Project Ireland 2040
Building Ireland's Future

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

KILKENNY COUNTY COUNCIL

ATKINS
Member of the SNC-Lavalin Group

N25 Waterford to Glenmore Scheme

Option Selection Report

Kilkenny County Council

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Introduction

This Option Selection Report has been prepared on behalf of Kilkenny County Council and in accordance with the Transport Infrastructure Ireland (TII) Project Management Guidelines (PMG), (PE-PMG-02041), January 2019, the TII Project Manager's Manual for Major National Road Projects, (PE-PMG-02042), February 2019 and the TII Project Appraisal Guidelines (PAG), (PE-PAG-02009 to 02039), October 2016.

This Option Selection Report presents in detail the different stages of the process, which inform the selection of the Emerging Preferred Route Corridor option for the project.

Kilkenny County Council (KCC), in association with Transport Infrastructure Ireland (TII), are proposing to develop a scheme to improve approximately 9.5 km of the existing N25 between Waterford and Glenmore. This proposed scheme is called the N25 Waterford to Glenmore Road Scheme. The scheme will link the N25 New Ross Bypass (opened in January 2020) and the N25 Waterford City Bypass (opened in October 2009) and is expected to consist of approximately 9.5km of dual carriageway providing continuity of cross section and alignment for approximately 35km.

The N25 Waterford to Glenmore Road Scheme is of particular importance as it forms part of the following policies:

- The Trans- European Transport Networks (TEN-T);
- Project Ireland 2040, incorporating The National Planning Framework (NPF), National Development Plan (2018-2027) (NDP) and the Regional Planning Guidelines for the South-East Region 2010 – 2022;
- Strategic Investment Framework for Land Transport (SIFLT);'
- Smarter Travel – A Sustainable Transport Future (2009-2020);'
- Road Safety Strategy (2013-2020);'
- Regional Planning Guidelines for the South-East Region (2010-2022);
- Kilkenny City & County Draft Development Plan 2021 - 2027.

On a European and National level, the N25 forms part of the TEN-T, which is a network of strategic transport corridors throughout the European Union (EU) that play a key role in the transportation of goods and passengers. The N25 TEN-T strategic route is a vital link in the national road network for the south of the country and is approximately 185km in length. The route connects the city of Cork in the west to the port of Rosslare in the east, with connections to New Ross, Waterford city and Waterford Port (Belview) between these locations. In addition, the N25 route links the towns and villages of Carrigtwohill, Midleton, Castlemartyr, Killeagh, Dungarvan, Kilmacthomas, Kilmeaden and Wexford.

The N25 route provides access to three of the five ports of national significance as identified in the National Ports Policy, these are the ports of Cork, Rosslare, and Waterford and also to the port of New Ross which is identified as a port of regional importance. As part of the TEN-T network, three of these ports are identified as strategic ports, Cork as a Tier 1 port and Waterford and Rosslare as Tier 2 ports. In addition, the N25 provides access to the TEN-T core and comprehensive airports of Cork and Waterford.

From a more regional and local perspective the N25 connects the employment hubs of Waterford City and New Ross and the village of Glenmore. The infrastructure supports local employment facilitating agricultural operations and local industries, most notably Glanbia Agribusiness which is a key local employer and source of supplies for farmers and agri-contractors in the study area. Glanbia Agribusiness is located at Glenmore village and largely accessed by staff, suppliers and customers from the N25 via the L7510.

Project Description

The section of the N25 under consideration is located between two major bypass schemes, Waterford City Bypass, completed in 2009, and New Ross Bypass, completed in 2020. In Q2 2019, Kilkenny County Council appointed Atkins Ireland to advance the scheme through the planning and design processes in accordance with Phases 1 - 4 of the TII Project Management Guidelines.

The proposed study area for the scheme is rural in nature and is located in the south east of county Kilkenny, close to the Waterford border between the townland of Luffany in the south and Jamestown in the north. The section of the N25 under consideration is a legacy single carriageway substandard stretch of the N25, which has been the subject of on-line upgrades and localised junction safety schemes with no future planned works identified.

Refer to the scheme location plan in Figure 0-1 below.

Figure 0-1 - Scheme Location

Existing Conditions

The section of the N25 under consideration between Luffany roundabout and the newly constructed Glenmore roundabout is a national primary route, which has evolved over the ages and thus fits within the existing landscape. The alignment is below current standards with inherent safety issues and limited capacity for expanding transportation demands as it traverses the hilly terrain.

The village of Glenmore to the north represents the most built up area along the existing route within the study area. The N25 is a single carriageway road, rural in nature with the existing topography classified as hilly. The existing alignment reflects this with a long section of climbing lane provided for southbound vehicles. The national route is a strategic traffic route in the southeast and caters for a significant percentage of HGV's. The rural nature, coupled with the numerous field access, private property entrances, and local road junctions contribute to a large mix of local and slow-moving agricultural traffic, which results in unreliable journey times, particularly at peak periods.

Purpose of the Option Selection Report

The purpose of this Option Selection Report is to identify a Preferred Option for the improvement and upgrade of the existing N25 between Waterford and Glenmore. The option selection process commenced with the identification of a defined Study Area appropriate to the scale of the proposed scheme and the subsequent identification of significant constraints, their nature and extent, within the Study Area. The constraints that have been identified were divided into three principal categories as follows:

- Natural Constraints, which include natural landscapes and natural features.
- Artificial Constraints, which include the built environment.
- External Parameters, which include design standards, policy, procedural and legal issues.

This Option Selection Report represents the main deliverable for Phase 2 of the PMGs. The purpose of the Option Selection Report is to present the project constraints and the assessments that have been undertaken in order to identify the Emerging Preferred Route Corridor for the project. The detailed technical and scientific information is included in the accompanying appendices to this report.

The main elements of assessment in Phase 2 are:

- Stage 1 – Preliminary Options Assessment
- Stage 2 – Project Appraisal Matrix
- Stage 3 – Preferred Option

On completion of the Phase 2 process this preferred option will be progressed to Phase 3 - Design and Environmental Evaluation and subsequently Phase 4 - Statutory Processes in accordance with TII's PMG (PE-PMG-02041), January 2019.

Project Operational Goals and Design Strategies

Overview

The specific objectives of the proposed road development are outlined in the Project Brief. These objectives are assessed based on multi-criteria headings outlined by the Department of Transport in their document 'Common Appraisal Framework for Transport Projects and Programmes (March 2019)' and also in TII's Project Appraisal Guidelines – PAG Unit 3.0 Project Brief and Unit 7.0 Multi Criteria Analysis. The objectives are as follows:

Economy

The key economic objectives of the scheme are as follows:

- To improve the capacity and efficiency of the road network in the southeast;
- To improve cross-border connectivity from the southeast to Europe via the N25 route and the ports by completing the TEN-T Comprehensive road network between the Waterford City bypass and the New Ross bypass;
- To maintain or reduce journey times and improve journey time reliability, which will in turn reduce transport costs and environmental impacts;
- To improve the economic out-look and encourage business growth in the areas served by the route by providing a reliable and efficient transport link;
- To support the future development and expansion of Cork, Waterford, Rosslare and New Ross ports by providing a high-quality route for freight traffic;
- To stimulate expansion of tourism in the areas served by the route by maintaining/reducing journey times, making these areas more accessible and attractive to visit.
- To deliver a value for money solution that ensures a lasting residual value.

Safety

The key safety objectives of the scheme are as follows:

- To reduce the occurrences of road collisions on the N25 by minimising road side hazards and reducing the requirements for cross-over and right turn manoeuvres;
- To provide a consistent cross section and treatment of junctions and direct access in keeping with that of the adjoining Waterford City and New Ross Bypass schemes.
- To separate vulnerable road users from high speed, strategic traffic, including freight;
- To provide increased safer overtaking opportunities;
- To adequately cater for the projected increase in traffic volumes;
- To improve and increase the capacity of the N25 and provide minimum LOS D.

Physical Activity

The key physical activity objectives of the scheme are as follows:

- To maintain/improve the connectivity to the Southeast greenway pedestrian and cycle facility and the nearby village of Glenmore;
- To improve the ambience and safety of the existing N25 and to facilitate increased usage of the existing N25 by pedestrians and cyclists.

Environment

The key environmental objectives of the scheme are as follows:

- To provide a sustainable long-term solution in line with the 2019 Climate Action Plan;
- To ensure alignment with sustainable development principles and measures to minimise effects on the environment to support the Government's policy on climate action;
- To maintain or reduce journey times and encourage free flow traffic, with the aim of reducing greenhouse gas emissions and impacts on climate;
- To construct a scheme that is suitably integrated into the surroundings both visually and from a noise impact point of view;
- To manage surface run-off both during and after construction of the scheme so as not to negatively impact on local water resources.

Accessibility and Social Inclusion

The key accessibility and social inclusion objectives of the scheme are as follows:

- To connect to other similar schemes enhancing the connectivity of the regional and national road network;
- To improve road based public transport by maintaining or reducing journey times and journey time reliability;
- To provide safer and more convenient access to public transport for residents in Glenmore Village and its immediate environs;
- To align with the accessibility and social cohesion objectives as outlined in the Kilkenny County Development Plan 2014- 2020 and Kilkenny City and Council Draft Development Plan 2021 - 2027.

Integration

The key integration objectives of the scheme are as follows:

- To connect to other similar schemes, enhancing the connectivity of the regional and national road network;

- To improve access between the ports of Cork, Waterford, Rosslare and New Ross and the comprehensive and core road networks;
- To improve transport links within the EU and beyond;
- To be consistent with the Kilkenny County Development Plan 2014 – 2020 and the Kilkenny City and County Draft Development Plan 2021 - 2027 in terms of land use and planning objectives;
- To maintain/improve the connectivity to the Southeast Greenway pedestrian and cycle facility;
- To compliment and support European, National, Regional and Local Government policies.

Performance Targets

The performance targets for the scheme are as follows:

- To provide a consistent cross section and treatment of junctions and direct accesses in keeping with that of the adjoining Waterford City and New Ross bypasses;
- To provide a sustainable long-term solution in line with the 2019 Climate Action Plan;
- To reduce journey times and improve journey time reliability;
- To improve safety;
- To separate vulnerable road users from high speed, strategic traffic, including freight.

Design Standards

The design of the scheme shall be in accordance with the requirements in the TII Publications (Technical). In particular, junctions incorporated into the Scheme shall be designed in accordance with the requirements outlined in DN-GEO-03060 (April 2017) Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade separated and compact grade separated junctions). Should provisions for vulnerable road users be included as part of the scheme, they shall be designed in accordance with DN-GEO-03047 (April 2017) Rural Cycleway Design (Offline).

Strategic Fit and Priority of Project within Sanctioning Authority Programme/Policy

Policy Background

The N25 Waterford to Glenmore Scheme is consistent and compatible with the following European, National, Regional and Local policy documents:

European Policy:

- Trans-European Transport Network (TEN-T), Regulation (EU) No. 1315/2013.
  - TEN-T Road Network
  - TEN-T Ports
    - Ports 2030 – Gateway for the Trans European Transport Network
  - TEN-T Rest Areas
    - Driving Time and Rest Periods Regulation (EU) No. 561/2006,
    - Road Infrastructure Safety Management Directive 2008/96/EC
    - Intelligent Transport Systems (ITS) Directive 2010/40/EC.

National Policy:

- Project Ireland 2040
  - National Planning Framework
  - National Development Plan 2018 - 2027;
- Strategic Framework for Investment in Land Transport;
- Smarter Travel: A Sustainable Transport Future 2009 - 2020;
- Road Safety Authority Road Safety Strategy 2013 – 2020.
- Spatial Planning & National Roads 2012 – Rest Areas
- Climate Action Plan – 2019
- National Roads Authority (NRA) Service Area Policy 2014 and
- National Policy Framework Alternative Fuels Infrastructure for Transport in Ireland 2017 to 2030

Regional Policy:

- Regional Spatial & Economic Strategy - Project Ireland 2040;
- Port of Waterford Master Plan 2020 – 2044;
- Regional Planning Guidelines for the South-East Region 2010 – 2022.

Local Policy

- Kilkenny County Development Plan 2014 – 2020;
- Kilkenny City and County Draft Development Plan 2021 – 2027;
- Kilkenny Local Economic and Community Plan 2016-2021 (LECP).

The objectives of the project are consistent with, and support the relevant policies at European, National, Regional and Local levels. The proposed project will improve the national road network and enhance accessibility in the southeast Region.

Project Specific Need.

Overview

This section of the report outlines and discusses the condition of the existing sections of the national road network under consideration and identifies the project specific needs, such as any network deficiencies and problems. These deficiencies combined with the European, National, Regional and Local policy discussed in Section 2 of this report constitute the 'Need for the Scheme'. The following areas are assessed in terms of network deficiencies:

- Existing Road Network;
- Existing Traffic Levels;
- Existing Journey Times;
- Existing Level of Service; and
- Existing Road Safety Issues.

Existing Road Network

The section of the N25 under consideration is a rural single carriageway road with varying or inconsistent cross section widths in terms of carriageway, hard-shoulders / hard-strips and verges. The existing N25 verge is substandard in width and is lined with unprotected hazards, such as boundary walls, concrete post and rail fencing, trees, substandard vehicle restraint systems etc. along the entire route. The vertical profile is largely compliant with one substandard crest curve, but the horizontal alignment has a number of substandard radii and is made up of sections of back to back curves or successive curves all connected with short lengths resulting in poor forward visibility for mainline traffic. In addition, the existing junction layouts and direct access layouts do not conform to standard with excessive dwell areas, acute angle approaches and poor visibility.

There are sixteen local/national road priority junctions along the route and eight of these have a right turn pocket provided. In addition, there is considerable existing road frontage development spread along the route with approximately 57 no. direct accesses.

Existing Traffic Levels

Traffic data on the N25 was collected from the existing TII Permanent Traffic Counter located between Glenmore Village and the Waterford Bypass roundabout i.e. TMU N25 120.0 W, Site ID 000000020253. A summary of the Average Annual Daily Traffic (AADT) and percentage Heavy Goods Vehicles (HGV) is provided in Table 0-1. The table indicates that traffic volumes have increased by 8.1% between 2015 and 2019.

	*2021	*2020	2019	2018	2017	2016	2015
AADT	7252	10333	12340	12307	12220	11792	11414
% HGV	14.6%	10.5%	8.6%	8.9%	8.5%	8.2%	8.1%
Annual Coverage	14.2%	100%	93.8%	99.7%	99.7%	99.7%	99.7%

Table 0-1 - Summary of Two-Way AADT on the Existing N25

**AADT figures are impacted by the COVID-19 public health restrictions being in place from March 2020 through to 21st February 2021 when the 2021 figures were taken.*

Existing Journey Times

Figure 0-2 provides a summary of the average journey times in seconds, whilst Figure 0-3 provides a summary of the resultant average speeds on the N25.

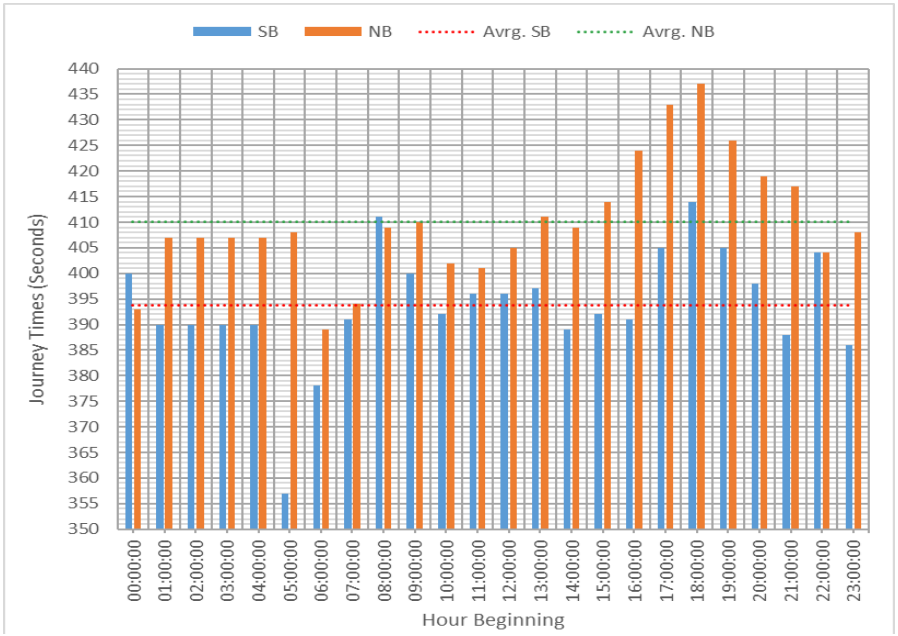

Figure 0-2 - Journey Times on the N25 Waterford to Glenmore - Southbound & Northbound

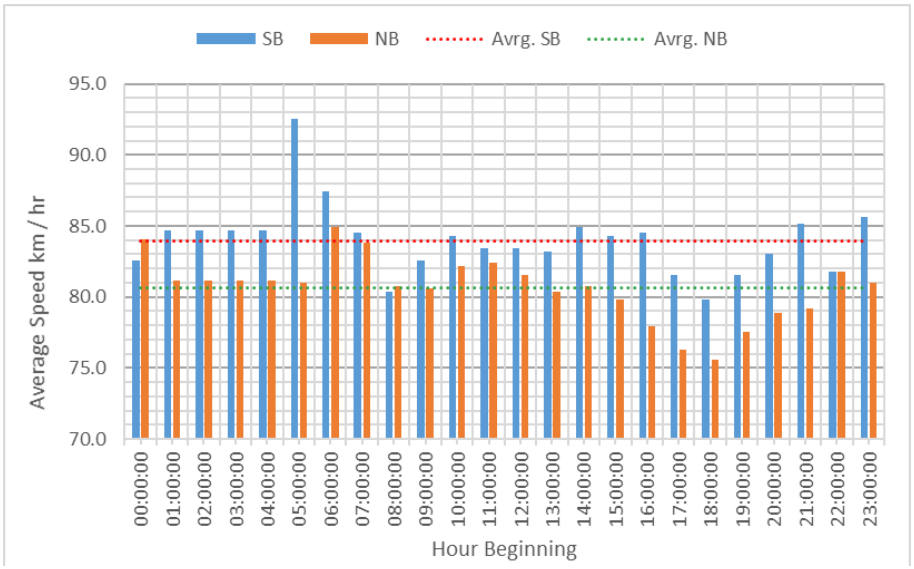

Figure 0-3 - Speeds on the N25 Waterford to Glenmore - Southbound & Northbound

Overall the average daily speeds are 81kph in the northbound direction and 84kph in the southbound direction. It is noted that lower speeds are typically being recorded in the northbound direction with a noticeable reduction in the period from 4pm to 8pm.

Existing Level of Service

Table 2-1 above indicates that the existing N25 in 2019 (prior to COVID-19 restrictions being imposed from March 2020) has an AADT of over 12,000 with a steadily increasing trend prior to 2019. The AADT of 12340 is over 6% in excess of the LOS D capacity of 11,600 AADT for a standard Type 1 single carriageway and over 40% in excess of the LOS D capacity of 8,600 AADT for a standard Type 2 single carriageway. The current AADT is at

the lower limit for the provision of Type 3 dual carriageway road indicating that the existing road is operating at below LOS D. This indicates that traffic flows and operations along this section of the N25 are currently below LOS D and are volatile and vulnerable to instability when subject to minor disruptions or incidents. It is also considered that this vulnerability will increase with prevailing traffic growth rates in the long term with further growth likely into the future based on Travel Demand Projections for the South-East region contained within Unit 5.3 – Travel Demand Projections of the PAG. These factors pose a very significant risk to the future operational performance of the existing road.

Traffic volumes along the existing N25 section are above the indicative capacity range for LOS D for a Type 1 or Type 2 single carriageway and it is noted that the proportion of HGV's along this section are more elevated. As the traffic volumes continue to increase, without intervention the existing LOS will decrease.

Existing Road Safety Issues

Current available data for a 16 year period from 2005-2020 along the existing N25 study corridor indicates that there have been a total of 37 reported accidents on the N25 between Luffany roundabout and Glenmore roundabout.

Of the 37 collisions identified, fourteen involved single vehicle loss of control, five were rear end collisions, seven involved head-on collisions, two were side-on/angle and one pedestrian/vehicle type collision. No incidences involved a vehicle colliding with a cyclist and eight collisions were classified as "other" or "unknown".

Of these collisions there were 10 Fatal, 9 Serious and 31 minor injury injury collisions, resulting in a total of 53 casualties (10 fatalities, 12 serious injury and 18 minor).

Based on the RSA Personal Injury Collision (PIC) data for the period 2005-2020 relating to Fatal, Serious and Minor collisions and a comparative assessment with the national average, shows that single vehicle collisions, involving two or more vehicles and side-on/angle type collisions are lower than the national average but that there is a significant safety issue involving head-on and rear-end type collisions compared to the national average.

Summary of Project Specific Need

The objectives of the project are consistent with, and support the relevant policies at European, National, Regional and Local levels. The Project Specific Need has identified the existing network deficiencies with the section of road operating at a LOS of less than D and inherent road safety issues. This is clearly demonstrated by the worsening collision risk level indicated between Ballinclare and Ballynaraha in the TII 2018 – 2020 network safety ranking. It is noted that in the last sixteen years the highest number of fatal (2) and serious (1) collisions were recorded on the N25 in 2019 and this deteriorating trend can be expected to continue as the AADT increases as there are no planned improvement projects identified for the existing N25. Combined with this is the fact that this section of road is now adjoined at either end by high-quality dual carriageway, creating an inconsistent environment for the road user, further contributing to this deteriorating trend.

The key objective of the scheme is to improve the TEN-T network and strategic transport network in County Kilkenny and the south-east region. Furthermore, it is an objective of the project to provide a long-term sustainable solution to improve accessibility to employment in regional and national centres, including the towns of Waterford and New Ross and to maintain/reduce journey times and improve journey time reliability.

The project is required to address the sub-standard infrastructure provision and improve the road safety performance of the network. This objective is supported by EU legislation, the NPF, the RPG, the RSES and the Kilkenny City & County Draft Development Plan. Fundamentally, this project addresses these objectives and recognises the importance of interconnectivity across the strategic transport network and towns with the need to protect the N25 as a "Strategic Linking Corridor" / "Strategic National Corridor" suitably upgraded to preserve and continue its strategic functionality.

Traffic Assessment and Option Cross Section

Traffic Modelling Report / Outputs

The Traffic Modelling Report is an appendix to the Cost Benefit Analysis Report in Appendix B of this report. The Traffic Modelling Report summarises the strategic modelling approach and assumptions made for the assessment of all Phase 2 Options considered and details of all outputs.

Fifteen feasible options were developed and assessed during the Phase 2 Stage 1 appraisal (refer to Section 6 for details). Of these fifteen options, six options have been brought forward to the Phase 2 Stage 2 appraisal (refer to Section 7 for details).

These six options have been assessed against the Do-Nothing Scenario using the Future Year Local Area Models. The following indicators have been used to assess the performance of each option:

- Network Performance Statistics;
- Journey Times; and
- Traffic Volumes.

The Network Performance Statistics indicate that all options, with the exception of the Purple Route, reduce the total travel time throughout the study area relative to the Do-Nothing Scenario. The performance of each route in terms of time savings is outlined in Table 0-2.

Route	Modelled Time Savings (Hrs)		
	AM	IP	PM
Purple Route	12.5	-9.6	14.0
Navy Route	52.5	17.6	54.5
Magenta Route	46.3	14.1	47.6
Red Route	59.5	21.6	60.5
Teal Route	63.5	25.1	66.2
Lime Green Route	62.3	23.6	63.3

Table 0-2 – 2045 Time Savings by Route Option & Time Period

The journey time analysis shows that the Teal route performs best in terms of journey time saving along the route compared to the Do-Nothing with a 19% - 34.5% reduction in the northbound direction and a 19.7% - 33.8% reduction in the southbound direction across all time periods. The Lime Green and Red routes perform similarly well, with reduction in journey times of 16% - 32% approximately, with marginally quicker journey times modelled along the Lime Green Route. The Navy and Magenta routes also perform similarly with only very marginal differences in journey times along these routes. Overall, the reduction on the Navy and Magenta Routes is between 11% - 28% approximately. The Purple is the worst performing route comparatively and only provides journey time savings in the southbound direction during the AM peak and the northbound direction in the PM period. A summary of the percentage reduction in journey times along each route option compared to the Do-Nothing Scenario is presented in Table 0-3.

Peak	Direction	Do-Nothing	Purple	Navy	Magenta	Red	Teal	Lime Green
AM	SB	08:14	-13.40%	-27.10%	-27.30%	-31.00%	-33.80%	-31.80%
	NB	06:34	7.10%	-11.20%	-11.40%	-15.70%	-19.00%	-16.80%
IP	SB	06:37	5.00%	-11.80%	-12.10%	-16.60%	-19.90%	-17.60%
	NB	06:37	6.00%	-11.60%	-11.80%	-16.40%	-19.60%	-17.40%
PM	SB	06:36	5.30%	-11.90%	-11.90%	-16.40%	-19.70%	-17.40%
	NB	08:21	-14.20%	-27.90%	-27.90%	-31.70%	-34.50%	-32.50%

Table 0-3 - 2045 N25 Journey Time Savings by Route Option & Time Period

In terms of Route Option AADT and transference of traffic from the existing N25, the highest AADTs are modelled along the Magenta Route, the partially (65%) online option. The highest AADT along an offline route option is 15,400, which is along the Lime Green route, followed by 15,300 along the Navy Route. Both the Red and Teal Route carry approximately 14,600 AADT in the design year. The Lime Green Route and Navy Route will experience higher levels of AADT as there is an intermediate junction and some traffic travelling to or from locations along the route utilise the new road. The Red and Teal have slightly lower levels of AADT as there is no intermediate junction assumed given these options are further removed from the existing carriageway. The Purple route has an AADT of 7,000 as traffic, particularly HGV and car traffic in the IP, fails to transfer due to the higher journey times. The AADT for each route option and the level of transference from the existing N25 are outlined in Table 0-4.

Route	AADT	Transference
Purple Route	7000	43.8%
Navy Route	15300	95.6%
Magenta Route	16000	100.0%
Red Route	14600	91.3%
Teal Route	14600	91.3%
Lime Green Route	15400	96.3%

Table 0-4 - 2045 AADT & Transference by Route Option

Consideration of Alternatives & Options

The following alternatives were assessed in Phase 0 Scope and Appraisal:

- Pre-Constraints Study Alternatives:
  - Improved Broadband to facilitate home working and reduce commuter travel demand;
  - Vulnerable Road Users (VRU) _ Cycling & Walking
  - Public Transport - Rail
  - Public Transport – Bus
  - Demand Management Proposals
- Road Based Options.
  - Do-Nothing

Improved Broadband

For Kilkenny County, the 2016 census shows a higher than average percentage of workers as skilled manual, 16% compared to the national average 14%. A total of 8% of the workforce are categorised as professional and 30% un-skilled, semi-skilled and skilled. Therefore, improvement in broadband alone is unlikely to result in increased working from home or have any notable impact on traffic levels on the road network. As such, improvement in broadband was not identified as a suitable alternative to meet the project objectives and was therefore discounted during Phase 1.

Vulnerable Road Users

An infrastructure solution focused on active modes would only improve access to nearby urban centres over short distances. Given the longer distances involved in most of the trips that take place on the N25 it is considered that active travel will not provide a viable alternative to motorised forms of transport for the majority of users and fail to address several key project objectives.

As such, the implementation of an active-travel based solution, in isolation, is not considered a viable alternative and the alternative was discounted during Phase 1

Public Transport Alternatives

This section of the existing N25 under consideration generates limited local traffic with the majority of demand travelling the scheme from end to end and with most traffic travelling between New Ross, Wexford, Enniscorthy and Waterford. In addition, there is long distance traffic travelling between the larger settlements of Cork, Dungarvan, Waterford and Rosslare, as well as the HGV traffic between the ports of Cork and Rosslare.

As a strategic section of the network, the N25 facilitates the operations of long-distance public transport provided by Bus Eireann connecting the counties of Kerry and Cork to Waterford and Wexford and in particular to ports and airports in the southern half of the country.

Rail Alternative

The nearest operational rail network is the Waterford to Dublin line. There is currently no rail line serving this area and no plans to open new services, a Rail Alternative is not considered to be feasible, in addition a rail alternative in isolation would fail to address key objectives and therefore was discounted at Phase 1.

Bus Alternative

There is one local bus route which travels regularly on the N25 and services the surrounding area of Glenmore between Waterford and New Ross, this service is provided by a combination of the 370 and 372 buses.

Analysis of design year traffic forecasts, as outlined in Chapter 3 of this report, revealed that AADTs will be over 16,000 along this section of the N25 in 2045. This is significantly over the 11,600 AADT required for a Level of Service D and indicates that a viable public transport alternative would be required to result in over a 30%

reduction in vehicular travel to result in a suitable Level of Service on this section of the N25. Additionally, a bus based public transport alternative in isolation would fail to address several key objectives

As such, the implementation of a bus based public transport solution, in isolation, is not considered a viable alternative and this alternative was discounted during Phase 1.

Demand Management Option

Given the rural nature of the project location and in the context of the key objectives identified it is anticipated that Demand Management Proposals will have a limited impact and may not be appropriate. For example, the implementation of a reduced speed limit could reduce the number and severity of collisions but would increase journey times and reduce average speeds along the route. Similarly, the implementation of a toll could result in re-routing onto less suitable local roads resulting in longer journey times and potentially more collisions. Tolls would also be an additional cost to business and freight users.

A Demand Management Option will fail to address the key project objectives and the implementation of a Demand Management solution is not considered a viable alternative and this alternative was discounted during Phase 1.

Road Based Options

As part of the TEN-T comprehensive network and as identified in the Regional Spatial & Economic Strategy and National Planning Framework – Project 2040 a road-based option is considered viable based on the direction of specific policy (TEN-T EU Regulation No. 1315/201 under Article 17(3) and references in regional and national transport strategies (NPF/RSES – Project Ireland 2040).

Although the consideration of options is determined largely by local conditions, there are a number of specific options which should be considered, and they are:

- Do-Nothing
- Do-Minimum (The Base Case) - the Do-Minimum is considered the same as the Do-Nothing scenario
- Do-Something
- Management Option

Do-Nothing

In the “Do-Nothing” scenario, users of the N25 will be subjected to the sub-standard alignment with insufficient sightlines and restricted road cross-section and retains the mixture of local traffic with the long-distance high-speed and freight traffic.

The option of “Do-Nothing’ would not realise the route’s strategic function in terms of future traffic demands, nor address the current safety concerns associated with the road in terms of collisions and risk rating. This is in direct conflict with the European, National, Regional and Local planning policies. As such, the alternative of a ‘Do-Nothing’ solution, was not considered a viable alternative and this alternative was discounted during Phase 1.

Do-Minimum

For the N25 Waterford to Glenmore scheme there are no committed projects or policies in the study corridor that have successfully completed their environmental review and as such the Do-Minimum is considered the same as the Do-Nothing scenario. Like the ‘Do-Nothing’ the ‘Do-Minimum’ would not realise the strategic function in terms of future traffic demands, nor address the current safety concerns nor meet the TEN-T requirements which is in conflict with Local, National, Regional and European planning policies. As such, the alternative of a ‘Do-Minimum’ solution, was not considered a viable alternative and is used solely as the Base Case for the purpose of assessments and comparison with viable alternatives.

Do-Something

At the highest level, a corridor improvement can be delivered through a major investment to widen an existing road, or to develop a new alignment. Typically, a number of physical options are possible at this level of investment. A 'Do-Something' road-based solution has the potential to meet key project objectives and is therefore considered viable.

Management Option

The Management Option is a Do-Something Option utilising the existing asset where feasible through on-line improvements, bottleneck removals and road safety works, traffic management measures or Intelligent Transport Systems are considered.

This optimum Management Option (Magenta Option) with limited collector roads is considered a feasible alternative as it meets the key objectives to provide a high-quality road, albeit to a lesser degree compared to the partial Management options or fully off-line options. The proposal will improve safety through the removal of cross-over movements and the provision of safe overtaking opportunities associated with a dual carriageway. Based on this the management option (Magenta Option) utilising 65% on-line with limited collector roads and 35% off-line improvement, has been included in the Phase 2 Stage 2 assessment.

It is noted that two of the remaining five 'Do-Something' options, the Navy and Lime Green Options, utilise approximately 30% and 25% of the existing N25 alignment. These options do not require collector roads and can accommodate the reduction of junctions and the removal of direct accesses and are considered partial management options.

Stage 1 – Preliminary Options Assessment

Identification of Route Options

Fifteen feasible options were developed having regard to the Constraints Study prepared for the N25 Waterford to Glenmore Scheme Study Area. The fifteen feasible options identified within the Study Area for the Phase 2 Stage 1 Preliminary Options Assessment are listed as follows and shown in Figure 0-4 below:

- Do-Nothing/Do-Minimum
- Route A – (Purple
- Route B – (Grey)
- Route D – (Blue)
- Route F – (Brown)
- Route F – (Brown)
- Route G – (Dark Blue)
- Route H – (Magenta)
- Route I – (Red)
- Route J – (Cyan)
- Route K – (Orange)
- Route P – (Turquoise)
- Route Q – (Lime Green)
- Route 2 – (Cyan Dashed)
- Route 3 – (Dark Blue Dashed)
- Route 4 – (Pink Dashed)
- Route 6 – (Orange Dashed

A Phase 2-Stage 1 Preliminary Options Assessment in accordance with the TII Publication Project Management Guidelines was carried out for each of the feasible options under the assessment criteria headings of Engineering, Economy and Environment.

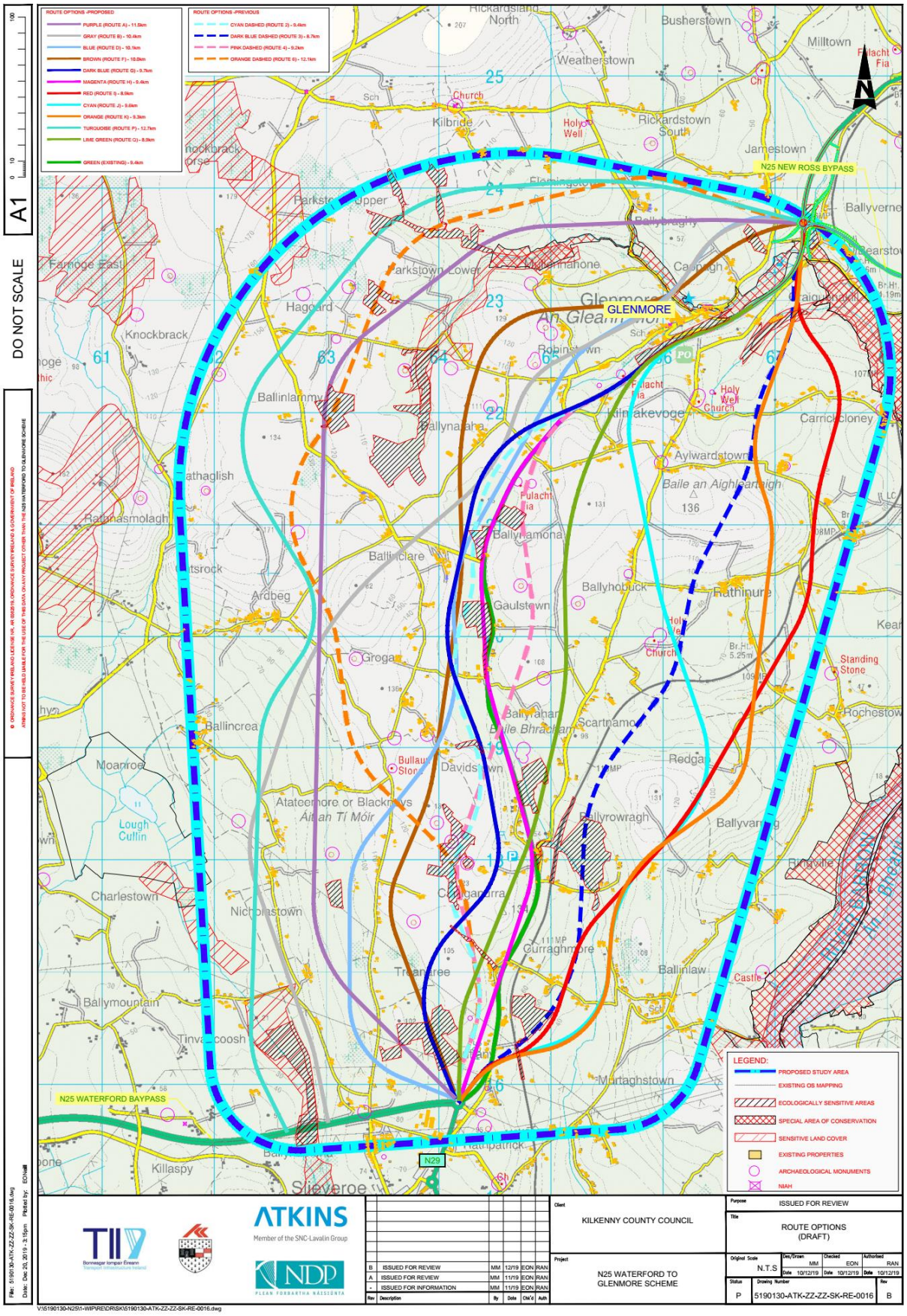

Figure 0-4 – Feasibility Options for the Phase 2 Stage 1 Assessment

Summary Matrix for Phase 2 – Stage 1 Preliminary Options Assessment

Table 0-5 below identifies the assessment findings of the Phase 2 – Stage 1 Preliminary Options Assessment. Preferences are colour coded to show the High (green), Medium (amber) and Low (red) preferences listed for each preliminary route option under each of the three main criteria of Engineering, Environment and Economy.

Route Options	Engineering	Environment	Economy	Progress to Stage 2
Do-Nothing / Do Minimum	Low Preference	Med Preference	Low Preference	**Yes** (for comparison purposes only)
Purple (A)	High Preference	High Preference	Low Preference	**Yes**
Grey (B)	Low Preference	Med Preference	Low Preference	No
Blue (D)	High Preference	Med Preference	Med Preference	No
Brown (F)	High Preference	Low Preference	Med Preference	No
Dark Blue (G)	Med Preference	High Preference	Med Preference	No
Magenta (H)	Low Preference	High Preference	High Preference	**Yes**
Red (I)	High Preference	Low Preference	High Preference	**Yes**
Cyan (J)	Low Preference	Low Preference	High Preference	No
Orange (K)	Med Preference	Low Preference	High Preference	No
Turquoise (P)	Med Preference	Med Preference	Low Preference	No
Lime Green (Q)	High Preference	High Preference	High Preference	**Yes**
Cyan Dashed (2)	Low Preference	High Preference	High Preference	**Yes**
Dark Blue Dashed (3)	Med Preference	Med Preference	High Preference	**Yes**
Pink Dashed (4)	Low Preference	Med Preference	High Preference	No
Orange Dashed (6)	Med Preference	Med Preference	Low Preference	No

Table 0-5 - Summary Matrix for Phase 2 – Stage 1 Preliminary Options Assessment

Stage 2 – Project Appraisal Matrix

Description of Phase 2 – Stage 2 Alternative Options

The Engineering, Economic and Environmental assessment for the Phase 2 Stage 1 Preliminary Options recommended the following 'Do-Something' feasible options to be brought forward to the next stage (Phase 2 Stage 2: Project Appraisal Matrix). These options are the Phase 2 Stage 1 Route Options with the revised option name used for Phase 2 - Stage 2 assessment:

- Route A (Purple) Purple
- Route H (Magenta) Magenta
- Route I (Red) Red
- Route Q (Lime Green) Lime Green
- Route 2 (Cyan Dashed) Navy
- Route 3 (Dark Blue Dashed) Teal

A Phase 2-Stage 2 Project Appraisal was carried out for each of the six route options identified above, each with a 600m wide corridor, refer to Figure 0-5 below. The appraisal was undertaken in accordance with TII's Project Management Guidelines by Atkins project team comprising engineering, economic and environmental consultants.

(Please note that the 'Route 2 (Cyan Dashed) and Route 3 (Dark Blue Dashed) route options were renamed 'Navy' and 'Teal' respectively and the route letters and numbers omitted from all options. This was done to provide clarity in further analysis of the route options.

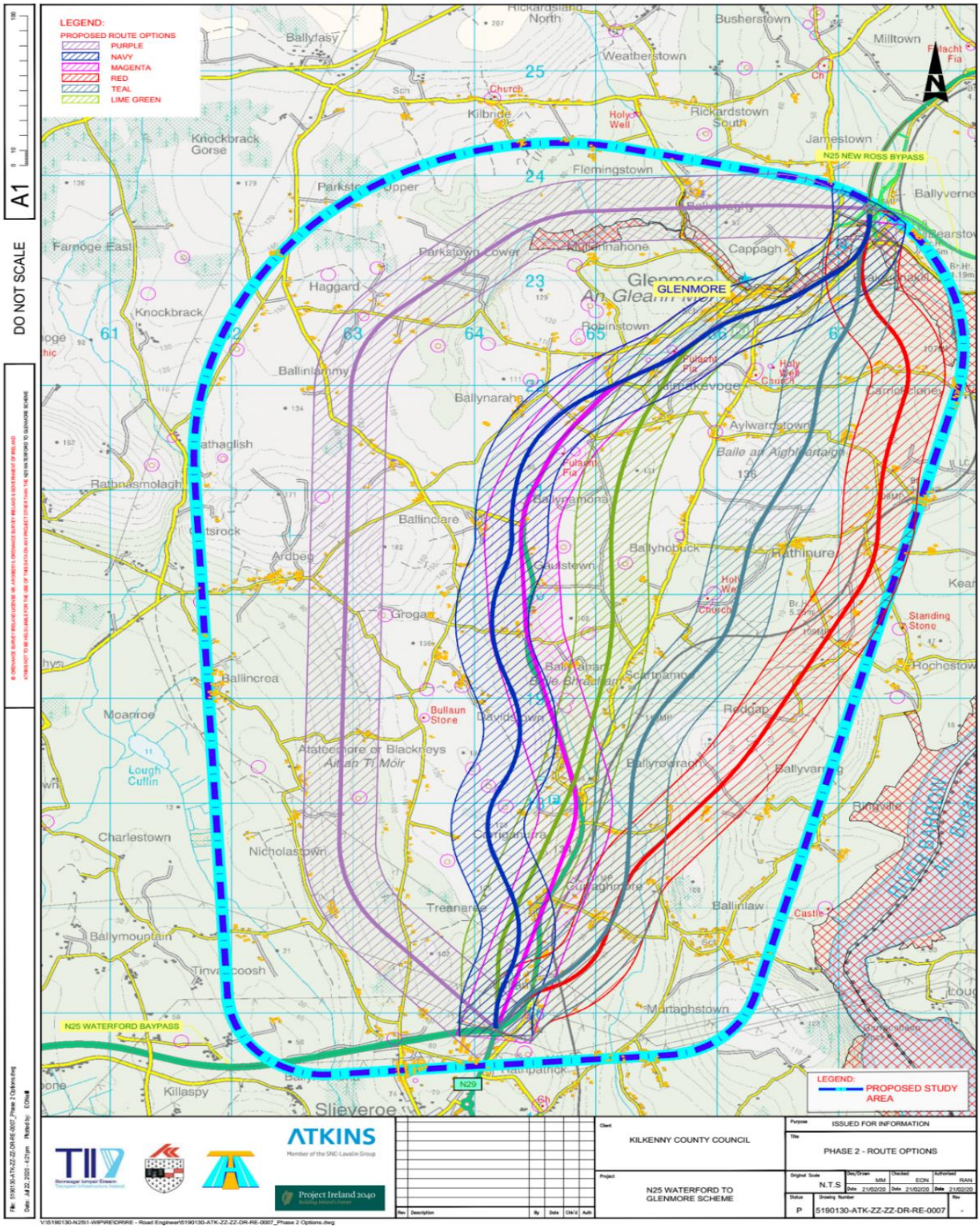

Figure 0-5 – Phase 2 Stage 2 Route Options

Multi Criteria Analysis

For this scheme both a Cost Benefit Analysis, and a Multi Criteria Analysis for each of the route options have been completed. The Multi Criteria Analysis for this scheme has been carried out with reference to the Project Appraisal Guidelines for National Roads Unit 7.0-Multi Criteria Analysis (PE-PAG-02031). Each impact was attributed a score based on its level of impact using the seven-point scale referenced below in Table 0-6.

Score	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

Table 0-6 - MCA Score System

The Project Appraisal Matrix (in Appendix L) consists of an appraisal of each route option for the Phase 2 Stage 2 Option Selection process under the following main criteria:

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

Overall Summary of the Economy Appraisal

Table 0-7 gives the overall summary of Economy assessment taken from the Cost Benefit Analysis Report (Appendix B).

Route Option	Transport Quality & Reliability	Efficiency & Effectiveness	Wider Economic Impacts	Funding Impacts	Overall Ranking
Purple	Intermediate	Least Preferred	Intermediate	Intermediate	Least Preferred
Navy	Preferred	Preferred	Intermediate	Intermediate	Preferred
Magenta	Preferred	Intermediate	Intermediate	Intermediate	Intermediate
Teal	Preferred	Intermediate	Intermediate	Intermediate	Intermediate
Lime Green	Preferred	Preferred	Intermediate	Intermediate	Preferred
Red	Preferred	Least Preferred	Intermediate	Intermediate	Least Preferred

Table 0-7 - Economy Assessment Ranking

Overall Summery of the Safety Appraisal

Table 0-8 gives the overall summary of Safety and the preferences assigned by the assessors following the in-depth analysis of the strengths and weaknesses of each option as detailed in the Stage F (Part 1) Road Safety Audit, the Road Safety Impact Assessment and the Safety Assessment as outlined in the Phase 2 – Stage 2 Assessment Matrix.

Route Option	RSA Stage F1	RSIA Overall Ranking	Phase 2 – Stage 2 - Safety Criteria	**Overall Safety Ranking**
Purple	Preferred	Least Preferred	Least Preferred	Least Preferred
Navy	Intermediate	Preferred	Preferred	Preferred
Magenta	Less Preferred	Intermediate	Intermediate	Intermediate
Lime Green	Intermediate	Preferred	Preferred	Preferred
Teal	Preferred	Intermediate	Preferred	Preferred
Red	Preferred	Intermediate	Preferred	Preferred

Table 0-8 - Overall Safety Ranking (Preferences)

Overall Summary of Environmental Appraisal

The following Table 0-9 Stage 2 - Environmental Assessment Matrix Summary provides the summary scores of the environmental matrix utilised within this assessment. The full matrix is located in Appendix I.

Environmental Sub-criteria	**Purple**	**Navy**	**Magenta**	**Red**	**Teal**	**Lime Green**
Air Quality	5	6	4	6	7	6
Climate	3	3	3	3	3	3
Noise	2	3	3	3	3	3
Landscape and Visual (including light)	1	3	3	1	1	1
Biodiversity- Flora and Fauna	1	1	1	1	1	1
Waste	2	3	3	1	1	2
Soils and Geology	3	2	1	3	3	2
Hydrology	4	3	3	3	3	3
Hydrogeology	2	3	3	4	4	3
Architectural Heritage	4	3	3	3	2	1
Archaeological and Cultural Heritage	2	1	2	2	2	1
Non-agricultural properties	2	1	1	2	3	1
Agriculture	1	2	2	1	2	2
Human Beings	3	3	1	2	3	2
Human Health	3	3	3	3	3	3
Total	**38**	**40**	**36**	**38**	**41**	**34**

Table 0-9 - Environmental Assessment Matrix Summary

Overall Summary of Accessibility & Social Inclusion Appraisal

In the context of Accessibility and Social Inclusion all options are considered to be of similar preference in this regard, which is neutral. The full matrix is located within Appendix L.

Overall Summary of Integration Appraisal

The overall integration assessment for each route options has resulted in varying preferences, these are summarised in Table 0-10.

Route Option	Transport Integration	Land Use Integration	Geographical Integration	**Other Government Policy Integration**	**Overall Safety Ranking**
Purple	Least Preferred	Intermediate	Preferred	Preferred	Least Preferred
Navy	Preferred	Intermediate	Preferred	Preferred	Preferred
Magenta	Least Preferred	Intermediate	Preferred	Preferred	Least Preferred
Lime Green	Preferred	Intermediate	Preferred	Preferred	Preferred
Teal	Intermediate	Intermediate	Preferred	Preferred	Intermediate
Red	Intermediate	Intermediate	Preferred	Preferred	Intermediate

Table 0-10 - Overall Integration Preferences

Overall Ranking of Physical Activity

The overall Physical Activity assessment for each route options has resulted in varying preferences, these are summarised in Table 0-11.

Route Option	Ambience	Absenteeism	Reduced Health Risks	**Overall Safety Ranking**
Purple	Least Preferred	Intermediate	Intermediate	Least Preferred
Navy	Preferred	Intermediate	Intermediate	Preferred
Magenta	Least Preferred	Intermediate	Intermediate	Least Preferred
Lime Green	Preferred	Intermediate	Intermediate	Preferred
Teal	Intermediate	Intermediate	Intermediate	Intermediate
Red	Intermediate	Intermediate	Intermediate	Intermediate

Table 0-11 - Overall Physical Activity Preferences

Conclusion

Based on the multi-criteria analysis, the RSA Stage F1, the RSIA assessments detailed in Table 0-8 – Phase 2 Stage 2 Assessment and taking into account the key objectives set for the scheme, it is recommended that the Navy Route Corridor is progressed through to Phase 3 Design and Environmental Evaluation and Phase 4 Statutory Processes stages for the N25 Waterford to Glenmore Scheme.

Table 0-13 shows the overall scoring for all six routes with the Navy scoring the highest points. While these points are a guide, the Emerging Preferred Route Corridor is discussed further based on how it compares to the other options.

ROUTE OPTIONS	Purple	Navy	Magenta	Red	Teal	Lime Green
ENVIRONMENTAL SUB TOTAL	38	40	36	38	41	34
SAFETY SUB TOTAL	13	20	15	20	21	22
PHYSICAL ACTIVITY SUB TOTAL	10	14	10	13	13	14
ACCESSIBILITY & INCLUSION SUB TOTAL	8	8	8	8	8	8
INTEGRATION SUB TOTAL	20	26	22	24	24	26
ECONOMY SUB TOTAL	13	18	16	16	17	19
OVERALL TOTAL	102	126	107	119	124	123

Table 0-13 - Phase 2 Stage 2 Assessment

The following bullet points document how the assessors have recommended the Navy Corridor and how it performs based on the assessment of its strengths and weaknesses and the individual impacts in determining the Emerging Preferred Route Corridor:

- Environment

  The Navy option is awarded a preferred preference for Environment, along with the Teal option. Both options were deemed equal for the following sub criteria Climate, Biodiversity – Flora & Fauna and Human Health. The Navy Option is preferable to the Teal for the following sub-criteria, Landscape and Visual, Waste and Architectural Heritage, and equal for Noise, Hydrology, Agriculture and Human Beings. Navy is less preferred when compared to Teal for Air Quality, Soils and Geology, Hydrogeology, Archaeology & Cultural Heritage and Non-agricultural Properties. It should be noted that neither option scored better than a "Not significant or neutral Impact" for these criteria except for Air Quality where the Navy option scored a "Moderately positive impact" compared to a "Highly positive impact" for the Teal option.

- Safety

  The Navy Option is awarded a preferred preference for Safety, along with the Lime Green, Teal, and Red options. This is based on a number of different sources and sub criteria. The Navy option along with Lime Green is a preferred option based on the RSIA assessment and under the Phase 2 – Stage 2 Safety and intermediate under the RSA Stage F1 audit.

  The Navy option is a medium length route, has the second highest transfer of traffic, a moderate collision reduction and is considered comparable to the Lime Green option for possible departures, number of junctions and VRU provisions. The Teal, Red and Lime Green options have a slightly better collision reduction (14.2, 11.1 and 9.7) compared to the Navy option's collision reduction of 6.2. However, the Navy option is comparable to Lime Green, Teal and Red options for Fatal and Serious collision savings (2.3, 2.3 and 2.2 fatal collisions compared to Navy's 2.2 and 4.8, 4.9, 4.8 serious collisions compared to Navy's 4.7). This is demonstrated in the discounted safety benefits with the average safety where all route options produce similar results (approx. €3.07M each) due to similar levels of transfer onto the newer safer road, with the exception of the Purple route.

- Physical Activity

  The Navy Option is awarded a preferred preference for Physical Activity, along with Lime Green, as it has a significant transfer of traffic and being off-line (70% and 75%) allows the existing N25 to be used for leisure or physical activities and reinstates the connectivity to the townland of Glenmore. All options are considered comparable for absenteeism and health risk reduction given the rural nature of the surrounding environment and the limited impact on the workforce.

- Accessibility and Inclusion

  For this criterion all options were considered neutral in respect to Deprived Geographical Areas and Vulnerable Groups and awarded the same preference. The options pass between a mix of marginally high and marginally low areas of deprivation as per the HP Phobal Index 2016 but it is considered unlikely any of the options will impact the calculation of these indices. Given the rural nature of the study area the impact of the options on vulnerable groups is considered neutral for all options as there will be little change for accessing employment, key facilities and social opportunities.

- Integration

  The Navy Option is awarded a preferred preference for Integration along with Lime Green. All options were considered moderately positive for Land Use Integration, Geographical Integration, and Other Government Policy Integration. All options connect at the same junction and provide connection to the existing local road network, but the options that add value to the existing network and best support sustainable transport modes are the Navy and Lime Green, with the highest transfer of traffic and BCR values providing an efficient link to the existing network.

- Economy

  The Navy Option is awarded a preferred preference for Economy, along with Lime Green. All options were assessed under the four sub criteria for Economy and were considered comparable for the wider economic benefits and neutral for funding sources. For Efficiency and Effectiveness, the Navy option is the second-best performing route after Lime Green. It has the lowest option cost estimate (OCE), delivers a PVB of €68m compared to the Lime Green option PVB of €88.6m, has the second highest BCR at 1.02 compared to Lime Green, which has a BCR of 1.16 and journey time saving of 1 minute 16 seconds compared to Lime Green with a journey time saving of 1 minute 39 seconds.

It should be noted that the difference in the OCE for Navy (€117.32m) compared to Lime Green (€137.69m) is €20.37m and the difference in PVB for Navy (€68.04m) compared to Lime Green (€88.59) is €20.55m. However, the impact on public accounts over a 30year appraisal period is €11.6m, which is substantially less than the difference in OCE. Given the significant difference in OCE, although the Lime Green has a slightly higher BCR, both the Navy and Lime Green options are considered preferred for economy.

Further sensitivity tests were carried out on the Navy option as the Emerging Preferred Route Corridor for the Shadow Price of Labour (SPL) and the Incremental Analysis and are detailed in the Cost Benefit Analysis report in Appendix B.

A SPL of 1.0 was adopted for the appraisal of the route options to reflect the full employment levels within the Irish Labour market. As unemployment has risen sharply due to the impact of Covid-19 and the longer-term impacts are uncertain, a sensitivity test using a SPL of 0.8 has been undertaken on the Navy Route Option. The result of that test is that the BCR for the route increases to 1.08.

For the Incremental Analysis a Type 1 Dual Carriageway cross section was decided upon for each of the route options. However, an additional sensitivity test has been undertaken on the Emerging Preferred Route to understand the impact of changing the cross section to a Type 2. The benefits delivered by the Type 2 Cross Section are the same as Type 1 in terms of journey times benefits, but the lower costs of a Type 2 Dual Carriageway results in a higher BCR of 1.11 for the Navy Route.

Table 0-14 illustrates the preferences allocated to each option under the MCA criteria.

	Economy	Safety	Environment	Accessibility	Integration	Physical Activity
Purple	Least Preferred	Least Preferred	Intermediate	Similar	Least Preferred	Least Preferred
Magenta	Intermediate	Intermediate	Least Preferred	Similar	Least Preferred	Least Preferred
Red	Least Preferred	Preferred	Intermediate	Similar	Intermediate	Intermediate
Lime Green	Preferred	Preferred	Least Preferred	Similar	Preferred	Preferred
Navy	Preferred	Preferred	Preferred	Similar	Preferred	Preferred
Teal	Intermediate	Preferred	Preferred	Similar	Intermediate	Intermediate

Table 0-14 – Overall Project Appraisal Assessment

The assessment has concluded that there is more than one preferred option under the different criteria. The Lime Green and Navy options have been awarded the most preferred preferences, a total of five for the Navy and four for the Lime Green. Considering the strengths and weaknesses of these two options they are both considered preferable for Physical Activity, Integration and Economy but there is a difference between the Lime Green and Navy options under the criteria Safety and Environment.

It is concluded that the Navy option is preferable, over and above the other options, and therefore the Navy option is recommended as the Emerging Preferred Route Corridor.

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