Proposed Development
Walking	
Measure Wk1 Improvements in the pedestrian environment.	
Retrofit neighbourhood infrastructure to enhance walkability and increase the attractiveness of walking such as permeability and passive surveillance;	The N19SAAR Scheme incorporates significant new segregated cyclist and pedestrian facilities along the N19, Drumgeely Road and Shannon Free Zone Access Road, as well as a widening and upgrade of existing footpaths to incorporate shared surfaces. Both existing signalised crossing points are being upgraded to include for cyclist facilities and four additional signalised crossing points are being provided to improve permeability for vulnerable road users between Shannon Town/Drumgeely and Shannon Airport and Shannon Free Zone West.

LSMATS Measures	Design and Operation of the Proposed Development
Lower traffic speeds to improve pedestrian safety and enhance the attractiveness of the environment for walking;	The speed limit of the proposed N19 SAAR will be 60kph from Knockbeagh Point Roundabout to the proposed Drumgeelly Junction. This is a reduction from the current posted speed limit of 80 just south of Drumgeelly to Westgate Junction. This will provide for a safer environment for cyclists and pedestrians.
Improve junctions and pedestrian crossings through measures such as pedestrian countdowns, longer crossing times and crossings that align with desire lines;	There are 2 no. existing signalised pedestrian crossings on the N19 - one at Drumgeely Hill access road , and one at a staff car park opposite Swissport. These will be upgraded in line with the Cycle Design Manual (2023) Standard. In addition, four additional signalised crossings for cyclists/pedestrians are being provide along the N19 to provide safe crossing facilities for cyclists and pedestrians. At crossings of side-roads and accesses, active travel users are given priority by the introduction of tabletop ramps to maintain grade of the footway/cycleway.
Incorporate safety and personal security considerations into the design and planning of pedestrian infrastructure.	The proposed cyclist and pedestrian facilities are designed in accordance with DMURS and the Cycle Design Manual (2023) to ensure universal access. Public Lighting is being provided to provide a level of security at nighttime. The Scheme has been subject to a Stage 1 Road Safety Audit and a further Stage 2 and 3 Road Safety Audit will be undertaken during the detailed design and subsequent construction phase of the Scheme.
Measure WK5	
Ensure pedestrian infrastructure is inclusive and accessible for all individuals of all abilities and ages using Universal Design principles and collaboration between a diverse range of stakeholders.	The proposed cyclist and pedestrian facilities are designed in accordance with DMURS and the Cycle Design Manual (2023) to ensure universal access.
Deliver permeability projects throughout urban areas which reduce the distance required to travel on foot to key destinations and to public transport services. In select locations, a package of permeability projects will be developed as part of local area plans or masterplans;	The N19SAAR Scheme incorporates significant new segregated cyclist and pedestrian facilities along the N19, Drumgeely Road and Shannon Free Zone Access Road, as well as a widening and upgrade of existing footpaths to incorporate shared surfaces. Both existing signalised crossing points are being upgraded to include for cyclist facilities and four additional signalised crossing points are being provided to improve permeability for vulnerable road users between Shannon Town/Drumgeely and Shannon Airport and Shannon Free Zone West.

LSMATS Measures	Design and Operation of the Proposed Development
Cycling	
Measure CC1	
To deliver an integrated, fully connected high quality cycle network linking all major origins and destinations within the LSMA.	The proposed N19 SAAR Scheme connects to existing and proposed pedestrian/cycling routes on Drumgeely Road, Shannon Free Zone Access Road, Airport Avenue, "canal" walkways and will facilitate connectivity with future active travel schemes such as the Greenway connecting with Sixmilebridge and Bunratty.
Develop a high-quality cycle network within the Metropolitan Towns of the LSMA	The N19SAAR Scheme incorporates a high-quality pedestrian and cycling network and associated crossings of the N19, Drumgeely Road, Shannon Free Zone Access Road and Airport Avenue designed to DMURS and Cycle Design Manual Standards.
Bus	
Measure BC9 Improve local and regional bus connectivity to Shannon town centre, employment areas and Airport.	The proposed development incorporates dedicated bus lanes along the N19 and on Drumgeely Road and Shannon Free Zone Access Road. The Scheme will also include for the upgrade of 3 No. existing bus stops and the provision of an additional 7 No. bus stops to facilitate future improvements in public transport. This supports Measure BC9 as the proposed development will facilitate efficient bus services and provide several bus stop options to those traveling to and from the Shannon Free Zone West and Shannon Airport.
Measure BC12 Continue to roll-out the program of bus stop and shelter provision, and to monitor potential for further expansion and upgrade during the lifetime of the strategy.	The proposed development will include the upgrade of 3 No. existing bus stops and provision of 7 No. new bus stops connected to the Active Travel Scheme and facilitating intermodal transport.
Roads and Demand Management	
Measure RS2 Better manage the road network to protect the function of the strategic road network and to reduce the use of the private car for short journeys.	The proposed development shall protect the strategic importance of the N19 as a connection between Shannon Airport and SFZ and the wider region. Goods and services critical to the economic prosperity of the region originate at this point on the N19. The proposed development will create permeability between Shannon Airport, SFZ and Shannon Town encouraging walking, cycling and public transport access between employment and residential areas. It will also encourage a modal shift for employees moving between the airport and SFZ. This will encourage a reduction in short car journeys.

LSMATS Measures	Design and Operation of the Proposed Development
Measure RS3 Subject to the feasibility and environmental assessment processes, including the full application of the Habitats Directive and all transposing legislation, new roads, where provided, will be developed in accordance with the principles and measures outlined in this chapter	The application for the proposed development will be accompanied by an EIAR and an NIS.
Measure RS4 Reduce peak time congestion on the N18/N19 network at Shannon and progress the upgrade of the N19. Sec 14.3.3 states "The upgrade of the N19 serving Shannon Airport is required."	The proposed development will provide improved bus connections in and out of SFZ and the airport which will encourage public transport use from origins beyond the N18/N19 junction. Increased use of public transport will mitigate congestion on the N18/N19. The delivery of the upgrade of the N19 is included as a short term deliverable of the strategy (up to 2030).

Shannon Airport and Shannon Free Zone are considered strategic and major employers within the LSMATS and the N19 Shannon Airport to N18/M18 is considered part of the Strategic Road Network. Strategic transport objectives of the strategy are as follows:

- To prioritise investment in sustainable transport in order to reduce the reliance on the private car.
- To provide a high level of public transport connectivity to key destinations.
- To deliver a fully accessible and inclusive transport system.
- To identify and protect key strategic routes for the movement of freight traffic and to improve access to Shannon-Foynes Port and Shannon Airport.
- To improve road safety, public health and personal security.
- To minimise the impact of motorised traffic in urban centres.

The N19 Shannon Airport Access Road Improvement Scheme is identified in Section 14.3.3 of LSMATS which states that "The upgrade of the N19 serving Shannon Airport is required."

There is a recognition that there is peak time congestion on the N19 and LSMATS "proposes a number of proposals that would assist in reducing this demand including promoting compact growth in the Shannon Town Centre area (reducing the need to travel to work), a significantly enhanced public transport network from Limerick City and Metropolitan Towns, and Smarter Travel initiatives that would look to spread traffic over a longer period thereby reducing peak time congestion."

Within the documentation Shannon Airport and Shannon Free Zone are considered strategic and major employers and key strategies and outcomes of the plan are as follows:

- Maximise the potential of the existing transport infrastructure including the InterCity rail network, Shannon Airport, the Port of Foynes and Ennis as a connecting hub.
- Provision of a Citywide public transport network, with enhanced accessibility from the City Centre to the National Technology Park, UL and Shannon Airport.

- Develop a primary pedestrian network throughout Limerick City, Shannon and other Metropolitan towns; included is the route from Shannon Town Centre to Shannon Free Zone.
- Part of the envisaged cycling network is the Inter-Urban Cycle Network which includes Limerick City Centre to Shannon.
- Connectivity to Shannon will be significantly improved over the lifetime of the Strategy. Existing bus services will be enhanced with some new additional services, including:
  - Limerick City Centre – Shannon Town Centre –Shannon Free Zone – Shannon Airport (Express service).
  - Limerick City Centre – Cratloe – Bunratty –Shannon Town Centre – Shannon Free Zone –Shannon Airport.
  - Sixmilebridge railway station – Shannon (Shuttle service).
  - Shannon – Ennis.
  - The potential for enhanced direct services from Shannon to Cork and Galway will be examined.
- In relation to National Roads the objectives are:
  - Retain and protect the strategic function of the National Road network;
  - Reduce peak time congestion on the N18/N19 junction at Shannon and improve the N19.

Relevance to the Proposed Development

The proposed development will help to achieve the strategic transport objectives of the LSMATS, and represents a specific measure as outlined in the LSMATS. The proposed development ties in with the strategic transport objectives as it:

- Involves the upgrading of the strategic road network (the N19);
- Reduces reliance on the private car through the provision of dedicated active travel and public transport infrastructure;
- Improves road safety by reducing the speed limit and providing segregated cycle lanes where there is no existing formal cycle infrastructure and improved road crossing facilities for vulnerable road users;
- Protects and enhances accessibility to a key strategic route for the movement of freight (Shannon Airport);
- Table 1-2 demonstrates compliance with measures for walking, cycling, bus, roads and demand management measures.

1.4 Local Policy Changes/Updates

1.4.1 Clare County Development Plan 2023 – 2029

The Clare County Development Plan (CDP) 2023-2029 (Clare County Council, 2023) was adopted by the Elected Members of Clare County Council on 9th March 2023 and by government on 3rd August 2023.

The CDP is a planning policy framework which sets out 20 key goals to be realised by 2029. Each of these goals (quality of life, sustainability, climate action, resilience and inclusivity) are supported by strategic aims and objectives. There are also specific objectives for the Limerick-Shannon Metropolitan Area and for the economic development of the Limerick-Shannon Metropolitan Area. Under the strategic objectives for the economic development of Shannon town, the CDP states that the town in an 'established centre of both foreign direct investment and indigenous enterprise' and that SFZ amongst other business campuses makes a significant contribution to the national economy each year. It notes that lands are zoned around the N19 SAAR for future development that the Council will promote along with the aviation cluster at Shannon.

The proposed development is integral to future development in the area as will facilitate greater numbers of employees commuting on foot, by bike or by bus. The strategic aims of the CDP with respect to infrastructure are; to provide a safe, integrated, efficient and sustainable network of transport to serve the needs of people, goods and services travelling to and within County Clare; to promote and encourage the use of alternative sustainable modes of transport; to safeguard the strategic transport function of the motorway and national road network and associated junctions in order to cater for the safe and efficient movement of inter-urban and inter-regional traffic; and to facilitate a reduction in CO2 emissions from transport in line with the National Climate Action Plan. Section 11.2.9.3 (Developments of Strategic Importance and Table 11.2 of the CDP specifically includes the N19 upgrade (between Shannon Town and Knockbeagh Point Roundabout) in a list of proposed projects identified for future development.

Other relevant strategic aims include:

- "To maximise the return from the economic assets of the County including Ennis, the Limerick-Shannon Metropolitan Area, Shannon International Airport…."
- To safeguard the strategic transport function of the motorway and national road network and associated junctions in order to cater for the safe and efficient movement of inter-urban and inter-regional traffic;

The CDP makes provision for the Shannon Rail Link in section 11.3.6 including an Infrastructure Safeguard for a rail link to Shannon Airport from the national rial network and notes that this is also supported by Government policy in the National Development Plan and is a strategic objective of the National Planning Framework and is included in LSMATS as well as an objective within the All-Island Strategic Rail Review ((NI), 2023). The CDP notes the Infrastructure Safeguard route for the rail link and the existing and proposed N19 SAAR are 'located in close proximity'. While the CDP states that "The delivery of the N19 National Road Upgrade is a priority of Clare County Council and should take precedence over other infrastructural projects along its route delivering on the significant exchequer investment already made in scheme planning and design ". The proposed upgrade of the N19 SAAR does not inhibit the future development of a rail connection.

Goal XVII of the CDP states "A County Clare that is resilient to climate change, manages flood risk, facilitates a low carbon future, supports energy efficiency and conservation and enables the decarbonisation of our lifestyles and economy".

The CDP also states that ”Climate change considerations have been integrated throughout the preparation of the Plan…”.

The CDP defines the following relevant climate related strategic aims and policy objectives:

- Strategic Aims of relevance to the proposed development include:
  - To ensure that future development is considered and managed having regard to the risk of flooding.
  - To minimise the level of flood risk to people, businesses, infrastructure and the environment;
  - To ensure that the potential effects of climate change are a key consideration in the location and design of new developments.
  - To ensure that the potential risk of flooding are fully assessed and taken into consideration in the identification of future development lands in the Plan area.
- Policy Objectives:
  - CDP18.1 Development Plan Objective: Climate Change Adaptation, It is an objective of Clare County Council:

A. To support the implementation of the Limerick Clare Climate Change Strategy 2006, and any subsequent versions of the Strategy.

B. To facilitate measures which seek to reduce emissions of greenhouse gases.

C. To adopt sustainable planning strategies through integrating land use and transportation and by facilitating mixed use developments as a means of reducing greenhouse emissions.

The proposed development is compliant the following objectives:

CDP2.14 - Transition to a Low Carbon Economy and Society:

- To support sustainable modes of transport such as walking and cycling through promotional strategies and the provision of active travel infrastructure where required

CDP 2.15 - Renewable Transport:

- To reduce reliance on private cars and achieve modal shift to sustainable transportation in conjunction with policies to achieve compact growth and reduce congestion;

CDP 6.5 - (Economic) Development of Shannon:

- To support the redevelopment and renewal of enterprise and industrial units in the Shannon Area, in particular works to enhance the energy efficiency of the buildings and the physical appearance of the existing business park/industrial zones in the Town;
- To support the development of Shannon as a centre for research and development in Autonomous Connected Electric Shared Vehicles (ACES), including Connected and Autonomous Vehicles (CAV)

CDP6.6 - It is an objective of Clare County Council:

- To facilitate the future development and expansion of Shannon International (sic) Airport and its continued role as a driver of economic, social and tourism growth in the Region whilst recognising the need to support actions to transition to a low carbon future.
- To facilitate the development of enhanced freight cargo facilities at Shannon International (sic) Airport.

- To facilitate the improvement/upgrade (as necessary) of key infrastructural resources within the Airport, to the airport lands, and to the N19 providing access to the area as well as improved sustainable transport links between Shannon International Airport, Limerick City Centre, the Technological University of the Shannon: Midlands Midwest, the South Clare/UL Economic SDZ and the National Technology Park at Limerick.

CDP9.22- It is an objective of Clare County Council:

- To support investment in infrastructure, increased capacity of Shannon International Airport, road and rail accessibility, in order to maximise the potential of tourism subject to the outcome of environmental assessments and the planning process.

CDP11.2 – Transport Planning

- That the overarching goal of transport planning in County Clare is to reduce car dependency and reduce emissions;
- To promote Steady State Investment to maintain and upgrade the existing road, rail and bus networks to provide a quality service to transport users;
- To implement initiatives under the Department of Transport to reduce congestion in urban areas primarily by enhancing sustainable travel options through traffic management, bus priority, urban cycling and urban walking routes;
- To oversee investment in cycling and walking networks within all settlements.
- To facilitate the expansion of the bus network by the NTA under initiatives such as Limerick BusConnects, Connecting Ireland and TFI Local Link Limerick Clare;

CDP11.5: It is an objective of Clare County Council:

- To require walkability and accessibility to be a central consideration in the planning and design of all new developments, transport
- To facilitate and support the delivery of a safe, accessible and convenient cycle network and environment across the County and in the Limerick-Shannon Metropolitan Area as set out in the Cycle Network Plans for Shannon and Limerick contained in the draft LSMATS;
- To provide for cycling trips for people of all ages and abilities from residential areas to town centres, employment centres and school locations, in line with the National Cycle Manual
- To support the enhancement of permeability, footpaths and the provision of safe crossing points in the towns and villages of the County.

CDP11.7 - It is an objective of Clare County Council:

- To work in conjunction with the NTA, Irish Rail and other relevant stakeholders to carry out a review of the existing feasibility study as it applies to the Shannon Rail Link infrastructural safeguard extending from the existing Limerick-Galway railway line to Shannon International (sic) Airport taking account of and being informed by the proposals contained within LSMATS to facilitate a Commuter Rail Network for the Limerick-Shannon Metropolitan Area and by the N19 National Road upgrade.
- To facilitate a proposed Shannon Rail Link which does not inhibit the N19 National Road Upgrade.

CDP 11.10 Smart Mobility

- To support and facilitate the development of the Future Mobility Campus at Shannon and to seek investment in actions and initiatives that position County Clare and the wider Southern Region as a leader in the digital transformation of transportation, E-Mobility and sustainable mobility.

CDP11.11 - It is an objective of Clare County Council:

- To advocate for and support improved road connectivity and, in particular, to advocate for an upgrade/extension of the N19 to Shannon International (sic) Airport.
- To sustainably maintain, support and enhance Clare's connectivity on the Trans European Transport Network.

CDP11.15 – It is an objective of Clare County Council:

- To provide and/or facilitate the projects identified in Table 11.2 (which includes upgrade/extension of N19 to Shannon International Airport) where necessary, and to ensure that such road infrastructure is designed and constructed to fulfil its intended purpose and to promote and support active travel.

CDP11.19 – It is an objective of Clare County Council:

- To support and facilitate multi-modal inter-regional and intra-regional transport linkages to and from the airport by both public and private service providers, with bus transport as the primary sustainable mode of transport.

CDP18.3 Development of a Low Carbon Economy, It is an objective of Clare County Council:

- To support sustainable modes of transport such as walking and cycling through promotional strategies and the provision of infrastructure where required.

Relevance to the Proposed Development

The N19 SAAR Scheme is clearly supported by the CDP and the Scheme is considered to be of strategic importance within the CDP as outlined above.

Furthermore, the CDP provides clear preference to the proposed development over an immediate proposed rail link to Shannon International Airport. However, the upgrade of the N19 SAAR will not deter future development of a rail line to the airport.

1.4.2 Shannon Town Centre Masterplan 2022-2037

On the 18th January 2022, the Shannon Town Centre Masterplan was adopted by the Council and will shape the planning policy for the town for the next 15 years.

The masterplan identifies a number of 'key opportunities', of which the following is relevant to the proposed development:

- Take advantage of views from the N19 national primary road and allow passer-by drivers to see the town centre.

The masterplan seeks to develop a number of character areas, some of which border the N19, to expand the town centre in a sustainable fashion. In order to achieve this, the masterplan outlines a number of different approaches to the development of Shannon Town Centre, which feeds into the finalised Development Framework.

The Development Framework identifies a number of intervention areas, including an Intervention Campus adjacent to the N19 which will promote *"*walking and cycling by allowing easy access and movement through the northern area*"*. Active travel is prioritised throughout the masterplan and is reinforced by the implementation of a car-free town centre and enhanced pedestrian and cycle connectivity.

Relevance to the Proposed Development

The proposed development aligns with the Shannon Town Centre Masterplan as it will facilitate views from the N19 towards the town centre. The proposed development also aligns with the masterplan as it promotes a modal shift towards sustainable modes of transport which are similarly promoted in the masterplan.

2 CONCLUSION

A review of policy publications and updates since the option selection process for the N19SAAR Scheme has been undertaken to ensure that the publication of any such policies does not impact on the choice of preferred scheme derived from the option selection process.

This Addendum describes the various and relevant national, regional and local level policies that have been published since the option selection process was undertaken. Furthermore, the relevance of each policy to the Scheme has been summarised and the Scheme's compliance with such policy documented.

It is concluded from this review that the preferred option is supported by all relevant policies published in the period between completion of the option selection and current date of this Addendum.

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APPENDIX A

Constraints Report

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APPENDIX B

Summary of Public Consultation
/ Public Display

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APPENDIX C

Road Safety Audit Stage F
Report (Phase 1 & 2)

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APPENDIX D

Traffic Modelling Report

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APPENDIX E

Preliminary Sources Study Report

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